Kinco 2S 系列伺服驱动器使用指南（中英文）V2.0

感谢您使用 Kinco 伺服产品！Kinco 系列不同型号产品的配件各不相同，收到产品后建议您对产品进行确认。

1. 请根据机身或包装盒上的铭牌信息确认驱动器型号与您所订购的型号是否一致。
2. 请检查产品是否在运输过程中有损坏，采用螺丝刀确认驱动器上所有固定螺丝有无松动。
3. 请按以下产品配件清单核收产品，确认是否有缺少。

产品配件清单			
物品			**数量**
驱动器			1 台
Kinco 2S 系列伺服驱动器使用指南			1 本
服务指南			1 张
合格证			1 张
接线端子	422S	SCSI 36P 插头	1 个
		6P 接线端子（头）	1 个
	432S 622S	SCSI 36P 插头	1 个
		6P 接线端子（头）	1 个
		6P 母座端子	1 个
		4P 母座端子	1 个

如以上任一项有问题，请及时与本公司或您的供应商联系。

深圳步科电气有限公司

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1 驱动器安装要求以及注意事项

1.1 安装要求

- ◆ 请安装于无雨淋和直射阳光的室内控制箱之内，且周围物品注意需为非易燃品
- ◆ 无削液、油雾、铁粉、切屑的场所
- ◆ 通风良好，干燥无尘，无振动的场所
- ◆ 本产品符合 EMC 标准 2014/30/EU 和低压标准 2014/35/EU（LVD）

1.2 安装环境

环境	条件
工作温度	0℃-40℃
工作湿度	90%RH 以下（无凝露）
储藏温度	-10℃-70℃（不结冰）
储藏湿度	5-95%（无凝露）
高度	海拔 1000m 以下无功率限制

1.3 注意事项

注意！

- 请勿使用汽油、稀释剂、酒精、酸性或碱性洗涤剂擦拭外壳，以免外壳变色或破损；
- 请确保产品在运输和存储过程中的环境安全，使用原厂包装进行存储和运输；
- 请在熟悉产品相关知识和遵守安全注意事项的前提下对驱动器进行操作；
- 请严格按照图 1-1 所示的安装方式正确安装伺服驱动器；
- 驱动器与电机动力电缆、抱闸线缆以及编码器电缆不能过度拉伸；
- 避免任何异物进入驱动器内，螺丝、金属屑等导电异物或可燃性异物进入驱动器内可能引起火灾和电击，安全起见，请不要使用有损伤或零件损伤的伺服驱动器。

警告！

- **注意电击危险；**
- 电缆一定要可靠安装到电源接口上；
- 连接电缆时，务必断开电源；
- 接触带电部件会造成严重伤害，并可能导致死亡；
- **本产品使用时一定要安装在电箱内，并且确定所有保护措施都已正常启动。**
- **在维护时、维修和清洁工作以及长时间服务中断时，在接触带电部件之前要注意：**
- 通过电源开关关闭电气设备的电源，并防止其再次打开；
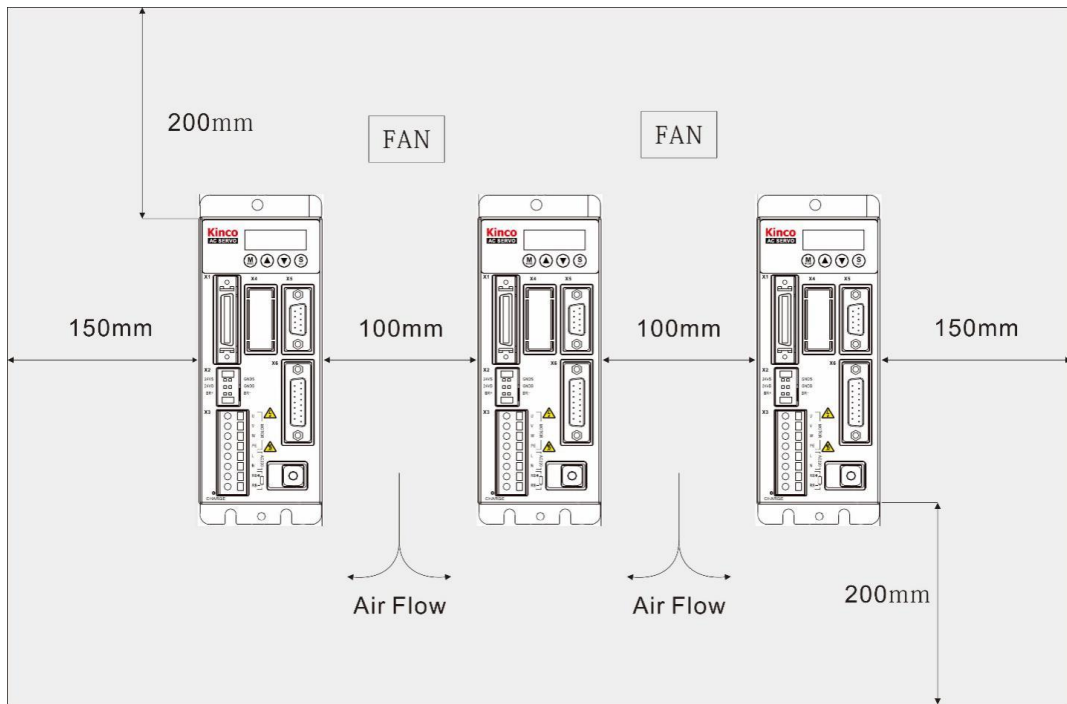- 充电指示灯(CHARGE)表示内部高压危险，指示灯熄灭且切断电源十分钟后，才可以接触或维修驱动器。
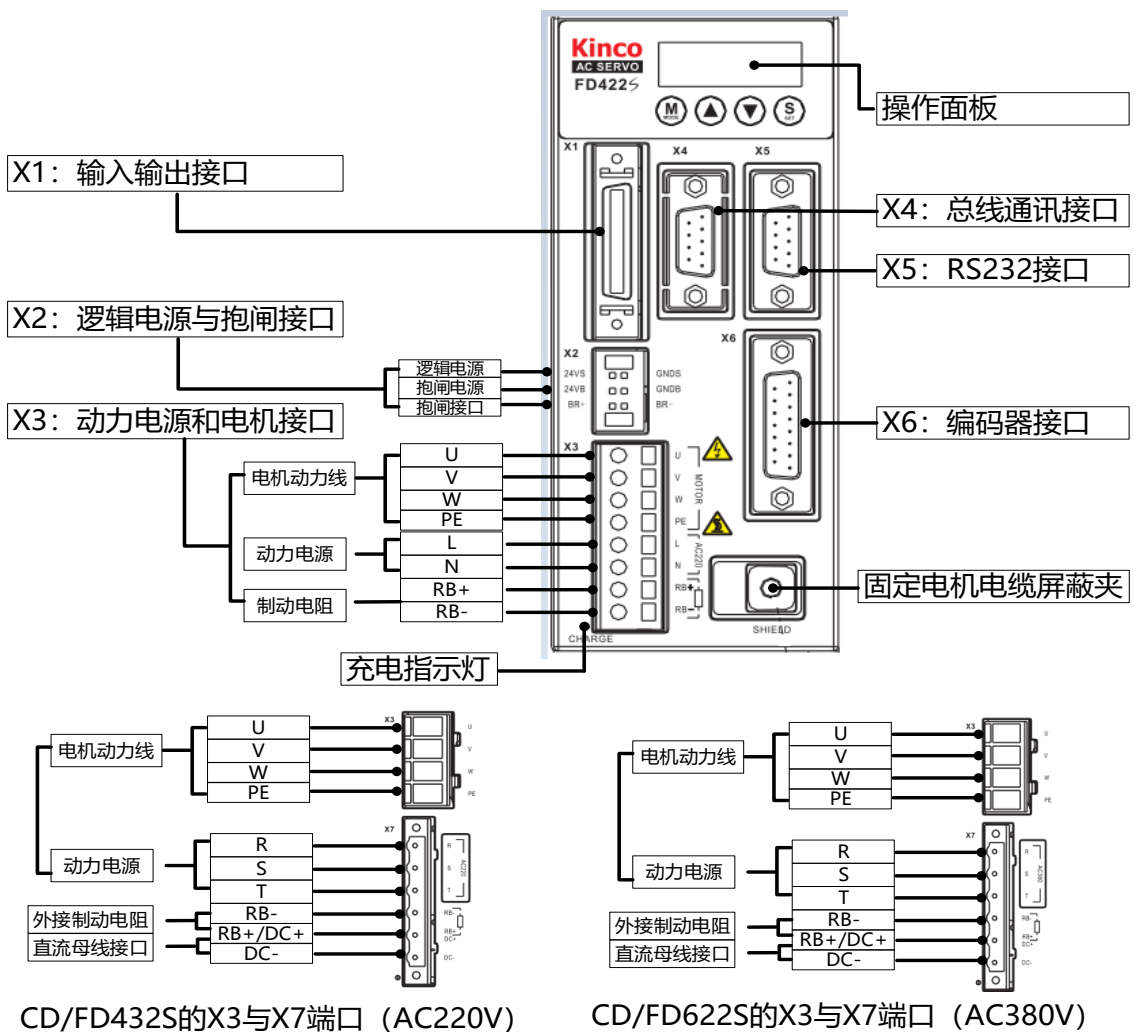
图 1-1 安装方向和间距要求

2 驱动器接线以及引脚定义

2.1 驱动器接口介绍

X1：输入输出接口

X2：逻辑电源与抱闸接口

X3：动力电源和电机接口

操作面板

X4：总线通讯接口

X5：RS232接口

X6：编码器接口

固定电机电缆屏蔽夹

充电指示灯

CD/FD432S的X3与X7端口（AC220V）

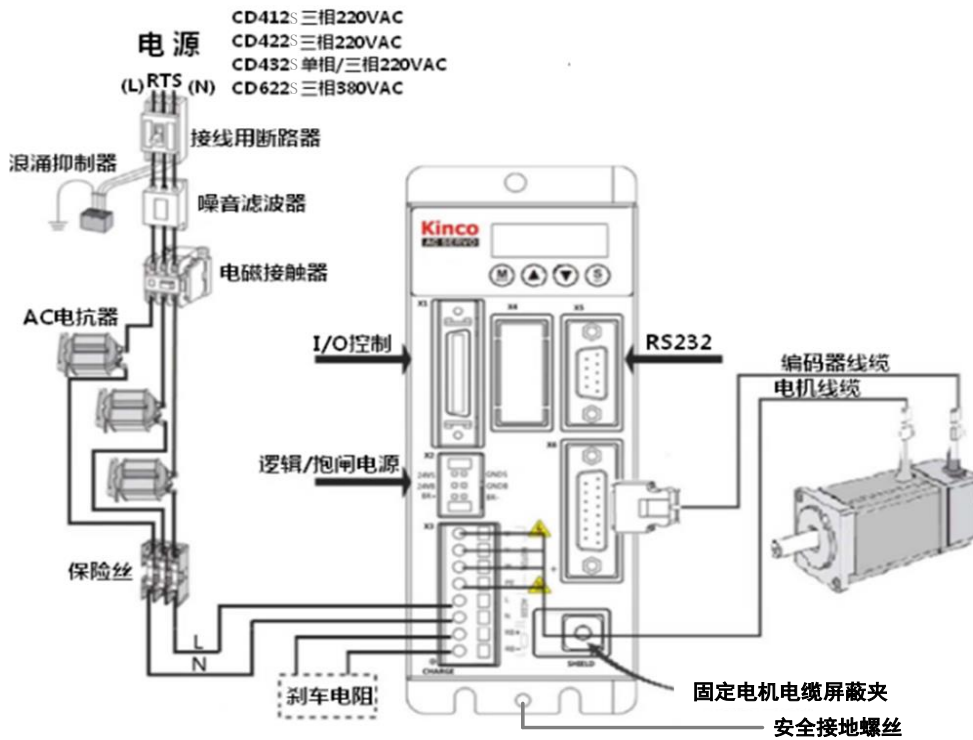CD/FD622S的X3与X7端口（AC380V）

图 2-1 驱动器外观结构组成说明

2.2 驱动器连接方式

图 2-2 驱动器外部接线图

警告！

- 在接通驱动器电源前，请确保所有防护罩和电气柜门已经关闭。
- 在安装和维护驱动器时，必须切断所有电源。驱动器断电至少十分钟之后，测量驱动器直流母线电压低于 36V 或驱动器充电指示灯（CHARGE）熄灭才可接触。
- 一定不要移除安全设施，不要接触带电部分和器件。
- 在驱动器上电之前请务必正确连接 PE 线，并将驱动器外壳良好接地。

2.3 驱动器端子定义说明

2.3.1 数字输入输出端
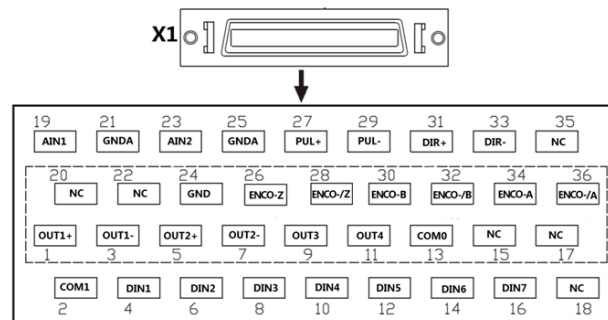
图 2-3 X1 端口定义
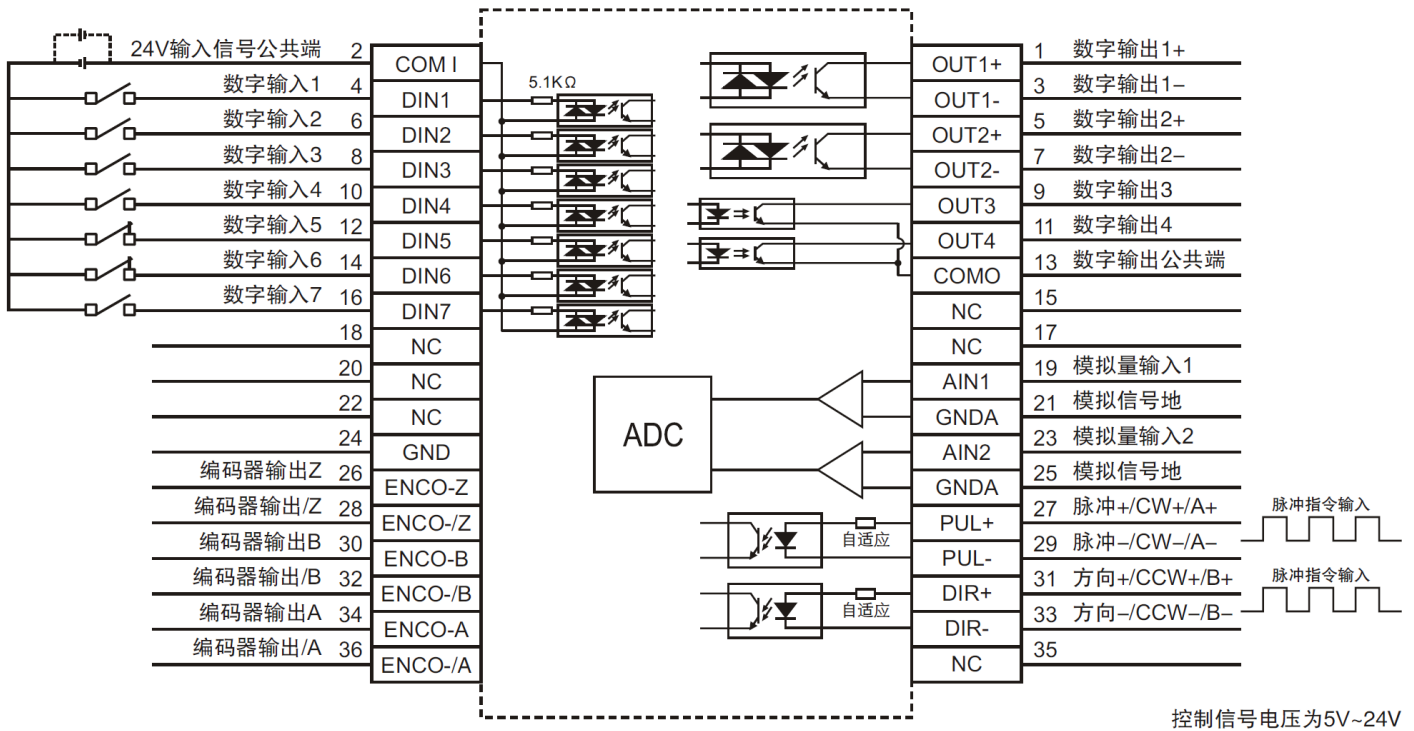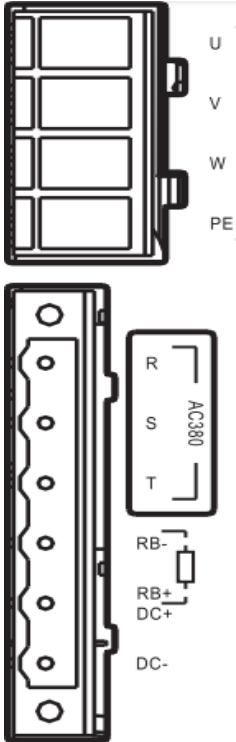
图 2-4 X1 接口接线图

2.3.2 动力电源与电机接口

表 2-1 CD/FD412S、422S 驱动器 X3 接口定义

	引脚名称	引脚功能
	UVW	伺服电机 UVW 相输出
	PE	电机 PE 线
	L、N	驱动电源输入 L/N: 单相线电压 200～240VAC +15%/-20% 47～63Hz 412S@2.0A 422@4.0A 电源接地：TN‐S， TN‐C， TN–C‐S, TT（不可角接地）
	RB+、RB-	外接制动电阻

V2.0

表 2-2 CD/FD432S、622S 驱动器 X3 与 X7 接口定义

	引脚名称	引脚功能
	UVW	伺服电机 UVW 相输出
	PE	电机 PE 线
	RST	432S 驱动电源输入： 单相线电压 200～240VAC +/-10% 47～63Hz 11.0A 三相线电压 200～240VAC +/-10% 47～63Hz 11.0A 612S/622S 驱动电源输入： 三相线电压 380～415VAC +/-10% 47～63Hz 612S@5.5A622S@7.0A 电源接地：TN‐S， TN‐C， TN–C‐S, TT（不可角接地）
	RB+、RB-	外接制动电阻
	DC+、DC-	直流母线接口 432S 输入电压 DC310V±20% 612S/622S 输入电压 DC540V±20%

2.3.3 RS232 通讯接口

表 2-3 驱动器 RS232 通讯接口定义

接口	针脚号	信号	描述	功能
	2	TX	驱动器数据发送端	可连接上位机软件 Kinco servo+ 进行调试与监控
	3	RX	驱动器数据接收端	
	5	GND	信号地	

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2.3.4 总线通讯接口

表 2-4 驱动器 X4 通讯接口定义
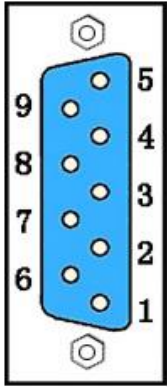
接口	RS485 接口		CANopen 总线接口	
	针脚号	信号	针脚号	信号
	2	RX+	2	CAN_L
	3	TX+	3	GND
	5	GND	7	CAN_H
	6	+5V		
	7	RX-		
	8	TX-		

表 2-5 驱动器 X10 通讯接口定义

接口	针脚号	信号	描述
	1	TD+	发送信号正端
	2	TD-	发送信号负端
	3	RD+	接收信号正端
	6	RD-	接收信号负端

3 Easy Use 功能

Easy Use 旨在为用户快速设定控制环参数，免去伺服调试的繁琐步骤，调整后的性能可以满足大部分应用场合；并另外开辟独立区域，方便用户设置常用的重要参数。

3.1 Easy Use 操作步骤

1、 EASY 流程包含常用参数，请逐一确认，最后通过 EA00 保存重启。EASY 流程执行完后，请运行机器，如果性能理想，则不需要执行 tunE 流程。否则，再执行 tunE 流程

2、 tunE 流程为惯量测定流程，最后通过 tn00 保存。通过 tn03 进行惯量测定后，驱动器将根据整定结果更改刚性等级（tn01）。

3、 请运行机器，如果性能不理想，再通过 tn01 逐级修改刚性等级，请注意一边调整，一边观察机器性能。

数码管编码	名称	描述	默认值
EA01	电机型号	参考表一，更改后需要保存并重启驱动器。	404b

EA02	指令类型	通过修改右边第一位数码管改变指令类型， 请注意，改变指令类型的同时会更改工作模式和 IO 口的定义。 0：双脉冲模式 CW/CCW， 1：脉冲方向模式 P/D 2：A/B 相控制模式 3：RS422 输入双脉冲模式 CW/CCW 4：RS422 输入脉冲方向模式 P/D 5：RS422 输入 A/B 控制模式 6：通道 1 模拟速度模式 7：通道 2 模拟速度模式 8：上位机通讯控制模式 注：对 FD2S、CD2S 系列驱动器的指令类型设置 3，4，5 不做任何响应。因为指令类型 3，4，5 只适合 JD 系列驱动器。 指令类型 0-5，对应工作模式-4。 指令类型 6-7，对应工作模式为-3。 指令类型 8 对应工作模式 0，并且屏蔽 DIN1，DIN2，DIN3。	1
EA03	电子齿轮比分子	当 EA02 写入 0-5 时有效。 默认十进制显示，超过 10000 的数值以十六进制显示。 （关于十进制和十六进制的显示方法见表四）。	1000
EA04	电子齿轮比分母		1000
EA05	模拟速度因数	当 EA02 写入 6-7 时有效。 模拟输入电压和电机转速的关系，单位是 rpm/V。 注：在高分辨率情况下模拟速度因素设置太高有可能无效。	300
EA06	报警输出极性 限位开关 应用场合 负载类型	数码管从右到左分别代表： （1）负载类型，影响控制环参数： 　　0：没有选择， 　　1：皮带， 　　2：滚珠丝杠。 （2）应用场合，影响控制环参数： 　　0：点到点模式， 　　1：CNC 模式， 　　2：主从跟随模式。 （3）限位开关： 　　0：默认限位开关设置（DIN5 和 DIN6）， 　　1：屏蔽所有限位开关。 （4）OUT2 的报警输出极性： 　　0：输出常闭， 　　1：输出常开。	1001
EA00	保存参数	写入"1"保存所有参数。 写入"2"保存所有参数并重启驱动器（**更改电机型号后必须重启驱动器**）。 写入"3"只重启驱动器。 写入"10"初始化参数。 保存参数后，驱动器根据负载类型与应用场合设置控制环参数。	–
tn01	刚性等级	0-31 级，决定驱动器速度环带宽与位置环带宽。数值越大，刚性越高。 如果此参数突然设得很大，系统增益会发生显著变化，导致机器有较大冲击。 注：出于安全考虑，在编辑状态修改刚性时，不需要按 SET 确认，数据也会立即生效，但只能逐级调整。	皮带：10 丝杆：13

tn02	惯量比	负载惯量与电机惯量的比值*0.1，例如数码管上显示 0050 代表惯量比为 5。 驱动器通过惯量比自动计算 K_Load，进而影响速度比例增益，公式： Kvp=VC_LOOP_BW*K_Load/4096，其中 VC_LOOP_BW 为速度环带宽 注：出于安全考虑，在编辑状态修改惯量比时，不需要按 SET 确认，数据也会立即生效，但只能逐级调整。	皮带：50 丝杠：30
tn03	惯量测量	写入"1"使能电机并进行惯量比测量，此时电机会轻微抖动，测量成功后将根据惯量比写入刚性等级 4-13，且 tn03 显示 1。 测定过程包含以下动作： 1、 屏蔽所有外部信号的控制 2、 工作模式切换为 11 3、 使能驱动器 4、 对象 0x2FF00C 设为 11 5、 电机轴抖动并获取结果 6、 还原所有外部信号的控制 若测量失败，tn03 将置-1，-2，-3 或-4，刚性为 10，惯量比为 30（*0.1）	–
tn04	整定距离	整定时轴移动距离*0.01，例如数码管上显示 0022 代表 0.22 圈，最大值为 0.4 圈	22
tn00	保存参数	写入"1"保存所有参数。 写入"2"保存所有参数并重启驱动器（**更改电机型号后必须重启驱动器**）。 写入"3"只重启驱动器。 写入"10"初始化参数。	–
注：EASY 和 tunE 菜单的设计初衷是使用按键操作解决问题。如果用户使用上位机软件初始化参数或更改电机型号，出于安全考虑，EASY 和 tunE 菜单将只显示 EA00，EA01，tn00 这三个对象。用户必须通过 EA01 重新确认电机型号后，驱动器才会恢复默认值并完整显示 EASY 和 tunE 菜单。			

3.2 注意事项

1. 惯量测定有可能导致机器振动，请立刻关闭电源或驱动器。
2. 开启惯量测定会令电机轴在很小的距离内做往复运动，请留出一定机械空间。
3. 执行完 EASY 流程后，强烈建议执行 tunE 流程进行惯量测定，并调整刚性等级。
4. EASY 和 tunE 菜单的设计初衷是使用按键操作解决问题。如果用户使用上位机软件初始化参数或更改电机型号，出于安全考虑，EASY 和 tunE 菜单将只显示 EA00，EA01，tn00 这三个对象。用户必须通过 EA01 重新确认电机型号后，驱动器才会恢复默认值并完整显示 EASY 和 tunE 菜单。

3.3 导致自整定失败的原因

1. 接线错误；
2. 电机型号设置错误；
3. 机械刚性极低；
4. 存在机械间歇；
5. 加减速小于粘性摩擦转矩；

3.4 EASY 和 tunE 参数说明

表 3-1 刚性等级表

刚性等级	位置环比例增益 0[0.01Hz]	速度环比例增益 0[0.1Hz]	输出截止频率[Hz]	刚性等级	位置环比例增益 0[0.01Hz]	速度环比例增益 0[0.1Hz]	输出截止频率[Hz]
0	70	25	18	16	1945	700	464
1	98	35	24	17	2223	800	568
2	139	50	35	18	2500	900	568
3	195	70	49	19	2778	1000	733
4	264	95	66	20	3334	1200	733
5	334	120	83	21	3889	1400	1032
6	389	140	100	22	4723	1700	1032
7	473	170	118	23	5556	2000	1765
8	556	200	146	24	6389	2300	1765
9	639	230	164	25	7500	2700	1765
10	750	270	189	26	8612	3100	1765
11	889	320	222	27	9445	3400	∞
12	1056	380	268	28	10278	3700	∞
13	1250	450	340	29	11112	4000	∞
14	1500	540	360	30	12500	4500	∞
15	1667	600	392	31	13889	5000	∞

注：当修改刚性或惯量比令 Kvp 大于 4000，再提升刚性对性能调节已没有作用，再提高惯量比则会降低带宽。

低于 80000PPR 分辨率的编码器，刚性等级最大设置为 22.

表 3-2 按键操作说明

数字/点/键	功能
MODE	用于切换基本菜单 在参数调节中，短按用于移动要调节的位，长按退出到上一级状态
▲	按下▲键可增加设定值，长按可快速增加数值
▼	按下▼键可减小设定值，长按可快速减小数值
③	"亮"代表十六进制，"灭"代表十进制
SET	用于进入选择的菜单 进入此参数设定状态 当参数设定完后确认输入参数
FFF.F 闪烁	表示未成功配置电机，请保证更改电机型号后保存参数并重启驱动器。
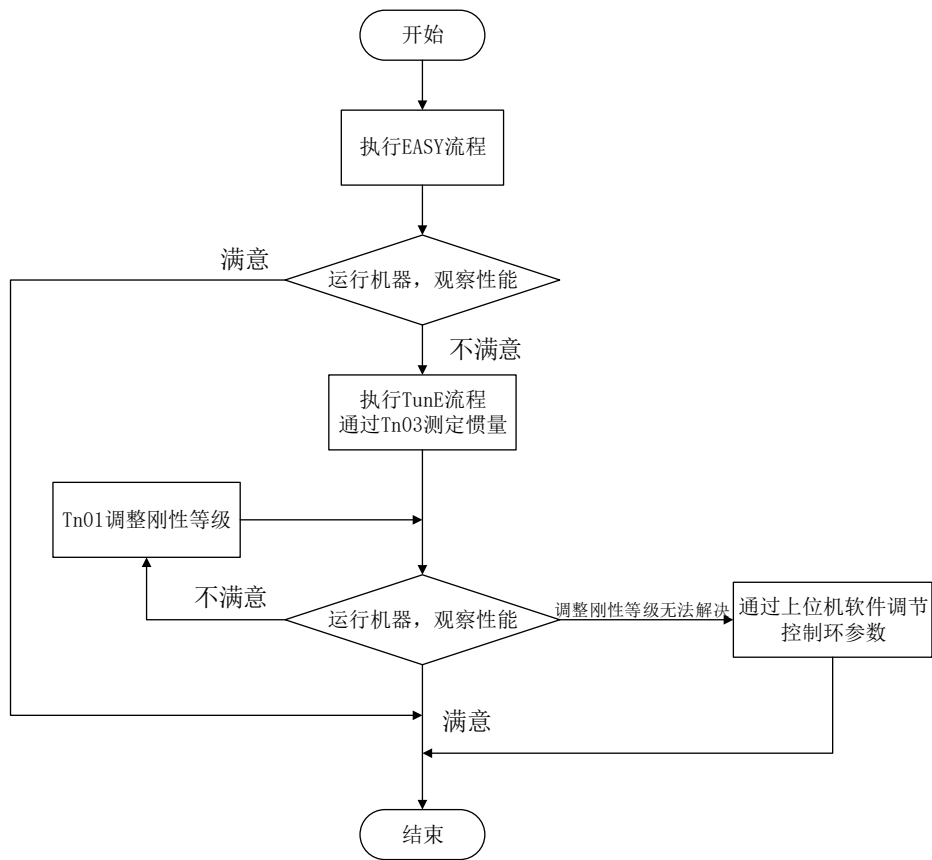
图 3-1 操作流程图

注：请按顺序设定参数，60S 未操作会自动退回起点。输入的数据会立即生效，但是通过 EA00 才能保存。
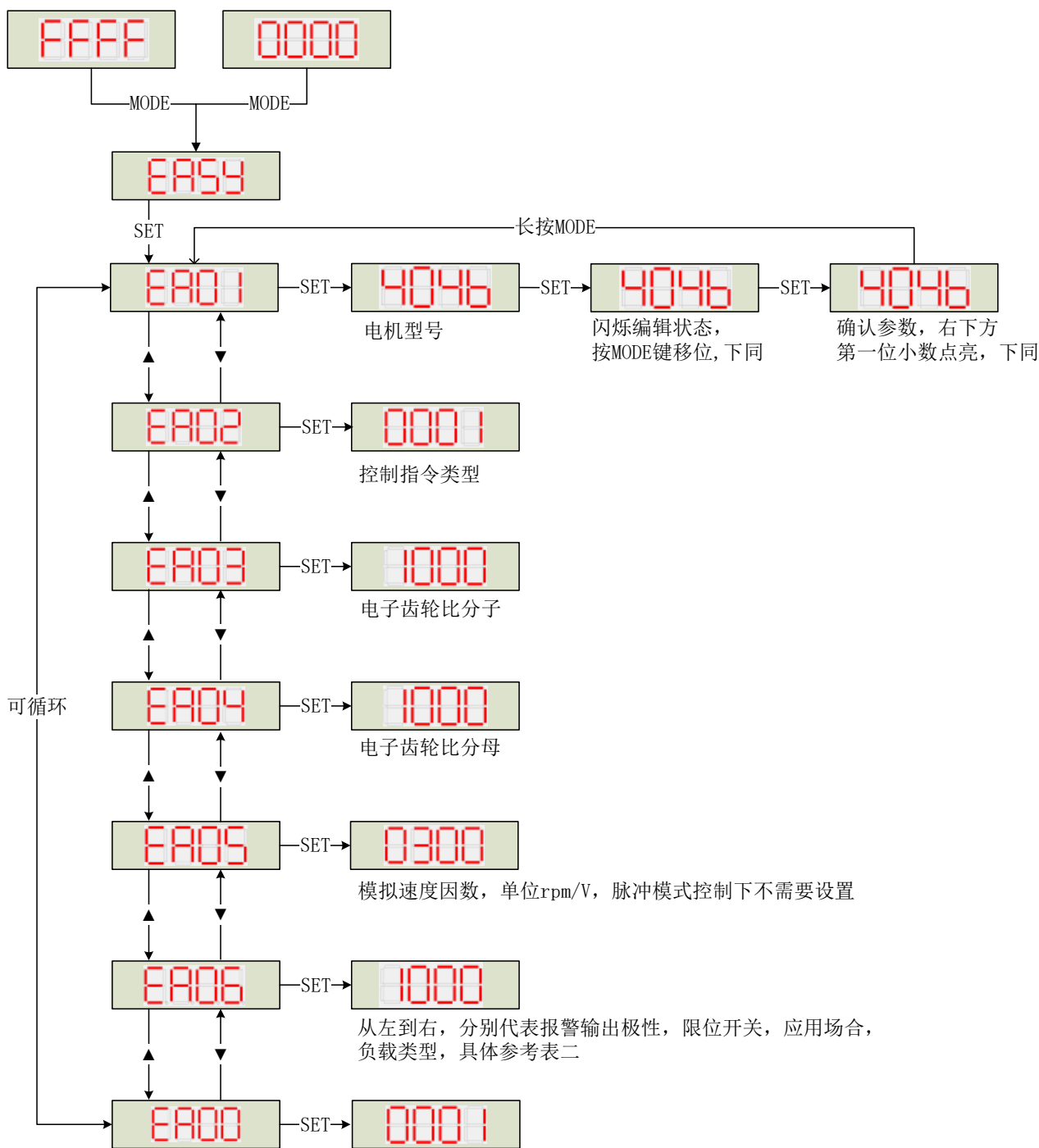
图 3-1 Easy 流程图

写入"1"保存所有参数。
写入"2"保存所有参数并重启驱动器（**更改电机型号后必须重启驱动器**）。
写入"3"只重启驱动器。
写入"10"初始化参数。
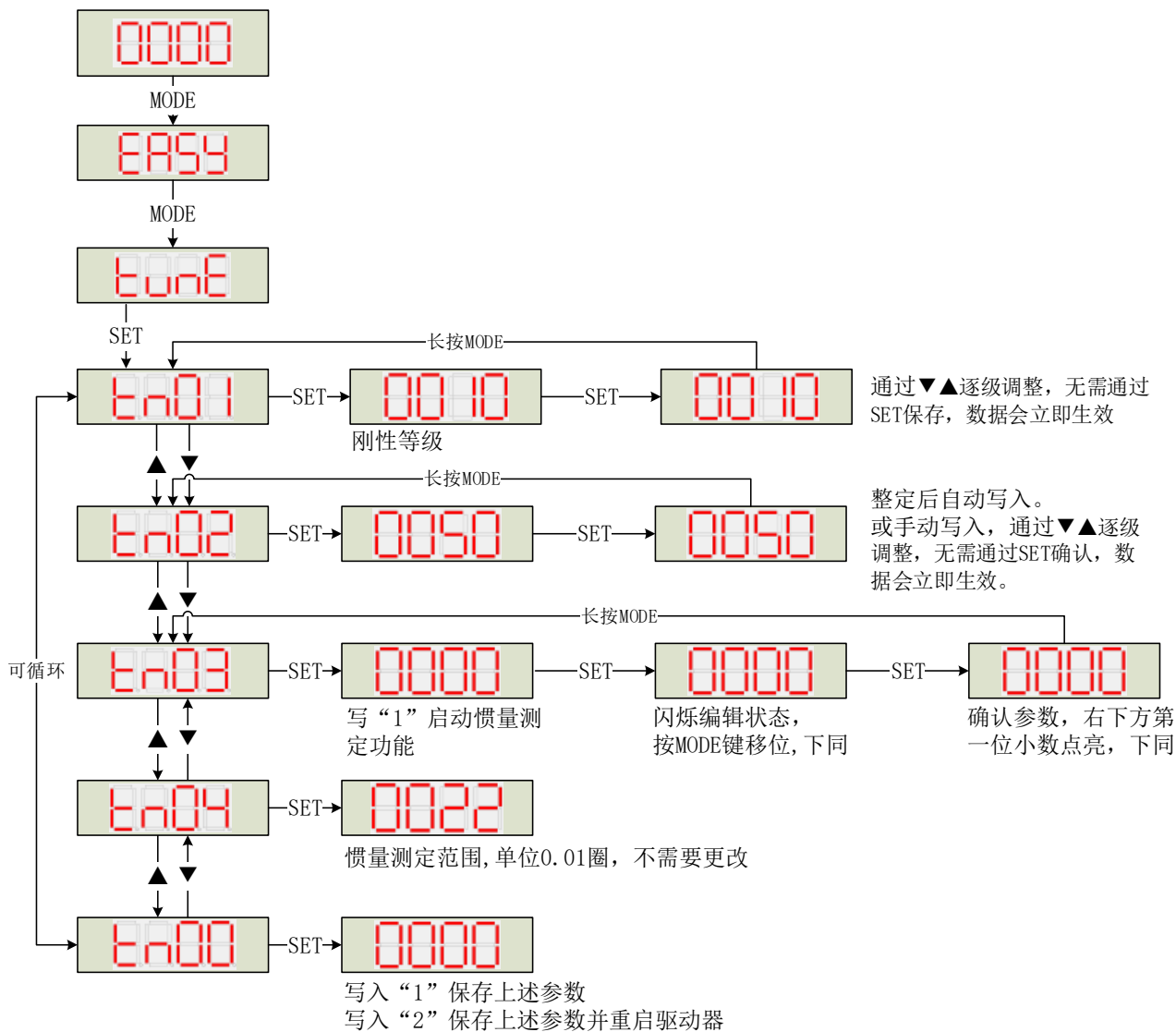
图 3-3 TunE 流程图

注：输入的数据可以立即生效，但必须通过 tn00 保存。

出于安全考虑，在编辑状态修改刚性或惯量比，不需要按 SET 确认，数据也会立即生效，但只能逐级调整。

3.5 试运转操作说明

数字面板试运行操作步骤

- 按 MODE 键，进入 F004 组，选择对象地址"d4.18"，确认电机型号；
- 按 MODE 键，进入 F000 组，选择对象地址"d0.02"，设定目标速度，速度单位为 RPM；建议先以低于 100RPM 的速度试运转，以避免人身伤害和财产损失；
- 按 MODE 键，进入 F006 组，进行按键测试，默认值为 d6.40，先使用"▼"调节数据到 d6.31，再按"▼"数据会自动变为 d6.15，再使用"▲"调节数据到 d6.25；
- 按 SET 键，试运转操作激活，此时数码管显示为"abc.d"，电机处于松轴状态。当长按"▲"或"▼"时电机自动使能，分别按照"+目标速度"或"-目标速度"来运行。试运转期间，数码管将实时显示电机速度；
- 电机默认逆时针方向为正转（面对电机轴侧方向观察），若与机械配合的方向不符合要求，可以通过改变 F002 组对象地址"d2.16"速度位置方向控制，来改变电机的默认旋转方向。"d2.16"默认值为 0，改为 1 即可改变默认的旋转方向。

图 3-4 为试运转操作步骤框图。

```
                        │按下MODE
                        ▼
    ┌──────────┐  按下SET  ┌──────────┐         ┌──────────┐
    │ 进入F004组 │─────────▶│  d4.18   │────────▶│ 检查电机型号 │
    └──────────┘          └──────────┘         └──────────┘
         │按下MODE              ▲
         ▼                     │
    ┌──────────┐  按下SET  ┌──────────┐         ┌──────────────┐
    │ 进入F000组 │─────────▶│  d0.02   │────────▶│  选择速度指令   │
    └──────────┘          └──────────┘         │（速度正负均可设）│
         │按下MODE                              └──────────────┘
         ▼
    ┌──────────┐  按下SET  ┌──────────────────────┐  ┌──────────┐
    │ 进入F006组 │─────────▶│d6.40--按▼--d6.31(再按▼ │─▶│  按键测试  │
    └──────────┘          │自动变为d6.15)--按 ▲--  │  └──────────┘
         │按下SET（数码管显示"abc.d"）│      d6.25        │
         ▼                └──────────────────────┘
    ┌──────────┐          ┌──────────────────────┐
    │ 长按▲或▼  │─────────▶│ 电机按设定目标速度运行，  │
    └──────────┘          │长按▲为正方向，长按▼为负方向│
                          └──────────────────────┘
```
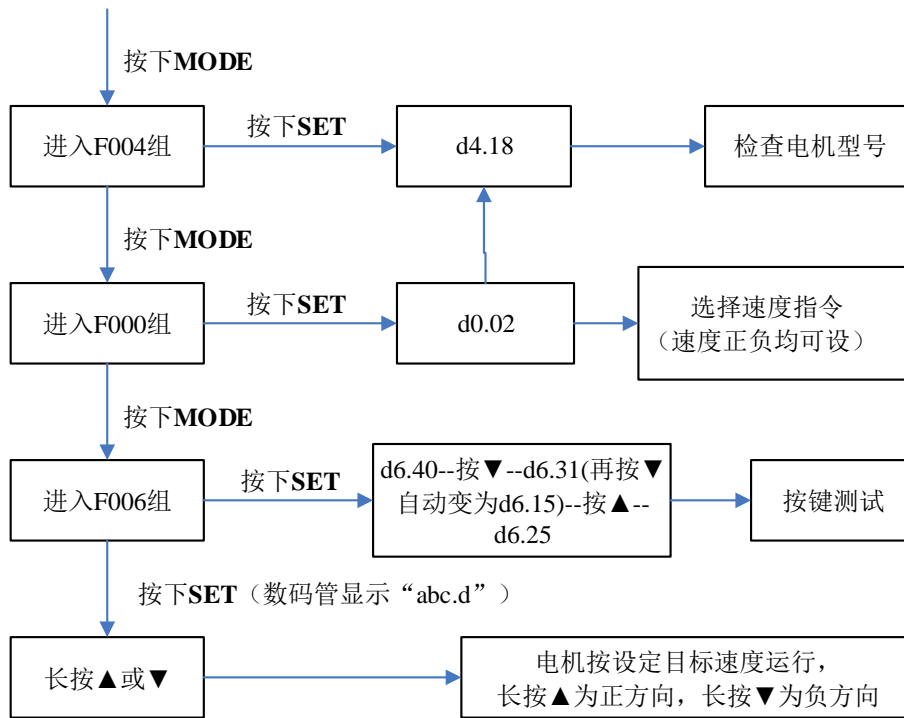
图 3-4 试运转操作步骤

Kinco 伺服上位机调试软件操作步骤

● 进入菜单栏—驱动器—控制面板—F004，用户通过 F004 组对话框"电机型号"配置电机，设置完毕按回车键确认，并重启驱动器。

● 取消 I/O 控制中定义的"驱动器使能"和"驱动器工作模式控制"。

● 打开基本操作界面，将"工作模式"设为"-3"，速度设为 100RPM，完成后将"控制字"改为 f。如需反方向运转，设置速度为负值即可。

电机配置表

上位机 操作地址：EA01	数码管	电机型号	适配驱动器					
			CD412S FD412S	CD422S FD422S	CD422S-AF（带风扇） FD422S-□F（带风扇）	CD432S FD432S	CD612S FD612S	CD622S FD622S
K@	404.b	未设置电机型号	数码管闪烁显示FFF.F					
G0	3047	SMC60S-0020-30A■K-3LK□		✓				
G1	3147	SMC60S-0040-30A■K-3LK□		✓				
G2	3247	SMC80S-0075-30A■K-3LK□		✓				
GB	4247	SMC130D-0100-20A■K-4LKP			✓			
G0	4F47	SMC130D-0150-20A■K-4LKP				✓		
GP	5047	SMC130D-0200-20A■K-4LKP				✓		
GC	4347	SMC130D-0150-20A■K-4HKP					✓	
GD	4447	SMC130D-0200-20A■K-4HKP					✓	
GR	5247	SMC130D-0300-20A■K-4HKP						✓
GQ	5147	SMC130D-0300-30A■K-4HKP						✓
KZ	5A4B	SMH40S-0005-30A■K-4LKH	✓					
KY	594B	SMH40S-0010-30A■K-4LKH	✓					
K0	304B	SMH60S-0020-30A■K-3LK□		✓				
K1	314B	SMH60S-0040-30A■K-3LK□		✓				
K2	324B	SMH80S-0075-30A■K-3LK□		✓				
K3	334B	SMH80S-0100-30A■K-3LK□				✓		
K4	344B	SMH110D-0105-20A■K-4LKC				✓		
K5	354B	SMH110D-0125-30A■K-4LKC				✓		
K6	364B	SMH110D-0126-20A■K-4LKC				✓		
K7	374B	SMH110D-0126-30A■K-4HKC						✓
K8	384B	SMH110D-0157-30A■K-4HKC						✓
K9	394B	SMH110D-0188-30A■K-4HKC						✓
KB	424B	SMH130D-0105-20A■K-4HKC				✓		✓
KC	434B	SMH130D-0157-20A■K-4HKC				✓		✓
KD	444B	SMH130D-0210-20A■K-4HKC						✓
KE	454B	SMH150D-0230-20A■K-4HKC						✓
P4	3450	SMG130D-0100-20A■K-4LKG			✓			
P3	3350	SMG130D-0100-10A■K-4LKG			✓			
P5	3550	SMG130D-0150-20A■K-4LKG				✓		
P7	3750	SMG130D-0200-20A■K-4LKG				✓		
P6	3650	SMG130D-0150-20A■K-4HKG					✓	
P8	3850	SMG130D-0200-20A■K-4HKG					✓	
PC	4350	SMG130D-0300-20A■K-4HKG						✓
YZ	5A59	SMS40S-0005-30J■K-5LKU	✓					
ZZ	5A5A	SMS40S-0005-30K■K-5LKU	✓					
YY	5959	SMS40S-0010-30J■K-5LKU	✓					
ZY	595A	SMS40S-0010-30K■K-5LKU	✓					
Y0	3059	SMS60S-0020-30J■K-3LKU		✓				
Z0	305A	SMS60S-0020-30K■K-3LKU		✓				
Y1	3159	SMS60S-0040-30J■K-3LKU		✓				
Z1	315A	SMS60S-0040-30K■K-3LKU		✓				
Y2	3259	SMS80S-0075-30J■K-3LKU		✓				
Z2	325A	SMS80S-0075-30K■K-3LKU		✓				
YB	4259	SMS130D-0100-20J■K-4LKP			✓			
ZB	425A	SMS130D-0100-20K■K-4LKP			✓			
Y0	4F59	SMS130D-0150-20J■K-4LKP				✓		
Z0	4F5A	SMS130D-0150-20K■K-4LKP				✓		
YP	5059	SMS130D-0200-20J■K-4LKP				✓		
ZP	505A	SMS130D-0200-20K■K-4LKP				✓		
YC	4359	SMS130D-0150-20J■K-4HKP					✓	
ZC	435A	SMS130D-0150-20K■K-4HKP					✓	
YD	4459	SMS130D-0200-20J■K-4HKP					✓	
ZD	445A	SMS130D-0200-20K■K-4HKP					✓	
YQ	5159	SMS130D-0300-20J■K-4HKP						✓
ZQ	515A	SMS130D-0300-20K■K-4HKP						✓
YR	5259	SMS130D-0300-30J■K-4HKP						✓
ZR	525A	SMS130D-0300-30K■K-4HKP						✓
F4	344.6	85S-0025-05AAK-FLFN-02		✓				
F6	364.6	85S-0035-05AAK-FLFN-02		✓				
F8	384.6	85S-0045-05AAK-FLFN-02		✓				

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Kinco 2S Servo DriverUser Guidance V2.0

Thank you for using Kinco servo products! The accessories of Kinco every series & different types drivers are different. We advice you accept products before use.

1.Whether the model of a delivered FD series servo system is consistent with the specified model

2.Please check whether the product is damaged during transportation and use a screwdriver to confirm whether all fixing screws on the drive are loose.

3.Please check and accept the products according to the following product parts list to confirm whether there is any shortage.

Product parts list			
Articles			**Quantity**
Driver			1 set
Kinco 2S Servo Driver User Guidance			1 copy
Service guide			1 sheet
Certificate			1 sheet
Ter min al	422S	SCSI 36P Plug	1
		6P Wiring terminal (head)	1
	432S 622S	SCSI 36P Plug	1
		6P terminal (head)	1
		6P Female base terminal	1
		4P Female base terminal	1

If there is any problem with any of the above, please contact our company or your supplier to solve it.

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1 Driver installation requirements and precautions

1.1 Installation requirements

● Please install in the indoor control box without rain and direct sunlight, and the surrounding items should be non-flammable

● The installation place should be no cutting fluid, oil mist, iron powder and chip

● The installation place should be ventilated, dry and dust free,No vibration of the installation place

● This product complies with EMC standards 2014/30 / EU and low voltage standards 2014/35 / EU (LVD)

1.2 Installation environment

Environment	Condition
Operating temperature	0℃-40℃
Operating humidity	5-95%（No condensation）
Storage temperature	-10℃-70℃（Not frozen）
Storage humidity	5-95%（No condensation）
Altitude	Rated power at 1000 m or below

1.3 Precautions

● Don't use gasoline, thinner, alcohol, acid or alkaline detergent to wipe the shell to avoid discoloration or damage for the shell;

● Please ensure that the environment is safe during transportation and storage. Please use the original packaging for storage and transportation;

● Please be familiar with the product knowledge and safety precautions before operating the driver;

● Please strictly install the servo driver according to the installation method shown in Figure 1-1.

● Driver and motor's power cables, brake cables and encoder cables cannot be over-stretched;

● Avoid any foreign objects entering the driver, conductive foreign objects such as screws and metal chips, or flammable foreign objects entering the driver may cause fire and electric shock. For safety reasons, please do not use the servo driver with damage or parts damaged.

Warning!

● **Beware of electric shock.**
● Cable must be securely mounted to power interface
● Be sure to disconnect the power when connecting the cables;
● Contact with live parts can cause serious damage and may lead to death;
● **This product must be installed in the electric box to use, and all the protective measures have been started.**
● **When servicing, cleaning and prolonged service interruptions, be careful before touching live parts：**

● Turn off the power of the electrical equipment by the power switch and prevent it from turning on again；

● After the power is off, check the charge lamp on the front of the unit. If the light is off ,you can touch the driver.
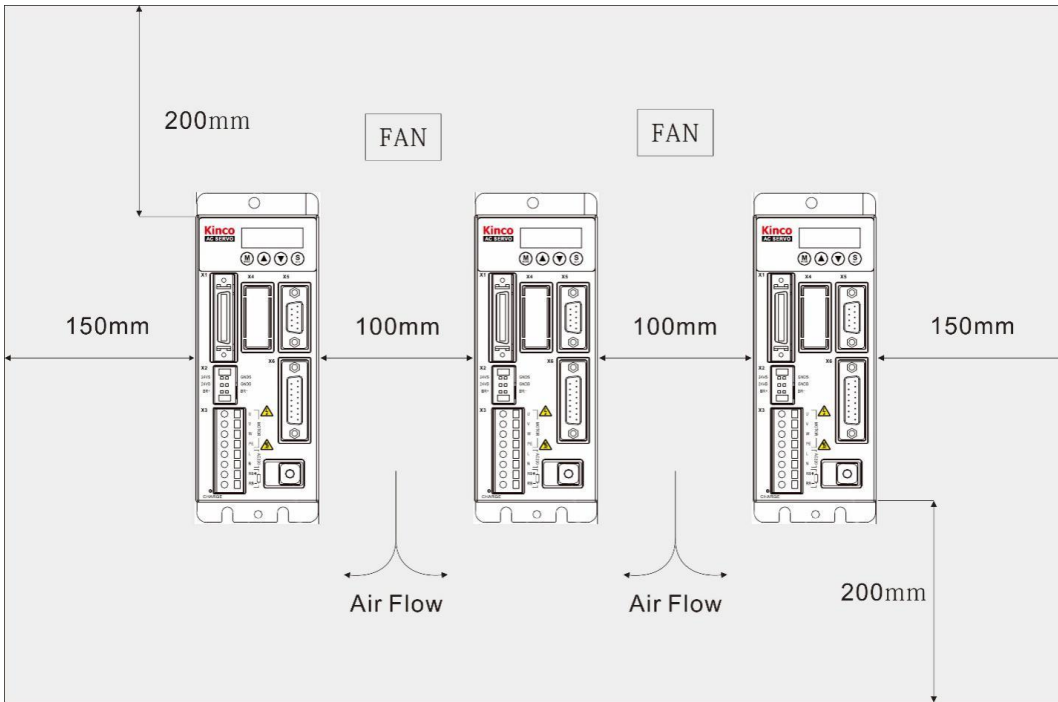
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Figure 1-1 Installation Direction and distance Requirements

2 Driver wiring and pin definition

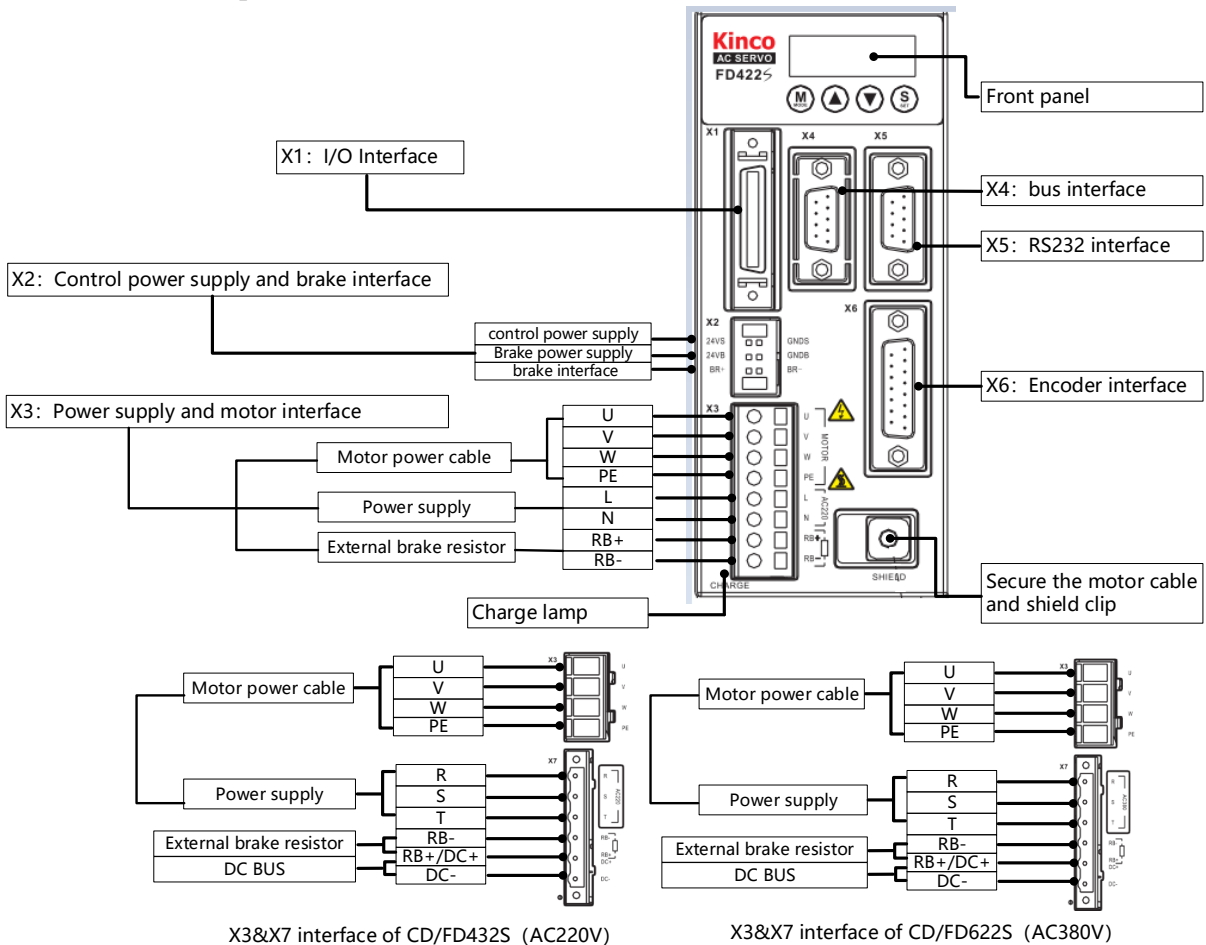## 2.1 Interface Description

Figure 2-1   driver appearance drawing
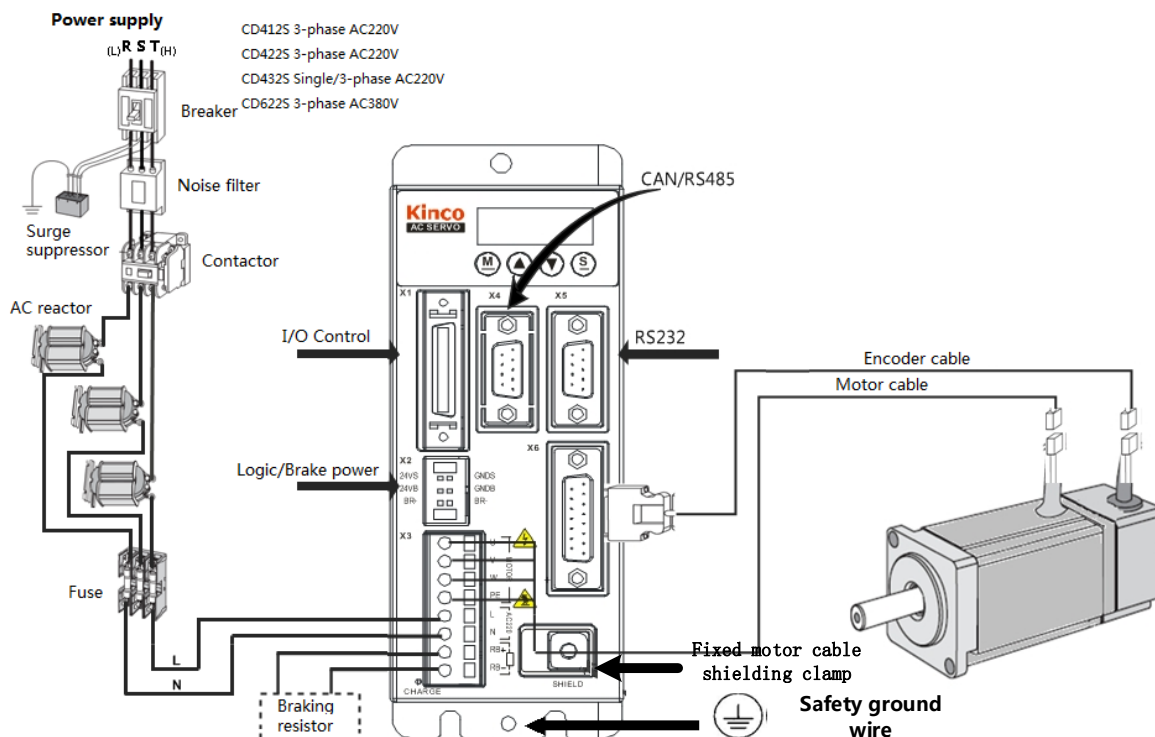
2.2 Driver wiring instructions

Figure 2-2 External Wiring Drawing of Driver

warning

● Ensure that all enclosures and cabinet doors are closed before powering the drive.

● When installing and maintaining the drive, all power must be cut off.After the driver is disconnected for at least ten minutes, the dc bus voltage of the measuring driver is lower than 36V or the charging indicator of the driver is off.

● Be sure not to remove safety devices and do not touch live parts and devices.
● Be sure to connect the PE wire correctly and ground the drive housing properly before the drive is powered on.

2.3 Port definition instructions

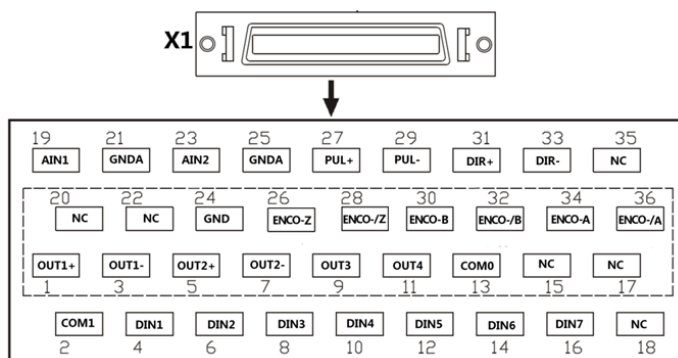### 2.3.1 External I / O port (X1) instructions
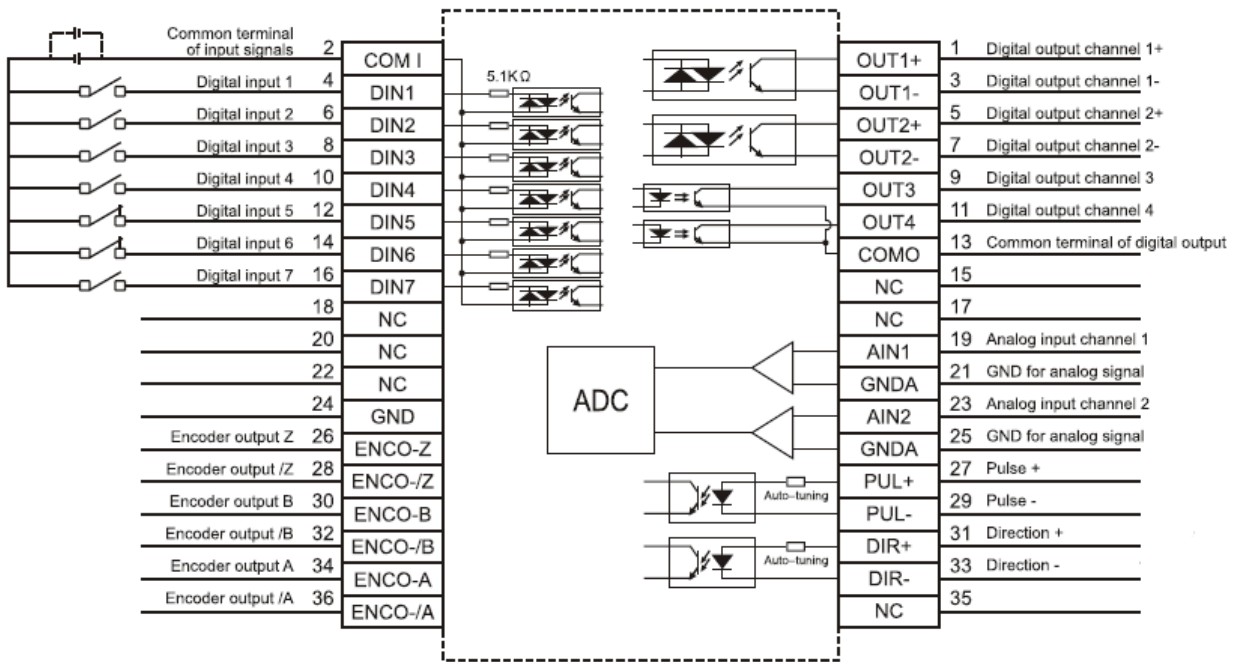

Figure 2-3   I/O interface X1 of FD2S driver

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Figure 2-4　Wirings of the I/O interface X1 of FD2S driver

2.3.2 **Power and motor interface (X3) instructions**

Table 2-1 X3 port definition（For CD/FD412S、422S driver）

Pin	PIN function
UVW	U/V/W phase power output for servo motor
PE	Motor earthing
L、N	Supply power inputL/N： Single phase 200～240VAC +15%/-20% 47～63Hz 412S@2.0A　422S@4.0A Supply ground systems: TN-S, TN-C, TN-C-S, TT (not corner earthed).
RB+、RB-	Externalbrake resistor

Table 2-2 X3&X7 port definition (For CD/FD432S、622S driver)

	Pin	PIN function
	UVW	U/V/W phase power output for servo motor
	PE	Motor earthing
	RST	432S Supply powe： Single phase 200～240VAC +/-10% 47～63Hz 11.0A 3- phase 200～240VAC +/-10% 47～63Hz 11.0A 612S/622S Supply powe: 3-phase380 ～ 415VAC +/-10% 47 ～ 63Hz 612S@5.5A622S@7.0A Supply ground systems: TN-S, TN-C, TN-C-S, TT (not corner earthed).
	RB+、RB-	Externalbrake resistor
	DC+、DC-	DC bus interface 432Sinput voltage DC310V±20% 612S/622S input voltage DC540V±20%

2.3.3 **RS232 serial port (X5) instructions**

Table 2-3 RS232 **interface (X3) instructions**

X3	Pin	Signal	Descriptions	Function
	2	TX	Send data	The upper computer software Kinco servo+ can be connected for debugging and monitoring
	3	RX	Receive data	
	5	GND	Signal ground	

Table 2-4 **Bus communication interface (X4) instructions**
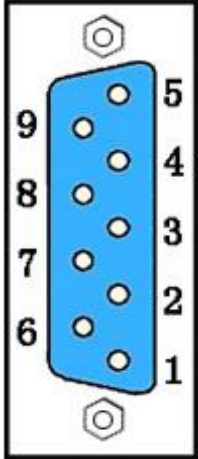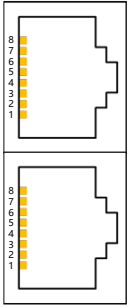
interface	RS485 interface		CANopen bus interface	
	Pin	Signal	Pin	Signal
	2	RX+	2	CAN_L
	3	TX+	3	GND
	5	GND	7	CAN_H
	6	+5V		
	7	RX−		
	8	TX−		

Table 2-5 Bus communication interface (X10) instructions

interface	pin	signal	descriptions
	1	TD+	Send data+
	2	TD−	Send data_
	3	RD+	Receive data+
	6	RD−	Receive data_

3 Easy Use function

The new function Easy Use aim to help users to set the parameters of control loop quickly that the adjusted performance can satisfy the need of most of the applications. There is also a new area for users to set the important and frequently-used parameters.

3.1 Step of Easy Use

1. There are motor type setting and some frequently-used parameters inthe menu EASY, please set and confirm them one by one. After completing process of EASY, please run the machine. If the performance is satisfying, it is unnecessary to execute the process of tunE. Otherwise, please execute the process of tunE:

2. Please write 1 into tn03 to start the inertia measuring and then the servo will adjust the parameters of control loop automatically by the result.

3. Please run the machine. If the performance is unsatisfying, please change the stiffness in tn01. While changing the stiffness, please observe the performance of machine.

LED Display	Parameters	Description	Default
EA01	Motor Model	Search Table-1 for motor model	404b
EA02	Command Type	Modify the first LED on the right to change the command type, meanwhile the operation mode and definition of IO will change. 0：CW/CCW 1：P/D 2：A/B phase control 3：CW/CCW by RS422 4：P/D by RS422 5：A/B phase control by RS422 6：Analog Speed by AN1 7：Analog Speed by AN2 8：Communication Notice: It is invalid when users set 3,4,or 5 into EA01 in FD2S and CD2S When command type is 0-5, the control mode is -4. When command type is 6-7, the control mode is -3. When command type is 8, the default control mode has to be controlled by communication and DIN1, DIN2, DIN3 have no input function	1
EA03	Gear Factor numerator	In useif EA02 is set to 0-5. The default display is in decimal.	1000
EA04	Gear Factor denominator	If the number is bigger than 10000, the display is in hexadecimal. Notice: please see the different way of LED display between decimal and hexadecimal in Table-4.	1000
EA05	Analog Speed Factor	In use if EA02 is set to 6 or 7. The relationship between Analog input voltage and speed of motor, and the unit is rpm/V Perhaps to be invalid if the factor is too big when the encoder is with high resolution.	300

EA06	1. Load Type
	2. Application
	3. Limit Switch
	4. Polarity of Alarm Output
		The meaning of each LED from right to left
		（1）Load Type, influences the control loop.
		    0: no shaft load,
		    1: belt drive,
		    2: ball screw
		（2）Application, influences the control loop.
		    0: P2P,
		    1: CNC,
		    2: Master/Slave mode
		（3）Limit Switch,
		    0: driver default,
		    1: disable the limit switch function
		（4）Polarity of Alarm Output
		    0: normally closed contacts,
		    1: normally open contacts.
			1001

EA00	Save Parameters	Write "1" to save all the parameters. Write "2" to save all the parameters and restart the servo, users **MUST** reboot the driver if changing the motor type) Write "3" to reboot the servo Write "10" to initialize the parameters Notice: After saving the parameters, the servo will set the control loop according to the load type and application	-
tn01	Stiffness Level	Level 0-31，determine the BW of velocity loop and the position loop The bigger the level is, the bigger the stiffness is. If this parameter is too big, the gain will change remarkably and the machine will be unstable. Notice: For safety, when setting tn01, the data will be valid immediately, and the parameters should be set level by level.	belt:10 screw:13

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LED Display	Parameters	Description	Default
tn02	InertiaRatio	Ratio of load inertia and motor inertia * 0.1. Servo will calculate K_Load automatically according to inertia ratio, and influence the proportion gain of velocity loop. Formula: Kvp=VC_LOOP_BW×K_Load/4096. VC_LOOP_BW represent the BW of velocity loop. Notice: For safety, when setting tn02, the data will be valid immediately, and the parameters should be set level by level.	belt:30 screw:50
tn03	Inertia measuring	1) Write 1 to enable the motor and start the inertia measuring. Set this parameter to 1 will run the inertia measuring function. It contains the following operation: 1.take over the enable function and the operation mode function of the IO function 2. switch the operation Mode to 11 3. enable the driver 4. set 0x2FF00C to 11 5. start shaking and get the result 6. give back the enable function and the operation mode function of the IO function 2) After confirming, the LED will stop flashing, and will show the Tuning result while 1 means success; -1,-2,-3,-4 means failure for some reasons. If the tuning is successful, control loop parameters will be set, and the stiffness will be set to 4-13 according to the inertia ratio, and tn03 will show 1. If the tuning failed, the stiffness will be 10 while the inertia ratio will be 30(*0.1) and the tn03 will show the error code.	-
tn04	Measuring Distance	Distance of inertia measuring*0.01. For example, 0022 represent 0.22 motor revolutions, the maximum is 0.4 revolutions.	22
tn00	Saving parameters	Write 1 to save all the parameters. Write 2 to save all the parameters and restart the servo , Write 3 to reboot the servo Write 10 to initialize the parameters Notice: Users **MUST** reboot the driver if changing the motor type.	

Notice: The EASY and tunE menu are designed to set by button originally. If users initialize parameters by PC software, EASY and tunE will only display EA00,EA01 and tn00 for safety. Users have to confirm motor type by EA01, after that the parameters become default and the LED will display in a complete way.

3.2 Notice

1. Inertia measurement might cause shaking of the machine, please be ready to shut off the power or driver immediately.
2. Keep space for inertia measuring.
3. It is strongly recommended that execute the flow of tunE after the flow of EASY, and adjust the stiffness.
4. The EASY and tunE menus are designed to set by button originally. If users initialize parameters by PC software, EASY and tunE will only display EA00, EA01 and tn00 for safety. Users have to confirm motor type by EA01, after that the parameters become default and the LED will display in a complete way.

3.3 Reason for the failure of tuning

1. Wrong wire connection；
2. configure the wrong motor type；
3. Stiffness is too low；
4. Mechanical gap exists；
5. Accelerated and decelerated torque are smaller than friction torque.

3.4 EASY and tunE parameter description

Stiffness	Kpp/0.01Hz]	Kvp/[0.1Hz]	Output filter[Hz]	Stiffness	Kpp/[0.01Hz]	Kvp/0[0.1Hz]	Output filter[Hz]
0	70	25	18	16	1945	700	464
1	98	35	24	17	2223	800	568
2	139	50	35	18	2500	900	568
3	195	70	49	19	2778	1000	733
4	264	95	66	20	3334	1200	733
5	334	120	83	21	3889	1400	1032
6	389	140	100	22	4723	1700	1032
7	473	170	118	23	5556	2000	1765
8	556	200	146	24	6389	2300	1765
9	639	230	164	25	7500	2700	1765
10	750	270	189	26	8612	3100	1765
11	889	320	222	27	9445	3400	∞
12	1056	380	268	28	10278	3700	∞
13	1250	450	340	29	11112	4000	∞
14	1500	540	360	30	12500	4500	∞
15	1667	600	392	31	13889	5000	∞

Notice: When the setting of stiffness or inertia ratio makes the Kvp value bigger than 4000, it isn't useful to raise stiffness any more, and it will decrease bandwidth if the inertia ratio becomes increased more then. If the resolution of encoder is less than 80000 inc per revoluiution, the range of stiffness is from 0 to 22.

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Table3-2 Operation of Key
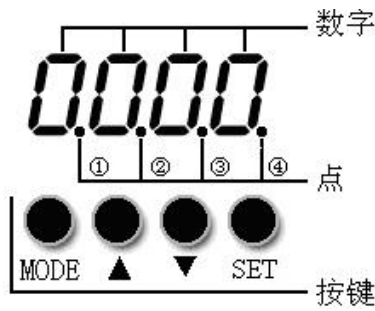
	Description
MODE	Switch menus； When setting parameters, short button press can shift the active digit, long button press can return to the previous menus.
▲	Press▲ can increase the number, long press can increase quickly
▼	Press▼ can decrease the number, long press can decrease quickly
③	Dot Shining represent displaying in hexadecimal, otherwise in decimal.
SET	Enter the selected menu； Enter the status of parameters setting； affirm the parameters；
Display FFF.F	No motor configured, please operate according to the flow chart of "Easy" and make it sure to save the parameters and reboot the servo.
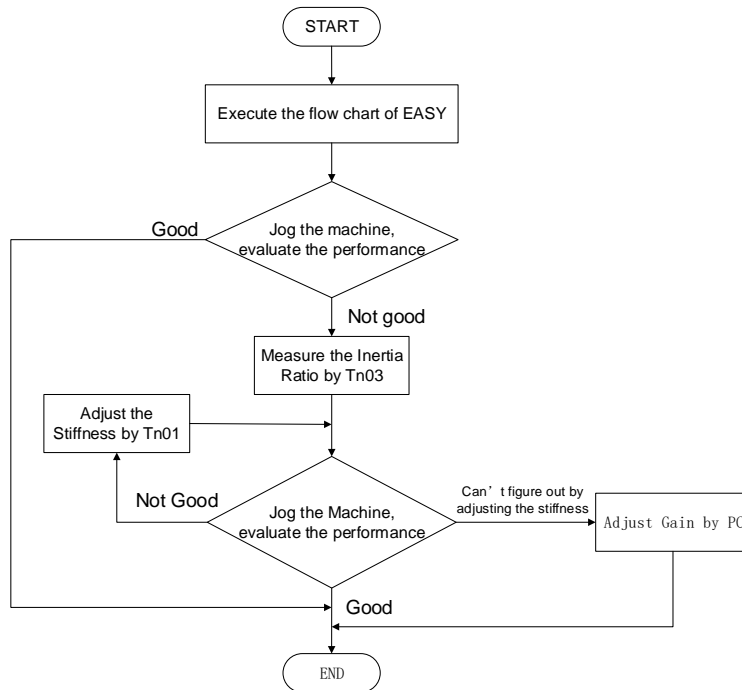
Notice: Must execute in order, exit automatically if there is no operation in 30s, and users have to start again. The data input will be valid immediately, but need to be saved by EA00
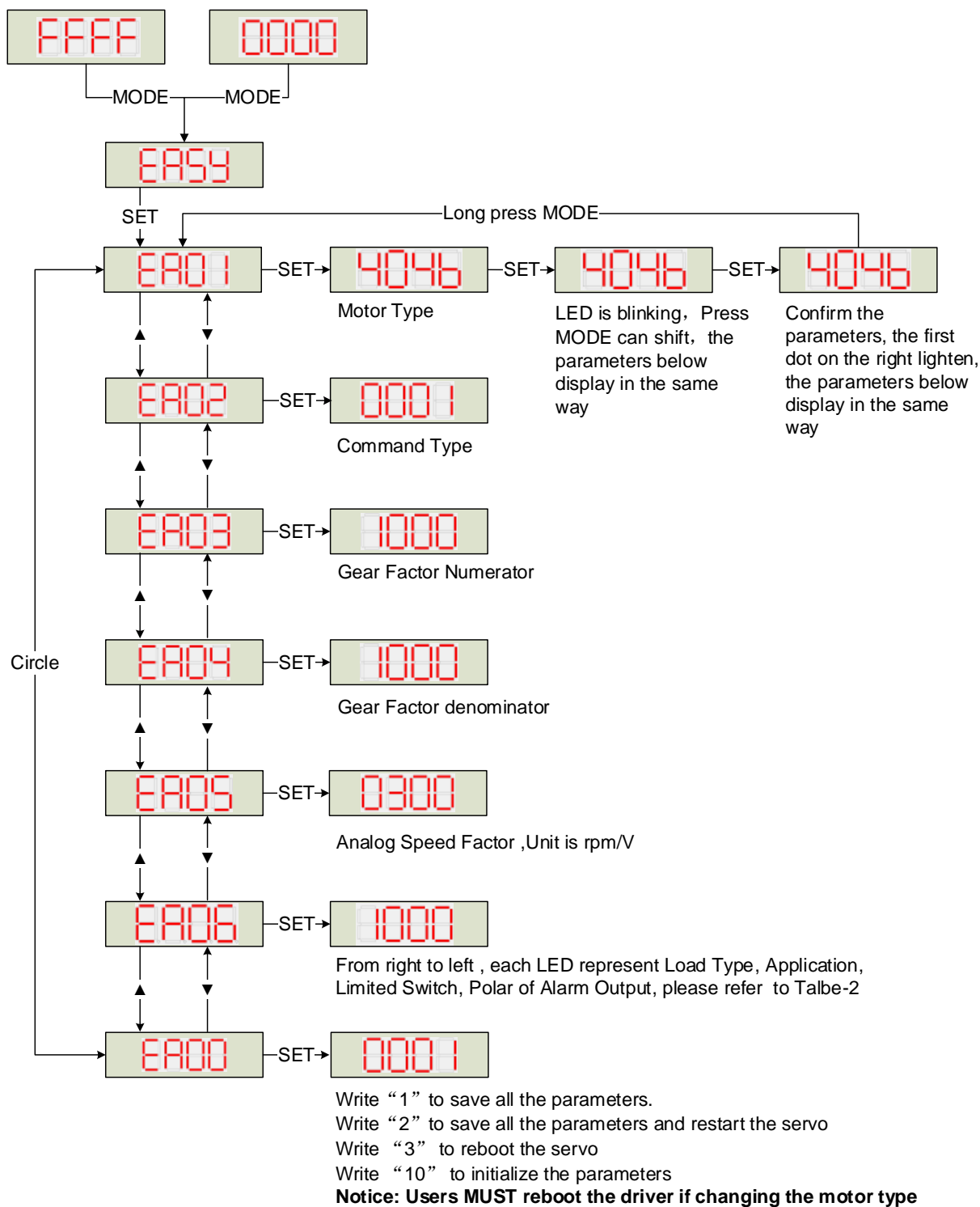

| FFFF | 0000 |

MODE — MODE

EASY

SET — Long press MODE

EA01 —SET→ 404b Motor Type —SET→ 404b LED is blinking, Press MODE can shift, the parameters below display in the same way —SET→ 404b Confirm the parameters, the first dot on the right lighten, the parameters below display in the same way

EA02 —SET→ 0001 Command Type

EA03 —SET→ 1000 Gear Factor Numerator

EA04 —SET→ 1000 Gear Factor denominator

EA05 —SET→ 0300 Analog Speed Factor ,Unit is rpm/V

EA06 —SET→ 1000 From right to left , each LED represent Load Type, Application, Limited Switch, Polar of Alarm Output, please refer to Talbe-2

Circle

EA00 —SET→ 0001

Write "1" to save all the parameters.
Write "2" to save all the parameters and restart the servo
Write "3" to reboot the servo
Write "10" to initialize the parameters
Notice: Users MUST reboot the driver if changing the motor type
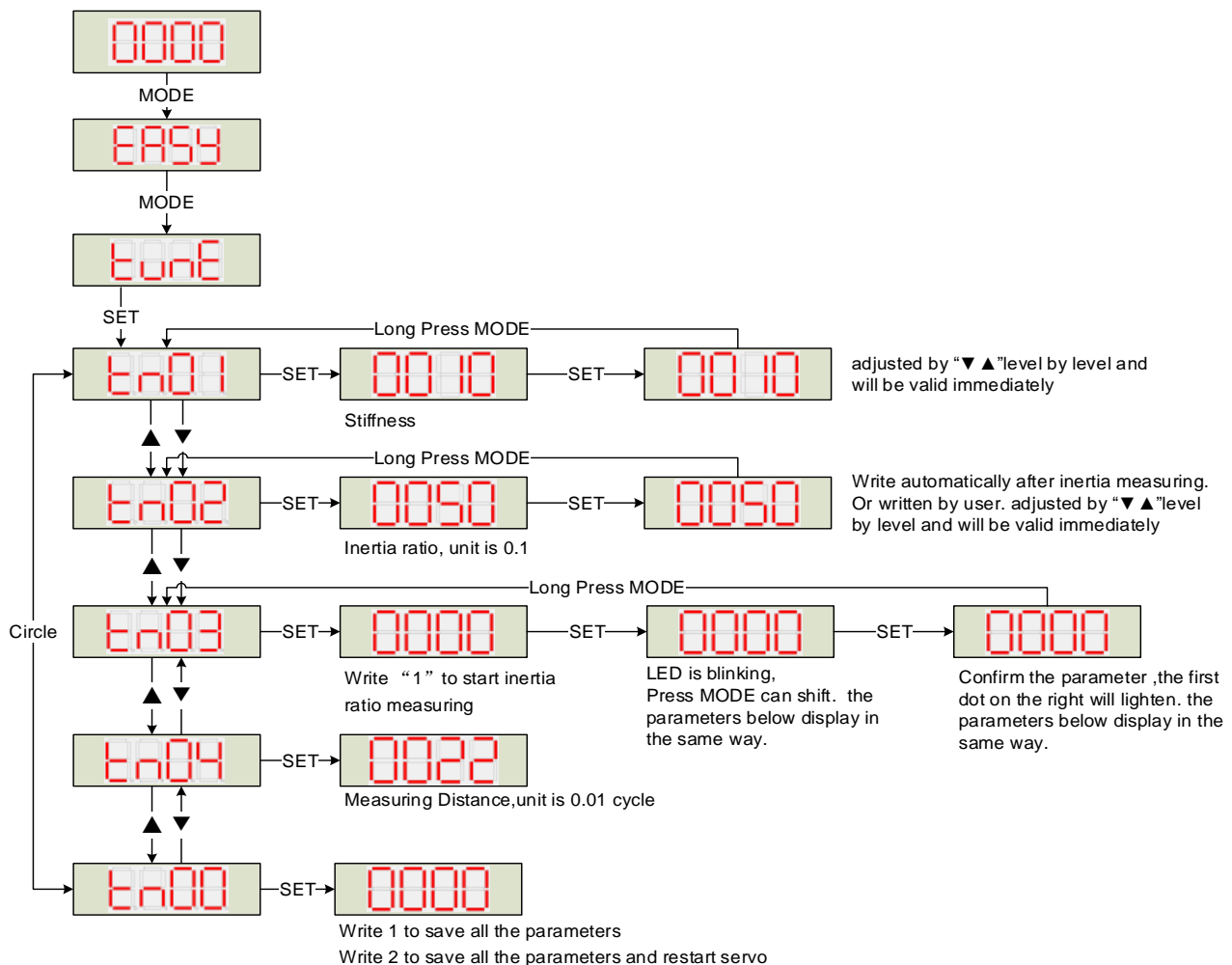
Figure 3-1 Easy flow chart

V2.0

Figure 3-3 TunE flow chart

Notice: The data will be valid immediately, but need to be saved by tn00.

For safety, when setting tn01 or tn02, the data will be valid immediately, and these two parameters should be set level by level.

3.5 Commissioning instructions

Digital panel trial operation steps

- Press "MODE", Enter F004, Select object address"d4.18", Confirm the motor model；
- Press "MODE" to enter F000 group, select the object address "d0.02" and set the target speed.，Its unit is RPM；；It is recommended to run at a speed lower than 100RPM to avoid personal injury and property damage.；
- Press "MODE" to enter F006 group and conduct key test. The default value is d6.40. Use "▼" to adjust the data to d6.31 first, then press "▼" to automatically change the data to d6.15, and then use "▲" to adjust the data to d6.25；；
- Press "SET" [originally ENTER] and the trail operation is activated. At this time, the digital tube is displayed as "abc.d" and the motor is in a loose shaft state. When "▲" or "▼" is pressed for a long time, the motor will be automatically enabled and will operate according to "+target speed" or "-"target speed ",respectively. During the process of trail operation, the digital tube will display the motor speed in real time.
- The default counterclockwise direction of the motor is forward rotation (viewed from the direction facing the motor shaft). If the direction cooperation of the machine does not meet with the requirements, the default rotation direction of the motor can be changed by changing the speed position direction control of F002 group object address "d2.16". The default value of "d2.16" is 0. Changing to 1 will change the default rotation direction.
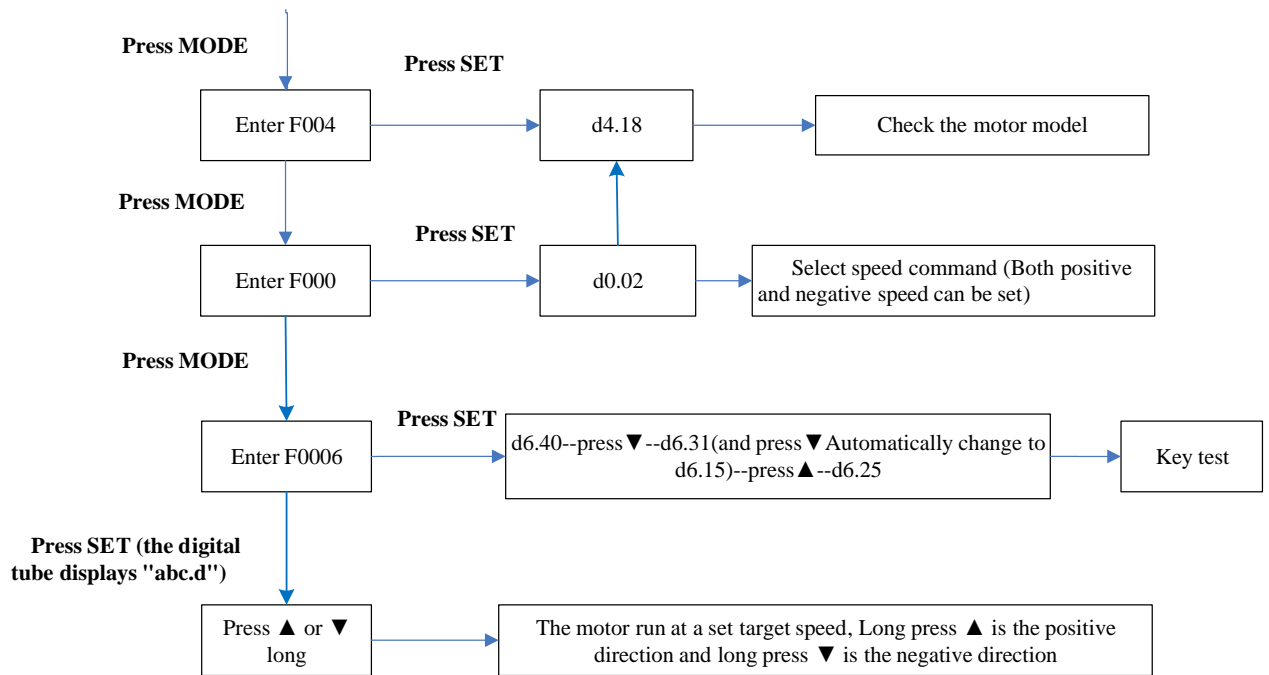
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Figure 3-4 Block diagram of trail operation steps

Kincoservo+ Operating procedure

- Enter menu bar-driver-control panel-F004, the user configures the motor through the "motor model" dialog box of f004 group, press enter key to confirm after setting, and reboot the driver.
- Cancel the "drive enable" and "drive operating mode control" defined in I/O control.
- Open the basic operation interface, set the "operation mode" to "-3" and the speed to 100RPM, and change the "control word" to f after completion. If you need to run in the opposite direction, set the speed to a negative value.

V2.0

The configuration between motor and servo

PC	LED	Motor Model	Suitable Servo					
LED CODE:EA01			CD412S FD412S	CD422S FD422S	With Fan CD422S-AF FD422S-□F	CD432S FD432S	CD612S FD612S	CD622S FD622S
K@	404.b	no motor configured	LED displays FFF.F					
G0	3047	SMC60S-0020-30A■K-3LK□		✓				
G1	3147	SMC60S-0040-30A■K-3LK□		✓				
G2	3247	SMC80S-0075-30A■K-3LK□		✓				
GB	4247	SMC130D-0100-20A■K-4LKP			✓			
G0	4F47	SMC130D-0150-20A■K-4LKP				✓		
GP	5047	SMC130D-0200-20A■K-4LKP				✓		
GC	4347	SMC130D-0150-20A■K-4HKP					✓	
GD	4447	SMC130D-0200-20A■K-4HKP					✓	
GR	5247	SMC130D-0300-20A■K-4HKP						✓
GQ	5147	SMC130D-0300-30A■K-4HKP						✓
KZ	5A4B	SMH40S-0005-30A■K-4LKH	✓					
KY	594B	SMH40S-0010-30A■K-4LKH	✓					
K0	304B	SMH60S-0020-30A■K-3LK□		✓				
K1	314B	SMH60S-0040-30A■K-3LK□		✓				
K2	324B	SMH80S-0075-30A■K-3LK□		✓				
K3	334B	SMH80S-0100-30A■K-3LK□				✓		
K4	344B	SMH110D-0105-20A■K-4LKC				✓		
K5	354B	SMH110D-0125-30A■K-4LKC				✓		
K6	364B	SMH110D-0126-20A■K-4LKC				✓		
K7	374B	SMH110D-0126-30A■K-4HKC						✓
K8	384B	SMH110D-0157-30A■K-4HKC						✓
K9	394B	SMH110D-0188-30A■K-4HKC						✓
KB	424B	SMH130D-0105-20A■K-4HKC				✓		✓
KC	434B	SMH130D-0157-20A■K-4HKC				✓		✓
KD	444B	SMH130D-0210-20A■K-4HKC						✓
KE	454B	SMH150D-0230-20A■K-4HKC						✓
P4	3450	SMG130D-0100-20A■K-4LKG			✓			
P3	3350	SMG130D-0100-10A■K-4LKG			✓			
P5	3550	SMG130D-0150-20A■K-4LKG				✓		
P7	3750	SMG130D-0200-20A■K-4LKG				✓		
P6	3650	SMG130D-0150-20A■K-4HKG					✓	
P8	3850	SMG130D-0200-20A■K-4HKG					✓	
PC	4350	SMG130D-0300-20A■K-4HKG						✓
YZ	5A59	SMS40S-0005-30J■K-5LKU	✓					
ZZ	5A5A	SMS40S-0005-30K■K-5LKU	✓					
YY	5959	SMS40S-0010-30J■K-5LKU	✓					
ZY	595A	SMS40S-0010-30K■K-5LKU	✓					
Y0	3059	SMS60S-0020-30J■K-3LKU		✓				
Z0	305A	SMS60S-0020-30K■K-3LKU		✓				
Y1	3159	SMS60S-0040-30J■K-3LKU		✓				
Z1	315A	SMS60S-0040-30K■K-3LKU		✓				
Y2	3259	SMS80S-0075-30J■K-3LKU		✓				
Z2	325A	SMS80S-0075-30K■K-3LKU		✓				
YB	4259	SMS130D-0100-20J■K-4LKP			✓			
ZB	425A	SMS130D-0100-20K■K-4LKP			✓			
Y0	4F59	SMS130D-0150-20J■K-4LKP				✓		
Z0	4F5A	SMS130D-0150-20K■K-4LKP				✓		
YP	5059	SMS130D-0200-20J■K-4LKP				✓		
ZP	505A	SMS130D-0200-20K■K-4LKP				✓		
YC	4359	SMS130D-0150-20J■K-4HKP					✓	
ZC	435A	SMS130D-0150-20K■K-4HKP					✓	
YD	4459	SMS130D-0200-20J■K-4HKP					✓	
ZD	445A	SMS130D-0200-20K■K-4HKP					✓	
YQ	5159	SMS130D-0300-20J■K-4HKP						✓
ZQ	515A	SMS130D-0300-20K■K-4HKP						✓
YR	5259	SMS130D-0300-30J■K-4HKP						✓
ZR	525A	SMS130D-0300-30K■K-4HKP						✓
F4	344.6	85S-0025-05AAK-FLFN-02		✓				
F6	364.6	85S-0035-05AAK-FLFN-02		✓				
F8	384.6	85S-0045-05AAK-FLFN-02		✓				