

# Kinco 伺服驱动器（2S 系列）选配电机使用指南 V1.1

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。

## 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。

## 注意

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。

## 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。

**表一驱动器与电机配置表**

| 上位机       | 数码管    | 电机型号                    | 适配驱动器          |        |                                |        |        |        |
|-----------|--------|-------------------------|----------------|--------|--------------------------------|--------|--------|--------|
| 操作地址：EA01 |        |                         | CD412S         | CD422S | 带风扇                            | CD432S | CD612S | CD622S |
|           |        |                         | FD412S         | FD422S | CD422S-AF<br>FD422S-AF (CF、LF) | FD432S | FD612S | FD622S |
| K@        | 404. b | 未设置电机型号                 | 数码管闪烁显示 FFF. F |        |                                |        |        |        |
| W0        | 305. 7 | SMC60S-0020-30E■K-3LKH  |                | ✓      |                                |        |        |        |
| W1        | 315. 7 | SMC60S-0040-30E■K-3LKH  |                | ✓      |                                |        |        |        |
| W2        | 325. 7 | SMC80S-0075-30E■K-3LKH  |                | ✓      |                                |        |        |        |
| WB        | 425. 7 | SMC130D-0100-20E■K-4LKP |                |        | ✓                              |        |        |        |
| WC        | 435. 7 | SMC130D-0150-20E■K-4HKP |                |        |                                |        | ✓      |        |
| WD        | 445. 7 | SMC130D-0200-20E■K-4HKP |                |        |                                |        | ✓      |        |
| WO        | 4F5. 7 | SMC130D-0150-20E■K-4LKP |                |        |                                | ✓      |        |        |
| WP        | 505. 7 | SMC130D-0200-20E■K-4LKP |                |        |                                | ✓      |        |        |
| WQ        | 515. 7 | SMC130D-0300-30E■K-4HKP |                |        |                                |        |        | ✓      |
| WR        | 525. 7 | SMC130D-0300-20E■K-4HKP |                |        |                                |        |        | ✓      |
| Y0        | 305. 9 | SMS60S-0020-30J■K-3LKU  |                | ✓      |                                |        |        |        |
| Y1        | 315. 9 | SMS60S-0040-30J■K-3LKU  |                | ✓      |                                |        |        |        |
| Y2        | 325. 9 | SMS80S-0075-30J■K-3LKU  |                | ✓      |                                |        |        |        |
| Z0        | 305. A | SMS60S-0020-30K■K-3LKU  |                | ✓      |                                |        |        |        |
| Z1        | 315. A | SMS60S-0040-30K■K-3LKU  |                | ✓      |                                |        |        |        |
| Z2        | 325. A | SMS80S-0075-30K■K-3LKU  |                | ✓      |                                |        |        |        |
| JZ        | 5A4. A | SMH40S-0005-30J■K-4LKU  | ✓              |        |                                |        |        |        |
| JY        | 594. A | SMH40S-0010-30J■K-4LKU  | ✓              |        |                                |        |        |        |
| MZ        | 5A4. d | SMH40S-0005-30K■K-4LKU  | ✓              |        |                                |        |        |        |
| MY        | 594. d | SMH40S-0010-30K■K-4LKU  | ✓              |        |                                |        |        |        |
| KZ        | 5A4. b | SMH40S-0005-30A■K-4LKH  | ✓              |        |                                |        |        |        |
| KY        | 594. b | SMH40S-0010-30A■K-4LKH  | ✓              |        |                                |        |        |        |
| K0        | 304. b | SMH60S-0020-30A■K-3LK□  |                | ✓      |                                |        |        |        |
| K1        | 314. b | SMH60S-0040-30A■K-3LK□  |                | ✓      |                                |        |        |        |
| K2        | 324. b | SMH80S-0075-30A■K-3LK□  |                | ✓      |                                |        |        |        |
| K3        | 334. b | SMH80S-0100-30A■K-3LK□  |                |        |                                | ✓      |        |        |
| K4        | 344. b | SMH110D-0105-20A■K-4LK□ |                |        |                                | ✓      |        |        |
| K5        | 354. b | SMH110D-0125-30A■K-4LK□ |                |        |                                | ✓      |        |        |
| K6        | 364. b | SMH110D-0126-20A■K-4LK□ |                |        |                                | ✓      |        |        |
| K7        | 374. b | SMH110D-0126-30A■K-4HK□ |                |        |                                |        |        | ✓      |
| K8        | 384. b | SMH110D-0157-30A■K-4HK□ |                |        |                                |        |        | ✓      |
| K9        | 394. b | SMH110D-0188-30A■K-4HK□ |                |        |                                |        |        | ✓      |
| KB        | 424. b | SMH130D-0105-20A■K-4HK□ |                |        |                                | ✓      |        | ✓      |
| KC        | 434. b | SMH130D-0157-20A■K-4HK□ |                |        |                                | ✓      |        | ✓      |
| KD        | 444. b | SMH130D-0210-20A■K-4HK□ |                |        |                                |        |        | ✓      |

| 上位机 | 数码管    | 电机型号                    | 适配驱动器            |                  |                                |                  |                  |                  |   |
|-----|--------|-------------------------|------------------|------------------|--------------------------------|------------------|------------------|------------------|---|
|     |        |                         | CD412S<br>FD412S | CD422S<br>FD422S | 带风扇                            | CD432S<br>FD432S | CD612S<br>FD612S | CD622S<br>FD622S |   |
|     |        |                         |                  |                  | CD422S-AF<br>FD422S-AF (CF、LF) |                  |                  |                  |   |
| KE  | 454. b | SMH150D-0230-20A■K-4HK□ |                  |                  |                                |                  |                  |                  | √ |
| F4  | 344. 6 | 85S-0025-05AAK-FLFN-02  |                  | √                |                                |                  |                  |                  |   |
| F6  | 364. 6 | 85S-0035-05AAK-FLFN-02  |                  | √                |                                |                  |                  |                  |   |
| F8  | 384. 6 | 85S-0045-05AAK-FLFN-02  |                  | √                |                                |                  |                  |                  |   |

表二 EASY 和 TunE 参数说明

| 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                           | <p>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 I/O 口的定义。</p> <p>0: 双脉冲模式 CW/CCW，<br/>1: 脉冲方向模式 P/D<br/>2: A/B 相控制模式<br/>3: RS422 输入双脉冲模式 CW/CCW<br/>4: RS422 输入脉冲方向模式 P/D<br/>5: RS422 输入 A/B 控制模式<br/>6: 通道 1 模拟速度模式<br/>7: 通道 2 模拟速度模式<br/>8: 上位机通讯控制模式</p> <p>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。<br/>指令类型 0-5，对应工作模式-4。<br/>指令类型 6-7，对应工作模式为-3。<br/>指令类型 8 对应工作模式 0，并且屏蔽 DIN1, DIN2, DIN3。</p> | 1    |
| EA03  | 电子齿轮比分子                        | 当 EA02 写入 0-5 时有效。   | 1000 |
| EA04  | 电子齿轮比分母                        | 默认十进制显示，超过 10000 的数值以十六进制显示。<br>(关于十进制和十六进制的显示方法见表四)。  | 1000 |
| EA05  | 模拟速度因数                         | 当 EA02 写入 6-7 时有效。<br>模拟输入电压和电机转速的关系，单位是 rpm/V。<br>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<br>限位开关<br>应用场合<br>负载类型 | <p>数码管从左到右分别代表：<br/>OUT2 的报警输出极性。0 表示输出常闭，1 表示输出常开。<br/>限位开关。0 代表默认限位开关设置 (DIN5 和 DIN6)，1 代表屏蔽所有限位开关。<br/>应用场合，影响控制环参数。0 代表点到点模式，1 代表 CNC 模式，2 代表主从跟随模式。<br/>负载类型，影响控制环参数。0 代表没有选择，1 代表皮带，2 代表滚珠丝杠。</p>  | 1001 |

| 数码管<br>编码 | 名称   | 描述  | 默认值            |
|-----------|------|---|----------------|
| EA00      | 保存参数 | 写入“1”保存所有参数。<br>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）。<br>写入“3”只重启驱动器。<br>写入“10”初始化参数。<br>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。<br>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。<br>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<br>丝杠：13 |
| Tn02      | 惯量比  | 负载惯量与电机惯量的比值(*0.1)。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： $K_{vp}=VC\_LOOP\_BW*K\_Load/4096$ ，其中VC_LOOP_BW为位置环带宽<br>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：5<br>丝杠：3   |
| Tn03      | 惯量测量 | 写入“1”使能电机并进行惯量比测量，此时电机会有轻微抖动，测量成功后将根据惯量比写入刚性等级4-13，且TN03显示1。<br>测定过程包含以下动作：<br>1、屏蔽所有外部信号的控制<br>2、工作模式切换为10<br>3、使能驱动器<br>4、对象0x2FF00C设为11<br>5、电机轴抖动并获取结果<br>6、还原所有外部信号的控制<br>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 | 自整定时电机移动的距离(*0.01)，最大值为0.4圈   | 0.22           |
| Tn00      | 保存参数 | 写入“1”保存所有参数。<br>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）。<br>写入“3”只重启驱动器。<br>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。

**表三 刚性等级表**

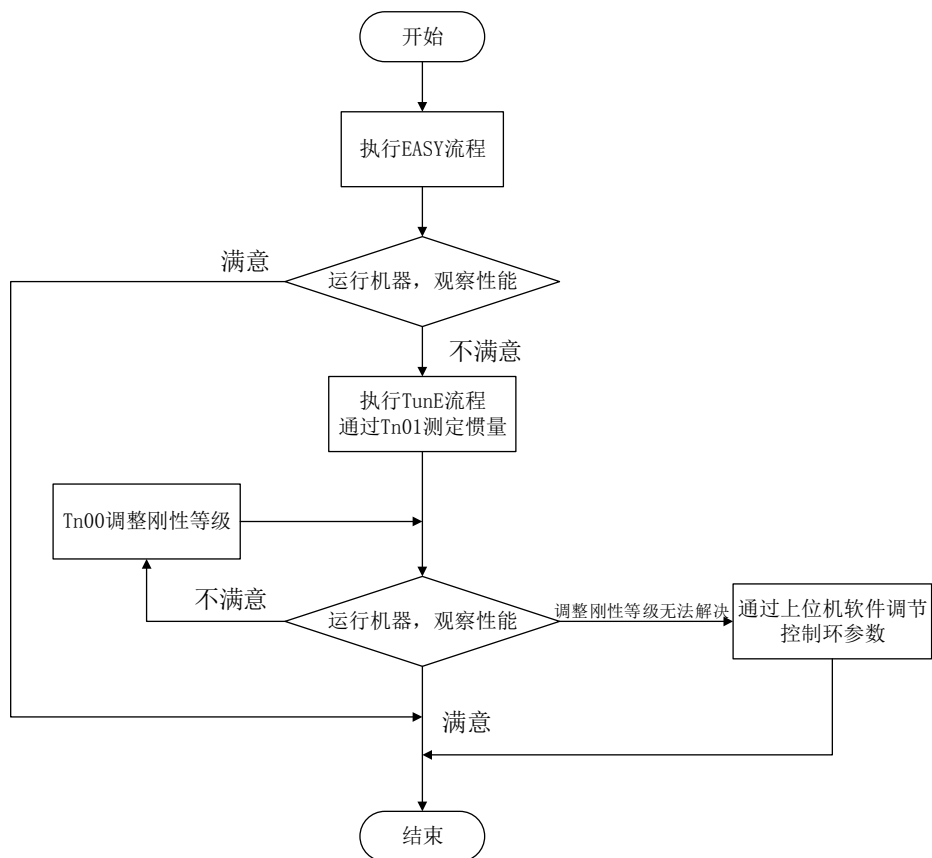
| 刚性等级 | 位置环比例增益 0[0.01Hz] | 速度环比例增益 0[0.1Hz] | 输出截止频率 [Hz] | 刚性等级 | 位置环比例增益 0[0.01Hz] | 速度环比例增益 0[0.1Hz] | 输出截止频率 [Hz] |
|------|-------------------|------------------|-------------|------|-------------------|------------------|-------------|
| 0    | 70                | 25               | 18          | 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  $K_{vp}$  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。

表四 按键操作说明

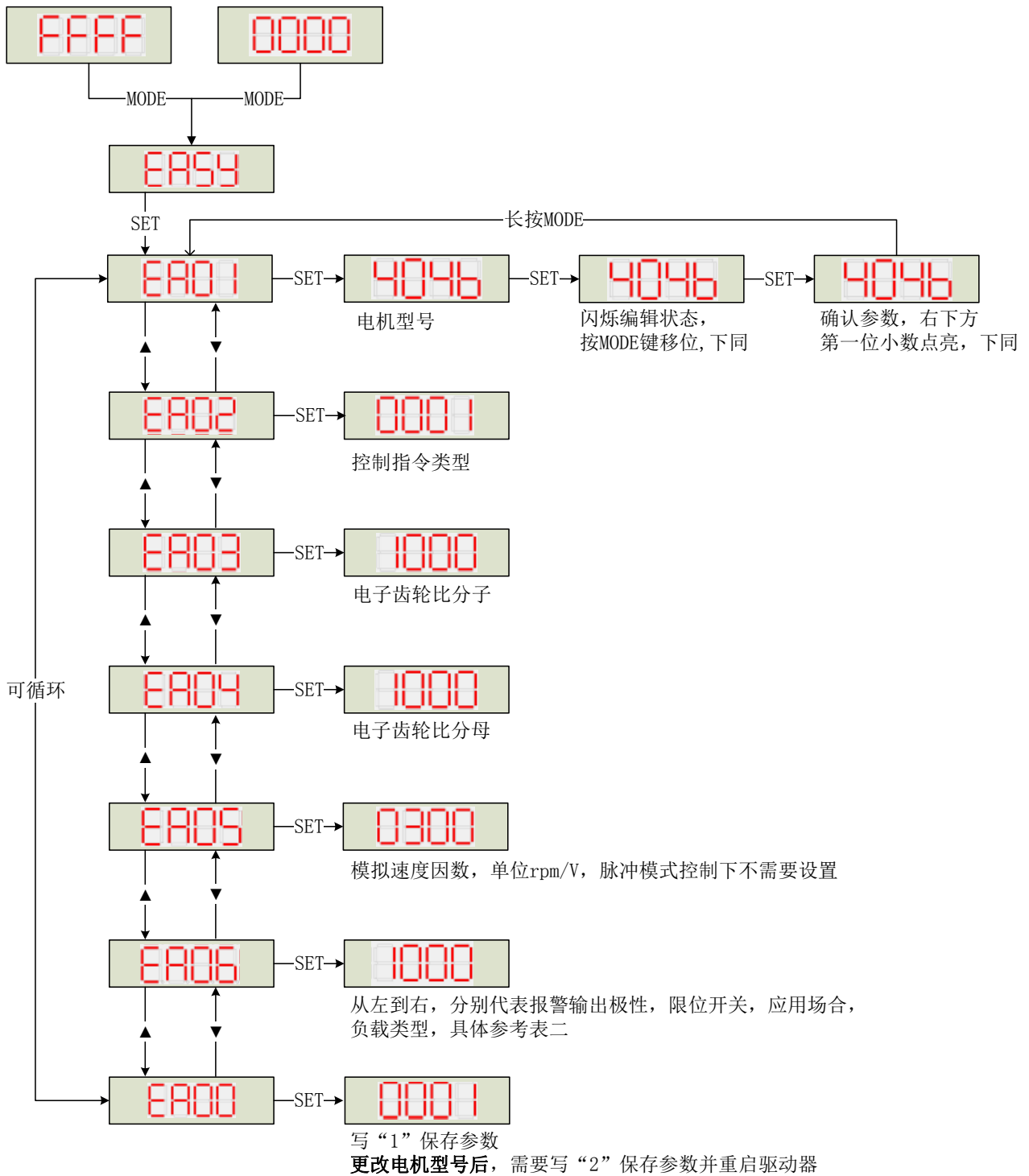
| 数字/点/键   | 功能  |
|----------|---|
| MODE     | 用于切换基本菜单<br>在参数调节中，短按用于移动要调节的位，长按退出到上一级状态 |
| ▲        | 按下▲键可增加设定值，长按可快速增加数值                      |
| ▼        | 按下▼键可减小设定值，长按可快速减小数值                      |
| ③        | “亮”代表十六进制，“灭”代表十进制                        |
| SET      | 用于进入选择的菜单<br>进入此参数设定状态<br>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。           |

操作流程图



## Easy 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。

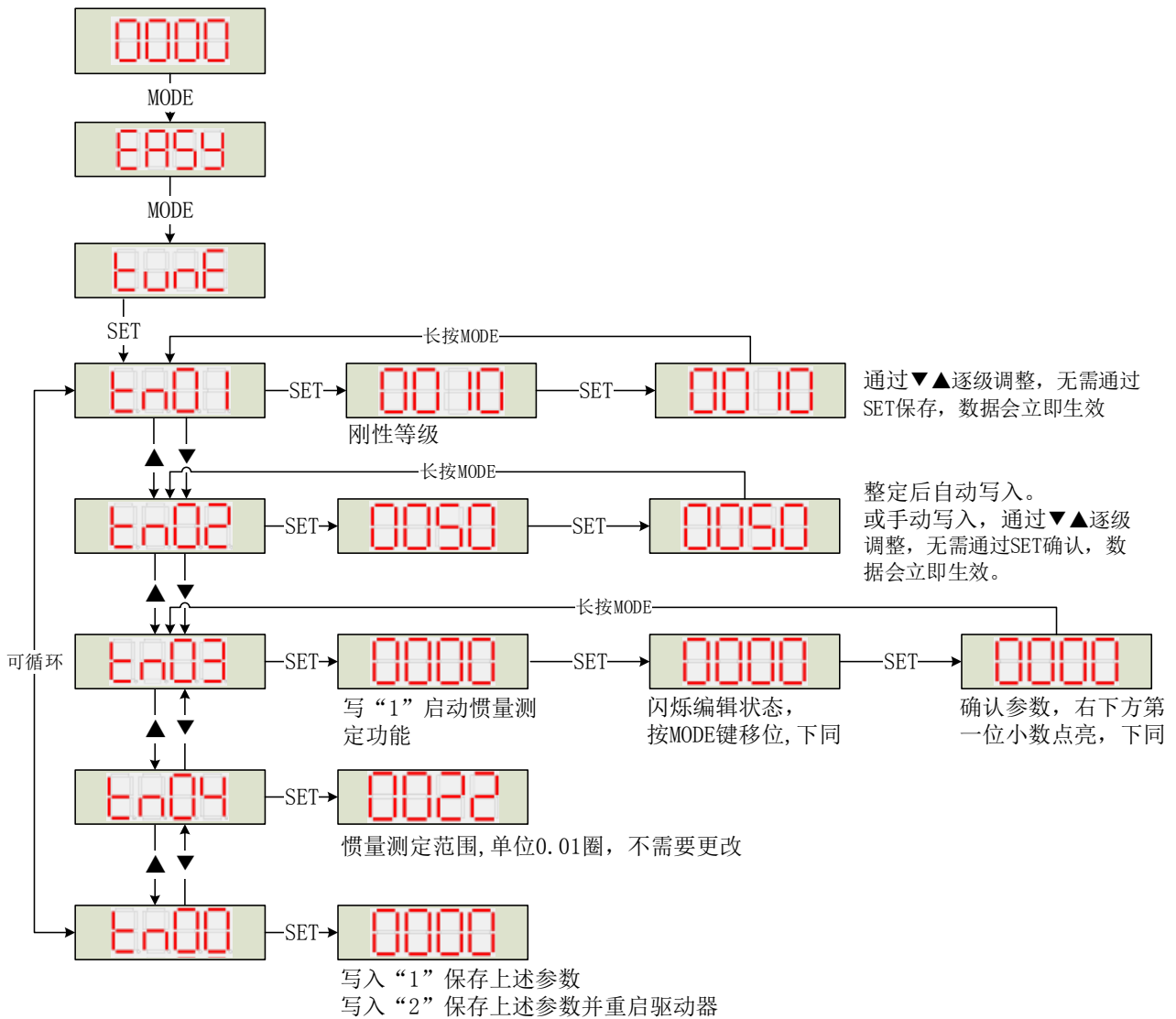


## TunE 流程图

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。

其中  代表 TunE,  代表 Tn01





# Motor Model Configuration Guide for Kinco 2S Servo V1.1

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

## Step of Easy Use

1. There are some frequently-used parameters in the menu of EASY, please set and confirm 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.

## Notice

1. Inertia measurement might cause shaking of machine, please 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 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.

## Reason for the failure of tuning

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

**Talbe-1 The configuration between motor and servo**

| PC | LED   | Motor Model             | Suitable Servo     |                  |                               |                  |                  |                  |
|----|-------|-------------------------|--------------------|------------------|-------------------------------|------------------|------------------|------------------|
|    |       |                         | CD412S<br>FD412S   | CD422S<br>FD422S | With Fan                      | CD432S<br>FD432S | CD612S<br>FD612S | CD622S<br>FD622S |
|    |       |                         |                    |                  | CD422S-AF<br>FD422S-AF(CF、LF) |                  |                  |                  |
| K@ | 404.b | Do not configure motor  | LED displays FFF.F |                  |                               |                  |                  |                  |
| W0 | 305.7 | SMC60S-0020-30E■K-3LKH  |                    | ✓                |                               |                  |                  |                  |
| W1 | 315.7 | SMC60S-0040-30E■K-3LKH  |                    | ✓                |                               |                  |                  |                  |
| W2 | 325.7 | SMC80S-0075-30E■K-3LKH  |                    | ✓                |                               |                  |                  |                  |
| WB | 425.7 | SMC130D-0100-20E■K-4LKP |                    |                  | ✓                             |                  |                  |                  |
| WC | 435.7 | SMC130D-0150-20E■K-4HKP |                    |                  |                               |                  | ✓                |                  |
| WD | 445.7 | SMC130D-0200-20E■K-4HKP |                    |                  |                               |                  | ✓                |                  |
| WO | 4F5.7 | SMC130D-0150-20E■K-4LKP |                    |                  |                               | ✓                |                  |                  |
| WP | 505.7 | SMC130D-0200-20E■K-4LKP |                    |                  |                               | ✓                |                  |                  |
| WQ | 515.7 | SMC130D-0300-30E■K-4HKP |                    |                  |                               |                  |                  | ✓                |
| WR | 525.7 | SMC130D-0300-20E■K-4HKP |                    |                  |                               |                  |                  | ✓                |
| Y0 | 305.9 | SMS60S-0020-30J■K-3LKU  |                    | ✓                |                               |                  |                  |                  |
| Y1 | 315.9 | SMS60S-0040-30J■K-3LKU  |                    | ✓                |                               |                  |                  |                  |
| Y2 | 325.9 | SMS80S-0075-30J■K-3LKU  |                    | ✓                |                               |                  |                  |                  |
| Z0 | 305.A | SMS60S-0020-30K■K-3LKU  |                    | ✓                |                               |                  |                  |                  |
| Z1 | 315.A | SMS60S-0040-30K■K-3LKU  |                    | ✓                |                               |                  |                  |                  |
| Z2 | 325.A | SMS80S-0075-30K■K-3LKU  |                    | ✓                |                               |                  |                  |                  |
| JZ | 5A4.A | SMH40S-0005-30J■K-4LKU  | ✓                  |                  |                               |                  |                  |                  |
| JY | 594.A | SMH40S-0010-30J■K-4LKU  | ✓                  |                  |                               |                  |                  |                  |
| MZ | 5A4.d | SMH40S-0005-30K■K-4LKU  | ✓                  |                  |                               |                  |                  |                  |
| MY | 594.d | SMH40S-0010-30K■K-4LKU  | ✓                  |                  |                               |                  |                  |                  |
| KZ | 5A4.b | SMH40S-0005-30A■K-4LKH  | ✓                  |                  |                               |                  |                  |                  |
| KY | 594.b | SMH40S-0010-30A■K-4LKH  | ✓                  |                  |                               |                  |                  |                  |
| K0 | 304.b | SMH60S-0020-30A■K-3LK□  |                    | ✓                |                               |                  |                  |                  |
| K1 | 314.b | SMH60S-0040-30A■K-3LK□  |                    | ✓                |                               |                  |                  |                  |
| K2 | 324.b | SMH80S-0075-30A■K-3LK□  |                    | ✓                |                               |                  |                  |                  |
| K3 | 334.b | SMH80S-0100-30A■K-3LK□  |                    |                  |                               | ✓                |                  |                  |
| K4 | 344.b | SMH110D-0105-20A■K-4LK□ |                    |                  |                               | ✓                |                  |                  |
| K5 | 354.b | SMH110D-0125-30A■K-4LK□ |                    |                  |                               | ✓                |                  |                  |
| K6 | 364.b | SMH110D-0126-20A■K-4LK□ |                    |                  |                               | ✓                |                  |                  |
| K7 | 374.b | SMH110D-0126-30A■K-4HK□ |                    |                  |                               |                  |                  | ✓                |
| K8 | 384.b | SMH110D-0157-30A■K-4HK□ |                    |                  |                               |                  |                  | ✓                |
| K9 | 394.b | SMH110D-0188-30A■K-4HK□ |                    |                  |                               |                  |                  | ✓                |
| KB | 424.b | SMH130D-0105-20A■K-4HK□ |                    |                  |                               | ✓                |                  | ✓                |
| KC | 434.b | SMH130D-0157-20A■K-4HK□ |                    |                  |                               | ✓                |                  | ✓                |
| KD | 444.b | SMH130D-0210-20A■K-4HK□ |                    |                  |                               |                  |                  | ✓                |

| PC            | LED   | Motor Model             | Suitable Servo   |                  |          |                  |                  |                  |
|---------------|-------|-------------------------|------------------|------------------|----------|------------------|------------------|------------------|
|               |       |                         | CD412S<br>FD412S | CD422S<br>FD422S | With Fan | CD432S<br>FD432S | CD612S<br>FD612S | CD622S<br>FD622S |
| LED CODE:EA01 |       |                         |                  |                  |          |                  |                  |                  |
| KE            | 454.b | SMH150D-0230-20A■K-4HK□ |                  |                  |          |                  | ✓                |                  |
| F4            | 344.6 | 85S-0025-05AAK-FLFN-02  |                  | ✓                |          |                  |                  |                  |
| F6            | 364.6 | 85S-0035-05AAK-FLFN-02  |                  | ✓                |          |                  |                  |                  |
| F8            | 384.6 | 85S-0045-05AAK-FLFN-02  |                  | ✓                |          |                  |                  |                  |

**Table-2 EASY and TunE Parameters**

| LED Display | Parameters  | Description   | Default |
|-------------|---|---|---------|
| EA01        | Motor Model   | Search Talbe-1 for motor model  | 404b    |
| EA02        | Command Type  | <p>Modify the first LED on the right to change the command type, meanwhile the operation mode and definition of IO will change.</p> <p>0: CW/CCW<br/>1: P/D<br/>2: A/B phase control<br/>3: CW/CCW by RS422<br/>4: P/D by RS422<br/>5: A/B phase control by RS422<br/>6: Analog Speed by AN1<br/>7: Analog Speed by AN2<br/>8: Communication</p> <p>Notice: It is invalid when users set 3,4,or 5 into EA01 in FD2S and CD2S<br/>When command type is 0-5, the control mode is -4.<br/>When command type is 6-7, the control mode is -3.<br/>When command type is 8, the control mode is 0, and DIN1, DIN2, DIN3 will be shielded</p> | 1       |
| EA03        | Gear Factor numerator   | Valid when EA02 is set to 0-5.<br>The default display is in decimal.  | 1000    |
| EA04        | Gear Factor denominator   | If the number is bigger than 10000, the display is in hexadecimal.<br>Notice: please see the different way of LED display between decimal and hexadecimal in Table-4.   | 1000    |
| EA05        | Analog Speed Factor   | Valid when EA02 is set to 6 or 7.<br>The relationship between Analog input voltage and speed of motor, and the unit is rpm/V<br>Perhaps to be invalid if the factor is too big when the encoder is with high resolution.  | 300     |
| EA06        | 1.Load Type<br>2.Application<br>3.Limited Switch<br>4.Polar of Alarm Output | <p>The meaning of each LED from left to right.</p> <p>(1) Polar of Alarm Output.0 represent normally closed contacts, 1 represent normally open contacts.<br/>(2) Limited Switch, 0 represent keeping the default,1 represent shielding all the limited switch.<br/>(3)Application, influences the control loop. 0 represent P2P,1 represent CNC, 2 represent Master/Slave mode<br/>(4) Load Type, influences the control loop. 0 represent nothing, 1 represent belt, 2 represent ball screw.</p>  | 1001    |

| LED Display   | Parameters         | Description  | Default             |
|---|--------------------|--|---------------------|
| EA00  | Saving Parameters  | Write "1" to save all the parameters.<br>Write "2" to save all the parameters and restart the servo, users <b>MUST</b> reboot the driver if changing the motor type)<br>Write "3" to reboot the servo<br>Write "10" to initialize the parameters<br>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.<br>Notice: For safety, when setting Tn01, the data will be valid immediately, and the parameters should be set level by level.   | belt:10<br>screw:13 |
| Tn02  | Inertia Ratio      | 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: $K_{vp}=VC\_LOOP\_BW \times K\_Load/4096$ . VC_LOOP_BW represent the BW of position loop.<br>Notice: For safety, when setting Tn02, the data will be valid immediately, and the parameters should be set level by level.   | belt:3<br>screw:5   |
| Tn03  | Inertia measuring  | 1) Write 1 to enable the motor and start the inertia measuring.<br>Set this parameter to 1 will run the inertia measuring function. It contains the following operation:<br>1. take over the enable function and the operation mode function of the IO function<br>2. switch the operation Mode to 11<br>3. enable the driver<br>4. set 0x2FF00C to 11<br>5. start shaking and get the result<br>6. give back the enable function and the operation mode function of the IO function<br>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.<br>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.<br>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),maximum   | 0.22                |
| Tn00  | Saving parameters  | Write"1"to save all the parameters.<br>Write"2"to save all the parameters and restart the servo ,<br>Write "3" to reboot the servo<br>Write "10" to initialize the parameters<br>Notice: Users <b>MUST</b> 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 EAO1, after that the parameters become default and the LED will display in a complete way. |                    |  |                     |

**Table-3 Stiffness**

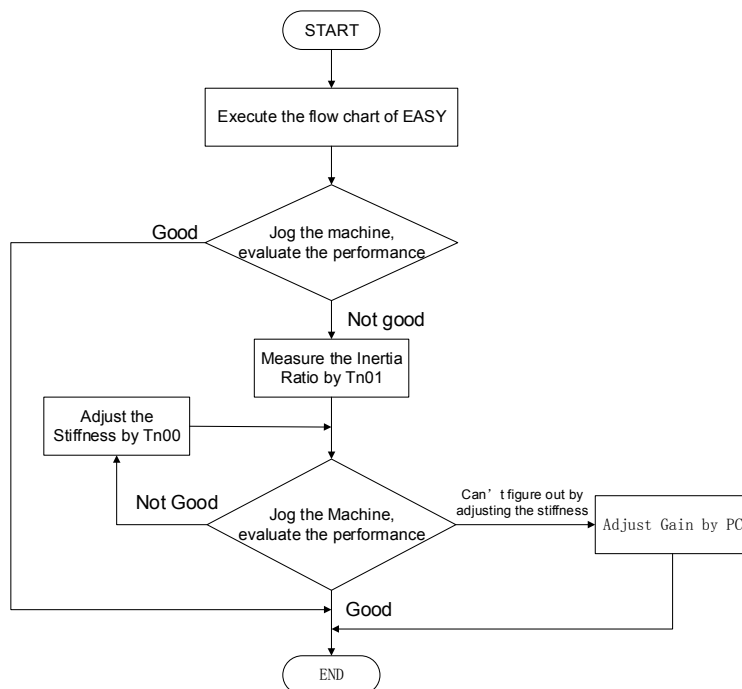
| Stiffness | Kpp/0.01Hz] | Kvp/[0.1Hz] | Output filter[Hz] | Stiffness | Kpp/[0.01Hz] | Kvp/0[0.1Hz] | Output filter[Hz] |
|-----------|-------------|-------------|-------------------|-----------|--------------|--------------|-------------------|
| 0         | 70          | 25          | 18                | 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 setting stiffness or inertia ratio make Kvp more than 4000, it isn't useful to raise stiffness any more, and it will decrease band width if increase the inertia ratio.  
If the resolution of encoder is less than 80000 PPR, the range of stiffness is from 0 to 22.

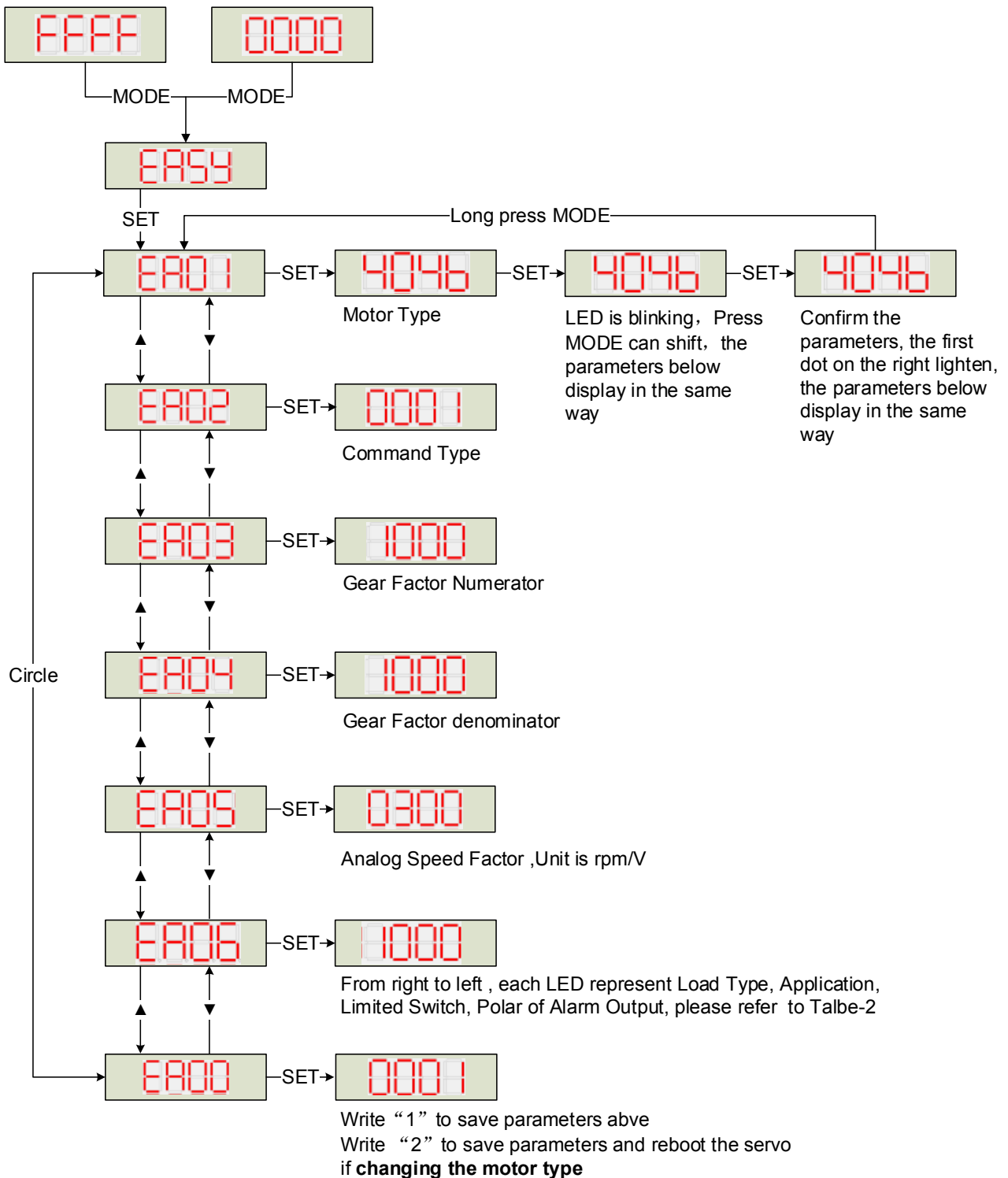
**Table-4 Operation of Key**

| Description   |  |
|---------------|--|
| MODE          | Switch menus:<br>When setting parameters, press can shift, long 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             | Shining represent displaying in hexadecimal, otherwise in decimal.   |
| SET           | Enter the selected menu;<br>Enter the status of parameters setting;<br>affirm the parameters;  |
| Display FFF.F | Do not configure motor, please operate according to the flow chart of “Easy” and make it sure to save the parameters and reboot the servo. |

**Flow Chart of Adjusting Gain**

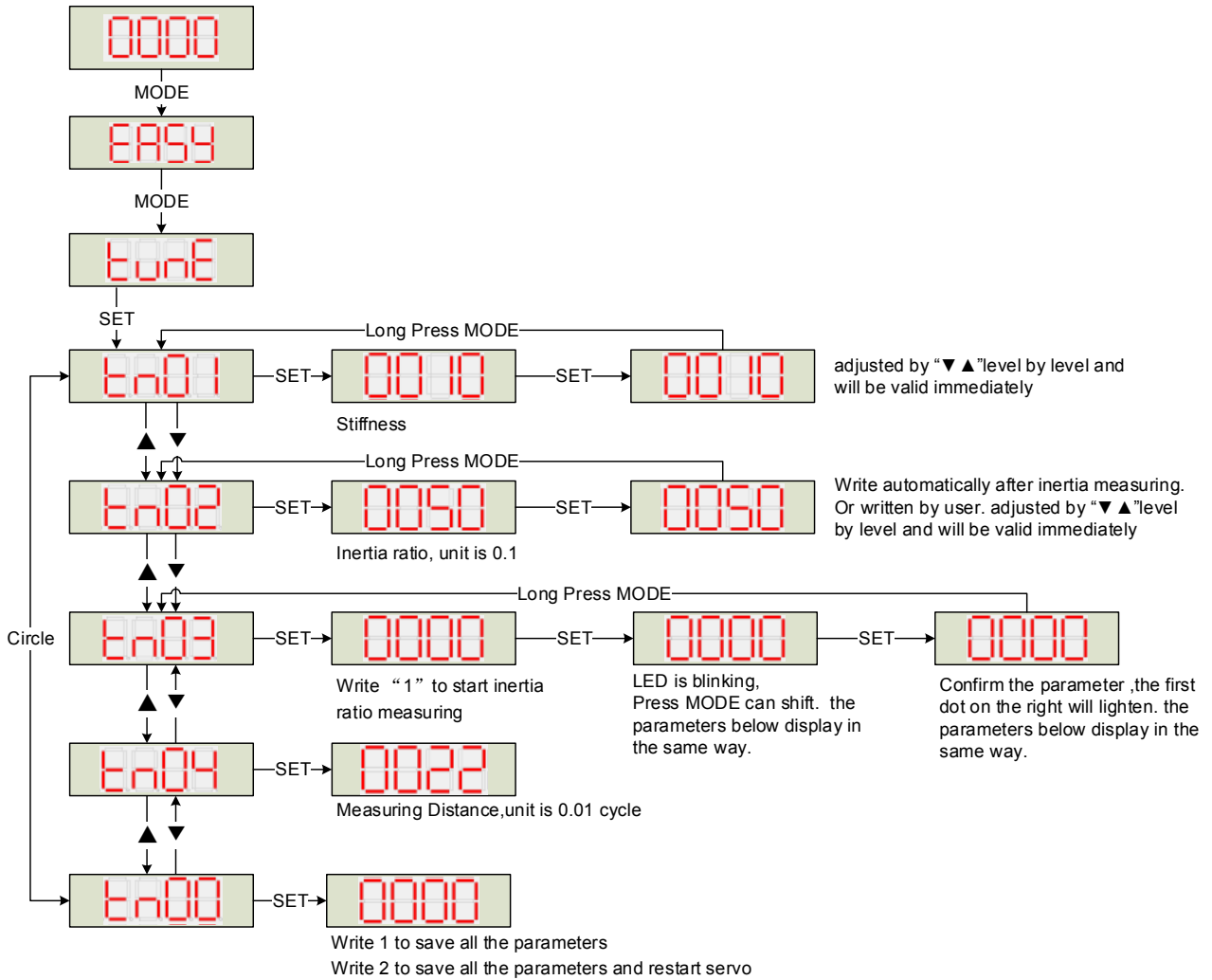


## Flow Chart of EASY



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

## Flow Chart of TuneE



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.