Kinco Servo User Manual of Easy Use Function V1.0

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

Steps of Easy Use

1. There are some frequently-used parameters in the menu of EASY, please set and confirm one by one.
   1.1 If motor type (EA01) hasn't been changed, please change EA00 to 1 to save all parameters;
   1.2 If motor type (EA01) has been changed, please change EA00 to 2 to save all parameters **and reboot servo.**
   1.3 After completing process of EASY, please run the servo. If the performance is satisfying, it is unnecessary to execute the process of TunE. Otherwise, please execute the process of TunE.
2. Parameters will become effective immediately after inputted in TunE but parameters can only be saved by Tn00.
   2.1 Please write 1 into Tn03 to start inertia measuring and then servo will adjust parameters of control loop automatically according to measured result.
   2.2 Please run the servo. If the performance is still unsatisfying, please change the stiffness by Tn01.

Notice

1. Inertia measurement might cause shaking of machine, please shut off the power or driver immediately.
2. It is strongly recommended that execute the flow of TunE after the flow of EASY and adjust the stiffness.
3. EASY and TunE menu are designed to solve the setting of servo by button originally. If users initialize parameters by PC software, EASY and TunE will only show 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. Wrong motor type configuration；
3. Much too low of Stiffness；
4. Mechanical gap existing；
5. Accelerated or decelerated torque is smaller than fiction torque.

Talbe-1 Motor and Servo configuration

PC	LED	Motor Model	Suitable Servo					
LED CODE:EA01			CD412S FD412S	CD422S FD422S	With Fan CD422S-AF FD422S-AF(CF、LF)	CD432S FD432S	CD612S FD612S	CD622S FD622S
K@	404.b	Without motor configuration	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		√				
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□						√
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 Parameters instruction

LED Display	Parameters	Description	Default
EA01	Motor Model	Refer as Talbe-1, users should save and reboot servo after changing	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 be changed. 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, it means the servo is FD2S and DIN1, DIN2, DIN3 will be shielded	1
EA03	Gear Factor numerator	Valid when EA02 is set to 0-5. Default display is in decimal. 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
EA04	Gear Factor denominator		1000
EA05	Analog Speed Factor	Valid when EA02 is set to 6 or 7. The relationship between Analog input voltage and speed of motor is rpm/V Perhaps to be invalid if the factor is too big when the motor is equipped with a high resolution encoder.	300
EA06	1. Polar of Alarm Output 2.Application 3.Limited Switch 4. Load Type	The meaning of each LED from left to right: (1) Polar of Alarm Output. 0 represent normally closed contacts, 1 represent normally open contacts. (2) Limited Switch. 0 represent keeping the default,1 represent shielding all limited switch. (3) Application. It influences the control loop. 0 represent P2P,1 represent CNC,2 represent Master/Slave mode (4) Load Type. It influences the control loop. 0 represent nothing, 1 represent belt, 2 represent ball screw.	1001

LED Display	Parameters	Description	Default
EA00	Saving Parameters	Write “1” to save all the parameters. Write “2” to save all the parameters and reboot the servo, users **MUST** reboot the driver if changed 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 suddenly, the gain will change remarkably and the machine will be unstable. Notice: For safety, when setting Tn01, the data will be valid immediately, so the parameters should be set level by level.	belt:10 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: Kvp=VC_LOOP_BW×K_Load/4096. VC_LOOP_BW represent the BW of position loop. Notice: For safety, when setting Tn02, the data will be valid immediately, so the parameters should be set level by level.	belt:3 screw:5
Tn03	Inertia measuring	1) Set 1 to enable motor and start inertia measuring. It contains the following operation: 1. shield all the control from external I/O 2. switch operation Mode to 10 3. enable the driver 4. set 0x2FF00C to 11 5. start shaking the shaft of motor and get the result 6. restore all the control of external I/O 2) After confirming, the LED will stop flashing and show the Tuning result. While 1 means success; -1,-2,-3,-4 means failure due to some reasons. If it is successful, the control loop parameters will be set automatically and the stiffness will be set to 4-13 according to inertia ratio and Tn03 will show 1. If it is failed, the stiffness will be set to 10 and the inertia ratio will be set to 30(*0.1) and Tn03 will show error code.	-
Tn04	Measuring Distance	Distance of inertia measuring(*0.01), maximum is 0.4 round	0.22
Tn00	parameters Saving	Write“1”to save all the parameters. Write“2”to save all the parameters and reboot the servo , Write “3” to reboot the servo Write “10” to initialize the parameters Notice: Users **MUST** reboot the driver if changed the motor type.	

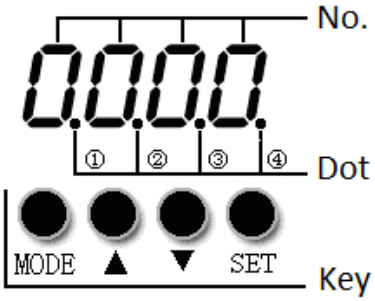
LED Display	Parameters	Description	Default
4. Notice: EASY and TunE menu are designed to solve the setting of servo by button originally. If users initialize parameters by PC software, EASY and TunE will only show EA00, EA01 and Tn00 for safety. Users have to confirm motor type by EA01.After that, the parameters become default and the LED will display in a complete way.			

Table-3 Stiffness level

Stiffness level	Kpp/0.01Hz]	Kvp/[0.1Hz]	Speed feedback filter[Hz]	Stiffness level	Kpp/[0.01Hz]	Kvp/0[0.1Hz]	Speed feedback filter [Hz]
0	70	25	100	16	1945	700	480
1	98	35	100	17	2223	800	560
2	139	50	100	18	2500	900	620
3	195	70	100	19	2778	1000	700
4	264	95	100	20	3334	1200	800
5	334	120	100	21	3889	1400	900
6	389	140	120	22	4723	1700	1000
7	473	170	120	23	5556	2000	1000
8	556	200	140	24	6389	2300	1000
9	639	230	160	25	7500	2700	1000
10	750	270	180	26	8612	3100	1000
11	889	320	200	27	9445	3400	1000
12	1056	380	240	28	10278	3700	1000
13	1250	450	300	29	11112	4000	1000
14	1500	540	360	30	12500	4500	1000
15	1667	600	420	31	13889	5000	1000

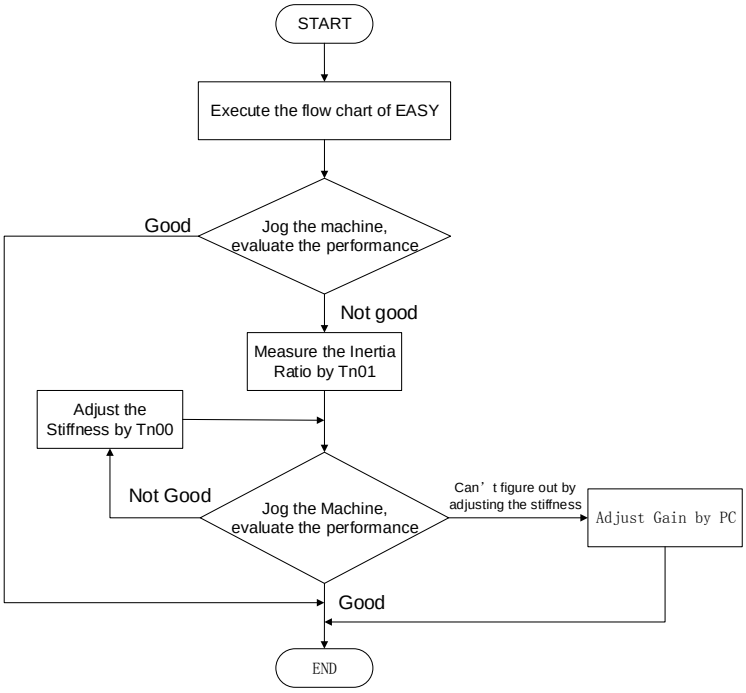
Notice: When setting stiffness or inertia ratio, it is useless to raise stiffness any more if Kvp is more than 4000. And it will decrease band width if going on increasing the inertia ratio.
If the resolution of encoder is less than 80000 PPR, the range of stiffness is from 0 to 22.

Table-4 Operation of Panel

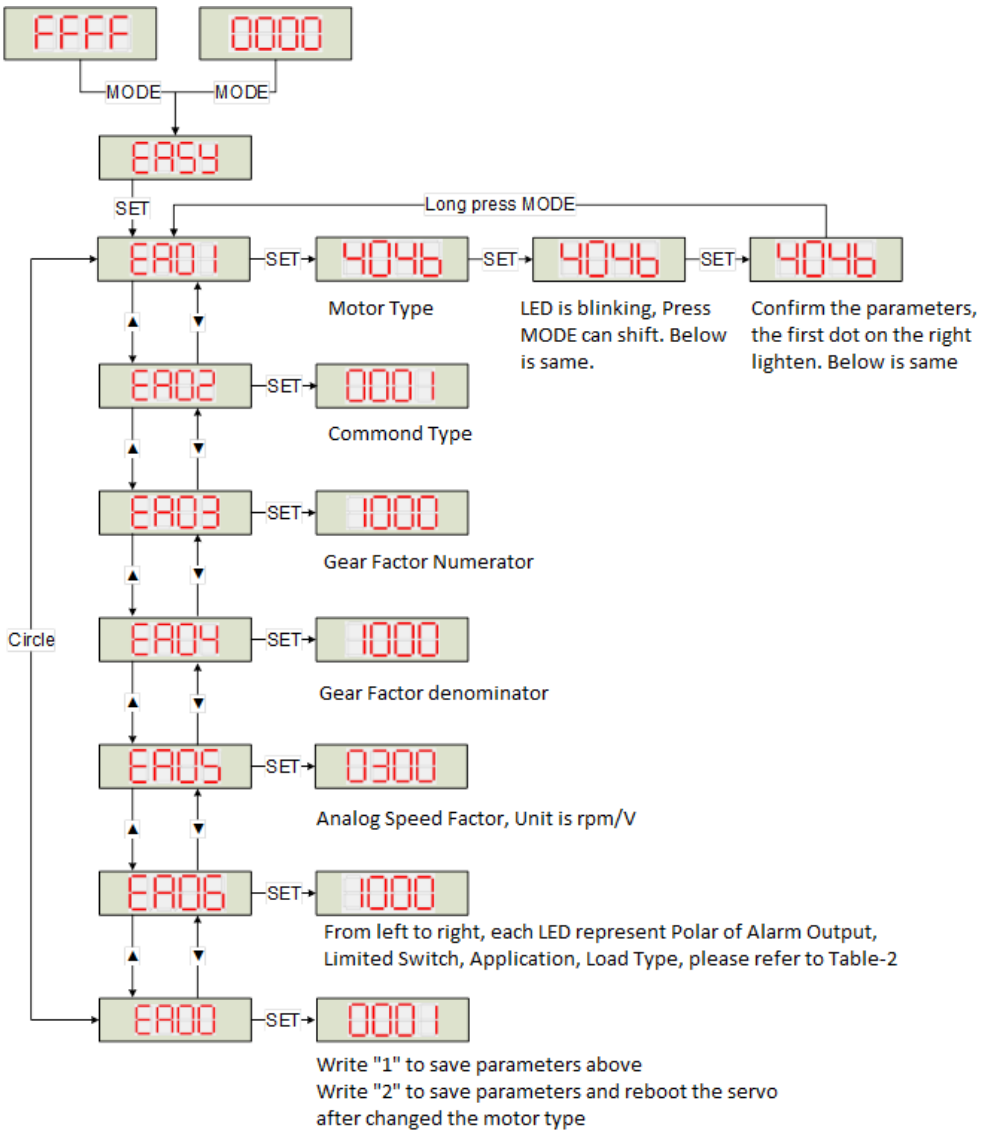


Description	
MODE	Switch menus; When setting parameters, press can shift, long press can return to the previous menus.
▲	Press▲ can increase the number, long press can increase quickly
▼	Press▼ can decrease the number, long press can decrease quickly
③	Shining represent displaying in hexadecimal, otherwise in decimal.
SET	Enter the selected menu; Enter the status of parameters setting; affirm the parameters;
Display FFF.F	Without motor configuration, 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

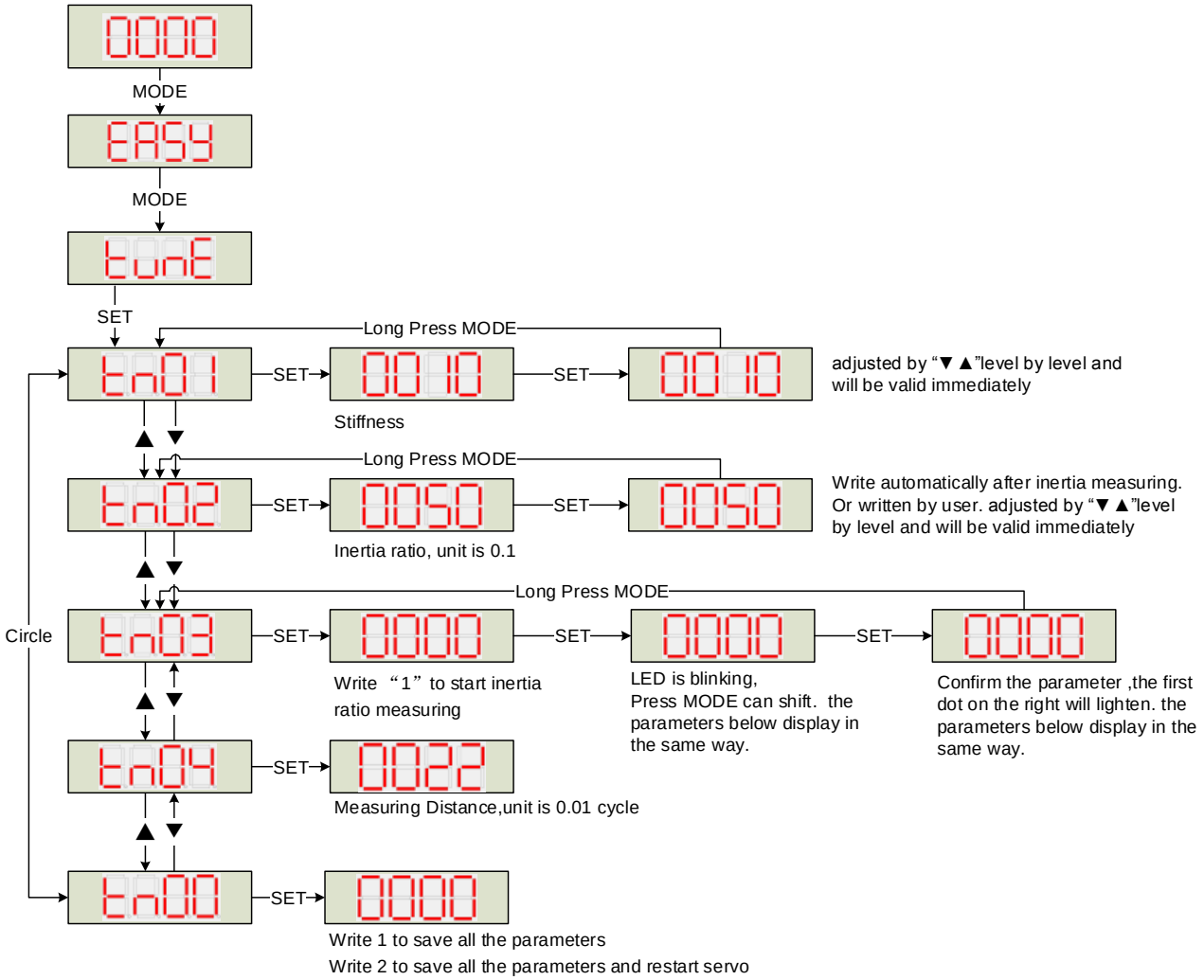


Flow Chart of EASY



Notice: Must execute in order. Exit automatically if there is no operation in 60s and users have to start again. The data input will be valid immediately, but need to be saved by EA00

Flow Chart of TunE



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.