

# KING MAX HOBBY®

## TS-2 V2.0 RC Multifunction Tester Instruction Manual

Thank you for purchasing KINGMAX products. Please read this manual carefully before using so that you can operate the product proficiently. Please keep the purchase receipt, warranty and the instructions.

The TS-2 multifunction tester is carefully crafted by KINGMAX. It is the most comprehensive multifunction tester for aircraft models on the market, providing the most comprehensive testing needs for model enthusiasts.

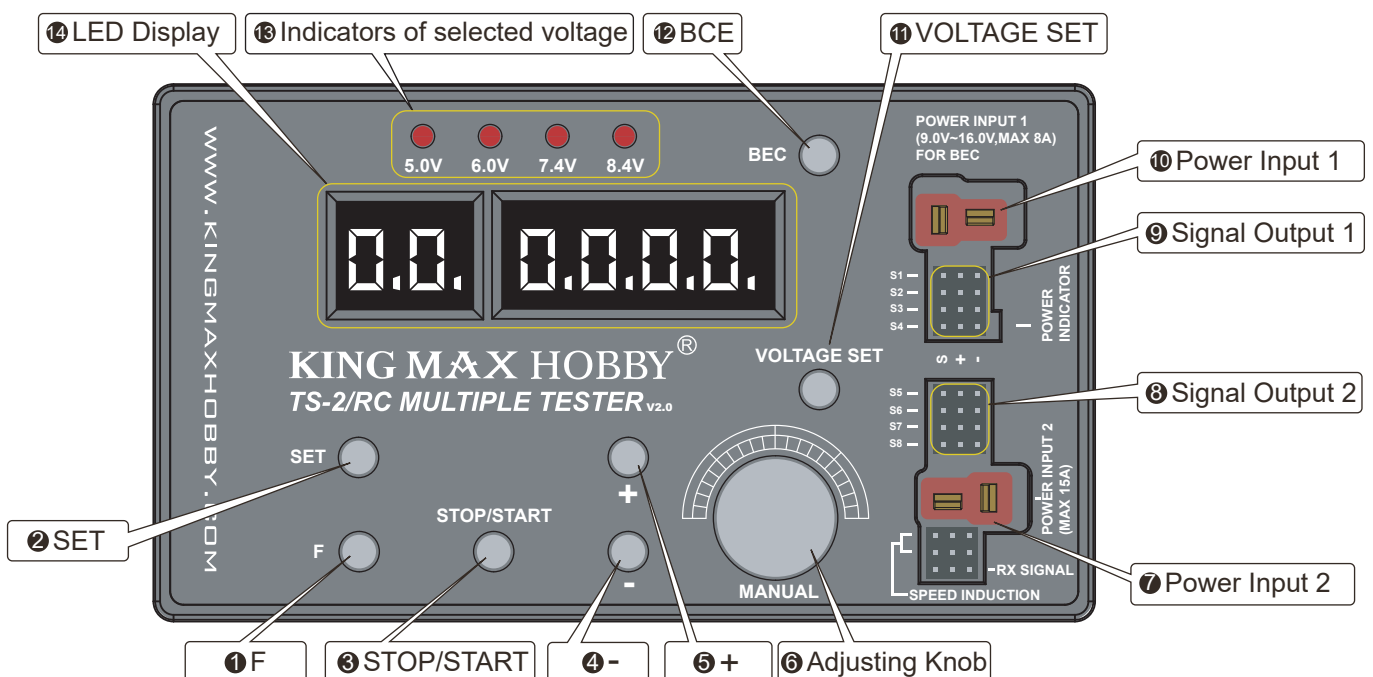
### Specifications and features:

- 6-digit red ultra-high brightness LED digital display;
- Input voltage range entry 1: 9V~16.8V (supports 3S~4S), entry 2: any voltage;
- With high current BEC step-down, output current up to 8A;
- Optional BEC output voltage, 5V 6V 7.4V 8.4V four voltage options.
- Up to 1us signal measurement and output accuracy.
- Flexible and adjustable signal pulse width. There are four modes for the servo signal output range, 0.5-1.0 1.0~2.0 0.5~2.5 custom range (adjustable between 0.5~2.5), and the four modes can be selected by pressing the SET button when the power is turned on.
- Product size: 139.5mm x 79.5mm x 32.5mm
- Product weight: 160g

### Product functions:

- Servo rotation direction and range test;
- Servo sensitivity test;
- Selection of servo automatic rotation and manual rotation;
- Transmitter channel pulse width can be measured;
- Servo working life can be recorded;
- Servo positioning accuracy test;
- Servo speed test;
- Servo angle and centering test;

### Product function introduction:



- ① **F key:** main function option, as shown in the figure, press the F key to select F1-F9 Switch between the main function options.
  - ② **SET key:** secondary function option setting,
  - ③ **STOP/START key:** start or pause the selected main function option,
  - ④ **- key:** decrease the setting value of the main function or secondary function option,
  - ⑤ **+ key:** increase the setting value of the main function or secondary function option,
  - ⑥ **MANUAL-adjustment knob:** manually adjust the value of the output pulse signal,
  - ⑦ **DC power input port 2:** no voltage limit, maximum current 15A, direct supply pulse signal output port 2,
  - ⑧ **Pulse signal output port 2:** connect 4 servers from S5~S8 at the same time for testing, voltage and current are directly supplied by power input port 2,
  - ⑨ **Pulse signal output port 1:** connect 4 servers from S1~S4 at the same time for testing, voltage and current are provided by BEC,
  - ⑩ **DC power input port 1:** 9V~16V DC power input terminal maximum current 8A, this port must be powered on to start the tester,
  - ⑪ **VOLTAGE SET key:** When using pulse signal output port 1, it is used to select the required output voltage.
  - ⑫ **BEC:** When using pulse signal output port 1, it is used to connect or disconnect the power supply.
  - ⑬ **Voltage display light:** Displays the selected output voltage.
  - ⑭ **Display:** Displays each function table or test value.
- SPEED INDUCTION:** Infrared photoelectric speed test interface (infrared photoelectric switch head is required)
- RX SIGNAL:** Transmitter and receiver signal test interface.
- POWER INDICATOR:** BEC power indicator light, the light is on when connected and off when disconnected.

## How to use:

### 1. First select the width range of the pulse signal:

Generally, the working signal range of the servo is from 1ms to 2ms or 0.5ms to 2.5ms. This tester provides four modes for selection:

#### **A: 1.0 2.0 Output width is 1.0~2.0ms**

Adjustment method: After power on, A 1.0 2.0 is displayed and flashes. At this time, press the STOP/START button to select and advance to the test mode.

#### **B: 0.5 2.5 Output width is 0.5~2.5ms**

Adjustment method: When the display "A 1.02.0" flashes, press the SET key to display "B 0.5~2.5". At this time, press STOP/START to select and jump to the test mode.

#### **D: 0.5 1.0 Output pulse width is 0.5~1.0ms (narrow frequency)**

Adjustment method: When the display "A 1.02.0" flashes, press the SET key to display "B 0.5~2.5". Press the SET key again to display "D 0.5~1.0". At this time, press STOP/START to select and jump to the test mode.

#### **CL~CH:**

Free adjustment, adjustable range: minimum value between 0.5~1.5ms, maximum value between 1.5~2.5ms.

Adjustment method: when "D 0.5~1.0" is displayed, press SET key to display "CL XXXX", which indicates the minimum value of the signal, press "+" "-" key to adjust the minimum value. After adjusting the CL value, press SET key again to display "CH XXXX", which indicates the maximum value of the signal, press "+" "-" key to adjust the maximum value, press SET key multiple times to switch between A, B, D, CL, and CH, press STOP/START to select after adjustment, enter the test function.

### 2. BEC output voltage adjustment:

Press VOLTAGE SET key, the output voltage will switch between 5V, 6V, 7.4V, 8.4V, the corresponding indicator lights on, then press BEC key to start BEC output, at this time the POWER indicator light indicates output. In order to protect the servo, after adjusting the output voltage, You need to press the BEC key to manually start BEC if BEC has no output.

**Note:** Before starting BEC, you must confirm whether the BEC output voltage exceeds the working voltage of the servo. If it exceeds, the servo will burn out.

### 3. Selection and setting of main and secondary functions:

#### **F1: Use the knob to adjust the output pulse width**

Function description:

The tester outputs a control signal with a signal period of 20mS (that is 50Hz). Twisting the potentiometer knob can adjust the output signal width. Press the +- key to adjust the output signal width. Each pressing increases or decreases the output by one step. The step is determined by adjusting "C3" and the range is 1~100.

Adjustment of related parameters of F1 function

Adjustment of step amount "C3": Pressing the SET key will display the related parameter step amount "C3" under function F1. After entering the adjustment state, C3 is displayed on the left and the step value is displayed on the right.

The number on the right is jumping. Press the +/- key once to add/subtract 1 to the number on the right. Press and hold continuously to make quick adjustments. Adjustable range 1~100.

Exit the parameter adjustment state of F1 function

In the parameter adjustment state, press F key to exit the adjustment state and return to the normal state of F1. The parameters set when exiting will be stored, even after power failure, and automatically loaded the previous settings the next time you use it.

### **F2: Automatic output pulse width adjustment**

Function description:

The servo signal automatically changes from minimum to maximum and then to minimum. When the automatic change is over, you can press STOP/START key to pause the operation.

Related parameter adjustment of F2 function:

Automatic swing speed adjustment "C5": Press SET key to display F2 related parameter "C5", at this time the number on the right flashes, press +/- to adjust. The smaller the number, the faster the servo swings.

Exit the parameter adjustment state of F2 function

In the parameter adjustment state, press F key to exit the adjustment state and return to the normal state of F2.

The parameters set when exiting will be stored, even after power failure, and automatically loaded the previous settings the next time you use it.

### **F3: Three-point automatic test**

Function description:

Entering the F3 function automatically cycles the output from its minimum value to the intermediate value, then to maximum value, back to intermediate value, then to the minimum value, and then repeats. Pressing the STOP/START key will pause or resume the function. While in the paused mode the output can be toggled by using the + / - key.

The values of C4 and C5 regulates the F3 function. To adjust the value of C4 press the SET key. The mid-point's value will be displayed on the right side of the LED as a flashing number. Note that the value increments and decrements by one each time the + / - key is pressed. Continuously holding the + / - key for four seconds will then advance the value rapidly.

The value of C5 will adjust the three-point speed of F3's function. Advance from the C4 value to C5 by pressing the SET key. The value of C5 will be displayed on the right side of the LED display as a flashing number. Adjust C5's value with the + / - keys. Note that the larger the value of C5, the slower the transition speed. The output will increment or decrement once every 10 seconds when the value of C5 is 100. To exit either C4 or C5 mode press the F key.

The TS-2 will then return to the F3 function.

### **F4: Cycle test**

Function description:

During the test, the servo signal swings back and forth between the maximum and minimum values. Each time it moves, the digital tube automatically adds 1 and stops when the set value is reached. During the cycle test, the digital tube function window no longer displays F4, and all of it is used to display the number of swings. The STOP/START key is used to start or pause the test.

Test value cleared to 0: first press the STOP/START key to pause the test, press and hold the "-" key in the pause state, and after about 3 seconds, all the data will become 0, then press the STOP/START key to start a new test.

Related parameter adjustment of the F4 function:

F4 cycle test has two parameters. Press the SET key, the left two digits of the digital tube jump, press it again, the middle two digits jump, and press it again, the right two digits jump. When jumping, it means that these two digits are in a settable state. The +/- keys correspond to a jumping digit each. Press the "-" key to adjust the left digit, and press the "+" key to adjust the right digit. When adjusting, the corresponding digits "0~9" change in a cycle, and select the number you want.

The maximum setting is "999999" times.

Action speed adjustment "C5":

Press the FSET key to display the "C5" speed setting state, the number on the right flashes, and the value is adjusted by +/- . The larger the value, the slower the speed. When the value is 100, it changes once every 10 seconds. Set the number of actions for this test: Press the SET key in the "C5" setting state. Press the FSET key to cycle between the action number setting and the action speed adjustment "C5".

Exit the parameter adjustment state of the F4 function

Press the F key to exit the adjustment state and return to the F4 life test state.

### **F5: Dear band test**

Function description:

The TS-2's output signal will oscillate continuously in a relatively small range of microsecond ( $\mu$ s) values from 1 to 30.

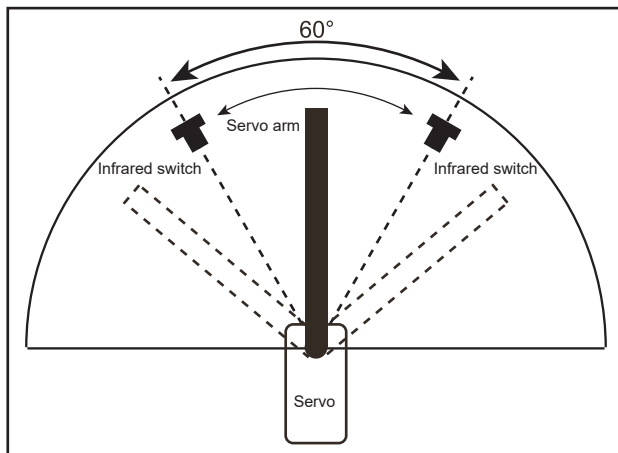
To increase the oscillation range use the "+" key. To decrease the oscillation range use the "-" key. When a servo advances from no movement to a slight movement, the dead-band value is display as microseconds. Note that the servo cannot respond to a signal value that is smaller than its dead-band. A one microsecond range is not measurable because the step values of the TS-2 are one microsecond; i.e.,  $1 + 0 = 1$ , which is steady state for a servo.

Pressing the F key will advance the TS-2 from the F5 function to the F6 function.

### **F6: Infrared photoelectric speed test**

Function description:

Install two infrared photoelectric switches with the servo shaft as the center and at an angle of 60 degrees. The servo arm needs to be extended to the center of the infrared switch to ensure that it can pass smoothly and block the infrared when rotating. When the infrared is blocked by the sensor, one switch starts timing and the other stops timing. The time displayed in the data window is the speed of the servo, and the unit is X.XXXs/60 degrees. Press the STOP/START key to pause or continue the test. Press the F key to exit the test and move to the F7 current test state. The schematic diagram is as follows:



### F7: Servo current test

Function description:

When measuring current, the servo keeps swinging, and the data window displays the servo current value, and the unit is: A. Press the F key to exit the test and advance to the F8 receiver pulse width measurement state.

### F8: Receiver pulse width measurement

Function description:

When the receiver signal output end is inserted into the "RX SIGNAL" port and the function is switched to F8. The data window will display the output signal width. The output signal change is displayed synchronously with the measurement signal. Press the F key to exit F8 the pulse width measurement and advance to F9 to measure the manual three-point test state.

**Note:** When using pulse width measurement, be sure to unplug the positive pole of the input signal line, otherwise the pulse width measurement cannot be performed.

### F9: Manual three-point test

Function description:

Manual switching between minimum value, middle value, and maximum value. The "+" key is the maximum value, the "-" key is the minimum value, and the STOP/START key is the middle value.

Press the F key to exit the manual three-point test and advance to F1.

**Combination shortcut key:** Press the "+" key and the STOP/START key at the same time to return to the power-on interface.

**Note:** Be sure to unplug the battery in time after use. If you must use the tester for a long time, please connect a low-voltage alarm device that rings on the battery to prevent the battery from being damaged by excessive discharge.

# KING MAX HOBBY®

## TS-2v2.0/遥控模型多功能测试仪

### 使用说明书

感谢您购买KINGMAX的产品. 使用本产品之前请仔细阅读此说明书, 以便对产品进行熟练操作. 请保留购物收据, 保证书和这些说明书。

TS-2多功能测试仪是KINGMAX公司精心打造, 是目前市面上功能最全面的一款航模专用多功能测试仪, 为模型爱好者提供了最全面的测试需求。

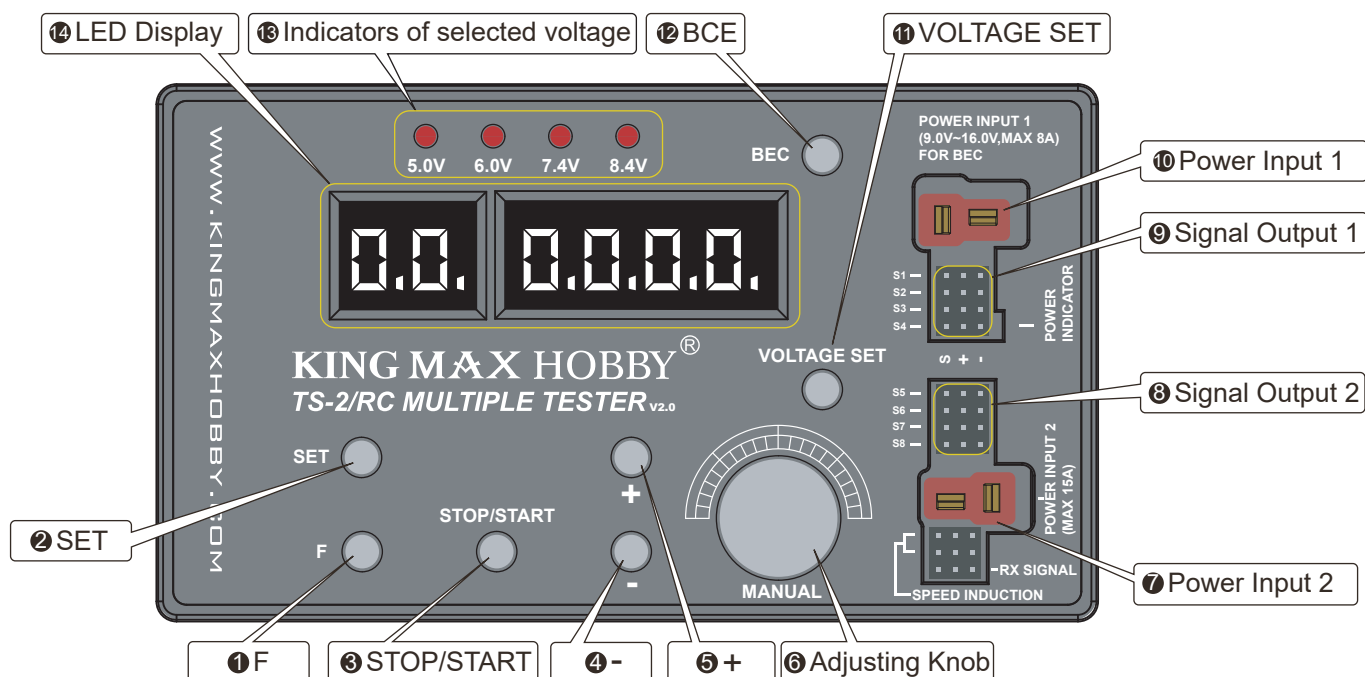
#### 规格和特点

- 6位红色超高亮度LED数字显示幕;
- 输入电压范围入口1: 9V~16.8V (支持3S~4S), 入口2: 任意电压;
- 自带大电流BEC降压, 输出电流达8A;
- 可选BEC输出电压, 5V 6V 7.4V 8.4V四种电压选择。
- 高达1us的信号测量和输出精度。
- 灵活可调的信号脉冲宽度。舵机信号输出范围有四种模式, 0.5-1.0 1.0~2.0 0.5~2.5 自定范围(在0.5~2.5之间调节), 四种模式可以在通电时按SET键选择。
- 产品尺寸: 139.5mm x 79.5mm x 32.5mm
- 产品重量: 160g

#### 产品功能

- 伺服器转运方向和范围测试;
- 舵机的灵敏度测试;
- 自动运转和手动运转测试伺服器的选择;
- 可以测量发射机通道脉冲宽度;
- 可以记录伺服器工作寿命;
- 伺服器定位精准度测试;
- 伺服器速度测试;
- 伺服器角度、回中测试;

#### 产品功能介绍



- ① F键：主功能选项，如图显示按下F键可以选择在F1-F9 主要功能选项中进行切换。
  - ② SET键：次功能选项设定，
  - ③ STOP/START键：启动或暂停已经选择的主功能选项，
  - ④ -键：递减主功或次功能选项的设定数值，
  - ⑤ +键：递加主功或次功能选项的设定数值，
  - ⑥ MANUAL-调整旋钮：手动调整输出脉冲信号的数值，
  - ⑦ 直流电源输入端口2：无电压限制最大电流15A，直供脉冲信号输出端口2，
  - ⑧ 脉冲信号输出端口2：从S5~S8同时连接4个伺服器进行测试，电压电流由电源输入端口2直供，
  - ⑨ 脉冲信号输出端口1：从S1~S4同时连接4个伺服器进行测试，电压电流由BEC提供，
  - ⑩ 直流电源输入端口1：9V~16V直流电源输入端最大电流8A，测试仪要开机此端口必须上电，
  - ⑪ VOLTAGE SET键：在使用脉冲信号输出端口1时，用来选择需要的输出电压，
  - ⑫ BEC：在使用脉冲信号输出端口1时，用来接通或断开电源，
  - ⑬ 电压显示灯：显示选择输出取用的电压，
  - ⑭ 显示屏：显示各功能表或测试数值，
- SPEED INDUCTION：红外线光电速度测试接口，(需要配红外线光电开关头)
- RX SIGNAL：发射机、接收机信号测试接口，
- POWER INDICATOR：BEC电源指示灯，接通时灯亮，断开时灯灭。

## 使用方法

### 1. 首先选择脉冲信号的宽度范围：

一般舵机的工作信号范围都是从1ms~2ms或者是0.5ms~2.5ms。本测试仪提供了四种模式以供选择：

A 1.0 2.0 输出宽度为1.0~2.0ms

调节方法：通电后显示A 1.0 2.0并闪烁，此时按确认STOP/START键即选中，并跳到测试模式。

B 0.5 2.5 输出宽度为0.5~2.5ms

调节方法：在显示“A 1.0 2.0”闪烁时按SET键则显示“B 0.5~2.5”此时按确认STOP/START即选中，并跳到测试模式。

D 0.5 1.0输出脉宽为0.5~1.0ms（窄频）

调节方法：在显示“A 1.0 2.0”闪烁时按SET键则显示“B 0.5~2.5”再按SET键则显示“D 0.5~1.0”此时按确认STOP/START即选中，并跳到测试模式。

CL~CH 自由调节，可调范围，最小值0.5~1.5ms之间 最大值在1.5~2.5ms之间，调节方法：在显示“D 0.5~1.0”时按SET键则显示“CL XXXX”，这表示信号的最小值，按“+”“-”键调节最小值大小。调完CL值后，再按SET键显示“CH XXXX”，这表示信号最大值，按“+”“-”键调节最大值大小，多次按SET键会在 A B D CL CH之间切换调好后按确认STOP/START即选中，进入测试功能。

### 2. BEC输出电压调节：

按VOLTAGE SET键,输出电压会在5V, 6V, 7.4V, 8.4V四种之间循环切换,对应的指示灯点亮,然后按BEC键启动BEC输出,此时POWER指示灯点亮表示有输出。为了保护舵机,对输出电压调整后,BEC是没有输出的,需要按BEC键手动启动BEC。

注意：在启动BEC之前必须确定，BEC输出电压是否超过所舵机工作电压，超过了就会烧坏舵机。

### 3. 主功能和次功能的选择和设定：

#### F1：用旋钮调节输出脉宽

功能描述：

测试仪输出控制信号，信号周期为20mS(即50Hz)。扭动电位器旋钮可以调节输出信号宽度。按+键调节输出信号宽度。每按一次输出增加或减少一个步进量，步进量通过调节“C3”决定，范围是1~100。

F1功能的相关参数调节

步进量“C3”的调节：按SET键会显示功能F1下的相关参数步进量“C3”，进入调节状态后左边显示C3，右边显示步进值，右边的数字呈跳动状态。按+/-键1次右边的数字加/减1。连续按住不放可以进行快速调节。可调范围1~100。

退出F1功能的参数调节状态

在参数调节状态下，按F键退出调节状态，回到F1正常状态。在退出时所设定的参数会被存贮，即使断电后也会保存，下次使用时自动载入前次的设定。

#### F2：输出脉宽自动调节

功能描述：

舵机信号自动由最小变化到最大再变化到最小。在自动变化过时可以按STOP/START键暂停运行。

F2功能的相关参数调节:

自动摆动速度调节“C5”:按SET键显示F2相关参数“C5”,此时右边的数字闪烁,按+/-可以调节。数字越小舵机摆动越快。

退出F2功能的参数调节状态

在参数调节状态下,按F键退出调节状态,回到F2正常状态。在退出时所设定的参数会被存贮,即使断电后也会保存,下次使用时自动载入前次的设定。

### F3: 三点自动测试

功能描述:

最小值→中间值→最大值→中间值→最小值不断循环。按STOP/START键可以暂停和继续。在暂停状态下可以通过+/-键切换。

F3功能的相关参数调节:

设置中间点“C4”:按SET键进入中间点设置,右边显示数据闪烁,此时按+/-键调节到自己需要的数值。按住不放可以快速调节。

调节三点动作速度“C5”:按SET键进入中间点“C4”设置后再按一次SET键则进入速度“C5”的设置,右边数字闪烁,通过+/-调节数值。数值越大速度越慢,值为100时约10秒变化一次。按SET键可以在C4和C5设置模式间循环切换。

退出F3功能的参数调节状态

按F键退出调节状态,回到F3正常状态。

### F4: 寿命测试

功能描述:

测试过程中舵机信号在最大值与最小值间来回摆动,每动作一次数码管自动加1,达到设定值后停止。在寿命测试时,数码管功能窗不再显示F4,全部用来显示摆动次数。STOP/START键用来开始或者暂停测试。

测试值清0:先按STOP/START键暂停测试,在暂停状态按“-”键不放,约3秒后数据全部变为0,然后按STOP/START键开始新测试。

F4功能的相关参数调节:

F4寿命测试有两个参数,按SET键,数码管左边两位跳动,再按一次中间两位跳动,再按就右边两位跳动。跳动时表示这两个位处于可设置状态。+/-键各对应一个跳动位,按“-”键,调节左边这个位,按“+”键调节右边这个位,调节时以应位“0~9”循环变化,选择自己要的数字。最大可以设置“99999”次。

动作速度调节“C5”:按FSET键显示“C5”速度设置状态,右边数闪烁,通过+/-调节数值。数值越大速度越慢,值为100时约10秒变化一次。设置本次测试的动作次数:在“C5”设置状态下按SET键,

按FSET键可以在动作次数设置和动作速度调节“C5”之间循环切换。

退出F4功能的参数调节状态

按F键退出调节状态,回到F4寿命测试状态。

### F5: 虚位测试

功能描述:

舵机信号在一个比较小的范围内不停摆动,通过+键增加节摆动范围,或者-键减小摆动范围。当舵机由不动到有极微的摆动时,即得到虚位值单位是uS。即舵机无法响应的信号变化量。

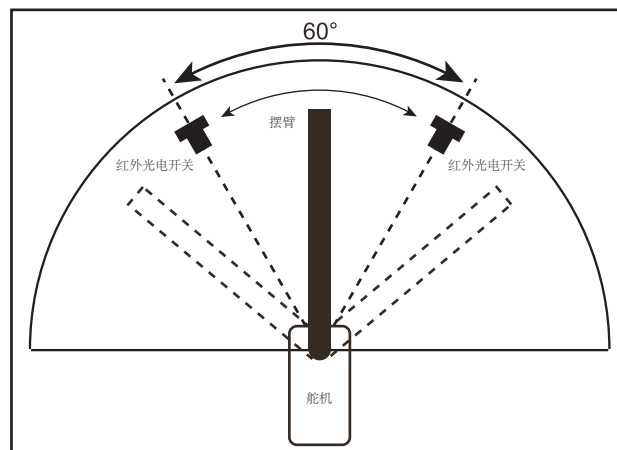
按F键退出虚位测试,跳到F6速度测试状态。

### F6: 红外线光电速度测试

功能描述:

将两个红外光电开关以舵机轴为圆心并以60度角安装,舵臂需要加长至红外开关中心位置,保证转动时既能顺利通过,又可挡住红外线,当红外线被感应挡住,一个开关启动计时,另一个停止计时,数据窗口显示的时间就是舵机的速度,单位是X.XXXs/60度,按STOP/START键可暂停或者继续测试,按F键退出测试,跳到F7电流测试状态。

示意图如下:



#### F7: 舵机电流测试

##### 功能描述:

测电流时舵机不停摆动, 数据窗口显示舵机电流值, 单位是: A 按F键退出测试, 跳到F8测接收机脉宽状态。

#### F8: 接收机脉宽测量

当接收机信号输出端插入“RX SIGNAL”端口并将功能切换到F8时。数据窗口会显示输出信号宽度。输出端信号变化与测量信号同步显示。按F键退出脉宽测量, 跳到F9测手动三点测试状态。

注意: 使用脉宽测量时务必把输入信号线的正极拔掉, 否则无法进行脉宽测量。

#### F9: 手动三点测试

##### 功能描述:

最小值、中间值、最大值手动切换。“+”键是最大值,“-”键是最小值, STOP/START键是中间值, 按F键退出手动三点测试, 跳到F1。

组合快捷键: 同时按“+”键和 STOP/START键可回到开机界面。

注意: 使用完后一定要及时拔掉电池, 必须长时间使用测试仪时请在电池上接BB响的低电压报警设备, 以防电池过度放电损坏。

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