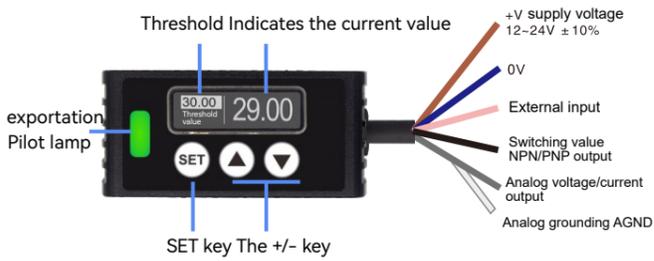


# [Laser displacement sensor] Product instruction manual



## 1. Applicable specifications/regulations

This product complies with the following specifications/regulations.  
 < European Specification > EMC Directive  
 < US/Canada Specification > CAN/CSA-C22.2 NO.60947-5-2-14

## 2. Confirmation of packaging items:

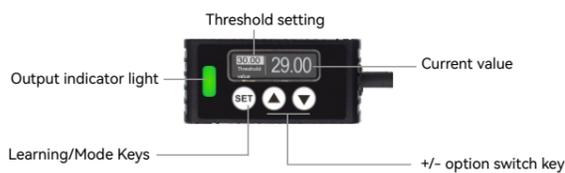
- |  |         |
|--|---------|
| <input type="checkbox"/> Host                                | A set   |
| <input type="checkbox"/> Specification of application        | 1 piece |
| <input type="checkbox"/> Product certificate                 | 1 piece |
| <input type="checkbox"/> Mounting bracket (including screws) |         |

## 3 Warnings

- Do not direct or reflect the laser light through the mirror body into the eye. If shot in the eye, it can cause blindness.
- This product is not explosion-proof structure, do not use in flammable or explosive liquid environment.
- This product does not have the function of automatically stopping laser projection after decomposition, do not decompose or transform.
- Do not use this product as a safety device for the purpose of protecting human body. If used improperly, it may cause injury, fire, and electric shock

## 4. operation panel description:

Power-on Displays the threshold and current detection value. The red indicator is the output indicator, and the green indicator is the power supply indicator.



## 9. Teach:

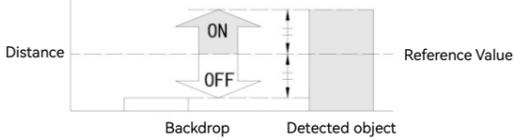
### 2 teachings:

- Basic guidance methods.

1, in the state of no object, press the "SET" key.



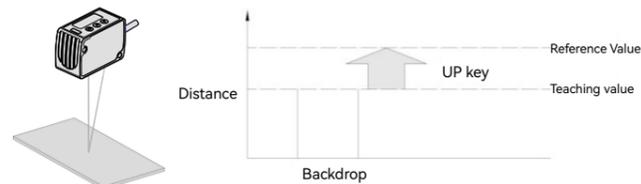
2, in the state of the object, press the "SET" key.



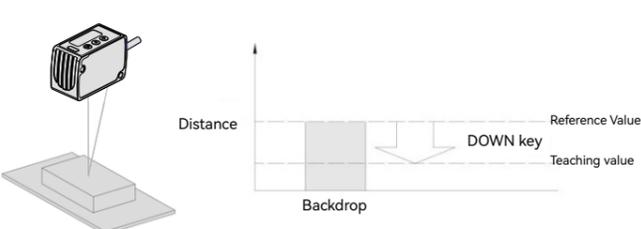
### 3. Complete the calibration. (When the difference between the two teachings is small, the return difference is too small.)

- In the case of small objects and backgrounds, how to use this teaching method is very convenient. < in case of background reference >

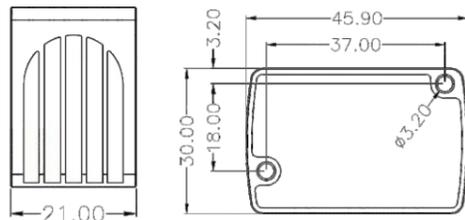
method is very convenient. < in case of background reference >



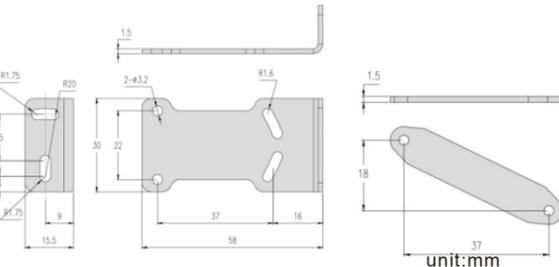
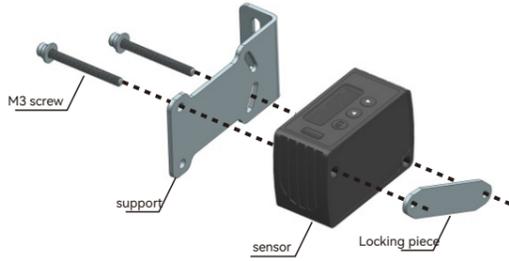
< In the case of detecting objects as benchmarks >



## 5. Product size diagram:



## 6, installation and support size diagram:



## 7, installation direction:

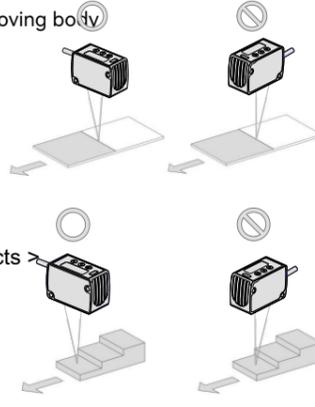
- Relative to the direction of the moving body

< Material, color difference case >

When measuring, if the material color of the moving measurement object is extremely different, install it according to the direction shown in the right figure, so that the measurement error can be controlled to a minimum.

< Measurement of rotating objects >

- When measuring the rotating object, install it in the direction shown in the figure on the right, which can inhibit the influence of the object's up and down vibration and position deviation.



1, in the state of the background object or in the state of the detection object, press the "SET" key.

2, in the case of background objects as the benchmark, press the "▲" key, set the reference value in the sensor. The value set in the checked object after pressing the "▼" key when the checked object is the base.

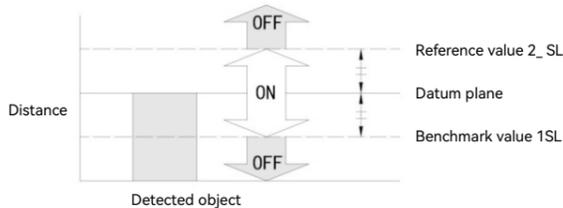
3. Complete the calibration.

### 1 point teaching (Window comparison mode)

- For the distance between the datum surface of the detected object, the 1-point instruction is not implemented, but the method of setting the upper and lower limits is implemented. This function is used to distinguish between the upper and lower limits.

- In the case of 1 point teaching (window comparison mode), please set it to [1 point teaching (window comparison mode)] in the detection output setting of PRO mode.

Refer to the "Operating Instructions for the Mode PRO" for setting methods.



1, in the case of detecting objects, press the "SET" key twice



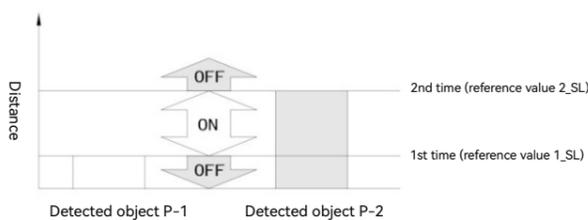
2. Teaching is complete.

### 2 point teaching (Window comparison mode)

- In the case of 2-point teaching (window compare mode), please set it to [2-point teaching (window compare mode)] in the detection output setting of PRO mode.

Refer to the "Operation Instructions for the Mode PRO" for setting methods.

- When performing the instruction, please use a constant distance detection object (P-1, P-2)



< in case of segment difference >

- If there is a segment difference in the moving measurement object, install it according to the method shown in the figure on the right, so as to suppress the influence of the segment difference edge.

Measurements are made in narrow Spaces and depressed sections

- In the case of measurement in narrow places and holes, take care to avoid blocking the light path from the light emitting part to the light receiving part when installing.

In the case of mounting the sensor part to the wall

Please install according to the method shown in the right figure, so as to avoid the multiple reflected light generate by the wall will enter the light receiving part, in addition, in the case of high reflectivity of the wall, if changed to dull black, you can obtain good results.

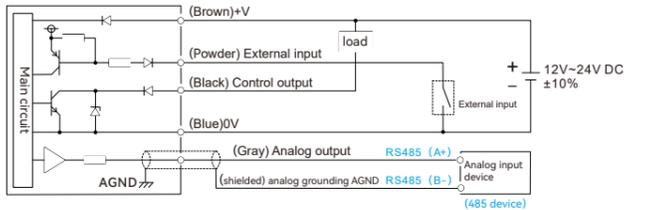
< About the maximum tilt Angle of the sensor >

- Sensor with mounting Angle range (90±15°)

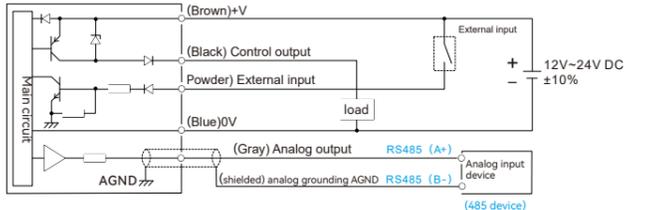
Please install and use in this Angle, beyond this range of measurement results will appear inaccurate measurement, misjudgment phenomenon.

## 8. Input/output circuit diagram:

- NPN+ analog output type (RS485 output)



- PNP+ analog output type (RS485 output)



1, in the detection of object P-1 state, press the "SET" key (the first time)

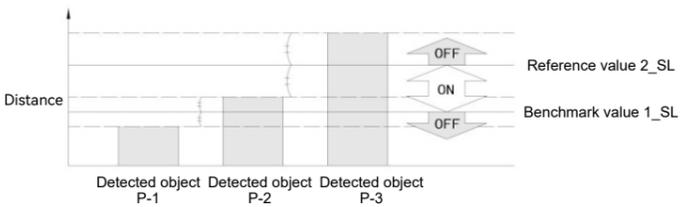
2, in the detection of object P-2 state, press the "SET" key (the second time) 3, complete the calibration.

### 3-point teaching (Window comparison mode)

- Perform the 3-point (P-1, P-2, P-3) instruction, as shown in the figure below, set the reference value 1\_SL between the 1st and 2nd time, Method of setting the reference value 2\_SL between the second and third times and setting the range of the reference value.

- In the case of 3-point teaching (window compare mode), please set to [3-point teaching (window compare mode)] in the menu detection output setting in advance.

- After teaching, P-1, P-2, P-3 will be automatically arranged in order from smallest to largest.



1, in the detection of object P-1 state, press the "SET" key (the first time)

2, in the detection of object P-2 state, press the "SET" key (the second time)

3, in the detection of object P-3 state, press the "SET" key (the third time)

4. Complete the calibration

## 10. Threshold fine-tuning function:

Usual detection mode:

Press the "▲" key or "▼" key to change the threshold directly.

Window comparison mode:

Press the "▲" key or "▼" key to change the threshold directly.

Press the "▲" key and "▼" key at the same time to switch threshold 1 and threshold 2.

## 11, zero function:

Zero setting function is the function of forcing the measurement value to "zero". When setting zero, the screen has a vertical line, as shown below:



Press the "SET" key and the "▲" key at the same time to reset the Settings

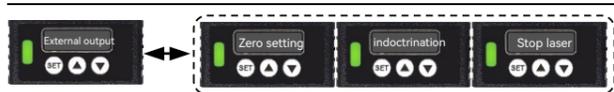
Press the "SET" key and the "▲" key at the same time to zero and cancel



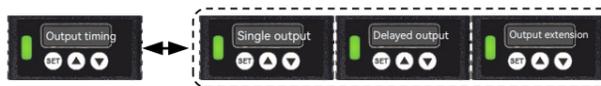
6. External input: When selecting the corresponding function, the pink line and OV short connect once Zero setting: the current value is cleared to zero, and the ± value is displayed in the range;

Instruction: Can be used as a single "SET" key;

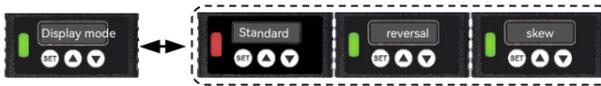
Stop laser: the sensor stops emitting laser and does not work;



7. Output timing: output delay, delayed output, single output, output extension, no timing. Default 5ms is not adjustable



8. Display mode: standard, reverse [the current detection value from +35 to -35 to -35 to +35, and the corresponding 0-5V or 4-20mA reverse to 5-0V or 20-4mA], offset is to change the ±35 value to 0-70.



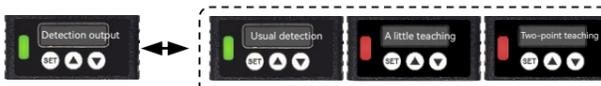
9. Hold: The default value is Hold off. You can press up or down to hold on. That is, when the current detection value reaches the maximum or minimum, the output voltage or current can be maintained. [Common application is to maintain 0 or 5v after exceeding the range].



10. Screen selection: steady on, timing screen.



1. Reset: press "SET" to return to the default display, you can switch to confirm the reset, press "SET OK", the display has restored factory Settings.



Press the "SET" and "▼" keys at the same time: keyboard lock on/off.

## 15, external input:

In the menu external input select: Zero, Teach, Stop laser.

PNP model: Pink wire gently shock the positive electrode of the source and release

species	Measuring center 30mm	Measuring center 50mm	Measuring center 100mm	Measuring center 200mm	Measuring center type 400mm
Output type	Analog output	NPN output	NPN output	NPN output	NPN output
	RS485 output	RS485 output	RS485 output	RS485 output	RS485 output
Measuring center distance	30mm	50mm	100mm	200mm	400mm
Measuring range	±5mm	±15mm	±35mm	±80mm	±200mm
repeatability	10μm	30μm	70μm	200μm	400μm(Measuring distance200-400mm) 800μm(Measuring distance400-600mm)
straightness	±0.1%FS.			±0.2%FS.	±0.2%FS.(Measuring distance200-400mm) ±0.2%FS.(Measuring distance400-600mm)
Temperature characteristic	0.03%FS/°C				
illuminant	Red semiconductor laser Class 2 Maximum output :1mW, light beam wavelength: 655nm				
Beam diameter	About φ50μm	About φ70μm	About φ120μm	About φ300μm	About φ500μm
Supply voltage	12-24V DC±10%, pulsation P-P10%				
Current consumption	Below 40mA (24V DC supply voltage), below 60mA (12VDC supply voltage)				
Control output	<NPN output type > NPN open collector transistor ● Maximum inflow current :50mA ● Applied voltage :30V DC below (control output -0V) ● Residual voltage: less than 1.5V (inflow current 50mA) ● Leakage current: below 0.1mA				
Output action	ON in light/ON in non-light can be switched				
Short circuit protection	Equipped (automatic recovery type)				
Analog output	Voltage analog output (When alert +5.2V) Current analog output (Alert 0mA)	Output range :0 to 5V Output impedance:100Ω	Output range 0-5V Output impedance: 100Ω	Output range 0-5V Output impedance: 100Ω	Output range 0-5V Output impedance: 100Ω
Reaction time	1.5ms/5ms/10ms can be switched				
External input	NPN No contact input Valid :0V to +12V DC Input impedance: about 10 kΩ				
Protective construction	IP60				
Degree of fouling	2				
Operating ambient temperature	-10°C~+40°C(pay attention to do not condensation, icing), storage : -20°C~+60°C				
Ambient humidity	35%~85%RH, storage :35%~85%RH				
Use ambient light	Incandescent lamp: the illumination degree of the illuminated surface is less than 3000lx				
Service level	Below 2000m				
cable	With 0.15mm 5-core composite cable 2m				
material	Body shell: aluminum casting front cover plate: propylene base				
weight	Approx. 35g(without cable), Approx. 85g(with cable)				
Applicable specification	Compliance with EMC directive				

(Note): When the measurement conditions are not specified, the use conditions are as follows: power supply voltage :24V DC, ambient temperature :+20°C, reaction time :10ms, analog output value of the measurement center distance. Object Object: White paper.

## MODBUS PROTOCOL

04H instruction (read input register)				
1. Communication frame format				
1byte	1byte	2byte	2byte	2byte
Address code	Function code	Register Address	Number of registers N	CRC code
2. Response frame format				
1byte	1byte	1byte	2N byte	2byte
Address code	Function code	Bytes 2N	Register value	CRC code
3. Error Frame Format				
1byte	1byte	1byte	2byte	
Address code	Error Code	Exception Code	CRC code	

communication mode	RS485
Synchronization method	asynchronous
Baud	9.6/19.2/38.4/57.6/115.2/256kbps
Data length	8-bit
Stop bit	1-bit
Parity check	nothing

## MODBUS PROTOCOL

### Communication example (obtaining distance)

● Dispatch orders

01 04 00 00 00 02 71 CB

Address code	Function code	Register Address	Number of registers N	CRC
01	04	0000	0002	71CB

● Feedback information

01 04 04 00 01 19 36 21 C2

Address code	Function code	Bytes	Register Value - Distance Value	Check digit
01	04	04	00 01 19 36	21 C2

Where 00 01 19 36 is distance information, unit: um, converted to Decimal, distance: 71990um=71.990mm

### Communication example (default Baud is 115200)

● Dispatch orders

01 10 00 0E 00 02 04 00 00 25 80 69 13

Address code	Function code	Register Address	Number of registers	Bytes	Register value	CRC
0x01	0x10	0x000E	0x0002	0x04	0x00002580	0x6913

● Feedback information

01 10 00 0E 00 02 20 0B

Address code	Function code	Register Address	Number of registers	CRC
0x01	0x10	0x000E	0x0002	0x200B

Note: The sensor address code can be set in the function menu, and after the address code is changed, the CRC also needs to be changed at the same time.

## 16. Precautions:

This product is developed/manufactured for use in an industrial environment.

Be sure to perform wiring operations when the power is off.

If miswiring occurs, it will cause a fault.

Avoid parallel wiring with high voltage and power lines, or use the same wiring tube. Otherwise, it will cause misoperation due to induction. Please confirm power supply changes to avoid power input exceeding the rated value.

In cases where a commercially available conversion regulator is used in the power supply, be sure to ground the housing ground (FG.) terminal of the power supply.

When using machines that cause interference (conversion regulators, variable frequency motors, etc.) around sensor installation, be sure to ground the frame ground (FG.) terminal of the machine.

Do not use in the transition state when the power is on.

For the extension of the cable, a cable of m0.03m or more can be used, with a total length 10m. up to Do not bend the cable outlet with brute force, and avoid pressure such as Segara pulling.

Although it varies by type, light from fast rt and bright high fluorescent lamps, as well as solar energy, can affect detection, so be careful to avoid direct incoming light.

Do not use outside

Do not allow the product to shine, light surface attached to water, oil, fingerprints and other substances that cause light refraction, or dust and garbage and other substances that cause light bloc

If it is attached, please use a soft cloth that does not produce dust, or lens paper to wipe it. Do not use it in an environment where there is a lot of steam, dust, or corrosive gases.

Please be careful to avoid exposure to diluents and other organic solvents, strong acids, strong bases, oils and fats.

When cleaning the light casting window or light receiving window of the sensor head, be sure to perform the operation in the power off state.

The orientation of this product is biased.

When using this product, please keep the optical axis of the mounting et, etc.brack adjustable. The memory has a write life of about 100,000 times.

ON" : When the memory save is valid, note the write lifetime.



Scan code to download 485 communication electronic protocol

## 12, key lock function:

Press the "SET" key and "▼" key at the same time to press the lock

Press the "SET" key and "▼" key at the same time to unlock

## 13. Menu Settings:

Press and hold the "SET" key for 3 seconds under the distance display interface to enter the menu setting mode.

In the menu setting mode, hold down SET for 3 seconds to exit the menu setting mode.

In the menu setting mode, stop for 20 seconds without pressing any button, you can automatically exit the menu setting mode.

After entering the menu setting mode, press the "▲" key or "▼" key to switch the menu up and down. Press the SET key to access the corresponding menu item.

1. Working mode: Standard, high speed, high precision



2. Normally open and normally close: press "SET" to enter, "▲" or "▼" to switch the selection, press "SET" to confirm.



3. Detection output: normal mode, one-point teaching, two-point teaching, three-point teaching.



4. Simulation selection: 0-5V, 4-20mA.



5. Error: Default precision 0.07



Read data						
Address code	Function code	Register Address	Number of registers N	CRC	Sending code	Function Description
0x01	0x04	0x0000	0x0002	0x71CB		Acquisition - Distance
0x01	0x04	0x0001	0x0001	0x600A		Acquisition - Working Mode
0x01	0x04	0x0002	0x0001	0x900A		Acquiring - NO and NC
0x01	0x04	0x0003	0x0001	0xC1CA		Get - Detect Output
0x01	0x04	0x0004	0x0002	0x300A		Acquire - Tolerance
0x01	0x04	0x0005	0x0001	0x21CB		Get - External Input
0x01	0x04	0x0006	0x0001	0xD1CB		Acquire Output Timing
0x01	0x04	0x0007	0x0001	0x800B		Get Output Timing Time
0x01	0x04	0x0008	0x0001	0xB008		Get - Display Mode
0x01	0x04	0x0009	0x0001	0xE1C8		Get Keop
0x01	0x04	0x000A	0x0001	0x11C8		Acquisition - Screen Selection
0x01	0x04	0x000B	0x0002	0x0009		Obtain zero adjustment value
0x01	0x04	0x000C	0x0002	0xB1C8		Acquisition - Threshold 1
0x01	0x04	0x000D	0x0002	0xE008		Acquisition - Threshold 2
0x01	0x04	0x000E	0x0002	0x1008		Acquire - Baud

10H instruction (writing multiple holding registers)						
1. Communication frame format						
1byte	1byte	2byte	2byte	1byte	N*2 byte	2byte
Address code	Function code	Register Address	Number of registers N	Bytes 2N	Register value	CRC code
2. Response frame format						
1byte	1byte	2byte	2byte			
Address code	Function code	Register Address	Number of registers N	CRC code		
3. Error Frame Format						
1byte	1byte	1byte	2byte			
Address code	Error code	Exception code	CRC code			

Operating functions							
Address code	Function code	Register Address	Number of registers	Bytes	Register value	CRC	Function settings
0x01	0x10	0x0000	0x0001	0x02	0x0000	0xA650	Discontinuous output
					0x0001	0x6790	Continuous output
0x01	0x10	0x0001	0x0001	0x02	0x0000	0xA781	High precision
					0x0001	0x6641	Standard
					0x0002	0x2640	High speed
0x01	0x10	0x0002	0x0001	0x02	0x0000	0xA7B2	Normally open
					0x0001	0x6672	Normally closed
					0x0000	0xA663	Usually detected
					0x0001	0x67A3	A little instruction
0x01	0x10	0x0003	0x0001	0x02	0x0002	0x27A2	Two point teaching
					0x0003	0xE662	Three point teaching
0x01	0x10	0x0004	0x0002	0x04			Stress difference
0x01	0x10	0x0005	0x0001	0x02	0x0000	0xA605	Zeroing
					0x0001	0x67C5	Teach
					0x0002	0x27C4	Stop laser
					0x0000	0xA636	Undimed
					0x0001	0x67F6	Output extension
					0x0002	0x27F7	Delayed output
					0x0003	0xE637	Single output
0x01	0x10	0x0007	0x0001	0x02			Timing time
0x01	0x10	0x0008	0x0001	0x02	0x0000	0xA718	Routine
					0x0001	0x66D8	Reversal
					0x0002	0x26D9	Deviation
0x01	0x10	0x0009	0x0001	0x02	0x0000	0xA6C9	Keep open
					0x0001	0x6709	Keep off
0x01	0x10	0x000A	0x0001	0x02	0x0000	0xA6FA	Teach inserting screen
					0x0001	0x673A	Chang Liang
0x01	0x10	0x000B	0x0001	0x02	0x0001	0x66EB	Zero adjustment - current measured value
0x01	0x10	0x000C	0x0002	0x04			Threshold - input threshold
0x01	0x10	0x000D	0x0002	0x04			Threshold - input threshold
0x01	0x10	0x000E	0x0002	0x04	0x000012C0	0x7ED3	4800
					0x00002580	0x6913	9600
					0x00009600	0x1D83	38400
					0x0001C200	0x7283	115200
					0x0003E800	0xCC23	256000
0x01	0x10	0x000F	0x0001	0x02	0x0000	0xA6AF	Reset

In response to						
Address code	Function code	Bytes 2N	Register value	CRC	Response code	Response description
0x01	0x04	0x04	0x0000	0xB930		Distance
			0x0001	0x78F0		High precision
			0x0002	0x38F1		Standard
			0x0000	0xB930		High speed
0x01	0x04	0x02	0x0000	0xB930		Normally open
			0x0001	0x78F0		Normally closed
			0x00			