Laser distance measuring sensor

MS series

CE

LASER 2

TRI-TRONICS
MS-100A

IP67
Sn: 8-50cm
Uc 12-24VDC
Ia: 4-20mA
Ie: 200mA
YA2501S

Precautions

● **Please do not use in the following environment**
- o Direct sunlight.
- o Places with high humidity or easy condensation.
- o Places containing corrosive gases.
- o Places subject to severe vibration or shock.

● **Connection and installation**
- o Do not use the sensor in an unstable state immediately after the power is turned on, it is recommended to test after 30 minutes of power on to achieve desired accuracy.
- o Be sure to carry out wiring with the power off. If a wrong wiring occurs, it will cause a malfunction. Please make sure that the power supply voltage is within the rated value before powering on Please use rated load.
- o When installing the sensor, do not subject the sensor to severe external forces(such as hammering...etc), as this may damage the sensor performance.
- o Do not bend the lead out of the cable with excessive force, and avoid applying pressure such as pulling.

● **Cleaning**
- o Thinner will corrode the surface of the filter, it is best to avoid using it.
- o If there is dust on the surface, please wipe it gently with a dry dust-free cloth.

Safety warning
- o Do not use in an environment with flammable, explosive or corrosive gases
- o Do not disassemble, repair or modify this product without authorization
- o Please do not look directly at the laser or observe the optical system through the lens.

Scrap treatment
- o When the product is scrapped, please dispose of it as industrial waste

■ Laser description

CAUTION

LASER RADIATION
DO NOT STARE INTO BEAM
RAYONNEMENT LASER
NE PAS REGARDER DANS LE FAISCEAU
CLASS 2 LASER PRODUCT
APPAREIL A LASER DE CLASSE 2
WAVELENGTH 650nm
MAX AVERAGE POWER 0.5mW
PULSE DURATION 170µs
(IEC 60825-1:2014/EN 60825-1:2014+A11:2021/CAN/C-SA E60825-1-15)
COMPLIES WITH 21 CFR 1040.10 AND 1040.11
EXCEPT FOR CONFORMANCE WITH IEC 60825-1 ED.
3, AS DESCRIBED IN LASER NOTICE NO. 56, DATED
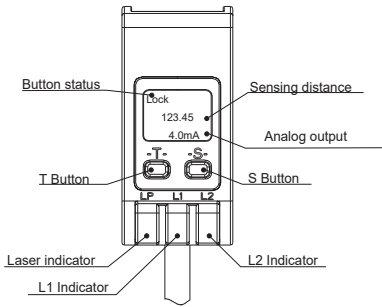MAY 8, 2019.

LASER APERTURE
OUVERTURE LASER

- o This sensor series is a Class 2 laser product. Please do not look directly at the laser or observe it through the laser lens. Warning labels are affixed to this series; please follow the label instructions.

■ Specifications

	Digital display laser distance measuring sensor		
Series	MS-10A	MS-50A	MS-100A
Measuring range	30...100mm	80-500mm	150-1000mm
Full range(F.S.)	70mm	420mm	850mm
Supply voltage	4...20mA: 12...24VDC		
Consumption power	≤700mW		
Load current	200mA		
Voltage drop	<2.5V		
Beam divergence	0.88°		
Pulse duration	170us		
Max average power	500mW		
Light source type	Red laser(650nm); Laser level: Class 2		
Light spot size	1mm*3mm@100mm	Φ2.5mm@500mm	Φ3mm@1000mm
Dimension	65*51*23mm		
Resolution	5um@30mm 50um@100mm	15um@80mm 500um@100mm	50um@150mm 2000um@1000mm
Linear accuracy ①②	Please refer to the specification of specific models		
Repeated stability ①②③	10um@30mm 30um@50mm 100um@100mm	30um@80mm 250um@250mm 1000um@500mm	100um@150mm 520um@500mm 4000um@1000mm
Output 1	Analog: 4...20mA (Load resistance<390Ω)		
Output 2	Switch value: PUSH-PULL/NPN/PNP & NO/NC settable		
Distance setting	4...20mA: keypress setting		
Temperature drift	±0.02%F.S./℃		
Response time	2ms, 16ms, 40ms settable		
Indicator	Laser indicator: Green LED; Motion indicator: Yellow LED; Alarm indicator: Yellow LED		
Display	OLED Display (Size:14*10.7mm)		
Built-in function	Average map setting, average setting, product self-check, restore factory setting, single point teach, window teach, output setting, parameter query		
Protection circuit ⑤	Short circuit, reverse polarity, overload protection		
Service environment	Operating temperature: -10...+50℃; Storage temperature: -20...+70℃ Environment humidity: 35...85%RH (No condensation)		
Anti ambient light	Incandescent light:<3,000 lux		
Protection degree	IP67		
Material	Housing:ABS; Lens cover: PMMA Display panel: PC		
Vibration resistant	10...55Hz Double amplitude 1mm, 2hrs each for X,Y,Z direction		
Impulse withsand	500m/s(About 50G) ,3 times each for X,Y,Z direction		
Connection way	2m PVC cable 4 wire: Analog output		
Accessory	Screw (M4×35mm)×2, Nut×2, Washer×2		

①Test conditions: Standard data at 23 ± 5 ℃; supply voltage 24VDC; 30 minutes' warm-up before test; sampling period 2ms; average sampling times 100; standard sensing object 90% white card
②The statistical data follows the 3σ criteria
③Repeat accuracy:23 ± 5 ℃ environment,90% reflectivity white card,100 test data results
⑤Protecion circuit only for switch output

■ Panel introduction

Lock
123.45
4.0mA

Button status
Sensing distance
Analog output
T Button
S Button
Laser indicator
L1 Indicator
L2 Indicator

1. Button function: Digital output setup, analog scaling setup, parameter changes, reset and unlock.

T	Next menu	Toggle parameter
S	Enter menu item	Set buttom

2. Indicator lights: Laser on, detection status, output alarm (flashing).

Indicator	Color	On / Off	Flashing
LP	Green LED	Laser active	
L1	Yellow LED	Detection status	Output alarm
L2	Yellow LED		

3. OLED Display: Displays sensor status, sensing distance, analog output value, and menu parameters.

Display content	Description
Button status	Button LOCK, Button UNLOCK, RUN
Sensing distance	Real-time display of the measured distance
Analog output	Real-time display of sensors analog output measurement value
NO DIS	No measured value display (sensor failure)
Out of Range	Out of sensing range
Over Load	Switch output overload
OK	Parameter setting successfully
ERROR	Parameter setting failed (set point is outside the sensing range)

4. Self-lock and Unlock: If no key is pressed within 10 minutes after powering on, the sensor will self-lock. The screen displays LOCK. No adjustment can be made. To unlock: press and hold the S button for 4...6s. When the screen displays UNLOCK, release S button. You can now change sensor settings.

■ Function Description

**Status query:** Output logic phase, output status out, hold limit hold value, filtered average.

● Teaching & setting functions:

Functional category	
Button setting function	Single point teaching TEACH A
	Window teaching TEACH A, TEACH B
	Analog mapping 4mA
	Analog mapping 20mA
	Overrun hold value
	Output logic: NO/NC selection
	Output status out: NPN/PNP/PUSH-PULL (PP) selection
	Filter level Avg: FAST / MEDIUM / SLOW selection
	Reset

● Sensor calibration single point TEACH A:

1. Place Target at Desired Sensing Point
   • Ensure the target is within the sensor's sensing range at the desired sensing point distance.
2. Teach the Sensing Point (Teach A)
   • On the main interface, short press the S button to enter "Teach A" mode.
   • Long press the S button to start teaching.
   • Teaching is complete when the output turns ON.

Note: Actual operating point; Set value * 101% and actual exit point < set value * 102%.

Sensing point   Proximal

ON
OFF
Hysteresis
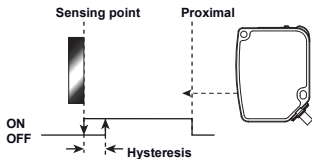
● Sensor calibration window TEACH A, TEACH B:

1. Place Target at First Sensing Point
   • Ensure the target is within the sensor's sensing range at the desired first sensing point distance.
2. Teach First Sensing Point (Teach A)
   • On the main interface, short press the S button to enter "Teach A" mode.
   • Long press the S button to start teaching the first sensing point.
   • Once teaching is successful, proceed to the second sensing point.
3. Place Target at Second Sensing Point
   • Ensure the target is within the sensor's sensing range at the desired second sensing point distance.
4. Teach Second Sensing Point (Teach B)
   • Short press the T button to enter "Teach B" mode.
   • Long press the S button to start teaching the second sensing point.
5. Completion
   • After teaching both sensing points, the sensor's output will be ON within the range between the two taught positions.

If entering single-point teaching after completing window teaching, the sensor will automatically clear the last window teaching values.

Note: Actual operating point: Set value * 101% and actual exit point < set value * 102%.

Far sensing point   Near sensing point

ON
OFF
Hysteresis   Hysteresis
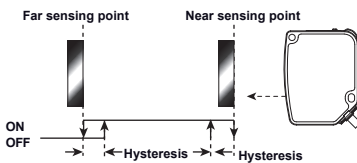
● 4mA or 20mA mapping calibration

Note: Sensing target must be within the specified range of the sensor. Distance between (A,B) points must be a minimum 0.5mm for successful mapping otherwise an ERROR will occur and mapping will fail.

Mapping the sensor can be taught separately for the 4mA and 20mA points, and you can choose to do either.

1. Identify Mapping Points:
   • Determine the target position for either the 4mA or 20mA mapping point.
2. Position the Target:
   • Place the target at the selected mapping point (either 4mA or 20mA).
3. Teach the Sensor:
   • Follow the sensor's instructions to complete the teaching process for the selected mapping points.

A<B
20mA
4mA
35mm A B 65mm

A>B
20mA
4mA
35mm B A 65mm
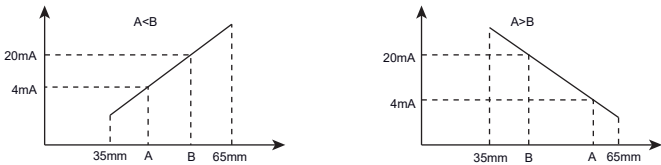
● Analog output behavior for out-of-range targets: HOLD

Max: When over range, the display shows 20mA. Analog output 20mA.
Min: When over range, the display shows 4mA. Analog output 4mA.

When the target is out of the sensor's range, the sensor's analog output can HOLD the analog value at either the minimum (4mA) or the maximum (20mA) value. You can select either option by accessing the appropriate menu item and changing the setting. The sensor's default setting is the maximum (20mA).
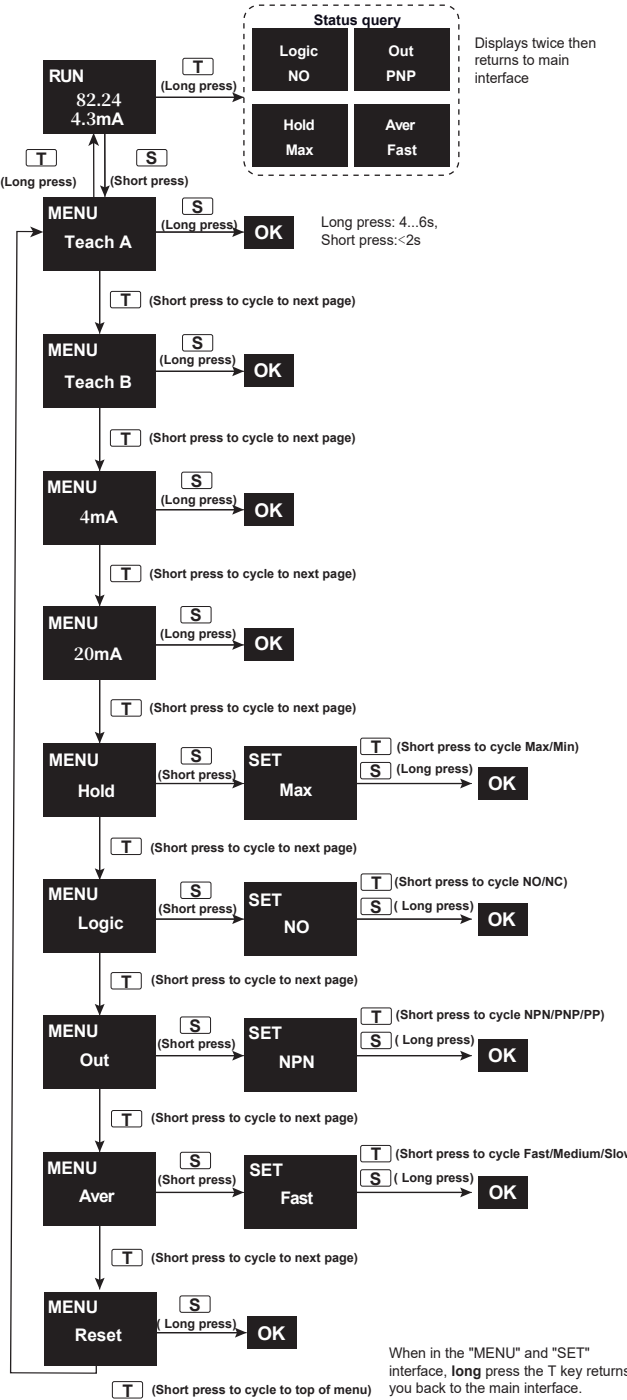
● Reset:
① PNP; NO; ② Single point teaching mode (Range center point).

■ Instructions

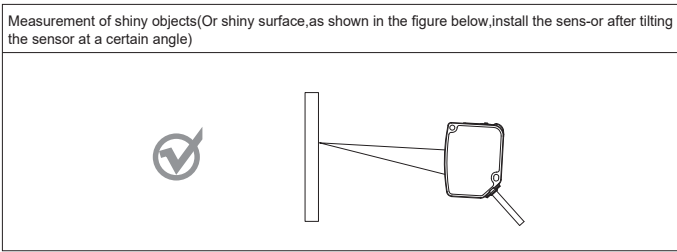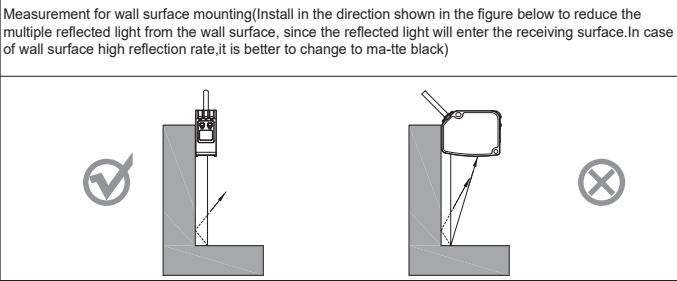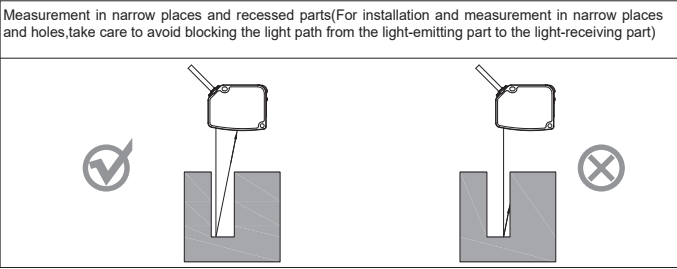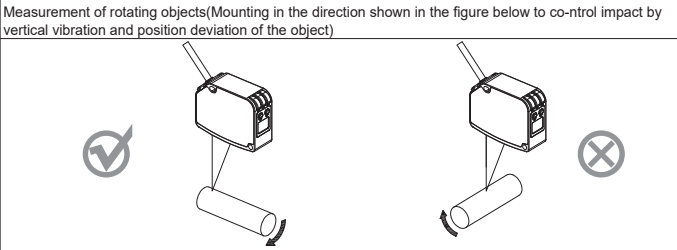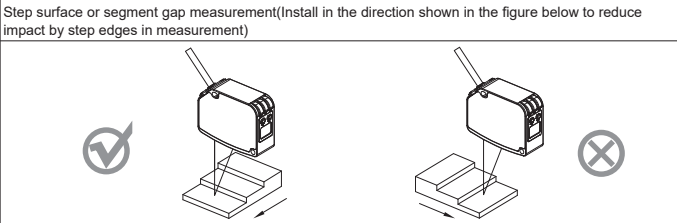Perform the following operations in the **unlocked** state:

Successful teaching OK: L1 and L2 flash simultaneously at 4Hz for about 3 seconds
Teaching failed ERROR: L1 and L2 flash asynchronously at a frequency of 4Hz for about 3 seconds

Status query

Logic NO	Out PNP
Hold Max	Aver Fast

Displays twice then returns to main interface

RUN
82.24
4.3mA

T (Long press)

T (Long press)   S (Short press)

MENU Teach A — S (Long press) — OK
Long press: 4...6s, Short press:<2s

T (Short press to cycle to next page)

MENU Teach B — S (Long press) — OK

T (Short press to cycle to next page)

MENU 4mA — S (Long press) — OK

T (Short press to cycle to next page)

MENU 20mA — S (Long press) — OK

T (Short press to cycle to next page)

MENU Hold — S (Short press) — SET Max — T (Short press to cycle Max/Min) — S (Long press) — OK

T (Short press to cycle to next page)

MENU Logic — S (Short press) — SET NO — T (Short press to cycle NO/NC) — S (Long press) — OK

T (Short press to cycle to next page)

MENU Out — S (Short press) — SET NPN — T (Short press to cycle NPN/PNP/PP) — S (Long press) — OK

T (Short press to cycle to next page)

MENU Aver — S (Short press) — SET Fast — T (Short press to cycle Fast/Medium/Slow) — S (Long press) — OK

T (Short press to cycle to next page)

MENU Reset — S (Long press) — OK

T (Short press to cycle to top of menu)

When in the "MENU" and "SET" interface, **long** press the T key returns you back to the main interface.

When long press S key to set, you will be prompted with three solid dots to indicate the setting progress. See below **Teach A** as an example.

MENU Teach A	MENU Teach A	MENU Teach A

■ Installation precautions
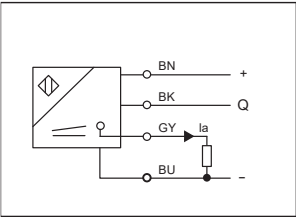
Measurement of color difference materials(Install in the direction shown in the figure below to minimize the measurement error)

Step surface or segment gap measurement(Install in the direction shown in the figure below to reduce impact by step edges in measurement)

Measurement of rotating objects(Mounting in the direction shown in the figure below to co-ntrol impact by vertical vibration and position deviation of the object)

Measurement in narrow places and recessed parts(For installation and measurement in narrow places and holes,take care to avoid blocking the light path from the light-emitting part to the light-receiving part)

Measurement for wall surface mounting(Install in the direction shown in the figure below to reduce the multiple reflected light from the wall surface, since the reflected light will enter the receiving surface.In case of wall surface high reflection rate,it is better to change to ma-tte black)

Measurement of shiny objects(Or shiny surface,as shown in the figure below,install the sens-or after tilting the sensor at a certain angle)

Wiring Diagram

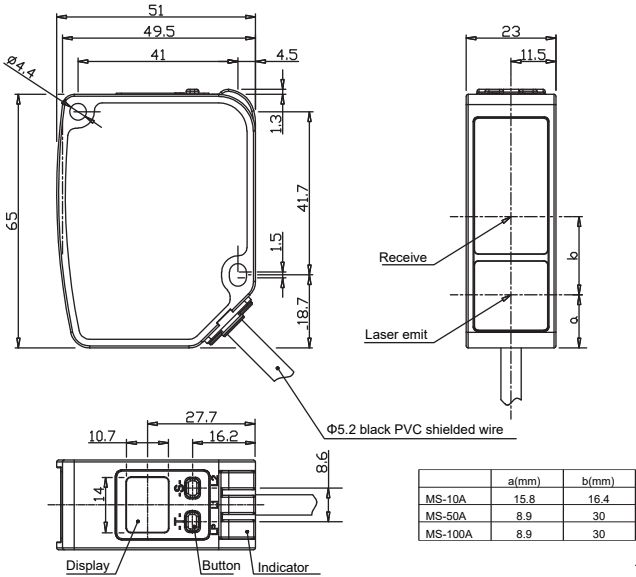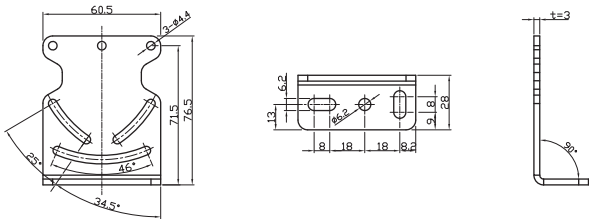|		
BN	+	
BK	Q	
GY	Ia	
BU	-	

Analog output: The sensor is equipped with a shielded cable for the analog output. The gray line, Ia, must not be short-circuited to the power line or ground. There is a grounding ring on the shielded wire. It is recommended that the grounding ring be either grounded or left ungrounded based on the specific installation requirements.
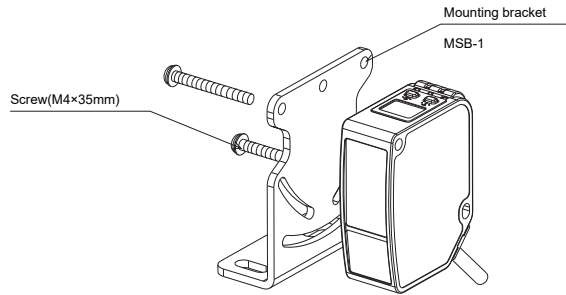
■ Sensor dimensions

Receive
Laser emit
Φ5.2 black PVC shielded wire
Display   Button   Indicator

	a(mm)	b(mm)
MS-10A	15.8	16.4
MS-50A	8.9	30
MS-100A	8.9	30

■ Accessory dimensions

Mounting bracket: MSB-1

t=3

■ Installation

Mounting bracket
MSB-1

Screw(M4×35mm)

*For mounting, please keep tightening torque ＜ 0.5N·m