METROL

RC-P10DX-TUHJ
RC-R03-003

Instruction Manual

Metrol Co., Ltd.

Acquired wireless certifications

USA

RC-P10DX-TUHJ FCC ID : AORMETROLRCK3X01
RC-R03-003 FCC ID : AORMETROLRCR0301

Federal Communications Commission (FCC) Statement

15.105(a)
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

15.21
You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

FCC RF Radiation Exposure Statement:
1.This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2.This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 5 mm between the radiator and your body.

15.19
This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
1) this device may not cause harmful interference and
2) this device must accept any interference received, including interference that may cause undesired operation.

Taiwan

xxxxxxxxxxxxxxx

取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、
加大功率或變更原設計之特性及功能。
低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，
應立即停用，並改善至無干擾時方得繼續使用。
前述合法通信，指依電信管理法規定作業之無線電通信。
低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

Mexico

"La operación de este equipo está sujeta a las siguientes dos condiciones:
(1) es posible que este equipo o dispositivo no cause interferencia perjudicial y
(2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada."

About Signals

In this Instruction Manual the seriousness and dangerousness levels of risk are denoted as follows.

⚠ DANGER : Danger indicates a hazardous event with a high risk that could result in death or serious injury if not avoided.

⚠ WARNING: Warning indicates a hazardous event with a moderate risk that could result in death or serious injury if not avoided.

⚠ CAUTION : Caution indicates a hazardous event with a low risk that could result in minor or moderate injury if not avoided.

For Safe Use

⚠ WARNING

a. The handling of this product and all system operation and maintenance, etc., related to it should be handled by a specialist possessing sufficient knowledge and experience.
b. This product was designed and manufactured as a general-purpose product for general industrial applications. When used in equipment or devices, etc., be sure to check the suitability of the application and the related standards, laws, and regulations. Do not use for the following applications in particular.
   (a) Applications where the usage conditions or environment (heat resistance, vacuum, magnetic field, etc.) exceed the functional or performance range of this product.
   (b) Applications that are expected to impact life or property (nuclear power equipment, transport equipment, medical equipment, etc.) or public infrastructure activities (electricity, gas, water, etc.), or any applications similar to these.
c. Absolutely do not install or remove this product or operate or maintain any systems, etc., related to this product until the situation has been confirmed to be safe.
d. To ensure the safe and correct use of this product, carefully read the Instruction Manual and understand its contents. Death or injury could result from not following the safety warnings and cautions or the instructions in the Instruction Manual.

Terms of Warranty

Before using our products, we would like to request that our customers have an understanding of our warranty policy and the functions and specifications of applicable products as indicated by our catalogs, instruction manuals and website to ensure that they are used properly under specified conditions. Durability, life time and repeatability are described based on our test conditions. Please note that the performance is not guaranteed under your specific usage environment.

1) Applicable Products

The warranty defined below is applicable to products manufactured and sold by METROL (to be referred to as the "applicable products").

2) Warranty Period

The warranty for applicable products is valid for one year and three months from the original delivery date to the location designated by the customer.

3) Range of Coverage

a. A replacement product will be provided on an exchange basis or the malfunctioning product will be repaired free of charge within the warranty period. If the product is or becomes defective and, at the sole discretion of METROL, the defects are due to faulty materials or workmanship. However, applicable products will not covered by the warranty in the case of the following malfunctions even within the warranty period.
   (I) Malfunctions due to use of a product in a manner that deviates from standards, specifications, environments, usage procedures or usage precautions described in the catalog, instruction manual or specifications.
   (II) Malfunctions having occurred for reasons other than those attributable to the delivered product.
   (III) Malfunctions having occurred due to disassembly, modifications or repairs made by someone other than a Metrol representative.
   (IV) Malfunctions or damage that results from external causes outside our control which shall include accidents, fires, natural disasters, or other force majeure.
b. The range of coverage is limited to the warranty of the applicable product only, and any other secondary loss or damage resulting from the malfunction of an applicable product is not covered by the warranty.
c. Please be aware that we do not offer installation, uninstallation, on-site confirmation, or repairs.

Contents

1. Before Using the Product

Product overview

The precision measurement sensor connected to industrial machine tool systems to measure the size of manufactured products.It has a wireless interface between the sensor and receiver to control the industrial machine.

⚠ WARNING

Battery

a. The sensor uses a 1/2AA size lithium battery (not rechargeable) that is included with the product. Dispose of used batteries in accordance with the environmental and safety regulations for your area. Refer to the instructions of the battery manufacturer for the guidelines regarding the use, safety, and disposal of the battery.
b. Do not charge the included battery.
c. When replacing the battery, confirm the replacement battery is the recommended/compatible type and follow the procedure in this manual to install the battery with the electrical poles oriented correctly.
d. Store batteries in a location out of direct sunlight and rain.
e. Do not heat or incinerate the batteries.
f. Do not intentionally discharge the batteries.
g. Do not short circuit the batteries.
h. Do not disassemble, apply excessive pressure, make holes in, or deform the batteries.
i. Do not swallow the batteries. Keep the batteries out of the reach of children.
j. Do not get the batteries wet.
k. Do not use new batteries together with old batteries.

Installation Work

a. Locate the sensor and receiver away from electrical noise sources, such as transformers and servo amps.
b. Separate the cables for this product from high current cables, such as motor power supply cables, and high-speed data cables.
c. Make the cables as short as possible.

Using the Product

The protective performance or function of this product could decrease if the product is not used as specified by METROL.

2. Specifications

2-1. Receiver Absolute Maximum Rating

> ⚠ CAUTION
>
> Applying load that exceeds the following absolute maximum rating could cause serious damage to the internal components.

Absolute Maximum Rating

Item	Output signals	Value	Unit
Power voltage		26.4	V
Output withstand voltage	Probe Status 1 Battery Alarm Communication Error Probe Status 2a	40	V
Output withstand current	Probe Status 1 Battery Alarm Communication Error	100	mA
	Probe Status 2a	50	mA
	Probe Status 2b	50	mA

2. Specifications

2-2. Specifications Table

⚠ CAUTION

a. The values in the following specifications table were tested based on METROL's setting conditions. This is not a guaranty of performance within the customer's usage environment.
b. The protective structure (IP) secondary characteristics numbers (right side numbers) show the waterproof property when submerged in water. This differs from the watertightness of the coolant.

2-2-1. Sensor Specifications Table

Item	Description
Repeatability *Feed speed 150 mm/min	1μm (2σ)
Measurement pressure	1N
Detection direction	1 direction
Over-travel amount	3mm
Contact signal	1-Point NC
Antenna	Built-in antenna
Display	Red LED：2 locations
Protective structure	IEC IP68
Usage environment	Indoor use only
Operation temperature	5°C to 50°C：20% to 80% (no condensation)
Storage temperature	-10°C to 70°C：20% to 80% (no condensation)
Weight	Battery installed：Approx. 130g Without battery：Approx. 110g
Power supply	1/2 AA Lithium-thionyl chloride battery：2 pcs Recommended model No.：LS14250 made by SAFT
Pollution degree	3

*Use this product only for a flat surface.

2. Specifications

2-2-2. Receiver Specifications Table

Item	Description
ID control *	Communication only with paired sensors
Antenna	Built-in antenna
Display	LED：6 locations POWER, BATTERY, TOUCH, SIGNAL ×3 locations
Parameter switch	Built-in DIP switch
Cable	Oil resistant cable with 14-core waterproof connector, outside diameter Φ7.2mm
Input signal	1 signal Machine Start
Output signal	5 signals Probe Status1, Probe Status2a, Probe Status2b Battery Alarm, Communication Error
Protective structure	IEC IP68
Usage environment	Indoor use only
Operation temperature	5°C to 50°C：20% to 80% (no condensation)
Storage temperature	-10°C to 70°C：20% to 80% (no condensation)
Power voltage	DC24V±10%
Consumption current	Max. 100mA
Pollution degree	3

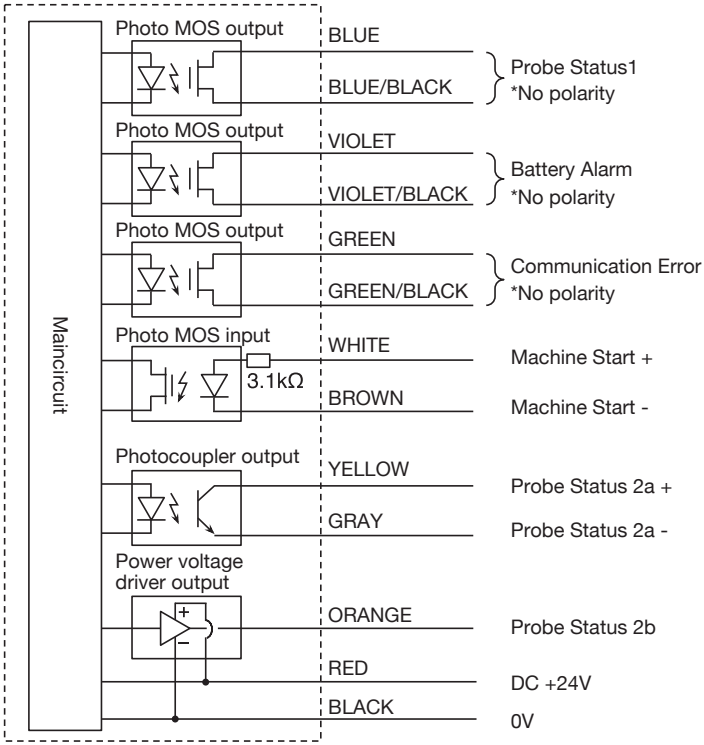
* The pairing operation can be done using the receiver main unit parameter switch (Refer to 6-5 Pairing Mode).

2-2-3. Wireless Unit Common Specifications Table

Item	Description
Frequency	2404 to 2476MHz
Number of units that can be connected	One-to-one connection Paired sensor and receiver communication

2. Specifications

2-3. Receiver Input/Output Specifications



Item	Specification	Explanation
Probe Status1	No polarity photo MOS relay output Output voltage up to 40V Output current up to 100mA	This outputs the communication status and sensor ON/OFF status.
Battery Alarm	No polarity photo MOS relay output Output voltage up to 40V Output current up to 100mA	This outputs the sensor battery alarm information.
Communication Error	No polarity photo MOS relay output Output voltage up to 40V Output current up to 100mA	This outputs the communication error information.
Machine Start	With polarity input wire Input voltage 24V±10%	This is used for the operation mode switch.
Probe Status2a	With polarity photocoupler output Output current up to 50mA	This outputs the sensor ON/OFF status.
Probe Status2b	With polarity power voltage driver output Output current up to 50mA	This outputs the sensor ON/OFF status.

*1 For details regarding the output signals, refer to the explanations for each mode.
*2 Don't use GREEN/YELLOW.（GND）

3. List of Included Items

Before using this product, please check all of the following items have been included in the packaging.

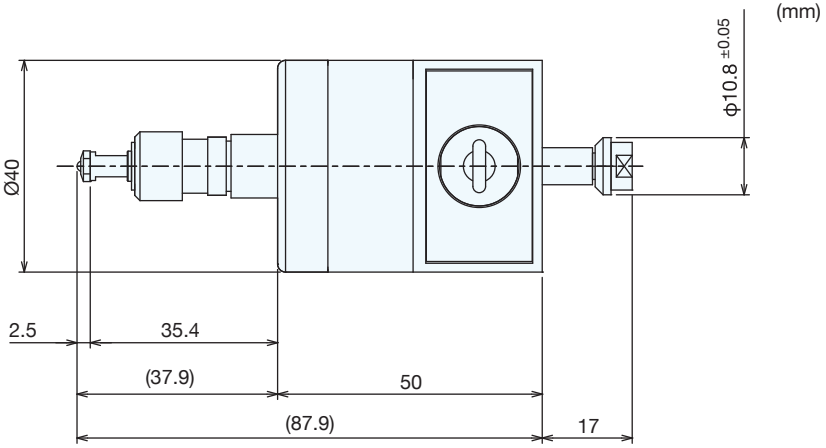
Item No.	Name	Model	Quantity
①	Sensor	RC-P10DX	1
②	Receiver	RC-R03	1
③	Cable	DC-R02	1
④	Shank		1
⑤	Spanner		2
⑥	Instruction manual (this document)		1

⑤ Spanner

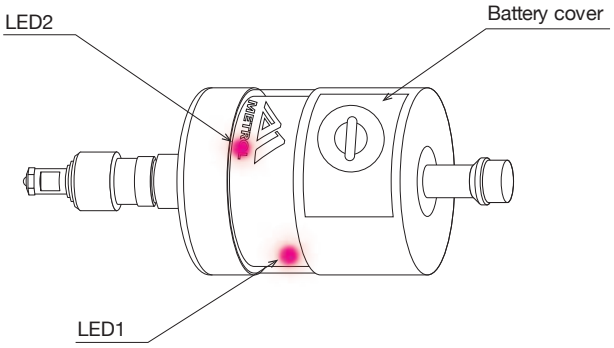
* Included accessories are different depends on the Product No.

4. Part Names and Functions

4-1. Sensor Main Unit External Dimensions Diagram



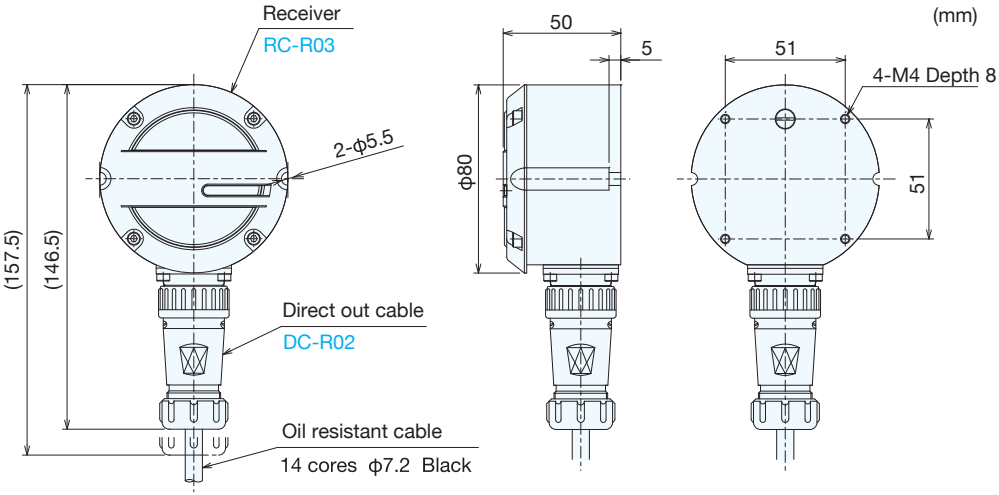
4-2. Sensor Part Names and Functions



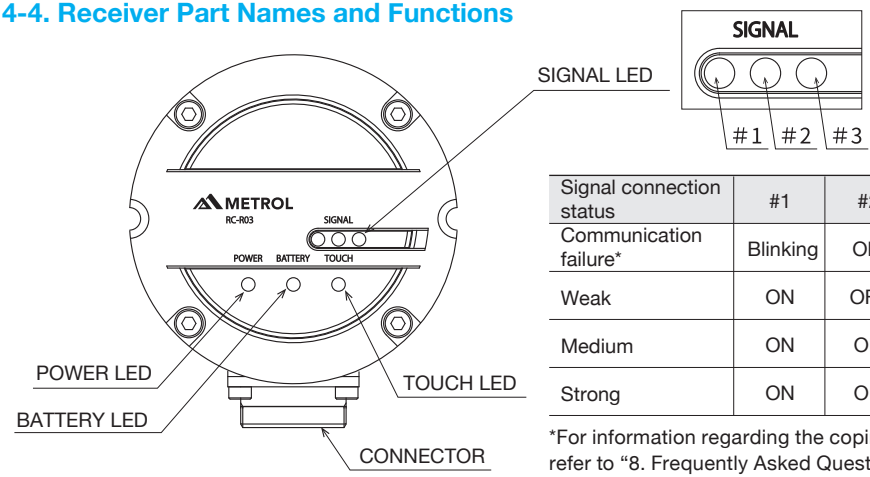
Name	Explanation
LED1	This shows the sensor ON/OFF status. When sleep mode: Off When measurement mode: Sensor ON (when touched): On Sensor OFF: Off
LED2	
Battery cover	When replacing the battery, install the battery cover by paying attention to the direction of the pin on the main unit and the groove on the battery cover. (Refer to 7-1. Battery Replacement Method).

4. Part Names and Functions

4-3. Receiver Main Unit External Dimensions Diagram



4-4. Receiver Part Names and Functions



Signal connection status	#1	#2	#3
Communication failure*	Blinking	OFF	OFF
Weak	ON	OFF	OFF
Medium	ON	ON	OFF
Strong	ON	ON	ON

*For information regarding the coping strategy, refer to “8. Frequently Asked Questions (FAQ)”.

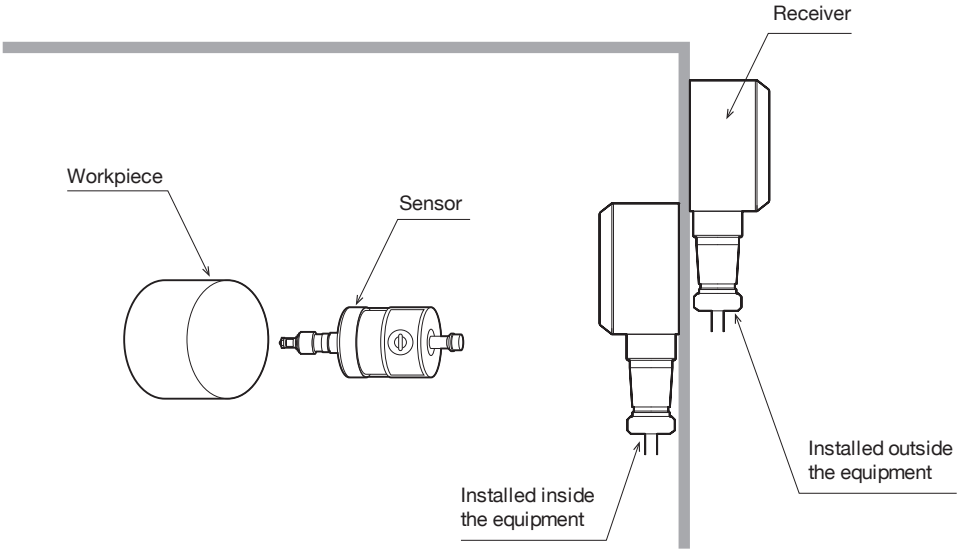
Name	Explanation
SIGNAL LED #1 to #3	This shows the signal connection status during measurement mode.
POWER LED	This shows the RC-R03 Power supply status. When power is ON: On
BATTERY LED	This shows the sensor battery alarm information.
TOUCH LED	This shows the sensor ON/OFF status.
CONNECTOR	This is a waterproof connector for connecting the cables.

*For details regarding the LED display, refer to the explanations for each mode of the software specifications.

5. Installation

5-1. Receiver Main Unit Installation Location

SIGNAL LEDs #1 to 3 are ON during the measurement mode and show the signal connection status. Communication has failed when #1 is blinking. For details, refer to “6-4. Measurement Mode”.
It is recommended that the receiver be installed in a location where all 3 SIGNAL LEDs #1 to 3 are on when the sensor is within the range of movement.

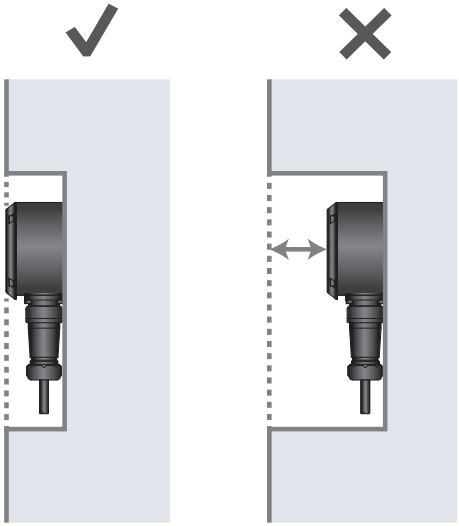


⚠ CAUTION

a. Please set the receiver so that it is not completely enclosed by metal.
b. Do not cover the front of the receiver with metal.
c. When the receiver is installed outside the equipment, place in a location where there is no metal and the signal can easily pass through.
d. Both the sensor and the receiver have waterproof construction, but if water or coolant stays on the window of the receiver, it could negatively impact communication.

5. Installation

Installed on an internal wall of the equipment

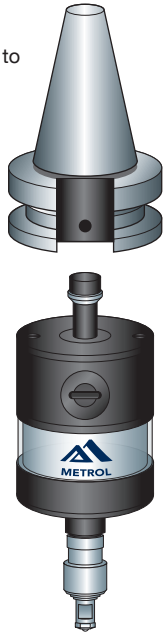


⚠ CAUTION
Position the receiver so that it is not embedded within an internal wall made of metal.

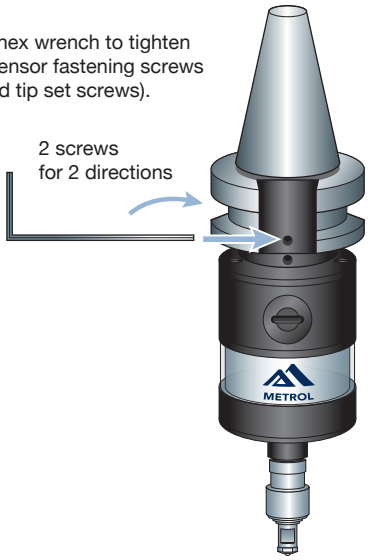
5. Installation

5-2. Shank Installation

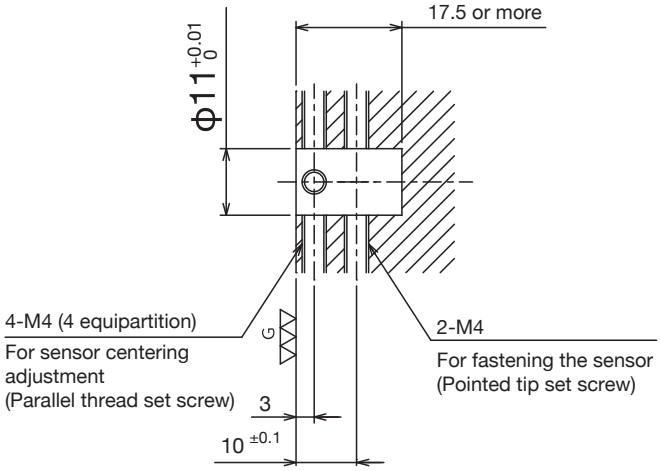
① Attach the shank to the sensor.



② Use a hex wrench to tighten the 2 sensor fastening screws (pointed tip set screws).



Shank sensor mount dimensions

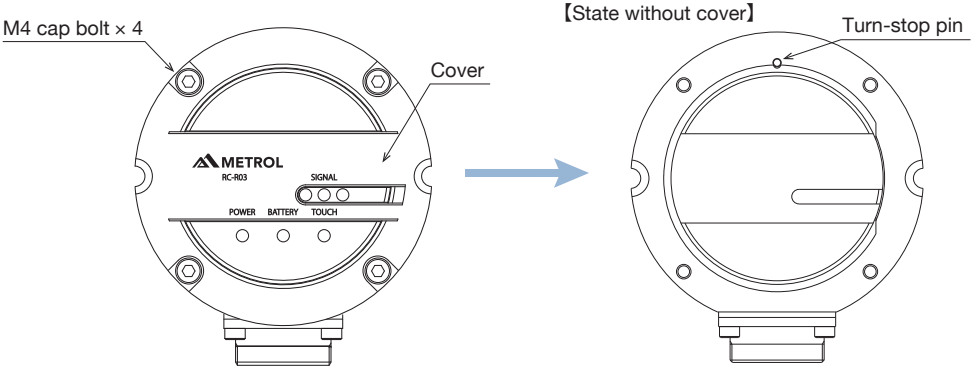


6. Software Specifications

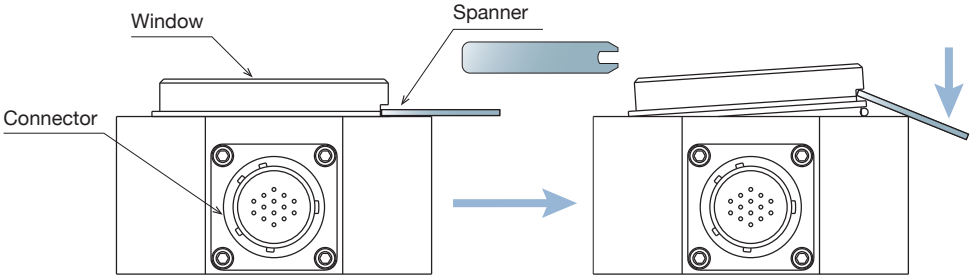
6-1. Receiver Parameter Switch Setting Procedure

The DIP switches mounted the receiver's internal circuit board are parameter switches #1 to #8 for the paring and setting of input/output signals. Use the procedure below to remove the cover and window and set the parameter switches.

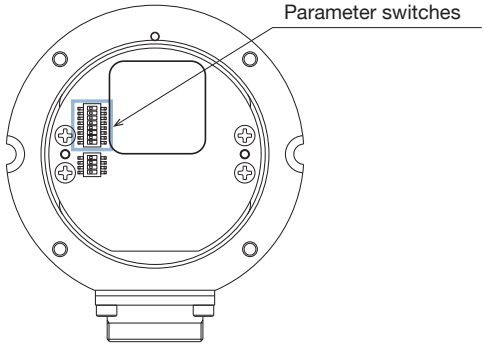
① **Remove 4 cap bolts on the front of the receiver and then remove the cover.**



② **Insert the spanner into the groove at the side of the window and then lift up and remove the window.**



③ **Set the parameter switches on the circuit board.**



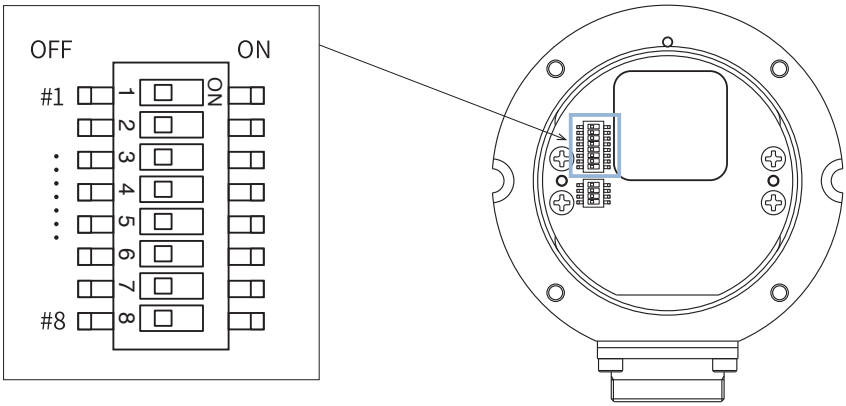
6. Software Specifications

6-2. Receiver Parameter Switch Specifications

⚠ CAUTION

Be careful not to touch the components on the circuit board when operating the parameter switches.

Parameter switch



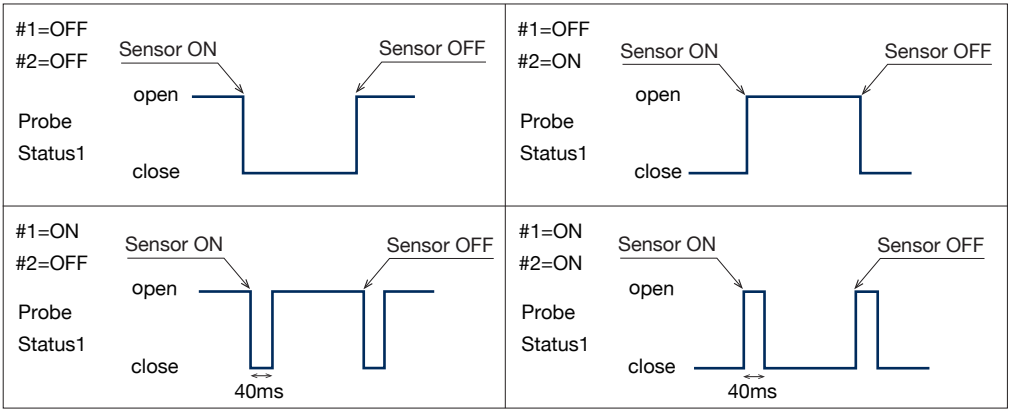
Parameter switch	Description	OFF (At factory shipment)	ON
#1	ProbeStatus1 Output method setting	Level output	Pulse output
#2	Probe Status 1 NO/NC setting	NO	NC
#3	Probe Status 2a、2b Output method setting	Level output	Pulse output
#4	Probe Status 2a Probe Status 2b Normal output setting	2a：NO 2b：Normal Low	2a：NC 2b：Normal High
#5	Battery Alarm NO/NC setting	NO	NC
#6	Communication Error NO/NC setting	NC	NO
#7	Machine Start Input method setting	Pulse input	Level input
#8	Pairing mode*	Sleep mode / Measurement mode	Pairing start

*For details regarding the pairing mode, refer to “6-5. Pairing Mode”.

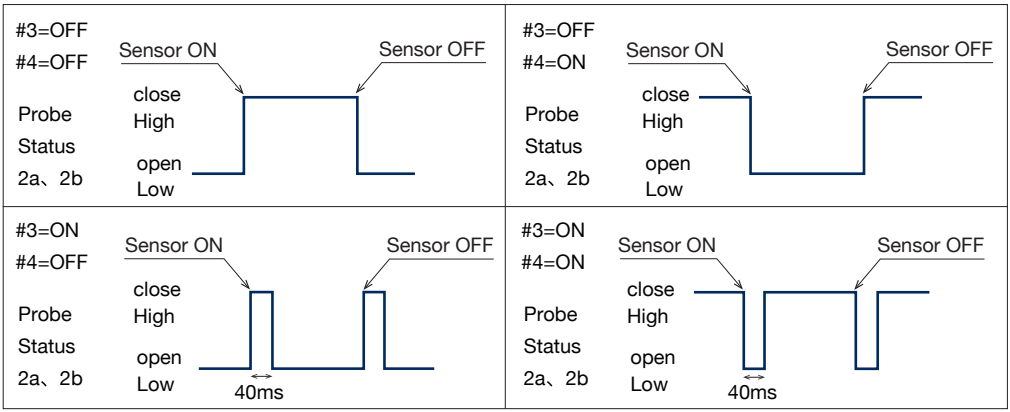
6. Software Specifications

6-2. Receiver Parameter Switch Specifications

Parameter switch	Description	OFF (At factory shipment)	ON
#1	Probe Status 1 Output method setting	Level output	Pulse output Pulse width: 40ms
#2	Probe Status 1 NO/NC setting	NO	NC



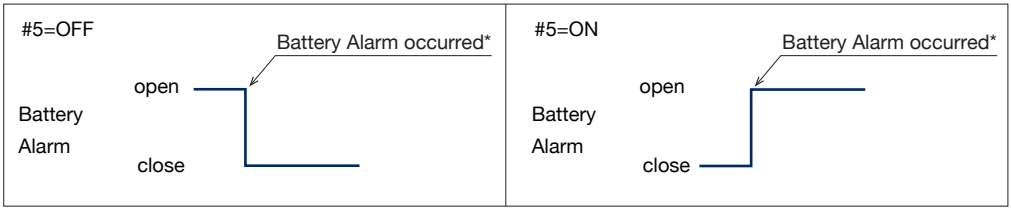
Parameter switch	Description	OFF (At factory shipment)	ON
#3	ProbeStatus 2a, 2b Output method setting	Level output	Pulse output Pulsewidth: 40ms
#4	Probe Status 2a Probe Status 2b Normal output setting	2a：NO 2b：Normal Low	2a：NC 2b：Normal High



6. Software Specifications

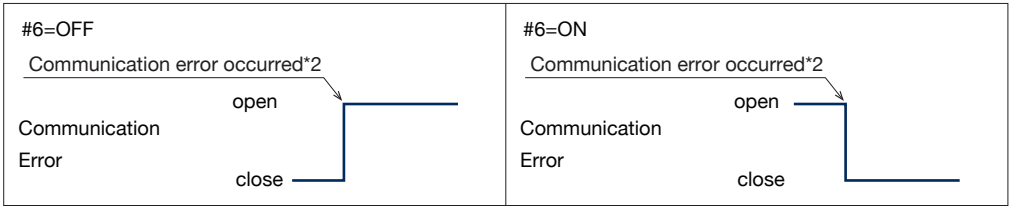
6-2. Receiver Parameter Switch Specifications

Parameter switch	Description	OFF (At factory shipment)	ON
#5	Battery Alarm NO/NC setting	NO	NC



* The Battery Alarm signal will be output when changing to sleep mode and then changing back to measurement mode after the battery has dropped during the measurement mode.

Parameter switch	Description	OFF (At factory shipment)	ON
#6	Communication Error NO/NC setting	NC*1	NO



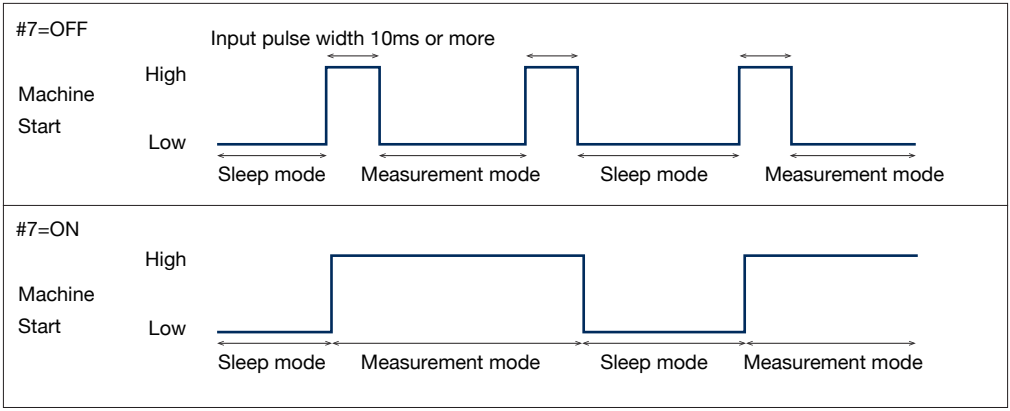
⚠ CAUTION

*1 The Communication Error signal is initially set as NC output.
*2 A communication error occurs when communication continuously fails for 0.8 sec while in the measurement mode.

6. Software Specifications

6-2. Receiver Parameter Switch Specifications

Parameter switch	Description	OFF (At factory shipment)	ON
#7	Machine Start Input method setting	Pulse input This switches between sleep mode ↔measurement mode when a pulse is input.	Level input Low: Sleep mode High: Measurement mode



6. Software Specifications

The sensor and receiver have 3 operation modes.

6-3. Sleep Mode

Sensor : When pairing with the receiver has been completed, the sensor is in the power conserving standby state as the initial state after the power is turned on.

Receiver : This is the initial state after the power is turned on when the Machine Start input is OFF.
The signals are not output when the sensor is turned ON/OFF. The system changes to the measurement mode when Machine Start input is turned ON while in the sleep mode.
→ Refer to“6-4 Measurement Mode”.
The system changes to the pairing mode when parameter switch #8 is turned ON while in the sleep mode.
→ Refer to“6-5 Pairing Mode”.

Sensor

Name	Operation
LED1, LED2	Off

Receiver

Name		Operation
LED	SIGNAL LED #1～#3	Off
	POWER LED	On
	BATTERY LED	On only when battery Alarm occurred
	TOUCH LED	Off
Output signal*	Probe Status1	Close
	Battery Alarm	Open
	Communication Error	Open
	Probe Status2a	Open
	Probe Status2b	Low

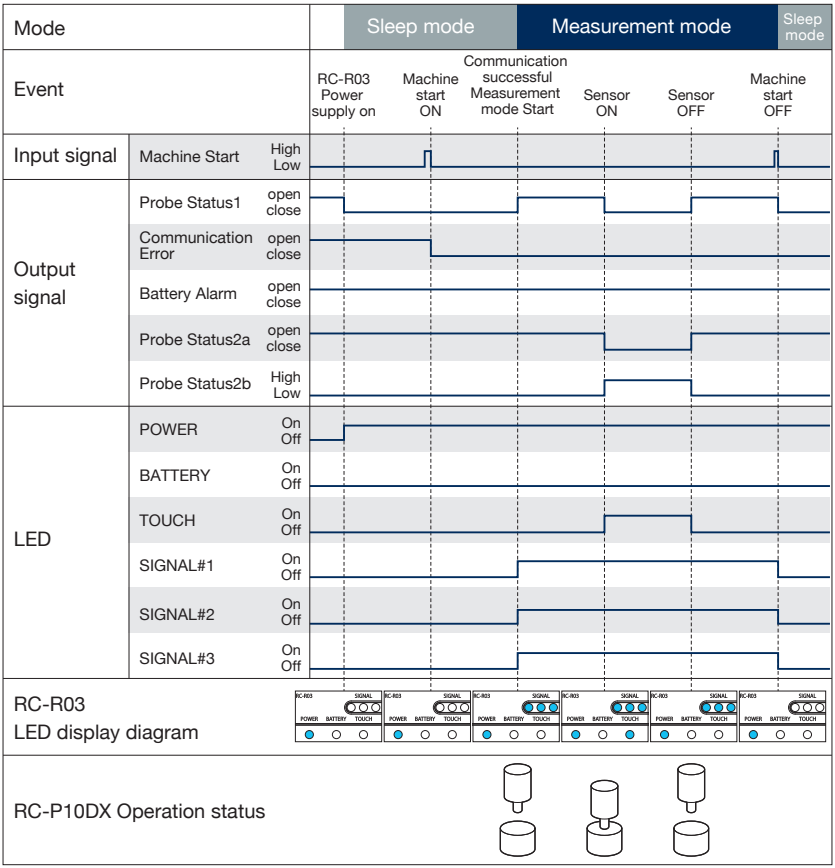
*When parameter switches #1 to #7 are all OFF (initial state).

6. Software Specifications

6-4. Measurement Mode

Sensor : The sensor transmits ON/OFF to the receiver.
LED1 and 2 show the sensor ON/OFF status.
Sensor ON (when touched) : On(LED), Sensor OFF: Off(LED)

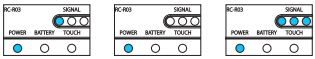
Receiver : The system changes to the measurement mode when Machine Start input is turned ON while in the sleep mode. The receiver receives the ON/OFF transmitted from the sensor and conducts signal output. This is also output when a Communication Error or Battery Alarm occurs.
The SIGNAL LEDs #1 to #3 show the signal connection status when in the measurement mode. Communication has failed when #1 is blinking. For information regarding the coping strategy, Refer to“8. Frequently Asked Questions (FAQ)”. The system changes to the sleep mode when Machine Start input is turned OFF while in the measurement mode.



*When parameter switches #1 to #7 are all OFF (initial state).

6. Software Specifications

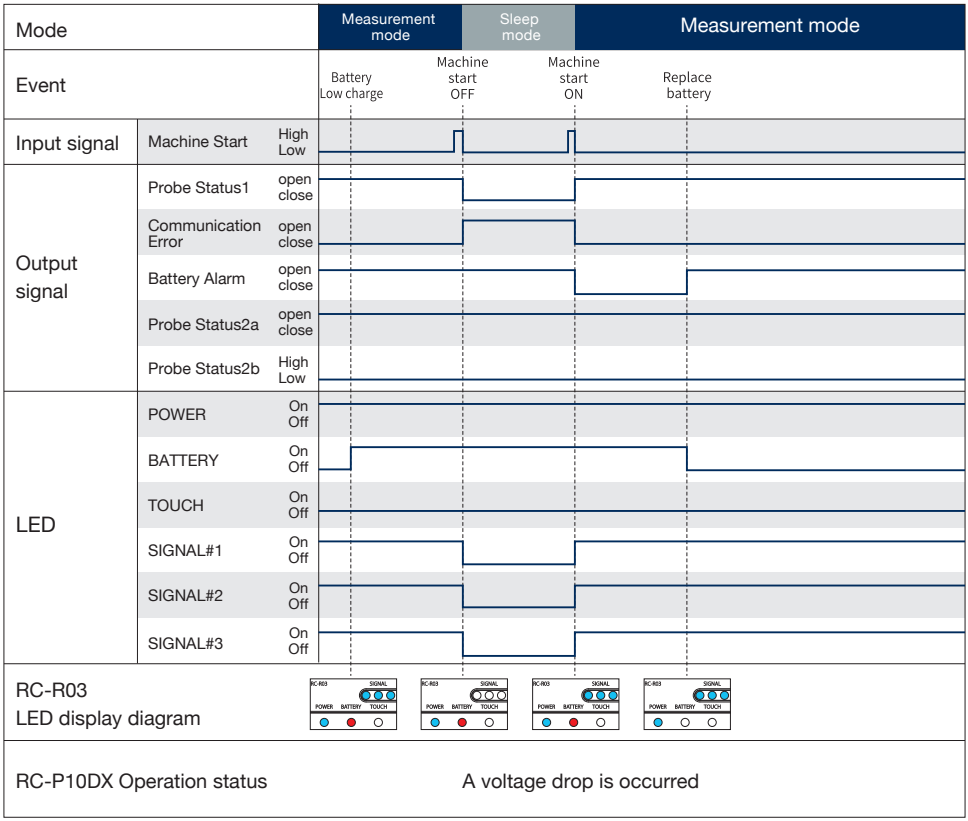
Communication error during measurement mode

Mode			Measurement mode
Event			Communication failure occurred / For 0.8 sec Continued communication failure Error occurred / Communication successful Error recovery
Input signal	Machine Start	High Low	
Output signal	Probe Status1	open close	
	Communication Error	open close	
	Battery Alarm	open close	
	Probe Status2a	open close	
	Probe Status2b	High Low	
LED	POWER	On Off	
	BATTERY	On Off	
	TOUCH	On Off	
	SIGNAL#1	On Off	Blinking
	SIGNAL#2	On Off	
	SIGNAL#3	On Off	
RC-R03 LED display diagram			
RC-P10DX Operation status			

*When parameter switches #1 to #7 are all OFF (initial state).

6. Software Specifications

Battery alarm



*When parameter switches #1 to #7 are all OFF (initial state).

6. Software Specifications

6-5. Pairing Mode

Pairing is conducted when the sensor and receiver are first installed. When purchasing by set part No., the pairing is completed at the time of shipment. Conduct pairing when replacing a sensor or receiver.

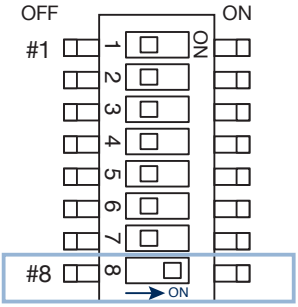
Pairing Procedure

1. Remove the sensor battery.
   →Refer to “7-1 Battery Replacement Method”.

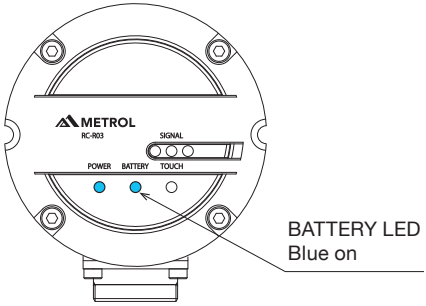
2. Set the receiver to sleep mode
   (Turn OFF Machine Start input).

3. Remove the receiver cover and window.
   →Refer to “6-1. Receiver Parameter Switch Setting Procedure”.

4. Turn ON parameter switch #8.

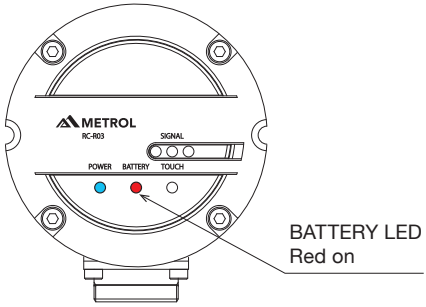


5. Confirm the BATTERY LED is lit blue.

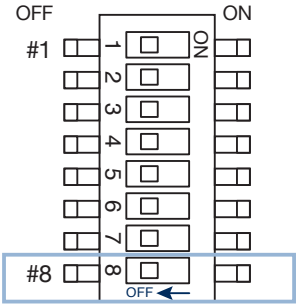


6. Install the battery in the sensor to be paired.

7. Confirm the BATTERY LED color changes from Blue to Red.



8. Turn OFF parameter switch #8.



9. Replace the sensor battery when the BATTERY LED turns off to complete the pairing.

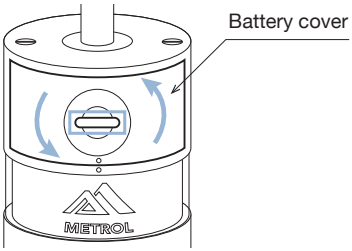
7. Maintenance

7-1. Battery Replacement Method

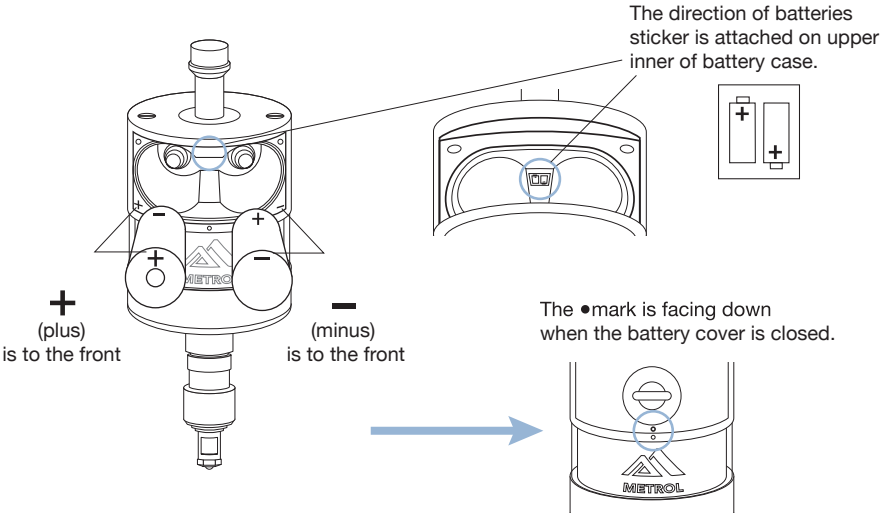
⚠ WARNING

a. When installing the batteries, make sure their poles are correctly oriented.
b. The sensor will not operate correctly if discharged batteries are installed.
c. When replacing the batteries, make sure that coolant and cutting chips do not get into the battery case.
d. Confirm there are any damages on the O ring and the contact surface of it before close the battery cover.
e. Be careful not to scratch the battery cover O ring. Confirm the battery cover is locked enough(the groove on the battery cover is horizontal), and the O ring is on initial position.
f. Do not use new batteries together with old batteries.

1. Use a spanner, flathead screwdriver, or coin, etc., to turn the battery cover lock 45 degrees counterclockwise to open it and then remove the battery cover.



2. Align the battery with the battery direction sticker and insert it into the battery case.Align the battery cover positioning hole with the body pin, install the battery cover, and while pushing in the battery cover turn the lock clockwise until it becomes horizontal.



8. Frequently Asked Questions (FAQ)

Trouble Description	Possible Cause	Countermeasure
Sensor power does not come on.	The battery is dead.	Replace the battery.
	A battery that is not recommended is being used.	Replace it with a recommended battery. (Recommended model No.: LS14250 made by SAFT)
	The battery was not installed correctly.	Make sure the battery installation direction/pole alignment is correct.
The sensor does not operate even though the measurement program is executed.	The sensor is not switched to the measurement mode.	Check if the control unit's Machine Start output is pulse or level. The receiver is set to pulse input at the time of shipment. For level output, turn ON receiver parameter switch #7 to set the sensor to level input.
	The measurement program has started before the sensor is switched to the measurement mode.	Enter the wait time after switching modes. (Depending on the communication status, about 1 sec is sometimes required until switching to the measurement mode.)
	The sensor is still in the sleep mode.	Confirm the sensor is within the transmission/reception possible range and then resend the Machine Start output.
	The sensor and receiver are outside the transmission/reception possible range.	Check the positional relationship between the sensor and receiver.Place the receiver in a position where the SIGNAL LED is lit.
	The battery is dead.	Replace the battery.
The equipment stops in an unexpected position while the measurement program is executing.	The sensor and receiver are outside the transmission/reception possible range.	Check the positional relationship between the sensor and receiver. Place the receiver in a position where the SIGNAL LED is lit.
	There is a problem with the control unit.	Refer to the control unit instruction manual.
	The battery is dead.	Replace the battery.
	The sensor cannot detect the target object.	Check if the workpiece is in the correct position and fastened down and that the sensor is not broken.
Sensor collision.	A malfunction(misdetection) occurred due to rapid acceleration or deceleration.	Reconsider the measurement program.
	There is a object on the sensor movement path.	

8. Frequently Asked Questions (FAQ)

Trouble Description	Possible Cause	Countermeasure
Measurement accuracy problem or repeatability problem.	There is foreign matter on the target object or the contact.	Remove the foreign matter.
	The connection between the sensor and shank is not tight enough or the contact is loose.	Check the applicable part and retighten the fastening part.
	Repeatability problem due to sensor installation/removal or replacement. (When using an ATC, etc.)	Conduct calibration each time the sensor is installed.
	The calibration value is not updated or the correction amount is not correct.	Reconsider the measurement program.
	The operation speed differs between when calibration is being done and when the measurement program is executing.	
	The sensor transmit ON signal before the contact touch the object (transmit ON signal due to acceleration/deceleration).	
	There is a problem with the control unit.	Conduct an accuracy inspection of the equipment.
The receiver SIGNAL LED #1 is blinking during measurement program execution.	The sensor and receiver are outside the transmission/reception possible range.	Check the positional relationship between the sensor and receiver. Place the receiver in a position where the SIGNAL LED is lit.
	The battery is dead.	Replace the battery.
	The sensor was not paired with the receiver when a new sensor was replaced.	Conduct pairing. For details regarding the pairing method, refer to “6-5. Pairing Mode” .
The receiver BATTERY LED is lit.	The battery is dead.	Replace the battery.
The transmission/ reception possible range is limited.	There is radio interference from another wireless device.	Check the positional relationship between another wireless device.
The sensor is lit while the sensor is in sleep mode.	The sleep mode change instruction has not been received from the receiver.	Check the measurement program Machine Start input signal.

NOTE

The specifications, prices and other information stated in this document are subject to change without notice due to product improvements.

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