

BS Series Linear Gauge Sensor Instruction Manual

Baby Gauge Sensor **BS-1210** (Resolution: 10 μm)

Baby Gauge Sensor **BS-1310** (Resolution: 1 μm)

This document (BS Series Linear Gauge Sensor Instruction Manual) describes the operation, maintenance, specifications and handling precautions of the Baby Gauge Sensor BS-1210/1310.

Be sure to read the precautions in this manual before use to ensure that you use Baby Gauge Sensor BS-1210/1310 safely and correctly.

Observe the instructions in this manual when using the BS-1210/1310.

ONO SOKKI assumes no responsibility or liability for damages or failures resulting from failure to follow the instructions in this manual.

Keep this manual in a convenient place.

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 B00002356 / IM13061401 (2.0) 10-5*2 13X (MS) 000

Omission of Issuance of Certificate

Since this product has been tested through a series of strict inspections and a complete program of quality control, issuance of the test qualification has been omitted.

Warranty

1. This product is covered by a warranty for a period of one year from the date of purchase.
2. This warranty covers free-of-charge repair for defects judged to be the responsibility of the manufacturer, i.e., defects that occurred while the product is used under normal operating conditions according to the instructions in this manual and the notices on the product label.
3. For free-of-charge repair, contact either your sales representative or our sales office nearby.
4. The following failures will be handled on a fee basis even during the warranty period.
 - (a) Failures occurring through misuse, improper operation, or modification
 - (b) Failures occurring through mishandling (dropping) or transportation
 - (c) Failures occurring through natural disasters (fires, earthquakes, floods, and lightning), environmental disruption, or abnormal voltage.

* For repairs after the warranty period expired, contact your sales representative or our sales office nearby.

Overview and Features

Overview

Baby Gauge Sensor BS-1210/1310 is a compact detector that detects dimensions, displacements and travels.

The BS-1210/1310 uses glass slits to provide evenly-spaced patterns onto which light is shone to repeat reflection and non-reflection. This is detected by the light receiver for conversion into displacement.

Features

- IP66 rated design for protection against dust and water.
- Highly durable, achieving 30 million times of sliding (based on our internal durability test).
- Can be connected to PLC.
- Remote control with a release (optional).

Precautions on Use



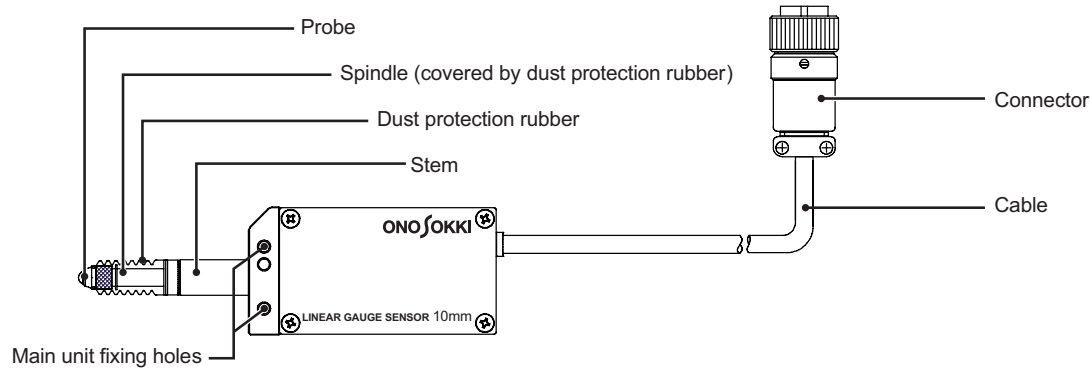
The following precautions should be observed to avoid a risk of personal injury and property damage which could result from inappropriate use of this product.

- The BS-1210/1310 is a precision device. Be careful not to drop the sensor. Do not subject it to heavy vibration or impact.
- Never disassemble the BS-1210/1310. If disassembled, dust, dirt or liquid may enter the sensor, resulting in a failure. Also, IP66 will not be assured.
- Do not pull the sensor cable with a force greater than 20 N.
- Use a collar or the like to secure the sensor by the stem. Do not hold the sensor directly with a screw or the like.
- Do not suddenly release the spindle from the state it is pushed in, or do not perform measurement in such a manner. This may impair the sensor's accuracy or destroy the internal mechanism.

- When pushing up the spindle, do not apply impact to the internal stopper to stop the spindle. This may impair the sensor's accuracy or destroy the internal mechanism. For measurement that requires the spindle to be released, the permissible movement range is within 1 mm from the workpiece. Always observe this limit.
- Do not fasten the stem with a force more than necessary. This may deteriorate spindle operation or shorten the sensor life. (See "Mounting the Sensor on a Holder" for details.)
- Do not apply force (greater than 0.1 N) to the spindle in the lateral direction. This may deteriorate spindle operation or shorten the sensor life.
- If the cover, dust protection rubber or release cap of the sensor is removed, internal condensation may occur.

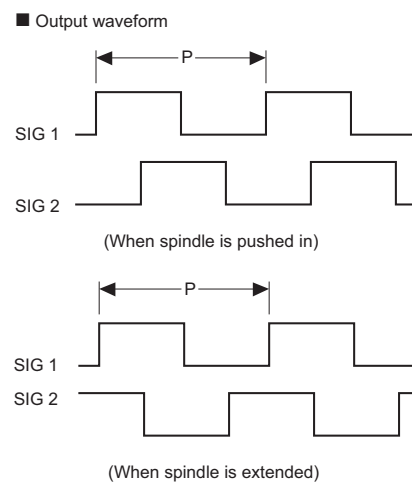
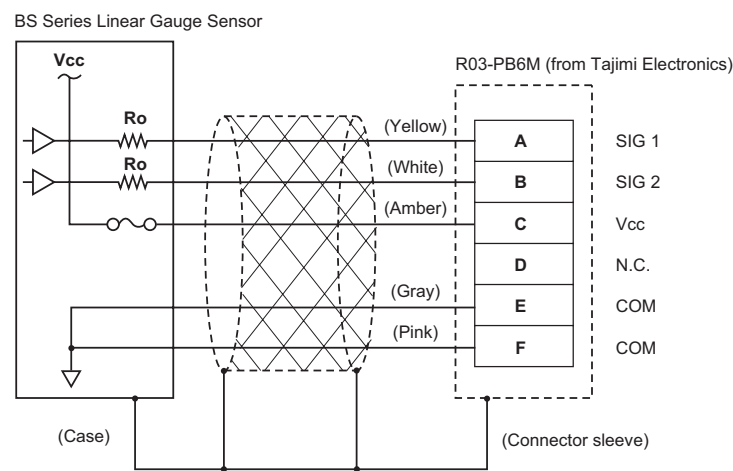
- If the dust protection rubber or release cap is not fitted correctly, IP66 is not assured.
- Do not use the sensor in an environment where it may be exposed to corrosive or inflammable gases.
- The BS-1210/1310 has protection equivalent to IP66. However, provide additional protection such as a cover so that the sensor is not exposed to water or dust.
- Never remove the ring from the sensor spindle. This ring is a stopper.
- A spindle stroke error may occur depending on the way the sensor is used. In case a stroke error occurs, manually move the spindle over its entire stroke.

Part Names



Output Connector Pin Assignment and Output Circuit

The following diagrams show the connector pin assignment and output circuit of the BS-1210/1310, and the phase relationship between output signals SIG1 and SIG2 when the spindle is operated. Each pitch of the output signal corresponds to 40 μm for the BS-1210 and 4 μm for the BS-1310.



Output resistor Ro is a PTC thermistor for output protection. It gives a resistance of 33 Ω at 25°C. P=40 μm: BS-1210 P=4 μm: BS-1310

Example of connection (wiring for improving resistance to noise)

- Connecting to Ono Sokki's gauge counter
 - When connecting to an Ono Sokki's gauge counter, ground the protective grounding terminal of each piece of equipment. See the instruction manual of the equipment for the grounding method.
- Connecting to gauge counter from other manufacturer
 - Connect to a gauge counter from other manufacturer using a connector from Tajimi Electronics (R03-R6F, R03-PB6F, R03-JB6F, R03-J6F). Also, ground the metal part on the outside of the connector.

Mounting the Sensor on a Holder

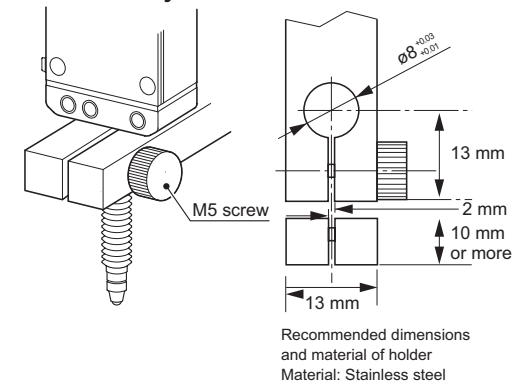
Observe the following precautions when installing the sensor by the stem:

- Check the movement of the spindle after installation.
- If the spindle does not move smoothly, the stem is fastened too tightly. Loosen it slightly. However, if loosened too much, the stem becomes unstable, making accurate measurement impossible. (Do not use a setscrew directly on the stem to hold it.)
- If the spindle moves normally after fastening the stem, the tightening force is correct and no adjustment is required.

Referring to the following illustration, install the sensor on a holder so that the movement direction of the spindle matches the lengthwise (displacement) direction of workpieces.

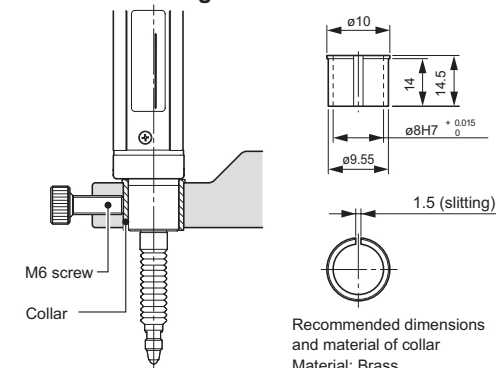
Be sure to check the position of the mounting face (see "External Dimensions") before installing the sensor.

Installation by the stem



Recommended tightening torque: 0.6 to 0.7 N·m

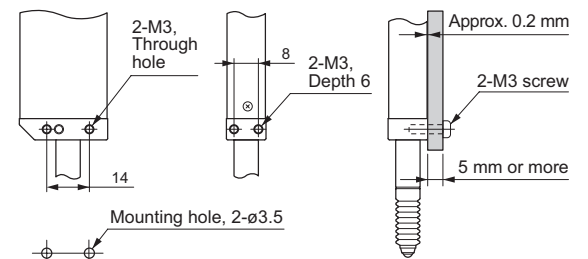
Installation using a collar



Recommended tightening torque: 0.5 N·m or less Recommended screw: M6

Installation using the holes for securing the body

1. M3 screw holes are provided on three faces of the sensor. Select convenient holes for installation. Make sure the sensor is secured so that at least three threads from the top of each screw hole are engaged.
2. Use a rigid jig to hold the sensor. Install the sensor so that the spindle is perpendicular with respect to workpieces.
 - The recommended installation angle is 0.15° (squareness of 260 μm/100 mm) or less.
 - If the sensor is installed in an oblique direction, a lateral force is applied to the spindle, which may lead to a failure.
3. Approximately 0.2 mm clearance between the top of the sensor and mounting surface is provided with the sensor installed.
 - Never try to eliminate this clearance by pressing with a fixture, etc.



Recommended tightening torque: 0.3 to 0.4 N·m

Measurement

- Follow the steps below to install the BS-1210/1310.
1. Connect the sensor to the gauge counter.
 2. Hold the probe by hand and slowly move the spindle to perform measurement.
 - When performing measurement, bring the spindle to within 1 mm from the workpiece, then slowly lower the spindle.
- Set the reference point in the position where the spindle is pushed in by 0.2 mm or more.

Replacing the Probe

When replacing the probe of the BS-1210/1310, care should be taken so that the spindle is not subjected to a twisting force greater than 0.3 N·m.

1. Pull off the dust protection rubber completely

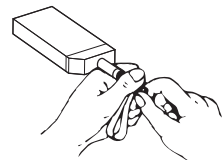
First pull on the stem side, then on the probe side to pull off the dust protection rubber completely.

2. Remove the probe

Turn the probe to loosen and remove it.

If the probe cannot be loosened, wind a rubber band around the spindle as shown, then turn the probe while firmly holding it by hand.

At this time, care should be taken so that the spindle is not subjected to a twisting force.



3. Replace the probe

After replacing the probe, secure the probe by following the removal procedure in reverse.

Replacing the Dust Protection Rubber

Replacement should be done in a clean and dry environment that is free from dust.

If dust enters inside the dust protection rubber or its attachment section, waterproofing performance may deteriorate or malfunctions may result.

If the dust protection rubber is replaced in a wet environment, condensation may occur due to sudden changes in temperature.

Dust protection rubber replacement service is provided at a fee. Contact your sales representative or our sales office nearby.

Removing the dust protection rubber

First pull on the stem side, then on the probe side to pull off the dust protection rubber completely.

Installing the dust protection rubber

1. Clean the spindle, dust protection rubber, and grooves

Before installing the dust protection rubber, use pure alcohol to wipe off dirt from the spindle, inside the dust protection rubber, and grooves A and B.

2. Fit the dust protection rubber

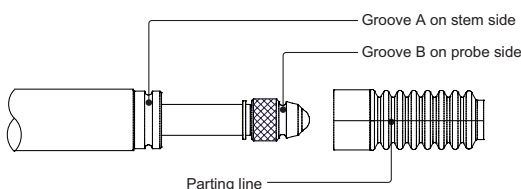
Fit the dust protection rubber in grooves A and B, first on the probe side, then on the stem side, taking care not to tear the rubber.

At this time, make sure the spindle, inside the dust protection rubber, and grooves A and B are free from dirt. If these parts are dirty, waterproofing performance may deteriorate or water may enter inside. Also, malfunctions may result.

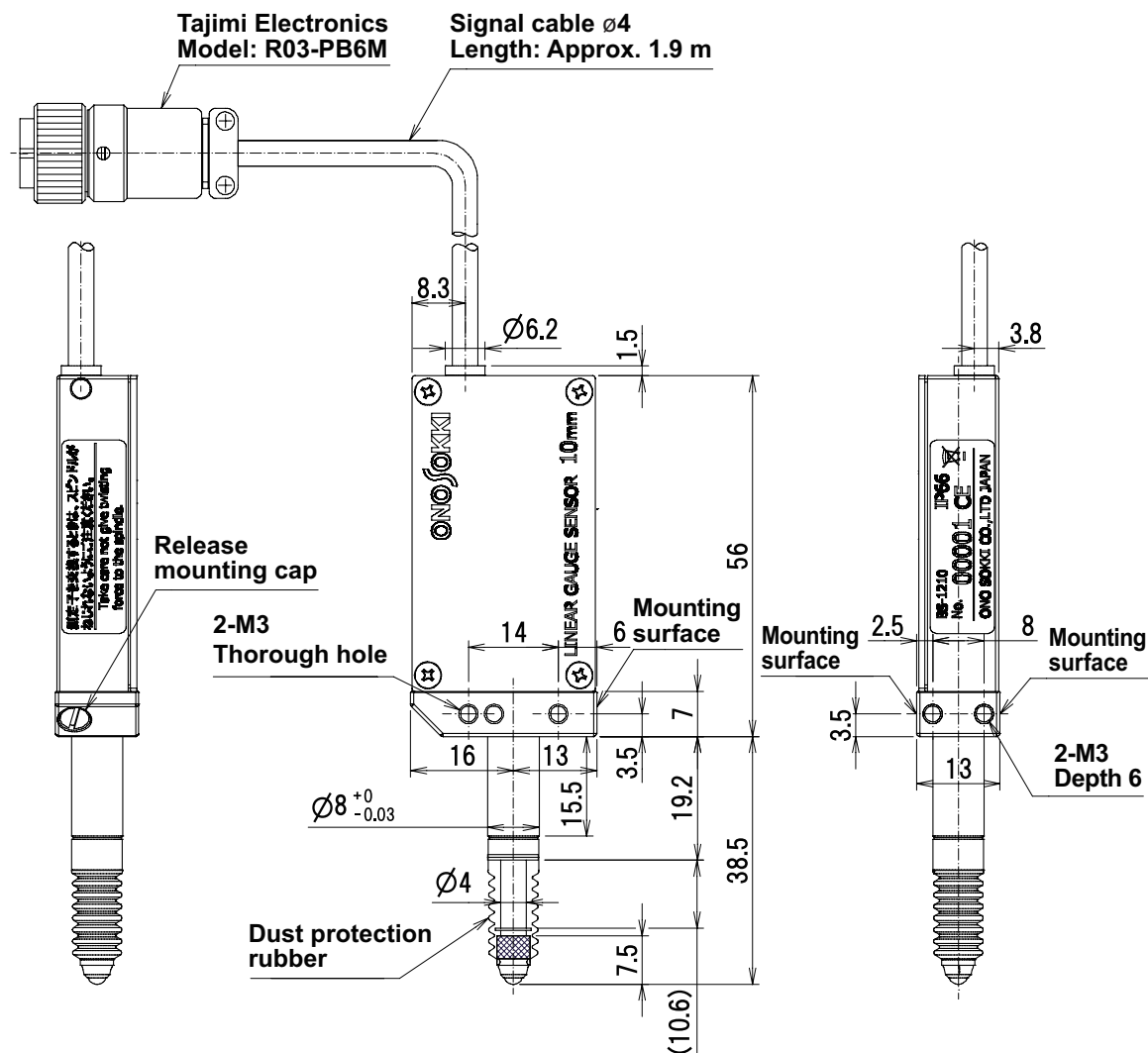
3. Check to be sure that the rubber is properly fit

After fitting the rubber boot, check that the parting line (seam appearing on a molded object) on the rubber boot is not twisted.

If the parting line is twisted, rubber performance may deteriorate.



External Dimensions Unit: mm



Installing and Handling the Release

To install optional release AA-813 (mechanical type) or AA-816 (pneumatic type), remove the cap on the release mounting hole in the sensor body and screw in the release. When the release has been installed, gently push in the release to check that the spindle moves up. Do not suddenly push in the release or suddenly release the depressed release. This may impair the sensor's accuracy or destroy the internal mechanism.

IP66 is not assured if the release is installed.

Installing the release and gauge stand

When using optional gauge stand ST-022, mount the sensor with the release so that the release is on the right side.

Precautions on handling the dust protection rubber

- The dust protection rubber is an expendable part. Periodically replace it.
- Never remove the dust protection rubber except when replacing it.
- If the dust protection rubber is damaged, purchase a new one from your sales representative or at our sales office nearby.
- Dust protection rubber replacement service is provided at a fee. Contact your sales representative or our sales office nearby.

Applicable Standards

Design and inspection of the BS-1210/1310 conform to the following standards:

CE marking	EMC Directive 2004/108/EC EMC Standard EN61326-1: 2006
FCC	CFR47 Part 15, Subpart B, Class B

Specifications

Mechanical specifications

Item	BS Series Linear Gauge Sensor	
	BS-1210	BS-1310
Measuring range	10 mm	
Resolution	10 μ m	1 μ m
Accuracy	3 μ m *1	
Maximum response speed	1 (4) m/s *2	0.3 (1.2) m/s *2
Measuring force (downward)	1.47 N or less	
Vibration resistance (during power-off) *3	98 m/s ² in each of X, Y, Z directions (150 min. each); 10 to 150 Hz sweep; 20 cycles	
Impact resistance (during power-off) *3	980 m/s ² in each of positive and negative X, Y, Z directions (6 directions); 3 times each (18 times total); Half sine wave; Application time: 6 ms	
Spindle sliding times	30 million times or more	

*1: Accuracy guaranteed at 20°C.

*2: When used with Ono Sokki's gauge counter. Values in "()" are the maximum response speed when used with Ono Sokki's Digital Gauge Counter DG-4320/4340/5100.

*3: Vibration resistance or impact resistance in the mechanical specifications is not guaranteed during measurement.

Electrical specifications

Item	BS Series Linear Gauge Sensor	
	BS-1210	BS-1310
Supply voltage	4.5 to 5.5 VDC	
Current consumption	30 mA or less (at 5 VDC)	50 mA or less (at 5 VDC)
Output signal	Two-phase square wave signal; Phase difference: 90° ± 20° (at 5 VDC) (Hi: +4.5 V or more; Lo: max. +0.4 V or less) at 5 VDC	
Output impedance	Approx. 33 Ω (PTC thermistor at 25°C)	
Load resistance	4.7 k Ω or more	

General specifications

Operating temperature	0°C to 50°C
Storage temperature	-10°C to 65°C *4
Maximum humidity	93% RH
Cable length	Approx 1.9 m *5
Cable extension	30 m maximum *6
Mass	Approx 110 g (including cable)
Standard accessory	Instruction manual (this document) x 1, Dust protection rubber x 1 (fitted on the sensor)
Protection class	IP66 (However, it does not apply to the connector, as well as a setup where the release is installed and/or a non-standard probe is used.)
Optional accessory *7	Various probes (Dust protection rubber cannot be used on some probes.); Indicator bushing: AA-2500; Release: AA-813/816; Gauge stand: ST-022; Replacement dust protection rubber: AA-973 (with probe)

*4: Warranty does not apply for failures caused by freezing.

*5: The CE marking does not apply if the signal cable connector is broken or modified.

*6: 20 m if EMC-compliant cable AA-8803 is used.

*7: Visit our website (<http://www.onosokki.co.jp>) or refer to our product brochure for details and the latest information.

Troubleshooting

If a failure is suspected, check the following points before asking for repair.

If the problem cannot be solved or the product does not operate normally after checking the following points, contact either your sales representative or our sales office nearby.

Problem	Possible cause	Solution
Spindle does not move smoothly.	The stem is fastened too tightly.	Loosen the stem slightly to make sure it is not fastened too tightly.
	The dust protection rubber has deteriorated due to oil or chemicals.	The dust protection rubber is not 100% resistant to oil and chemicals. Replace the boot with a new one. After replacement, make sure the boot is not exposed to oil or chemicals.
Measurements are not stable.	The sensor is not mounted firmly.	Firmly secure the sensor.
	Probe attachment is loose.	Firmly secure the probe so that it will not become loose.
	Electrical interference.	Keep the sensor cable away from equipment such as a motor, braking device or power line that may cause electromagnetic interference.
	Excessive vibration, excessive impact, or excessive speed.	Make sure the sensor is not subjected to excessive vibration or impact.