User's Manual

Sushi Sensor

XS550
Temperature Measurement Module

IM 01W06F02-01EN

YOKOGAWA

IM 01W06F02-01EN
1st Edition

CONTENTS

1st Edition: July 2020
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1. Introduction

Thank you for purchasing XS550 Temperature Measurement Module.
To make full use of all the functions of this product, and to ensure efficient and correct operation, please read this operation manual thoroughly before use, fully understand the functions and operations, and familiarize yourself with the product.
This manual describes the XS550 Temperature Measurement Module (Hereinafter simply referred to as XS550). The XS550 works by utilizing XS110A Wireless Communication Module (Hereinafter simply referred to as XS110A). The XS550 is powered by the battery built-in the XS110A. Please install XS110A before use.
Table 1.1 lists the documents related to this manual.

Table 1.1 Related Documents

Document Name	Document No.
General Specifications XS550 Temperature Measurement Module	GS 01W06F02-01EN
User's Manual XS110A Wireless Communications Module	IM 01W06D01-01EN
User's Manual Sushi Sensor Series Software Edition	IM 01W06C01-01EN

■ Regarding This Manual

- This manual should be provided to the end user.
- This manual and the identification tag attached on the packing box are essential parts of the product; keep them in a safe place for future reference.
- The contents of this manual are subject to change without prior notice.
- All rights reserved. No part of this manual may be reproduced in any form without Yokogawa's written permission.
- Yokogawa makes no warranty of any kind with regard to this manual, including, but not limited to, implied warranty of merchantability and fitness for a particular purpose.
- If any question arises or errors are found, or if any information is missing from this manual, please inform the nearest Yokogawa sales office.
- The specifications covered by this manual are limited to those for the standard type under the specified model number break-down and do not cover custom-made instruments. When products whose suffix code or optional codes contain code "Z" and an exclusive document is attached, please read it along with this manual.
- Please note that changes in the specifications, construction, or component parts of the instrument may not immediately be reflected in this manual at the time of change, provided that postponement of revisions will not cause difficulty to the user from a functional or performance standpoint.

■ Safety, Protection, and Modification of this Product

- This product is designed to be used by a person with specialized knowledge.
- To protect the operator, product, and system controlled by the product, observe the safety precautions described in this manual. If users handle contrary to these instructions, we cannot guarantee safety.
- The Modification of the product is strictly prohibited.
- Repair or modification to this instrument by customer will cause a malfunction of explosion protect function and hazardous situation. If you need to repair or modification, please contact the nearest Yokogawa office.

- The following safety symbols are used in this manual:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or physical damage. It may also be used to alert against unsafe practices.

IMPORTANT

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

NOTE

Draws attention to information essential for understanding the operation and features.

⏚ : Functional grounding terminal

■ Trademarks

- Sushi Sensor is a registered trademark of Yokogawa Electric Corporation.
- The registered trademarks or trademarks of the respective companies in the text do not bear the mark of TM or ®.

1.1 Safe Use of the Product

For the safety of the operator and to protect the instrument and the system, please be sure to follow this manual's safety instructions when handling this instrument. If these instructions are not heeded, the protection provided by this instrument may be impaired. In this case, Yokogawa cannot guarantee that the instrument can be safely operated. Please pay special attention to the following points:

(a) Installation

- The instrument must be installed by expert engineer or skilled personnel. The procedures described about INSTALLATION are not permitted for operators.
- In case of high process temperature, care should be taken not to burn yourself because the surface of body and case reaches a high temperature.
- All installation shall comply with local installation requirement and local electrical code.
- When handling with the instrument, avoid intense vibration and shock. In particular care should be taken not to drop the instrument because it may result in damage.
  Rated energy: 1J
  Testing method: Drop 500 g wrecking ball from 20 cm above.

(b) Wiring

- The instrument must be installed by an engineer or technician who has an expert knowledge of this instrument. Operators are not permitted to carry out wiring unless they meet this condition.

(c) Operation

- Do not remove XS110A from XS550 in wet weather or humid environment. If the cover is opened, stated enclosure protection is not applicable.

(d) Maintenance

- Please do not carry out except being written to maintenance descriptions. When these procedures are needed, please contact nearest YOKOGAWA office.
- Care should be taken to prevent the buildup of drift, dust or other material on the name plate. In case of its maintenance, soft and dry cloth is used.

(e) Modification

- Yokogawa will not be liable for malfunctions or damage resulting from any modification made to this instrument by the customer.

(f) Explosion Protected Type Instrument

- Users of explosion proof instruments should refer first to section 2.6 (Explosion Protected Instrument) of this manual.
- The use of this instrument is restricted to those who have received appropriate training in the device.

1.2 Warranty

- The warranty shall cover the period noted on the quotation presented to the purchaser at the time of purchase. Problems occurring during the warranty period shall basically be repaired free of change.
- If any problems are experienced with this product, the customer should contact the Yokogawa representative from which this product was purchased or the nearest Yokogawa office.
- If a problem arises with this product, please inform us of the nature of the problem and the circumstances under which it developed, including the model specification and serial number. Any diagrams, data and other information you can include in your communication will also be helpful.
- The party responsible for the cost of fixing the problem shall be determined by Yokogawa following an investigation conducted by Yokogawa.

■ The purchaser shall bear the responsibility for repair costs, even during the warranty period, if the malfunction is due to:

- Improper and/or inadequate maintenance by the purchaser.
- Malfunction or damage due to a failure to handle, use, or store this product in accordance with the design specifications.
- Use of this product in question in a location not conforming to the standards specified by Yokogawa, or due to improper maintenance of the installation location.
- Failure or damage due to modification or repair by any party except Yokogawa or an approved representative of Yokogawa.
- Malfunction or damage from improper relocation of this product in question after delivery.
- Reason of force majeure such as fires, earthquakes, storms/floods, thunder/lightening, or other natural disasters, or disturbances, riots, warfare, or radioactive contamination.

2. Notes on Handling

The XS550 is fully factory-tested before shipment. When the XS550 is delivered, check the appearance for damage and that all the components mentioned below are included. If the XS550 is ordered without the mounting bracket, the XS550 Mounting Parts will not be included.
This chapter describes the precautions required to handle this product. Before use, read this section thoroughly. For information about other items, refer to the relevant sections.

■ Bundled Items

- User's Manual (IM01W06F02-01EN)
- XS550 Mounting Parts (When specified Mounting Bracket)
- 1/2 NPT female conversion adapter (1/2 NPT female)
- Default key label
- XS550 mounting bolts (M4) x 2 Units
- Grounding screw (M4 with washer) x 1 Units
- Horizontal pipe mounting screws (M4, black) x 2 Units

Table 2.1 XS550 Mounting Parts

Parts	Quantity
Mounting Bracket	1
U-bolt	1
U-bolt nut	2

2.1 Check the Model and Specifications

The model name and specifications are written on the nameplate attached to the housing. Verify that the specification indicated in the "Model and Suffix Code" in General Specifications "GS 01W06F02-01EN" complies with the specifications written on the order sheet.

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2.2 Transportation

To prevent damage while in transit, leave the XS550 in the original shipping container until it reaches the installation site.

2.3 Storage

When an extended storage period is expected, observe the following precautions.

(1) Choose a storage location that satisfies the following requirements.
- A location that is not exposed to rain or water.
- A location subject to a minimum of vibration or impact.
- The following temperature and humidity range are recommended.
  - Temperature: –40 to 85°C (–40 to 185°F)
  - Humidity: 0 to 100% RH (non-condensation)

(2) When storing the XS550, repack it carefully in the packaging that it was originally shipped with.

NOTE

When storing this product over a long period, it is recommended to put the instrument in OFF Mode to conserve the battery. For details on how to switch to OFF Mode, refer to “IM 01W06C01-01EN”.

2.4 Selecting the Installation Location

This product is designed to withstand severe environmental conditions. However, to ensure that it will provide years of stable and accurate performance, take the following precautions when selecting the installation location.

■ **Wireless Communication**

Install where are no obstacles for radio waves such as walls or pipes around the product as possible.

■ **Ambient Temperature**

Avoid locations subject to wide temperature variations or a significant temperature gradient. If the location is exposed to radiant heat from plant equipment, provide adequate thermal insulation and/or ventilation.

■ **Ambient Atmospheric**

Do not install the product in a location with a corrosive atmosphere. If this cannot be avoided, ensure there is adequate ventilation.

■ **Shock and Vibration**

It is designed to be resistant to shock and vibration. However, it is recommended that XS550 be installed in a location that is subject to a minimum amount of impact and vibration.

2.5 Restrictions on Use of Radio Transceivers

IMPORTANT

Although this product has been designed to prevent high frequency noise, the effect of high frequency noise may occur if the transceiver is used near the product and its wiring. Therefore, when using the transceiver, investigate the effect of the transceiver beforehand, and use the transceiver at a distance where the problem does not occur.

2.6 Explosion Protected Instrument

2.6.1 ATEX Intrinsic Safety

Technical data:

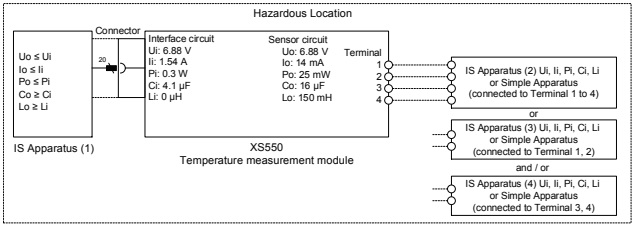
- Certificate number: DEKRA 20ATEX0024 X
- Applicable standards: EN IEC 60079-0:2018, EN 60079-11:2012
- Ex marking: Ⓔx II 2 (1) G Ex ib [ia Ga] IIC T4 Gb
- Ambient temperature: −40 to 75°C (–40 to 167°F)
- Electrical parameters:
  Interface circuit (Connector)
  Ui = 6.88 V, Ii = 1.54 A, Pi = 0.3 W, Ci = 4.1 µF, Li = 0 µH
  Sensor circuit (Terminals 1, 2, 3 and 4)
  Uo = 6.88 V, Io = 14 mA, Po = 25 mW, Co = 16 µF, Lo = 150 mH
- Enclosure: IP66/IP67 in accordance with only EN 60529 when combined with XS110A.
- Dielectric strength (Terminals to Enclosure): 500 V AC, r.m.s.,1 minute.

Certification information:

WARNING

A modification of the equipment would no longer comply with the construction described in the certificate documentation.

Control drawing:



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Notes:

1. In allowable Li and Ci which is specified for an IS Apparatus (2), (3), and (4), the following conditions of (a) or (b) must be satisfied.
   (a) {(Li × 100 < Lo) or (Ci × 100 < Co)} and {Li ≤ (Lo - Lc) and Ci ≤ (Co - Cc)}
   (b) { Li ≤ (Lo / 2 - Lc) and Ci ≤ (Co / 2 - Cc)} and [{(Ci + Cc) ≤ 600 nF for Group IIC} or {(Ci + Cc) ≤ 1 µF for Group IIA, IIB}]
2. If earthing of the Case (metallic part of the enclosure) is not ensured by installation, apply conductive connection between the Case and the earth point (or the equipotential bonding system).

Installation:

The equipment must be installed in accordance with EN 60079-14, local requirements, and the control drawing.

Maintenance and repair:

WARNING

Only personnel authorized by Yokogawa Electric Corporation can repair the equipment.

2.6.2 IECEx Intrinsic Safety

Technical data:

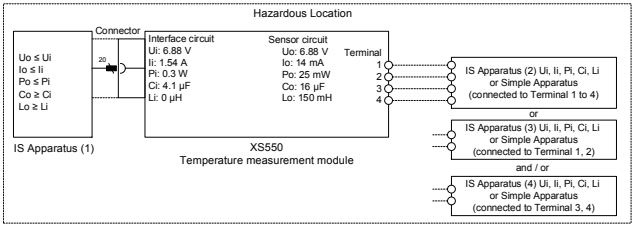
- Certificate number: IECEx DEK 19.0027X
- Applicable standards: IEC 60079-0 Ed. 7.0 (2017),
  IEC 60079-11 Ed. 6.0 (2011)
- Ex marking: Ex ib [ia Ga] IIC T4 Gb
- Ambient temperature: −40 to 75°C (–40 to 167°F)
- Electrical parameters:
  Interface circuit (Connector)
  Ui = 6.88 V, Ii = 1.54 A, Pi = 0.3 W, Ci = 4.1 µF, Li = 0 µH
  Sensor circuit (Terminals 1, 2, 3 and 4)
  Uo = 6.88 V, Io = 14 mA, Po = 25 mW, Co = 16 µF, Lo = 150 mH
- Enclosure: IP66/IP67 in accordance with only IEC 60529 when combined with XS110A.
- Dielectric strength (Terminals to Enclosure): 500 V AC, r.m.s.,1 minute.

Certification information

WARNING

A modification of the equipment would no longer comply with the construction described in the certificate documentation.

Control drawing:



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Notes:

1. In allowable Li and Ci which is specified for an IS Apparatus (2), (3), and (4), the following conditions of (a) or (b) must be satisfied.
   (a) {(Li × 100 < Lo) or (Ci × 100 < Co)} and {Li ≤ (Lo - Lc) and Ci ≤ (Co - Cc)}
   (b) { Li ≤ (Lo / 2 - Lc) and Ci ≤ (Co / 2 - Cc)} and [{(Ci + Cc) ≤ 600 nF for Group IIC} or {(Ci + Cc) ≤ 1 µF for Group IIA, IIB}]
2. If earthing of the Case (metallic part of the enclosure) is not ensured by installation, apply conductive connection between the Case and the earth point (or the equipotential bonding system).

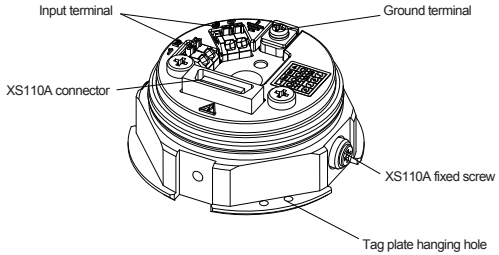
Installation:
The equipment must be installed in accordance with IEC 60079-14, local requirements, and the control drawing.

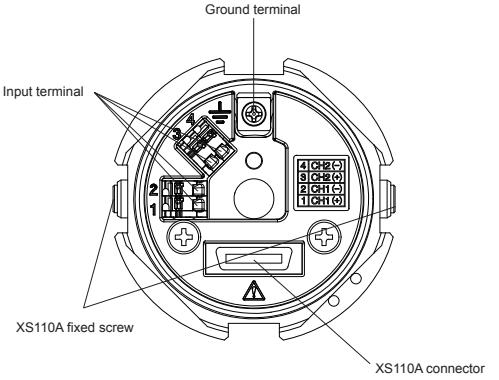
Maintenance and repair:

WARNING

Only personnel authorized by Yokogawa Electric Corporation can repair the equipment.

3. Component Names





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4. Installation

4.1 Precautions

Before installing XS550, read the cautionary notes in subsection 2.4 “Selecting the Installation Location”. For additional information on the ambient conditions allowed at the installation location, refer to chapter 8 “General Specifications”.

IMPORTANT

Connector Protection

To protect the connector, use a protective cap (Part Number: F9097ND) when replacing batteries or installing without XS110A.

The protective cap is used to temporarily protect the XS550 connector when the XS110A is removed from the XS550 during battery replacement and other operations. When the XS110A is removed, waterproof and dustproof performance cannot be guaranteed. Therefore, install the XS110A on the XS550 as soon as possible after work.

Installation Work

- When welding piping during construction, take care not to allow welding currents to flow through XS550.
- Do not step on this instrument after installation.

Mounting with XS110A

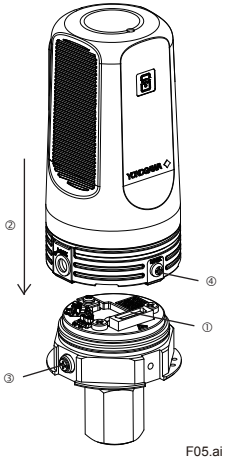
After installing the XS110A, be sure to check that the head of the XS110A fixing screw of the XS550 has been pulled out to a level with the surface of the XS110A and that the measuring module fixed screw of the XS110A is properly tightened.

4.2 Mounting

This product can be attached to a 2-inch pipe using a mounting bracket. Refer to Section 4.2.1 "mounting the XS110A" for mounting the XS110A. For details, refer to Section 4.2.2 "Mounting using mounting brackets (When using a U bolt)" or Section 4.2.3 "Mounting using mounting brackets (When using a belt)".

4.2.1 Mounting with XS110A

This section describes the installation procedures of XS110A to the XS550. Before installation, check that the battery is built-in the XS110A.



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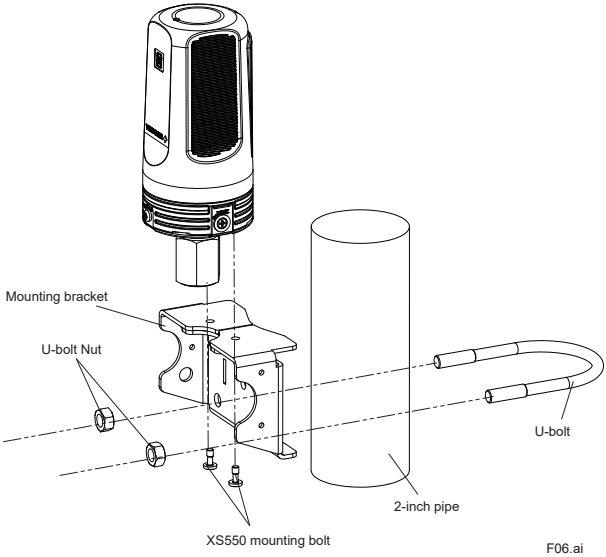
Refer to Section 4.1 "Notes on installation" before mounting with XS110A.
The installation procedure is as follows.

① Align and insert the XS110A and XS550 connectors.
② Fit the XS110A into the XS550.
③ Turn the XS110A fixing screws attached to the XS550 one by one to the left, pull them out, and turn them 1/4 left from where they come into contact to tighten them. At this time, check that the head of the XS110A fixing screw is flush with the surface of the XS110A.
④ Turn the XS110A measuring module fixing screw to the right. At this time, tighten the screws. Set the torque to 1.4 N·m.

After the XS110A has been installed, the settings can be made using the Sushi Sensor App. First, make sure that the Sushi Sensor has the latest firmware. To remove, follow the same procedure as for mounting. If it is difficult to pushup the XS110A and XS550 by hand, you can easily pushup them by pushing a flat blade screwdriver in between the grooves of the XS110A and XS550.

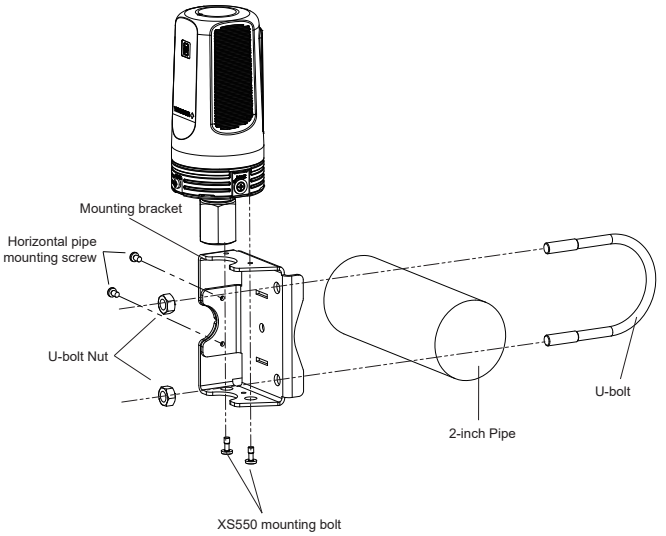
4.2.2 Mounting using mounting bracket



■ Mounting procedure for vertical 2-inch pipe

① Mount the XS550 to the mounting bracket using the XS550 mounting bolts with a torque of 1.4 N·m.

② Mount the mounting bracket to the 2-inch pipe using the U-bolt.



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■ Mounting procedure for horizontal 2-inch pipe

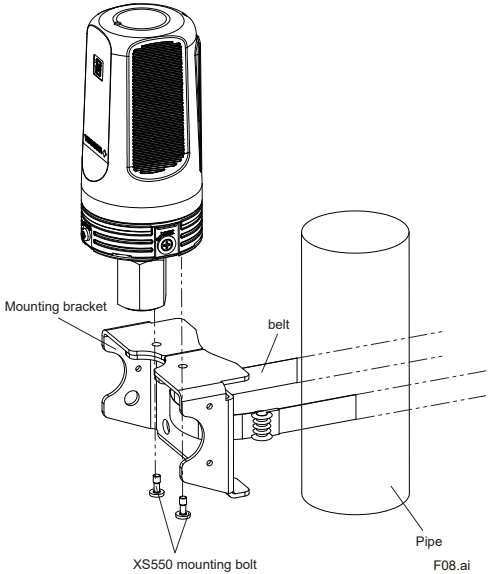
① Mount the XS550 to the mounting bracket using the XS550 mounting bolts with a torque of 1.4 N·m.

② Mount the bracket to the 2-inch pipe using the U-bolt.

③ Use the horizontal pipe mounting screws to secure the mounting bracket with a torque of 1.4 N·m.

4.2.3 Mounting using brackets (using a belt)

This product can be attached to pipes using a belt. The belt is not included with the product, so please prepare it in advance. The belt hole that passes through the mounting bracket is 15 mm and 3 mm wide. Use a metal belt such as stainless steel.



■ installation procedure

① Mount the XS550 to the mounting bracket using the XS550 mounting bolts with a torque of 1.4 N·m.

② Using a belt, attach the XS550 mounting bracket to the pipe.

5. Wiring

5.1 Precautions in Wiring

CAUTION

Ensure continuity (Resistance less than 0.2 MΩ) between the sheath (Element) of the thermocouple to be connected and the grounding pole. Grounding resistance 100 Ω or less is recommended.

IMPORTANT

- Be sure to waterproof the threaded area. (For waterproofing, we recommend silicone resin non-curing sealant.)
- Avoid wiring noise sources such as large capacity motors or power Power supply.

5.2 Cable Selection

Only thermocouples can be used for the temperature sensor. A compensating conductor (Refer to IEC584-3 Compensating Conductor for Thermocouples) corresponding to the type of thermocouple is used. Use a wire with a cross section of 0.5 mm^2 to 1.25 mm^2 (AWG 20 to 16). Use shielded cables when wiring in locations susceptible to noise.
Use the following grounding cable for the shield.

■ Applicable cable (Vinyl insulated wire for equipment)

- Core: 0.5 to 1.25 mm^2 (AWG 20 to 16) end treatment
- For round crimp terminal M4

Use the following grounding cables.

■ Applicable Cables

Insulated cables for industrial equipment such as;

- 600 V polyvinyl chloride insulated wires (IV): JIS C3307
- Polyvinyl chloride insulated wires for electrical apparatus (KIV): JIS C3316
- 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV): JIS C3317
- Heatproof vinyl insulated wires VW-1 (UL 1015/UL 1007)

Wire size

- Core: AWG 14 to 13 (2 to 2.6 mm^2)

Termination

- Use a round crimp terminal for M4 terminals with an insulation sleeve

5.3 Connecting Cables to Terminals

5.3.1 Connection of the input terminal

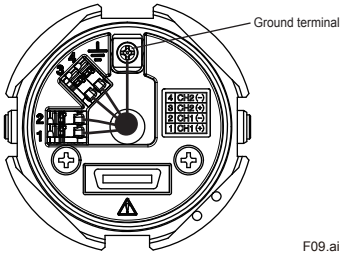


Figure 5-1 Input Terminal Connections

If the cable has a screen for shielding, connect the screen to the ground terminal shown in Figure 5-1. Be careful not to make the screen as a multi-point grounding. Connect the thermocouple as shown in Figure 5-2. Pay attention to the connection terminal because this product does not detect polarity misconnection.

CAUTION

To protect against excessive surge, be sure to tighten the ground terminal to 0.7 N·m regardless of the connection of the shielded cable.

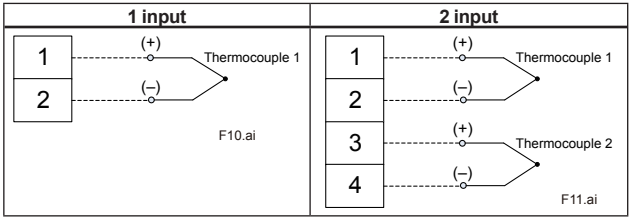


Figure 5-2 XS550 Input terminal wire connection diagram

Prepare a cable ground that matches the electrical connection you ordered. When ordering the M20 female of the electrical connection, tighten the cable gland. Let the k be about 2 N·m. 1/2 NPT female of the electrical connection is ordered, a thread conversion adapter with a hexagonal external shape is mounted shown in Figure 5-3. Fix the hexagonal shape part by tool and tighten the cable gland.

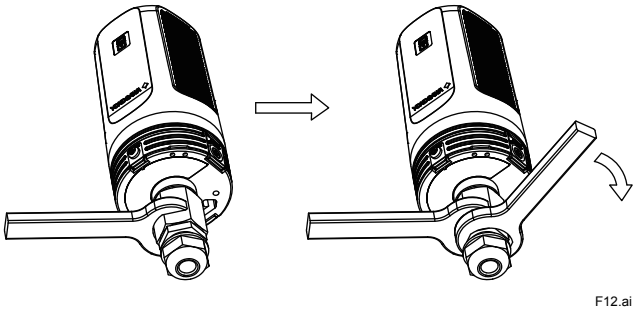


Figure 5-3 Tightening the Cable Ground

IMPORTANT

Be sure to waterproof the threaded area of the cable gland (For waterproofing, we recommend silicone resin type non-curing sealant.).

■ Input Terminal

Input terminal is a spring terminal. While pushing the lever on the upper part of the input terminal Plug in the cable. To remove the cable, push the lever in. while pulling out the cable. Do not use stick terminals as there is a risk of short-circuiting between adjacent terminals.

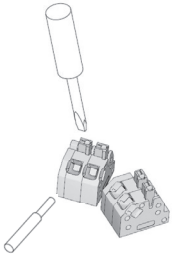


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Figure 5-4 Wiring to the spring-loaded terminal block

■ Wiring to the input terminals

strip the insulated cover and twist and connect it. Strip the insulated cover for 8 mm. Never solder the stranded conductor when connecting cables. Be careful not to cause the loosely stranded conductor to come in contact with adjacent terminals or others. Insert the cable leads into the terminal block securely.

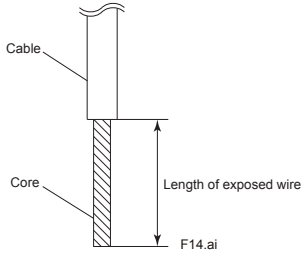


Figure 5-5 Length of Exposed Wire

■ Replacement with different type of temperature sensor

When replacement to different type of temperature sensor, it is necessary to change the parameters related to the sensor type. For setting method, refer to "Sushi Sensor Series Software Edition" (IM01W06C01-01EN).
XS550 supports the following sensor types.

Thermocouples: B, E, J, K, N, R, S, T, C

Check the connection between the input terminal and thermocouple, and set the correct sensor type and number of connections.

5.4 Grounding

Ensure continuity (Resistance less than 0.2 MΩ) between the grounding terminal and grounding pole in Figure 5-6 or Figure 5-7. Grounding resistance 100 Ω or less is recommended. If continuity between the ground terminal and the ground electrode cannot be ensured, use the cable described in Section 5.2. Do not share the ground wiring of the XS550 with other devices .

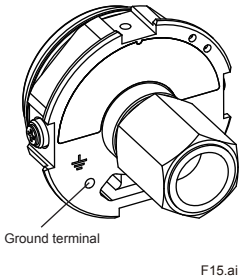


Figure 5-6 Ground Terminal

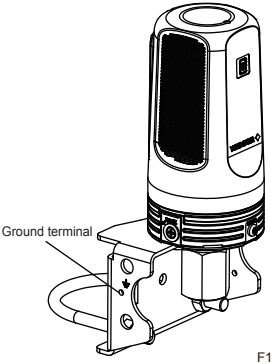


Figure 5-7 Ground Terminal on bracket side

CAUTION

Grounding is required for safe operation. The input cable shield should be connected to grounding terminal inside of the housing.

6. Operation

6.1 Operation Start Preparation

NOTE

Mount the XS110A before using the product. Refer to 4.2.1 "Mounting with XS110A" for mounting method of XS110A.

(1) Checking Installation and wiring

Ensure that the XS550 is installed correctly and the temperature sensor is connected correctly according to the procedures described in section 4 “Installation”, and section 5 “Wiring”.

When connecting the thermocouple, particular attention needs to be paid because the transmitter cannot detect a wrong polarity connection.

(2) Checking the Firmware of the Sushi Sensor

Make sure the Sushi Sensor has the latest firmware. For details on how to check and update the firmware, refer to the Sushi Sensor Series Software Edition (IM01W06C01-01EN).

(3) Checking Parameter of XS550

The Parameter shown below is the minimum setting required to operate the XS550. The product has been shipped with the values specified at the time of order, but please confirm or change them as necessary. For the setting method, refer to Sushi Sensor Series Software Edition (IM01W06C01-01EN).

- Type of input sensor
- unit of measurement
- Selection of radio transmission data

6.2 Zero Point Adjustment

IMPORTANT

Do not remove the XS110A and XS550 after performing a zero point adjustment. Powering off within 30 seconds of performing this procedure will return the zero point to its previous setting.
When the input sensor is set, the adjustment amount of the zero point is automatically calculated based on the value obtained at the time of shipment from the factory. Return to the state.

When preparation for starting operation is completed, zero point adjustment is performed as necessary. Adjust the zero point while the input to the sensor is stable. For how to adjust the zero point, refer to the Sushi Sensor Series Software Edition (IM01W06C01-01EN). When zero point adjustment is completed, the motor is already in operation.

6.3 Start of operation

Confirm that installation, wiring, network settings and operation of the product are correct before starting operation.

6.4 Operation stoppage

To stop operation, remove XS110A or set XS550 to OFF mode.

NOTE

- Refer to the XS110A User's Manual (IM01W06D01-01EN) for how to remove the battery.
- When storing the XS110A with the battery installed, it is recommended to set this product to OFF mode to prevent battery exhaustion. To change to OFF mode, refer to Sushi Sensor Series Software Edition (IM01W06C01-01EN).

7. Maintenance

7.1 Overview

This chapter describes the procedures required for maintenance of the product. For details on how to check the equipment, refer to (IM01W06C01-01EN) in the Sushi Sensor Series Software. When replacing the equipment, read the explanation of each item below carefully and handle it properly.

7.2 Replacing the XS110A

When replacing the XS110A, follow the procedure below.
Therefore, perform replacement work. The XS550 is installed on the site.
You can replace the XS110A.

① Remove the XS110A from the XS550 (Refer to Chapter 4).
② Attach the battery to the new XS110A.
③ Install the new XS110A on the XS550 (Refer to Chapter 4).

Refer to the XS110A User's Manual (IM01W06D01-01EN) for details on installing batteries in the XS110A.

7.3 Replacing the XS550

When replacing the XS550 , follow the procedure below.
Perform the replacement operation.

① Use the Sushi Sensor App to read and save the XS550 settings to be replaced.
② Remove the installed XS550 (Refer to Chapter 4).
③ Remove the XS110A from the XS550 being replaced and install it on the new XS550 (Refer to Chapter 4).
④ Writes the settings saved in (1) to the new XS550.
⑤ Configure the XS550 network settings.
⑥ Return the XS550 to the installed state (Refer to Chapter 4).

How to set up XS550 and use the Sushi Sensor App are described in the Sushi Sensor series.
Refer to the Sushi Sensor Series Software Edition (IM01W06C01-01EN).

8. General Specifications

Refer to GS 01W06F02-01EN for the latest information.

8.1 Standard Specifications

■ Measurement Range

Refer to Table 1

■ PERFORMANCE SPECIFICATIONS

Measurement Accuracy:

Refer to Table 1

Reference contact compensation accuracy:

± 1.0°C

Ambient Temperature Effect:

Refer to Table 2

Battery Characteristics:

Battery life is 10 years under the following conditions*.

- Ambient temperature: 23 ± 2°C
- Update Time: 1 hour

* Environmental condition such as vibration may affect the battery life.

Update Time:

1 minute to 3 days

■ FUNCTIONAL SPECIFICATION

Input:

Input number and type: 2, non-insulated

Thermocouples: B, E, J, K, N, R, S, T, C

Input Signal Source Resistance:

1 kΩ or less

Zero Point Adjustment:

Conducted by Sushi Sensor App.

Diagnostic Function:

Terminal block temperature error, memory failure, setting sensor failure, sensor measurement error, Input adjustment error

■ INSTALLATION ENVIRONMENT

Ambient Temperature Limits:

Operating:
–40 to 85°C (–40 to 185°F)
Storage: –40 to 85°C (–40 to 185°F)

Ambient Humidity Limits:

0 to 100% RH (non-condensation)

Temperature Gradient:

Operating: Within ± 10°C/h
Storage: Within ± 20°C/h

Altitude:

Up to 3000 m

Vibration resistance:

0.21 mm P-P (10 to 60 Hz),
3 G (60 to 2 kHz)

Shock Resistance:

50 G 11 ms

■ PHYSICAL SPECIFICATIONS

Wire connection port:

M20 female, 1/2 NPT female

Housing:

stainless steel

Wight:

400 g (0.88 lb)

Mounting:

Refer to “MODEL AND SUFFIX CODES.”

Table 8.1 Sensor Type, Measurement Range, and Accuracy

Sensor Type		Standard	Measurement Range	Accuracy
T/C	B	IEC60584	100 to 300°C (212 to 572°F)	± 8.0°C (46°F)
			300 to 400°C (572 to 752°F)	± 3.0°C (37°F)
			400 to 1820°C (752 to 3308°F)	± 2.5°C (36.5°F)
	E		–200 to 1000°C (–328 to 1832°F)	± 0.6°C (33°F)
	J		–200 to 1200°C (–328 to 2192°F)	± 0.75°C (33.4°F)
	K		–200 to 1372°C (–328 to 2502°F)	± 1.5°C (34.7°F)
	N		–200 to 1300°C (–328 to 2372°F)	± 1°C (33.8°F)
	R		–50 to 100°C (–58 to 212°F)	± 3°C (37°F)
			100 to 1768°C (212 to 3214°F)	± 2°C (35.6°F)
	S		–50 to 1768°C (–58 to 3214°F)	± 2°C (35.6°F)
	T		–200 to 400°C (–328 to 752°F)	± 1°C (33.8°F)
	C		0 to 2315°C (32 to 4199°F)	± 1.5°C (34.7°F)

Note: Measurement Accuracy will be changed when electromagnetic noise applied.

Table 8.2 Effects of Ambient Temperature

Sensor Type		Temperature Effects per 1.0°C Change in Ambient Temperature	Measurement Range
T/C	B	0.092°C – (0.032% of (t –100))	100°C ≤ t < 300°C
		0.025°C – (0.0010% of (t –300))	300°C ≤ t < 1000°C
		0.029°C	1000°C ≤ t < 1820°C
	E	0.00099°C – (0.0040% of t)	–200°C ≤ t < 0°C
		0.00099°C + (0.0019% of t)	0°C ≤ t < 1000°C
	J	0.0012°C – (0.0041% of t)	–200°C ≤ t < 0°C
		0.0012°C + (0.0019% of t)	0°C ≤ t < 1200°C
	K	0.0015°C – (0.0048% of t)	–200°C ≤ t < 0°C
		0.0015°C + (0.0023% of t)	0°C ≤ t < 1372°C
	N	0.0023°C – (0.0056% of t)	–200°C ≤ t < 0°C
		0.0023°C + (0.0019% of t)	0°C ≤ t < 1300°C
	R, S	0.013°C – (0.020% of t)	–50°C ≤ t < 0°C
		0.013°C + (0.0021% of t)	0°C ≤ t < 100°C
		0.0093°C + (0.0012% of t)	100°C ≤ t < 600°C
		0.0030°C + (0.0021% of t)	600°C ≤ t < 1768°C
	T	0.0016°C – (0.0044% of t)	–200°C ≤ t < 0°C
		0.0016°C + (0.0015% of t)	0°C ≤ t < 400°C
	C	0.0046°C + (0.0014% of t)	0°C ≤ t < 400°C
		0.00013°C + (0.0024% of t)	400°C ≤ t < 1400°C
		–0.023°C + (0.0041% of t)	1400°C ≤ t < 2000°C
		–0.11°C + (0.0085% of t)	2000°C ≤ t < 2315°C

Note1: The “t” on Table 2 means the value of the reading in°C.

8.2 MODEL AND SUFFIX CODES

Model	Suffix Codes							Description
XS550								Temperature Measurement Module
Inter-module communication	-A							Digital communication for XS-series
Area		2						Europe EU868
		3						North America US915
		4						Southeast Asia AS923
Type			00					General Purpose*1
			K2					ATEX intrinsic safety*2
			S2					IECEx intrinsic safety*3
—				-A				Always A
Housing material					6			Stainless Steel
Electrical connection						2		1/2 NPT female*4
						4		M20 female*4
— —							A	Always A
Mounting bracket							-J	316 SST 2-inch Horizontal Pipe Mounting
							-K	316 SST 2-inch Vertical Pipe Mounting
							-N	None
—							A	Always A

*1: Applicable when Area Code is 3.
*2: Applicable when Area Code is 2 or 4.
*3: Applicable when Area Code is 4.
*4: Cable gland is not included. When 4 (M20 female) is selected, prepare the cable gland with a flat gasket.

8.3 Optional Accessories

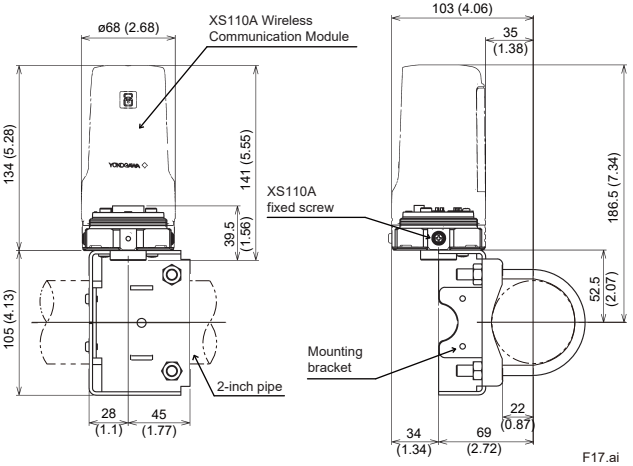
Item	Parts Number	Description
Protection Cap	F9097ND	Rubber protective cap*

* The protective cap is used to temporarily protect the connector of the product when the XS110A is removed from XS550 for battery replacement, etc. When the XS110A is removed from the product, waterproof and dustproof performance cannot be guaranteed.

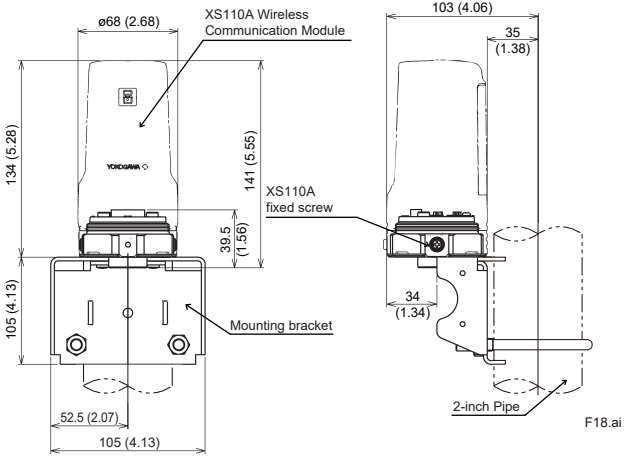
8.4 Outline

● 2-inch Horizontal Pipe Mounting

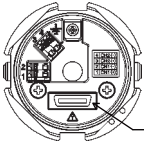
Unit: mm (approx. inch)



● 2-inch Vertical Pipe Mounting

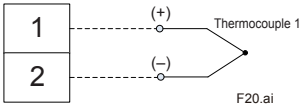
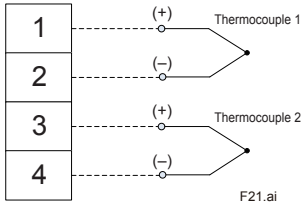


● Terminal Layout



F19.ai

● Connection of Input Terminal

1 input	2 input
	

F20.ai

F21.ai

8.5 Regulatory Compliance Statements

This device satisfies the following standards.

*: Please confirm that an installation region fulfills an applicable standard. If additional regulatory information and approvals are required, contact a Yokogawa representative.

CE Conformity:

The Authorized Representative for this product in the EEA is:
Yokogawa Europe B.V. Euroweg 2, 3825 HD Amersfoort, THE NETHERLANDS.

RoHS Directive:
EN50581

EMC Directive:
EN61326-1 Class A Table 2, EN61326-2-3, EN55011 Class A

CAUTION

This instrument is a Class A product, and it is designed for use in the industrial environment. Please use this instrument in the industrial environment only.

Other Normative Standards:
Safety: EN61010-1, EN61010-2-30 (Indoor/Outdoor use)

(1) Pollution Degree 2
"Pollution degree" describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering. "2" applies to normal indoor atmosphere. Normally, only non-conductive pollution occurs. Occasionally, however, temporary conductivity caused by condensation must be expected.

(2) Installation Category I
"Overvoltage category (Installation category)" describes a number which defines a transient overvoltage condition. It implies the regulation for impulse with stand voltage. "I" applies to electrical equipment which is supplied from the circuit when appropriate transient overvoltage control means (interfaces) are provided.

The full text of the EU declaration of conformity is available at the following internet address:
https://partner.yokogawa.com/global/

Canadian Safety Standards:

CAN/CSA-C22.2 No.61010-1
CAN/CSA-C22.2 No.61010-2-030
CSA-C22.2 No.94.2
IEC 60529
Pollution degree 2
Overvoltage category I

Degrees of Protection:

IP66/IP67 and Type 4X
Apply when connected to the XS110A.

Revision Information

Title : XS550 Temperature Measurement Module

Manual No. : IM 01W06F02-01EN

Edition No.	Date	Page	Revision Item
1st	July 2020	-	New publication

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