

# General Specifications

## XS770A Wireless Vibration Sensor

**Sushi Sensor**

GS 01W06E01-01EN

### ■ GENERAL

The Wireless Vibration Sensor XS770A is a compact battery-powered, measures vibration and temperature, and targets Industrial IoT (IIoT) applications.

With this sensor, you can detect an indication of abnormalities of the assets and the equipment by monitoring long term trends of the vibration and the surface temperature. Visualization of the long term trend achieves condition-based maintenance and effective asset management.

LPWA (Low Power Wide Area) offers long-range reachability to low power devices, allowing wide area coverage and easy installation.

### ■ FEATURES

#### ● Battery-powered Compact Wireless Sensor

The XS770A is compact and has excellent environment resistance characteristics. It can be installed in a plant where wiring is difficult. With a number of sensors, you can collect various data for plant maintenance by early detection and prediction of equipment failure.

#### ● Installable in Hazardous Location

This sensor can be installed in hazardous areas, such as petrochemical plants, paint plants, drug plants, where flammable gas or vapor may exist.

#### ● Long-Distance Communication on License-free Bands

This sensor has adopted LoRaWAN. LoRaWAN has excellent sensitivity reception, good radio interference resistance, and offers a communication distance of 10 km or more in an ideal communication environment. You can install this sensor anywhere you want over vast area.

#### ● Configuration And Status Monitoring Using Smartphone

Using an Android-based smartphone with NFC (Near Field Communication) interface makes configuration and status monitoring of sensors simple and intuitive.



### ■ STANDARD SPECIFICATIONS

#### □ WIRELESS SPECIFICATIONS

##### Communication Protocol:

LoRaWAN class A

For detail on channel plan, refer to Table 1.

##### Modulation Method:

LoRa modulation

##### Data Rate:

250 to 21900 bps\*

\*: Available data rate vary depending on the country.

##### Frequency:

Refer to Table 1.

##### Radio Security:

AES 128 bit encryption

##### RF Transmitter Power:

Max. 7 dBm

##### Antenna:

Built-in Omni-directional antenna

#### □ POWER SUPPLY SPECIFICATIONS

##### Battery:

Lithium thionyl chloride battery: 1 unit  
(dedicated product)

Rated voltage: 3.6 V

Rated capacity: 2.6 Ah

## PERFORMANCE SPECIFICATIONS

### Measurement:

	Item	Specifications
Vibration	Measurement	Acceleration (peak), Velocity (RMS)
	Axis	X, Y, Z axes and 3-axis composite
	Range *1	Acceleration: 0 to 130 m/s <sup>2</sup> (0 to 13.26 g) Velocity *2: 0 to 20 mm/s (0 to 0.79 in/s)
	Frequency range	10 to 1,000 Hz (± 3 dB)
	Accuracy (100 Hz)	X, Y, Z axes : ±10% FS 3-axis composite: ±20% FS
Temperature	Measurement	Temperature
	Range	–20 to 85°C (–4 to 185°F)
	Resolution	0.1°C
	Measurement part	Base

\*1: Peak value of the input vibration. For the relation between the measurement frequency band and measurable range, refer to the following figure.

\*2: The 20 mm/s pk value is equivalent to 14 mm/s RMS when input is based on a sine wave.

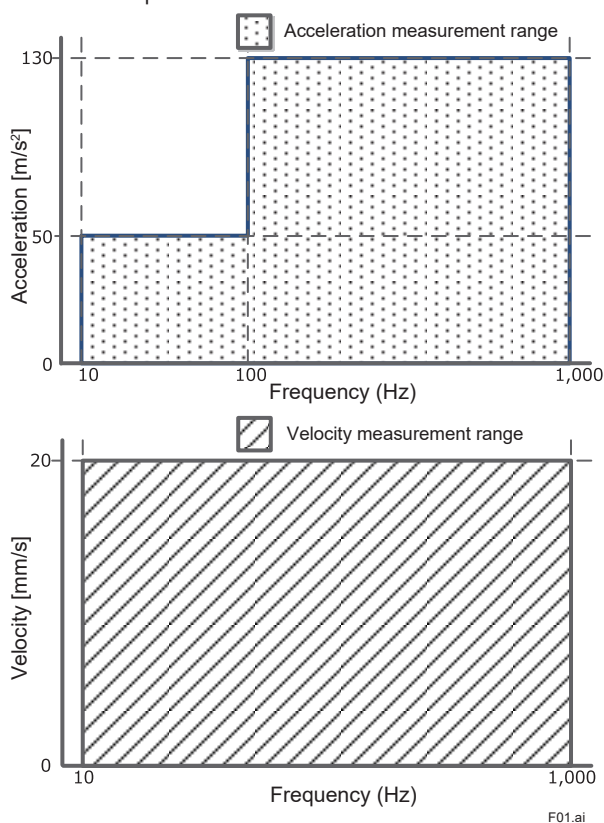


Figure: Measurable Range

### Battery Characteristics:

The typical battery life is 4 years in the following conditions\*.

- Update period: 1 hour
- Number of sending data: 1
- Ambient temperature: 23±2°C (73.4±3.6°F)

\*: Battery life may be shortened due to variable factors such as ambient temperature and communication quality.

### Update Period:

1 minute to 3 days

## FUNCTIONAL SPECIFICATIONS

### Output:

LoRaWAN

For detail on channel plan and available countries and regions, refer to Table 1.

### NFC Interface:

NFC Forum Type 2 Tag

### Diagnostic Function:

Battery alarm\*, internal temperature, wireless communication failures, sensor over-range, sensor failures, memory failures

\*: The difference between the actual battery level and the battery level estimated from the usage status may be large.

### Software Download Function:

Allows the user to update the software of the sensor via the NFC interface.

## INSTALLATION ENVIRONMENT

### Ambient Temperature Limits:

Operating: –20 to 85°C (–4 to 185°F)

### Ambient Humidity Limits:

Operating: 0 to 100% RH (non-condensation)

### Altitude (Atmospheric pressure):

[Type Code: 00, C1] Up to 3000 m

[Type Code: K2,S2,F1,P1,U1] 80 to 110 kPa (Up to 2000 m\*)

\*: Ambient Temperature: over 10°C

### Shock Resistance:

100 G 11 ms (3 directions/3 times)

## 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.

### Telecommunication Compliance:

Refer to Table 1.

### CE Conformity\*1\*3:

RE Directive:

Safety: EN61010-1 (Indoor/Outdoor use)\*2, EN62479\*2

EMC: EN 301 489-1, EN 301 489-3,

EN61326-1 Class A Table 2, EN61326-2-3,

EN55011 Class A Group 1

Radio Spectrum: EN 300 220-2 (Band h1.3 in the table 1 of CEPT ERC Rec. 70-03), EN 300 330

ATEX Intrinsic Safety\*1: Refer to Table 2.

EU RoHS Directive compliant

\*1: When area code is 2, UKCA conformity and UKEX intrinsic safety are applied.

\*2: When area code is 2 or H, EN61010-1 and EN62479 are applied.

\*3: When area code is 2, 4, C or H, CE mark is given on the marking. When area code is 4, C or H, it cannot be used in Europe Economics Area.

### Canadian Safety Standards:

CAN/CSA-C22.2 No.61010-1

CSA-C22.2 No.94.2

IEC 60529

Ambient Temperature Limits: –35 to 85°C (–31 to 185°F)

Altitude (Atmospheric pressure): Up to 3000 m

\*: XS770A with suffix code area 3 is adapted into Canadian Safety Standards

**Degrees of Protection:**

[Housing material Code: 1] IP66/IP67  
 [Housing material Code: 2] IP66/IP67 and Type 4X

**KC Marking**

Trade Name: Yokogawa Electric Corp.  
 Equipment Name: Wireless Vibration Sensor  
 Manufacturer: Yokogawa Electric Corp.

☐ **PHYSICAL SPECIFICATIONS****Housing Material:**

For detail, refer to "MODEL AND SUFFIX CODES."

**Weight:**

260 g (0.57 lb)

**Mounting:**

Mounting on the measurement target using the screw\*

\*: Can also mount using the magnetic holder supplied as an accessory. Note that, when using the magnetic holder, the vibration measurement frequency band drops.

**■ SOFTWARE SPECIFICATIONS**☐ **SUSHI SENSOR APP**

This software is used to perform the setting and status check of this product via the NFC interface.

**Operating Environment:**

Item	Recommended System Requirements
OS	Android 5.1.1 or later
CPU	Snapdragon 800 or equivalent or higher
Resolution	1280x720 dots or more
NFC	Reader, writer
GPS	Optional

**Note of Available Android Device:**

When using Sushi Sensor APP to intrinsically safe explosion devices, the Android device must comply with the following.

- When using an NFC link in a non-hazardous area, the maximum magnetic field strength generated by the Android device is 18 A/m (r.m.s.) or less (Compliant with ISO / IEC 14443).
- When using an NFC link in a hazardous area, only an Android device confirmed by Yokogawa Electric Corporation can be used.
- If additional information and approvals for Android devices are required, contact a Yokogawa representative.

☐ **KEY CARD EDITOR**

This software writes the security information used in the authentication and encryption process of LoRaWAN communication to the key card.

Item	Recommended System Requirements
OS	Android 5.1.1 or later
CPU	Snapdragon 800 or better
Resolution	1280 x 720 dots or more
Supported NFC cards	<ul style="list-style-type: none"> <li>• MIFARE Ultralight</li> <li>• MIFARE Classic</li> </ul>

**Table 1. Area code specifications**

Area Code	Frequency	Telecommunication Compliance*4	Channel Plan	Countries and Regions*4
2	863 to 870 MHz*1	RE Directive	EU868	Europe
3	902 to 928 MHz*2	FCC/ISED Approval	US915	North America
4	919 to 925 MHz*2	SIRIM Type Approval	AS923-1	Malaysia, Singapore, Thailand
5	915 to 928 MHz*2	RCM	AU915	Australia, Chile
6	915 to 928 MHz	RCM	AS923-1	Australia, New Zealand
7	920.9 to 923.3 MHz	KC Marking	KR920	South Korea
8	865 to 867 MHz	WPC Type Approval	IN865	India
9	915 to 928 MHz	ANATEL Approval	AU915	Brazil
C	920 to 923 MHz	SDPPI Type Approval	AS923-2	Indonesia
G	915 to 928 MHz	ENACOM Approval	AU915	Argentina
H	863 to 870 MHz*2	TRA Type Approval*3	EU868	UAE, Saudi Arabia

\*1: This wireless frequency can be used throughout Europe, although there are some restrictions in Sweden and Greece.

\*2: Available frequency bands vary depending on the country.

\*3: Referred from RE Directive.

\*4: The representative telecommunication compliance, countries and regions are listed. If you would like other available countries, contact a Yokogawa representative.

**Table 2. Specification for explosion protected type**

Item	Description	Type code
IECEx Intrinsic safety	Certificate number: IECEx DEK 19.0072*1 Applicable Standards: IEC 60079-0:2017, IEC 60079-11:2011 Ex marking: Ex ic IIB T4 Gc Ambient temperature: -20 to 80°C (-4 to 176°F)	<b>S2</b>
ATEX Intrinsic safety*2	Applicable Standards: EN IEC 60079-0:2018, EN 60079-11:2012 Ex marking: II 3 G Ex ic IIB T4 Gc Enclosure: IP66/IP67 in accordance with EN 60529 Ambient temperature: -20 to 80°C (-4 to 176°F)	<b>K2</b>
FM Nonincendive	Certificate number: FM19US0205 Applicable Standards: FM 3600:2018, FM 3611:2018, FM 3810:2018, ANSI/UL 121201 Ed.9 (2017), ANSI/UL 61010-1 Ed.3 (2012), NEMA 250:1991 Ex marking: Nonincendive for Class I, Division 2, Groups A, B, C, D; Class II, Division 2, Groups F, G; Class III, Division 1; Class I, Zone 2, Group IIC Temperature Class: T4 Ambient temperature: -20 to 85°C (-4 to 185°F) Enclosure: Type 4X	<b>F1</b>
CSA Nonincendive	Certificate number: 80076463 Applicable standards: C22.2 No. 213-17, CAN/CSA-C22.2 No. 61010-1-12, C22.2 No. 94.2-20 Ex marking: Nonincendive for Class I, Division 2, Groups A, B, C, D T4; Class II, Division 2, Groups F, G T4; Class III Ambient temperature: -35 to 85°C (-31 to 185 °F) Enclosure: Type 4X	<b>C1</b>
South Korea Energy-limited safety	Certificate number: 20-AV4BO-0300 Applicable Standards: Notice of Ministry of Labor 2020-33 Harmonized with IEC 60079-0:2017, IEC60079-11:2011 Ex marking: Ex nL IIB T4 Ambient temperature: -20 to 80°C	<b>P1</b>
INMETRO Intrinsic safety	Certificate number: DEKRA 20.0010 Applicable standards: ABNT NBR IEC 60079-0:2013 Versão Corrigida 2:2016 ABNT NBR IEC 60079-11:2013 Versão Corrigida:2017 Ex marking: Ex ic IIB T4 Gc Ambient temperature: -20 to 80°C	<b>U1</b>

\*1: Referred from ECAS-Ex (UAE) and PESO (India) certificate.

\*2: When area code is 2, ATEX intrinsic safety and UKEX intrinsic safety are applied.

## ■ MODEL AND SUFFIX CODES

Model	Suffix Codes	Description
<b>XS770A</b> *1	.....	Wireless Vibration Sensor
---	<b>-A</b> .....	Always A
Area*12	<b>2</b> .....	Europe EU868
	<b>3</b> .....	North America US915*2
	<b>4</b> .....	Malaysia, Singapore, Thailand AS923-1
	<b>5</b> .....	Australia, Chile AU915
	<b>6</b> .....	Australia, New Zealand AS923-1
	<b>7</b> .....	South Korea KR920
	<b>8</b> .....	India IN865
	<b>9</b> .....	Brazil AU915
	<b>C</b> .....	Indonesia AS923-2
	<b>G</b> .....	Argentina AU915
	<b>H</b> .....	UAE, Saudi Arabia EU868
Type	<b>00</b> .....	General Purpose*3
	<b>K2</b> .....	ATEX Intrinsic safety*4
	<b>S2</b> .....	IECEx Intrinsic safety*5
	<b>F1</b> .....	FM Nonincendive*6
	<b>C1</b> .....	CSA Nonincendive*11
	<b>P1</b> .....	South Korea Energy-limited safety*7
	<b>U1</b> .....	INMETRO Intrinsic safety*8
---	<b>-A</b> .....	Always A
Housing*13 material	<b>1</b> .....	Plastic (PBT), Stainless steel*9
	<b>2</b> .....	Plastic (PC), Stainless steel*10
Power source	<b>C</b> .....	Battery powered (battery included)
---	<b>A</b> .....	Always A

\*1: A hexagon socket set screw is attached.

\*2: Conversion screw is included when area code is 3.

\*3: Applicable when area code is 2, 3 or 7.

\*4: Applicable when area 2, 4, C or H. Area code H is applied only to Saudi Arabia. When area code is 2, ATEX intrinsic safety and UKEX intrinsic safety are applied.

\*5: Applicable when area code is 4, 5, 6, 8, G or H. Area code H are Saudi Arabia and UAE.

\*6: Applicable when area code is 3 and sales country is United States.

\*7: Applicable when area code is 7.

\*8: Applicable when area code is 9.

\*9: Applicable when area code is 2, 4 or C.

\*10: Applicable when area code is 3, 5, 6, 7, 8, 9, G or H.

\*11: Applicable when area code is 3 and sales country is Canada.

\*12: The representative countries and regions are listed. If you would like other available countries, contact a Yokogawa representative.

\*13: Avoid the components of organic solvents and acidic/alkaline chemicals from adhering to the case.

## ■ OPTIONAL ACCESSORIES

Item	Parts Number	Description
Magnetic holder*2	F9096DA	Magnet for mounting (M6 female screw) Material: SUS430 and SUS304, Inner magnet: Samarium-cobalt magnet
Hexagon socket set screw	B1137BS	Screw for mounting (M6)
Conversion screw	F9096CM	Screw for mounting (M6 to 1/4-28UNF)*1

\*1: Conversion screw is attached when area code is 3.

\*2: When the magnetic holder is used, the vibration measurement value around the vibration frequency of 1 kHz is affected. In addition, since the temperature measurement value measures the temperature of the base, it is affected by the temperature conduction of the magnetic holder which contains the magnet and metal compared to direct mounting.

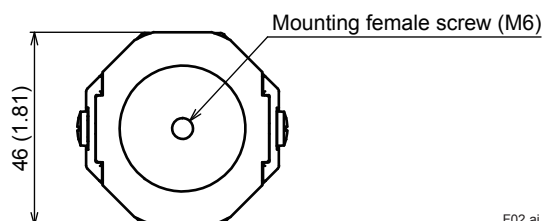
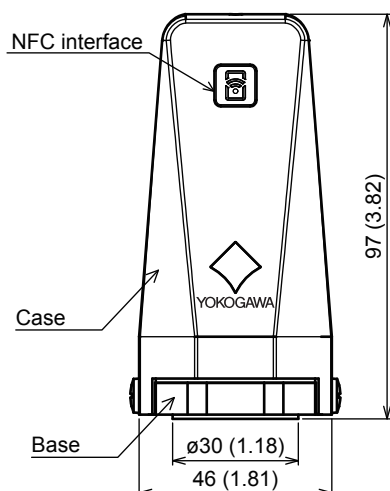
Model	Suffix Codes	Description
<b>XS70BT</b> *1	.....	Lithium battery
Battery type	<b>-A</b> .....	Dedicated battery for XS770A
---	<b>A</b> .....	Always A
Number of Unit	<b>-C004</b> .....	4 units
	<b>-C012</b> .....	12 units

\*1: The XS70BT is a dedicated product (model: LS14500 C5SY) with a battery connector incorporated to SAFT battery

## DIMENSIONS

Unit: mm (approx. inch)

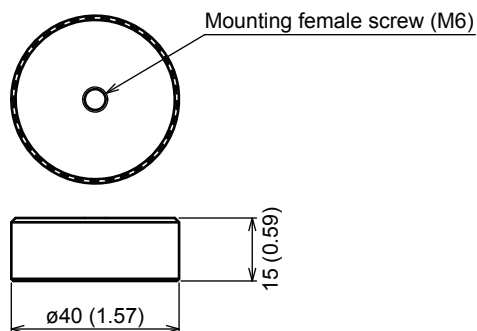
### Main unit



F02.ai

### Magnetic holder

Parts No.: F9096DA



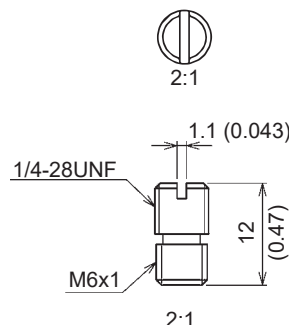
F03.ai

### Hexagon socket set screw (M6) Parts No.: B1137BS



F04.ai

### Conversion screw\*1 (M6 to 1/4-28UNF) Parts No.: F9096CM



F05.ai

\*1: Conversion screw is attached when area code is 3

## <Ordering Information>

1. Model, suffix codes, and option code

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