Hard-hat-on Sensor

ENS-HH01

Instruction Manual V1.10

Please use this Instruction manual correctly on reading well.

Please keep it carefully to be able to read immediately, when required.

Table of Contents

1. Overview

The hard-hat-on sensor "ENS-HH01"（referred to below as "the sensor"） is a wearable device that prevents accidents that occur when employees are not wearing hard hats.
The sensor for detecting the wearing status of hard hats is integrated with the wireless unit. By attaching the sensor to a hard hat's chin strap, it detects the wearing status of the hard hat in real time.

◆ Equipped with HERUTU's Pokayoke wireless module HRF-2402, ENS-HH01 can communicate with the following Pokayoke receivers TW-800 series (referred to below as "the receiver"), and makes it possible to monitor whether workers are wearing hard hats by transmitting the hard hat's wearing status received from the receivers to a PC or PLC.

　・ LAN Connection Type TW-8##R-EXL

　・ RS232C Serial Output Type TW-8##R-EXS

　・ CC-Link IE Field Basic Support TW-800R-EXB

　　*The number of ENS-HH01 that can be connected to one receiver is unlimited.

For details of receivers, refer to the instruction manual of each product.
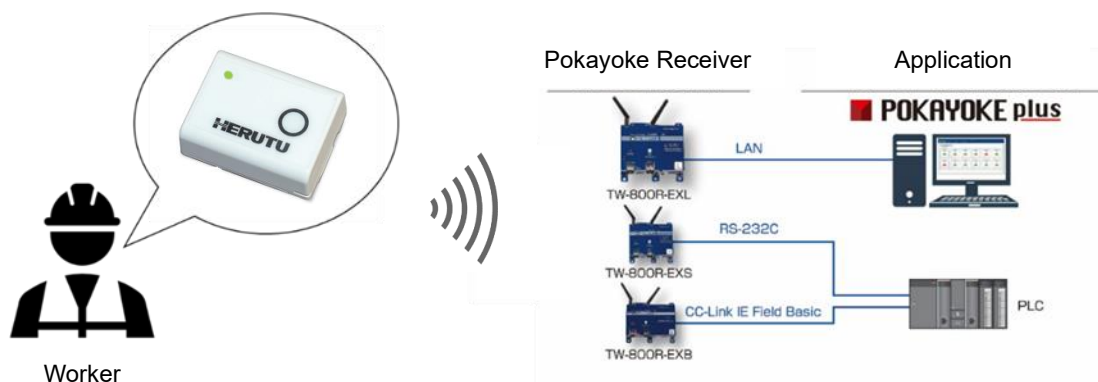
◆ Communication distance of approx.30m indoors (depends on usage conditions).
◆ Waterproof and Dustproof (Protection Structure IP65)
◆ Power source is a coin battery (CR2032). Battery life is approx. 1 year by wearing for 8 hours a day (depending on usage conditions).

(*1) "POKAYOKE plus" is a Windows compatible application to be used in conjunction with POKAYOKE receivers with LAN connection. The application is designed for customers who want to ensure traceability of "Tasks using tools" or "Wearing safety protective equipment" for workers in the factory.
For details, refer to "Production Process Support Software for Pokayoke Tools POKAYOKE plus Instruction manual".

2. Main part and accessories

2-1. ENS-HH01 body

Hard-hat-on sensor ENS-HH01
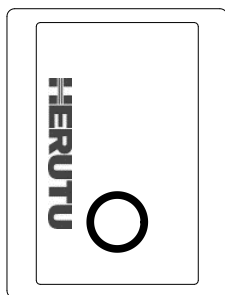
ENS-HH01 body ×1
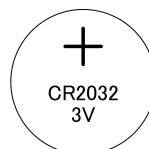
Coin battery   CR2032 ×1

*ENS-HH01 is delivered with a coin cell battery installed.

Due to properties of the product, the touch sensor and other component directly touch a customer's skin.

*When you feel uncomfortable with your skin while wearing the sensor, stop using the sensor immediately.

*It is recommended to wash away sweat and dirt and keep the product clean. Rinse the main unit with water and wipe it with a dry cloth.

【Touch Sensor Component Information】

Component Name	CAS No.
Polylactic acid resin	9051-89-2
Carbon black	1333-86-4

2-2. Option

The touch sensors are consumables. The following model is available for replacement separately.
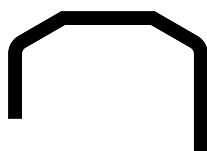
Touch Sensor

Item name	Model
Touch Sensor	S20006-25-00

3. Safety Precautions (Be Sure to Read This)

This section describes the matters to be observed in order to prevent harm to the users and other persons and damages to the property.

■The following marks and displays classify and describe the extent of harm and damage caused by failing to observe the display content and using this product wrongly.

⚠ **Caution**	This display column shows "a failure to do observe it could result in only the personal injury or property damage".

■Handling this product

● This product is the wireless communication equipment made of precision parts. Do not disassemble or modify it. Or the accident or fault may occur.	🚫
● Do not drop or scratch the unit. Doing so may prevent the unit from maintaining its dustproof and waterproof performance.	🚫

■Use and storage environment

● DO NOT USE OR STORE the product in the following places to prevent defects, malfunction, deterioration, fire, and electric shock: · Do not use and store it in places exposed to direct sunlight, · Do not use and store it in places where liquids, foreign substances, corrosive gases or combustible gases can enter the product, · Do not use and store it in places with high humidity or where there is abundant oil smoke, dust, sand, etc.	🚫

■Specific handling of this product

This product is a radio equipment with certification of construction design.

● It is prohibited by law to disassemble or modify certified devices.	🚫
● Do not remove the certification label affixed to the case. It is prohibited to use any product without the label.	🚫
● This product is only available in the countries where the certification is acquired.	🚫

⚠ **Warning**	This display column shows "a failure to do observe it could result in death or serious personal injury".

■Handling this product

● Do not use this product for application that requires the extremely high reliability affecting the human life.	🚫
● Do not use this product in the area which the radio wave reaches or not.	🚫

■Notes on the Radio Law

○The wireless device used for this product is certified as a specific radio device for a radio equipment of a low power data communication system based on the Radio Law.　Therefore, a radio station license is not required to use this product.

○The wireless device of this product is certified under the Radio Law, so that DO NOT disassemble or remodel this product.

○Do not use this product near any person using cardiac pacemaker. The cardiac pacemaker may be disturbed by electromagnetic wave, which may cause risk of life.

○Do not use this product near any medical equipment. The medical equipment may be disturbed by electromagnetic wave, which may cause risk of life.

○Do not use this product near any microwave oven. Electromagnetic wave from microwave oven may disturb radio communication.

○This product can be used only in Japan or countries where required certification is acquired. In the case that it is used in other countries, this product may be damaged or it may damage other equipment. It also may conflict with the laws of that country. Please contact our sales department for the countries that the product is certified other than Japan.

■Notes on radio interference of 2.4 GHz radio

When communicating with 2.4 GHz band wireless products, pay attention to the following points.
In this product's frequency band not only industrial, scientific and medical equipment such as microwave ovens but also local radio stations for mobile objects identification (which require the license), specified low-power radio stations (license not required), and amateur radio stations (license required) can be in operation.

○Before using this product, make sure that there are no local radio stations for mobile objects identification, specified low-power radio stations and amateur radio stations operating nearby.

○In event that harmful interference occurs to any radio station by the radio wave from this product, stop using it immediately and consult with us about avoiding interference.

○Also contact us in case of any trouble such as harmful radio interference to specified low-power radio stations for mobile objects identification or amateur radio stations.

ENS-HH01 is equipped with the built-in wireless module HRF-2402.

Available countries：Japan, Canada, USA, China, Thailand, Vietnam, Philippines and India.

■FCC/ISED Warning

Information about FCC Standard.

> FCC CAUTION
> Change or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

> This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

> This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment has very low levels of RF energy that is deemed to comply without maximum permissive exposure evaluation (MPE).

> This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment has very low levels of RF energy that is deemed to comply without testing of specific absorption rate(SAR).

I Information about ISED Standard.

> This device complies with Industry Canada's applicable license-exempt RSSs. Operation is subject to the following two conditions:
> (1) This device may not cause interference; and
> (2) This device must accept any interference, including interference that may cause undesired operation of the device.
>
> Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
> 1) l'appareil ne doit pas produire de brouillage;
> 2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

> This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment and meets RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment has very low levels of RF energy that is deemed to comply without maximum permissive exposure evaluation (MPE).
>
> Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'IC. Cet équipement émet une énergie RF très faible qui est considérée comme conforme sans évaluation de l'exposition maximale autorisée (MPE).

> This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment and meets RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment has very low levels of RF energy that is deemed to comply without testing of specific absorption rate (SAR).
>
> Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'IC. Cet équipement émet une énergie RF très faible qui est considérée comme conforme sans évaluation du débit d'absorption spécifique (DAS).

This radio transmitter (10608A-HRF2402) identify the device by certification number or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Antenna type:1/4λ Dipole antenna (chip antenna)   Gain: 3dBi

Antenna type:1/2λ Dipole antenna   Gain: 2dBi

Antenna type:1/2λ Dipole antenna Magnet Base   Gain: 2dBi

Le présent émetteur radio (10608A-HRF2402) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Type d'antenne:1/4λ Dipole antenna (chip antenna)   Gain: 3dBi

Type d'antenne:1/2λ Dipole antenna   Gain: 2dBi
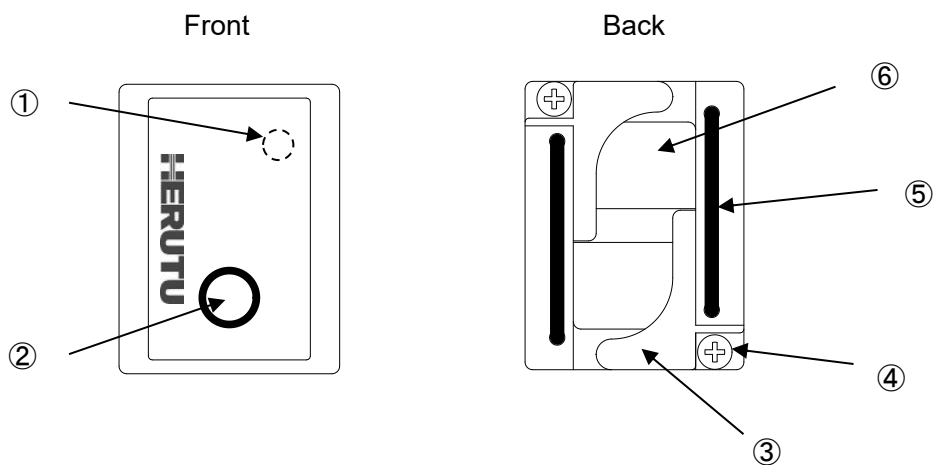
Type d'antenne:1/2λ Dipole antenna Magnet Base   Gain: 2dBi

■Thailand Radio Law (SDoC)

This telecommunication equipment is in compliance with NBTC requirements.

4. Name and Function of Each Part

Hard-hat-on sensor ENS-HH01

Front   Back

①	LED (green)	The LED for communication confirmation/battery check. It lights up/blinks green according to the communication result.
②	Test switch (Pairing switch)	Used for testing wireless communication or for pairing.
③	Band hooks×2	Hooks to be hung on a hard hat's chin strap.
④	Screws×2	Screws for securing band hooks/ battery replacement.
⑤	Touch sensor×2	Sensors for detecting hard hat wearing status. *The touch sensors are consumables. Please refer to "9. Cautions for use".
⑥	Label	Model No. and serial No. are indicated on the label.

5. How to use

5-1. Procedures for use

The sensor transmits the hard hat wearing status by wireless communication. Thus, a receiver that receives communication is necessary.

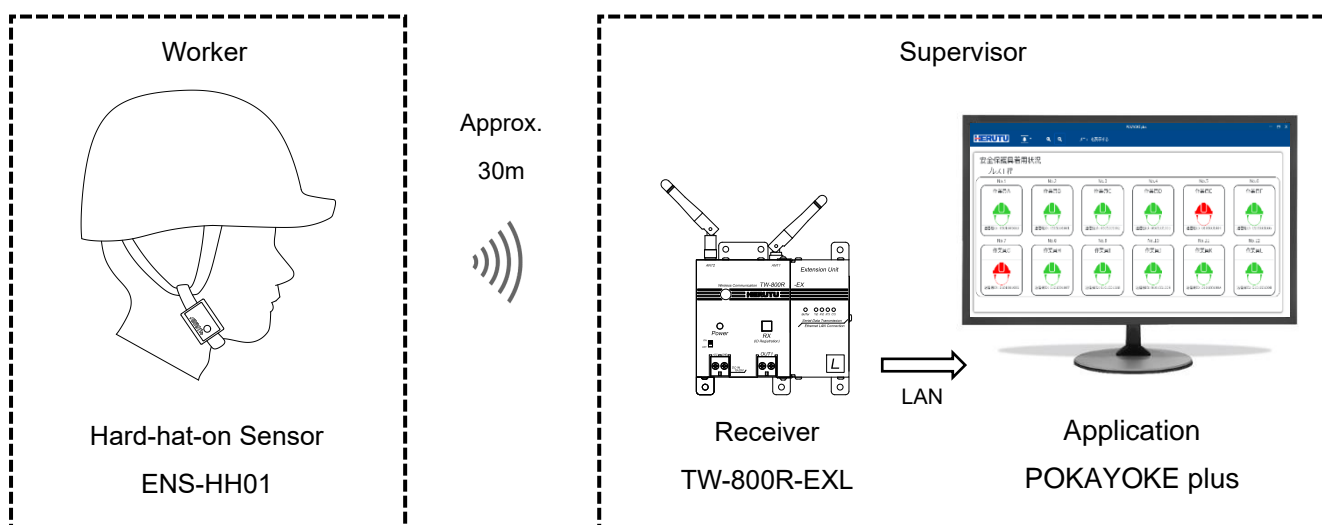### 5-1-1. Procedures for use with POKAYOKE plus.

By using "POKAYOKE plus", you can monitor the wearing status of the hard hats with up to 256 sensors attached. Please install "POKAYOKE plus" on your PC in advance.

To use "POKAYOKE plus", it is necessary to set the sensor and receiver on "POKAYOKE plus". Please refer to "Production Process Support Software for Pokayoke Tools POKAYOKE plus Instruction manual" for the setting method. (POKAYOKE plus V2.00 or later is supported.)

This manual uses the "LAN connection type receiver TW-800R-EXL" as an example.

①Connect the receiver "TW-800R-EXL" to a PC with a LAN cable and place them where the receiver can communicate with the sensor. The wireless communication distance is approx. 30m indoors (depends on usage conditions).

②Pair the sensor to the receiver.

③Register the sensor (transmitter) and the receiver with "POKAYOKE plus".

④Attach the sensor to a hard hat's chin strap. When using the hard hat, the wearing status will be transmitted wirelessly. When the communication is done normally, receiver output LAN output and receiver sounds the buzzer and output relay output according to setting.

⑤The wearing status of each hard hat can be checked on "POKAYOKE plus". Also, the wearing history can be saved in CSV format.

Worker

Hard-hat-on Sensor
ENS-HH01

Approx.
30m

Receiver
TW-800R-EXL

LAN

Supervisor

Application
POKAYOKE plus

*ENS-HH01 may detect the wearing status incorrectly due to noise or other causes.

The wearing status can be identified by the color of the hard hat.
Green・・・Hard hat is worn correctly.
Red　・・・Chin strap is off.

5-2．How to use

5-2-1．Use with POKAYOKE plus

Please refer to "POKAYOKE plus Instruction manual".

5-3．Timing for notification of the hard hat wearing status

・ A wireless signal is transmitted to indicate the wearing status each time the chin strap is fastened or removed. When the correct wearing status continues for approx. 2 seconds or longer, the hard hat is judged to be worn correctly and a wireless signal is transmitted. After the correct wearing status was identified, when the chin strap is off for approx.10 seconds or longer, the hard hat is judged to be removed and a wireless signal is transmitted.

・ The signal is transmitted regularly approx. every 5 minutes from when the hard hat wearing was detected, and the wearing status at the point of transmission is notified. When the chin strap is not securely fastened or when the hard hat is not worn for approx. 30 minutes, the regular transmission is stopped. When the hard hat is worn again, the wireless transmission is started again.

> ***Cautions for wearing a hard hat**
> ・Keep the touch sensor attached to your skin.
> ・Allow the sensor to touch your skin directly. (When the sensor does not
>   directly touch the skin due to wearing of a mask, scarf, neck warmer, etc.,
>   the wearing status may not be correctly detected.)

5-4．Test transmission

Press the test switch (pairing switch) of the sensor once to perform a test transmission.

The LED indication patterns displayed immediately after the test switch was pressed indicate the following.

Please refer to "5-6.LED indication patterns of ENS-HH01" for the LED indication patterns.

   ・　Communication status with the receiver
   ・　Paired status with the receiver
   ・　Whether or not a memory fault has occurred in the sensor(transmitter)
   ・　Battery level (Indication of low battery level)

5-5．Battery level notification function

The sensor checks the battery remaining capacity each time transmitting wirelessly or performing a test transmission after pressing the test switch once. The low battery level is indicated by the LED indication patterns.

Please refer to "5-6.LED indication patterns of ENS-HH01" for the LED indication patterns.

5-6. **LED indication patterns of ENS-HH01**

Notification of the hard hat wearing status, regular transmission at the time interval of 5 minutes, communication status with the receiver when a test transmission is made, etc. are indicated by the LED indication patterns.

No.	State	Indication patterns
1	Communication OK	LED blinks 1 time
2	Communication Failed	LED blinks 10 times (Approx. 1 second from when the LED starts blinking until it stops blinking.)
3	BUSY	LED blinks 4 times
4	Memory fault (*3)	LED blinks 2 times
5	Not paired with the receiver	LED blinks 3 times
6	Battery level low (*4)	LED lights for 1 second
7	Initial settings	LED blinks 10 times (Approx. 2 second from when the LED starts blinking until it stops blinking.)

(*3) A fault occurs in memory. Remove the coin battery and install it again. If the symptom is not improved, please consult your representative.

(*4) This condition can be checked only when a test transmission is made. After the communication status with the receiver (any one of No.1 to No.3) is indicated, if the battery level low, it is indicated.

The low battery level is not indicated when a memory fault occurs or when the sensor is not paired with the receiver.

5-7. **Maintenance of the touch sensor**

When moisture including sweat, oil, dust or other contaminants are deposited on the touch sensor, rinse the touch sensor mounted on the sensor body with running water and wipe off the water with dry cloth.

*The touch sensor (S20006-25-00) is available for replacement separately.

> ***Cautions for washing with water**
> ・Do not immerse the touch sensor in the stored water. Water may pass
>   through waterproof and enter inside.
> ・Do not use cleaning products, such as detergents or alcohol. They will
>   deteriorate the touch sensor and the case.

6. Features and settings

6-1. Initial settings

To ensure sensing accuracy of the touch sensor, perform initial settings in the environment where hard hats are used. Once initial settings are completed, they are not needed to be performed every time.
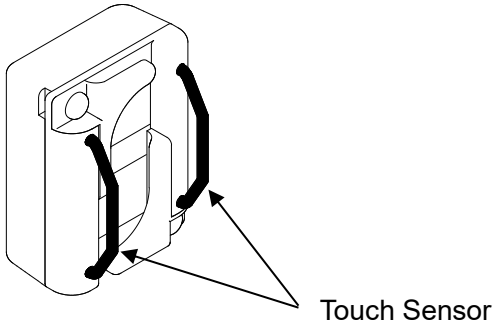
*The touch sensor does not work properly in factory default settings. Be sure to perform initial settings before using the sensor for the first time.

Also, perform initial settings after replacement of the touch sensor.

①Perform initial settings while paying attention to the following. By not observing it, initial settings may not be performed correctly.

*Cautions

Be careful not to allow the touch sensor to touch hands or objects during settings.

Touch Sensor

②Press the test switch of the sensor three times in succession within 1 second.

When starting initial settings, the LED blinks 10 times. (Approx. 2 second from when the LED starts blinking until it stops blinking.)

When the LED blinking status is different from the one listed above, initialization has not been performed. Perform operation of ② again.

LED

Test Switch
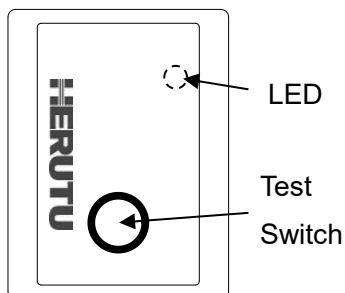
Indication patterns	State
LED blinks 10 times (Approx. 2 second from when the LED starts blinking until it stops blinking.)	Initial settings are in progress
LED blinks 3 times	Failed to start initial settings (Indication patterns vary depending on the conditions, such as paired with the receiver.)
LED blinks 1 times	
LED blinks 10 times (Approx. 1 second from when the LED starts blinking until it stops blinking.)	

③Wait until the LED goes out. When the LED goes out, initial settings are completed.

6-2．Pairing(registration)

Before using the sensor, pair (register) the sensor with a communication target device.

By pairing them, they recognize an identification signal from each other and communicate with each other.

6-2-1．For use with POKAYOKE plus

The communication target is Pokayoke receiver.

This steps for pairing with one of POKAYOKE receivers, "LAN connection type receiver TW-800R-EXL" are described below.

①Press the lighting switch for paring of the receiver, and turn ON the power switch at the same time.
   The lighting switch for paring blinks and the receiver enters the pairing mode for 10 seconds.

Example) TW-800R-EXL
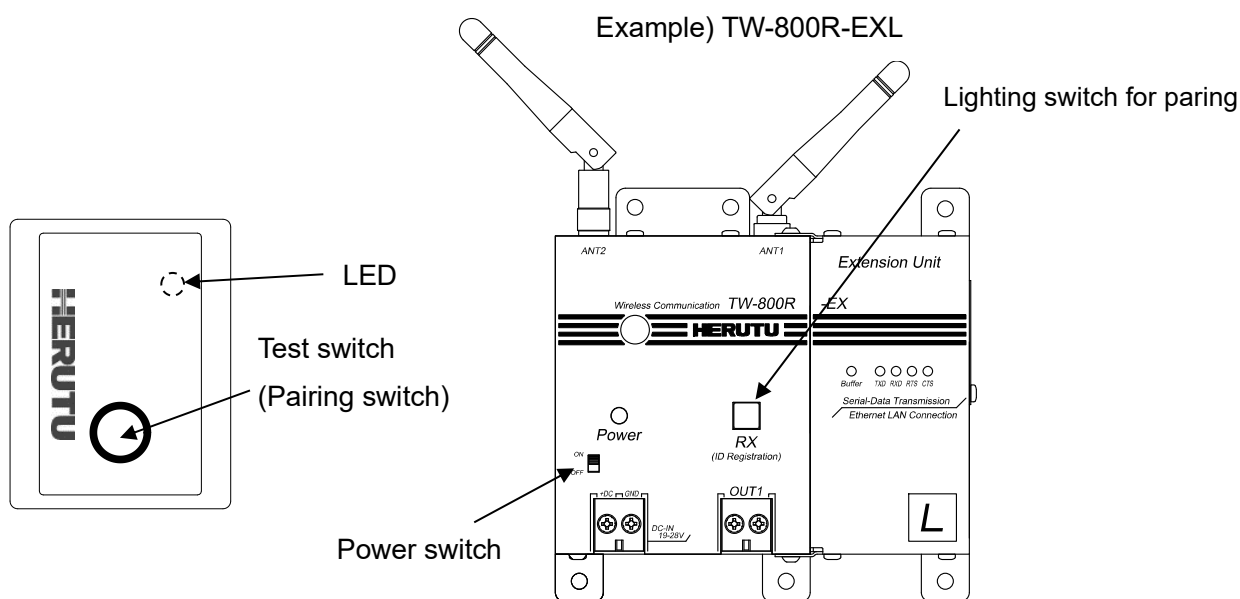
②Long press the test switch(pairing switch) of the sensor for 3 seconds or longer.
   The lighting switch for paring of the receiver goes out and pairing is complete.

③Turn OFF the power of the receiver once and turn it ON again , and the receiver can communicate
   with the paired sensor.

*Unlimited number of sensors can be paired with TW-800R-EXL.
   Even when pairing multiple units to a receiver, the pairing process must be done one at a time.

6-3．Delete the pairing

At receiver is not "Paring situation", the sensor cancels the paring information (registration information on a receiver) when the paring switch is pushed over 3 seconds continuously. By this operation, the sensor can not communicate a receiver is registered "Paring".

When pairing is reset by mistake, perform the pairing procedure again.

7. Installation

7-1. Attach the ENS-HH01 to the hard hat

Insert a hard hat's chin strap into the groove on the back of the sensor. Avoid the adjuster for adjusting the length of the chin strap.
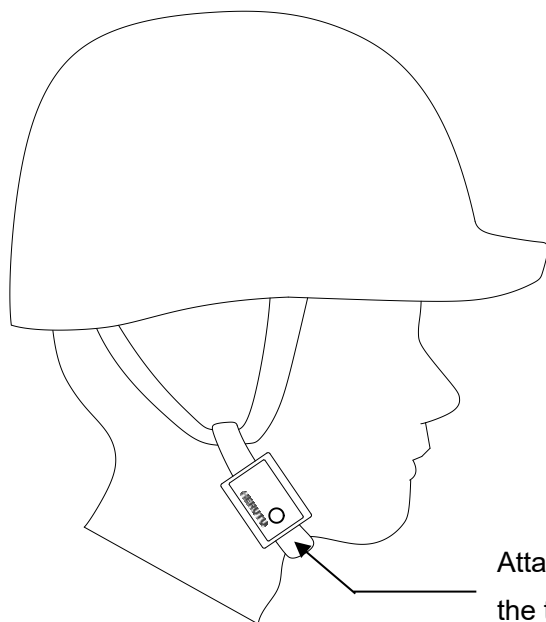
Adjust the length of the chin strap <u>before mounting ENS-HH01 on the chin strap.</u> Adjust it to the proper length so that there is some space for an index finger to be inserted between the chin and the chin strap.

Attach the sensor to the strap to allow the touch sensor to touch the user's skin when wearing a hard hat.

Slide in the chin strap between the band hook and the groove.
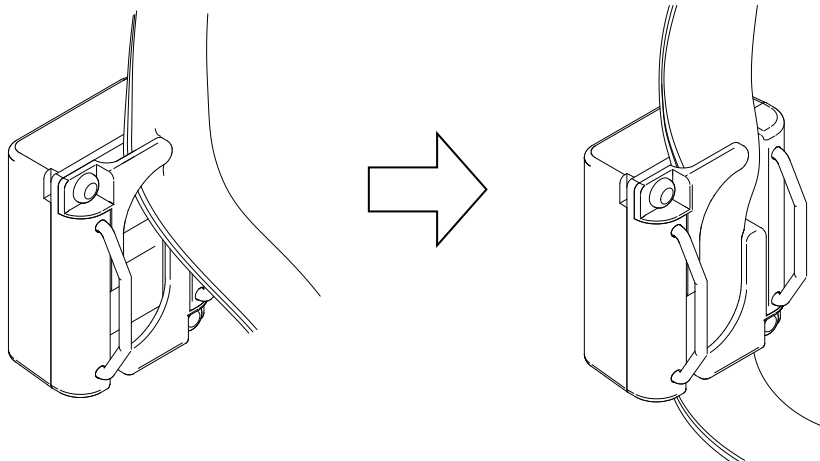
Insert the chin strap into a gap.

When the chin strap passes thorough the groove, installation is completed.

<u>*Do not remove the screws. </u>Waterproof performance may not work.

7-2．Replace the battery of ENS-HH01

7-2-1．Battery Replacement

When low battery level is indicated, replace the battery. Observe the following when replacing the battery. Not doing so may lead to lack of waterproof or damage to the product.
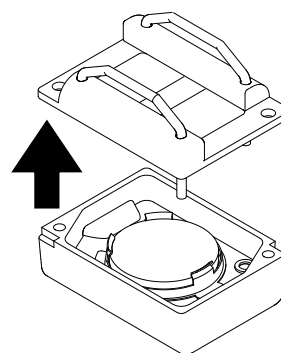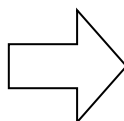
> ・Wipe off dirt and moisture from the surface before replacing the battery.
>
> ・Prevent moisture from building up inside the product.
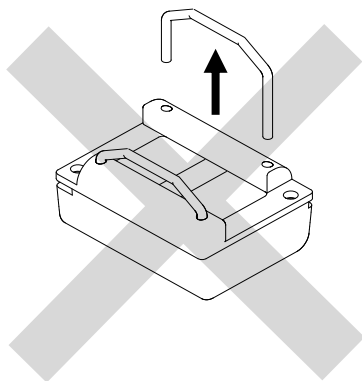
7-2-2．Procedure of battery replacement

①Unscrew 2 screws from the back of the sensor and remove the cover.
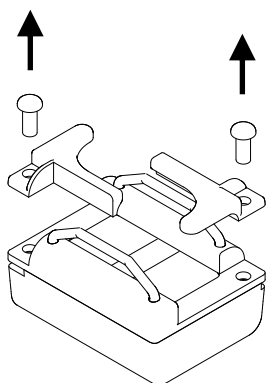
Unscrew 2 screws.

Keep in mind that the

band hooks come off.

Remove the cover.

Place your fingers in the recesses at
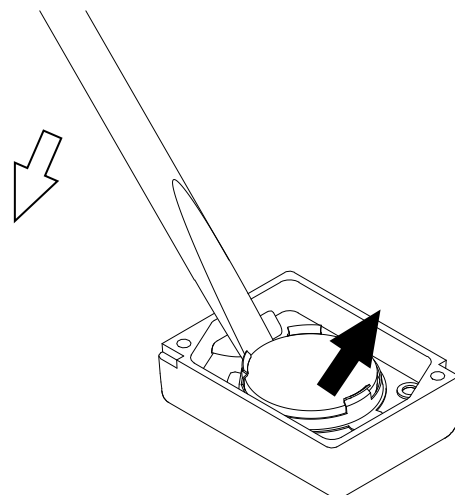
the corners to make it easier to

remove the cover.

Do not pull out the touch sensors.

If the touch sensors come off,

insert them as far as they will go.

②Remove the battery.

Insert a flat-end tool and lift the battery like using a lever.
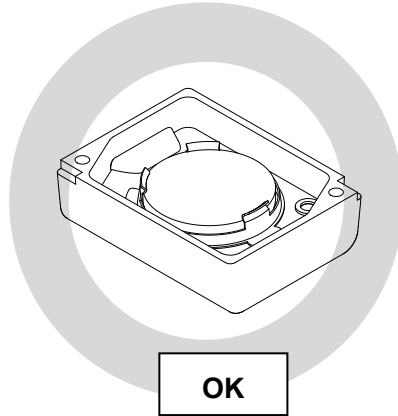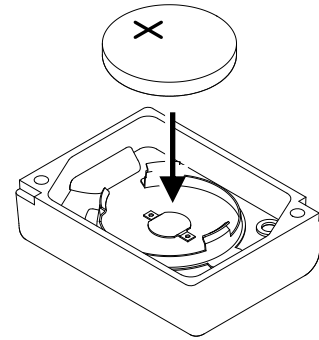
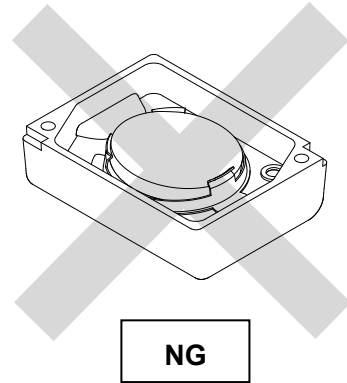> The battery may jump out quickly. Work carefully.

③Install a new battery.

Install coin cell battery (CR2032).

Make sure that the positive（＋）side faces upward.

When the battery is tilted or the claws of the battery

holder come off, remove the battery and install it again.

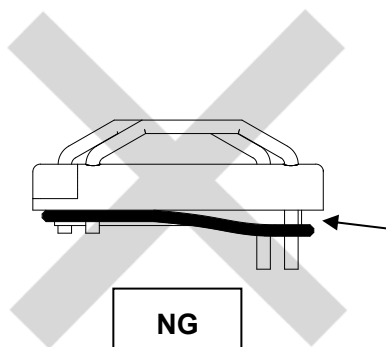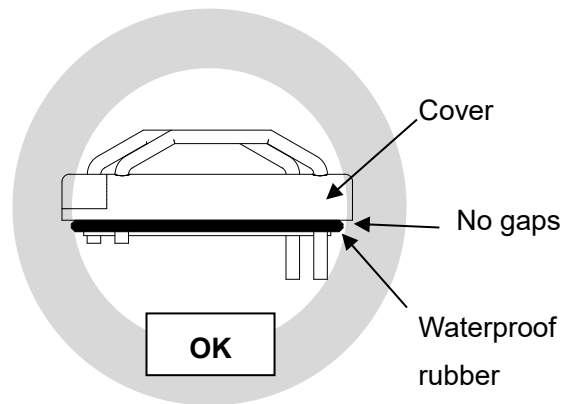| OK |
|---|

・The battery is stuck in

three claws.

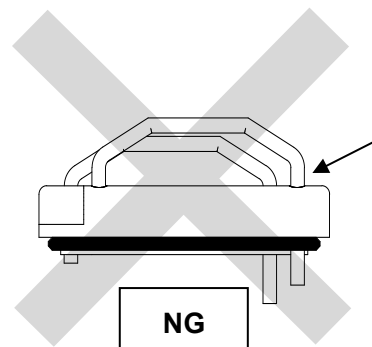| NG |
|---|

・Battery is tilted.

・The battery is off the claws.

④Put the cover back on.

Make sure that there is no gap between the

waterproof rubber seal and the cover. If there is

a gap, waterproof function cannot be performed.

Also, if the touch sensor is lifted off,

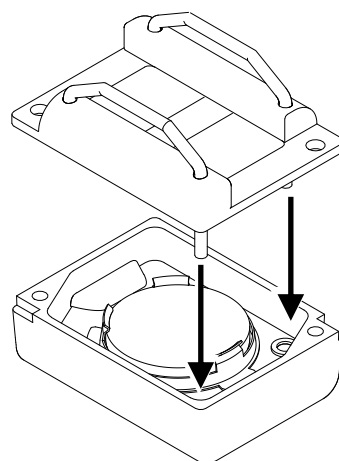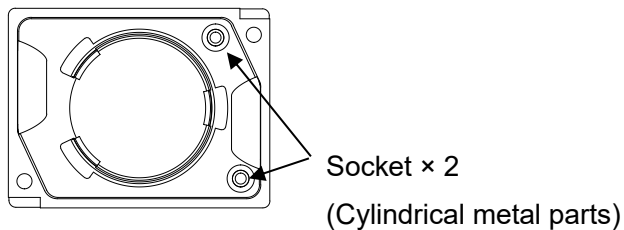insert it as far as it will go.

Cover

No gaps

OK

Waterproof

rubber

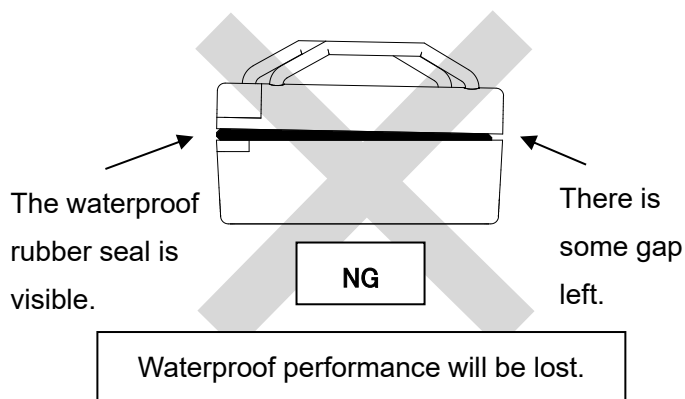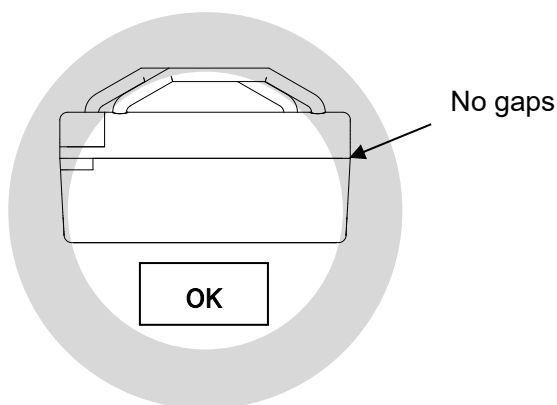| NG |
|---|

There is a gap

NG

The touch sensor is lifted off

Insert two long legs of the touch sensors into
the sockets and place the cover back on.
If installing in reverse orientation, the touch sensors
cannot be inserted into the sockets and the hard hats
wearing status cannot be detected.

Socket × 2
(Cylindrical metal parts)

Insert the touch sensor into
the socket.

Push in the cover so that the waterproof rubber seal is
completely hidden in the case. Push in the cover while
moving it side to side for easier reinstallation.

No gaps

OK

The waterproof
rubber seal is
visible.

There is
some gap
left.

NG

Waterproof performance will be lost.

⑤Secure the band hooks with the screws.
　Tighten the screws to the specified torque value.
　Tightening the screws too much may damage the case.

Specified torque： 0.2〜0.3N・m

⑥Check if the touch sensor is working properly.
　Touch both touch sensors with your finger and make sure
　that the touch sensors can transmit data by the LED.

 *Please refer to "5-6.LED indication patterns of ENS-HH01"
　for the LED indication patterns.

Touch Sensor

LED (Green)

7-3．Replace the touch sensor of ENS-HH01

7-3-1．Touch sensor Replacement

Do not use any of the following touch sensors, and replace it with a new one immediately.

- ・Deformed
- ・With significant scratches and chips
- ・Damaged or cracked
- ・Discoloration is identified

*The touch sensor (S20006-25-00) is available for replacement separately.

Observe the following when replacing the touch sensor. Not doing so may lead to lack of waterproof or damage to the product.

> ・Wipe off dirt and moisture from the surface before replacing the touch sensor.
> ・Prevent moisture from building up inside the product.

7-3-2．Procedure of touch sensor replacement

①Unscrew 2 screws from the back of the sensor and remove the cover.
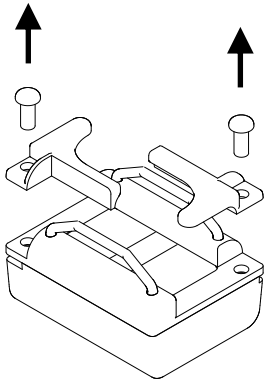
Unscrew 2 screws.
Keep in mind that the band hooks come off.
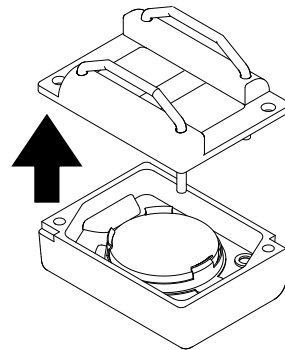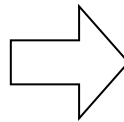
Remove the cover.
Place your fingers in the recesses at the corners to make it easier to remove the cover.

②Remove the touch sensors.

Hold each touch sensor with your hand and pull them out one by one.
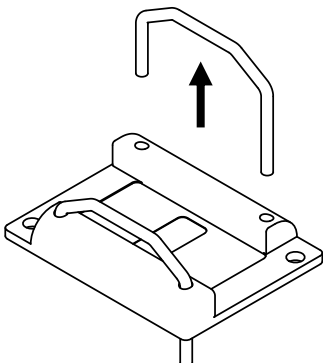
> Do not reuse the replaced touch sensors.
> Use of the replaced touch sensors may lead to unexpected accidents.

③Attach a new touch sensor.

Attach the touch sensors so that the leg directions (long and short legs) are aligned.
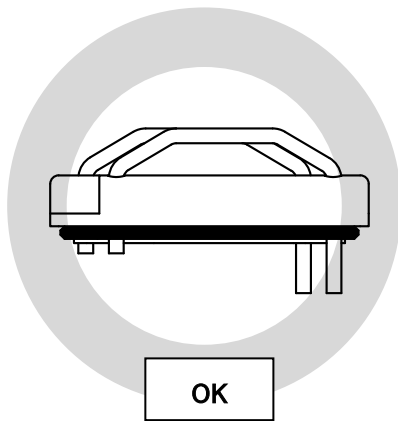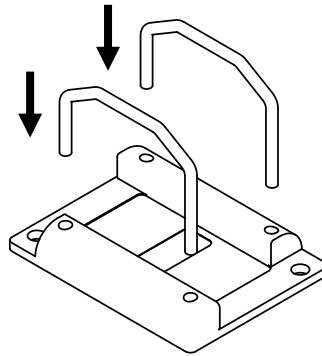
OK	NG
・The leg directions are aligned.	・The leg directions are misaligned.
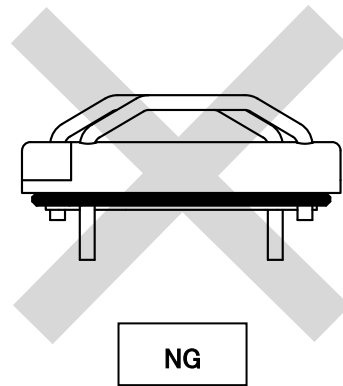
④Put the cover back on.

Make sure that there is no gap between the
waterproof rubber seal and the cover. If there is
a gap, waterproof function cannot be performed.
Also, if the touch sensor is lifted off,
insert it as far as it will go.

Cover

No gaps

OK

Waterproof
rubber
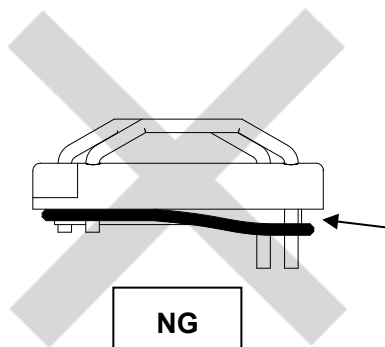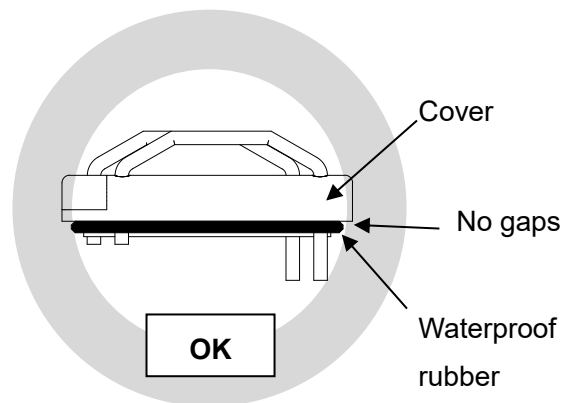
NG	NG
There is a gap	The touch sensor is lifted off

Insert two long legs of the touch sensors into
the sockets and place the cover back on.
If installing in reverse orientation, the touch sensors
cannot be inserted into the sockets and the hard hats
wearing status cannot be detected.

Socket × 2
(Cylindrical metal parts)

Insert the touch sensor into
the socket.

Push in the cover so that the waterproof rubber seal is
completely hidden in the case. Push in the cover while
moving it side to side for easier reinstallation.

No gaps

OK

The waterproof
rubber seal is
visible.

There is
some gap
left.

NG

Waterproof performance will be lost.

⑤Secure the band hooks with the screws.
Tighten the screws to the specified torque value.
Tightening the screws too much may damage the case.

Specified torque: 0.2～0.3N・m

⑥Check if the touch sensor is working properly.
Touch both touch sensors with your finger and make sure
that the touch sensors can transmit data by the LED.

*Please refer to "5-6.LED indication patterns of ENS-HH01"
for the LED indication patterns.

Touch Sensor

LED (Green)

19

8. Communication Specification

For use of the sensor with a PC (POKAYOKE plus) or PLC, LAN communication of the POKAYOKE receiver is explained below.

8-1. Data type setting of receiver

When the hard hat's wearing status changes, when transmitting regularly or when performing test transmission, the receiver receives signals transmitted from the sensor and communicates with the external device (PC, PLC, etc.).

The output data types are classified into two types: "Short data" and "Long data".

When using the receiver in conjunction with the sensor, set the output data type to "Long data".

Please refer to the instruction manual of each receiver for the setting method.

This manual uses the "LAN connection type receiver TW-800R-EXL" as an example.

①Turn OFF the power switch of the receiver.

②Set No.5 of DIP SWITCH2 for the expansion unit to "ON", and Ethernet output data type is set to "Long data". The switch is set to "OFF"(Short data) at default.

Example) TW-800R-EXL

Expansion unit

DIP SWITCH2
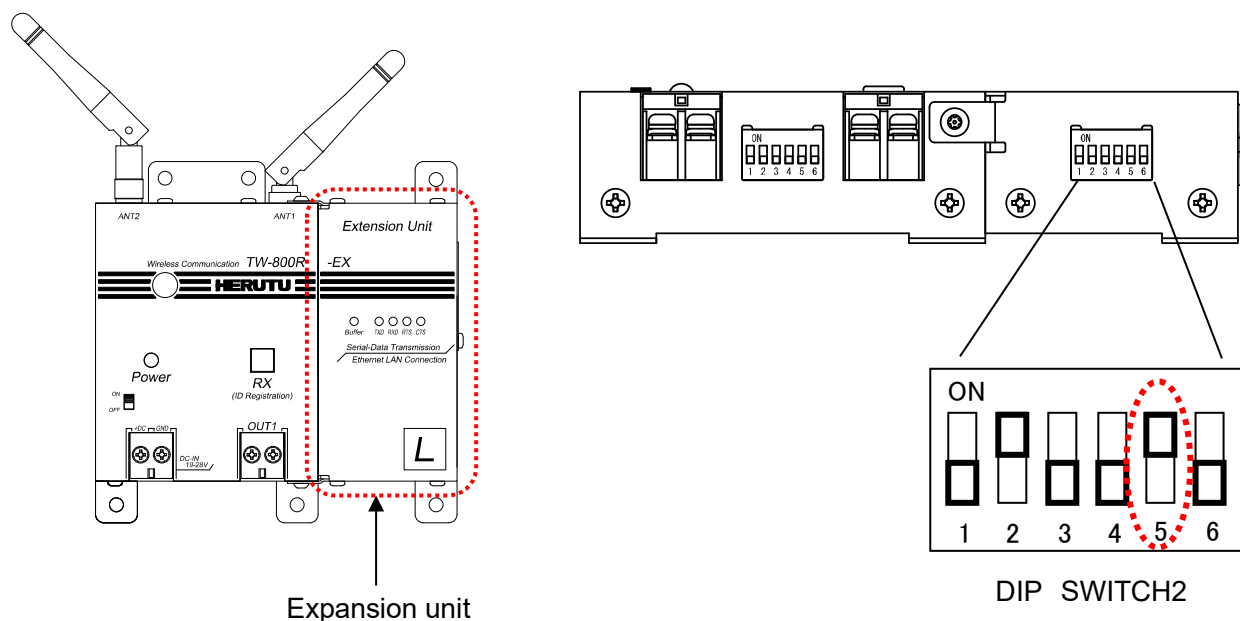
③Turn ON the power switch of the receiver to reflect the settings.

8-2. Receiver data format

To communicate with the sensor, the receiver communicates with the external device in the following data format. For other communication specifications for the receivers, refer to the instruction manuals of the target receivers.

● **Data format(43byte)**

Preamble	STX	Transmitter ID number	Transmission type、 battery information	Wearing status of the hard hat	Error information	System area	ETX	Checksum

Data name	Description	Byte
Preamble	FFH,FFH,FFH	3
STX	02H	1
Transmitter ID number	ID number 10 digit is converted to ASCII data(Hexadecimal). Example) "010100004A" (30H,31H,30H,31H,30H,30H30H,30H,34H,41H)	10
Transmission type、 battery information	2byte ASCII data Normal transmission "01"(30H,31H) Test transmission(Battery voltage OK)"02"(30H,32H) Test transmission(Battery voltage low)"12"(31H,32H)	2
Wearing status of the hard hat	2byte ASCII data Wearing status NG "00" (30H,30H) Wearing status OK "01" (30H,31H)	2
Error information	2byte ASCII data No Error "00"(30H,30H) Error No. "01"(30H,31H) *Sequential number from "01"	2
System area (*5)	-	20
ETX	03H	1
Checksum	Calculated XOR from "Transmitter ID number" to "ETX". And it is converted to ASCII data for 2byte.	2

(*5) The system area contains system specific data for "ENS-HH01". When using the output data in your environment, read and discard the data in the system area.

"ENS-HH01" transmits wireless signals when the hard hat wearing status changes, when transmitting regularly every 5 minutes or when transmitting a test signal. The receiver outputs data to an external device (PC, PLC, etc.) at the timing it receives the signal.

9. Cautions for use

・Waterproof and dustproof function

The device is rated at IP65 waterproof and dustproof rating, but the waterproof and dustproof function

cannot be achieved if the device is not assembled properly.

When disassembling the device for battery replacement or other purposes, carefully read

"7. Installation" and disassemble and assemble the sensor correctly.

・Maintenance of the touch sensor

Soiled touch sensor may lower the accuracy of the sensor.

Refer to "5-7. Maintenance of the touch sensor" and perform regular maintenance of the touch

sensors.

・Touch sensor Replacement

Do not use any of the following touch sensors, and replace it with a new one immediately.

・Deformed

・With significant scratches and chips

・Damaged or cracked

・Discoloration is identified

・Allergies

When you feel uncomfortable with your skin while wearing the sensor, stop using the sensor

immediately.

10. Specifications

Item	Specifications
Compliance Standards	<Japan> Radio equipment specified in Article 2 paragraph 1 item(19) of the Radio Law *Specialized radio equipment: Low power data communication system in the 2.4 GHz band Article 49-20 paragraph 1 of the Ordinance Regulating Radio Equipment <USA> FCC Part15-247 <Canada> ISED RSS-247 Issue 2
Radio format	F1D
Frequency Band	2,403MHz～2,478MHz
Number of Channels	76CH
Modulation Method	GFSK
Communication Method	two-way communication 250kbps
Antenna Power	2.1mW
Antenna	Chip antenna
Input(s)	1 Test switch (Pairing switch) / 2 Touch sensors
Display	1 LED (Green)
Power Source	1 Coin Battery (CR2032)
Operating Environment	Temperature: 0-50℃
Protective structure	Waterproof and Dustproof (Protection Structure IP65)
External Dimensions	28.6W×17H×37.6Dmm (Excluding protrusions)
Weight	approx. 19g
Battery Life	approx. 1 year by wearing for 8 hours a day. (Depending on usage conditions)
Touch sensor component	Polylactic acid resin（CAS No.9051-89-2） Carbon black（CAS No.1333-86-4）

11. Dimensions Drawing
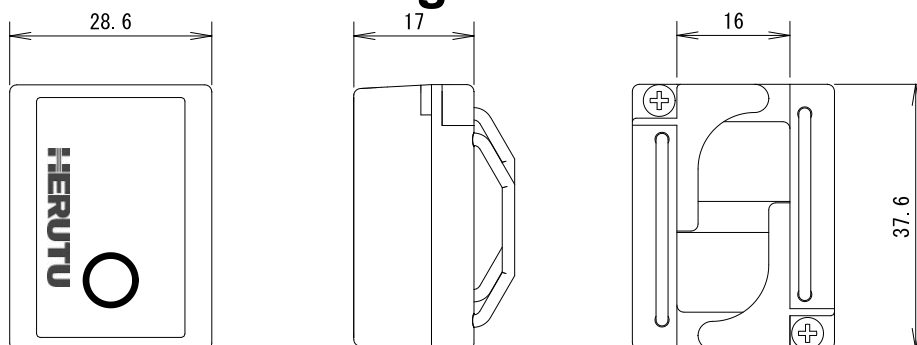
12. Troubleshooting

Phenomenon	Cause and remedy
The sensor does not transmit. LED does not light up.	Battery capacity is low.
	→Please replace the battery (CR2032).
The LED blinks 3 times after transmitting.	Pairing is not done. (Not registered)
	→Perform pairing with the receiver to communicate with the sensor [6-2. Refer]
The LED blinks 10 times after transmitting.	The power of the receiver is not ON.
	→Make sure the power of the receiver to communicate with the sensor is ON.
	The communication distance is too far.
	→The distance is beyond the maximum communication distance of the machine. Install the sensor in a location where it can communicate with a receiver.
	The antenna installation status of the receiver is not good.
	→Check whether or not the receiver's antenna is surrounded by obstacles blocking radio waves or placed in the control panel (iron), and improve the installation status of the antenna. Also, consider using an external antenna.
	Communication cannot be done due to external factors.
	→Use of a product using the same frequency band (2.4GHz band) as this product may prevent communication. Please contact our Sales Department with your product information.
The LED blinks 4 times after transmitting.	The receiver is busy.
	→During relay output of the receiver or double count prevention time, communications concentrate all at once. ・For the settings, refer to the instruction manual of the receiver. ・The connection with the external device may be disconnected. Check connection with the external device.

The LED lights up for 1 second after transmitting.	Battery capacity is decreasing.
	→Please replace the battery (CR2032).
The LED blinks 2 times after transmitting.	A fault occurs in memory inside the transmitter.
	→Remove the coin battery and install it again. Please contact our Sales Department with your product information.
Pairing cannot be done.	The receiver is not in the pairing mode.
	→Set the receiver to the pairing mode and press the pairing switch of the transmitter for 3 seconds or more.
Wearing hard hats but is perceived as not wearing.	The hard hat's chin strap is not securely fastened.
	→Fasten the hard hat's chin strap so that the touch sensor to touch your skin directly.
	The hard hat's chin strap is loose.
	→Adjust the length of the hard hat's chin strap so that the touch sensor to touch your skin directly.
	ENS-HH01 is attached in the opposite direction.
	→Attach the sensor to the chin strap to allow the touch sensor to touch your skin.
	The touch sensor is not touching the skin.
	→When the sensor does not directly touch the skin due to wearing of a mask, scarf, etc., the wearing status may not be correctly detected. Allow the sensor to touch your skin directly.
	Not correctly detected.
	→Perform initial settings again.
	Not correctly detected.
	→The touch sensors may not be inserted into the sockets. Insert the touch sensors into the socket, referring to "7-3-2. Procedure of touch sensor replacement".
	After perform initial settings again and inserted the touch sensors into the socket, it is not correctly detected.
	→Replace the touch sensor.

13. After Service and Warranty

If something is wrong. If you should find anything wrong with the machine when using it under normal conditions, check the warranty and repair regulations and contact the outlet store through which you purchased the product or our Sales Office. The latest warranty and repair regulations can be found on our website.

> The user is prohibited by law from disassembling or making modification to the unit or otherwise may be subject to punishment.

〔Warranty Regulation〕

This regulation (hereinafter referred to as the "Regulation") is for post-shipment warranty provided by HERUTU ELECTRONICS CORPORATION (hereinafter referred to as the "Company") so that you can use the Company's product you have purchased with confidence. The Regulation does not apply to special order products (custom products). In addition, purchased products shall be subject to the relevant manufacturer's warranty regulations, and the Regulation shall not apply.

Please note that in the event that the product you purchased comes with an instruction manual that describes the Company's old repair regulation, the latest Regulation will still apply.

1. Warranty period

Unless otherwise specified, the warranty period shall be "up to thirteen months from the date of shipment of the product by the Company". During the warranty period, the Company will replace the product with a new one or repair it free of charge in accordance with the provisions of the Regulation.

In addition, if a failure occurs during the warranty period due to the Company's responsibility and the product with the failure (hereinafter referred to as the "Product") is replaced with a new one or repaired free of charge, the warranty period of the Product will be "thirteen months from the date of initial shipment of the Product, or six months from the date of shipment of the Product that has been replaced or repaired, whichever comes later".

The warranty period for paid repairs shall be in accordance with the provisions of the Company's repair regulation.

2. Warranty scope

If a failure occurs during the warranty period due to the Company's responsibility, the Company will replace the product with a new one or repair it free of charge.

Even within the warranty period, the warranty does not apply in the following cases:
A) In the event of failure or damage caused by improper handling by the customer, such as dropping or impact during transportation or movement by the customer
B) In case of failure due to disassembly or modification of the main unit by the customer
C) In case of natural disasters such as fires, earthquakes, floods, and in case of failure or damage due to abnormal voltage

D) In case of failure caused by failure of equipment other than the Company's designated equipment connected to the Product

E) In case of failure of the Product's accessories (AC adapter, antenna, connection cable, etc.)

F) If damage is caused by the failure of consumables or limited-life parts included in the Product:

1. Consumables: Batteries (rechargeable, batteries, dry batteries, button batteries, etc.), recording media (SD cards, etc.)

2. Limited-life parts: Various switches (limit switches, push button switches, etc.) and various sensors

3. Other items that are worn out or have a service life due to use

If consumables or limited-life parts fail, we will replace or repair the parts for a fee.

G) In case of failure caused by handling contrary to the usage and precautions described in the instruction manual of the Product

H) If repaired, adjusted, or improved by elsewhere other than the Company

I) If the Company is unable to reproduce the failure

3. About repair of the Product

Please note that repairing the Product requires equipment such as measuring instruments and tools, so the Company will handle it as a pick-up repair service at the Company.

4. About the shipping cost for replacement or repair of the Product

Shipping charges for sending the Product to the Company or a distributor, as well as shipping charges for sending the Product that has been replaced or repaired by the Company or the distributor to the customer, will be borne by the Company or the distributor.

5. Disclaimer

The Company is not responsible for any direct or indirect damages or monetary loss caused by failure of the Product or its use.

6. Additional notes

Please note in advance that the information of the Product described on the Company's website and in the catalogs, instruction manuals, technical materials, and other materials provided by the Company are subject to change without notice to customers.

〔Repair Regulation〕

This regulation (hereinafter referred to as the "Regulation") shall be applied to paid repair service (hereinafter referred to as the "Service") provided by HERUTU ELECTRONICS CORPORATION (hereinafter referred to as the "Company"). The Regulation does not apply to special order products (custom products). In addition, purchased products shall be subject to relevant manufacturer's repair regulations, and the Regulation shall not apply.

Please note that in the event that the product you purchased comes with an instruction manual that

describes the Company's old repair regulation, the latest Regulation will still apply.

1.   Subject of the Regulation

The Service is provided for the Company's products that are "beyond the scope of the warranty specified in the warranty regulation" and "from the sales start date to the end date of the repair period (seven years from the production end date)". However, please note that the end date of the repair implementation period may be earlier depending on the availability and procurement status of repair parts.

2.   Establishment of contract

The contract shall be established when the customer approves the quotation presented by the Company and issues an order form before the end of the repair implementation period.

3.   Purpose of the Service

The Company will provide the Service for the purpose of repairing the function and performance of the Company's product used by the customer if it fails beyond the scope of the warranty specified in the warranty regulation. Please note that the Service requires equipment such as measuring instruments and tools, so the Company will handle it as a pick-up repair service at the Company.

4.   Usage fee for the Service

The usage fee for the Service shall be the total of the following fees:

A)   Repair service fee

The repair service fee is the total amount of technical fees, parts costs, other expenses incurred, and applicable taxes associated with repairing the Company's product (hereinafter referred to as the "Product for repair") that the customer wishes to repair.

B)   Shipping fee (including the cost of packaging boxes)

The Company kindly asks that customers bear the shipping costs for sending the Product for repair to the Company and for returning it from the Company. However, in the event that the Product for repair is sent by payment on delivery by the customer, the shipping cost will be included in the Service charge.

5.   Warranty period and scope of the Product for repair

The warranty period for the Product for repair is "up to six months from the date of repair completion". However, please note that failures other than the repaired parts (repaired places or replaced parts) are not covered by the warranty of the Product for repair. In addition, if a failure occurs due to the Company's responsibility within the warranty period, the Company will again repair the product free of charge.

6.   Handling of repair parts

A)   In order to provide the Service stably for a long time and to promote environmental protection,

etc., the Company may use recycled parts or alternative parts at the time of repair at its discretion.

B) The Company may, at its own discretion, collect the removed parts for the purpose of recycling or analysis at the time of parts replacement through the regulation of the Service. Please note that the collected parts are the property of the Company and will be recycled, used or discarded at its discretion.

7. Estimate for the Service

The estimate for the Service is basically free of charge. However, if the Company is unable to reproduce the failure, it will not be able to carry out repairs and will not provide an estimate. If a technical investigation is required to reproduce the failure, the Company will estimate the cost of reproducing the failure.

8. Return of unrepaired product

If the Company does not estimate the cost of the Service due to reasons such as being unable to reproduce the failure, it will return the Product for repair to the customer.

In addition, if the customer does not place an order within three months from the date of creation of the quotation, or if the customer does not accept the quotation and the customer expresses an intention not to carry out the repair, the Company will assume that the customer has canceled the request for the Service, and the Company will return the Product for repair to the customer without carrying out the repair.

In addition, if a shipping fee is incurred for returning the product, it will be borne by the customer.

9. Handling of personal information

The Company will properly handle personal information such as names and addresses being provided in accordance with the privacy policy posted on the Company's website.

10. Compensation for damages

A) The responsibility of the Company for providing the Service shall be limited to the matters and contents specified in the repair regulation, and shall not include any damages incurred by the customer due to special circumstances (including loss of profits of the customer and damages based on claims for compensation made by third parties against the customer) and damages caused by the customer being unable to use the product due to a failure or defect of the Product for repair. However, this does not apply if the damage was caused by the Company's willful misconduct or gross negligence.

B) Even if the Company is liable to the customer for damages in connection with the regulation of the Service, the Company's liability shall not exceed the amount equivalent to the value of the Product for repair, except in cases of willful misconduct or gross negligence on the part of the Company. The value of the Product for repair shall be calculated based on the residual value after depreciation or the price of products with equivalent performance sold in the market at the

time of damage.

11. Additional notes

A) The Company cannot restore stickers, LCD protective sheets, and coloring applied to the outer casing parts that you have attached yourself. In addition, if advertisement stickers were affixed at the time of sale, they cannot be newly prepared as repair parts when replacing the outer casing parts. After replacing the outer casing parts, the advertisement stickers will be returned without being affixed.

B) Please note in advance that the information of the Product on the Company's website and in the catalogs, instruction manuals, technical materials, and other materials provided by the Company are subject to change without notice to customers.