Custos Wireless Water Detector

Technology for Humanity

LoRa

INDEX

1 INTRODUCTION

1.1 What's LoRa

LoRa (short for long range) is a spread spectrum modulation technique derived from chirp spread spectrum (CSS) technology. Semtech's LoRa devices and wireless radio frequency technology is a long range, low power wireless platform that has become the de facto technology for Internet of Things (IoT) networks worldwide.

1.2 About Custos WWD

Custos Wireless Water Detector "Custos WWD" detects Water Leakage with long battery operation lifespan, super tiny form factor detects water from either in body detection probe on 4 sides as well as optional remote wired water detection probe. It is a perfect companion for Custos BVS to work in concerto as a complete solution to close water valve once WWD detected water leak (need proper set up on App or gateway configuration).

2   FEATURES & SPECIFICATIONS

2.1   Physical Specifications

Parameter	Value
Model No.	WWDLWU (US) / WWDLWE (EU)
Dimensions	21.6 x 21.6 x 67.5mm
Weight	WWD Unit: 52g
Body Color	White
Water Detection method	Conduction
Waterproof and Dustproof	IPX5
Operation Temperature	14~122° F (-10 ~ +50°C)
Relative Humidity	8% ~ 80%

2.2   Hardware Characteristic

Parameter	Value
CPU	Main: SMT32 RF: SX1261
RF Working Distance	40m (Indoor) / 120m (Outdoor) "Life of sight"
Region Frequency	US: 902 & 915MHz, FCC CFR47 Part 15.247 EU: 868.42 & 869.85MHz
Water Leak Sensor	Dual Water Detection Probes "Built-in & Remote"
Temperature Sensor	Temperature Sensor Range from -40°C to +125°C / (-40°F to +257°F)
Action Sensor	3-Axis Accelerometer Sensor
LED Indicator	3 colors LED. (Green, Yellow & Red)
Power Supply	ER14250 - Battery 3.6V 1200mAH
Battery Life	Standby: ~3.uA over 10 Years

2.3   Software Specifications

Parameter	Value
RF Wireless Protocol	LoRa
Protocol Version	
Device EUI	DevEUI "Unique Number that provided by Factory"
AppsKey	Can be provide by provided by Factory" or requested by SI
AppsEUI	Can be provide by provided by Factory" or requested by SI
Device Type	Sensor
Class Type	Class A
API Protocol Provide	Provided by Ubitech
Firmware Update	Yes (OTW with CommBox)
Alarm Report	Yes
Temperature Report	Yes "Temperature Change, Overheat & Underheat"
Uplink	
Downlink	
Configurable	Temperature Unit Report, Wakeup Interval "Only for Advance Ubilink Mode"
Factory Default Reset	Yes, by "Gesture UI"

3   WHAT INSIDE IN THE BOX

Standard Custos Wireless Water Detector (WWD) package comes with below items

3.1   Custos WWD Main Unit x 1 ``A``
3.2   Remote Water Detection Probe x 1 (Optional) ``B``

3a

3b

4   UNDERSTANDING CUSTOS WWD

4.1   Connectors & Interfaces

Terminology	Description	Terminology	Description
(a) 3D Action Sensor	3-axis Action Sensor	(h) SN & Product Details	Product Details and S/N
(b) Display Indicators	3 Colors LED "Green, Yellow & Red"	(i) Dust Cover	Dust & Waterproof Cover
(c) Sound Indicator	Buzzer	(j) Battery Cover Screw	2 x Screw
(d) Temperature Sensor	Built-in Temperature Sensor	(k) Battery Cover	Battery Cover With Gasket
(e) Leak Sensor #1	Built-in Water Detection Probe	(l) Battery Contact	Metal Contact Connect Cover & Housing
(f) Leak Sensor #2	Remote Water Detection Probe – 3.5mm jack	(m) Battery	3.6V
(g) Device EUI	DevEUI "QR Code"		
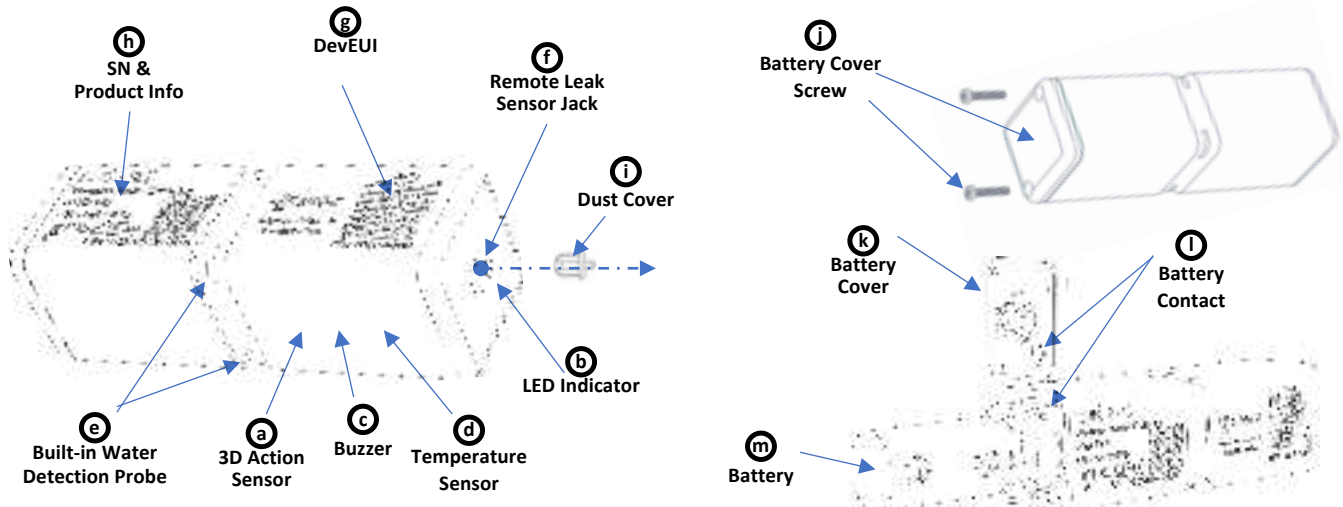
5   CHANGE THE BATTERY

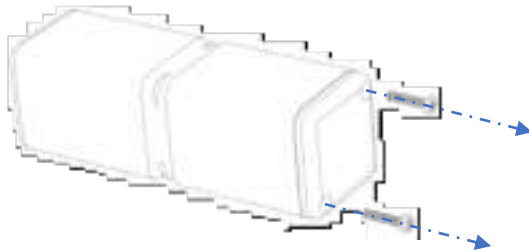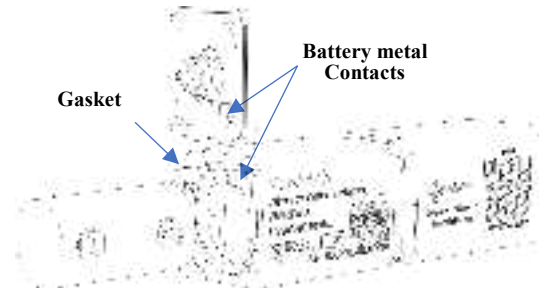## 5.1   Battery Support
- Model: ER14250
- Voltage: 3.6V
- Type: Lithium 1200mAh

5.2   How to Change Battery
- Remove the screws of battery cover and batter cover, (5a)
- Replace new ER14250 battery
- Put the rubber waterproof rubber o-range (5b)
- Put the battery cover and align with two battery metal contacts then tighten the screws.

5a

Gasket

Battery metal Contacts

5b

6 ACTION SENSOR & INDICATORS BEHAVIOR

6.1 3-axis Action Sensor

- Built-in 3-Axis Accelerometer for gesture recognition by detecting a series of movements, Once the 3-Axis Action Sensor is activated, you also can see below Visual and Sound Indicators response with the 3-Axis Action Sensor.

6.2 Visual Indicator

- 3 Colors LED: GREEN, YELLOW & RED
- ON Event: ON, quick blinking and slow blinking

6.3 Sound Indicator

- Buzzer: Long & short beep sound.

7   HOW CUSTOS WWD WORKS

7.1   3-axis Actions Sensor – Gesture Recognition Procedure

- End-user can use built-in 3-axis Accelerometer to replace physical touchable key, it can detect any movement very sensitive, end-user use a series of action to enable some defined function, such as below functions
    - I.   To wake up Custos WWD from sleep mode and send out uplink packet to Gateway / LoRa Server,
    - II.   Factory Default Reset,
- Custos WWD only supports below gesture movement, shake it vertically or horizontally as below,

Vertical-shaking   Horizontal-shaking

8   HOW WATER LEAK SENSOR WORKS

8.1   Water Detection Probes

- Custos WWD supports two Water Detection Probes ¨Built-in & Remove¨,

8.2   Built-in Water Detection Probe

- WWD has special recess which helps induce Water run through it, to create effective detection by probes from both end
- To achieve better result, please put the WWD on the floor flatly

- Water will be gone through and absorbed by this slot when water is leaking
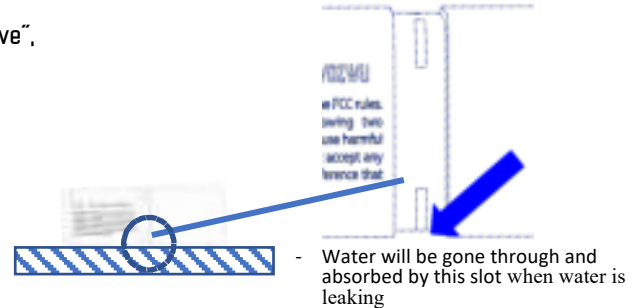
8.3   Remote Water Detection Probe

- To make sure Sensor Probe works properly show as below pictures, please make sure insert the Remove Sensor Probe tightly and there is no any gap allowed between 3.5mm jack and housing.
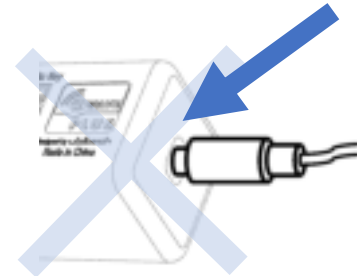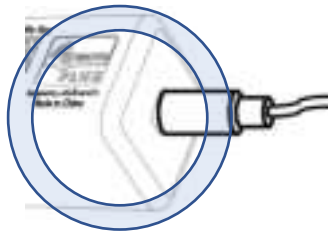
9   WORKING MODE SUPPORT

9.1   Shipping Mode (Deep Sleep Mode)

-    By default, Custos WWD is set in Shipping Mode to keep it in deep sleep to conserve battery for transportation & warehousing, in this time all functions will be disabled until unlocked it from Shipping Mode. End-customer must activate the device from Shipping Mode before joined to any LoRa Network

9.2   Standalone Mode

-    If Custos WWD is not paired to any LoRa Network and it unlocked from Shipping Mode.

9.3   Network Mode

-    Custos WWD is paired with a LoRa Network and it can join full benefits.
-    Supported function as Water Leak Detection, Temperature Report and downlink configuration.
-    Custos WWD also can associate with Custos BVS to shut off the Water Valve when detected Water Leak.

9.4   Water Leak Sensor & Alarm

-    Water Leak Alarms refer to two Water Detection Probes ``Built-in & Remote``

Remote Probe

Built-in Probe

10 SETUP WITH LoRa NETWORK

10.1 Check Network Status:

- By brand new default, Custos WWD does not belong to any LoRa Network and it is under shipping mode.
- To check Custos WWD Network status, trigger the Built-in Leak Sensor;
- Yellow LED flashing means Custos WWD is in Standalone mode, not joined in LoRa network.

10.2 OTAA Activations:

- Custos LoRa WWD can support two methods to activate OTAA (time limit mode and forever mode)
    i. Periodically activate OTAA for 3 minutes only.
    ii. Activate OTAA forever.

10.2.1 Time limit activate OTAA:

- OTAA will be activate only 3 minutes, after that if Custos WWD is not joined to any LoRa Network then it will return to shipping mode, this keeps lowers power consumption.
    i. Trigger Built-in Water Leak Sensor for 2 seconds comes with Yellow LED Lights on per seconds.
    ii. OTAA will be started per 30 seconds automatically if it's still remain in standalone mode.
    iii. OTAA success with LoRa Server, 2 Buzzer Sounds and Green LEED on when OTAA success,
    iv. After 3 minutes time-out without OTAA success then it will be back to shipping mode.

10.2.2 Activate OTAA and exits Shipping Mode permanently (Not recommended):

- OTAA will be activated forever until it joined into a LoRa Network and it will not return to shipping mode anymore,
    i. Trigger Built-in Water Leak Sensor for 5 seconds and comes with Yellow LED Lights on per seconds.
    ii. OTAA will be started per 30 seconds automatically if it's still remained in standalone mode.
    iii. Yellow LED will keep flashing when OTAA is process with LoRa Server and 2 Buzzer Sounds and Green LEED on when OTAA success,

10.3   Remove Custos WWD from LoRa Network:

- If you need to remove the Custos from a LoRa Network and may move it to other LoRa Network,
  i. Remove Device information form LoRa Server, "Please refer to related LoRa Server user manual";
  ii. Perform Factory Default Reset as item 13.4;
  iii. Follow below procedure to start Exclusion procedure in Custos WWD,

10.4   Factory Default Reset:

- To remove all Custos WWD settings without involve LoRa Gateway or LoRa Server.
  i. Pick up the Custos WWD;
  ii. Shaking it as illustration (10a) with 5 Buzzer sounds then stop and hold still for 2 seconds;
  iii. You'll get 2 Buzzer Sounds with Green LED Lights 2 times;
  iv. Trigger the Built-in Leak Sensor as illustration (10b) for 10 seconds with Yellow LED Lights 5 times;
  v. Once success, Green LED Lights up while it's reseting itself to factory state;
  vi. Then WWD goes into hibernation (Shipping Mode).

OR

10a

10b
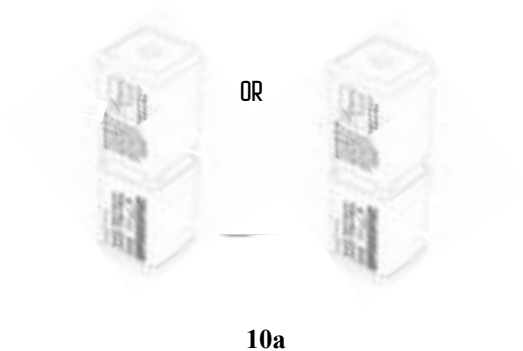
11   BATTERY LEVEL

11.1   Battery Level Report

- The Battery Level Report will be sent through Uplink packet when triggered 3-Axis Action Sensor or Water Leak Sensor,
- Custos WWD sends Uplink packet with Battery Level Report,
- Following below procedure to start Battery Level Check,
- There're three result of Battery Level UIs,
    i. Battery Full = 61 – 100%
    ii. Battery Fair = 31 – 60%
    iii. Battery Low < 30%

11.2   Low Battery Alarm

- Low Battery Alarm UI will be enabled when battery level less than 15% once triggered the 3D-Axis Action Sensor (Red LED flashing 2 time and buzzer sounds 2 times.)

12 WATER LEAK SENSOR & ALARM

12.1 Water Leak Detection & Alarm

- Once the Built-in or Remote Water Leak Sensor Probe is triggered, the Custos WWD sends Uplink packet with Water Leak Detected to LoRa Server automatically,
- End-user can configure to control Custos BVS to close the water Valve automatically in LoRa Server once it received Water Leak Detected signal from Custos WWD.

13 FCC Statement

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:
1) this device may not cause harmful interference, and
2) this device must accept any interference received, including interference that may cause undesired operation.
Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
--Reorient or relocate the receiving antenna.
--Increase the separation between the equipment and receiver.
--Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
--Consult the dealer or an experienced radio/TV technician for help.
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

14   IC Statement

IC Note:

This device complies with Industry Canada's licence-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.The digital apparatus complies with Canadian CAN ICES-3(B)/NMB-3(B).

Cet appareil est conforme aux CNR exemptes de licence d'Industrie Canada .Son fonctionnement est soumis aux deux conditions suivantes :

(1) Ce dispositif ne peut causer d'interférences ; et

(2) CCet appareil doit accepter toute interférence, y compris les interférences susceptibles de

provoquer un fonctionnement indésirable de l'appareil. l'appareil numérique du ciem conforme canadien peut - 3 (b) / nmb - 3 (b).

This device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and

compliance with RSS 102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

cet appareil est conforme à l'exemption des limites d'évaluation courante dans la section 2.5 du cnr - 102

et conformité avec rss 102 de l'exposition aux rf, les utilisateurs peuvent obtenir des données canadiennes sur l'exposition aux champs rf et la conformité.

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment.

Cet équipement est conforme aux limites d'exposition aux rayonnements du Canada établies pour un environnement non contrôlé.

RF Exposure Statement

The device has been evaluated to meet general RF exposure requirement. The device can be used

installed and operated with minimum distance 0mm between the radiator and your body.

L'appareil a été évalué pour répondre aux exigences générales d'exposition aux RF.Cet équipement

doit être installé et utilisé avec une distance minimale de 0 mm entre le radiateur et votre corps.

Contact us if you have any questions

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