SENSA.iO

Intelligent Connected
Wireless Sensors
For Hazardous Environments

VALVE POSITION
INSTRUCTION MANUAL

(613-00001) SENSA.VALV

Disclaimer

CONFIDENTIAL

Revisions

Page No.	Context	Version	Date
All	First Release	DRAFT	01/02/2021
All	Second Update	Rev.1.1	21/07/2021
#21, #15	Payload decoding, Grounding	Rev.1.2	16/09/2021
All	Third Update	Rev.2	11/09/2022

Further information
Additional documentation on SENSA.iO LoRaWAN Valve position is available for download free of charge at https://sensa.io/wireless-valve position-transmitter/ or alternatively, scan this code:

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Contents

1 Safety information

These instructions are an important part of the product and must be retained for future reference.

- Installation, commissioning, and maintenance of the product may only be performed by trained specialist personnel who have been authorized by the plant operator accordingly.
- The specialist personnel must have read and understood the manual and must comply with its instructions. For additional information or if specific problems occur that are not discussed in these instructions, contact the manufacturer. The content of these instructions is neither part of nor an amendment to any previous or existing agreement, promise or legal relationship.
- Information and symbols on the product must be observed. These may not be removed and must be fully legible at all times.
- The operating company must strictly observe the applicable national regulations relating to the installation, function testing, repair and maintenance of electrical products.
- Modification of the product is strictly prohibited. Any repair or modification to this device by customer will cause a malfunction of explosion protect function and hazardous situation and the protection provided by the device may be compromised. If you need to repair or modification, please contact the manufacturer or nearest authorized reseller.
- Use of personal protective equipment, or other plant standard safety procedures. must be followed.
- The signal words in these instructions are structured as follows:

⚠ DANGER

The signal word "DANGER" indicates an imminent danger. Failure to observe this information will result in death or severe injury.

⚠ WARNING

The signal word "WARNING" indicates an imminent danger. Failure to observe this information may result in death or severe injury.

⚠ CAUTION

The signal word "CAUTION" indicates an imminent danger. Failure to observe this information may result in minor or moderate injury.

ⓘ NOTE

The signal word "NOTE" indicates useful or important information about the product.
The signal word "NOTE" is not a signal word indicating a danger to personnel. The signal word "NOTE" can also refer to material damage.

1.1 Intended use

Referring to the User Instructions, name-plate and Technical Information brochures, check that the product is suitable for the intended use/application.

- To measure the *valve position* of fluid or gases substances. The device has been designed for use exclusively within the values stated on the sensor plate and within the technical limit values specified on the data sheets.
- The maximum and minimum operating valve position limits must not be exceeded or undershot in normal and default conditions.
- The permissible ambient temperature must not be exceeded
- The housing's degree of protection must be observed during operation

Prior any installations you must take in consideration:

- Flammable materials, substances hazardous to health, extremes of temperature.
- Explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery
- Ensure the sensors have the correct gaskets regard the temperature and that those were designed accordingly the maximal valve position. Make sure the valve position pipe were shutdown before any attempt to remove the sensors.
- Allow time for temperature to normalize after isolation to avoid the danger of burns and consider whether protective clothing is required.
- Before starting work ensure that you have suitable tools and / or consumables available. Use only genuine parts from manufacturer or authorized reseller.
- All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.
- In normal use it is not advised to touch the sensor in the case the pipe is hot or under valve position. If used at the maximum permitted operating conditions the surface temperature of some products may reach hot temperatures.
- This product has to be dumped regarding the local legislation. The product should be recycled in line with local legislation. Special attention should be paid to the battery, see section 1.2.

1.2 Handling of lithium-ion batteries

Lithium batteries do not pose a danger if handled properly. Please note the following points for the proper handling of lithium batteries:

- Do not recharge, short circuit, crush, disassemble, heat above +100°C / +212°F, incinerate, or expose contents to water.
- Keep batteries in non-conductive (i.e. plastic) trays.
- Fire, explosion and burn hazard
- Do not obstruct venting mechanism

1.3 Transportation

Transport of lithium batteries is subject to regulations. i.e.:

- ADR (European Ground Transportation)
- IATA (International Air Transport Association)
- ICAO (International Civil Aviation Organization) and the Regulations concerning the International Carriage of Dangerous Goods by Rail (Intergovernmental Organization for International Carriage by Rail).

It is the responsibility of the shipper to ensure that these regulations are followed.

1.4 Packaging

Observe the following instructions:

- Check the packaging and the delivered items for visible damage.
- Report any claims for damages immediately to the shipping company.
- Verify the specification indicated in the marking plate complies with the specifications written on the order sheet.
- To prevent damage while in transit, leave the device in the original shipping container until it reaches the installation site.

⚠ WARNING

Using damaged or incomplete device may cause risk of explosion in hazardous areas
Do not use damaged or incomplete devices

1.5 Warranty provisions

Using the device in a manner that does not fall within the scope of its intended use, disregarding this manual, using underqualified personnel, or making unauthorized alterations releases the manufacturer from liability for any resulting damage, the protection provided by the device may be compromised. This renders the manufacturer's warranty null and void. Please read the Quick Start Guide before use.

1.6 Storage

When an extended storage period is expected, observed the following instructions:

- A location that is not exposed to rain or water
- A location subject to a minimum of vibration or impact
- Store the device at +25°C (+77°F) , dry, clean and well-ventilated area.
- When storing the device, repack it carefully in original packaging

ⓘ NOTE

When storing or shipping, it’s recommended to unscrew the nut ring to put the instrument in OFF Mode to conserve the battery. For maximum battery life, the storage temperature should not exceed +25°C (+77°F)

1.7 Environmental conditions

Ambient conditions	For use indoors and outdoors
Ambient Temperature	In hazardous areas, observe the maximum permissible ambient temperature corresponding to the temperature class
Permissible ambient temperature for operation	-40 … + 59°C (-40 … +138°F)
Storage Temperature (recommended)	+ 25 °C (+77°F)
Protection rating	IP65/67 in accordance with EN60529
Vibration	20 g, 5…2000 Hz, X/Y/Z
Endurance @ 25°C (+77°F)	>10 million FS cycles
Shock	50g/11ms 100g/6ms
Relative humidity	0 to 100% (Use in wet locations)
IEC 61010-1 Compliance	Meets Pollution Degree 3

1.8 Radio Waves

This product is designated as a certification of construction type as a wireless facility from 800MHz, 900 MHz and 2.4GHz bands low-power data communication systems of the Radio Act. Refer to Regulatory parameter Statements" for detail.

NOTE

- Available frequency bands vary depending on the country.
- Due to the designated certification of construction type, users may be subject to legal punishment in case of disassembling or modifying this product.
- Preventing interference with other wireless stations Industrial, scientific, and medical equipment, as well as local wireless stations (license required) and specific low power wireless stations (license not required) for identifying mobile objects used in factory production lines, use the same frequency band as this product.
- Check that local wireless stations and specific low-power wireless stations are not being used in the vicinity before using this product.
- If this product causes radio interference in a local wireless station, stop the emission of radio waves immediately. For details on how to prevent radio interference, contact our service office.

2 General Product information

2.1 Product description

SENSA.iO is a wide range of Industrial intelligent connected devices that converts any conventional assets into an intelligent connected machine located in hazardous et remote locations. Fully autonomous, this device is battery-operated transmitting value by radio communication over Bluetooth 5.0 or LoRaWAN™ (version 1.0.3), an LPWAN technology (lower power wide area network) to enable long transmission ranges and long battery life.
The transmission of the measured valve position values can be carried out in a customer-specific IIoT infrastructure while performing advanced analytics at edge and alarm threshold triggering. SENSA.iO devices fulfil safety-related requirements of the relevant international standards and regulations for hazardous areas Zone 0/1/2. This device enables accurate valve position measurement for numerous different applications (e.g pipeline, wellhead,).

How does it work?

A state-of-the-art IMU (Inertial Measurement Unit) sensing element composed of accelerometer and Gyroscope is mounted at the end of the process connection, an electronic sensor board process the data, electronic mainboard wake-up at a preset sending interval or interrupt function trigger a wake-up to transmit the measured value to the IIoT platform via a LoRaWAN gateway. The device goes back to deep sleep mode until the next wake-up.

An embedded secure element enables end-to-end security with full asymmetric encryption and authentication.

In addition, the device status and values can also be queried locally via a mobile device using Bluetooth 5 radio communication and dedicated mobile application available on Android and IOs store free-of-charge.

The LoRaWAN™ network operating frequency depends on the operating region. Device have to be ordered with the right frequency plan to comply with the local regulation.

2.2 Product specifications

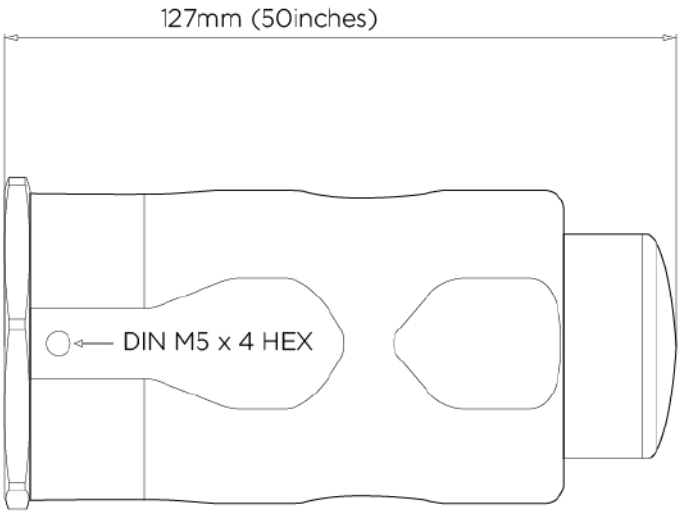
Measuring Principle	Inertial Measurement Unit	
Measuring ranges	0-100%	
Accuracy	3º degree	
Embedded Software	Sensor fusion algorism	
Long term stability	0.5° (0.05% of FS) max	
Ingress Protection	IP 65/67 in accordance with EN60529	
Wetted Part	Stainless Steel 316L	
Housing option	Aluminum powder coated	1.05 kg
	Stainless Steel 316L	1.6 kg
Antenna	Reinforced anti-static polymer ESG protected and UV stabilized	
Bluetooth 5	Android 7.0 or IOS 12 or greater	
LoRaWAN 1.0.3	Class	A
	Range	Up to 10km
	Baud rate range[1]	From 0.3 kbps to 50kbps
	Transmission	Downlink/Uplink
	Adaptative Data rate	Yes
	Spreading factor (SF) / modulation [2]	Refer to section 5.1
	Interference immunity	Very high
	Mode	OTAA
	Update rate (Default & adjustable)	100 trames/day
	Frequency plans	800 and 900 bands
	RF power[3]	Max. 14dBm ERP

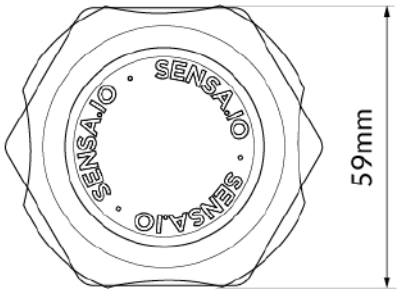
[1] The speed with which the data is transmitted. Dependent upon the bandwidth used and the spreading factor.
[2] Spreading factors (e.g. graded between 7 ... 12) are automatically assigned according to the ambient conditions between the instrument and the gateway. A higher SF increases the sending time and improves the communication range, though the energy consumption of the instrument rises.
[3] Amount of energy transmitted to the antenna for communication. In Europe, the maximum transmission power for the uplink is limited to 25 mW (14 dBm).

NOTE

Duty cycle is the fraction of time in which an end device can occupy a channel. In Europe there is a duty cycle depending on the selected channel of 0.1 % or 1 % per day.

Dimensions





Tool Kit

• Flat Spanner	59 mm
• Allen key	2.5mm
• Max Torque	50Nm

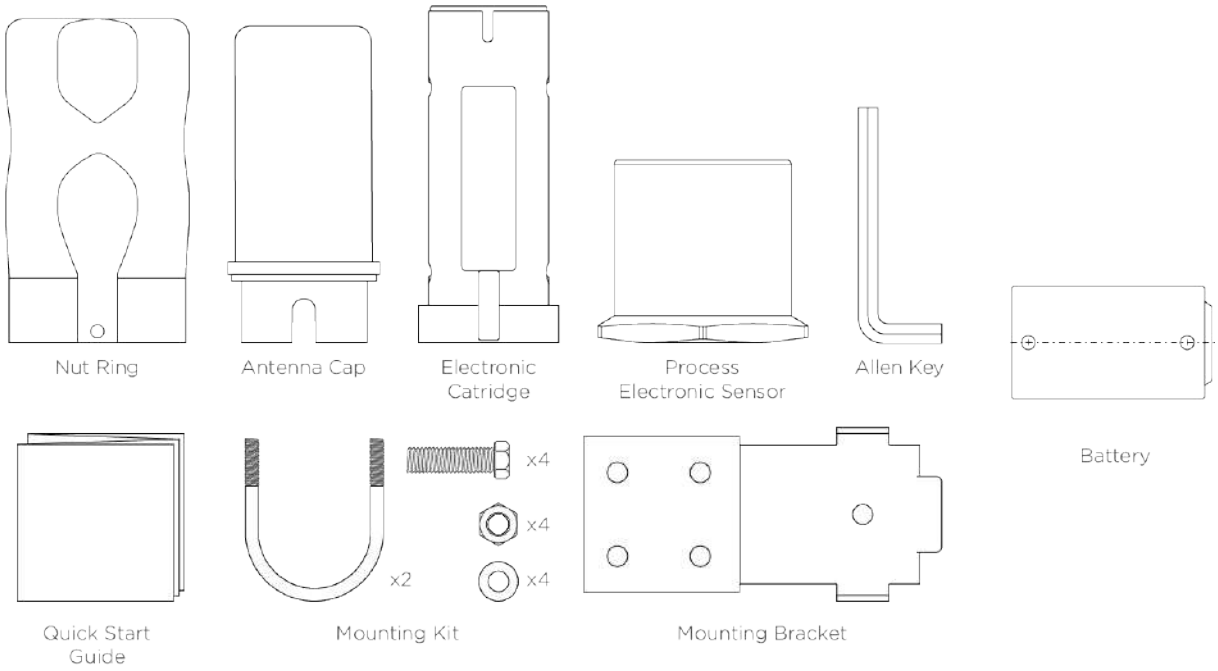
3 Installation of the sensor

NOTE

Prior any installation please carefully read the 'Safety information' in Section 1.

The SENSAIO Sensor includes the following parts:

- 1 Valve position device
- 1 Battery SAFT M20 EX SV
- 1 Quick Start Guide
- 1 Allen screw M5
- 1 Set mounting bracket



NOTE

The quick start guide provides a step-by-step description of how to set the device. This can be found in the box delivered with the device.

Installation

- Mount the bracket on the handwheel of the valve (fig.1), (fig.2),

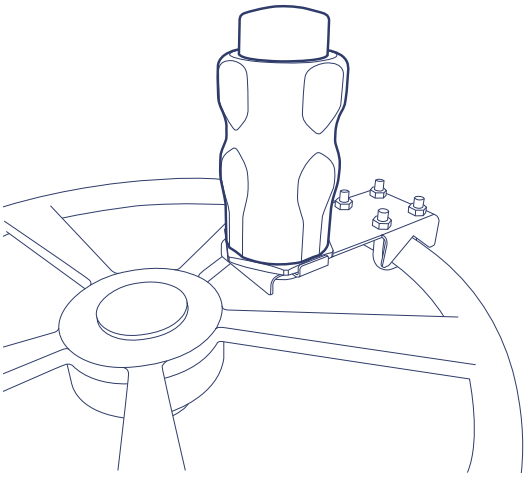


Fig. 1. Horizontal mounting

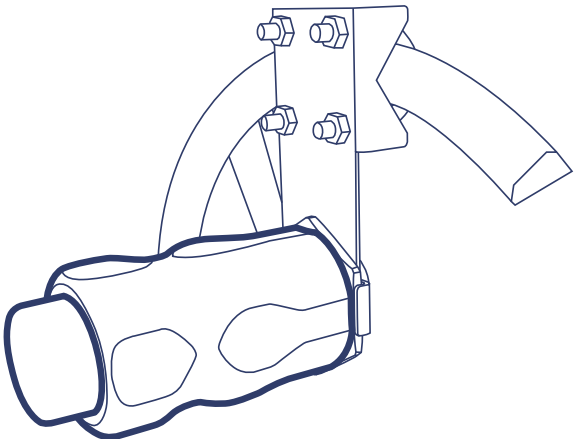
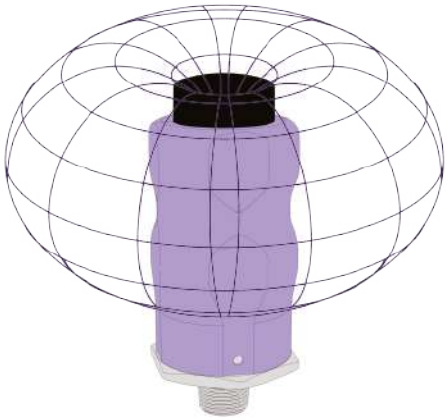


Fig. 2. Vertical mounting

- During installation, ensure no obstructions surrounding the antenna radiation patterns. We recommend enough clearance surrounding the device.



- Position the gateway so that the transmission power of the device is used optimally.

For this, the following recommendations should be observed:

■ Depending on the application, a gateway for indoor or outdoor use should be selected
■ Between the instrument antenna and the gateway, there should be as few barriers as possible (e.g. walls and hills)
■ The radiation characteristics of the antenna must be taken into account when positioning the gateway.
■ If the measuring instruments are located on one level, vertical mounting of the LoRa® antenna on the gateway is recommended.

■ The location should ideally be in the middle of the area to be covered.
■ Ensure that the gateway is mounted at a sufficient height and is not covered by anything in the immediate vicinity.

NOTE
Signal coverage can impact the life of the battery. Make a test survey prior installing the device

3.1 Replacing the battery

NOTE
Only use SAFT M20 EX SV 3 V battery only (Part# 142187103) with this device.

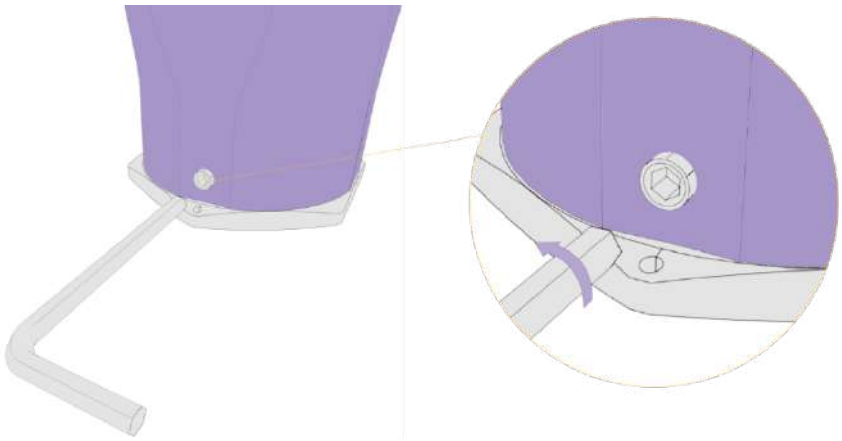
NOTE
Only carry out battery replacement procedure in a dry environment

NOTE
The device can only be powered by the SAFT M20 EX SV battery. The battery can be buy to any SAFT authorized reseller only. https://www.saftbatteries.com/about-us/who-saft/saft-worldwide

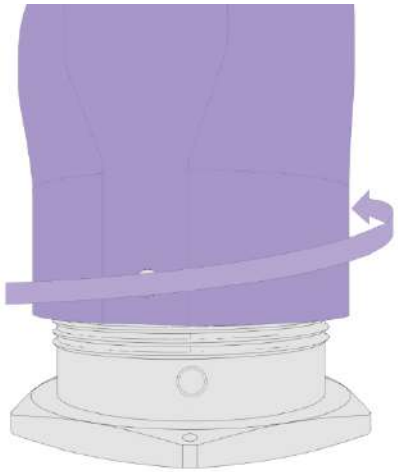
CAUTION
There is a risk of explosion if the battery is replaced by an incorrect type. The battery must be replaced by qualified personnel only.

Procedure

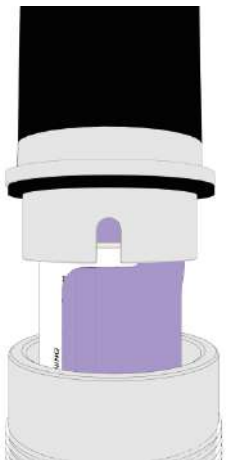
1. Loosen the allen screw on the side of the nut rings with M5 Allen key provided in the box



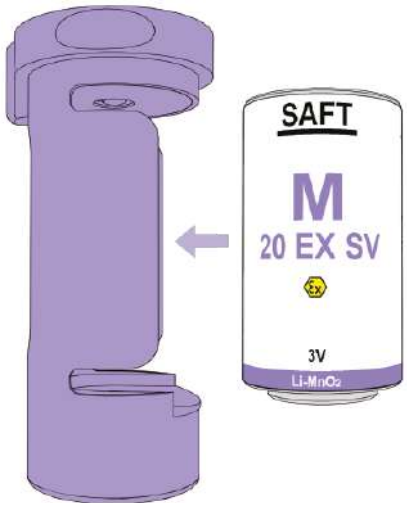
2. Unscrew the nut ring



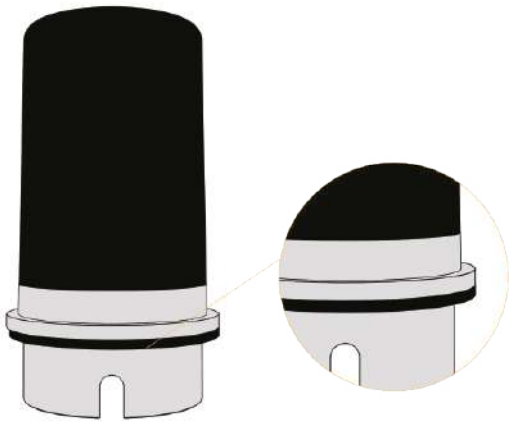
3. Remove the antenna cap carefully without dropping the electronic cartridge.



4. Insert the battery inside the electronic cartridge



5. Ensure the sealing gasket is there and not damage

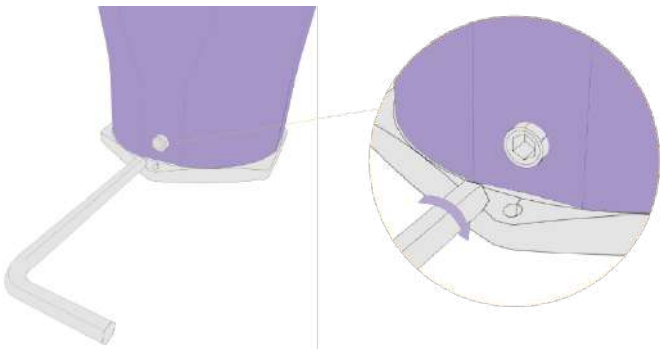


6. Fully tighten the nut ring

NOTE

Make sure nut ring is completely screw without gap otherwise device will not be power on. The device switches automatically and advertise below for 30s before going to LoRaWAN mode.

7. Screw back the allen screw on the side of the nut ring



8. When battery has been replaced and device is power-on, using Sensalink Mobile, go to status/battery and click on “Replace”. Please refer to section 4.1 Sensalink Mobile.

⚠ WARNING

Danger for electronic components through electrostatic discharge (ESD)
Improper handling of electrical components can destroy or damage them.

- When the battery compartment is open, e.g. when changing the battery, sufficient ESD protection must be ensured
- Battery replacement must be performed by trained personnel only
- Battery has to be replaced only when gas atmosphere is not present. We recommend to use portable gas detector when performing this action.

3.2 Sealing procedure

ⓘ NOTE

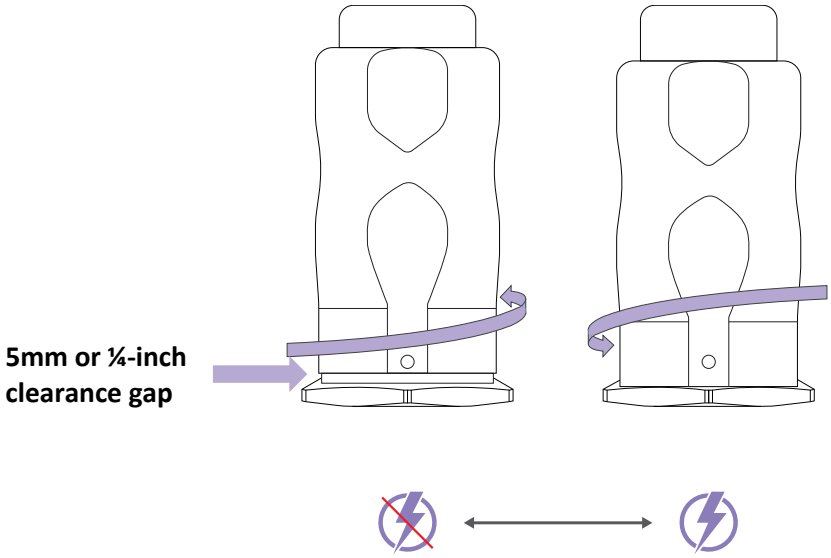
Sealing gasket should be replaced if any damaged is observed and free of moisture with genuine gasket only. Please contact manufacturer or authorized reseller for order.

3.3 Operate the device

ON/OFF mode

When device is delivered it is **POWER OFF**. A 5mm or 1/4-inch clearance will appear between the nut ring and the process connection as illustrate below. See below illustration.

To **POWER ON** the device, simply fully screw the nut ring until there is no more clearance between the nut ring and the process.



NOTE

Device will automatically start advertising in BLE® mode during 30s after **POWER ON**

NOTE

It's mandatory to **POWER OFF** the device during storage, or transportation. If device if **POWER ON** it will automatically try to connect to a LoRaWAN gateway and drag battery down unnecessarily.

BLE® Advertising mode

This mode is only active 30s after **POWER ON** the device. Double tap the antenna cap with your hand firmly as shown in the illustration to wake up the device in BLE® advertising mode. The device will advertise for 30s prior switching to LoRaWAN mode.

BLE® Beacon mode

To active the beacon mode, Beacon mode is always-on mode. Device will keep advertising (1 data per second) and data can be collected using Bluetooth® Gateway. This mode is used for data extraction on site or any application requiring live data pulling. Default sampling rate is set to 1 data sample per second. Refer to section 4.1 Sensalink Mobile to active Beacon Mode.

NOTE

Be aware that beacon mode will drag battery down quickly. (Approximately 90 Days)
BLE® Beacon and advertising mode are taking into account in the battery life calculation.

LoRaWAN® mode

LoRaWAN mode is the main operating mode with full functionality of the LoRa communication. The LoRaWAN® mode is activated automatically when the 30s Bluetooth® advertising mode has stopped. LoRaWAN® parameters can be modified either using SENSALINK® Mobile application or via LoRaWAN® downlink.

NOTE

Device will automatically switch to LoRaWAN mode after 30s BLE® advertising mode end.

NOTE

No data will be send via LoRaWAN® mode when BLE® Beacon mode or advertising mode is active.

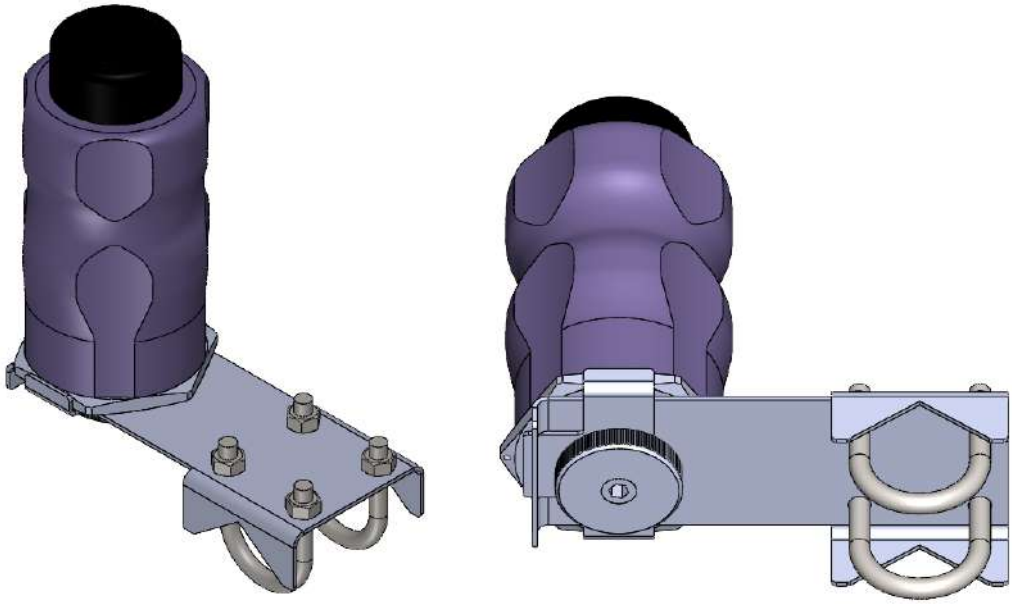
3.4 Battery life

The battery life is displayed as a percentage value vue LoRaWAN® transmitted or locally by Bluetooth® using SENSALINK® mobile application. The calculation of the approximate value is based on an internal algorithm measuring each processing time with compensated in temperature to -10Deg, 10DegC, 30DegC and 50DegC. Since the battery life is influenced by many factors, this value is only an approximation. At value below 25% a battery change is recommended. If the battery is completely discharged, no more value is transmitted via the radio interface.

Here below an estimated battery life calculation for Sensa.io Valve position device:

Tests conditions	SensaIO Sensor	LoRa TX periodicity	SensaIO lifetime in SF7	SensaIO lifetime in SF12	*Disclaimer*
Product storage before use: 1 year maximum Measurements have been done on firmware version 1.1 at **0°C** in May 2021	VALVE POSITION	288 LoRa TX per day (every 5')	8 years and 262 days	1 year and 147 days	*Due to the internal chemistry of the battery, the autonomy results beyond 7 years should be considered as highly approximate.*
		144 LoRa TX per day (every 10')	9 years and 311 days	2 years and 181 days	
		96 LoRa TX per day (every 15')	10 years and 109 days	3 years and 136 days	
		72 LoRa TX per day (every 20')	10 years and 197 days	4 years and 33 days	
		48 LoRa TX per day (every 30')	10 years and 288 days	5 years and 72 days	
		32 LoRa TX per day (every 45')	10 years and 351 days	6 years and 125 days	
		24 LoRa TX per day (every 60')	11 years and 19 days	7 years and 46 days	
		16 LoRa TX per day (every 90')	11 years and 52 days	8 years and 48 days	
		12 LoRa TX per day (every 120')	11 years and 69 days	8 years and 273 days	
Tests conditions	**SensaIO Sensor**	**LoRa TX periodicity**	**SensaIO lifetime in SF7**	**SensaIO lifetime in SF12**	*Disclaimer*
Product storage before use: 1 year maximum Measurements have been done on firmware version 1.1 at **25°C** in May 2021	VALVE POSITION	288 LoRa TX per day (every 5')	6 years and 352 days	1 year and 127 days	*Due to the internal chemistry of the battery, the autonomy results beyond 7 years should be considered as highly approximate.*
		144 LoRa TX per day (every 10')	7 years and 245 days	2 years and 120 days	
		96 LoRa TX per day (every 15')	7 years and 343 days	3 years and 27 days	
		72 LoRa TX per day (every 20')	8 years and 29 days	3 years and 240 days	
		48 LoRa TX per day (every 30')	8 years and 83 days	4 years and 190 days	
		32 LoRa TX per day (every 45')	8 years and 119 days	5 years and 131 days	
		24 LoRa TX per day (every 60')	8 years and 138 days	5 years and 332 days	
		16 LoRa TX per day (every 90')	8 years and 157 days	6 years and 214 days	
		12 LoRa TX per day (every 120')	8 years and 167 days	6 years and 359 days	

3.5 Installation of Valve position Sensor



⚠ WARNING

Ensure the suitability of the valve position measuring instrument and its media resistance within the application through proper choice of materials. Non-observance can result in serious injury and/or damage to property and the environment.

⚠ CAUTION

Damage to the instrument

In order to prevent any damage to the instrument, follow below recommendation:

- The device must not be subjected to any mechanical loading
- Make sure the threaded connections are clean and undamaged
- The device should be installed in such a way that process-related electrostatic charges can be excluded.
- Ensure the antenna cap is not damaged
- To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or anti-static cloth.
- When cleaning the device, make sure that the cleaning agent used does not corrode the housing surface and the gaskets.

3.6 Grounding

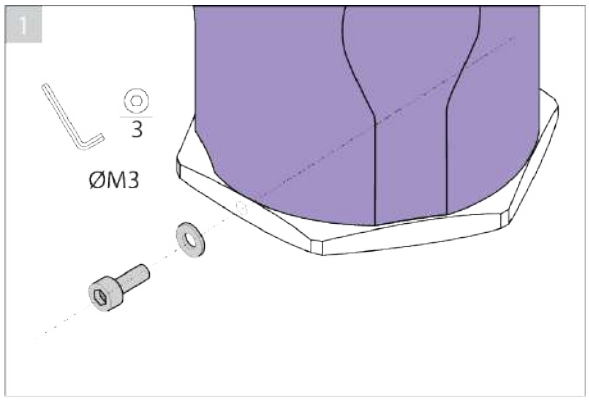
NOTE

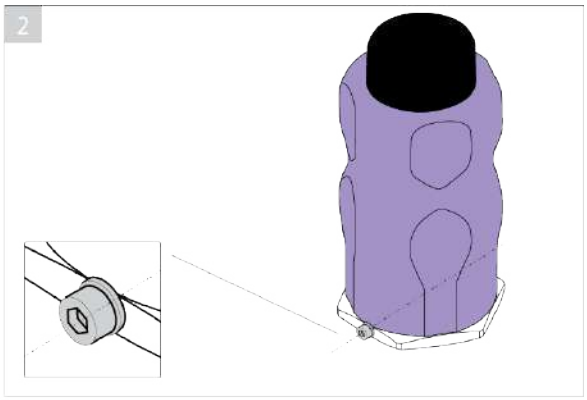
Functional grounding terminal

This symbol identifies the terminal which is intended for connection to ground to mitigate electromagnetic interference (EMI). Device should be grounded or earthed in accordance with national and local electrical codes.

It is necessary to ensure conductivity (Resistance less than 0.2MΩ) between the device and equipment. Grounding impedance equal or less of 5Ω is recommended. In order to ensure grounding through the process connection while maintaining the seal can be done in several ways.

If continuity between the ground terminal and the ground electrode cannot be ensured, use the following cables and a round crimp terminal for M4/M3 grounding terminal with insulation sleeve as per Figure below.





NOTE

- While using Teflon tape properly tighten and measuring the resistance afterwards
- Insulated Cables for industrial equipment such as;
  - 600V polyvinyl chloride insulated wires AWG 14 to 13 (2 to 2.6 mm^2)
  - In each case, it is recommended to ensure that the connection is made by measuring the ground resistance.

3.7 Serial Number

The Device EUI and the Device Address are unique numbers to the piece of equipment it is attached to. This cannot be changed and will remain with the product for its lifetime.

4 App and Device

4.1 Sensalink Mobile

Sensa.io device has no display. Though, we are providing free-of-charge a mobile application named Sensalink that will help you to visualize data and configure the device. Sensalink Mobile is available on both App Store and Google Play.

NOTE

Only user with granted access from your organization administrator can connect to the device using Sensalink Mobile. Please ask your manager to grant you an access that consists of an email and a password. Please use the following QR code to download the last version of Sensalink Mobile.

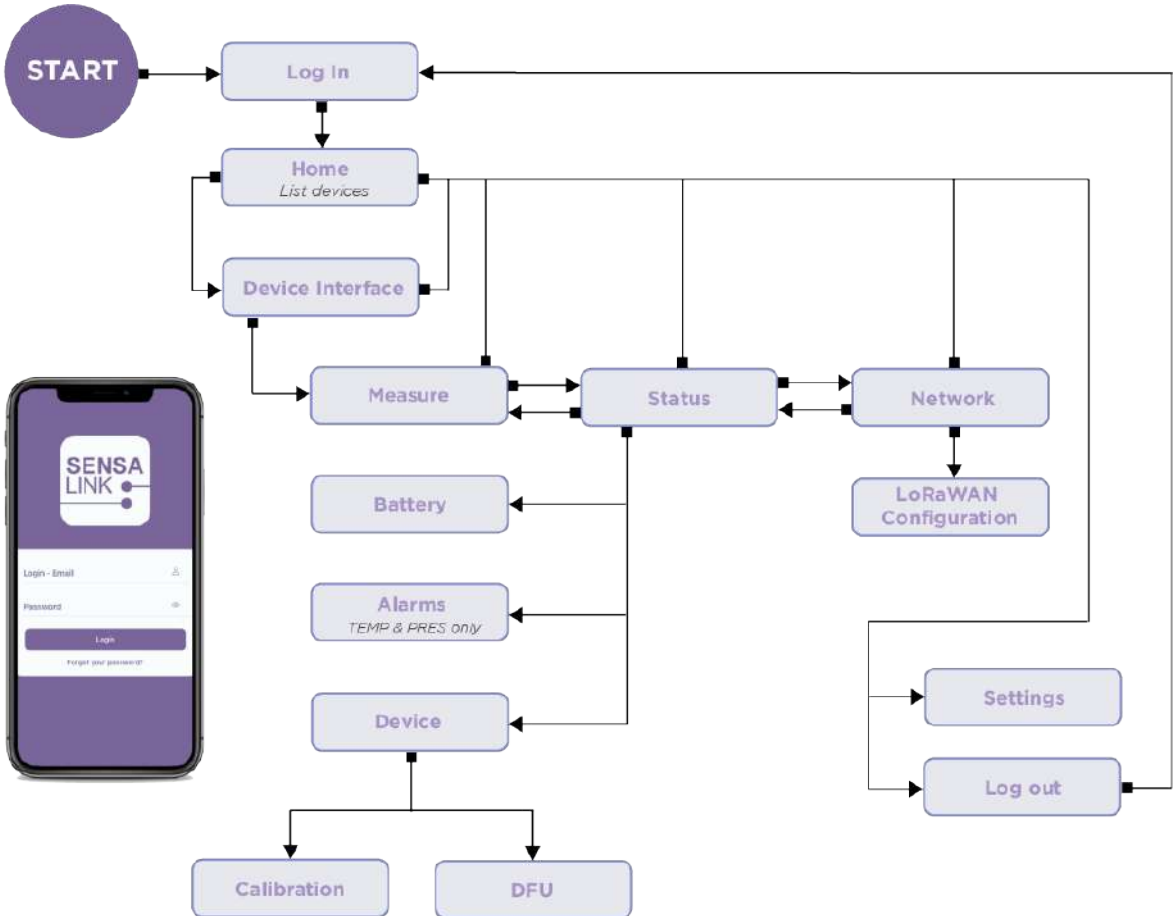
NOTE

Only user with granted access and right can connect to the device using Sensalink Mobile. Please ask the administrator of your organization ID to get an access. User creation and user right can be managed using Sensalink Web. Please refer to section 4.2 Sensalink Web.

NOTE

The version used for Bluetooth 5.0 in that case, it is the user's responsibility to have a version of OS and hardware compatible with Bluetooth 5.0.

Sensalink Mobile App Tree



Before to start:

- Make sure the last version of the application is downloaded from the App Store or Google Play of your phone.
- Turn on Bluetooth and the location features.
- Launch the SENSALINK Mobile app.

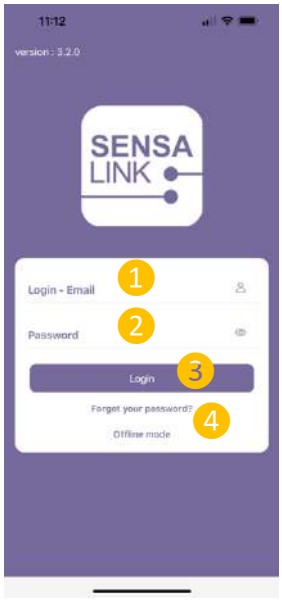
NOTE

Sensalink is only compatible with Android 7.0 or IOS 12 or greater.

NOTE

Internet connectivity is mandatory for the first connection of Sensalink with the device in order to activate the warranty.

Log-in and first steps:



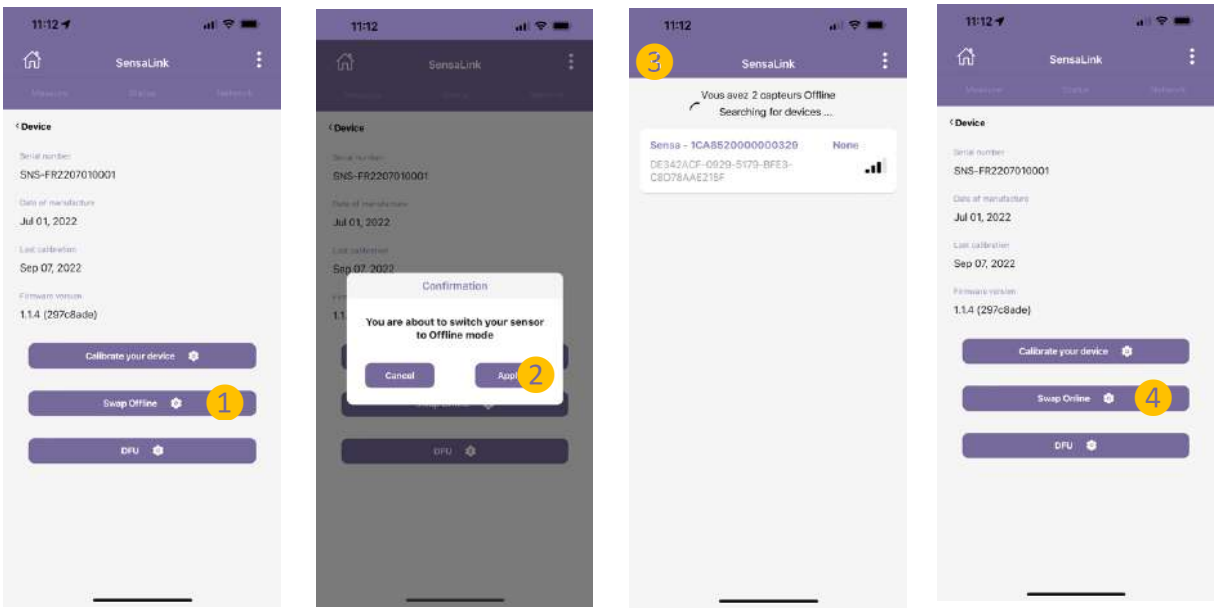
- Enter your **« Login-Email »** ❶ and **« password »** ❷ (if you have no login and password, contact the administrator of your organization ID).
- Click **« Login »** ❸
- Click on **« Forget your password »** ❹ to reset your password
- Click on **« Offline Mode »** if you have no internet connectivity on your smartphone and want to access your device settings. Please refer to section Off line mode for further information.

ⓘ NOTE

The device is activated once you connected to it from the Sensalink application. Ensure you have accepted Bluetooth Pairing request to do it.

Off-Line mode:

Offline mode has been developed in order to allow specific user and sensalink application to access the device settings without needs of internet. Please note user must have the right from Sensalink organization admin.



- Go to status/device and click **« Swap Offline »** ❶, then click **« Apply »** ❷
- Click « home » ❸ to display the list of devices in Offline mode.
- Click **« Swap Online »** ❹ on device menu, to put back device to Online Mode.

ⓘ NOTE

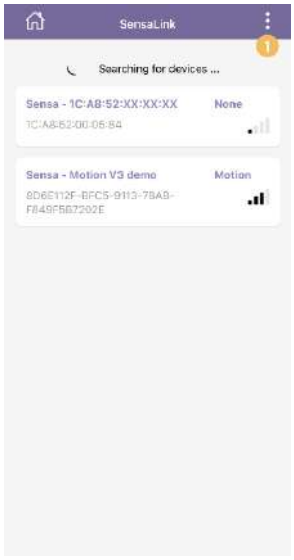
Internet connection is mandatory on the smartphone to swap online/offline.

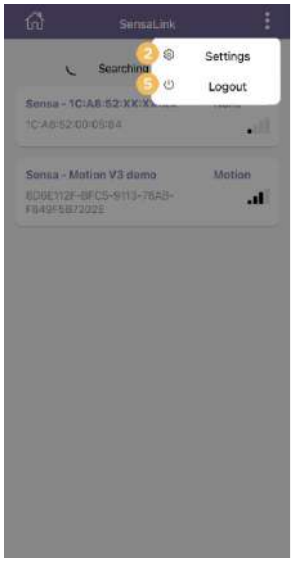
ⓘ NOTE

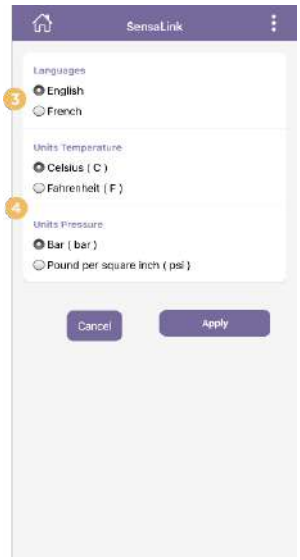
Please refer to section 4.2 Sensalink Web – User right to grant acces on Sensalink Mobile

Home menu:

If you click on the expanded menu icon in the upper right corner ❶, you open **Settings** ❷ where you can change language ❸ or units of measurement ❹. This menu is still available after connection to the device. To log out, just click on the same menu and choose **Logout** ❺.



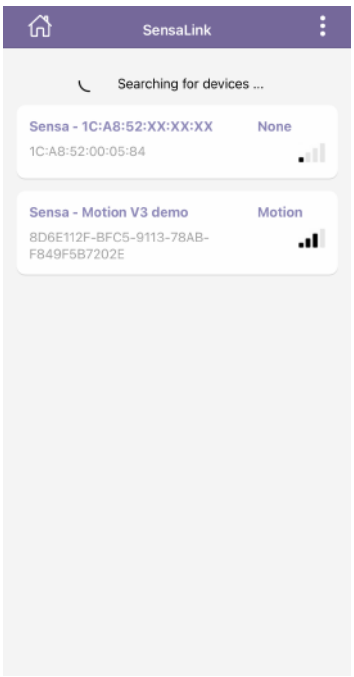




Connect the device:

- After you configure your settings in the application, click side to return to home menu. A list of devices will be refresh automatically. It may take few second before you can find your device on the list.

If your device is not shown in the list, ensure the device is power on. Please refer to section 3.3 Operate the device.
Check BLE and location (GPS) on your smartphone if active or your smartphone fits with the compatibility.



- Click on the device name listed to connect.
- Confirm the Bluetooth Pairing request and Current Location request from the pop-up.
- When connected to the device, measure page will display live data.

If you cannot access the device, it may due to :

- The device is too far
- Your mobile phone is not compatible
- Your mobile phone is not connected to Internet
- The device is damaged
- The battery is too low
- Someone is already connected to the device
- Device is in sleep mode. Double tap to wake it up.

Measure menu

- Measure tab is the device interface menu displaying live device data. From here, you have an access to the main information about your device: **Value** ❷, **Process Var** ❸ and **Graph** ❹.

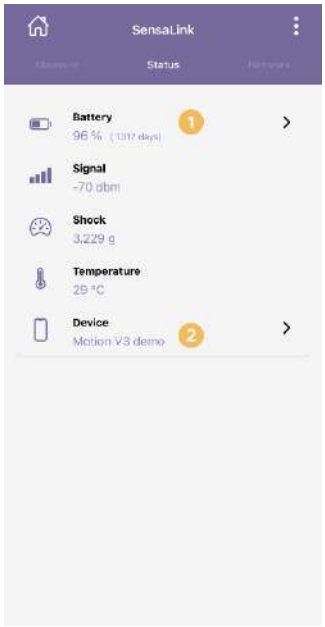
- Change your device name and add a photo by clicking on the **Information tab** ❶. Click on the existing device name to change it (❺). To change your device photo, click on the photo pictogram of the Device Update menu(❻).

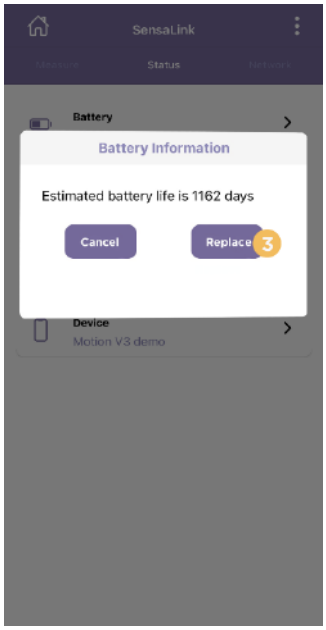
NOTE

Device information and unit settings will be available on Sensalink web hence if you change, information will be recovered.

Status menu

Status menu gives you access to the **Signal**, **Shock** and **Device Temperature** data for quality purpose. **Battery**, and **Device** are expanded menus, click on it to get access to settings as described below.





- To check out estimated battery life, go to **Battery** ❶
- If you need to replace the battery, go to Battery and click *Replace* ❸ in order to reset the battery life calculation. Battery life calculation is based on in-house algorithm.

NOTE

When replacing the battery, strictly follow the safety rules. Consult the section 3.1 Replacing the battery.

Device

Device menu contains the next information:

- Serial number
- Date of manufacture
- Last calibration
- Firmware version

To calibrate your device or to do the Device Firmware Update, click on **Device** ❷ and follow the instructions in the Device section below.

NOTE

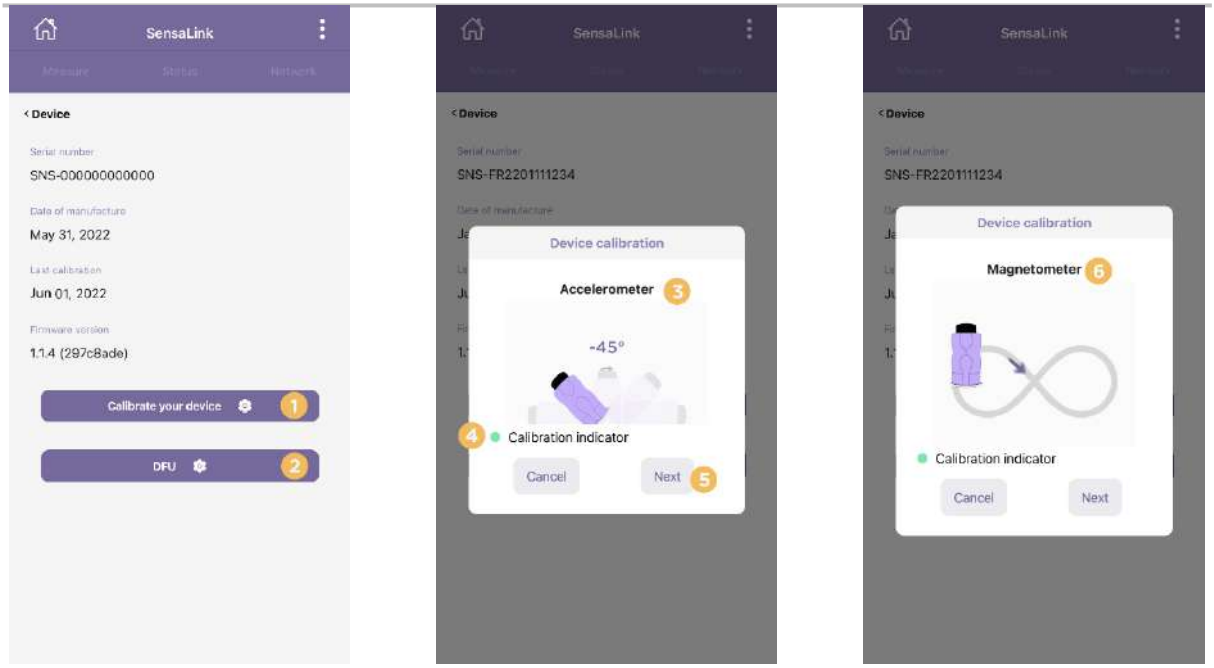
Device Firmware Update and device Calibration are only available for authorized person. Please contact your Sensalink Organization Admin.

NOTE

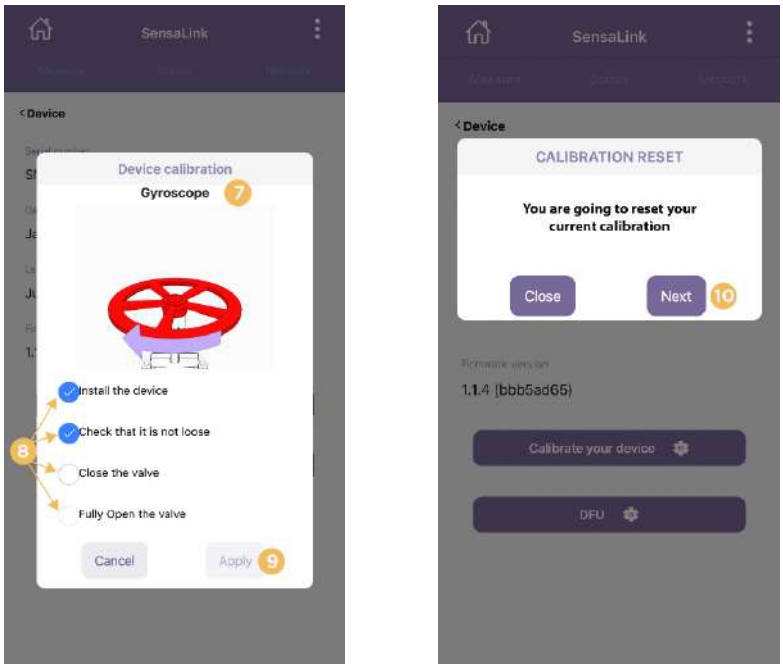
Valve position device do not have alarm menu. The device will automatically wake-up when valve is moving then will send LoRaWAN information. When device is asleep LoRaWAN wake will happens very 24hrs.

If you are granted person to access the calibration and firmware update, follow the next steps to calibrate your device:

- Click ***Calibrate your device*** ❶ button to access the calibration tab
- Take the device in your hand. Calibrate the **Accelerometer** ❸ according to the animated guide keeping the device in your hand. If the **Calibration indicator** ❹ is green, you can go to the next stage of calibration (5)
- Calibrate the **Magnetometer 6** keeping your device in your hand and following the animated instruction. Do till the device indicator becomes green same as with Accelerometer.

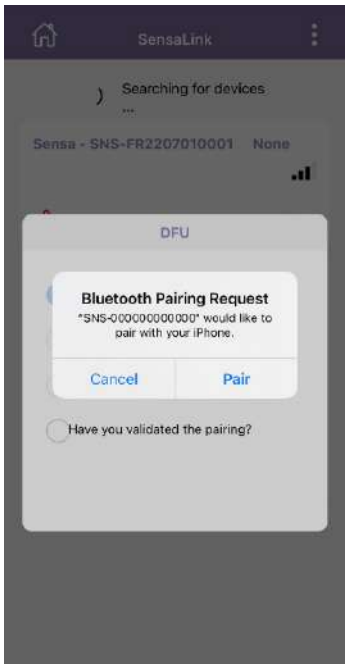


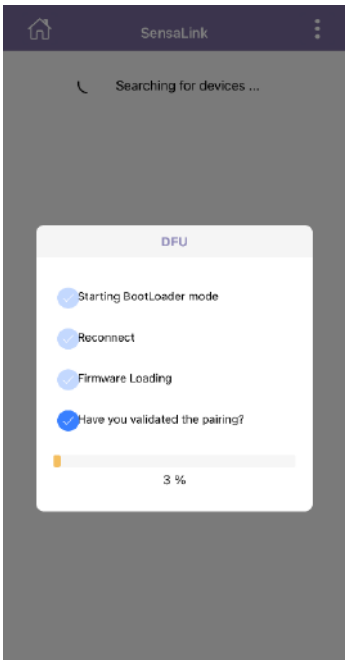
- Calibrate **the Gyroscope 7** using the targeting valve. To do this, follow the instructions of the next stage of calibration till all the circles will be ticked (8).
- Click **Apply** 9 to save your changes
- If you recalibrate your device, you will see the Calibration Reset pop-up window. Click **Next** 10 to continue and follow the aforementioned instructions



If you are granted person to access the firmware update:

- Click on the **DFU** button ❷
- Confirm Bluetooth Pairing request
- Wait till the end of update





NOTE

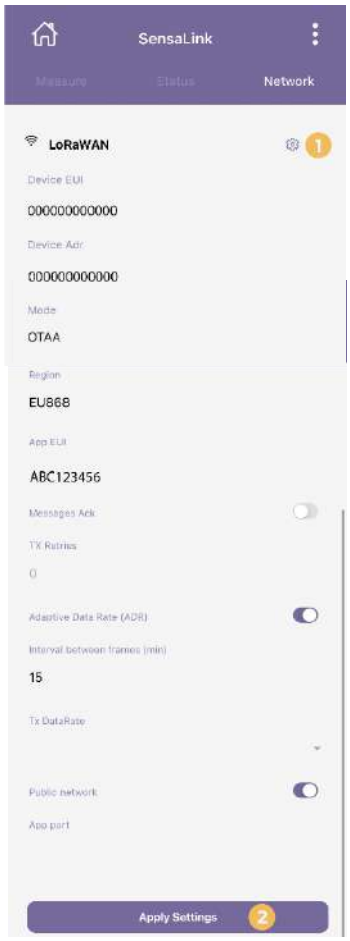
Please note that alarm periodicity will impact the battery life. Such parameter is taking into account in the battery life calculation and we invite you to refer to battery menu ensure battery life consumption is acceptable for your application.

NOTE

Internet connectivity is mandatory for DFU.

Network

Network menu contains data/settings about your LoRaWAN network. You can modify settings by enabling or disabling the options:



- Click the **Parameters** icon ❶
- Modify the options
- Scroll down to save and click **Apply Settings** ❷

LoRaWAN Specific Glossary for better LoRaWAN settings understanding:

DevEUI (Extended Unique Identifier) is a 64-bit unique identification key assigned to an end device by the manufacturer. This value is linked to the hardware and it cannot be modified.

ADR (Adaptive Data Rate) this is the optimization feature of the LoRaWAN allowing to use an optimize data rate.

AppEUI is the unique ID of the Application server. This is the destination of the messages sent by the nodes. This can be change on Network settings.

ACK (Automatically Acknowledged) – this is the mode that allows to consider a message to be successfully delivered immediately after it is sent. It will consume more battery.

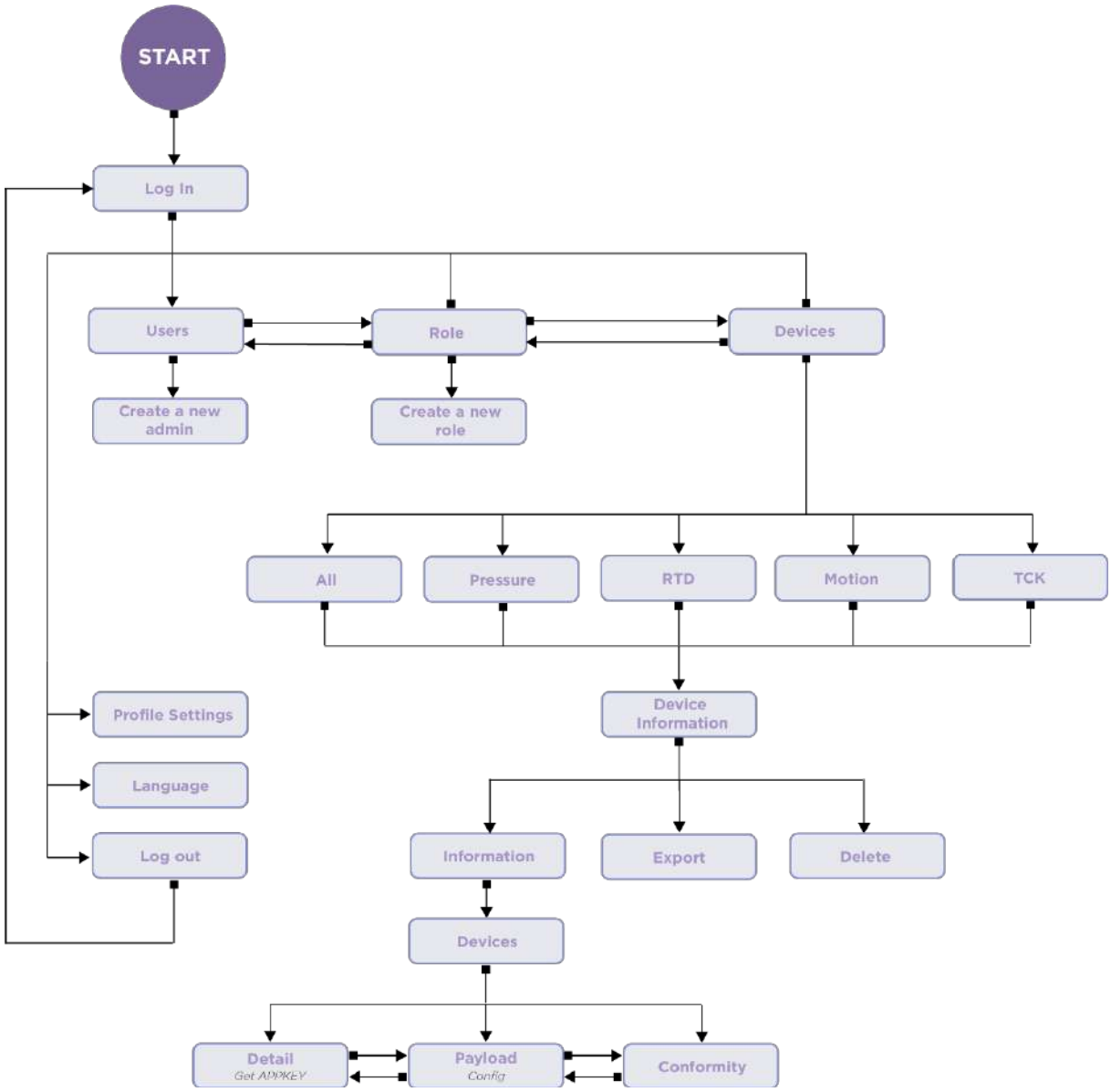
TX Retries – these are attempts of the device to connect to an AP but with too weak signal.

TX Data Rate represents rate at which data packets being transmitted

4.2 Sensalink Web

Sensalink Web is an online platform to manage access to user management, device activation and document management.

Sensalink Web Tree

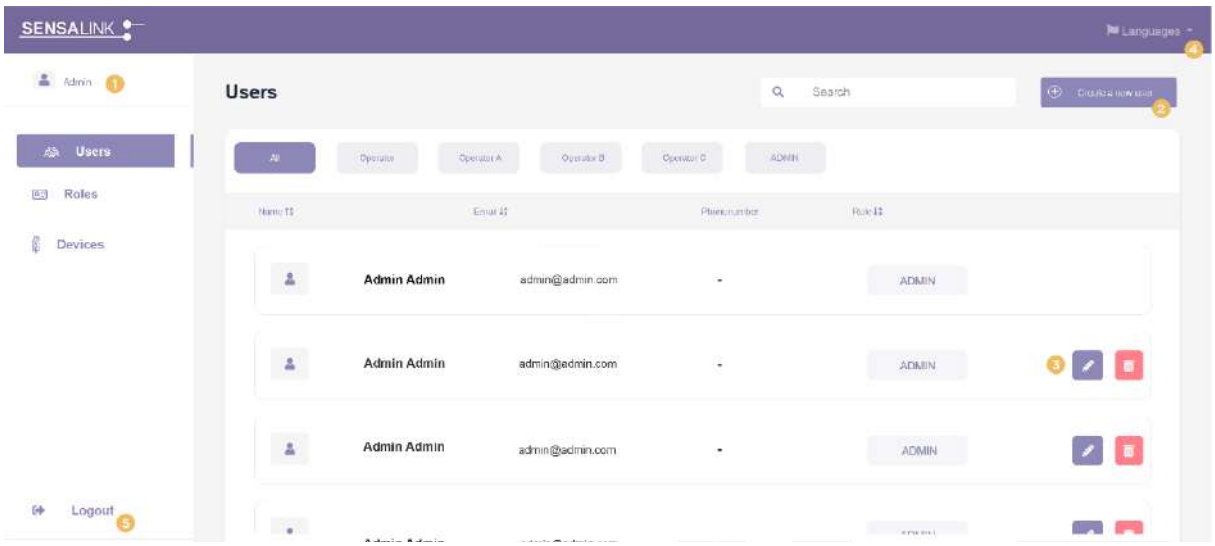


Login

- Go to the https://sensalink.cloud
- Enter your email and password you have created
- You can download Sensalink Mobile by scanning the QR code to interact directly with the device.

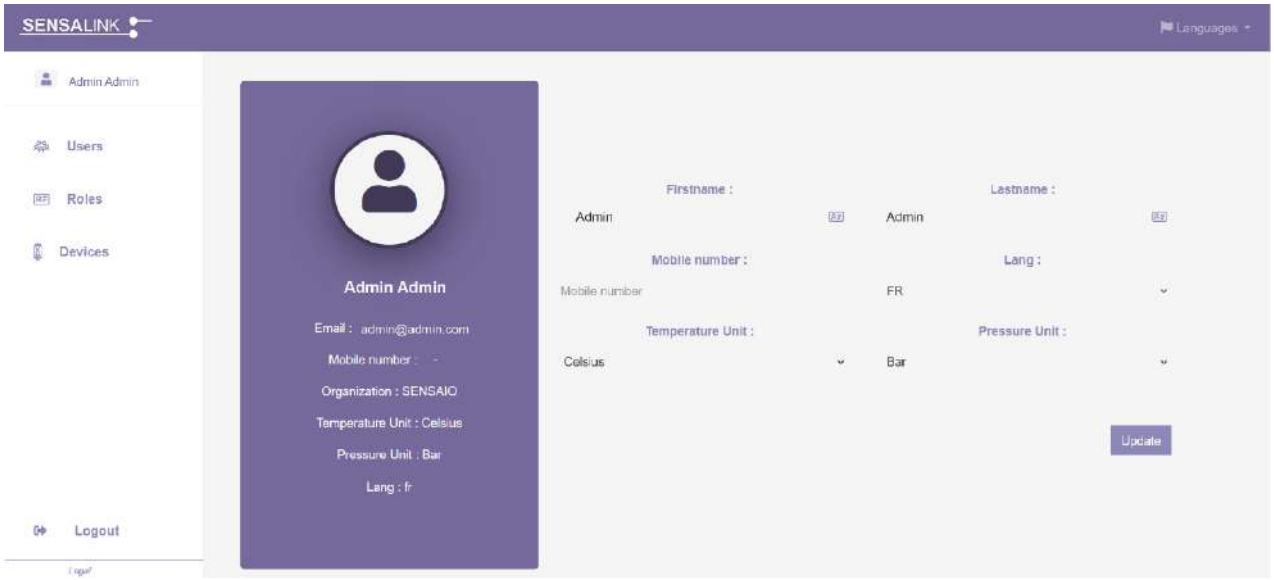
Users

After successful log-in the first page you will see is user menu, user rights menu and devices. From here, you can manage your users, edit information about your profile and information about other users, affiliated to you. You have also access to Language settings, Your own profile Settings and Logout button from every page of the platform.
You may consider creating new Roles prior adding new users.

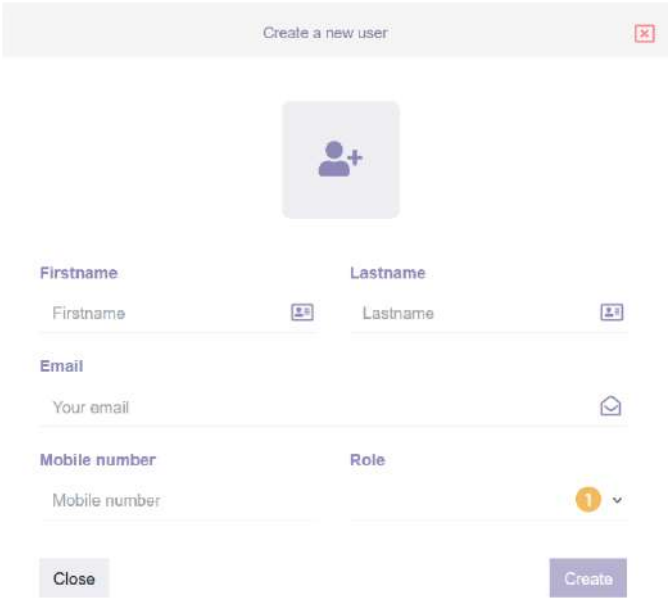


- To edit your own profile, click on your username ❶ on upper left corner
- To add a new user, click on **Create a new user** ❷
- To edit an existing user, click on edit icon on the user table ❸
- To switch languages, click on the **Languages** ❹ menu on the upper right corner.
- To logout, click on **Logout** button ❺ on lower left corner.

After clicking on your name in the right menu, you can modify information about yourself:

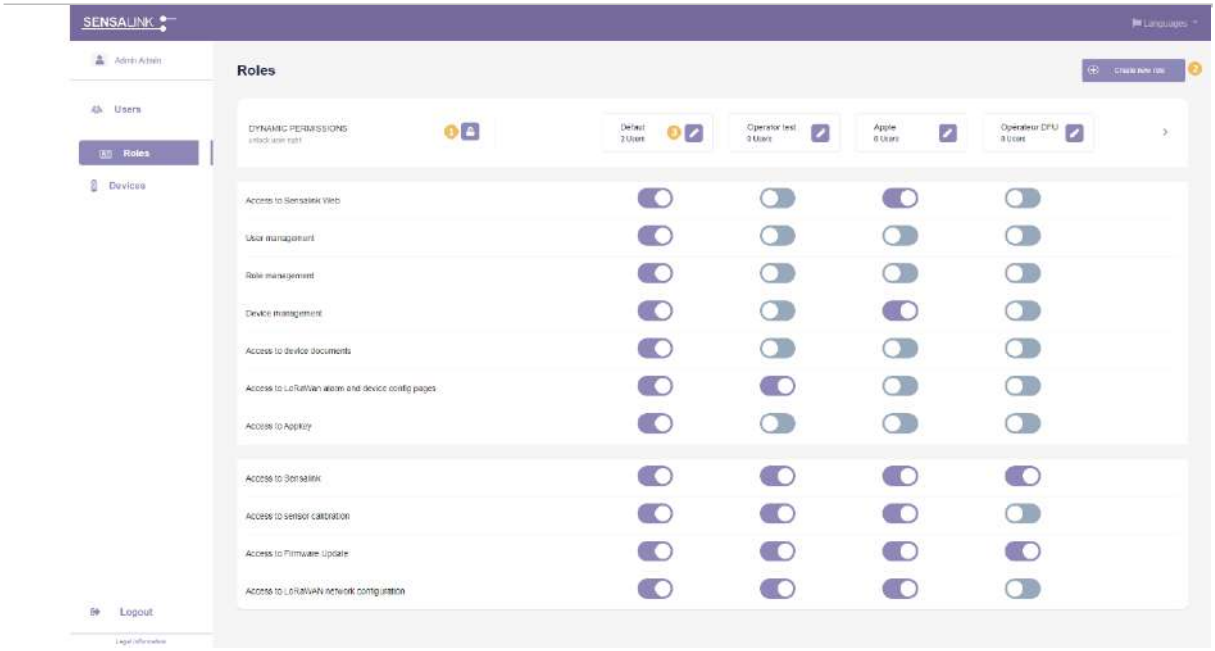


If you add a new user, ensure you have created an attributable role to them in the menu **Roles** (see the next chapter). The same window you will see while updating information about the existing user. Choose the role in the drop down list ❶.



Roles

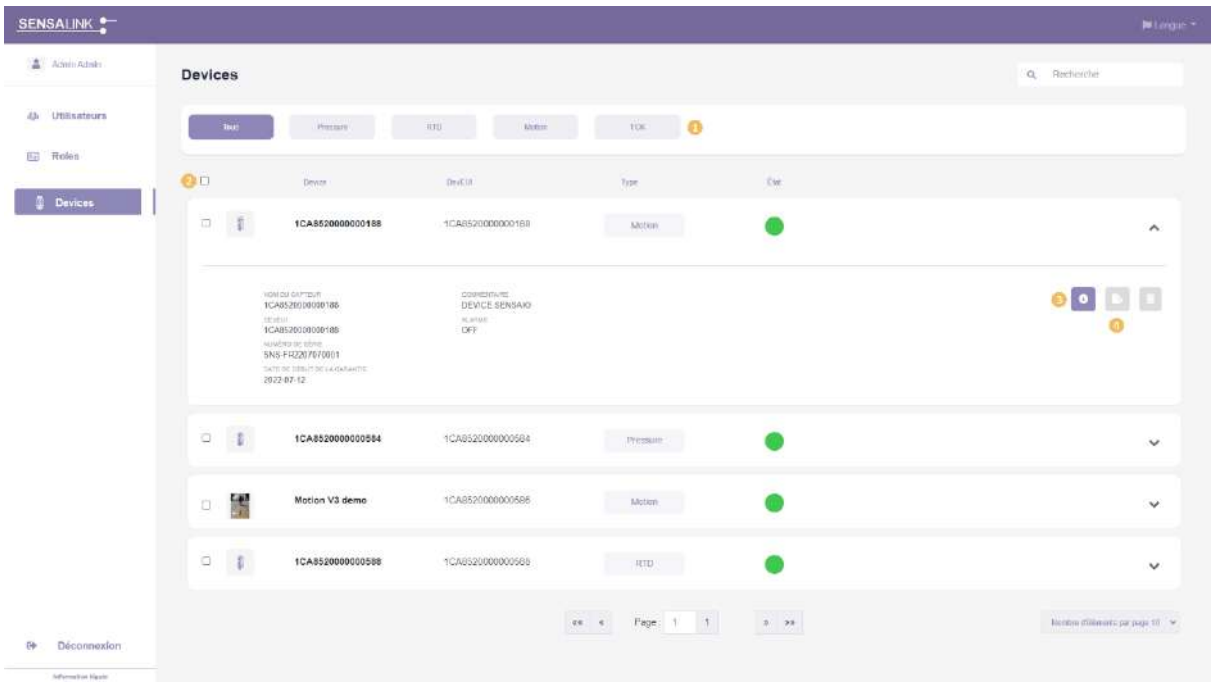
From here, you can manage role with rights of your different admin, with the ability to edit and create new ones easily.



- To enable or disable **role editing**, click on (❶).
- To **create a new role**, click on create new role (❷).
- To change information about a role, go to the role list and click on the **Edit** (❸) button of role you want change information about.

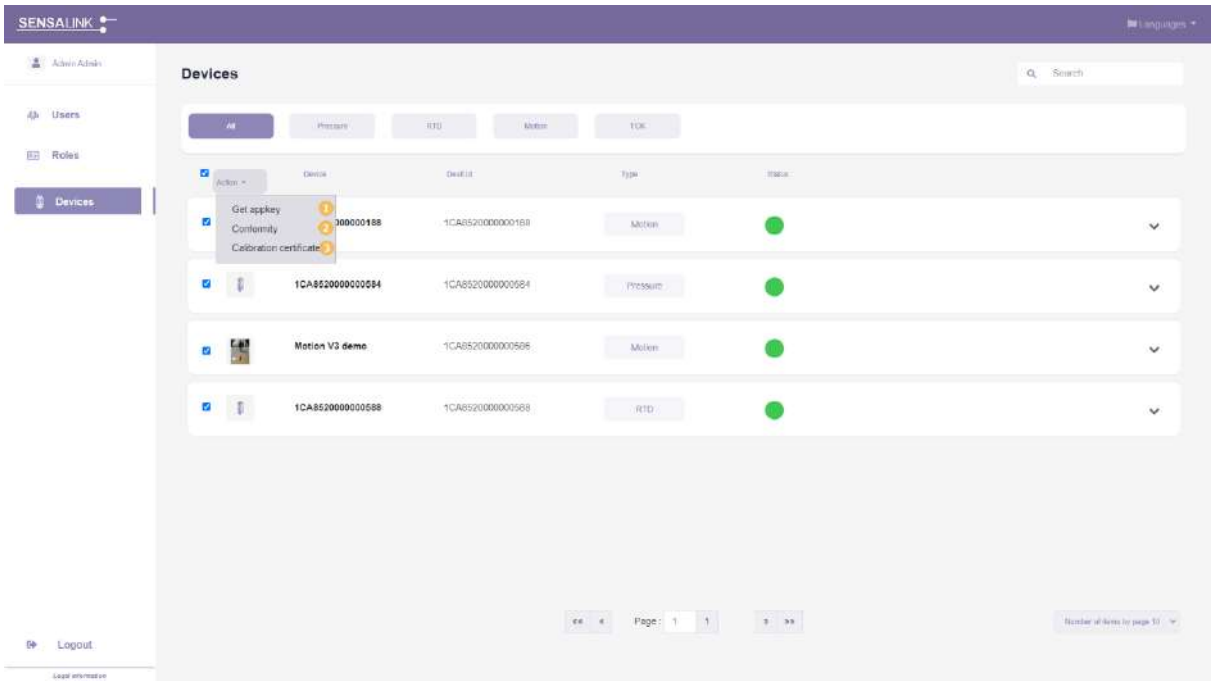
Devices

From here, you can see and manage all your sensors and find their information, Name, Type, Conformity, Calibration.

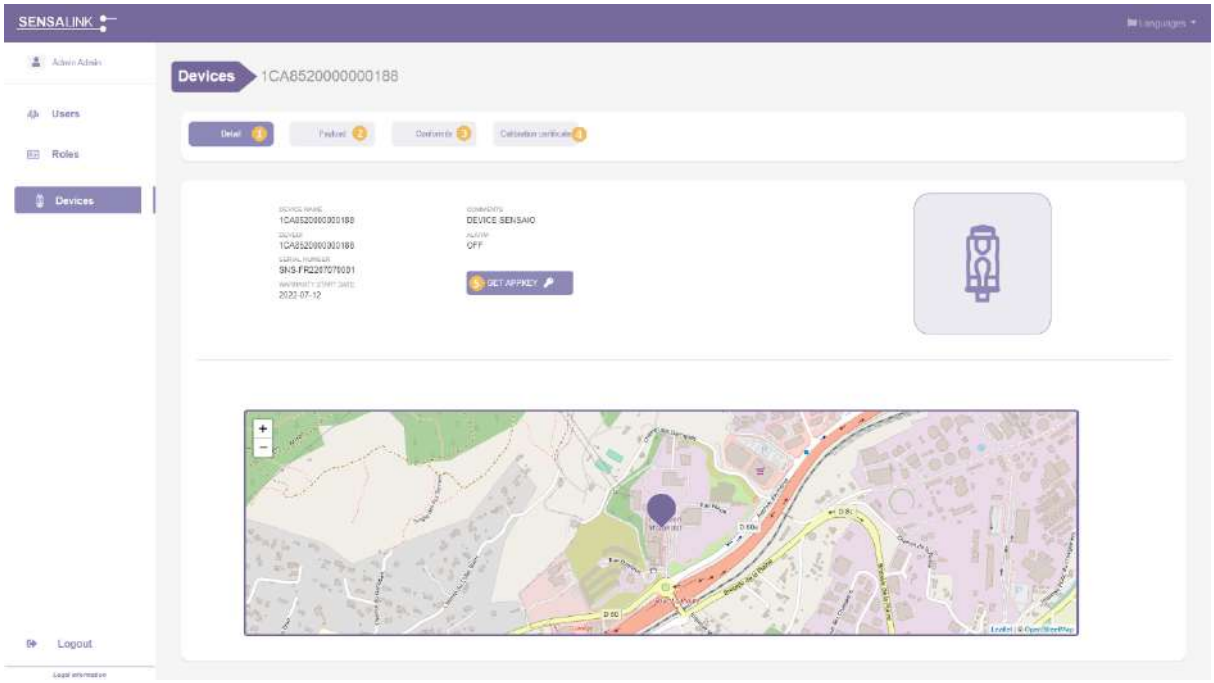


- To **filter** sensor types, click on the different types (❶).
- To **select/deselect** all or a single sensor, click on (❷).

- To view **sensor details**, click on (❸).
- To **export** details, click on (❺).



- To get of all the selected sensors, the **APPKEYS** click on (❶), the **Conformity** click on (❷) and the **Calibration certificate** click on (❸).



- To have the details of the selected sensor, click on (❶), on this page you can also get the **APPKEY** by clicking on (❺).
- To get the **payload** and change location click on (❷).
- To see the **Conformity**, click on (❸) and the **Calibration certificate**, click on (❹).

5 LoRawan Payload

NOTE

The SENSA.iO device uses the class A version of the LoRaWAN communication, following the v1.0.3 specification. All missing information here is assumed to follow the reference document: https://lora-alliance.org/wp-content/uploads/2020/11/lorawan1.0.3.pdf

5.1 LoRaWAN Regional parameters

The reference document used is available here : https://lora-alliance.org/wp-content/uploads/2021/05/RP002-1.0.3-FINAL-1.pdf

The SENSA.iO device follows all the regulations described in the above reference.

The SENSA.iO device is compliant with the regional parameters for the following regions in the table below, with the following DataRate set adaptations. The LoRaWAN regions not addressed in this table cannot be used by the SENSA.iO device because they are out of the antenna capability range.

Region	Available DataRate
EU863-870	[SF12/125kHz;SF7/125kHz]
US902-928	[SF10/125kHz;SF8/500kHz]
AU915-928	[SF12/125kHz;SF8/500kHz]
AS923	[SF12/125kHz;SF7/125kHz]
KR920-923	[SF12/125kHz;SF7/125kHz]
IN865-867	[SF12/125kHz;SF7/125kHz]
RU864-870	[SF12/125kHz;SF7/125kHz]

5.2 Data formatting

NOTE

For LoRaWAN regional limitations reasons, the uplink payload size might be reduced to 11 bytes. This could happen for US915 in DR0 (SF10). For the valve position sensor data uplink, this would imply the temperature would be missing.

Data Uplink

Byte	Bit							
	7	6	5	4	3	2	1	0
0	8-bit Sensor Type (see table below for sensor type encoding)							
1	7-bit Battery Level (6-bit LSB)						2-bit Msg Type (seebelow)	
2	3-bitHwVersion(1-bit LSB)	3-bit FwMajorVersion			3-bit FwMinorVersion			7-bit Battery Level (1-bit MSB)
3	9-bit DeviceTemp (6-bit LSB)						3-bit HwVersion (2-bitMSB)	
4	13-bit DeviceShock (5-bit LSB)						9-bit DeviceTemp (3-bit MSB)	
5	13-bit DeviceShock (8-bit MSB)							
6	Reserved	Swap Failure Flag	Sensor warning Flag	Accelerometer Failure Flag	Memory Failure Flag	Sensor Failure Flag	LoRaWAN Failure Flag	Secure Failure Flag
Specific for valve position sensor								
7	32-bit Valve position value (Pa, float LSB)							
8								
9								
10								
11	32-bit Temperature value (K, float LSB)							
12								
13								
14								
Specific for temperature sensors (TCK and RTD)								
7	32-bit Temperature value (Pa, float LSB)							
8								
9								
10								
Specific for motion sensor								
7	8-bit Valve opening percentage ([0:100] %, unsigned integer)							
8	8-bit Valve opening time (s, unsigned integer)							

In byte 0, the *Sensor Type* is encoded on 8 bits, and can be one of the following:

- 0x00: Test *(internal)*
- 0x01: Valve position sensor
- 0x02: Temperature RTD sensor
- 0x03: Motion sensor
- 0x04: Temperature TCK sensor
- 0x05: Gas sensor *(ongoing)*
- 0x06: Vibration sensor *(ongoing)*
- 0x07: Loadcell sensor *(ongoing)*
- 0x08: Differential valve position sensor *(ongoing)*

In byte 1, the *Msg Type* is encoded on 2 bits, and can be one of the following:

- 0x0: Test
- 0x1: Periodic
- 0x2: Alert
- 0x3: Log

Log message type description

They are sent in response of a log request downlink *(see below)*. It is useful to recover the latest data sent, in case of temporary network failure for instance. It returns the longest LoRaWAN payload possible with the last uplinks contents. The structure is the same as the Data uplink. Only the pattern of the sensor dedicated field differs from regular data uplinks : It is a list of elements formed as follow:

[(timestamp1, data1), (timestamp2, data2), … (timestampn, datan)]

- Each timestamp is on 4 bytes (LSB), corresponding to the data sampling time (GPS time, see GPS, UTC, and TAIClocks for details).
- The data; is the regular sensor dedicated data content (2 floats for valve position sensor, 1 float for temperature sensor,...).

Configuration Uplink

This payload is triggered by an internal change of the LoRaWAN or alarm settings, or in response of the LoRaWAN or Alarm configuration downlink *(see the downlink section below)*

NOTE

Configuration uplinks are only valid for devices with FW version 1.1.2 and above.

Alarm configuration uplink (deprecated)

NOTE

Alarm configuration format has changed in firmware version 1.2.0+. We strongly recommend to upgrade the devices with the latest firmware, and use the extended alarm configuration *(see below)* formatting.

Refer to the alarm dedicated documentation for the data details.

Byte	Name/Value	Description
0	0xFF	Configuration message token
1	0x05	Alarm Configuration message token
2	Status	0 = OK, when triggering configuration downlink was accepted, >0 otherwise
3-6	High Alarm Threshold Value	32-bit float LSB
7-10	High Alarm Hysteresis Value	32-bit float LSB
11-14	Low Alarm Threshold Value	32-bit float LSB
15-18	Low Alarm Hysteresis Value	32-bit float LSB
19	Active alarms	0x00=No active alarm, 0x01=High alarm active, 0x02=Low alarm active,0x03:High and low alarm active
*And **only** for the valve position sensor, a second alarm (for the temperature)*		
20-23	High Alarm Threshold Value	32-bit float LSB
24-27	High Alarm Hysteresis Value	32-bit float LSB
28-31	Low Alarm Threshold Value	32-bit float LSB
32-35	Low Alarm Hysteresis Value	32-bit float LSB
36	Active alarms	0x00=No active alarm, 0x01=High alarm active, 0x02=Low alarm active,0x03: High and low alarm active

Extended alarm configuration uplink

From firmware version 1.2.0 and above.

Refer to the alarm dedicated documentation for the data details.

Byte	Name/Value	Description
0	0xFF	Configuration message token
1	0x07	Extended alarm Configuration message token
2	Status	0 = OK, when triggering configuration downlink was accepted, >0 otherwise
3-6	High Alarm ThresholdValue	32-bit float LSB
Byte	Name/Value	Description
7-10	High Alarm Hystersis Value	32-bit float LSB
11-14	Low Alarm ThresholdValue	32-bit float LSB
15-18	Low Alarm Hystersis Value	32-bit float LSB
19	Parameters	Bit0: High alarm threshold active Bit1: Low alarm threshold active Bit2: Variation alarm active Bit3: *Reserved* Bit7-4: Wakeup period *(see below for authorized values)*

20	Variation alarm value	8-bit integer [1:255]
21	*Reserved*	
22	*Reserved*	
*And **only** for the valve position sensor, a second alarm (for the temperature)*		
23-26	High Alarm ThresholdValue	32-bit float LSB
27-30	High Alarm Hystersis Value	32-bit float LSB
31-34	Low Alarm ThresholdValue	32-bit float LSB
35-38	Low Alarm Hystersis Value	32-bit float LSB
39	Parameters	Bit0: High alarm threshold active Bit1: Low alarm threshold active Bit2: Variation alarm active Bit3: *Reserved* Bit7-4: Wakeup period *(see below for authorized values)*
40	Variation alarm value	8-bit integer [1:255]
41	*Reserved*	
42	*Reserved*	

Allowed wakeup period encodings:

- 0x0: 15 seconds
- 0x1: 30 seconds
- 0x2: 1 minute, default
- 0x3: 2 minutes
- 0x4: 5 minutes
- 0x5: 15 minutes
- 0x6: 30 minutes
- 0x7: 1 hour
- 0x8: 3 hours
- 0x9: 6 hours
- 0xA: 12 hours

LoRaWAN configuration uplink

Below is the structure of the LoRaWAN configuration uplink

Byte	Name/Value	Description
0	0xFF	Configuration message token
1	0x06	LoRaWAN configuration message token
2	Status	0 = OK, when triggering configuration downlink was accepted, >0 otherwise
3	TxDatarate	8-bit unsigned
4	*Reserved*	8-bit unsigned
5	TxRetries	8-bit unsigned
6	AppPort	8-bit unsigned
7-10	TxPeriodicity	LoRaWAN TX Period (32-bit unsigned LSB)
11	IsTxConfirmed	8-bit unsigned
12	AdrEnable	8-bit unsigned
13	PublicNetworkEnable	8-bit unsigned

Downlink

Downlinks are used to update the device configuration (alarms or LoRaWAN), or to request the data log.

NOTE

An dummy empty configuration downlink on the respective port (4, 5 or 7) will force the device to send its current alarm/LoRaWAN configuration.

LoRaWAN configuration downlink

This command updates the LoRaWAN configuration of the device. It must be sent on the AppPort 4

Byte	Name/Value	Type	Valid range	Default value
0	TxDatarate	8-bit unsigned	Region dependent. See LoRaWAN specifications	0 (DR0)
1	*Reserved*			
2	TxRetries	8-bit unsigned	[0;5]	0 (no retries)
3	AppPort	8-bit unsigned	[1;254]	2
Byte	**Name/Value**	**Type**	**Valid range**	**Default value**
4-7	TxPeriodicity	LoRaWAN TX Period (32-bit unsigned LSB)	>= 60000 ms (=1 minute)	900000 (15minutes)
8	IsTxConfirmed	8-bit unsigned	[0;1]	0 (Unconfirmed)
9	AdrEnable	8-bit unsigned	[0;1]	1 (Adaptative DataRate Enabled)
10	PublicNetworkEnable	8-bit unsigned	[0;1]	1 (Public Network enabled)

Alarm configuration downlink

This command updates the LoRaWAN configuration of the device. It must be sent on the AppPort 4

Byte	Name/Value	Type	Valid range	Default value
0	TxDatarate	8-bit unsigned	Region dependent. See LoRaWAN specifications	0 (DR0)
1	*Reserved*			
2	TxRetries	8-bit unsigned	[0;5]	0 (no retries)
3	AppPort	8-bit unsigned	[1;254]	2
4-7	TxPeriodicity	LoRaWAN TX Period (32-bit unsigned LSB)	>= 60000 ms (=1 minute)	900000 (15minutes)
8	IsTxConfirmed	8-bit unsigned	[0;1]	0 (Unconfirmed)
9	AdrEnable	8-bit unsigned	[0;1]	1 (Adaptative DataRate Enabled)
10	PublicNetworkEnable	8-bit unsigned	[0;1]	1 (Public Networkenabled)

Alarm configuration downlink (deprecated)

This command updates the LoRaWAN configuration of the device. It must be sent on the AppPort 5

NOTE

Alarm configuration format has changed in firmware version 1.2.0+. We strongly recommend to upgrade the devices with the latest firmware, and use the extended alarm configuration *(see below)* formatting.

Byte	Name/Value	Description
0-3	High AlarmThreshold Value	32-bit float LSB
4-7	High Alarm HystersisValue	32-bit float LSB
8-11	Low Alarm ThresholdValue	32-bit float LSB
12-15	Low Alarm HystersisValue	32-bit float LSB
16	Active alarms	0x00=No active alarm, 0x01=High alarm active, 0x02=Low alarm active, 0x03:High and low alarm active
*And **only** for the valve position sensor, a second alarm (for the temperature)*		
17-20	High AlarmThreshold Value	32-bit float LSB
21-23	High Alarm HystersisValue	32-bit float LSB
24-27	Low Alarm ThresholdValue	32-bit float LSB
28-31	Low Alarm HystersisValue	32-bit float LSB
32	Active alarms	0x00=No active alarm, 0x01=High alarm active, 0x02=Low alarm active, 0x03:High and low alarm active

Extended alarm configuration downlink

From firmware version 1.2.0 and above.

This command updates the alarm configuration of the device. It must be sent on the AppPort7.

Refer to the alarm dedicated documentation for the data details.

Byte	Name/Value	Description
0-3	High Alarm Threshold Value	32-bit float LSB
4-7	High Alarm Hystersis Value	32-bit float LSB
8-11	Low Alarm Threshold Value	32-bit float LSB
12-15	Low Alarm Hystersis Value	32-bit float LSB
16	Parameters	Bit0: High alarm threshold active Bit1: Low alarm threshold active Bit2: Variation alarm active Bit3: *Reserved* Bit7-4: Wakeup period *(see below for authorized values)*
17	Variation alarm value	8-bit integer [1:255]
Byte	**Name/Value**	**Description**
18	*Reserved*	
19	*Reserved*	
*And **only** for the valve position sensor, a second alarm (for the temperature)*		
20-23	High Alarm Threshold Value	32-bit float LSB
24-27	High Alarm Hysteresis Value	32-bit float LSB
28-31	Low Alarm Threshold Value	32-bit float LSB
32-35	Low Alarm Hysteresis Value	32-bit float LSB
36	Parameters	Bit0: High alarm threshold active Bit1: Low alarm threshold active Bit2: Variation alarm active Bit3: *Reserved* Bit7-4: Wakeup period *(see below for authorized values)*
37	Variation alarm value	8-bit integer [1:255]
38	*Reserved*	
39	*Reserved*	

Allowed wakeup period encodings:

- 0x0: 15 seconds
- 0x1: 30 seconds
- 0x2: 1 minute, default
- 0x3: 2 minutes
- 0x4: 5 minutes
- 0x5: 15 minutes
- 0x6: 30 minutes
- 0x7: 1 hour
- 0x8: 3 hours
- 0x9: 6 hours
- 0xA: 12 hours

Log request downlink

This command triggers the send of a data payload of type LOG. It must be sent on the AppPort 6 with the following payload:

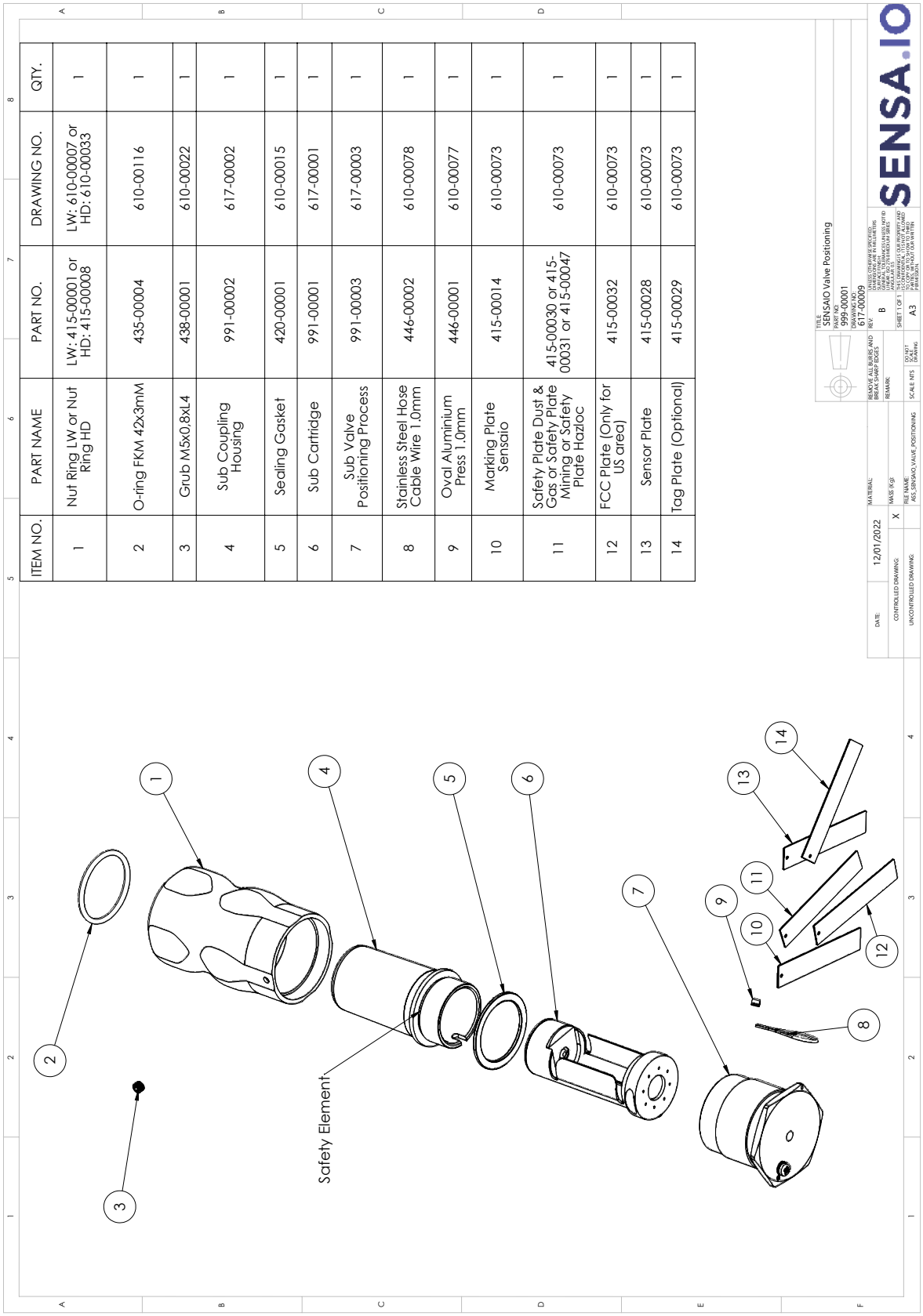
Byte	Value	Description
0	0x52	'R' ASCII char
1	0x45	'E' ASCII char
2	0x50	'P' ASCII char
3	0x4C	'L' ASCII char
4	0x41	'A' ASCII char
5	0x59	'Y' ASCII char
6	0x00	NULL terminating ASCII string

NOTE

Uplink decoders and Downlink encoders are available in JS in the following repository: https://bitbucket.org/sightgate/sensaiodecoder/src/main/

6 Spare parts

ITEM NO.	PART NAME	PART NO.	DRAWING NO.	QTY.
1	Nut Ring LW or Nut Ring HD	LW: 415-00001 or HD: 415-00008	LW: 610-00007 or HD: 610-00033	1
2	O-ring FKM 42x3mM	435-00004	610-00116	1
3	Grub M5x0.8xL4	438-00001	610-00022	1
4	Sub Coupling Housing	991-00002	617-00002	1
5	Sealing Gasket	420-00001	610-00015	1
6	Sub Cartridge	991-00001	617-00001	1
7	Sub Valve Positioning Process	991-00003	617-00003	1
8	Stainless Steel Hose Cable Wire 1.0mm	446-00002	610-00078	1
9	Oval Aluminium Press 1.0mm	446-00001	610-00077	1
10	Marking Plate Sensaio	415-00014	610-00073	1
11	Safety Plate Dust & Gas or Safety Plate Mining or Safety Plate Hazloc	415-00030 or 415-00031 or 415-00047	610-00073	1
12	FCC Plate (Only for US area)	415-00032	610-00073	1
13	Sensor Plate	415-00028	610-00073	1
14	Tag Plate (Optional)	415-00029	610-00073	1



7 Certifications and approvals

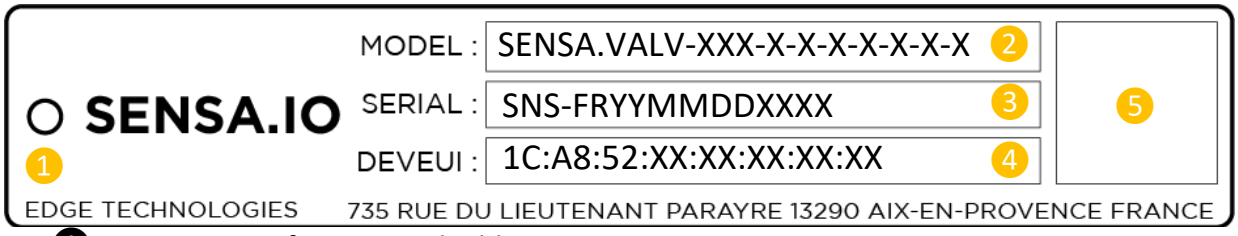
The purpose of this document is to identify the key information relating to explosion protection that is to be included in the user instructions. This include requirements of EN / IEC 60079-0:2017 Clause 30.1, EN / IEC 60079-11:2011 Clause 13, and EU directive 2014/34/EU Annex II 1.0.6.

7.1 Equipment marking

The following information is on the certificates, and hence is not required if copies of the certificates form part of the user instructions.

This product is composed of 3 or 4 marking plates attached to the device using stainless steel wire tag. Marking plates are made of stainless steel 304 with dimension 80mm (L) by 15mm (W) and laser engraved police Gotham size 2.1mm (5.6pt).

Manufacturing Plate:



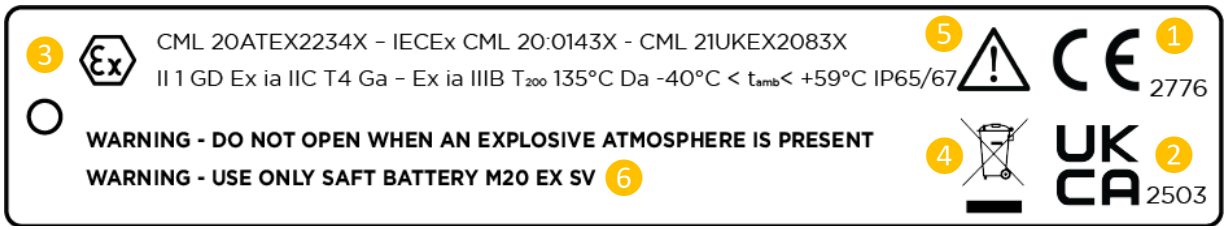
1 - Device manufacturer and address
2 - Device model number (Refer to Section 9 Ordering Number)
3 - Device serial number
4 - DevEUI a 64-bit globally-unique Extended Unique Identifier (EUI-64)
5 - QR code LoRaWAN Device Identification QR Code Full (Refer Standard QR tagging scheme https://lora-alliance.org/resource_hub/tr005-lorawan-device-identification-qr-codes/

NOTE

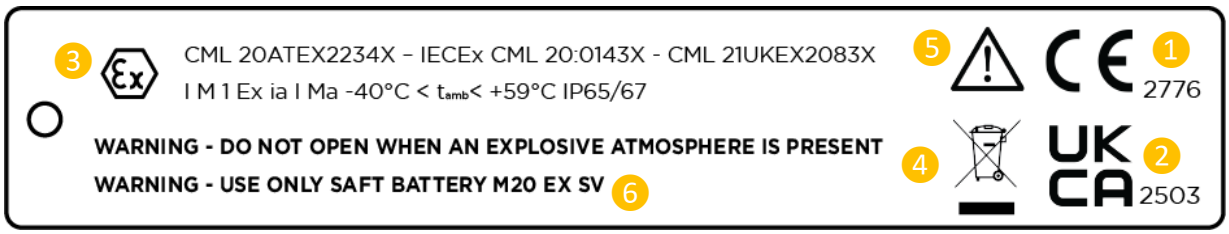
Serial number indicates country of manufacturing (e.g FR) and date of manufacturing.

Safety Plates (European / UK / International) :

Gas and Dust ATEX plate:



Mining ATEX plate:



1 - CE mark (EC conformity) + Notify Body 2776

2 - UK mark (UKCA conformity) + Approved Body 2503

3 - Approvals ATEX/IECEX marking for hazardous area with temperature class

4 - Waste Instructions

5 - Consulting operating instructions

6 - Warning indication

II 1 GD Ex ia IIC T4 Ga Ex ia IIIB T_{200} 135°C Da -40°C ≤ Tamb ≤ +59°C	**Or**	I M 1 Ex ia I Ma -40°C ≤ Tamb ≤ +59°C

If the user instructions are common to both Group 1 and Group II products both marking sets shall be included.

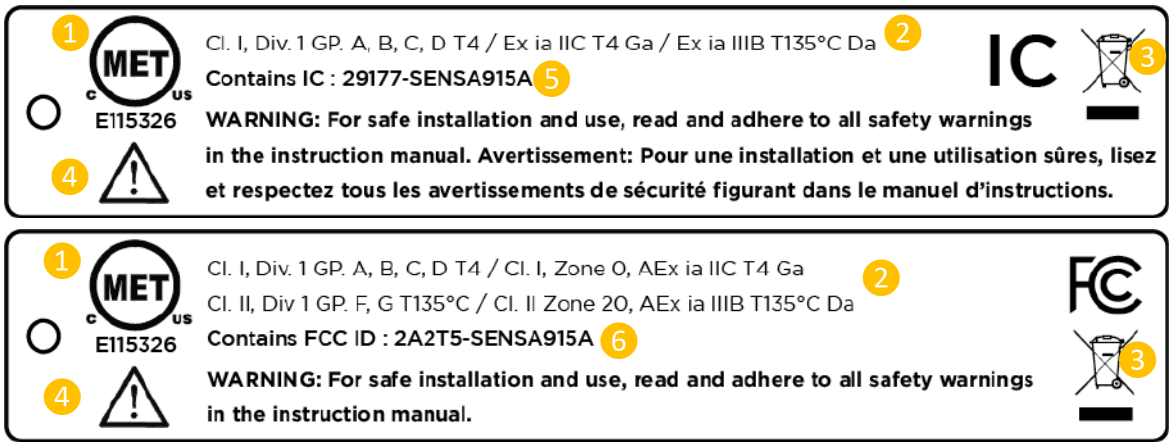
IEC 60079-0:2017 ; EN IEC 60079-0:2018

IEC 60079-11:2011 ; EN 60079-11:2012

Do not open when an explosive gas atmosphere is present

Use only Saft battery M20 EX SV.

Safety / FCC / IC Plates (USA / CANADA) :



1 - MET logo and file number
2 - Conformity with country-specific directives
3 - Waste Instructions
4 - Consulting operating instructions
5 - Contains IC for Canada
6 - Contains FCC for USA

NOTE

Devices described in this manual should be recycled. They may not be disposed in the municipal waste disposal services according to the Directive 2012/19/EC on waste electronic and electrical equipment (WEEE). Devices can be returned to the supplier within the EC, or to a locally approved disposal service for eco-friendly recycling. Observe the specific regulations valid in your country.

Sensor Plate:

1 - Sensor type
2 - Sensor range
3 - Process type
4 - Calibration certificate
5 - TEB (Total Band Error)
6 - Miscellaneous

7.2 Installation, maintenance and repair

The instruction shall contain statements reflecting the following:

- Instructions on how to safety replace the battery.
- The device shall be installed in accordance with IEC 60079-14 or EN 60079-14 by a suitably qualified person.
- The installation of the Sensaio shall ensure that no part of the main body of the enclosure (not including external probes) can exceed the temperature range of -40°C ≤ Tenc ≤ +59°C
- The device shall be installed onto earthed metalwork in a location that would give the non-metallic parts of the enclosure a low risk of the build-up of electrostatic charge, and so as to avoid an ignition hazard due to the impact or friction on the aluminium nut ring.
- There are no user-replaceable or repairable parts other than the battery by qualified personnel only, and that faults must be rectified by return to the manufacturer.
- The installation shall ensure that there is a low risk of mechanical danger to the device.

7.3 Specific Conditions of Use

i. The installation shall minimize the risk from electrostatic discharge.

ii. The user shall minimize an ignition hazard from impact or friction on the aluminum nut ring.

iii. The installation shall ensure a low risk of mechanical danger.

7.4 Availability of instructions

The operating instructions will be translated into one of the EC community languages as and when requested by the end user country requirements.

All sales literature and literature describing the equipment will not contradict the instructions with regard to the safety aspects.

Paper copies of the instructions shall be provided with every product placed on the market.

7.5 Regulatory Compliance Statements

NOTE

Please confirm that an installation region fulfills an applicable standard. Observe the test certification, provisions and laws applicable in your country during connection, assembly and operation. These include, for example:

- National Electrical Code (NEC – NFPA 70) USA
- Canadian Electrical Code (CEC) Canada

Further provisions for hazardous area application are for example:

- EN 60079-0
- EN IEC 60079-0
- EN 60079-11

CE Conformity:

The applicable directives and applied standards with their revision levels can be found in the EU declaration of conformity on http://www.sensalink.cloud/

The Authorized Representative for this product is:

EGDE TECHNOLOGIES
735 Rue du Lieutenant Parayre
13290 AIX-EN-PROVENCE
France

This product complies with the following directives:

RE Directive (EU Countries)

- Electro Magnetic Compatibility (EMC) 2014/30/EU
- Radio Equipment Directive (RED) 2014/53/EU
- Low Voltage Directive (DBT) 2014/35/UE

ATEX Directive (2014/34/EU)

Directive of the European Parliament and of the Council on the harmonization of the laws of the member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.

PE directive 2014/68/EU

Directive of the European Parliament and of the Council on the harmonization of the laws of the member States relating to Valve position equipment Directive.

Reduction of Hazardous Substances (RoHS) (2011/65/EU)

Safety: IEC 61010-1:2010 + A1:2016 (Indoor/Outdoor use), Meets Pollution Degree 3

“Pollution degree” describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering. “3” to be found in industrial environment or construction sites.

▪ FCC compliances (United States)

FCC ID : 2A2T5-SENSA915A

FCC Approval

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.

Co-located:

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

⚠ FCC WARNING

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

ⓘ NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be requiered to correct the interference a his own expense.

RF Exposure Compliance:

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 should be installed and operated keeping the radiator at least 20 cm or more away from person's body.

▪ ISED compliances (Canada)

IC : 29177-SENSA915A

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s).

Operation is subject to the following two conditions:

(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

French :

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF Exposure Compliance:
This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment and meets the RSS-102 of the ISED radio frequency (RF) Exposure rules. This equipment should be installed and operated keeping the radiator at least 20 cm or more away from person's body.

French :
Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respects les règles d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'ISDE. Cet équipement doit être installé et utilisé en gardant une distance de 20 cm ou plus entre le radiateur et le corps humain.

NOTE
CAN ICES-003(A) / NMB-003(A)

8 Technical Battery data

3 V lithium manganese dioxide D-size spiral cell

Electrical characteristics	
(Typical values relative to cells stored up to one year at + 30°C max)	
Nominal capacity (at 150 mA, + 20°C, 2.0 V cut-off) Open circuit voltage (at + 20°C)	12.4 Ah 3.2 V
Nominal voltage (under 1 mA at + 20°C)	3.0 V
Nominal energy (at 150 mA, + 20°C, 2.0 V cut-off)	35 Wh
Pulse capacity	up to 8.0 A
Recommended maximum continuous discharge	3.5 A
Operating conditions	
Operating temperature range Storage temperatures (Recommended)	- 40°C / + 72°C (- 40°F / + 161°F) + 30°C (+ 86°F) max
Physical characteristics	
Diameter (max)	34.2 mm (1.35 in)
Height for the tabbed version (max)	61.5 mm (2.42 in)
Typical weight	115 g
Li metal content	approx.3.5g

NOTE

Prior any installation please carefully read the 'Safety information' in Section 1 or for further safety information, scan this code:

9 Ordering number

Ordering Details									
SENSA.	XXXX-	XXX-	X-	X-	X-	X-	X-	X-	X
Valve Position sensor	VALV								
Type									
Inertial Measurment		IMU							
Measurement Range									
Max range 0-100%			1						
Process connection									
M10 Female				1					
Mounting option									
Mounting support					1				
Housing Material									
Aluminium Powder Coated						L			
Stainless Steel 316L (Mandatory for Mining)						H			
Safety Standard									
ATEX/IECEX/UKCA (Gas/Dust							1		
HAZLOC NEC USA / CSA Canada							2		
ATEX/IECEX/UKCA (Mining)							3		
INMETRO							4		
Frequency Plan									
EU 868								1	
US 915								2	
AU915								5	
AS923								7	
AS923-2								8	
AS923-3								9	
KR920								10	
IN865								11	
RU864								12	
AS923-4								13	
Options									
Null									N