IOT WIRELESS PRESSURE SENSOR
USER MANUAL

Doc# 20027955-12

Revision 0.2

REVISIONS

DATE	Revision	Change Description	Prepared by	Approver
03/22/2023	Rev 0.1	Initial draft NEW Version		
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1 GLOSSARY

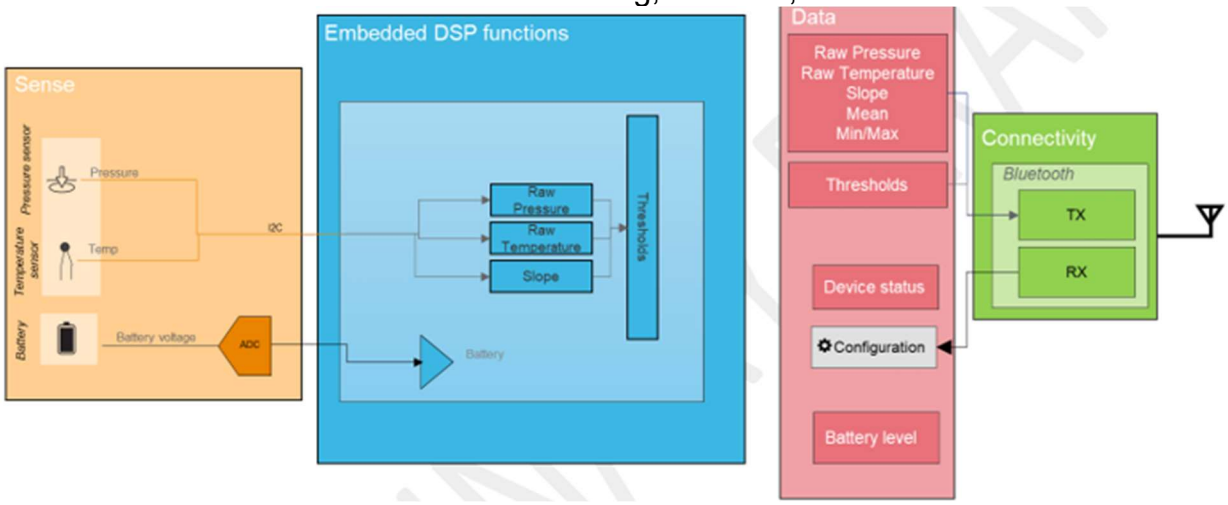
- ***Sensor*** is the sensing element that transform physical value to voltage value. It could have digital or analog interface.
- ***Platform*** is the generic electronic and software used to acquire data and send data over RF communication.
- ***System*** is the combination of a sensor and the platform.
- ***Product*** is specific system.

2 GLOBAL OVERVIEW

The system operates as a smart device. It offers sensor acquisition, processing capabilities, analysis, and wireless communication capabilities.
Processing and analysis functions offer to the end user flexibility and cover most of the application.
The device computes pressure or internal temperature data in a smart way:

- slope detection,
- raw data.

Threshold can be configured. User has to choose between data to feed threshold.
BLE only system, data are sent over BLE advertisement. BLE is used to configure the sensor and access to others feature as datalog, live data,...



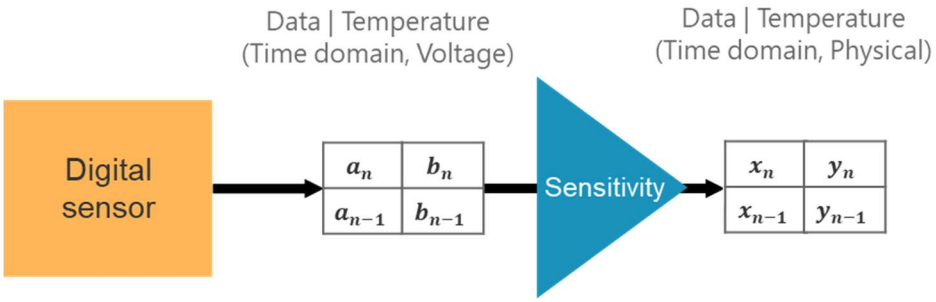
The product has two BLE modes:

- Advertisement Mode: provides data periodically
- Connected Mode: mode for configuration and advanced features. Each advertisement allows the opportunity to user to switch to Connected mode. It's the only way to go into connected mode.

3 MEASUREMENT PROCESS

Platform acquires digital data from the sensor. On acquisition chain system uses:

- Sensor power supplies: A separate power supply is used for the sensor at 2.8V
- A communication bus (I2C or SPI): It can read data from the memory of the sensor. (Data, Calibration,…)
- The system acquires and stores data.
- It applies sensitivity to the raw value



Data collection diagram

At every measurement interval, platform power up the sensor and ask a new acquisition and the sensor provides a data and temperature. Both data are stored.
When measurement interval is changed a new measurement is done when the new value is received by the system.

4 DATA PROCESS

4.1 DATA PROCESSING

4.1.1 Slope

Time domain data are used to calculate the slope between two data.

$$Slope(n) = x_n - x_{n-1}$$

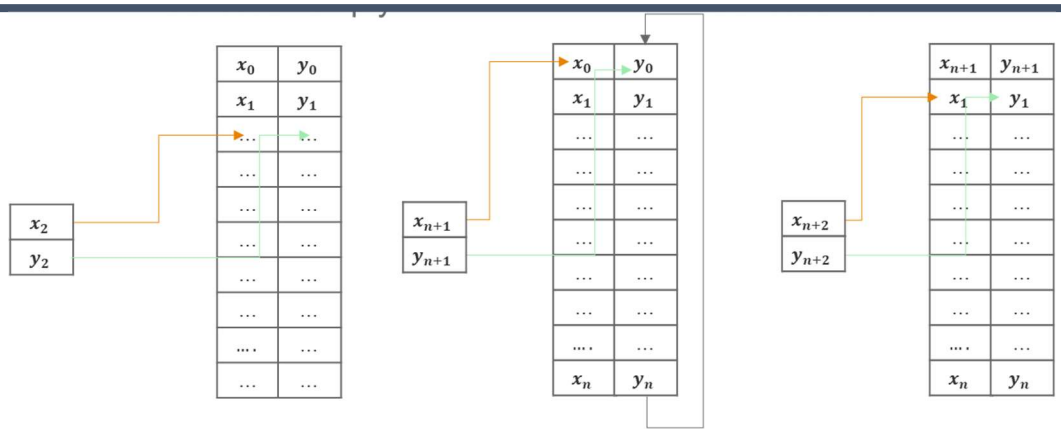
Slope formula

4.2 TRIG MEASUREMENT COMMAND

When BLE connected mode is activated, user can ask a new measure without waiting measurement interval.
After a Trig measurement command, the next measurement will happen after measurement interval.

4.3 DATALOG DATA

The system store in memory 4096 data. When the memory is full the oldest data store is replaced by the new one and so on.



Data stored in memory are available on BLE connected mode.

4.5 LIVE MODE

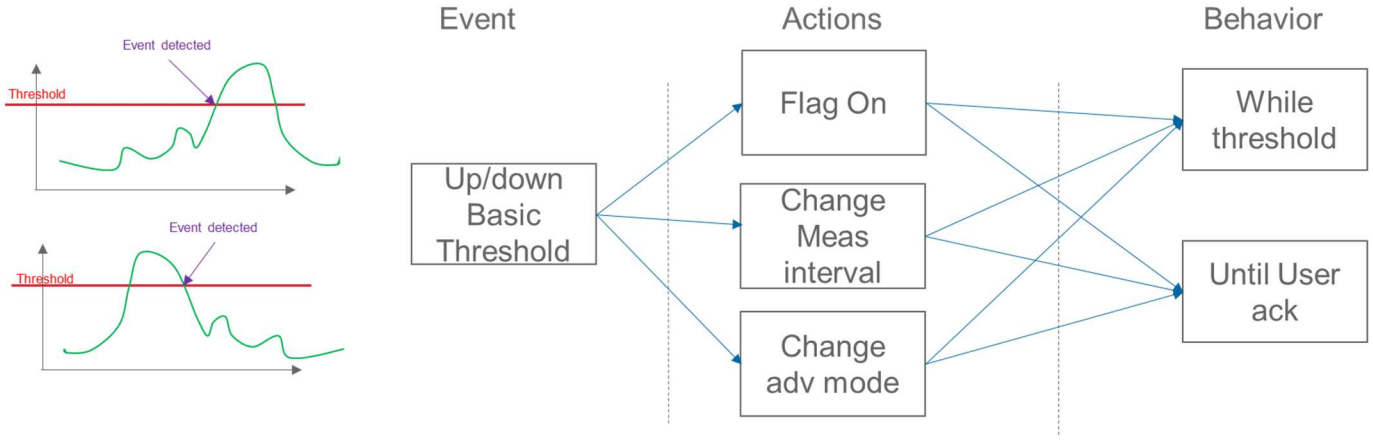
When connected mode is activated, user can get access to a live mode. It will acquire data at new measurement interval fixed at 100ms and provide all data to be available in “real time”.

When user stop BLE connection the system come back to its current configuration and applies regular measurement interval.

Note: if a threshold is reached during live mode the system will use Threshold measurement interval otherwise it uses standard measurement interval.

4.6 THRESHOLD EVENT MANAGER

Threshold event manager allows user to have a specific configuration when a value reach a level (main sensor and/or secondary sensor).



- Up/down Threshold: Every new acquired value is compared to a threshold.

$$Threshold_{Up} = x_n > \text{Thr}$$

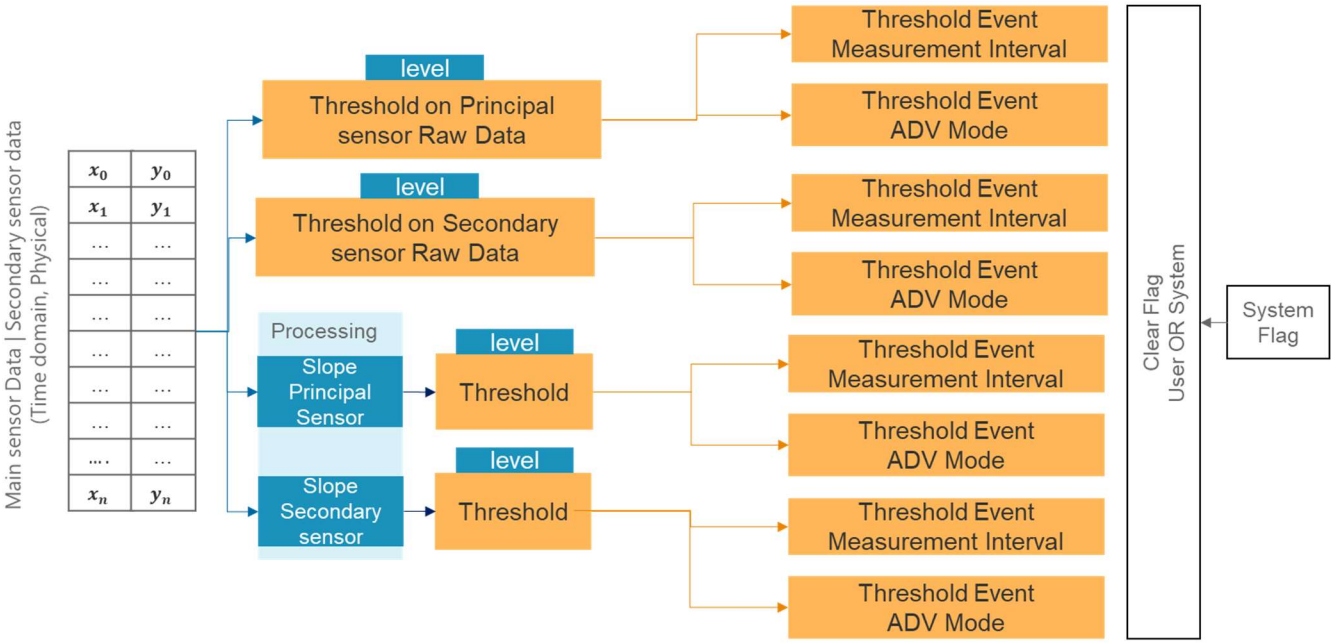
Threshold high formula

$$Threshold_{Down} = x_n < \text{Thr}$$

Threshold low formula

- Actions: When a threshold is reached, the system will set a flag. This flag is available on advertisement frame. Upon user configuration the system can change advertisement mode and measurement interval. This configuration can be done on BLE connected mode.

- Behavior: This new configuration can last while the threshold is reached or until user clear Threshold flag. All this configuration can be done on BLE connected mode.



Threshold manager bloc diagram

At configuration the user need to define:

- Data to consider: Main sensor and/or Secondary sensor
- Data to use: Raw data and/or Slope
- Threshold : Level and type: up or down
- Event after threshold: Flag, Measurement interval, Advertisement mode

Every new acquired value is compared to a threshold. On threshold the sensor will do a specific action and behavior defined by user:

- Set up flags to inform customer that a threshold is reached
- Change BLE Advertisement mode (only on event mode activated)
- Change measurement interval (only on event mode activated)

If there are conflict when several Threshold are reached:

- System will use the lowest measurement interval and at each new threshold reached or released a new configuration analysis will be done
- System will use first Periodic Mode and then On measure mode

4.7 SYNC BETWEEN DIFFERENT SENSOR

If the user configuration can manage multiple BLE connection, user can synchronize several sensors.
To achieve that user has to:

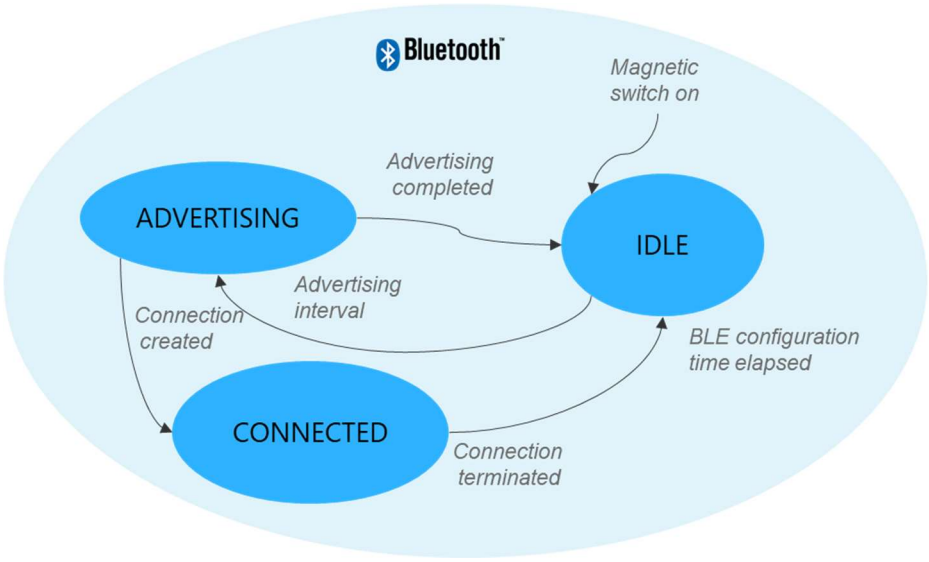
- Activate connected mode on several sensor
- Send a Trig measurement command to all send.

All sensors will be synchronized with a resolution of 1s. All measurement will be done during the same timeslot.

5 COMMUNICATION: BLE

BLE is used to send data to a central acquisition system.
BLE provide 3 main state:

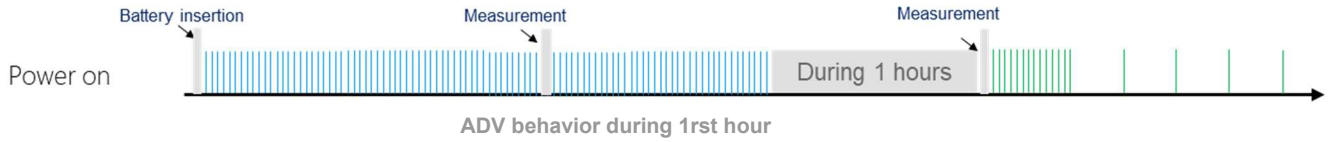
- Advertisement Mode: periodic data available
- Connected mode: advanced data analysis and sensor configuration
- Idle: low power mode with no activity



The product has several advertisement frequencies varying upon time, configuration and hardware event:

1. **FAST ADVERTISING PHASE: during 1hours after power on**

When the device is powered on, a yellow LED blinks to confirm the proper battery insertion.
From the sensor startup and for 1 hour, the device advertises every 1 sec. This allows user to configure the product by switching to connected mode. A measurement is performed at each measurement interval.



ADV behavior during 1rst hour

2. **ADVERTISING MODE PHASE: 1 hour after power on**

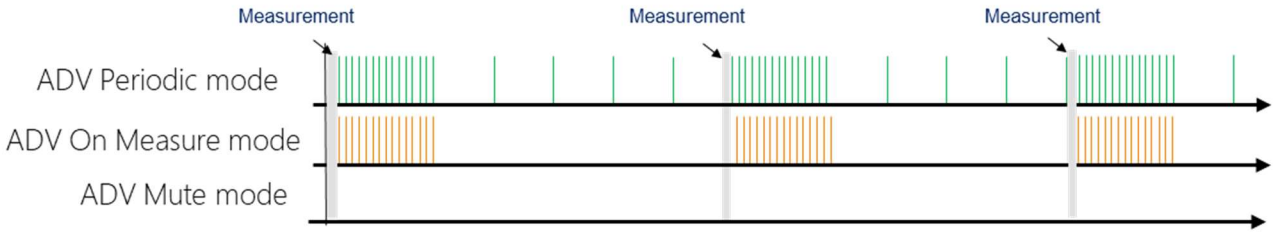
After the first hours the system will apply configuration parameters such as ADV Mode.
After every measurement, the device will advertise upon ADV Mode configuration:

- ADV Periodic Mode: (Default ADV mode)

After each measurement the sensor will send advertisement every 1s interval for 15 seconds. This will give multiple chances to the gateway to connect to the device. After 15 seconds, the device will advertise at 10s interval till the next measurement. During, this phase, the connection between the system and an external device could be more difficult. Between two measurements, the data into the advertisement frames is the same. The payload is only updated after every measurement interval.

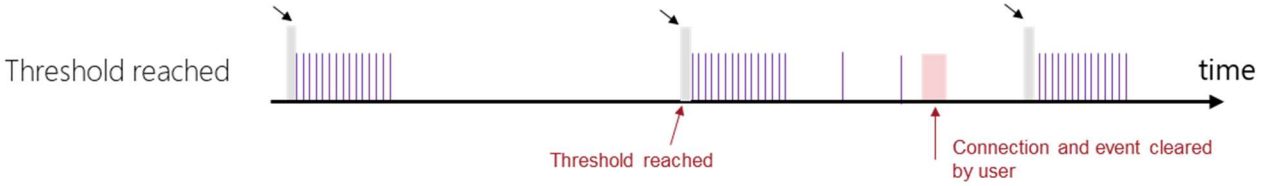
- ADV On Measure Mode:
  After each measurement the sensor will send advertisement every 1s interval for 15 seconds. This will give multiple chances to the gateway to connect to the device. After 15 seconds, the device will stop to advertise.
  This ADV Mode can be selected by using BLE services **ADV_CFG** for current state and **THS_ADV_MODE** if a threshold is activated

- ADV Mute Mode:
  After each measurement the sensor won't send advertisement.
  This ADV Mode can be selected by using BLE services **ADV_CFG.**
  This mode is not recommended if threshold is not activated and **THS_ADV_MODE** is not configured. The only way to change configuration over BLE is to use the magnet and activate advertisement (see 3. Magnet Event).



Comparison of ADV mode

After a measurement, if a threshold is reached, the system will use threshold configuration (ADV mode and Measurement interval).

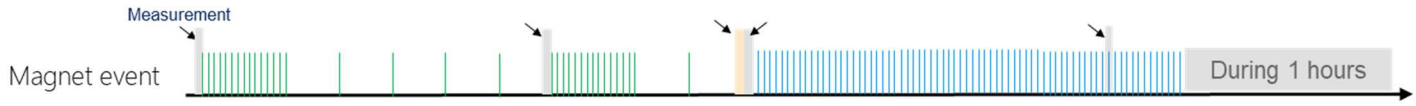


Example of ADV On Measure Mode and ADV Periodic mode after a threshold

3. Magnet event:

If the advertisement interval is too long, it could be difficult to switch to connected mode. Our system offers the opportunity to advertise more often when the magnet is used. The

magnet event will trig a measurement and the device will advertise every second during 1hour. User can therefore connect to the device.



Example of Magnet event with an ADV periodic mode

Note: When the system detect a magnet event, user has to wait 10s to achieve another magnet event.

5.1 GENERIC ADVERTISING MESSAGE FORMAT

ADVERTISEMENT GENERIC PRESSURE																		
byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
field	CI		DEVTYPE		CUSTOM ADVERTISING DATA				CNT		DEV STAT	BATT	TEMP		DATA32			

- CI: Company identifier, 0x08DE.
- DEVTYPE: Information about the product

DT VALUE															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
SW Platform				Sensor				Wireless				Output			
0	Error			0	Error			0	Error			0	Error		
1	Platform_21			1	Vibration			1	BLE			1	Float		
				2	Temperature			2	BLE / LoRa			2	Integer		
				3	Pressure										
				4	Humidity										

Example for a pressure BLE only product will be:

DT Value	Description
0x1311	Pressure Generic BLE

- CUSTOM ADV DATA: 4-byte array
- CNT: measurement counter
- DEVSTAT: System global status
- BATT: Battery level
- TEMP: Secondary data from sensor 2-Byte. Note for Temperature generic sensor temperature will be platform internal temperature.
- DATA32: Main data from the sensor 4-Byte (Pressure, Humidity, Temperature)

5.2 CONNECTED MODE

User can connect to the system with a Bluetooth device like computer, smartphone or tablet. It allows to configure, get access to special functions and update firmware.
Product embeds with 2 different BLE connected modes which are listed below:

Operating mode	Description	Condition
Standard	User mode to configure the sensor and activate some specific function only available when connected	None
DFU	Mode used during FW update.	OTA update

5.2.1 Access to Connected mode

To get access to connected mode, the user should use a device with BLE feature. When an advertisement is sent by the system the user BLE device will have opportunities to connect.

5.2.2 Exiting from Connected mode

When in connected mode, there are way to disconnection:

- Use the disconnect software function on the BLE user's device
- Use the magnet to disconnect.

5.2.3 List of services available

When a user is on BLE connected mode, he can access to a list of services. Each service include characteristics which allow user to configure the sensor.
Every service and characteristic share a common UUID. Only byte #3 and #4 (XXXX) differ from the identifier.

BLE UUID	B614XXXX-B14A-40A6-B63F-0166F7868E13
UUID Service key	XXXX

Services	UUID Service Key	Characteristics	UUID Characteristics Key	Read/Write/ Notification	Payload length (bytes)
Device status	FC00	Device status	FC01	R/N	1
Battery	180F	Battery level	2A19	R/W	1
Bluetooth	CD00	Customer Specific Data	CD01	R/W	4
		Adv Mode Configuration	CD02	R/W	1
		Change Device Name	CD03	R/W	25
Environmental sensing	181A	Internal platform temperature	2A6E	R/N	2
Data collection	B300	Measurement Counter	B301	R/W/N	2
		Measurement interval	B302	R/W	3
		Trig measurement	B303	W	1

Last data from sensor	DA00	Last data acquired (Temperature + sensor specific)	DA01	R/N	6
Live Mode	B400	Live Measurement interval (milisecond)	B401	R	1
		Live mode configuration	B402	R/W	1
Threshold	B200	Threshold	B201	R/W/N	5
Datalog Raw value	DB00	Datalog data	DB01	R/W/N	/
Engineering	DD00	Engineering special	DD01	R/W	/

Note: Two BLE generics services are embedded into the sensor:
- GENERIC ATTRIBUTE
- GENERIC ACCESS

They are mandatory for BLE use. These services aren't useful for our system.

Note1: All bytes into a frame are code in BigEndian when use into a TE custom services
All bytes into a frame are code in LittleEndian when linked with BLE standard
When specific code is implemented, a note is added into description.
Note2: All bits into a byte are code in LittleEndian

5.2.4 Device status

DEVSTAT								
byte	0							
bit	7	6	5	4	3	2	1	0
field	SENSOR	CONFIG.	MISC	CONDITION	SYSTEM PHASE			

- **SENSOR**: Open Circuit, Short Circuit, No Communication, Calibration corruption (CRC), Out of range reading
- **CONFIGURATION**: Wrong parameter (unproper config), Conflicting configuration, User configuration corruption (CRC)
- **MISC**: Self diag fails (memory access, ref reading …), No Network coverage, Fail to join network
- **CONDITION**: Threshold trig
- **SYSTEM PHASE**:

System Phase	Value
FAST ADVERTISING (1rst Hour)	1
ADV_MODE	0

5.2.5 Data Collection

5.2.5.1 Measurement Counter

MEASUREMENT COUNTER (R/W)																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
field	CNT16															

- **CNT16**: Number of measurements done. When reach 0XFFFF it will restart to 0x0000.

  Write 0x0000 the counter is reset to 0x0000. Other value won't affect current counter.

5.2.5.2 Measurement interval

Interval between two measurements.

MEAS_INTERVAL			
Byte	0	1	2
field	HOUR8	MINUTE8	SECOND8

- **HOUR8**: Number of hours [0-255]
- **MINUTE8**: Number of minutes [0-255]
- **SECOND8**: Number of seconds [0-255]
- MEAS_INTERVAL = "HOUR8" & "MINUTE8" & "SECOND8"

Note: Default value is 1min.
Note2: It's possible to write value over standard time representation (ex:120min). The system will transform automatically value into standard time representation (ex:120min => 2hours).

5.2.5.3 Trig Measurement

TRIG MODE								
bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
field	DISCON							TRIG

- **TRIG**: trig a new measurement flow (read raw values, temperature, battery and process the data)

Trig	Value
Disable	0
Ask a new measurement	1

- **DISCON**: force BLE disconnection before measurement trig.

Trig	Value

Disable	0
BLE connected mode disconnection	1

5.2.6 Live mode

5.2.6.1 Measurement interval

LIVE_MODE_MEAS_INTERVAL								
bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
field	LIVE_MODE_MEAS_INTERVAL8							

- **MEAS_LIVE_INTERVAL8**: Read Only Value in millisecond.

5.2.6.2 Live mode configuration

LIVE_MODE_CFG								
bit	7	6	5	4	3	2	1	0
field								ENABLE

- **ENABLE**: enable or disable Live mode.

Enable	**Value**
Disable	0
Enable	1

NOTE: Two way are available to stop “Live mode”:
- BLE disconnection from the central device or with the magnet
- Send Live Mode disable into LIVE_MODE_CFG

5.2.7 Battery

BATTERY								
bit	7	6	5	4	3	2	1	0
field	BATTERY8							

- **BATTERY8**: percentage of remaining battery. Writing 0xFF in this register will reset the battery algorithm to 100%. Other value written here will be ignored.

5.2.8 Internal platform temperature

INTERNAL_TEMPERATURE16															
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
field	INTERNAL_TEMPERATURE16															

- **INTERNAL_TEMPERATURE16** (signed): Internal temperature of the platform

$$TEMP_{°C} = TEMP_{LSB} * 0.01$$

5.2.9 Last data from sensor

Last data acquired from the sensor:

Last data						
Byte	0	1	2	3	4	5
field	TEMP16		SENSOR32			

In case of Pressure generic

- **TEMP16:** Temperature of the sensor

$$TEMP_{°C} = TEMP16_{LSB} * 0.01$$

- **SENSOR32** (signed): Data from the sensor

5.2.10 Bluetooth

5.2.10.1 Customer specific data

CAD			
3	2	1	0
CAD			

- **CAD**: Custom Advertisement Data: 4Byte

5.2.10.2 Advertising configuration

ADV_CFG								
bit	7	6	5	4	3	2	1	0
field	ADV_MUTE						ADV_MODE	

- **ADV_MUTE**: when the external device is connected, the system stops the advertising till the next event or measurement if set. Flag is reset on next event.
- **ADV_MODE**:

Mode	Value	Description
Periodic mode	0	Advertisement 15 times every 1s after measurement then. every 10 sec
On Measure mode	1	Advertisement 15 times every 1s only after a measurement.
ADV Mute mode	2	No advertisement included even after measurement.

5.2.10.3 Change Device Name

Change device name characteristic allows customer to change device name.

Device Name							
24	-	5	4	3	2	1	0
DEVICE NAME							

- **DEVICE NAME**: Device name when BLE scan: 25Byte

5.2.11 Threshold

To ask threshold parameters use the following frame:

Request Threshold information		
byte	0	1
field	ID DATA	PARAM SEL

Sensor will answer with the following frame:

Answer after a Read requestion						
byte	0	1	2	3	4	5
field	ID DATA	PARAM SEL	DATA32			

To write threshold parameters:

Write Threshold Configuration						
byte	0	1	2	3	4	5
field	ID DATA	PARAM SEL	DATA32			

- **ID_DATA**: defines the source for threshold

Source		Value
Main Sensor raw value	*Temperature sensor (T) or pressure sensor (P) or humidity sensor (HR)*	0x0
Main Sensor slope		0x1
Secondary Sensor Raw value	*Platform Temperature (T) or Temperature into sensor (HR and P)*	0x2
Secondary Sensor slope		0x3
Error	ID_DATA not defined or threshold configuration error	0xFF

- **PARAM SEL:** Select parameters to be changed (more details below)

Value	
THS_CONFIG	0x0
THS_LEVEL	0x1

MEAS_INTERVAL	0x2
ADV_MODE	0x3

- **PARAM SEL**=0x0 (Threshold configuration)

This command can be used with multiple parameters.

Data32 format:

THS_CONFIG																															
Byte	3								2								1								0							
bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
field	EVT_FLAG	THRESHOLD ENABLE	CONDITION	AUTO_CLR	ACTION: MEAS INTERVAL	ACTION: ADV MODE BLE																										

- **EVT_FLAG:** Forcing this bit to 0 clears the event flag until next trig.

State	Value
No event detected	0
Threshold event detected	1

- **THRESHOLD ENABLE:** Enable threshold

State	Value
Disactivated	0
Threshold activated	1

- **CONDITION:** Define the threshold condition

Condition	Value
Data32 < Threshold Level	0
Data32 > Threshold Level	1

- **AUTO_CLR:** Auto clear once event condition:

State	Value
Keep flag even if the threshold is ended	0
Autoclear Flag after threshold end	1

- **ACTION: MEAS_INTERVAL:** Change Measurement Interval after the threshold level reached:

State	Value
Disable	0

Change measurement interval after threshold	1

- **ACTION: ADV MODE BLE:** Change Advertisement Mode after the threshold level reached

State	Value
Disable	0
Change ADV Mode BLE interval after threshold	1

- **PARAM SEL**=0x1 Data32 format: Threshold level

THS_LEVEL				
Byte	3	2	1	0
field	INT32 / FLOAT32			

Same data format as SENSOR32
Default value: 0x0

- **PARAM SEL**=0x2 Data32 format: Measurement interval after a threshold

MEAS_INTERVAL				
Byte	3	2	1	0
field	HOUR8	MINUTE8	SECONDE8	0 (Not Use)

Default value: 1 second

- **PARAM SEL**=0x3 Data32 format: Advertising mode after a threshold

THS_ADV_MODE																															
Byte	3								2								1								0							
bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
field							ADV_MODE																									

- **ADV_MODE**:

Mode	Value	Description
Periodic mode	0	Advertisement 15 times after measurement then every 10 sec
On Measure mode	1	Advertisement only after a measurement (15 consecutives ADV)

ADV Mute mode	2	No advertisement included even after measurement.

5.2.12 Datalog

5.2.12.1 Datalog array access request

ARRAY ACCESS REQUEST				
byte	0	1	2	3
field	TYPE8	INDEX16		LENGTH8

- **TYPE8**: Data (0 = TEMPERATURE16, 1 = SENSOR32, 2 = TEMPERATURE16 + SENSOR32).
- **INDEX16**: start index from 0 up to 4095 for Raw data (MSB first). 0=lastest data acquired, 4095= oldest data acquired
- **LENGTH8**: number of values to be read. Admissible range depends on TYPE8:
  - 0-120 for TYPE8=TEMPERATURE16
  - 0-60 for TYPE8=SENSOR32
  - 0-40 for TYPE8= TEMPERATURE16 + SENSOR32

  If the required length is larger than possible, fill the frame with the max possible data.

5.2.12.2 Datalog array access response with notification

ARRAY ACCESS RESPONSE									
byte	0	1	2	3			-	m-1	m
field	TYPE8	INDEX16		LENGTH8	VALUE_0			VALUE_n	

- **TYPE8**: Data (0 = TEMPSERATURE16, 1 = SENSOR32, 2 = TEMP16 + SENSOR32).
- **INDEX16**: start index of the value
- **LENGTH8**: number of values has been really sent over BLE.
- **VALUE_n**: SENSOR32 or TEMP16 or SENSOR32 + TEMP16. For TEMP16 the 1rst Byte is filled of 0.

5.3 DFU MODE: DEVICE FIRMWARE UPDATE

DFU mode should be used to upgrade the sensor firmware. It is accessible from the standard mode.

The new firmware to be loaded must be signed by TE.

The DFU works with a single bank only. This means that if the firmware update is interrupted (power cut off or BLE disconnection), the application firmware will be corrupted, and the sensor will stay in DFU mode. The user will have to re-try the upgrading process. Note that the DFU MAC address is the sensor MAC address +1.

6 BATTERY

6.1 SAFT LS17330

The system should be exclusively powered with an LS17330 battery.

Parameters	Typical value
Manufacturer	SAFT
Reference	LS 17330
Technology	Primary lithium-thionyl chloride (Li-SOCl2)
Nominal voltage	3.6 V
Capacity at 20°C	2100 mA
Operating temperature range	- 60°C/+ 85°C

6.2 BATTERY LIFE

Depending on customer settings (measurement interval) battery life could go up to 4 years (depends on measurement interval and RF communication).
Lower will be the number of measurements per day, higher will be the battery life.

6.3 BATTERY REPLACEMENT

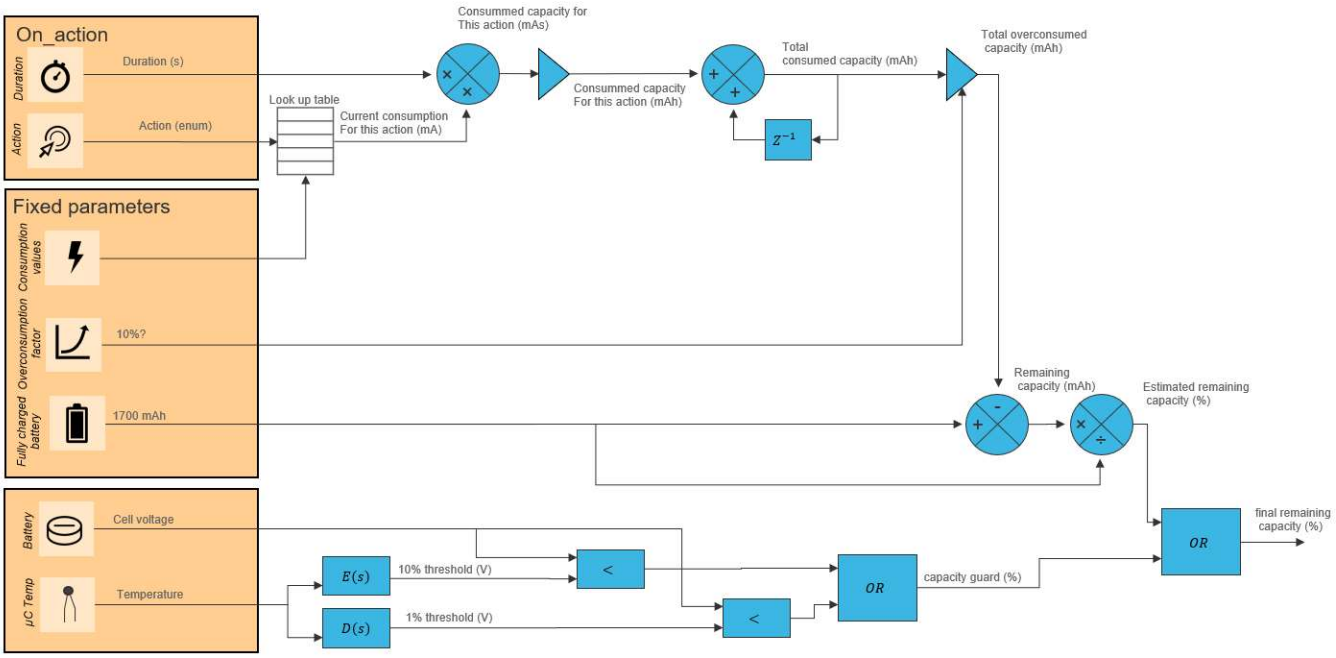
The system battery can be changed if empty. Unscrew the plastic housing and remove it from the base. Carefully use a small tool (such as a flat screwdriver) to take off the battery. Note that it MUST be replaced by the same battery reference (others may damage and/or bring uncontrolled behavior of the sensor). Double check the polarity and then insert the new battery inside the holder. Re-position the plastic cover on the sensor.
Once done, the user must have to use the BLE “battery” characteristic value to reset the battery estimation algorithm.

!This action is mandatory otherwise battery level will stay at 0%!

6.4 HIGH LEVEL IMPLEMENTATION

Battery capacity baseline: 1.7Ah
Every action is transformed into an energy and subtract from the baseline.
The battery voltage is used to check 1% and 10% threshold to confirm the battery estimation. This threshold condition has the priority.

Action	Current consumption	Duration
Idle	To be updated	To be updated
Measurement	To be updated	To be updated
Processing	To be updated	To be updated
BLE Tx	To be updated	To be updated
Reed switch	To be updated	To be updated

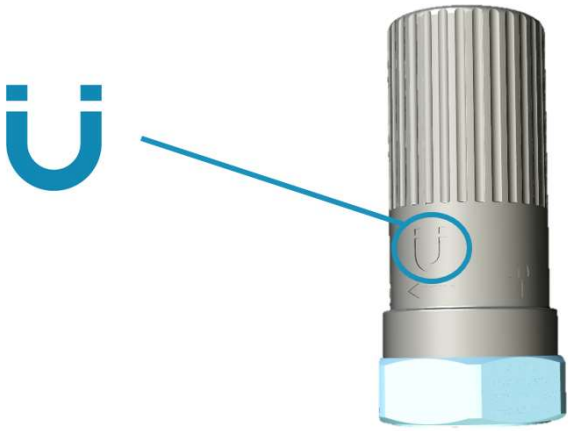


Guards

The battery voltage is used to confirm the battery estimation. If 10% or 1% is detected using the cell voltage and confirmed 5 consecutive times. The guard ignores the estimation and only relies on the cell voltage.

7 MAGNETIC SWITCH

The system embeds an internal reed switch. This contactless button can be activated approaching a strong magnet close to the magnetic sensor location.
The magnetic switch location is indicated by the magnet drawing on the plastic housing.



Two different functions are available depending on the user action:

Function	User action	LED
Activates BLE for another one hour plus trigs a new measurement.	Short tap	One short blink. If user holds the magnet close to the switch for a longer duration, the LED will blink faster. Remove the magnet to only initiate a transmission. Else it going to initiate a sensor reset.
Resets the sensor.	Hold the magnet for 10 seconds.	Wait for at least 10 seconds, to see the very fast blink. Release the magnet once a very long orange led appears

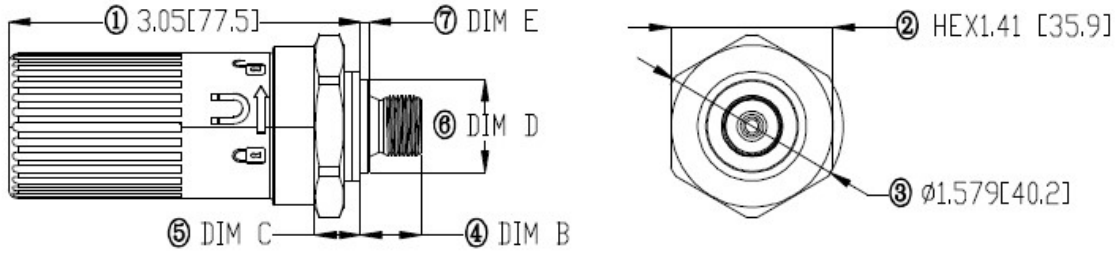
8 LED

A yellow led is used to indicate user some specific event:

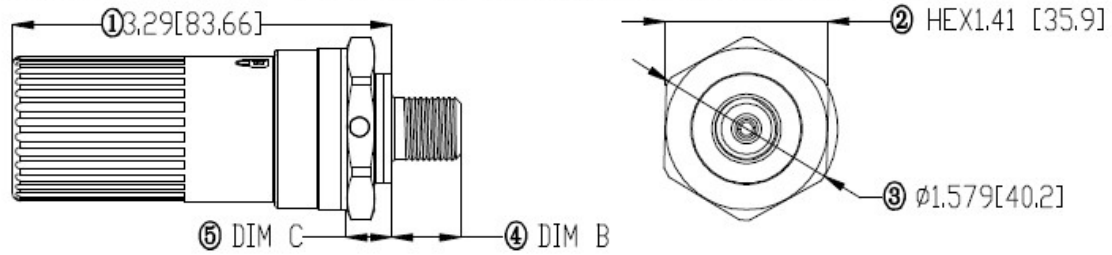
		Led Behavior
Battery insertion		ON during 2s
Magnet event		ON during 200ms
Maintaining Magnet	<3s	Slow blinking
	[3s-10s]	Fast blinking
	>10s	OFF -> reboot

9 Dimensions

ABSOLUTE TYPE CRITICAL DIMENSIONS



COMPOUND TYPE CRITICAL DIMENSIONS

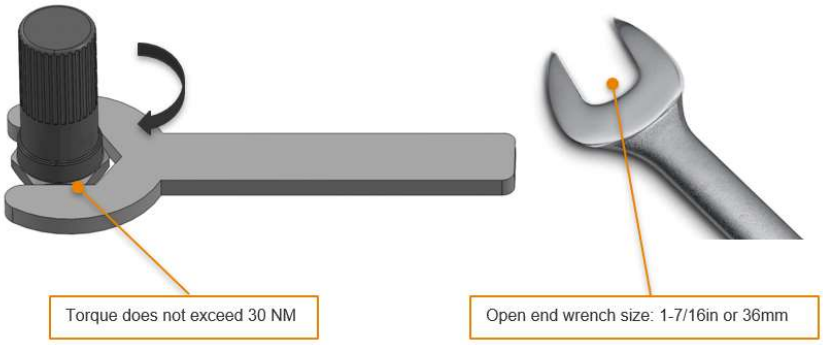


PORT TYPE	PRESSURE RANGE	DIM B TYP.	DIM D TYP.	DIM E TYP.
1/4-18 NPT	7 BAR	0.60 [15.24]	NA	NA
	20 BAR			
	35 BAR			
	350 BAR			
1/4-19 BSPP	7 BAR	0.526 [13.36]	0.80 [20.32]	0.075 [1.905]
	20 BAR			
	35 BAR			
	350 BAR			

Pressure Range	PRESSURE REF	DIM C TYP.
7，20，35 BAR	ABSOLUTE	0.397[10.08]
	COMPOUND	0.391[9.92]
350 BAR	ABSOLUTE COMPOUND	0.397[10.08]

10 Mounting Considerations

The pressure sensor should be stud mounted on a clean, flat surface. The mounting torque for the sensor is not exceed 30 N-m.



WARNING – Do NOT tighten the sensor by twisting on the housing. Damage to the sensor WILL occur. Tighten to the correct torque using a wrench on the hex base.

WARNING – Install in a process connection with enough room to allow the use of Spanner/Wrench.

WARNING – To reduce the risk of burns or frost bite, wear protective personal equipment when installing or removing from high or below-freezing temperature process or environments.

WARNING – After installation carefully check for leaks.

11 Certifications & Compliances

CERTIFICATIONS

65X1N Wireless Sensors with characteristic (EX) in model name are certified for Intrinsic Safety to the following classification:

IS Class I, Div1, Groups A, B, C, and D;
Class I Zone 0, AEx ia IIC T4 Ga;
Ex ia IIC T4 Ga;
II 1 G Ex ia IIC T4 Ga

Please see section 14 for details on how to order.

12 REGLUATORY STATEMENTS

FCC and IC

This Radio Equipment is Certified for FCC (US) and ISED (Canada).

This equipment does not support simultaneous transmissions.

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

FCC Warning:

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 a particular installation. If this equipment does not cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment to an outlet on a circuit that is different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Industry Canada (IC) Warning:

This device complies with ISED Canada licence-exempt RSS standard(s). 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'ISED 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, et (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IMPORTANT NOTE:

Radiation Exposure Statement: This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. To maintain compliance with IC RF exposure compliance requirement, please follow operation instruction as documented in this manual.

Déclaration d'exposition aux radiations

Cetéquipementestconforme Canada limitesd'exposition aux radiations dans un environnement non contrôlé. Cetéquipementdoitêtreinstallé et utilisé à distance minimum de 20cm entre le radiateur et votre corps.

A distance of 20cm shall be maintained between the antenna and users, and the transmitter may not be co-located with any other transmitter or antenna.

13 EU Conformity

The products below were tested by approved agencies and found compliant with EU regulatory standards.

Model Families: 69X1N & 65X1N

Product Description: Wireless Pressure Sensor

Manufacture/Brand: TE Connectivity Ltd

Manufacturer:

Measurement Specialties (China) LTD

No 26 LangShan Road

518057 Shenzhen-Nanshan District, China

European Contact:

TE Connectivity Sensors France

4 Rue Gaye Marie

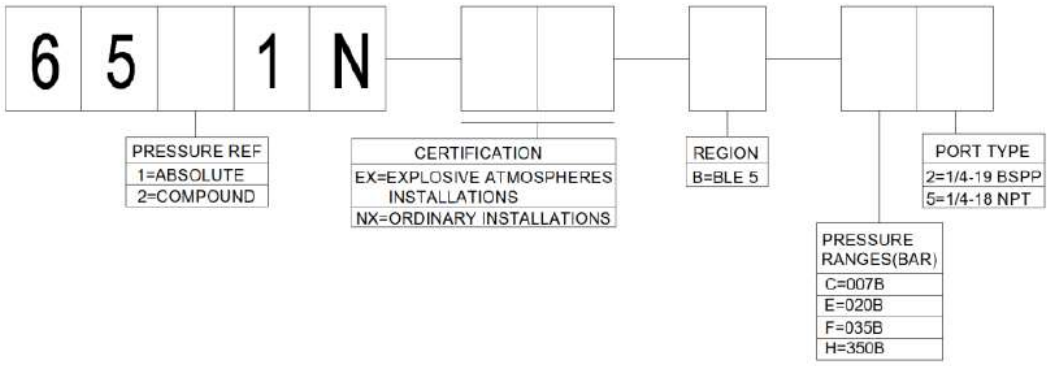
31027 Toulouse – France

OPERATING FREQUENCY (the maximum transmitted power)

2402MHz—2480MHz(EIRP 3.4dBm)

14 Ordering Information

BLE Sensor Model Number



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