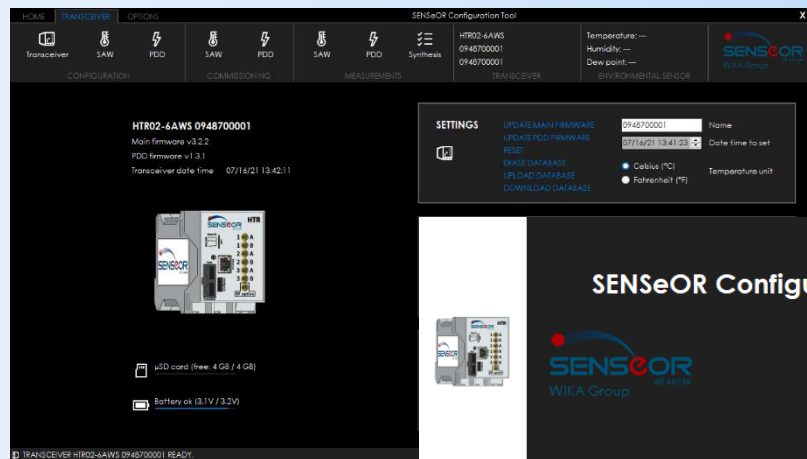


24/7 ASSET MONITORING SOLUTION ENERGY CONFIG. TOOL USER MANUAL

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WARRANTY

These products are warranted to be free from functional defects in material and in workmanship at the time of the manufacturing and to conform at that time to the specifications set forth in the relevant instruction manuals or in the data sheets, for such products for a period of one year.

Reference SENSEOR terms and conditions provided at time of purchase for complete warranty details.



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SAFETY INFORMATION

IT IS IMPORTANT TO READ THIS MANUAL BEFORE INSTALLING OR COMMISSIONING SENSEOR CRITICAL ASSET MONITORING SYSTEMS.

DANGER

DANGER INDICATES AN IMMINENTLY HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.

FAILURE TO FOLLOW THE INSTRUCTIONS GIVEN WILL RESULT IN DEATH OR SERIOUS INJURY.

WARNING

WARNING INDICATES A POTENTIALLY HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.

FAILURE TO FOLLOW THE GIVEN INSTRUCTIONS CAN RESULT IN DEATH OR IN SERIOUS INJURY.

CAUTION

CAUTION INDICATES A POTENTIALLY HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, MAY RESULT IN MINOR OR MODERATE INJURY.

FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PERSONAL INJURY.

NOTICE

NOTICE PROVIDES GUIDANCE ON DAMAGE UNRELATED TO PERSONAL INJURY, SUCH AS THOSE THAT CAN CAUSE DETERIORATED PROPERTY.

FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PROPERTY DAMAGE.

IMPORTANT

IMPORTANT INDICATES ADDITIONAL INFORMATION ABOUT MAKING EFFECTIVE USE OF THIS PRODUCT.

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OVERVIEW

This user manual describes how to use the *SENSeOR Configuration Tool* to configure a monitoring **HTR02-2AWS** or **HTR02-6AWS** transceiver, to add and to configure SAW sensors, to configure partial discharge, to upgrade firmwares and to perform other common tasks related to the commissioning of a *SENSeOR* monitoring system.

This manual provides user guidelines for Configuration Tool **version 3.2.0** application.

Previous revisions may operate differently.

1.1 SYSTEM HARDWARE INSTALLATION

This manual provides details on the software installation and its configuration **only**, please refer to the '[SENSeOR HTR02 User Manual](#)' for specific hardware details.

WARNING

PROFESSIONAL INSTALLATION REQUIRED.

INSTALLATION AND CONFIGURATION SHOULD BE PERFORMED ONLY BY USERS WHO ARE TECHNICALLY COMPETENT AND AUTHORIZED TO DO SO.

LOCAL REGULATIONS REGARDING ELECTRICAL INSTALLATION AND SAFETY MUST BE OBSERVED.

FAILURE TO FOLLOW THE GIVEN INSTRUCTIONS CAN RESULT IN DEATH OR IN SERIOUS INJURY.

CONFIGURATION TOOL INSTALLATION

1.2 OPERATING SYSTEM

The *SENSeOR Configuration Tool* operates only on Microsoft Windows operating system, with at least Windows 8 **64-bit**.

1.3 CONFIGURATION TOOL INSTALLER

To install *SENSeOR Configuration Tool*, open the provided distribution media (CD, memory stick, or zipped files sent via email) and double-click on the '*Setup SENSeOR Configuration Tool v3.2.0.msi*'.

NOTE

THE LAST REVISION OF THE SENSEOR CONFIGURATION TOOL IS AVAILABLE ON THE [SENSEOR WEBSITE](http://www.senseor.com).

The '*SENSeOR Configuration Tool – InstallShield Wizard*' will appear once the installer is launched. Follow the installer wizard instructions to complete the installation.

1.4 OTHER REQUIRED INSTALLATION

NOTE

ADMINISTRATOR RIGHTS ARE REQUIRED TO INSTALL AND TO MANAGE THE NETWORK FIREWALL SECURITY SETTINGS.

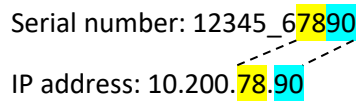
The *SENSeOR Configuration Tool* requires **Microsoft .NET Framework 4.8**. If the machine does not have Microsoft .NET Framework 4.8 installed, the installer can be found on the distribution media. Newer computers may only have newer Framework versions. Loading the older .NET Framework will not harm more recent Framework software.

1.5 CONFIGURATION OF THE CONNECTION

Transceivers Ethernet network is provided by a fixed configuration more detailed below.

Firstly, the IP address is defined by the last four digits of the product serial number printed on the side of the transceiver.

Serial number: 12345_67890
IP address: 10.200.78.90



Secondly, the connected computer must have an IP address in the range of '10.200.AA.BB' subnet and with '255.255.0.0' mask.

To avoid any IP addresses conflict between the transceiver and the computer, 'AA' and 'BB' settings are recommended to be higher or to be equal to the value of '100'.

APPLICATION LAUNCH

The *SENSeOR Configuration Tool* installation creates a shortcut in the desktop. Double-click on it to launch the program. If this shortcut is missing, open the directory where Configuration Tool has been installed and double-click on '*SENSeOR Configuration Tool.exe*'.

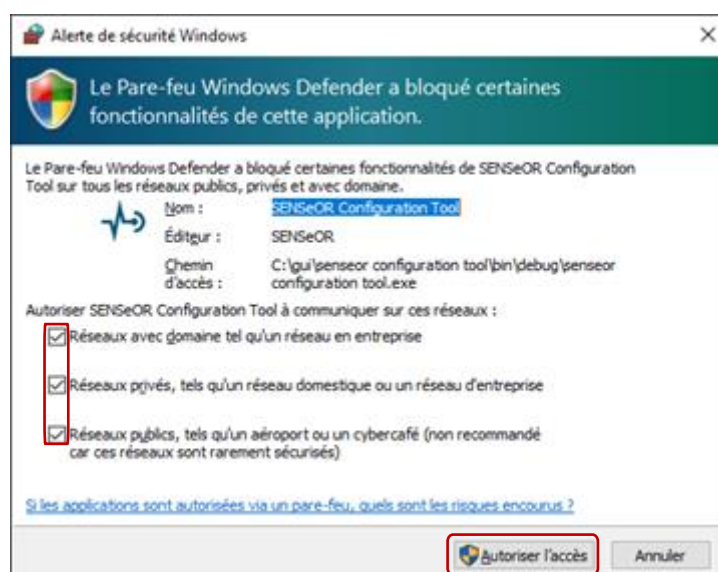
For Windows 10, locate newly installed applications in the Start screen and pin the program to the start menu or to the task bar, as desired.



1.6 FIRST LAUNCH AND WINDOWS FIREWALL

At the first use of '*Scan for transceivers*', the Windows firewall will ask for you about security notice.

You must allow the *SENSeOR Configuration Tool* software to communicate using your networks.



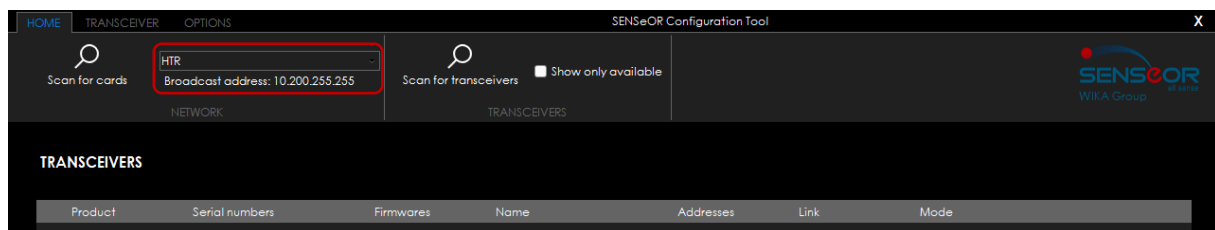
1.7 SOFTWARE STARTUP

At start-up, the application scans and lists **available and active** network adapters.

By default, the selected network card has the type of 'Ethernet'.

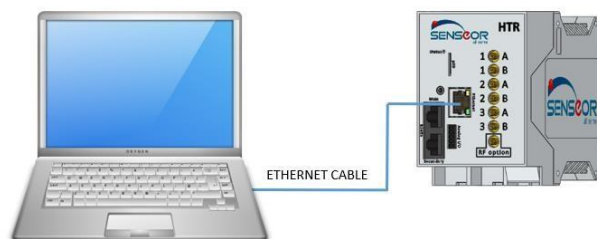
Select one transceiver among the connected ones. Only those connected with the selected network adapter are listed.

Only if needed, use the 'Scan for cards' button to refresh the network adapters list.

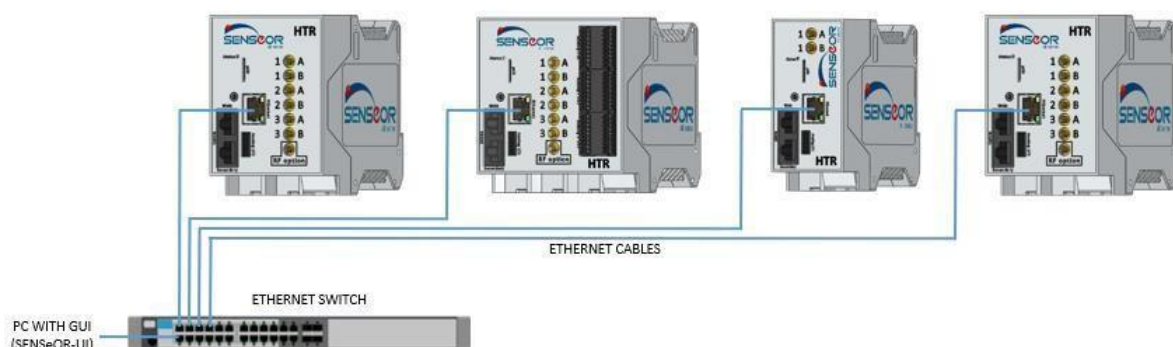


In case of Ethernet connection, two use cases are possible:

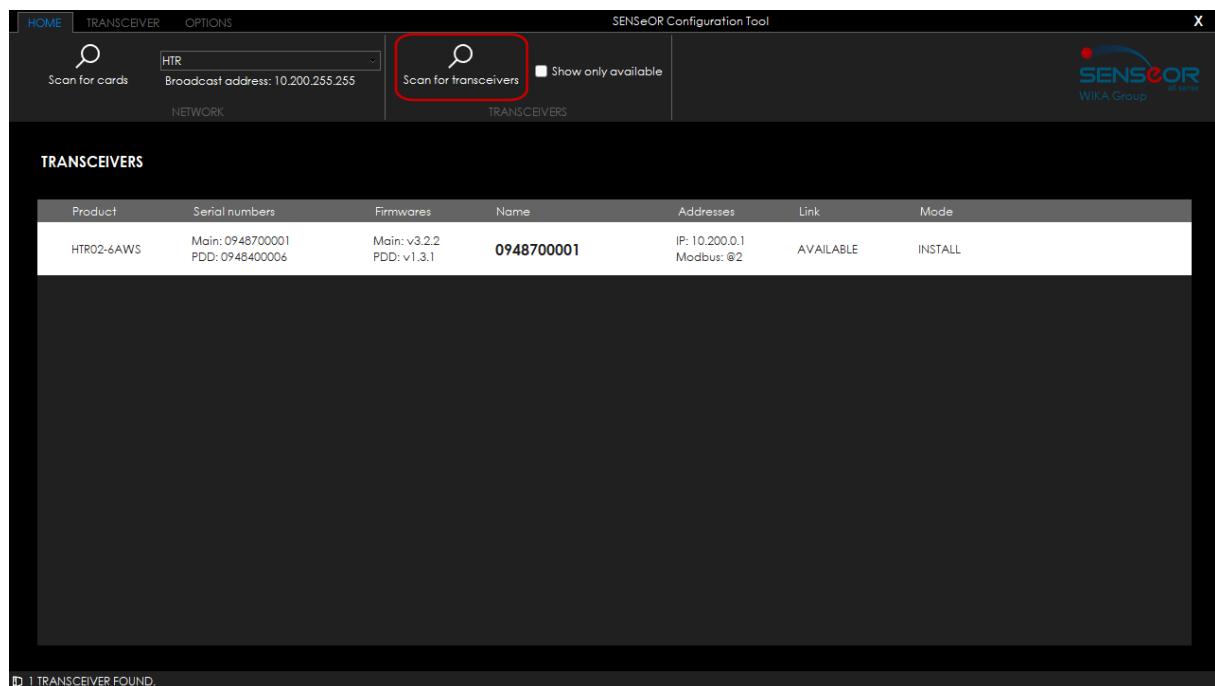
- Firstly, a direct connection between the computer and one transceiver (HTR02-2AWS or HTR02-6AWS):



- Secondly, several transceivers connected to an Ethernet switch (HTR02-2AWS and/or HTR02-6AWS):



Click on '*Scan for transceivers*' button to list the discovered transceivers on the selected network adapter as displayed below:

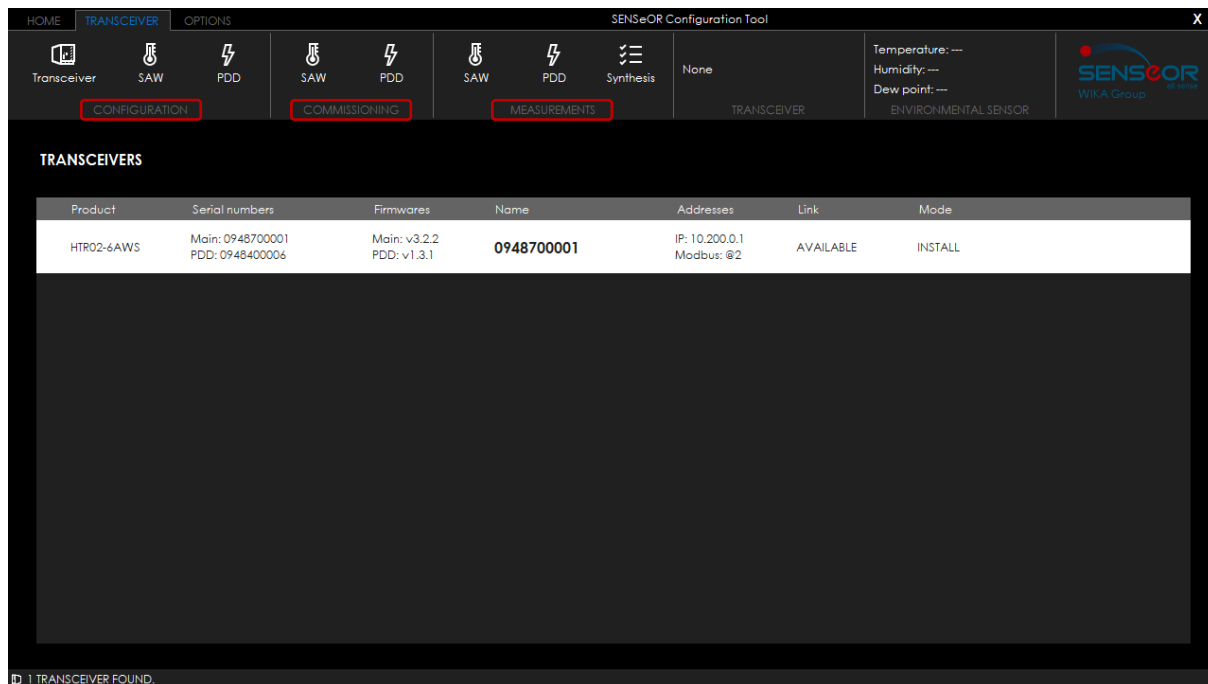


Each row corresponds to a transceiver containing:

- The product reference (HTR02-2AWS or HTR02-6AWS)
- The serial numbers (9 or 10-character) of the main board and the partial discharge one (if present)
- The firmware revisions for the main board and the partial discharge one (if present)
- The transceiver name
- The transceiver addresses (IP and Modbus)
- The link status:
 - AVAILABLE (transceiver is ready to connect)
 - NOT AVAILABLE (transceiver is already handled by another application)
- The current transceiver mode:
 - INSTALLATION
 - CONFIGURATION
 - DEMO SAW
 - DEMO PDD
 - MEASURE

MONITORING SOLUTION ENERGY

Select the transceiver to connect to, switch to 'TRANSCIEVER' tab and select your action between 'CONFIGURATION', 'COMMISSIONING' and 'MEASUREMENTS' panels:



The screenshot displays the SENSEOR Configuration Tool interface. The top navigation bar includes 'HOME', 'TRANSCIEVER' (selected), and 'OPTIONS'. The main toolbar contains icons for Transceiver, SAW, PDD, and Synthesis, with corresponding action buttons: 'CONFIGURATION', 'COMMISSIONING', and 'MEASUREMENTS'. The right sidebar shows sensor status (Temperature, Humidity, Dew point) and the SENSEOR Wika Group logo. The central area is titled 'TRANSCIEVERS' and contains a table with the following data:

Product	Serial numbers	Firmwares	Name	Addresses	Link	Mode
HTR02-6AWS	Main: 0948700001 PDD: 0948400006	Main: v3.2.2 PDD: v1.3.1	0948700001	IP: 10.200.0.1 Modbus: @2	AVAILABLE	INSTALL

At the bottom left, a status message reads: '1 TRANSCIEVER FOUND.'

INTERFACE DESCRIPTION

1.8 CONFIGURATION OF TRANSCIVER

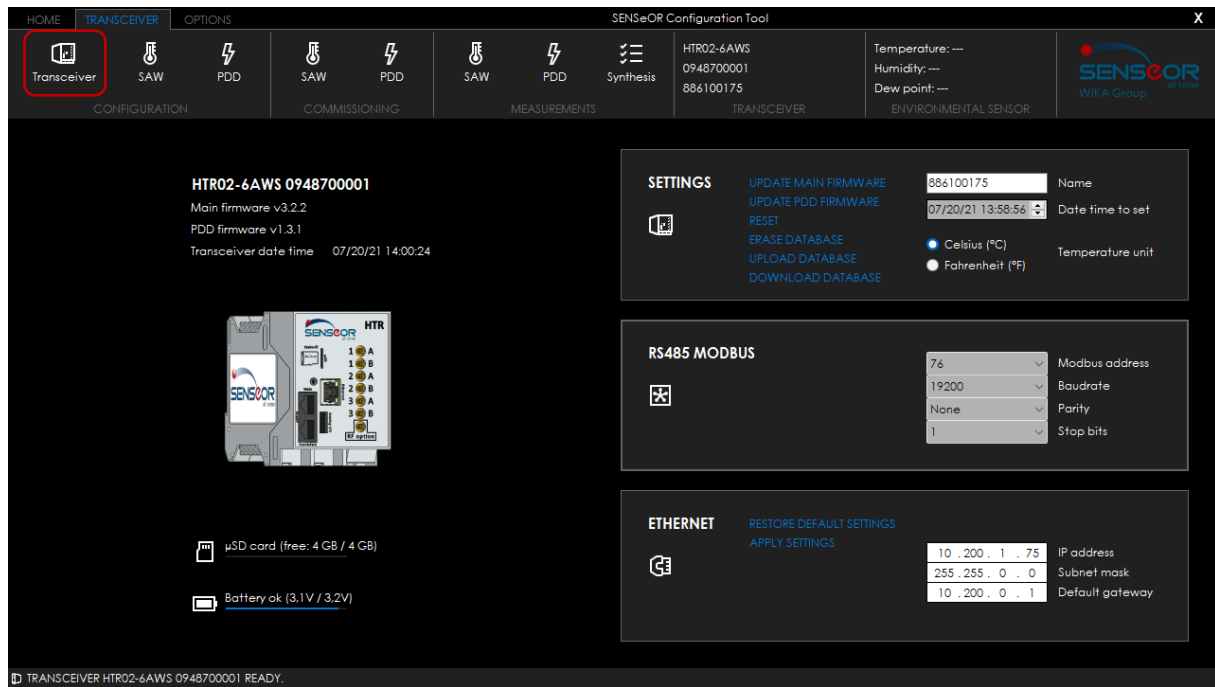
This page provides settings information of the connected transceiver. On the left side, transceiver main information is presented:

- Product reference and transceiver serial number
- Main firmware revision
- PDD firmware revision (if board is present)
- Internal date and time
- Transceiver image
- μ SD card status
 - μ SD card is absent
 - μ SD card is present and ready to use (with free space value)
 - μ SD card is present but almost full (with free space value)
 - μ SD card is present but full (with free space value)
- Battery level status (real time clock and data retention backup)
 - Battery is ok
 - Battery is low
 - Battery is critical

On the right side, transceiver settings are listed:

- GENERAL
 - Update the transceiver name (default value is the transceiver serial number)
 - Set a date and time to the transceiver
 - Temperature unit selection (*Celsius* or *Fahrenheit* – default value is '*Celsius*')
 - Update main firmware command (from a '*.bin' file)
 - Update PDD firmware command (from a '*.bin' file – only available if board is present)
 - Reset command (restarts the transceiver)
 - Erase database command (clear all content of the transceiver database)
 - Upload a database to the transceiver (from a '*.bin' file)
 - Download the transceiver database (to a '*.bin' file)
- RS485 MODBUS
 - Modbus address (from '1' to '247' – default value is the two last digits of transceiver serial number + 1)
 - Baudrate (default value is '19 200')
 - Parity (default value is '*None*')
 - Stop bits (default value is '1')

- ETHERNET
 - IP address (IPv4 format)
 - Subnet mask (IPv4 format)
 - Default gateway (IPv4 format)
 - Restore default settings command
 - Apply settings command



1.9 CONFIGURATION OF SAW SENSORS

SAW sensors are based on *Surface Acoustic Waves* technology and are wireless, battery-less and maintenance-free. Each RF antenna pair supports up to six sensors, and each transceiver supports up to eighteen sensors. For example, 'TSA EV11 XX' are surface temperature sensors and are specifically designed for electrical equipment monitoring.

This page allows to get and set SAW sensors configuration to the connected transceiver.

To simplify configuration and general understanding of the system, the *SENSeOR Configuration Tool* allows to configure the SAW sensors by groups.

On the left side, are listed all sensors available for configuration (following stored '*.xml' files in 'My documents\SENSeOR\Sensor data' directory). There is one row per SAW sensor (icon, product reference and serial number).

To add new SAW sensors into this list, you can:

- Copy all the XML files for your sensors into 'My documents\SENSeOR\Sensor data' before starting to use the software.
- Use the 'ADD SENSORS' command (up to the list). Only unconfigured sensors will be added.

The configured SAW sensors on the connected transceiver appear in the right side. Each group represents a group of three sensors. Each group is associated to an antenna pair (1A & 1B for groups A and B, 2A & 2B for groups C and D, 3A & 3B for groups E and F). Groups are organized to reflect the SAW sensors installation into the switchgear.

Example of a configuration with three antenna pairs and nine sensors:

- Group A is for bus bar with three sensors (one by phase)
- Group C is for circuit breaker with three sensors
- Group E is for cable compartment with three sensors

Each group is also composed of two alarms (disabled by default, while duration value is equal to '0'):

- Overheating (°C): set warning, alarm level and duration
- Deviation (°C): set warning, alarm level and duration

When an alarm is triggered and the relay activation is checked, the system will activate the front panel analog I/O relay switch output and the front status led will blink in red color. If the relay activation is disabled, only the front led status will blink in red color when an alarm is triggered.

Usually, the parameters that are configured in the switchgears are the following:

- Warning temperature: 85°C
- Alarm temperature: 110°C
- Duration (detection time): 60 minutes

To add a SAW sensor to a group, drag and drop sensor line from the left of the data grid view to the selected sensor group location. **Each antenna pair cannot host two sensors with the same product reference** ('TSA EV11 01' for example). The first column of the data grid view indicates the Modbus register where the sensor measurements will be available.

It is also possible to edit the group names.

When the configuration is done, click on 'SAVE' button to update the transceiver database.

Here below is described the SAW sensors configuration panel:

The screenshot displays the 'SENSeOR Configuration Tool' interface. The top navigation bar includes 'HOME', 'TRANSCIVER', and 'OPTIONS'. The 'TRANSCIVER' tab is active, showing a sidebar with 'ADD SENSORS' and 'DELETE SENSOR' buttons. A list of sensors is shown on the left, including 'TSA EV01 08' through 'TSA EV11 10'. The main area displays six groups (A-F) for configuration. Each group has a table with columns for 'R.', 'Warning', 'Alarm', and 'Dur. (min)'. Red arrows indicate a sensor being moved from the list to Group B. The 'SAVE' button is highlighted in the bottom right corner.

NOTE

TO REMOVE A SENSOR FROM ITS GROUP, SELECT IT FIRST THEN USE THE 'DELETE' KEY FROM THE KEYBOARD.

1.10 CONFIGURATION OF PARTIAL DISCHARGE

Partial discharge functionality provides the information of an insulation default inside an electrical power equipment. Physically, measurements are provided by RF probe antennas (the same used to interrogate the SAW sensors). Each transceiver supports up to three probe antennas composed of three twins of measurements (on *Low*, *Medium*, and *High* frequency bands).

This page allows to get and set partial discharge configuration to the connected transceiver.

First, you must select the mains voltage frequency between *50 Hz* and *60 Hz* (depending on your localization).

The '*Enable filtering*' check box allows to select the noise filtering functionality. Unselect it only for demonstration purpose. In this case, the system does not perform noise filtering on input signal and detects all activities not synchronized with 50 Hz or 60 Hz.

NOTE

INSIDE THE CUBICLE, BE SURE THAT THE '*ENABLE FILTERING*' CHECK BOX IS ENABLED DURING INSTALLATION.

To enable a probe antenna, click on the corresponding panel. The frame borders will turn into white color.

Each probe antenna is also composed of two alarms (disabled by default, while duration value is equal to '0'):

- Ratio (dB): set warning, alarm level and duration
- EPPC (Estimated Pulses Per Cycle): set warning, alarm level and duration

When an alarm is triggered and the relay activation is checked, the system will activate the front panel analog I/O relay switch output and the front status led will blink in red color. If the relay activation is disabled, only the front led status will blink in red color when an alarm is triggered.

When the configuration is done, click on 'SAVE' button to update the transceiver database.

Here below is described the partial discharge configuration panel:

SENSeOR Configuration Tool

HOME | **TRANSCIEVER** | OPTIONS

Transceiver | SAW | **PDD** | SAW | PDD | SAW | PDD | Synthesis

HTR02-6AWS
0948700001
0948700001

Temperature: ---
Humidity: ---
Dew point: ---

PROBE ANTENNA 1A & 1B ON

P.	Warning	Alarm	Dur. (min)
<input checked="" type="checkbox"/>	3.0	10.0	5
<input checked="" type="checkbox"/>	15.0	25.0	5

Ratio (dB)
EPPC (peaks/cycle)

PROBE ANTENNA 2A & 2B OFF

P.	Warning	Alarm	Dur. (min)
<input checked="" type="checkbox"/>	3.0	10.0	0
<input checked="" type="checkbox"/>	15.0	25.0	0

Ratio (dB)
EPPC (peaks/cycle)

PROBE ANTENNA 3A & 3B OFF

P.	Warning	Alarm	Dur. (min)
<input checked="" type="checkbox"/>	3.0	10.0	0
<input checked="" type="checkbox"/>	15.0	25.0	0

Ratio (dB)
EPPC (peaks/cycle)

Mains voltage frequency
☒ 50 Hz
☐ 60 Hz
☐ Enable filtering

CANCEL **SAVE**

✓ PDD CONFIGURATION SAVED.

1.11 INSTALLATION OF SAW SENSORS

1.11.1 SAW SENSORS DETECTION

WARNING

TO PERFORM THE COMMISSIONING OF THE SAW SENSORS, IT IS ASSUMED THAT ALL SENSORS ARE CORRECTLY INSTALLED INSIDE THE CUBICLE. ALL METALLIC PARTS AND DOORS ARE CLOSED, AND THE CIRCUIT BREAKER IS INSERTED AND IN NOMINAL SERVICE MODE.

SAW sensors installation page allows to proceed to the detection and the commissioning of the SAW sensors.

All configured SAW sensors are listed.

SAW SENSORS INSTALLATION

1) Close all doors including back door:

2) Put the circuit breaker in nominal service mode.

3) Confirm the local temperature around SAW sensors (°C).
If a temperature has to be different for a specific phase, see the SENSEOR HTR02 User Manual.

25

Product	Serial number	Ant. pair	Status
TSA EV01 01	TX7250191RX7255060	1A & 1B	START COMMIT
TSA EV01 04	TX7126378RX7111316	1A & 1B	START COMMIT
TSA EV01 07	TX7250628RX7255470	1A & 1B	START COMMIT

TRANSCIEVER HTR02-6AWS 0948700001 READY.

Check the enumerated instructions and adjust the local temperature surrounding the SAW sensors.

On the right list, each row corresponds to a sensor with its icon, product reference, serial number, antenna pair configured and the sensor commissioning status.

To commit a sensor, click on '*START COMMIT*' button.

NOTE

THE LOCAL TEMPERATURE INFORMATION MUST BE ADJUSTED BECAUSE IT IS USED TO OPTIMIZE THE DETECTION OF THE SAW SENSORS. THE DEFAULT VALUE IS 25°C.

1.11.2 COMMISSIONING OF THE SAW SENSOR

This view offers an advanced diagnostic for the selected sensor, before commissioning it.

Main graph represents the RF signal of the sensor response for the eight working points (one color per working point, from 'A' to 'H'), for the two resonators. X axis represents frequency (Hz), whereas Y axis stands for signal level (amplitude). By default, '*Only valid cur.*' is unchecked and the system displays series of valid working points.

- 'mMFR' value represents the quality of the sensor communication form factor. This value should be higher than '10' value.
- 'Frequency standard deviation' defines the deviation in Hz, compared with the product reference frequency (represented by '*f est.*' for estimated frequency). This value must be below '1500'.
- 'Power Tx' value displays the emitted RF power in dBm, sent by the transceiver to interrogate the resonator.

On the right side, data are refreshed once by clicking on the '*Play*' square button. At the first launch, one measurement is performed automatically. It may take up to one minute.

History publications can be displayed by checking '*Show measurement history*'.

Use '*SAVE LOG AS CSV FILE*' button to save the publication data.

The sensor status, the recommended working point and the estimated temperature are shown in the '*(1) Recommended working point*' area.

The calculation of the recommended working point is automatically provided by the firmware (that means the best one to interrogate the sensor). It is represented in bold in the graph more below.

To commit the SAW sensor, select a working point (the recommended one or another working point following your own diagnostic) through the combo box displayed as '*(2) Select working point*'.

If the estimated temperature measured by the SAW sensor is correct, click on the '*SAVE*' button in '*(3) Commit sensor*' location to validate the sensor configuration and its installation parameters.

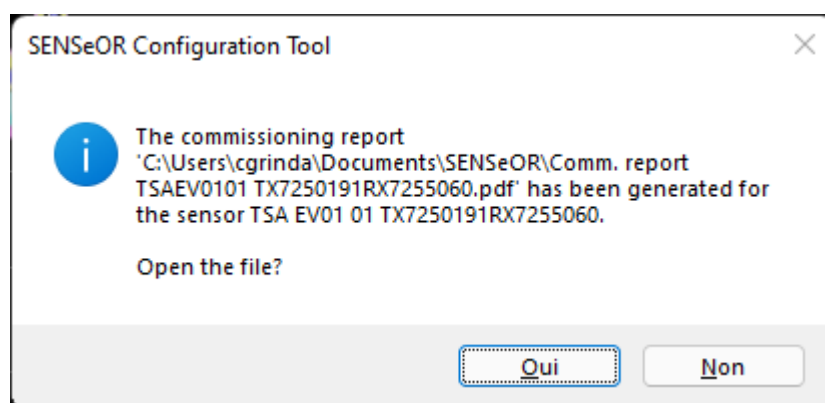
Else, check '*Use local temp. below as reference*' and adjust the local temperature to the one around the sensor before saving.

A report is generated to provide the system information into a PDF file. It includes the complete sensor installation data (that means the RF data and commissioning settings) by clicking on 'EDIT REPORT'. It is recommended to save this document.

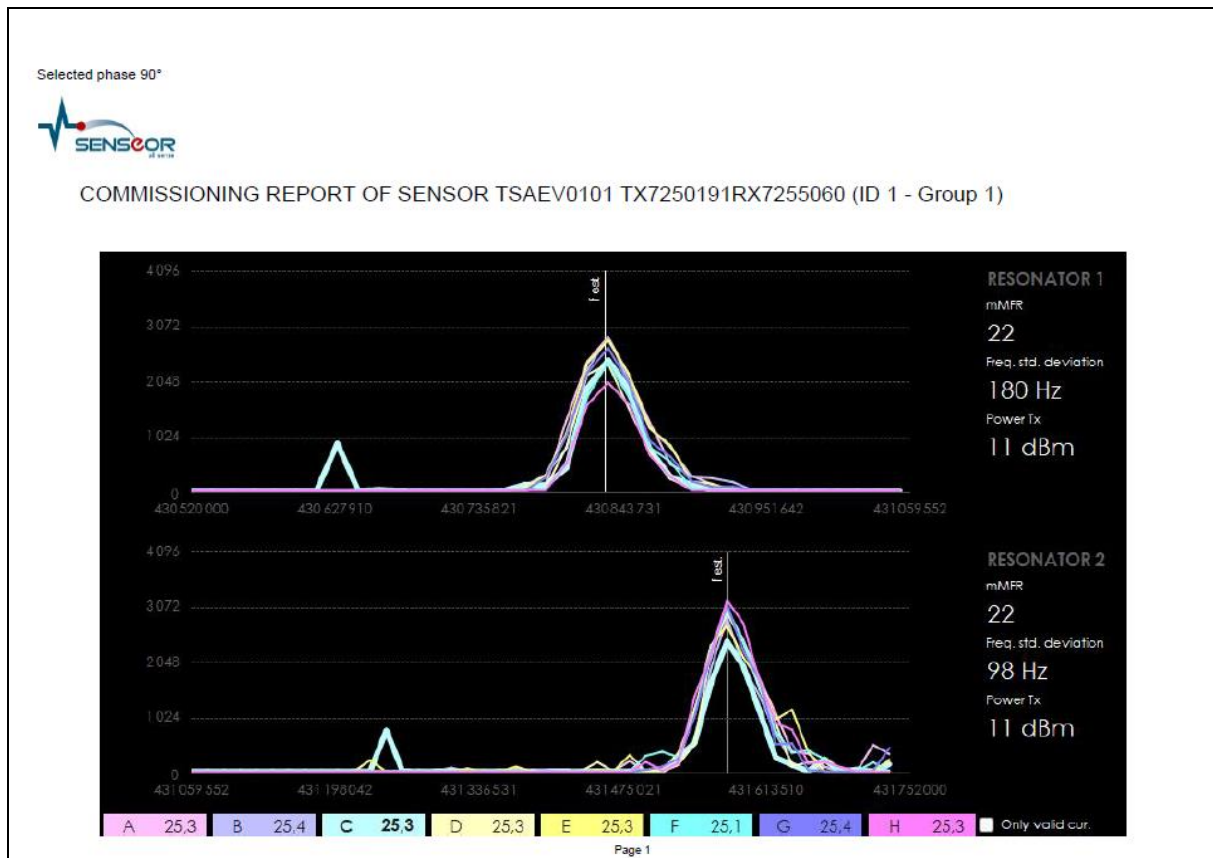
Below is displayed the SAW commissioning panel:



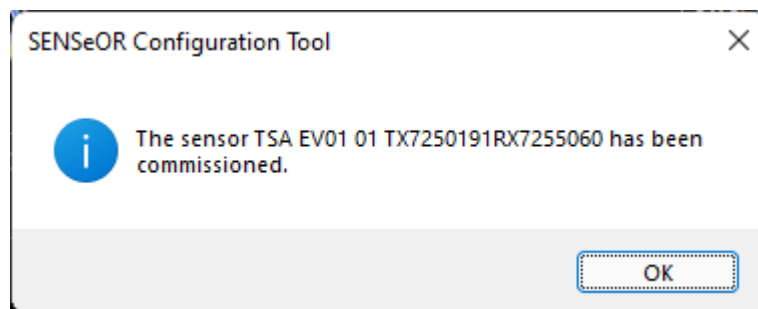
When the commissioning report is generated, the application suggests opening the PDF file:



Example of a generated report content:



If the SAW commissioning operation succeeded, below pop-up appears.



Furthermore, if the SAW commissioning succeeded, the program returns to the 'SAW SENSORS INSTALLATION' page. And this sensor status becomes 'COMMISSIONED'.

Repeat this commissioning procedure for all the listed SAW sensors:

The screenshot shows the "SENSeOR Configuration Tool" interface. The top navigation bar includes "HOME", "TRANSCIEVER", "OPTIONS", and "SENSeOR Configuration Tool". Below this, there are tabs for "Transceiver", "SAW", "PDD", "SAW", "PDD", and "Synthesis". The "SAW" tab is selected and highlighted with a red box. The main content area is titled "SAW SENSORS INSTALLATION" and contains three steps: 1) Close all doors including back door; 2) Put the circuit breaker in nominal service mode; 3) Confirm the local temperature around SAW sensors (°C). A temperature input field shows "25". To the right, there is a table with sensor data:

Product	Serial number	Ant. pair	Status
TSA EV01 01	TX7250191RX7255060	1A & 1B	COMMISSIONED
TSA EV01 04	TX7126378RX7111316	1A & 1B	START COMMIT
TSA EV01 07	TX7250628RX7255470	1A & 1B	START COMMIT

The "COMMISSIONED" status for the first sensor is highlighted with a red box. The "START COMMIT" buttons for the other two sensors are also highlighted with red boxes. At the bottom left, a status bar reads: "TRANSCIEVER HTR02-6AWS 0948700001 READY."

1.12 INSTALLATION OF PARTIAL DISCHARGE

WARNING

TO PERFORM THE PARTIAL DISCHARGE CALIBRATION, IT IS ASSUMED THAT ALL PROBE ANTENNAS ARE CORRECTLY INSTALLED INSIDE THE CUBICLE AND ALL METALLIC PARTS AND DOORS ARE CLOSED. THE CIRCUIT BREAKER IS INSERTED AND IN NOMINAL SERVICE MODE.

The partial discharge commissioning panel allows to calibrate probe antennas.

For each probe antenna, the calibration process must be performed first in *base level*, and then in *reference level*. It may take up to two minutes.

The base level calibration must be done when the switchgear is switched off and the reference level when the switchgear is powered on.

The calibration results appear when the listening process is done on each channel:

- LFB (low frequency band)
- MFB (medium frequency band)
- HFB (high frequency band)

Below is described the PDD probe antennas installation. Blue color displays the base and reference levels to calibrate since the PDD probe antennas are already enabled in the PDD configuration page:

HOME TRANSDUCER OPTIONS SENSEOR Configuration Tool

Transceiver SAW PDD SAW PDD Synthesis HTR02-6AWS 0948700001 0948700001 Temperature: --- Humidity: --- Dew point: --- SENSEOR Wika Group

CONFIGURATION COMMISSIONING MEASUREMENTS TRANSCEIVER ENVIRONMENTAL SENSOR

PROBE ANTENNA 1 NOT CALIBRATED

PERFORM BASE LEVEL PROCEDURE

PERFORM REFERENCE LEVEL PROCEDURE

LFB channel	MFB channel	HFB channel	RF frequency (Hz)
368 000 000	573 000 000	1 175 000 000	
4 000	4 000	2 500	Offset
30.55	10.36	11.04	Base level
			Reference level

PROBE ANTENNA 2 DISABLED

PERFORM BASE LEVEL PROCEDURE

PERFORM REFERENCE LEVEL PROCEDURE

LFB channel	MFB channel	HFB channel	RF frequency (Hz)
			Offset
			Base level
			Reference level

PROBE ANTENNA 3 DISABLED

PERFORM BASE LEVEL PROCEDURE

PERFORM REFERENCE LEVEL PROCEDURE

LFB channel	MFB channel	HFB channel	RF frequency (Hz)
			Offset
			Base level
			Reference level

PERFORMING CALIBRATION OF REFERENCE LEVEL ON THE PROBE ANTENNA 1... IT MAY TAKE UP TO TWO MINUTES.

When a probe antenna is fully calibrated, the frame borders turn into white color:

HOME

TRANSCIVER

OPTIONS

SENSeOR Configuration Tool

X

Tranceiver

SAW

PDD

SAW

PDD

SAW

PDD

SAW

PDD

Synthesis

HTR02-6AWS

0948700001

0948700001

Temperature: ---

Humidity: ---

Dew point: ---

SENSeOR

WIKI Group

CONFIGURATION

COMMISSIONING

MEASUREMENTS

TRANSCIVER

ENVIRONMENTAL SENSOR

PROBE ANTENNA 1 CALIBRATED

PERFORM BASE LEVEL PROCEDURE

PERFORM REFERENCE LEVEL PROCEDURE

LFB channel

368 000 000

800

10.32

10.61

MFB channel

573 000 000

600

10.39

10.47

HFB channel

1 175 000 000

600

10.28

10.26

RF frequency (Hz)

Offset

Base level

Reference level

PROBE ANTENNA 2 DISABLED

PERFORM BASE LEVEL PROCEDURE

PERFORM REFERENCE LEVEL PROCEDURE

LFB channel

MFB channel

HFB channel

RF frequency (Hz)

Offset

Base level

Reference level

PROBE ANTENNA 3 DISABLED

PERFORM BASE LEVEL PROCEDURE

PERFORM REFERENCE LEVEL PROCEDURE

LFB channel

MFB channel

HFB channel

RF frequency (Hz)

Offset

Base level

Reference level

✓ REFERENCE LEVEL DONE ON THE PROBE ANTENNA 1.

1.13 INSTALLATION SUMMARY AND VALIDATION

NOTE

TO TURN THE SWITCHGEAR MONITORING SYSTEM ON, THE FULL CONFIGURATION AND COMMISSIONING HAVE TO BE DONE FOR THE SELECTED TRANSCEIVER AND THE MEASUREMENT MODE HAS TO BE ENABLED IN SYNTHESIS PANEL.

The measurement mode allows the system to proceed to the measurement of the SAW sensors temperature and the partial discharge activity with a nominal refresh rate of **15 minutes**.

To enable the measurement mode, go into '*TRANSCEIVER* → *Synthesis*' page.

This panel provides:

- The list of configured SAW sensors for this system with the installation information
- The list of partial discharge probe antennas configured, including the calibration information

A report is generated to provide the system information into a PDF file. It includes the complete system installation data (that means the calibrated sensors and the partial discharge probe antennas) by clicking on '*EDIT REPORT*'. It is recommended to save this document.

Below is described the '*Synthesis*' panel:

SAW SENSORS

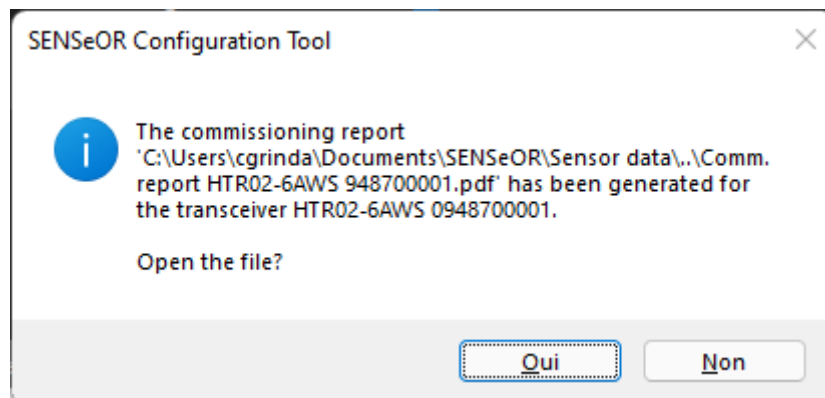
Product	Serial number	Group	Antenna pair	Modbus register	Working point	Commissioned
TSA EV01 01	TX7250191RX7255060	Group A	1A & 1B	@30001	C	<input checked="" type="checkbox"/>
TSA EV01 04	TX7126378RX7111316	Group A	1A & 1B	@30002	E	<input checked="" type="checkbox"/>
TSA EV01 07	TX7250628RX7255470	Group A	1A & 1B	@30003	C	<input checked="" type="checkbox"/>

PARTIAL DISCHARGE

Antenna pair	Channel	Frequency	Offset	Base level	Reference level	Calibrated
1A & 1B	LFB	368 000 000 Hz	4000	30.55	33.16	<input checked="" type="checkbox"/>
1A & 1B	MFB	573 000 000 Hz	4000	10.36	10.01	<input checked="" type="checkbox"/>
1A & 1B	HFB	1175 000 000 Hz	2500	11.04	12.02	<input checked="" type="checkbox"/>

EDIT REPORT **START MEASUREMENT MODE**


When the commissioning report is generated, the application suggests opening the PDF file:



Example of a generated report content:

07/16/21 14:13:18
Local temperature (C): 25

Generated by SENSEOR Configuration Tool v3.2.0



COMMISSIONING REPORT OF TRANSCEIVER HTR02-6AWS 0948700001

ETHERNET		MODBUS		TRANSCEIVER	
IP address	10.200.0.1	Modbus address	@2	F/W Main	v3.2.2
Subnet mask	255.255.0.0	Baudrate	19200	F/W PDD	v1.3.1
Default gateway	10.200.0.1	Parity	NONE	Antenna pairs	3

SAW SENSORS:

Product	Serial number	Group	Antenna pair	Modbus register	Working point	Commissioned
TSA EV01 01	TX7250191RX7255060	Group A	1A & 1B	@30001	D	True
TSA EV01 04	TX7126378RX7111316	Group A	1A & 1B	@30002	C	True
TSA EV01 07	TX7250628RX7255470	Group A	1A & 1B	@30003	C	True

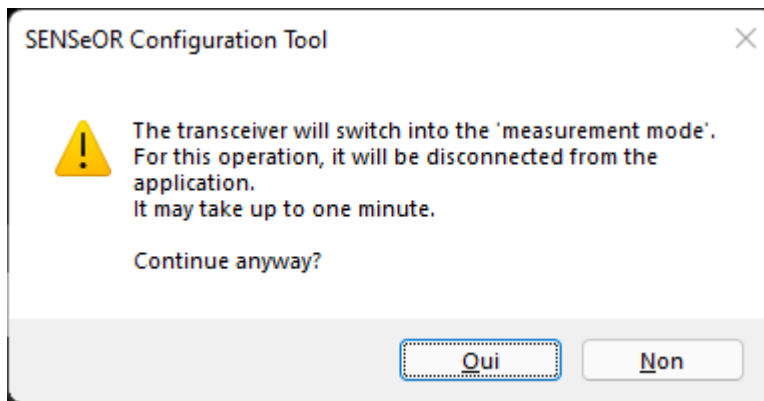
PARTIAL DISCHARGE:

Antenna pair	Channel	Frequency	Offset	Base level	Reference level	Calibrated
1A & 1B	LFB	368 000 000 Hz	800	10.32	10.61	True
1A & 1B	MFB	573 000 000 Hz	600	10.39	10.47	True
1A & 1B	HFB	1175 000 000 Hz	600	10.28	10.26	True

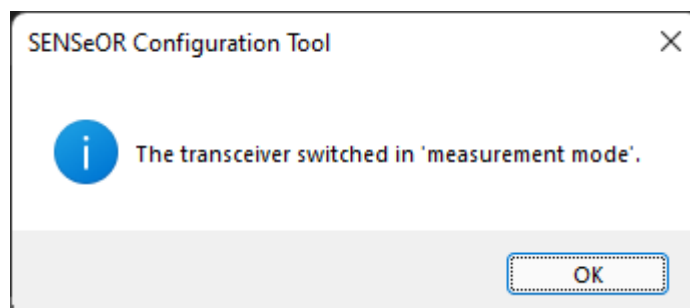
1.13.1 SWITCHING IN 'MEASUREMENT MODE'

To turn the system on measurement mode, click on the '*START MEASUREMENT MODE*' button.

Valid the warning message:



After a while, a popup appears specifying that the system switched in measurement mode. When enabled, the button switches from '*START MEASUREMENT MODE*' in black color to '*STOP MEASUREMENT MODE*' in white color.



NOTE

WHEN THE SYSTEM IS IN MEASUREMENT MODE, THE SYSTEM ONLY PERFORMS MEASUREMENTS OF CONFIGURED AND COMMISSIONED SAW SENSORS AND OF PARTIAL DISCHARGE PROBE ANTENNAS.

IN THIS MODE, YOU CANNOT MODIFY THE CONFIGURATION ANYMORE UNTIL STOP MEASUREMENT MODE IS SELECTED.

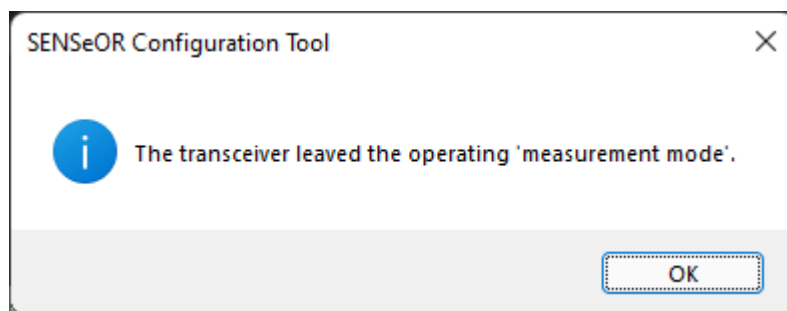
1.13.2 LEAVING 'MEASUREMENT MODE'

Leaving the measurement mode is possible to edit an existing configuration or to perform a new one.

To turn back to configuration, select the transceiver in the measurement mode. Only the '*Synthesis*' button is available (from '*TRANSCIVER*' tab).

By selecting the '*STOP MEASUREMENT MODE*' button, the transceiver should successfully change the mode after the reception of the following pop-up highlighting that the transceiver is no more in measurement mode. This pop-up can take some time to be displayed.

Below is described the corresponding pop-up:



1.14 SAW SENSORS MEASUREMENTS (DEMO MODE)

This panel shows dynamic and kinetic measurements of SAW sensors. At least one sensor must be configured and commissioned to access to this page. In this mode, the system provides a faster refresh rate and assures to **interrogate only the SAW sensors**.

SAW sensors are horizontally displayed by group of three sensors.

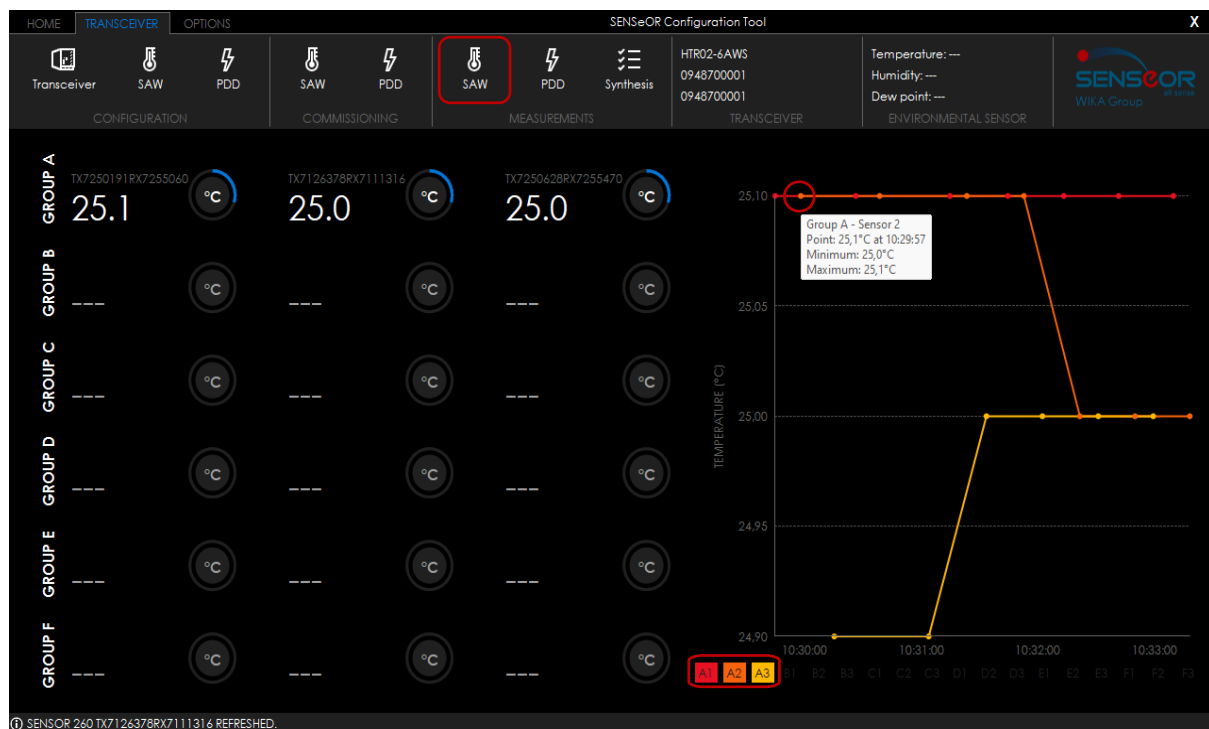
A left side is shown the measurements done in live, whereas at right side are displayed the kinetic measurements.

Each series represent a SAW sensor measurement. By clicking on the caption of the graph, the SAW sensor traces are available (from 'A1' to 'F3').

The X axis represents the date and the time (according to the local system time zone, not the internal transceiver date and time), whereas Y axis defines the measured temperature (according to the specified unit).

The graph can be zoomed in and out using the square button above the vertical scroll bar.

In the graph below, moving the mouse pointer over a point displays SAW sensor data like its group, the sensor number in the group, its values on the graph (on X, Y axis) and for example the minimum and the maximum temperature values for this sensor.



1.15 PARTIAL DISCHARGE MEASUREMENTS (DEMO MODE)

This panel shows dynamic and kinetic measurements of the partial discharge probe antennas. At least one probe antenna must be configured and calibrated to access to this page. In this mode, the system uses a fast refresh rate and **interrogates only the probe antennas**.

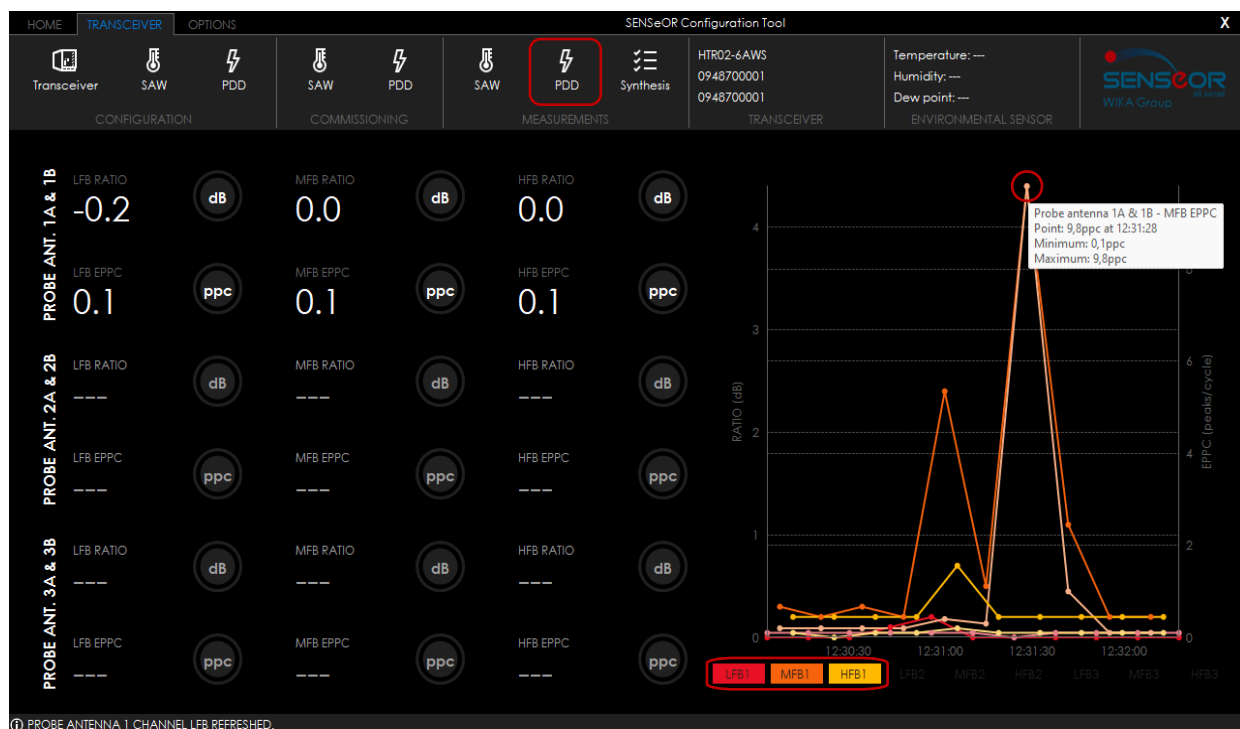
Values are horizontally grouped by three frequency channels (*LFB*, *MFB* and *HFB*) and vertically by two kinds of data, the *ratio* and the *EPPC* settings. At left, live measurements are displayed, whereas at the right side, the kinetic measurements are represented.

Each series provide a physical value, grouped by two kinds of data. The most intense color defines the *ratio*, whereas the clearest one the *EPPC*. From 'LFB1' to 'HFB3', click on the series caption to show or to hide the twin traces. So, each probe antenna has six kinds of data.

The X axis defines the date and the time (according to the local system time zone, not the internal transceiver date and time). At left side of Y axis is represented the *ratio* (dB) and at the right side of it is displayed the *EPPC* (peaks per cycle).

This graph can be zoomed in and out using the square button above the vertical scroll bar.

In the graph, moving the mouse pointer over a point displays following data: the probe antenna, the frequency band interrogated (*LFB*, *MFB*, *HFB*) and the minimum and the maximum received power in dB values for this probe antenna setting.



INSTALLATION PROCEDURE

To proceed to a system commissioning, the following steps must be executed:

- Perform the installation of the antennas and the SAW sensors as mentioned in the '*SENSeOR Installation Manual*'.
- Power on the HTR02 transceiver and connect it to a computer using an Ethernet cable following the instructions of the chapter: '[CONFIGURATION OF THE CONNECTION](#)'.
- Proceed to the discovering through Ethernet network.
- Configure the main system like:
 - The transceiver name
 - The RS485 parameters if needed
 - The temperature unit, *Celsius* or *Fahrenheit*
 - The Ethernet IP configuration
- Configure the groups by adding the SAW sensors according to the sensor IDs and to the names in the groups and following the related antennas pair. You can also enable the alarms levels.
- Configure the partial discharge detection by enabling the selected antenna probes and by enabling the requested alarm levels.
- Perform now the detection of the SAW sensors and their commissioning. At this moment, it is assumed that sensors and antennas are installed inside the cubicle, the circuit breaker is engaged and in nominal service mode. Do not forget to close all doors!
 - Go into '*COMMISSIONING* → *SAW*' panel.
 - Let the system performs a first detection. For more information, see the instructions in chapter: '[INSTALLATION OF SAW SENSORS](#)'.
 - If a SAW sensor commissioning fails, the operator must adapt the antennas to move the position of the related sensor to be able to get the correct detection and check the green led indicator is displayed. Do not forget specially to correct the estimated local temperature surrounding the sensor for a specific working point if different with the system temperature defined at the first interrogation.
 - The commissioning of a SAW sensor must be completely achieved to store measurement parameters required in the measurement mode.
- Proceed to partial discharge installation in two times:
 - Firstly, during the system commissioning, a base level is measured to get environmental noise.
 - Secondly, the switchgear is powered on and the reference level calibration must be done to get the partial discharge activity at start-up.
- **Switch the system in the 'Measurement mode'.**

IMPORTANT

IT IS ASSUMED THAT THE SENSORS AND THE ANTENNAS HAVE BEEN INSTALLED IN A POWERED-ON SYSTEM. IF LAB TESTS ARE PERFORMED, ENSURE THAT THE SENSORS AND THE ANTENNAS ARE ON A METAL SURFACE FOR BEST RESULTS.

IMPORTANT

IF THE SENSORS HAVE ALREADY BEEN POSITIONNED INSIDE THE CUBICLE BEFORE THE CONFIGURATION WITH THE CONFIGURATION TOOL, PLEASE ENSURE TO DOCUMENT THE SENSORS' LOCATION, AND THE SENSOR REFERENCES TO EASE THE INSTALLATION.

IMPORTANT

AN ANTENNA SHOULD BE ENABLED ONLY FOR SENSORS THAT ARE REASONABLY EXPECTED TO BE MEASURED. THAT IS, A SENSOR INSIDE A CABLE COMPARTMENT CANNOT BE READ THROUGH A METAL BARRIER BY AN ANTENNA IN THE BUS BAR COMPARTMENT. THIS KIND OF INSTALLATION SHOULD NOT BE ENABLED.