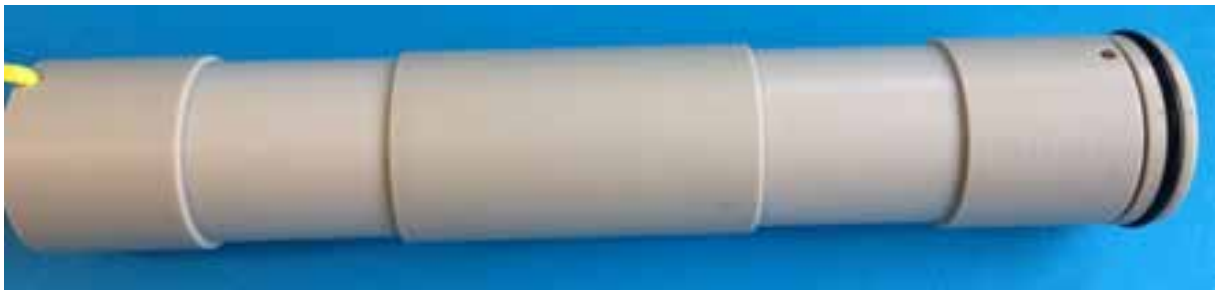
WISENS TD

PRESSURE AND TEMPERATURE MEASUREMENTS



Revision 1.2 (06.07.18)

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1 Product description

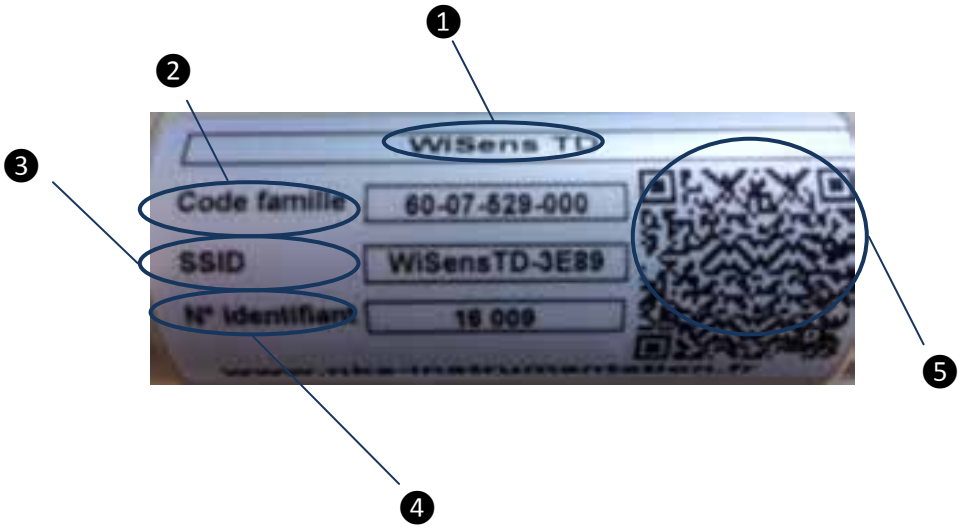
The WISENS TD data logger measures and records pressure and temperature over a depth range from 0 to 1000m. Three versions are available: 50m, 500m and 1000m.

The data is stored in FLASH memory and can be retrieved by the user after the unit has been recovered. Connection to the data logger is achieved through a WiFi link that the user can activate using the docking station supplied.

The WISENS TD configuration and data recovery do not require any dedicated software. The data logger can be fully used from a Web browser such as IE, Safari or other.

2 Product identification

The sensor is identified by a label that includes its identifiers and the information necessary for its connection.



1. Product name
2. Product family code (nke Instrumentation internal information)
3. Product serial number
4. SSID number to identify the product over WiFi
5. QR-code to access the configuration interface

The SSID number identifies the product in the list of available WiFi networks proposed on the platform used (PC, tablet or smartphone).

3 WiFi activation

By default, and upon delivery, the product is switched off and the WiFi is not activated. Activation is performed using the docking station supplied.

The docking station includes a blue LED that indicates WiFi activation. This feature is useful but not necessary for the sensor to operate. In order to use this visualisation aid, the mini-USB cable must be connected to a standard USB port that will power the LED. When the WiFi is activated, the blue LED flashes.

The docking station is designed to hold the sensor and to instantly activate the WiFi when the latter is placed in the slot. The sensor must be positioned in such a way that the antenna end is on the LED side and the identification label is centred on the docking station, facing upwards.

Once the sensor is correctly positioned, the WiFi should activate within a few seconds (3 to 4 seconds). From then on, it is possible to connect to the WISENS TD.

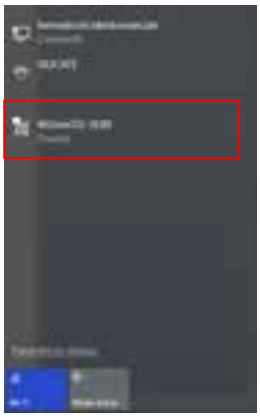
4 Connection to WISENS TD

⚠ Once the WiFi is activated, it remains active for **1 minute and 30 seconds**. If no connection is made during that time, the WISENS returns to standby mode. The WISENS TD must then be removed from the docking station and placed back to activate a new WiFi session.

1.1 From a PC

Before attempting to connect to the WISENS TD, make sure the WiFi is activated on the PC used (PC-integrated WiFi or WiFi USB stick). Under Windows 7 or Windows 10, click on the network icon in the bottom right corner of your screen. If the WISENS TD WiFi is activated, it should appear in the list of networks. To connect, click on the corresponding WISENS TD. The connection sequence will include the following steps (under Windows 10):

Connection sequence



The WISENS TD *appears in the list of available networks. It must match the sensor's SSID.*

When connecting for the first time, you can set it to automatic mode if it detects the WISENS TD. *In any case, click on connect.*

Connection in progress window.

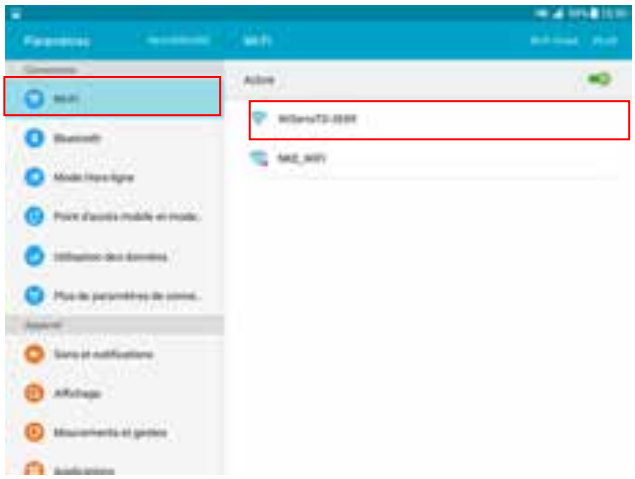
The PC is connected to the WISENS TD.

Only one platform can connect to the WISENS TD at a time. Thus, if the option of automatic connection to the WISENS TD is checked on multiple platforms (PC, iPhone, tablet, etc.), the first one that connects will take control of the sensor, thereby preventing the other platforms from connecting.

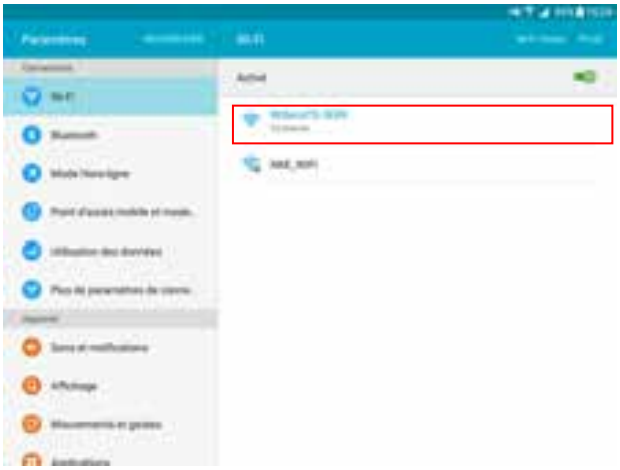
1.2 From an Android smartphone / tablet

The WISENS TD data logger is seen as a network identified by its SSID. A connection to the WISENS TD must therefore be established before it can be used. To do this, go to the application menu.

Select the "Settings" application.



Check that the WiFi is activated and that the WISENS TD *appears in the list of available networks.*



Select the WISENS TD *so the tablet or smartphone connects to the sensor. It should then appear as connected.*

1.3 From an iPhone / iPad

To connect the WISENS TD to an iPhone or iPad, activate the WiFi and select the desired instrument. To do this, go to the settings menu by selecting the corresponding icon on the iPhone or the iPad.

In the settings menu, select WiFi.

Check that the WiFi is activated and that the WISENS TD *appears in the list of available networks.*

Select the WISENS TD *so the iPhone or iPad connects to the sensor.*

5 Launching the user interface

Before you can launch the WISENS TD sensor interface, the platform you are using must be connected to the sensor. Otherwise, a loading error will appear.

5.1 Using the QR-code

Using the QR-code allows you to quickly access the interface without having to enter the connection's IP address.

The QR-code is located on the identification label of the WISENS TD sensor or below:

It works with platforms that feature a camera, such as smartphones and tablets.

Once the WISENS TD is connected to the platform, use an application designed to read this QR-code (Flashcode or similar). When the QR-code is flashed, the application will switch to a browser and open the WISENS TD sensor configuration page.

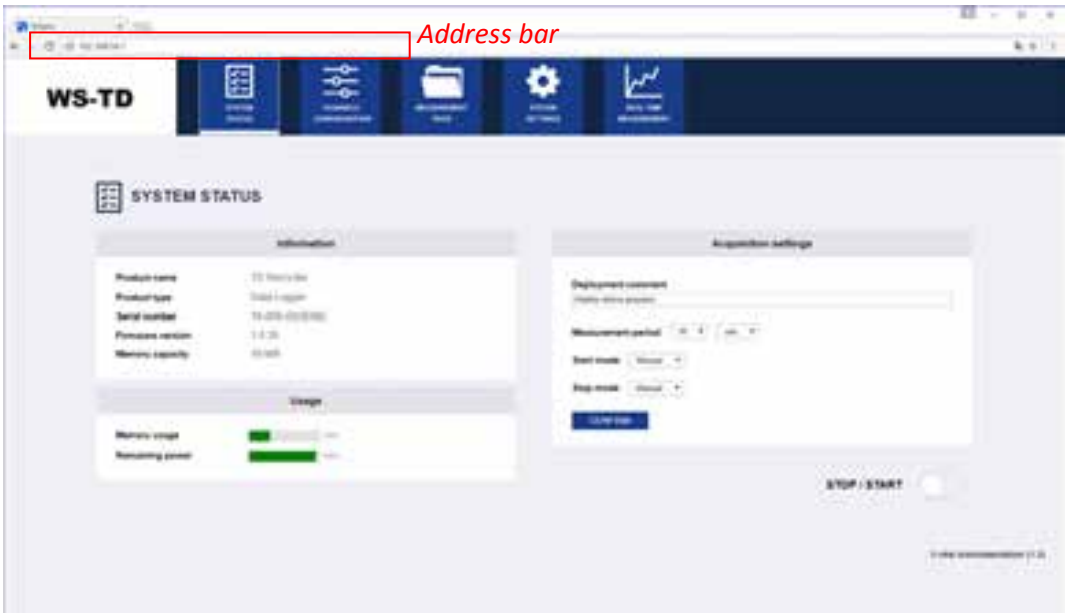
Interface loading upon QR-code detection

5.2 From a browser

The interface is compatible with the most popular Web browsers (Safari, Internet Explorer, Chrome, Firefox). Start a session from your browser. Enter the following in the address bar:

http://192.168.56.1/

The interface will load and the following screen should appear:



The IP address shown in this document is the default IP address of the WISENS TD sensor. This address can be changed in the interface. However, if you change the address and forget what you

have entered, you will no longer be able to access this interface. In such a case, you will need to follow the recovery procedure (see 5.4).

5.3 Creating a shortcut on an iPhone / iPad

To avoid systematically entering the sensor's IP address, you can create an "application" shortcut on your iPad or iPhone. Once connected to the WISENS TD sensor, launch Safari on your iPad / iPhone and enter the sensor's address.

Once on the WISENS TD *home page, select the transfer icon.*

Select Add to home screen.

The app icon is created. The next time you want to connect, simply ***click on the icon****.*

5.4 Resetting the IP address

If the IP address of the WISENS TD sensor has been changed and the user forgets what it is, the WISENS TD can be reset to the default address.

To do this, a power cycle (ON/OFF) must be performed using the WISENS TD docking station.

Place the WISENS TD on its docking station in the WiFi activation configuration. Then perform 5 power cycles (by placing the sensor on the docking station then removing it) in less than 10 seconds.

The subsequent connection to the WISENS TD sensor will be made using the default IP address.

6 User Interface

6.1 Home page / System status

This is the WISENS TD connection page. Depending on the platform used, the following pages are displayed when the interface is launched:

Interface in a Web browser

Interface on an iPhone

6.1.1 Information window

No entry can be made in the information window. It provides information such as:

Product name	This name can be customised by the user under the "System settings" tab
Product type	nke product category
Serial number	Number specific to the product
Software version	Version of the software installed in the product
Memory capacity	Flash memory capacity for data storage

6.1.2 Usage window

No entry can be made in the usage window. It provides information on memory usage and the remaining level of energy.

Memory usage is calculated based on the memory capacity of the WISENS TD sensor. Accuracy is within 1%.

The remaining energy is calculated in real time according to the operations performed by the sensor, taking into account all phases of operation, in particular those involving the energy-intensive WiFi connection. The remaining energy is calculated based on the capacity of the battery used, i.e. 5.8Ah.

⚠ If data acquisition has not been stopped, it will appear below "Remaining energy", the acquisition start date and the number of measurements already made.

6.1.3 Acquisition settings window

This window allows you to configure the acquisition mode of the WISENS TD sensor. It defines the acquisition rates and start/stop modes.

6.1.3.1 Deployment comment

This is an entry field. It allows you to write a comment that will be associated with the measurement file. The comment can help identify a specific campaign or configuration. Entering a comment is not compulsory.

⚠ If a comment is written, it will be inserted in every file created until it is either deleted or modified.

6.1.3.2 Measurement frequency

The frequency is chosen from a list. The sampling speeds are pre-formatted to the following values (and then depend on the selected unit): 10/20/50/100/200/250/500

The lowest possible period is 20ms. However, maintaining this frequency depends on the channel configuration (averaging, number of channels). If the configuration does not allow this frequency to be maintained, a "window" will appear to warn that the frequency cannot be maintained. For the WISENS TD, the minimum period is 500ms. In order to decrease this period, the sensor's performances must be reduced.

⚠ Failure to maintain the frequency does not prevent the configuration from being loaded. However, the data will not be acquired at the desired value. It is recommended to change the frequency and select one that is compatible with the channel configuration.

6.1.3.3 Start mode

You can choose between three start modes, as described below:

Manual	Date	Condition
Acquisition will begin as soon as the sensor is disconnected (removed from the docking station)	Acquisition will begin on the scheduled date and time	Acquisition will begin as soon as the programmed condition is fulfilled

It should be noted that these modes will only be active if the sensor has been placed in recording mode (see 6.1.4).

Timed start mode:

You can select the date on the calendar or enter it manually.

Conditional start mode:

For a conditional start, the condition parameter can be selected from the list of available parameters. For the WISENS TD sensor, the choice is between the pressure channel and the temperature channel.

You can select the direction of the condition (higher or lower than a set value) and the monitoring frequency for the condition.

6.1.3.4 Stop mode

As with the start modes, you can choose between three stop modes, as described below:

Manual	Date	Condition
Acquisition will stop once the acquisition is stopped from the sensor interface	Acquisition will stop on the scheduled date and time	Acquisition will stop as soon as the programmed condition is fulfilled

It should be noted that for the timed and conditional stop modes, when reconnecting with the sensor, the latter will be in Off state. This will not be the case for the manual stop mode.

Timed stop:

You can select the date on the calendar or enter it manually.

Conditional stop:

For a conditional stop, the condition parameter can be selected from the list of available parameters. For the WISENS TD sensor, the choice is between the pressure channel and the temperature channel.

You can select the direction of the condition (higher or lower than a set value).

Start and stop modes are independent. For example, you can choose a timed start and a conditional stop.

6.1.4 Validating the configuration

To upload the configuration to the sensor, click on Confirm.

If changes have not been validated by clicking on the corresponding button, they will be lost when switching to a different page or if the connection is lost. The connection is lost after one minute and thirty seconds of inactivity. Changes made on the page are not considered as an activity for the purpose of keeping the connection active.

6.1.5 Start recording

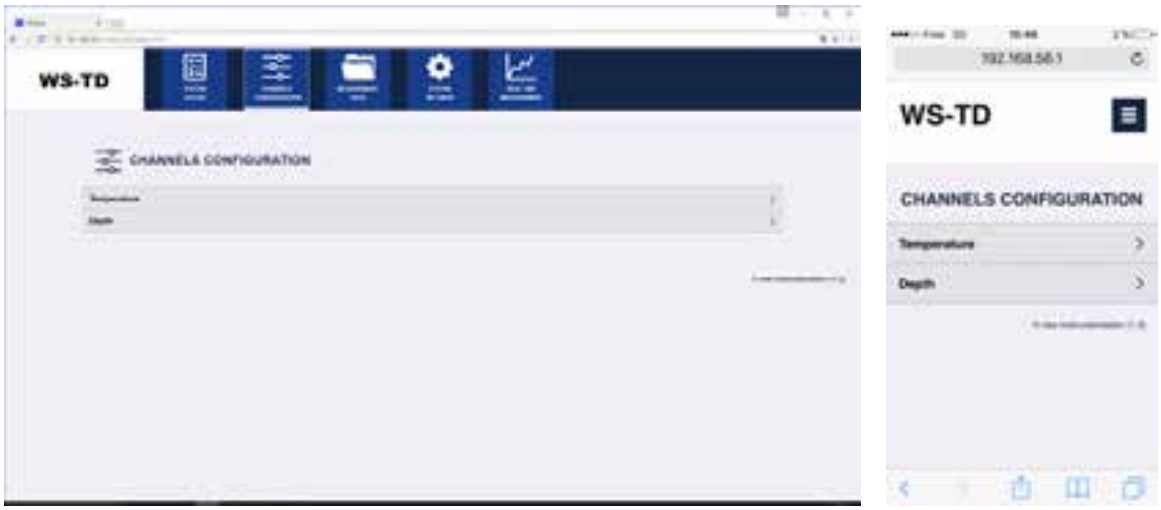
To switch on the WISENS TD sensor, the On/Off button must be activated. Once the sensor is switched on, it will start once removed from its docking station.

Sensor switched off

Sensor recording

6.2 Channel configuration page

Clicking on the channel configuration icon opens the following window:



The WISENS TD sensor can configure two channels: the pressure channel and the temperature channel. This page allows you to define how the data is acquired and the calibration to be applied. Click on the selected sensor to display the parameters specific to the channel.

⚠ Channel configuration is generally done at the factory. Any change made to this configuration may prevent the sensor from operating properly.

6.2.1 Channel configuration

Selecting a channel opens the following window:

Name	The name corresponds to the sensor itself (Pressure in our case). This is the name that is included in the measurement file. It must not be changed
Unit	The unit corresponds to the sensor associated with the channel. It is factory set and must not be changed
Calibration type	A type of calibration can be chosen depending on the sensor. See below
Averaging	The sensitivity to noise can be improved by averaging the measurement over a number of samples. It should be noted that averaging (up to a maximum of 1000 samples) affects the acquisition speed and can make speeds incompatible with the configuration.
Calibration point	Points that will be used for the chosen calibration method.

Calibration type:

Depending on the sensor, it is possible to choose whether to perform a calibration or not. In the case where no calibration is chosen, the data recorded in the file is the raw data.

Depending on the sensor, the calibration types available are linear (up to 14 calibration points), second order polynomial, Steinhart and Bennett.

If a linear calibration is selected, the calibration points that are entered will be used. The linear calibration will automatically adapt to the number of points entered.

6.2.2 Advanced options

Advanced options are set at the factory and should only be changed by an experienced user. Some parameters are hardware-related and must not be modified without nke's prior consent.

Measuring channel	Must not be modified. nke parameter associated with the hardware
Stabilisation time before measurement	Must not be modified. Time delay for readying the sensor. Every time a measurement starts, this time is taken into account. When the recurrence of acquisition is less than this time, the sensor stays on and the stabilisation time is only applied to the first measurement.
Recording format	Sets the number of digits used for the data recorded in the measurement file. Decreasing the resolution reduces the size of the file. Possible values: .1f / .2f / .3f / .4f
Compensation point	These points are used to set an offset and a slope on the calibration curve. Caution: usage changes the calibration and nke shall not validate the quality of the measurement.

6.2.3 Validating the configuration

In order for the changes made to be taken into account, they must be validated by clicking on the Confirm button. An update animation appears. Its disappearance means the new parameters have been uploaded to the WISENS TD.

Switching from the Pressure/Temperature configuration to Temperature/Pressure without validating the changes will result in the latter being lost.

6.3 Measurement files page

This page allows you to manage the measurement files. It is as follows:

It contains a list of the measurement files completed and in progress.

6.3.1 File information

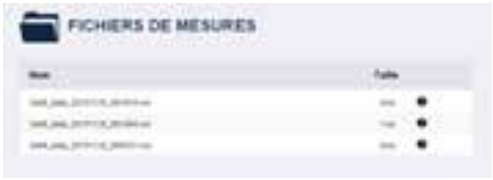
The icon ❷ allows you to quickly access the file's recording information. Clicking on the icon opens the following window:

It shows the deployment comment that was used, the acquisition rate for the measurements, the recording start and end dates, and the number of measurements made.

If the sensor has not been stopped, measurements are on hold and will resume as soon as the sensor is disconnected. In this case, the window does not show a recording end date, as shown below:

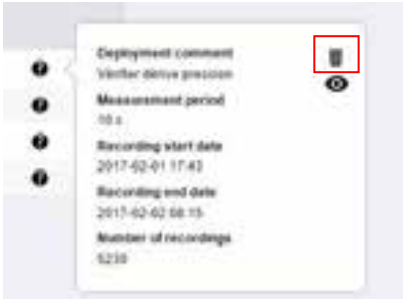
6.3.2 Downloading a file

To download a file from the interface, place the cursor on the name of the file. (This highlights the name of the file). The file is downloaded either by right-clicking the mouse and selecting "Save As", or directly by left-clicking the mouse.



6.3.3 Deleting a file

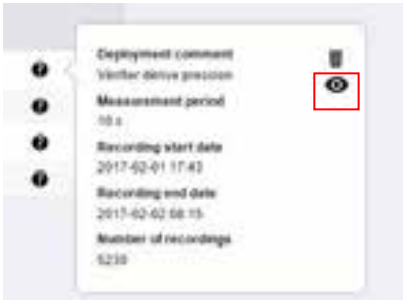
To delete a file, you must first click on the icon ❷ . Then click on the "trash" icon.



Before the file is actually deleted, the interface asks if you wish to proceed with the deletion.

6.3.4 Previewing a file

To preview a file, you must first click on the icon ❷ . Then click on the "eye" icon.



The file is then downloaded temporarily and the data is displayed on the page.

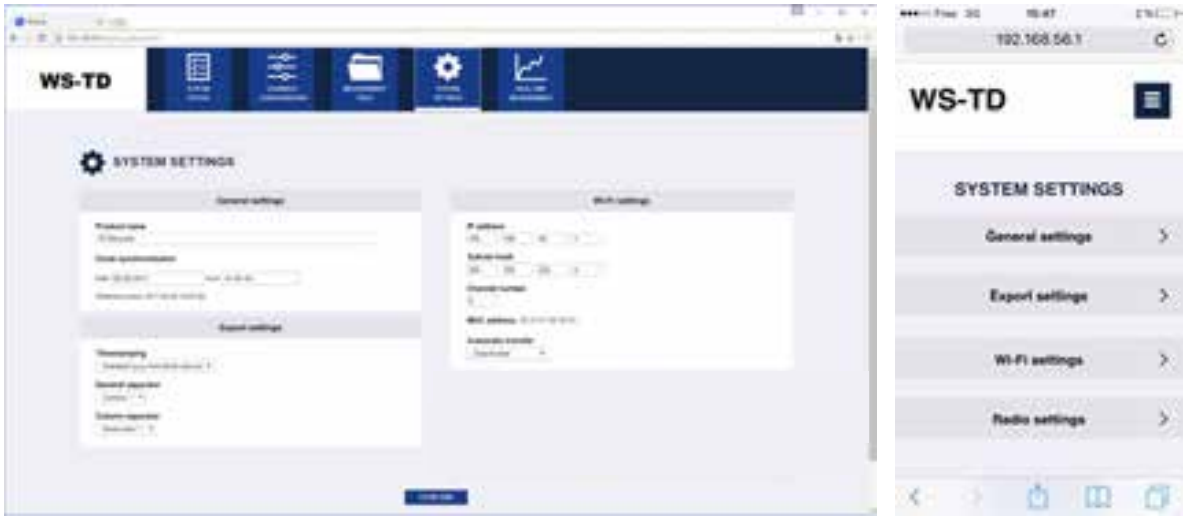
The check boxes allow you to select the channels you wish to view.
Zoom functions are available:

Click and hold the left button of the mouse or pad and select the area from left to right while dragging the cursor down.

To return to a wider view, click and hold the left button again and select an area from right to left while dragging the cursor up.

6.4 System settings page

The system settings page allows you to customise your recordings and WiFi connection settings.



6.4.1 General settings

The product name can be customised. The name entered will then be displayed on the system status page, in the information window.

The clock is synchronised from the general settings page. To synchronise the clock, select the current date and time and click on the Confirm button.

6.4.2 Export settings

The data is saved in CSV format. Data formatting can be customised by the user, in particular the date and time format, the decimal separator and the column separator.

6.4.2.1 Timestamping

Two formats are possible. Standard format: year/month/day/hour/minutes/seconds. This format can easily be used in "Excel" or "Numbers" spreadsheets. Another more universal format is available: the EPOCH UNIX format. The date and time are then defined as the number of seconds elapsed since January 1st, 1970 at midnight (UTC).

6.4.2.2 Decimal separator

The decimal separator can be selected according to the operating system. The possible choices are the period or the comma.

6.4.2.3 Column separator

As for the decimal separator, the column separator can be customised. Four choices are possible: space, semicolon, comma or tab

6.4.3 WiFi settings

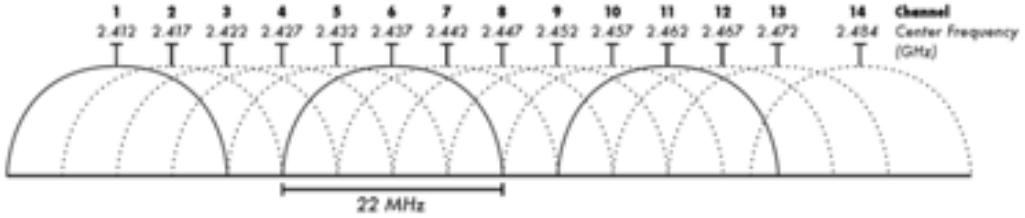
6.4.3.1 IP address & subnet mask

The IP address associated with the subnet mask is used to identify the sensor and to launch the configuration interface. This address can be modified by the user and in this case, the interface will be accessed via the new address.

All the shortcuts created in the interface with the default address will no longer work. They will have to be recreated with the new address.

6.4.3.2 Channel number

The channel number corresponds to the WiFi channel number. The latter can be modified if the WiFi environment is congested or in case of communication problems over the selected channel. However, cases of modification of this channel are rare.



13 channels can be used. The main ones are no. 1, 6 and 11

6.5 Real-time measurement page

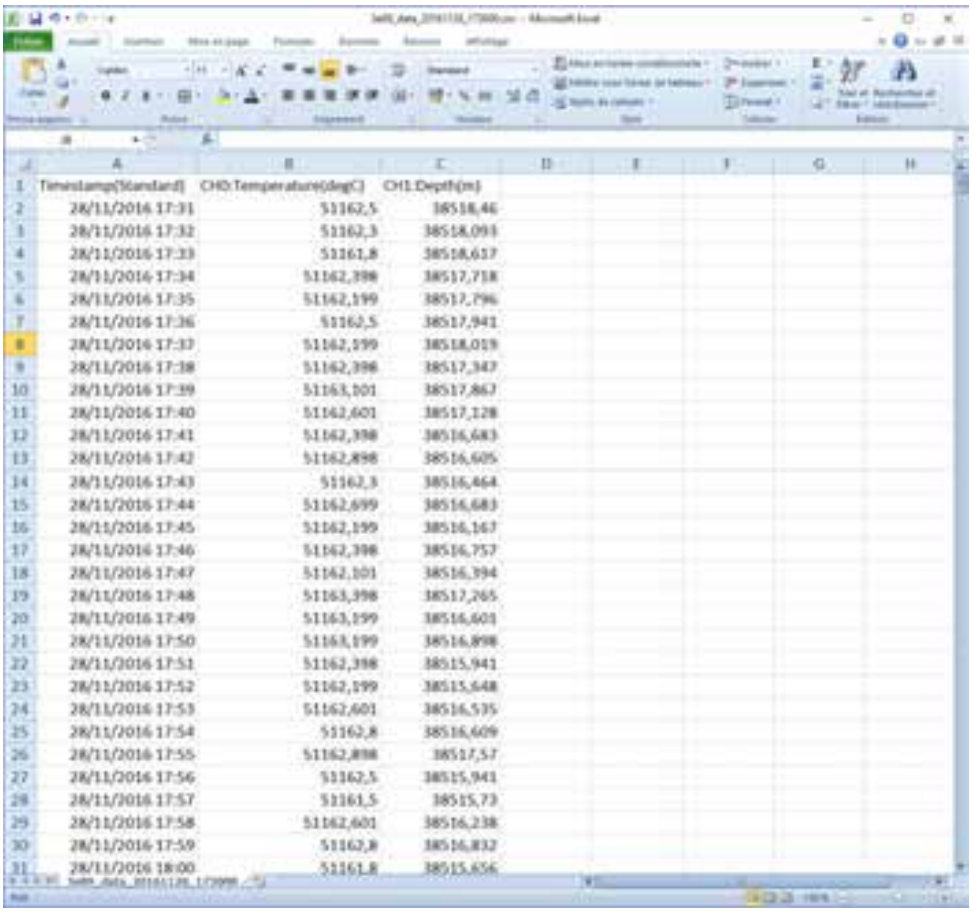
This page provides a real-time view of the sensor's measurements. Data acquisition is carried out and then displayed on the graph. All the channels defined are displayed. This page is an aid to the functional check of the sensor. The data shown cannot be saved or exported.

⚠When you are on the view page, the connection is maintained but the session will expire after 10 minutes to preserve the sensor's battery life.

7 Format of measurement files

The measurement files created by the WISENS TD sensor are in CSV format. The data is arranged as per the export configuration chosen by the user.

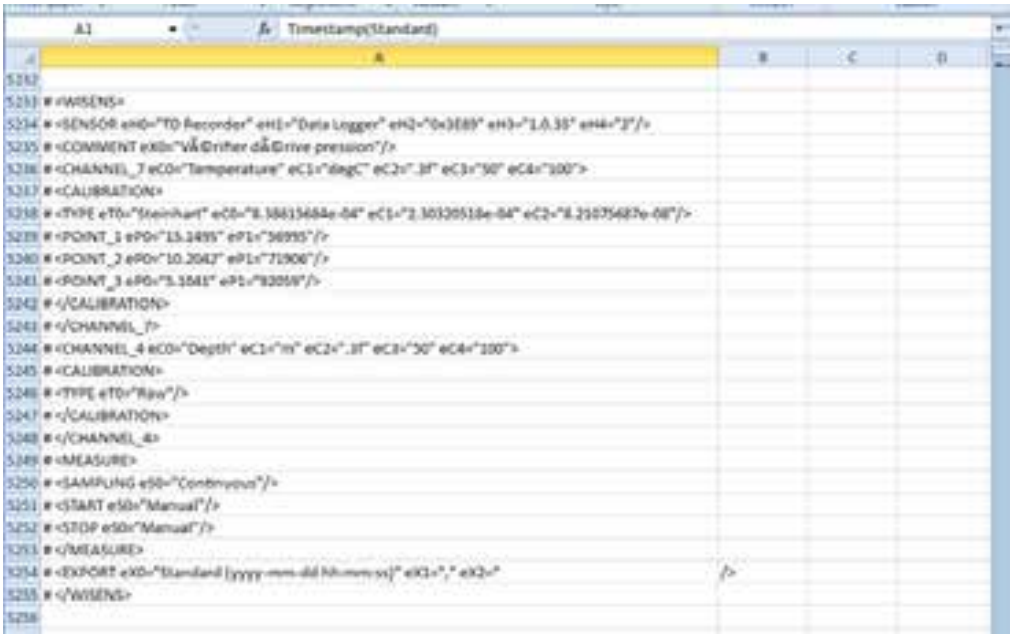
7.1 Data



	A	B	C
1	Timestamp(Standard)	CH0:Temperature(degC)	CH1:Depth(m)
2	28/11/2016 17:31	51162,5	38518,46
3	28/11/2016 17:32	51162,3	38518,093
4	28/11/2016 17:33	51161,8	38518,617
5	28/11/2016 17:34	51162,398	38517,718
6	28/11/2016 17:35	51162,199	38517,796
7	28/11/2016 17:36	51162,5	38517,941
8	28/11/2016 17:37	51162,199	38518,019
9	28/11/2016 17:38	51162,398	38517,347
10	28/11/2016 17:39	51163,101	38517,867
11	28/11/2016 17:40	51162,601	38517,128
12	28/11/2016 17:41	51162,398	38516,683
13	28/11/2016 17:42	51162,898	38516,605
14	28/11/2016 17:43	51162,3	38516,464
15	28/11/2016 17:44	51162,699	38516,683
16	28/11/2016 17:45	51162,199	38516,167
17	28/11/2016 17:46	51162,398	38516,757
18	28/11/2016 17:47	51162,101	38516,394
19	28/11/2016 17:48	51163,398	38517,265
20	28/11/2016 17:49	51163,199	38516,601
21	28/11/2016 17:50	51163,199	38516,898
22	28/11/2016 17:51	51162,398	38515,941
23	28/11/2016 17:52	51162,199	38515,648
24	28/11/2016 17:53	51162,601	38516,535
25	28/11/2016 17:54	51162,8	38516,609
26	28/11/2016 17:55	51162,898	38517,57
27	28/11/2016 17:56	51162,5	38515,941
28	28/11/2016 17:57	51161,5	38515,73
29	28/11/2016 17:58	51162,601	38516,238
30	28/11/2016 17:59	51162,8	38516,832
31	28/11/2016 18:00	51161,8	38515,656

7.2 Configuration

At the end of the measurement file, the full configuration used to acquire the data is inserted in XML format. This section is mainly used to display the file's information in the interface, but can also be used by the user to retrieve the sensor's full configuration.



In particular, the averaging per channel, the calibration points, the start and stop modes.

SENSOR	
eH0	Product name
eH1	Product type
eH2	Product serial number
eH3	Product software version
CHANNEL	
eC0	Measuring channel name and type
eC1	Units
eC2	Number of digits for measurement accuracy
eC3	Power-on timing (do not change without nke approval)
eC4	Measurement averaging (do not change without nke approval)
CALIBRATION	
eT0	Calibration type (raw, linear, etc.)
eC0	If Steinhardt for example, coefficient A
eC1	If Steinhardt for example, coefficient B
eC2	If Steinhardt for example, coefficient C
POINT	
eP0	Physical value of the calibration point
eP1	Raw value of the calibration point
START	
eS0	Start type (manual, timed, conditional)
STOP	
eS0	Stop type (manual, timed, conditional)
EXPORT	
eX0	Data export type
eX1	Decimal separator (period or comma)
eX2	Field separator (space, tab, semicolon)

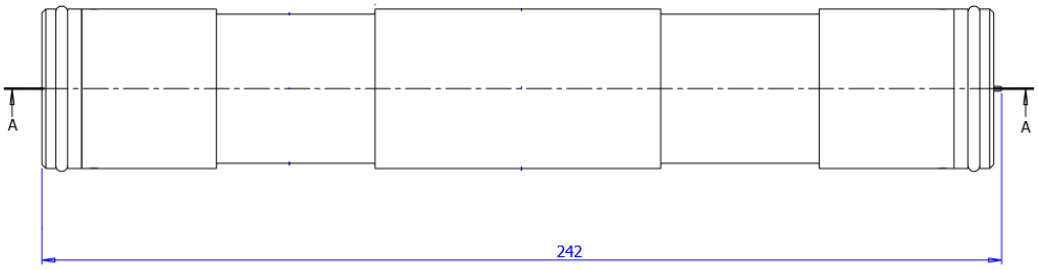
8 WISENS TD characteristics

8.1 Mechanical characteristics

The material used is Ketron.

Weight in air: 320g

Maximum mechanical dimensions: ϕ = 40mm



8.2 Electrical characteristics

8.2.1 Energy

The sensor is powered by a battery with connector based on an LSH14 lithium battery [3.6V Primary lithium-thionyl chloride (Li-SOCl2)].

Rated supply voltage	3.6V
Rated capacity	5.8Ah

8.2.2 Radio

WiFi radio communication

Wireless standards supported	IEEE 802.11b/g/n
Frequency band	2.4 - 2.5 GHz

8.3 Measurement characteristics

8.3.1 Maximum sampling frequency for given accuracy

The maximum frequency with averaging (100 points) of the channels is 2Hz.

8.3.2 Pressure measurement

Maximum immersion: 100 bar / 50 bar / 5 bar

Accuracy	0.15% typical of full scale		
Resolution	0.5mm	5mm	1cm
Dynamic	0-5 bar	0-50 bar	0-100 bar
Drift	Typical: 0.15%/yr		

8.3.3 Temperature measurement

Accuracy	0.005°C
Resolution	0.001°C
Dynamic	-2°C to 35°C
Drift	Typical: 0.005°C/yr

8.3.4 RTC

Clock drift: 5min/yr

8.4 Autonomy

The autonomy of the data logger is limited by the energy and/or the memory capacity.

8.4.1 Energy

The autonomy of the WISENS TD depends on the configuration of data acquisition and on the use of WiFi functions. The examples below show 3 typical configurations:

Estimation consommation énergétique			
Cadence de mesure (s):	**1**	**60**	**300**
Nombre de connexion WIFI par an :	24	24	24
Durée moyenne connexion WIFI (s) :	120	120	120
Autonomie	**<15 jours**	**2 ans**	**>5ans**

8.4.2 Memory

The memory capacity of the WISENS data logger depends mainly on the measurement frequency. The examples below show 3 typical configurations:

Estimation autonomie mémoire			
Cadence de mesure (s):	**1**	**60**	**300**
Autonomie	**5 jours**	**300 jours**	**4 ans**

9 Annexe

9.1 Replacing the battery

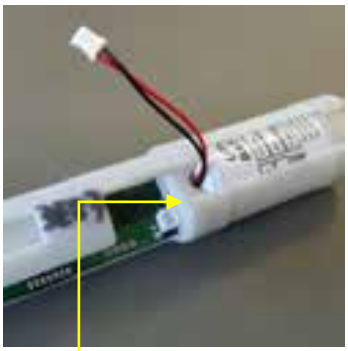
Preamble : before changing the battery, make sure that the WiSens Sensor is off and the WiFi is turned off.

1. Unscrew the 2 retaining screws and remove the electronics and battery pack

2. Remove the tape now holding the battery pack and disconnect the battery

3. Push the battery out

4. Insert new battery



Passage for the supply wires

5. Connect the battery (a key preventing an inversion)

6. Hold the battery with scotch and store the wires of the connector

7. Remettre Replace the electronic unit in the body and close with the 2 screws

Nota : check the condition of the 2 O-rings (replace them if necessary), lubrication recommended with Silicone type grease Molykote 44.

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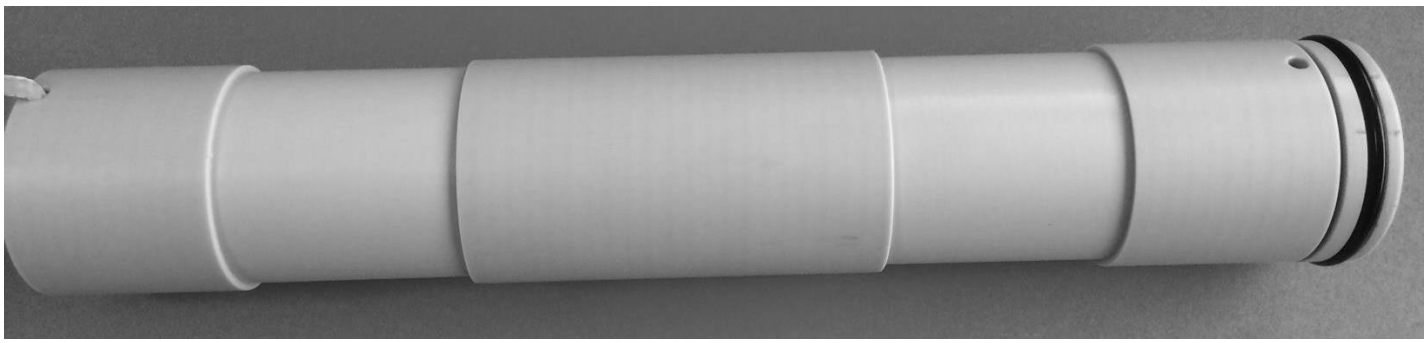
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