



Ultrasound Solutions



Online4US

USER MANUAL

Version 3 – March 2021

© SDT International. All rights reserved. Specifications are subject to change without notice.

Table of contents

Part 1: Hardware

1. Online4US architecture	4
1.1. CPU/Central unit module	4
1.2. Bus expander and termination module	5
1.3. US sensor module	5
1.4. VIB sensor module	6
1.5. Digital output module	8
1.6. Digital input module	9
1.7. Analog input module	10
1.8. Main unit	11
1.9. Extension unit	13
1.10. Hardware rules	13
1.11. Din rail bus	15
1.12. Bus inter rail connection cable & bus inter enclosure connection cable	15
1.13. Adding a module	16
1.14. Removing a Module	18
1.15. Removing a din rail bus	18
2. Sensor mounting	18
2.1 Introduction	18
2.2 Recommended sensor location	19
2.3 Sensor installation	19
3. Display	20
4. Mechanical enclosure installation	21
5. Enclosure electrical supply	21
6. Online4US configurator	22
6.1 Step 1	22
6.2 Step 2	22
6.3 Step 3	22
6.4 Step 4	23
6.5 Step 5	23
6.6 Step 6	23
6.7 Step 7	23

Part 2: firmware

1. Group management	25
1.1. Available Groups	25
1.2. Sensors and channels assigned to Groups	25
1.3. Monitoring scheme	25
2. Block diagram of menus and sub menus	28
2.1 Setting screen overview	29
2.2 Alarm settings	32
2.3 Monitoring schedule	40
3. Home screen overview	44
3.1. Home Screen	45
4. Info screen overview	46
4.1. Info screen	47
4.2. Memory management screen overview	48
4.3. Debug screen	54
5. Recommended steps throughout initial Online4US-ACM settings	55

Part 3: Communication

1. Communication	56
2. Specifications	56
2.1. RS-232 38400-8N1	56
2.2. RS-485 38400-8E1	56
2.3. Ethernet 10/100T	56
3. Protocol	57
3.1. Measures	57
3.2. Commands	58
4. Alternative	64
4.1. Anybus Communicator	64

Part 1: Hardware

1. Online4US architecture

Online4US is a modular design.

From a CPU/CUM module, a touch screen to an enclosure, you can build a customized configuration including measurement channels, sensors, data, and alarms distribution.

Then the operator is able to add and configure additional module, because Online4US design was though scalable and resilient.

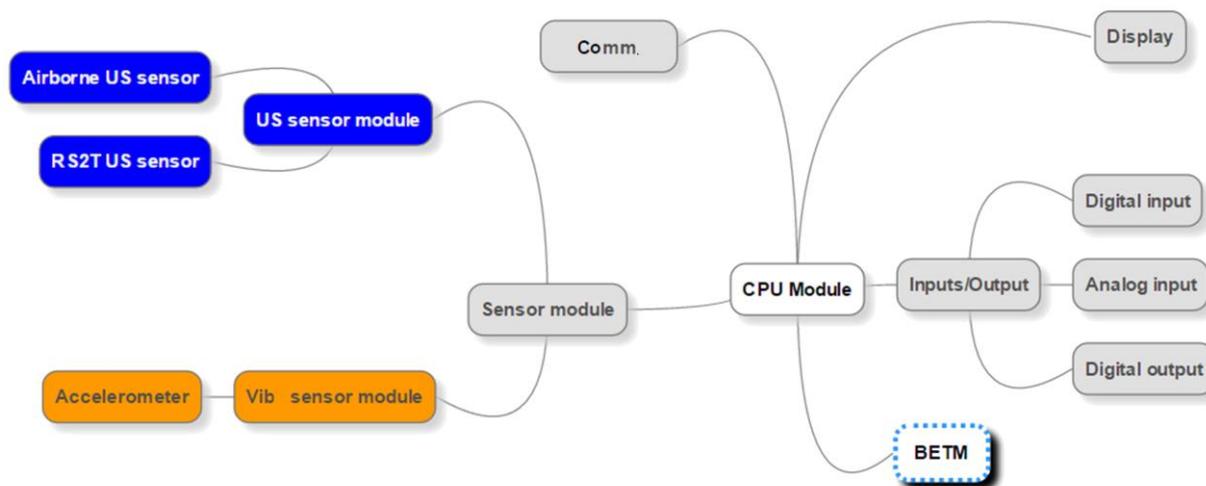


Figure 1: Online4US architecture

1.1. CPU/CUM module

The CPU/CUM (Central Unit Module) is the heart of the hardware.

It manages the display, readings, modules, alarms and saves data.

The CPU/CUM has a RS485, a RS232 and an ethernet connectors for alarms and data distribution to a PLC or a SCADA system (Supervisory Control and Data Acquisition).

It has an on/off switch that cuts the power of the Online4US but does not cut the power of the transformer.

- ①: On/Off Power supply switch (switching off all Online4US modules)
- ②: Power supply connector. Valid voltage ranges from 18VDC to 30VDC
- ③: RS232 connector (see [Part 3](#) for more detailed communication information)
- ④: RS485 connector (see [Part 3](#) for more detailed communication information)
- ⑤: USB connector for system update and reading export
- ⑥: Ethernet connector (see [Part 3](#) for more detailed communication information)
- ⑦: Reset button (data are not deleted)
- ⑧: Display connector

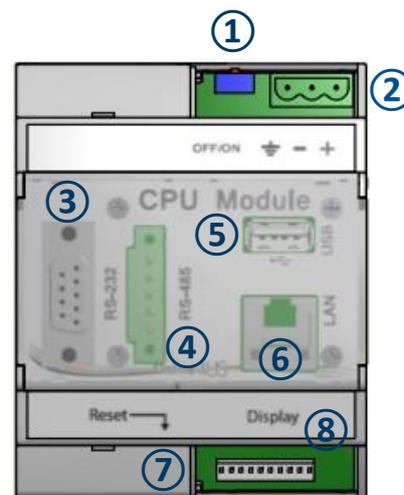


Figure 2: CPU/Central Unit Module

1.2. Bus expander and termination module

The module has 2 functions:

- It indicates to the CPU/CUM that there is no module behind. For this reason, the bus expander and termination must be the last module of the main unit or the expansion unit;
- It is used to connect the main unit to the expansion unit.

①: Bus end sliding switch. Must be ON (right position) if the Bus Expander and Termination Module (BETM) is the last module of the bus and OFF (left position) if not.

②: Bus terminal block to connect the last BETM of the main enclosure to the first BETM of the expansion enclosure using the inter enclosure bus cable.



Figure 3: Bus expander and termination module

1.3. US sensor module

The US sensor module is the ultrasound conditioning and processing unit of the system. It collects analog ultrasound data (up to 2 sensors), computes all indicators and communicates this information to the main central unit.

The module is compatible with:

- Structure borne US sensor;
- Airborne US sensor.

The sensors are specific to Online4US.

①: First channel sensor connector cable. Wiring (from left-to-right) GND (Ground), +5V (amplifier power supply), 0V (amplifier power supply), S- (Sensor signal -), S+ (Sensor signal +)

②: Second channel sensor connector cable

③: SMB connector. First channel signal output for connecting an oscilloscope, an FFT analyzer. Monitoring scheduling remains active when connecting an external analyzer

④: SMB connector. Second channel signal output

⑤: LEMO connector. First channel signal output for connecting an SDT handheld device such as the SDT340/270/200. Monitoring scheduling remains active when connecting an SDT device

⑥: LEMO connector. Second channel signal output for connecting an SDT handheld device

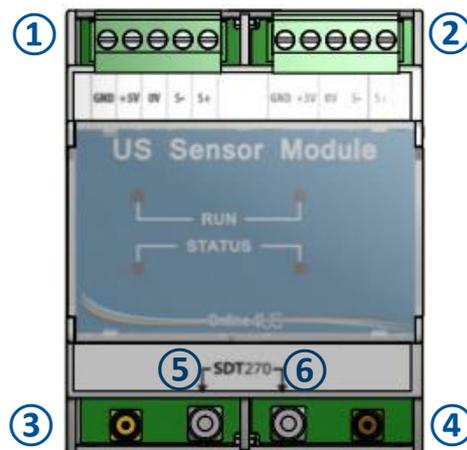


Figure 4: US sensor module

US sensor module can host one or two ultrasound sensors type:

- Pre-amplified airborne US sensors (integrated cable);
- Pre-amplified structure borne US sensors (separate cable).

US sensor module has outputs for connecting an SDT handheld device and/or an analyzer.

1.3.1. Airborne US sensor

Airborne sensor is designed in two parts:

- A sensor holder with an integrated cable;
- A removable sensor.

For the removable sensor, the choices are:

- An open 16 mm transducer;
- A tight (enclosed) 25 mm transducer.



The enclosed sensor is less sensitive than the open design, but it is protected from dust and water spray.



The design allows replacing a damaged sensor without disassembling the holder and its wiring.

1.3.2. Structure borne US sensor

The RST (Resonant Sensor Threaded) is a structure borne US sensor with an integrated amplifier to maintain a proper SNR ratio using a cable whose length can reach up to 50 meters.

1.3.3. Cable for US structure borne sensors

The cable for US structure borne sensors has a LEMO connector (sensor side) and a terminal connector (US sensor module side).

A cable label on the terminal block side indicates the cable reference which is FU.O4US.CABL.001 (or 002, 003, 004). The 3 number digits is the cable length code. The cable length of the sensor holder must be specified when ordering. The ranges are:

- 0 to 5 meters;
- 5.1 to 10 meters;
- 10.1 to 25 meters;
- 25.1 to 30 meters;

The maximum cable length is adjustable and limited at 30 m/9 ft.

The cable can be shortened from the terminal connector side if required. It is highly recommended to clamp new cable lugs to achieve electrical contact quality.

The cable color is:

- **Yellow/Green** is for GND;
- **Brown** is the +5V pre-amplifier power supply;
- **Grey** is the 0V pre-amplifier power supply;
- **Pink** is for sensor signal -;
- **Black** is for sensor signal +.

1.4. VIB sensor module

The VIB sensor module is the vibration conditioning and processing unit of the system. It collects analog vibration data (up to 2 sensors), computes all indicators and communicates this information to the main central unit.

The module is specific for ICP accelerometer with a sensitivity of 100 mV/g.

The reading bandwidth is from 10 Hz to 1000 Hz.

①: First channel sensor connector cable. Wiring (from left-to-right) GND (Ground), +20V (ICP Bias voltage), 0 V (common for sensor signal and bias voltage), S+ (Sensor signal +)

②: Second channel sensor connector cable

③: SMB connector. First channel signal output for connecting an oscilloscope, an FFT analyzer. Monitoring scheduling remains active when connecting an external analyzer

④: SMB connector. Second channel signal output

⑤: LEMO connector. First channel signal output for connecting an SDT handheld device such as the SDT340/270/200. Monitoring scheduling remains active when connecting an SDT device

⑥: LEMO connector. Second channel signal output for connecting an SDT handheld device

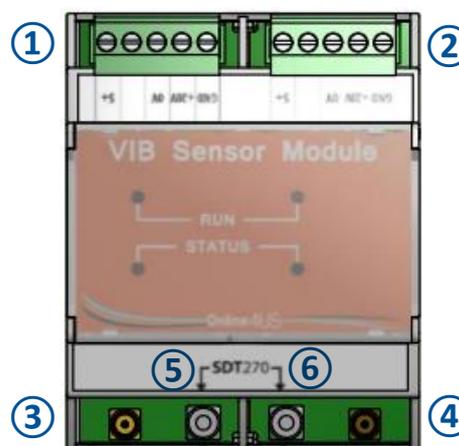


Figure 5: VIB sensor module

VIB sensor module can host one or two ICP accelerometers having 100 mV/g output.

VIB sensor module has outputs for connecting an SDT handheld device and/or an analyzer.

1.4.1. Accelerometer

SDT proposes an ICP 100 mV/g accelerometer with a M6 thread but Online4US is compatible with any 100 mV/g ICP accelerometers.



Figure 6: Accelerometer provided by SDT

1.4.2. Cable for VIB sensors

The cable for accelerometer has a 2 pins cable socket (sensor side) and a terminal connector (US sensor module side).

A cable label on the terminal block side indicates the cable reference which is FU.O4US.CABL.001—xx (xx is the cable length code). The cable length of the sensor holder must be specified when ordering. The ranges are:

- 0 to 5 meters;
- 5.1 to 10 meters;
- 10.1 to 25 meters;
- 25.1 to 30 meters;

The maximum cable length is adjustable and limited at 30 m/9 ft.

The cable can be shortened from the terminal connector side if required. It is highly recommended to clamp new cable lugs to achieve electrical contact quality.

The cable color code is:

- **Yellow/Green** is for GND;
- **White** is for +20V ICP bias voltage;

- **Brown** is the 0V common for sensor signal and ICP bias voltage;
- **Pink** is for sensor signal +;



SDT340/270/200 are able to directly collect raw data coming from sensors. No signal processing is performed by Online4US. Monitoring scheme and machinery protection are not interrupted.

1.5. Digital Output Module

Digital outputs are used to externally send the alarm information (warning and danger) of machinery health status. The DOM (Digital Output Module) has 8 independent outputs.

①: Digital outputs power supply 3VDC to 30VDC

②: Output connector for (from left-to-right) output 1 to output 4. Maximum breaking capacity of 750 VA. Refer to information below for outputs wiring

③: Output connector for (from left-to-right) output 5 to output 8

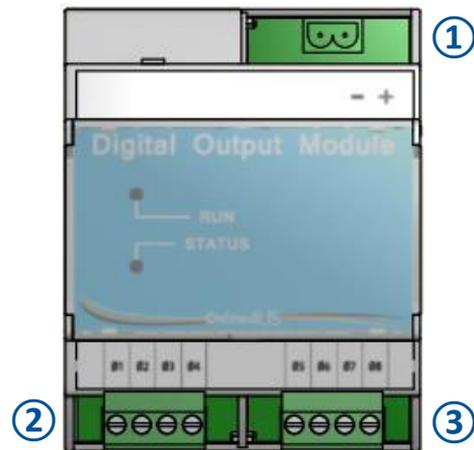


Figure 7: Digital output module

As Online4US manages 8 groups and for each group two digital outputs are used (one for the warning status and one for the danger status):

- One DOM is needed when using up to 4 groups;
- Two DOM are needed when using 5 to 8 groups.

The assignation is as following:

- Digital output 1 is needed to send the information **warning** to group 1;
- Digital output 2 is needed to send the information **danger** to group 1;
- Digital output 3 is needed to send the information **warning** to group 2;
- Digital output 4 is needed to send the information **danger** to group 2;
- Digital output 5 is needed to send the information **warning** to group 3;
- Digital output 6 is needed to send the information **danger** to group 3;
- Digital output 7 is needed to send the information **warning** to group 4;
- Digital output 8 is needed to send the information **danger** to group 4;
- Digital output 9 is needed to send the information **warning** to group 5;
- Digital output 10 is needed to send the information **danger** to group 5;
- Digital output 11 is needed to send the information **warning** to group 6;
- Digital output 12 is needed to send the information **danger** to group 6;
- Digital output 13 is needed to send the information **warning** to group 7;
- Digital output 14 is needed to send the information **danger** to group 7;
- Digital output 15 is needed to send the information **warning** to group 8;
- Digital output 16 is needed to send the information **danger** to group 8.

The DOM works on AON (All-Or-Nothing) mode. The output status could be:

- All (or 1 or On);
- Nothing (or 0 or Off).

1.5.1. Powering digital outputs

Note 1: Online4US DOM is working on sourcing mode, each digital output provides the voltage source to the load and all digital outputs are bridged to the +VDC.

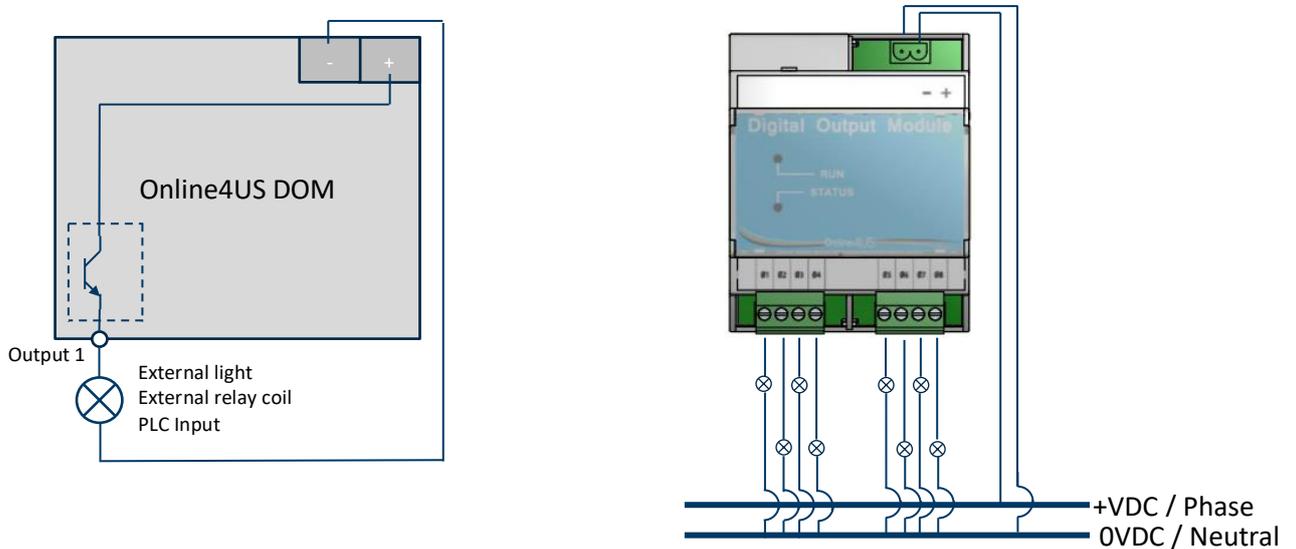


Figure 8: Wiring of sourcing digital outputs

The permissible voltages are:

- A DC voltage from 3V to 30V.

Important notice 1: the breaking capacity of one digital output is 750 VA.

Note 2: the DOM by itself is always powered by the din rail bus. This topic concerns only the powering of the digital outputs.

1.6. Digital Input Module

Digital inputs are used to trigger the sensor data measurement and control the period of monitoring using external commands.

- ①: Digital inputs power supply from 3V to 30V
- ②: Input connector for (from left-to-right) Input 1 to Input 4. Refer to information below for input wiring
- ③: Input connector for (from left-to-right) Input 5 to Input 8

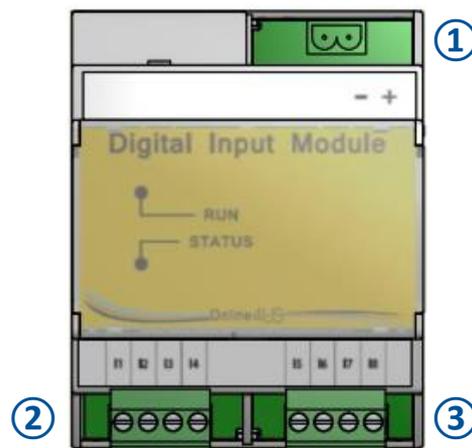


Figure 9: Digital input module

As Online4US manages 8 groups, the DIM (Digital Input Module) has 8 independent inputs. The assignation is as following:

- Digital input 1 is assigned to group 1;

- Digital input 2 is assigned to group 2;
- Digital input 3 is assigned to group 3;
- Digital input 4 is assigned to group 4;
- Digital input 5 is assigned to group 5;
- Digital input 6 is assigned to group 6;
- Digital input 7 is assigned to group 7;
- Digital input 8 is assigned to group 8.

The DIM works on AON (All-Or-Nothing) mode. The input status could be:

- All (or 1 or On);
- Nothing (or 0 or Off).

1.6.1. Powering digital inputs

Note 1: Online4US DIM is working on sinking mode: each digital input is (internally) bridged to the ground needed in the circuit.

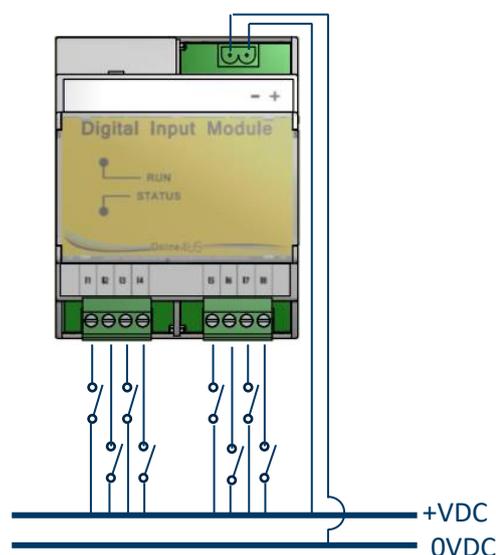
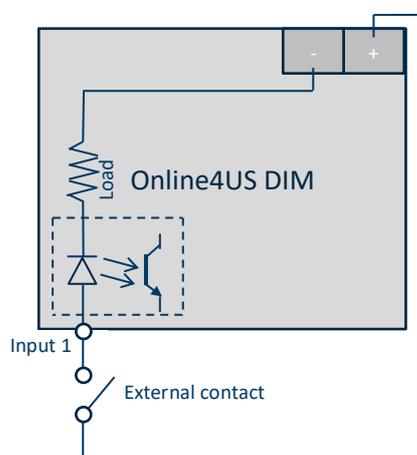


Figure 10: Wiring of sinking digital inputs

1.7. Analog Input Module

Similarly, to the digital input module, an optional analog input module can also be used to trigger the sensor data measurement and control the period of monitoring using an analog voltage level.

①: Input connector for (from left-to-right):

1. Isolated ground;
2. Analog input 1;
3. Analog input 2;
4. Analog input 3;
5. Analog input 4;
6. Isolated 12VDC (internally generated).

②: Input connector for (from left-to-right):

1. Isolated ground (same as connector 1);
2. Analog input 5;
3. Analog input 6;

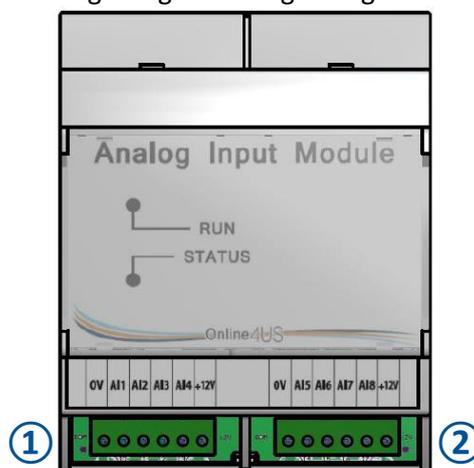


Figure 11: Analog Input Module

4. Analog input 7;
5. Analog input 8;
6. Isolated 12VDC (same as connector 1).

As Online4US manages 8 groups, the AIM (Analog Input Module) has 8 independent inputs. The assignation is as following:

- Analog input 1 is assigned to group 1;
- Analog input 2 is assigned to group 2;
- Analog input 3 is assigned to group 3;
- Analog input 4 is assigned to group 4;
- Analog input 5 is assigned to group 5;
- Analog input 6 is assigned to group 6;
- Analog input 7 is assigned to group 7;
- Analog input 8 is assigned to group 8.

The permissible voltages are:

- A DC voltage from 0V to 12V.

For more information see the [Monitoring Schedule](#) below.

1.8. Main unit

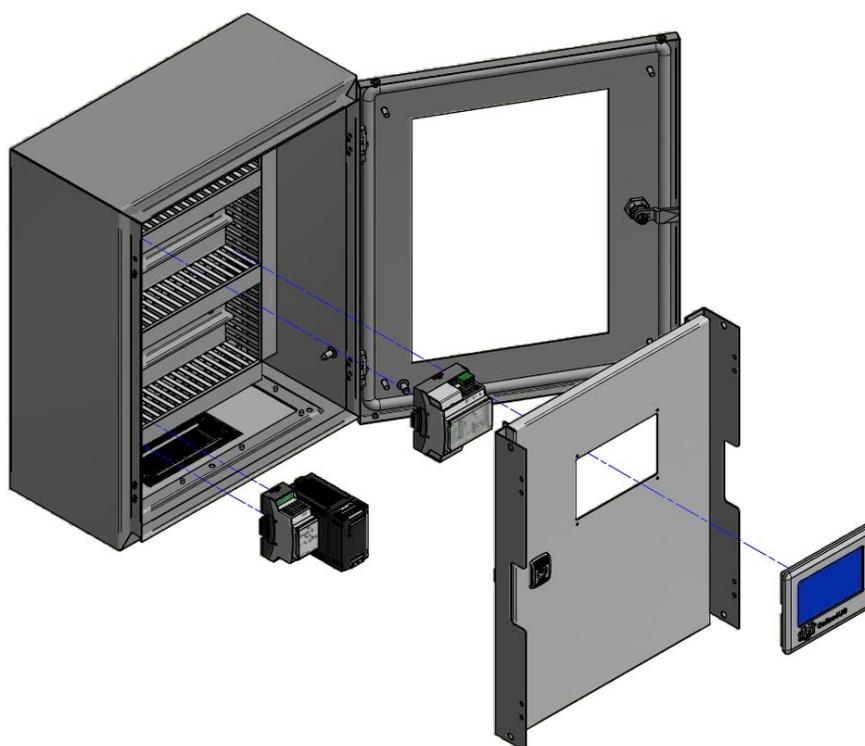


Figure 12: Main enclosure with the display, inner and transparent doors

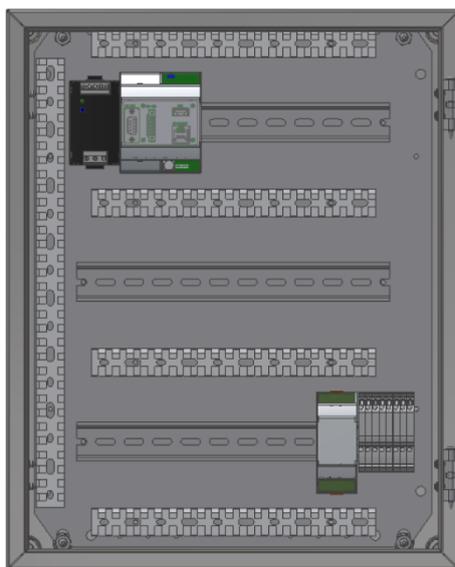


Figure 13: Mounting plate of the main unit with power supply, CPU/CUM, din rails, bus termination module, terminal blocks



The main unit contains max one CPU/CUM, one power supply, 9 additional modules and 1 bus expander and termination module.
If more modules are needed, they will be installed within the expansion unit.

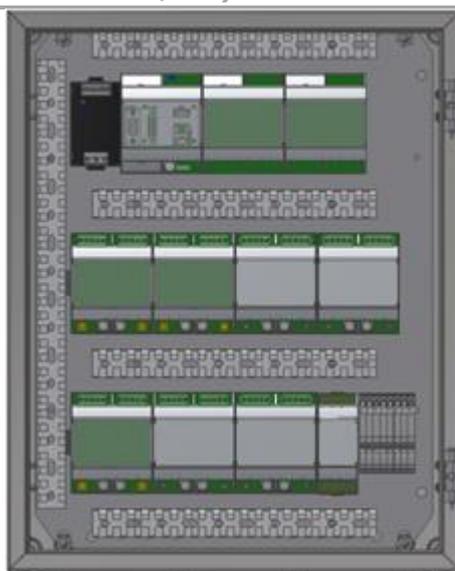


Figure 14: The maximum number of modules is achieved in the main unit

The main unit delivery includes:

- 1 enclosure;
- 1 inner door;
- 1 mounting plate;
- 1 transparent door;
- 1 power supply;
- 1 CPU/CUM;
- 1 touch screen and cable;
- 1 bus expander and termination module;
- 3 din rails;
- 2 inter bus connection cables;
- Terminal blocks;
- 1 cable entry frame;

- Wire ducts.

1.9. Expansion unit

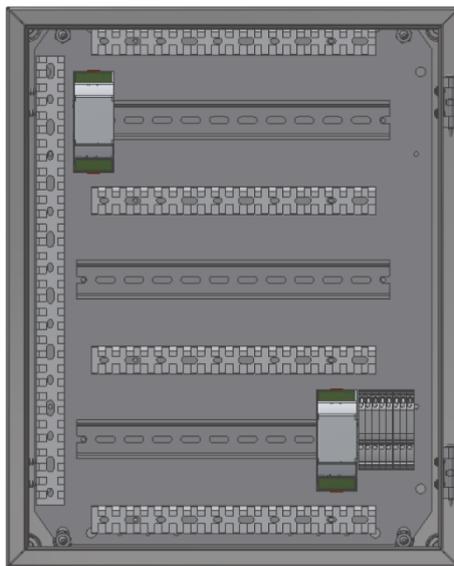


Figure 15: Mounting plate of the expansion unit with 2 bus expander and termination modules, 3 din rails

The expansion unit delivery includes:

- 1 enclosure;
- 1 solid door;
- 2 bus termination modules;
- 3 din rails;
- 2 inter bus connection cables;
- 1 inter enclosure connection cable;
- Terminal block;
- 1 cable entry frame.



The expansion unit can never have a CPU/CUM and a touch screen.



The protection rating of the main unit and the expansion unit is IP 65.

1.10. Hardware rules

- The sequential arrangement of the modules is a left-to-right pattern from the top to the bottom;
- The first module of the main unit must be the CPU/CUM. It is located top left;
- The last module of the main unit must be the bus termination module. It is located bottom right.

- ①: Left-to-right pattern from top to bottom
- ②: CPU/CUM is the first module
- ③: Bus expander and termination module is the last module

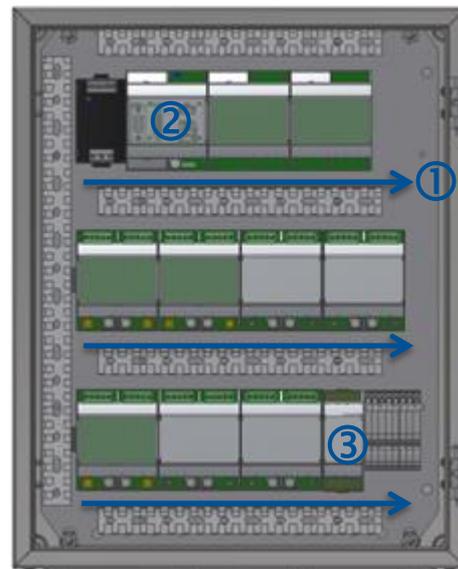


Figure 16: Main unit CPU/CUM and bus expander and termination module position. Left-to-right pattern

The first module of the expansion unit is the bus expander and termination module. It is located top left.

The last module of the expansion unit is the bus expander and termination module. It is located bottom right.

- ①: The first module is the bus expander and termination module
- ②: The last module is the bus expander and termination module

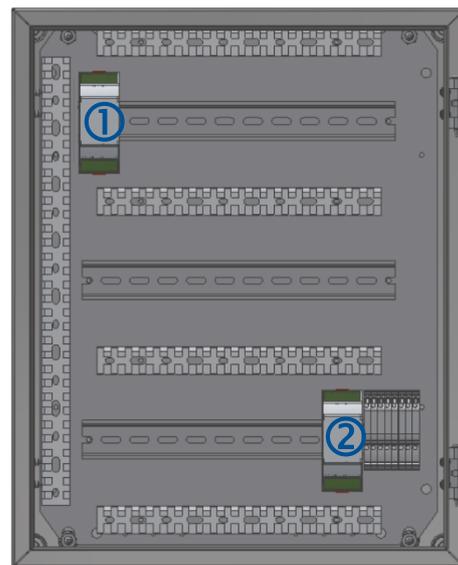


Figure 17: Bus termination module position for the expansion unit

A din rail can accommodate up to 4 modules.

The fourth location is assigned to a bus termination module.

- ①: The din rail accommodates 3 modules
- ②: The fourth location is assigned to the termination module
- ③: Note that a fourth module can be plugged on the second din rail in place of the termination module. In that case, the termination module should be plugged in the third din rail

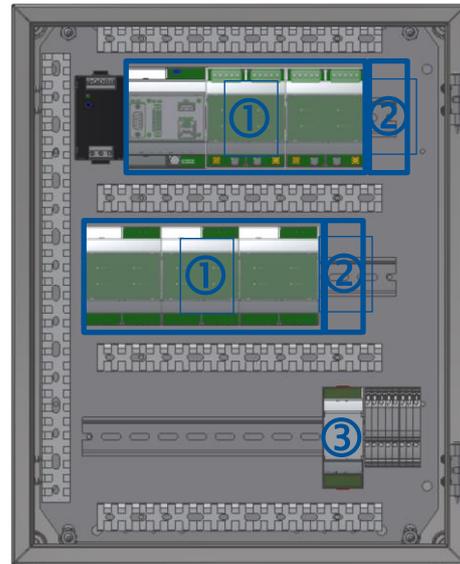


Figure 18: Module distribution on a din rail

1.11. Din rail bus

Din rail bus is always supplied with its module.

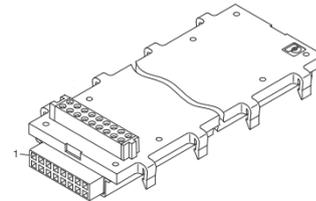


Figure 19: Din rail bus

1.12. Bus inter rail connection cable & bus inter enclosure connection cable

Inter rail connection cable:

- For connecting the rows of an enclosure.

Inter enclosure connection cable:

- For connecting the expansion enclosure to the main enclosure.

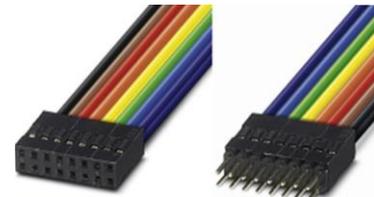


Figure 20: Inter rail & inter enclosure connection cable



*Pay attention to not cross the connection cables.
The connector does not have a mechanical coding.*



Figure 21: The inter enclosure cable connects the expansion unit to the main unit

1.13. Adding a module

Important notice: prior to module installation, the SDT Online4US must be first powered off using the CPU/CUM sliding switch (refer to [CPU/CUM details](#) for more information).

As empty slot is forbidden, it makes sense to install another module at the end of the existing arrangement. As the last module must be a BETM, the new module will be inserted in between the last module and the BETM.

A slot is free at the right of the last module on the din rail

1. Remove the bus termination module by pulling the 2 din rail connectors;
2. Unplug the din rail bus of the bus termination module by dragging it to the right;
3. Clip the din rail bus of the new module on the din rail;
4. Firmly plug it to its left neighbor;
5. Clip the new module on its din rail bus;
6. Clip the din rail bus of the bus termination module;
7. Firmly plug it to its left neighbor;
8. Clip the bus termination module on its din rail bus.

A slot is not free at the right of the last module on the din rail

1. Remove the bus termination module by pulling the 2 din rail connectors;
2. Unplug the din rail bus of the bus termination module by dragging it to the right;
3. Clip the din rail bus of the new module on the first left slot of the next din rail;
4. Clip the new module on its din rail bus;
5. Connect the 2 din rails using a bus inter rail connect cable;
6. Clip the din rail bus of the bus termination module;
7. Firmly plug it to its left neighbor.

1.13.1. Plugging a din rail bus

Online4US should be switched off.

①: Clip the din rail bus on the din rail until it clicks. Ensure the locking tabs are all in their locking position

②: If the din rail bus is not the first of the row, slide it to the left so that the male connector fits into the corresponding female connector

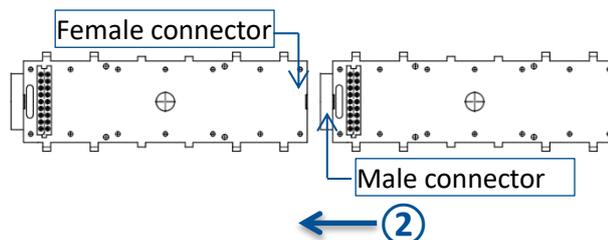


Figure 22: Sliding the din rail bus

③: If the din rail bus is the first of the row, connect the din rail bus to its predecessor placed on the right of the previous row using the inter bus cable connection

④: Pay attention to not cross the bus cable connection, the red wire must be on top

1.13.2. Plugging a module

Online4US should be switched off.

①: Ensure the connectors of the din rail bus and of the module are aligned

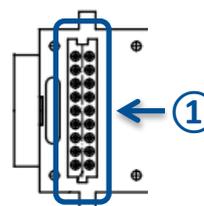


Figure 23: Din rail bus connector dedicated to the module

②: Plug the module on the din rail until it clicks. Ensure it is locked firmly in place

1.13.3. Connecting the expansion unit to the main unit

Online4US should be switched off.

①: Place the sliding switch of the main unit BETM on the position OFF

②: Place the sliding switch of the expansion unit BETM located on top left on the position OFF

③: Place the sliding switch of the expansion unit last BETM on the position ON

④: Connect the main unit BETM to the top left expansion unit BETM using the inter enclosure connection cable



Figure 24: BETM connector and sliding switch

1.14. Removing a Module

- ①: Pull the 2 locking tabs to the unlocked position using a flat blade screwdriver
- ②: Vertically pull up the module

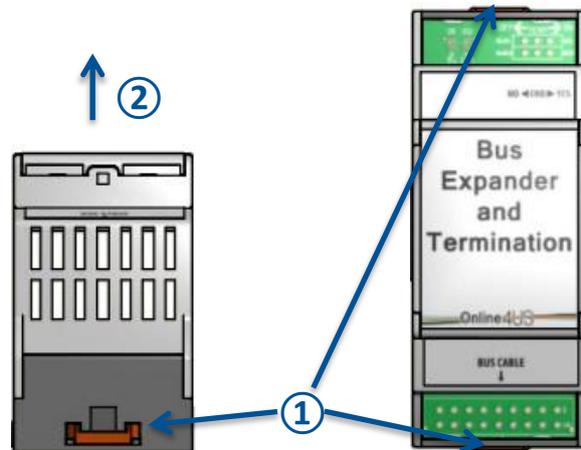


Figure 25: Removing a module

1.15. Removing a din rail bus

Online4US should be powered off.

- ①: Slide to the right the din rail bus to remove until its male connector is disengaged from the female connector of its left din rail bus

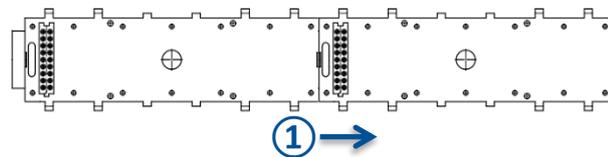


Figure 26: Slide the din rail bus

- ②: Gently pull all the din rail bus locking tabs from the din rail

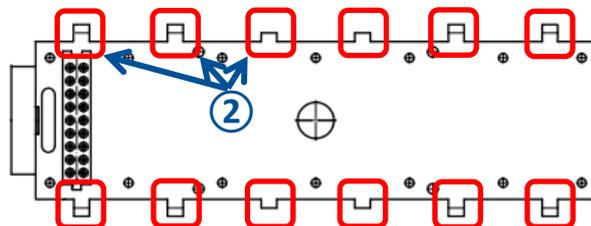


Figure 27: Pull the bus locking tabs

- ③: Remove the din rail bus

2. Sensor mounting

2.1 Introduction

For permanent monitoring, the sensors should be stud mount. This method permits to measure the US (ultrasound) and vibration signal in the most ideal manner. So, it should be used wherever possible.

The mounting location should be clean and paint free (paint free is essential for US) for efficient bearing and gearing damage detection. The surface should be spot faced to achieve a smooth and flat surface.

The adhesive or glue mounting provides a secure attachment for vibrating machineries. Use for instance Loctite AA 330 with activator 7387 or 7386, Loctite Threadlocker 242. Epoxies, quick bonding glues or dental cement are an alternative. When sensor removal is needed, a suited debonding agent should be prior applied to prevent sensor damaging.

2.2 Recommended sensor location

The choice of the sensor location is critical for the measurement reliability. For RST US sensors, an incorrect sensor location will be detrimental to early stage detection of lubrication, bearing and gearing problems.

For US, it is recommended to use a handheld SDT device such as the SDT340. Using a RSN (Resonant Sensor Needle) probe or a RST probe with a magnetic base, the manipulation consists in finding the place where the signal is the strongest. This spot should be first considered as the optimum sensor location.

When monitoring several identical machineries, common sense dictates that the sensor location should be the same. Measurements should be reliably comparable to each other.

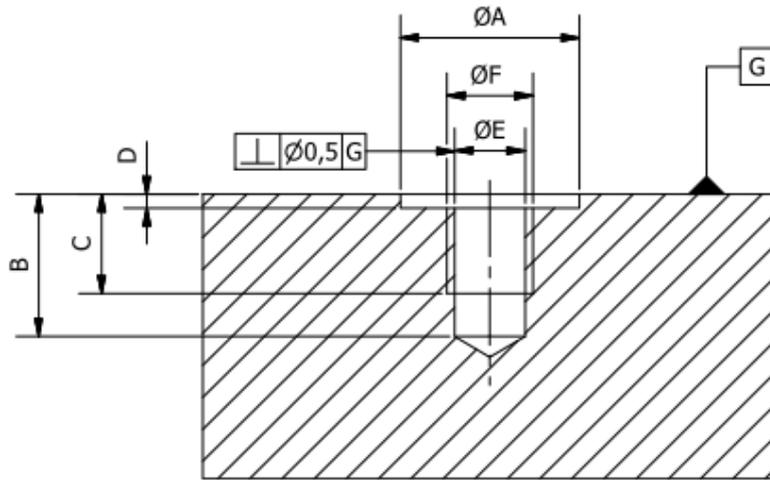
To ensure an optimum signal transmission quality, respect as far as possible the following rules:

- Signal path between the sensor and the bearing should be as short and straight as possible. So, the sensor should be mounted to the nearest point of the bearing (the bearing housing, most of the time);
- Signal path should contain only one mechanical interface. Strictly prohibit a seal presence in between the sensor and the bearing. As well a sensor cannot be mounted on a protection cover;
- Except when the RS location is chosen using a handheld SDT instrument, the sensor should be placed on the load zone of the bearing. For heavy machineries and horizontal shaft, the load zone is generally the lower part of the bearing housing. For pulley and belt transmission, the load zone is the bearing housing which is carrying the belt tension;
- For US, contact sensors should be placed in radial position when possible.

2.3 Sensor installation

1. Drill 5.5 mm diameter hole to a depth of minimum 9 mm. Respect the perpendicularity of the hole axis with respect to the bearing housing;
2. Flat face the contact surface of the sensor to a depth of maximum 1 mm. For RST sensor use a drill mill of minimum 13 mm diameter. For ACC130, use a drill mill of minimum 26 mm diameter;
3. Tap hole for M6 to a depth of minimum 6 mm;
4. Clean the hole with compressed air. Carefully remove cutting oil with solvent if necessary;
5. Apply the adhesive if necessary, on the thread of the stud;
6. For RST, deposit a thin layer of silicon grease or acoustic coupling foil on the sensor seat surface;
7. Tighten the sensor with a torque wrench to the recommended torque of 10 Nm;
8. Clamp the cable on the machinery close to the sensor.

The dimensions are summarized in the following drawing:



Dimensions						
Sensor	A	B	C	D	E	F
RS1T	> Ø 12,5 mm	> Ø 8 mm	> Ø 6 mm	< 1 mm	Ø 5 mm	M6x1
Acc 130	> Ø 25,5 mm	"	"	"	"	"

Figure 28: Dimensions for sensor mounting

3. Display

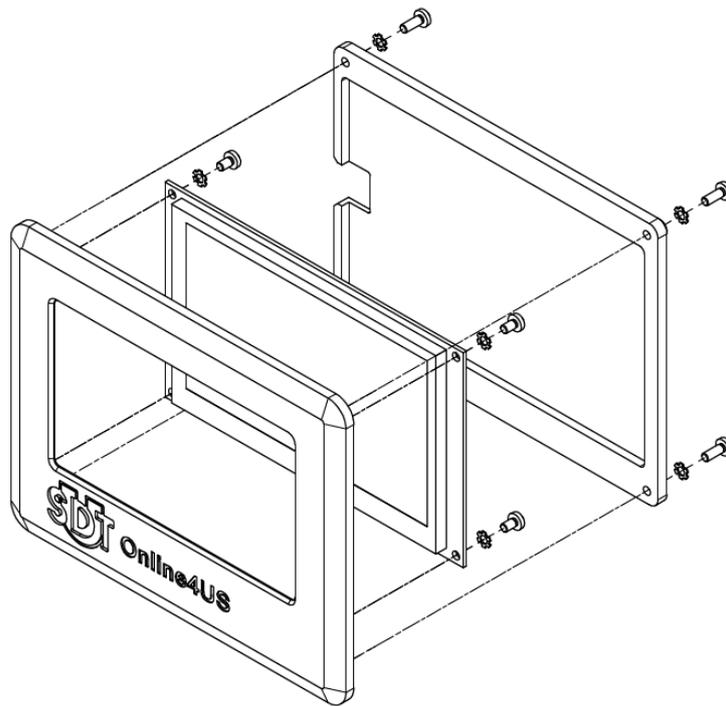


Figure 29: Display

The Online4US integrates a 5" 800x480px resistive touchscreen color LCD for Human Machine Interface (HMI) control. For more information concerning the HMI see [part 2](#).

4. Mechanical enclosure installation

The enclosure is either mild steel or stainless steel (304L).

The main enclosure has an inner door and a transparent door.

The extension enclosure has a single door.

Refer to the following drawing for the attachment of the enclosure using the wall mounting brackets. Please note that all dimensions are in millimeters.

Refer to the mechanical drawing (located on the interior door of the enclosure inner door).

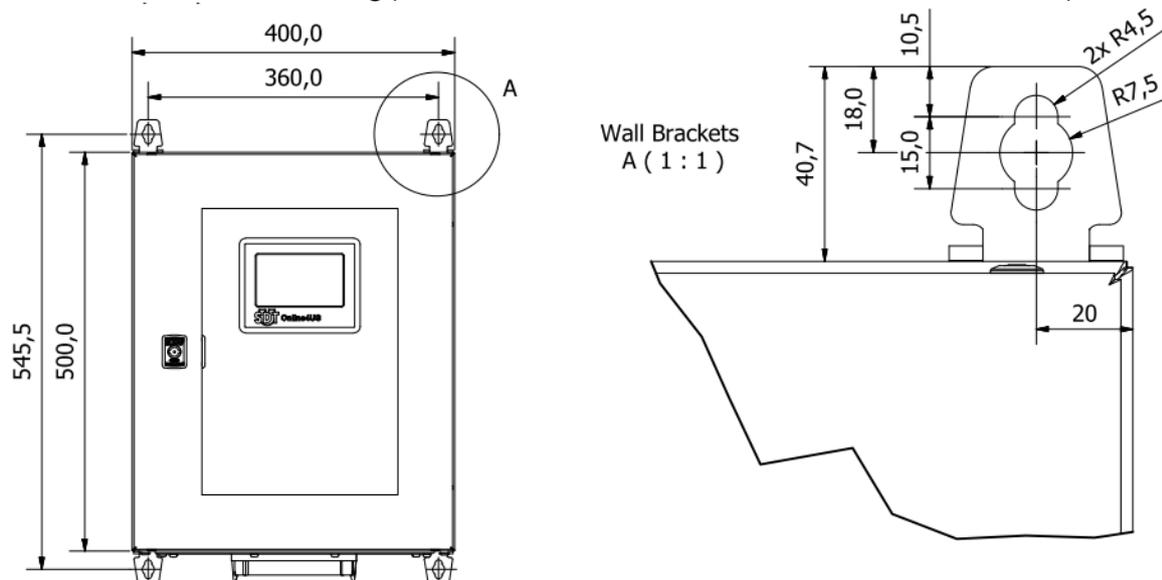


Figure 30: Dimensions for enclosure wall mount

5. Enclosure electrical supply

The characteristics of the provided electrical supply are:

- Reference: Traco Power TCL 060-124;
- Input: 85 to 264 VAC – 50/60 Hz;
- Output: 24VDC – 2500 mA – 60 W.

Note 1: any power supply with the same characteristics can be used.

Note 2: Online4US can also be directly powered from a 60W 24VDC power supply.



Figure 31: Provided power supply

6. Online4US configurator

The address of the Online4US configurator is:

<https://www.sdtultrasound.com/Online4USConfigurator/index.php?lang=en>

Online4US configurator is a web tool used to easily configure the Online4US according to the application needs.

6.1 Step 1

Choice between coated steel and stainless-steel cabinet.

6.2 Step 2

- The first tab is to choose the number of structure borne RST sensors and cables;
- The second tab is to choose the number of open, tight airborne sensors and cables;
- The third tab is to choose the number of accelerometers and cables.

SDT International - Bd. de l'Humanité, 415 - 1190 Brussels - Belgium - Phone : +32 (0) 2 332 32 25 - Email : info@sdt.be

Figure 32: The 3 sensor tabs of the step 2



The number of selected sensors automatically defines the number of needed sensor modules.

You can choose at your convenience different cable lengths.

The total number of sensors is 32.

6.3 Step 3

Select if a digital input (DI) module, an analog input (AI) module and digital output (DO) module are needed.



Having 8 groups of machineries:

- Only one DI module and/or one AI module is required;
- One DO module is required for up to 16 channels;
- Two DO modules are required for 17 to up to 32 sensors.

6.4 Step 4

SDT communication modules are not available yet. For a list of industrial communication modules compatible with the Online4US please contact your provider.

6.5 Step 5

Indicates the power supply.

6.6 Step 6

Recapitulates the previous choices in a table with quantity and references:


Online4US - Configuration

1 Step
Main unit

2 Step
Sensors & Modules

3 Step
Inputs & Outputs

4 Step
Communications

5 Step
Power supply

6 Step
Summary

7 Step
Finish

Step 6 - Summary

Designation	Reference	Quantity
Main unit : Coated steel	FS.O4US.MU.001--01	1
Airborne ultrasound sensor Tight 25mm	FU.SENS.C25.001--01	2
Cable for airborne ultrasound sensor : 0m to 5m	FU.O4US.SH1.001--01	2
Module for ultrasound sensor	FU.O4US.USM.001--01	1
Type power : 85 to 264 VAC, 50Hz or 60Hz		1

Previous
Next
Finish

SDT International - Bd. de l'Humanité, 415 - 1190 Brussels - Belgium - Phone : +32 (0) 2 332 32 25 - Email : info@sdit.be

Figure 33: Configuration summary with quantities and references

6.7 Step 7

Contact form. You will receive the prospect requests coming from the territory you are competent.



The background color of a completed step is green.

The background color of an active step is orange.

The background color of a step not completed is grey.

You can go back to a previous completed step using the "Previous" button or by clicking on the button step itself.



Figure 34: Completed, active and non-completed steps

Part 2: firmware

This part concerns Online4US firmware version 475 and display version 477.

1. Group management

One group represents machinery or a subcomponent of machinery. This machinery management was thought to simplify Online4US settings. Online4US firmware is organized according the following methods.

1.1. Available groups

Online4US manages 8 groups. The user may choose to use one or more of the 8 groups at his/her convenience. It is not required to follow the chronological order of the groups.



Figure 35: Home screen. Groups 1 and 3 are used

1.2. Sensors and channels assigned to groups

One sensor represents one measurement channel. One group hosts up to 4 sensors (or 4 measurement channels) mixing US and VIB.

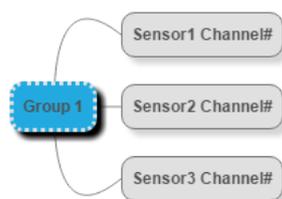


Figure 36: Sensors and channels assigned to group 1

1.3. Monitoring scheme

The monitoring scheme is common to all sensors of one group. The measurement acquisition time and the monitoring periodicity are the same for the sensors assigned to a group, so that the channels of a group are synchronous.

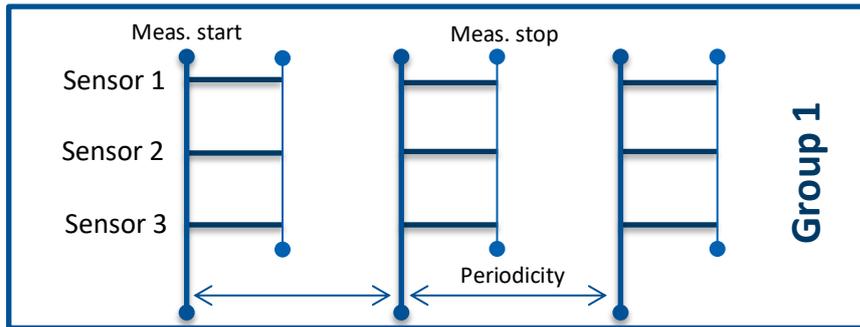


Figure 37: The monitoring scheme is common to all sensors assigned to a group

1.3.1. Input and output assigned to a group

One digital input and one analog input are assigned to each group.

Two digital outputs are assigned to each group, the first one for the warning alarm level, the second one for the danger alarm level.

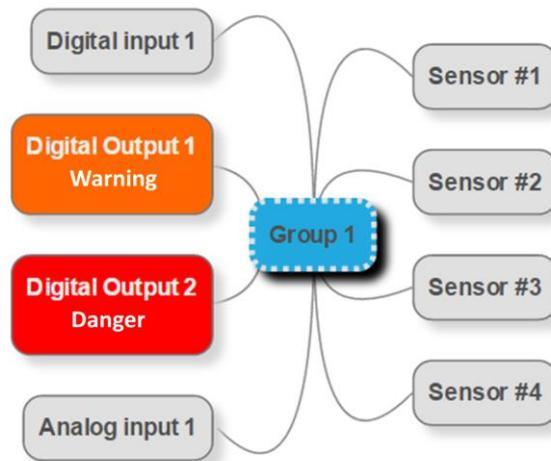


Figure 38: Sensors, DI, AI and DO assigned to group 1

GROUP #	DI #	AI #	DO#
GROUP 1	DI 1	AI 1	DO 1 DO 2
GROUP 2	DI 2	AI 2	DO 3 DO 4
GROUP 3	DI 3	AI 3	DO 5 DO 6
GROUP 4	DI 4	AI 4	DO 7 DO 8
GROUP 5	DI 5	AI 5	DO 9 DO 10
GROUP 6	DI 6	AI 6	DO 11 DO 12
GROUP 7	DI 7	AI 7	DO 13 DO 14

GROUP 8	DI 8	AI 8	DO 15 DO 16
----------------	-------------	-------------	------------------------------

Figure 39: Overview of DI, AI and DO assigned to their respective GROUP

Legend: DI = Digital Input
 AI = Analog Input
 DO = Digital Output

2. Block diagram of menus and sub menus

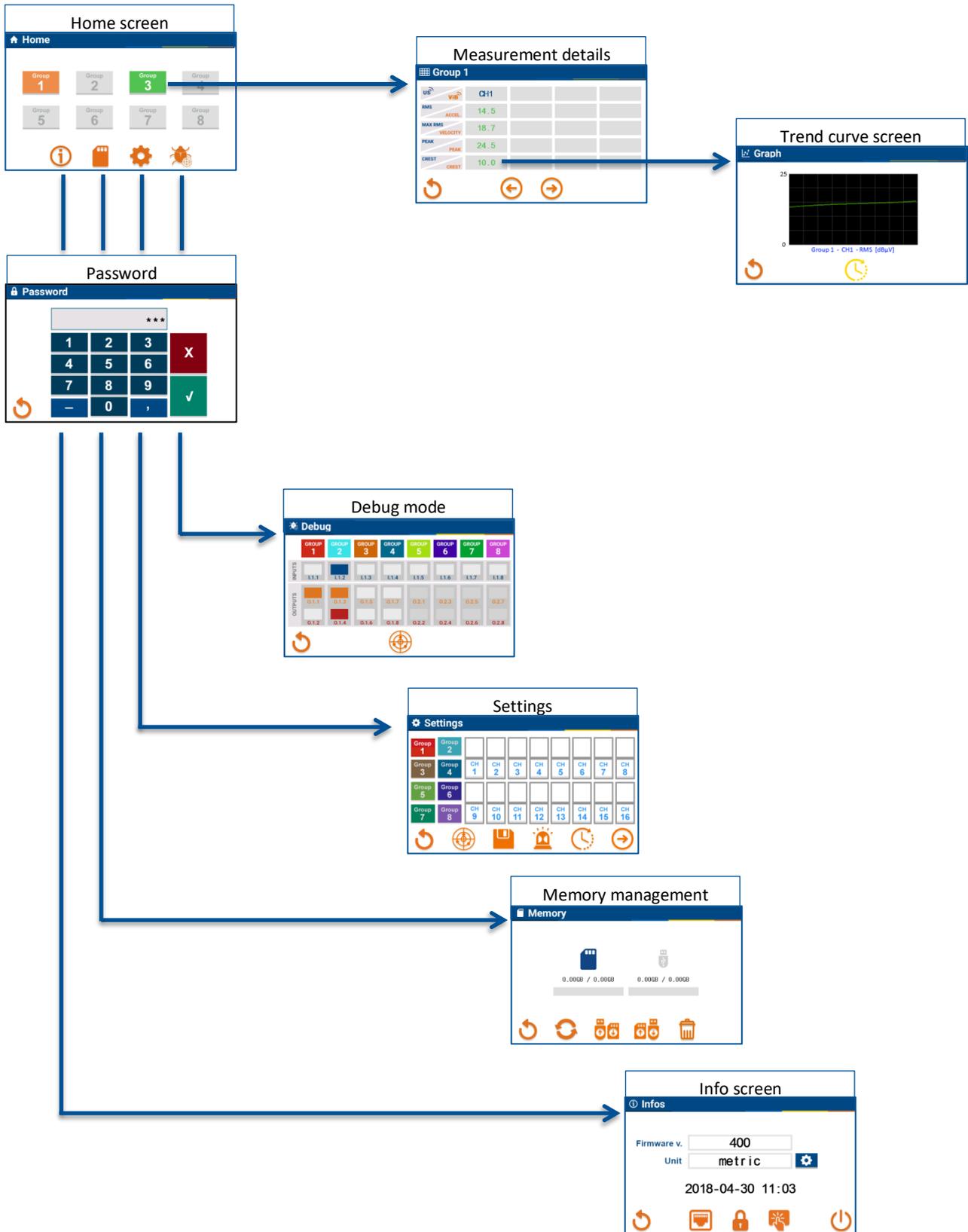


Figure 40: Block diagram of menus and sub menus

2.1 Setting screen overview

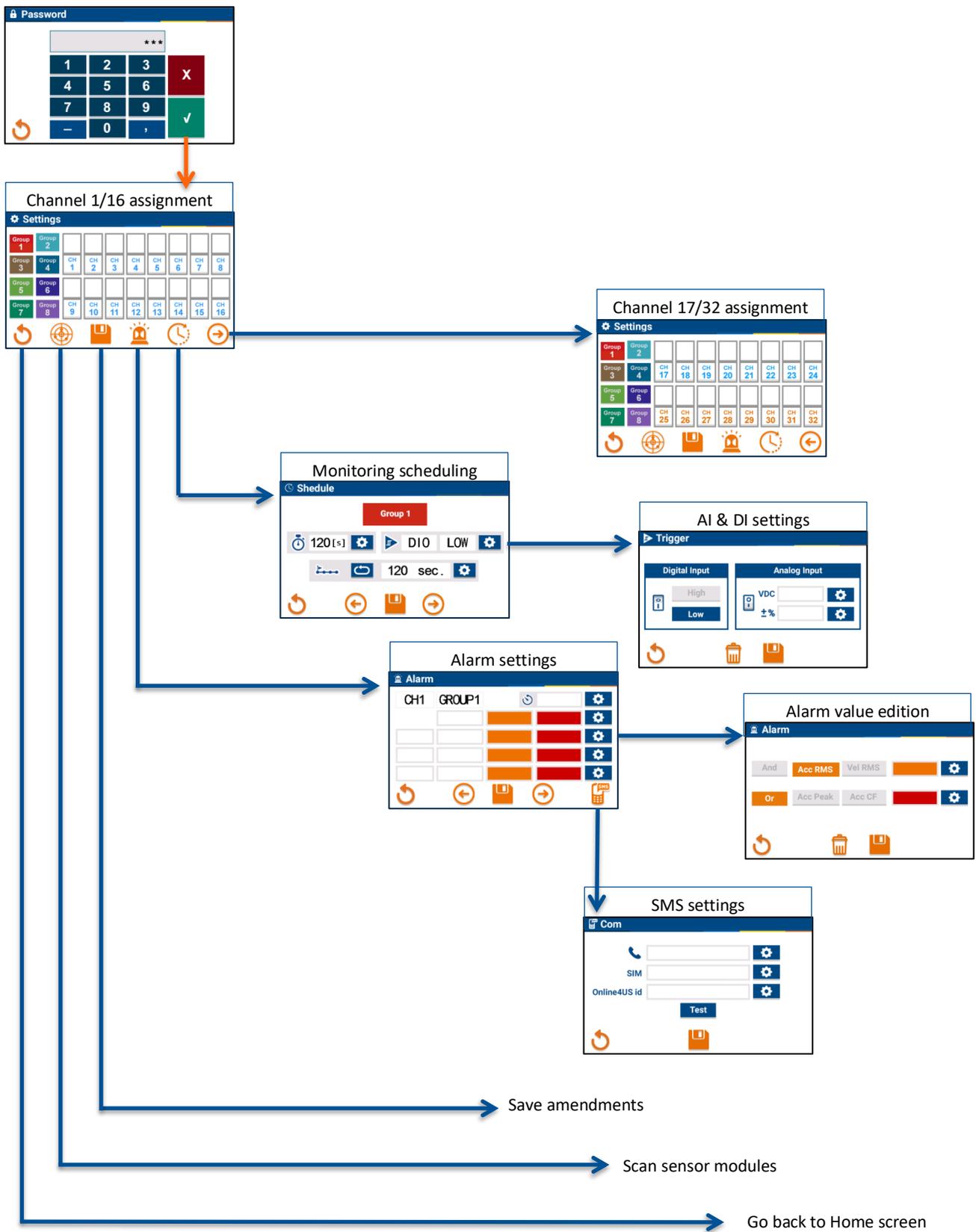


Figure 41: Setting screen overview

2.1.1. Channel assignment

From the Home screen, press the parameter icon.

①: An intermediate window asks for your password (default is 159753)

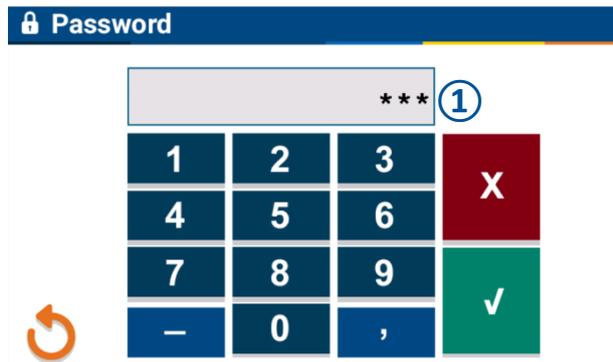


Figure 42: Password typing

If the password is correct, the main setting screen is displayed.

②: Press the scan icon to detect active sensors



Figure 43: Scan for detecting active channels

③: Active US channels become blue

④: Active VIB channels orange



Figure 44: Active US channels are blue, VIB orange

- ①: Press the group in which you want to assign your channel
- ②: Press the zone above the desired channel
- ③: The zone turns to the color of the associated group
- ④: If needed, press the right arrow to assign channels 17 to 32
- ⑤: When channel assignment is completed, press the save icon



Figure 45: Channel assignment



The channel numbering is decided by the CPU/CUM. There is no relationship between the sensor module physical location with respect to CPU/CUM and the number assigned by the CPU/CUM of its 2 sensor channels. For instance, for a sensor module located just to the right of the CPU/CUM, the channel numbers could be 3 and 7, and not necessarily 1 and 2. The following topic explains how to perform the matching between a sensor input of a sensor module and its channel numbering.

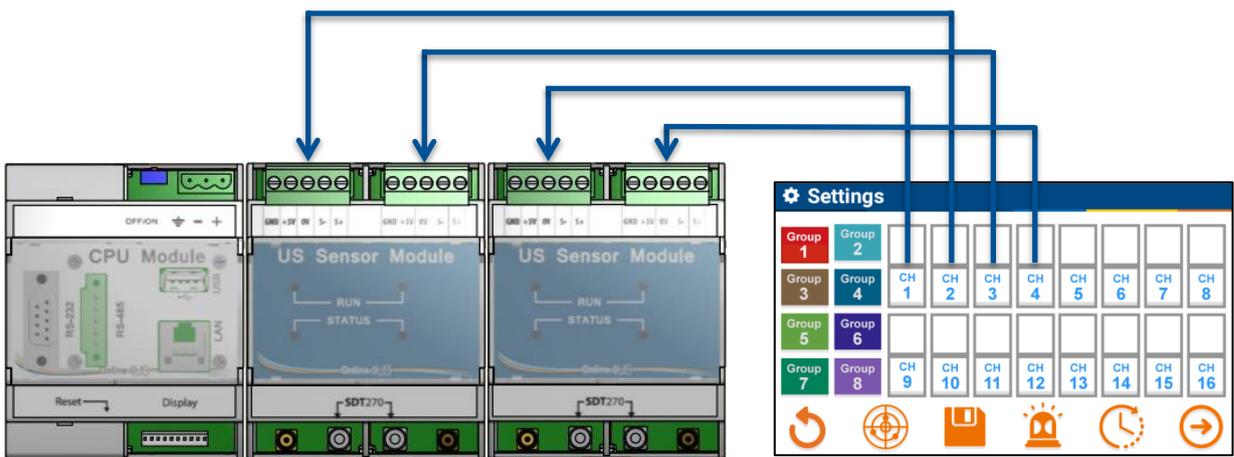


Figure 46: No matching between sensor module location and channel numbering

①: Press a channel number on the touch screen

②: The STATUS LED and the RUN LED of the corresponding sensor module channel will blink. Press the channel number a second time to stop the blink status

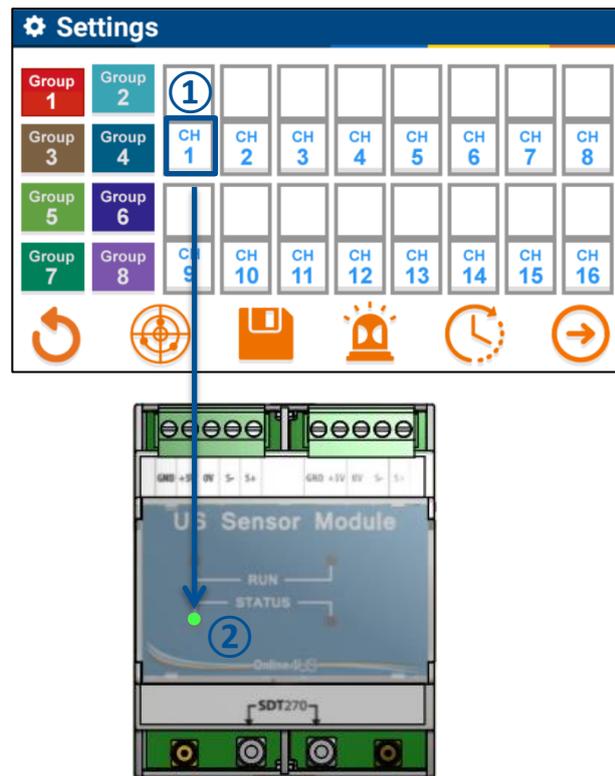


Figure 47: Matching channel number with sensor module

2.2 Alarm settings

2.2.1. Alarm delay



The machine health status of a group switches to warning or danger only when the number of consecutive measurements exceeding the warning or danger alarm threshold reaches the alarm delay set point.

Online4US modifies the color code of the group, the color code of the measurements and the digital output status only when the alarm delay set point is reached.

Alarm delay is a feature to reject false alarm when an unexpected event without relation to machine damage causes an abnormally increased reading.

Alarm delay acts as a counter with a set point which is a numerical value adjustable from 0 to 99.

The alarm delay acts as follow:

- When a reading triggers an alarm condition, the counter is incremented;
- If the next reading does not trigger the alarm condition, the counter is reset;
- When the number of consecutive readings in alarm matches the alarm delay set point, the alarm is activated, and the machine health status is changed to warning or danger.

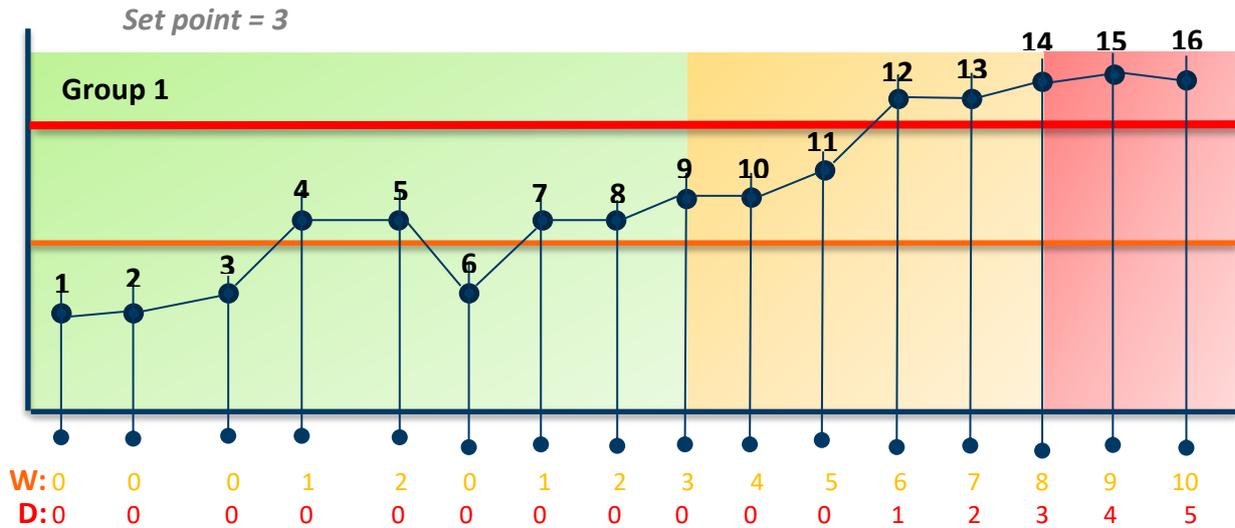


Figure 48: Working principle of the alarm delay behavior

Legend: **W** is the alarm delay counter for the warning alarm level
D is the alarm delay counter for the danger alarm level

The following table indicates for each reading:

- The value of the warning alarm delay counter (column A);
- The value of the danger alarm delay counter (column B);
- The machine health status of group 1 (column C);
- The status of the digital output #1 (warning) (column D);
- The status of the digital output #2 (danger) (column E).

Reading #	A	B	C	D	E
1	0	0	GOOD	OFF	OFF
2	0	0	GOOD	OFF	OFF
3	0	0	GOOD	OFF	OFF
4	1	0	GOOD	OFF	OFF
5	2	0	GOOD	OFF	OFF
6	0	0	GOOD	OFF	OFF
7	1	0	GOOD	OFF	OFF
8	2	0	GOOD	OFF	OFF
9	3	0	WARNING	ON	OFF
10	4	0	WARNING	ON	OFF
11	5	0	WARNING	ON	OFF
12	6	1	WARNING	ON	OFF
13	7	2	WARNING	ON	OFF
14	8	3	DANGER	ON	ON
15	9	4	DANGER	ON	ON
16	10	5	DANGER	ON	ON

Figure 49: Machine health status and digital output status according to the alarm delay counter value

i There is no manual alarm reset. Alarms are automatically reset when the signal value goes below the alarm condition level.

2.2.2. Alarm condition

Alarm condition set point is defined per channel.

The alarm definition is the combination of the 4 condition indicators using boolean connectors AND and OR. When a reading fulfills the alarm condition, the alarm delay counter is incremented.

The available condition indicators are:

- RMS, Max RMS, Peak and Crest Factor for US measurements;
- Acceleration RMS, Velocity RMS, Acceleration Peak and Acceleration Crest Factor for VIB measurements.



The alarm type corresponds to the absolute mode in UAS

2.2.3. Alarm delay set point

From the setting screen, press the alarm icon:

①: Press the parameter icon of the alarm delay set point



Figure 50: Alarm settings screen

②: Enter the desired value where the value range is from 0 to 99

③: Press the cancel button to reset the value

④: Confirm with the valid button



Figure 51: Keypad for the alarm delay counter

2.2.4. Alarm condition settings

From the setting screen, press the alarm icon:

To select one channel:

- ①: Press the left arrow
- ②: Press the right arrow
- ③: The selected channel is shown on the top left of the window
- ④: Press the threshold parameter icon of the first alarm row



Figure 52: Alarm setting screen

⑤: Select a condition indicator. The available indicators are:

For US:

- RMS, Max RMS, Peak and Crest Factor

For VIB:

- Acceleration RMS, Velocity RMS, Acceleration Peak and Acceleration Crest Factor

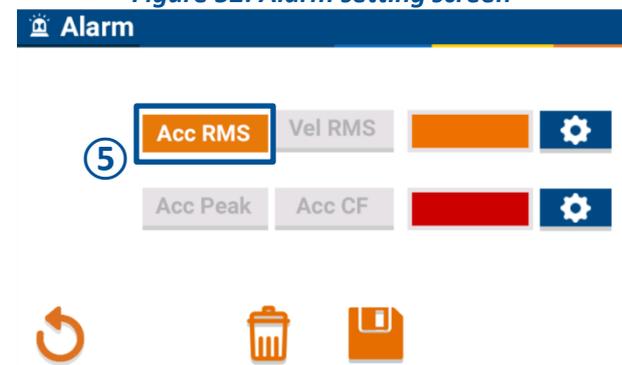
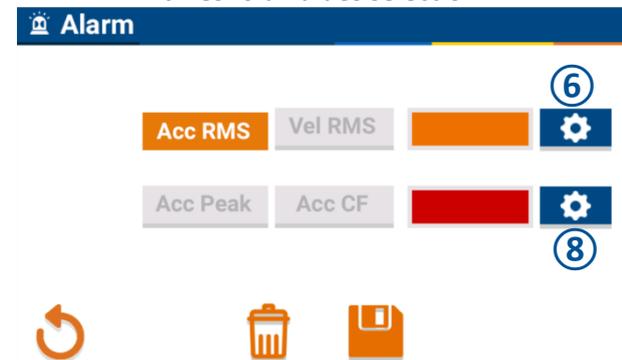


Figure 53: Condition indicator and threshold values selection

⑥: Press the Warning value icon



⑦: Enter the desired value. Start with the minus sign for US if needed



Figure 54: Entering the warning value

⑧: Press the danger value icon

9: Enter the desired value

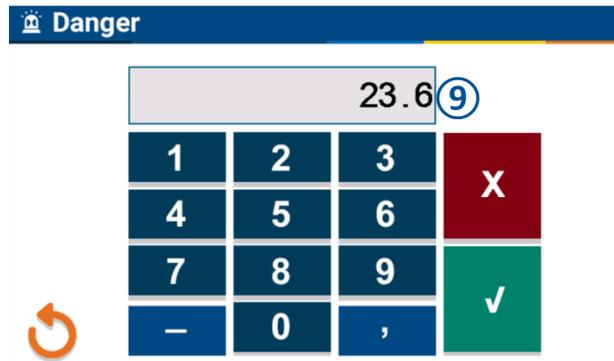


Figure 55: Entering the danger value

10: Save the alarm threshold using the save icon

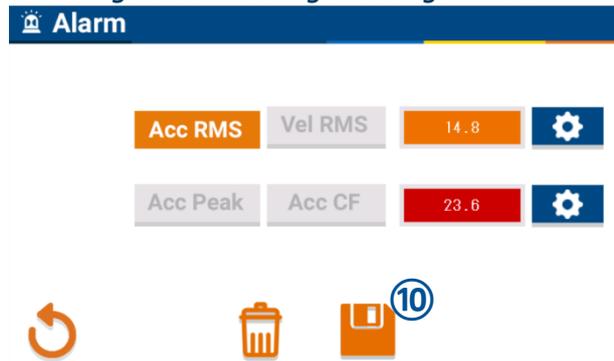


Figure 56: Saving alarm thresholds

11: Save the alarm condition using the save icon

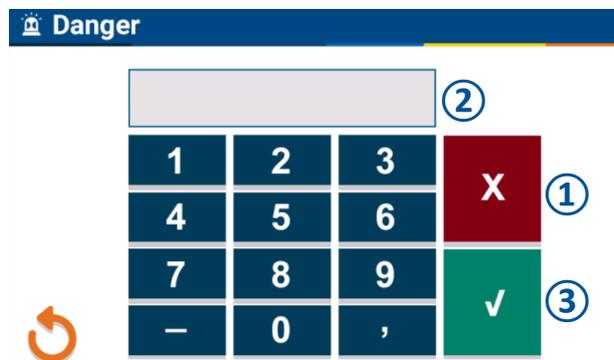


Figure 57: Saving alarm settings

 Do not forget to save first the alarm threshold AND then the alarm condition

If you do not want to use one threshold:

- 1: Clear the field using the cancel button
- 2: The value field is empty
- 3: Confirm with the valid button



11: The result is shown in the adjacent figure

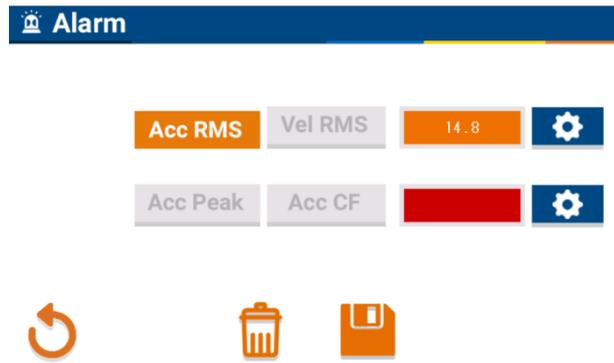


Figure 58: Deleting one threshold

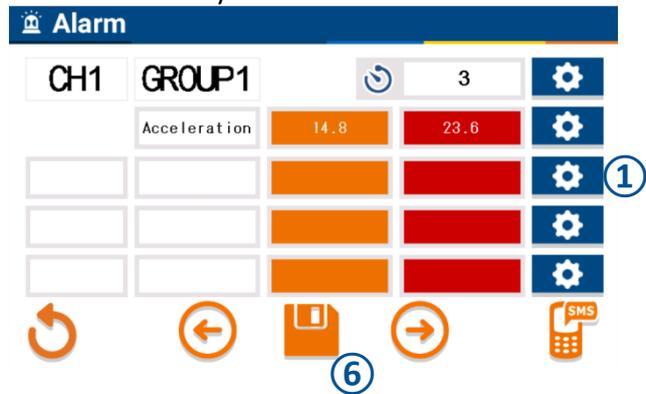


The danger threshold can be lower than the warning threshold (the Online4US processes both alarm levels separately).

2.2.5. Condition indicator combination

Online4US provides the opportunity to combine the condition indicators using boolean operators AND and OR. The following procedure assumes a first indicator is already used:

1: Press the threshold parameter icon of the second alarm row



2: Select the boolean operator AND or OR

3: Enter the warning value

4: Enter the danger value

5: Save the alarm threshold

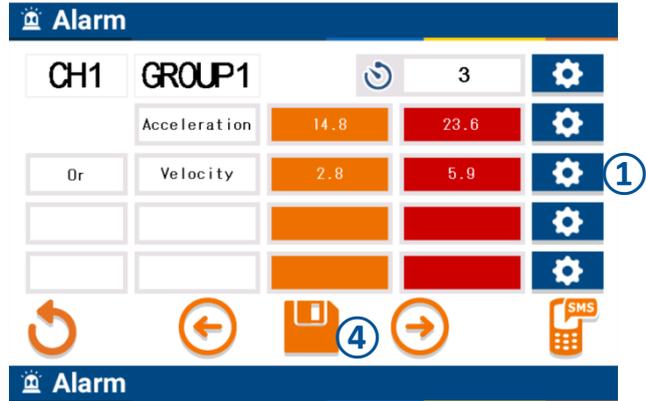
6: Save the alarm condition



Figure 59: Adding condition indicator combination

2.2.6. Deleting one condition indicator and its alarm threshold

1: Press the threshold parameter icon of the row to delete



2: Press the trash bin icon

3: Save the alarm threshold

4: Save the alarm settings

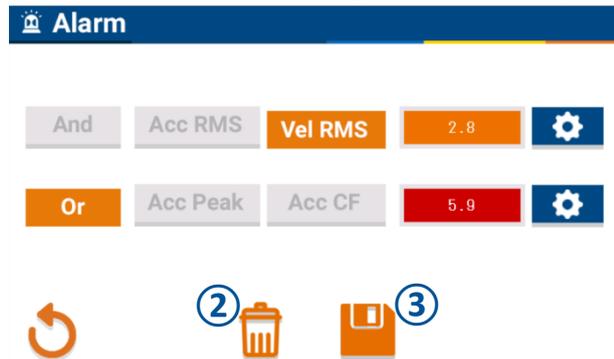


Figure 60: Deleting condition indicator combination

2.2.7. SMS alarm message (not available yet)

The SMS alarm sending is active when a SMS module is connected.

From the alarm condition screen:

1: Press the SMS icon



2: Enter the cell phone number of the recipient

3: Enter the PIN CODE number of the sim card

4: Enter an Online4US ID (used when several Online4US are sending a SMS to the same recipient. The SMS format will be "danger (or warning) group x Online4US id xxxxxx")

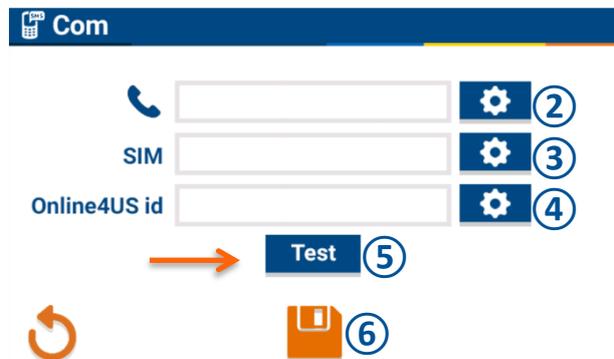


Figure 61: SMS alarm message screen

5: Use the test button to verify that the setting is correct

6: Save the setting

2.2.8. Digital outputs

Digital outputs can be used to externally communicate the state of the alarm and have an AON (All-Or-Nothing) behavior with two states:

- All, or 1, or On;
- Nothing, or 0, or Off.

Digital output could be compared to a NO (Normally Open) contact, open when inactive and closed when active.

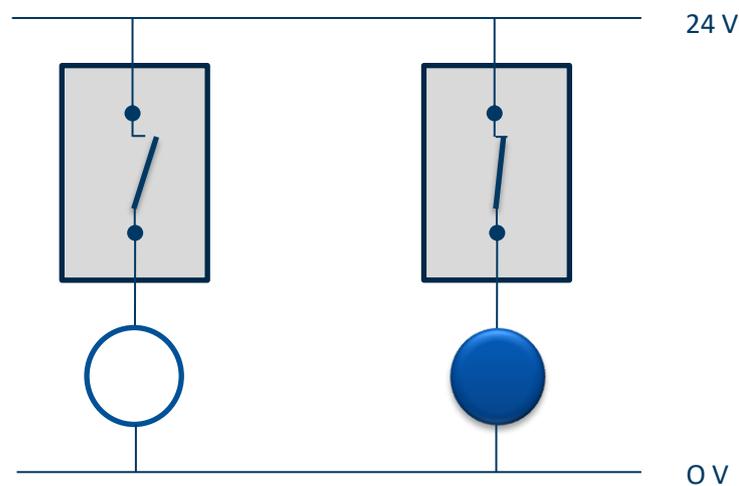


Figure 62: Left side, the output is OFF; right side, the output is ON

Digital outputs are used to distribute alarms to a PLC, a SCADA system or to directly trigger an audible and/or visual signaling device.

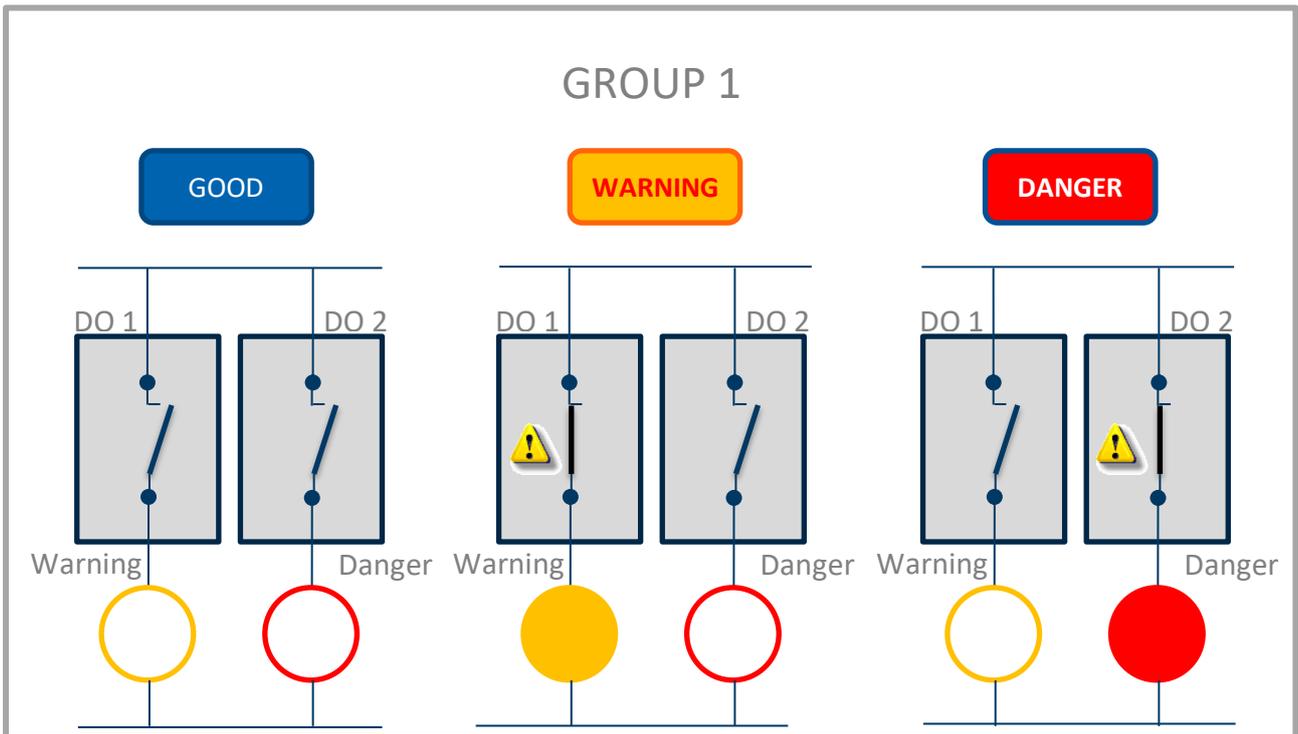


Figure 63: States of digital outputs for Group 1 according to the alarm status

2.3 Monitoring schedule

From the setting screen:

- 1: Press the schedule icon



Figure 64: Setting screen

To select a Group:

- 2: Press the left arrow
- 3: Press the right arrow
- 4: Select the acquisition time parameter to enter the acquisition time. The range is from 1 to 120 seconds
- 5: Select the trigger icon to trigger the start of a measurement acquisition

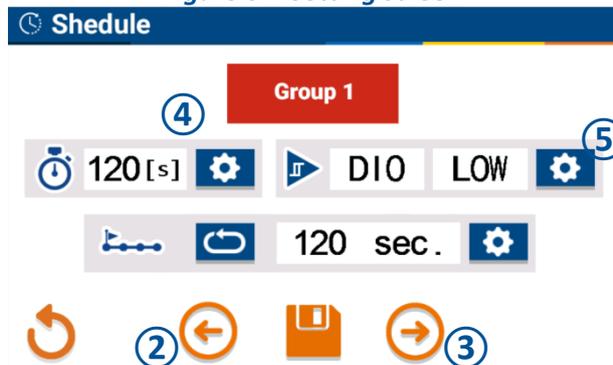


Figure 65: Schedule screen

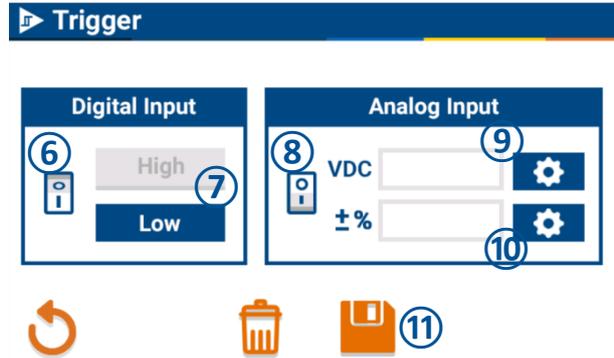
A measurement can be triggered using:

A digital input:

- ⑥: Turn the digital input switch to ON
- ⑦: Select if the measurement starts when the digital input status is high (closed) or low (open)

An analog input:

- ⑧: Turn the analog input switch to ON
- ⑨: Enter the set point value
- ⑩: Enter if necessary, a percentage tolerance on the set point value
- ⑪: Save the setting by pressing the save button



To delete a trigger setting:

- ⑫: Press the trash bin icon
- ⑬: Save the change by pressing the save button

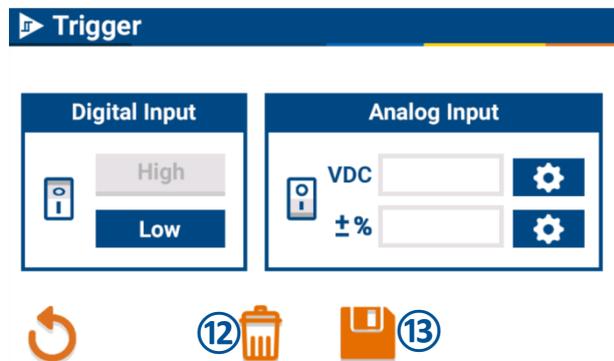


Figure 66: Trigger setting screen

Select the periodicity between two measurements acquisition:

To perform continuous measurement:

- ①: Press the continuous icon. The icon becomes green
- ②: The duration field turns blank

To perform cyclic measurement:

- ③: Press the duration setting icon when the continuous icon is blue
- ④: Select a periodicity in:
 - Seconds (ss)
 - Minutes (mm)
 - Hours (hh)
 - Days (dd)
- ⑤: Enter the set point value
- ⑥: Save the schedule setting

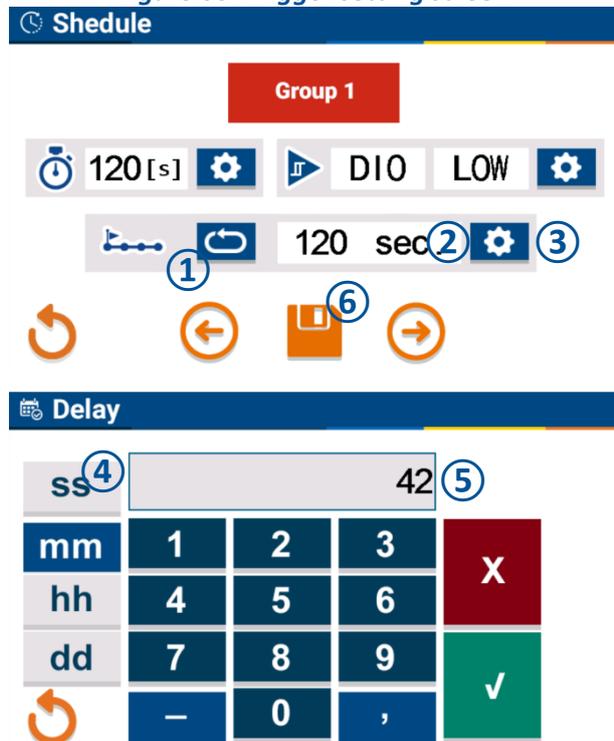


Figure 67: Periodicity setting screen

The monitoring schedule defines how the group will be monitored.

The parameters are:

- The acquisition time of one measurement;
- The periodicity between measurements;
- The triggering of measurements.



Triggering measurement of the sensors assigned to a group is synchronous. Then the measurement start, and stop will be identical for all sensors of a group.

2.3.1. Acquisition time

The acquisition time defines the duration (and so the number) of samples used to calculate the 4 condition indicators. The duration of the acquisition time is adjustable from 1 to 120 seconds.

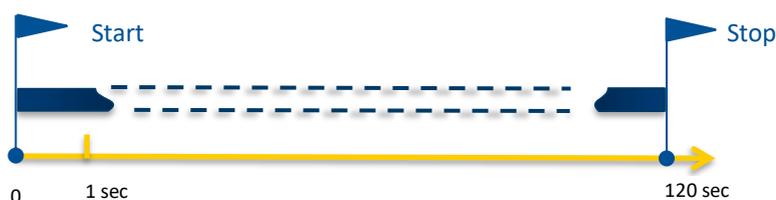


Figure 68: The acquisition time is adjustable from 1 to 120 seconds



A longer acquisition time improves the measurement repeatability.

2.3.2. Periodicity: continuous

When the periodicity is set to continuous:

- Online4US realizes a first data acquisition;
- When finished, the CPU/CUM retrieves the condition indicators, refreshes the alarm status of the group, triggers digital outputs, check the status of inputs. These operations take a few milliseconds;
- Then a next acquisition is started and so on;
- The loop is continued till the conditions of triggering are valid.

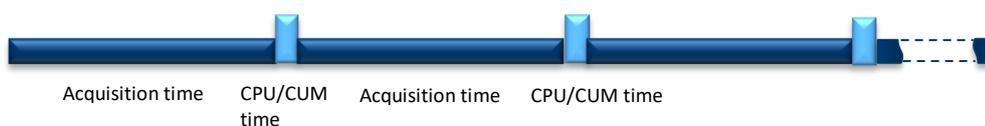


Figure 69: Continuous monitoring

2.3.3. Periodicity: every xx seconds/minutes/hours/days

When the periodicity is set to every xx seconds/minutes/hours/days:

- Online4US realizes a first data acquisition;
- When finished, the CPU/CUM retrieves the condition indicators, refreshes the alarm status of the group, triggers digital outputs, check the status of inputs. These operations take a few milliseconds;
- The next acquisition will start at the end of the duration of xx seconds/minutes/hours/days.



Figure 70: Periodic monitoring

2.3.4. Digital inputs: AON mode

AON (All-Or-Nothing) mode takes into consideration two states. It has a binary behavior:

- All, or 1, or On;
- Nothing, or 0, or Off.

This mode is useful for machineries whose operation is intermittent: their health status evaluation must be performed only when running.



Figure 71: Reliable monitoring periods are correlated to the machine running periods

2.3.5. Analog inputs

Operation is the same than digital input except that user can define an analog level, as well as a voltage tolerance, used to trigger the start of measurement.

3. Home screen overview

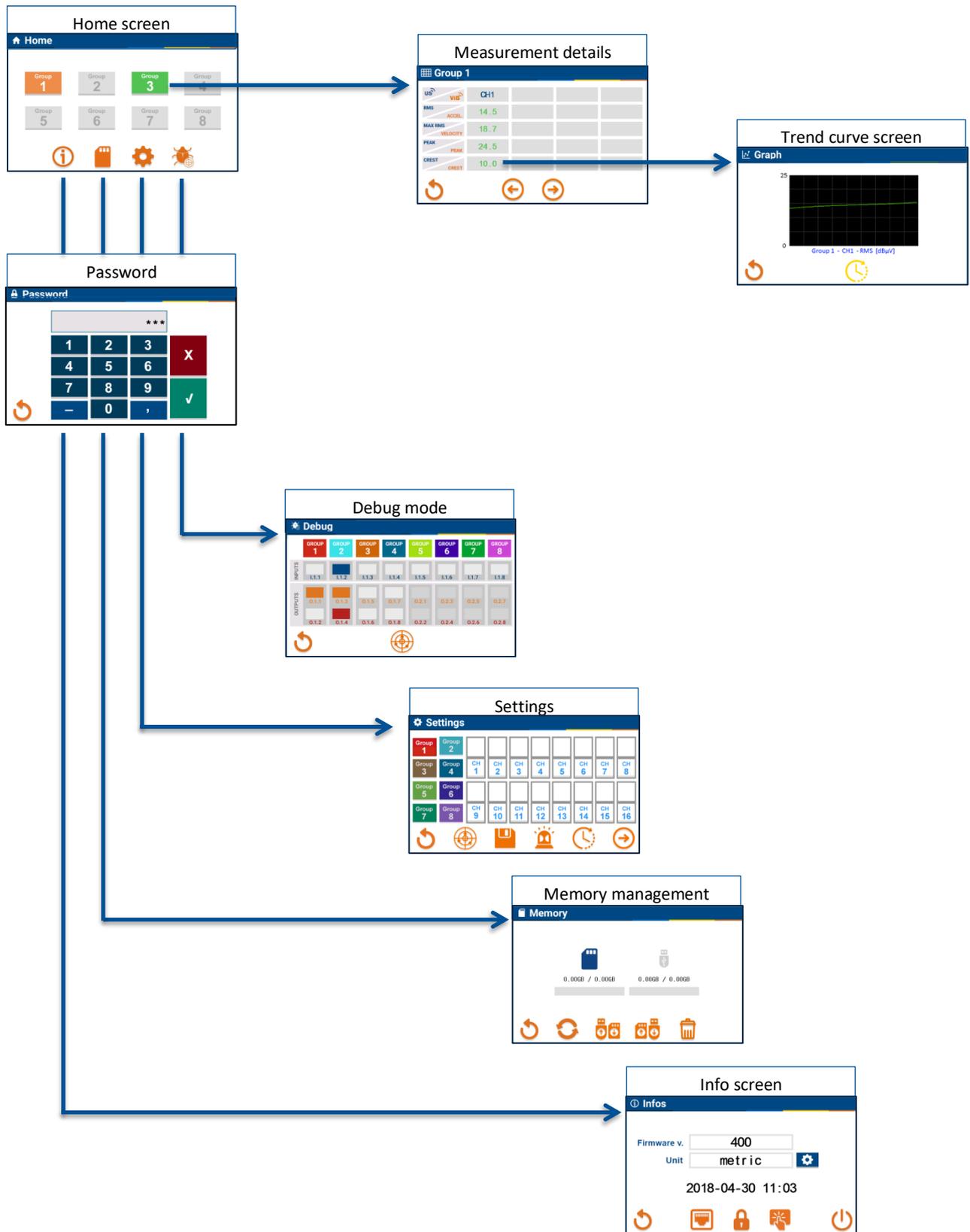


Figure 72: Home screen overview

3.1. Home Screen

- 1: Display the machine health status of the 8 groups. The color code is:
 - Grey: the group is not used
 - Green: no triggered alarm
 - Orange: the warning alarm level is triggered
 - Red: the danger alarm level is triggered
- 2: Info menu icon
- 3: Memory menu icon
- 4: Setting menu icon
- 5: Debug menu icon



Figure 73: Home screen

3.1.1. Measurement detail screen

From the home screen, click on the group you desire to visualize the measurement details:

- 1: The channel is indicated on the top of the row. The channel number is in blue for ultrasound sensor and in orange for vibration sensor
- 2: The indicator measurements are displayed below the channel name:
 - The ultrasound indicators are, from top to bottom, RMS (dBμV), Max RMS (dBμV), Peak (dBμV) and Crest Factor (dB)
 - The vibration indicators are, from top to bottom, Acceleration RMS (g), Velocity RMS (mm/s or ips), Acceleration Peak (g) and Acceleration Crest Factor (-)
- 3: Press the left arrow to display the measurement details of the previous group
- 4: Press the right arrow to display the measurement details of the next group
- 5: Press the return icon to go back to the home screen



Figure 74: US readings, the channel number is in blue



Figure 75: VIB readings, the channel number is in orange



Rows are empty when no more channels are assigned to the selected group. Readings are refreshed at the end of each acquisition.

- 1: Readings are in green when values have not triggered an alarm
- 2: Readings are in red when values have triggered their danger alarm level
- 3: Readings are in orange when values have triggered their warning alarm level

Notes:

- When no alarm is configured for the indicator, readings are in black
- When sensor is waiting for a trigger (see schedule menu), readings are greyed out

Only the indicator reading relative to the triggered alarm will have its color changed

3.1.2. Trend curve screen

From the measurement detail screen:

- 1: Click on one reading to display the trend curve of the corresponding indicator
- 2: The legend indicates which curve is displayed
- 3: Press the monitoring icon to display previous measurement (this can take some time). The progress percentage will be shown in the legend. Press a second time the button to stop loading previous data and to display the already loaded ones
- 4: Press the bottom Y axis number to change the lower scale value
- 5: Press the top Y axis number to change the upper scale value
- 6: Press the return icon to go back to the measurement screen details



Figure 76:
 No triggered alarm for channel 1
 Danger alarm level is triggered for channel 2
 Warning alarm level is triggered for channel 3

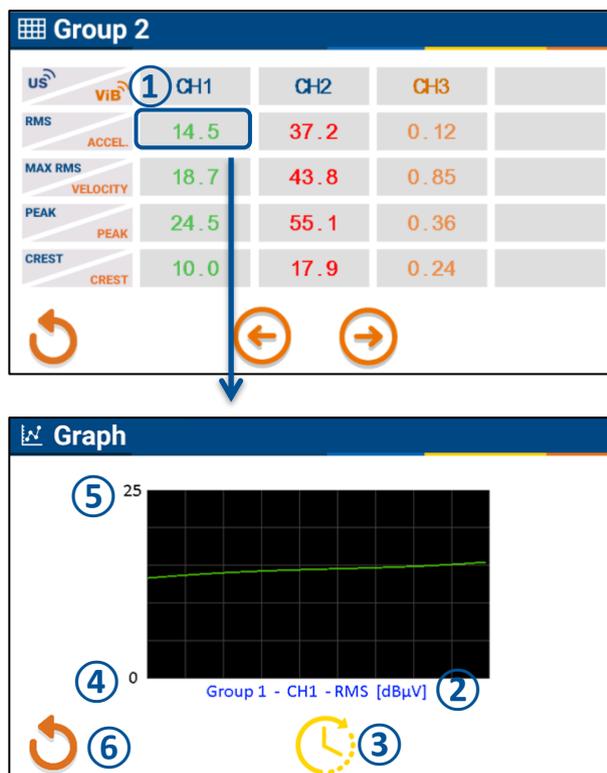


Figure 77: Trend curve screen

i *The last saved readings are displayed for a maximum of 550 points. At the end of an acquisition time, the new reading is added. If the maximum of points was already reached, the curve is left-shifted.*

4. Info screen overview

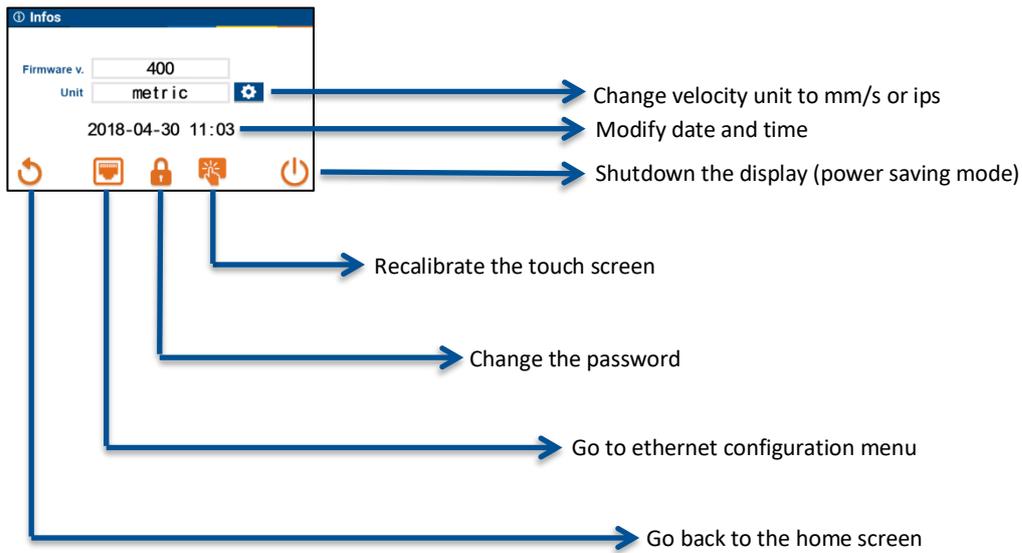


Figure 78: Info screen overview

4.1. Info screen

From the home screen, press the icon info to display the info menu:

- 1: Click the settings icon to choose between metric (the unit for vibration velocity will be mm/s) or imperial (the unit will be ips)
- 2: Click the year field to change it. Repeat the same operation to change month, day, hours, and minutes
- 3: Power off the display (energy saving mode). When powered off, any touch on the display will resume it and the home screen will be displayed

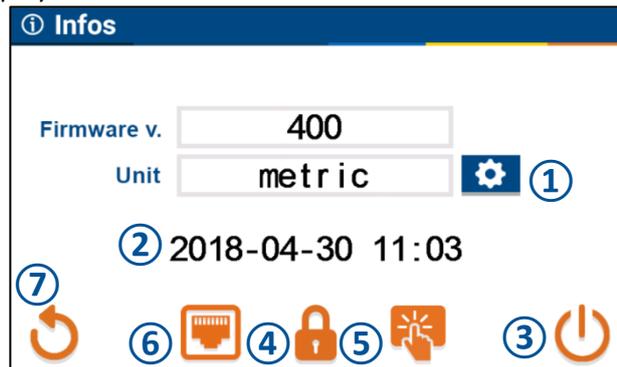


Figure 79: Info screen

- 4: Change password menu
- 5: Touch screen calibration menu
- 6: Ethernet configuration menu
- 7: Press the return icon to go back to the home screen



The date and time formats are as specified by ISO 8601. So, the time is based on the 24-hour timekeeping system. The format is: YYYY; MM; DD; HH:mm.

4.1.1. Password menu

From the info menu, press the icon password to change it:

- ①: Type the current password
 - ②: Type the new password
 - ③: Confirm the new password
- The maximum number of digits is 16

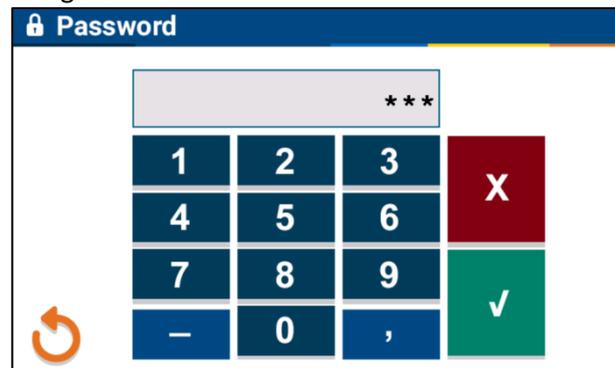


Figure 80: Password menu



The default password is 159753 and this specific password will always work. You can use it for password recovery.

4.1.2. Ethernet configuration menu

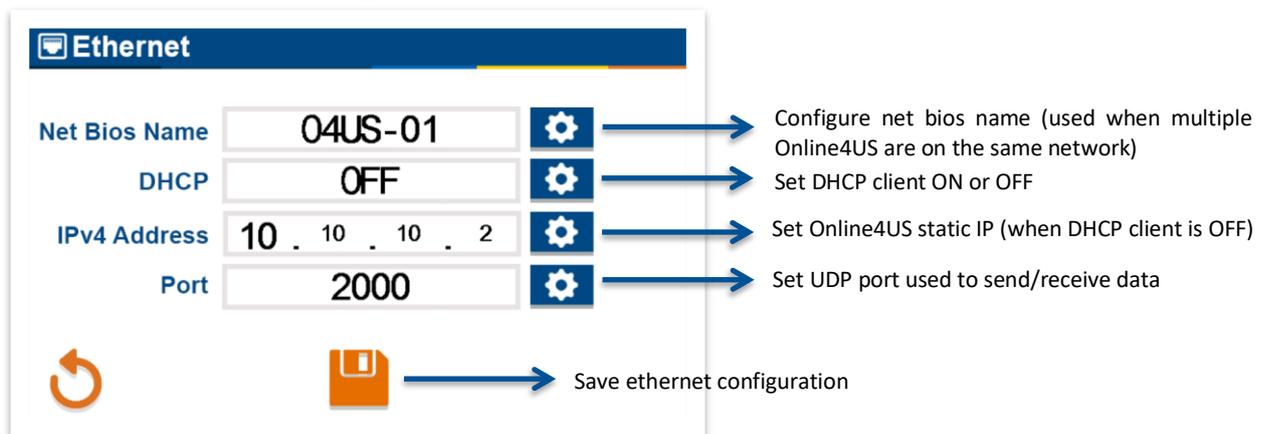


Figure 81: Ethernet menu

See [Part 3: Communication](#) for more detailed communication information.

4.2. Memory management screen overview

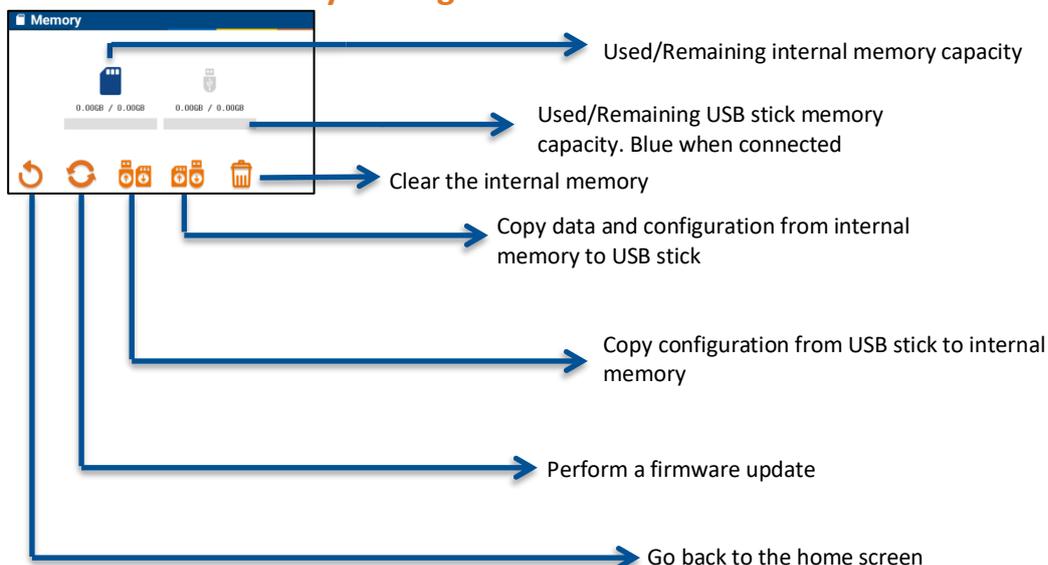


Figure 82: Memory management screen

4.2.1. Memory management screen

From the home screen, press the memory icon:

①: This progress bar indicates the remaining capacity of the internal memory

②: This progress bar indicates the remaining capacity of the USB stick. It is active only when a USB stick is plugged

③: Click the update icon to update Online4US firmware

④: Click the copy-to-USB icon to copy the saved reading and the configuration from the internal memory (active when a USB stick is plugged)

⑤: Click the trash bin icon to clean the internal memory (all data will be deleted)

⑥: Click the copy-to-SD icon to copy the configuration from an USB stick to the internal memory (active when a USB stick is plugged)

⑦: Click the return icon to back to the home screen

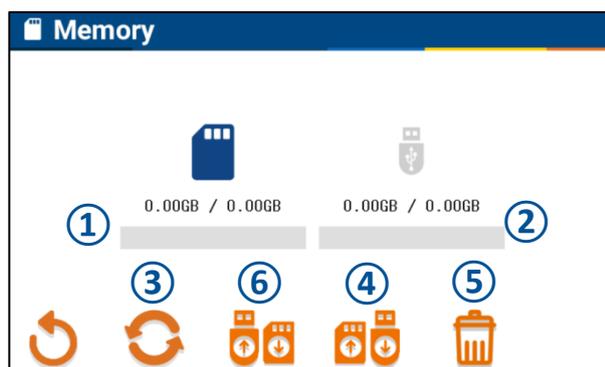


Figure 83: Memory management screen

4.2.2. Update firmware

From the memory management screen:

①: Insert a USB stick containing the last firmware in the CPU/CUM. The icons update and USB become active

②: Press the update icon

Note:

- Firmware files should be located in "U0:/O4US/Firmware/" (where "U0" is the letter or the name used for the USB memory stick).

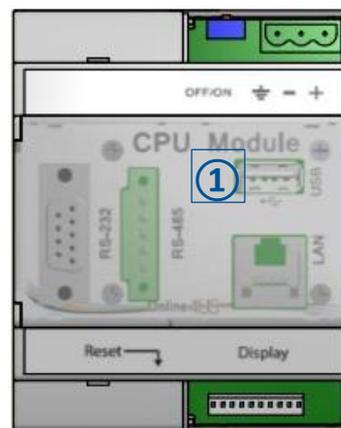


Figure 84: CPU/CUM



The last firmware can be downloaded from SDT ftp. The address is <http://ftp.sdt.be/pub/Software/Online4US/>

4.2.3. Copy data and configuration on a USB stick

From the memory management screen:

- 1: Insert a USB stick. The icons update and USB become active
- 2: Verify the remaining storage capacity of the USB stick is large enough
- 3: Press the copy-to-USB
- 4: During the copy process, the icons update, Copy-to-USB, and trash bin are yellow

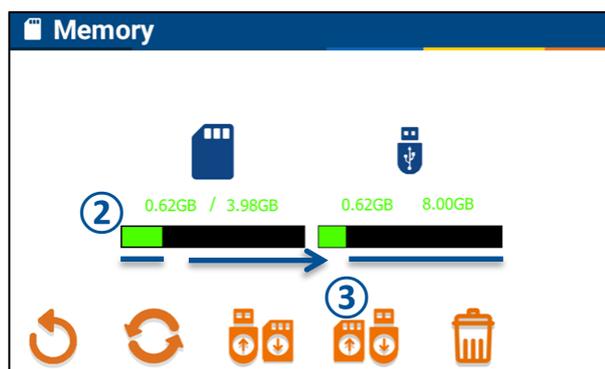


Figure 85: Copying data & configuration to a USB stick



*It is recommended to clean the internal memory after a successful data transfer to a USB stick.
Depending on the data size to transfer, the process can take several minutes.*

4.2.4. Clear the internal memory

From the memory management screen, press the trash bin icon. During the process, the icons update, Copy-to-USB, and trash bin are yellow.

4.2.5. Content transferred from Online4US internal memory to a USB stick

The following tree hereafter shows the content of the USB stick after a transfer on a computer:

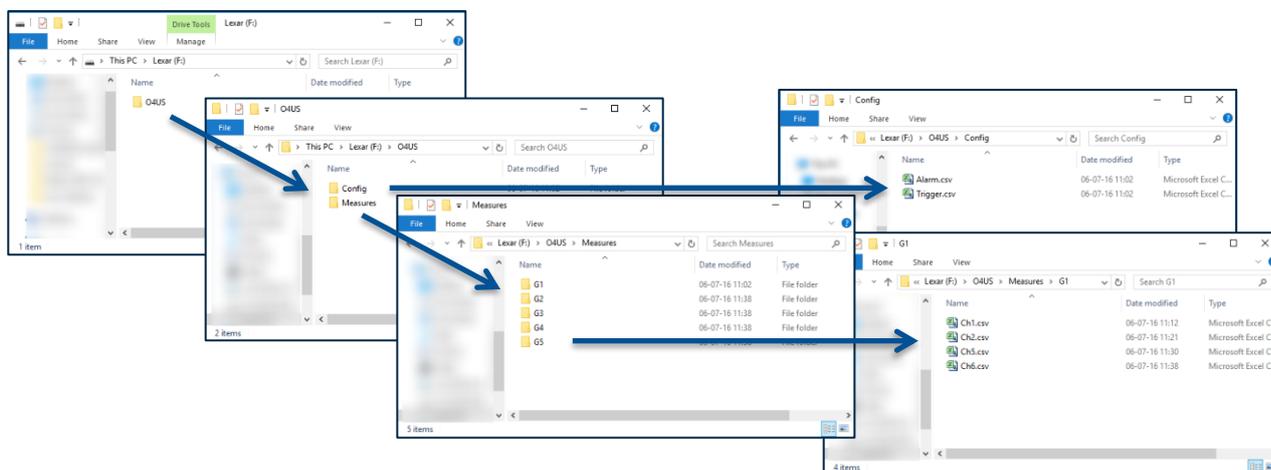


Figure 86: Content of Online4US data transferred on a USB stick

The files are "CSV" files and can be opened with MS Excel or equivalent.
The list of the files is:

- Alarm & trigger (config folder);
- Chxx (G1 to G8 folders) where xx is the channel number.

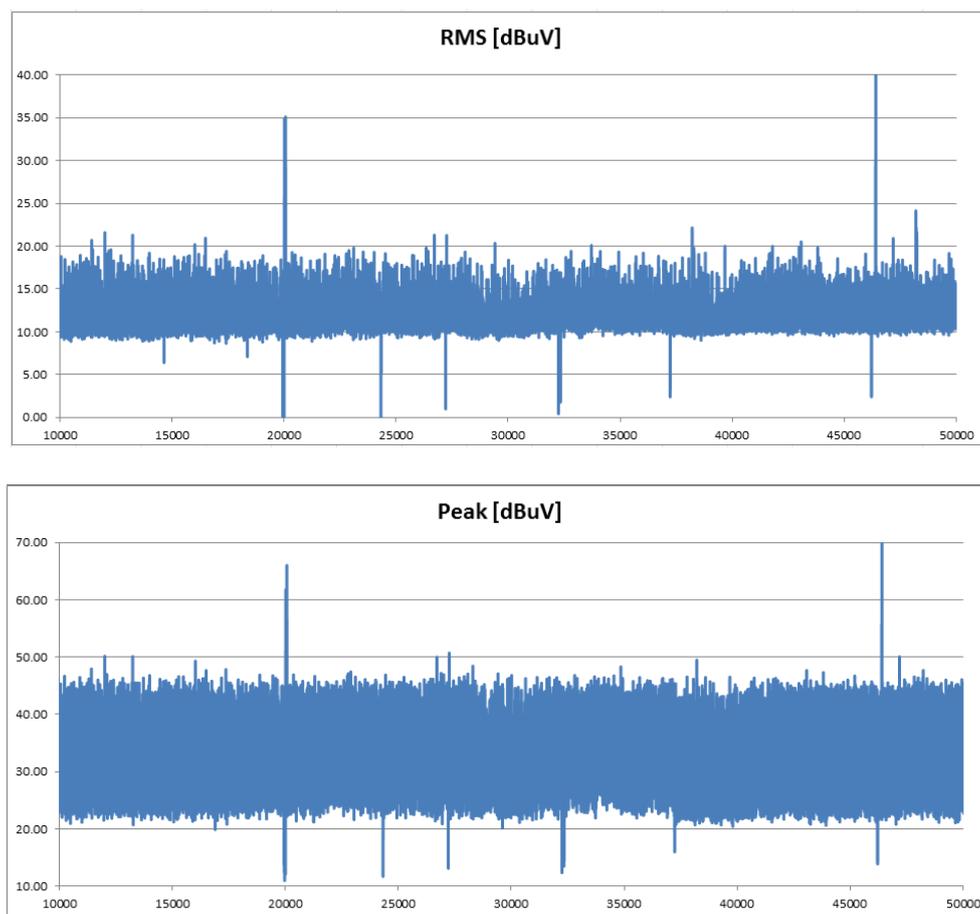


Figure 87: Examples of RMS and Peak curves using Excel

4.2.6. Load configuration from a USB stick

From the memory management screen:

- ①: Insert a USB stick. The icons update and USB become active
- ②: Press the load-from-USB
- ③: During the copying process, the icons update, Copy-to-USB, and trash bin are yellow

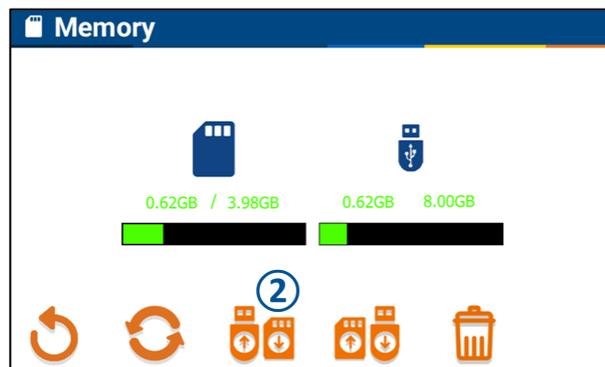


Figure 88: Loading configuration from a USB stick

Two files can be loaded from an USB stick to the Online4US: “Alarm.csv” (configuration file for sensors’ alarms) and “Trigger.csv” (configuration file for groups’ measurements scheduling). Both files should be located in the “U0:/O4US/Config/” folder where “U0” corresponds to the name of the USB stick (the exact name does not matter for the process).

These files can be edited within any notepad software in order to configure the Online4US alarm and triggering without using the Online4US display (to be sure to use the correct syntax for the files, it is recommended to copy the files from the Online4US first and then editing them).

Alarm file

Sensor ID	Logic condition 1	Logic condition 2	Logic condition 3	Data type 1	Data type 2	Data type 3	Data type 4	Warning threshold 1	Warning threshold 2	Warning threshold 3	Warning threshold 4	Danger threshold 1	Danger threshold 2	Danger threshold 3	Danger threshold 4	Accumulator
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

The columns designate respectively:

- Sensor ID (1 to 32);
- Logic condition 1: logic operator used for the second condition indicator
 - 0 = not used;
 - 1 = AND;
 - 2 = OR.
- Logic condition 2: logic operator used for the third condition indicator;
- Logic condition 3: logic operator used for the fourth condition indicator;
- Data type 1: first condition indicator used for alarm
 - 0 = RMS / Acceleration RMS;
 - 1 = Sub RMS / Velocity;
 - 2 = Peak;
 - 3 = Crest Factor.
- Data type 2: second condition indicator used for alarm;
- Data type 3: third condition indicator used for alarm;
- Data type 4: fourth condition indicator used for alarm;
- Warning threshold 1: value used to trigger warning level for the first condition indicator;
 - Value must be in decimal format with a "." (point) as decimals separator (e.g. "-5.3").
- Warning threshold 2: value used to trigger warning level for the second condition indicator;
- Warning threshold 3: value used to trigger warning level for the third condition indicator;
- Warning threshold 4: value used to trigger warning level for the fourth condition indicator;
- Danger threshold 1: value used to trigger danger level for the first condition indicator
 - Value must be in decimal format with a "." (point) as decimals separator (e.g. "10.7").
- Danger threshold 2: value used to trigger danger level for the second condition indicator;
- Danger threshold 3: value used to trigger danger level for the third condition indicator;
- Danger threshold 4: value used to trigger danger level for the fourth condition indicator;
- Accumulator: Value used for the "Alarm delay" (0 to 99, 0 and 1 having the same behavior).

Trigger file

Group ID	Acquisition time	Acquisition delay	Acquisition delay [ms]	Acquisition type	Continuous	I/O trigger	Analog Threshold	Tolerance
1	1	1	1000	1	1	0	0	0
2	2	1	1000	1	1	0	0	0
3	3	1	1000	1	1	0	0	0
4	4	1	1000	1	1	0	0	0
5	5	1	1000	1	1	0	0	0
6	6	0	0	0	0	0	0	0
7	7	0	0	0	0	0	0	0
8	8	0	0	0	0	0	0	0
9	8	0	0	0	0	0	0	0
10								

The columns designate respectively:

- Group ID (1 to 8);
- Acquisition time: time, in seconds, used by each sensor within the group to compute their RMS value (1 to 120);
- Acquisition delay: time, in seconds, minutes or hours, between each measurement (0 to 120);
- Acquisition delay [ms]: time, in milliseconds, between each measurement
 - This need to be computed manually. If acquisition delay = 4 and acquisition type is configured to “minutes”, the acquisition delay [ms] should be = $4 * 60 * 1000 = 240000$.
- Acquisition type: unit used for acquisition delay;
 - 1 = seconds;
 - 2 = minutes;
 - 3 = hours;
 - 4 = days.
- Continuous: continuous measurement
 - 1 = true, sensors are measuring continuously;
 - 0 = false, each measurement is delayed by acquisition delay.
- I/O trigger: measurement triggering condition
 - 0 = no external trigger;
 - 1 = measurement starts on digital input high state;
 - 2 = measurement starts on digital input low state;
 - 3 = measurement start with analog input.
- Analog threshold: analog value used to trigger measurement (0.0 to 10.0)
 - Value must be in decimal format with a “.” (point) as decimals separator (e.g. 9.5).
- Tolerance: tolerance, in percentage, used for the analog threshold value (0 to 100)
 - To start a measurement, analog input should be between the limits [analog threshold + tolerance] and [analog threshold - tolerance] (e.g. a tolerance of 10% for an analog threshold of 5.0V result in a upper limit of 5.5V and a lower limit of 4.5V).

4.2.7. Auto save

It is possible to deactivate/activate the measurement auto save function. If auto saving measurement is not needed (measures are saved through serial communication, or historic of measures is not needed), deactivate this option will increase global performance.

From the memory management screen:

- ①: Press the SD-Card icon
SD-Card icon will be shown yellow if auto save is deactivated (default value), blue if auto save is activated





Figure 89: Loading configuration from a USB stick

4.3. Debug screen

The debug mode allows to verify the status of digital inputs and to manually force the status of digital outputs to ON or OFF. This mode is useful for verifying the correct input/output wiring between Online4US and a PLC or a SCADA system.

From the home screen, press the debug icon:

- ①: Use the scan function to refresh the input and output status
- ②: White color when the input or the output is physically present
- ③: Gray color when not present
- ④: Input is active (high state)
- ⑤: Input is inactive (low state)
- ⑥: For an active output, press its color zone to modify its status
- ⑦: Press the return icon to go back to the home screen

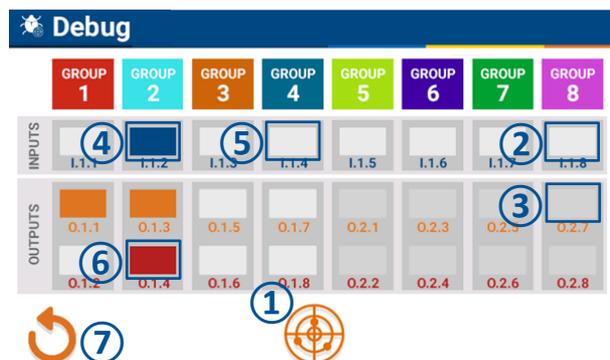


Figure 90: Debug screen

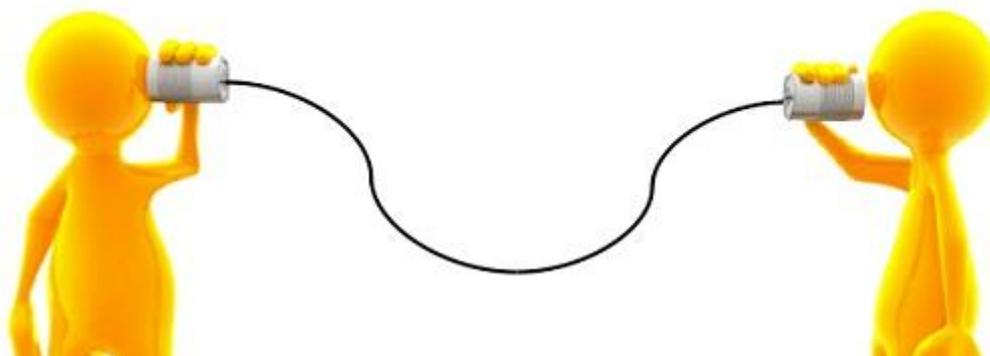
5. Recommended steps throughout initial Online4US-ACM settings



As every situation is unique, the following recommendations should not be considered as the universal way to efficiently start a permanent monitoring. Many parameters influence them. Historical data, criticality, machine type and age, spare part availability, Mean-Time-To-Repair are some. Then this generic guideline should be reviewed to quickly find relevant information inside this user manual.

1. **Velocity unit:**
If needed, choose the unit for acceleration velocity between mm/s and ips (inches per second).
2. **Channel assignment:**
Assign channels to groups.
3. **Acceptance test:**
When possible, collect US and VIB dynamic data respecting sensor location and orientation with an SDT handheld device.
Analyze time and frequency domain results.
4. **Shortened heightened surveillance:**
Configure the scheduling for each group using an increased periodicity of data collection (one hour for instance).
This period should be adapted to the time between a defect occurrence and the component failure.
5. **First alarm set:**
Define a first alarm set after having at least 20 readings.
6. **Data analysis:**
Visualize trend curve to detect any suspicious evolution.
7. **Alarm set adjustment:**
Adjust alarm levels and condition indicator combinations after having at least 100 readings.
8. **Long term normal monitoring:**
Adjust the scheduling for each group using a long-term periodicity of data collection (every 12 hours for instance).
This period should be adapted to the time between a defect occurrence and the component failure as the intervals between scheduled maintenance periods.
9. **Configuration saving:**
Save the configuration on a USB stick.

Part 3: Communication



1. Communication

The Online4US can communicate through 3 serial communication lines:

- RS-232;
- RS-485;
- Ethernet.

The communication protocol is OSC (Open Sound Control): <http://opensoundcontrol.org/>

2. Specifications

2.1. RS-232 38400-8E1

Speed: 38400 bauds
Word: 8 bits
Parity: Even
Stop bit: 1 bit
Flow control: No
Connector: DB-9 Female «DCE» (Rx, Tx, GND)

2.2. RS-485 38400-8E1

Speed: 38400 bauds
Word: 8 bits
Parity: Even
Stop bit: 1 bit
Mode: 2 wires (A, B)
Connector: pin header 3.5 mm female 5 wires, (GND, A, B, X, Y)

2.3. Ethernet 10/100T

Frame: UDP
Port: 2000 (configurable see [Part 2: firmware](#))
IP address: DHCP (configurable see [Part 2: firmware](#))
Host name: O4US-01 (configurable see [Part 2: firmware](#))
Connector: RJ-45

3. Protocol

3.1. Measures

The protocol used by the Online4US is OSC. Each time a measurement is done by a sensor, the Online4US send the 4 indicators values through the serial lines. The data sent use the following OSC format: **/INDICATOR,ii<CH><VAL><ALARM>**

Where:

«**/INDICATOR**» is the OSC message pattern.

«**,ii**» are the OSC message («i» for integer).

<CH> is the sensor channel number.

<VAL> is the indicator data value multiplied by a factor 10 in order to send only integer number (7.2 dB μ V is sent as 72).

<ALARM> is the indicator alarm (0 = no alarm configured – 1 = no indicator alarm triggered – 2 = indicator warning alarm triggered – 3 = indicator danger alarm triggered).

All data are ASCII except **<CH>** and **<VAL>** which are sent into big endian 32 bits integer form.

The OSC pattern and the arguments are always sent in a 4 bytes group and the last byte is always 0.

➔ If pattern or arguments are less than 4 bytes, «zero padded» is used.

➔ If pattern or argument are exactly 4 bytes length, 4 zero padded bytes will follow.

For example, «**/PEAK,iii**»

«**/PEAK**» is 5 bytes, so 3 zero padded bytes will follow.

«**,iii**» is 4 bytes, so 4 zero padded bytes will follow.

«**/PEAK**»000«**,iii**»0000**<CH><VAL><ALARM>**

Note: when using RS-232 or RS-485, two additional end characters are used: “Carriage return” (0x0D) followed by “Line feed” (0x0A).

For more information please refer to the official OSC documentation.

3.1.1. Patterns

The OSC patterns used by the Online4US are the following ones:

For the US sensors:

- «**/RMS**»;
- «**/SUB_RMS**»;
- «**/PEAK**»;
- «**/CREST_FACTOR**».

For the VIB sensors:

- «**/ACCELERATION**»;
- «**/VELOCITY**»;
- «**/PEAK**»;
- «**/CREST_FACTOR**».

3.1.2. Example

A measurement done by the US sensors number 5.

RMS = 7.2 [dB μ V] – no alarm triggered.

SUB RMS = 8.0 [dB μ V] – danger alarm triggered.

PEAK = 10.0 [dB μ V] – warning alarm triggered.

CREST FACTOR = 2.8 [dB] – no alarm configured.

The Online4US will send the following data:

- /RMS,iii<5><72><1>;
- /SUB_RMS,iii<5><80><3>;
- /PEAK,iii<5><100><2>;
- /CREST_FACTOR,iii<5><28><0>.

3.2. Commands

3.2.1. /QC?

Get Online4US software Quality Control I/O.

Response from Online4US:

/QC,iiii,<START/STOP><READY/BUSY><LEAK/NOLEAK><ACK/NACK><ERROR/OK>

Parameters:

- START/STOP: 1 = quality test in process, 0 = no quality test in process;
- READY/BUSY: 0 = system busy (no parameter can be modified), 1 = system ready to start a test (parameters can be modified);
- LEAK/NOLEAK: 0 = no leak detected, 1 = Leak detected (Warning threshold reached);
- ACK/NACK: 0 = NACK, 1 = ACK (a transition from 0 to 1 is used to ACK the signal LEAK/NOLEAK and release it);
- ERROR/OK: 0 = conform test, 1 = noise error (danger threshold reached). This signal is released at the beginning of each quality control tests.

3.2.2. /QC,ii,<START/STOP><ACK/NACK>

Set Online4US software Quality Control I/O.

Parameters:

- START/STOP: 1 = Start quality test, 0 = Stop quality test;
- ACK/NACK: 0 = NACK, 1 = ACK (a transition from 0 to 1 is used to ACK the signal LEAK/NOLEAK and release it).

3.2.3. /SCAN?,i,<Sensor ID>

Get Online4US specific sensor information.

Parameters:

- Sensor ID: sensor ID (range = 1 to 32).

Response from Online4US: **/SCAN,iiii,<Sensor ID><State><Type><Group ID>**

Parameters:

- Sensor ID: sensor ID;
- State: sensor state, 0 = sensor is down – 1 = sensor is up;
- Type: sensor type, 0 = unknown sensor – 1 = US sensor – 2 = VIB sensor;
- Group ID: sensor group ID, range 0 to 8 – 0 = no group assigned.

3.2.4. /SCAN

Send a scan request to the device (the Online4US will do an internal scan refresh).

3.2.5. **/GAIN?,i,<Sensor ID>**

Get specific sensor gain information.

Parameters:

- Sensor ID: sensor ID (range = 1 to 32).

Response from Online4US: **/GAIN,ii,<Sensor ID><Gain>**

Parameters:

- Sensor ID: sensor ID;
- Gain: sensor gain.

3.2.6. **/GAIN,ii,<Sensor ID><Gain>**

Set specific sensor gain.

Parameters:

- Sensor ID: sensor ID (range = 1 to 32);
- Gain: sensor Gain (range = 0 to 84 with step of 6).

Response from Online4US: **/GAIN,ii,<Sensor ID><Gain>**

Parameters:

- Sensor ID: sensor ID;
- Gain: sensor gain.

3.2.7. **/AUTO_GAIN?,i,<Sensor ID>**

Get specific sensor auto gain information.

Parameters:

- Sensor ID: sensor ID (range = 1 to 32).

Response from Online4US: **/AUTO_GAIN,ii,<Sensor ID><Auto_Gain>**

Parameters:

- Sensor ID: sensor ID;
- Auto_Gain: sensor auto gain value (1 = ON; 0 = OFF).

3.2.8. **/AUTO_GAIN,ii,<Sensor ID><Auto_Gain>**

Set specific sensor auto gain.

Parameters:

- Sensor ID: sensor ID (range = 1 to 32);
- Auto_Gain: sensor auto gain (1 = ON; 0 = OFF).

Response from Online4US: **/AUTO_GAIN,ii,<Sensor ID><Auto_Gain>**

Parameters:

- Sensor ID: sensor ID;
- Auto_Gain: sensor auto gain value.

3.2.9. **/GROUP?,i,<Group ID>**

Get all sensors assigned to a specific group ID.

Parameters:

- Group ID: Group ID (range 1 to 8).

Response from Online4US: **/GROUP,iiii,<Group ID><Sensor number><Sensor ID1><Sensor ID2><Sensor ID3><Sensor ID4>**

Parameters:

- Group ID: Group ID (range 1 to 8);
- Sensor number: number of sensors assigned to the specific group;
- Sensor IDs: list each sensor ID assigned to the group (if there are not 4 sensors assigned to the group, 0 will be sent as Sensor ID for the unassigned sensors).

3.2.10. /GROUP,iii...,<Group ID><Sensor number><Sensor ID><...>

Assign specific sensors to a specific group ID.

Parameters:

- Group ID: Group ID (range 1 to 8)
- Sensor number: number of sensors to assign
- Sensor ID: list each sensor ID (for example, to assign sensor 4 and 7 to group ID 3: /GROUP,iii<3><2><4><7> – note that /GROUP,iiii<3><4><4><7><0><0> will also work).

3.2.11. /GROUP

Reassign all sensors from all groups.

3.2.12. /GROUP_ALARM?,i,<Group ID>

Get current group ID alarm status.

Parameters:

- Group ID: group ID (range 1 to 8).

Response from Online4US: **/GROUP_ALARM,ii,<Group ID><Alarm Status>**

Parameters:

- Group ID: group ID (range 1 to 8);
- Alarm status: 1 = no alarm – 2 = warning alarm – 3 = danger alarm – 4 = warning alarm & danger alarm.

3.2.13. /GROUP_ALARM,ii,<Group ID><Alarm Status>

This message is sent by the Online4US each time a group alarm status is modified.

Parameters:

- Group ID: group ID (range 1 to 8);
- Alarm status: 1 = no alarm – 2 = warning alarm – 3 = danger alarm – 4 = warning alarm & danger alarm.

3.2.14. /SENSOR_ALARM?,i,<Sensor ID>

Get current sensor ID alarm status.

Parameters:

- Sensor ID: Sensor ID (range 1 to 32).

Response from Online4US: **/SENSOR_ALARM,iiiiii,<Sensor ID><Global Alarm Status><RMS Alarm Status><SUB RMS Alarm Status><Peak Alarm Status><Crest Factor Alarm Status>**

Parameters:

- Sensor ID: Sensor ID (range 1 to 32);
- Global Alarm Status: 0 = No alarm configured – 1 = No Alarm – 2 = Warning Alarm – 3 = Danger Alarm – 4 = Warning Alarm & Danger Alarm;
- RMS Alarm Status: 0 = No alarm configured – 1 = No Alarm – 2 = Warning Alarm – 3 = Danger Alarm – 4 = Warning Alarm & Danger Alarm;
- SUB RMS Alarm Status: 0 = No alarm configured – 1 = No Alarm – 2 = Warning Alarm – 3 = Danger Alarm – 4 = Warning Alarm & Danger Alarm;
- Peak Alarm Status: 0 = No alarm configured – 1 = No Alarm – 2 = Warning Alarm – 3 = Danger Alarm – 4 = Warning Alarm & Danger Alarm;
- Crest Factor Alarm Status: 0 = No alarm configured – 1 = No Alarm – 2 = Warning Alarm – 3 = Danger Alarm – 4 = Warning Alarm & Danger Alarm.

3.2.15. **/SENSOR_ALARM,iiiiii,<Sensor ID><Global Alarm Status><RMS Alarm Status><SUB RMS Alarm Status><Peak Alarm Status><Crest Factor Alarm Status>**

This message is sent by the Online4US each time a sensor global alarm status is modified.

Parameters:

- Sensor ID: Sensor ID (range 1 to 32);
- Global Alarm Status: 0 = No alarm configured – 1 = No Alarm – 2 = Warning Alarm – 3 = Danger Alarm – 4 = Warning Alarm & Danger Alarm;
- RMS Alarm Status: 0 = No alarm configured – 1 = No Alarm – 2 = Warning Alarm – 3 = Danger Alarm – 4 = Warning Alarm & Danger Alarm;
- SUB RMS Alarm Status: 0 = No alarm configured – 1 = No Alarm – 2 = Warning Alarm – 3 = Danger Alarm – 4 = Warning Alarm & Danger Alarm;
- Peak Alarm Status: 0 = No alarm configured – 1 = No Alarm – 2 = Warning Alarm – 3 = Danger Alarm – 4 = Warning Alarm & Danger Alarm;
- Crest Factor Alarm Status: 0 = No alarm configured – 1 = No Alarm – 2 = Warning Alarm – 3 = Danger Alarm – 4 = Warning Alarm & Danger Alarm.

3.2.16. **/INFO?**

Get Online4US system information.

Response from Online4US: **/INFO,iiiiiiiiiiiiiiii,<Version> <Data Format> <Year> <Month> <Day> <Hour> <Minute> <SD Capacity MSB> <SD Capacity LSB> <SD freespace MSB> <SD Freespace LSB> <SD State> <USB Capacity MSB> <USB Capacity LSB> <USB Freespace MSB> <USB Freespace LSB> <USB State>**

Parameters:

- Version: Firmware version;
- Data Format: Format used for velocity, 0 = metric – 1 = imperial;
- Year: yyyy format;
- Month: MM format;
- Day: dd format;
- Hour: 24-hour format;
- Minute: mm format;
- SD capacity MSB: SD card total capacity MSB (32bits);
- SD capacity LSB: SD card total capacity LSB (32bits);

- SD freespace MSB: SD card total freespace MSB (32bits);
- SD freespace LSB: SD card total freespace LSB (32bits);
- SD state: SD card state, 1 = SD connected – 0 = SD disconnected;
- USB capacity MSB: USB stick total capacity MSB (32bits);
- USB capacity LSB: USB stick total capacity LSB (32bits);
- USB freespace MSB: USB stick total freespace MSB (32bits);
- USB freespace LSB: USB stick total freespace LSB (32bits);
- USB state: USB stick state, 1 = USB connected – 0 = USB disconnected.

3.2.17. **/INFO,iiii,<Data Format><Year><Month><Day><Hour><Minute>**

Send system information to Online4US.

Parameters:

- Data Format: format used for velocity, 0 = metric – 1 = imperial;
- Year: yyyy format;
- Month: MM format;
- Day: dd format;
- Hour: 24-hour format;
- Minute: mm format.

3.2.18. **/TRIGGER?,i,<Group ID>**

Get Online4US group measurement information.

Parameters:

- Group ID: Group ID, range 1 to 8.

Response from Online4US: **/TRIGGER,iiii,<Group ID> <Acquisition time> <Input State> <Digital Input Level> <Analog Input Threshold> <Analog Input Tolerance> <Continuous measurement> <Acquisition Delay> <Acquisition Type>**

Parameters:

- Group ID: group ID, range 1 to 8;
- Acquisition time: group sensor acquisition time [sec], time used to calculate the RMS, range 1 to 120;
- Input state: 0 = digital input used to trigger measurement – 1 = analog input used to trigger measurement – 2 = No Input used to trigger measurement;
- Digital input level: digital input level used to trigger measurement, 0 = Low level – 1 = high level;
- Analog input threshold: analog voltage threshold used to trigger measurement [voltage*10], range 000 (0.0V) to 100 (10.0V);
- Analog input tolerance: analog voltage threshold tolerance [%], range 0 to 100;
- Continuous measurement: 0 = no continuous measurement, the measures can be delayed using acquisition delay and acquisition type data – 1 = continuous measurement;
- Acquisition delay: delay between two measures, range 1 to 99;
- Acquisition type: unit used for acquisition delay, 0 = sec – 1 = min – 2 = hour – 3 = day.

3.2.19. **/TRIGGER,iiii,<Group ID> <Acquisition time> <Input State> <Digital Input Level> <Analog Input Threshold> <Analog Input Tolerance> <Continuous measurement> <Acquisition Delay> <Acquisition Type>**

Send group measurement information to Online4US.

Parameters: see above.

3.2.20. /ALARM?,i,<Sensor ID>

Get Online4US Sensor alarm parameters.

Response from Online4US: /ALARM,iiiiiiiiiiiiiii,<Sensor ID> <Alarm Data 1> < Alarm Data 2> < Alarm Data 3> < Alarm Data 4> <Alarm Condition 1> <Alarm Condition 2> <Alarm Condition 3> <Warning Threshold 1> <Warning Threshold 2> <Warning Threshold 3> <Warning Threshold 4> <Danger Threshold 1> <Danger Threshold 2> <Danger Threshold 3> <Danger Threshold 4> <Accumulator>

Parameters:

- Sensor ID;
- Alarm data 1: first parameter used for alarms, 0 = none – 1 = RMS – 2 = SUB RMS – 3 = PEAK – 4 = CREST FACTOR;
- Alarm data 2: second parameter used for alarms;
- Alarm data 3: third parameter used for alarms;
- Alarm data 4: fourth parameter used for alarms;
- Condition 1: first condition used for alarms (used for alarm data 2), 0 = no condition – 1 = AND condition – 2 = OR condition;
- Condition 2: second condition used for alarms (used for alarm data 3);
- Condition 3: third condition used for alarms (used for alarm data 4);
- Warning threshold 1: value used to trigger warning alarm for alarm data 1 (value * 10), range -200 (-20.0) to 1200 (120.0);
- Warning threshold 2: value used to trigger warning alarm for alarm data 2;
- Warning threshold 3: value used to trigger warning alarm for alarm data 3;
- Warning threshold 4: value used to trigger warning alarm for alarm data 4;
- Danger threshold 1: value used to trigger danger alarm for alarm data 1;
- Danger threshold 2: value used to trigger danger alarm for alarm data 2;
- Danger threshold 3: value used to trigger danger alarm for alarm data 3;
- Danger threshold 4: value used to trigger danger alarm for alarm data 4;
- Accumulator: number of measures above threshold needed to trigger alarms.

3.2.21. /ALARM,iiiiiiiiiiiiiii,<Sensor ID> <Alarm Data 1> < Alarm Data 2> < Alarm Data 3> < Alarm Data 4> <Alarm Condition 1> <Alarm Condition 2> <Alarm Condition 3> <Warning Threshold 1> <Warning Threshold 2> <Warning Threshold 3> <Warning Threshold 4> <Danger Threshold 1> <Danger Threshold 2> <Danger Threshold 3> <Danger Threshold 4> <Accumulator>

Send sensor alarm parameters to Online4US.

Parameters: see above.

3.2.22. /DEBUG?

Get digital input/output information.

Response from Online4US: /DEBUG,iiiiii,<Input State> <Input Data> <Output 1 State> <Output 1 Data> <Output 2 State> <Output 2 Data>

Parameters:

- Input state: input board state, 0 = board not connected – 1 = board connected;
- Input data: 32 bits word but only 8 bits are used. Each bit indicates the state of the input, 1 = input high – 0 = input low (first bit indicates the state of the first input, ...);

- Output 1 state: first output board state, 0 = board not connected – 1 = board connected;
- Output 1 data: 32 bits word but only 8 bits are used. Each bit indicates the state of the first output board, 1 = output high – 0 = output low (first bit indicates the state of the first output, ...);
- Output 2 state: second output board state, 0 = board not connected – 1 = board connected;
- Output 2 data: 32 bits word but only 8 bits are used. Each bit indicates the state of the second output board, 1 = output high – 0 = output low (first bit indicates the state of the first output, ...).

3.2.23. /DEBUG,i,<Debug Mode>

Set Debug mode for the Online4US.

Parameters:

- Debug mode: 0 (debug off) – 1 (debug on).

3.2.24. /DEBUG,iii,<Input Data> <Output 1 Data> <Output 2 Data>

Set Online4US input/output level on debug mode.

Parameters:

- Input data: 32 bits word but only 8 bits are used. Each bit indicates the state of the input, 1 = input high – 0 = input low (first bit indicates the state of the first input, ...);
- Output 1 data: 32 bits word but only 8 bits are used. Each bit indicates the state of the first output board, 1 = output high – 0 = output low (first bit indicates the state of the first output, ...);
- Output 2 data: 32 bits word but only 8 bits are used. Each bit indicates the state of the second output board, 1 = output high – 0 = output low (first bit indicates the state of the first output, ...).

3.2.25. /RESET

Restart the system.

4. Alternative

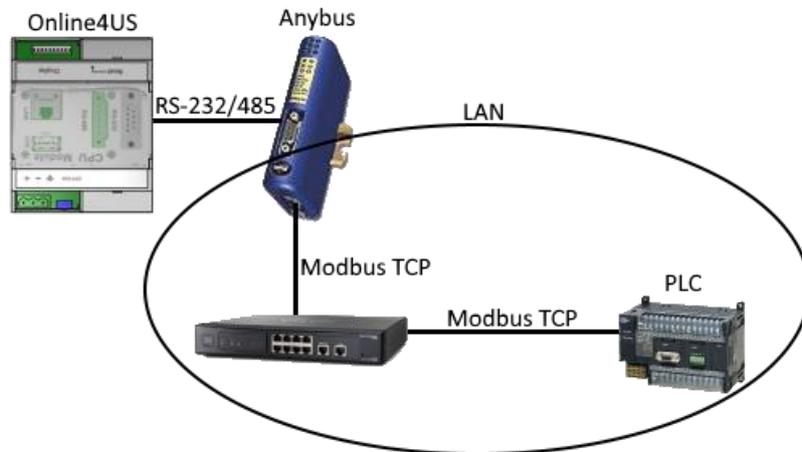
4.1. Anybus Communicator



The anybus communicator allows the use of multiple communication protocols in order to access the Online4US data.

This communicator can be connected to the Online4US RS232/RS485 connector and is used to convert the Online4US protocol to others standard protocol used by PLCs.

In this document we discuss the specific case of accessing data using Modbus TCP but the way to do is the same for other protocols.

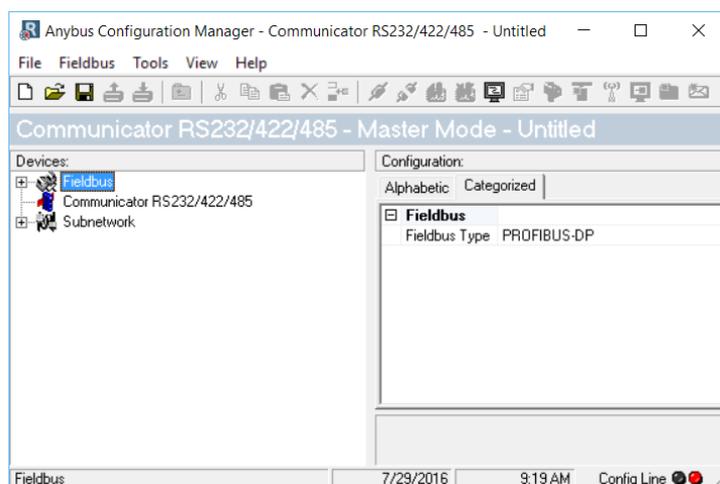


4.1.1. Configuration

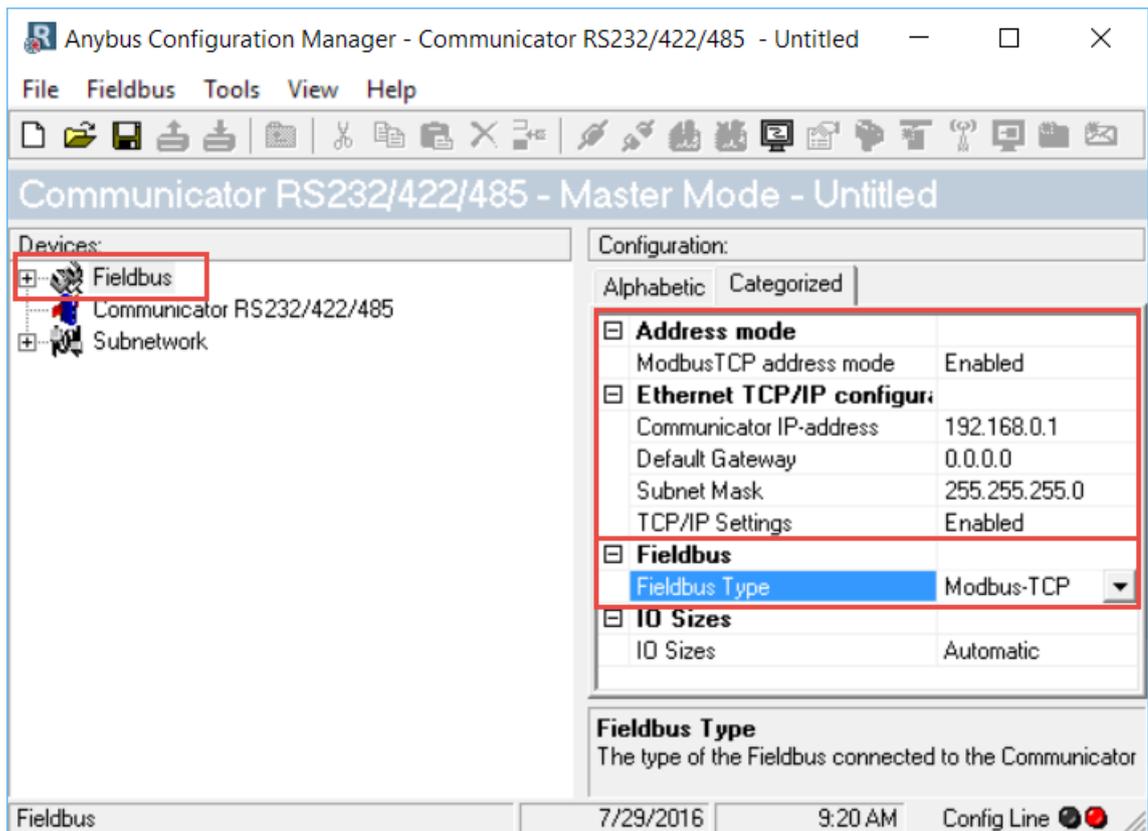
- 1) Connect the anybus configuration port to a computer;



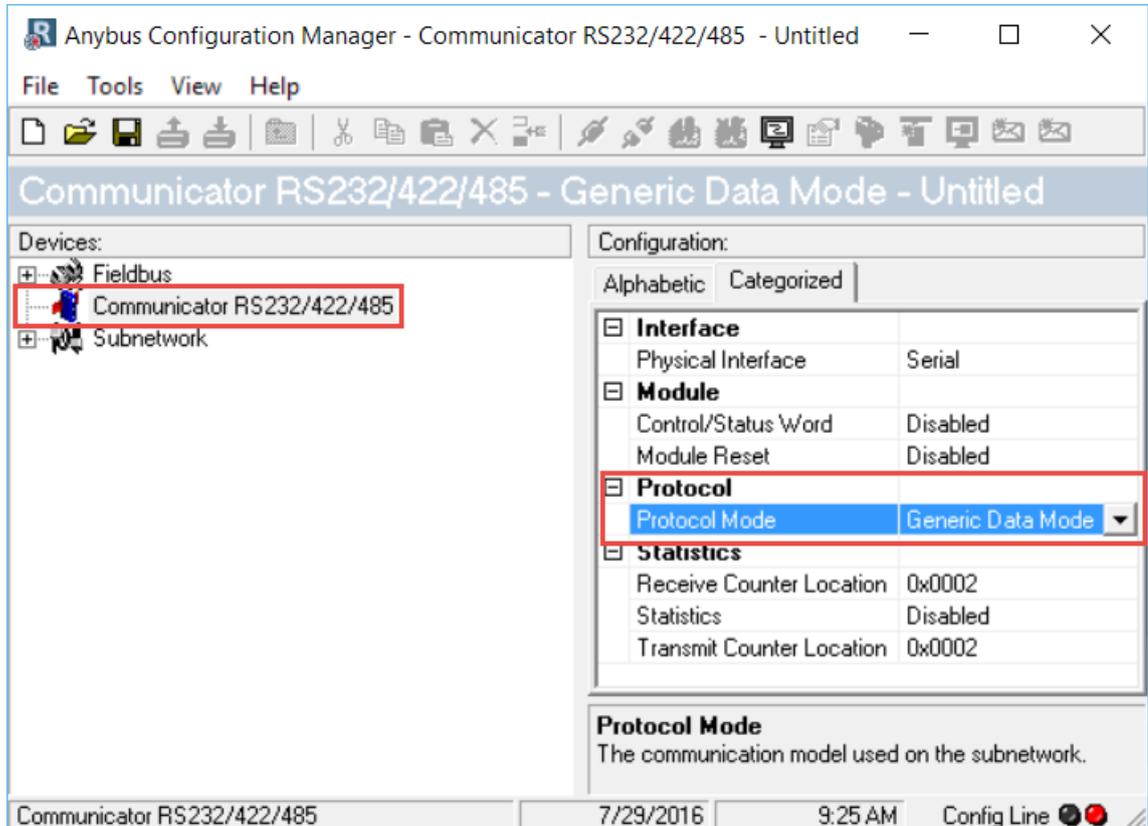
- 2) Open the anybus application (available on anybus website): Communicator RS232-422-485;



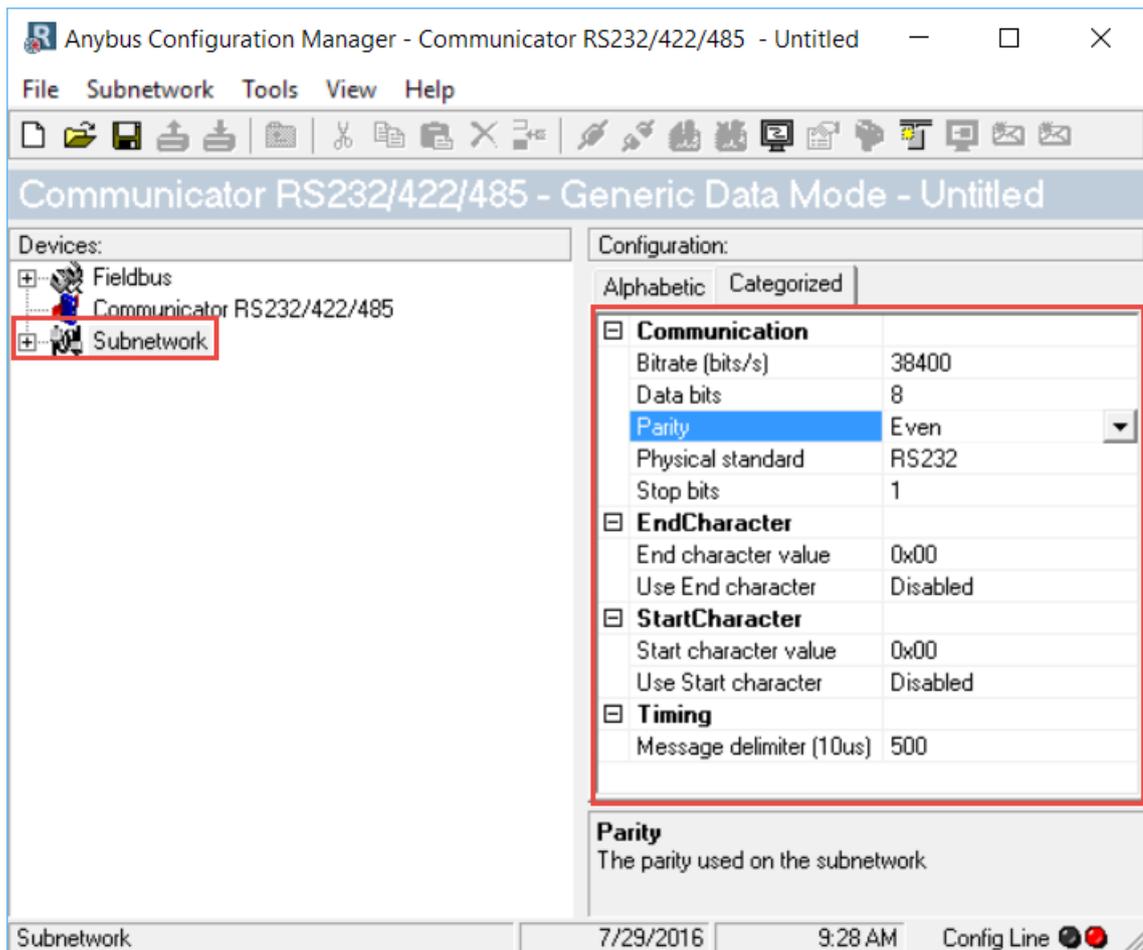
- 3) In the fieldbus device select the Fieldbus Type (Modbus-TCP) and enter the network settings;



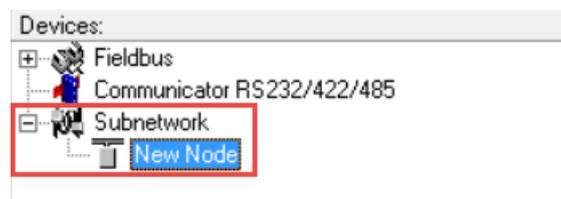
- 4) In the communicator RS232/422/485 device select generic data mode for the protocol mode;



- 5) In the subnetwork device, enter the communication settings (between the Online4US and the anybus): 38400-8E1.



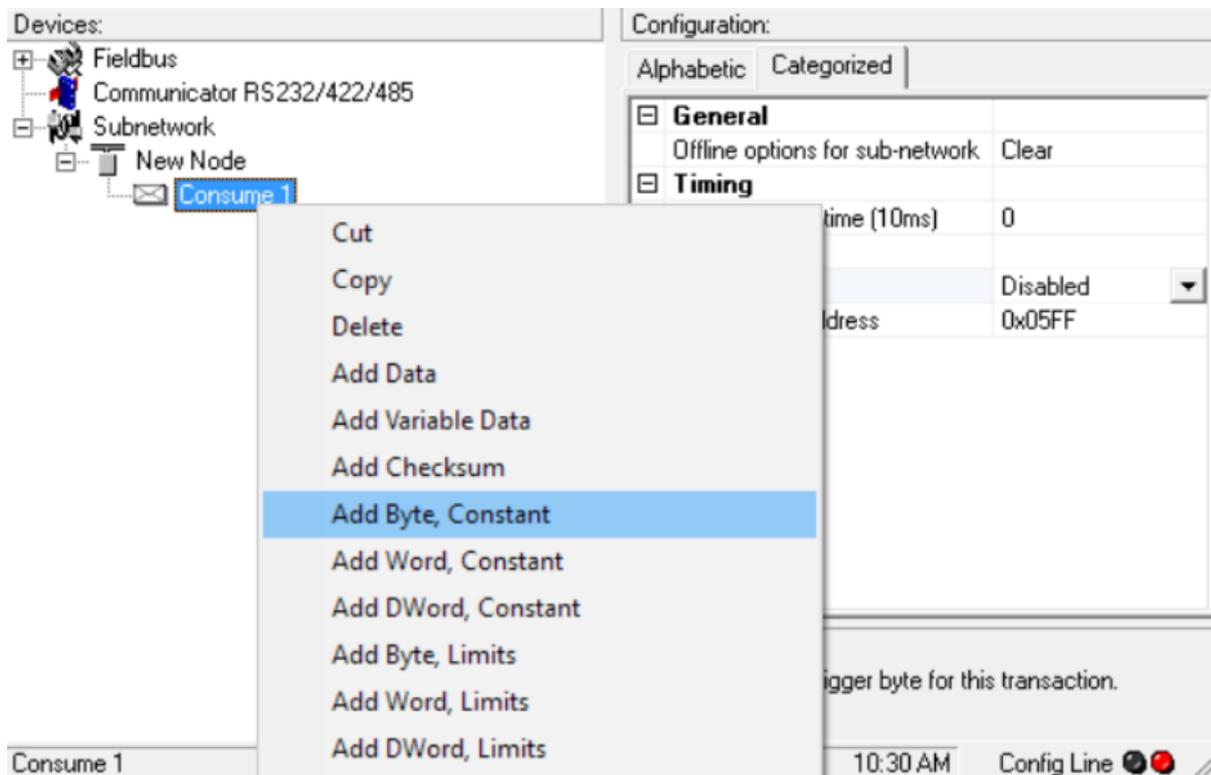
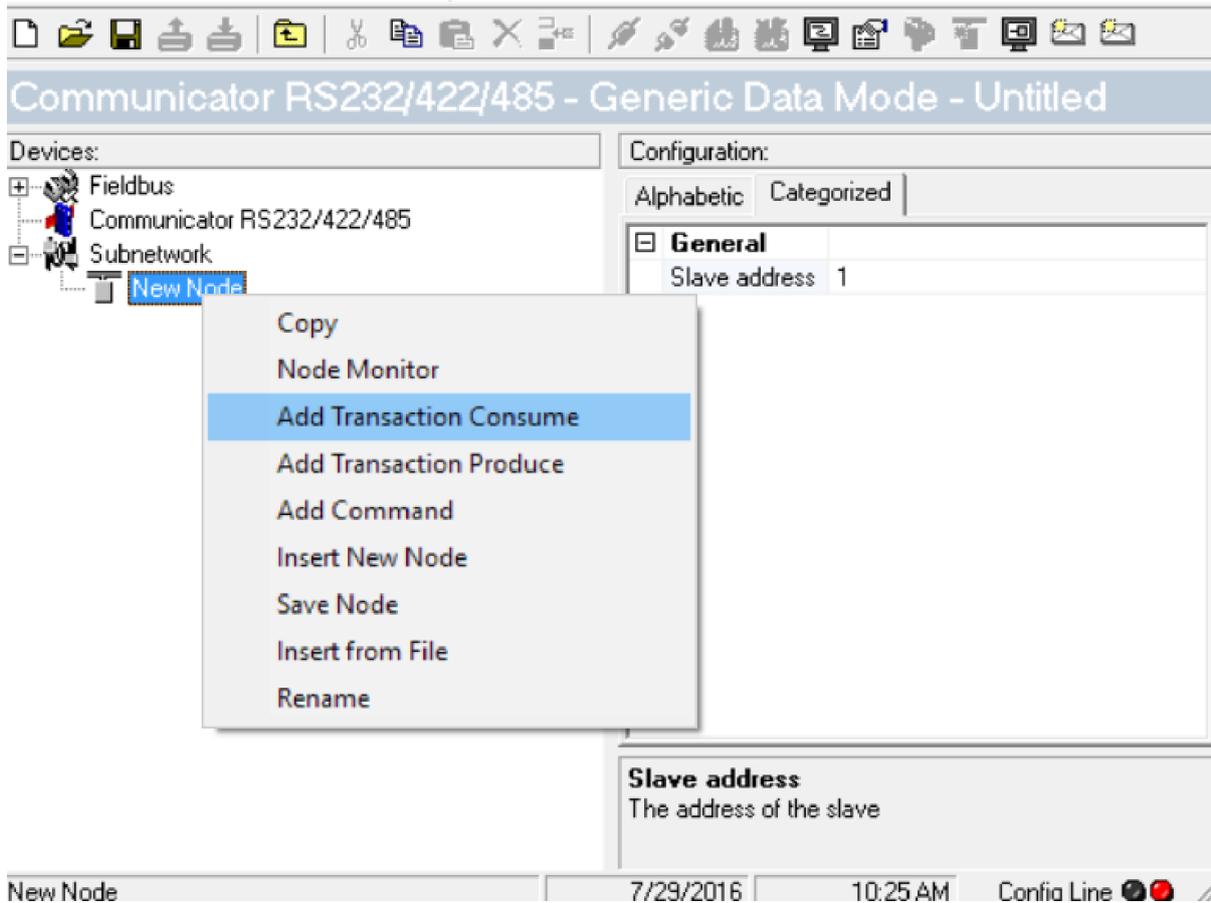
Now we need to specify the message structure sent by the Online4US to the anybus. The Online4US is a node inside the anybus subnetwork.



For each message sent by the Online4US we use a “transaction consume”. The transaction consume will contain all bytes that need to be decoded for a specific message.

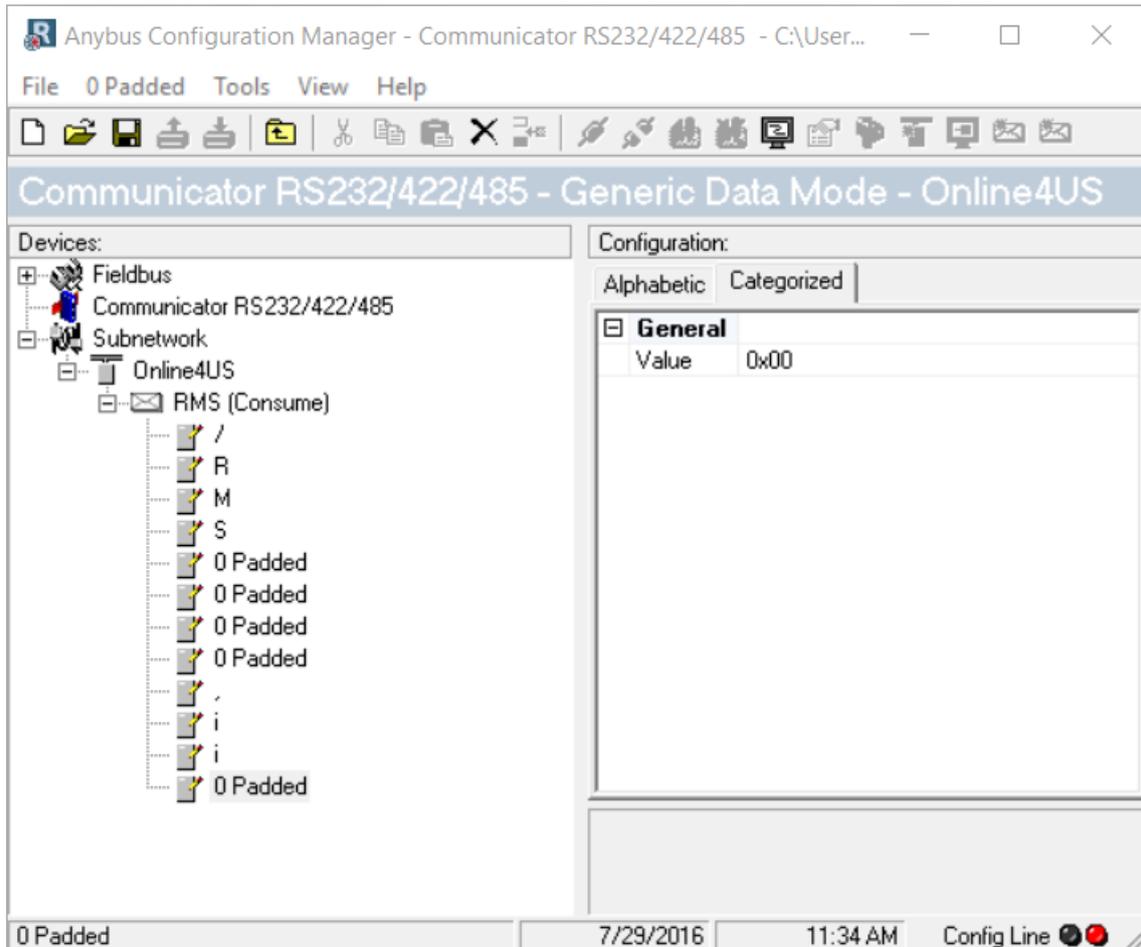
For this example, we use the “RMS” message which is coded as: `/RMS,ii<CH><DATA>`
“/RMS” is followed by four 0 padded and “,ii” is followed by one 0 padded.

For each constant byte (“/RMS,ii” and the 0 padded) we add a constant byte to the transaction consume. The value of the constant byte need to be set to the value of the character we want to decode. For example, the first character of the transaction is “/” which is ASCII character number 47.

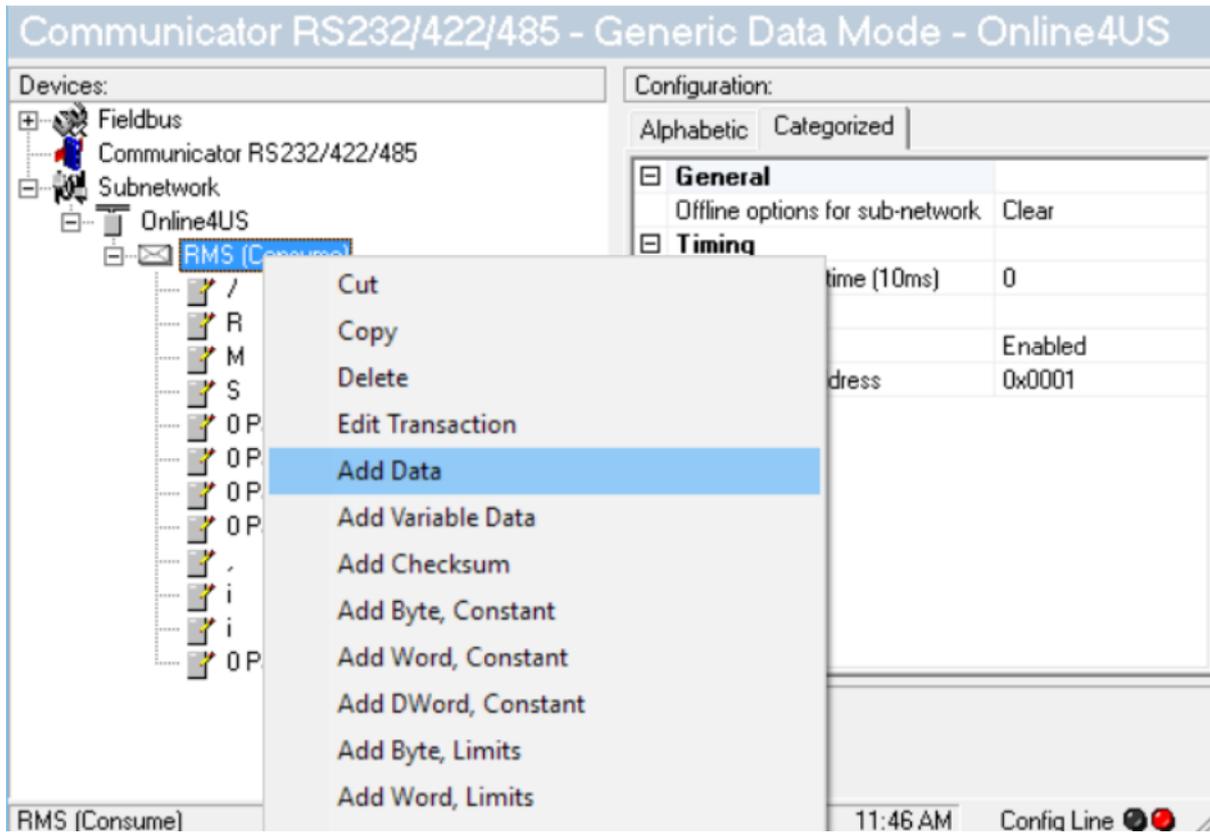




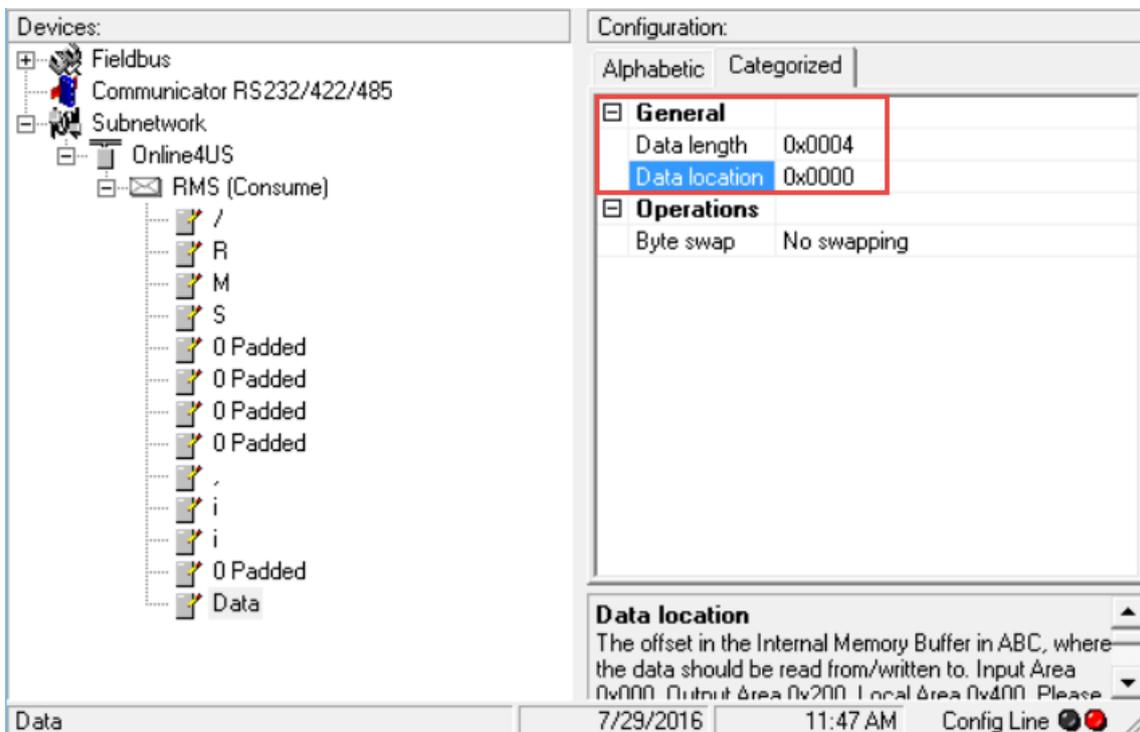
The same operation needs to be done for all the message characters ("/RMS,ii" and the 0 padded).



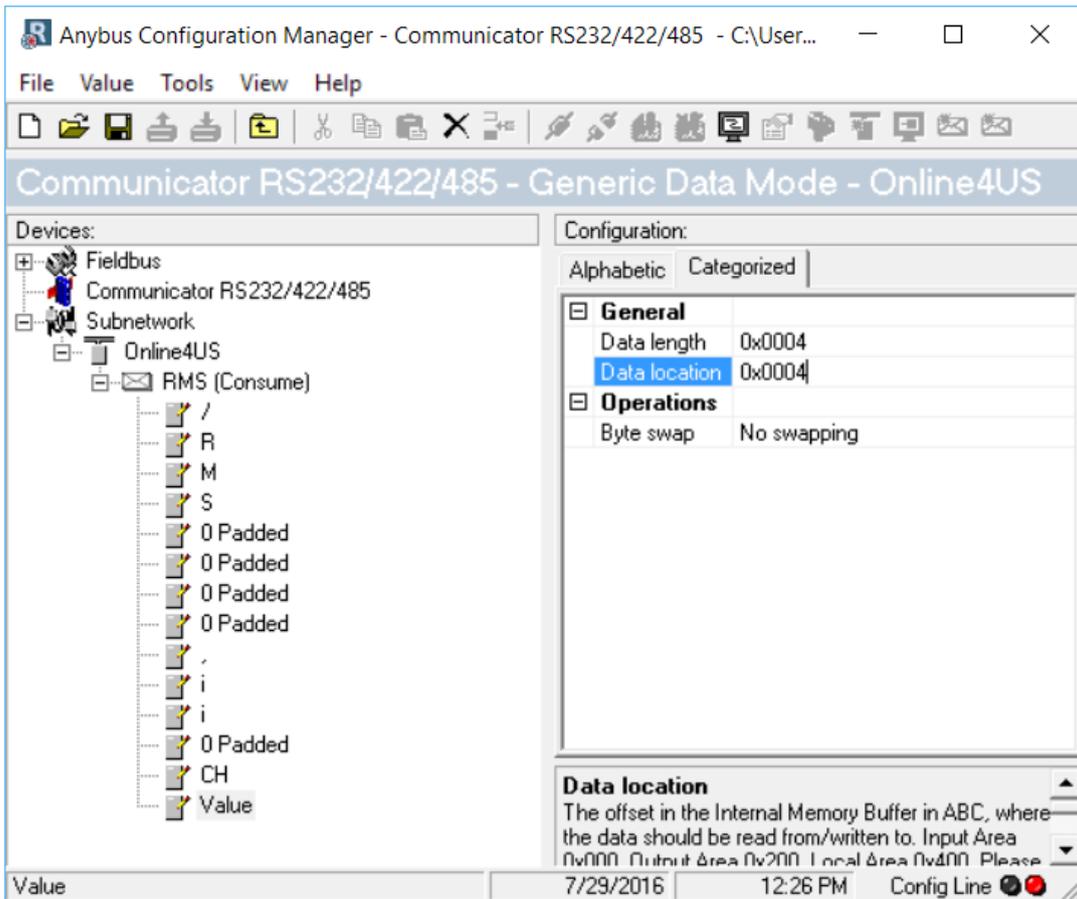
The next 8 bytes, <CH> and <DATA> correspond to the data we need to save into the anybus memory in order to have them accessed by the user. For these values we use a "Data" element.



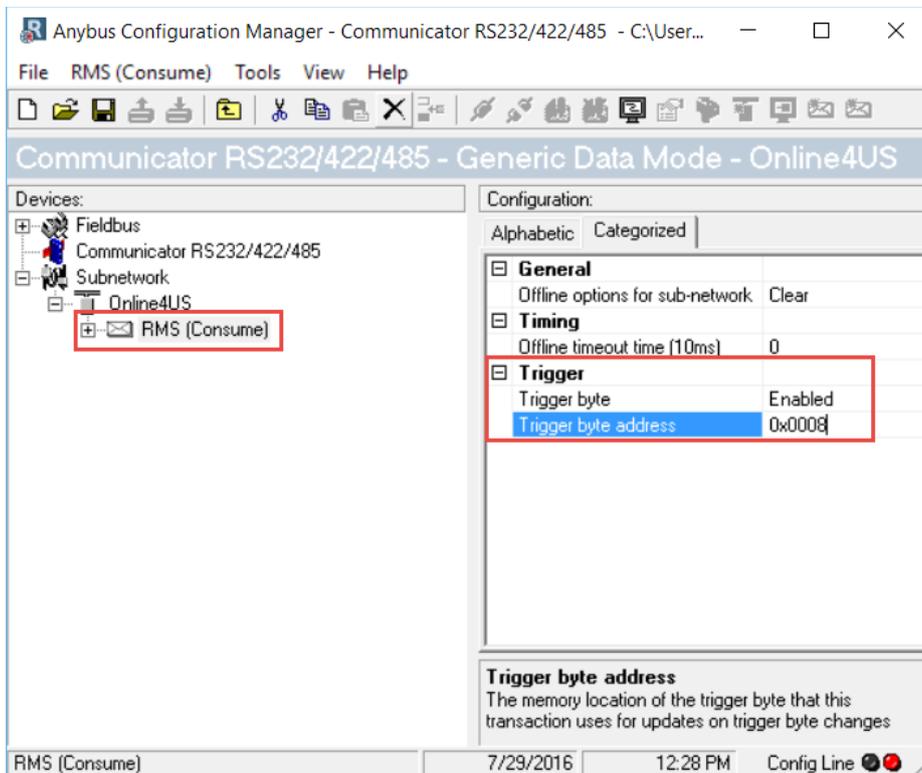
Then we need to specify the data length (4 bytes) and the data location (inside the anybus memory). The first value can be stocked at address 0.



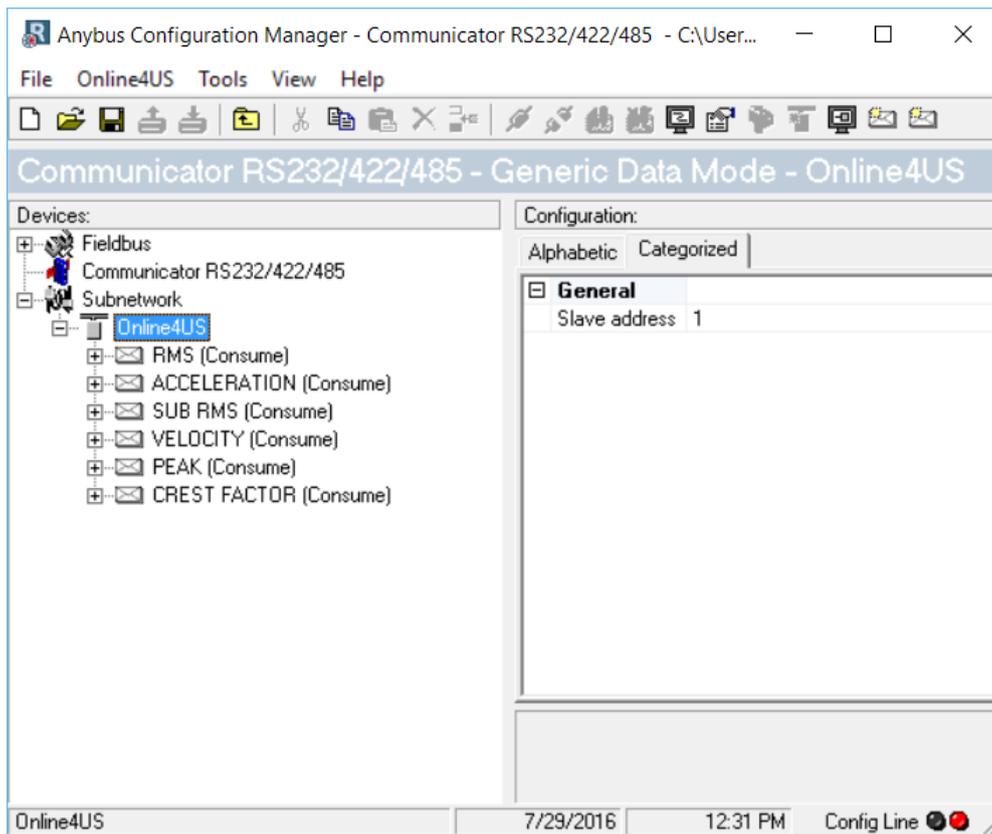
The second value (sensor measurement value) can be stocked at address 4.



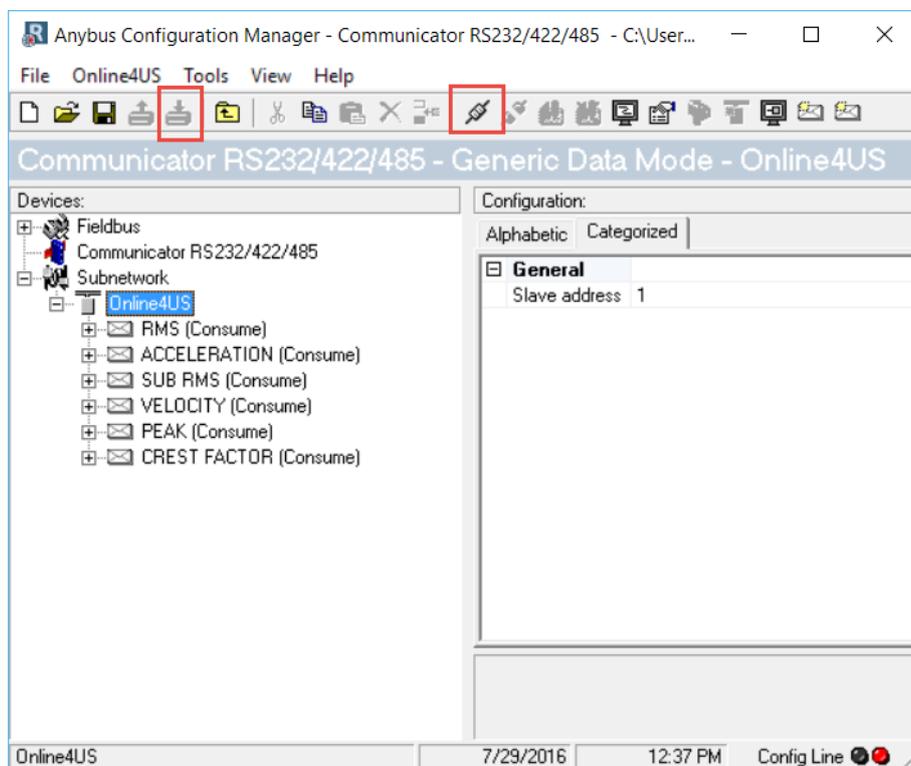
It is also possible to specify a trigger byte for each transaction consume. This allows the user to check the trigger byte in order to know if a new message was received.



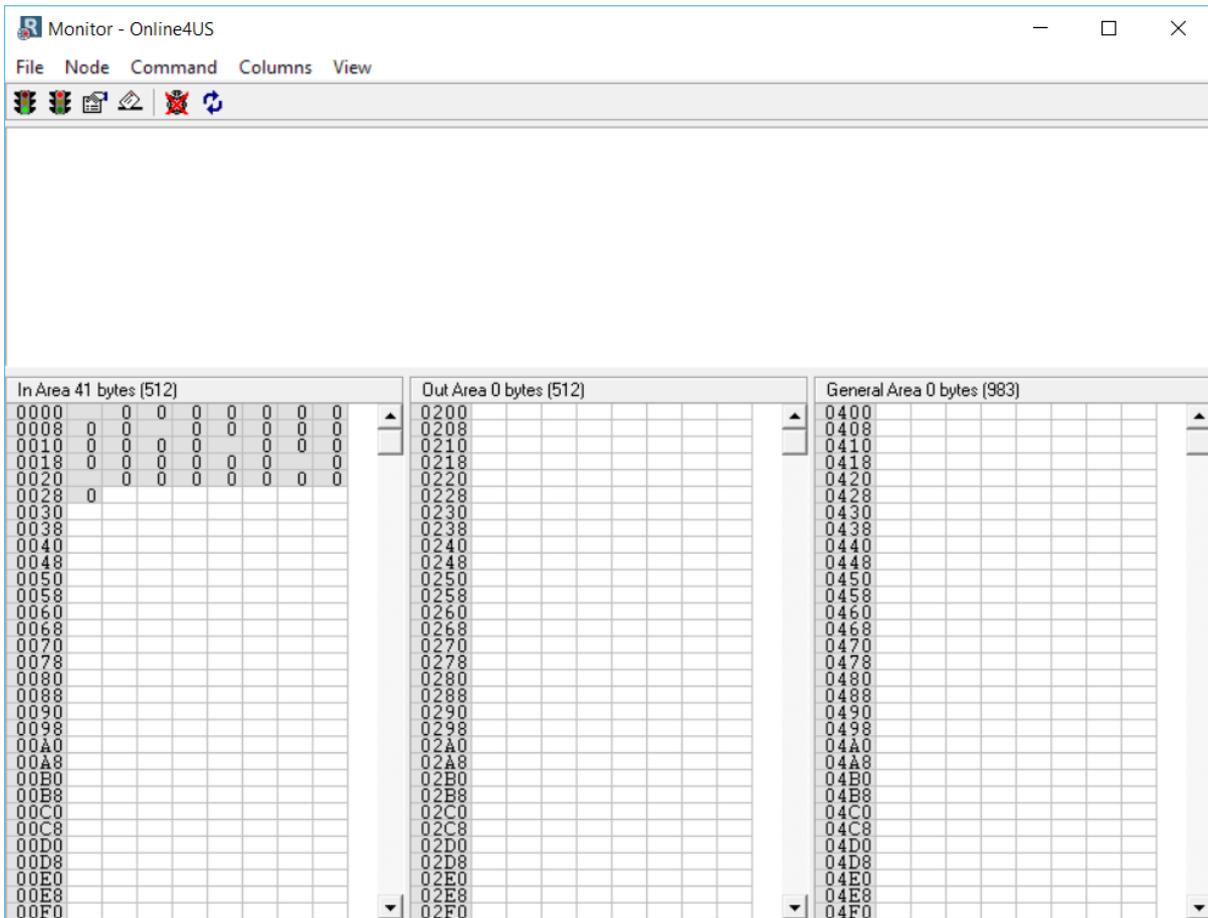
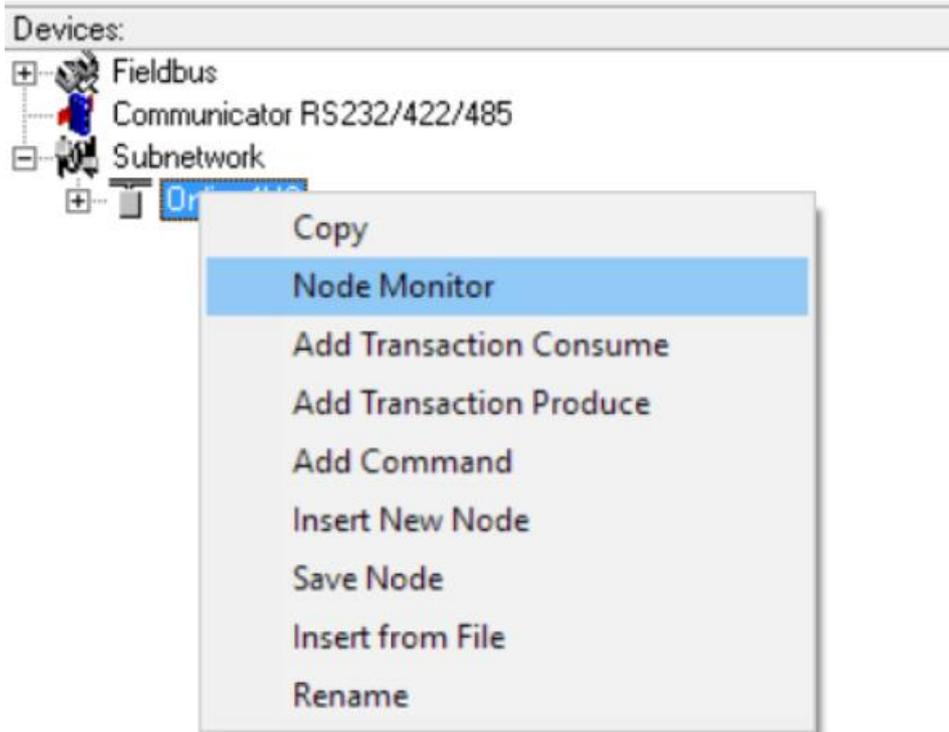
We can add more transaction consume to decode all messages that is sent by the Online4US.



Finally, we need to connect the computer to the anybus and load the configuration file.



To monitor the node, right click and the node and click sur monitor.



All data received are now mapped into the anybus memory.

NONAME1

Device Settings

Device ID: Input registers:

Address: Length:

Display options

Decimal 32bit float
 Integer 32bit sw. float
 Hexadecimal 64bit float
 Binary 64bit sw. float

ASCII display

Enable
 1 char/reg
 2 char/reg
 2 char/reg sw

	Alias	0	Alias	10	Alias	20
+0		176		175		0
+1		0		0		0
+2		2		2		0
+3		65535		65535		0
+4		65287		65399		0
+5		176		175		0
+6		0		0		0
+7		2		0		0
+8		65535		512		0
+9		65288		0		0

Polls : 19
OK : 19
Errors : 0

3	CMA 29/03/2021	Max cable length	
2	CGI 8/09/2020	Layout	CMA
1	RGO 20/08/2020	Updated version combining old manuals	CGI
Ver.	Editor	Nature of modification	Verified