Instruction Manual for

Interface Measurement NivuScope 2

(Original Instruction Manual – english)

Valid as of Firmware 1.xx

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Contents

Chapter 1 Start Here...

Congratulations on your purchase of a NivuScope 2. This quality system has been developed over many years and represents the latest in high technology ultrasonic sludge monitoring.

It has been designed to give you years of trouble free performance, and a few minutes spent reading this operating manual will ensure that your installation is as simple as possible.

About this Manual

It is important that this manual is referred to for correct installation and operation.

There are various parts of the manual that offer additional help or information as shown.

Tips

TIP

At various parts of this manual you may find tips to help you.

Additional Information

Additional Information

At various parts of the manual, you will find sections like this that explain specific things in more detail.

References

See Also

References to other parts of the manual

About the *NivuScope 2*

The single NivuScope 2 unit provides dual point level sensing in liquids and/or air.
Easily installed, conduit entry on unit via 5 x 20 mm Knockouts and 1 x 16 mm knockout.

Outstanding stability, accuracy and repeatability.

Sophisticated algorithms for echo extraction utilizing powerful Digital Signal Processing (DSP) microprocessors.

Superior performance based on current leading edge technology and modern design procedures.

Two independent sensor channels with the option of combining submersible and air sensors

Two fully adjustable 4-20 mA outputs

Six fully programmable SPDT status relays

RS232 and RS485 communications ports for multiple unit installations.

Radio communications for remote 4-20 mA Indication (optional).

All these features and more plus the ease of programming, make this instrument the number one choice for interface level measurement in liquids.

Applications

The NivuScope 2 is designed to monitor the levels of materials in various processes and to regulate the control loops, start and stop motors, and initiate events based on measured process conditions.

Some applications for the units are listed below:

- *Water & Wastewater Treatment Clarifiers*
- *Water & Wastewater Gravity & DAF Thickeners*
- *Raw Water Clarifiers*
- *Sumps, lagoons, settling ponds*
- *Industrial Process Thickeners*
- *Salt Brine Tanks*
- *Material Inventory Tanks*
- *Process Thickeners*
- *Dewatering/Hydro Bins*
- *Pyrite Holding/Transfer Tanks*
- *FGD Thickeners*
- *Surge & Settling Tanks*
- *Oil/Water separators*
- *SBR Tanks*

Functional Description

NivuScope 2 sends a transmit pulse to the sensor, which then emits a high frequency ultrasonic sound wave perpendicular to the sensor face, the returned echo is received by the ***NivuScope 2***. The time taken to receive the echo is measured and the distance from the sensor face to the sludge interface is calculated.

The relays can be programmed to activate alarms, pump starters, or other control equipment. There is an isolated 4-20 mA output for each of two sensor channels that can be connected to a recorder or PLC to monitor the **sludge interface** independently from that shown on the display. Finally, there is an RS232 port, so that the ***NivuScope 2*** can be operated remotely by a PC or other equipment to download/upload parameters or view real time echo traces.

NivuScope 2 can be programmed either by the built-in keypad, or by PC via the RS 232 Serial Interface. All parameters are stored in non-volatile memory, so are retained in the event of power interruption. A second backup copy of all parameters can also be retained in the ***NivuScope 2*** memory, in case an alternative set of parameters needs to be stored.

Six user definable control relays with individual setpoints and intelligent performance logging software features ensure maximum control versatility.

The NivuScope 2 ultrasonic sludge detector has been designed to provide maintenance-free fit and forget performance.

Product Specification

Physical

Wall Mount

Outside dimensions	235 x 184 x 120 mm
Weight	Nominal 1 kg
Enclosure material/description	Polycarbonate, flame resistant to UL94-5 V
Cable entry detail	10 cable entry knock outs, 5 x M20 and 1 x M16 underside, 4 x PG11 at rear
Sensor cable extensions	2 twisted pair 0.5 mm^2 with overall screen
Maximum separation	200 m

Environmental

IP Rating (Wall)	IP65
Max. & min. temperature (electronics)	-20 ºC to +50 ºC
Flammable atmosphere approval	Safe area: compatible with approved P-sensors (see sensor spec' sheet)
CE approval	2004/108/EC EMC approval 2006/95/EC low voltage directive

Performance (with Sludge)

Accuracy	0.25 % of the measured range or 30 mm (whichever is greater)
Resolution	0.25% of the measured range or 10 mm (whichever is greater)
Max. range	10 m
Min. range	0.3 m

Outputs

Analogue output	2 off Isolated (to 150V floating) output of 4-20 mA or 0-20 mA into 1kΩ (user programmable and adjustable) 0.1% resolution
Digital output	Half Duplex RS232
Volt free contacts, number and rating	6 form "C" (SPDT) rated at 5 A at 240 V AC
Display	192 x 128 pixel illuminated graphical display Fully programmable display options Integral keypad with menu navigation keys
Radio Modem (optional)	4 – 20 mA using wireless exempt frequencies Maximum range 500m line of site
Communication bus (optional)	RS485 Modbus RTU/ASCII or Profibus DPV0 or DPV1 (slave device)

Programming

On-board programming	By integral keypad
PC programming	via RS232
Programming security	Via passcode (user selectable and adjustable)
Programmed data integrity	Via non-volatile memory

Supply

Power supply	universal 100-240V ac 50-60 Hz, dc 22 - 28V 20 W maximum power (typically 14 W)
Fuse	2A slow blow

NIVUS GmbH operates a policy of constant development and improvement and reserve the right to amend technical details as necessary.

Chapter 2 Installation

Power Supply Requirements

NivuScope 2 can operate from AC supply or from a DC battery. The **AC** is supplied via a universal 100-200 V AC transformer. The **DC** is **22-28 V**. In all cases the ***NivuScope 2*** **w**ill typically consume 14 W of power, with a maximum of 20 W.

> *All electronic products are susceptible to electrostatic shock, so follow proper grounding procedures during installation.*

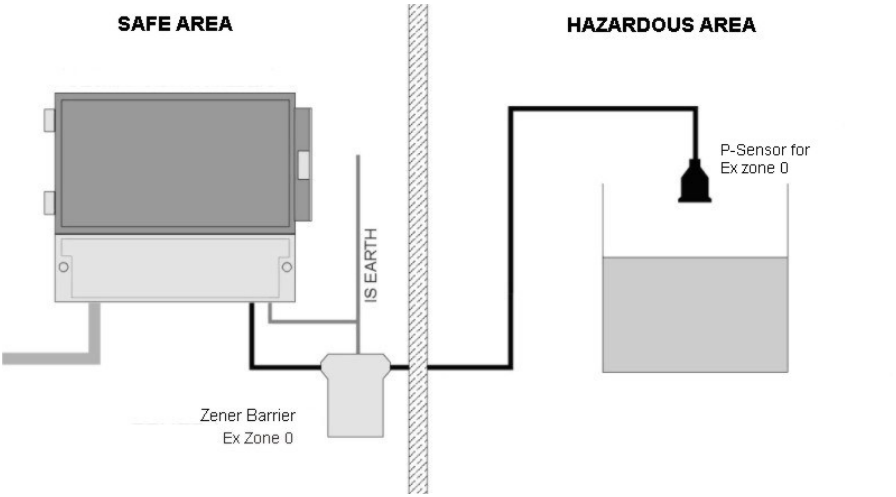
Unpacking

All shipping cartons should be opened carefully. When using a box cutter, do not plunge the blade deeply into the box, as it could potentially cut or scratch equipment components. Carefully remove equipment from each carton checking it against the packing list before discarding any packing material. If there is any shortage or obvious shipping damage to the equipment, report it immediately to NIVUS GmbH.

Location

> *All electronic products are susceptible to electrostatic shock, so follow proper grounding procedures during installation.*

NivuScope 2 must be mounted in a non-hazardous (safe) area at all times. When fitted with a sensor **from the dB range (air sensors)**, the P sensor may be mounted in a hazardous area as shown below. At the time of publication of this manual, the VT range of sensors do not have hazardous area approval. There are two types of approval available for P sensors, Ex m and Ex ia. The Ex m sensor can be connected directly to the *NivuScope 2* terminals but the Ex ia sensor must be connected through a suitable zener barrier as shown below.



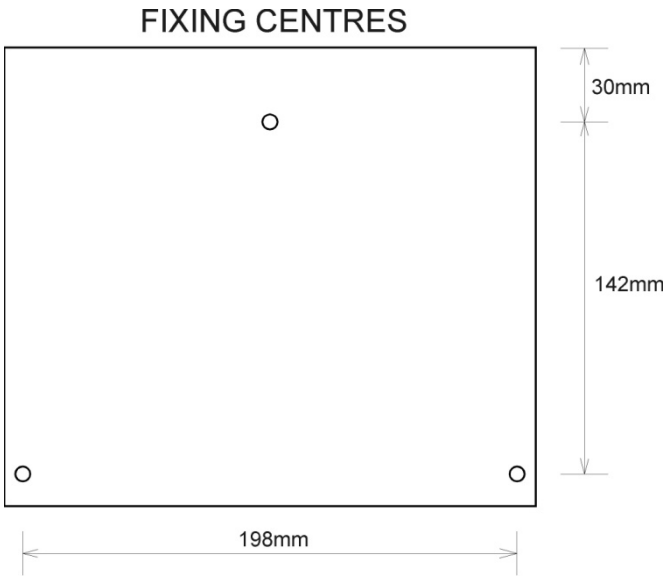
When choosing a location to mount the enclosure, bear in mind the following:

- Ensure that the ***NivuScope 2*** is installed in a "Safe", non-hazardous, area.
- For a clear view of the LCD display it is recommended that it is mounted at eye level.
- The mounting surface is vibration-free.
- The ambient temperature is between -20 ºC and 50 ºC.
- There should be no high voltage cables or inverters close by.

Dimensions

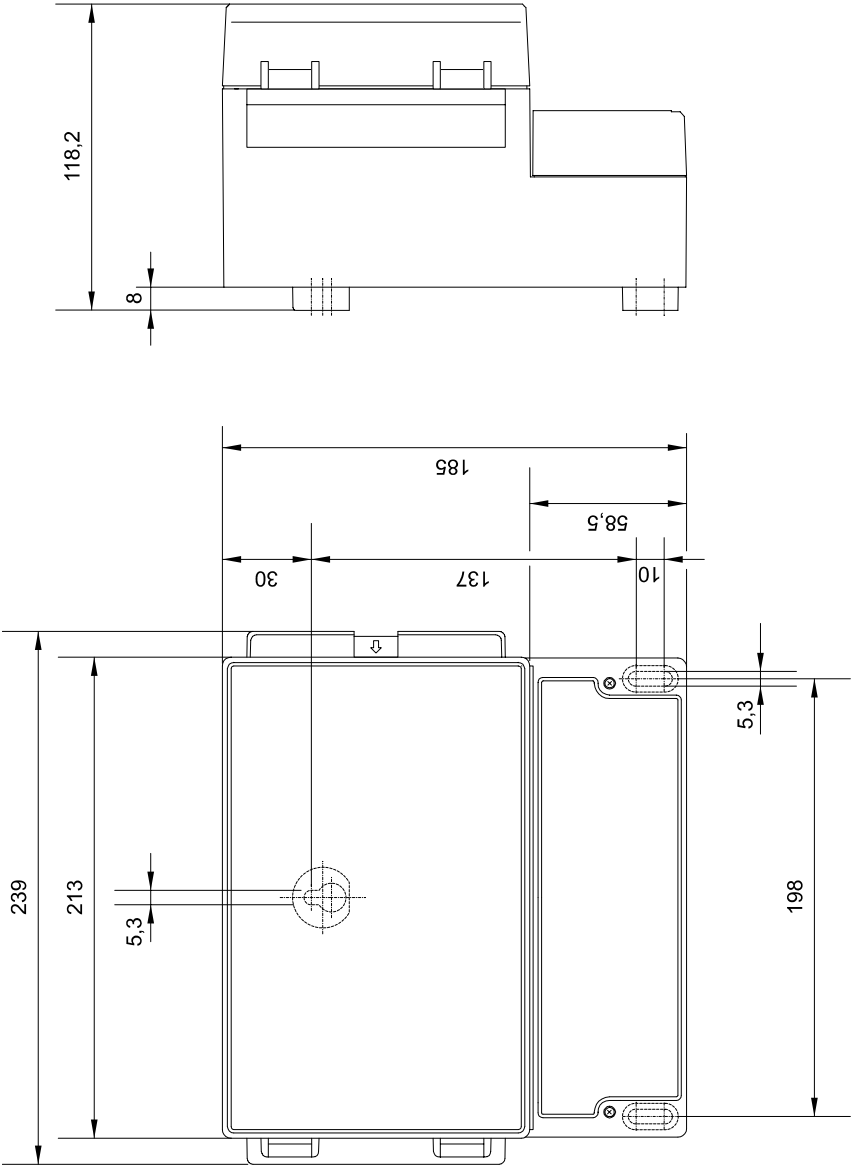
Wall mount

The dimensions of the wall fixing holes are as shown below.



NivuScope 2 should be mounted by drilling three holes suitable for size 8 screws (length to suit your application) and fixing the top screw in place. Hang the unit on this and fix the two remaining screws by removing the terminal access cover to access the pre drilled holes.

The full dimensions of the enclosure are as shown below.

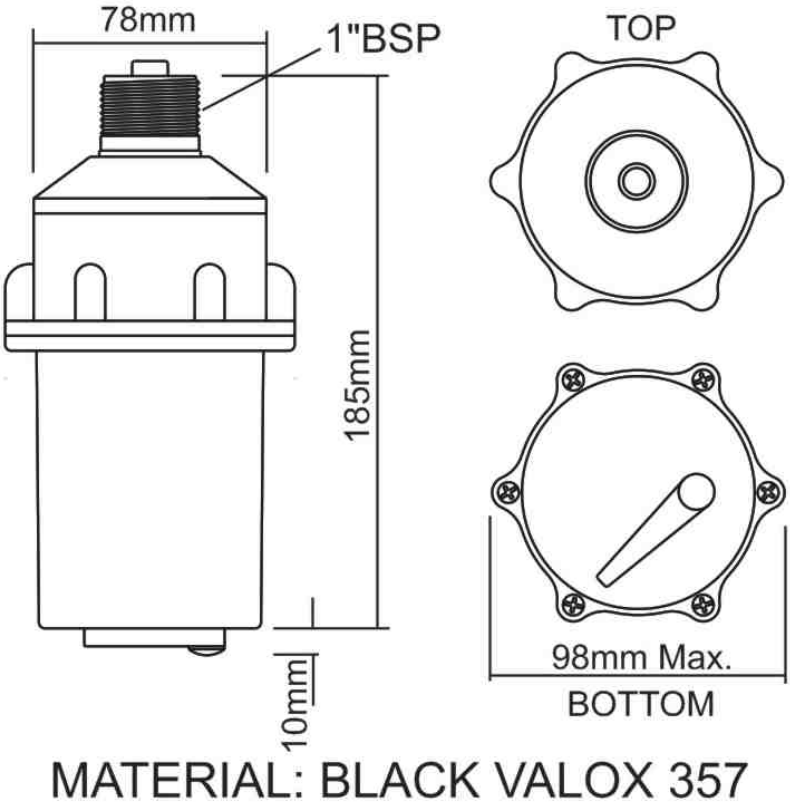


Cable Entry

There are 6 cable gland knockouts on the base of the ***NivuScope 2*** (5 x M20, 1 x M16) and 4 on the rear (4 x PG11). Select which ones you wish to take out, and remove them by using a circular cutter, such as a tank cutter. Take care not to damage the circuit board inside whilst undertaking this. Do not use a hammer, as this may cause damage to the enclosure.

It is recommended that you use suitable cable glands to ensure that the ingress rating is maintained.

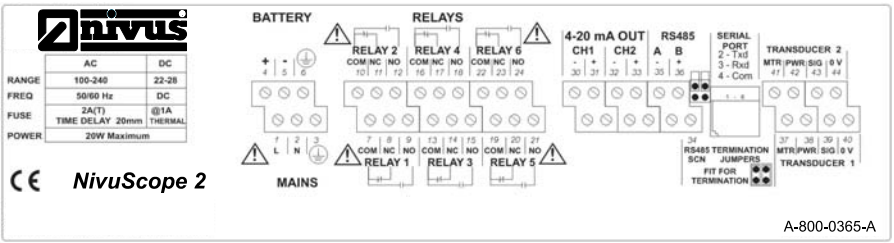
Sensor



Terminal Connection Details

Wall Mount

The terminal strip is as detailed below. There is also a wiring diagram inside the terminal access cover.



Terminal Connections

Power

NivuScope 2 can operate from mains AC and automatically from DC or battery backup in the event of power failure, or can be operated permanently from DC or batteries.

Wire the sensor to the ***NivuScope 2***'s sensor terminals as follows:

Sensor 1

VT Sensor

	Terminal Connection Details				
Unit Type	Orange Motor	Red Power	White Signal	Black 0 volts	Green Screen
Terminal no.	37	38	39	40	40

P-Sensor

	Terminal Connection Details				
Unit Type	N/C	Red Power	White Signal	Black 0 volts	Green Screen
Terminal no.	37	38	39	40	40

Sensor 2

VT Sensor

	Terminal Connection Details				
Unit Type	Orange Motor	Red Power	White Signal	Black 0 volts	Green Screen
Terminal no.	41	42	43	44	44

P-Sensor

	Terminal Connection Details				
Unit Type	N/C	Red Power	White Signal	Black 0 volts	Green Screen
Terminal no.	41	42	43	44	44

Relay Outputs

The six relays can be programmed for a variety of alarms or process control functions. The relay contacts are all rated at 5 A at 240 V AC. All connections should be such that the short circuit capacity of the circuits to which they are connected, is limited by fuses rated such that they do not exceed the relay rating.

Current Outputs

These are isolated (floating) active mA outputs (to 150 V), of 4 – 20 mA or 0 – 20 mA, and the load should not exceed 1 kΩ.

RS232 Serial Interface

If required, you can connect to the serial interface, to operate your ***NivuScope 2*** remotely.

Important Information

Never operate the ***NivuScope 2*** with terminal access exposed.

An external switch or circuit breaker should be installed near to the ***NivuScope 2*** to allow the supply to be removed during installation and maintenance. In installations where the relay contacts have mains power connected, there should be a means of isolating them from the ***NivuScope 2***.

Interconnecting cables must be adequately insulated for IEC 664 Category II installations. Strip back 30 mm of the outer insulation of the cable. Strip 5 mm of insulation from the end of each conductor. Twist all exposed strands of the conductor together. Insert the stripped conductor into the terminal block as far as it will go and tighten the terminal block screw. Ensure that all strands are firmly clamped in the terminal block and that there is no excess bare conductor showing, and no stray strands.

Important Information

If the equipment is installed or used in a manner not specified in this manual, then the protection provided by the equipment may be impaired.

Sensor

Locating the Sludge Sensor

- Position the sensor at an elevation in the tank such that it is fully submerged at all times that measurements are required; typically the face of the sensor should be **150 mm** below the normal water level. **The temperature compensation will only function correctly if the sensor is submerged at this level or below**.
- Ensure an unobstructed path between the sensor and the bottom of the tank. N.B. Rotating subsurface rakes and flights that pass beneath the sensor do not interfere with normal operation.
- Select a location that minimizes the presence of gas bubbles, high flow and heavy solid concentration dynamics in the process liquid near the sensor.
- Typical installation in a round clarifier or thickener is 1/3 to 2/3 the distance from the sidewall to the centre of the tank with the sensor mounted from the walkway safety railing.
- Typical installation in a rectangular clarifier or thickener is along the length of the clarifier in the third of the tank nearest the sludge discharge sump.

Installing the Sensor

- The sensor housing is designed to accept a 1 inch BSP female threaded coupler for pipe or conduit. Feed the integral sensor cable through the mounting pipe and tighten by hand until snug. **CAUTION: extreme over-tightening may crack the sensor housing.**
- Position the sensor such that it is 150 mm below the water surface and the mounting pipe is perpendicular to the water surface. Secure the mounting pipe in place with clamps to ensure that it is rigid.
- Flexible arm sensors assemblies are available and are required where there is surface skimming equipment that passes the location of the sensor. Rotate the sensor mounting pipe so that the integral sensor shield contacts the skimmer arm squarely. Ensure that the sensor moves freely away from the passing skimmer equipment.

- Optional sensor mounting brackets are available to extend the mounting pipe away from its connection point at the handrail to provide clearance from obstructions.
- If desired, the sensor cable may be extended up to 200m. Install sensor cables in grounded metal conduit. Do not run in cable trays or duct banks with variable frequency drives or other high voltage sources.
- Air (P) sensors should be installed and connected in accordance with the installation instructions contained in the P Sensor User Guide.

Wall mount unit

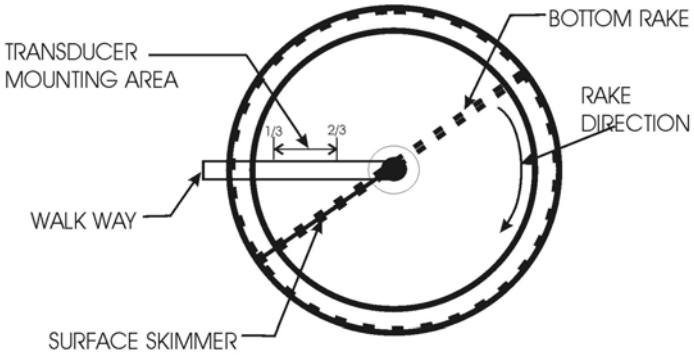
Locating the NivuScope 2 unit

- The unit may be located inside a building or it may be field-mounted.
- Locate the unit so that the maximum cable length to any sensor does not exceed 200m.
- Avoid locating the processor near variable frequency drives or other high voltage equipment or cables.
- Ensure that the ***NivuScope 2*** controller is installed in a "Safe", non-hazardous, area.
- For a clear view of the LCD display it is recommended that it is mounted at eye level.

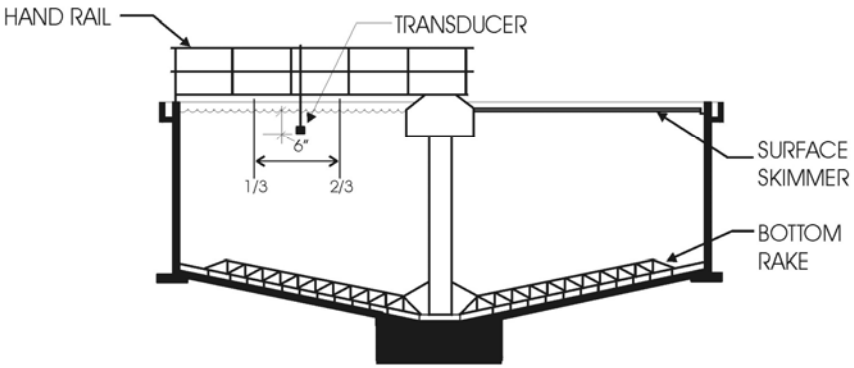
- Ensure the mounting surface is vibration-free and the ambient temperature is between -20ºC and 50ºC.

Installing the controller

- Mount the unit at a convenient height for viewing the control panel and displays. Allow sufficient clearance around the unit for the door to swing fully open for instrument service.
- Secure to a wall or panel using the mounting holes. Alternatively, attach to a local handrail using the optional Integrator Mounting Assembly.



CIRCULAR CLARIFIER



TYPICAL SECTION

TYPICAL ROUND CLARIFIER

Preparation for Operation

Before switching on, check the following:

- ✓ ***NivuScope 2*** is mounted correctly and is in a 'safe' area.
- ✓ The power supply is correctly installed.
- ✓ The relays are wired correctly.

Maintenance

There are no user serviceable parts inside ***NivuScope 2***, except the mains fuse. If you experience any problems with the unit, then please contact NIVUS GmbH for advice.

To clean the equipment, wipe with a damp cloth. Do not use any solvents on the enclosure.

Sensor Maintenance.

Procedure for the Removal of Sensors

From time to time it may be necessary to remove the sensor for cleaning or maintenance purposes, the following procedure is to ensure that this is done carefully with regard for the health and safety of the operator involved, and without damage to the sensor.

The sensor mounting bracket (option 1) is designed such that the sensor can be removed without any parts being available to fall into the application.

Before attempting to remove the sensor for cleaning or maintenance, the power to the unit should be disconnected.

The correct PPE should be worn to ensure you do not come into direct contact with the wetted parts of the NivuScope 2 system, if in doubt contact your site Health and Safety Officer.

To remove the sensor, loosen the retaining bolts on the end of the mounting brackets as shown in fig.1 and lift the sensor conduit assembly onto the walkway. The conduit is attached to the mounting assembly plate by means of a security chain so that it cannot be dropped and lost into the application.

The sensor can then be safely inspected for damage or material fouling and can be carefully cleaned with a damp cloth to remove any foreign debris. Care should be taken not to move the wiper by hand as any movement not under the power of the motor may damage the unit.

IMPORTANT WARRANTY NOTICE:

THE ONE YEAR SENSOR WARRANTY IS VOID IF THE WIPER BLADE IS ROTATED BY HAND. THIS IS DETRIMENTAL TO THE MOTOR GEAR DRIVE AND WILL DAMAGE THE UNIT.

The wiper arm will move twice every 20 mins as a default setting, if the face of the sensor is dirty and you are unsure as to whether or not the wiper is cleaning then place the sensor such that the wiper movement will not foul on anything and use the appropriate function key (F5) to force a wipe (see note below).

Note

The F5 function key will only initiate a wiper sweep on a VT sensor related to the currently viewed point and will only operate in runmode on the "Main" display. The function key will not initiate a wiper sweep if the dual point view is displayed.

If it is necessary to replace the sensor, the following procedure should be followed.

Disconnect the sensor wiring from the electronics as shown on page 15 and remove the sensor cable from the electronics enclosure.

The sensor is mounted onto the end of the conduit via its process fitting, this should be carefully unscrewed in an anticlockwise direction. Make sure the sensor is not dropped or knocked as this can damage the unit.

When replacing the sensor care must be taken not to over tighten the unit as this can result in the sensor 'ringing'. Hand tight is sufficient.

When the sensor is replaced into the application and the power re-applied the unit will re-initialise and after a short period of time depending on the process conditions show the correct blanket reading.

Chapter 3 How to Use Your *NivuScope 2*

Operating the Controls

Display

The graphical display provides four levels of runtime information and a sophisticated, progressive menu system in program mode.

While in **Run Mode**, the '**Main**' screen displays the current level reading and its units of measure, with a graphical representation of level for point 1 and/or point 2 along with status information with regards to the Sensor, Echo reception, Wiper status and Fail Safe Mode via the hotkeys. To scroll between run mode screens, use the left and right arrow keys (see diagrams below). To switch between points, use the up and down arrow keys.

The '**Echo**' screen shows the live echo trace of point 1, point 2 or both on the same screen, with various viewing options described later in this chapter.

The '**Range**' screen gives details of the empty level, span and blanking for point 1 or point 2.

The '**Relays**' screen gives live information on relay type and current state, a graphical representation of on and off setpoints and the current level for point 1 or point 2.

When in **Program mode**, the display is used to read information on the menu system, parameter details and the values that can be entered.

During **Test Mode** the display is used to monitor the simulated level with a screen similar to the '**Main**' screen in Run Mode. The current test mode (auto/manual hard/soft) will also be shown at the bottom of the screen.

There are two main operating modes for your ***NivuScope 2***, **Run Mode** and **Program Mode**. There is also a **Test Mode**, used for checking the set-up. All modes are now described.

Run Mode

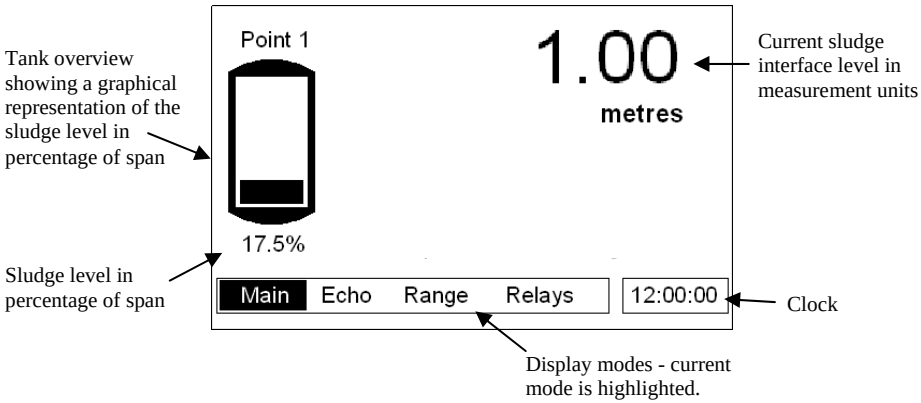
This mode is used once the ***NivuScope 2*** has been set up in program mode. It is also the default mode that the unit reverts to when it resumes operation after a power failure.

When ***NivuScope 2*** is switched on for the first time, it will display, in metres, a level measurement relating to the default tank dimensions. All relays by default are switched off.

After programming is complete, any relays that are set will operate when the level reaches the relevant setpoint, and the LED's will change colour (unless specifically switched off).

Main

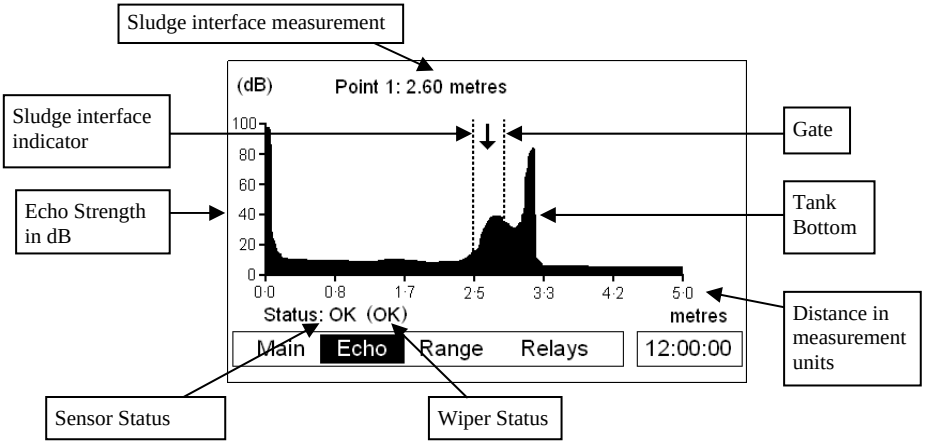
This group of screens provides information on Point 1, Point 2 or an overview of both Points. Use the up and down arrows to scroll between points 1, 2 or both. Below is an example of point 1, this is the screen that will be displayed when the ***NivuScope 2*** is switched on for the first time.



Error messages, such as "Wiper Fault", "Status = LOE" or "Status = Failed" will be displayed on this screen, relating to the point of measure currently being viewed, when a fault condition occurs.

Echo

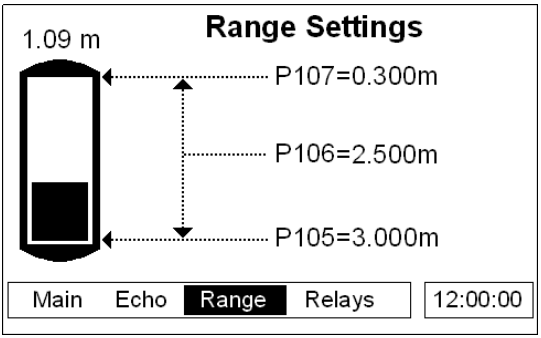
The echo screen displays the echo data. Below is an annotated example of a typical secondary settlement tank sludge interface



Range

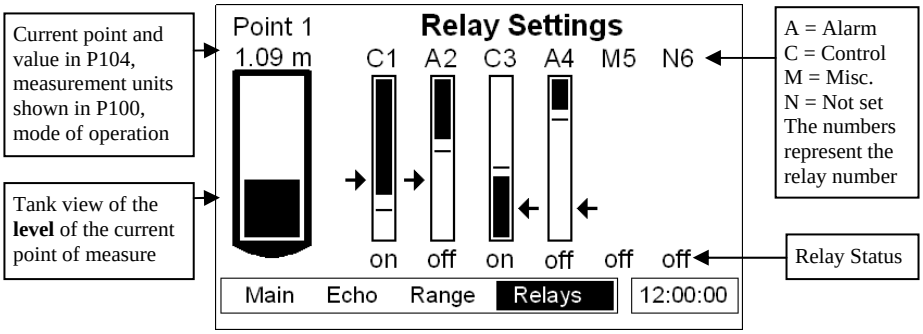
This screen gives details of the current interface level and the range settings held in the ***NivuScope 2***.

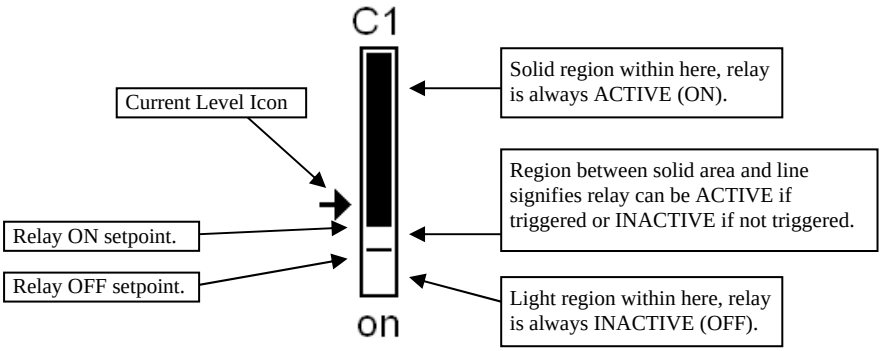
P107 = Near Blanking Distance
P106 = Span
P105 = Empty Distance



Relays

The relays screen indicates the current state of all relay outputs and gives a visual representation of the current interface level and the on and off setpoints of the individual relays. The level icons, e.g. "➔" (point 1), represent the level reading of the sensor that the corresponding relay is assigned to (see table below). Relays that do not relate to level will be displayed without the graphical representation of level setpoints but will still show the relay number and status.





Level Icon	Description
→	Point 1 Level, shown on left hand side of relay diagram.
←	Point 2 Level, shown on right hand side of relay diagram.
◆	Average level, shown on left hand side of relay diagram.
+	Sum of levels, shown on left hand side of relay diagram.
−	Differential level, shown on left hand side of diagram.

All icons show the measurement from the vertical centre of the icon.

Program Mode

This mode is used to set up the ***NivuScope 2*** or change information already set. You must use the built-in keypad to access program mode. Alternatively the unit can be set up with a PC via the RS 232 Serial Interface.

Entering a value for each of the parameters that are relevant to your application provides all of the programming information.

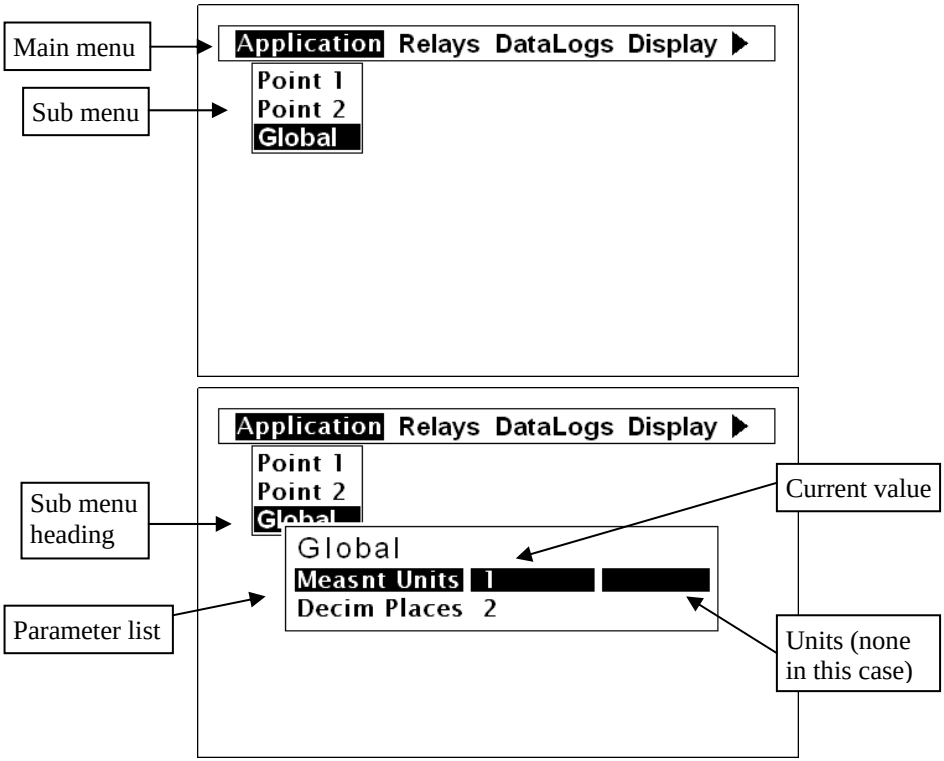
How to Access Program Mode

With ***NivuScope 2***, to enter **program mode**, you simply enter the passcode, via the keypad, followed by the ENTER key. The **default passcode** is **1997**, so you would press the following:

Note

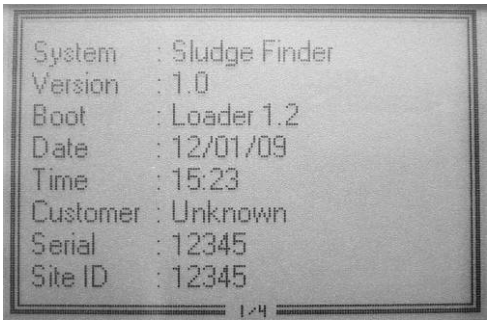
There is a time-out period of 15 minutes when in **program mode**, after which time **run mode** will be resumed. The timer is reset every time a key is pressed.

Screenshots of program mode



Information screen

The information screen can be used to view system details such as Software revision, serial number etc. but can also be used to view a summary of the application settings. To access the information screen, press the button when the ***NivuScope 2*** is in *run mode*. There are 4 pages within the information screen, preceded by the NIVUS logo, showing the current page number at the bottom centre of the information screen. The screens will automatically scroll but can also use the left and right arrow keys to toggle between pages an example of page 1 is shown below:



Page 1: General information on the system, see example above.

Page 2: Information on communications set up incl. RS232 and RS485 (if available).

Page 3: Information on application set up incl. sensor type, mode, empty level etc.

Page 4: Information on mA output set up incl. mode, allocation etc.

Hot Keys

There are five hot keys on the keypad that can be used to quickly access common parameters for viewing only, while in Run Mode. Pressing the hot key once will initiate or toggle the function assigned to that key, then the ***NivuScope 2*** reverts to the Run Mode display, if applicable. In program mode, they have different functions. Information displayed by the function keys in the "Main" screen will timeout and disappears after 20s. The functions are shown below:

Hot Key	Run Mode	Program Mode
	Toggle status, echo strength, wiper status and temperature display in the "Main" screen. Toggle the Gate display in the "Echo" screen.	Clear the current value.
	Toggle distance, level and space display in "Main" screen. Toggle the DATEM trace in "Echo" screen.	Not used with ***NivuScope 2***.
	Toggle mA output display in the "Main" screen.	Reset parameter to default setting.
	Not used with ***NivuScope 2***.	Not used with ***NivuScope 2***.
	Initiates a wiper sweep on the sludge sensor face (VT sensors on single point main display only).	Not used with ***NivuScope 2***.
	Not used with ***NivuScope 2***.	Toggle negative values.
	Displays the information screen, timeout 20 seconds.	Enter decimal point.

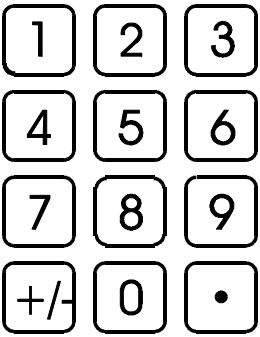
Menu Keys

The menu keys have the following functions:

Menu Key	Function
	1) Arrow keys for moving left and right through the menu system and used as 'backspace' when editing the value of a parameter. 2) Used for changing display mode in run mode. 3) Used in test mode to simulate the level moving up and down (right=up, Left=down).
	1) Arrow keys for moving up and down through the menu system 2) Used for changing displayed point of measurement in run mode.
	1) Used to confirm each action (for example, select a menu option or accept a parameter number or value). 2) Used to confirm questions asked by your ***NivuScope 2*** such as before restoring factory defaults.
	Used to navigate up a level in the menu system, and back to run mode. Used to cancel a value entered in error.

Numeric Keys

These keys are used for entering numerical information during programming or to enter the passcode from run mode.

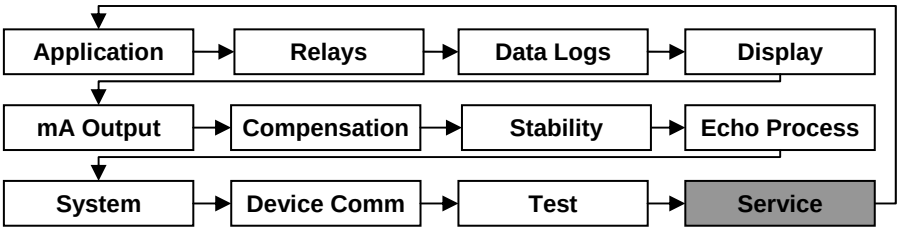


There are two means of editing parameters, directly or using the menu system. Each is now described.

Using the Menu System

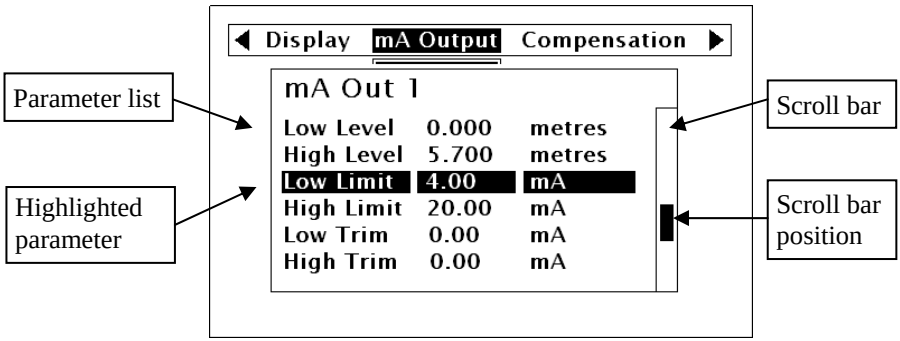
The menu system has been designed to make the changing of parameters very simple. There are two levels of menu: **Main Menu** and **Sub Menu**.

At the top of the display there is a line of text that displays the main menu items. Pressing the left/right arrow keys scrolls the display between the top-level menu items, (as the example shown below, starting at Application).



As you press the cursor keys to scroll left and right between these, you can press ENTER, or the down arrow, at any time, to expand the sub-menu.

Each menu options, along with their sub-menus, is described later in this manual. When you move down into the sub-menu, you can scroll up and down using the arrow keys and then press ENTER to go to the required parameter lists. If there are more menu options or parameters than can be viewed on the display in one go, then a scroll bar will appear on the right hand side of the menu/parameter box. The position of the solid bar within the scroll bar provides a visual aid as to your position in the current menu.



Once you have reached the relevant section, scroll down the parameter list to highlight the parameter you wish to edit and press ENTER to access the parameter options. When you are at parameter level, the options for that parameter will be displayed on the screen. If the parameter has preset options then scroll up or down, with the up/down arrow keys, or press the designated number key (displayed on the left hand side) to highlight the option, then press ENTER to save. If the parameter requires you to enter a value within a particular range, the range options will be displayed with a box to enter the value. Use the numeric keypad to enter the required value following the onscreen prompts and press ENTER to save.

When you have finished, press CANCEL to go back to the previous menu level. When you have reached the top level, press the CANCEL button again, the ***NivuScope 2*** will ask for confirmation before allowing you return to run mode. This is done by pressing ENTER at the display prompt.

Directly Editing Parameters

If you already know the number of the parameter that you wish to look at or edit, simply type the number in at any time while you are in the menu system. Thus, if you are in either the menu or sub-menu level by pressing a numeric key, you can enter the parameter number directly and jump straight there. You cannot type a parameter number whilst at parameter level, only at one of the two menu levels.

When you are at parameter level, the options for that parameter will be displayed on the screen. If the parameter has preset options then scroll up or down, with the up/down arrow keys, until the required option is highlighted, then press ENTER to change it. If the parameter requires a value within a particular range, the range options will be displayed with a box to enter the value. Use the numeric keypad to enter the required value following the onscreen prompts and press ENTER to save it.

Once you have accessed a parameter, you can either just look at it, or change it.

Once a parameter has been changed, press ENTER and you will see the parameter value changed in the parameter list. If you press CANCEL then you will be returned to the parameter list with no change to the values.

Test Mode

Test mode is used to simulate the application and confirm that all parameters and relay setpoints have been entered as expected. During simulation, there is a choice of whether the relays will change state (hard simulation) or not (soft simulation), but the LED's will always change colour as programmed, and the mA outputs will change in accordance with the chosen mode of operation. If you wish to test the logic of the system that the **relays are connected** to then select **hard simulation**, but if you **don't wish to change the relay state**, then select a **soft simulation**.

There are two simulation modes for each point of measurement, automatic and manual. Automatic simulation will move the level up and down between empty level or the pre-determined **Start Level (P983)** and the span, if you wish to change the direction of the level movement, this can be done by using the left/right arrow keys. In manual simulation, using the up/down arrow keys will allow you to move the level up and down as required.

To enter simulation, first go to **program mode**. Using the menu system, select menu item '**Test**', then sub-menu item '**Simulation**'. Select the point of measure you wish to simulate and press enter to access the simulation options. You can change the value of the parameter to one of the following:

1= Manual soft simulation
2= Automatic soft simulation
3= Manual hard simulation
4= Automatic hard simulation

When in test mode, the display will show the graphical **level** indicator with the current mode of operation value in measurement units. Also shown will be the relay setpoint indicators, for each relay, with an arrow showing the current level relevant to that relay allocation e.g. if you are simulating point 1 then the level indicator will move up and down along with the arrows next to any relay allocated to point 1. If a relay is allocated to sum, average or differential, then the ***NivuScope 2*** will span the relay diagram to the sum, average or differential of point 1 and 2. The level of point 2 (or point 1 if simulating point 2) will always remain at 0.

To return to program mode, press CANCEL and test mode will end.

When in **manual** simulation, by default test mode will move the level by 0.1m steps. Altering the **increment** (**P981**) will change this value.

In **automatic** mode, the rate at which the level moves up and down is set by the **increment** (**P981** in metres, the **rate** (**P982**) in minutes, which can be changed to make the level move up and down faster. E.g. if **increment** (**P981**) is set for 0.1m and **rate** (**P982**) is set to 1 min then the level will increase or decrease at a rate of 0.1m/min. To make the simulated level move slower, decrease the value in **increment** (**P981**) or increase the value in **rate** (**P982**). To make the simulated level move faster, increase the value in **increment** (**P981**) or decrease the value in **rate** (**P982**).

Using the RS232 Serial Interface

The RS232 serial interface is used to communicate between the ***NivuScope 2*** and a PC using the optional NivuScope 2 PC software and other associated NIVUS software packages. To obtain information such as data logging and view echo traces, upload, download and save parameter files. In addition it can also be used to control or obtain information using a standard PC or other computer base equipment. To do so, the default settings for communications port are as follows: **baud rate 19,200**, **8 data bits**, **no parity**, **1 stop bit**.

The device should be connected as shown in **Chapter 2 Installation**.

To use the device remotely, you need to **log on** to start, and **log off** when finished. When **logged on**, ***NivuScope 2*** will show "**Remote**" on the display in place of the clock. When logged off, the display will return to normal (clock will be displayed).

All commands should be followed by a carriage return.

The unit will respond either OK or a value if the command is accepted, or NO if the command is not recognised or is not available.

To log on, send the command

/ACCESS:pppp where pppp is the passcode (P922).

To log off, send the command

/ACCESS:OFF

To read a parameter value, send the command

/Pxxx where xxx is the parameter you wish to read, and the ***NivuScope 2*** will respond with the parameter value.

To set a parameter, send the command

/Pxxx:yy where xxx is the parameter number, and yy is the value you wish to set it to.

Other commands you can use are:

/LEVEL1 (shows current level of point 1)

/LEVEL2 (shows current level of point 2)

/DISTANCE1 (shows current level of point 1)

/DISTANCE2 (shows current level of point 2)

/TEMP1 (shows current temperature of point 1)

/TEMP2 (shows current temperature of point 2)

/CURRENTOUT1 (shows the mA output value for mA output 1)

/CURRENTOUT2 (shows the mA output value for mA output 2)

Please consult NIVUS GmbH or contact your local NIVUS representative for further details and a full list of available commands.

Parameter Defaults

Factory Defaults

Factory Defaults

When first installing the ***NivuScope 2***, or subsequently moving or using the unit on a new application, before proceeding to program the unit for its intended application it is recommended that you ensure that all parameters are at their default values by completing a **Factory Defaults P930,** as described in the **parameter guide**.

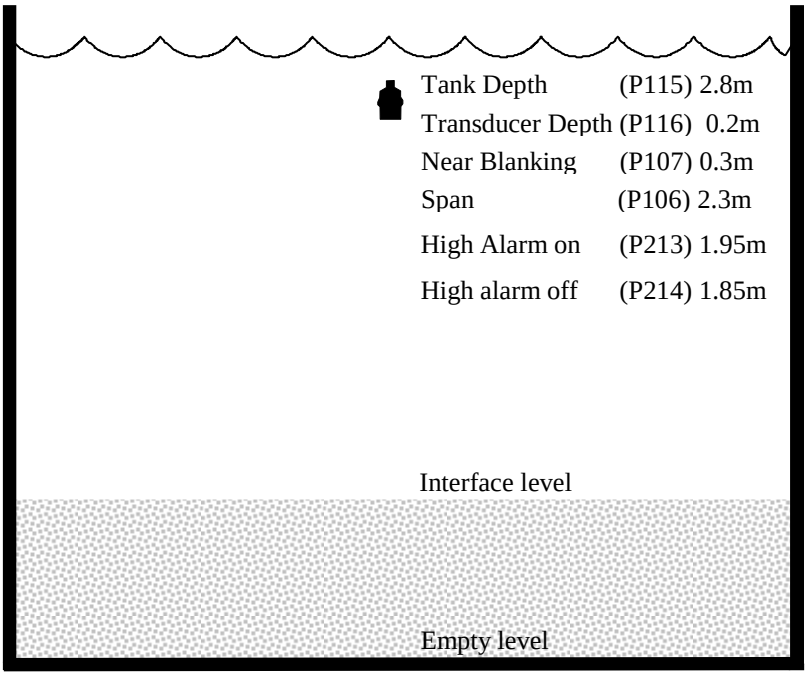
When you first switch ***NivuScope 2*** on, it will be reading the **distance** from the face of the sensor to the interface. It will be indicating in **metres**, as shown on the display and all relays are set OFF.

The **date** (P931) and **time** (P932) in ***NivuScope 2*** were set at the factory, but may need checking, and amending if, for example the application is in a time zone other than GMT, see relevant unit **Parameter listing** for full details.

Once you are satisfied with the installation, and ***NivuScope 2*** is reading what you would expect in terms of distance from the face of the sensor to the material level, then you can proceed with programming for the intended application. It is sensible to program all of the required parameters at the same time. The system will then be fully set-up.

Note that the span is automatically calculated from the tank depth (or empty level for P-sensors), so the tank depth should be entered first.

Example 1a Primary Settlement Sludge Interface monitoring



In this example, when the sludge interface level rises to 1.95 m, relay 1 will come on until the level drops to 1.85 m when it will turn off.

The display for point 1 will show the sludge interface level in the tank.

The mA output will be representative of sludge interface level where 4 mA = empty level (0 %) and 20 mA = 2.3 m (100 %).

To program the unit for **Example 1a Primary Settlement Sludge Interface Monitoring**, proceed as follows.

If required access the **Program Mode**.

Key in the **passcode** 1997 and press **ENTER**.

Use the arrow keys to scroll to the following menus and parameters and press **ENTER** to access them. Select the relevant option using the up and down arrows or type in the required value using the keypad and press **ENTER** to accept.

Menu	Sub Menu	Parameter	Value/Option
Application	Point 1	Mode P100	2 = Level
		Xducer P101	7 = VT10
		Material P102	2 = Primary
		Tank Depth P115	2.8 (metres)
		Xducer Depth P116	0.2 (metres)
		Span P106	2.3 (metres)
	Global	Measnt Units P104	1 = metres
Relays	Relay 1	Type P210	1 = Alarm
		Function P211	1 = Level
		Ident P212	2 = High
		Setpoint 1 P213	1.95 (metres)
		Setpoint 2 P214	1.85 (metres)
		Allocation P216	1 = Xducer 1

All other parameters should remain at default values.

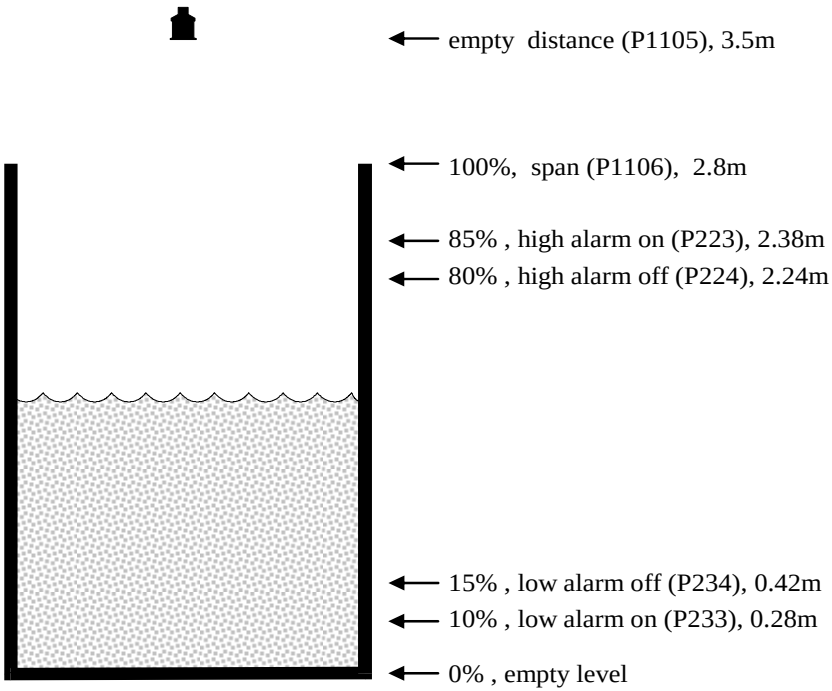
If combining the sludge interface monitoring with a tank liquid level monitor then proceed to **Example 1b Level Monitoring with Alarms on Point 2** otherwise, programming is now complete and the unit can be returned to the run mode, press **CANCEL** until **Run Mode?** Is displayed on the LCD press **ENTER**, and the ***NivuScope 2*** will return to the **Run Mode**.

Setting Up Point 2 to be an Ultrasonic Point of Measurement

If it is required that point two is to be set up as an ultrasonic sensor to measure level in air follow the procedure as per the example below.

Level Monitoring with High and Low Alarms on Point 2

A vessel, containing a liquid that has a variation in level that is to be monitored, with a high level alarm set on Relay 1, and low level alarm set on Relay 2. The following method uses an air sensor from the P-series, example shown is a P-06 on channel 2.



In this example, when the level rises to 2.38 m, relay 2 will come on until the level drops to 2.24 m when it will turn off. If the level drops to 0.28 m, then relay 3 will come on until it rises 0.42 m when it will turn off.

The display for point 2 will show the level in the tank.
The mA output will be representative of level where 4 mA = empty level (0 %) and 20 mA = 2.8 m (10 0%).

To program the unit for **Example Level Monitoring with alarms**, proceed as follows.

If required access the **Program Mode**

Key in the **passcode** 1997 and press **ENTER**

Use the arrow keys to scroll to the following menus and parameters and press **ENTER** to access them. Select the relevant option using the up and down arrows or type in the required value using the keypad and press **ENTER** to accept.

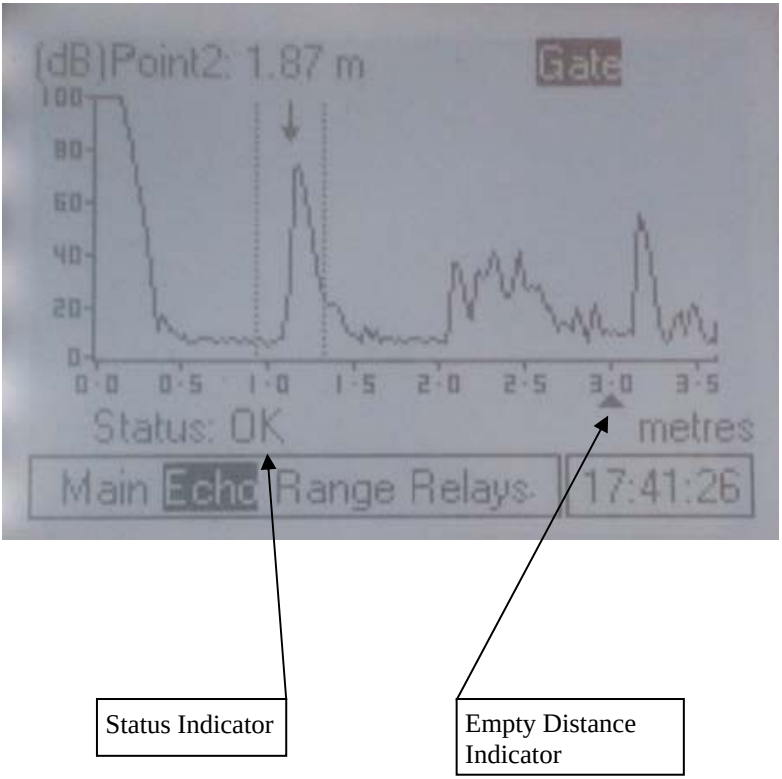
Menu	Sub Menu	Parameter	Value/Option
Application	Point 2	Mode P1100	2 = Level
		Xducer P1101	2 = P-06
		Material P1102	1 = Liquid
		Empty Level P1105	3.5 (metres)
		Span P1106	2.8 (metres)
Relays	Relay 2	Type P220	1 = Alarm
		Function P221	1 = Level
		Ident P222	2 = High
		Setpoint 1 P223	2.38 (metres)
		Setpoint 2 P224	2.24 (metres)
		Allocation P226	2 = Xducer 2
	Relay 3	Type P230	1 = Alarm
		Function P231	1 = Level
		Ident P232	2 = Low
		Setpoint 1 P233	0.28 (metres)
		Setpoint 2 P234	0.42 (metres)
		Allocation P236	2 = Xducer 2
mA Output	mAOut 2	Allocation P899	2 = Xducer 2

All other parameters should remain at default values.

Programming is now complete and the unit can be returned to the run mode,

press **CANCEL** until **Run Mode?** Is displayed on the LCD press **ENTER**, and the ***NivuScope 2*** will return to the **Run Mode**.

Example Echo Screen for Ultrasonic Sensor



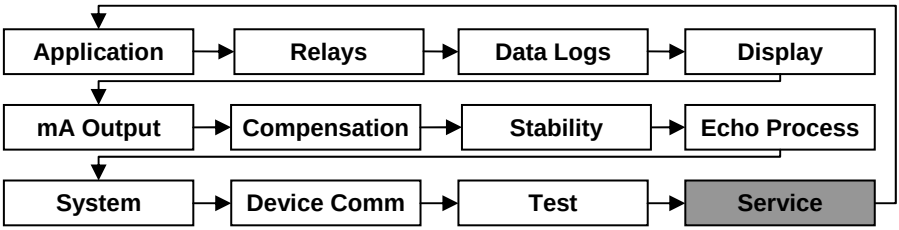
Chapter 4 Menu System and Parameter Guide

This section outlines all parameters available in the ***NivuScope 2***, as they appear in the menu system.

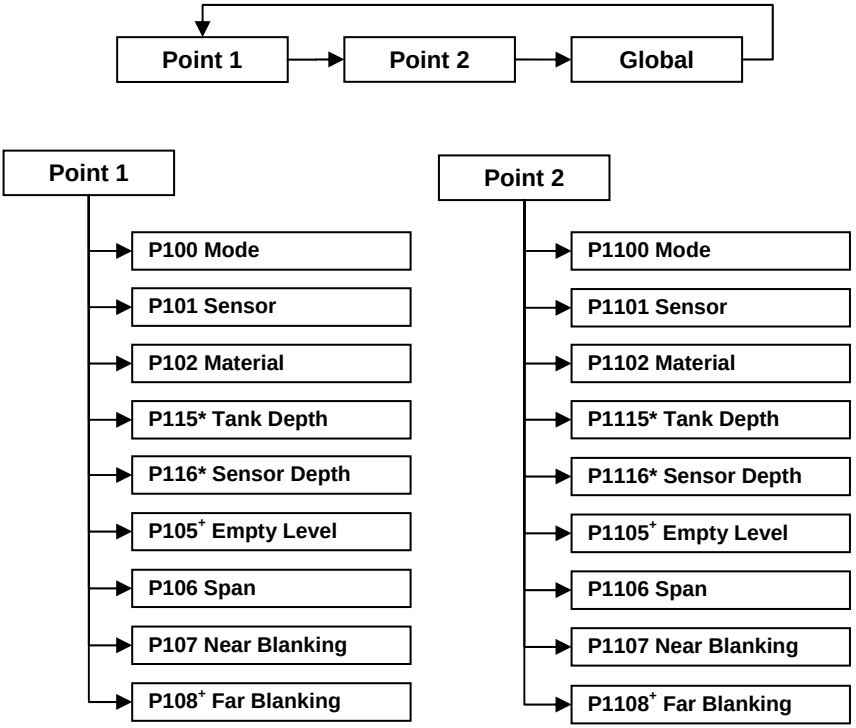
Shown below is a set of charts to show you how all the various parts can be found using the menu system.

For further details and a full description of all parameters refer to Chapter 6 Parameter Listings and Descriptions

Top Level Menu

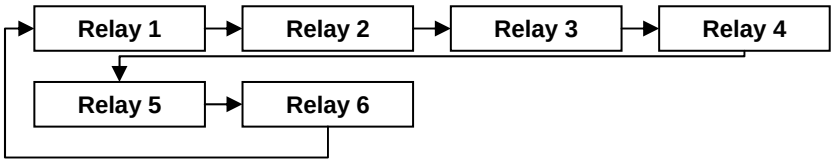


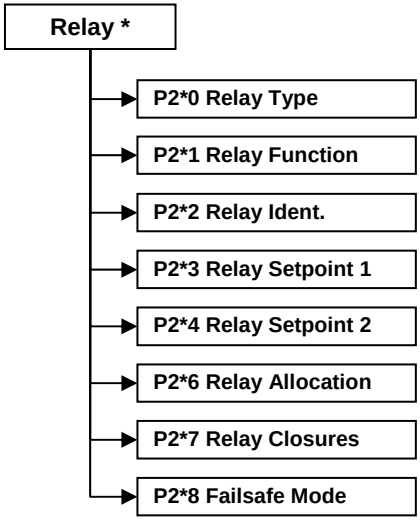
Application Menu



*** only available with VT sensors**
+ only available with dB sensors

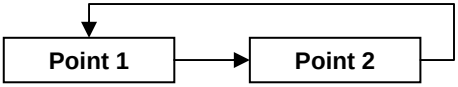
Relays Menu

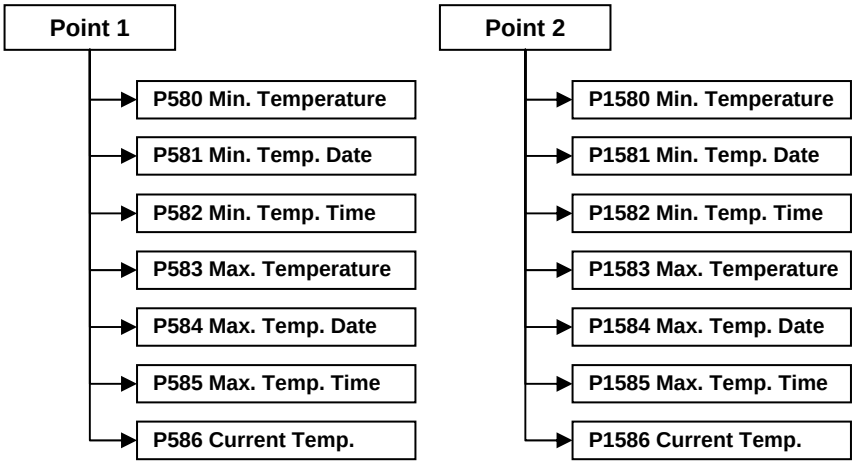




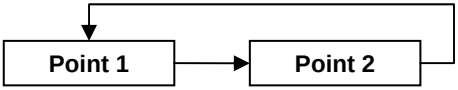
*** is the number of the relay from 1 to 6**

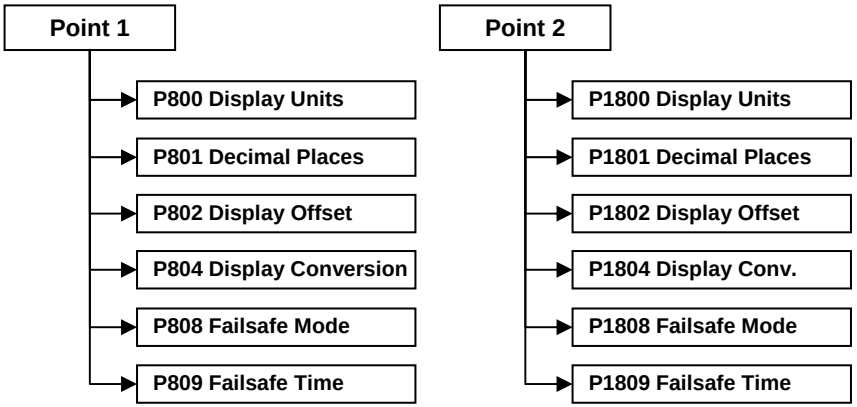
Data Logs Menu



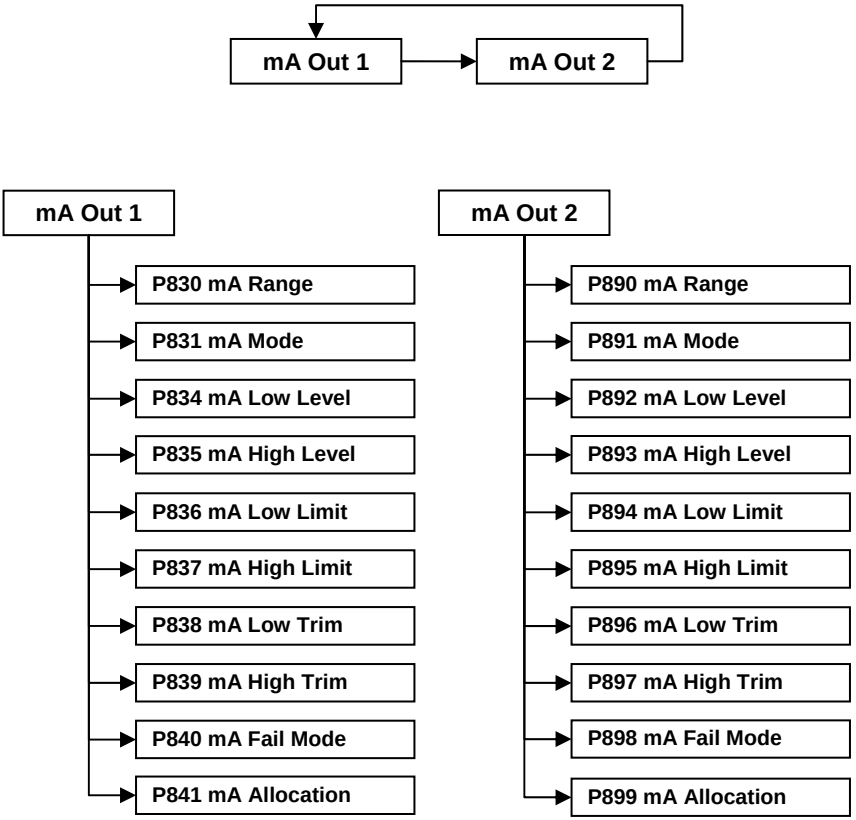


Display Menu

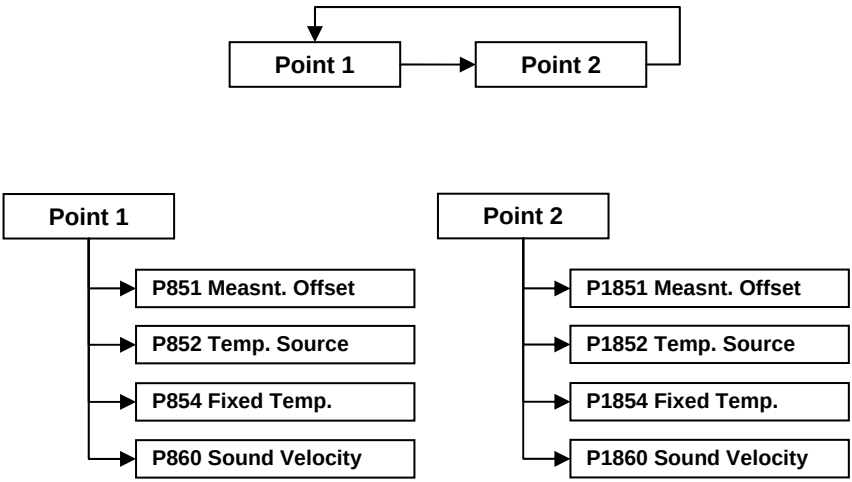




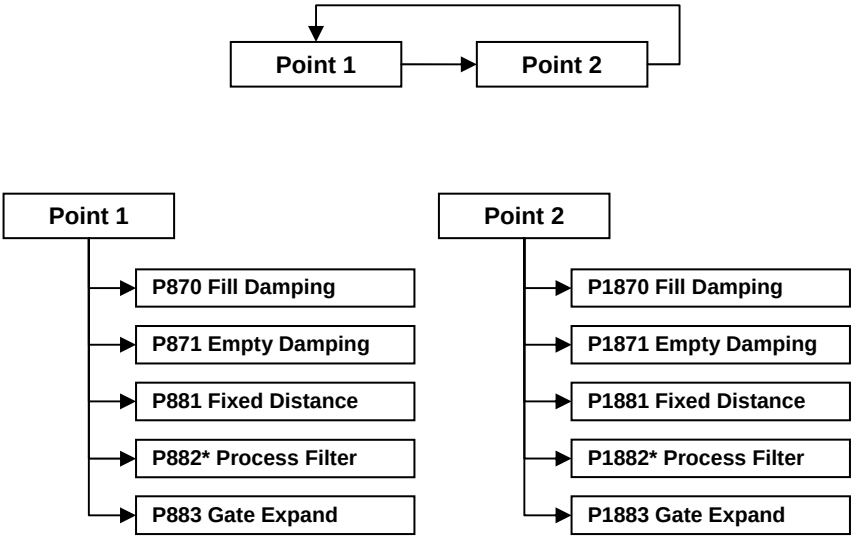
mA Output Menu



Compensation Menu

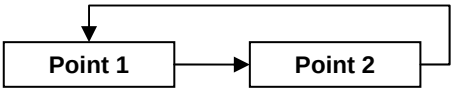


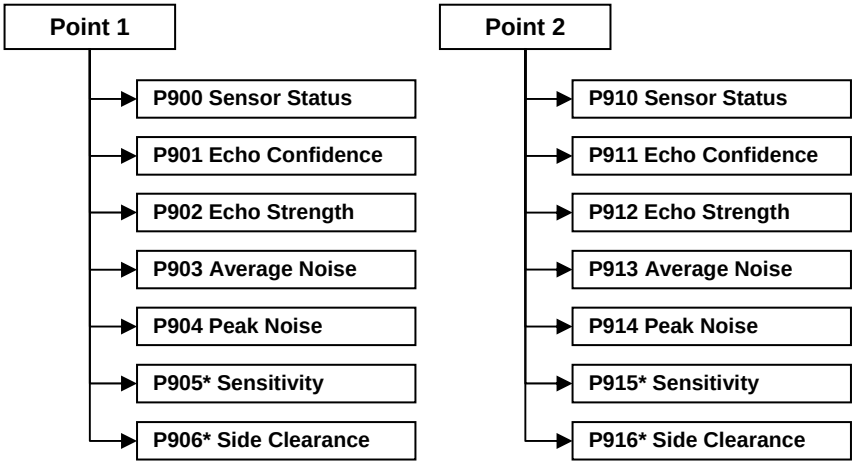
Stability Menu



*** dB sensors only**

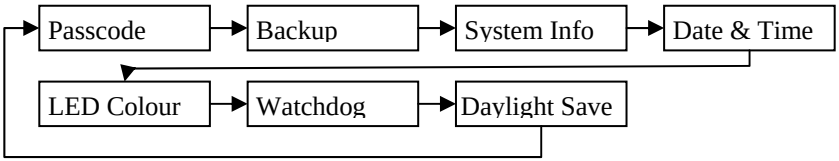
Echo Processing Menu

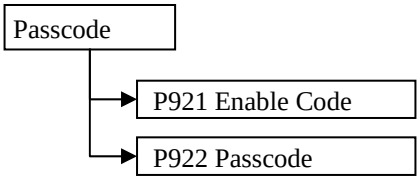


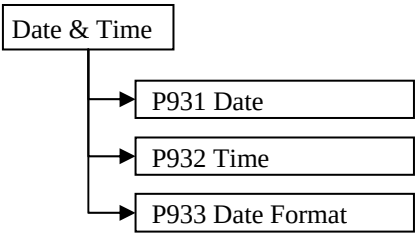


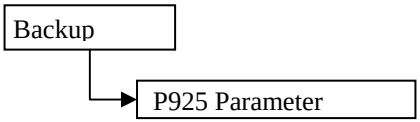
*** dB sensors only**

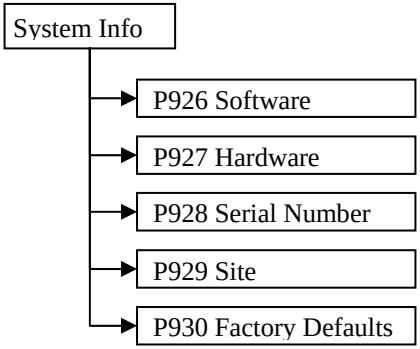
System Menu

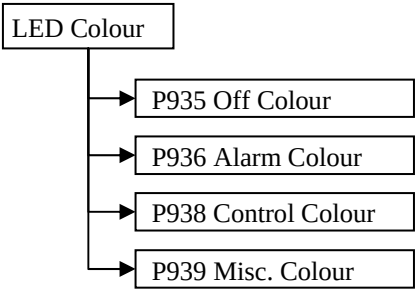

Passcode
Backup
System Info
Date & Time
LED Colour
Watchdog
Daylight Save

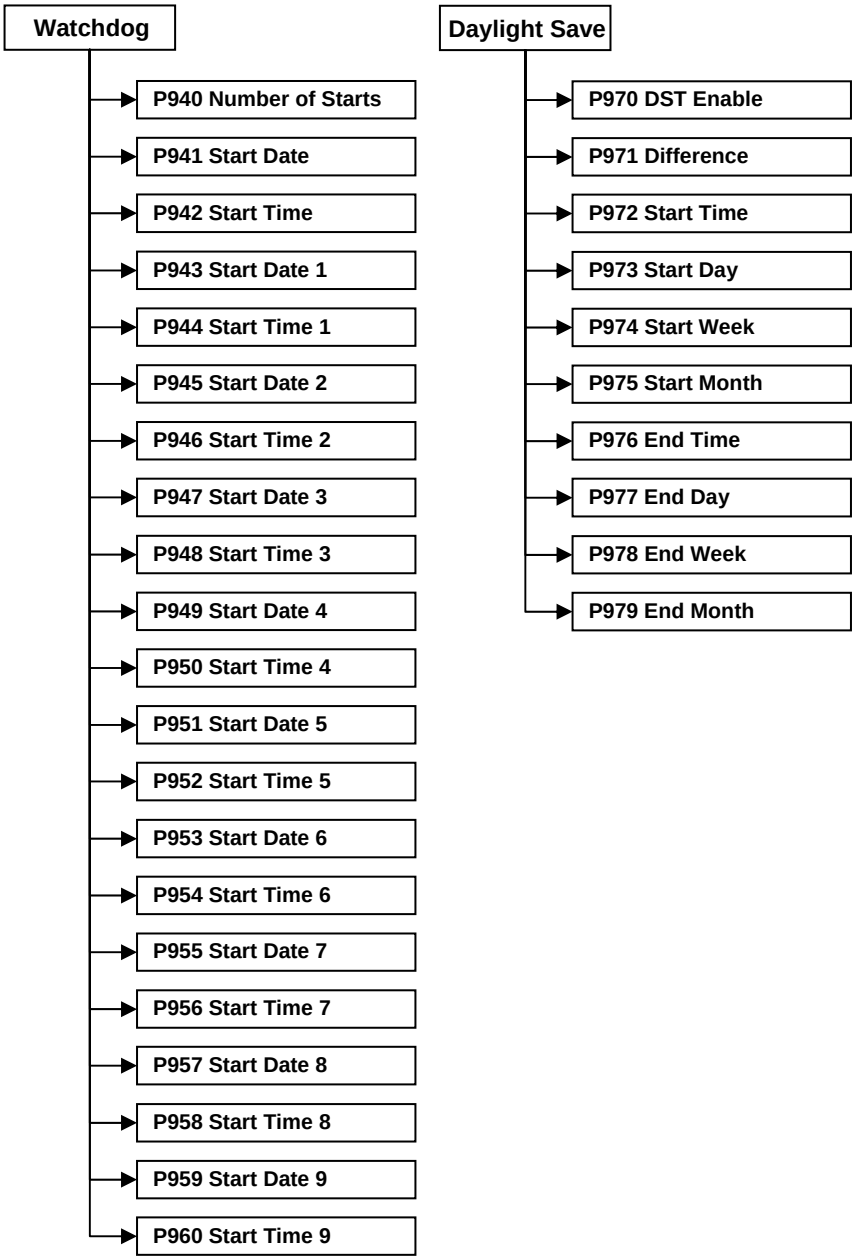

Passcode
P921 Enable Code
P922 Passcode


Date & Time
P931 Date
P932 Time
P933 Date Format

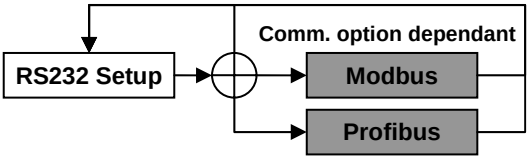

Backup
P925 Parameter

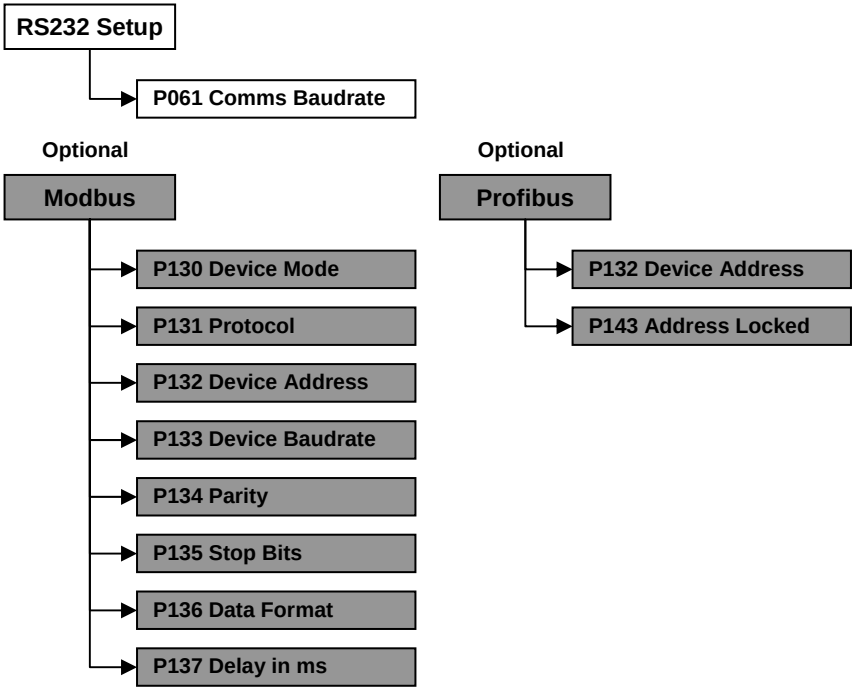

System Info
P926 Software
P927 Hardware
P928 Serial Number
P929 Site
P930 Factory Defaults


LED Colour
P935 Off Colour
P936 Alarm Colour
P938 Control Colour
P939 Misc. Colour

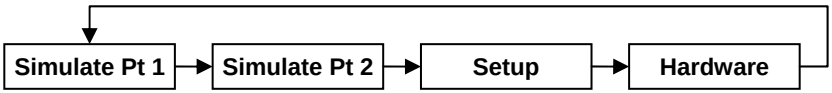

Watchdog
P940 Number of Starts
P941 Start Date
P942 Start Time
P943 Start Date 1
P944 Start Time 1
P945 Start Date 2
P946 Start Time 2
P947 Start Date 3
P948 Start Time 3
P949 Start Date 4
P950 Start Time 4
P951 Start Date 5
P952 Start Time 5
P953 Start Date 6
P954 Start Time 6
P955 Start Date 7
P956 Start Time 7
P957 Start Date 8
P958 Start Time 8
P959 Start Date 9
P960 Start Time 9
Daylight Save
P970 DST Enable
P971 Difference
P972 Start Time
P973 Start Day
P974 Start Week
P975 Start Month
P976 End Time
P977 End Day
P978 End Week
P979 End Month

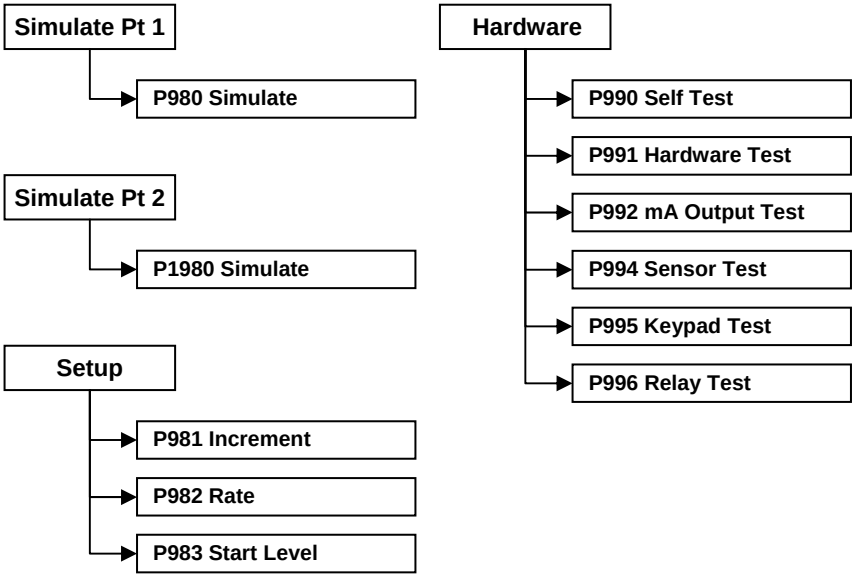
Device Comm Menu





Test Menu


Simulate Pt 1
Simulate Pt 2
Setup
Hardware


Simulate Pt 1
P980 Simulate
Simulate Pt 2
P1980 Simulate
Setup
P981 Increment
P982 Rate
P983 Start Level
Hardware
P990 Self Test
P991 Hardware Test
P992 mA Output Test
P994 Sensor Test
P995 Keypad Test
P996 Relay Test

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Chapter 5 Parameter Listing and Descriptions

Application Parameters

Point 1 / Point 2

P1-P100, P2-P1100 Mode of Operation

This parameter sets the mode of operation, when in run mode, and can be set to one of the following:

Option	Description
1 = Distance (Default)	Display shows the distance from the sensor face to the surface/interface.
2 = Level	Display shows how full the vessel is.
3 = Space	Display shows how empty the vessel is.
4* = Average 1 & 2	Display shows the average level of point 1 and point 2.
5* = Differential 1 & 2	Display shows the differential between point 1 and point 2.

* If sensor 2 is enabled

P1-P101, P2-P1101 Xducer (Sensor)

This parameter should be set to the sensor being used with the unit. Sensors prefixed with "dB" are air sensors and those prefixed with "VT" are submersible sludge sensors. This parameter can be set to one of the following:

Option	Description
0 = None	For point 2 only. Disables point 2 (default).
1 = dB3	Sensor is a P 3. Range 0.125 to 3.00 metres
2 = dB6	Sensor is a P 6. Range 0.3 to 6.00 metres
3= dB10	Sensor is a P 10. Range 0.3 to 10.00 metres
4= dB15	Sensor is a P 15. Range 0.5 to 15.00 metres
5= dB25	Sensor is a P 25. Range 0.6 to 25.00 metres
6 = dB40	Sensor is a P 40. Range 1.2 to 40.00 metres
7 = VT10 (Default)	Sensor is a VT10. Range 0.3 to 10.00 metres

P1-P102, P2-P1102 Material

This parameter should be set to the type of site being monitored for Sludge or the material being monitored with air sensors. The options are:

VT sensors

Option	Description
1 = Industrial	Use for the majority of non-sludge sites
2 = Primary (Default)	Use for primary settlement tanks
3 = Secondary	Use for secondary settlement tanks
4 = SBR	Use for SBR tanks

P sensors

Option	Description
1 = Liquid (Default)	Use for liquids and flat solid materials
2 = Solid	Solid material that is heaped or at an angle

P1-P105, P2-P1105 Empty Level ***P sensors only***

This parameter is to be set to the **maximum distance** from the **face** of a P sensor to the **empty point** (bottom of the tank), in **P104 Measurement Units**. Note this value also affects span, (see important information below), so should be set before span. With sludge sensors, the empty level is automatically calculated from **P115 Tank Depth** and **P116 Sensor Depth**.

P1-P106, P2-P1106 Span

This parameter should be set to the maximum distance from the **Tank Depth (P115/P1115)** or **Empty Level** (**P105/P1105**) to the maximum material level. It is automatically set to be equal to the **Tank Depth (P115/P1115)** or **Empty Level** (**P105/P1105**) less the **Near Blanking** distance (**P107/P1107**), when you set the tank depth or empty level.

Important Information

When changing the Tank Depth (P115) or Empty Distance (P105) you can also recalculate the values for the Span and the Relay Setpoints to take in to account the near blanking (P107) and sensor depth (P116) where applicable, so that they remain at the same percentage values of the empty distance as they were before they were changed. The question “Recalculate Span?” will be asked, if you choose yes (enter), then the span will be recalculated, any other answer will leave the span at its original value. You will then be asked if you want to “Recalculate Setpoints?”, if you choose yes (enter), then all Relay Setpoints will be recalculated as a percentage of the new empty distance, any other answer will leave the setpoints at their original values.

P1-P107, P2-P1107 Near Blanking Distance

This parameter is the distance from the face of the sensor that is not measurable (also known as the 'dead zone'), and is pre-set to the minimum value dependant on the Xducer (P101) selected. It should not be set to less than this figure, but can be increased, typically to ignore close in obstructions.

Sensor	Near Blanking Distance
P101/P1101 = P 3 Sensor	Default Blanking Distance = 0.125m
P101/P1101 = P 6 Sensor	Default Blanking Distance = 0.30m
P101/P1101 = P 10 Sensor	Default Blanking Distance = 0.30m
P101/P1101 = P 15 Sensor	Default Blanking Distance = 0.50m
P101/P1101 = P 25 Sensor	Default Blanking Distance = 0.60m
P101/P1101 = P 40 Sensor	Default Blanking Distance = 1.20m
P101/P1101 = VT10 Sensor	Default Blanking Distance = 0.30m

P1-P108, P2-P1108 Far Blanking Distance P sensors only

This is the distance (as a **percentage** of **empty level P105**) beyond the empty point that the unit will be able to measure, and by **default** is pre-set to **20%** of the empty level.

If the surface being monitored can extend beyond the **Empty Level** (**P105**) then the far blanking distance can be increased to a maximum of 100% of empty level.

This parameter is always entered as a % of empty level.

P1-P115, P2-P1115 Tank Depth

This is the distance from the top of the tank (or the surface of the liquid when full) to the bottom of the tank in **P104 Measurement Units**. This parameter will only become available when a sludge sensor (prefixed 'VT') is selected in **P101 Sensor Type**.

P1-P116, P2-P1116 Sensor Depth

This is the distance from the top of the tank (or the surface of the liquid when full) to the face of the sludge sensor in **P104 Measurement Units**. This parameter will only become available when a sludge sensor (prefixed 'VT') is selected in **P101 Sensor Type**.

Global

P104 Measurement Units

This parameter sets the units you want to use for programming and display

Option	Description
1 = metres (Default)	All units of measure are **METRES**
2 = cm	All units of measure are **CENTIMETRES**
3 = mm	All units of measure are **MILLIMETRES**
4 = feet	All units of measure are **FEET**
5 = inches	All units of measure are **INCHES**

Relay Parameters

All relay related parameters are prefixed with a **2****.

The second digit of the three figure parameter number denotes the relay number as follows:

2**1*** parameters for Relay 1

2**2*** parameters for Relay 2

2**3*** parameters for Relay 3

2**4*** parameters for Relay 4

2**5*** parameters for Relay 5

2**6*** parameters for Relay 6

The third digit selects specific parameter for the setting of the relays, which can be selected individually and results in the following parameter numbers for each relay.

Relay 1 21**0** to 21**8**

Relay 2 22**0** to 22**8**

Relay 3 23**0** to 23**8**

Relay 4 24**0** to 24**8**

Relay 5 25**0** to 25**8**

Relay 6 26**0** to 26**8**

P210, P220, P230, P240, P250, P260 - Relay Type

This parameter defines what type each relay should be, see the table below for available options.

Option	Description
0= Not In Use (Default)	Relay not in use or programmed and LED will always be off.
1= Alarm	Relay is programmed as an alarm relay, which will **de-energise ON**, and **energise OFF**. This will ensure an alarm is raised if the power fails to the unit.
2= Control	Relay is programmed as a control relay, which will **energise ON**, and **de-energise OFF.**
3= Miscellaneous	Relay is programmed as a miscellaneous relay, which will **energise ON**, and **de-energise OFF**.

Alarms

P210, 220, 230, 240, 250, 260 =1 (Alarm)

The **second parameter** for each relay determines the **function** of the alarm.

P211, P221, P231. P241, P251, P261 - Relay Function

This parameter defines what **function** the **alarm** will respond to as follows.

Option	Description
0= Off (Default)	Relay will not operate.
1= Level	Alarm is based on the level in the vessel, and the type of level alarm (P2**1**2, 2**2**2, 2**3**2, 2**4**2, 2**5**2, 2**6**2) and two setpoints must be set (P2**1**3, 2**2**3, 2**3**3, 2**4**3, 2**5**3, 2**6**3 & P2**1**4, 2**2**4, 2**3**4, 2**4**4, 2**5**4, 2**6**4). Setpoints are entered in Display Units or % of span as referenced to Empty Level *.
2= Temperature	Alarm is based on the temperature, and the type of temperature alarm (P2**1**2, 2**2**2, 2**3**2, 2**4**2, 2**5**2, 2**6**2) and two setpoints must be set (P2**1**3, 2**2**3, 2**3**3, 2**4**3, 2**5**3, 2**6**3 & P2**1**4, 2**2**4, 2**3**4, 2**4**4, 2**5**4, 2**6**4). The temperature used depends on the temperature source selected (P852). Setpoints are entered in ^{o}C.
3= Loss of Echo	Alarm is raised if the **Failsafe Timer** (**P809**) expires. No setpoints are required.
4= Loss of Clock	Alarm is raised if the real time clock fails. No setpoints are required.
5= Wiper Fault	Alarm is raised if the wiper fails on a VT sensor. No setpoints are required.

The **third parameter** for each relay determines the **alarm ID** for the relay you wish to set.

P212, P222, P232, P242, P252, P262 - Relay Alarm ID

When P211, 221, 231, 241, 251, 261 = 3 (Loss of Echo), 4 (Loss of Clock) or 5 (Wiper Fault)

This parameter has no function and will not be displayed.

P211, 221, 231, 241, 251, 261 = 1 (Level) or 2 (Temperature)

This parameter defines which **alarm type** the relay should respond to, as follows:

Alarm ID	Description	Setpoints
1=General (Default)	Relay goes "ON" when the value reaches the ON setpoint and goes "OFF" when the value reaches the OFF setpoint.	P2**1**3, 2**2**3, 2**3**3, 2**4**3, 2**5**3, 2**6**3 is ON Setpoint; P2**1**4, 2**2**4, 2**3**4, 2**4**4, 2**5**4, 2**6**4 is OFF Setpoint.
2= High	Relay goes "ON" when the value rises to the ON setpoint and goes "OFF" when the value lowers to the OFF setpoint.	ON> OFF Relay Setpoints P2**1**3, 2**2**3, 2**3**3, 2**4**3, 2**5**3, 2**6**3 and P2**1**4, 2**2**4, 2**3**4, 2**4**4, 2**5**4, 2**6**4 Setpoints, can be set in any order as the unit 'knows' that you are setting a high level alarm.
3= Hi-Hi	Same as 2 = High, but different identifier.	
4= Low	Relay goes "ON" when the value lowers to the ON setpoint and goes "OFF" when the value rises to the OFF setpoint.	ON<OFF Relay Setpoints P2**1**3, 2**2**3, 2**3**3, 2**4**3, 2**5**3, 2**6**3 and P2**1**4, 2**2**4, 2**3**4, 2**4**4, 2**5**4, 2**6**4. Setpoints, can be set in any order as the unit 'knows' that you are setting a low level alarm.
5= LoLo	Same as 4=Lo, but different identifier.	

Alarm ID	Description	Setpoints
6= In bounds	Relay goes "ON" if value is inside the zone between the two setpoints.	Relay Setpoints, P2**1**3, 2**2**3, 2**3**3, 2**4**3, 2**5**3, 2**6**3 and P2**1**4, 2**2**4, 2**3**4, 2**4**4, 2**5**4, 2**6**4 can be set in any order as the unit 'knows' that you are setting an in bounds alarm.
7= Out of bounds	Relay goes "ON" if value is outside the zone between the two setpoints.	Relay Setpoints P21**3**, 2**2**3, 2**3**3, 2**4**3, 2**5**3, 2**6**3 and P2**1**4, 2**2**4, 2**3**4, 2**4**4, 2**5**4, 2**6**4 can be set in any order as the unit 'knows' that you are setting an out of bounds alarm.

The **fourth parameter** and the **fifth parameter** for each relay set the **Alarm** "**ON**" and "**OFF**" points. For a ***high alarm*** the "**ON**" is set **higher than** "**OFF**". For ***low alarm*** then "**ON**" is set **lower than** "**OFF**". See the appropriate **alarm ID,** table (**P212, 222, 232, 242, 252, 262**) for further information.

When P211, 221, 231, 241, 251, 261 = 3 (Loss of Echo), 4 (Loss of Clock) or 5 (Wiper Fault)

These parameters have no function and will not be displayed.

P211, 221, 231, 241, 251, 261 = 1 (Level) or 2 (Temperature)

P213, P223, P233, P243, P253, P263 - Relay Setpoint 1

Determines the "ON" or "OFF" point for the alarm according to the ID selected.

P214, P224, P234, P244, P254, P264 - Relay Setpoint 2

Determines the "ON" or "OFF" point for the alarm according to the ID selected.

Important Information

Setpoints are entered in values according to the **function** selected.

Level - entered in Display Units or % of span as referenced to Empty Level.
Temperature - entered in ºC.

See the appropriate **alarm function**, table (**P211, 221, 231, 241, 251, 261**) for further information.

Control

P210, 220, 230, 240, 250, 260 = 2 (Control)

When a relay is being set up as a **control** relay, the **second parameter** that will be displayed in the menu determines its **function.**

P211, P221, P231, P241, P251, P261 Relay Function

This function allows the relay to be assigned to specific **control** functions (other than alarms).

This can be used to activate devices based on elapsed time or running cycles, such as a timed rake control to keep a ram lubricated if idle for long periods.

Options	Description
0 = Off	Relay is always de-energised
1 = Time	Relay will **energise** "**ON**" after the **Cycle time** that is set in Relay **Setpoint 2** (P2**1**4, 2**2**4, 2**3**4, 2**4**4, 2**5**4, 2**6**4). And turns "**OFF**", **de-energises**, after the **On Time Period** that is set in Relay **Setpoint 1** (P2**1**3, 2**2**3, 2**3**3, 2**4**3, 2**5**3, 2**6**3)
2 = General	Control is based on the level in the vessel. All general controls are used to assist each other (run at the same time) and each general control has its own **"ON"** and **"OFF"** setpoints.

The **third parameter** has **no function** when **control relays** are chosen and will not be displayed.

The **fourth parameter** and **fifth parameter** are set to determine the switch points, "**ON**" and "**OFF**" for the relay. See **control function**, table (**P211, 221, 231, 241, 251, 261**) for further information.

P213, P223, P233, P243, P253, P263 Relay Setpoint 1

P211, 221, 231, 241, 251, 261 =1 (Time)

This parameter determines the "**Time Period**" that the relay will remain "**ON**".

Relay Setpoints are entered in Minutes.

See the appropriate relay **Function** tables (**P211**, **221**, **231**, **241**, **251, 261**) for further information.

P211, 221, 231, 241, 251, 261 =2 (General)

This parameter is the **"ON"** point for the general control relay. Relay setpoints are entered in values of Measurement Units (**P104**).

P214, P224, P234, P244, P254, P264 Relay Setpoint 2

P211, 221, 231, 241, 251, 261 =1 (Time)

This parameter determines the "**Cycle Time** " for the operation of the relay.

See the appropriate relay **Function** tables (**P211**, **221**, **231**, **241**, **251, 261**) for further information.

P211, 221, 231, 241, 251, 261 =2 (General)

This parameter is the **"OFF"** point for the general control relay. Relay setpoints are entered in values of Measurement Units (**P104**).

Miscellaneous

P210, 220, 230, 240, 250, 260 = 3 (Miscellaneous)

When a relay is set to be a **miscellaneous relay**, the **second parameter** determines its **function**.

P211, P221, P231, P241, P251, P261 - Relay Function,

This function allows the relay to work in relation to a clock or a specific event and will be set to activate in relation to Real Time.

Options	Description
0 = Off (Default)	Relay **Off de-energised**
1 = Clock	Relay will **energise ON** at a specified time each day as set in Relay Setpoint 1 (P2**1**3, 2**2**3, 2**3**3, 2**4**3, 2**5**3, 2**6**3). And turns **OFF**, **de-energises**, after the specified On Time period as set in Relay Setpoint 2 (P2**1**4, 2**2**4, 2**3**4, 2**4**4, 2**5**4, 2**6**4)

Important Information

When using a Relay to control a device at a specified time of day ensure that the **Time P932** is set correctly. And if required, enable **Daylight Saving** for the appropriate time difference **P970 – P979**.

The **third parameter** has **no function** when **miscellaneous relay** is chosen and will not be displayed.

The **fourth parameter**, and **fifth parameter**, are set to determine the switch points, "**ON**" and "**OFF**" for the relay. See **miscellaneous** function table (**P211, 221, 231, 241, 251, 261**) for further information.

P211, 221, 231, 241, 251, 261 = 1 (Clock)

P213, P223, P233, P243, P253, P263 - Relay Setpoint 1

Relay Setpoints are entered in Hours & Minutes (HH:MM) to set Time at which relay will energise. **Default = 00:00 (HH:MM)**

P214, P224, P234, P244, P254, P264 - Relay Setpoint 2

Relay Setpoints are entered in Minutes to set Time Period that the relay will remain ON. **Default = 0.00 mins.**

Common Parameters

P216, P226, P236, P246, P256, P266 - Relay Allocation

This parameter determines which input the relay will act on. You can set it to the sensor1 (default), sensor 2 or an average, sum or differential of the two when available.

Option	Description
1 = Xducer 1 (Default)	Relay acts on Xducer 1calculated levels.
2 = Xducer 2	Relay acts on Xducer 2 calculated levels.
3 = Average of 1 & 2	Relay acts on the resulting average levels of two signal inputs.
4 = Sum of 1 & 2	Relay acts on the resulting sum level of two signal inputs
5 = Differential of 1 & 2	Relay acts on the resulting differential level of two signal inputs.

P217, P227, P 237, P247, P257, P267 - Relay Closures

The ***NivuScope 2*** will record how many times each relay is closed, this parameter displays the number of times the relay has activated since the relay has been in use. It can be reset with any value.

P218, P228, P238, P248, P258, P268 - Relay Fail Safe

Your ***NivuScope 2*** has a general fail-safe parameter **P808**. However, this can be overridden so that each individual relay has its own independent fail safe mode.

This parameter determines what the relay will do in the event of the **Fail** safe **Time** (**P809**) expiring.

Option	Description
0 = Default	Relay assumes system default mode P808
1 = Hold	Relay remains in its current state
2 = De-Energise	Relay will De-Energise
3 = Energise	Relay will Energise

Data Log Parameters

The data log parameters contains the following information.

Point 1 / Point 2

The following parameters give information on temperature conditions seen by the **Temperature source** (**P852/P1852**) in ºC. All of these parameters are read only and cannot be changed, though if P852/P1852 is changed they will be reset.

P1-P580, P2-P1580 Minimum Temperature

This parameter displays the minimum temperature recorded.

P1-P581, P2-P1581 Minimum Temperature Date

This parameter displays the date when the minimum temperature was recorded.

P1-P582, P2-P1582 Minimum Temperature Time

This parameter displays the time when the minimum temperature was recorded.

P1-P583, P2-P1583 Maximum Temperature

This parameter displays the maximum temperature recorded.

P1-P584, P2-P1584 Maximum Temperature Date

This parameter displays the date when the maximum temperature was recorded.

P1-P585, P2-P1585 Maximum Temperature Time

This parameter displays the time when the maximum temperature was recorded.

P1-P586, P2-P1586 Current Temperature

This parameter displays the current temperature.

Display Parameters

Point 1 / Point 2

P1-P800, P2-P1800 Display Units

This parameter determines whether the reading displayed is in **Measurement Units** (**P104**), or as a **percentage of span.**

Option	Description
1 = Measured (Default)	Display is in selected units dependant on Mode (**P100/P1100**)
2 = Percentage	Display is in **percentage** of span dependant on Mode (**P100/P1100**).

P1-P801, P2-P1801 Decimal Places

This parameter determines the number of decimal places on the reading during run mode.
Minimum = 0 (No decimal places), Maximum 3 = (3 decimal Places) **Default = 2** (2 decimal Places)

P1-P802, P2-P1802 Display Offset

The value of this parameter is added to the reading before it is displayed, in **Measurement Units** (**P104**).

It does not affect the relay setpoints or the mA output, only the reading on the display.

You could use this feature if for example with a sludge sensor, you wanted to reference a distance reading to the surface level, where you would enter the distance between the face of the sensor and the surface level.

P1-P804, P2-P1804 Display Conversion

The reading is multiplied by the value of this parameter before being displayed. The default is 1.0, but if for example you wanted to display the reading in yards, then set the **Measurement Units** (**P104**) to feet, and set **P804/P1804** to 0.33.

Failsafe

P1-P808, P2-P1808 Fail-safe Mode

By default, if a fail-safe condition occurs, then the display, relays and the mA output are held at their last **known** values until a valid reading is obtained.

If required, then you can change this so that the unit goes to **high** (100% of span), or **low** (empty) as follows:

Option	Description
1 = Known (Default)	Remain at the last **known** value
2 = High	Will fail to the **high** value (100% of Span).
3= Low	Will fail to the **low** value (empty)

See Also P218, P228, P238, P248, P258, P268 - Relay Fail-safe and P840/P898 mA Output Fail-safe

Important Information

In the event of a **fail-safe** condition occurring, the display, relays and mA Output can be configured to fail to a condition which is independent of each other. To set independent **Relay Failsafe** see **P218, 228, 238, 248, 258, 268**. And for independent **mA Output Failsafe** see **P840/P898.**

P1-P809, P2-P1809 Fail-safe Time

In the event of a fail-safe condition the fail safe timer determines the time before fail-safe mode is activated. **Default = 2mins**

If the timer activates, the unit goes into **fail-safe**, as determined by **P808/P1808**,(**Display**), **P218, 228, 238, 248, 258, 268** (**Relays**) and **P840/P898** (**mA Output**). When this happens, the display/mA output/relay state will take on that of the relevant fail mode.

When a valid measurement is obtained then the display, relays and mA output will be restored and the timer is reset.

mA Output Parameters

mA Out 1 / mA Out 2

P1-P830, P2-P890 mA Range

This parameter determines the range of the mA output, from the following.

Option	Description
0= Off	mA output disabled.
1= 0 to 20 mA	mA output directly proportional to the **mA mode** (**P831/P891**), so if the reading is 0% the output is 0 mA. If the reading is 100% the output is 20 mA.
2= 4 to 20 mA (Default)	mA output directly proportional to the **mA mode** (**P831/P891**), so if the reading is 0% the output is 4 mA. If the reading is 100% the output is 20 mA.
3= 20 to 0 mA	mA output inversely proportional to the **mA mode** (**P831/P891**), so if the reading is 0% the output is 20 mA. If the reading is 100% the output is 0 mA.
4= 20 to 4 mA	mA output inversely proportional to the **mA mode** (**P831/P891**), so if the reading is 0% the output is 20 mA. If the reading is 100% the output is 4 mA.

P1-P831, P2-P891 mA Mode

This parameter determines how the mA Output relates to what is measured. By **default** it operates exactly the same as the display (mode of operation **P100/P1100**), but it can be set to operate as follows:

Option	Description
0 = Default	mA output relative to **Mode P100**
1 = Distance	mA output relative to **distance**.
2 = Level	mA output relative to **level**.
3 = Space	mA output is relative to **space**.
4* = Average Level	mA output is relative to **average level**.
5* = Differential	mA output is relative to **differential level**.

* If sensor 2 is enabled

Setpoints

By **default** the mA Output will represent the **empty** (**0** or **4mA** dependant on (**P830/P890**) **mA Range**) and **100%** of the operational **span** (**20mA**), but you may wish to have the output represent a section of the operational span. For example, the application has an operational span of 6 metres but **output** is to **represent empty** (**0** or **4mA** dependant on (**P830/P890**) **mA Range**) to a **level** of **5 metres** (**20mA)**. If so P834 (Low Level) should be set to 0.00 metres and P835 (High Level) should be set to 5 metres.

P1-P834, P2-P892 mA Low Level

This parameter sets the level, distance or space, depending on the selected **mA Out Mode** (**P831/P891**) at which the low mA output will occur (**0** or **4mA** dependant on (**P830/P890**) **mA Range**)
Default = 0.000m

P1-P835, P2-P893 mA High Level

This parameter sets the level, distance or space, depending on the selected **mA Out Mode** (**P831/P891**) at which the high mA output will occur (**20mA**).
Default = 6.000m

P1-P836, P2-P894 mA Low Limit

This parameter sets the lowest level that the mA output will drop to, the default is 0mA, but you can override this if the device you connect to cannot for example accept less than 2mA, yet you want to use the 0-20mA range. **Default = 0.00mA**

P1-P837, P2-P895 mA High Limit

This parameter sets the highest level that the mA output will rise to, the default is 20 mA, but you can override this if the device you connect to cannot for example accept more than 18 mA, yet you want to use the 0-20 mA range. **Default = 20.00mA**

P1-P838, P2-P896 mA Low Trim

If the device you are connected to is not calibrated, and not showing the correct **low value** (reading), then you can trim it using this parameter. You can either type in the offset directly, or use the up/down arrow keys to move the output up and down until you get the expected result (reading) on the device that is connected.

P1-P839, P2-P897 mA High Trim

If the device you are connected to is not calibrated, and not showing the correct **high value** (reading), then you can trim it using this parameter. You can either type in the offset directly, or use the up/down arrow keys to move the output up and down until you get the expected result (reading) on the device that is connected.

P1-P840, P2-P898 mA Fail-safe Mode

This parameter determines what happens to the mA output in the event of the unit going into fail-safe mode. The **default** is to do the same as the **system fail-safe** (**P808**/**P1808**), but this can be overridden to force the mA output to an independent fail-safe mode as follows:

Option	Description
0 = Default	mA output will fail as per **P808**/**P1808**.
1 = Hold	mA output will retain its last known value.
2 = Low	mA output will fail to its **low** condition.
3 = High	mA output will fail to its **high** condition.

P1-P841, P2-P899 mA Allocation

By default the mA output will be representative of the reading obtained, as determined by the **Mode P100/P1100**. When **P100/P1100** = 4 **(Average)** or **5 (Differential)** the mA output can be assigned to be representative of the **level** of either of the two points of measurement This parameter is automatically set to the correct default option when selecting the **Mode P100** and **Xducer** (**P101**), and under normal circumstances will not require changing.

The options, dependant on the **value** entered for **Mode P100/P1100**, are as follows:

Option	**Description**
1 = Xducer 1 (Def. P1)	mA output relates to Xducer 1 **level**.
2 = Xducer 2 (Def. P2)	mA output relates to Xducer 2 **level**.

Compensation Parameters

Offset

P1-P851, P2-P1851 Measurement Offset

The value of this parameter is added to the measured distance, in **Measurement Units** (**P104**).

This Offset will be added to the level, as derived from the sensor, and will affect everything including the reading on the display, the relay setpoints and the mA output.

Temperature

P1-P852, P2-P1852 Temperature Source

This parameter determines the source of the temperature measurement. By **default** it is set to automatic (**P852/P1852=1**), which will automatically detect if a temperature sensor is available from the sensor. If for any reason, no temperature input is received, then the **Fixed Temp** value is used, as set by **P854/P1854**.

The temperature source can be specifically set as follows:

Option	Description
1 = Automatic (Default)	Will automatically select sensor temperature sensor, if available, or fixed temperature (P854/P1854) if no temperature sensor found.
2 = Xducer 1	Always uses temperature reading from sensor 1.
3 = Xducer 2	Always uses temperature reading from sensor 2.
4 = Fixed	Always uses fixed temperature (P854/P1854)

P1-P854, P2-P1854 Fixed Temperature

This parameter sets the temperature, in degrees Celsius, to be used if **P852/P1852** (**Temperature Source**) =**3**. Default = 20°C

P1-P860, P2-P1860 Sound Velocity

This parameter allows for the velocity of sound to be changed according to the atmosphere the sensor is operating in. By default the velocity is set for sound travelling in air/water at an ambient temperature of 20 degrees centigrade. **Default = 342.72m/s (velocity in air for P-sensor)**
Default = 1482.32m/s (velocity in water for VT sensor)

Stability Parameters

Point 1 / Point 2 Damping

Damping is used to damp the display, to enable it to keep up with the process but ignore minor surface fluctuations.

P1-P870, P2-P1870 Fill Damping

This parameter determines the **maximum rate** at which the unit will respond to an **increase in level**. It should be set slightly higher than the maximum vessel fill rate. **Default = 10m/min**

P1-P871, P2-P1871 Empty Damping

This parameter determines the **maximum rate** at which the unit will respond to a **decrease in level**. It should be set slightly higher than the maximum vessel empty rate. **Default = 10m/min**

Filters

The following two parameters can be used to filter out unwanted changes of level caused by a 'rippled' or agitated surface.

P1-P881, P2-P1881 Fixed Distance

This parameter determines the width of gate to be used in tracking an echo and under normal circumstances will not require changing, but it can be increased in the cases where the surface is moving extremely fast (in excess of 10m/min) to ensure smooth processing of the changing level.

P1-P882, P2-P1882 Process Filter ***P-sensors only***

This parameter determines the number of 'cycles' that will be taken before a change in level is processed and the display updated.

Option	Description
1 = Fast	level will be updated every cycle
2 = Medium	level will be updated every 8 cycles
3 = Slow (Default)	level will be updated every 16 cycles

P1-P883, P2-P1883 Gate Expand

This parameter determines the size of the increment by which the gate expands per cycle when an echo is detected outside of the gate. **Default = 0.1m**

Echo Processing Parameters

Point 1 / Point 2

P1-P900, P2-P910 Sensor 1 Status

This parameter shows the current state of the sensor. The value means the following.

Option	Description
0= OK	Sensor working correctly.
1= Disabled	Sensor is not being used (mA input is being used instead, so P101=1)
2= Stuck High	Indicates that the power and signal lines on the sensor terminals are crossed over, or the signal line is shorted to earth.
3= Not Found	No sensor is detected.

P1-P901, P2-P911 Echo Confidence1/2

This parameter displays the most recent echo confidence from the sensor. It is useful to help find the best mounting location for the sensor, where you should aim to get the highest figure. It is a percentage of confidence that the echo reporting the level is the correct one.

P1-P902, P2-P912 Echo Strength1/2

This parameter displays the most recent echo strength figure for the sensor, where a higher figure indicates a better returned echo.

P1-P903, P2-P913 Average Noise1/2

This is the mean noise reading for the sensor. It is measured while the sensor is not firing, and gives an indication of the average amount of electrical noise present on the cabling.

P1-P904, P2-P914 Peak Noise1/2

This is the peak noise reading for the sensor. It is measured while the sensor is not firing, and gives an indication of the maximum amount of electrical noise present on the cabling.

P1-P905, P2-P915 Sensitivity (P sensors only)

This parameter sets the minimum DATEM level and can be increased to cover a high noise floor in noisy applications. It is recommended that this parameter not be changed unless necessary as any echo below the DATEM will be ignored. **Default 5dB (50mV).**

P1-P906, P2-P916 Side Clearance (P sensors only)

This parameter sets the distance by which the DATEM trace will be separated from the raw echo when the DATEM trace covers an echo returned from an undesired obstruction. **Default 0.05m.**

System Parameters

Passcode

P921 Enable Code

Enables the passcode (**P922**), which means the passcode must be entered to go into program mode. If **disabled** (set to **0**), then no passcode is required, and ENTER is used to enter program mode. **Default =1 (Enabled)**

P922 Passcode

This is the passcode that must be used to enter program mode. The **default** is **1997**, but this can be changed to another value from 0 to 9999.

Backup

P925 Parameter Backup & Restore

This parameter is used to make a backup of all parameters, for example to ensure a default set is maintained within the unit. If alterations are made to the parameters that do not work as intended, then the backup set can be restored into the unit.

You can make two separate backup copies if you wish, called backup 1 and backup 2, and restore from either.

The options are:

Option	Description
1= Backup 1	Make backup to area 1 of all parameters
2= Backup 2	Make backup to area 2 of all parameters
3= Restore 1	Restore all parameters from area 1
4= Restore 2	Restore all parameters from area 2

System Information

The following three parameters do not affect how the unit performs, but details, contained in them, may be required, by NIVUS, when making technical enquiries.

P926 Software Revision

This parameter will display the current software revision. It is read only, and cannot be changed.

P927 Hardware Revision

This parameter will display the current hardware revision. It is read only, and cannot be changed.

P928 Serial Number

This parameter will display the serial number of the unit. It is read only, and cannot be changed.

P929 Site Identification

This parameter allows you to give each unit an individual reference number, for identification purposes. You can set any number between 1 and 99999.

P930 Factory Defaults

This parameter resets all parameter values to the original Factory Set values that were installed when the unit was tested, before despatch to you.

To **reset** parameters, enter **1** (**Yes**), and press **ENTER**, then you will see a message "**Enter if sure**", you should press **ENTER** again. If you press any other key at this point, the parameters will not be reset, and you will see a message confirming this.

Once you have done this, program the unit, to the desired application.

Date & Time

The date and time is used, to control specific relay functions and date stamp certain events that are contained in the Data Logs. It is also used in conjunction with the system watchdog that keeps an eye on the times the unit has started.

P931 Date

This parameter display the **current date**, in the format as set by **P933** (**Date Format**), and can be reset if required.

P932 Time

This parameter displays the **current time** and can be reset if required, in the format HH: MM (24-hour format). This is set initially at the factory for UK time.

P933 Date Format

This parameter allows you to alter the format that the date is displayed to your choice of DD: MM: YY, MM: DD: YY or YY: MM: DD. The default is DD: MM: YY.

LED Colour

Each relay has an associated LED, located on the unit's front panel, which indicates the status of the relay. By default the LED of any relay that has been programmed but is in its "OFF" state will be illuminated 'yellow'. When "**ON**" **alarm** relays will cause the **LED** to illuminate **Red**, and **control** relays will cause the **LED** to illuminate **green**. LED's of any relays that have not been programmed will not be illuminated. Customised settings for the colour of LED's can be achieved by using the following parameters.

P935 Off Relay Colour

This parameter selects the colour that a **programmed relay** should be when it is in its "**OFF**" state. The **default** is **3 = yellow**, but can be changed to 'no colour', red or green.

P936 Alarm Relay Colour

This parameter selects the colour that an **alarm** relay should be when it is in its "**ON**" state. The **default** is **1 = red**, but can be changed to 'no colour', green or yellow.

P938 Control Relay Colour

This parameter selects the colour that a **control** relay should be when it is in its "**ON**" state. The **default** is **2 = green**, but can be changed to 'no colour', red or yellow.

P939 Miscellaneous Relay Colour

This parameter selects the colour that a **miscellaneous** relay should be when it is in its "**ON**" state. The default is **2 = green**, but can be changed to 'no colour', red or yellow.

All relays that are not programmed will show, 'no colour', i.e. they are off.

Watchdog

You can check how many times the unit has been switched on, and look at the date and time of the last ten starts. This can be useful if there have been power failures or if for any reason the ***NivuScope 2*** restarts due to a fault condition. The ***NivuScope 2*** can be backed up from a battery which automatically cuts in during power failure. Battery backed up units will continue uninterrupted operation and therefore will not register a loss of mains power. If, however, the battery were to fail during a mains power interruption, a start up would be recorded once power has been restored.

P940 Number of Starts

This parameter shows how many times the unit has been powered up.

P941-P960 Start Date & Time

Parameters **P941** and **P942** show the **date** and **time** that the unit was last started. There are **ten start dates & times** recorded, which are parameters **P943-P960**. The first on the list are the most recent, and the last ones are the oldest. These are read only, and cannot be changed.

Daylight Saving Time

Important Information

In order to ensure the correct operation of Daylight Saving Time **P932 Time** should be checked, and adjusted if necessary, to ensure that it is set for the current valid time.

P970 DST Enable

When **Enabled** (set to **1**) the internal clock will be automatically adjusted to compensate for the difference between standard time and **Daylight Saving Time. Default = 1 (Yes)**

P971 DST Difference

This parameter sets the time difference between standard time and **Daylight Saving Time.** The time difference is entered in HH:MM. **Default = 01:00**

P972 DST Start Time

This parameter is used to set the **time** of day at which **Daylight Saving Time** will **start**, the time is entered in the format HH: MM (24-hour format). **Default = 02:00**

P973 Start Day

Use this parameter to enter the **day** of the week (**P974**) that **Daylight Saving Time** is to **start**.

Option	Description
2= Monday	**DST** will **start** on a **Monday**
3= Tuesday	**DST** will **start** on a **Tuesday**
4= Wednesday	**DST** will **start** on a **Wednesday**
5= Thursday	**DST** will **start** on a **Thursday**
6= Friday	**DST** will **start** on a **Friday**
7= Saturday	**DST** will **start** on a **Saturday**
8= Sunday (Default)	**DST** will **start** on a **Sunday**

P974 Start Week

This parameter will determine the **week** of the month (**P975**) in which **Daylight Saving Time** is to **start**.

Option	Description
1= Week 1	**DST** will **start** on **day** (**P973**) in the **first** week (**P974**) of the **month** (**P975**).
2= Week 2	**DST** will **start** on **day** (**P973**) in the **second** week (**P974**) of the **month** (**P975**).
3= Week 3	**DST** will **start** on **day** (**P973**) in the **third** week (**P974**) of the **month** (**P975**).
4= Week 4	**DST** will **start** on **day** (**P973**) in the **fourth** week (**P974**) of the **month** (**P975**).
5= Last (Default)	**DST** will **start** on **day** (**P973**) in the **last** week (**P974**) of the **month** (**P975**).

P975 Start Month

This parameter is used to select the **month**, in which **Daylight Saving Time** will **start**.

Option	Description
1= January	**DST** will **start** during the month of **January**
2= February	**DST** will **start** during the month of **February**
3=March (Default)	**DST** will **start** during the month of **March**
4= April	**DST** will **start** during the month of **April**
5= May	**DST** will **start** during the month of **May**
6= June	**DST** will **start** during the month of **June**
7= July	**DST** will **start** during the month of **July**
8= August	**DST** will **start** during the month of **August**
9= September	**DST** will **start** during the month of **September**
10= October	**DST** will **start** during the month of **October**
11= November	**DST** will **start** during the month of **November**
12= December	**DST** will **start** during the month of **December**

P976 DST End Time

This parameter is used to set the **time** of day at which **Daylight Saving Time** will **end**, the time is entered in the format HH: MM (24-hour format). **Default = 02:00.**

P977 End Day

Use this parameter to enter the **day** of the week (**P974**) that **Daylight Saving Time** is to **end**.

Option	Description
2= Monday	**DST** will **end** on a **Monday**
3= Tuesday	**DST** will **end** on a **Tuesday**
4= Wednesday	**DST** will **end** on a **Wednesday**
5= Thursday	**DST** will **end** on a **Thursday**
6= Friday	**DST** will **end** on a **Friday**
7= Saturday	**DST** will **end** on a **Saturday**
8= Sunday (Default)	**DST** will **end** on a **Sunday**

P978 End Week

This parameter will determine the **week** of the month (**P975**) in which **Daylight Saving Time** is to **end**.

Option	Description
1= Week 1	**DST** will **end** on **day** (**P977**) in the **first** week (**P978**) of the **month** (**P979**).
2= Week 2	**DST** will **end** on **day** (**P977**) in the **second** week (**P978**) of the **month** (**P979**).
3= Week 3	**DST** will **end** on **day** (**P977**) in the **third** week (**P978**) of the **month** (**P979**).
4= Week 4	**DST** will **end** on **day** (**P977**) in the **fourth** week (**P978**) of the **month** (**P979**).
5= Last (Default)	**DST** will **end** on **day** (**P977**) in the **last** week (**P978**) of the **month** (**P979**).

P979 End Month

This parameter is used to select the **month**, in which **Daylight Saving Time** will **end**.

Option	Description
1= January	**DST** will **end** during the month of **January**
2= February	**DST** will **end** during the month of **February**
3= March	**DST** will **end** during the month of **March**
4= April	**DST** will **end** during the month of **April**
5= May	**DST** will **end** during the month of **May**
6= June	**DST** will **end** during the month of **June**
7= July	**DST** will **end** during the month of **July**
8= August	**DST** will **end** during the month of **August**
9= September	**DST** will **end** during the month of **September**
10= October (Default)	**DST** will **end** during the month of **October**
11= November	**DST** will **end** during the month of **November**
12= December	**DST** will **end** during the month of **December**

Device Comm.

RS232 Set Up

P061 Comms Baud

This parameter is used to set the speed (Baud Rate) of the RS232 communications and can be changed to suit the connecting device. **Default = 19200**

Modbus or Profibus RS485 Setup

Please refer to the relevant communications manual for availability of parameters and details of options.

Test Parameters

Simulation

P980 Simulate

Test mode is used to simulate the application and confirm that all parameters and relay setpoints have been entered as expected. During simulation, there is a choice of whether the relays will change state (hard simulation) or not (soft simulation), but the LED's will always change colour as programmed, and the current output will change. If you want to test the logic of the system that the relays are connected to then select a hard simulation, but if you don't want to change the relay state, then select a soft simulation.

There are two simulation modes, **automatic** and **manual**. Automatic simulation will move the level up and down between empty level or the pre-determined **Start Level (P983)** and Control relay switch points, if you wish to change the direction of the level movement e.g. to go beyond relay setpoints, this can be done by using the arrow keys. In manual simulation, using the arrow keys will allow you to move the level up and down as required.

The choices for you to enter are as follows.

1= Manual soft simulation
2= Automatic soft simulation
3= Manual hard simulation
4= Automatic hard simulation

To return to program mode, press CANCEL and test mode will end.

P981 Increment

By **default**, simulation mode will move by **0.1m** steps in manual simulation and by 0.1m/min in automatic simulation. Altering the increment can change this value.

P982 Rate

In automatic mode, the rate at which the level will move up and down is determined by distance, **P981 Increment** and the time, **P982 Rate** which by **default** is set to **1min** and can be changed as required. To increase the rate at which the level moves increase the **Increment (P981)** or decrease the **Rate (P982)**. To decrease the rate at which the level moves decrease the **Increment (P981)** or increase the **Rate (P982)**.

P983 Start Level

When using automatic simulation this parameter can be used to pre-determine the point at which the simulated level will start at and return to. This can be used to simulate the lowest point to which the level would normally operate.

Hardware

P990 Self Test

If you enter 1 for this parameter, then the unit will perform a self-test. This will confirm that the various parts of the circuitry are working correctly. You will see confirmation messages that the clock and the EEPROM are working correctly, and error messages for any parts that fail.

P991 Hard Test

When this parameter is selected, the unit will test the following in turn.

- **LED's**. Watch them change colour as shown on the display, and press ENTER if they operated as shown.

- **Relays**. Press a numeric key corresponding to the number of the relay you wish to test, and the relay will change state each time the key is pressed. If you press any other key other than a valid relay number then the test will end.

- **Keys**. You should press each key, to confirm it works, with a counter showing how many more keys you have to press. Be sure to press the **CANCEL** key last, as this will show if all keys were pressed or not. If they were not, then an error message is displayed.

P992/P993 mA Out 1/2 Test

These parameters will allow you to force a specified current on the mA output to test the equipment that it is connected to and to make sure the unit is working correctly. The figure you enter will be generated by the mA output after pressing the enter key to accept.

P995/P996 Sensor 1/2 Test

If you enter 1 for either of these parameters it will continually fire the sensor, for 1000 pings, so you can check the wiring. You can cancel at any time during the test by pressing any key.

P997 Keys Test

You should press each key, to confirm it works, with a counter showing how many more keys you have to press. Press the **CANCEL** key last, as this will confirm if all keys were pressed or not. If they were not, then an error message is displayed.

P998 Relays Test

Press a numeric key corresponding to the number of the relay you wish to test, and the relay will change state each time the key is pressed. If you press any other key other than a valid relay number then the test will end.

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Chapter 6 Troubleshooting

This section describes many common symptoms, with suggestions as to what to do.

Symptom	What to Do
Display blank, sensor not firing.	Check power supply, voltage selector switch and fuse.
Status shows "Xdr Fault"	There is a fault with the sensor wiring, so check wiring to sensor.
Incorrect reading being displayed for current level on a dB sensor.	Check the trace screen for the relevant sensor. If there is an obstruction in front of the true echo then enter Program Mode and directly access P21 (Set Distance) for xdr1 or P1021 for xdr2. Type in the distance of the true echo and press ENTER. Press ENTER again when prompted, wait until 'Operation successful' is displayed and return to Run Mode, the display should now update to correct reading.
Material level is consistently incorrect by the same amount.	Check empty level, (P105) display offset, (P802) and measurement offset (P851).
LED's change colour at relevant relay switch points but relays do not change state.	Check supply to unit and ensure voltage selector set to correct position.
Main display shows "Wiper Fault"	There is a fault with the wiper. Check sensor wiring (incl. motor terminal). Use the hotkey (F5) to initiate a manual wiper sweep. If the message is still present then there is a problem with the wiper or motor. Remove the sensor from the application, remove any fouling and attempt a manual sweep once more. If there is still a fault, consult NIVUS.

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Parameter Record

For parameters common to both sensors, the parameter number should be added to by 1000 to give point 2 (P1 and P2 columns are provided in relevant tables below, P* represents a universal parameter).

APPLICATION

Distances

Parameter Details		Entered Values						
No.	Description	Default	Date	P1	P2	Date	P1	P2
P100	Mode	1 = Dist.						
P101	Xducer	2 = VT						
P102	Material	2 = Primary						
P115	Tank Depth	10.000m						
P116	Sensor Depth	0.200m						
P105	Empty Level	10.000m						
P106	Span	9.500m						
P107	Near Blanking	0.300m						
P108	Far Blanking	20.0%						

System Units

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P104	Measurement Units	1=metres					

RELAYS

Relay 1

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P210	R1 Type	0 = Off					
P211	R1 Function	0 = Off					
P212	R1 Alarm ID	1 = Off					
P213	R1 Set 1	0.000 metres					
P214	R1 Set 2	0.000 metres					
P216	R1 Allocation	1					
P217	R1 Closures	0					
P218	R1 Fail Safe	0					

Relay 2

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P220	R2 Type	0 = Off					
P221	R2 Function	0 = Off					
P222	R2 Alarm ID	1 = Off					
P223	R2 Set 1	0.000 metres					
P224	R2 Set 2	0.000 metres					
P226	R2 Allocation	1					
P227	R2 Closures	0					
P228	R2 Fail Safe	0					

Relay 3

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P230	R3 Type	0 = Off					
P231	R3 Function	0 = Off					
P232	R3Alarm ID	1 = Off					
P233	R3 Set 1	0.000 metres					
P234	R3 Set 2	0.000 metres					
P236	R3 Allocation	1					
P237	R3 Closures	0					
P238	R3 Fail Safe	0					

Relay 4

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P240	R4 Type	0 = Off					
P241	R4 Function	0 = Off					
P242	R4 Alarm ID	1 = Off					
P243	R4 Set 1	0.000 metres					
P244	R4 Set 2	0.000 metres					
P246	R4 Allocation	1					
P247	R4 Closures	0					
P248	R4 Fail Safe	0					

Relay 5

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P250	R5 Type	0 = Off					
P251	R5 Function	0 = Off					
P252	R5Alarm ID	1 = Off					
P253	R5 Set 1	0.000 metres					
P254	R5 Set 2	0.000 metres					
P256	R5 Allocation	1					
P257	R5 Closures	0					
P258	R5 Fail Safe	0					

Relay 6

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P260	R5 Type	0 = Off					
P261	R5 Function	0 = Off					
P262	R5Alarm ID	1 = Off					
P263	R5 Set 1	0.000 metres					
P264	R5 Set 2	0.000 metres					
P266	R5 Allocation	1					
P267	R5 Closures	0					
P268	R5 Fail Safe	0					

DATA LOGS

Temperature

Parameter Details		Entered Values						
No.	Description	Default	Date	P1	P2	Date	P1	P2
P580	Minimum Temperature	Read Only						
P581	Min Temperature Date	Read Only						
P582	Min Temperature Time	Read Only						
P583	Maximum Temperature	Read Only						
P584	Max Temperature Date	Read Only						
P585	Max Temperature Time	Read Only						
P586	Current Temperature	Read Only						

DISPLAY

Parameter Details		Entered Values						
No.	Description	Default	Date	P1	P2	Date	P1	P2
P800	Display Units	1=Measured						
P801	Decimal Places	2						
P802	Display Offset	0.000						
P804	Display Conversion	1.000						
P808	Failsafe Mode	1 = Known						
P809	Failsafe Time	2.0mins						

mA OUTPUT

mA Output 1

Parameter Details		Entered Values					
No.	Description	Default	Date	P1		Date	P1
P830	mA Out Range	2 = 4 - 20					
P831	mA Out Mode	0 = Default					
P834	Low Level	0.000 metres					
P835	High Level	9.500 metres					
P836	Low Limit	0.0 mA					
P837	High Limit	20.0 mA					
P838	Low Trim	0.0 mA					
P839	High Trim	0.0 mA					
P840	Fail Mode	0 = Default					
P841	Allocation	1 = Xducer 1					

mA Output 2

Parameter Details		Entered Values					
No.	Description	Default	Date	P2		Date	P2
P890	mA Out Range	2 = 4 - 20					
P891	mA Out Mode	0 = Default					
P892	Low Level	0.000 metres					
P893	High Level	6.000 metres					
P894	Low Limit	0.0 mA					
P895	High Limit	20.0 mA					
P896	Low Trim	0.0 mA					
P897	High Trim	0.0 mA					
P898	Fail Mode	0 = Default					
P899	Allocation	1 = Xducer 1					

COMPENSATION

Parameter Details		Entered Values						
No.	Description	Default	Date	P1	P2	Date	P1	P2
P851	Measurement Offset	0.0 mA						
P852	Temperature Source	1 =						
P854	Fixed Temperature	20.00°C						
P860	Sound Velocity	342.720						

STABILITY

Parameter Details		Entered Values						
No.	Description	Default	Date	P1	P2	Date	P1	P2
P870	Fill Damping	0.02						
P871	Empty Damping	0.02						
P881	Fixed Distance	0.20 metres						
P882	Process Filter	3 = Slow						
P883	Gate Expand	0.1m						

ECHO PROCESS

Xducer Status 1

Parameter Details		Entered Values						
No.	Description	Default	Date	P1		Date	P1	
P900	Xducer 1 Status	Read Only						
P901	Echo Confidence 1	Read Only						
P902	Echo Strength 1	Read Only						
P903	Average Noise 1	Read Only						
P904	Peak Noise 1	Read Only						
P905	Sensitivity	5dB						
P906	Side Clearance	0.050 metres						

Xducer Status 2

Parameter Details		Entered Values						
No.	Description	Default	Date		P2	Date		P2
P910	Xducer 2 Status	Read Only						
P911	Echo Confidence 2	Read Only						
P912	Echo Strength 2	Read Only						
P913	Average Noise 2	Read Only						
P914	Peak Noise 2	Read Only						
P915	Sensitivity	5dB						
P916	Side Clearance	0.050						

SYSTEM

Passcode

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P921	Enable Code	1 = Yes					
P922	Passcode	1997					

Backup

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P925	Parameter Backup	0 = No					

System Information

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P926	Software Revision	Read Only					
P927	Hardware Revision	Read Only					
P928	Serial Number	Read Only					
P929	Site Ident.	1					
P930	Factory Default	0 = No					

Date & Time

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P931	Date	Current Date					
P932	Time	Current Time					
P933	Date Format	1=DD:MM:Y					

LED Colours

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P935	Off Colour	3 = Yellow					
P936	Alarm Colour	1 = Red					
P938	Control Colour	2 = Green					
P939	Miscellaneous Colour	2 = Green					

Daylight Save

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P970	DST Enable	0					
P971	Difference	01:00					
P972	Start Time	02:00					
P973	Start Day	8					
P974	Start Week	5					
P975	Start Month	3					
P976	End Time	02:00					
P977	End Day	8					
P978	End Week	5					
P979	End Month	10					

DEVICE COMM SETUP **RS232**

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P061	Comms Baud	19200					

RS485 SETUP (OPTIONAL)

Modbus

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P130	Device Mode	0 = Off					
P131	Protocol	0 = Modbus RTU					
P132	Device Address	126					
P133	Device Baud	19200					
P134	Parity	2 = Even					
P135	Stop Bit	1 = One Stop					
P136	Data Format	0 = Unsigned Int					
P137	Delay in ms	10 milli seconds					

Profibus

Parameter Details		Entered Values					
No.	Description	Default	Date	P*		Date	P*
P132	Device Address	126					
P143	Addr. Locked	0 = No					

DE / EN / FR

EU Konformitätserklärung

EU Declaration of Conformity

Déclaration de conformité UE

NIVUS GmbH
Im Täle 2
75031 Eppingen

Telefon: +49 07262 9191-0
Telefax: +49 07262 9191-999
E-Mail: info@nivus.com
Internet: www.nivus.de

Für das folgend bezeichnete Erzeugnis:

For the following product:

Le produit désigné ci-dessous:

Bezeichnung:	**Messumformer NivuScope 2 zur kontinuierlichen Ultraschall-Trennschichtenerfassung mit Sensor**
Description:	*Measurement transmitter NivuScope 2 for continuous Ultrasonic Interface Detection with Sensor*
Désignation:	*Convertisseur de mesure NivuScope 2 pour l´acquistion en continu du niveau d´interface par ultrasons avec capteur*
Typ / Type:	**NS2020065Txx / NS20SENVTxx**

erklären wir in alleiniger Verantwortung, dass die auf dem Unionsmarkt ab dem Zeitpunkt der Unterzeichnung bereitgestellten Geräte die folgenden einschlägigen Harmonisierungsvorschriften der Union erfüllen:

we declare under our sole responsibility that the equipment made available on the Union market as of the date of signature of this document meets the standards of the following applicable Union harmonisation legislation:

nous déclarons, sous notre seule responsabilité, à la date de la présente signature, la conformité du produit pour le marché de l'Union, aux directives d'harmonisation de la législation au sein de l'Union:

- 2014/30/EU
- 2014/35/EU
- 2011/65/EU

Bei der Bewertung wurden folgende einschlägige harmonisierte Normen zugrunde gelegt bzw. wird die Konformität erklärt in Bezug auf die nachfolgend genannten anderen technischen Spezifikationen:

The evaluation assessed the following applicable harmonised standards or the conformity is declared in relation to other technical specifications listed below:

L'évaluation est effectuée à partir des normes harmonisées applicable ou la conformité est déclarée en relation aux autres spécifications techniques désignées ci-dessous:

- EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019
- EN 61326-1:2013

Diese Erklärung wird verantwortlich für den Hersteller:

This declaration is submitted on behalf of the manufacturer:

Le fabricant assume la responsabilité de cette déclaration:

NIVUS GmbH
Im Taele 2
75031 Eppingen
Germany

abgegeben durch / *represented by / faite par:*

Ingrid Steppe (Geschäftsführerin / *Managing Director / Directeur général)*

Eppingen, den 25.10.2022

Gez. *Ingrid Steppe*

UK Declaration of Conformity

NIVUS GmbH
Im Täle 2
75031 Eppingen

Telefon: +49 07262 9191-0
Telefax: +49 07262 9191-999
E-Mail: info@nivus.com
Internet: www.nivus.de

For the following product:

Description:	**Measurement transmitter NivuScope 2 for continuous Ultrasonic Interface Detection with Sensor**
Type:	**NS2020065Txx / NS20SENVTxx**

we declare under our sole responsibility that the equipment made available on the UK market as of the date of signature of this document meets the standards of the following applicable UK harmonisation legislation:

- SI 2016 / 1091 The Electromagnetic Compatibility Regulations 2016
- SI 2016 / 1101 The Electrical Equipment (Safety) Regulations 2016
- SI 2012 / 3032 The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

The evaluation assessed the following applicable harmonised standards or the conformity is declared in relation to other technical specifications listed below:

- BS EN 61326-1:2013
- BS EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019

This declaration is submitted on behalf of the manufacturer:

NIVUS GmbH
Im Taele 2
75031 Eppingen
Germany

represented by:
Ingrid Steppe (Managing Director)

Eppingen, 25/10/2022

Signed by *Ingrid Steppe*