TELEDYNE VALEPORT
Everywhereyoulook™

pH Operating Manual

Intelligent pH Instrument

Document No. 0920815

Version 1.0

In collaboration with

ANB Sensors

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Revision History

The information within this manual is subject to change without notice. The company shall not be held liable for errors or omissions in this manual or for incidental or consequential damages.

For the most up to date version of this manual please consult Products - Valeport

Version	Date	Description
1.0	May 2025	New operating manual for the pH Sensor

Feedback

We welcome your feedback to help us continuously improve our products and supporting documentation. If you encounter any errors, omissions or unclear sections please reach out to us. Your input is highly valued and appreciated.

Preface

This manual is designed to give detailed information regarding the setup, operation maintenance of the Teledyne Valeport pH sensor. If you need additional information or clarification, please contact our Support Team at Valeport-Support@Teledyne.com.

Safety **clarification,** read this manual before setting up and operating this equipment. Pay attention to all safety notices. Failure to do so could result in injury to the operator or damage to equipment. Do not use the equipment in any way other than specified in this manual.

Note:	Indicates additional highlighted information
⚠ **Caution:**	Indicates a potentially hazardous situation that may result in a minor or moderate injury or damage to equipment.
Warning:	Indicates a possibly imminent hazardous situation that could result in serious injury or death.

Interactive Document

This document has links to make it quicker and easier to navigate. Clicking elements of the contents, section tabs, buttons (previous, contents and next), website URLs and other references will take you automatically to those locations. For best results use the free software Adobe Reader.

Abbreviations

Abbreviation	Definition
12 V	V represents voltage
ASCII	American Standard Code for Information Interchange
ASV	Autonomous Surface Vehicle
CE	French phrase 'Conformité Européene' meaning 'European Conformity' the product complies with relevant European health, safety and environmental protection legislation
DC	Direct Current
EU	European Union
FAQ	Frequently Asked Questions
GND	Ground (Electronics)
mA	Milliamp
MCBH6F	SubConn Micro Circular 6 Female
MCIL6M	SubConn Micro Circular Inline 6 Male
NMEA	Marine communication standard, controlled by the National Marine Electronics Association
pH	Parts Hydrogen, unit for pH measurement
PPT	Parts Per Trillian, unit of measurement for salinity
ROV	Remotely Operated Vehicle
Rx	Receiver, electronics
RS232	Recommended Standard 232 serial communication
RS485	Recommended Standard 485 serial communication
Tx	Transmit, electronics
UK	United Kingdom
UKCA	United Kingdom Conformity Assessed
USB	Universal Serial Bus
USV	Uncrewed Surface Vehicle

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1. Introduction

The Teledyne Valeport pH sensor provides a reliable and robust option for long-term measurement of pH within rivers, estuaries and oceans. The sensor, with titanium housing as standard, utilises ANB Sensors patented calibration-free technology. This novel approach to measuring pH involves solid-state ion selective electrodes, which are proven to be more robust than conventional pH measurement techniques (such as glass electrodes).

The electrodes can provide continuous measurements for ~10,000 readings, after which point the sensor requires minor on-site intervention, before redeploying. Please see section 6.2 for a selection of deployment scenarios. More information on the abrasion process is described in Section 5.

Currently rated to a depth of 1250 m, the Teledyne Valeport pH sensor is ideal for deploying on a multitude of platforms, including USVs/ASVs, ROVs, fixed monitoring platforms or temporary stations. Available in a variety of data outputs and formats (including ASCII and Modbus) with configurable sampling modes, the Teledyne Valeport pH sensor provides versatility for any application.

Figure 1-1 Side (left) and front (right) views of the Teledyne Valeport pH sensor.

Caution:

- Touching the recessed reference electrodes of the sensor face can lead to irreparable sensor damage. See Figure 2-3.
- Ensure the pH sensor is submerged within water/seawater before applying power to the unit.

Future versions of the instrument/firmware will facilitate additional functionality – please contact Valeport-Support@Teledyne.com for further information.

The instrument has been developed for configuration using Teledyne Valeport Configure software and utilising a terminal programme, such as Teledyne Valeport Terminal X2 or other 3rd party terminals.

The sensing technology has complementary sensors which are able to measure conductivity and water temperature, providing a multi-parameter sensor in a compact package. The resolution of the temperature and conductivity measurements are low and should only be used as indicative, however.

Before deploying your pH sensor, please first check all sections of this manual, performing the test and checks presented in Section 3.1.

2. Overview

2.1 What's in the box?

Figure 2-1 Teledyne Valeport pH transit case contents.

2.2 Materials

Table 2-1 pH Sensor Materials

Housing & Bulkhead:	Titanium
Thread protector:	Acetal
Connector:	SubConn type MCBH6F (titanium)
Weight:	<1 kg (in air)

2.3 Dimensions

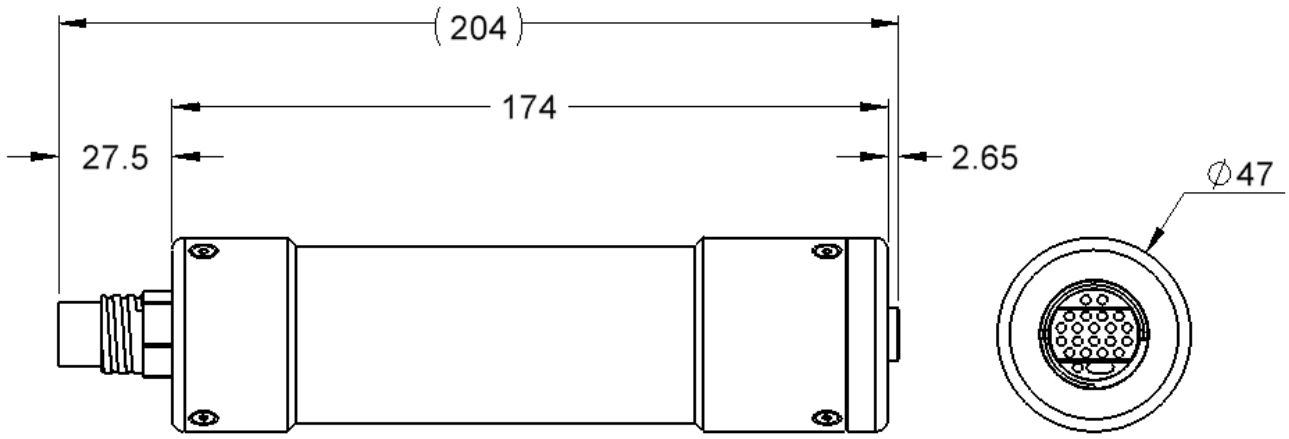


Figure 2-2 Teledyne Valeport pH dimensions in mm

2.4 Sensors

The pH instrument is fitted with the following sensors:

- ANB Sensors solid-state, calibration-free, electrochemical pH sensor.

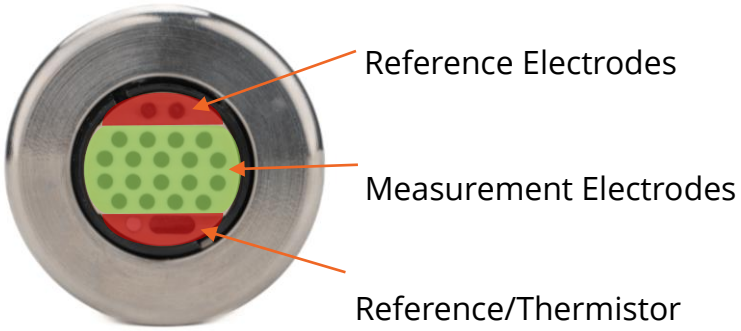


Figure 2-3 Teledyne Valeport pH sensor transducer showing electrode layout.
Note the recessed reference electrodes (red shaded) – these should not be touched or abraded.

Table 2-2 pH Sensor Specification

Type:	Solid-state electrochemical	
Range:	0.025-40 PPT (salinity)	2-10 (pH)
Resolution:	0.01 pH	
Accuracy:	±0.2 pH	
Response Time:	217 second minimum, dependent on deployment conditions	

2.4.1 Complementary Sensors

The pH sensor also has some complementary sensors including temperature and conductivity and therefore the ability to calculate salinity. The temperature sensor is accurate to 0.1°C, however the conductivity and salinity are low resolution sensors and should only be used for indicative measurement.

2.5 Electronic Specification

2.5.1 Power

Table 2-3 Electronic Specification

Power Source	External Supply Only
Input Range	9 – 28 V DC (isolated)
Consumption	Less than 0.4 W (32 mA @ 12 V DC)

2.5.2 Output

Table 2-4 Output Communication

Output	RS232, RS485, Modbus RTU
Baud Rate	2400 – 230400 (default 115200)
Data Bits	8
Parity	None
Stop bits	1
Flow control	None

Units are fitted with both RS232 and RS485 communications as standard.

RS485 is enabled by grounding a pin in the communications lead, see Section 2.6.2. Protocol is 8 data bits, 1 stop bit, no parity, no flow control.

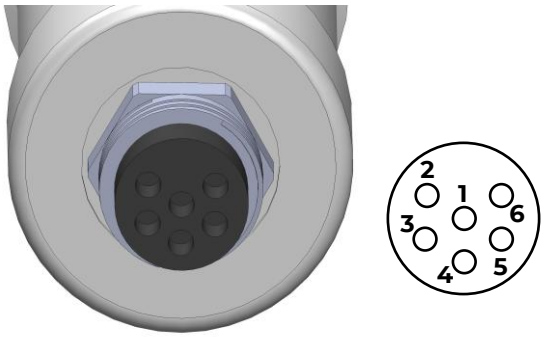
📝 **Note** - Fast data rates may not be possible with low baud rates

2.6 Wiring

⚠️ **Caution** - wiring colours are correct at the time the manual was printed. However, it is advised that continuity checks are performed prior to all terminations.

2.6.1 pH Sensor main bulkhead connector

Table 2-5 pH Sensor Bulkhead connector wiring

SubConn 6 pin female (MCBH6F)		
Pin	**Function**	**View (instrument connector)**
1	RS232 GND	
2	RS232 Tx (Out of sensor) or RS485A(-)	
3	RS232 Rx (In to sensor) or RS485B(+)	
4	Sensor Power +V	
5	Enable RS485	
6	Sensor Power -V	

Systems are supplied with a short (50cm) USB interface Y lead for testing. See Table 2-6 for wiring details.

2.6.2 USB interface Y Lead

Table 2-6 USB Interface Y lead Wiring

SubConn 6 pin male line (MCIL6M)		USB/4 mm Banana
Pin	**Function**	**Pin**
1	RS232 GND	USB
2	RS232 Tx (Out of sensor) or RS485A	
3	RS232 Rx (Into sensor) or RS485B	
4	Power +V	Red Banana Plug
5	Link to Pin 1 for RS485. N/C for RS232	
6	Power -V	Black Banana Plug

3. Operation

3.1 Getting Started

The pH Sensor is compatible with Teledyne Valeport Configure software, for initial/inter-deployment configuration changes, but can also be interfaced using Datalog X2 and Terminal X2 (plus third-party terminal programmes).

Teledyne Valeport Configure, DataLog X2 and Terminal X2 can be downloaded from Valeport - Software (valeport.download), but are also available on the USB supplied with the instrument.

To setup communications with the pH Sensor:

3.1.1 Prepare seawater solution

1. Take 1 x pot of Instant Ocean (supplied with the instrument) and mix with 500 ml of tap water (or ideally deionised water) within a suitably sized vessel.
2. Ensure salts are completely dissolved before submerging the pH sensor face.
3. Ensure the sensor face is submerged within the saltwater solution before plugging the USB into your computer/laptop or applying power to the unit. We would recommend using a clamp for positioning the sensor within the salt-water solution, if available.

Please note that if using tap water, the pH reading will vary based on geographical location but should be in the region of 6-8.5 (due to the variability of tap water pH). If you have access to deionised water, a pH around 8 would be expected.

3.1.2 Communicating with the sensor

⚠ **Caution** - Ensure the pH sensor face is submerged within water/seawater before applying power to the unit.

1. When placing the sensor face into the seawater solution, jiggle the sensor to remove any air bubbles at the sensor face, or tilt the sensor slightly to allow any air bubbles to disperse.
2. Connect the USB interface Y-lead to the computer via the USB A connector and to the pH instrument via the 6 pin SubConn.
3. Open Teledyne Valeport Configure. Select the relevant COM port, baud rate (the sensor is set to 115200 baud as standard), and 'pH' from the instrument drop-down.

   Further instructions are available within Section 4.

3.2 Data Requests and Output Formats

Control of the pH Sensor is achieved via use of Teledyne Valeport Configure Software (Section 4) or by using '# codes' as described in this section.

📝 **Note** - All commands must be 'sent' by pressing the enter key on the keyboard, not the smaller number pad entry key. The large key sends two instructions – 'carriage return' (<CR>) and 'Line Feed' (<LF>). The pH Sensor needs both these instructions to terminate a command. The smaller entry on the keypad only sends the <CR> instruction.

3.2.1 Start/Stop

When power is applied to the pH Sensor, it will immediately begin to operate according to the settings already programmed. The most basic level of Stop/Start control can be achieved by switching the power on and off.

Table 3-1 Start/Stop Commands

Command	Notes
#	When the instrument is running, the pH Sensor may be put into set up mode at any time by typing the '#' character. The device will respond with a command prompt '>' and wait the next instruction. 📝 Note: that there is a 'watchdog' function here – if the unit is interrupted with the '#' character, and no further command is received for a period of 5 minutes, the sensor will automatically begin sampling data using the existing settings.
#028	Starts sampling from set up mode, or takes a single reading if unit is in 'Single' sampling mode.

3.2.2 Communications Setup

Communication settings can either be changed using Configure or by # commands in Terminal X2 or a third-party terminal program.

Table 3-2 Communication Commands

Command	Notes
#019;{baud rate]	Sets the sensor baud rate as required. Available baud rates are: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200.
Example	#019;9600
#702;nn	Sets the sensor Modbus RTU address to any number from 01 to 99 (not including 35)
#703	Reads the pH sensor address.
#700;[ON/OFF];[PARITY]	Turns the pH Sensor Modbus RTU address mode on (or OFF), and selects if even parity is used.
#701	Reads the pH sensor Modbus address and parity settings.

3.2.3 Data Output Formats

3.2.3.1 Teledyne Valeport Format

$PVPH1,8.067,20.90,100.0,100.0,1,1*2D

Field Number	Description	Type	Units	Description
1	NMEA Header	Ascii	-	Teledyne Valeport $PVPH1 string header
2	pH value	Float	pH	Measured pH value. Format = x.xxx
3	Temperature value	Float	Deg C	Measured temperature value. Format = x.xx
4	Conductivity value	Float	Ppm	Measured conductivity value. Format = x.x
5	Salinity value	Float	Ppm	Measured salinity value. Format = x.x
6	Sensor status	Unsigned char		0=Transducer performing well 1=Transducer will require abrasion soon 2=Transducer needs abrasion 3=Transducer needs replacing - please contact Teledyne Valeport Service 4=Transducer out of water 5=iref failed - please wait 6=No valid pH reading - please wait
7	Immersed	Unsigned char		
8	Checksum			End of message. Format = *xx

3.2.4 Information #codes

The following commands will cause the sensor to report back various pieces of information, as described:

Table 3-3 Instrument Information Codes

Command	Notes
#014	Firmware version number
#003	Instrument serial number
#006	Date of last calibration
#209	Driver name
#211	Driver sub name
#213	Driver serial number

If contacting the Support team, you may be asked to provide these settings.

3.2.5 Modbus Register Lookup Table

# Code	followed by	Description	Type	Modbus Register Hex	Modbus Register Dec	Number of Modbus 2 byte registers	Reply timing @ 19200 Baud (in ms)
#003	<CR><LF>	Reads the serial number for the instrument	F_ULONG	0x0000	0	2	<40
#006	<CR><LF>	Date of last calibration	F_UCHAR	0x0034	52	1.5	<40
#014	<CR><LF>	Reads the firmware version of the instrument	F_ASCII	0x000C	12	17.5	<40
#019	;baud_rate<CR><LF>	Set Baud rate. 2400,4800,9600,19200,115200 or 230400	F_ULONG	0x002F	47	2	<40
#028	<CR><LF>	Place unit into run mode	F_CHAR	0x0033	51	0.5	<40
#042	;cycle_time<CR><LF>	Set the time in seconds between samples. 14400 is 4 hours.	F_USHORT	0x0056	86	1	<40
#043	<CR><LF>	Read time in seconds between samples.	F_USHORT	0x0056	86	1	<40
#051	;Power_driver<CR><LF>	Sets the driver power. 0 = off, 1 = on	F_UCHAR	0x00DF	223	0.5	<40
#052	<CR><LF>	Reads the driver power. 0 = off, 1 = on	F_UCHAR	0x00DF	223	0.5	<40

# Code	followed by	Description	Type	Modbus Register Hex	Modbus Register Dec	Number of Modbus 2 byte registers	Reply timing @ 19200 Baud (in ms)
#053	;cycle_type<CR><LF>	Set if a long cycle period is being used. If period is > 1 hour, set to 1. If < 1 hour, set to 0.	F_UCHA	0x00E0	224	0.5	<40
#054	<CR><LF>	Reads if long cycle period is being used.	F_UCHAR	0x00E0	224	0.5	<40
#055	<CR><LF>	Reads new sensor status	F_UCHAR	0x00B6	182	0.5	<40
#088	<CR><LF>	Reads the temperature calibration from NV and not the driver.	F_FLOAT	0x00C8	200	6	<40
#205	<CR><LF>	Reads sensor mode.	F_UCHAR	0x005B	91	0.5	<40
#207	<CR><LF>	Reads scan type.	F_UCHAR	0x005C	92	0.5	<40
#209	<CR><LF>	Reads the driver name.	F_ASCII	0x005D	93	8.5	<40
#211	<CR><LF>	Reads the driver sub name.	F_ASCII	0x006E	110	8.5	<40
#213	<CR><LF>	Reads the driver serial number.	F_ULONG	0x007F	127	2	<40
#217	<CR><LF>	Reads the number of electrodes to scan to produce a pH value.	F_UCHAR	0x00A3	163	0.5	<40
#218	<CR><LF>	Reads the status of each electrode.	F_UCHAR	0x00A4	164	7	<40
#219	<CR><LF>	Reads the overall sensor status.	F_CHAR	0x00B2	178	0.5	<40

# Code	followed by	Description	Type	Modbus Register Hex	Modbus Register Dec	Number of Modbus 2 byte registers	Reply timing @ 19200 Baud (in ms)
#220	<CR><LF>	Reads the driver firmware version.	F_ASCII	0x00B7	183	8.5	<40
#352	;enable_hash_on_modbus<CR><LF>	Enabled this prevents use of 35 as a modbus address. Allows instrument to be interrupted with #	F_UCHAR	0x003E	62	0.5	<40
#353	<CR><LF>	Reads if # on modbus enabled.	F_UCHAR	0x003E	62	0.5	<40
#701	<CR><LF>	Reads modbus mode and parity.	F_UCHAR	0x003B	59	1	<40
#702	;modbus_address <CR><LF>	Sets modbus address.	F_UCHAR	0x003D	61	0.5	<40
#703	<CR><LF>	Reads modbus address.	F_UCHAR	0x003D	61	0.5	<40

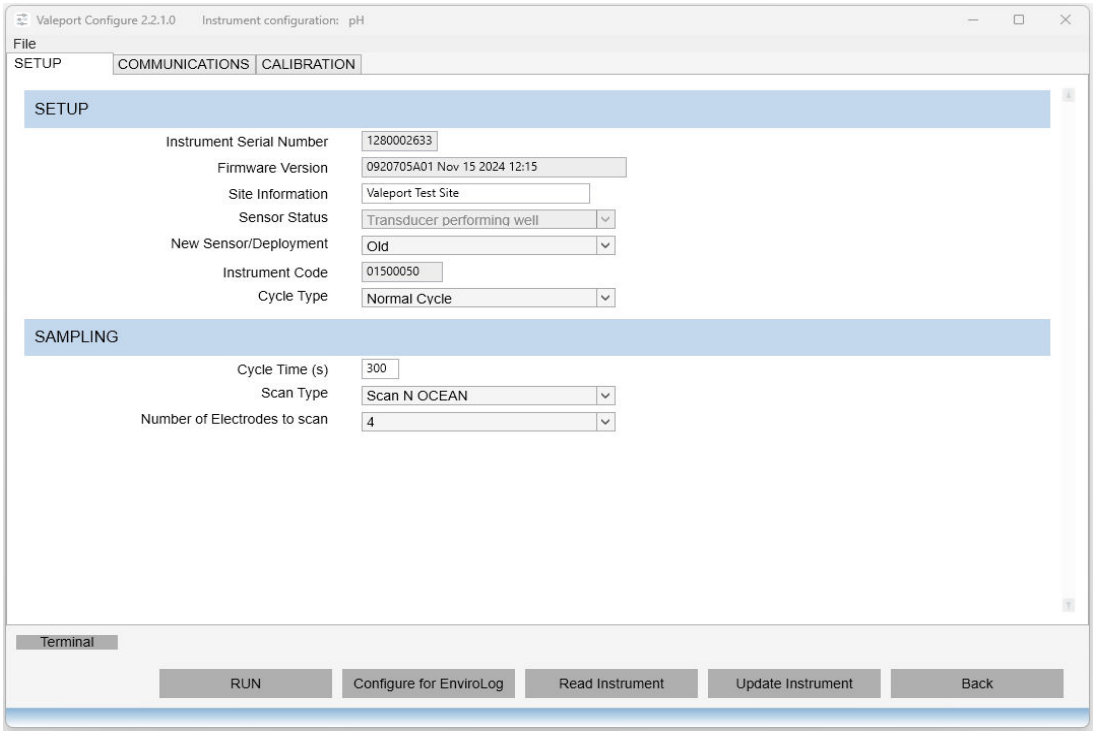
4. Software

The pH Sensor is fully compatible with Teledyne Valeport Configure, DataLog X2 and Terminal X2. These can be downloaded from Software - Valeport (valeport.download).

4.1 First use

Connect to the sensor using Teledyne Valeport Configure. Select 'pH' from the instrument drop down tab. If you don't see pH as an option, go into Settings to download the pH configuration file. Select the appropriate COM port and baud rate – the instrument is set to 115200 baud as standard.

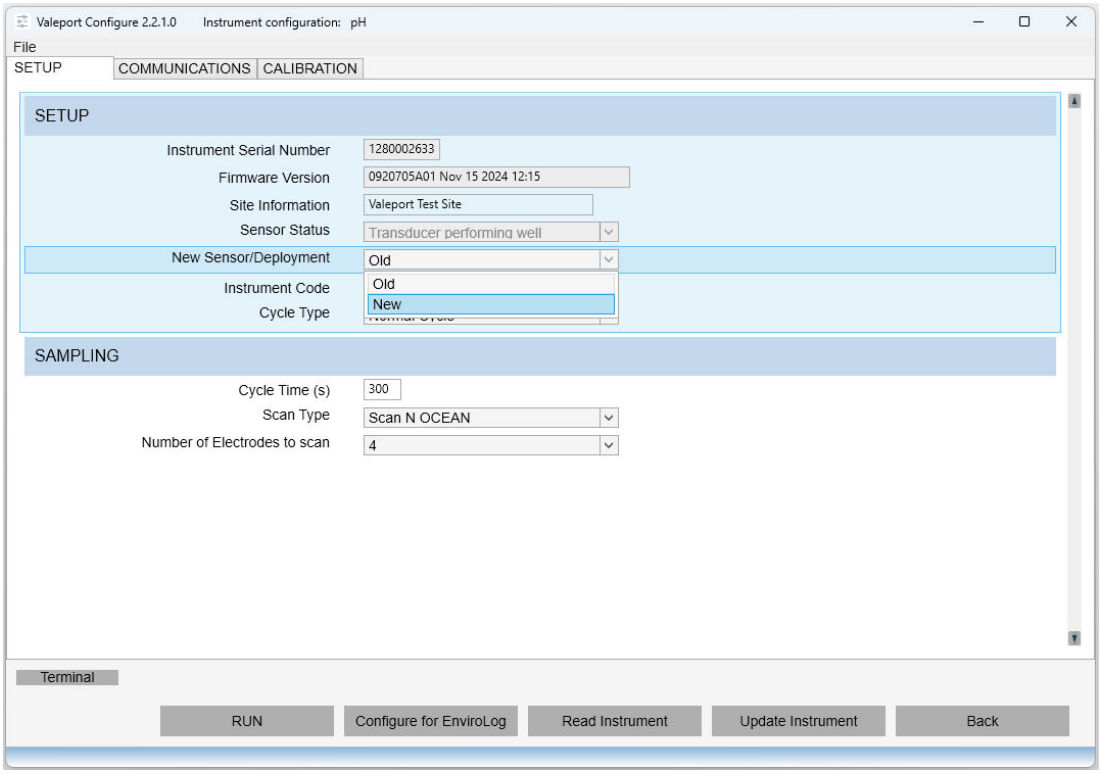
Select 'Read Instrument'.



Pre-set information for the sensor will populate the tabs.

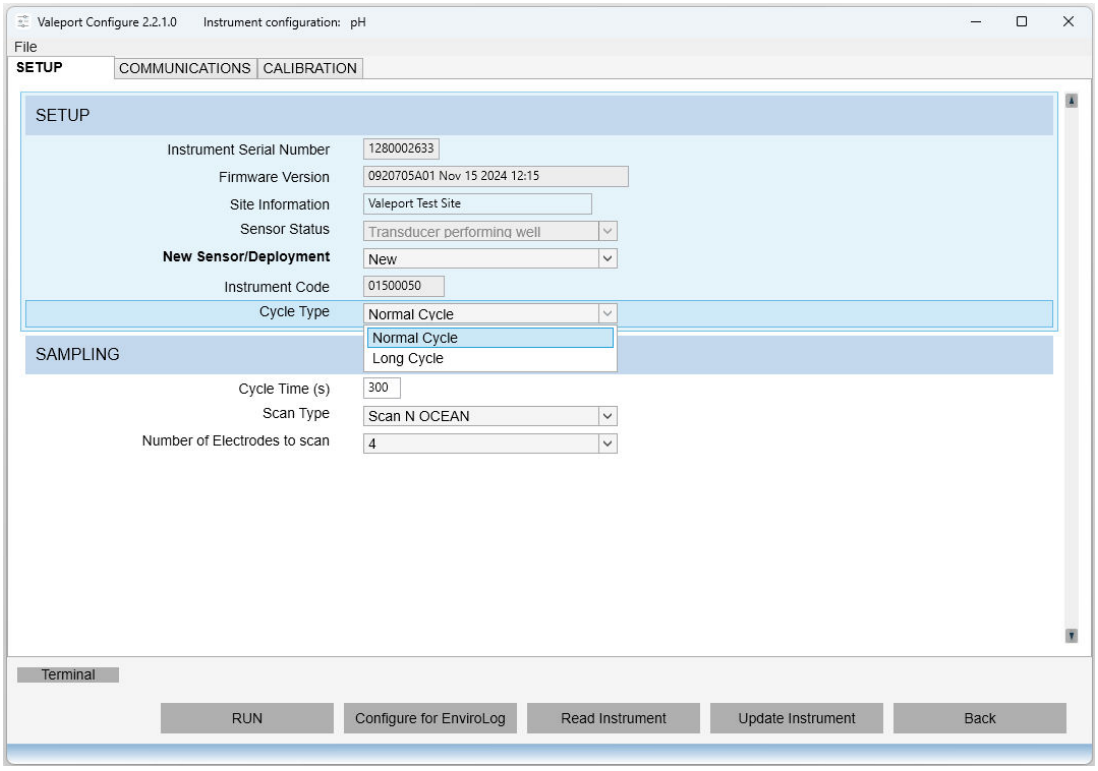
Setup Tab

For the first use and for subsequent uses after the sensor head has been abraded, or if you are using the instrument after storage, select 'New Deployment' from the New Sensor/Deployment drop down.



Next, select the appropriate option within the 'Cycle Type' drop down:

- Normal Cycle = more than 1 reading per hour (i.e. 1 reading every 10 minutes, 30 minutes, 1 hour, etc)
- Long Cycle = less than 1 reading per hour (i.e. 1 reading per 6 hours, per day, etc).



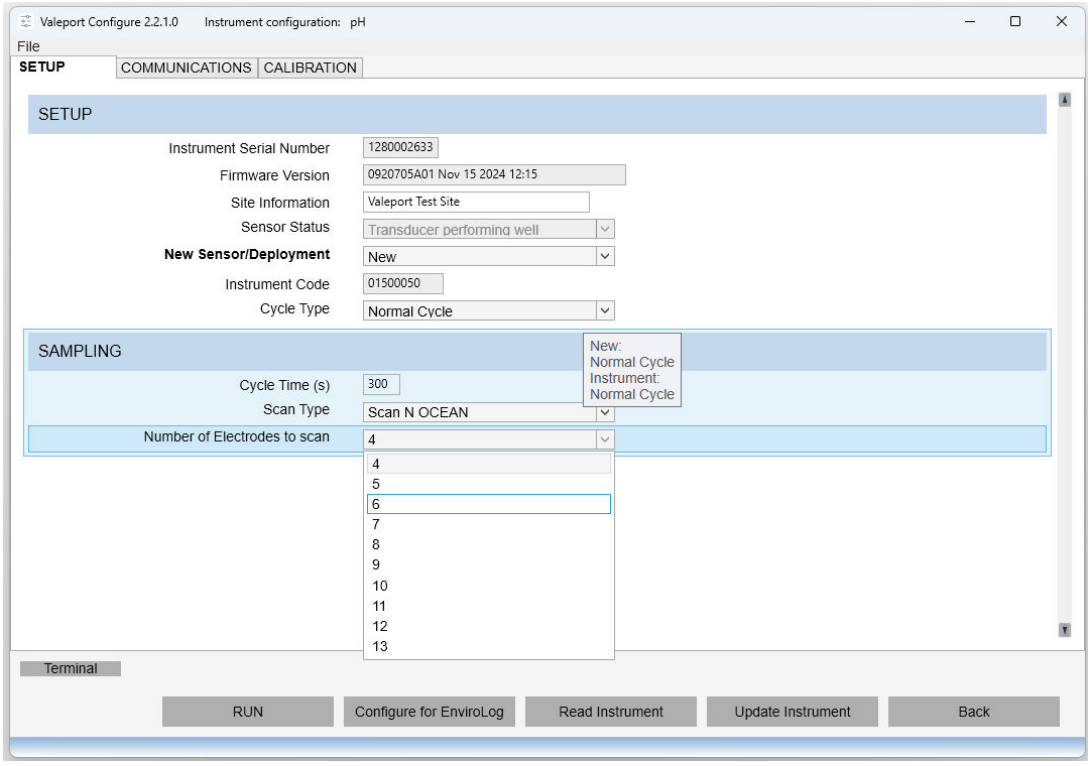
Within ‘Sampling’, enter the Cycle Time in seconds.

For example:

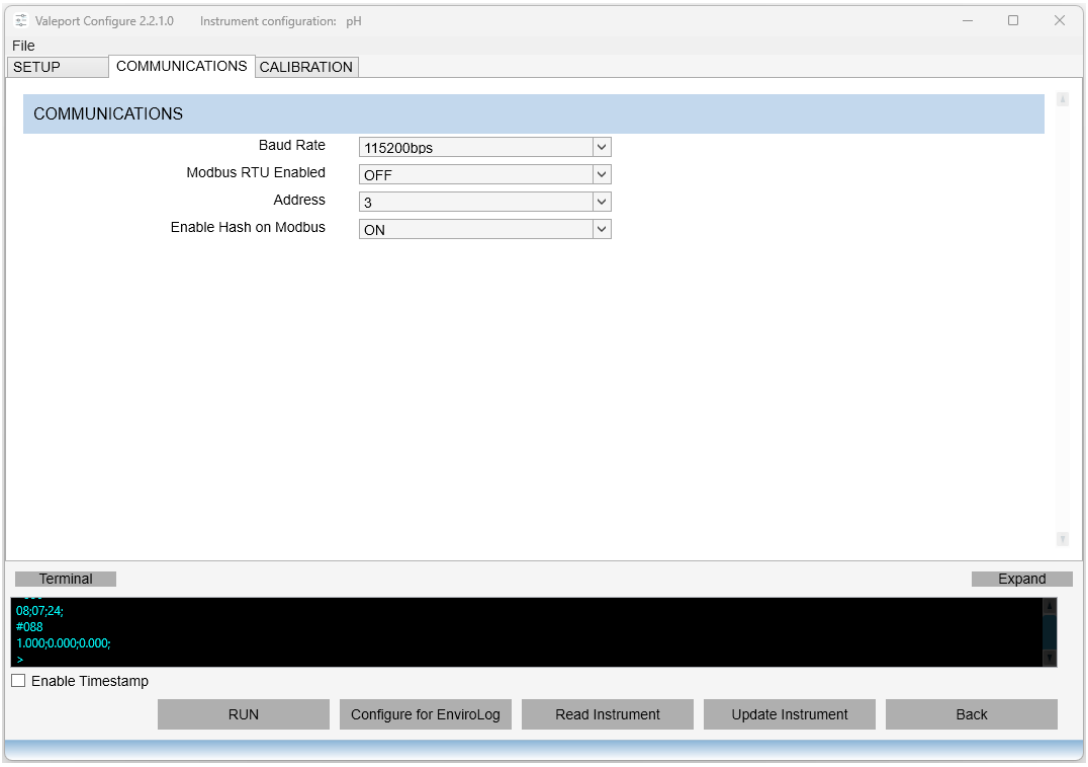
5 minutes	300 seconds
15 minutes	900 seconds
1 hour	3600 seconds
6 hours	21600 seconds

Select the Scan Type (n.b. at present the only option is ‘Scan N Ocean’, future firmware versions may allow additional scan types).

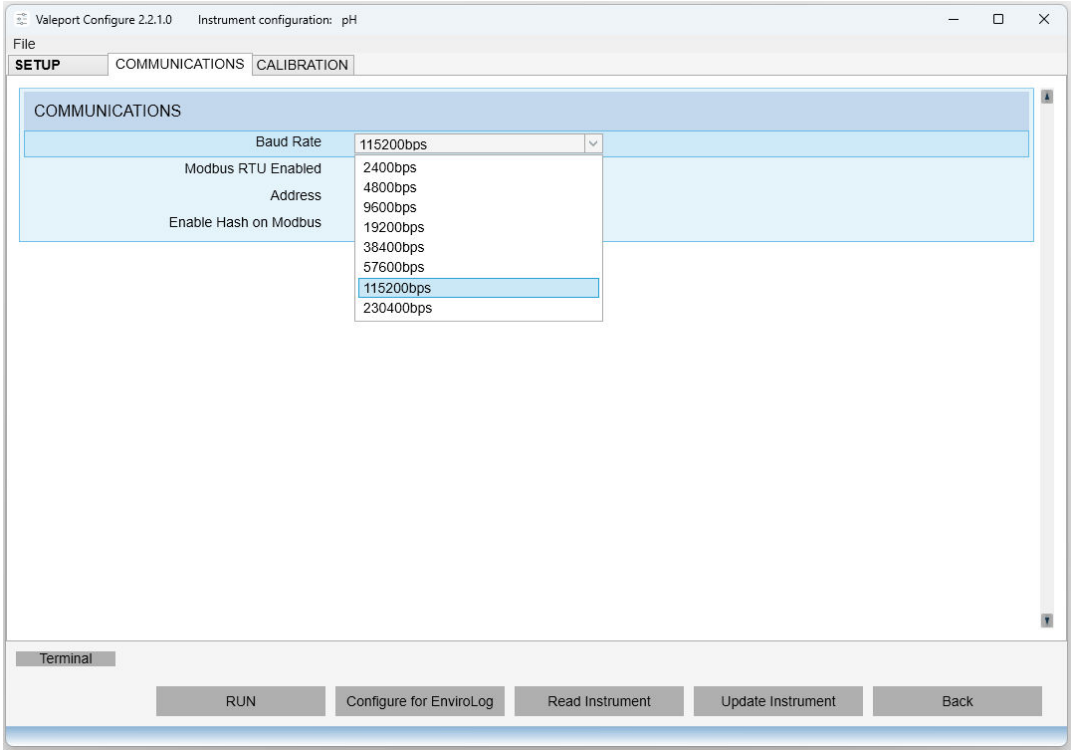
Select the number of electrodes to scan – a minimum of 4 electrodes can be used, up to a maximum of 13. Using fewer electrodes extends the time between abrasion, whereas using a higher number of electrodes will cause the sensor to require abrasion more frequently. Please take this into consideration when planning your deployment.



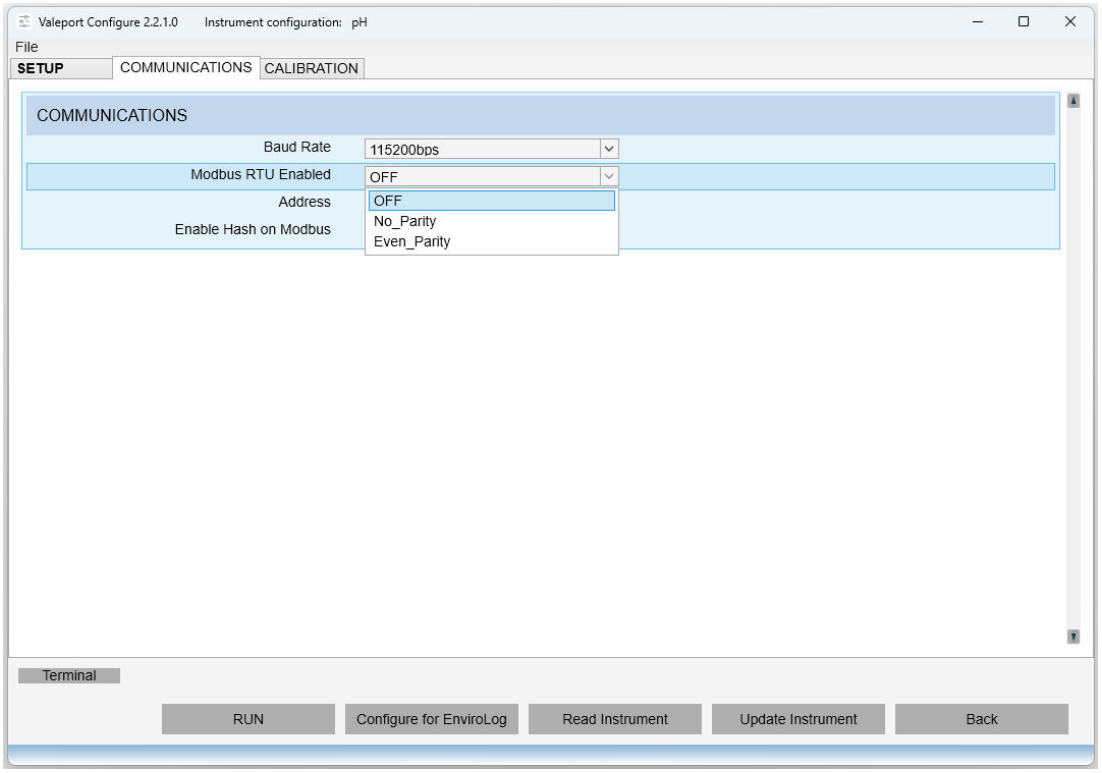
Communications Tab



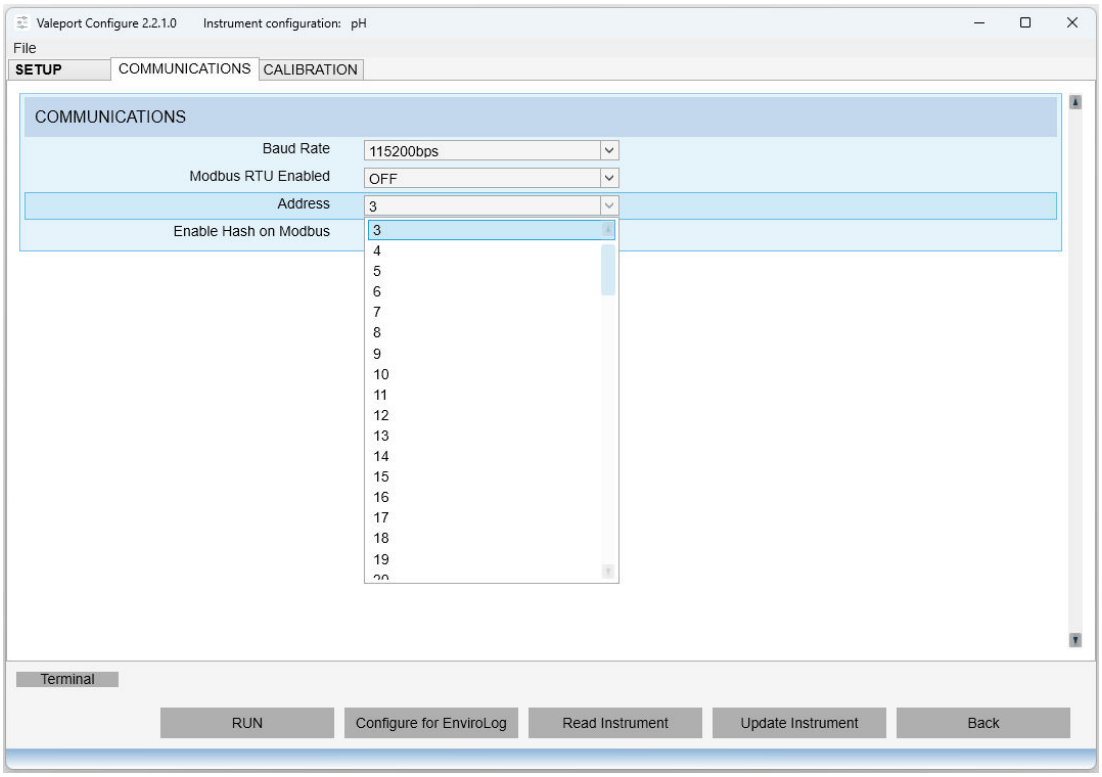
Within this section, various communications settings such as Baud rate and Modbus can be changed/configured.



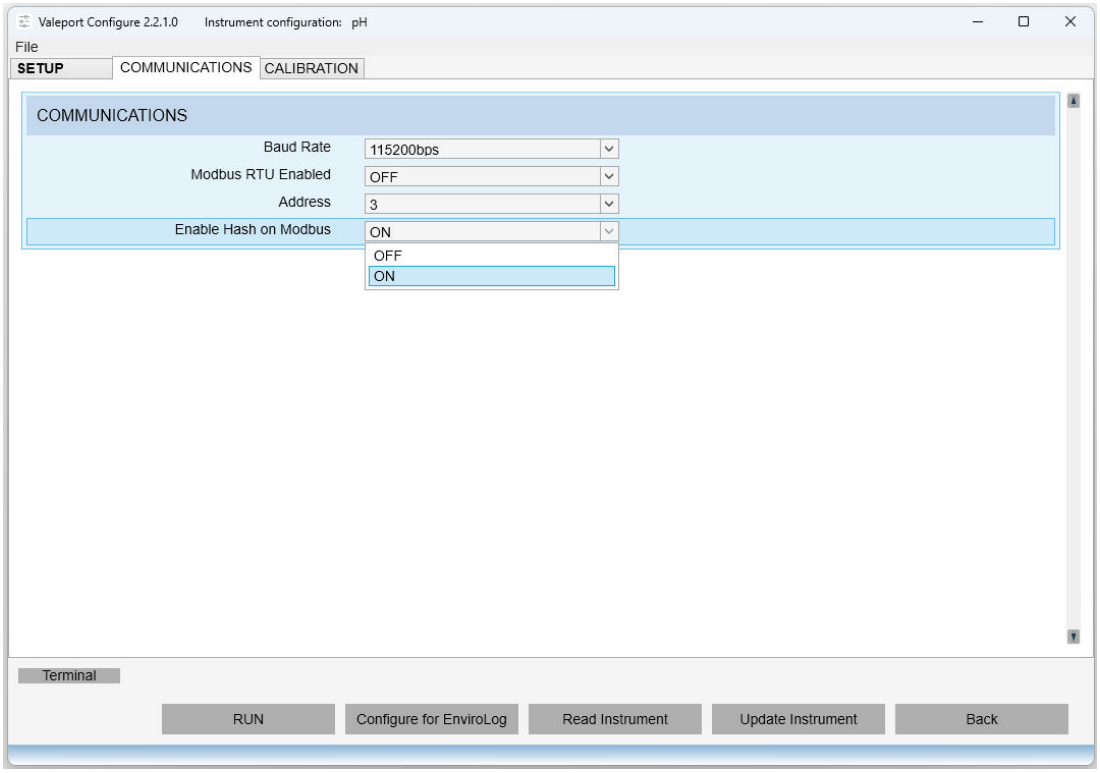
Baud rate is configurable between 2400 – 230400 bps. The pH is configured at 115200 baud as standard.



Modbus RTU can be enabled with No or Even parity.



The instrument address can be set, between 1-99, with the exception of 35 which is not used.



Hash on Modbus can be switched On or Off. It is recommended that this is set to 'On' if enabling Modbus RTU communications, to allow for improved troubleshooting/future configuration changes.

With any of the above configuration changes, select 'Update Instrument' to send the new configuration to your sensor. To check the settings have set correctly, select 'Read Instrument' once more.

The sensor can now be run, either via Teledyne Valeport Configure software, or an alternative logging method (data logger/other system, as per your requirements).

4.2 Subsequent uses – changing deployment settings

Any of the settings can be altered using Configure software, or # codes. If updating within Configure, ensure 'Update Instrument' is selected once settings have been changed. If updating via # codes, check the setting is confirmed by sending the appropriate 'get' # code (further details in Section 3).

5. Care and Maintenance

⚠ **Caution** – Any damage to the pH sensor face/pins will render the instrument warranty invalid.

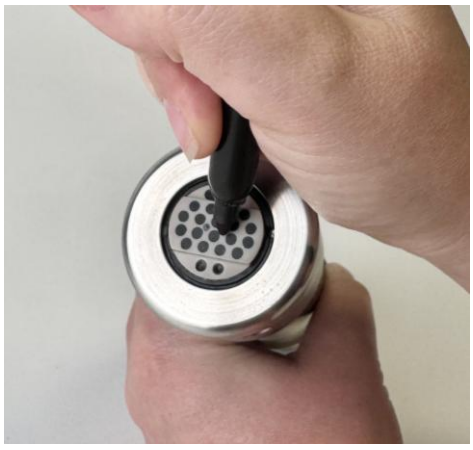
The pH Sensor is remarkably robust, being primarily constructed of titanium. The only maintenance required, other than periodic abrasion of the sensor head (described in Section 5.1), is to keep the sensor as clean as possible between deployments.

5.1 Abrading

The sensor's calibration-free design means that the instrument requires very little maintenance. Occasionally, generally after ~10,000 readings (dependent on deployment settings), the sensor face requires abrading. The sensor will provide a status of '1' or '2' within the data string (or readable within Teledyne Valeport Configure software) when the sensor face requires abrading.

If the sensor has been configured to run in excess of every 6 hours, the sensor will need abrading and configuring as a new deployment.

To abrade:



Use the permanent marker pen supplied and draw two dots on the light part of the sensor face.

Wet the sensor face.

Use the supplied abrasion tool to gently sand the sensor face in a circular motion until the permanent marker has been removed.

Rinse the sensor under running water again to remove any residue.

Dry the sensor thoroughly using a clean cloth or paper towel, taking special care with the recessed elements.

The pH sensor is now ready for deployment once again!

5.2 Storage

When not in use, ensure the sensor is powered off, the face is completely dry and it is stored within its supplied transit case.

When using the instrument after a period in storage, abrade the sensor face as per Section 5.1 and set up as a ‘new’ deployment, as per Section 4.1.

6. Troubleshooting

In this section, you will find guidance on where to begin troubleshooting if an instrument does not function as expected.

If you come across any issues, please do the following:

- Approach the issue systematically. Start with power and connections.
- If the setup uses custom cables or power supply, test the instrument with the cables that were originally supplied with the instrument.
- Update your instrument firmware and software to the latest versions. These can be downloaded at Software - Valeport (valeport.download).

If these steps do not resolve your issue, please contact our support team via the Valeport-Support@Teledyne.com email address. Further information within the next section.

6.1 Teledyne Valeport Support

When contacting our Support team, please provide the following:

- The serial number of the instrument/sensor;
- The version information of Instrument Firmware and software;
- The specific problem;
- Include a screen shot, video and a data file if appropriate.

6.2 Teledyne Valeport Service

If your instrument requires the head to be replaced (signalled via a status of '3' within the data strings) or for fault investigation that can't be resolved remotely via our Support team, please contact Teledyne Valeport Service, for an RMA (return merchandise authorisation).

Valeport-Service@Teledyne.com.

Please do not ship any equipment without contacting our Service department first.

6.3 Deployment lifetime examples

6.3.1 High salinity environments (1-38 ppt)

	Continuous	15 minute intervals	1 hr intervals	>4 hr intervals
Outputs per day	7000	96	24	<6
Time between abrasions	13 days	61 days	246 days	983 days
Time between transducer replacements	8.3 months	3.5 years	13.6 years	54.4 years

6.3.2 Low salinity environments (<1 ppt)

	Continuous	15 minute intervals	1 hr intervals	>4 hr intervals
Outputs per day	6000	96	24	<6
Time between abrasions	4.7 days	14 days	47 days	189 days
Time between transducer replacements	1.5 months	8.3 months	2.9 years	10.6 years

Please note the timescales presented in the tables above are best estimates and rely on perfect use, with appropriate settings having been set as per the deployment scenario.

Specifications have been adapted for Teledyne Valeport's pH sensor from information supplied by ANB Sensors.

7. Part Numbers

📝 **Note** - As part of our policy of continuous development, we reserve the right to alter, without prior notice, all specifications, designs, prices and conditions of supply for all our equipment.

Table 7-1 Part Numbers

0920001	Teledyne Valeport pH Sensor – Titanium housing • 1250m depth rated. Supplied with: ○ 0.5m interface cable ○ Sensor cleaning tool ○ Operation manual ○ Teledyne Valeport Configure software ○ Instant Ocean calibration solution ○ Transit case

8. Declarations of Conformity

Caution - Any changes or modifications to the product or accessories supplied, that are not authorised by Teledyne Valeport Ltd, could void the CE compliance of the product and negate your authority to operate it.

This product has demonstrated CE compliance under conditions that include the use of shielded cables. It is important that you use shielded cables compliant with the product's conformance, to protect from potential damage and reduce the possibility of interference to other electronic devices.

8.1 UK Declaration of Conformity - UKCA Mark

UK Declaration of Conformity

Manufacturer:	Valeport Ltd
Address:	St Peter's Quay, Totnes, Devon, TQ9 5EW
Certification marking:	UKCA
Product Description:	Solid state pH Sensor

We the manufacturer declare that the product pH Sensor, is in conformity with the following UK Statutory requirements and designated standard(s):

Electromagnetic Compatibility Regulations 2016	Standards
EMC (SI 2016 No.1091)	BS EN 61326-1:2021 (Basic Level)- BS EN 60945:2002

RoHS Directive 2015/863/EU	Standards
Prevention (Article 4.1b)	BS EN IEC 63000:2018

Name:	Edward Griffiths
Position:	Electronic Design Engineer
Place of Issue:	Valeport Ltd, Totnes, UK
Date of Issue:	20/03/2023
Signature:	*E.Griffiths*

Valeport Limited
St. Peters Quay, Totnes, Devon TQ9 5EW UK
+44 1803 869 292
sales@valeport.co.uk | **valeport.co.uk**

VAT No: GB 165 8753 67 | Registered in England No: 10535323

8.2 EU Declaration of Conformity - CE Mark

EU Declaration of Conformity

Manufacturer:	Valeport Ltd
Address:	St Peter's Quay, Totnes, Devon, TQ9 5EW
Certification marking:	CE
Product Description:	Solid State pH Sensor

We the manufacturer declare that the product pH Sensor, is in conformity with the following EU Directives and harmonised standard(s):

EMC Directive 2014/30/EU	Standards
EMC (Article 3.1b)	BS EN 61326-1:2021(Basic)

RoHS Directive 2015/863/EU	Standards
Prevention (Article 4.1b)	BS EN IEC 63000:2018

Name:	Edward Griffiths
Position:	Electronic Design Engineer
Place of Issue:	Valeport Ltd, Totnes, UK
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