



uvSVX Operating Manual



Document ID MANUAL-857569191-10 | issue: 1.2
Date: October 2020

This confidential document was prepared by the staff of Valeport Limited, the Company, and is the property of the Company, which also owns the copyright therein. All rights conferred by the law of the copyright and by virtue of international copyright conventions are reserved to the Company. This document must not be copied, reprinted or reproduced in any material form, either wholly or in part, and the contents of this document, and any method or technique available there from, must not be disclosed to any other person whatsoever without the prior written consent of the Company.

© 2020 Valeport Ltd

Valeport Ltd
St Peter's Quay
Totnes TQ9 5EW
United Kingdom

Phone: +44 1803 869292
email: sales@valeportwater.co.uk
Web: www.valeportwater.co.uk

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

Contents

1	Introduction.....	1
2	Sensors.....	2
2.1	Sound Velocity Measurement	2
2.2	Temperature	2
2.3	Pressure.....	2
2.3.1	Interchangeable Pressure Sensor Modules	3
2.4	Calculated Parameters	5
2.4.1	Calculated Conductivity	5
2.4.2	Calculated Salinity.....	5
2.4.3	Calculated Density	5
3	Physical Characteristics	6
3.1	Materials	6
3.2	Dimensions	6
4	Communications.....	7
4.1	Serial Comms - RS 232 and RS485	7
4.2	Ethernet	8
4.2.1	Setting up Ethernet Connectivity	8
4.2.2	Operation with Datalog x2	11
4.3	uvSVX Communications Setup	12
5	Setting Up the uvSVX.....	13
5.1	Start / Stop.....	13
5.1.1	Output Last Measured Reading.....	13
5.2	Information #Codes	14
5.3	Sampling Modes	14
5.4	Pressure Tare	15
5.5	Error Flag	16
5.6	Warning Message.....	16
5.7	Pressure Depth Units.....	17
5.8	Set Latitude.....	17
5.9	DASH Formula.....	18
5.10	User Calibration	18
6	Data Output Formats.....	19
6.1	Data String Formatting	19
6.2	CSV Format	20
6.3	Valeport NMEA (\$PVSX)	21
6.4	Data String #1	22
6.5	Modbus RTU.....	22
7	Electrical	23
7.1	Power uvSVX.....	23
7.2	Power uvSVXe.....	23
7.3	Wiring Information.....	23
8	Software.....	24
8.1	Setup Using DataLog X2	24
8.1.1	Interface to the uvSVX.....	24
8.1.2	Configure the uvSVX	25
8.2	Setup Using the SetUp App	31

8.2.1	Interface to the uvSVX	31
8.2.2	Configure the Instrument	32
9	Care & Maintenance.....	36
9.1	Calibration.....	37
10	Ordering and Part Numbers.....	38
11	EU Declaration of Conformity - CE Marking	39
11.1	uvSVX.....	40
11.2	Interchangeable Pressure Module	41

1 Introduction

Aimed primarily at the underwater vehicle market, the uvSVX is a compact direct reading instrument that outputs a selectable, fixed data string at up to 64Hz of Sound Velocity, Temperature, Depth and optionally, Salinity and Density calculated with Valeport's proprietary DASH formula. High accuracy data is assured with the added bonus of Valeport's unique interchangeable pressure module that allows customers to maximise operational specific depth requirements. This innovative pressure module, with integral calibration, can be changed in a couple of minutes without opening the instrument.

There are two communication options of the uvSVX, RS232 / RS485 and Ethernet



uvSVX - Sound Speed, Pressure and Temperature
for underwater vehicles

To be used in a variety of subsea applications ROVs, construction survey, monitoring and positioning operations, one of the key development drivers was to provide a cost-effective alternative to the use of resonant quartz pressure sensors. Using the very latest technology in temperature compensated piezo-resistive transducers, the uvSVX offers several advantages over resonant quartz sensors, with similar performance - cost, maintenance and operationally specific pressure ratings.

Valeport's DASH equations are included in the uvSVX, as standard and provide a real-time water density output.

- Interchangeable Pressure Sensor Module
 - Pressure ranges from 10 to 600Bar (approx 100m to 6 000m water)
 - Titanium diaphragm pressure sensor
 - No external diaphragms, oil reservoir or oil-filled tubes
 - Long term calibration stability with a 2 year recommended recalibration cycle
- Sound Speed
 - Valeport's industry standard 25mm baseline, Digital Time of Flight sound speed sensor
- Temperature
 - fast response PRT
- Titanium housing
- RS232 or RS485 (addressable) data output
- ASCII and Modbus RTU output protocols
- Choice of calibrated data output format at a sampling rate of up to 64Hz
- TEOS 10 seawater properties of water computation for depth calculation

2 Sensors

2.1 Sound Velocity Measurement

Utilising Valeport's latest design for the world's most accurate sound velocity sensor, each measurement is made using a single pulse of sound travelling over a precisely known distance, so is independent of the inherent calculation errors present in CTD calculated data. Valeport's unique digital signal processing technique virtually eliminates signal noise and gives an almost instantaneous response; the digital measurement is also entirely linear, giving predictable performance under all conditions.

Range:	1375 - 1900m/s
Resolution:	0.001m/s
Accuracy:	±0.020m/s

2.2 Temperature

The uvSVX is fitted with an accurate, fast response Platinum Resistance Thermometer (PRT) temperature sensor.

Type:	PRT
Range:	-5°C to +35°C
Resolution:	0.001°C
Accuracy:	±0.01°C

2.3 Pressure

The uvSVX is fitted with a high accuracy, 0.01% of full scale, temperature compensated piezo-resistive pressure transducer.

The Pressure Module is interchangeable

Type:	Strain Gauge
Range: individual modules	10, 30, 50, 100, 200, 300, 400 or 600 Bar 1 bar is approximately equal to 10m depth
Resolution:	0.001 units (selectable)
Accuracy:	±0.01% or full range
Response Time:	1 milliseconds

2.3.1 Interchangeable Pressure Sensor Modules

The Interchangeable Pressure Sensor Modules can be swapped to best suit the operational depth of the project. The accuracy of the sensor is a factor of the full-scale capability of the sensor - 0.01% and not the measured pressure. A 600 Bar module will offer the same $\pm 0.60\text{m}$ accuracy at 6000m as it will at 300m while a correctly selected 30 Bar Pressure Module, for an operation at 300m, will provide an accuracy $\pm 0.03\text{m}$

Bar	Approximate maximum operational depth metres	Accuracy (0.01%) \pm metres
10	100	0.01
20	200	0.02
30	300	0.03
50	500	0.05
100	1000	0.10
200	2000	0.20
300	3000	0.30
400	4000	0.40
600	6000	0.60

Prior to changing out a Pressure Module the uvSVX should be thoroughly rinsed in fresh water and dried.

A Pressure Module should ideally be changed in dry lab conditions but if this is not possible every effort must be made to keep water out of the module socket. Check the module and socket for any water and if found dry everything thoroughly before fitting. If water does get into the socket it could cause the connector to corrode.

A special tool is provided to unscrew the fitted module and screw its replacement securely into place. Never use excessive force. The design allows the Pressure Module to be swapped out without the need to remove the protection cage of the uvSVX.

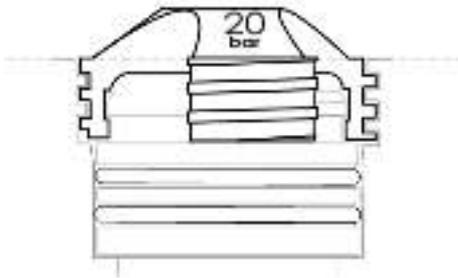


The three prongs should be carefully inserted into the black screw cap of the Pressure Module and turned counter-clockwise (when looking directly at the module) to loosen it. Keep turning until the Pressure Module gently pops out of the socket. The tool will engage with the Pressure Module and allow you to very gentle pull if required.

Before fitting a replacement Pressure Module, check all surfaces for wear - especially the screw cap. Check the O ring is clean and free of any wear or damage. There is no need to grease the O ring. The closing action of the system does not rely on surfaces sliding over one another and grease might attract debris that would compromise the seal.

The replacement Pressure Module should be placed into the socket with the connector approximately lined up with its pair in the socket. Fine adjustment is achieved by the shape of the module housing in the socket. If the Pressure Module is misaligned it will not tighten smoothly and should be removed and turned by 180° .

Engage the screw cap into the threads of the socket and then use the tool to tighten the Pressure Module into place. The module should be screwed down until the shoulder of the black screw cap is in line with the shoulder of the titanium end-cap as shown below:



Inside the transit case an additional transit case is provided for the Pressure module to allow it to be returned to Valeport for calibration without the need to send the whole instrument.

2.4 Calculated Parameters

From directly measured sound velocity, temperature and pressure, the uvSVX calculates Conductivity, Salinity and Density using a proprietary Valeport algorithm developed from extensive laboratory and fieldwork data sets.

2.4.1 Calculated Conductivity

Accuracy:	± 0.05 mS/cm
Resolution:	0.001 mS/cm

2.4.2 Calculated Salinity

Accuracy:	± 0.05 PSU
Resolution:	0.001 PSU

2.4.3 Calculated Density

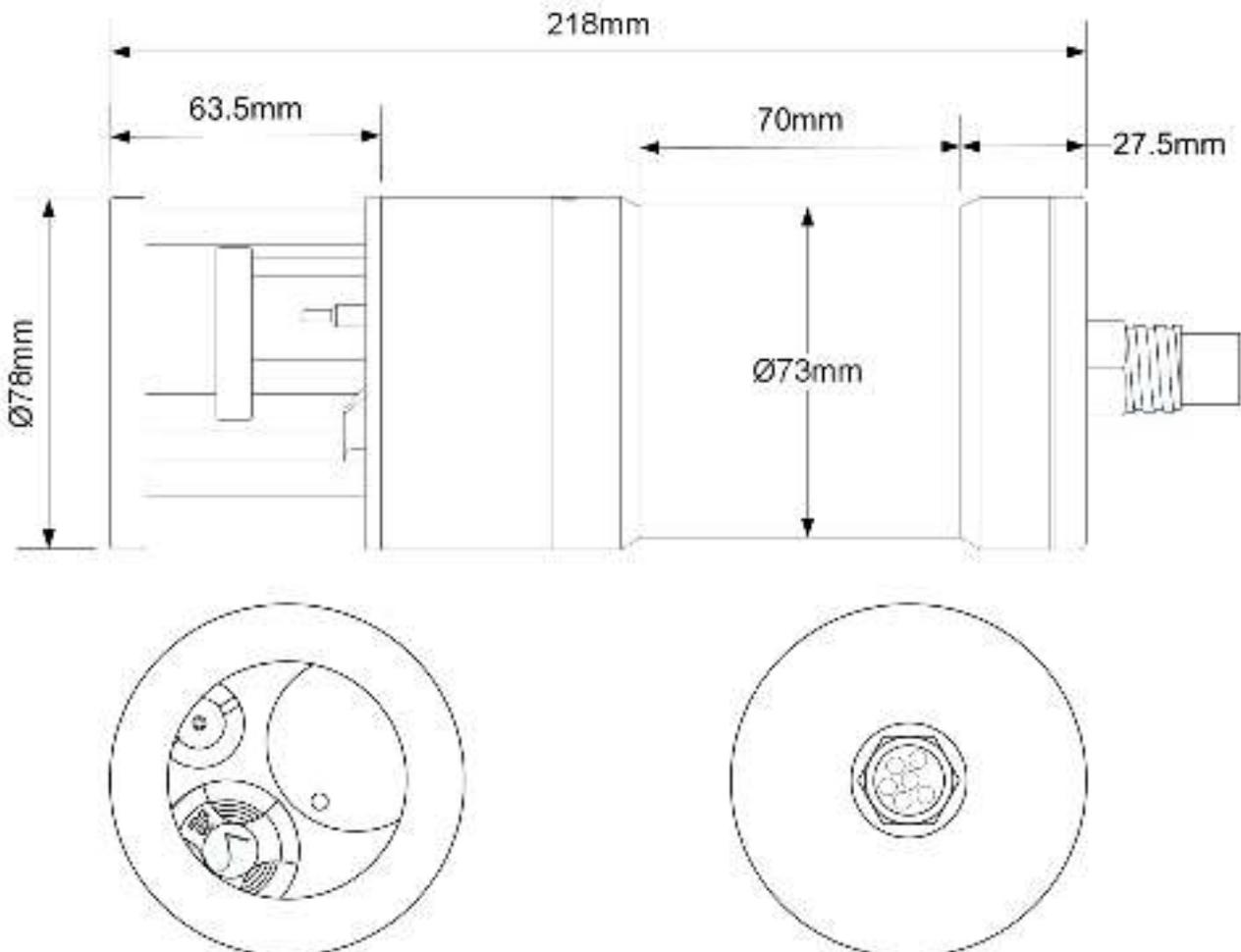
Accuracy:	± 0.05 kg/m ³
Resolution:	0.001 kg/m ³

3 Physical Characteristics

3.1 Materials

Housing & Bulkhead:	Titanium
Screw Cap:	Acetal
Pressure Transducer Diaphragm	Titanium
Connector:	uvSVX: Standard is SubConn type MCBH6F (titanium) uvSVXe: Standard is SubConn type DBH13F (titanium) Alternatives may be supplied on request
Weight:	<1.75kg (in air)

3.2 Dimensions



4 Communications

Control of the uvSVX is achieved through the use of “# codes”, as described below.

All commands must be “sent” by pressing the Enter key
with the exception of the single ‘#’ character required to enter set up mode

4.1 Serial Comms - RS 232 and RS485

The uvSVX is fitted with both RS232 and RS485 communications as standard. RS485 is enabled by grounding a pin in the communications lead (refer to [Wiring Section](#)).

Protocol is 8 data bits, 1 stop bit, no parity, no flow control.

RS232 comms have been tested over 200m of cable. Successful operation over this distance will depend on the quality of cable. Contact Valeport for more information.

Baud rate is factory set to 115200. User may choose between 2400, 4800, 9600, 19200, 38400, 57600, 115200 and 230400.

Fast data rates and longer data string outputs may not be possible with low baud rates

4.2 Ethernet

The uvSVXe is fitted with a Transmission Control Protocol/Internet Protocol (TCP/IP) Ethernet module set up in Dynamic Host Configuration Protocol (DHCP). This means the instrument will automatically be assigned an IP address. Depending on how your router works, it should go back to that IP address each time it is interfaced although this is not guaranteed unless you provide it with a fixed IP in the router configuration.

4.2.1 Setting up Ethernet Connectivity

The uvSVXe has a Lantronix Ethernet module that will need to be configured. You can download the Lantronix Device Installer software from [here](#).

Connect the uvSVXe to the network and run the software. If the device is not found after a few moments press Search, top left



Once the module has been found click on XPort to reveal the IP address - in the example above: 192.168.8.155

Click on the IP Address in the left-hand panel to reveal more information in the right-hand panel

Select Web Configuration



Select the green arrow to reveal the password entry dialogue



Do not enter a Username or Password - simply select OK



Select Connection, ensure settings are similar to below

Do not select or accept a Local Port number 23
Local Port number 23 is reserved for TelNet

Select Apply Settings

Perform a new search after the settings have been completed.

The screenshot shows the 'Connection Settings' page for 'Channel 1' in the XPort LANTRONIX web interface. The interface includes a navigation menu on the left with 'Connection' and 'Apply Settings' highlighted. The main settings area is divided into several sections:

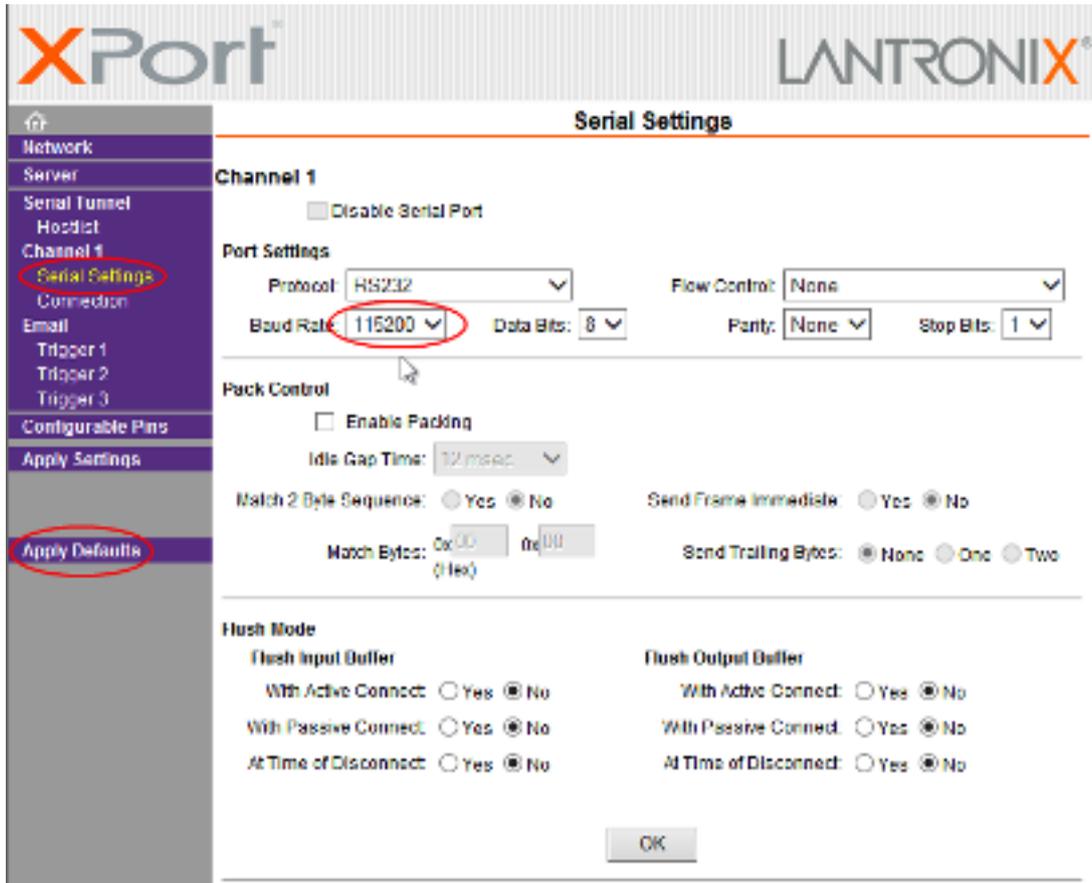
- Channel 1**
 - Connect Protocol: Protocol: TCP
 - Connect Mode
 - Passive Connection:
 - Accept Incoming: Yes
 - Password Required: No
 - Password: [Empty]
 - Modem Escape Sequence Pass Through: Yes
 - Active Connection:
 - Active Connect: None
 - Start Character: 0x0D (In Hex)
 - Modem Mode: None
 - Show IP Address After RING: Yes
 - Endpoint Configuration:
 - Local Port: 10001
 - Remote Port: 0
 - Auto increment Local Port for active connect: [Unchecked]
 - Remote Host: 0.0.0.0
 - Common Options:
 - Telnet Com Port Cntrl: Disable
 - Connected Response: None
 - Terminal Name: [Empty]
 - Use Hostlist: No
 - LED: Blink
 - Disconnect Mode:
 - On Mdm_Ctrl_In Drop: No
 - Hard Disconnect: Yes
 - Check EOT(CM-D): No
 - Inactivity Timeout: 0 : 0 (mins : secs)

An 'OK' button is located at the bottom of the settings area.

Select Serial settings, Set Baud Rate on Channel 1 to 115200

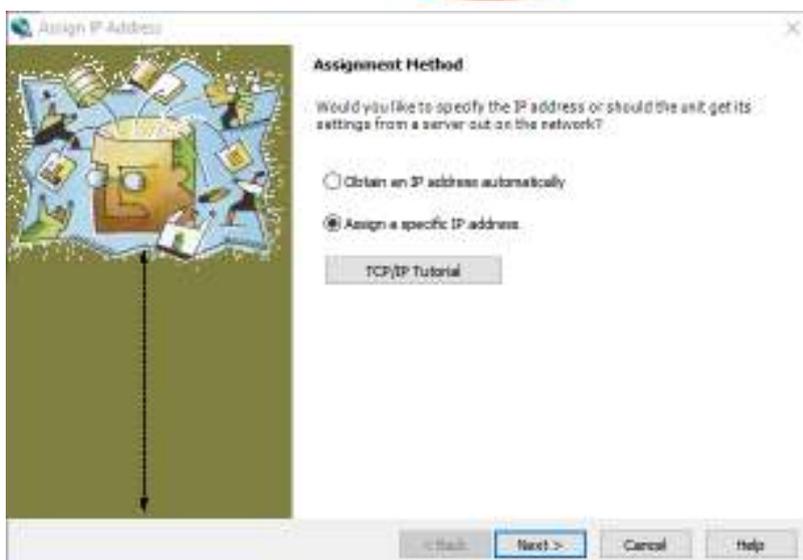
Apply settings

Perform a new search after the settings have been completed and applied.



4.2.1.1 Fixed IP

To set a fixed IP address for the unit follow the wizard in the Lantronix App



4.2.2 Operation with Datalog x2

Load the latest version of Valeport's configuration software DataLog x2. It can be downloaded from [here](#). Search for uvSVX then look for the software section towards the bottom of the page.

Setup the TCP Client windows to match the data from the Lantronix Device Installer. The instrument can be configured using the software or with individual #commands as required.



4.3 uvSVX Communications Setup

The following # commands need to be set as required to achieve the communications scenario required

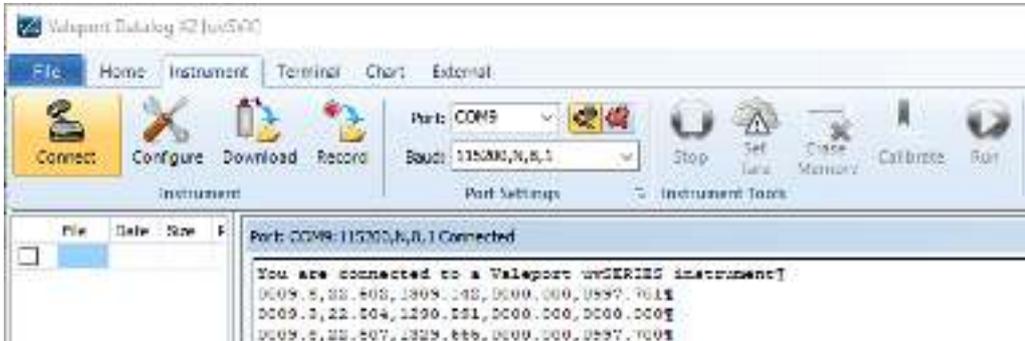
Code	Description
#005;n	<p>Set address mode On Off where n = 0 or 1 #005;0 (Off) #005;1 (On) In address mode, the uvSVX will only respond to commands prefixed by its address, or the global address "00"</p> <p>Example: 03:#028 uvSVX address "03" begin sampling</p> <p>Example: 00:#028 All uvSVX addresses begin sampling</p> <div style="border: 1px solid red; padding: 2px; display: inline-block;">this function is password protected</div>
#006	Read address mode activation status
#033;nn	<p>Set uvSVX RS485 Modbus address to any number from 01 to 99</p> <div style="border: 1px solid red; padding: 2px; display: inline-block;">this function is password protected</div>
#034	Read address
#059;nnnnnn	<p>Set the baud rate in the Instrument - factory set to 115200 where nnnnnn = 2400,, 230400</p> <div style="border: 1px solid red; padding: 2px; display: inline-block;">this function is password protected</div>
#352,n	<p>Enable Disable # on Modbus interrupts the instrument with a serial # if in Modbus mode #352;0 (disable) #352;1 (enable)</p> <div style="border: 1px solid red; padding: 2px; display: inline-block;">this function is password protected</div>
#353	read # on Modbus activation status
#700; n;n	<p>Enables Modbus communications mode with parity on or off. Once entered into Modbus mode the uvSVX will begin to measure on the measurement cycle. #700;0;0 - Modbus disabled #700;0;1 - Modbus disabled #700;1;0 - Modbus No Parity #700;1;1 - Modbus Even Parity</p> <div style="border: 1px solid red; padding: 2px; display: inline-block;">this function is password protected</div>
#701	Read Modbus activation status

5 Setting Up the uvSVX

5.1 Start / Stop

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

A Welcome message is transmitted:



To put the uvSVX into run mode:

Code	Description
#028	Starts sampling in the mode set, or takes a single reading if unit is in "Single" sampling mode.
#	<p>When the instrument is running, the uvSVX 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.</p> <p>When interrupted an error is often seen. This is generated due to the <CR><LF> usually associated with the # and should not be interpreted as a problem with the uvSVX</p> <div style="border: 1px solid red; padding: 5px;"> <p>A "watchdog" function is in operation within the uvSVX 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</p> </div>

5.1.1 Output Last Measured Reading

In order to read the last measured reading the command #015 can be used.

The data is output in the selected units and data telegram format.

5.2 Information #Codes

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

#nnn to be followed by <CR><LF>:

# Code	Description
#003	Read uvSVX serial number
#006	Read address mode activation status
#010	Read Tare value
#012	Read Tare activation status
#014	Read firmware version number
#017	Read the instrument Latitude
#023	Read the SV calibration coefficients
#027	Read the data string delimiter
#032	Read calibration mode
#034	Read RS485/Modbus address value
#040	Read sampling mode
#043	Read leading separator activation status
#045	Read trailing separator activation status
#051	Read the number of samples in the dataset for averaging
#053	Read the pressure depth units
#084	Read the number of decimal places in the pressure depth field
#086	Read the User pressure calibration coefficients
#088	Read the temperature calibration coefficients
#089	Read the output string format
#096	Read the sampling frequency
#114	Read the FPGA firmware
#117	Read the pressure depth error message
#121	Read DASH equations activation status
#138	Read last SV and Temperature calibration date
#200	Read Pressure Module serial number
#202	Read Pressure Module maximum pressure rating
#209	Read the DataMatrix Code (Pressure Module Serial Number)
#221	Read is warning message activation status
#353	Read '#' character to leave Modbus mode activation status (to use # codes with 8N1 framing) If this mode is enabled do not use address 0x23 for Modbus
#501	Read the Calibration history for Temperature sensor
#502	Read the Calibration history for SV sensor
#511	Read User Calibration activation status
#701	Read Modbus activation status and parity status

5.3 Sampling Modes

The uvSVX will operate in a number of different modes, only one is for regular use - Continuous

Contact Valeport if you have a special requirement

# Code	Sampling Mode	Description
#039;1	Continuous	Data is observed and output at a fixed sampling rate from 1 to 64Hz set by #095

# Code	Description
#095;xx	Set the sampling rate where xx = 1, 2, 4, 8, 16, 32 or 64Hz
#096	Read sampling rate

Slow baud rates and long output strings can limit the sampling rate

5.4 Pressure Tare

The Interchangeable pressure sensor fitted in the uvSVX measures absolute pressure, that is, it includes atmospheric pressure. The pressure Tare function allows the atmospheric pressure (as measured by the sensor, normally before deployment) to be removed from the observations so the output is simply the pressure of water.

By taking a TARE reading at any fixed point in the water column, readings will then be output relative to that point

The pressure Tare observation should be taken with the sensor in the same orientation as it will be deployed (horizontal, pointing up or pointing down) to negate any effects of the weight of the sensing element itself

Whilst this effect is small, it is an unnecessary contribution to the error budget

Code	Description
#009;0	Auto TARE observe current pressure and program it as current TARE value
#009;nnnn.nnn	Set manual TARE in dBar or Bar (max resolution of 0.000001) depending on units selected by #020 command. Example: #009;10.325 sets TARE to 10.325dBar
#010	read current Tare value in the units set at the time it was observed
#011;n	Enable Disable pressure tare function #011;0 (disable) the tare value is not subtracted from the measured pressure #011;1 (enable) the tare value is subtracted from the measured pressure
#012	read pressure Tare activation status - 1 (Enabled) 0 (Disabled)

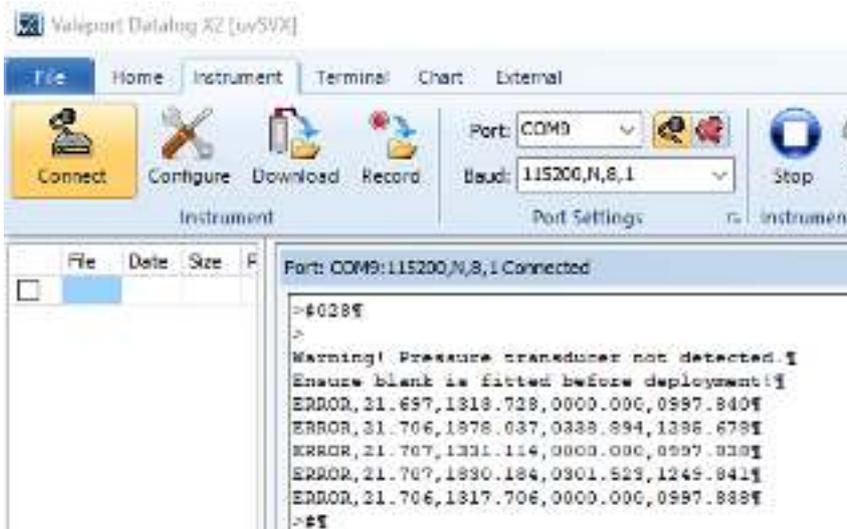
If the pressure | depth units or calibration are changed the Tare value must be re-observed

5.5 Error Flag

Code	Description
#116;n	Sets the value output in the CSV data string when the Pressure Depth value is in error e.g. missing Pressure Module Where n = 1, 2 or 3 0 = 0.000 1 = -99999 2 = ERROR
#117	Read the Error Flag

5.6 Warning Message

If a Pressure Module is not fitted and the uvSVX is deployed, damage can be caused to the instrument. In order to bring this situation to your notice a warning is transmitted on power up and putting the uvSVX into run mode: #028 or the watch dog.



DataLog x2 showing a warning message that a Pressure Module is not fitted
This message can be turned on or off

Code	Description
#220;n	Enable Disable the Warning Message #220;0 disables the warning #120;1 enables the warning
#221	Reads the Warning Message activation status:

DASH computation will be erroneous if a pressure term is not available

5.7 Pressure | Depth Units

It is also possible to present the data in units of metres or feet of seawater

calculated using the TEOS 10 Simple Pressure / Depth relationship, which assumes “standard” water density

Local Latitude is required (#016;nn.nnn)

Code	Description
#052;n	Set calibrated units as follows where n= 0 = dBar (d) 1 = Metres (M) 2 = Feet (f) Example: #052;1 sets the units to metres (M)
#053	Read pressure unit set
#083;n	Set the number of decimal places for pressure depth output where n = 1 to 3
#084	Read the number of decimal points in pressure depth output

5.8 Set Latitude

This is required for an accurate pressure / depth conversion - the relationship is partially dependent on local gravity, which varies with distance from the equator

Code	Description
#016;nn.nnn	Set the local Latitude in decimal degrees Positive / negative signing for North / South of the equator is not relevant Example: #016;50.426 Sets latitude to 50.426° North (50° 25' 34")
#017	Read the Latitude set in the instrument

5.9 DASH Formula

DASH is a set of equations used to determine the conductivity, salinity and hence density of water based on the measurement of sound speed, pressure and temperature. Developed in conjunction with world renowned Oceanographers and extensive field and laboratory investigation, results cannot be considered WOCE (World Ocean Circulation Experiment) standard of ± 0.001 - 0.003 psu but ± 0.05 psu is sufficient for many operational scenarios.

Code	Description
#120;n	Enable Disable the DASH formula calculations #120;0 disables the equation and removes the fields from the output data strings #120;1 enables the equation and includes the fields in the output data strings
#121	Read DASH equations activation status: 1 (Enabled) 0 (Disabled)

5.10 User Calibration

It is possible to include a user calibration in the uvSVX. Please contact Valeport for more information how this can be achieved.

Code	Description
#085;	Sets the User Calibration coefficients for Pressure <div style="border: 1px solid red; padding: 2px; display: inline-block; margin-top: 5px;">this function is password protected</div>
#086	Read User Pressure Calibration coefficients
#510;n	Enable Disable the User Calibration #510;0 disables the User Calibration #510;1 enables the User Calibration
#511	Read User Calibration activation status

6 Data Output Formats

The uvSVX has a selection of different data output formats allowing easy interface to software packages and third-party instrumentation.

6.1 Data String Formatting

Code	Description
#026;n	Set the string delimiter Where n = "ASCII character" e.g. #026;, #026;/
	this function is password protected
#027	Read the data string delimiter character
#042;n	Enable Disable a leading delimiter character at the beginning of a data string #042;0 disables the character from the output data strings #042;1 enables the character in the output data strings
	this function is password protected
#043	Read leading data string delimiter character activation status
#044	Enable Disable a trailing delimiter character at the end of a data string #044;0 disables the character from the output data strings #044;1 enables the character in the output data strings
	this function is password protected
#045	Read leading data string delimiter character activation status
#083;n	Set the number of decimal places for pressure depth output data string where n = 1 to 3
	this function is password protected
#084	Read the number of decimal places in pressure depth output data string
#116;n	Set the pressure depth error message displayed in the data string for faulty or no pressure transducer 0 = 0.000 1 = -99999 2 = ERROR
#117	Read the error message

6.2 CSV Format

Command:	#082;3	
Format:	x.xxx,t.ttt,cccc.ccc (DASH disabled #120;0) x.xxx,t.ttt,cccc.ccc,ssss.sss,dddd.dd (DASH enabled;1)	
Notes:	Field	Format
	Pressure Depth (d M f)	x.xxx
	Temperature (°C)	t.tttt
	Sound Speed (ms ⁻¹)	cccc.ccc
	Salinity (PSU)	ssss.sss
	Density (kg/m ³)	dddd.ddd

Output String Examples

with DASH disabled

09.812,20.571,1504.164

09.821,20.572,1504.164

with DASH enabled

09.812,20.571,1504.164,0017.811,1011.610

09.821,20.572,1504.164,0017.810,1011.609

6.3 Valeport NMEA (\$PVS VX)

Command:	#082;8	
Format:	\$PVS VX,aa,bbbb,p.ppp,d.ddd,y,t.ttt,cccc.ccc,ss.sss,dddd.ddd*zz	
Notes:	Field	Format
	NMEA Identifier	
	Instrument address	aa
	Serial number	bbbb
	Absolute Pressure (dBar)	p.ppp
	Depth	d.ddd
	Depth type (d M f)	y
	Temperature (°C)	t.ttt
	Sound Velocity (ms-1)	cccc.ccc
	Salinity (PSU)	ss.sss
	Density (kg/m3)	dddd.ddd
	Checksum	*zz

Output String Examples

with DASH disabled

```
$PVS VX,01,12345,9.895,32.183,f,20.979,1505.411,0.000,0.000*17
```

```
$PVS VX,01,12345,9.895,32.184,f,20.979,1505.430,0.000,0.000*13
```

with DASH enabled

```
$PVS VX,01,12345,9.880,9.795,M,21.006,1505.501,17.895,1011.567*06
```

```
$PVS VX,01,12345,9.896,9.811,M,21.007,1505.530,17.918,1011.584*08
```

6.4 Data String #1

A dual output string for a specific requirement

Command:	#082;7	
Format:	xxxx.xxx cccccc \$PSGDS,ADSVP,xxx.xxx,cccc.ccc,tt.tttt,dddd.dd*zz	
Notes:	First String:	
	Field	Format
	Pressure Depth (d M f)	xxxx.xxx
	Speed of Sound	ccccccc
	Second String:	
	Field	Format
	NMEA Header	\$XXXXXX,XXXXXX
	Pressure Depth (d M f)	xxxx.xxx
	Speed of Sound (ms ⁻¹)	xxxx.xxx
Temperature (°C)	xx.xxx	
Density (kg/m ³)	xxxx.xxx	

```
0009.919 1505340
$PSGDS,ADSVP,0009.919,1505.340,21.972,1130.56*1D
0009.830 1504058
$PSGDS,ADSVP,0009.830,1504.058,21.959,1130.80*19
0009.829 1504131
$PSGDS,ADSVP,0009.829,1504.131,21.964,1130.85*14
```

6.5 Modbus RTU

Modbus RTU as implemented in the uvSVX is an industry standard interface protocol that will run over RS232 or RS485.

The Baud rate is variable 4800 to 19200 with 8N1 or 8E1 framing.

This conforms to the minimum requirements of the MODBUS standard of 9600 and 19200 baud with 8E1 framing.

Full set up and operation through Modbus is outside the scope of this document, please contact Valeport for further details.

7 Electrical

Power GND and Signal GND are isolated.

7.1 Power uvSVX

9 – 28V DC input (isolated)

Draws approximately 30mA at 12V DC

7.2 Power uvSVXe

9 – 28V DC input (isolated)

Draws approximately 130mA at 12V DC

7.3 Wiring Information

Systems are supplied with a short (50cm) lead for splicing or testing

6 Way Male SubConn (MCIL6M)	
PIN	FUNCTION
1	RS232 GND
2	RS232 Tx (Out of sensor) or RS485A
3	RS232 Rx (Into sensor) or RS485B
4	+V
5	Link to Pin 1 for RS485 N/C for RS232
6	Power GND

8 Software

The uvSVX and uvSVXe are fully compatible with Valeport Datalog X2 and Terminal X2 - latest version. DataLog X2 has a series of wizards that will assist in setting up the instrument without the need for specialist knowledge and understanding of the # code system.

Any compatible Terminal program can be used to send individual # commands.

Valeport's SetUP App can also be used.

8.1 Setup Using DataLog X2

DataLog X2 can be used to setup a uvSVX or uvSVXe. The following example uses a uvSVX but once interfaced operation with a uvSVXe is identical.

The software can be downloaded from the Valeport Website [Here](#)

8.1.1 Interface to the uvSVX

Use the drop-down Lists to select your port, baud rate or Host details as required.

Click on the Connect Icon and if the instrument is powered and depending on the Sampling Mode selected data will start streaming into the data window



8.1.2 Configure the uvSVX

Once your instrument is interfaced Click on the Configure

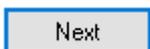
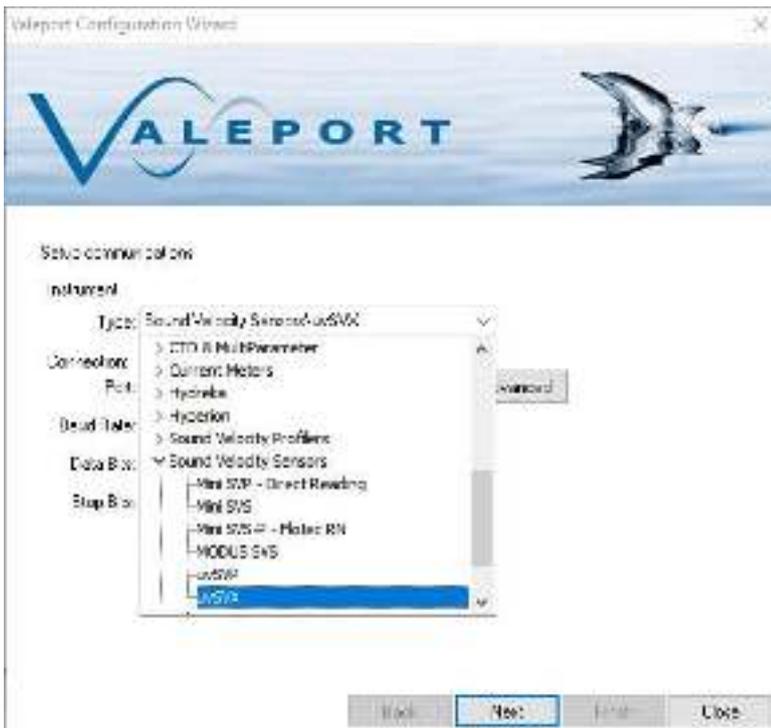


button

You will be presented with the following dialogue. The Comms settings will be filled in automatically from the Connect settings already configured (TCP/IP in the example below):



choose uvSVX from the Instrument Type drop down menu



Click

You will be presented with the following dialogue. Leave all the settings as standard unless told to change them by Valeport.



Next Click and wait for the system to read all the current configuration setting.

The results will be displayed as follows:



Next Click

The next dialogue is where you will configure:

- the units of the output data string
- whether Tare is applied or not
- measure the current pressure value and set it as the Tare value or manually program a Tare value
- input the local Latitude (decimal degrees, North and South are both positive) as required for conversion to depth



Pressure

The Pressure Module fitted to the uvSVX measures absolute pressure, i.e. it includes atmospheric pressure. The pressure TARE function allows the atmospheric pressure (as measured by the sensor before deployment) to be removed from the readings, so the output is simply pressure of water. Note also that by taking a TARE reading at any fixed point in the water column, readings will then be output relative to that point.

Units: Metres

TARE ON / OFF: OFF

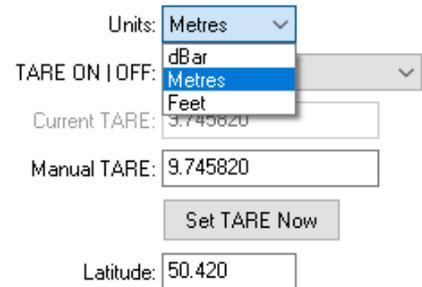
Current TARE: 9.745820

Manual TARE: 9.745000

Get TARE Now

Latitude: 50.420

Back Next Finish Cancel



Units: Metres

TARE ON / OFF: OFF

Current TARE: 9.745820

Manual TARE: 9.745820

Set TARE Now

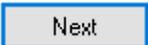
Latitude: 50.420

Set the required units before observing a Tare value

Setting the Tare Value

To measure the current atmospheric data and use that as the Tare value press  take note of the warning. By taking the Tare value at the surface you will remove atmospheric pressure and all measurements will be

relative to that sea level. If you take it a point in the water column, all measurements will be relative to that point.

Next

Click

The next dialogue is where you will configure:

- the sampling mode
- the sampling rate (in Hz) and dataset size (in samples) to be averaged
- Whether DASH equations are enabled or not
- the output string format

Options:



Mode:

Mode: Continuous

Sampling Rate: 2 Hz

Sampling Rate:

Sampling Rate: 16 Hz

Dataset Size to Average (1 to 60):

1 Hz
2 Hz
4 Hz
8 Hz
16 Hz
32 Hz
64 Hz

DASH ON | OFF:

16 Hz

32 Hz

64 Hz

Dataset Size:

Dataset Size to Average (1 to 60): 2

DASH Equations

DASH ON | OFF: ON

Output Format: OFF

ON

Output Format:

Output Format: Valeport NMEA (PVSX)

CSV Format

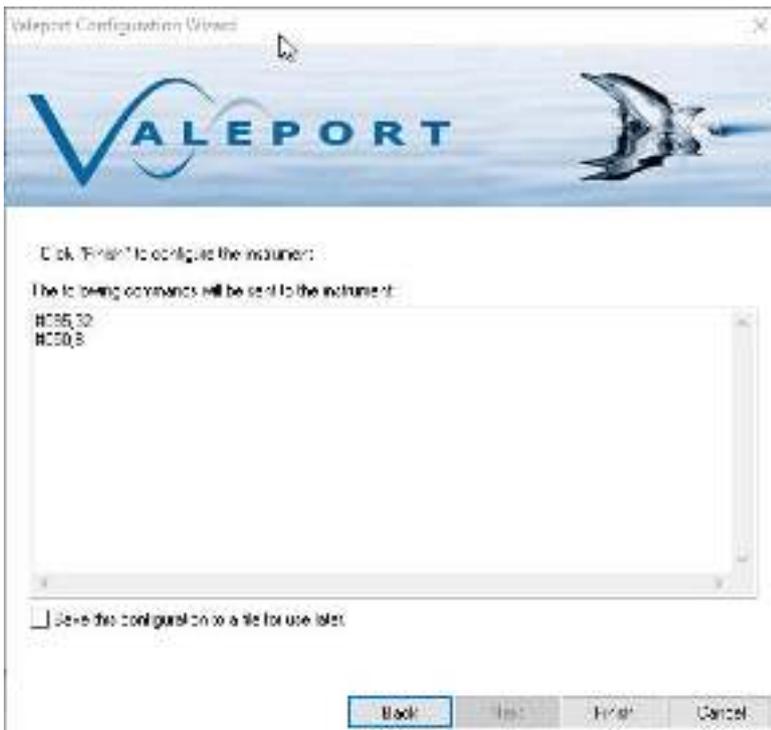
Valeport NMEA (PVSX)

Data String #1

- Chose your sampling mode - Continuous only (future development)
- Set the sampling (update) rate in Hz
- Set the dataset size - number of samples that will be averaged before a data string is output
- the uvSVX will collect that number of samples, average the result and output the data string
- in the above example the data string will be the average of 8 samples and output at 2Hz
- Turn the DASH equations ON to calculate and output Salinity and Density or turn it OFF
- 64Hz sampling and output rate is not possible with DASH enabled
- Select the Output String format

Next Click

The next dialogue lists the commands that will be sent to the instrument to set it up as required:



There is an option to save the configuration of the instrument to a text file - tick the box:

Save this configuration to a file for use later



Click **Finish** to send the commands to the instrument to set it up as required.

If you have ticked the Save configuration option you will be prompted for a file name.

The instrument is interrupted so either you must wait the watchdog period before the uvSVX will start automatically or press the Run button on the Instrument ribbon.



8.2 Setup Using the SetUp App

8.2.1 Interface to the uvSVX

Connect the uvSVX to a suitable comm port and power.

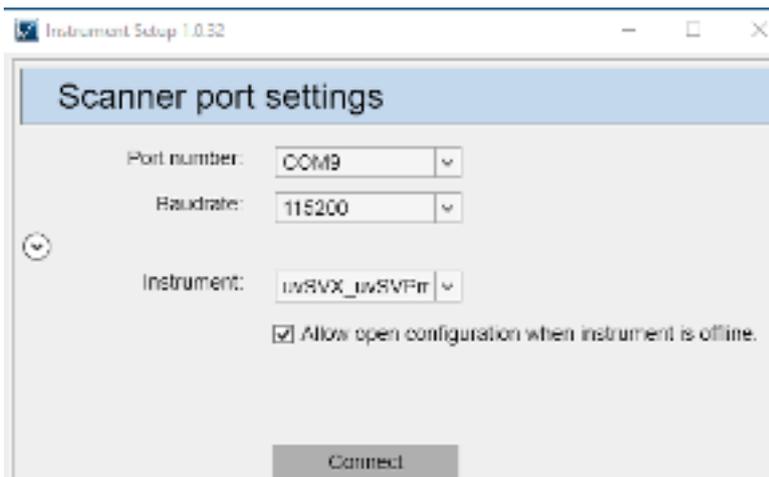
Use the drop-down lists to select your port, baud rate and Instrument SetUp file as required.



Click  the button.

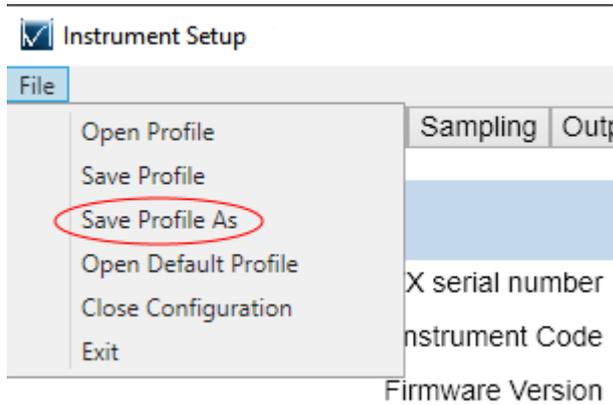
8.2.1.1 SetUp App Without an Instrument

If you do not have an instrument or would like to setup a configuration file to load into another instrument or in preparation for a future deployment select the tick box on the opening dialogue



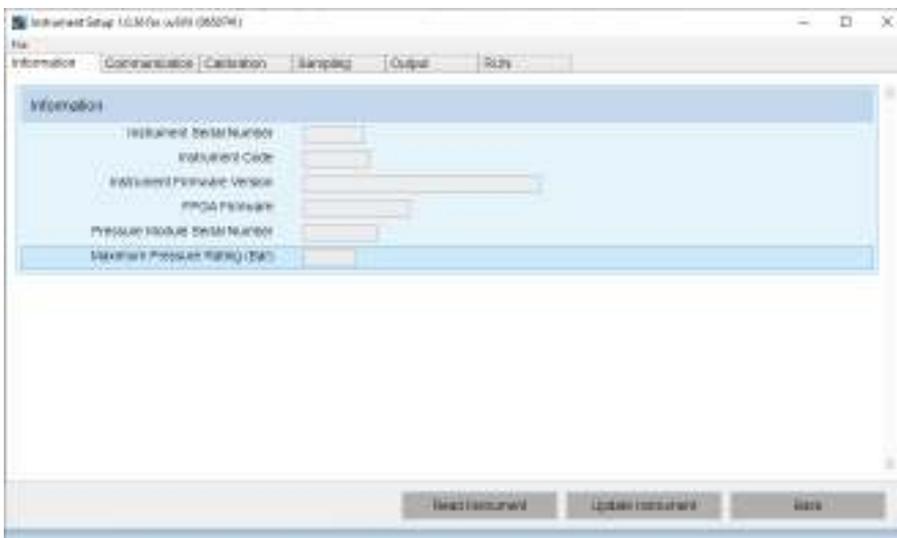
This will give you access to all the configuration options and allow you to store the SetUp file for later upload.

Once you have prepared the SetUp configuration use the File menu to store the configuration Profile



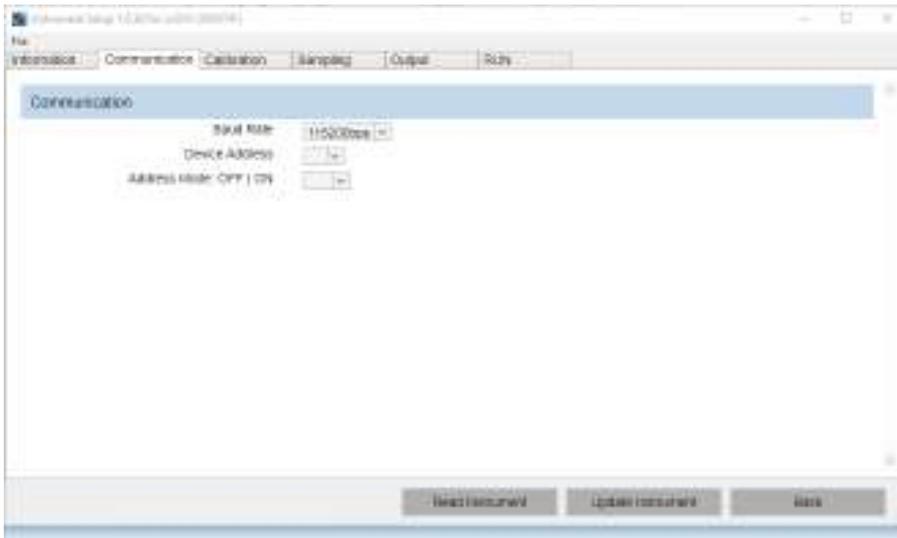
8.2.2 Configure the Instrument

The Information Tab will open. It contains read only fields that will display relevant information on the interfaced instrument

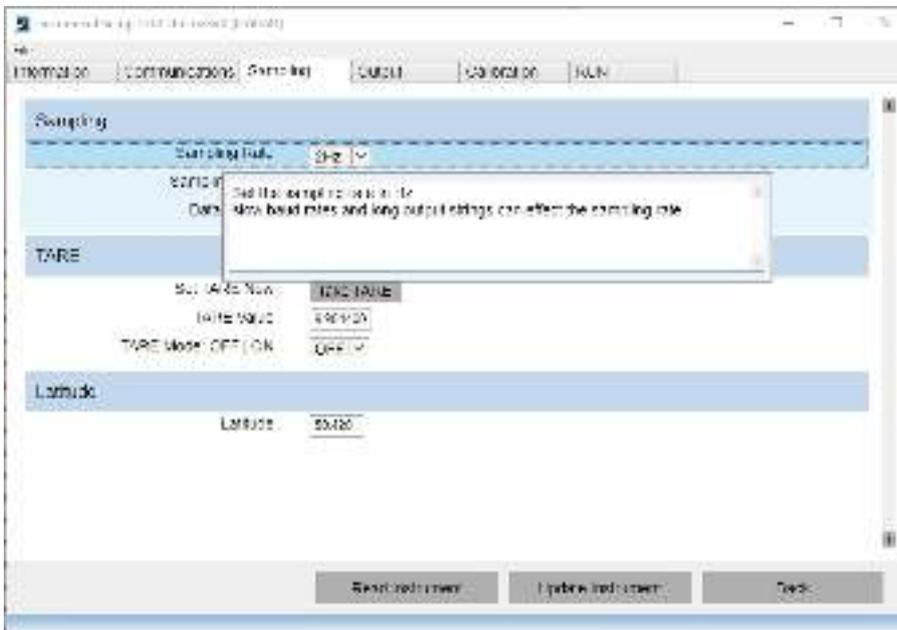


Press the button to interrogate the instrument to upload all the current settings

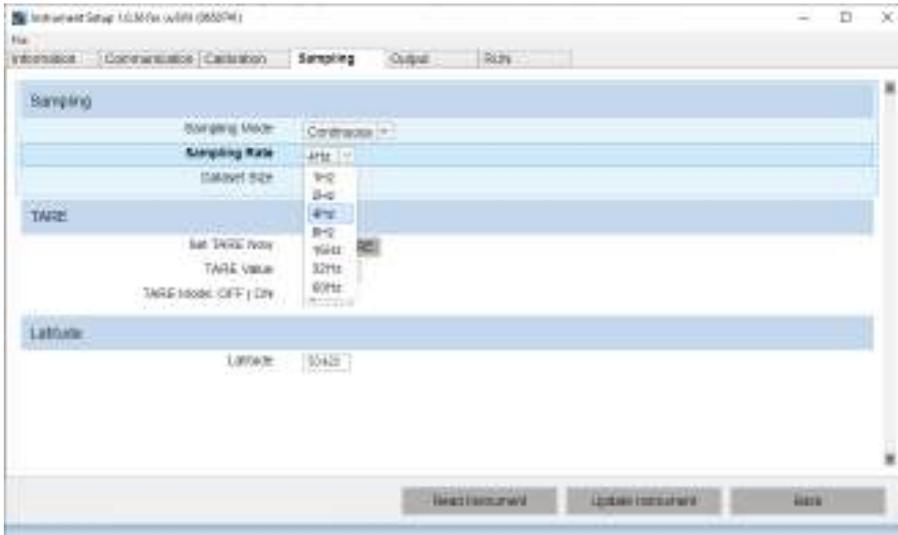
Click on the other Tabs to see relevant information and fine tune your set up, for example Communication:



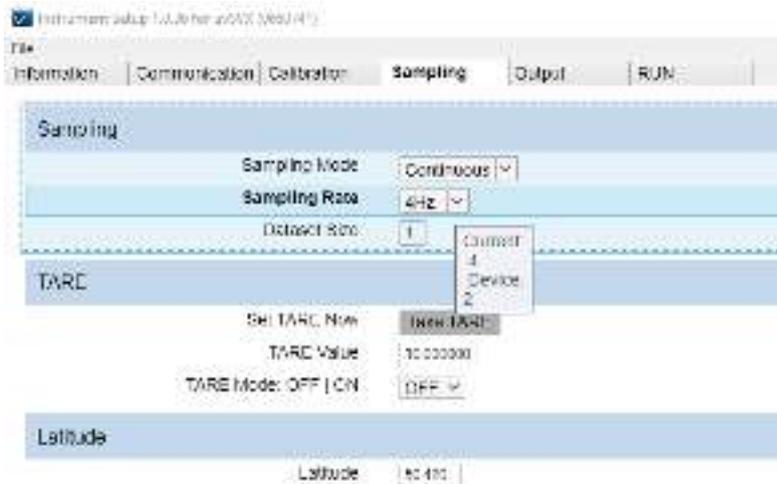
Hover over the label with your mouse to see the pop up information window on a particular field:



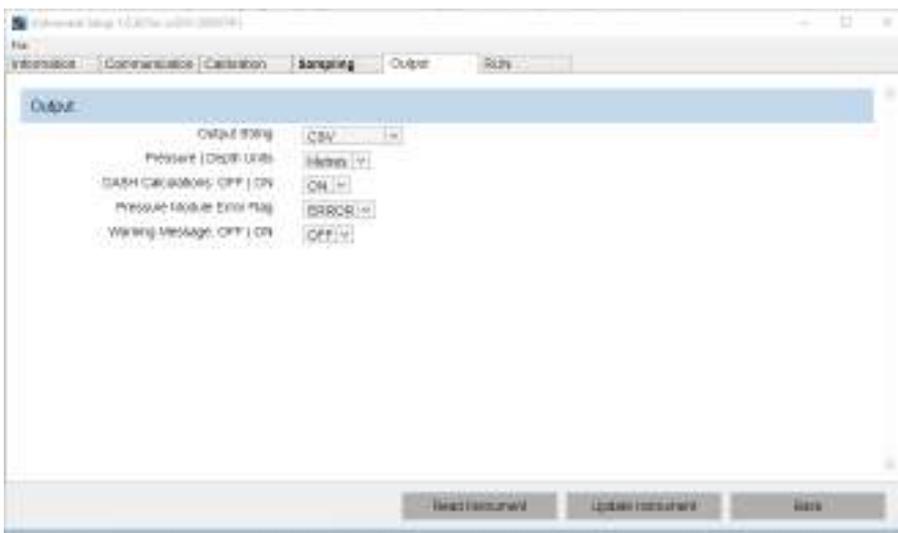
In the example below select a new Sampling Rate and the field label and Tab title will be bold to indicate the change.



Hover over the field you have just updated to see what the current setting is and what is set in the instrument (Device):



Select the Output Setup, output string, units, DASH calculations, messages



Once you have made all your changes configuration into the instrument

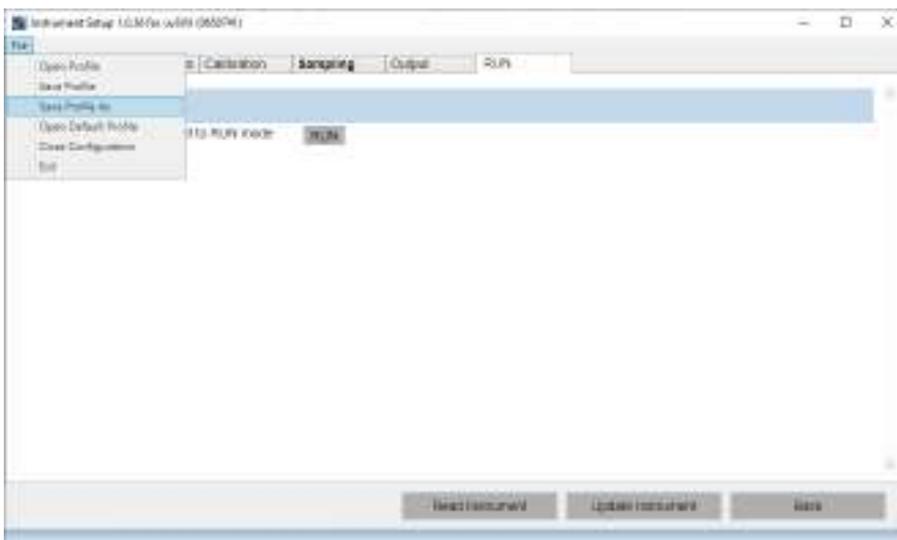
Update Instrument

press to upload the new

To set the instrument into a Run Mode select the RUN tab and click on the **RUN** button



If you would like to save the configuration for future use click on the File menu (top left) and save the Profile, file. You will use the same menu to open the file into the SetUp App to load into an instrument



9 Care & Maintenance

The uvSVX is remarkably robust, being primarily constructed of titanium. The only maintenance required, other than periodic recalibration as necessary or recommended at maximum of 2 years, is to keep the instrument and sensors as clean as possible. The instrument should be rinsed with freshwater when recovered and any debris or growth gently removed.

Do not attempt to remove the acetal Lock Screw Cap from the Pressure Module. If debris is caught under the cover attempt to remove it under slowly flowing water, **use no tools**. If this fails contact Valeport for further advice. If the sensor diaphragm is damaged in any way it will have to be replaced.

The instrument should be stored in its transit case when not in use. It is not necessary to remove the Interchangeable Pressure Sensor Module during storage.

Any damage to this diaphragm will render the Pressure Module warranty invalid

9.1 Calibration

The uvSVX may be returned to Valeport or one of its approved laboratories for recalibration:

Temperature

Pressure

Sound Velocity

Code	Description
#022	Sets the SV Calibration coefficients <div style="border: 1px solid red; padding: 2px; display: inline-block; float: right;">this function is password protected</div>
#023	Read the SV Calibration coefficients
#031	Sets the Calibration output mode for all readings #031;0 = raw #031;1 = calibrated <div style="border: 1px solid red; padding: 2px; display: inline-block; float: right;">this function is password protected</div>
#032	Read the Calibration mode
#085	Sets the User Pressure Calibration coefficients <div style="border: 1px solid red; padding: 2px; display: inline-block; float: right;">this function is password protected</div>
#086	Read the User Pressure Calibration coefficients
#087	Sets the User Temperature Calibration coefficients <div style="border: 1px solid red; padding: 2px; display: inline-block; float: right;">this function is password protected</div>
#088	Read the User Temperature Calibration coefficients
#138	Read the date for the last SV and Temperature Calibration
#203	Read the Pressure Sensor Gain Calibration
#204	Read the Pressure Sensor Offset Calibration
#223	Read the Pressure Sensor Calibration date
#501	Read the Calibration history for Temperature
#502	Reads the Calibration history for Sound Velocity
#510	Set the User Calibration activation status #510;0 = User Calibration OFF #510;1 = User Calibration ON (applied after conversion to feet or metres)
#511	Read User Calibration activation status

Sensors should be calibrated biennially

10 Ordering and Part Numbers

Part No.	Description
0650030-XX	uvSVX - RS232, RS485, Modbus Fitted with: 25mm Carbon composite time of flight SV sensor 0.01% accuracy Interchangeable piezo-resistive pressure sensor - Titanium diaphragm PRT Temperature Sensor Supplied with: Interface lead USB Y lead Operating manual and transit case
0650031-XX -eNET	uvSVXe - Ethernet Fitted with: 25mm Carbon composite time of flight SV sensor 0.01% accuracy Interchangeable piezo-resistive pressure sensor - Titanium diaphragm PRT Temperature Sensor Supplied with: Interface lead Ethernet Y lead Operating manual and transit case.
Components and Spares	
PTSAXX	Interchangeable Pressure Sensor Module (XX Bar)
06504320	uvSVX Pressure Module removal tool

XX denotes pressure transducer range - select from 10, 30, 50, 100, 200, 300, 400 or 600 Bar

11 EU Declaration of Conformity - CE Marking

Any changes or modifications to the product or accessories supplied, that are not authorised by 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

11.1 uvSVX



EU Declaration of Conformity

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

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

EMC Directive 2014/30/EU	Standards
EMC (Article 3.1b)	BS EN 61326-1:2013 (Basic Level)

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

Name:	James Bishop
Position:	Design Engineer
Place of issue:	Valeport Ltd, Totnes, UK
Date of issue:	28 February 2020
Signature:	

Valeport Limited
St. Peter's Quay, Totnes,
Devon TQ9 5EW UK

+44 (0) 1803 869292
sales@valeport.co.uk
www.valeport.co.uk

VAT No: GB 95 8753 87
Registered in England No: 1830444



11.2 Interchangeable Pressure Module



EU Declaration of Conformity

Manufacturer:	Valeport Ltd
Address:	St Peter's Quay, Totnes, Devon, TQ9 5EW
Certification marking:	CE
Product Description:	Interchangeable Pressure Sensor Module (IPSM)

We the manufacturer declare that the product **Interchangeable Pressure Sensor Module (IPSM)** is in conformity with the following EU Directives and harmonised standard(s):

EMC Directive 2014/30/EU	Standards
EMC (Article 3.1b)	BS EN 61326-1:2013 (Basic Level)

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

Name:	James Bishop
Position:	Design Engineer
Place of issue:	Valeport Ltd, Totnes, UK
Date of issue:	27 February 2020
Signature:	

Valeport Limited
St. Peter's Quay, Totnes,
Devon, TQ9 5EW, UK

+44 (0) 3865 882292
sales@valeport.co.uk
www.valeport.co.uk

01749 82 98 9793 87
Incorporated in England by 3000000

