# miniCTD and miniSVP (Direct Reading) - Operating Manual

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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

This manual covers the basic specifications, deployment and maintenance procedures for the:

- miniCTD-DR Direct reading CTD sensor
- miniSVP-DR Direct reading SVP sensor

The instrument can be controlled by sending commands directly, using a suitable terminal emulation program such as HyperTerminal.

The instrument is based on Valeport's existing “mini” sensor range. The product is available in either 500m rated acetal or 6000m rated titanium housing. The housing material has no effect on instrument function or operation. Where illustrations show plastic housing, it may be taken that the instructions apply equally to titanium housing, and vice versa.

The product has been designed to be simple to use and maintain, as well as being small and lightweight for easy handling and deployment.

# 2. SPECIFICATION

## 2.1. Dimensions:

| | Housing Ø | Sensor Bulkhead Ø | Overall Length |
|---|---|---|---|
| miniCTD-DR | 48mm | 54mm | 295mm |
| miniSVP-DR | 48mm | 54mm | 360mm |

## 2.2. Materials:

| Part | Material |
|---|---|
| Main housing | Titanium (6000m) or Acetal (500m) |
| Sensor bulkhead | Titanium (6000m) or Acetal (500m) |
| Conductivity Sensor (6000m) | Titanium structure, polyurethane coating, ceramic core |
| Conductivity Sensor (500m) | Acetal structure, ceramic core |
| Sound Velocity Sensor | Carbon Composite legs, Titanium Body, Ceramic Transducer |
| Temperature sensor | Titanium |
| Pressure sensor | Ceramic transducer behind polycarbonate window. |

## 2.3. Power:

| | |
|---|---|
| External | 9 – 28v DC input |
| miniCTD/SVP-DR | <250mW (20mA @12v) |

## 2.4. Connection:

Standard is SubConn type MCBH10F (MCBH6F prior to 2013)

In titanium on titanium housings, in brass on Acetal housings

Alternatives may be supplied on request

Wiring Information is here

## 2.5. Output:

Units are fitted with both RS232 and half-duplex RS485 communications as standard, selected by pin choice on the output connector. Protocol is 8 data bits, 1 stop bit, no parity, and no flow control.

Baud rate is factory set to 19200. User may choose between 2400, 4800, 9600, 19200, 38400, 57600, 115200. (Note that fast data rates may not be possible with low baud rates). Continuous output at 1, 2, 4 or 8Hz

Acoustic Frequency (miniSVP): Single sound pulse of 2.5MHz frequency.

## 2.6. Performance:

| Sensor | | miniSVP | miniCTD |
|---|---|---|---|
| Sound Velocity | Range | 1400 – 1600m/s | |
| | Accuracy | ±0.03m/s | |
| | Resolution | 0.001m/s | |
| Conductivity | Range | | 0 – 80mS/cm |
| | Accuracy | | ±0.01mS/cm |
| | Resolution | | 0.001mS/cm |
| Pressure | Range | 10, 50, 100, 300, 600Bar | 10, 50, 100, 300, 600Bar |
| | Accuracy | ±0.05% range | ±0.05% range |
| | Resolution | 0.001% range | 0.001% range |
| Temperature | Range | -5 to +35°C | -5 to +35°C |
| | Accuracy | ±0.01°C | ±0.01°C |
| | Resolution | 0.001°C | 0.001°C |

Certain features of the sensors used in the “mini” range are designed specifically to enable high quality data to be delivered:

| Sound Velocity (miniSVP) | |
|---|---|
| Carbon Composite Rods: | The carbon composite material used for the sensor spacer rods has been specifically selected to provide 3 features:<br>a) Excellent corrosion resistance<br>b) Very high strength<br>c) Virtually zero coefficient of thermal expansion<br>This last point is particularly important; accurate sound velocity measurement relies on measuring the time taken for a pulse of sound to travel a known distance. The material selected does not measurably expand over the operating temperatures of the instrument, ensuring the highest possible accuracy at all times. |
| Digital Sampling Technique: | Enables a timing resolution of 1/100th of a nanosecond, equivalent to about 0.5mm/sec speed of sound on a 25mm path sensor, or 0.125mm/sec on a 100mm sensor. In practice, the output is restricted to 1mm/sec resolution.<br>Linear sensor performance allows easy calibration. |
| Conductivity (miniCTD) | |
| Construction Materials: | The materials used in the Valeport Conductivity sensor have been specially chosen to resist compression at high pressure; This unique approach ensures that it performs within specification under even the harshest of field conditions. |
| Digital Sampling Technique: | A new digital sampling technique allows the Valeport conductivity sensor to operate with significantly less noise and greater long term stability than traditional inductive cells. |

# 3. DATA REQUESTS AND OUTPUT FORMATS

The miniCTD-DR respond to a series of text commands that are detailed here, for those users who wish to interface the products to other systems. Note that this list is not comprehensive, but will allow the standard functions of the instrument to be accessed. For more detailed information, please contact Valeport Ltd.

Notes

All commands must be confirmed using “Carriage Return” or “Enter” on the keyboard, with the exception of the “Stop” command (#).

All commands are echoed back by the instrument as they are typed

| Code | Followed By | Operation |
|---|---|---|
| # | | Interrupts instrument when running |
| | | |
| M | rate<CR> | Performs continuous measurement at set rate. If rate is omitted then instrument performs continuous measurements at previous rate: 1 ,2, 4 or 8 Hz |
| S | <CR> | Returns a single reading |
| | | |
| #001 | ;address<CR> | Sets the 485 address |
| #002 | <CR> | Returns the address |
| #004 | <CR> | Read header info |
| #005 | ;ON<CR> or ;OFF<CR> | Turns ON or OFF address mode |
| #006 | <CR> | Returns ON or OFF for address mode |
| #015 | <CR> | Returns last result |
| #026 | ;valeport_separator<CR> | Sets the Valeport output string separator (4 chars) |
| #027 | <CR> | Returns the Valeport output string separator |
| #028 | <CR> | Set the unit into run mode |
| #029 | <CR> | Read run mode |
| #032 | <CR> | Returns the software version number. |
| #034 | <CR> | Returns the units serial number |
| #039 | ;ModeValue<CR> | Set mode without putting unit into run mode where:<br>Mode = M or B<br>Value = 1,2,4 or 8 for Normal mode (M)<br>Value = 1,2,3,4 or 5 for Burst mode(B) |
| #040 | <CR> | Read operating mode. |
| #050 | ; ON<CR> or ;OFF<CR> | Turns on leading $ char (miniCTD only) |
| #051 | ;<CR. | Read leading $ mode (miniCTD only) |
| #059 | ;baud_rate<CR> | Sets the units baud rate 2400, 4800, 9600, 19200, 38400 |
| #082 | ;ON or OFF or 3 or 2 or CSV | Add decimal point into output string or CSV selects CT (when no pressure selected) |
| #091 | ;ON<CR> or ;OFF<CR> | Sets miniCTD startup mode. OFF=No readings at startup, ON=Readings at last rate at startup |
| #102 | ;ON or OFF<CR> | Sets 485 mode |
| #103 | <CR> | Sends 485 mode |

## 3.1. Data Formats

Real time data follows the format described below. Use #091 to control whether the instrument starts sampling as soon as power is applied or waits for command.

| | | | |
|---|---|---|---|
| miniSVP example | 10.351 | 21.488 | 1506.739 |
| miniCTD example | 10.147 | 26.519 | 23.146 |

The data separator is a tab (this may be altered if required).

For the miniCTD a leading $ can be added to the string using #050 command.

Data is presented in the order: Pressure, Temperature, SV/Conductivity

Pressure data format is dependent on sensor range, and may be any of the following. Leading zeroes are included, so it is a fixed length string:

PPPP.P (e.g. 0123.4 dBar)

PPP.PP (e.g. 012.34 dBar)

PP.PPP (e.g. 12.345 dBar)

The temperature data is given to 3 decimal places. Value is in °C and leading zeroes are included; signed if negative:

21.456

02.769

-01.174

Conductivity (miniCTD) is given in mS/cm, as a fixed length string with 3 decimal places, and leading zeroes if appropriate.

Sound Velocity (miniSVP) is given in m/s, as a fixed length string with 3 decimal places. In air, the sensor reads 0000.000

# 4. CARE AND MAINTENANCE

There are no user serviceable parts within the mini series. The instruments are remarkably robust, being primarily constructed of titanium. Maintenance that is required, other than periodic recalibration as necessary, is to keep the sensors as clean as possible.

## 4.1. Pressure Sensor

After deployment, use the tool supplied to carefully unscrew the pressure sensor protective cap, exposing the sensor diaphragm.

After deployment, use the tool supplied to carefully unscrew the pressure sensor protective cap, exposing the sensor diaphragm.

Rinse all parts in fresh water removing any growth or debris as necessary, but take exceptional care not to touch or damage the diaphragm itself.

Any damage to this diaphragm will render the instrument warranty invalid

## 4.2. SubConn Care

The following handling procedures should be adopted when using Subconn connectors:

The connector should not be exposed to long term heat or sunshine.

If this occurs, and the connectors are very dry, soak in fresh water before use.

Ensure the connectors are lubricated - the recommended lubricant is:

Loctite 8021 in a spray can

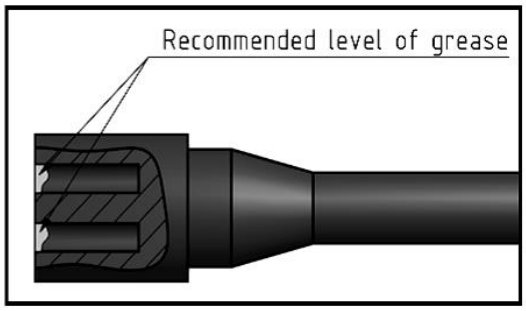
or

Molykote 44 Medium - but use very sparingly.

Any accumulation of sand or mud in the female contact should be removed with fresh water. Failure to do so could result in the splaying of the female contact and damage to the O-ring seals.

When using bulkhead connectors ensure that there are no angular loads as this destroys the connector.

### 4.2.1. Greasing and Mating Above Water (Dry Mate)




Connectors must be greased with Molykote 44 Medium before every mating

A layer of grease corresponding to minimum 1/10 of socket depth should be applied to the female connector

The inner edge of all sockets should be completely covered, and a thin transparent layer of grease left visible on the face of the connector

After greasing, fully mate the male and female connector in order to secure optimal distribution of grease on pins and in sockets

To confirm that grease has been sufficiently applied, de-mate and check for grease on every male pin. Then re-mate the connector

When disconnecting, pull straight, not at an angle

# 5. WIRING INFORMATION

Wiring colours are correct at the time the manual was printed. However, it is advised that continuity checks are performed prior to all terminations.

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

For systems fitted with 6 way SubConn (pre 2013):

| SubConn 6 pin male line (MCIL6M) | | 9 Way D Type | 4mm Banana Plugs | |
|---|---|---|---|---|
| Pin | Function | Pin | Pin | Wire colour |
| 1 | RS232 GND | 5 (Link to 1,6,8,9) | | |
| 2 | RS232 Tx (Out of sensor) or RS485A | 2 | | |
| 3 | RS232 Rx (Into sensor) or RS485B | 3 | | |
| 4 | +V | | Red Plug | Red, linked to Green inside D type |
| 5 | Link to Pin 1 for RS485. N/C for RS232 | | | |
| 6 (Link to pin 1 in sensor) | Power GND | | Black Plug | Black, linked to Brown inside D type |

For systems fitted with 10 Way SubConn (Post 2013)

| End 1: SubConn MCIL10M+DLSA-M 4Mt | End 2: Free End |
|---|---|
| Pin | Function |
| 1 | -V |
| 2 | +V |
| 3 | N/C |
| 4 | N/C |
| 5 | RS485 Enable |
| 6 | N/C |

For RS232 Communication, leave Pin5 on END 1 connector open
For RS485 Communication, link Pin5 to Pin9 on END 1 connector

Due to colour differences in supplied pigtails, no colours have been stated, therefore it is necessary to check colour to pin number

# 6. 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.

## 6.1. miniCTD - DR

## EU Declaration of Conformity

CE Marking

| | |
|---|---|
| **Manufacturer:** | Valeport Ltd |
| **Address:** | St Peter's Quay, Totnes, Devon, TQ9 5EW |
| **Certification marking:** | CE |
| **Product Description:** | miniCTD-DR (Direct Reading Profiler) |

We the manufacturer declare that the product **miniCTD-DR**, is in conformity with the following EU Directives and harmonized standard(s):

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

| **RoHS Directive 2011/65/EU** | **Standards** |
|---|---|
| Prevention (Article 4.1) | BS EN 50581:2012 |

| | |
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| **Position** | Development Engineer |
| **Place of issue:** | Valeport Ltd, Totnes, UK |
| **Date of issue:** | 10th May 2018 |
| **Signature:** | |

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## 6.2. miniSVP - DR

# EU Declaration of Conformity

CE Marking

| | |
|---|---|
| **Manufacturer:** | Valeport Ltd |
| **Address:** | St Peter's Quay, Totnes, Devon, TQ9 5EW |
| **Certification marking:** | CE |
| **Product Description:** | miniSVP-DR |

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

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

| **RoHS Directive 2011/65/EU** | **Standards** |
|---|---|
| Prevention<br>(Article 4.1) | BS EN 50581:2012 |

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