VALEPORT LIMITED

miniSVP/CTD – 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.

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 SPECIFICATIONS

Dimensions:

	Housing Ø	Sensor bulkhead Ø	Overall length
miniCTD-DR	48mm	54mm	295mm
miniSVP-DR	48mm	54mm	360mm

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.

Power:

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

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 in Section 4

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.

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: a) Excellent corrosion resistance b) Very high strength c) Virtually zero coefficient of thermal expansion 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. 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 Mode = M or B Value = 1,2,4 or 8 for Normal mode (M) 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

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. The only maintenance required, other than periodic recalibration as necessary, is to keep the sensors as clean as possible.

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

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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.

1.1 SUBCONN CARE

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

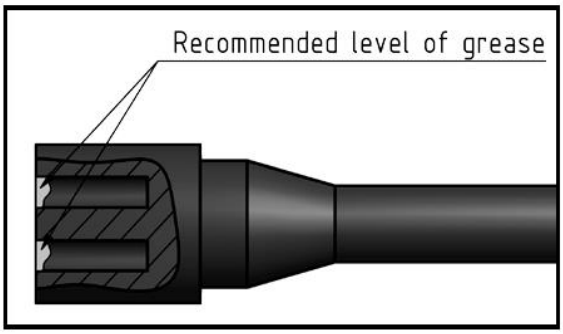
- The connector should not be exposed to long term heat or sunshine.
- If this occurs, and the connectors are very dry, soak in fresh water before use.
- Ensure the connectors are lubricated - the recommended lubricant is:

  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.

1.2 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)		**Function**	**9 Way D Type**	**4mm Banana Plugs**	
Pin	**Wire Colour** (See note 1)		**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

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

For systems fitted with 10 Way subconn(Post 2013)

END 1: 10Way Male SUBCONN			**END 2: Free End**		**FUNCTION**
CONNECTOR	WIRE COLOUR	PIN	CONNECTOR	PIN	
SUBCONN MCIL10M+DLSA-M 4Mt	BLACK	1			-V
	WHITE	2			+V
	RED	3			N/C
	GREEN	4			N/C
	ORANGE	5			RS485 Enable
	BLUE	6			N/C
	WHITE/BLACK	7			RS232 Tx (Out of sensor) / RS485A_Inv
	RED/BLACK	8			RS232 Rx (Into sensor) / RS485B_Non-Inv
	GREEN/BLACK	9			RS232 GND
	ORANGE/BLACK	10			N/C

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