MIDAS CTD+
Operating Manual

Document Ref: 0606829a
Date: Wednesday, November 21, 2018

Valeport Limited
St Peters Quay
Totnes
Devon, TQ9 5EW

Tel: +44 1803 869292
e mail: sales@valeport.co.uk | support@valport.co.uk
Web: www.valeport.co.uk

United Kingdom

1. Introduction

This section of the manual describes the specification, construction, wiring diagrams and basic maintenance procedures of the Valeport MIDAS CTD+ Multi-Parameter CTD, including the optional additional sensors and water sampling system.

The MIDAS CTD+ system consists of the following components:

- Titanium housed instrument with bulkhead mounted sensors
- Stainless steel deployment cage
- 3m Y lead (interface to PC)
- Switching Plug
- Basic maintenance tools and spare o-rings
- DataLog Pro Software
- Operating Manual
- Transit case

In addition, the following components may be supplied as optional extras:

- Additional remote sensors with interface cables
- RS485 communications adaptor
- RS422 communications adaptor
- FSK modem communications adaptor (includes PCB in instrument)
- Various lengths & types of signal cable are also available

Please refer to Section 2 of this manual for details of software operation.

2. Specifications

2.1. Sensor Specifications

The unit is fitted with the following standard sensors:

Conductivity	Type:	Pressure balanced inductive coils
	Range:	0.1 to 80 mS/cm
	Accuracy:	± 0.01mS/cm
	Resolution:	0.004mS/cm
Pressure	Type:	Strain Gauge
	Range:	20Bar absolute (approx 200m water depth) as standard, others available on request
	Accuracy:	± 0.1% Full scale
	Resolution:	0.005% Full scale
Temperature	Type:	Fast response PRT
	Range:	-5 to +35°C
	Accuracy:	± 0.01°C
	Resolution:	0.002°C

2.2. Optionally Fitted Sensors

The following sensors may be optionally fitted:

	Turbidity	DO	pH	Redox (ORP)	PAR
Type:	Seapoint	Oxyguard	Pressure Balanced Electrode	Pressure Balanced Electrode	BioSpherical See manufacturer's datasheet
Range:	0 to 2000FTU (max)	0 to 200%	2 to 12	0 to 1000mV	
Accuracy:	± <2% to 750 FTU	±1% of measured value	± 0.1	± 0.1mV	
Resolution:	0.005% FS	0.005% sat	0.001	0.01	

Note that all these sensors give an analogue output signal (either volts or amps) as standard – the accurate measurement of this signal is the function of the primary sensor calibration, which is given in the calibration section of this manual. This primary calibration has a high level of long-term stability, and should not need to be rechecked any more often than the conductivity, temperature or pressure sensors – typically every one or two years depending on the customer's own requirements.

However, this primary data output may be subjected to a secondary, or "User" calibration within the instrument, so that the output is converted into engineering units, for example mg/l. Details of how to perform these User calibrations are given in a separate manual.

2.3. Mechanical Specifications

2.3.1. Instrument

2.3.1.1. Materials

Housing:	Titanium or Acetal
Exceptions:	Conductivity Cell, DO Sensor, Turbidity Sensor and pH Sensor use Acetal. Temperature Sensor uses Stainless Steel (316 grade). Redox and pH use glass electrodes.
Cage:	Stainless steel (316 grade) with polypropylene clamping brackets
Dimensions:	Instrument - 88mm Ø, 665mm long (including connector)
	Cage – 750mm long x 140mm x 120mm
Weight (in cage):	20kg Titanium (air), 8.5kg (water) 12kg Acetal (air)
Depth Rating:	6000m Titanium (unless shallower rated pressure sensor fitted) 500m Acetal

2.3.1.2. Connectors

Instrument:	10 pin female SubConn bulkhead type with lock ring, data and power
Comms Cable:	Valeport 3m Y lead. 10 pin male SubConn line type to instrument, 2 x 4mm banana plugs to external power, 9 pin female D type to PC.
Switching Plug:	10 pin male SubConn line type, with lock ring. Note that the switch cap contains wiring links to activate the instrument – it is not a dummy plug.

2.3.2. Water Sampling System

2.3.2.1. Motor System

Housing:	Pressure balanced perspex and stainless steel. Device filled with Fluorinert FC-77 to provide pressure balancing
Motor:	Brushed DC motor
Power:	10vDC input, drawing 25mA when running
Positioning:	Rotor position detected by optical switches

2.3.2.2. Rosette Frame

Materials:	316 grade stainless steel.
Dimensions:	assembled size is 92cm diameter x 1.7m high
Fittings:	Provision for 12 x 2.5litre water bottles, 1 x Valeport MIDAS CTD+ CTD, 1 x WS Envirotech EcoLab system.
Weight:	48kg (excluding instruments and bottles)

2.3.2.3. Sample Bottles

Materials:	PVC
Volume:	2.5litre
Weight:	2kg

2.4. Performance Specifications

Memory:	8 Mbyte solid state memory (upgradeable in 8 Mbyte steps to 32 Mbyte)
Internal Power:	8 x 1.5V alkaline D cells. The unit will accept 8 x 3.6V Lithium D cells with no alterations required. Do not mix battery types
External Power:	Between 8 and 30V DC
Current Drain:	Depends on sensors fitted. CTD only uses 50mA at 12V when running, and 0.25mA when in sleep mode
Sampling Rate:	1, 2, 4 or 8Hz (synchronised)
Data Output:	RS232, RS485 or RS422, depending on pin selection. Baud rate is user selectable from 2400 to 115200

2.5. Sample Lifetime Calculations

2.5.1. Based on Memory

Lifetime based on memory is simple to calculate. Conductivity, Temperature, Pressure, Turbidity, DO and pH values use 2 bytes of memory per sample. Therefore total memory used per record is (6 x 2) = 12 bytes. Note that in Trip mode, each record is also assigned a date/time stamp, which uses a further 7 bytes.

The 8 Mbyte memory actually contains 8,388,608 bytes. Allowing a small amount of memory usage for header files, the memory will store over 430,000 records in Trip sampling mode, and over 1 million records in all other modes.

The length of time that this will last for obviously depends on sampling scenario. Here are three examples:

2.5.1.1. Continuous Data Sampling - 8Hz

Memory used per second is 8 x 12 bytes = 96 bytes.

Total memory fitted is 8,388,608 bytes.

Number of seconds before memory full is 8,388,608 / 96 = (approx) 87,381 seconds.

This is equivalent to 24 hours.

This period can be doubled by sampling at 4Hz.

2.5.1.2. Burst Sampling - 4Hz (sampling for 1 minute every 10 minutes, recording all data points)

Memory used per burst is 12 bytes x 4Hz x 60 seconds = 2880 bytes.

The memory will therefore be full after 8,388,608 / 2880 bytes = 2912 bursts. At a 10 minute cycle time, this is 29120 minutes, which is equivalent to 20 days.

2.5.1.3. Trip Sampling - 6000m Cast (measurement every 1 metre)

In this example, the instrument will take 1 reading every metre of both descent and ascent. This means 6000 data points descending, and a further 6000 ascending. Each record consists of 12 bytes of data and 7 bytes of time stamp. Each record therefore uses 19 bytes. A single cast will take 12,000 such records and will, therefore, use 228,000 bytes.

The 8Mbyte memory will therefore hold approximately 35 casts of data.

2.5.2. Based on Batteries

The MIDAS CTD+ will function with a voltage supply of between 9 and 30VDC. The voltage output of the 8 x D cell battery pack will vary according to the type of cell fitted. The most likely cells to be used will be standard alkaline type (1.5V each) or Lithium cells (3.6V each), giving a 12V nominal output for alkaline cells, or 28.8V nominal for Lithium cells. The following calculations are based on the same sampling scenarios as the memory calculations, using figures for a 12V alkaline battery pack. Each example also gives a figure for a Lithium battery pack, calculated from a basic ratio of alkaline to Lithium performance.

In all examples, it is taken that an 8 D cell alkaline battery pack will have a nominal capacity of 14Ah, and will be 75% efficient (total available charge, 10.5Ah), and that an 8 D cell Lithium pack will have a nominal capacity of 17.5Ah, and will be 95% efficient (total available charge, 16.6Ah).

Note:	the following examples are intended as guides only. Valeport accepts no responsibility for variation in actual performance

Note:	the performance of individual battery cells is not always consistent

2.5.2.1. Continuous Data Sampling - 8Hz

At 12V, the instrument will draw approximately 60mA when sampling, with DO, pH and turbidity sensors fitted.

Total charge available is 10500mAh.

Number of hours available is therefore 10500mAh / 60mA = 175 hours.

This is equivalent to just over 7 days.

For Lithium cells, a similar calculation gives over 27 days.

Note that the instrument is effectively operating continuously when in Trip sampling mode, so similar calculations will apply.

2.5.2.2. Burst Sampling - 4Hz (sampling for 1 minute every 10 minutes)

At 12V, instrument draws 60mA when sampling, plus 60mA for 5 seconds at the start of each burst. It draws 0.25mA when in sleep mode between bursts.

In this scenario then, the instrument will draw 60mA for 65 seconds, and then 0.25ms for 535 seconds. On average, it will draw:

$$\frac{(60 * 65) + (0.25 * 535)}{(65 + 535)} = 6.72\text{mA}$$

Total charge available is 10500mAh.

Number of hours available is therefore 10500mAh / 6.72mA = 1562 hours.

This is equivalent to approx 65 days.

For Lithium cells, a similar calculation gives approx 156 days.

3. Installation

The MIDAS CTD+ system is supplied in an ABS transit case, together with any communications adaptors ordered. Any additional lengths of signal cable are packed separately.

3.1. Communications With PC

The MIDAS CTD+ can be set up and interrogated using the DataLog Pro software supplied. Please refer to separate manual for details of how to use the software.

To connect the instrument directly to a PC for RS232 communications, use the 3m Y lead supplied. This lead is fitted with a 10 pin SubConn type connector, which should be plugged directly into the connector on the top of the housing (or to a length of signal cable). The lead also features 2 x 4mm banana plugs for application of external power if required and a 9 way D type connector which should plug directly into a spare comm port on the back of the PC.

If non-RS232 communications are to be used, via the optional RS485, RS422 or FSK methods, then the appropriate adaptor should be used. Each adaptor is supplied with a switched 3m Y lead (different to the standard RS232 Y lead), which should be connected as follows:

Comms Method	Adaptor Part no.	Connections
RS485	0400029	Connect 15 pin D type and 4mm plugs from Y lead into adaptor. Connect 9 pin D type from adaptor to PC, and 4mm plugs from adaptor to external power, as indicated on adaptor housing.
RS422	0400030	Connect 15 pin D type and 4mm plugs from Y lead into adaptor. Connect 9 pin D type from adaptor to PC, and 4mm plugs from adaptor to external power, as indicated on adaptor housing.
FSK	0400005	Connect 4mm plugs from Y lead into adaptor, leaving D types unconnected (FSK uses power and signal on just two wires). Connect 9 pin D type from adaptor to PC, and 4mm plugs from adaptor to external power, as indicated on adaptor

3.2. Deploying the MIDAS CTD+ on its Own

All parts of the standard system (with the exception of the top part of the 3m Y lead) are designed for immersion. All communications adaptors (RS485, RS422, FSK) are splash proof, but should be sited in a dry place, as close to the PC as possible.

The MIDAS CTD+ is supplied with a stainless steel protective cage, but care should still be taken not to damage the instrument. For profiling work, the recommended deployment method is to suspend the instrument using the stainless steel wire strop. For fixed deployments, the user may wish to remove the steel cage, and use the grooves in the titanium instrument housing as clamping points.

3.2.1. Real Time Operation

For real time data output, connect the signal cable to the 10 pin SubConn connector on the instrument. All Valeport signal cables include a suspension point for strain relief, and a similar arrangement is recommended for other cable types. Connect the top end of the cable to a PC using the appropriate method as described above.

3.2.2. Self Recording Operation

For self recording only deployments, the instrument is switched on by insertion of the SubConn style switch plug. This plug must be inserted for the unit to operate.

3.2.3. Recovery

On recovery, data can be extracted to PC via the 3m Y lead. This is covered in Section 2.

To prolong the lifetime of the instrument the following procedures should be carried out once the instrument has been recovered:

- Remove any significant growth from the instrument, taking care not to damage any of the sensor faces. A high pressure water jet or stiff (not metal) brush is recommended.
- Remove any significant growth from the pressure sensor port. Take care not to introduce any sharp objects onto the sensor face – this may result in sensor damage.
- Check instrument for signs of damage.
- Rinse the instrument in fresh water
- Dry the instrument if possible, paying particular attention to the sensors and connector.
- Repack the instrument in the transit cases provided.

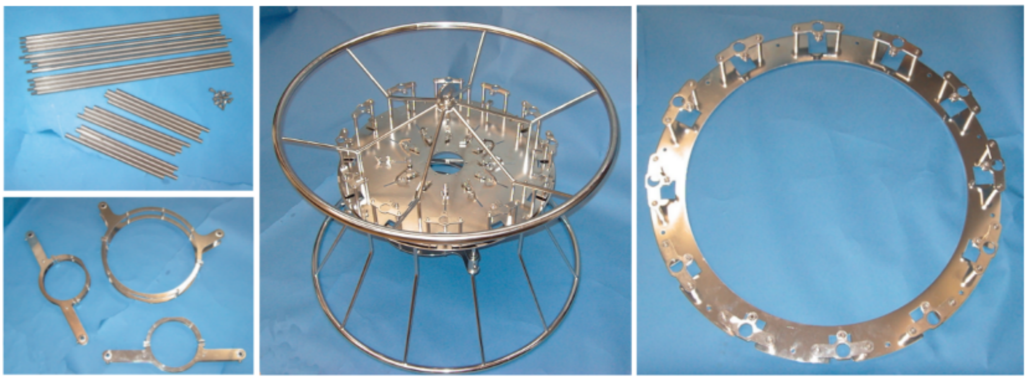
3.3. Deployment Of The Water Sampler System

3.3.1. Assembly

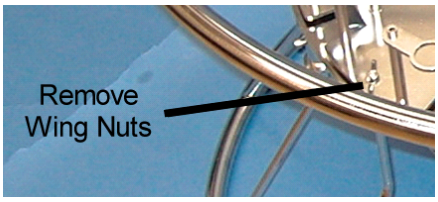
The water sampler system is supplied in kit form, and must be assembled prior to use. The procedure should take no more than 30 minutes. All required tools are provided.

Unpack the frame from the packing case, and remove all the packaging materials. The following components should be present, as illustrated:

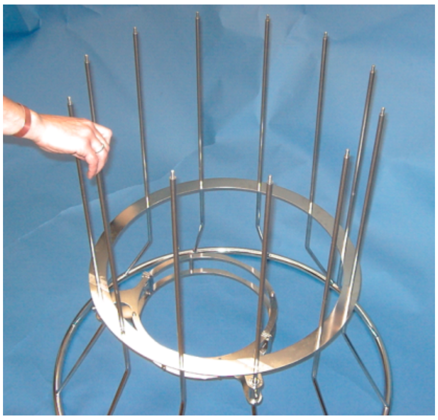
12x	40cm stainless steel rods
12x	20cm stainless steel rods
12x	M5 stainless steel screws
1x	stainless steel bottle mounting ring
1x	combined top & bottom frame
2x	150mm diameter clamping rings for MIDAS CTD+
2x	310mm diameter clamping rings for EcoLab (1 packed separate, 1 fixed to bottom frame)
1x	motor assembly (not illustrated)



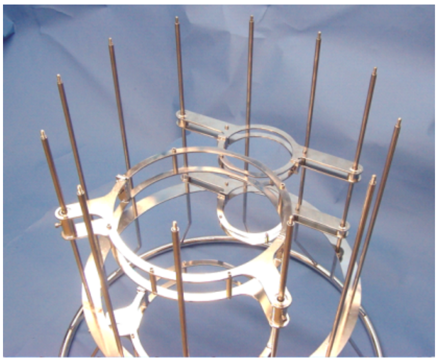
Begin by separating the top and bottom frames, by undoing the wing nuts holding them together:



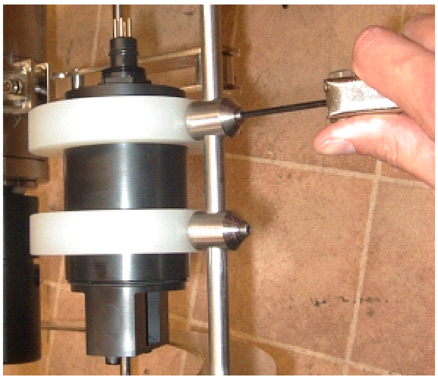
Screw the 12x 40cm stainless steel rods onto the bottom frame, tightening as much as possible.



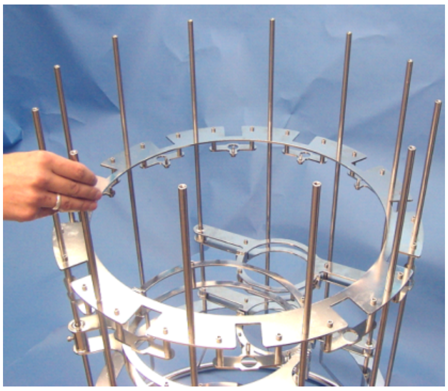
Lower the instrument clamping brackets onto the rods. The larger EcoLab bracket should be positioned vertically above the bracket that is already in place. The smaller MIDAS CTD+ brackets should be positioned directly opposite the EcoLab brackets, vertically above each other.

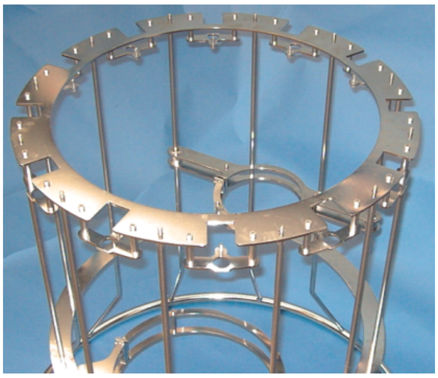


Also note that the MIDAS CTD+ is supplied with a fluorometer; the clamping brackets for this should be fitted to one of the rods at this time.

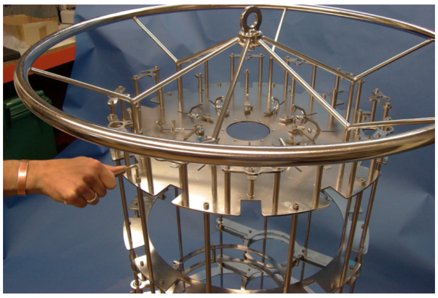


Next, place the bottle mounting ring on the rods, taking care to position it the right way up. The thread on the top of the rods should fit through the holes in the ring. Then, screw the 20cm rods in place as shown, tightening as much as possible.

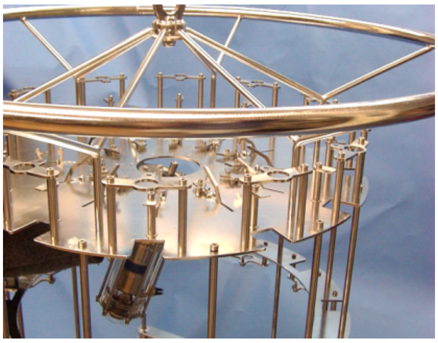




Now, position the top frame on the rods, and secure in place with the M5 screws, using a 4mm Allen key.



The motor system is pressure balanced, and contains a liquid called Fluorinert. It is important that the motor housing contains little or no air bubbles, as this will affect the pressure balancing capabilities of the housing. If there are air bubbles visible in the housing, the Fluorinert must be replenished, using the procedure described in Section 4.3 of this manual.



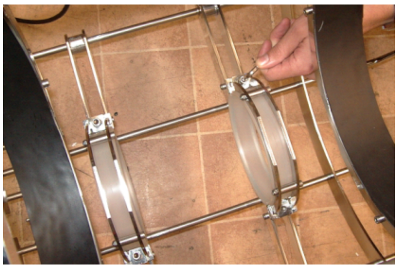
Position the motor underneath the top frame, so that the mounting holes align. The rotor arm may need to be removed to allow this. Secure in place with the screws provided.

If the rotor arm is loose, it must be secured in the correct position. To do this it is necessary to communicate with the instrument using the software. This procedure is therefore described in the software manual.

Assembly of the frame is now complete.

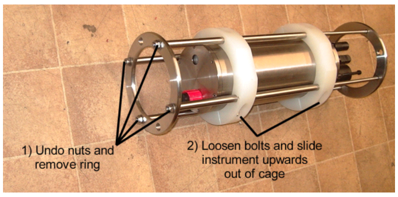
3.3.2. Fitting Instruments to the Frame

It is easiest to fit the MIDAS CTD+ by laying the frame on its side. Use the locking screws to tighten the lower clamping bracket onto the frame, and loosen the upper clamping bracket.



Each clamping bracket is made of two half-clamps. These should be separated by undoing the screws as shown:

The MIDAS CTD+ is shipped in a separate frame, which may be used for deploying the instrument on its own if required.



The instrument must be removed from this frame to allow it to fit into the water sampler frame.

Remove the instrument from its frame as shown in the picture.

Gently place the MIDAS CTD+ into the clamping brackets on the water sampler frame, with the sensors towards the bottom of the frame. Slide the upper bracket so that the clamps fit into the grooves in the instrument housing. Fix the upper bracket tightly to the frame. Now replace the other half of the clamps, and screw into place.

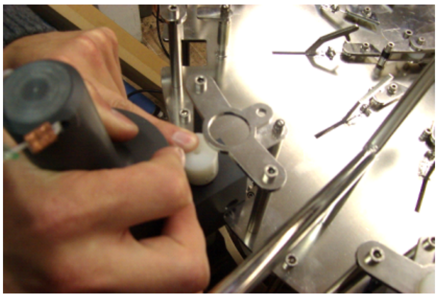
Repeat this procedure to fit the EcoLab system into the large clamps.

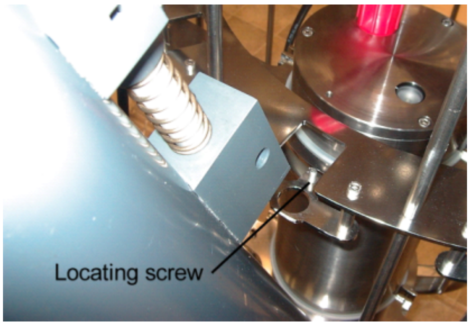
Using the lead supplied, connect the instrument to the motor unit. The lead may be held to the frame by means of cable ties.

3.3.3. Loading The Water Bottles

The motor and frame are designed to work with 12 x 2.5 litre water bottles. The bottles should be fixed to the frame as follows.

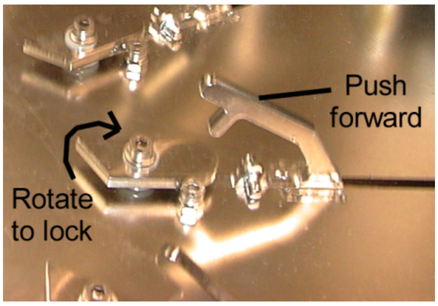
Locate the hole in the mounting block of the bottle onto the screw of the bottle mounting ring, as shown, and then depress the white plunger. This allows the top of the bottle to slide into place in the top part of the frame. The white plunger is spring loaded, and should release into the hole in the frame, locking it in place.





Arm the bottles using the following procedure:

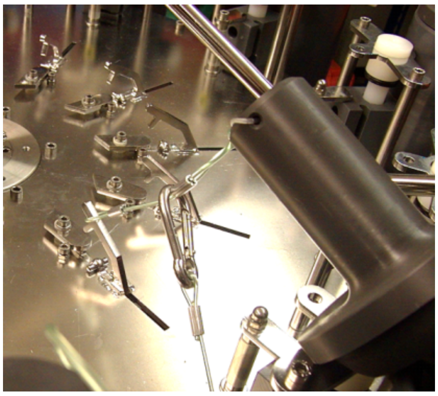
Push forward the release lever, and secure in place with the rotating plate.



Carefully lift the top cap of the water bottle, and hook the loop of nylon cord over the end of the release lever.

Then, carefully disengage the bottom cap of the water bottle, and use the spring shackle to secure the nylon cord to the top nylon cord as shown. Ensure that the shackle goes over the whole cord, and not through it.

Repeat for each bottle.



Finally, to prepare the bottle for deployment, ensure that the tap on the side of the bottle is pulled out as far as the stop will allow, and that the release screw on the top of the bottle is tightly secured.

3.3.4. Releasing the Water Sample

To release the water sample after the deployment, place a small hose over the tap, leading to the desired container. Push the tap into the bottle as far as the stop will allow, causing a small amount of water to be ejected. Release the remainder of the sample by slowly release the screw on the top of the bottle. This allows the water to drain out of the tap under atmospheric pressure.

4. Maintenance

The MIDAS CTD+ Multi-Parameter Logger with CTD is completely solid state, and therefore requires very little maintenance. Other than performing calibration routines on the sensors (detailed in a separate document), the user will need to keep the instrument relatively clean, and to change the batteries. This Chapter also covers details of the o-rings that are fitted to the instrument, and which should be checked regularly for damage and replaced if necessary.

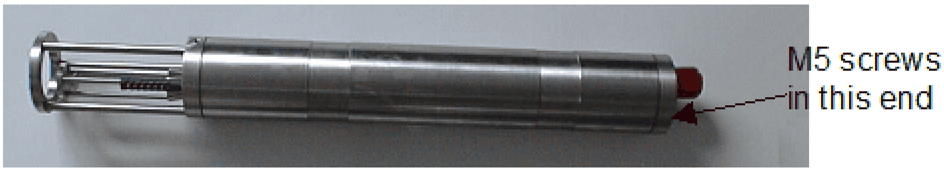
4.1. Changing Batteries

The MIDAS CTD+ Multi-Parameter Logger accepts 8 x D cells, of either 1.5V alkaline or 3.6V Lithium type. These cells are arranged in series, so the output voltage is 12V (alkaline) or 28.8V (Lithium). Some example scenarios for lifetime of these batteries are given in Chapter 2.4.2.

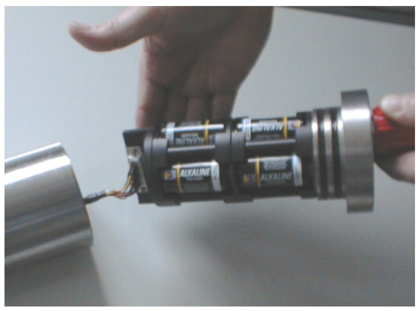
The batteries are located in a holder in the top of the instrument, and should be accessed by removing the connector bulkhead.

1. Remove the instrument from the protective cage by loosening the M10 nuts on the polypropylene clamps. Gently lever these clamps apart, using a screwdriver if necessary.

2. Slide the instrument out of the cage, in either direction.



3. Remove the 3 M5 x 20 socket cap screws in the connector bulkhead, using the Allen key provided. Note that these screws are titanium, and should be replaced with titanium screws if lost. Other materials may suffer galvanic corrosion and may be destroyed.



4. Without twisting or putting undue stress on the SubConn connector slide the bulkhead and attached battery pack out of the main housing. A slot between the tube and the bulkhead allows levering with a screwdriver if necessary. Take care not to scratch the bore of the tube.

5. A lead connects the battery pack to the electronics inside the tube. This may be disconnected at the battery pack if required, for ease.

6. Replace the batteries.

7. Check the condition of the bore seal o-rings and apply a light coating of silicon grease. Ensure that they sit in the groove correctly, and are free from damage. Replace them if necessary.

8. Reattach the connector to the electronics if necessary, and gently slide the battery pack back into the tube, ensuring that the fixing holes are correctly aligned. Again, take care not to scratch the bore.

9. Replace the 3 x M5 titanium screws, using a small amount of copper grease (supplied). Do not force the screws, just tighten firmly.

10. Finally, slide the instrument back into the protective cage. Note that the clamping brackets are offset, and that the sensor end of the instrument should lie at the long end of the cage.

4.2. O-Ring Sizes

The MIDAS CTD+ Multi-Parameter Logger with CTD is kept watertight by using o-ring seals. Double o-ring seals are used at each end of the titanium housing, although the customer should have no reason to open any seal other than that at the battery end. To help preserve the watertight nature of the equipment, please observe the following guidelines:

- Ensure that all o-rings are free from cuts, abrasions or perishing.

- Ensure that all-o-rings are free from dirt, grit, sand, hair and other foreign objects.

- Whenever an o-ring seal is opened (e.g. when changing batteries), ensure that a light coating of silicon grease is applied to the o-ring before the seal is closed.

- Ensure that all o-ring protected seals are tightened.

A set of spare o-rings is included with the equipment. If an o-ring needs replacing, be sure to use the correct size. If obtaining further spare o-rings from an alternative source, be sure to obtain the correct material (signified by the last 4 digits of the o-ring code number).

O-ring size:	200-158-4470
Anti-Extrusion ring size:	158

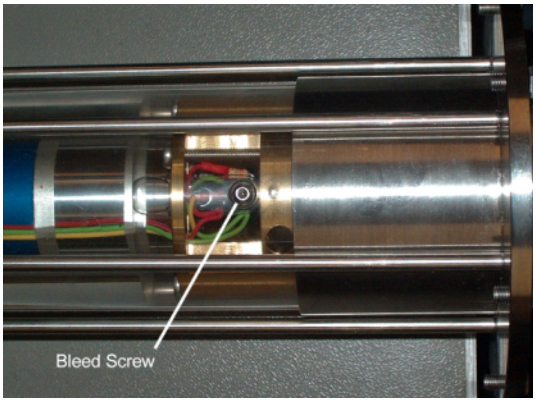
4.3. Replenishing Pressure Balance Fluid in Motor Housing

The Motor housing for the water is pressure balanced using a liquid called Fluorinert FC-77. This is a very inert, non-toxic fluid. It is very important that there are no significant air bubbles in this fluid, since this will affect the pressure balancing of the housing, and may result in damage.

If there are air bubbles present, lay the housing horizontal, and position it such that the air bubbles are directly beneath the bleed screw shown.

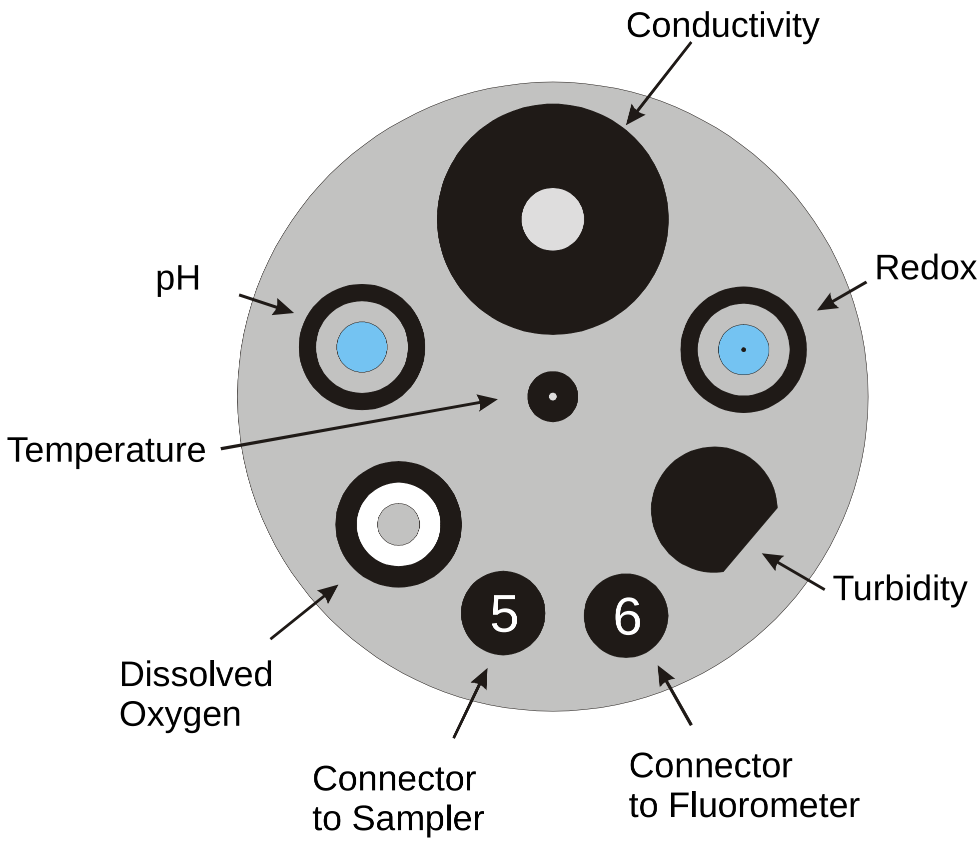
Remove the bleed screw, and using the syringe supplied, fill the housing with Fluorinert (approx 200ml are supplied for this purpose).

When the housing is full, refit the bleed screw and tighten.



5. Sensor Information

The view onto the end of a fully specified MIDAS CTD+ is as below. Note that not all sensors may be fitted to a specific unit.



Notes:

Redox, pH and Temperature sensors are protected by plastic guards. These guards may be unscrewed for cleaning or calibration purposes, but should be replaced prior to deployment.

The pH and Redox sensors are fitted with a protective rubber cap, which is used to prevent the sensor from drying out. A small amount of reference solution should be put into the cap before it is fitted for storage.

The pH and Redox sensors are filled with an electrolyte via a small hole in the side of the glass tube. This hole is sealed with a rubber ring, which should only be moved if the sensors are being refreshed.

The Dissolved Oxygen sensor is fitted with a protective plastic cap, which should be removed prior to deployment. Note also that this cap contains a small sponge, which should be kept moist with reference solution during instrument storage.

If a Valeport Hyperion Turbidity sensor is fitted it will be via a connector and not fitted to the bulkhead as shown above.

5.1. Optionally Fitted Sensors

For optionally fitted sensors please see the specific manuals:

For the latest manuals please download from the following websites:
Valeport Hyperion Fluorometer: www.valeport.co.uk/Support/Manuals
SeaPoint Turbidity Meter: www.seapoint.com/pdf/stm_um.pdf
OxyGuard D.O. Profile: www.oxyguard.dk/products/probes/do-profile-2/

6. Wiring Information

6.1. 3m Y Lead (RS232)

10 Way Male SubConn	4mm Banana Plugs	9 Way D Type	FUNCTION
1	BLACK		Power Ground
2	RED		Power +V
3			
4			
5			
6			
7		2	RS232 Tx (To PC)
8		3	RS232 Rx (From PC)
9		5 (link to 1,6,8,9)	RS232 Ground
		SHELL	
10			Internal Battery Enable Link to RS232 Ground

6.2. Remote Fluorometer Flylead

END 1: 6 WAY MALE SUBCONN MCIL6M + LOCKING SLEEVE	END 2: IMPULSE AG306	FUNCTION
PIN	PIN	
1	1	PWR GND
4	2	SENSOR SIG (0-5v)
5	3	SIG GND
2	4	SENSOR PWR (10v)
6	5	GAIN CTRL A
3	6	GAIN CTRL B

6.3. Water Sampler Motor Flylead

END 1: 5 WAY MALE SUBCONN MCIL5M + LOCKING SLEEVE	END 2: 5 WAY FEMALE SUBCONN MCIL5F + LOCKING SLEEVE	FUNCTION
PIN	PIN	
1	1	Motor +10V
2	2	Motor 0V
3	3	+5V Sensor
4	4	0V Sensor
5	5	Sensor O/P

7. Warranty

Thank you for purchasing a Valeport instrument. Every care has been taken to ensure that the instrument has been manufactured to the highest possible standards, and as such it is covered under Valeport's Warranty Policy as detailed below:

Standard Warranty Policy

- The instrument detailed below is supplied with a Limited 3 Year Warranty against defects in materials and workmanship, valid from the date of despatch from Valeport's premises, with the following exclusions, exceptions and limitations:
  1) Sensors supplied by other manufacturers (including pressure sensors) are only warranted according to the warranty period provided by the original manufacturer (typically 1 year).
  2) Consumable items (including, but not limited to: batteries, o-rings, zinc anodes and electrolytes) are not covered by warranty.
  3) Reasonable wear and tear (as judged by Valeport) is not covered by warranty.
  4) Valeport Limited shall be under no liability for any consequential loss or damage of any kind whatsoever.
  5) Correctly performed standard maintenance procedures as described in the operating manual will not invalidate the warranty. Failures caused by improper care and handling, or by unskilled or poor quality repair and maintenance attempts are not covered under warranty. Modifications to the original design will invalidate the warranty, insofar as it relates to the modified part.
  6) All warranty repairs must be performed by Valeport personnel or their authorized representatives.
  7) Valeport Limited is the sole judge of the cause of any failure, and the validity of any warranty claim. Please refer to the "Spirit of the Warranty" section below.
- In the event of a warranty claim, please contact Valeport for an RMA Returns Number prior to shipping the goods. Failure to do so may result in a delay in the processing of your equipment.
- Goods for warranty assessment should be adequately packed (preferably in the original packing) and returned freight pre-paid to Valeport, complete with a description of the nature of the problem. All warranty claims are assessed on a case-by-case basis. You will be informed as soon as possible as to the validity of the warranty claim.
- In the event of a valid warranty claim, the goods will be repaired or replaced as appropriate at the sole discretion of Valeport Limited. The repaired / replacement instrument will be returned to you at our cost, using our choice of shipping method.
- In the event of an invalid warranty claim, you will be informed of any repairs that are necessary, and if acceptable, the instrument will be repaired as if it had been returned for service, with appropriate costs and return freight charges payable by you.
- Any repairs made under warranty shall have no effect on the duration of the warranty period, i.e. the warranty shall continue as if no fault had occurred.
- Valeport may, at our discretion, opt to despatch a replacement part for fitting in the field, if it is deemed to be the most appropriate response. In such circumstances, the user will be required to return the faulty part to Valeport (at the user's cost) for assessment and confirmation that the failure is a valid warranty claim. Failure to return the faulty part, or if the fault is subsequently judged to fall outside the terms of the warranty, shall result in the user being invoiced for the replacement part and freight costs.

Spirit of the Warranty

This warranty is offered on the basis that Valeport fully expects the instrument to perform satisfactorily for many years. We have built a reputation on reliability, longevity and quality, and therefore the aim of this warranty is your satisfaction and peace of mind. The "rules" as detailed above are the framework within which we operate our warranty policy, and the minimum that you can expect from us in resolving any warranty issue. However, each case is considered on its own merit, and we may decide that in certain circumstances, alternative arrangements or solutions to a warranty issue are appropriate. Equally, we hope that our customers accept this warranty in the spirit in which it is given, and to respect that whilst our primary concern is always to try and ensure that any issues are resolved as quickly and as satisfactorily as possible, we do also have a responsibility to objectively assess the validity of any warranty claim, and to consider the interests of Valeport Limited in any actions taken.

M. Quartley

Matthew Quartley
Managing Director

Instrument Type ....

Serial Number(s) ....

Pressure Test .... **Bar**

Date of Despatch ....

Valeport Limited, St. Peter's Quay, Totnes, Devon, TQ9 5EW UK
Tel: +44 (0)1803 869292 Fax: +44 (0)1803 869293
E-mail: sales@valeport.co.uk Web: www.valeport.co.uk

VAT No: GB 165 8753 67 Registered in England No: 1950444

ACS REGISTRARS ISO 9001

ACS REGISTRARS ISO 14001