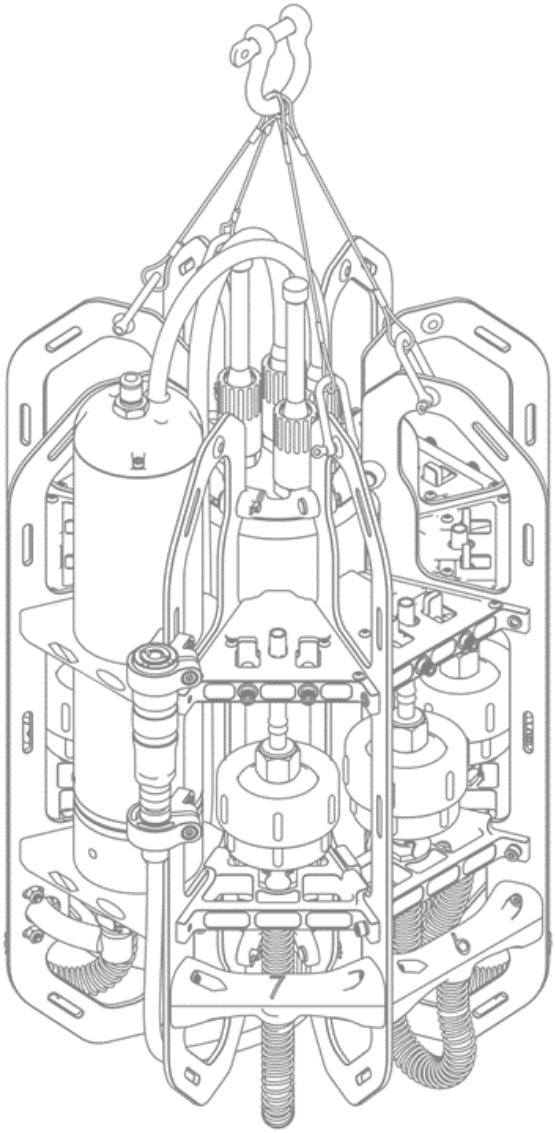
OCEAN DIAGNOSTICS

User Manual v1.6 2025.07



ASCENSION DEPTH PROFILER

Searching for Keywords

Search for keywords such as “filter” and “install” to find a topic. If you are using Adobe Acrobat Reader to read this document, press Ctrl+F on Windows or Command+F on Mac to begin a search.

Navigating to a Topic

View a complete list of topics in the table of contents. Click on a topic to navigate to that section.

Printing this Document

This document supports high resolution printing… But please consider the environment first!

Revision Log

Version	Date	Revisions
V1.1	2022.09	Added support for automated modes (Timed Sample Start, Target Volume Capture, Automated Rinse) and added advanced onboard logging tools.
V1.2	2024.03	Updated valve section and applicable illustrations to include new pinch valve configuration and added CTD documentation.
V1.3	2024.05	Updated battery and charging sections to include information regarding third party chargers.
V1.4	2024.09	Added Standard Terms & Conditions and updated Warranty Policy.
V1.5	2025.01	Updated diagram numbering and descriptions. Minor changes throughout document.
V1.6	2025.07	Updated definitions in warranty policy.

Table of Contents

User Manual

Using this Manual

➢ Legend

Warning Important Hints and Tips Reference

➢ Read Before the First Deployment

Read the following documents before using the Ascension Depth Profiler:

1. Safety Guidelines
2. Quick Start Guide
3. User Manual

It is recommended to watch all tutorial videos on the official ODI website and read safety guidelines before deploying for the first time. Prepare for your first deployment by reviewing the quick start guide and refer to this user manual for more information.

➢ Video Tutorials

Go to the address below or scan the QR code to watch the Ascension tutorial videos, which demonstrate how to use the Ascension Depth Profiler safely:

https://www.oceandiagnostics.com/ascension/tutorials

➢ Download the Ascension Desktop Application

Make sure to use *Ascension Desktop* during deployment. Scan the QR code to download the latest version.

https://www.oceandiagnostics.com/ascension/downloads

- Users are required to download and install the *Ascension Desktop* application on a laptop or desktop PC to use Ascension.
- The *Ascension Desktop* application is compatible with Windows 10 and Windows 11 only.
- Please visit the downloads page for up-to-date minimum system requirements.

Product Profile

This section introduces the Ascension Depth Profiler and lists each component onboard the instrument.

➢ Introduction

Ascension is a filter-based tethered sampling instrument capable of collecting up to fourteen filtered samples directly *in situ* down to a maximum deployment depth of 400m (1300ft). The instrument provides real-time control over seven sample valves and pump throttle while logging environmental data such as water temperature, depth, flow rate, and total volume filtered for each sample. Ascension features a high-capacity rechargeable Li-ion battery capable of powering the instrument for a maximum deployment time of up to 15 days. The instrument also boasts a lightweight and compact design, weighing less than 10kg (22lbs) and requiring no additional deployment equipment or heavy support infrastructure. Ascension is easy to deploy by hand off any size vessel and is ready to collect samples at depth directly out of the box.

Feature Highlights

Adaptable Sampling: Suitable for sampling many types of suspended particulate including environmental DNA (eDNA), microplastics and microfibers, total / dissolved organic carbon (TOC), plankton, suspended sediment.
Flexible Sample Configurations: Choose between single or stacked filters for each sample channel on the fly out in the field. Compatible with a wide range of filter mesh from 1mm to sub-micron pore size.
Automated Deployment Mode: Capture time series samples effortlessly with automated features such as *Timed Sample Start* and *Target Volume Capture*.
Instrument Rinse Mode: Let the instrument clean itself after a deployment using the built-in automated rinse feature. With just one click, the instrument will clean out the internal fluidic system, valves, pump, and flow meter autonomously.
Modular Design: Easily replace or upgrade instrument components such as valves, pumps, and flow meters without specialized tools or modifying the instrument.

⚠

- The maximum deployment depth was tested in a laboratory environment using an oil submersion pressure vessel.
- The performance of the Li-ion battery varies depending on the temperature of the deployment environment. Reduced performance may be experienced when deploying Ascension in colder sampling environments.
- The dry weight of Ascension is different from the weight observed when submerged. Sometimes additional mass is required to reach the desired sample depth.
- The dry weight of Ascension is different from the wet weight after deployment. Water contained within the fluidic system can add additional weight when retrieving the instrument from the deployment environment.

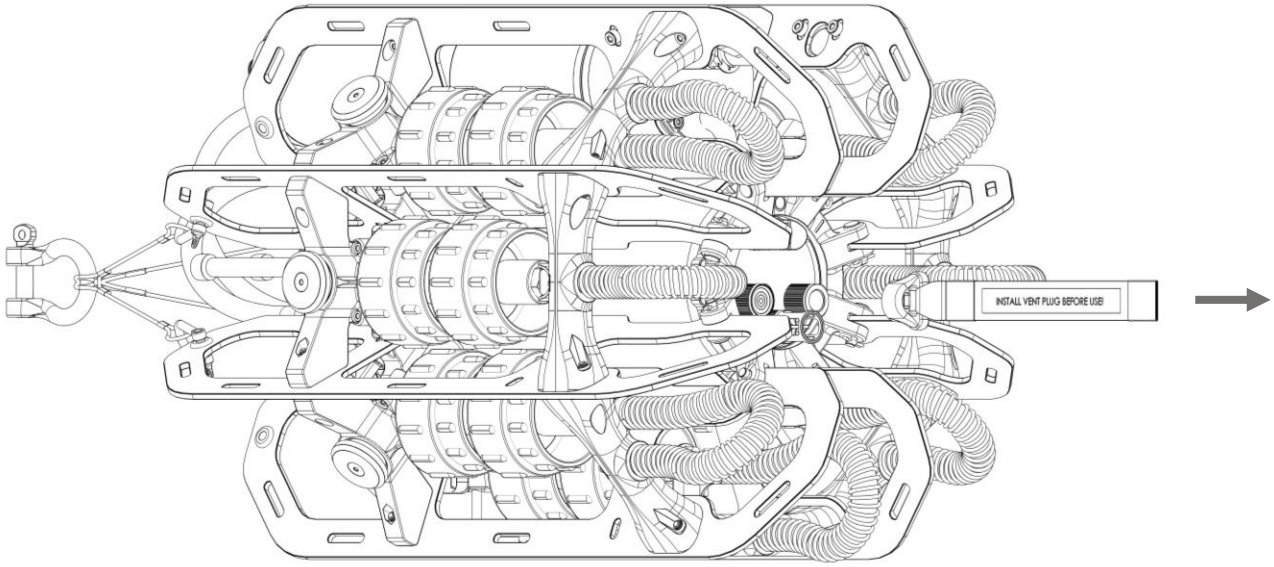
➢ Using for the First Time

Ascension is packaged in a specific way to protect the instrument during shipping. Follow the steps below to prepare the instrument before powering it on for the first time.

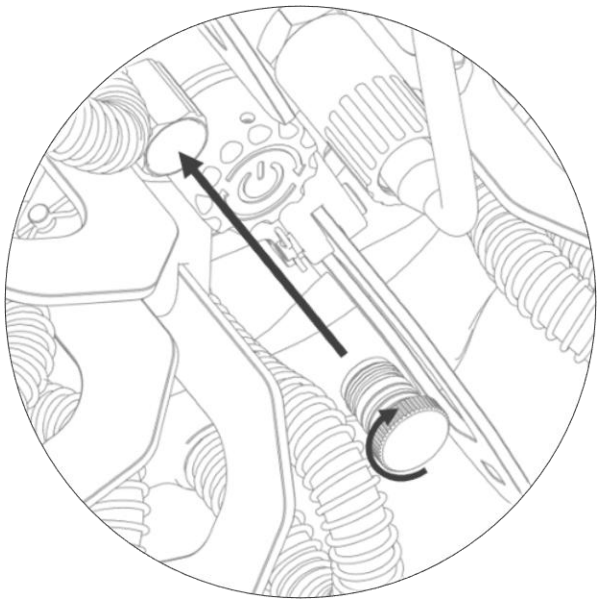
Preparing the Instrument

The vent plug on the bottom of the pressure housing is removed before the instrument is packaged to allow for pressure equalization during transport by air. Follow the steps below to reseal the instrument.

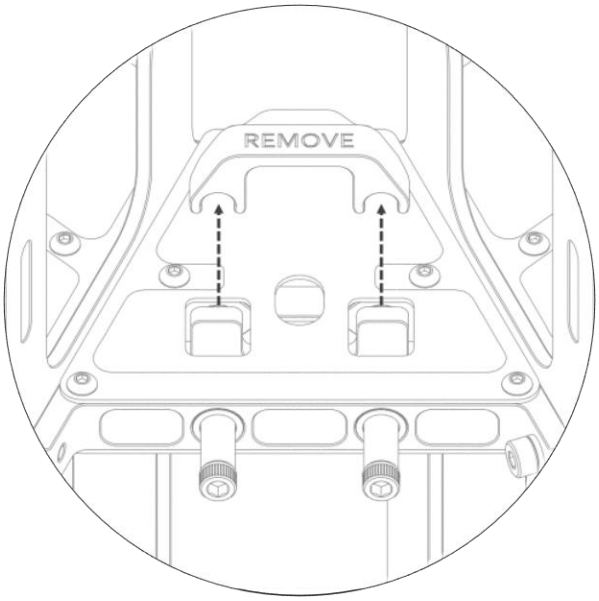
1. Remove the vent port protector from the vent port.



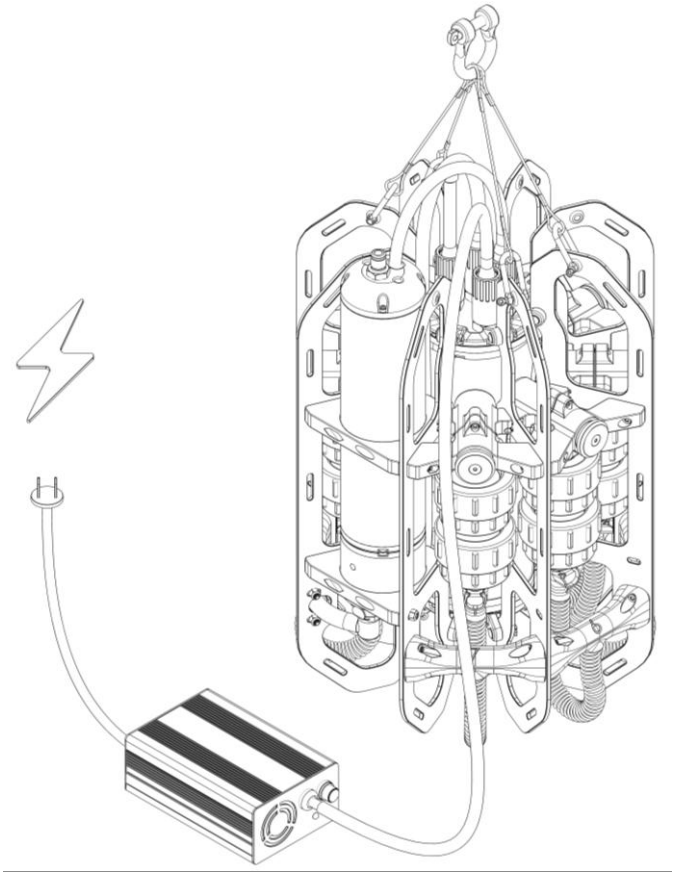
2. Ensure the O-rings on the included vent plug are clean and install into the vent port by applying downward pressure and twisting clockwise.

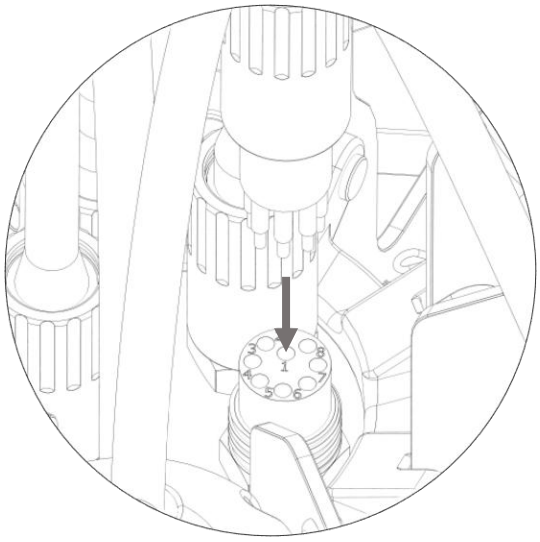


3. Remove the valve protection inserts from all 7 valves by pulling them out vertically.



4. The instrument battery is discharged before shipment to ensure safety during transport. Connect the charger to the charging port on the top of the instrument to charge and activate the instrument for the first time.

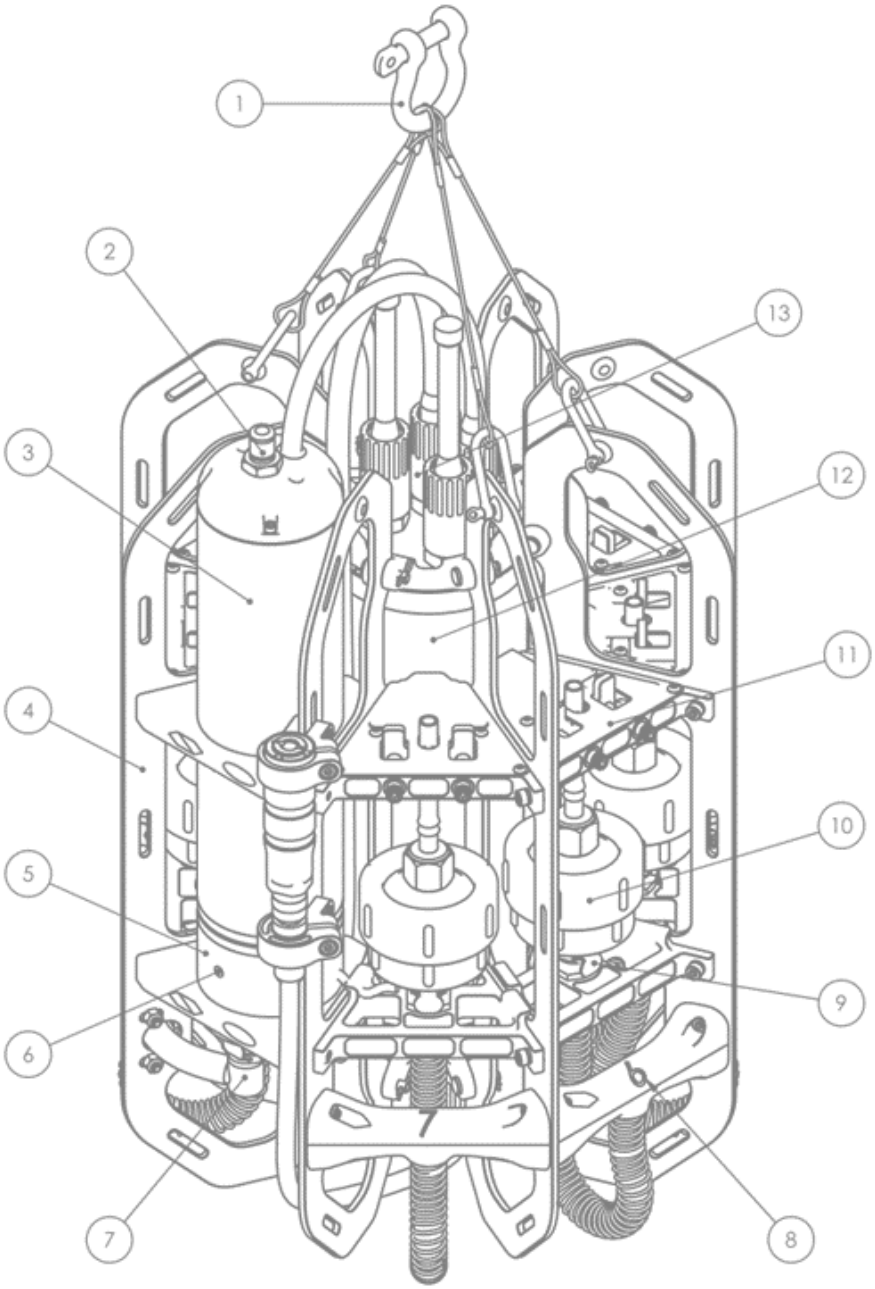




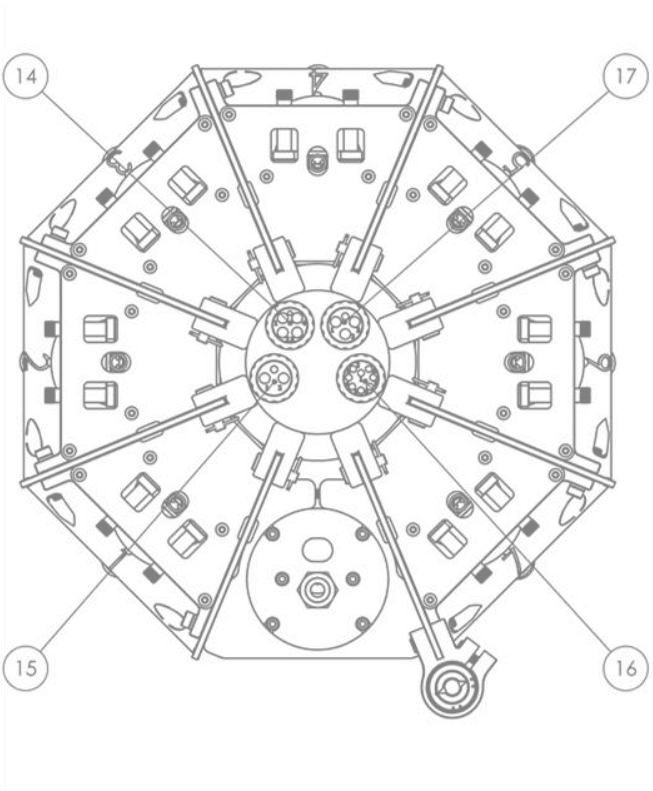
- Only use the included battery charger provided by Ocean Diagnostics to charge the Ascension instrument. Use of a 3rd party battery charger may void the warranty.
- Ensure the pump and flow meter are plugged into the core before powering on the instrument. Failing to do so may affect the instrument initialization process.
- Never connect or disconnect the pump or flow meter cables while the instrument is powered on. You may risk damaging the internal circuitry.

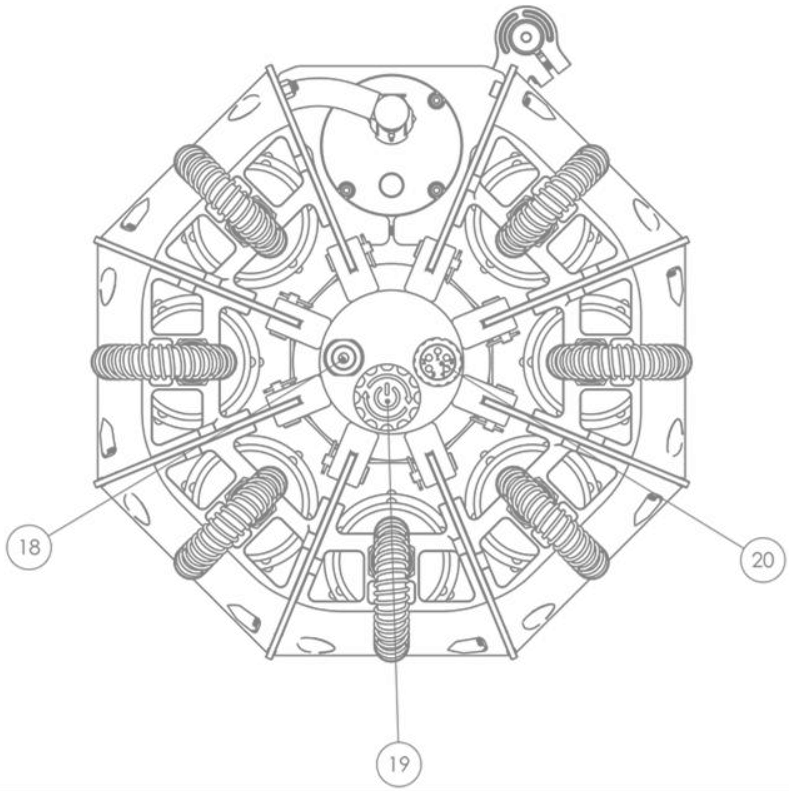
➢ Diagram

Instrument



1. Tether Shackle
2. Fluid Exhaust Port
3. Pump
4. Instrument Frame
5. Flow Meter
6. Instrument Status LED
7. Fluidic System Connector
8. Channel Number Indicators
9. Payload Fluidic Connectors
10. Filter Housing
11. Valves
12. Core (Pressure Housing)
13. Instrument I/O & Power Ports





14. Flow Meter Port (4-Pin/5-Pin)
15. Tether Port (2-Pin)
16. Charging Port (8-Pin)
17. Pump Port (3-Pin)
18. Vent Port
19. Power Switch
20. External Sensor Port (4-Pin)

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1. **Tether Shackle**
   Use the tether shackle to secure Ascension to the tether. The shackle features a locking design that prevents the screw from loosening during operation.

2. **Fluid Exhaust Port**
   Water pumped through the instrument exits through the fluid exhaust port located on top of the pump.

3. **Pump**
   The pump onboard Ascension is used to move fluid throughout the instrument and through each sample channel.

4. **Instrument Frame**
   A rigid structure used to mount all the sub-components within Ascension. The frame is also responsible for protecting Ascension during deployment.

5. **Flow Meter**
   Used for real-time measurement of flow rate and volume through each sample channel.

6. **Instrument Status LED**
   Indicates the current mode of Ascension.

7. **Pump/Flow Meter Connection**
   A quick disconnect fluidic connector used to connect the pump and flow meter to the fluidic system within Ascension.

8. **Channel Number Indicators**
   Light numbering embossed onto the frame to indicate which channel corresponds to each sample.

9. **Payload Fluidic Connectors**
   Quick disconnect fluidic connectors used for rapid installation and removal of filters within each sample channel.

10. **Filter Housing**
    Sample water passes through this filter when the corresponding valve is open.

11. **Valves**
    Control the flow of sample water through the corresponding filter mounted within the sample channel.

12. **Core (Pressure Housing)**
    Contains the battery and other electronic components of Ascension.

13. **Instrument I/O & Power Ports**
    The location of all the electrical input and output connections onboard Ascension.

14. **Flow Meter Port (4-Pin/5-Pin)**
    Provides both a power and data connection between the flow meter and Ascension.

15. **Tether Port (2-Pin)**
    Provides a data connection for controlling the instrument.

16. **Charging Port (8-Pin)**
    For charging the internal battery and providing shore power to the instrument.

17. **Pump Port (3-Pin)**
    Provides power to the onboard pump.

18. **Vent Port**
    Used during transport to equalize the pressure housing with outside pressure.

19. **Power Switch**
    Push in and turn the quarter-turn power switch clockwise to power on the instrument. Push in briefly and turn in the counterclockwise direction to power off.

20. **External Sensor Port (4-Pin)**
    Used for the integration of external sensor modules for recording external environmental data such as conductivity, temperature, and depth.

Instrument

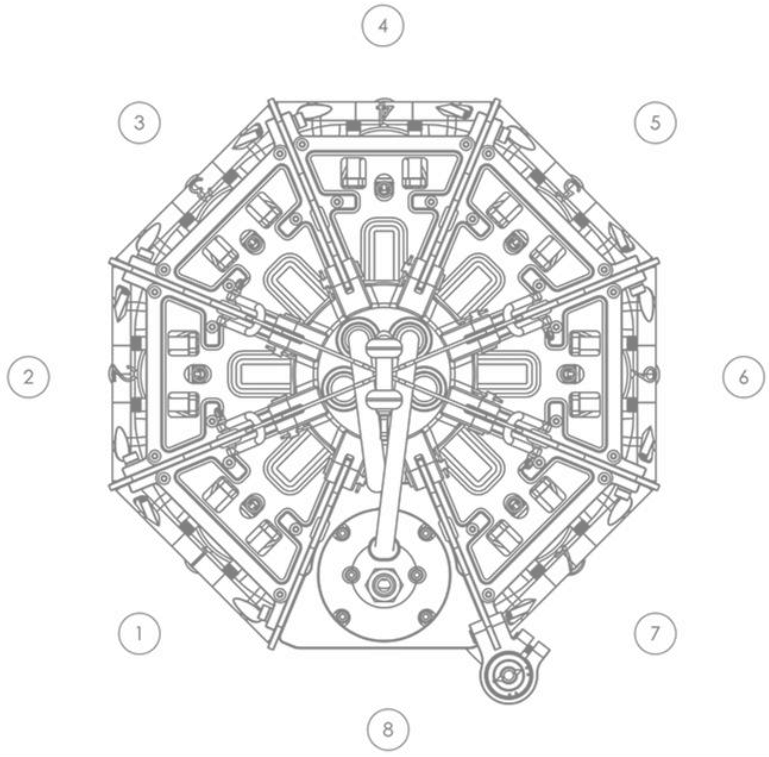
➢ Introduction

The Ascension depth profiler is composed of 5 fundamental sub-systems:

① Core ② Valves ③ Filters ④ Pump ⑤ Flow Meter

The core is located at the center of Ascension and comprises the instrument's electronics & power system, battery, and valve actuator; all of which are contained within a watertight pressure housing. Located on the bottom surface of the core are external sensors for measuring pressure (depth) and water temperature, a vent port, as well as a two-position switch for powering the instrument on and off. The top surface of the core contains 4 wet mate ports for the instrument's umbilical, pump, flow meter, and charger.

The region outside the core is divided into eight separate octants by the Ascension frame. Seven of the eight octants contain independently actuatable valves connected to fluidic channels. Each valve is responsible for opening and closing each fluidic channel to the environment. Underneath each of the seven valves is a series of one or two stacked filter housings (configurable by the user) containing 47mm disc filters for sample collection. The eighth octant onboard Ascension contains both a pump and flow meter for pulling and measuring the volume of flow through each of the seven filter channels.



Ascension was designed with modularity in mind. The valves, pump, and flow meter can be swapped out relatively easily; making the Ascension platform both configurable, and amenable to upgrades that increase the capability of the instrument. Multiple mounting points exist on the frame for mounting auxiliary attachments.

➢ System Modes

Ascension has three system modes, plus two warning modes that the instrument switches to in certain scenarios. System modes can be switched via the *Ascension Desktop* application running on the control computer.

Manual Mode: *Manual Mode* is intended for short term deployments where the instrument is cast from a floating vessel or surface platform to profile the water column. In *Manual Mode*, all instrument functions are controlled manually by the instrument operator. Valve control and pump throttle are set in real time from the surface using *Ascension Desktop,* and all instrument data (Water Temperature, Depth, Flow Rate, Sample Volume, etc…) is available for viewing on the control interface in real time. In *Manual Mode*, deployment data is logged through *Ascension Desktop* onboard the control computer.

Automated Mode: *Automated Mode* is intended for time series deployments where the instrument is left unattended for long periods of time. In *Automated Mode*, the instrument executes a preprogrammed sampling script autonomously. Valve control and pump throttle are set automatically by the instrument according to the deployment mission script created beforehand using *Ascension Desktop*. In *Automated Mode*, Ascension does not require a connection with *Ascension Desktop* and can be secured untethered to a floating buoy or underwater platform. If Ascension is connected to the control computer, instrument data (Water Temperature, Depth, Flow Rate, Sample Volume, etc…) can be viewed through *Ascension Desktop* in real time while the automated mission is executed. In *Automated Mode*, deployment data is logged onboard the instrument and can be offloaded after the automated deployment is complete.

Rinse Mode: *Rinse Mode* is an automated routine used to clean the internal fluidics after a deployment. The instrument pumps water through each fluidic channel a set number of times to remove any contaminants and impurities that may be present within the pump, flow meter, valves, and internal fluidic system. The instrument automatically switches back into manual mode once the rinse is complete.

The instrument will enter *Inactivity Mode* when no input is received from the control computer for a set period of time. In *Inactivity Mode*, the instrument will emit a repeating tri-tone alarm until an input is received from the control computer. The inactivity alarm timeout is 20 minutes by default but can be changed through the instrument settings window in *Ascension Desktop*. *Inactivity Mode* will only activate when Ascension is in less than one meter of water and the pump is not in motion.

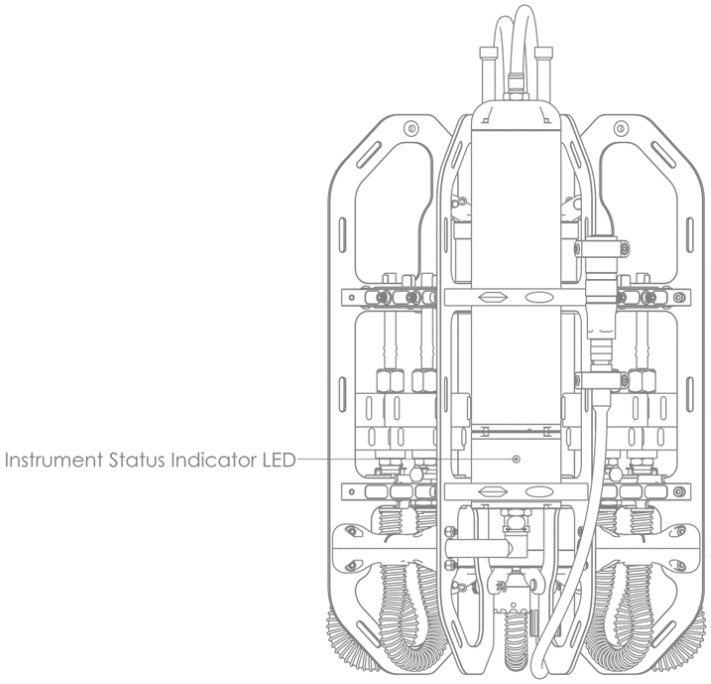
The instrument automatically changes to *Lockdown Mode* when the battery gets too low for sampling. In *Lockdown Mode*, the instrument is still powered on and functional; however, functions that demand greater power such as valve movements or running the pump are disabled.

- During deployment, Ascension must always be secured to a weight bearing tether or rigid structure. Ascension is negatively buoyant and will sink if not connected to a suitable attachment point.
- In automated mode, the instantaneous pump throttle can be modified in real time with respect to the deployment script.
- Setting the pump throttle too low during an automated deployment may cause the instrument to sample less volume than specified in the mission script. The actual volume sampled is recorded accurately in the deployment log file.

- During an automated mission, if the instantaneous flow rate falls below the minimum detection threshold of the flow meter, Ascension will automatically terminate the sample and move to the next task in the mission script to prevent the automated deployment from failing.
- Once an automated deployment has been completed successfully, the instrument cannot be put back into automated mode until a new automated script has been uploaded.
- Rinse mode settings can be changed through the *Ascension Desktop* application.

➢ Instrument Status Indicator

Ascension has an instrument status indicator integrated into the flow meter located on the forward surface of the instrument below the pump.



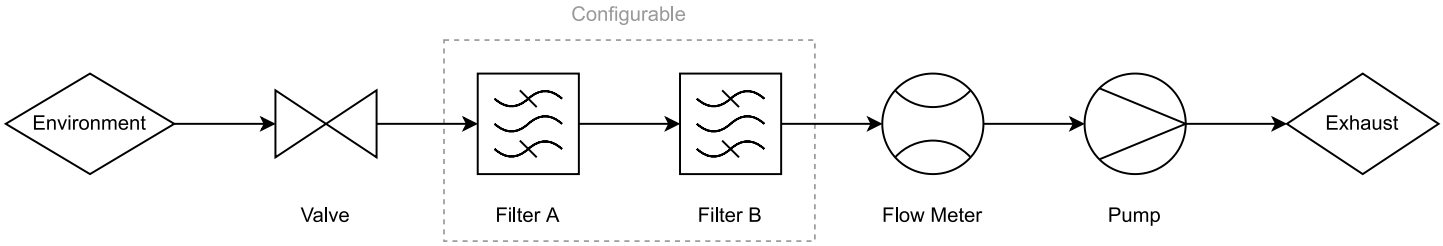
When Ascension is powered on, the instrument status indicator will display the live status of the instrument control system. Refer to the table below for more information about the instrument status indicator.

Instrument Status Indicator Descriptions

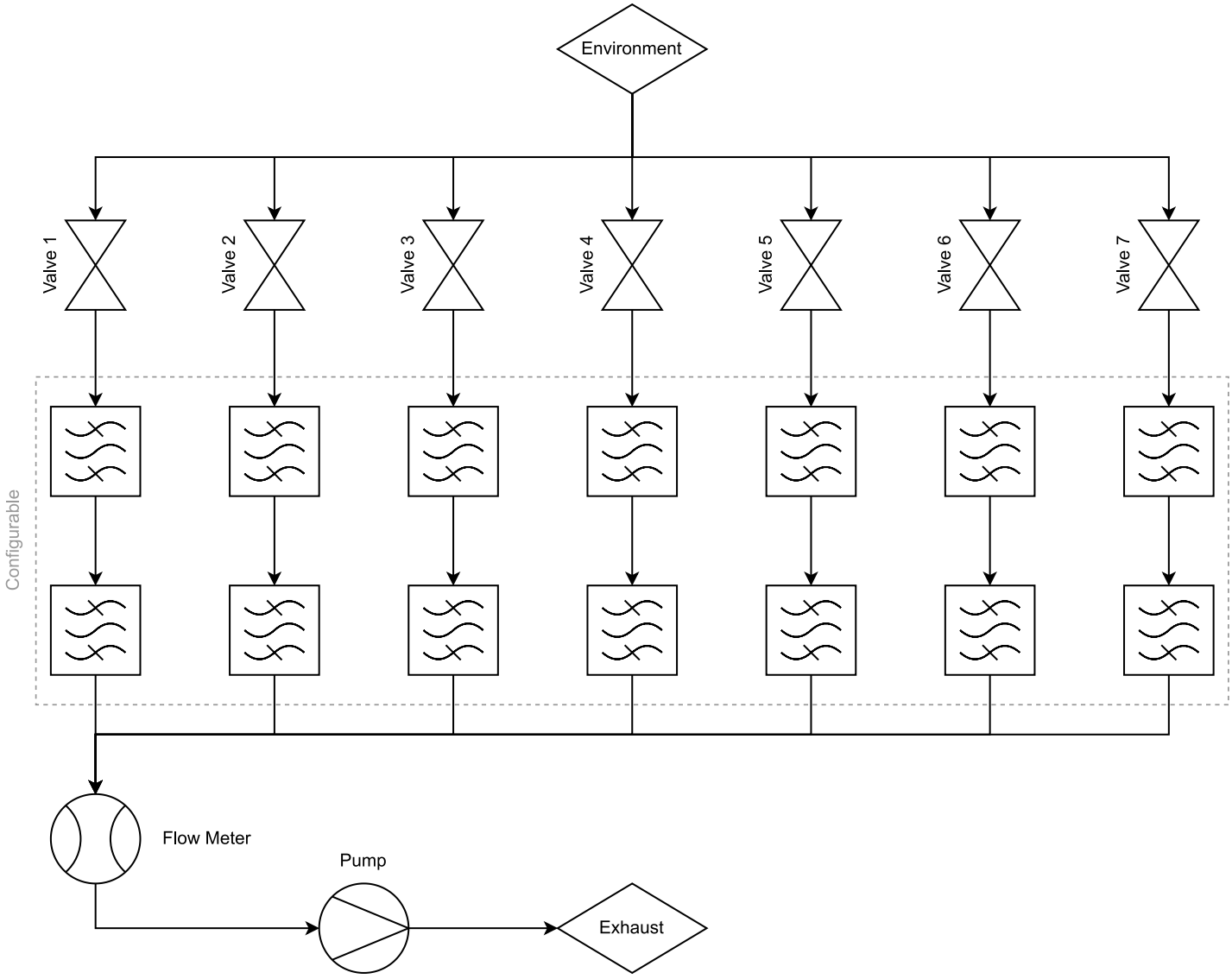
Normal States				
☼	. . . .	Blue	Blinks quickly, one blink every 3 seconds	Manual Mode
☼	… … …	Blue	Blinks quickly, three blinks every 3 seconds	Automated Mode
☼	--------	Blue	Solid, always on	Rinse Mode
Warning States				
☼	-- -- --	Blue	Blinks slowly, 1 second on 1 second off	Inactivity Mode
☀	……	Blue	Continuous rapid blinking	Lockdown Mode

➢ Fluidic System

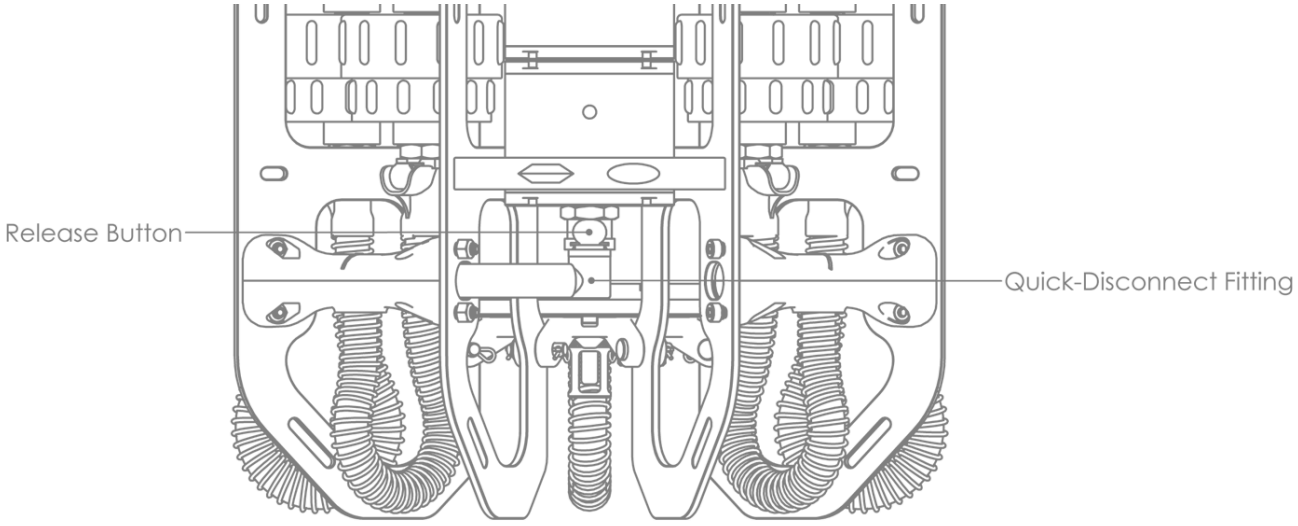
The fluidic system onboard Ascension is designed to minimize sample contamination *in situ* while maximizing sample efficiency.



The sample filter(s) is mounted upstream just behind the sample channel valve. All the fluid transport and measurement infrastructure such as the pump and flow meter are mounted downstream of the filter to minimize any sample contamination resulting from these components.



All seven sample channels are multiplexed to a common channel leading to the flow meter and pump assembly. The common channel or fluidic ring is located inside the bottom portion of the Ascension frame and is terminated with a quick-disconnect fitting located at the bottom of the pump/flow meter octant. The fluidic ring is non-symmetrical with channel one located closest to the pump/flow meter intake and channel seven located farthest away.

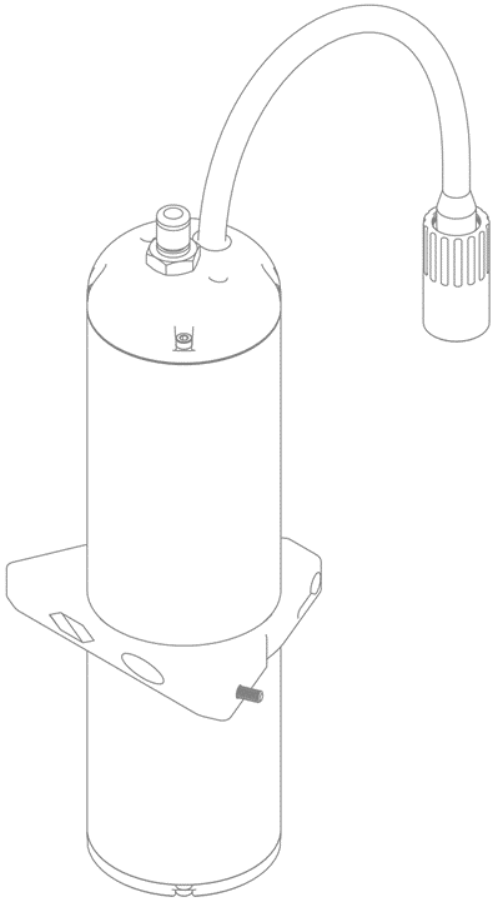


⚠

- Do not use Ascension in the environment without filters installed! The fluidic system is designed to have filters installed ahead of the flow meter and pump to prevent large debris from passing through and fouling these components. Only in a clean environment such as in a freshwater tank during an automated rinse is it safe to run the pump without filters installed.
- Only one valve can be opened at a time. Multiple samples cannot be collected at the same time.

➢ Impeller Pump

When configured for coarse mesh filtration, Ascension is equipped with a centrifugal impeller pump. The impeller pump is suitable for large volume sampling in open ocean conditions with filter mesh of 10µm or greater in pore size (typical for applications such as microplastics and microfibers, plankton, and suspended sediment sampling). The centrifugal impeller pump mounts directly to the flow meter via a ½" NPT threaded interface and connects to the Ascension core via the 3-Pin wet mate connector for power and pump control.



Feature Highlights

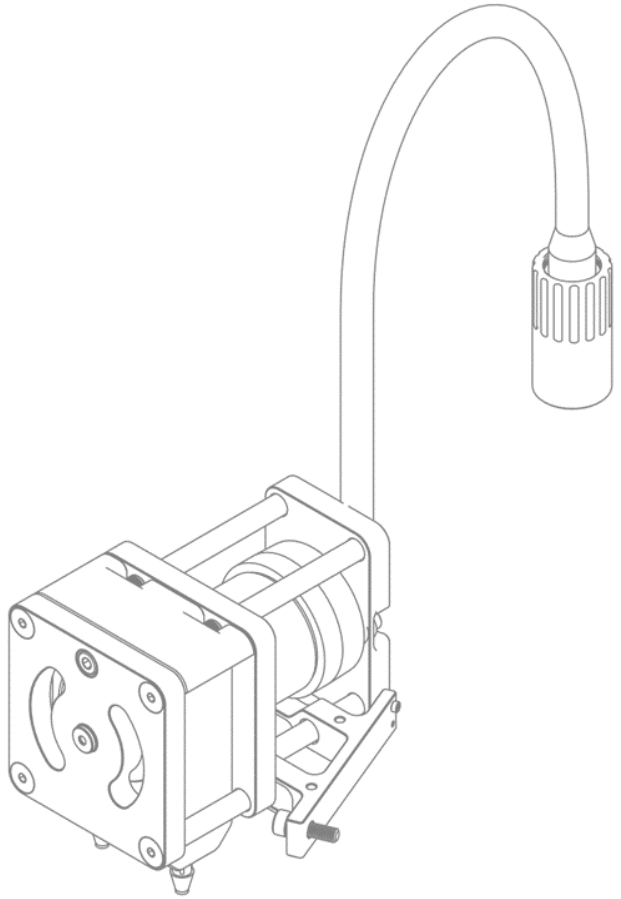
High Flow Rate Continuous Sampling: Collect samples at flow rates of up to 2.0 l/min when sampling with coarse mesh filters. The passive flow design cools the pump while sampling for continuous sampling without pause.
Quick-Disconnect Exhaust Port: Divert exhaust water away from the instrument using the quick-disconnect exhaust port on the top surface of the pump.
Modular Design: Easily replace or upgrade the pump yourself without specialized tools.

⚠

- Do not run the pump when the instrument is dry! Only run the pump when the instrument is fully submerged in water. The water level should be above the fluid exhaust port before enabling the pump.

➢ Peristaltic Pump

When configured for fine mesh filtration, Ascension is equipped with a peristaltic pump. The peristaltic pump is suitable for low volume sampling in open ocean conditions with filter mesh of 10µm or smaller in pore size (typical for applications such as environmental DNA, and total / dissolved organic carbon). The peristaltic pump connects to the flow meter via a 4mm ID soft rubber tube/barbed interface and connects to the Ascension core via the 3-Pin wet mate connector for power and pump control.



Feature Highlights

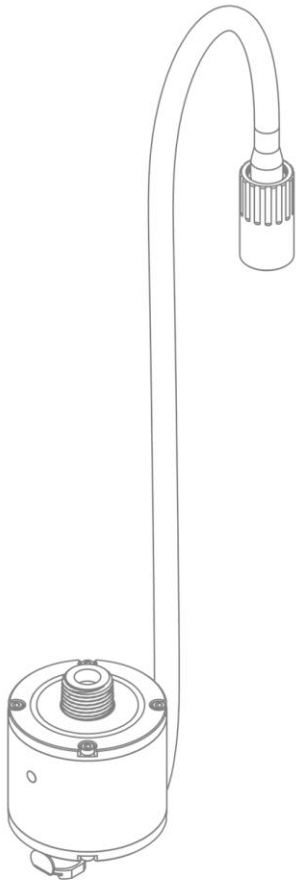
High Pressure Sampling: Collect samples at flow rates of up to 0.5 l/min when sampling with fine mesh filters. The passive flow design cools the pump while sampling for continuous sampling without pause.
Easily Replaceable Peristaltic Tubing: Easily swap out the peristaltic pump tubing yourself out in the field without specialized tools.
Modular Design: Easily replace or upgrade the pump yourself without specialized tools.

⚠

- Do not run the pump when the instrument is dry! Only run the pump when the instrument is fully submerged in water. The water level should be above the topmost portion of the pump before enabling the pump.

➢ Flow Meter (Coarse Mesh Filtration)

When configured for coarse mesh filtration, Ascension is equipped with a high flow rate turbine flow meter. The high flow rate turbine flow meter is suitable for large volume sampling in open ocean conditions with filter mesh of 10µm or greater in pore size (typical for applications such as microplastics and microfibers, plankton, and suspended sediment sampling). The high flow rate turbine flow meter mounts directly to the centrifugal impeller pump via a ½" NPT threaded interface and connects to the Ascension core via the 4-Pin wet mate connector for power and communication.



Feature Highlights

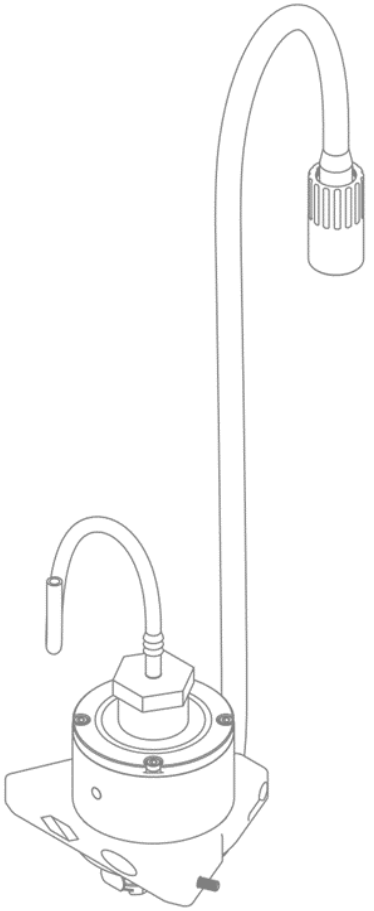
Wide Range Sensitivity: The high flow rate turbine flow meter can characterize fluid flow from 0.20 - 4.50 L/min with an accuracy of ±1.5% and a repeatability of ±0.1%.
Modular Design: Easily replace or upgrade the flow meter yourself without specialized tools.

⚠

- Never use the flow meter in the environment without filters installed! The flow meter contains small components which are susceptible to damage and/or fouling. Only in a clean environment such as in a freshwater tank during an automated rinse is it safe to use the flow meter without filters installed.

➢ Flow Meter (Fine Mesh Filtration)

When configured for fine mesh filtration, Ascension is equipped with a low flow rate turbine flow meter. The low flow rate turbine flow meter is suitable for small volume sampling in open ocean conditions with filter mesh of 10µm or less in pore size (typical for applications such as environmental DNA, and total / dissolved organic carbon). The low flow rate turbine flow meter interfaces with the peristaltic pump via a 4mm ID soft rubber tube/barbed interface and connects to the Ascension core via the 4-Pin wet mate connector for power and communication.



Feature Highlights

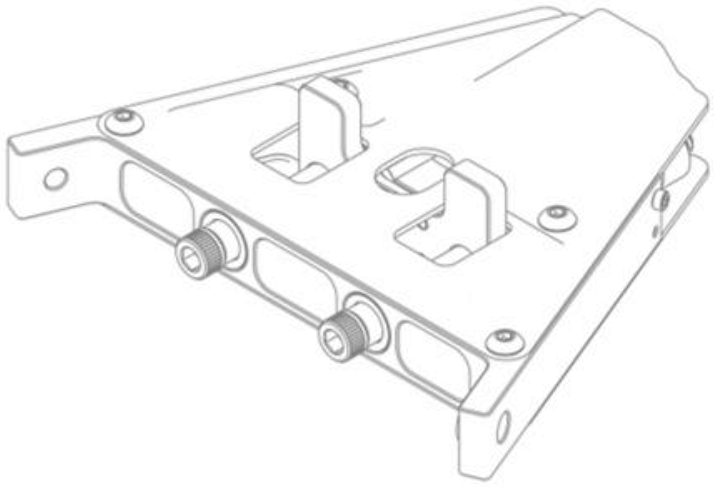
Wide Range Sensitivity: The low flow rate turbine flow meter can characterize fluid flow from 0.05 - 0.50 L/min with an accuracy of ±2.0% and a repeatability of ±0.1%.
Modular Design: Easily replace or upgrade the flow meter yourself without specialized tools.

⚠

- Never use the flow meter in the environment without filters installed! The flow meter contains small components which are susceptible to damage and/or fouling. Only in a clean environment such as in a freshwater tank during an automated rinse is it safe to use the flow meter without filters installed.

➢ Valves

The standard configuration of Ascension is equipped with seven linear pinch valves. The linear pinch valves are suitable for both coarse and fine mesh filtration in open ocean conditions with all filter mesh pore sizes. The linear pinch valves mount directly to the instrument frame with a single M4 socket head cap screw and are magnetically coupled to the valve actuator inside the Ascension core.



Feature Highlights

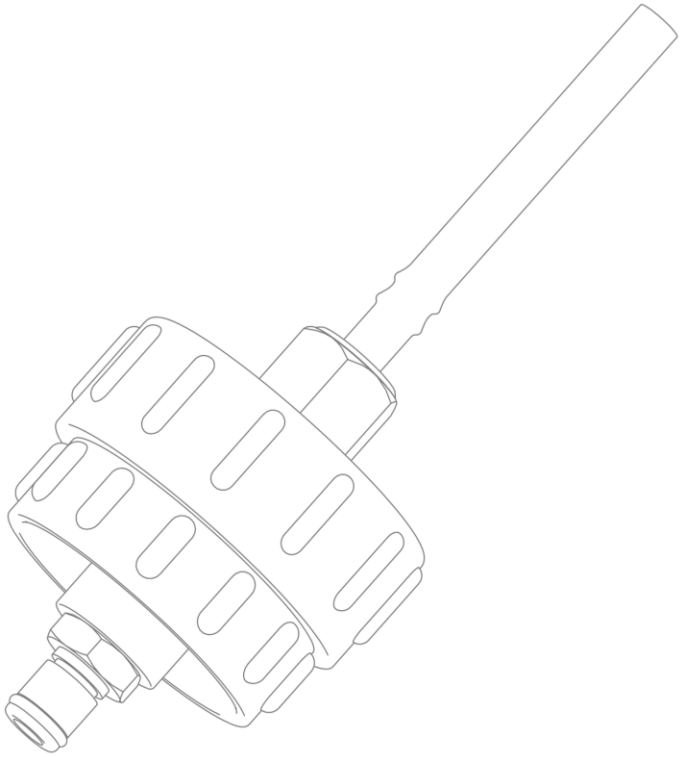
Hand Actuatable: The valve actuators can be opened and closed freely by hand without causing damage to the actuation mechanism.
Compact Design: The linear pinch valves fit tightly within the Ascension frame and provide ample room for installing filter housings in the sample compartment.
Quick Mount: Mount and remove samples with ease by quickly screwing the filter housing directly into the ¼" NPT interface on the valve.
Modular Design: Easily replace or upgrade the valves yourself without specialized tools.

⚠

- Warning, the valves contain Neodymium magnets which create a strong magnetic field around the instrument.

➢ Filter Housings

Ascension uses reusable filter housings which are compatible with 47mm disc filters. The instrument can be loaded with up to 7 total filter housings during a deployment. The filter housings are highly configurable and include filter supports that can be installed when using delicate filter materials such as mixed cellulose ester.



Feature Highlights

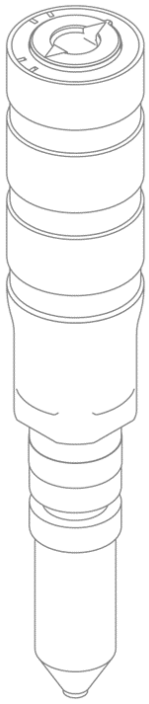
Filter Compatibility: Choose between many filter materials from stainless steel or fiberglass to nylon and mixed cellulose ester membranes. Compatible with a wide range of filter meshes from 1mm to sub-micron pore size.
Screw Top: Quickly insert and remove filters from the filter housing by twisting the top and bottom portions of the filter housing.
Self-Sealing Design: Filter housings self-seal when disconnected from the instrument or purging tool. This helps to reduce contamination and prevent purging fluid from escaping.

⚠

- Ascension is compatible with 47mm disc filters.
- Do not overtighten the filter housings when screwing the top and bottom halves together. Filter housings should be twisted until hand tight to seal the filter inside the housing.

➢ Onboard Sensors

Ascension is equipped with six onboard sensors (three external and three internal). The three external sensors measure external metrics such as water conductivity, temperature, and pressure (used to calculate instrument depth) and are contained within a CTD probe mounted to the outside of the frame. The three internal sensors are located within the instrument core and measure ambient air temperature, pressure, and humidity within the pressure housing. These metrics are monitored by the onboard computer and used to detect any abnormalities within the pressure housing during operation.



Sensor Specifications

Internal Sensors			
Temperature	-40 to 85	± 1 °C	°C
Pressure	30 to 110	± 0.1 kPa	kPa
Humidity	0 to 100	± 3%	%
External Sensors			
Conductivity	3 to 68	± 1.5 mS/cm	mS/cm
Temperature	-1 to 40	± 0.1 °C	°C
Depth	5 to 500	± 3.0 m	m

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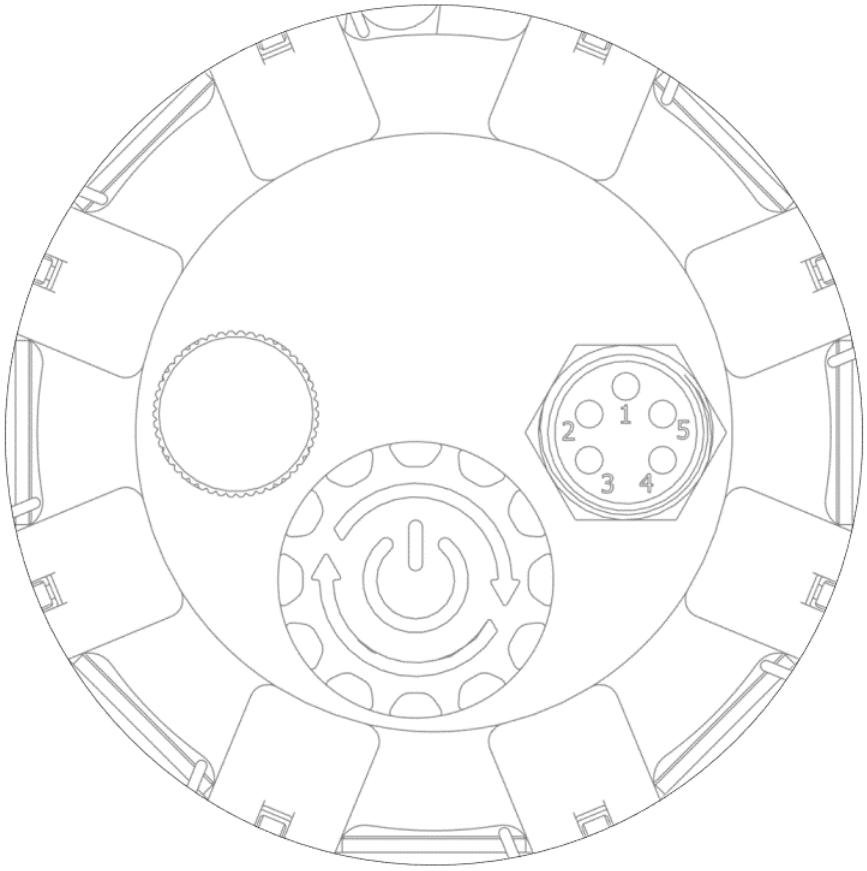
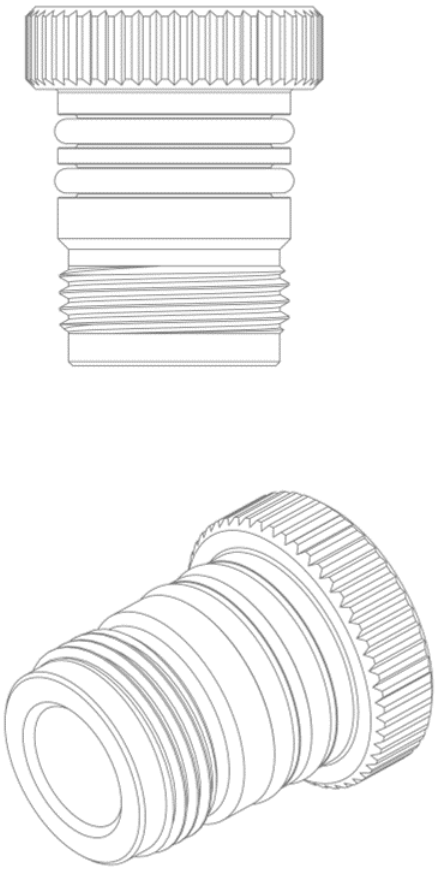
- Additional third-party sensors can be mounted to Ascension using the auxiliary mounting points located on the outer frame. Please contact support at Ocean Diagnostics for assistance with third-party sensor compatibility.

➢ Power Switch & Vent Port

The power switch, vent port, and external sensor port are all located on the bottom surface of the Ascension core. To power on the instrument, push in and turn the quarter-turn power switch clockwise until it clicks into the *on* position (90 degrees from the *off* position). To power off the instrument, use a similar push-turn motion but instead in the counterclockwise direction. The vent port allows for pressure equalization between the Ascension core and the atmosphere. This is necessary during transportation to allow equalization when the instrument is moved between different elevations. The vent port seals using a double O-ring bore seal and screws into the bulkhead on the bottom surface of the instrument core. The vent port plug must always be installed before the instrument is submerged and should be removed only when transporting the instrument or when storing for long periods of time. The external sensor port is used to connect the CTD probe mounted to the outside of the instrument frame.

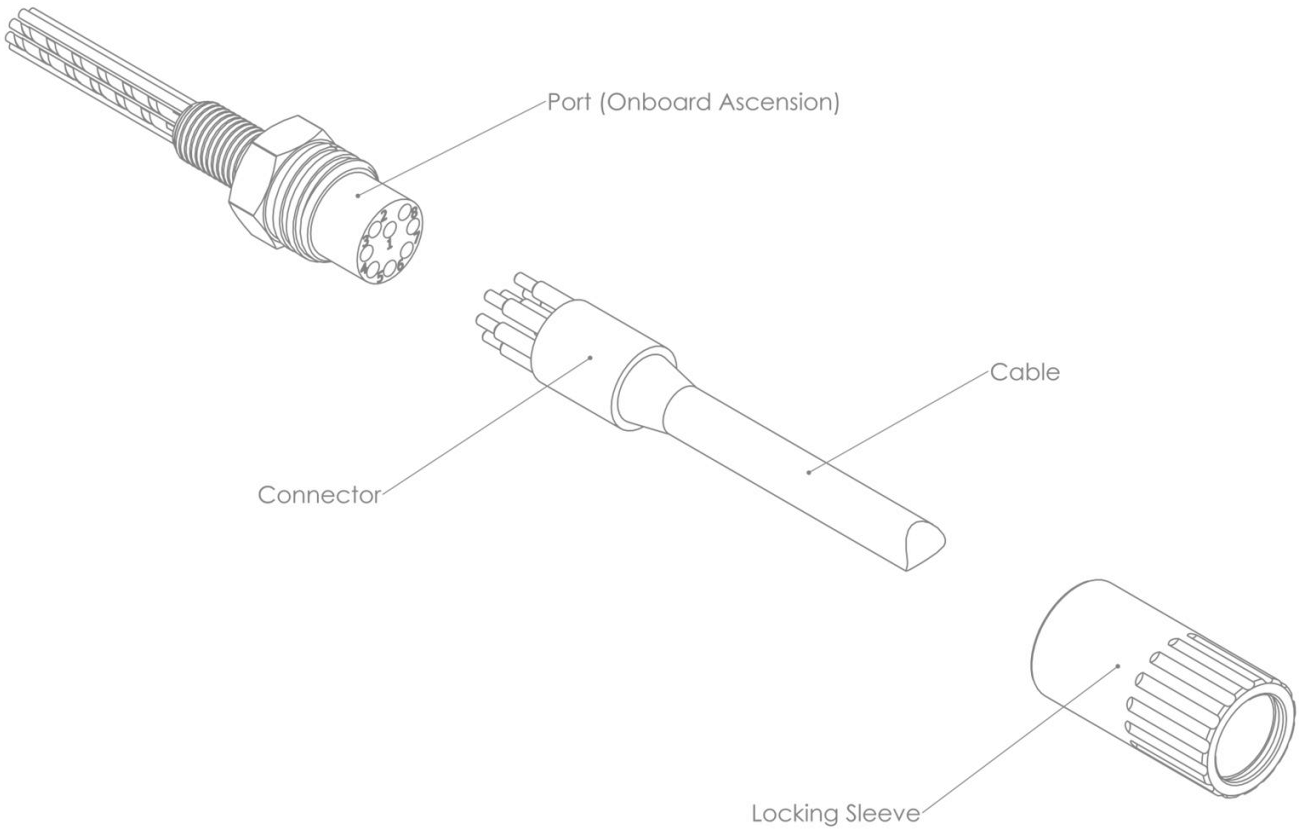




- The vent port provides an unobstructed opening into the instrument's pressure housing. Under no circumstances should the vent port plug be removed while the instrument is submerged.
- Always check that the vent port plug is fully inserted and tight before lowering the instrument into water. Failing to install the vent port plug properly before submerging the instrument will permanently damage Ascension.

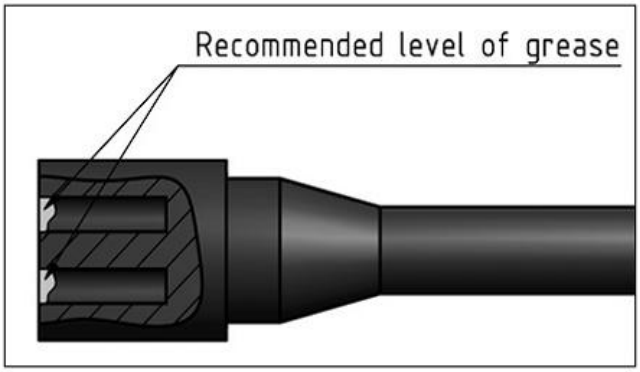
➢ Connectors

Ascension has five electrical ports total (4x located on the top surface of the instrument core and 1x on the bottom). These ports provide connection with the pump, flow meter, tether, charger, and external CTD probe. All four ports are wet mate capable and can be connected/disconnected underwater. Proper care must be taken to ensure reliable operation of each port.



Every connection is a three-step process:

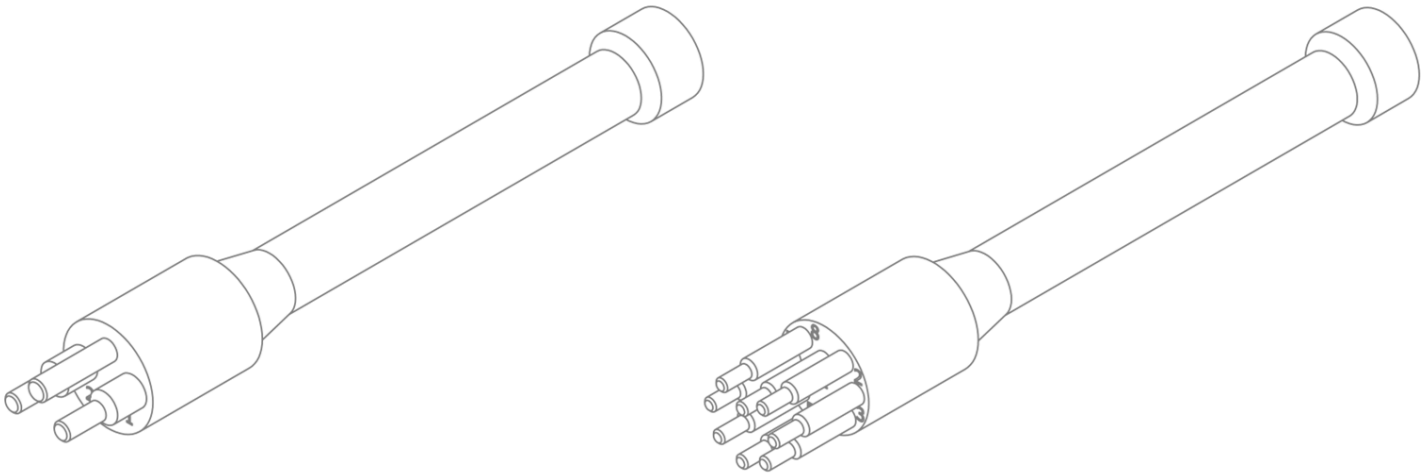
1. Grease the port onboard the instrument.
2. Insert the free hanging plug into the port on the instrument.
3. Tighten the red locking sleeve onto the port to fasten the connector into place.



Go to the address below or scan the QR code to watch the SubConn greasing and mating tutorial video, which demonstrates how to grease and mate the connectors properly:

https://youtu.be/Vp_cbGtSsXI

Two dummy plugs are included with the Ascension kit, one 2-Pin dummy for the tether port and one 8-Pin dummy for the charging port. The dummy plugs should be installed into their respective ports onboard the instrument when the port is not in use. For example, in the event Ascension is deployed without the tether attached during an automated deployment, the 2-Pin dummy plug must be inserted into the 2-Pin tether port on the instrument. The 8-Pin dummy plug should always be installed into the charging port when the charger is not connected to the instrument. Dummy plugs follow the same mating procedure as regular connectors and should be greased prior to every insertion and secured with a red locking sleeve.



- All five electrical ports onboard Ascension are unique meaning none of the external connectors can be accidently plugged in to the wrong port.

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- Connectors must be greased with Molykote 44 Medium before every mating.
- A layer of grease corresponding to a minimum of 1/10 of the socket depth should be applied to the female connector on the Ascension core.
- 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 to secure optimal distribution of grease on all pins and in the sockets.
- To confirm that grease has been sufficiently applied, de-mate and check for grease on every male pin. Then re-mate the connector.
- Do not use WD-40, greasing compound, or similar products when greasing the connectors. Use only Molykote 44 Medium to grease the instrument connectors. The use of alternative greasing compounds may void your instrument warranty.
- Connectors should not be exposed to extended periods of heat or direct sunlight. If a connector becomes very dry, it should be soaked in fresh water before use.
- Never deploy Ascension with an open port. Ports must always be sealed with either an electrical cable or dummy plug before deployment.
- Never short any of the electrical contacts on the connectors.
- Always disconnect the electrical connectors by pulling straight out, not at an angle.

➢ Battery & Charger

Ascension is equipped with a 14.4V, 18Ah Li-ion smart battery pack for a total of 260Wh. The battery contains smart charging and discharging functionality built into the battery management system (BMS). The battery management system protects the instrument battery from over-charge, over-discharge, and over-load events.

Battery Features

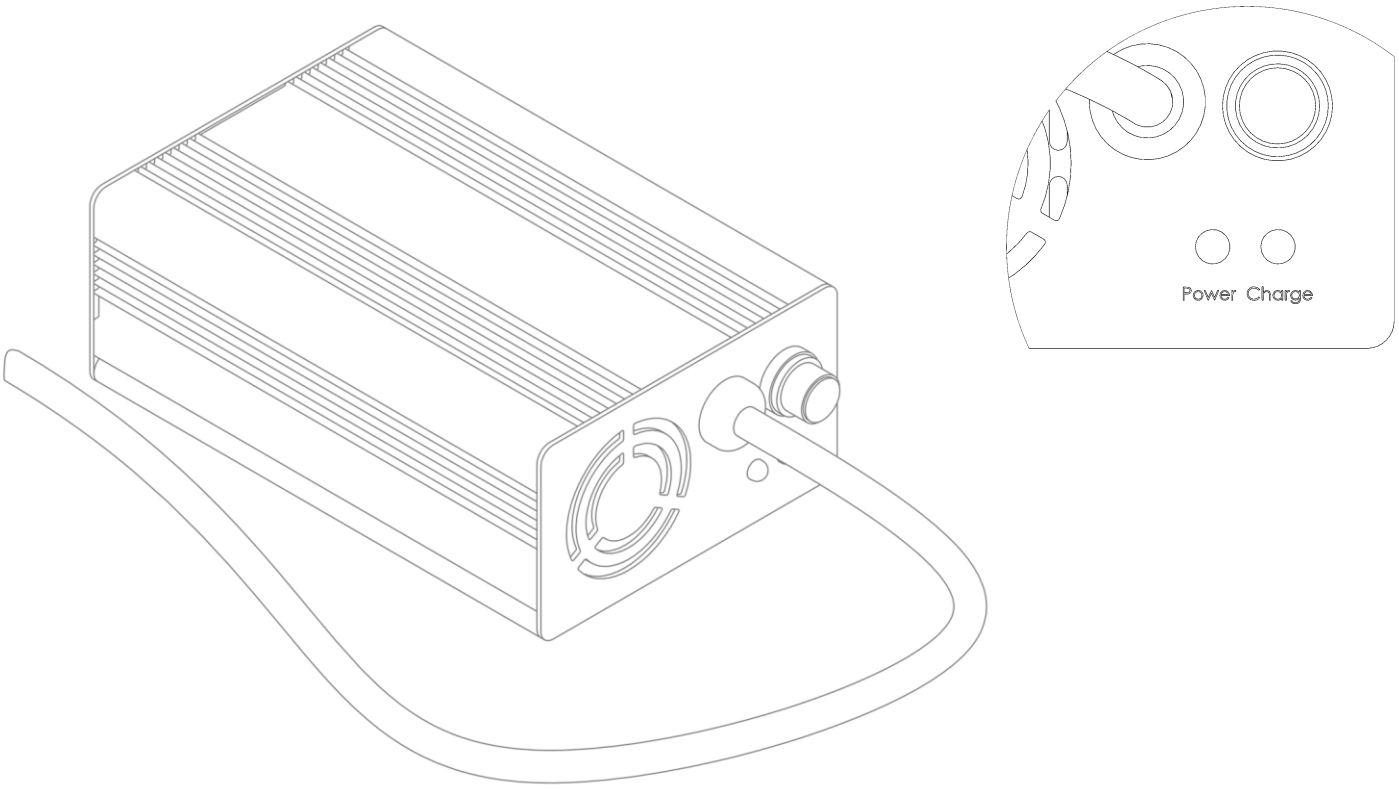
Balanced Charging: During charging, the voltages of the battery cells are automatically balanced.
Overcharge Protection: The battery stops charging automatically once fully charged.
Temperature Detection: To prevent damage, the battery stops charging automatically if the temperature of the battery cells exceeds safe levels while charging.
Overcurrent Protection: The battery stops charging if an excess current is detected.
Over-Discharge Protection: Discharging stops automatically to prevent excess discharge when the battery is overloaded.
Short Circuit Protection: The battery is automatically disconnected if a short circuit is detected.
Hibernation Mode: If the voltage on an individual battery cell drops below 2.5V, the BMS automatically puts the battery into Hibernation mode to prevent over-discharge.
Communication: Information about the voltage, current, and remaining capacity of the battery is transmitted to the instrument controller.

Battery life can vary significantly between deployments. Instrument factors such as filter pore size, filter configuration, and pump throttle, as well as environmental factors such as turbidity and ambient water temperature all impact the volume of sample achievable per channel. While sampling at a greater pump throttle may decrease the amount of time required to collect a sample, it often means the pump is operating outside the region of optimal pumping efficiency. Lowering the pump throttle to 50% or 60% can increase the achievable sample volume per channel by bringing the pump closer to the region of highest efficiency. Depending on the sampling goal for the deployment, it is recommended to keep the pump throttle in the 40% - 60% range during long term automated deployments to prolong battery life. The instrument battery can be depleted in as little as one hour when the pump is operated at maximum pumping throttle.

- Refer to the Ascension Safety Guidelines and the stickers on the battery before use. Users take full responsibility for any violations of the safety requirements stated on the label.

Charging the Battery

Ascension comes default with a 10A charger compatible with both 110-120V and 220-240V AC standards. It is recommended to fully charge the instrument battery before each deployment. Ascension can be charged while powered on and sampling. In this mode the charger is used as shore power to keep the instrument battery topped up between samples.



The Ascension battery charger has two LEDs for indicating the charge status. The power LED on the left side illuminates red when the charger is plugged into power. The charge status LED on the right-side illuminates red while the battery is charging or green when the battery is fully charged. The charge status LED also illuminates green when the instrument is not plugged in. Using the included 10A charger, the instrument will charge from empty to 100% charge in just under two hours or to 80% in approximately one hour. Charging times may vary depending on the ambient temperature, age of the battery, and whether the instrument is powered on and sampling. It is recommended to use only the instrument charger provided by Ocean Diagnostics Inc.

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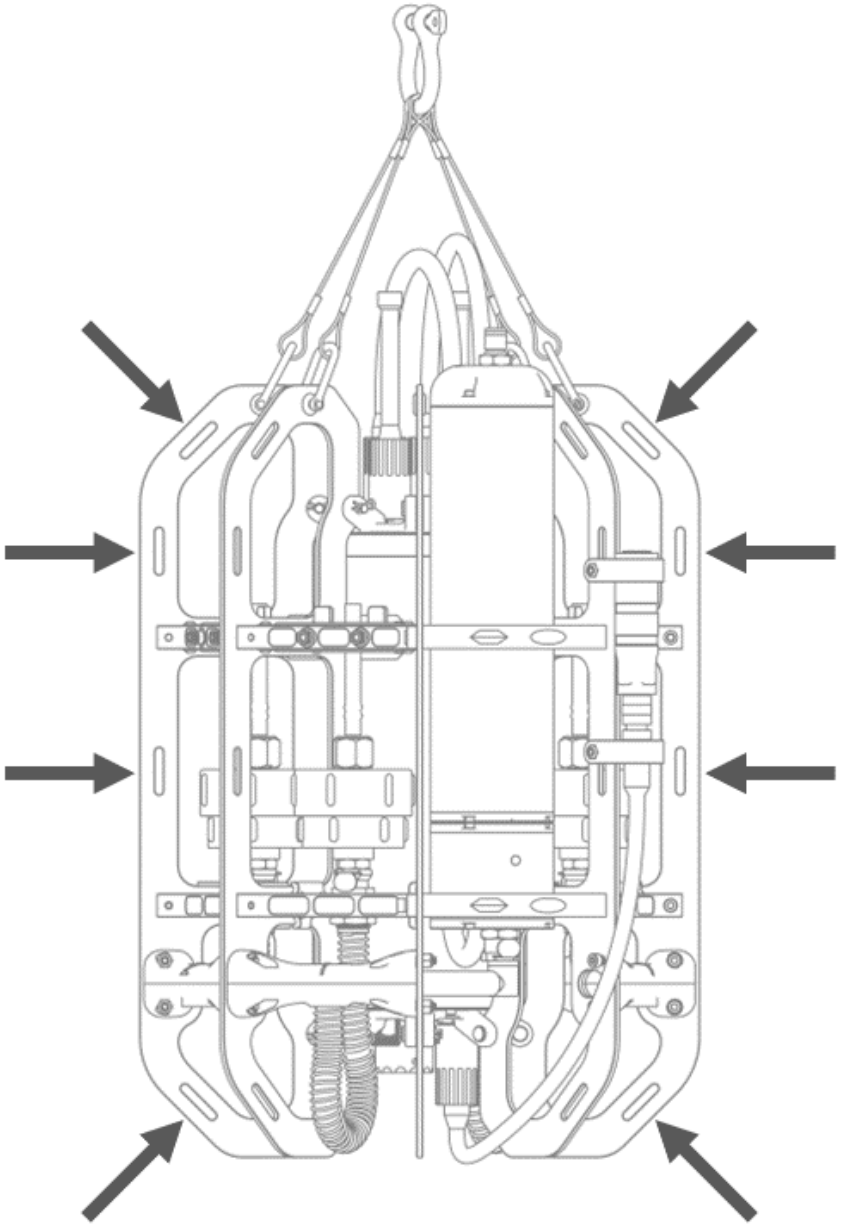
- Only use the included battery charger provided by Ocean Diagnostics to charge the Ascension instrument. Use of a 3rd party battery charger may void the warranty.
- The battery charger is not water resistant. Do not expose the charger to water. Doing so may damage the charger and could result in physical injury due to electrical shock or fire.
- If charging the instrument while submerged, ensure the length of cable between the charger and XT60 connector (yellow connector) are above water and dry. The only section of charging cable that can be submerged is the section between the wet mate connector and XT60.

➢ Mounting Auxiliary Components

Ascension has multiple mounting points located around the instrument frame for mounting additional hardware and instrumentation. Weight can be hard mounted or hung from the attachment points to decrease buoyancy and counteract drift when sampling in high current or turbulent sampling conditions. Each frame segment contains four mounting slots on the outer edge furthest from the core. All 32 mounting slots are designed for optimal compatibility with M4 fasteners.



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- Ensure the dry weight of Ascension plus any auxiliary components does not exceed 14kgs or 30lbs. Surpassing this limit could result in damage to the communication tether.

Deployment

➢ Deployment Environment Requirements

Before deploying Ascension, it is recommended to conduct a safety check of the surrounding area. Make sure that all deployments are carried out in an open area away from underwater obstructions that could damage or snag the instrument and tether. Keep in mind that when deploying from a floating vessel, wind and currents can move the vessel to unsafe or shallower areas throughout the course of the deployment. Always review up to date charts of the deployment area prior to deployment and keep an eye out for underwater hazards, obstructions, and other vessels.

➢ Deployment Limits

- Ascension is limited to a deployment depth of 400m. DO NOT exceed this depth.
- Ascension is limited to deployment temperatures between 0°C and 40°C. DO NOT operate Ascension in temperatures outside this range.

➢ Instrument Preparation

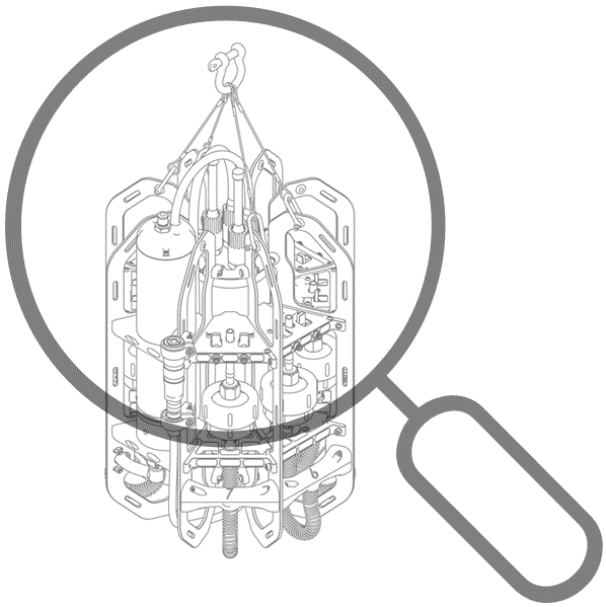
Preparing Ascension for deployment is a relatively quick and straight forward process. There are three main items to be completed before deployment:

1. **Instrument Setup**
    a. Conduct a general inspection of the instrument and tether to evaluate deployment worthiness
    b. Connect the tether to the instrument
    c. Ensure any unpopulated ports are sealed with dummy plugs
    d. Replace the peristaltic tubing before every deployment if configured with the peristaltic pump
    e. Ensure the vent plug in installed into the vent port on the bottom of the instrument
    f. Power on the instrument and tether spool
    g. Purge the fluidic system within the instrument
2. **Filter Setup**
    a. Install a new section of valve seal tubing onto each filter housing
    b. Wash and dry a fresh set of 7x filter housings
    c. Install new filters into each filter housing
    d. Conduct a vacuum seal test on each filter housing
    e. Purge each filter housing when using fine mesh filters
    f. Install each filter housings into its respective sample channel onboard the instrument
3. **Deployment Setup**
    a. Initiate a new deployment on the command computer using the *Ascension Desktop* application
    b. Fill out the deployment and filter information
    c. Review your sample plan
    d. Review up to date charts of the deployment area and scope out your surroundings
    e. Keep an eye out for underwater hazards, obstructions, and other vessels during deployment

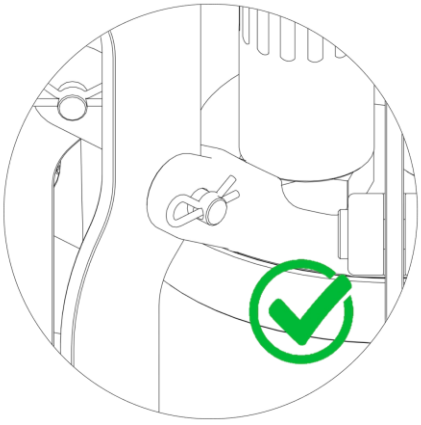
The following pages contain step-by-step instructions for completing the above-mentioned setup procedures.

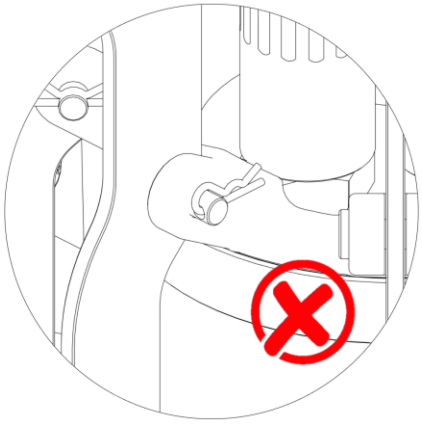
Instrument Inspection

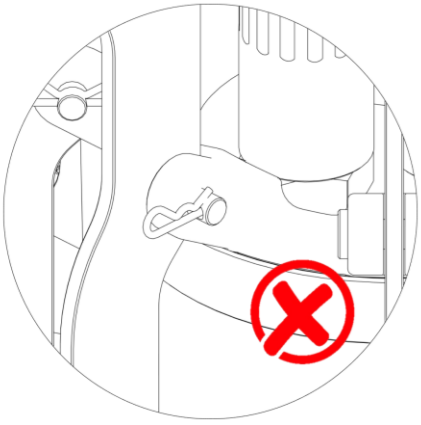
1. Inspect the instrument for visible signs of damage or extreme wear.



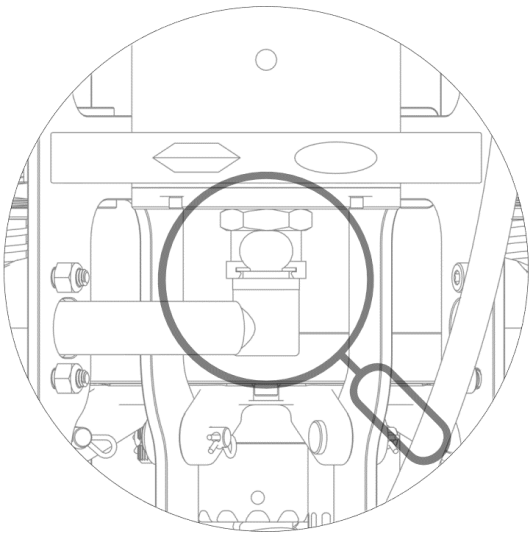
2. Check to ensure all 16x top and bottom frame pins and cotter pins are secured.





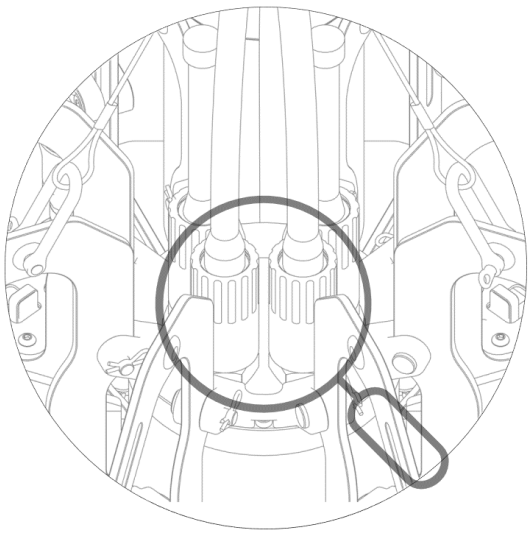


3. Check to ensure the fluidic channel fitting is fully inserted into the flow meter intake.

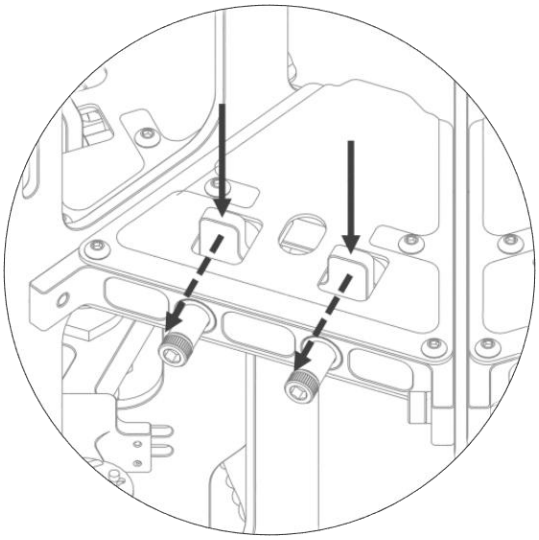


4. Check to ensure all 4x load bearing tether lanyards are attached and intact.

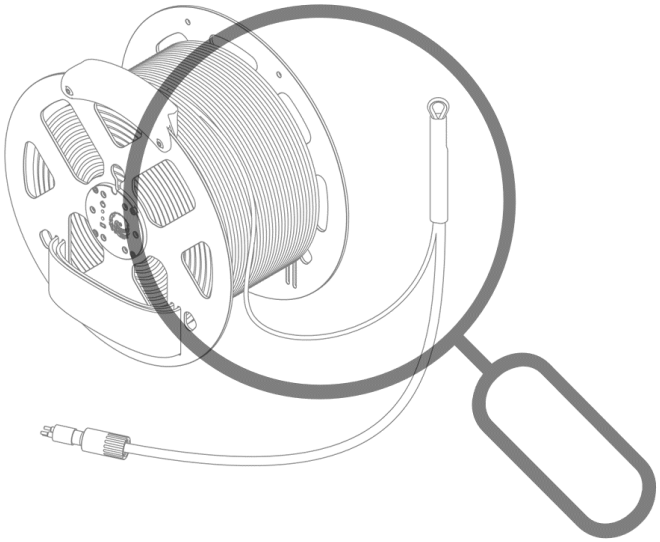
5. Check to ensure both the pump and flow meter cables are plugged into their respective ports on the instrument core and the red locking sleeves are tight.



6. Gently open and close all 7x valves by hand to ensure free movement of the valve mechanism.

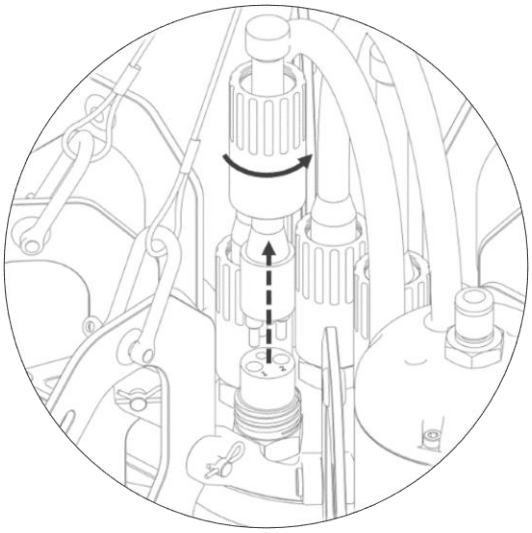


7. Inspect the tether for kinks, damage, and areas of significant wear that could compromise the structural integrity of the tether.

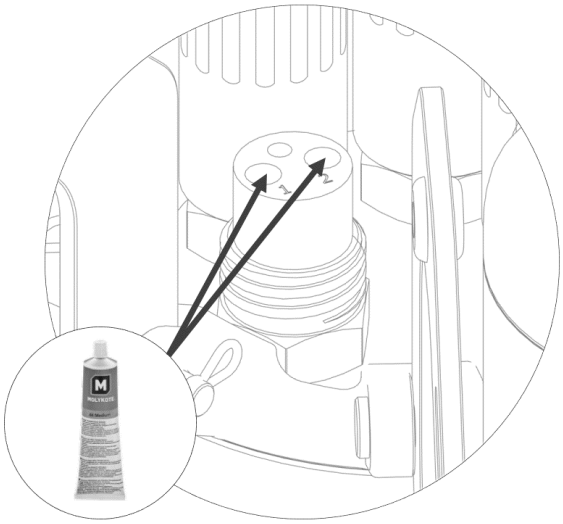


Connecting the Tether

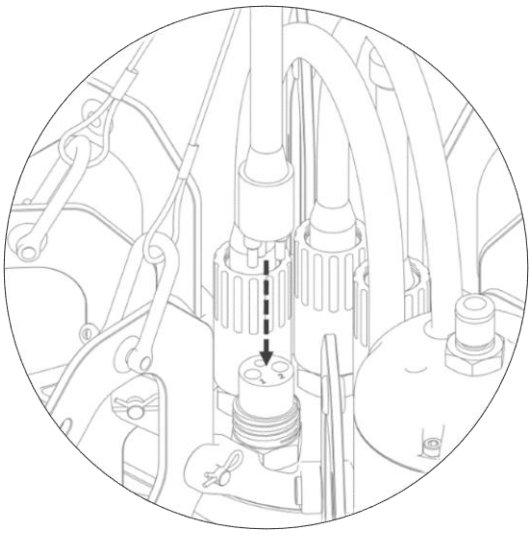
1. Remove the dummy plug from the tether port.



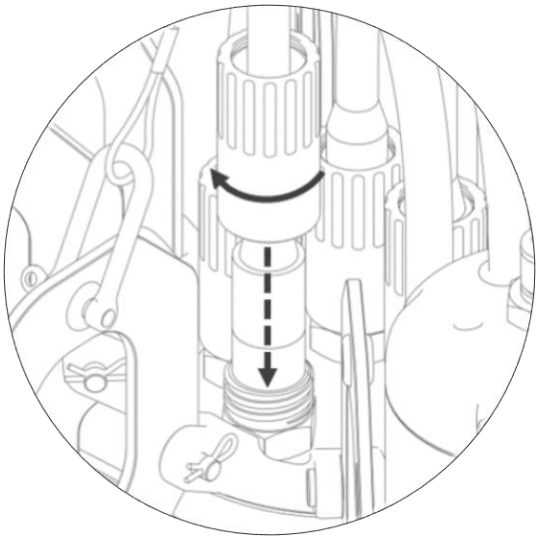
2. Grease the tether port with Molykote 44 Medium.



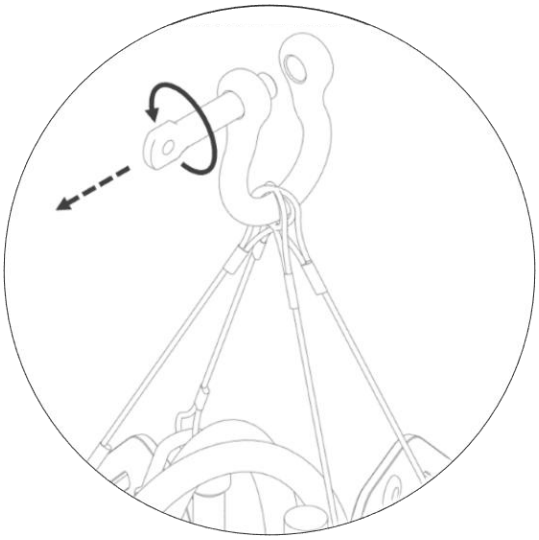
3. Insert the tether connector into the port on the instrument.



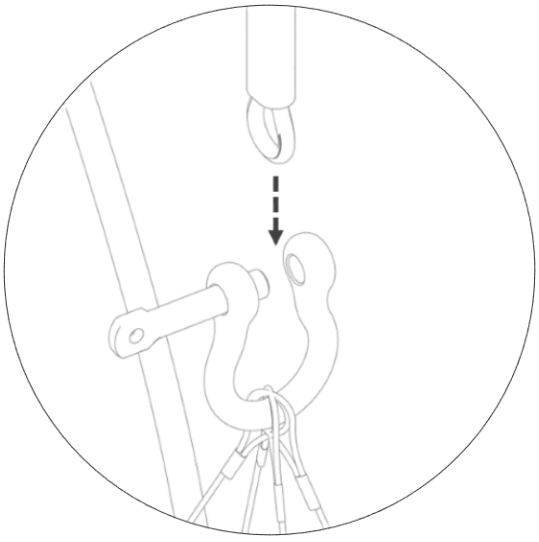
4. Tighten the red locking sleeve onto the tether port to secure the connection.



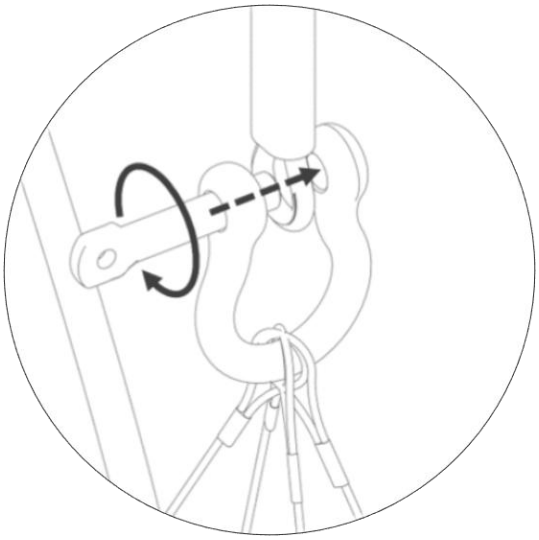
5. Unscrew the pin of the tether shackle while holding in the upright position with the shackle pin in the topmost position.



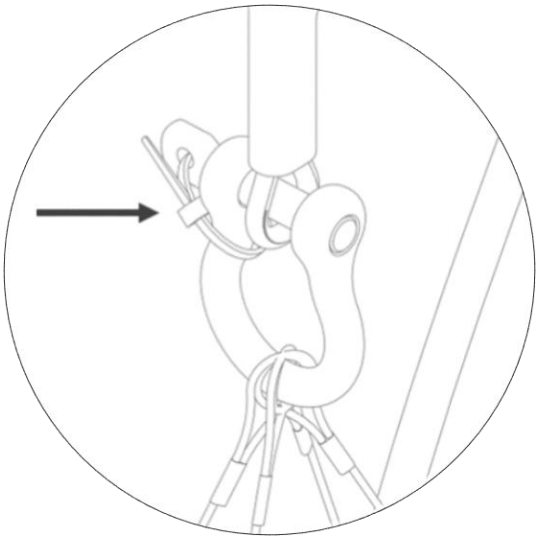
6. Slide the shackle pin through the thimble of the weight bearing portion of the tether.



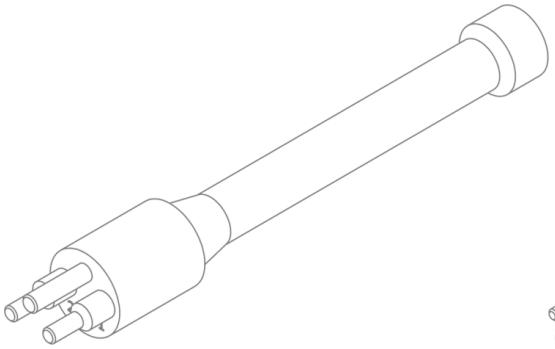
7. Rotate the shackle pin clockwise until tight.

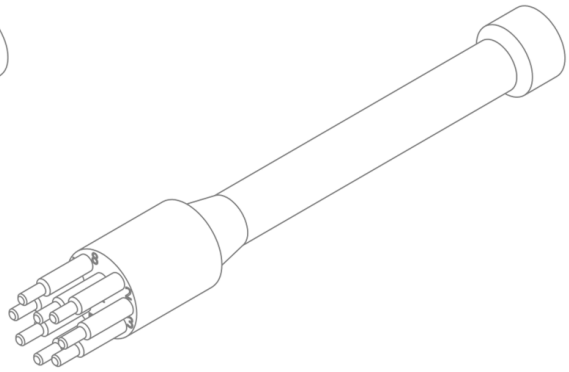


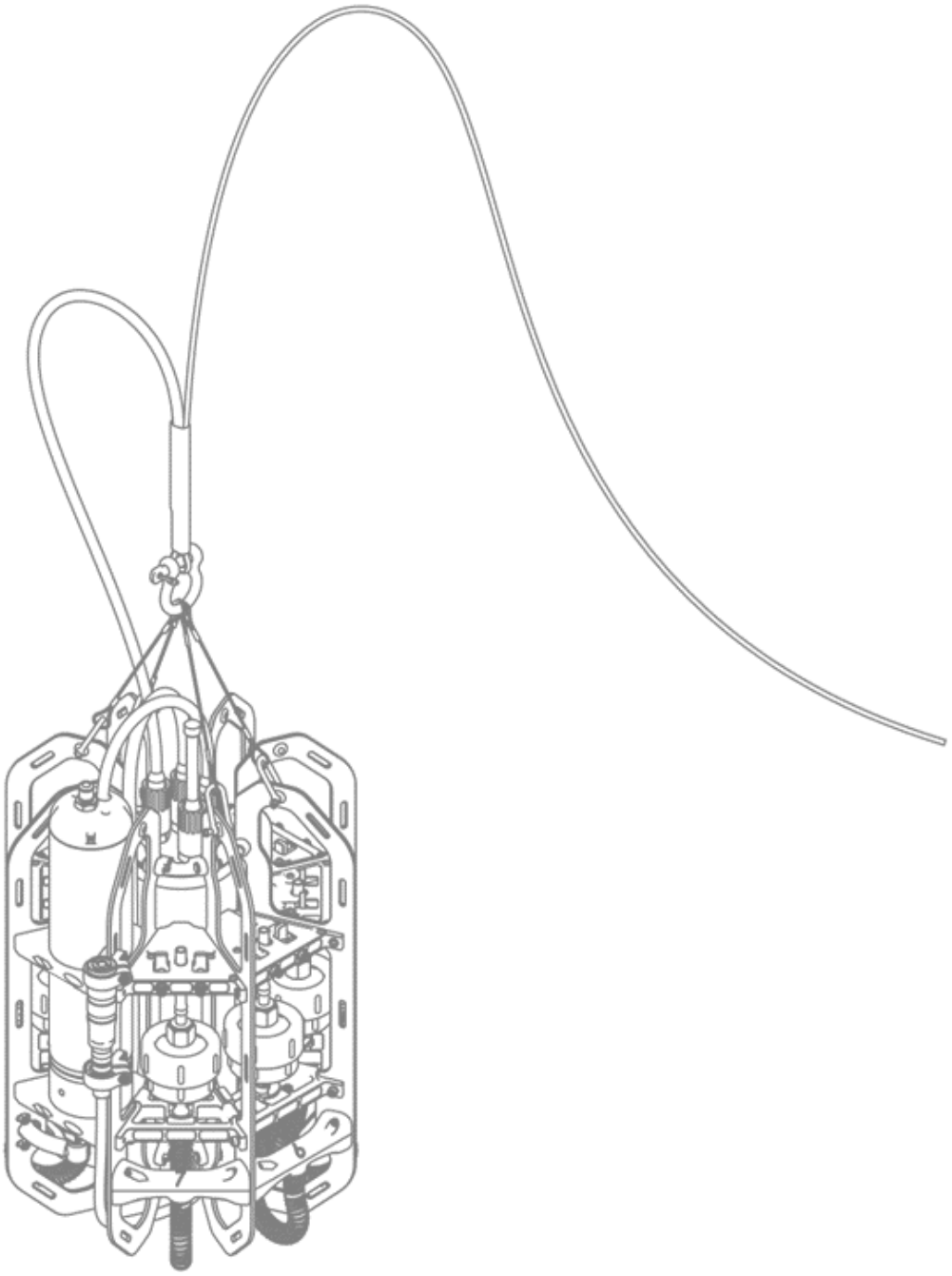
8. Install a zip tie through both the hole at the end of the pin and the shackle itself to prevent the pin from coming loose during deployment.



9. Plug any unpopulated electrical ports with dummy plugs. Do not forget to grease dummy plugged ports with Molykote 44 Medium as well.







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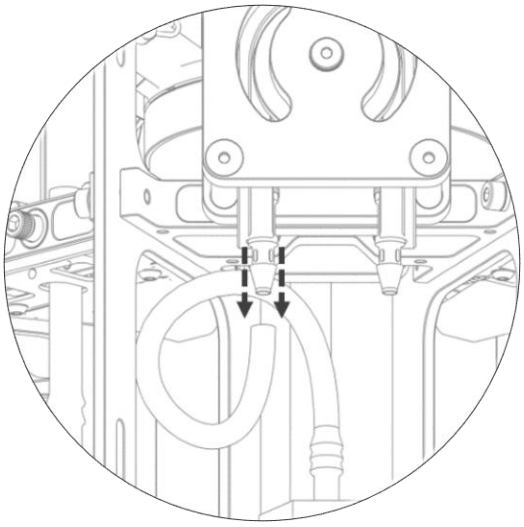
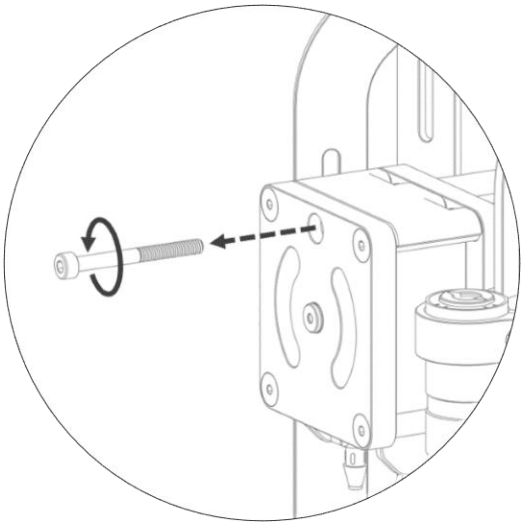
- Make sure to grease the electrical port with Molykote 44 Medium before every insertion of either a wet mate connector or dummy plug into the mating port.
- Do not use WD-40, greasing compound, or similar products when greasing the electrical ports. Use only Molykote 44 Medium to grease the electrical ports. The use of alternative greasing compounds may void your instrument warranty.
- Always install a zip tie through the tether shackle pin to prevent the shackle from coming loose during deployment.

Replacing Peristaltic Pump Tubing

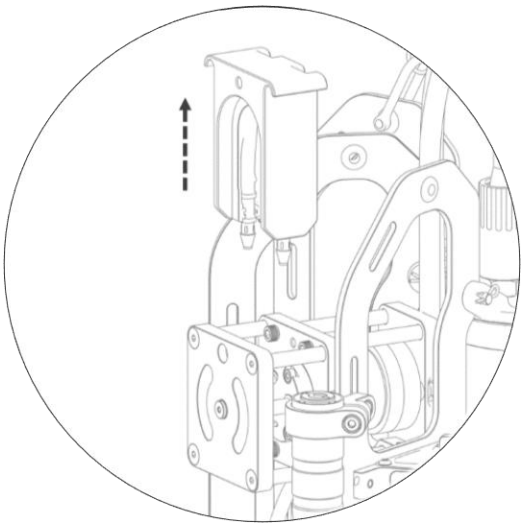
1. Disconnect the intake tubing between the flow meter and peristaltic pump. If applicable, remove any exhaust tubing from the peristaltic pump as well.



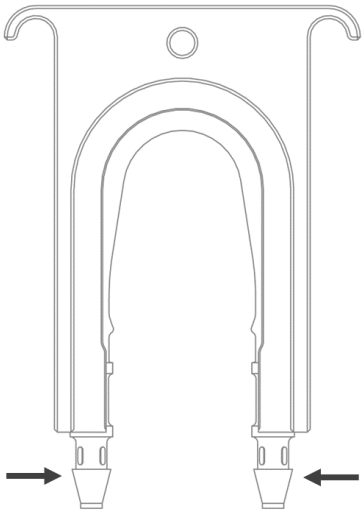
2. Unscrew the peristaltic tubing access tray retaining screw by rotating counterclockwise using the service tool.



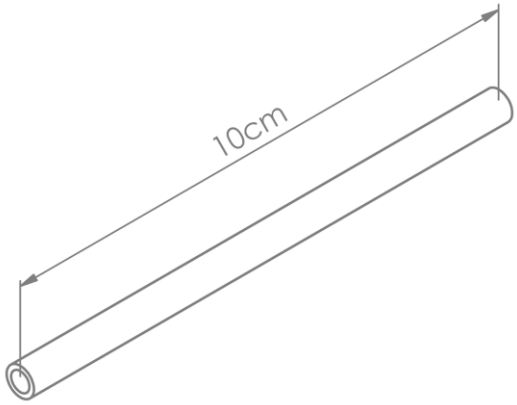
3. Slide out the peristaltic tubing access tray.



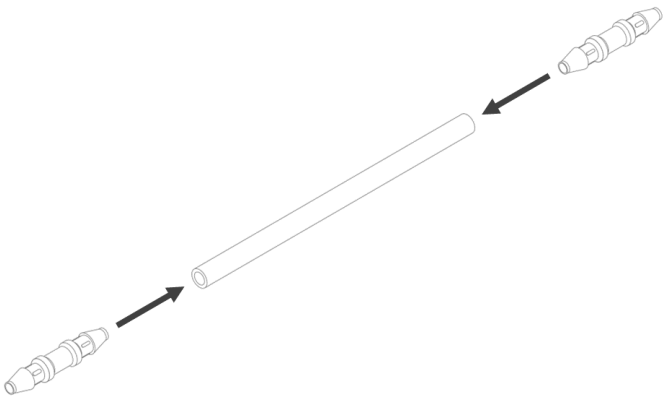
4. Remove the tubing by pressing inwards on the barbed fittings as shown.



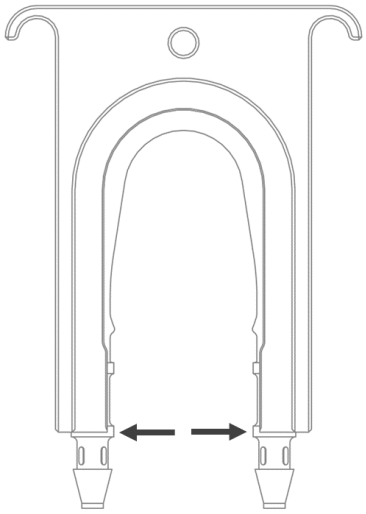
5. Cut a new section of peristaltic tubing 10cm in length.



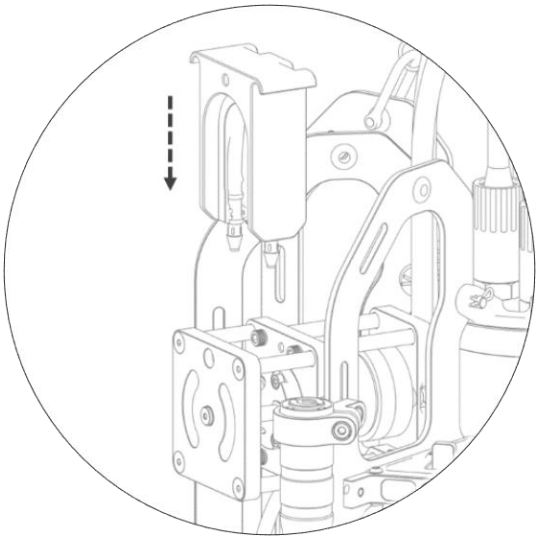
6. Install a barbed fitting on both ends of the new section of peristaltic tubing.



7. Install the new peristaltic tube into the access tray by clicking the barbed fittings into place.

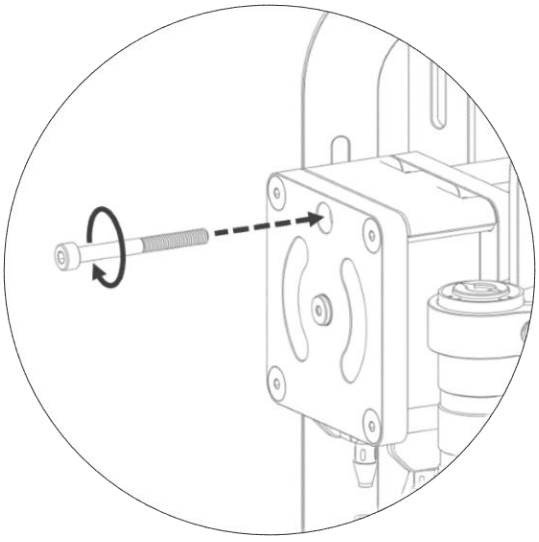


8. Re-insert the peristaltic tubing access tray into the peristaltic pump.



9. Re-install the peristaltic tubing access tray retaining screw by rotating clockwise using the service tool.

   DO NOT OVERTIGHTEN!

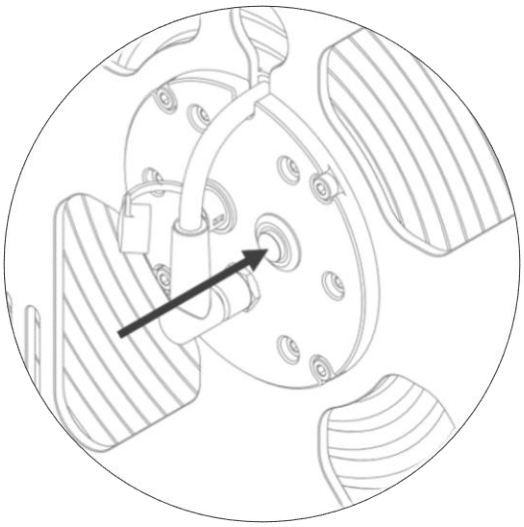


Power-On Procedure

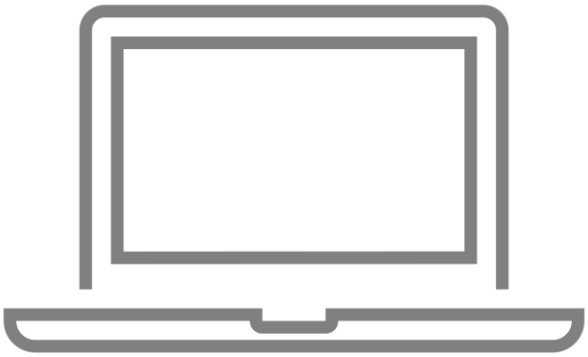
1. Ensure the vent plug is installed into the vent port on the bottom of the instrument.

2. Power on Ascension by pushing and turning the quarter-turn power switch clockwise until it clicks into the *on* position (90 degrees from the *off* position).

3. Power on the tether spool with a single press of the power button located on the back side of the tether spool.

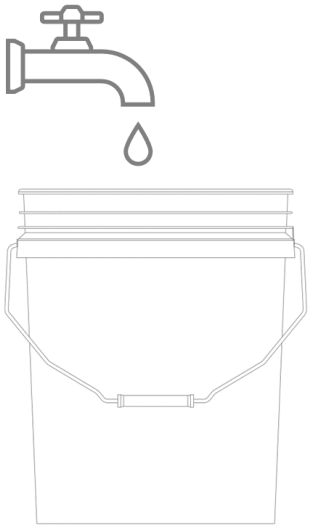


4. Connect to the instrument using the *Ascension Desktop* application.

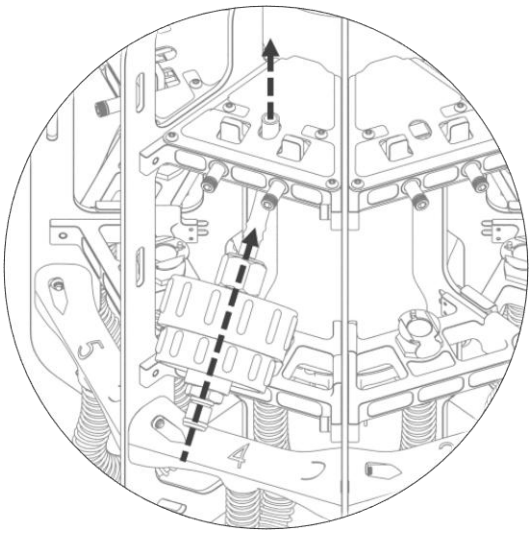


Instrument Purge Procedure

1. Prepare a tank or bucket large enough to fully submerge Ascension with fresh water.

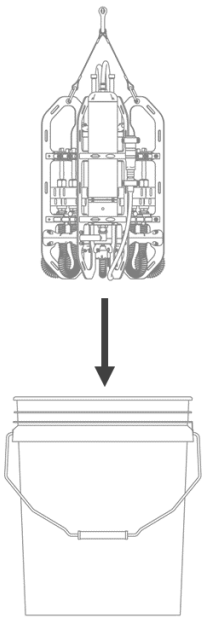


2. Install 7x empty filter housings into all seven sample channels onboard Ascension.

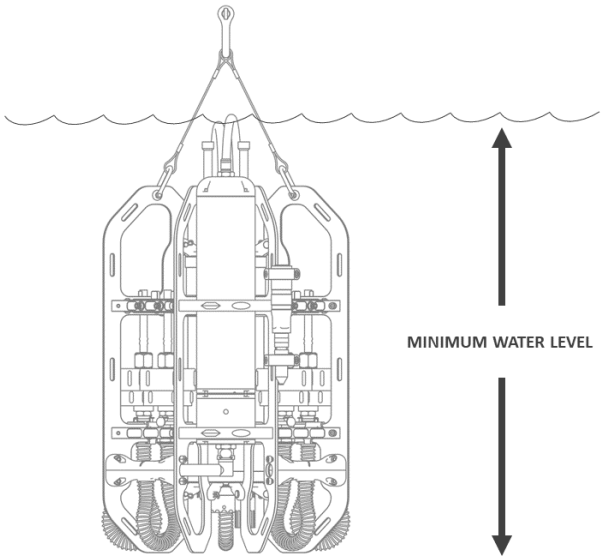


3. Ensure the vent plug in installed into the vent port on the bottom of the instrument.

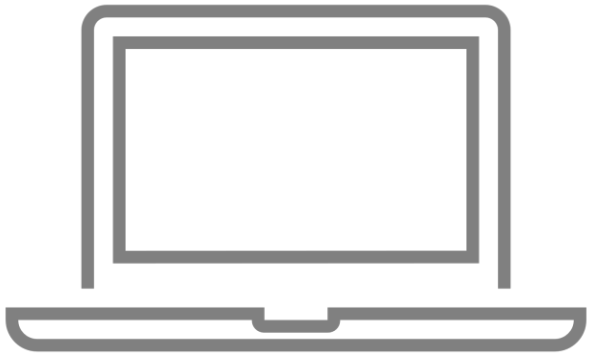
4. Lower Ascension into the purge bucket.



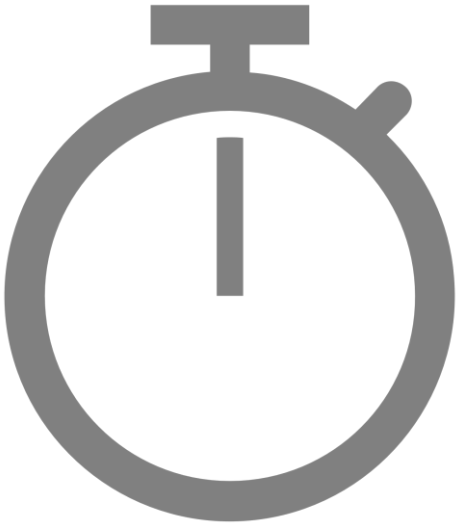
5. Ensure the instrument is fully submerged. The water level should be above the pump exhaust port.



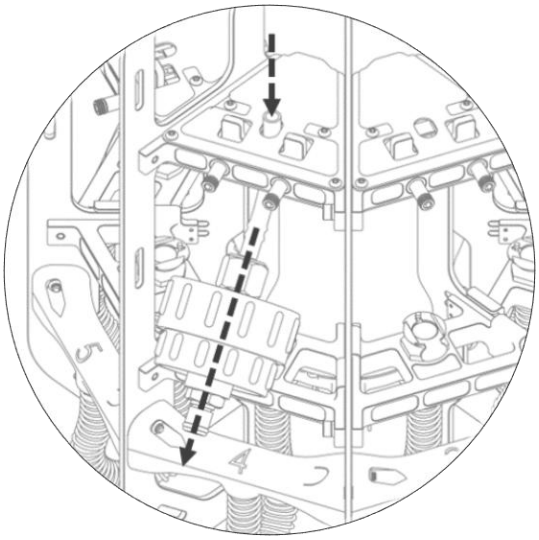
6. Within Ascension Desktop, set the following:
   Rinse Time per Valve: 10s
   Rinse Number of Passes: 2
   Rinse Pump Throttle: 30% or 100%
   (Peristaltic Pump: 30%, Impeller Pump: 100%)
   Rinse Soak Time: 0s



7. Start the automated instrument purge.

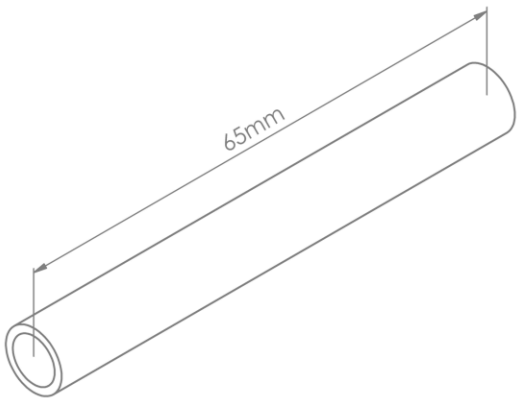


8. Once complete, remove the 7x empty filter housings in preparation to install 7x purged filter housings prepared with filters inside.

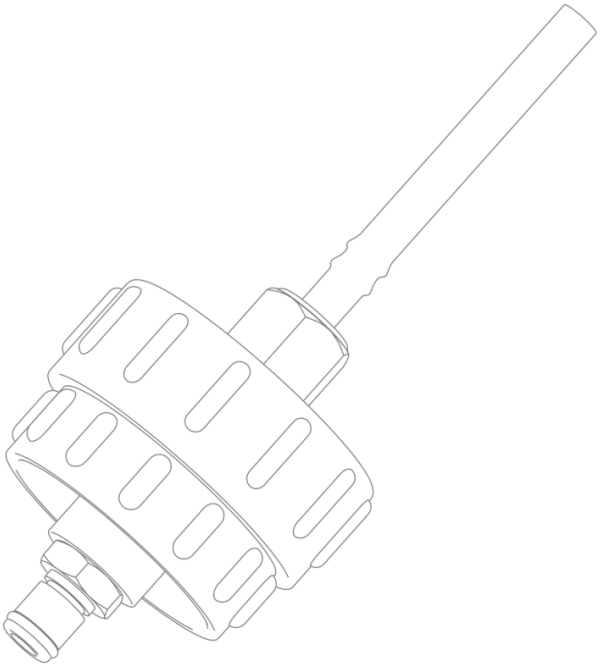


Filter Housing Preparation

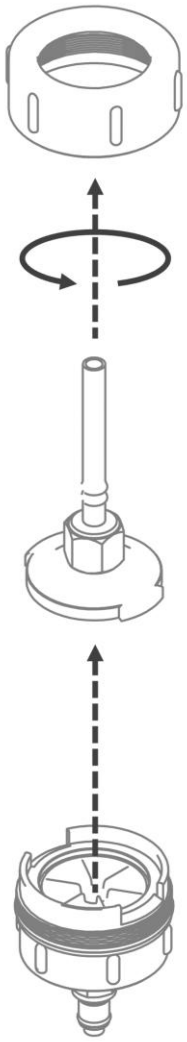
1. Cut a new section of valve seal tubing 65mm in length.



2. Install the valve seal tubing onto the barbed fitting on the intake of the filter housing.



3. Unscrew the filter housing and separate the top and bottom halves.



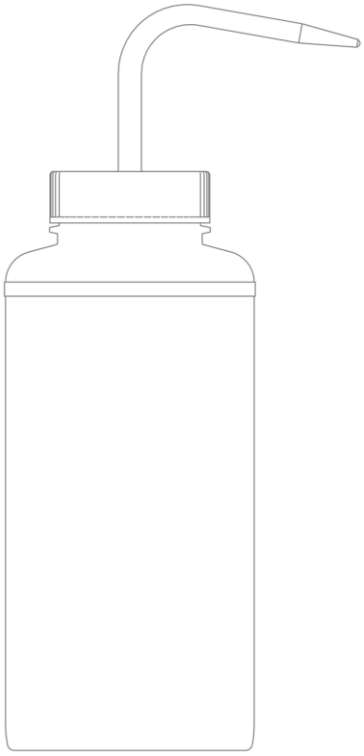
4. Place all filter housing parts into a cleaning solution and let soak for an extended period of time based on your personalized cleaning protocol. Don’t forget to include both white filter supports for the top and bottom halves of your filter housing if using delicate filter materials such as Mixed Cellulose Ester (MCE).

   (Select a cleaning solution based on your application. Dilute bleach solution, alcohol, or simply soapy water are common cleaning solutions for eDNA and microplastics sampling)

5. Using a squirt bottle and rinse fluid, rinse down all filter housing parts focusing extra effort on parts and surfaces located on the inside of the filter housing.

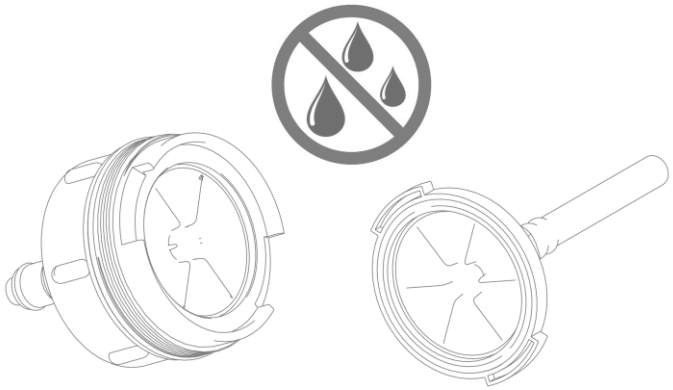
   (Select a rinse fluid based on your application. Milli Q water and deionized water are common rinse fluids for eDNA and microplastics sampling)

   (This step is best completed in a laminar flow hood to prevent unwanted contamination during the rinsing process)



6. Let all parts of the filter housing air dry for an extended period of time.

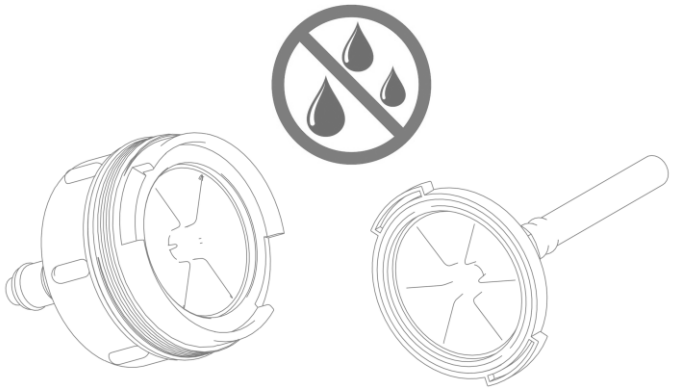
   (This step is best completed in a laminar flow hood to prevent unwanted contamination during the drying process)



Installing a Filter

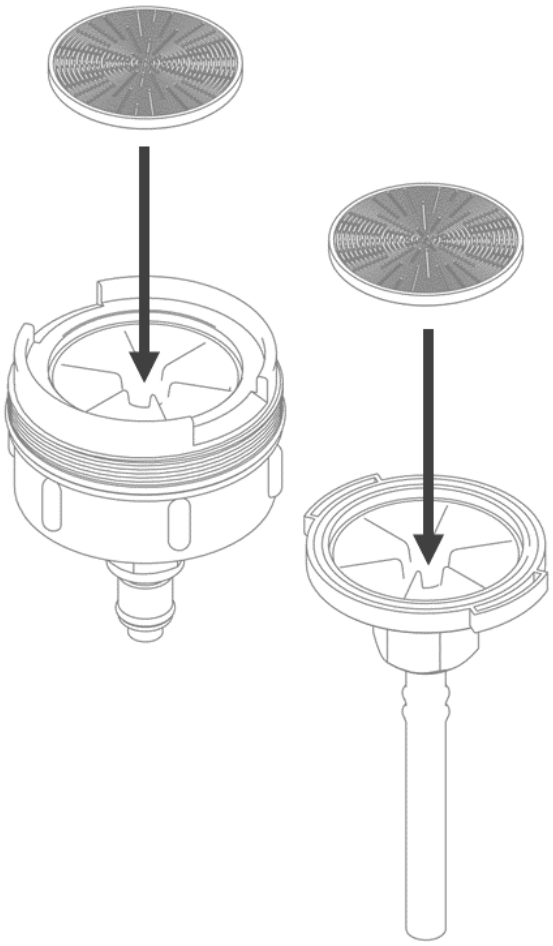
1. Ensure the inside of the filter housing is completely dry.

   (This step is critical when using fine mesh Mixed Cellulose Ester (MCE) filters)

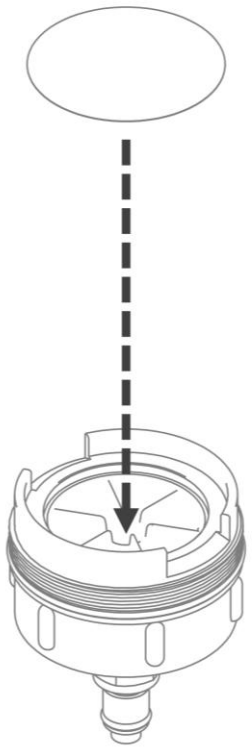


2. When using delicate filter materials such as Mixed Cellulose Ester (MCE) for eDNA sampling, it is important to install the white filter supports in both the top and bottom halves of the filter housing.

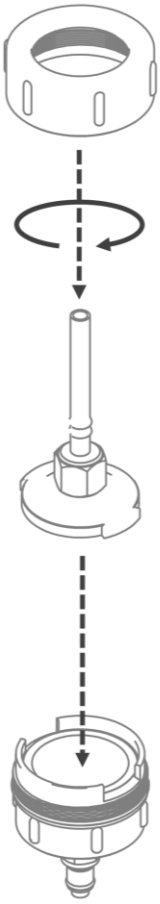
   (Stainless steel mesh filters are usually stiff enough to be installed inside the filter housing without filter supports)



3. Place a new filter into the bottom half of the filter housing.

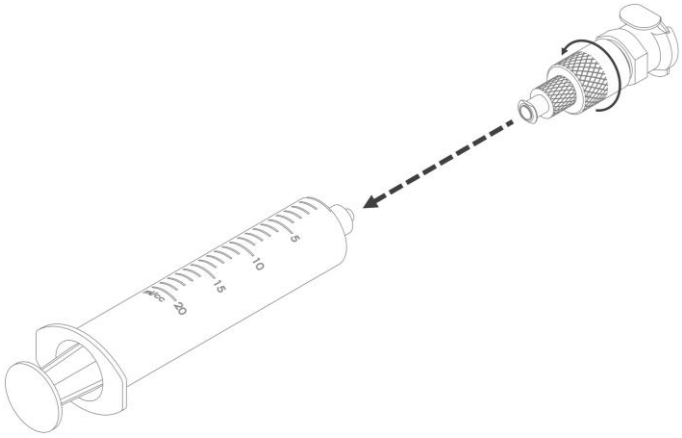


4. Install the top half of the filter housing and tighten down the outer ring.

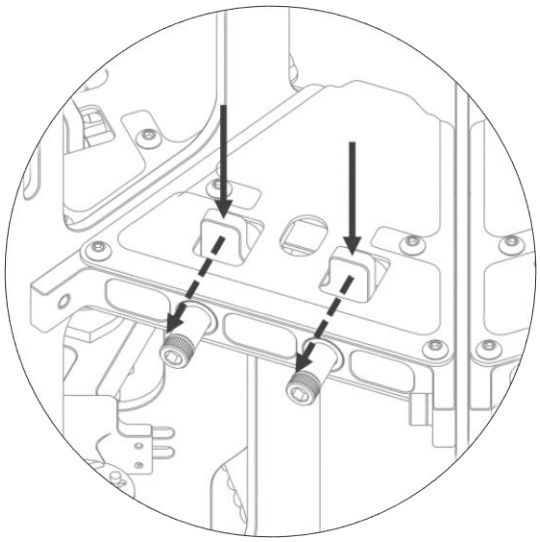


Filter Vacuum Test

1. Install the filter adapter onto the syringe.

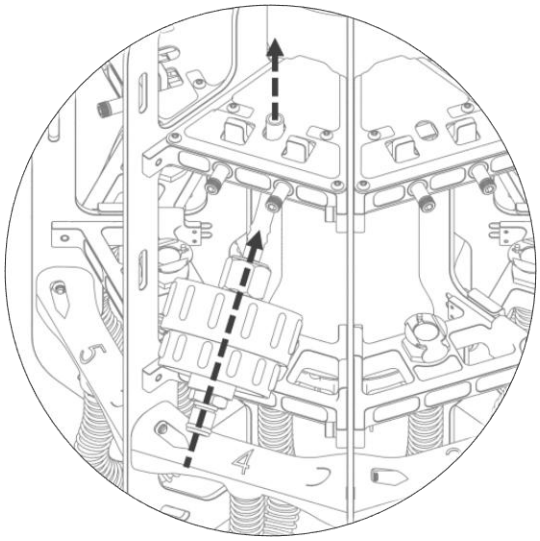


2. Open the valve manually by pulling on the two valve control handles. Hold open for the following step.

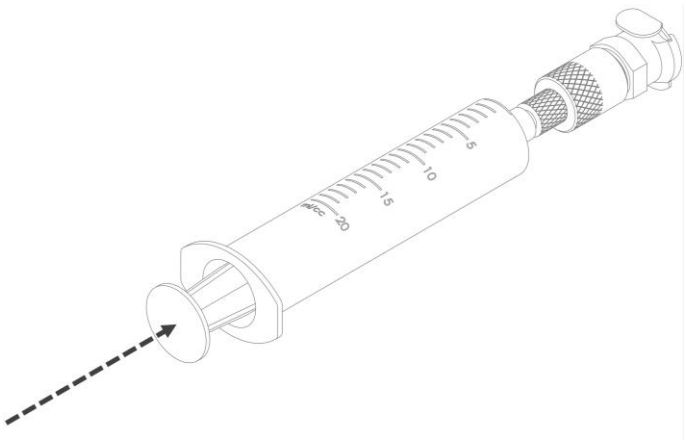


3. Insert the valve tubing attached to the filter housing up through the valve opening and release the valve control handles to pinch the tube.

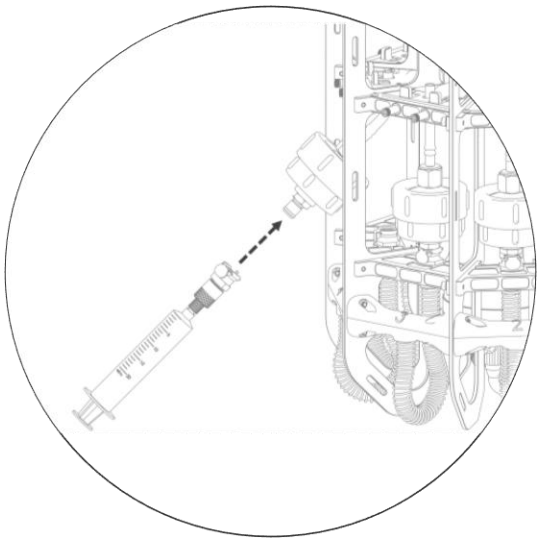
   (Do not connect the bottom of the filter housing into the Ascension fluidic system)



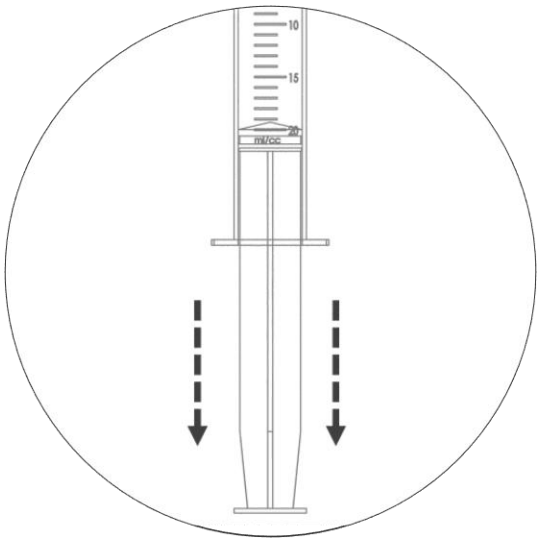
4. Fully depress the plunger into the purging syringe to expel all internal volume.



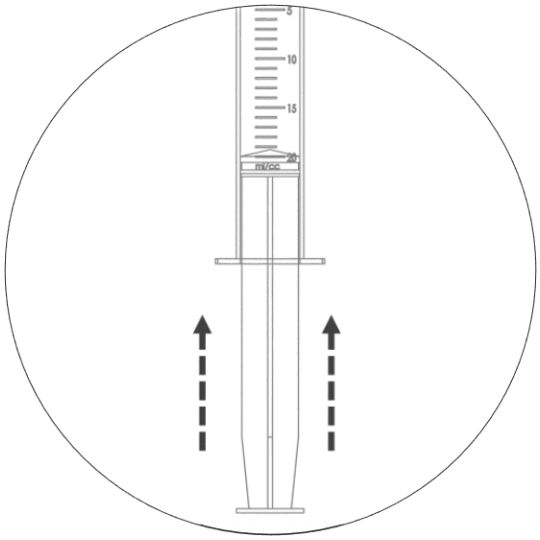
5. Connect the purging syringe to the base of the filter housing.



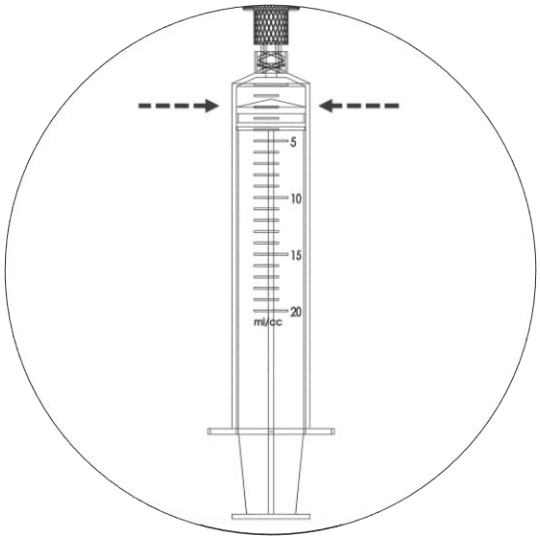
6. Pull the syringe plunger to the 20mL mark to pull a vacuum inside the filter housing. Hold for 3 seconds.



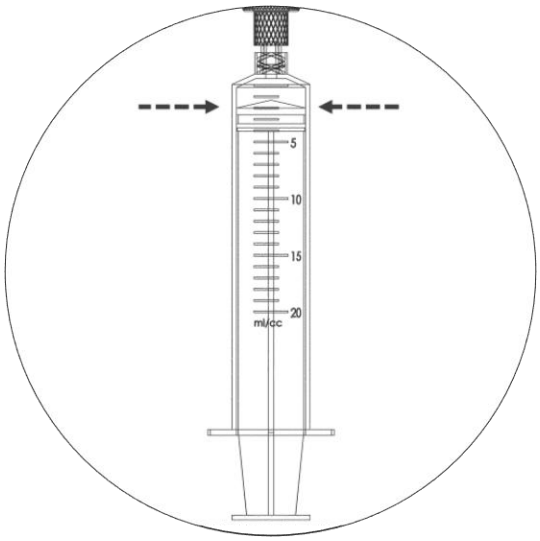
7. Slowly release the syringe plunger and let it return to the equilibrium position.



8. The equilibrium position should be within 3mL of the zero point. Take note of the resting position of the syringe plunger.



9. Repeat steps 6 and 7 again. The filter housing is properly sealed if the reading on the syringe is identical to the position noted in step 8. If the equilibrium position is greater than the position noted in step 8, there is a leak in the filter housing.

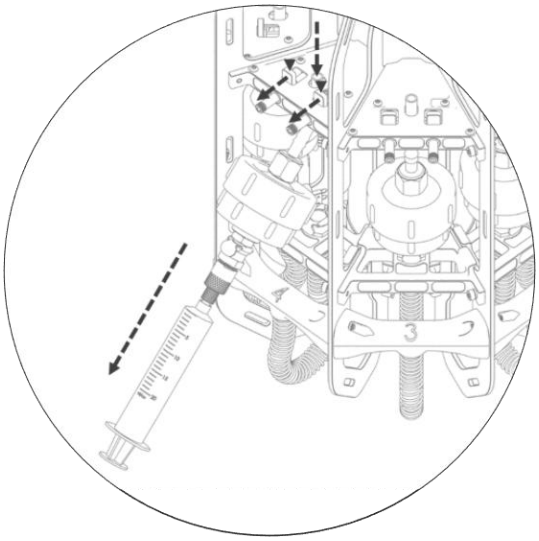


- It is essential to ensure all filter housings are sealed properly when loading filters. Failure to seal filter housings properly can result in sample contamination and inaccurate volume and flow rate measurements across all samples.
- If a leak is detected using the vacuum test, refer to the *Filter Vacuum Test Troubleshooting* guide under the *Maintenance & Storage* section.
- The purge test may be repeated multiple times if a filter housing is suspected to contain a small leak. Ensure the syringe plunger returns to the same resting position every time the plunger is pulled to 20mL for 3 seconds. If the volume continues to increase with every pull and release of the plunger, there is a leak within the filter housing.

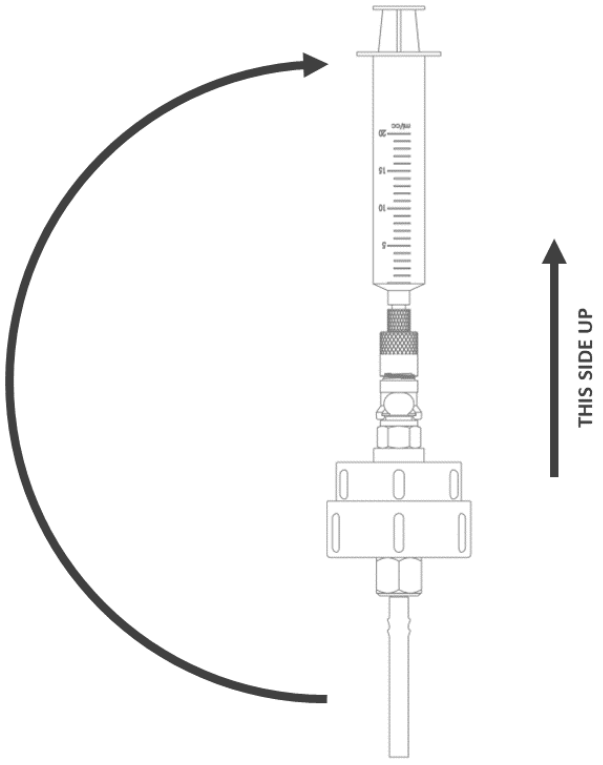
Filter Housing Purge Procedure

When using fine mesh filters with a pore size of less than 10µm, it is important to purge all air from within the system prior to deployment. Air bubbles inside the filter housing can get trapped on the filter surface and prevent the filter from operating optimally. Air trapped on the surface of the filter effectively reduces the active surface area of the filter. To prevent this, the following steps should be taken when sampling with fine mesh filters with a pore size of less than 10µm.

1. Remove the filter from the instrument after the vacuum test with the syringe still attached.

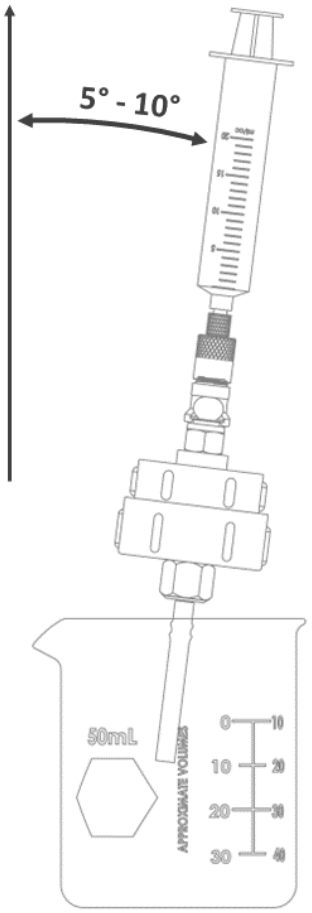


2. Invert the filter housing and purging syringe so the valve tubing is facing the floor.



3. Insert the valve tubing down into a beaker of purging fluid at a very slight 5 to 10-degree angle.

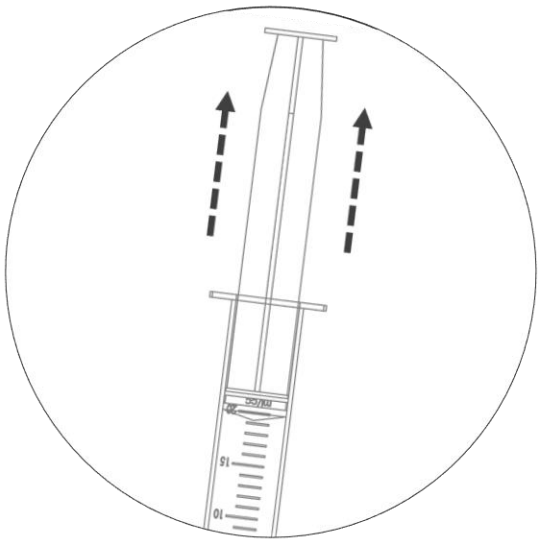
   (Select a purging fluid based on your application. Milli Q water and deionized water are common purging fluids for eDNA and microplastics sampling)



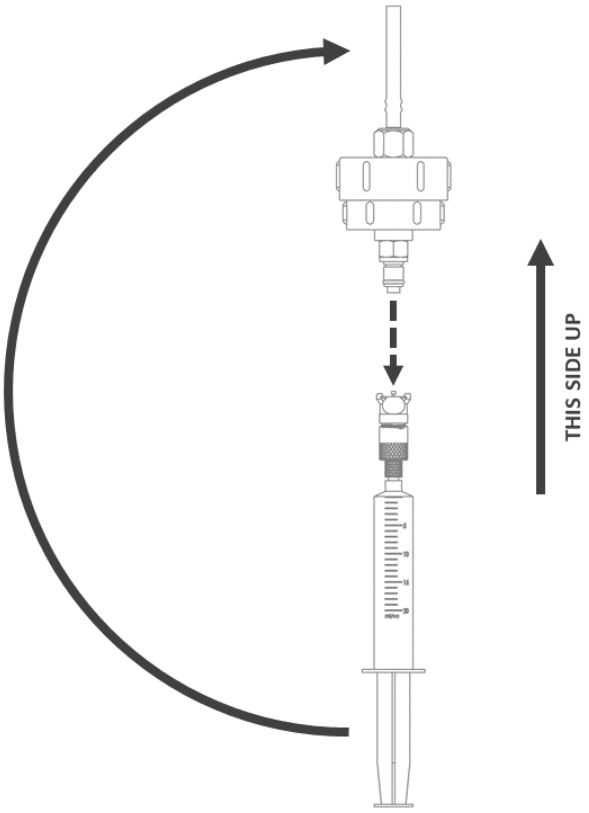
4. Gently pull the plunger of the purging tool until purging fluid begins to flood into the syringe.

   (Pull the plunger very slowly, it should take between 5 and 10 seconds of pulling the plunger before you start to see purging fluid accumulate in the syringe)

   (The Plunger should move freely during the backfill stroke with very little resistance. If you feel significant resistance, the filter housing may not have been completely dry before installing the filter – This is a phenomenon that can occur when an MCE filter dries out after already being exposed to water)



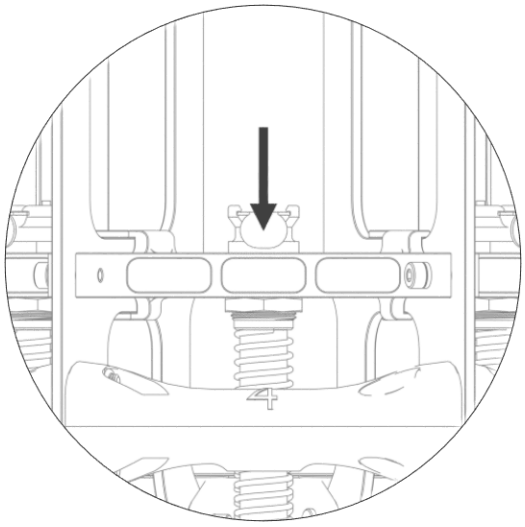
5. Re-invert the filter housing and purging syringe so the valve tubing is facing up and disconnect the purging syringe.



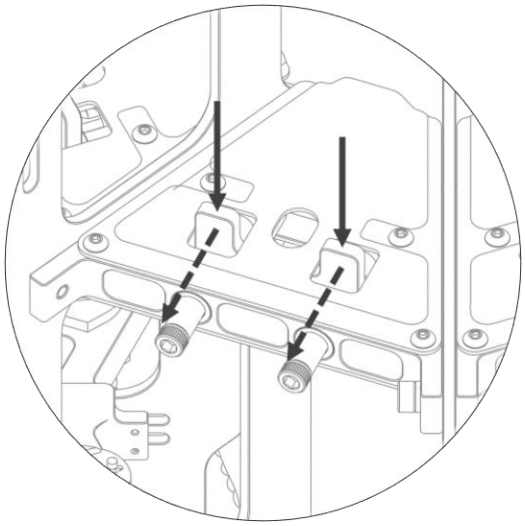
6. Discard the unused purging fluid remaining in the purging syringe before repeating the vacuum test and purge procedure on the next filter housing.

Installing a Filter Housing into the Instrument

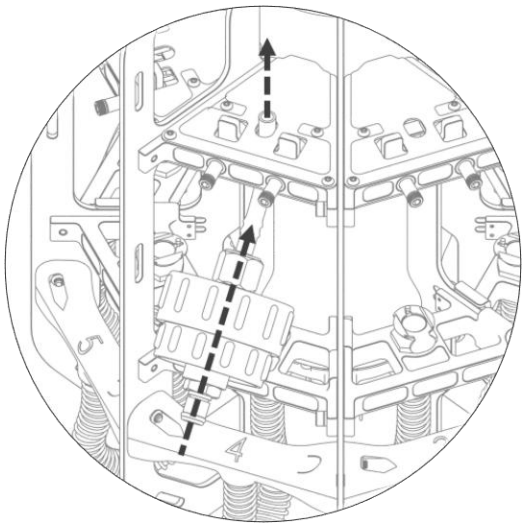
1. Toggle the sample channel quick-disconnect fitting by pressing the release button.



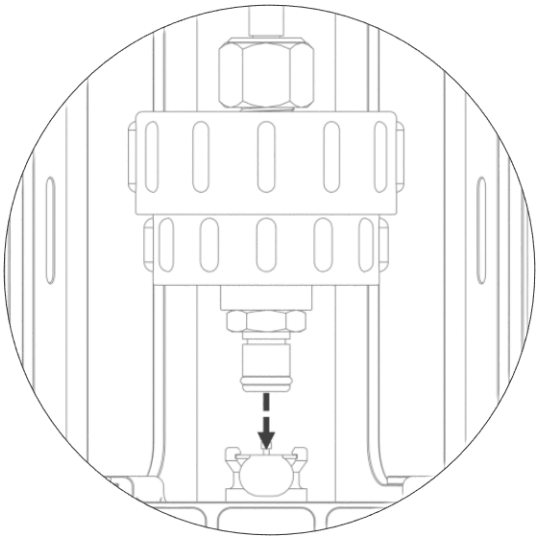
2. Open the valve manually by pulling on the two valve control handles. Hold open for the following two steps.



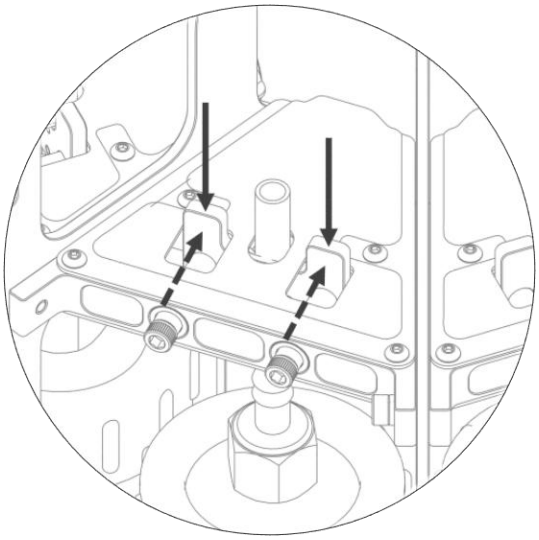
3. Slide the valve tubing attached to the filter housing up through the valve opening.



4. Push the quick-disconnect fitting down into place. You should hear an audible click indicating the connector is fully inserted.



5. Close the valve by releasing the two valve control handles.



- Always install filter housings into all seven sample channels prior to deployment. The fluidic system requires all seven sample channels to be loaded for proper sealing and operation.

➢ Pre-Deployment Checklist

Always complete the *Pre-Deployment Checklist* prior to deployment. The *Pre-Deployment Checklist* guides you through the instrument preparation process described above and covers all the basic checks that should be completed before deployment including a full instrument inspection.

N	Item Description	Checke	Confirm	Initials
Instrument Inspection				
1	Instrument frame intact	[ ]	[ ]	
2	All valves installed and secure	[ ]	[ ]	
3	Pump & flowmeter assembly secured to frame	[ ]	[ ]	
4	All top & bottom cotter pins present and fully inserted x16	[ ]	[ ]	
5	Fluidic channel fitting fully inserted into flowmeter	[ ]	[ ]	
6	Screw-pin elongated shackles present and locked x4	[ ]	[ ]	
7	Mechanical tether lanyards not freyed or warn x4	[ ]	[ ]	
8	Pump & flowmeter connectors fully inserted and tight x2	[ ]	[ ]	
9	Gently open each valve by hand. All should open freely x7	[ ]	[ ]	
Instrument Prep				
1	Grease tether and charging ports with Molykote 44	[ ]	[ ]	
2	Connect tether to instrument port and tighten locking sleeve	[ ]	[ ]	
3	**Connect tether thimble to instrument anchor shackle**	[ ]	[ ]	
4	Install small zip tie through anchor shackle to lock in place	[ ]	[ ]	
5	Install dummy plug on charging port and tighten locking sleeve	[ ]	[ ]	
6	Screw filter cartridges into valve channels x7 (hand tight)	[ ]	[ ]	
7	Connect channel tubing to filter cartridges x7 (audible click)	[ ]	[ ]	
8	Ensure all 7 filter channels occupied and connected	[ ]	[ ]	
9	**Ensure bottom vent plug installed and tight**	[ ]	[ ]	
Power On Checks				
1	Power on Ascension instrument using bottom switch	[ ]	[ ]	
2	Ensure blue status LED flashing on Ascension instrument	[ ]	[ ]	
3	Power on tether spool by a single press of the side button	[ ]	[ ]	
4	Ensure status LED flashing green on tether spool	[ ]	[ ]	
5	Plug Bluetooth dongle into USB port on your PC	[ ]	[ ]	
6	Ensure PC bluetooth turned on in Windows settings	[ ]	[ ]	
7	Ensure *ODI Ascension Tether* paired or *Add Bluetooth device*	[ ]	[ ]	
8	Launch *Ascension Desktop* software	[ ]	[ ]	
9	Click *Cancel* on *Ascension Desktop Start Window*	[ ]	[ ]	
10	Connect to instrument "File -> Connect Profiler (Bluetooth)"	[ ]	[ ]	
11	Wait for instrument serial number to populate (top right)	[ ]	[ ]	
12	Open instrument controller "Control -> Real-Time Controller"	[ ]	[ ]	
13	Ensure *Instrument Information* values updating in realtime	[ ]	[ ]	
14	Open *Home Position* using *Sample Channel Selector*	[ ]	[ ]	
15	Open valves 1 through 7 to ensure valves operating properly	[ ]	[ ]	
16	Open *Home Position* again in preparation for deployment	[ ]	[ ]	

- Included with the Ascension documentation located on the included USB flash drive is the standard instrument checklist package. This package includes comprehensive checklists for *Charging*, *Sample Prep*, *Packing*, *Pre-Transport*, *Pre-Deployment*, *Manual Deployment*, *Automated Deployment*, *Post- Deployment*, and *Automated Rinse*, in addition to the *Master Check List*.

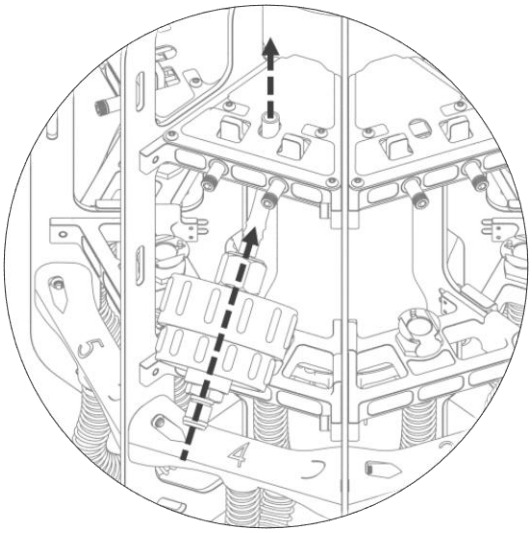
➢ Post-Deployment

Upon completion of a deployment in the environment (seawater or freshwater) it is essential to clean the instrument to prevent the buildup of contaminants and debris within the fluidic system. Ascension includes an automated rinse mode that pumps water through each fluidic channel to remove any contaminants from within the pump, flow meter, valves, and internal fluidic system. Before running an automated rinse, remove all filter housings containing samples from the instrument and install an empty set of housings containing no filters.

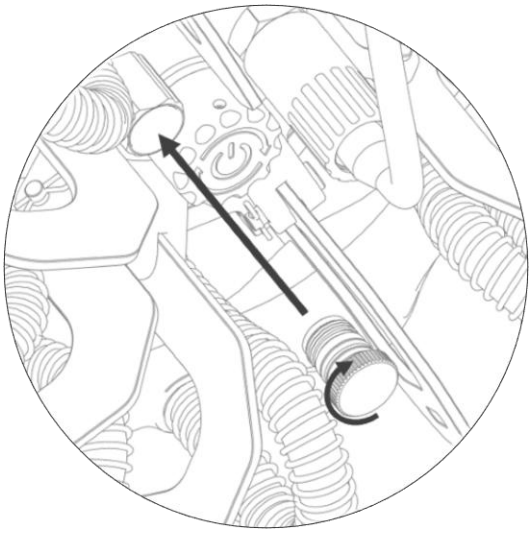
Post-Deployment Rinse Procedure

1. Prepare a tank or bucket large enough to fully submerge Ascension with fresh water.

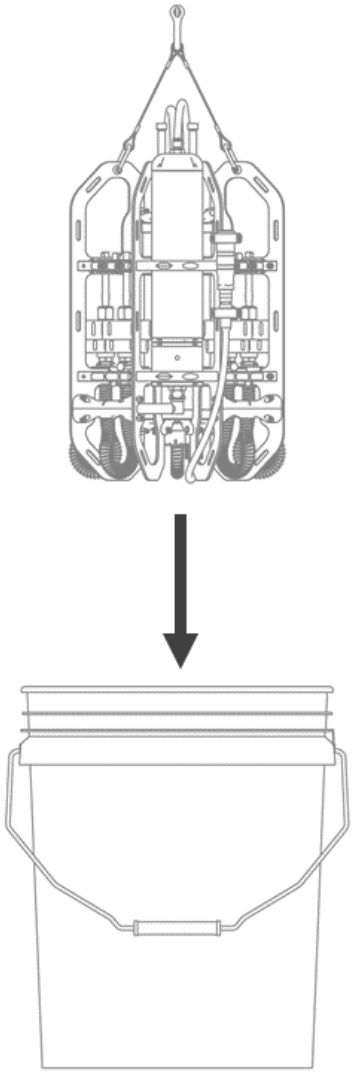
2. Install 7x empty filter housings into all seven sample channels onboard Ascension.



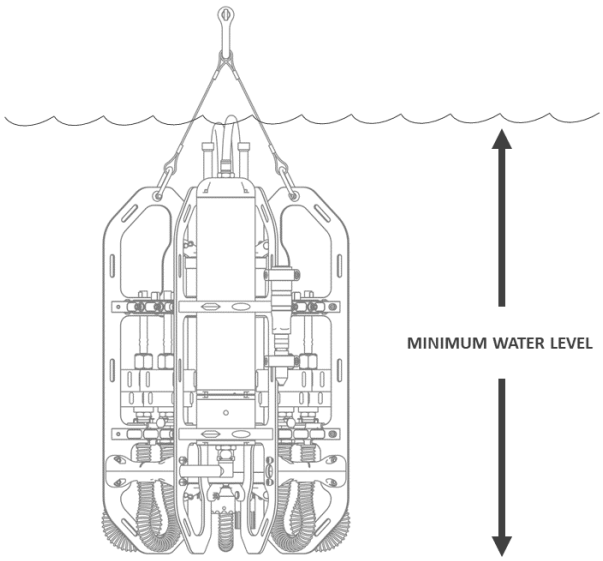
3. Ensure the vent plug in installed into the vent port on the bottom of the instrument.



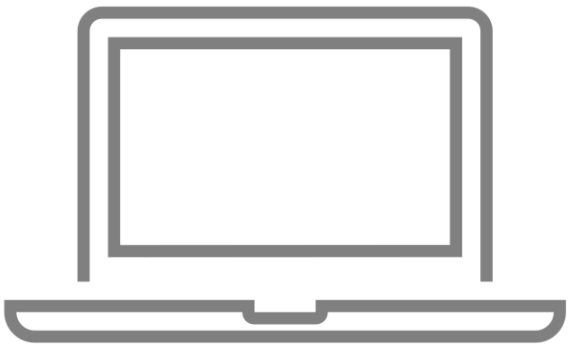
4. Lower Ascension into the rinse bucket.



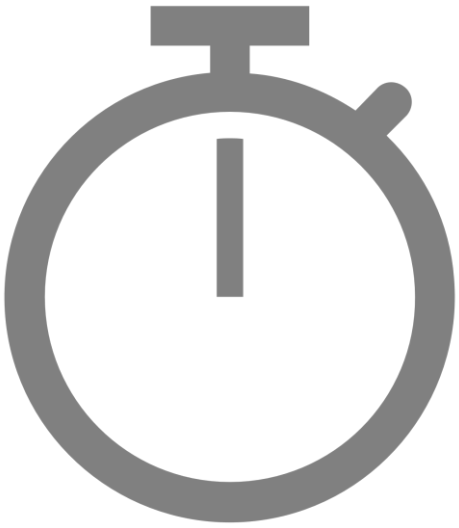
5. Ensure the instrument is fully submerged. The water level should be above the pump exhaust port.



6. Within Ascension Desktop, set the following:
   Rinse Time per Valve: 60s
   Rinse Number of Passes: 3
   Rinse Pump Throttle: 30% or 100%
   (Peristaltic Pump: 30%, Impeller Pump: 100%)
   Rinse Soak Time: 0s

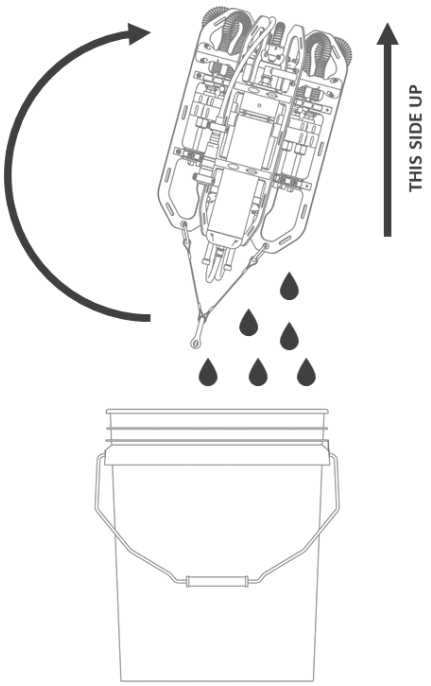


7. Start the automated instrument rinse. Using the recommended settings for the rinse process takes just under 25 minutes.



8. Once complete, remove the instrument from the rinse bucket and invert 180°. Individually open all 7x sample channel valves by hand to allow all remaining water to drain from the internal fluidic system.

   (If using a peristaltic pump, first remove the pump intake tubing between the flow meter and pump to unseal the fluidic system)



9. Using a cotton swap, gently dab the sensor surface of the CTD probe to remove any residual water.

Follow the *Ascension Desktop* application manual for more detailed instructions on how to initiate the automated rinse through the control interface. Upon completion of the automated rinse, ensure the instrument is completely dry before storing in the case for long periods of time.

⚠

- Always install filter housings without filters into all seven sample channels prior to running an automated rinse. Any sample channels left unloaded will not get rinsed.
- Always ensure the vent plug is installed before submerging the instrument.

Maintenance & Storage

➢ Sensor Maintenance

Sensor readings can drift over time due to bio growth and general wear of the sensor head. The CTD probe should be cleaned periodically to minimize drift over time. It is best to use warm water and a cotton swab to clean the sensor head. Vinegar can be used if needed; however, only if extreme biofouling is observed. When using vinegar, let the sensor head sit in the liquid for 15-20 min. Do not use sharp tools to clean the sensor head. This can cause damage to the two conductivity cells and the membrane/pressure sensor end.

It is recommended to test the CTD probe to a conductivity reference standard 12 months after purchase and then at least once a year to monitor accuracy and ensure conductivity readings are within the margin of error required for your specific application. The accuracy of the conductivity probe can be tested using standard saltwater solutions as reference. 5L bottles of standard saltwater solution can be purchased from OSIL (https://osil.com/product/p-series/) for accuracy testing. 5L bottles are suitable for multiple accuracy tests when only a small portion of the bottle is used per test.

If the accuracy of the conductivity probe is found to be outside the specifications, the CTD probe can be disconnected from the instrument and shipped to Ocean Diagnostics Inc. for recalibration in lab.

➢ Connector Maintenance

It is recommended to clean the electrical ports and connectors when visible accumulation of sand, mud, or other contaminants can be seen. General cleaning should be performed using spray-based contact cleaner (isopropyl alcohol), however liquid soap and hot water can be an effective alternative. New grease must be applied again after cleaning prior to mating.

Go to the address below or scan the QR code to watch the SubConn cleaning tutorial video, which demonstrates how to clean female connectors properly:

https://youtu.be/1zim2aG7LSk

Go to the address below or scan the QR code to watch the SubConn cleaning tutorial video, which demonstrates how to clean male connectors properly:

https://youtu.be/FSaOogjx08E

- Do NOT use Acetone, Gasoline, or similar products to clean the electrical ports and connectors! The use of these products can permanently damage the electrical ports and connectors.

➢ Winterization (Long Term Storage)

Ascension should be winterized at the end of the sampling season when it is known that the instrument will be left unused for more than four (4) weeks. It is recommended to store Ascension in a warm and dry environment with the vent plug removed. To prolong battery life, it is recommended to discharge the instrument battery to ~40-50% when storing for more than two (2) weeks. This can be done manually by using the battery charger or running the pump in a bucket or tank of freshwater large enough to fully submerge Ascension.

Recommended Storage Conditions

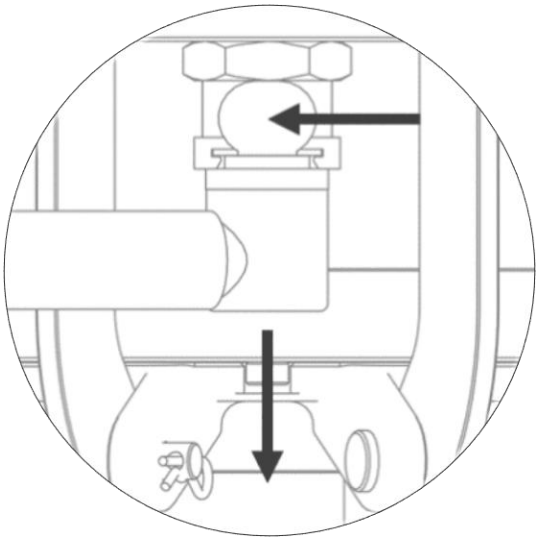
Ambient Conditions		
Temperature	15 to 25	°C
Humidity	30 to 80	%

➢ Upgrading & Replacing Components

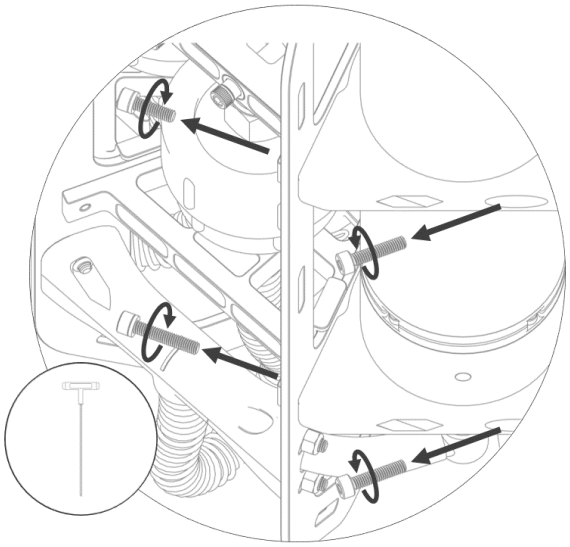
Removing an Impeller Pump and Flow Meter

1. Unscrew the red locking sleeves and disconnect the pump and flow meter connectors from their respective ports.

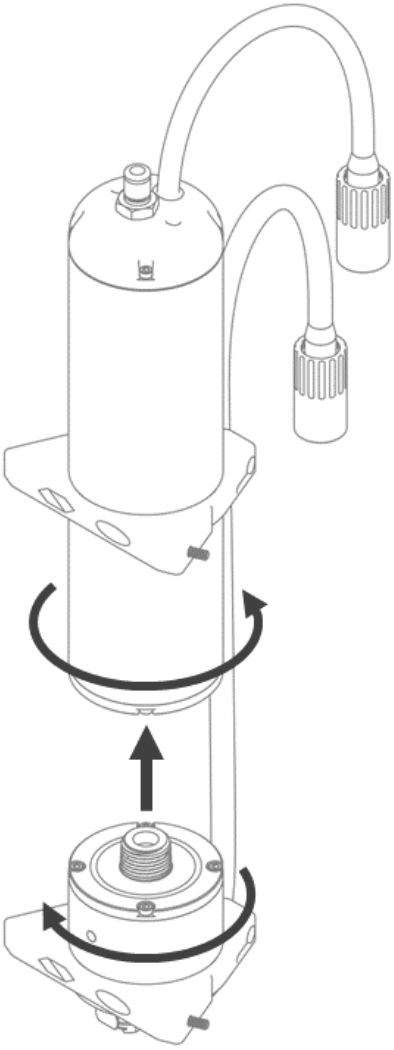
2. Disconnect the fluidic channel fitting from the flow meter intake.



3. Using the provided service tool, unscrew the 4x mounting screws holding the pump & flow meter assembly onto the instrument frame.



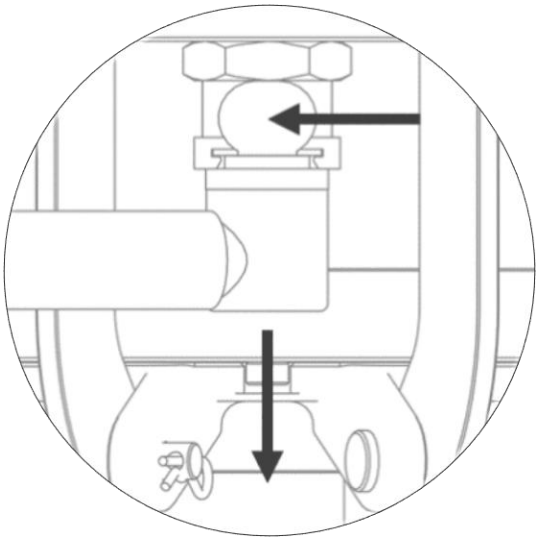
4. Separate the pump and flow meter by unscrewing them from one another.



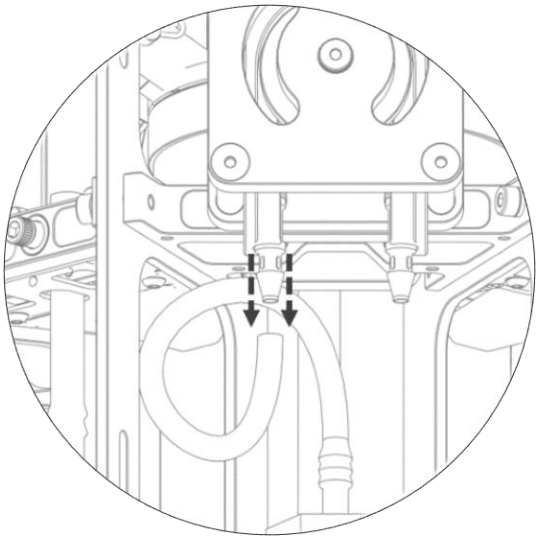
Removing a Peristaltic Pump and Flow Meter

1. Unscrew the red locking sleeves and disconnect the pump and flow meter connectors from their respective ports.

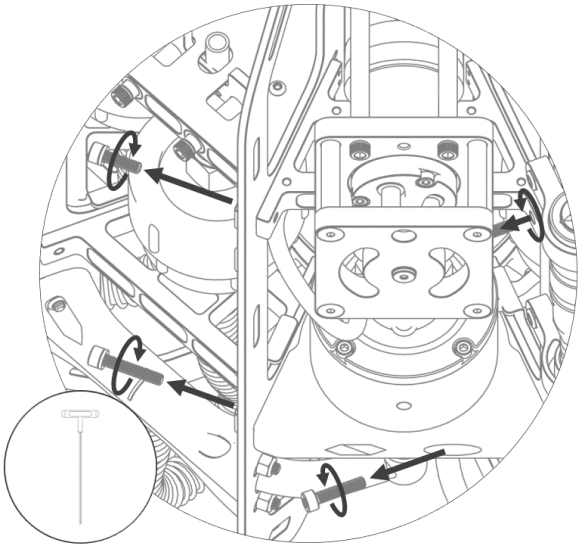
2. Disconnect the fluidic channel fitting from the flow meter intake.



3. Disconnect the intake tubing between the flow meter and peristaltic pump.



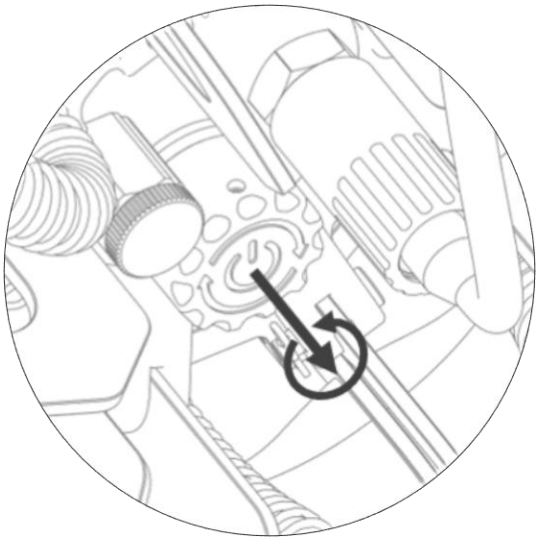
4. Using the provided service tool, unscrew the 4x mounting screws holding the pump & flow meter onto the instrument frame.



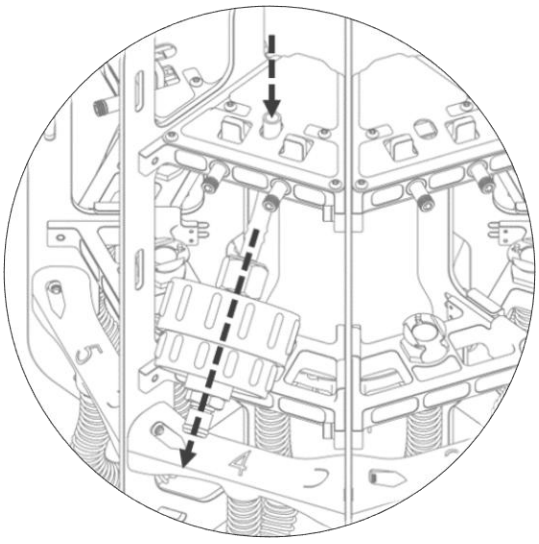
Removing a Valve

1. Power on Ascension and home the valve actuator using the *Real-Time Controller* interface inside *Ascension Desktop*.

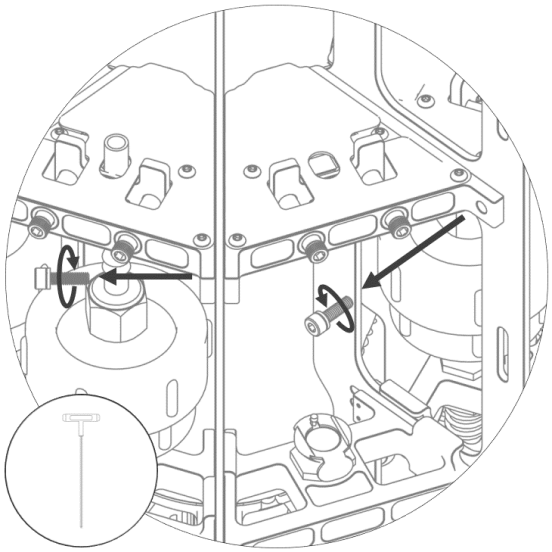
2. Power off Ascension.



3. Remove the filter housing from the sample channel.

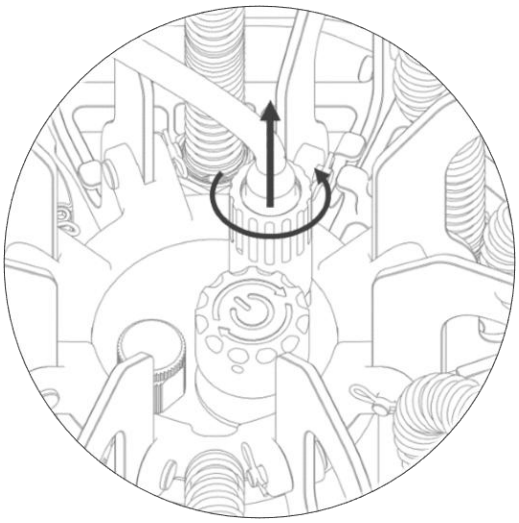


4. Using the provided service tool, unscrew the 2x mounting screws holding the valve onto the instrument frame.

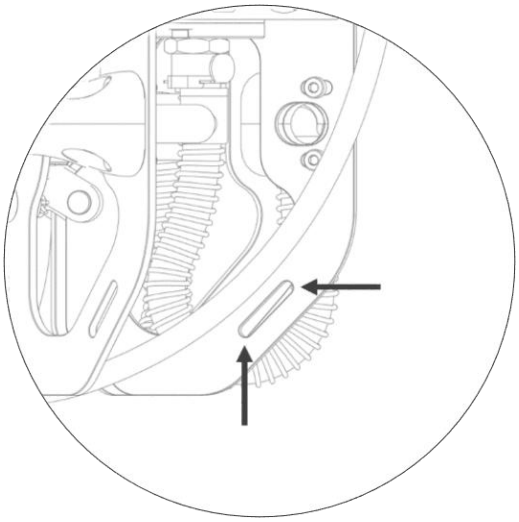


Removing the CTD Probe

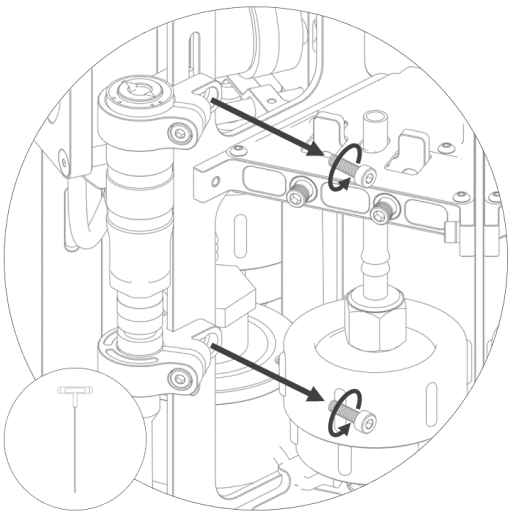
1. Unscrew the red locking sleeve and disconnect the CTD probe connector from the port on the bottom of the instrument core.



2. Cut off any zip ties holding the CTD probe cable to the instrument frame.

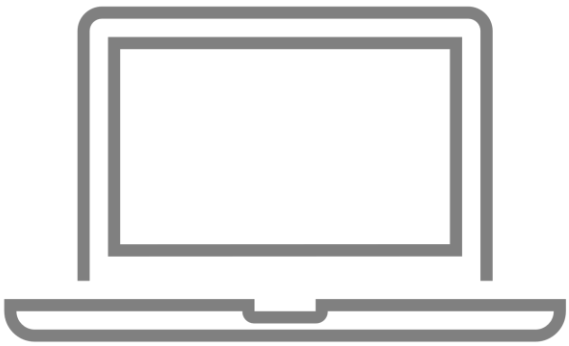


3. Using the provided service tool, unscrew the 2x mounting screws holding the CTD probe onto the instrument frame.

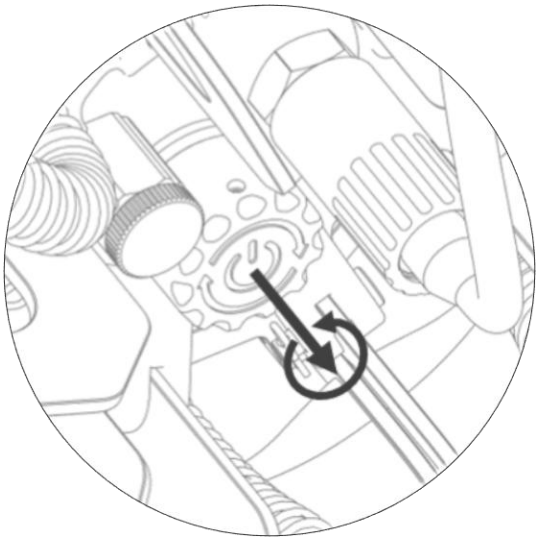


Removing the Instrument Core

1. Power on Ascension and home the valve actuator using the *Real-Time Controller* interface inside *Ascension Desktop*.

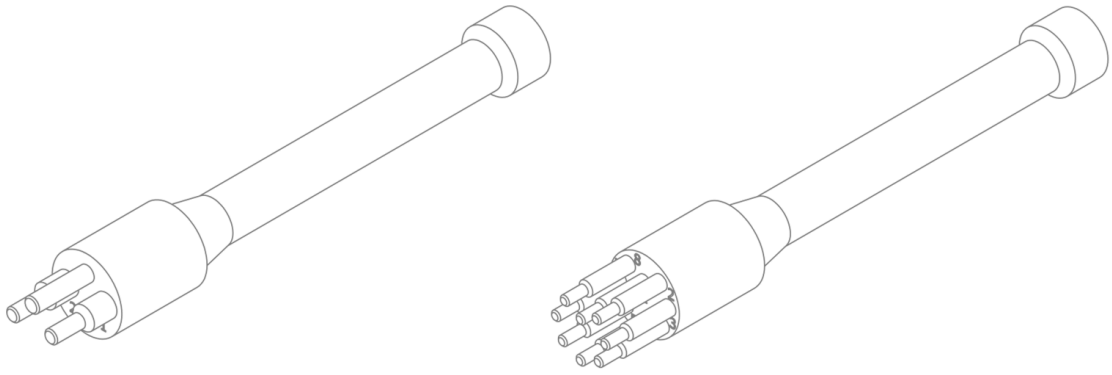


2. Power off Ascension.



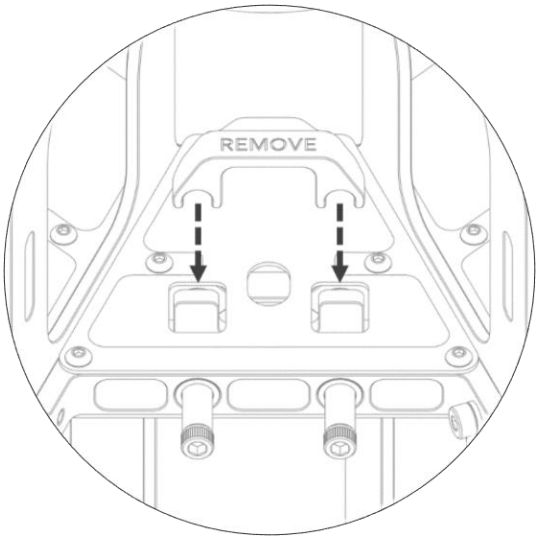
3. Ensure the vent port plug is inserted and tight.

4. Install dummy plugs into both the tether and charging ports. Tighten the red locking sleeves.



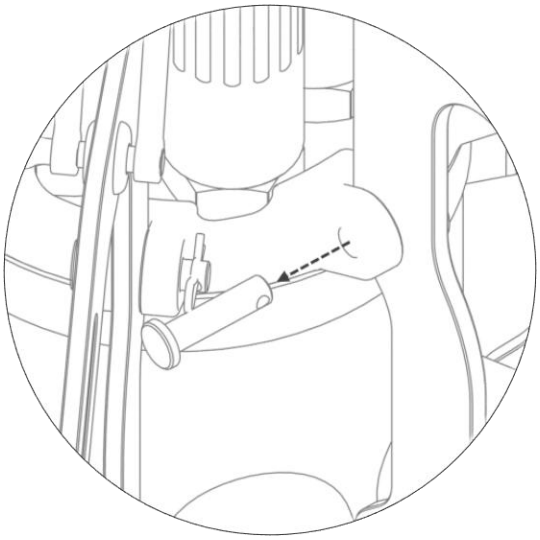
5. Unscrew the red locking sleeves and disconnect the pump and flow meter connectors from their respective ports.

6. Open each valve by hand and install the valve protection insert to keep the valves open during the core removal process.

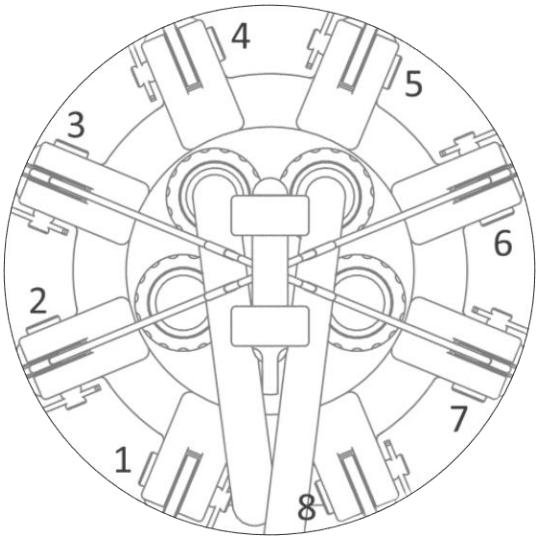


7. Starting on any one of the eight top core retaining mount pins, remove the cotter pin from the clevis pin.

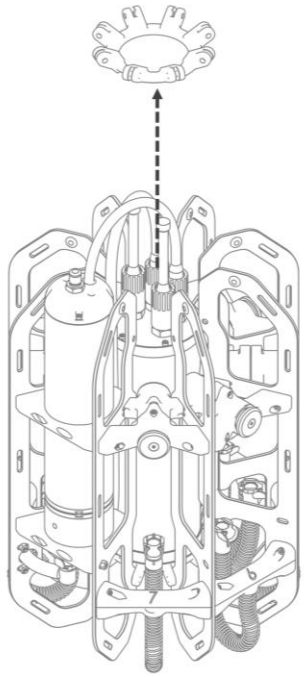
8. Remove the clevis pin from the top core retaining mount.



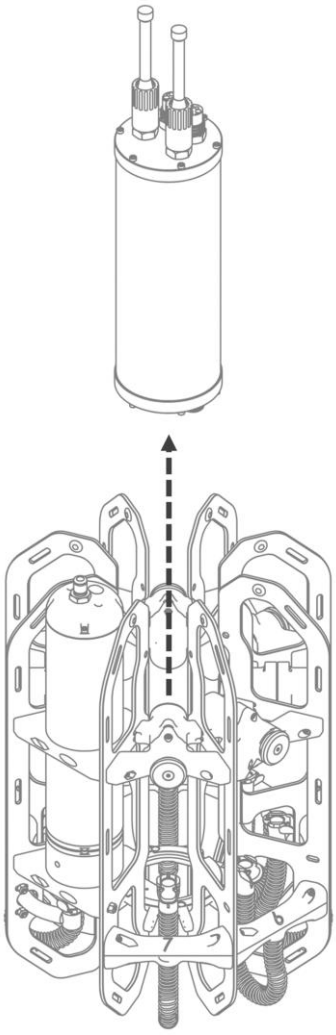
9. Repeat the above steps for all eight pins holding the top core retaining mount in place.



10. Pull the top core retaining mount up and remove it from the instrument.

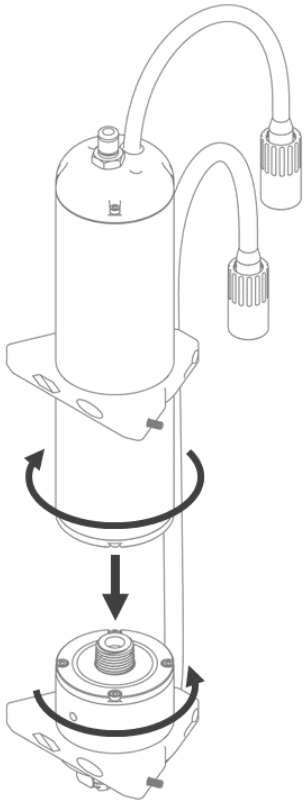


11. Gently pull up on the instrument core and remove it from the instrument. It should slide out freely. Be careful not to pull so hard as to pull the end caps off the core.

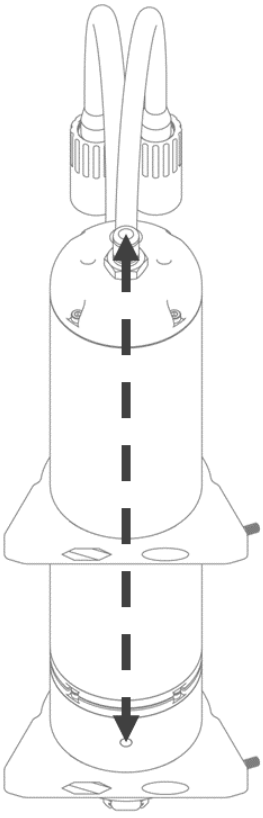


Installing an Impeller Pump and Flow Meter

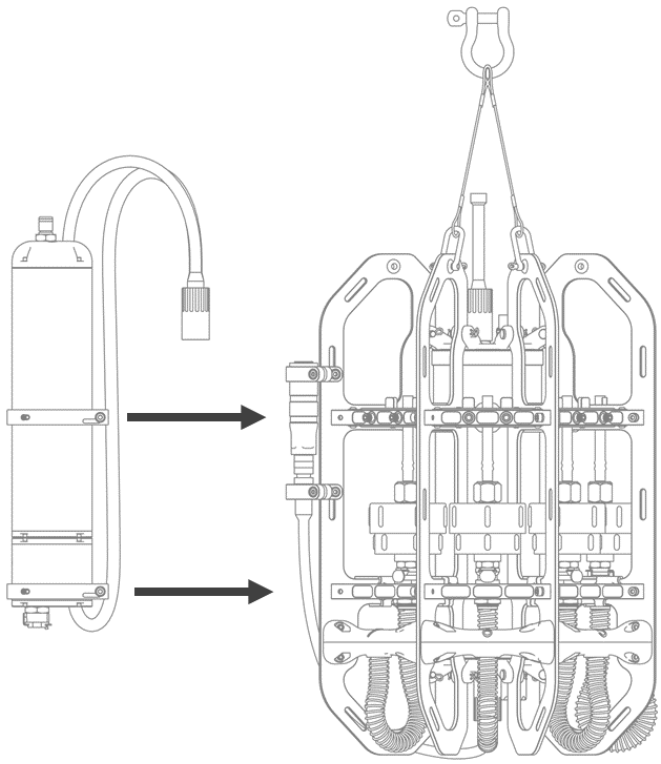
1. Assemble the pump and flow meter together by screwing the exhaust thread of the flow meter into the intake on the bottom of the impeller pump.



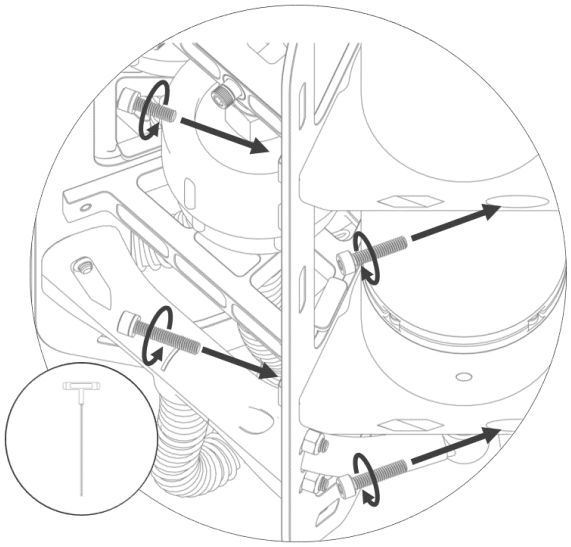
2. Ensure the front side of the pump (indicated by the quick-disconnect exhaust port) and front side of the flow meter (indicated by the status indicator LED) are aligned together on the same side.



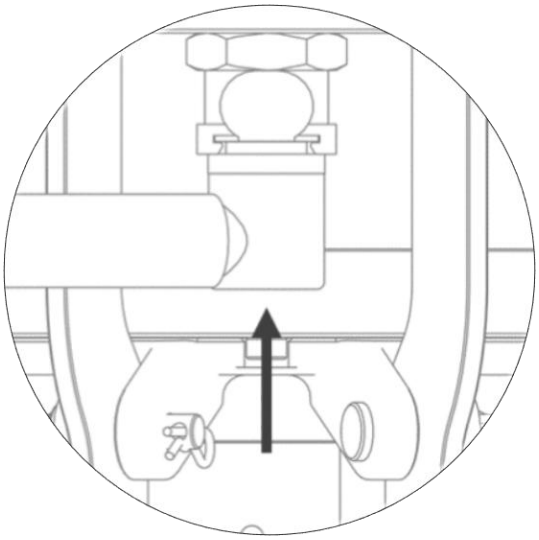
3. With the flow meter cable inserted up through the gap between the pump and instrument core, insert the pump and flow meter assembly into place on the instrument frame.



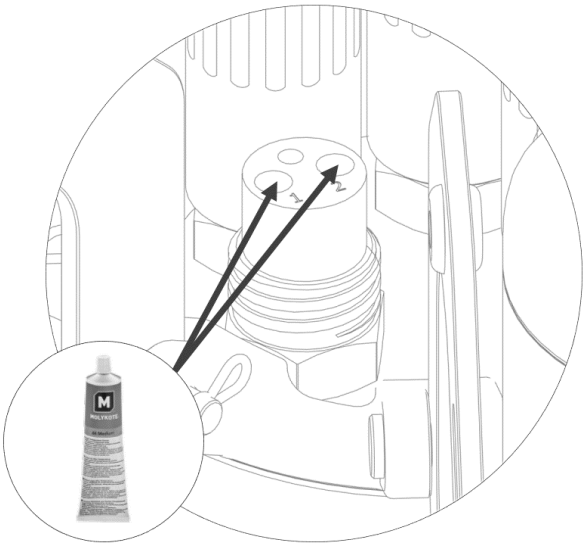
4. Using the provided service tool, insert and tighten the 4x mounting screws holding the pump & flow meter assembly onto the instrument frame.



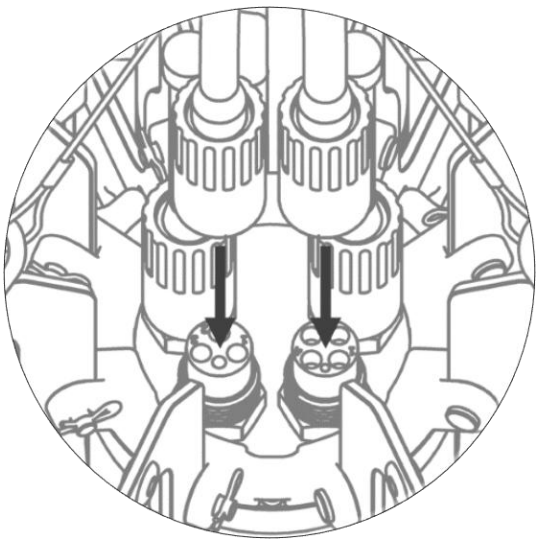
5. Install the fluidic channel fitting into the flow meter intake.



6. Grease both the pump and flow meter ports on the instrument core with Molykote 44 Medium.

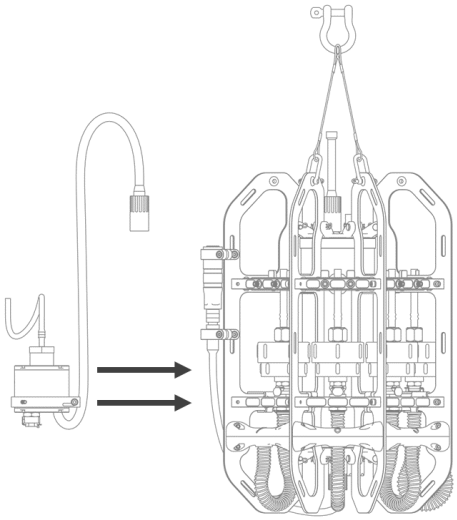


7. Insert both the pump and flow meter connectors into their respective ports on the instrument core and tighten their red locking sleeves.

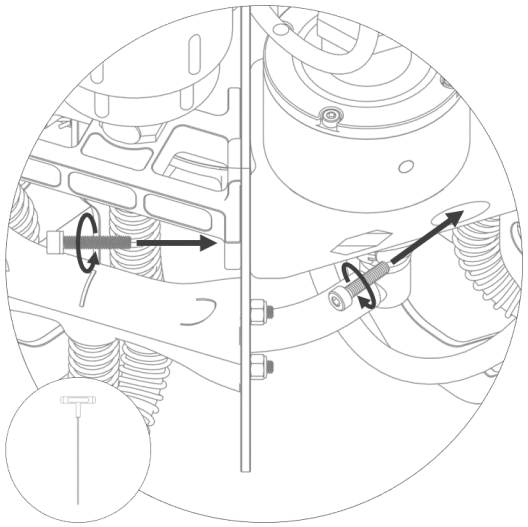


Installing a Peristaltic Pump and Flow Meter

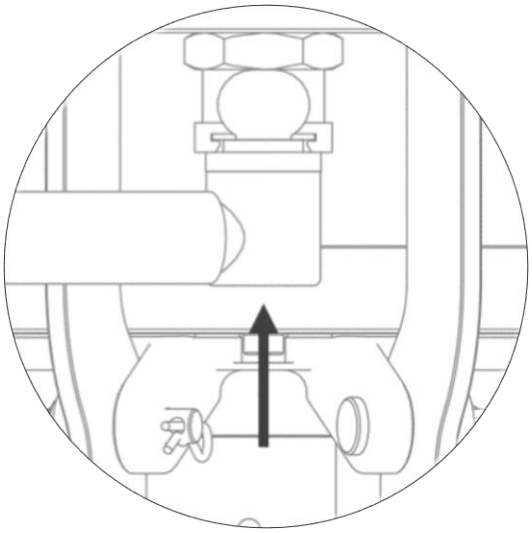
1. With the flow meter cable inserted up through the gap between the flow meter and instrument core, insert the flow meter into place on the instrument frame.



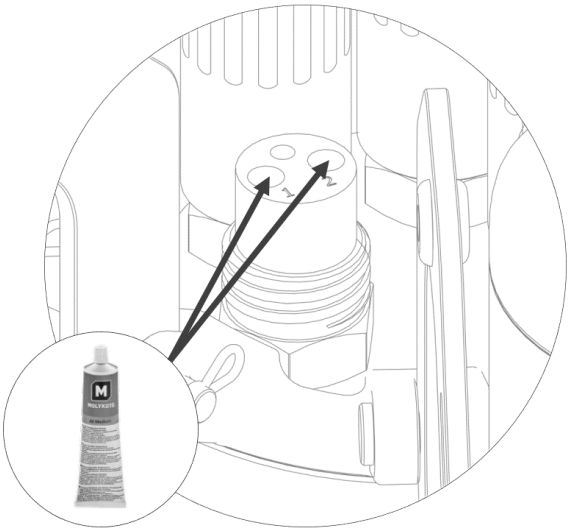
2. Using the provided service tool, insert and tighten the 2x mounting screws holding the flow meter onto the instrument frame.



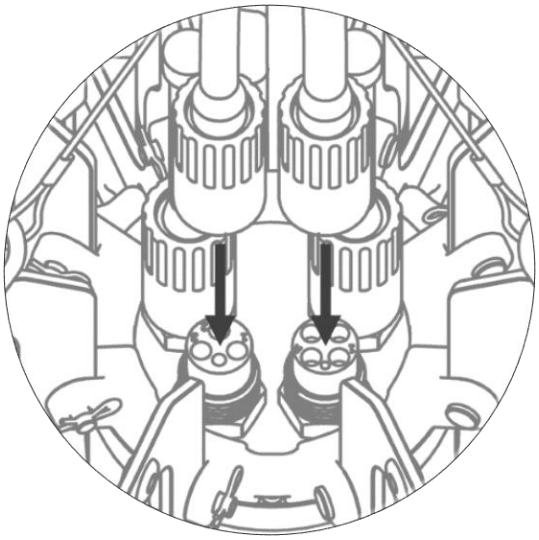
3. Install the fluidic channel fitting into the flow meter intake.



4. Grease the flow meter port on the instrument core with Molykote 44 Medium.

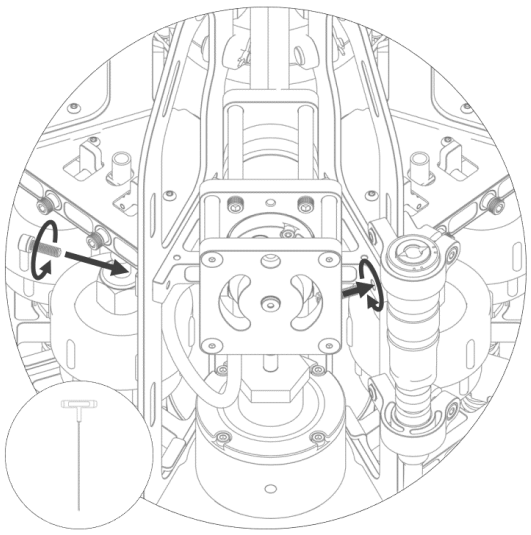


5. Insert the flow meter connector into the flow meter port on the instrument core and tighten the red locking sleeve.

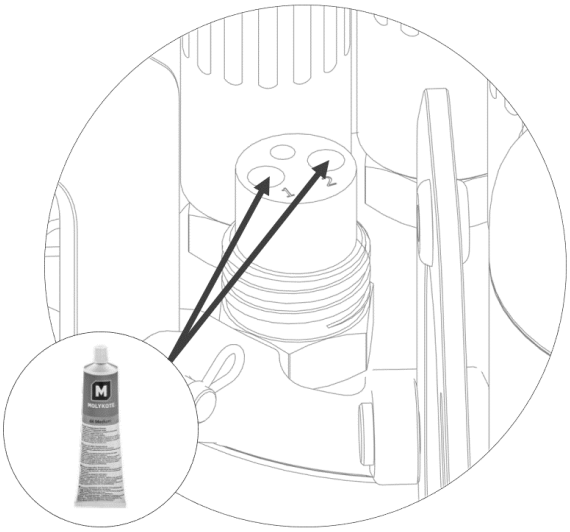


6. Hold the peristaltic pump in place on the instrument frame and using the provided service tool, insert and tighten the 2x mounting screws to secure the peristaltic pump onto the instrument frame.

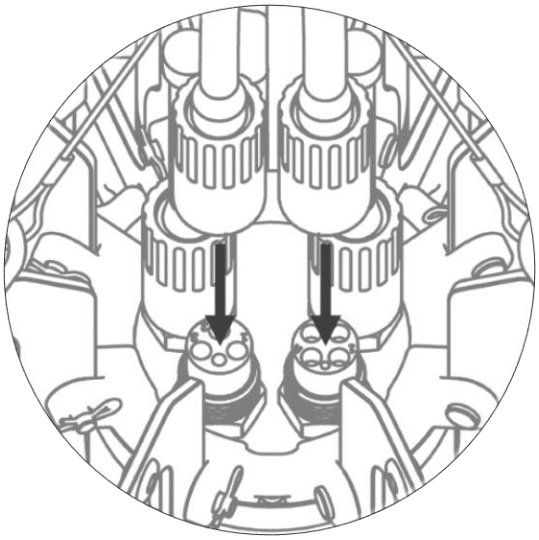
   (The flow meter cable should run between the peristaltic pump and the instrument core)



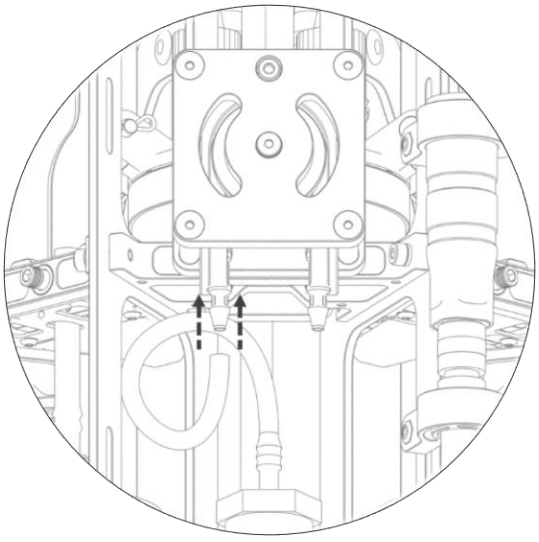
7. Grease the pump port on the instrument core with Molykote 44 Medium.



8. Insert the peristaltic pump connector into the pump port on the instrument core and tighten the red locking sleeve.

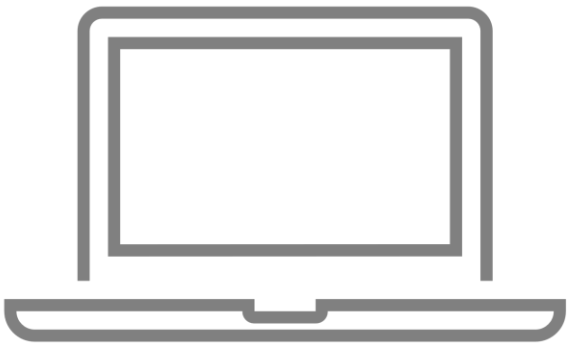


9. Connect the intake tubing between the flow meter and peristaltic pump.

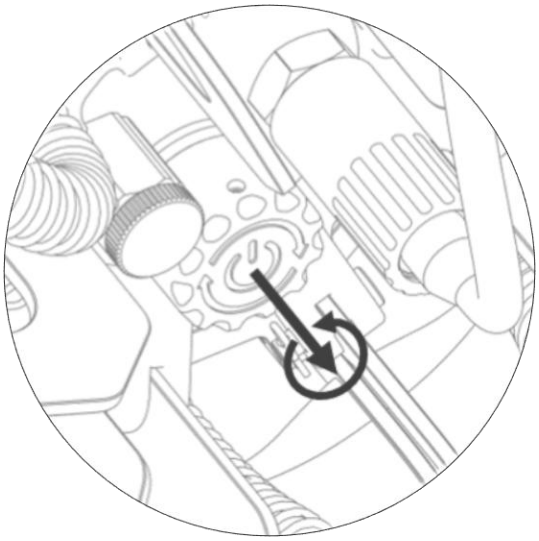


Installing a Valve

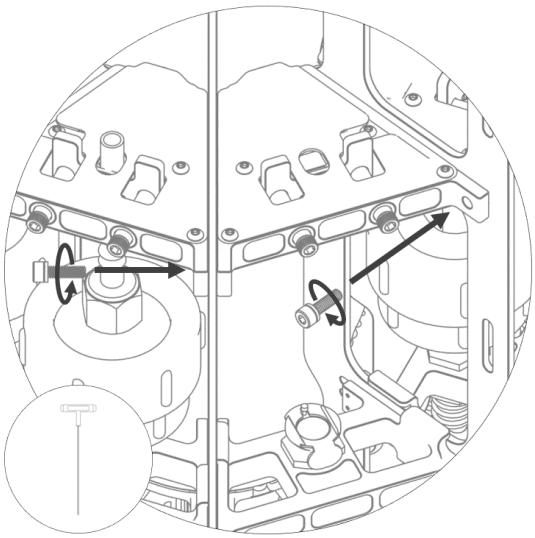
1. Power on Ascension and home the valve actuator using the *Real-Time Controller* interface inside *Ascension Desktop*.



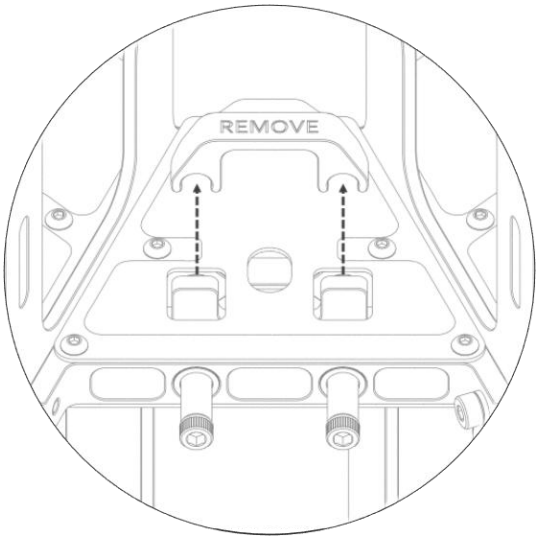
2. Power off Ascension.



3. Hold the valve in place on the instrument frame and using the provided service tool, insert and tighten the 2x mounting screws to secure the valve onto the instrument frame.

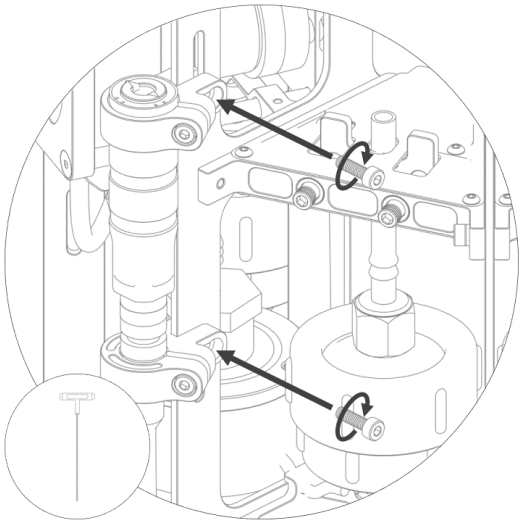


4. Remove the valve protection insert from the valve by pulling out vertically.

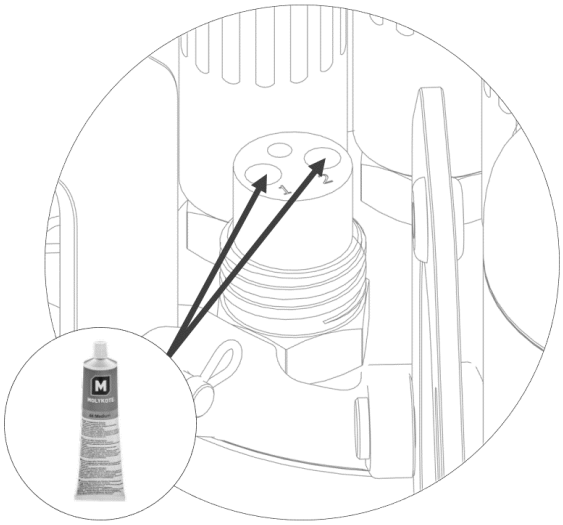


Installing the CTD Probe

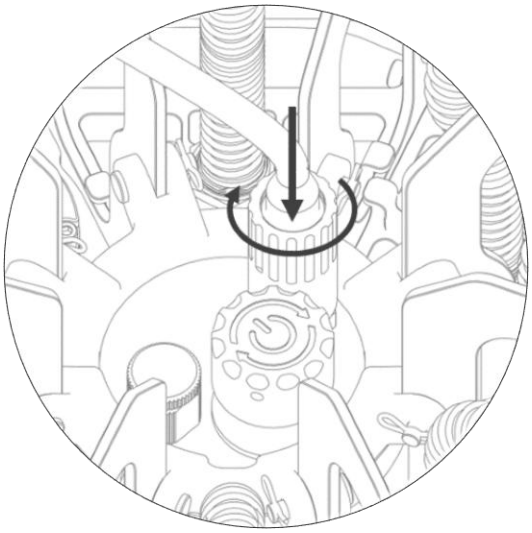
1. Slide the CTD probe into place on the instrument frame and using the provided service tool, insert and tighten the 2x mounting screws to secure the CTD probe.



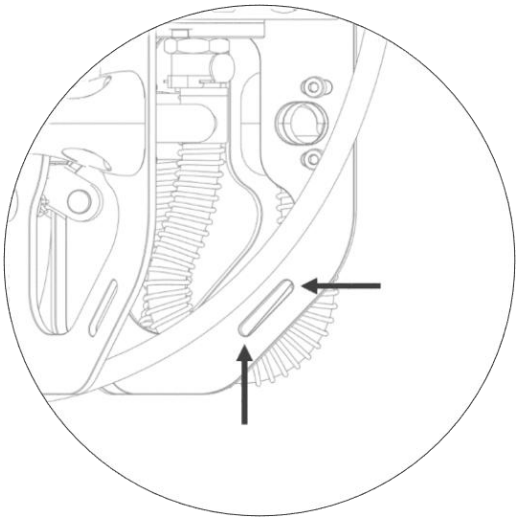
2. Grease the CTD probe port on the bottom of the instrument core with Molykote 44 Medium.



3. Insert the CTD probe connector into the CTD probe port on the bottom of the instrument core and tighten the red locking sleeve.

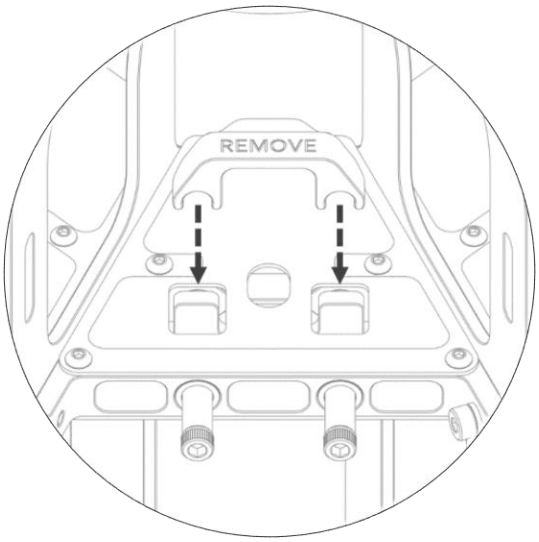


4. Zip tie the CTD probe cable to the instrument frame.

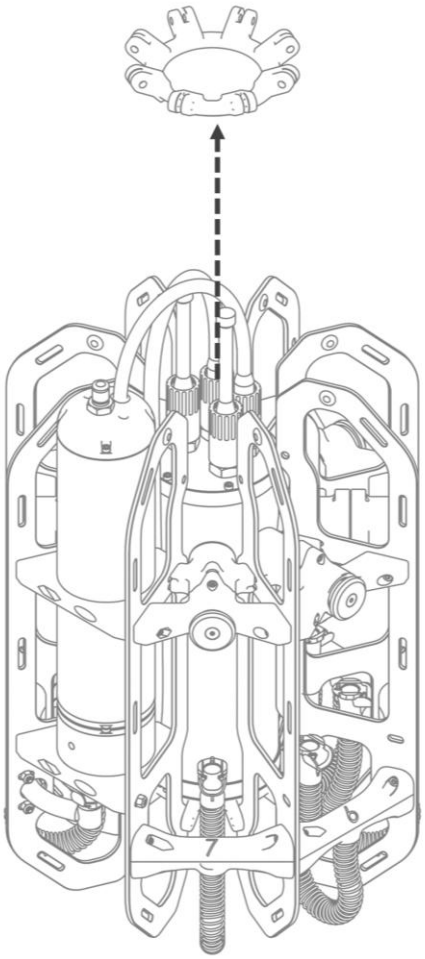


Installing the Instrument Core

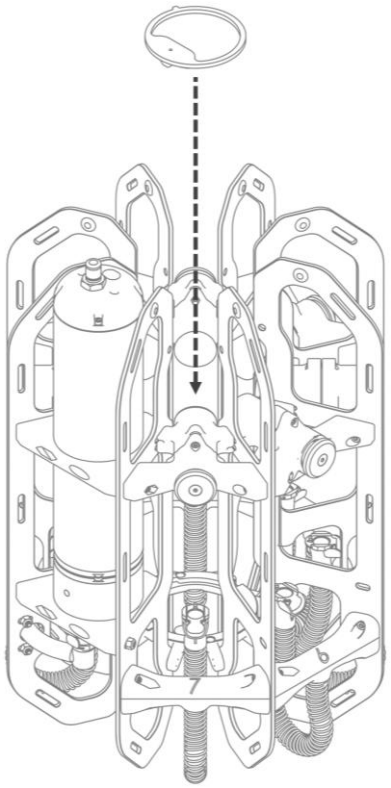
1. Open each valve by hand and install the valve protection insert to keep the valves open during the core installation process.



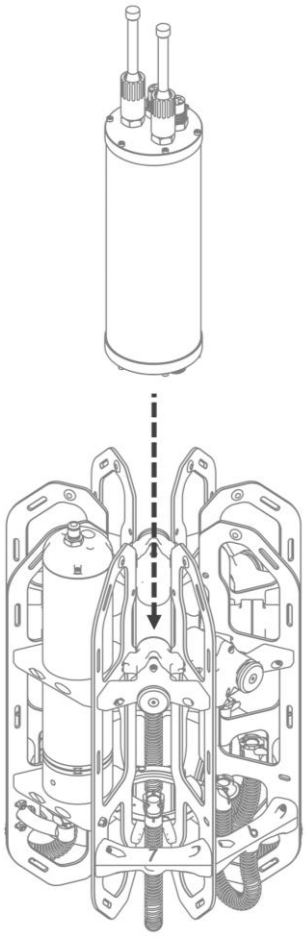
2. Remove the top core retaining mount from the instrument frame.



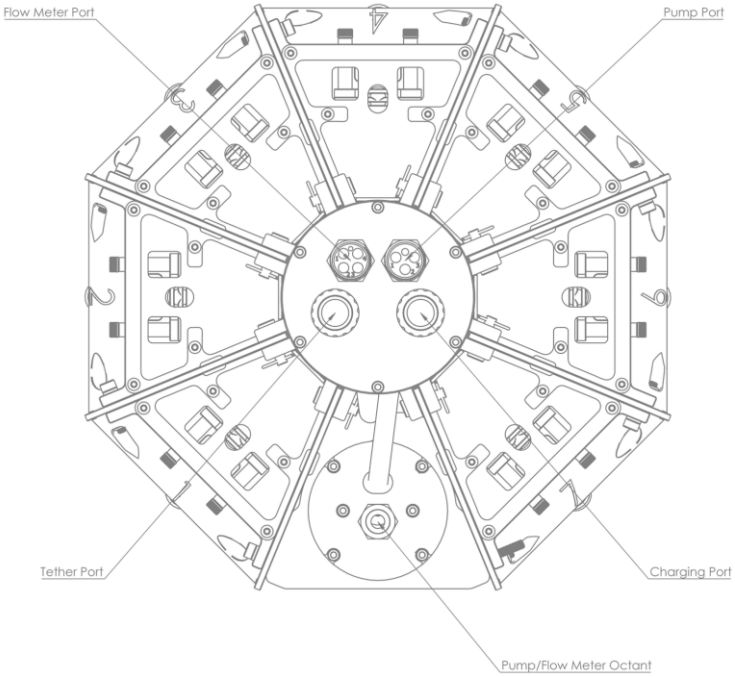
3. If applicable (depending on your instrument generation), install the power switch into the bottom core retaining mount. Ensure the notch on the outside of the ring is placed within the notch slot on the bottom core retaining mount.



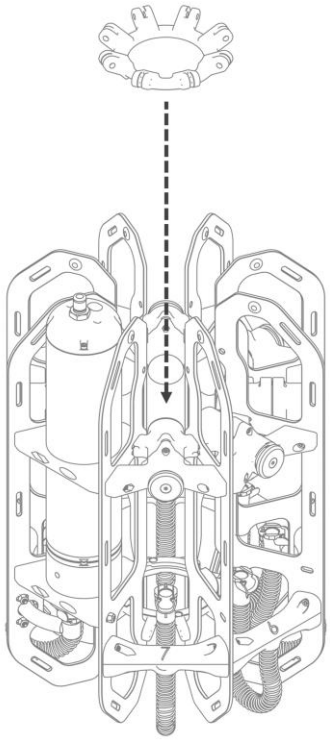
4. Gently slide the instrument core down into the instrument frame.



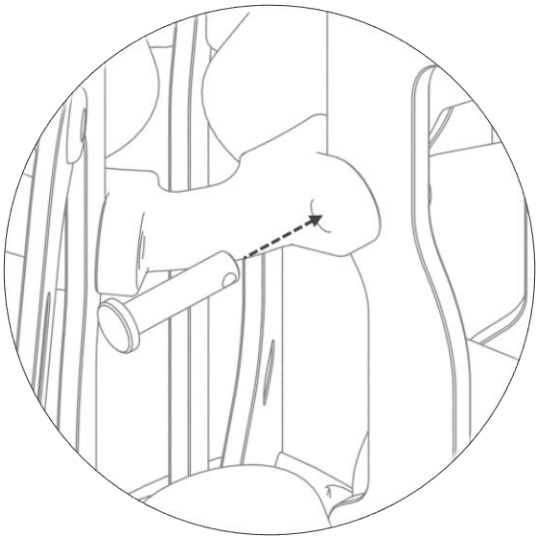
- Ensure the core is oriented within the instrument frame as shown below. Failure to insert the core in the proper orientation will prevent Ascension from functioning properly.



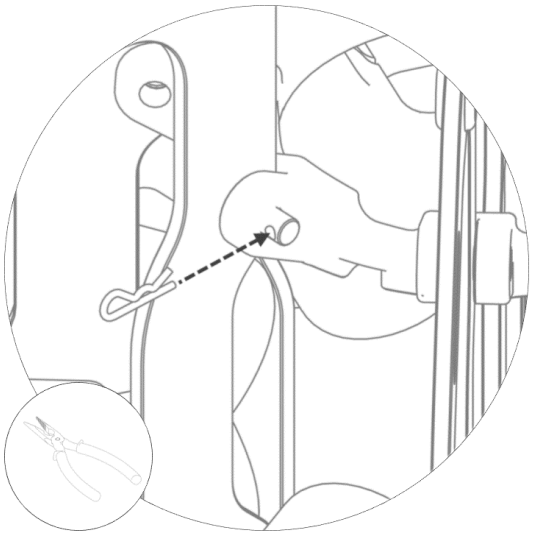
5. Place the top core retaining mount back onto the instrument frame and align the pin holes with the receptacles on the frame.



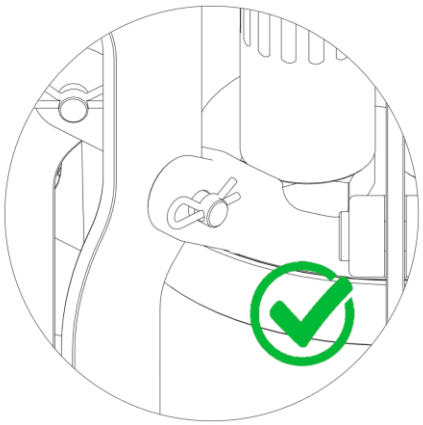
6. Reinsert the clevis pin into the top core retaining mount.

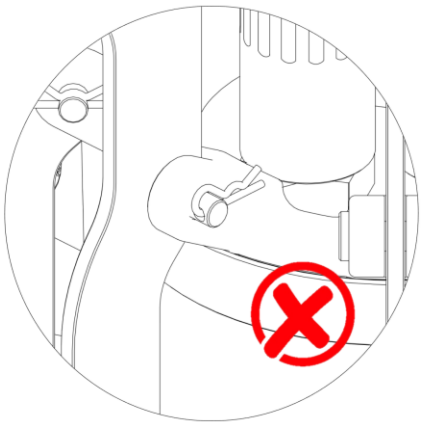


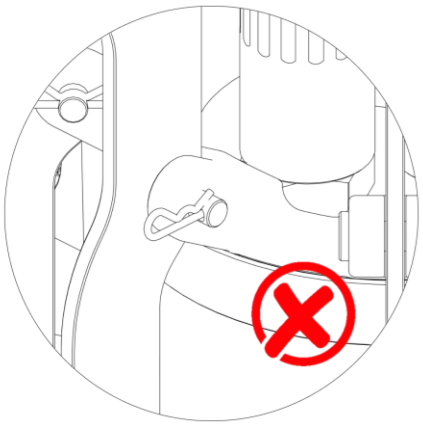
7. Reinsert the cotter pin into the clevis pin. Needle nose pliers can help to insert both the clevis and cotter pins into the tight octants beside the pump.



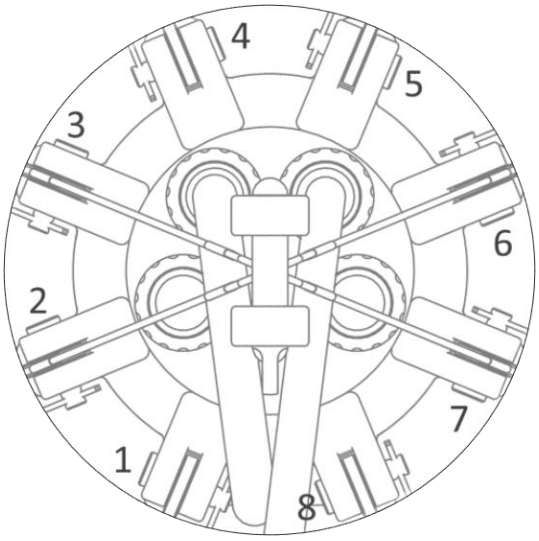
8. The cotter pin should be installed as shown.



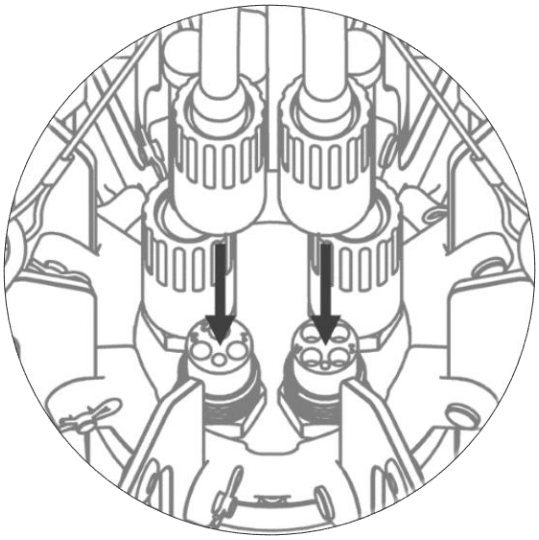




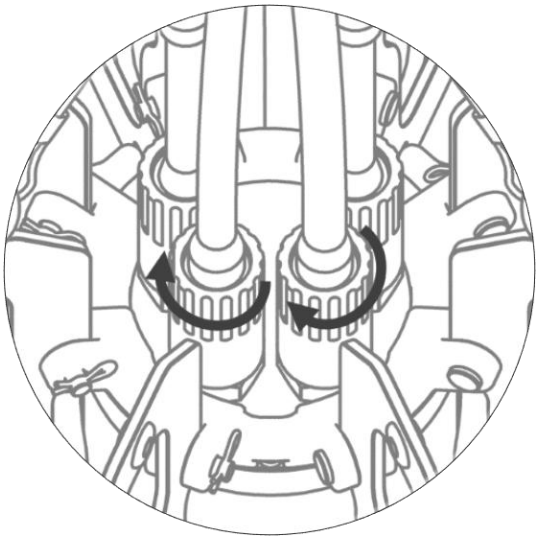
9. Repeat the above steps for all eight pins holding the top core retaining mount in place.



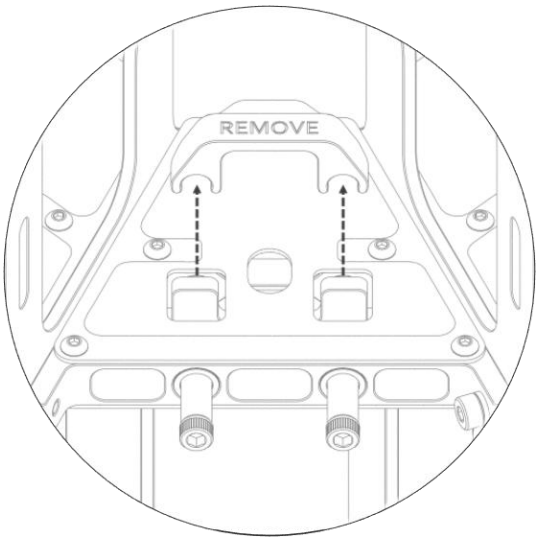
10. Install both the pump and flow meter connectors back into the core. Ensure both ports are greased with Molykote 44 Medium before insertion.



11. Tighten the red locking sleeves on both the pump and flow meter ports.



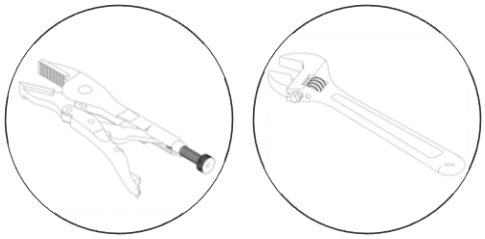
12. Remove the valve protection inserts from all 7 valves by pulling out vertically.

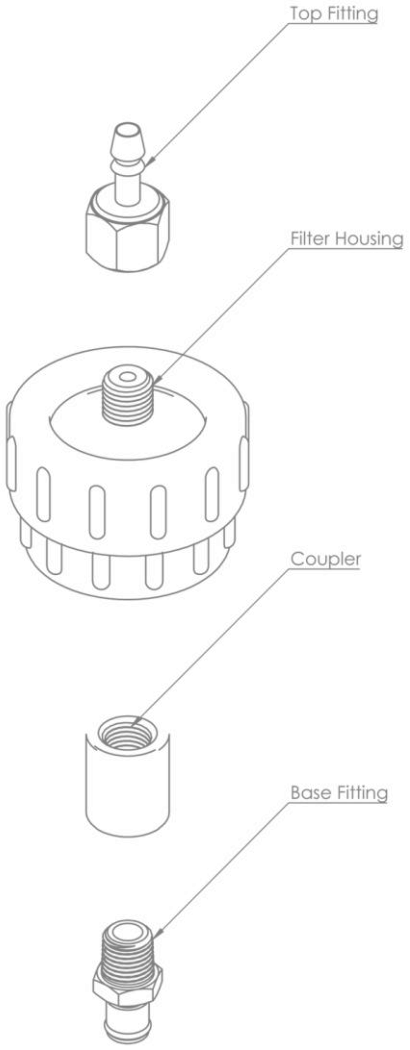


➢ Filter Vacuum Test Troubleshooting

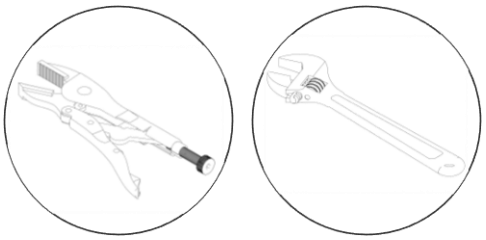
- If a leak is detected using the vacuum test, address the problem in the following order:
    1. Check to ensure the top and bottom parts of the filter housing don't move relative to one another by wiggling both halves.
    2. Check to ensure the filter housing is screwed together tightly.
    3. Check to ensure the valve pinch tubing is pinched properly.
    4. Check to ensure the syringe is fully inserted onto the purging tool.
    5. Check to ensure the purge tool is fully inserted into the fitting on the base of the filter housing.
    6. Check to ensure no O-rings are missing from the filter housing. There should be three O-rings within the filter housing assembly, (one per part).
    7. If multiple filter housings fail the vacuum test successively, it is likely that a seal within the purge tool is compromised. Check to ensure the purge tool is sealing properly by verifying the filter adapter is properly inserted onto the syringe.
    8. If the filter housing continues to fail the vacuum test after checking all the above, reassemble the three threaded interfaces on the top and bottom fittings using Teflon sealing tape (instructions on the following page).

1. Disassemble the filter housing assembly into four separate components as shown. A wrench and vise-grips may be used gently to aid the disassembly process.

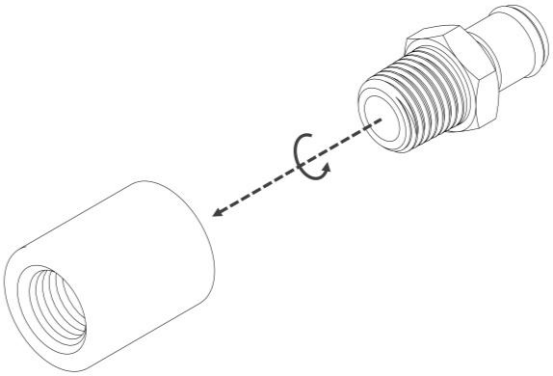




2. Using a pair of vise-grips and a wrench, install quick-disconnect fittings onto one side of each threaded coupler by screwing clockwise. Be careful not to overtighten and damage the quick-disconnect fitting.

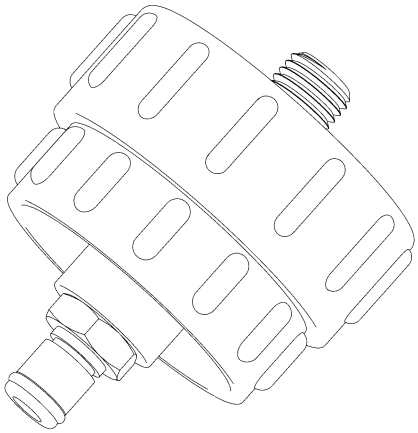


- *See page 96 for instructions on applying Teflon sealing tape.*



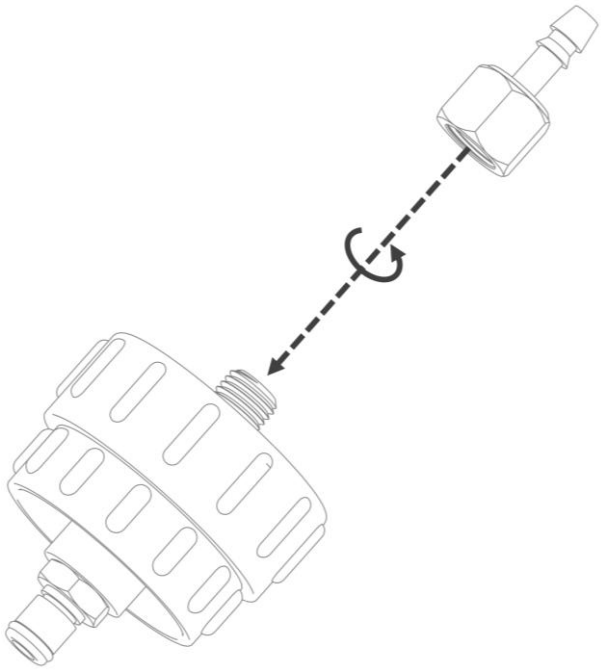
3. Re-install the threaded couplers containing quick-disconnect fittings onto the bottom of each filter housing by screwing on clockwise.

- *See page 96 for instructions on applying Teflon sealing tape.*

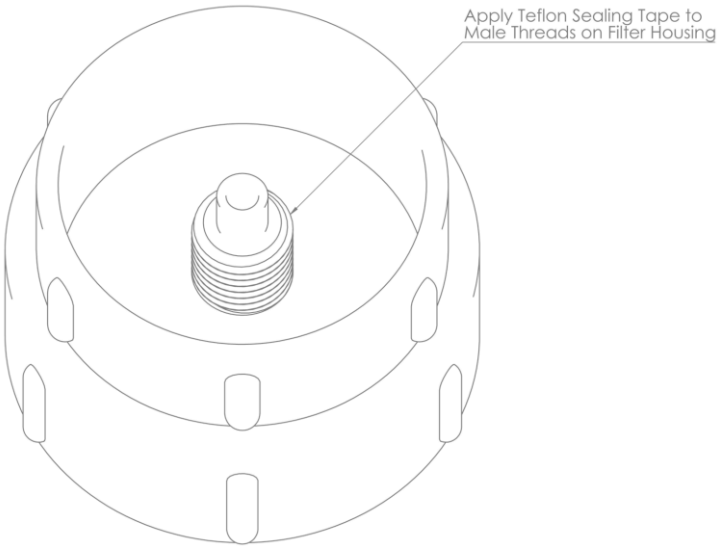


4. Install a barbed fitting onto the intake of each filter housing by screwing on clockwise.

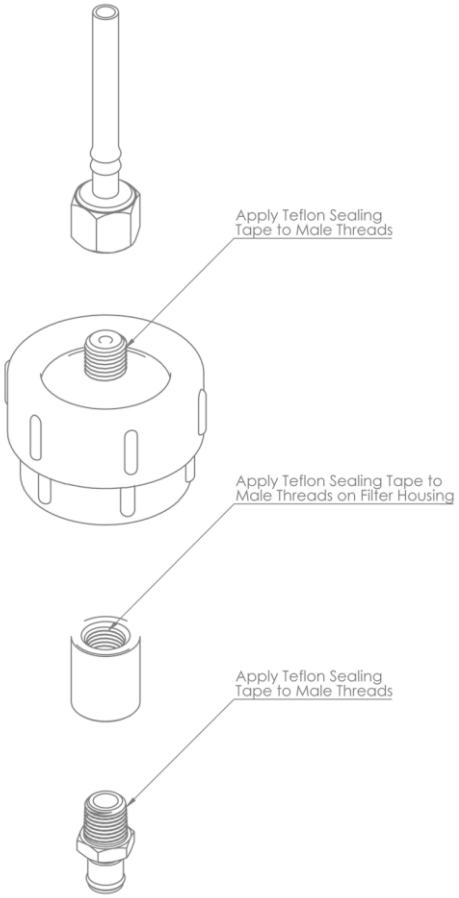
- *See page 96 for instructions on applying Teflon sealing tape.*



- Apply Teflon sealing tape to each NPT threaded connection of the filter housing assembly. There are three threaded connections per filter housing. Teflon sealing tape is required to ensure a proper seal is maintained between all components of the filter housing.



**Bottom View*



Warranty Policy

The following warranties are the official and sole warranties recognized by Ocean Diagnostics Inc. (ODI). If ODI equipment should be defective or fail to meet operational requirements, the customer's sole solution shall be repair or replacement by ODI or a directly authorized third-party instrument repair facility. Any repairs, which, in ODI's opinion, are required as a result of misuse, lack of routine maintenance, damage during installation, improper installation and use outside of specified operating conditions will not be covered. In no event will ODI be liable for any direct, indirect, consequential, or incidental damages including loss of profits or loss of savings, or any other damages resulting from any instrument or component defects resulting in the inability to use the instrument or components thereof.

To return products to ODI for repair or replacement under warranty, contact the ODI Customer Support Department at **support@oceandiagnostics.com** to diagnose an issue and request a Returned Material Authorization (RMA) form. All warranty claims must be completed promptly after defective nature is suspected and must be received by ODI within the applicable warranty periods outlined below. Warranty claims should clearly state the product Serial Number, Date of Purchase, and provide a full description of circumstances giving rise to the claim. All instruments, components, or products that are covered under warranty replacement become property of ODI after diagnostics are completed and a replacement is provided to the customer.

ODI reserves the right to make any changes in design or specifications on instruments without incurring any obligation to modify previously delivered instruments. Instrument manuals are produced for information and reference purposes and are subject to change without notice. A record of instrument manual changes will be recorded in a table at the top of this document.

➢ Instrument Core

ODI warrants the instrument core including pressure housing, connectors, and mechanical frame for a period of **TWO YEARS (24 MONTHS)** from the date of shipment of the instrument. ODI will repair or replace, at its discretion and at no component or labour charge, components on the instrument core that are deemed defective. This instrument core warranty does not include shipping charges to and from customer. This warranty only applies to the original purchaser of a new instrument and only to instruments manufactured by ODI. This warranty does not apply if the instrument core has been damaged, by accident or misuse, and is void if repairs or modifications to the instrument were attempted by the customer or third parties other than authorized personnel. This warranty is also void if the mechanical pressure housing has been opened or if the warranty seal has been removed or broken.

➢ Pump

ODI warrants the filtration pump for a period of **ONE YEAR (12 MONTHS)** from the date of shipment of the instrument. ODI will repair or replace, at its discretion and at no component or labour charge, components of the pump that are deemed defective. This pump warranty includes shipping charges to and from customer. This warranty only applies to the original purchaser of a new instrument and only to pumps manufactured by ODI. This warranty does not apply if the pump has been damaged, by accident or misuse, and is void if repairs or modifications to the pump were attempted by the customer or third parties other than authorized personnel.

➢ Flow Meter

ODI warrants the instrument flow meter for a period of **ONE YEAR (12 MONTHS)** from the date of shipment of the instrument. ODI will repair or replace, at its discretion and at no component or labour charge, components of the flow meter that are deemed defective. This flow meter warranty includes shipping charges to and from customer. This warranty only applies to the original purchaser of a new instrument and only to flow meters manufactured by ODI. This warranty does not apply if the flow meter has been damaged, by accident or misuse, and is void if repairs or modifications to the flow meter were attempted by the customer or third parties other than authorized personnel.

➢ Valves

ODI warrants the instrument valves for a period of **ONE YEAR (12 MONTHS)** from the date of shipment of the instrument. ODI will repair or replace, at its discretion and at no component or labour charge, components of the valves that are deemed defective. This valve warranty includes shipping charges to and from customer. This warranty only applies to the original purchaser of a new instrument and only to valves manufactured by ODI. This warranty does not apply if the valve has been damaged, by accident or misuse, and is void if repairs or modifications to the valve were attempted by the customer or third parties other than authorized personnel.

Standard Terms and Conditions

➢ Ocean Diagnostics Inc.

2716 Rock Bay Ave, Victoria, BC V8T 4R9 CANADA
(Referred to as “ODI”)

➢ General

The following are the terms and conditions (referred to as the “Terms and Conditions”) attaching to the acceptance by Ocean Diagnostics Inc. (“ODI”) of any order placed by any person or entity (the “Purchaser”) for sales by ODI of any goods, products or services (the “Goods”) which ODI offers for sale from time to time. The Terms and Conditions apply to any purchase and sale of ODI Goods, whether by accepted purchase order, accepted ODI quote or estimate, or other written record. The Terms and Conditions may be varied or amended only by written agreement of the Purchaser and ODI. Where an appointed agent of ODI is buying on their own account, they shall be deemed to be the Purchaser.

➢ Prices

All prices accepted are firm and shall be denominated in the currency of the order acceptance or as otherwise agreed. Unless otherwise agreed, prices are Ex Works (EXW) ODI’s facility, and do not include insurance or shipping.

➢ Delivery

Delivery dates at time of acceptance of order are not guaranteed. All Goods shall be shipped Ex Works (EXW) ODI’s facility. Charges incurred by ODI for freight, documentation, export (or other special) packing, insurance and any other related services will be billed to the Purchaser. ODI is not responsible for loss or damage to goods in transit and risk of loss passes to the Purchaser upon the goods departing the ODI facility. The Purchaser is responsible to arrange insurance at its discretion for loss or damage to goods in transit.

➢ Payment

Payment for Goods shall be made by the Purchaser to ODI strictly according to the terms of payment specified on ODI’s acceptance of order. Payments when due from the Purchaser shall be made to ODI at its address as indicated on the invoice or order acceptance. No holdback, deduction or delay in payment is permitted for late delivery or shipping loss unless agreed in writing by the Purchaser and ODI, and in no event where delivery is lost or delayed due to circumstances not in ODI’s control. Purchaser agrees to pay interest on overdue payments at the rate of 18% per annum (1.5% per month).

➢ Return

All returns must have prior written authorization of ODI. Returns will be subject to a restocking fee of 30%, at ODI’s discretion. No returns after 90 days will be accepted.

➢ Modification of Goods

Where the Purchaser intends to integrate ODI Goods for use or resale, the Purchaser agrees not to modify ODI Goods except strictly in accordance with any manual, directions or specifications provided, or with the express permission of ODI to each proposed modification.

➢ Use of Intellectual Property Prohibited

Purchaser is strictly prohibited from making reproducing, reverse engineering, disassembling or modifying any ODI Goods or any part or component of any ODI Goods, for its own use or for third party use or resale, including software programs shipped with the Goods. Software, unless otherwise agreed in writing, may only be used or distributed with the Goods. Except where expressly agreed in writing, Purchaser is not granted any rights in or to any patents, trademarks, trade names, logos, copyrights or trade secrets of ODI or its suppliers in connection with the Goods.

➢ Resale

These terms and conditions shall not be affected by or varied by any terms and conditions of sale accepted by the Purchaser from its customer(s). The Purchaser is responsible for compliance by its customers with these terms and conditions, as applicable.

➢ Cancellation

Purchaser may not cancel an order without the consent of ODI. Cancellations are subject to fees of 10% of order value plus customization or configuration costs (if applicable).

➢ Non-Standard Goods

Special orders will require pre-payment in an amount to be determined by ODI, which will be forfeited if the order is cancelled or delayed without ODI's consent.

➢ Warranty

ODI warranties ODI Goods to be free from defects in materials, workmanship and function (as set out in the acceptance of Purchaser's order) for a period of TWENTY-FOUR (24) months from date of delivery (the "ODI Warranty"). ODI will replace or repair to its standards any Goods which are proved to be defective, subject to the conditions and limitations herein. Any repair or replacement by ODI under the ODI Warranty will be completed at ODI's facility, at the address indicated above. Costs of transport or delivery to ODI's facility are for the Purchaser's account. Where a valid claim has been made and Goods are to be redelivered to the Purchaser, ODI will pay costs of re-delivery by usual commercial means (upcharges for express or expedited delivery will be paid by the Purchaser).

➢ Limitations to Warranty

For a Purchaser's claim under the ODI Warranty to be accepted by ODI, it must be the case that the Goods in question have been installed, powered, and operated in compliance with all instructions, manuals or specifications supplied by ODI or otherwise in effect. Damage incurred in shipping is not covered. Damage or default resulting from contact with corrosive materials or atmosphere is not covered. Damage or default from deployment inconsistent with instructions or guidelines in the user manual or documentation is not covered. Damage or default caused by modification of the ODI Goods without consent is not covered.

➢ Limitations to Liability

Except as to its obligations under the ODI Warranty, ODI is not responsible for any costs, losses, damages or claims whatsoever, whether direct or indirect, and howsoever incurred, by the Purchaser or by any third party claiming through or in relation in any way to the Purchaser, due to or related to any alleged or demonstrated fault or defect or unsuitability for purpose in ODI Goods, or the period of time during which the Purchaser or any claiming party may be deprived of the use of the Goods as a consequence thereof.

➢ Special Conditions

Special or supplemental terms or conditions may be attached to or apply in respect of certain ODI Goods (including OEM terms and conditions). Where contained in product documentation or otherwise set out in writing in the order, acceptance of order, invoice or elsewhere, these will apply and are binding on the Purchaser, to the extent they are not inconsistent with these terms and conditions. Unless expressly set out in writing, or otherwise by agreement of ODI and the Purchaser, no term or condition other than those set out herein will apply or be enforceable.

➢ Confidential Information

Any specifications, samples, designs, formulations or other information of ODI disclosed to the Purchaser in connection with an order or along with any ODI Goods is acknowledged by the Purchaser to be confidential and proprietary to ODI (the "Confidential Information"). Confidential Information shall remain the exclusive property of ODI and shall, along with any information derived from the same, be kept confidential by the Purchaser and its employees and agents and shall not, without ODI's prior written consent, be disclosed to any third party or used except for authorized purposes connected with or ancillary to the Purchaser's use of the ODI Goods. The Purchaser agrees not to analyze or reverse engineer any Good or sample or to assist and/or allow any third party to do so without the express written consent of ODI. The Purchaser agrees that the covenant of confidentiality and nondisclosure set forth above shall survive and remain in effect for so long as the Confidential Information remains confidential.

➢ Language

The language of the contract between ODI and a Purchaser is agreed to be English. Where the laws of a country of sale require goods to be marked in any particular manner or language(s), it is the Purchaser's responsibility to fulfill these obligations. ODI will provide assistance as is reasonably required.

➢ Arbitration

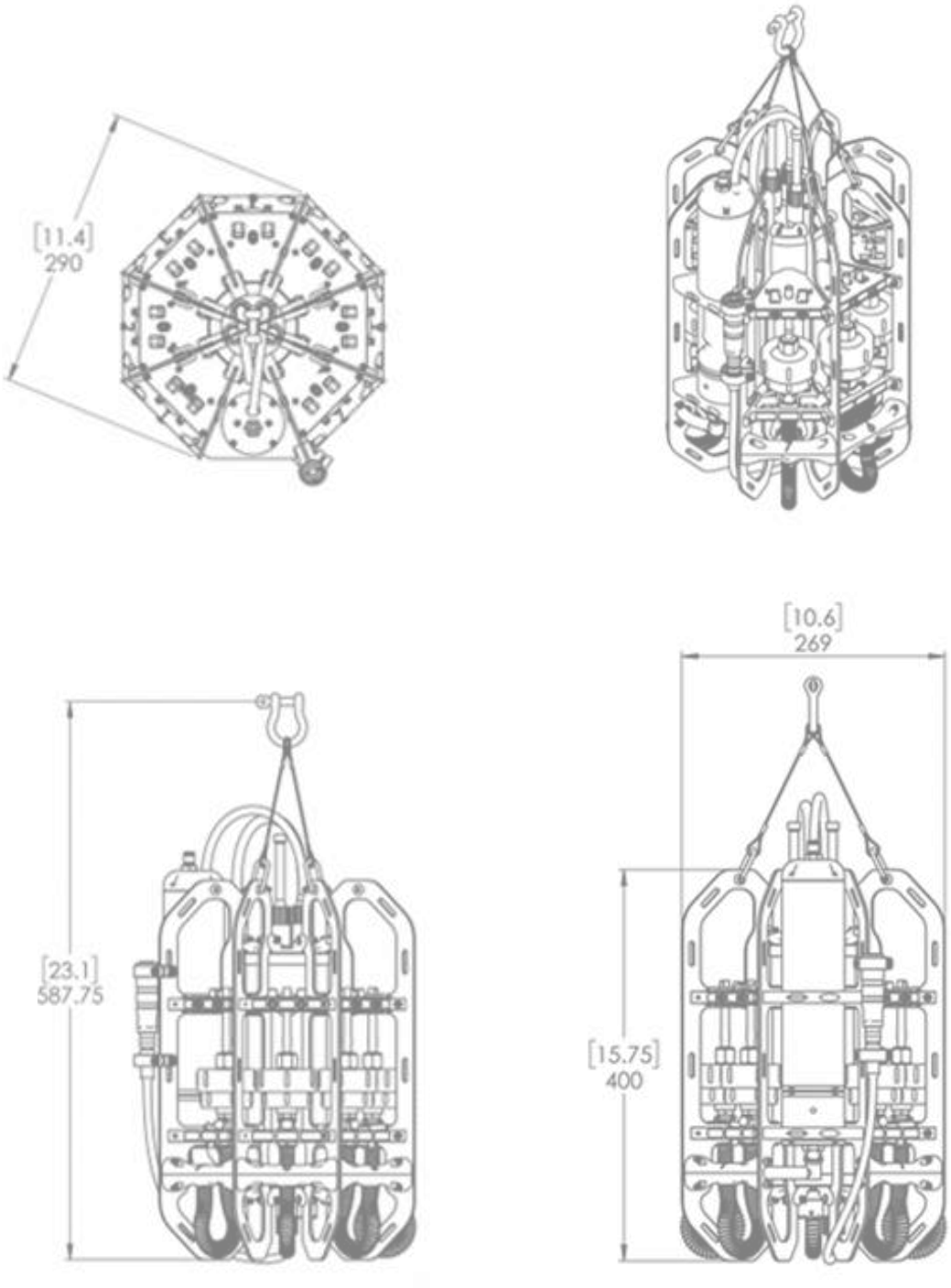
Any disagreements that cannot be resolved by the parties shall be exclusively resolved by binding arbitration in British Columbia, under the Arbitration Act (British Columbia), before a single arbitrator. Purchaser hereby consents to the venue and jurisdiction of such arbitration, whose costs shall be borne equally by the parties.

➢ Applicable Law

This Agreement shall be governed and construed in all respects in accordance with the laws of the Province of British Columbia, Canada, without regard to provisions relating to choice of law. The parties agree to exclude entirely the application of the United Nations Convention on Contracts for the International Sale of Goods from this Agreement and from any agreement or transaction that may be executed or carried out pursuant to this Agreement. Nevertheless, if any of the provisions of this Agreement or the application of any such provisions to the parties is held by a tribunal of competent jurisdiction to be governed other than by British Columbia law, then any relevant reference, waiver or incorporation of a British Columbia rule or statute contained in this Agreement shall be interpreted to the maximum extent practical to refer to comparable laws of the applicable jurisdiction.

Appendix

➢ Specifications



Primary dimensions displayed in millimeters. [Secondary dimensions displayed in inches].

➢ Firmware Update

Please contact ODI support at **support@oceandiagnostcs.com** for help updating the firmware on your instrument.

➢ Aftersales Information

Visit https://www.oceandiagnostics.com/support to learn more about aftersales service policies, repair services, and support.

⚠

- Warning! Ascension can generate a strong magnetic field around the instrument which has the potential to impact external equipment and devices sensitive to magnetic interference.
- Warning! This product has the potential to expose you to chemicals including lead, nickel, and chromium, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, please visit www.P65Warnings.ca.goc

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ODI Support
https://www.oceandiagnostics.com/support

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https://www.oceandiagnostics.com/ascension/downloads

If you have any questions about this document, please contact
Ocean Diagnostics Inc. by sending a message to **support@oceandiagnostics.com**.

