



















### Product Overview

The Lovibond® PTV Series Turbidimeters are continuous-reading process monitoring instruments for filter management and regulatory reporting for turbidity in potable water. This includes regulatory reporting of turbidity for the United States Environmental Protection Agency (USEPA) or ISO 7027 International Standard. The Lovibond® PTV Series Turbidimeters may be applicable for water monitoring application in which the expected turbidity is typically less than 10 NTU or FNU. The Lovibond PTV Series Turbidimeters are designed to detect an incremental change in turbidity of less than 0.0005 NTU below 0.05 NTU. This sensitivity is 100 times lower than the sensitivity as specified by USEPA 180.1 (measurement rounding).

**Measurement Module** (synonymous to turbidimeter 'Head') - The measurement module of the turbidimeter contains the light source, optics, signal processing, data storage, display and a touch screen user interface. The local touch screen permits operation of the Lovibond® PTV series turbidimeters without an external controller. The 'Home' screen displays the current turbidity value and status of the turbidimeter.

**Flow Body** - The Flow Body contains the components that come in contact with the sample and is engineered to ensure consistent results over a large range of operating conditions. The flow body incorporates design elements necessary for low-level turbidity detection. Routine maintenance, such as calibration and cleaning, can be performed without the use of tools and with low chemical exposure.

**Power & Communications Module (PCM)** - The PCM contains the high voltage power supply, digital and analog communication interfaces. (A complete description of PCM including all electrical installation instructions are included within a separate manual. A qualified electrician trained in the installation of electrical equipment should read and understand prior to working with this component as potential lethal hazards are present.)

\*For the purposes of specification, FNU = NTU when 1) the instruments are calibrated on formazin based standards and 2) formazin is used in the derivation of the specifications. It is possible for FNU and NTU to differ on real world samples.

**Technical Specifications**

The Lovibond® PTV Series turbidimeter is available in three versions, one ISO and two US EPA compliant versions. The PTV 1000 IR displays turbidity values in FNU units and is compliant to ISO method 7027. The PTV 1000 WL and the PTV 2000 are EPA approved methods and display turbidity values in NTU units. Approval information for the PTV 1000 WL and PTV 2000 are referenced in Federal Register / Vol. 82, No 143 / Thursday, July 27, 2013 / Rules and Regulations, 34861 – 34868.

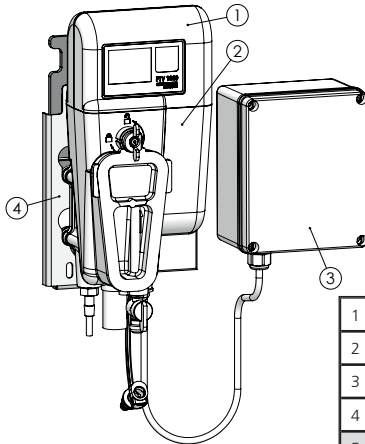
<b>Specification</b>	<b>Details</b>
Measurement Method	Nephelometry, scattered light collected at 90° to the incident beam
Operating temperature	0 to 50°C (32 to 122°F)
Measurement Range	0.0001 to 100 NTU / FNU
Display units	FNU, NTU, mNTU, TE/F, mg/l PSL, mg/l Kaolin, Degree, custom
Accuracy	± 2% of reading from 0 to 10 NTU ± 4% of reading between 10 to 100 NTU
Repeatability	Less than 1% at 1 NTU/FNU, expressed as percent relative standard deviation (%RSD)
Linearity error	Less than 1% for 0 to 5 NTU and 2% for turbidity values greater than 10 NTU (requires 2-point calibration)
Stray Light	PTV 1000 IR (ISO): < 0.005 / 5 mNTU PTV 1000 WL (EPA*): <0.015 / 15 mNTU PTV 2000 RL (EPA*): <0.008 / 8 mNTU
Limit of Detection	PTV 1000: <0.0005 NTU PTV 2000: <0.0001 NTU
Limit of Quantitation	PTV 1000: Better than 0.005 NTU PTV 2000: Better than 0.001 NTU
Resolution	0.0001 NTU or FNU (range dependent 5 digits displayed)
Response time	10% change within 40 seconds @ 200 mL/min
Response 10 to 90%	Less than 240 seconds @ 200 mL/min at 1 NTU
Signal Averaging	User Selectable: 1, 3, 6, 10, *30, 60, and 90 seconds, *default set to 30 seconds
Sample temperature <sup>1</sup>	0 to 50°C (32 to 122°F) <sup>1</sup> <i>for best performance the sample temperature should be at least 5°C less than the ambient temperature.</i>
Sample Flow	30 to 500 <sup>2</sup> mL/min (0.476 to 7.925 gal/hr), 40 to 80 mL/min (0.634 to 1.268 gal/hr) recommended flow; <sup>2</sup> <i>for flow rates above 100 ml/min (1.585 gal/hr) use external flow monitoring (not supplied).</i>
Sample pressure	0.03 to 5.5 bar (0.435 to 80 psi)
Sample Volume	285-ml (Measurement Module installed in Flow Body)

## GB Specifications

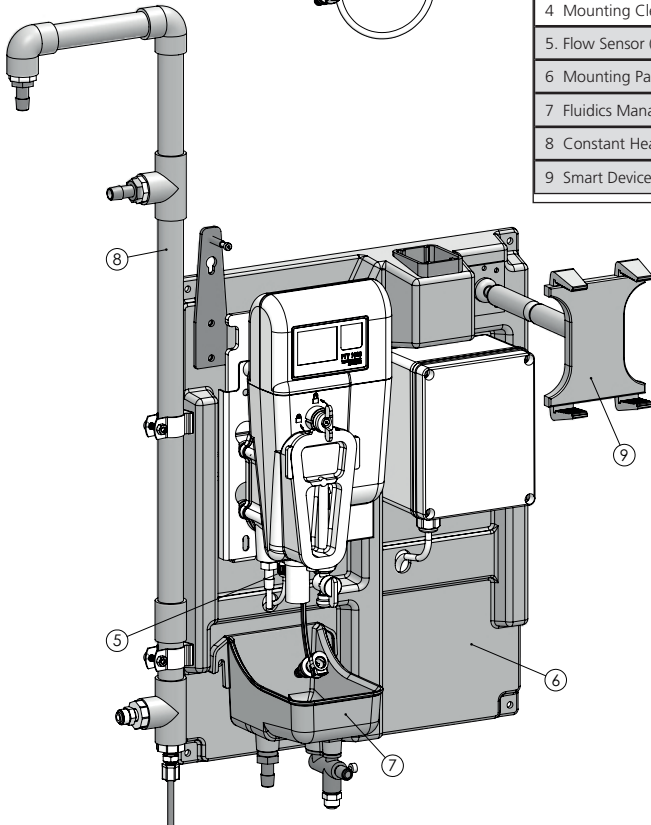
Specification	Details
Humidity	5 to 95 %RH (Non-condensing)
Compliance Methods	ISO7027: PTV 1000 IR EPA: PTV 1000 WL & PTV 2000 The Lovibond White Light LED Method and The Lovibond 660-nm LED Method are cited in 40 CFR 141.74(a)(1) as approved by the USEPA for drinking water turbidity.
Alarms	Three set-point alarms, each equipped with an SPDT relay with unpowered contacts rated 5A resistive load at 230 VAC
Pollution degree	2
Enclosure rating	IP 65
Mounting	Indoor using supplied quick-connect mounting bracket affixed to a wall. (optional panel)
Dimensions HxDxW	34.0 x 13.7 x 20.3 cm (13.4 x 5.4 x 5.8 in)
Shipping weight	1 kg (2.2 lbs)
Method of calibration	1-point calibration defaulted to a value of 5.0 NTU with any regulatory approved formazin calibrant.
Sensor cable length	standard: 0.6 m (~2 ft), optional: 2, 3 and 10 m (6.6, 9.8 and 32.8 ft)
Storage and shipping temperature	-40 to 60°C (-40 to 140°F)
Power requirements	24 VDC, 12W supplied by Power Communication Module
Inlet fitting	¼-inch NPT female, ¼-inch quick-connect tubing (Included) (¼ inch = 6 mm)
Outlet fitting	3/8-inch NPT female, 3/8-inch hose barb tubing (Included) (3/8-inch = 9mm)
Sample tubing	HDPE, ¼-inch OD (high-density polyethylene), color = black or blue (¼ inch = 6 mm)
Analog output	Single output selectable range of 0-20 mA or 4-20mA; Output programmable over any portion of the measurement range.
Interface protocols	Direct: Touch screen  Wireless (Regional Availability): Low Energy <i>Bluetooth</i> ® between Measurement Module and Smart Device (iOS or Android)
Verification options	Dry Verification Device (high or low value), T-CAL <i>plus</i> ®, T-CAL® or Formazin
Calibration options	T-CAL <i>plus</i> ®, T-CAL® or Formazin: 1-point calibration (5.0 NTU recommended; or between 4 to 22 NTU)
Warranty	1 year

## Product Components

Main components and optional accessories



1	Measurement Module
2	Flow Body
3	Power & Communications Module
4	Mounting Cleat
5	Flow Sensor (optional)
6	Mounting Panel (optional)
7	Fluidics Manager (optional)
8	Constant Head Device (optional)
9	Smart Device Mount (optional)



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## **Installation**

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### **General Guidelines**

Before beginning the installation, locate an area with a solid wall to mount the instrument that is away from heavy traffic, exposure to direct sunlight or other heat sources, with minimum dust and vibration. The panel mount option is recommended to ensure proper installation, to manage cables and to provide conveniences that help increase work flow efficiency.

 <b>WARNING</b>
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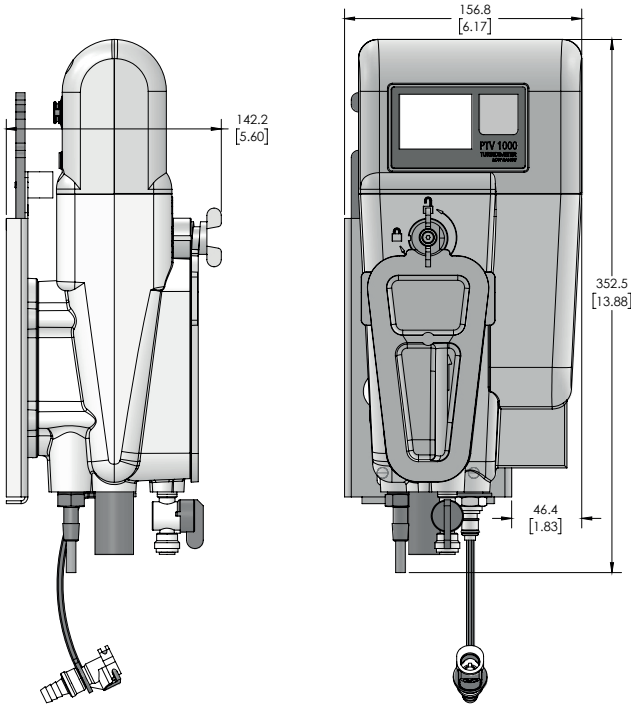
There are multiple hazards associated with the installation of this equipment. Installation of this equipment should only be conducted by qualified personnel.
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### Mechanical Installation

- Install this instrument on a wall.

#### **NOTICE**

**ALLOW AN ADDITIONAL 30.5CM (12" INCH) CLEARANCE FROM THE TOP OF THE FLOW BODY FOR REMOVAL OF THE MEASUREMENT MODULE.**



### Installing the Mounting Plate

Allow 25-cm (9.8 inch) above and 6-cm (2.4 inch) clearance to the right of the mounting plate for serviceability and cable routing. The mounting plate attaches to the vertical wall using four M6 or 1/4 inch stainless steel bolts, (of a suitable style and length determined by installer, to assure the mounting plate is securely attached).

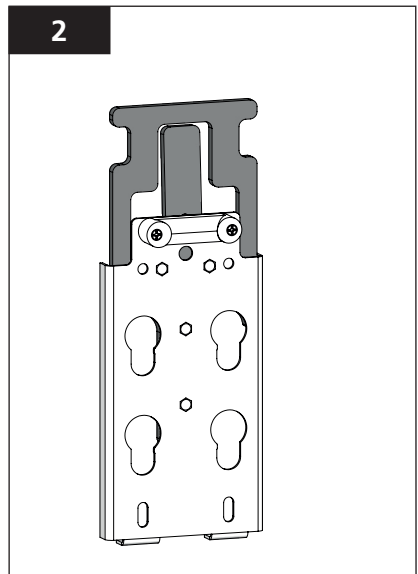
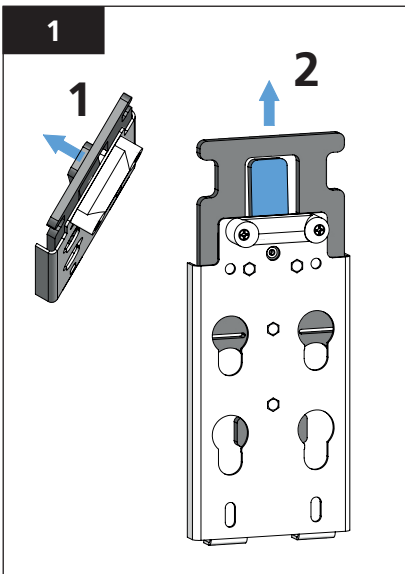
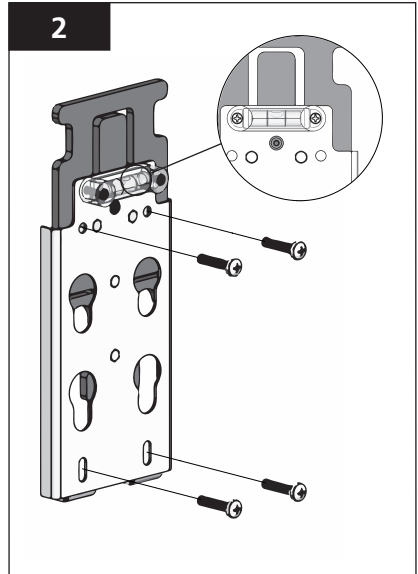
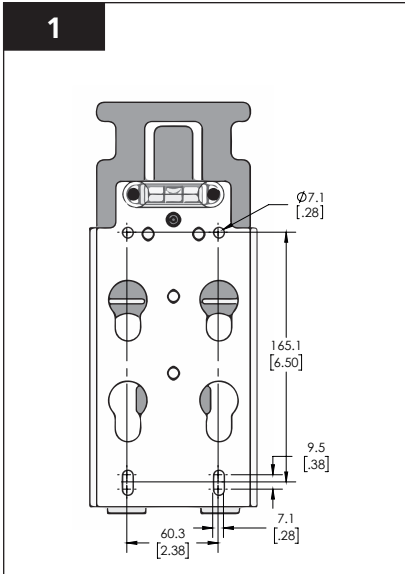
#### **NOTICE**

Do not over-tighten screws and deform the mounting plate during installation.

# GB Installation

## NOTICE

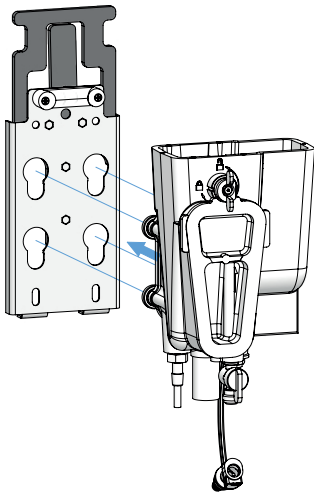
The Sight Level, (included as part of the Mounting Cleat), should be used while marking the hole locations on the wall and during installation. Level mounting of the Flow Body is important for proper transfer of sample through the turbidimeter.



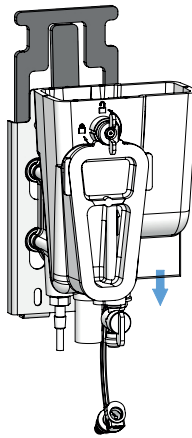
# GB Installation

## Attaching the Flow Body to the Mounting Cleat

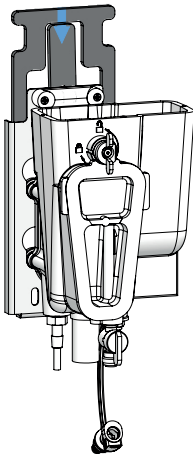
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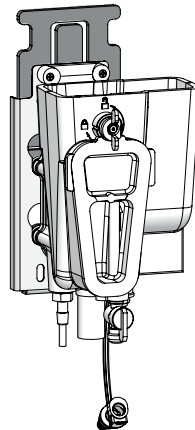
2



3



4



### NOTICE

Check to ensure the instrument is level after installation.





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## Fluidic Connections

ASTM D6698 sampling conditions should be followed for this installation.

### Sample tap (from the source)

Sample tap should project into the center of the pipe to minimize interference from air bubbles or sediment. Run sample lines as direct as possible to the turbidimeter to minimize delays to changes in the sample turbidity. Avoid sample line routings which cause the inlet pressure to drop below the recommended sample line pressure minimum; (this can cause air lock conditions within the sample line).

### Sample Line Installation

1. Adjust the length of the 1/4-inch\* sample tubing to minimize the distance that the sample must travel.
2. Cut the 1/4-inch\* sample tubing square to ensure a secure and leak free connection.
3. Insert the sample line into the shutoff valve inlet located on the bottom of the PTV series Flow Body; push firmly to seat the tubing in the shutoff valve

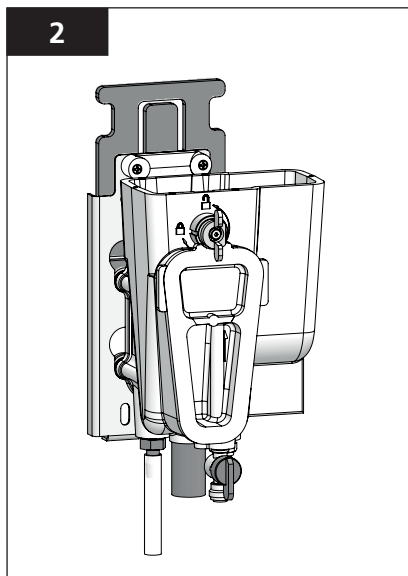
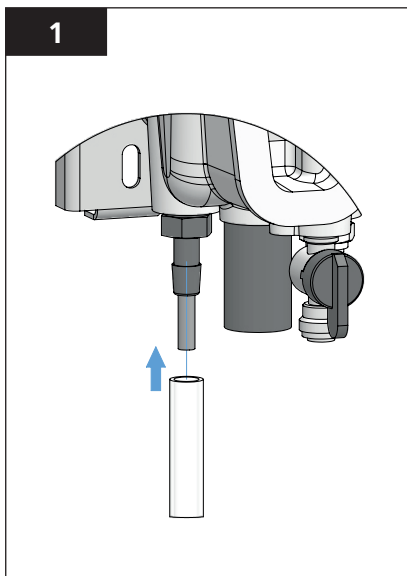
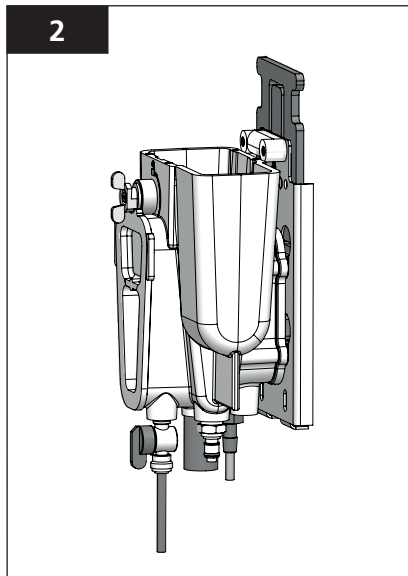
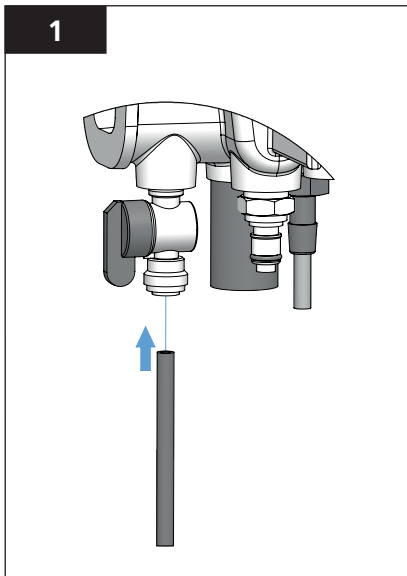
NOTICE
For setup and/or for real time 'at-the-head' observations, a 0 to 100 ml/min rotameter may be installed into the 1/4-inch sample flow line as a visual flow indicator. See <i>Accessories &amp; Replacement Parts</i> section for details.

### Drain Line Installation

1. Connect a 3/8-inch\* ID tube to the 3/8-inch\* barbed fitting located on the bottom of the PTV series Flow Body and route to drain.

NOTICE
Avoid drain line routings which can become kinked or trap water within the drain tubing when no grab sample air break is present at the turbidimeter Outlet Fitting.

\* See Technical Specification section for metric conversions.



**NOTICE**

Flow Bodies equipped with a flow sensor; the 1/4-inch\* siphon tube will fit inside the 3/8-inch\* ID Outlet tube; **DO NOT SHORTEN OR REMOVE THE SIPHON TUBE.**

For best performance, the flow rate and operating conditions should be kept as constant as possible; (an optional constant head device may be added to minimize flow variation).

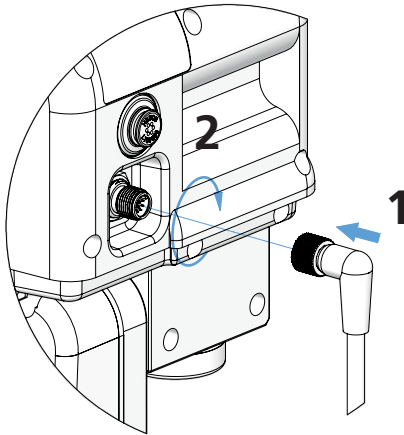
## Electrical Installation

Measurement Module power connection - Connect to the 90 degree 12 PIN M12 connector to the Measurement module.

### NOTICE

Refer to the Power & Communications Module Installation Manual for all other electrical and communication connections

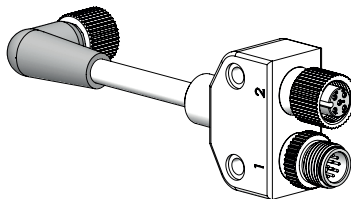
\*This is a keyed connector pair; carefully align the connectors during insertion so as not to bend the pins on the male connector.



Connecting the power cable to the PTV Measurement Module

### NOTICE

For Flow Bodies that come equipped with a flow sensor, the 12-PIN M12 connection will be made through a supplied Y-Connector attached to the Measurement Module.



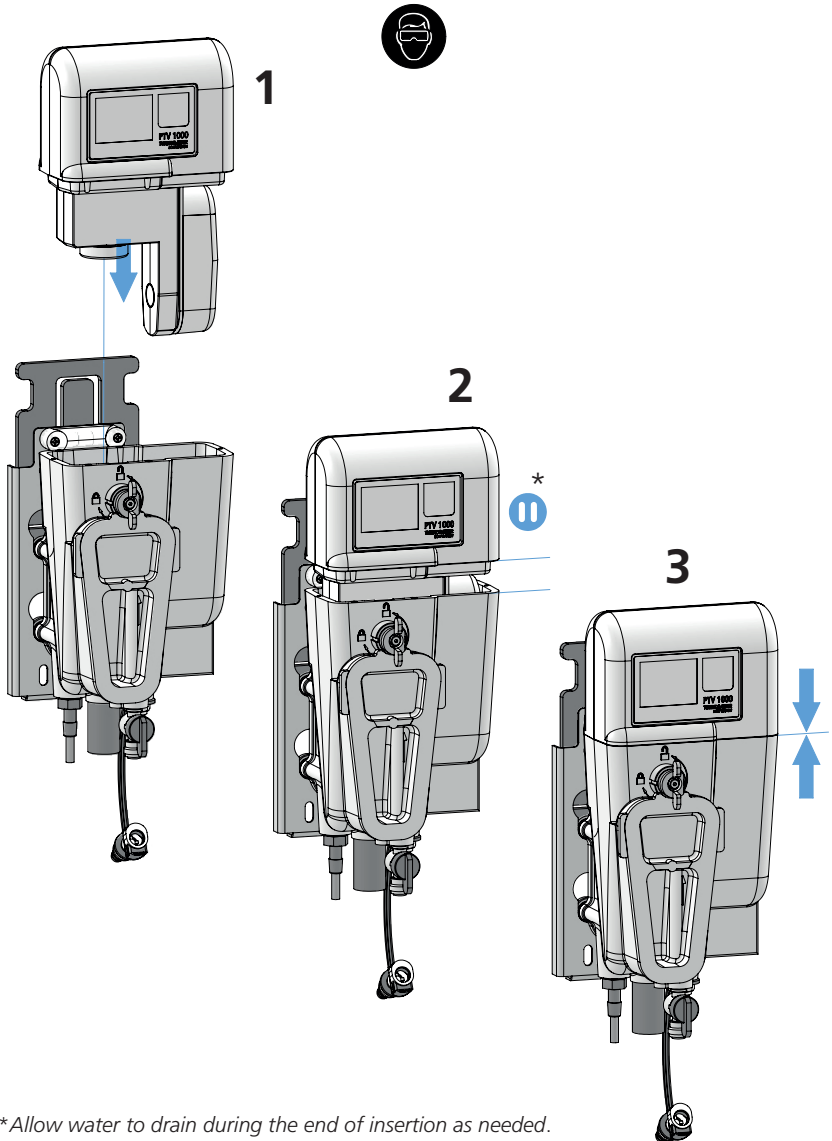
PTV series turbidimeters are shipped with the Flow Sensor configuration set to **DISABLED**. Refer to the Configuring the Instrument Section to enable this feature. With the Flow Sensor configuration set to **ENABLED**, a flow warning will be issued if: 1. the Flow Sensor is not present or 2. has been disconnected or 3. the average flow rate is outside the recommended flow range.

## GB Installation

### Inserting the Measurement Module into the Flow Body

#### NOTICE

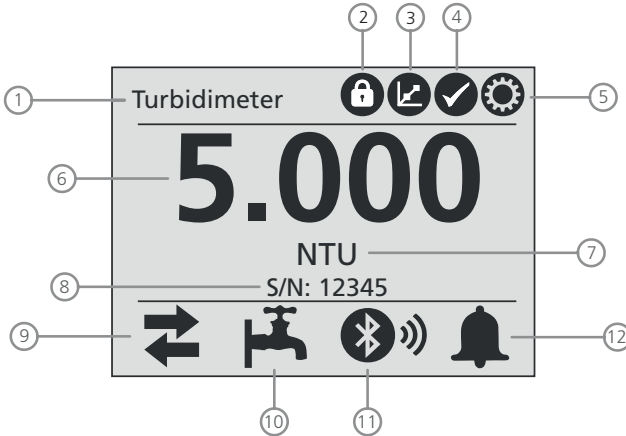
Do not plunge the Measurement Module into the Flow Body.



## GB Instrument Interfaces

PTV series turbidimeters are operable through two interfaces; 1. the built-in touch screen or 2. using a smart device via low-energy *Bluetooth*® (BLE) wireless interface, **(BLE IS AN OPTION THAT MAY BE UNAVAILABLE IN CERTAIN COUNTIES AND REGIONS).**

### Touchscreen Interface



\*Home screen for the touch screen interface (located on sensor).

1 - Turbidimeter Name	2 - Security Icon (if set)	3 - Calibration Icon
4 - Verification Icon	5 - Settings Icon	6 - Turbidity Value
7 - Units	8 - Serial Number	9 - Outputs Icon
10- Flow Icon	11 - <i>Bluetooth</i> ® Icon	12 - Alarm Icon

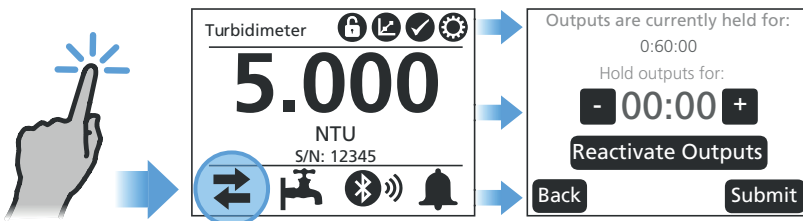
### Outputs Icon:



Displays whether outputs are active or held.

- A **green** icon = outputs are **active**.
- A **red** icon = outputs are **held**, (not active).

Tap the icon to access the outputs controls.



## Touchscreen Interface, continued

### Flow Icon:



Displays the status of the Flow Sensor.

- A **green** icon indicates normal flow.
- A **yellow** icon = warning.  
(sample flow may be too high or too low)
- A **grey** icon = sensor not present or disabled.

### Bluetooth® Icon:



Displays the *Bluetooth*® connectivity status of the Measurement Module.

- The signal strength of the connection varies with distance.
- The bars will display when a mobile application is connected.
- The number of bars indicates the signal strength.
- A grey icon = *Bluetooth*® not present or disabled.

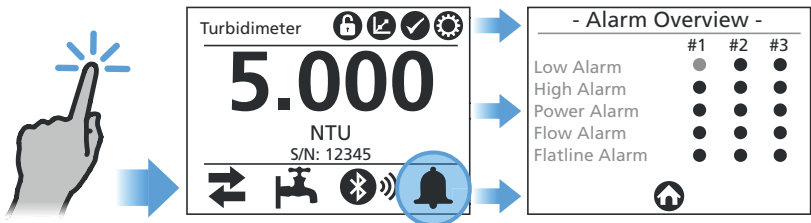
### Alarm Icon:



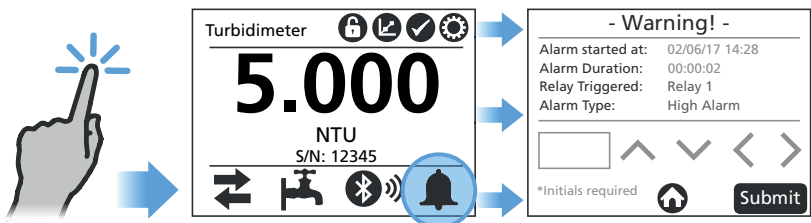
Displays the status of the Alarm Relays.

- A **green** icon = **no alarm** is triggered.
- A **red** icon = **alarm** has been triggered.

Tapping on a **green** alarm icon will show an overview of all of the Alarm Relays.



Tapping on a **red** alarm icon will display the alarm screen with details on the triggered alarm relay. A log is created when initials are added and the form is submitted.



## Touchscreen Interface, continued

### Calibration Icon:



Tap the **calibration** icon to access the two calibration options:

- 1-point.
- Zero Electronics
- Grab-sample

### Verification Icon:



Tap the **verification** icon to access the three verification options:

- Wet.
- Dry
- Grab-sample

### Settings Icon:

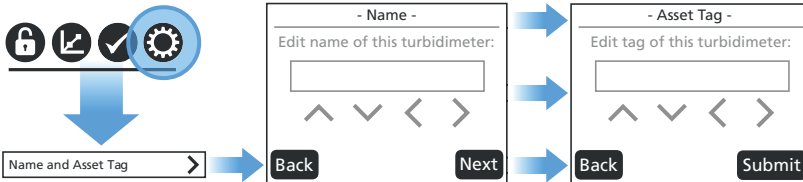


Tap the **settings** icon and select from nine categories:

Date and Time >	Pass / Fail >
Name and Asset Tag >	Security >
Measurement Parameters >	Language >
Outputs >	Diagnostic Data >
About >	Flow Indicator >

### Initial Configuration:

*Enter the Turbidimeter Name and Asset Tag (name and/or number).*

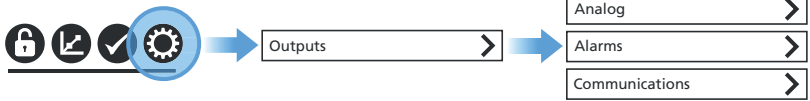




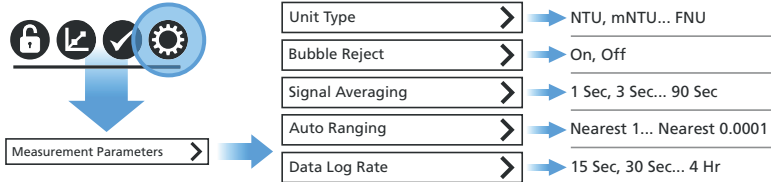
# GB Configuring the Instrument

## Touchscreen Interface, continued

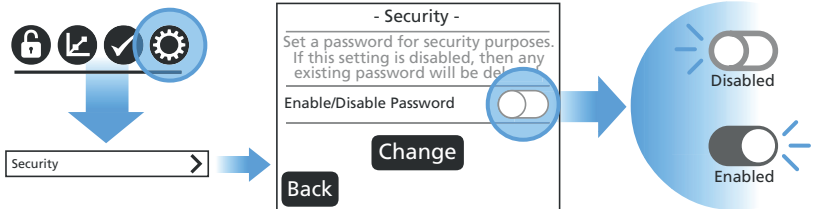
Outputs menu:



Measurement Parameters:



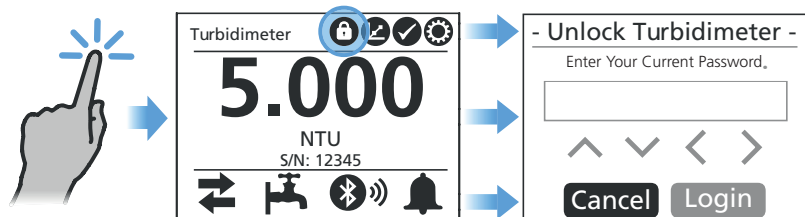
Security:



'Locked' Security icon:



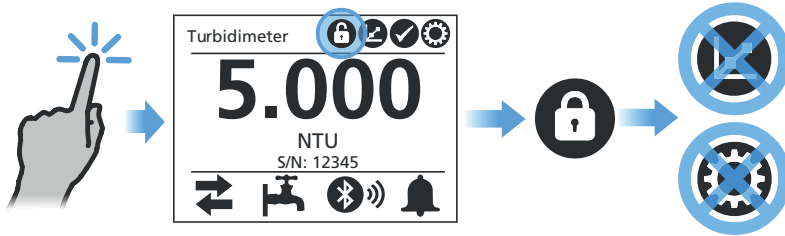
Tap on the **'locked'** security icon and enter your password.



## GB Configuring the Instrument

### Touchscreen Interface, continued

Tap on the '**unlocked**' security icon to lock functionality.



For faster response time the flow rate to the instrument can be increased to a maximum flow rate of 500 ml/min (7.925 gal/hr). At flow rates **GREATER THAN 120 ml/min (1.902 gal/hr)** the Flow Sensor output should be set to **DISABLED** to avoid the instrument from issuing a flow warning.

To enable or disable the Flow Sensor output, go to; 'Settings' > 'Flow Sensor' > then 'ENABLE' or 'DISABLE' using the slide switch.

#### NOTICE

It is not necessary or recommended to remove the flow sensor cable from the Flow Body when disabling the Flow Indicator as damage to the electronics may occur.

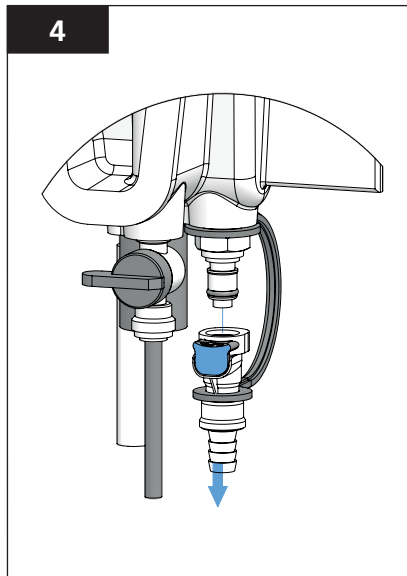
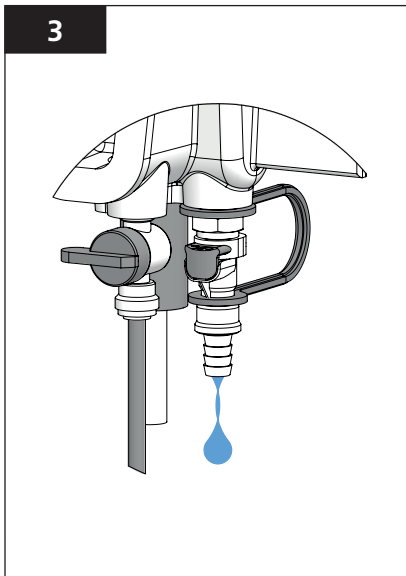
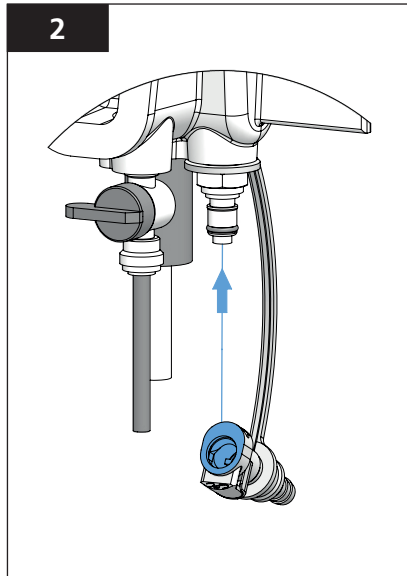
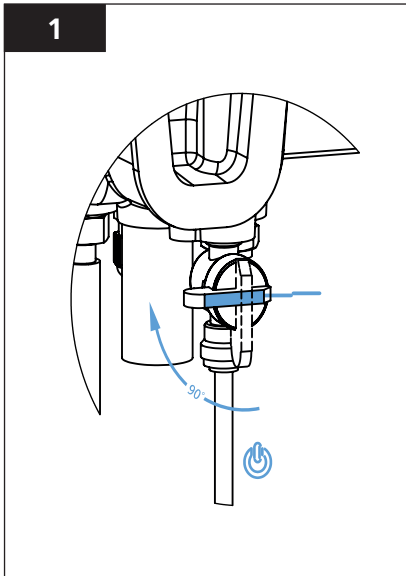
## Calibration

Use care not to allow particle contamination during and after cleaning of the instrument. See the section on 'Cleaning' for more detailed cleaning instructions.

NOTICE
Calibration should be performed every 90-days or more frequently as regulatory requirements demand. <b>ABIDE BY ALL GOVERNING REGULATIONS REGARDING THE FREQUENCY OF CALIBRATION.</b>
Perform any maintenance and cleaning prior to calibration.
Low turbidity water can be filter effluent water, distilled water, or filtered tap water that has been passed through a 0.5 micron (or smaller) filter.
A minimum of 300 ml of calibrant is required for calibration; T-CAL® or T-CALplus® stabilized formazin, or other standard approved calibrant for instruments that report turbidities under USEPA or ISO regulations.
A valid calibration standard must have a value between 4 and 30 FNU/NTU. Calibrant values outside the 4 to 30 FNU/NTU range will not be accepted by the instrument.

*Note: The performance specifications provided in this manual are based on formazin standards and can only be guaranteed when calibration is performed as described herein (including the smart device interface). The manufacturer cannot guarantee the performance of the instrument if calibrated with co-polymer styrenedivinylbenzene beads or other suspensions.*

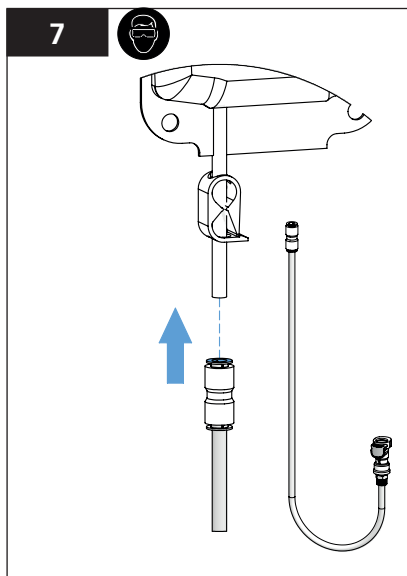
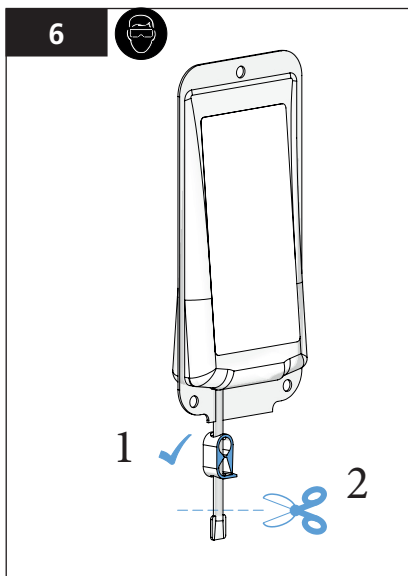
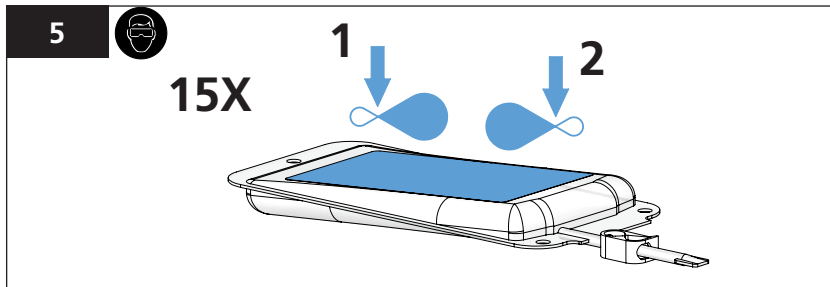
**Draining the Flow Body**



1. Close the Inlet Ball Valve.
2. Connect the Discharge Fitting to the Service Port to empty the Flow Body.
3. Allow the Flow Body to empty before proceeding.
4. Press the release button on the Discharge Fitting to remove it from the Service Port.

## GB Calibration

Preparing Lovibond® T-CAL<sub>plus</sub>® calibrant for use



Rinse the **BLUE** Calibration Tube with filtered water before each use.

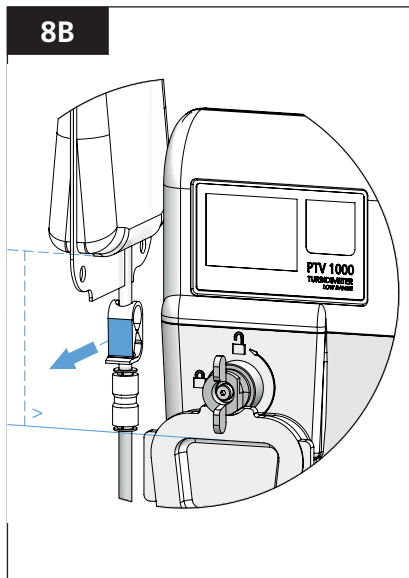
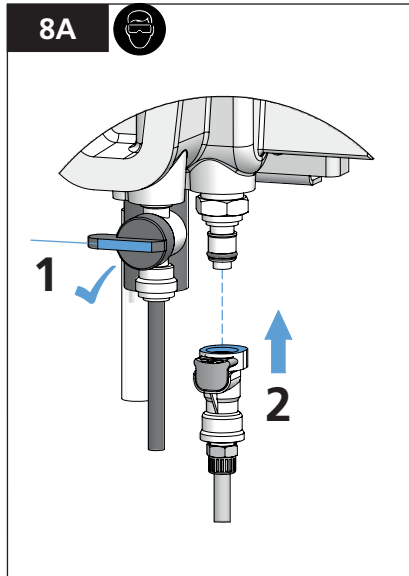
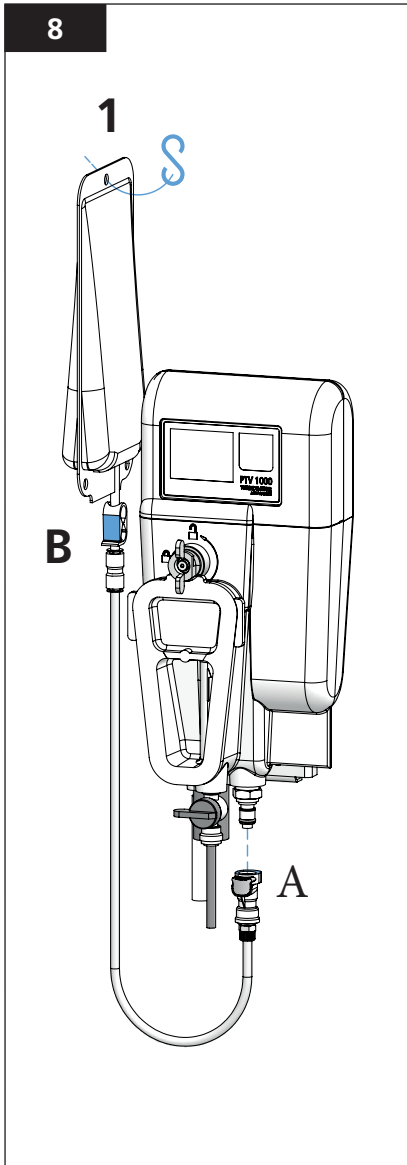
### NOTICE

**USE ONLY** the **BLUE** Calibration Tube with T-CAL<sub>plus</sub>® calibrant; **DO NOT USE** the **BLACK** Cleaning Tube for calibration as degradation to the calibrant may occur.

### WARNING

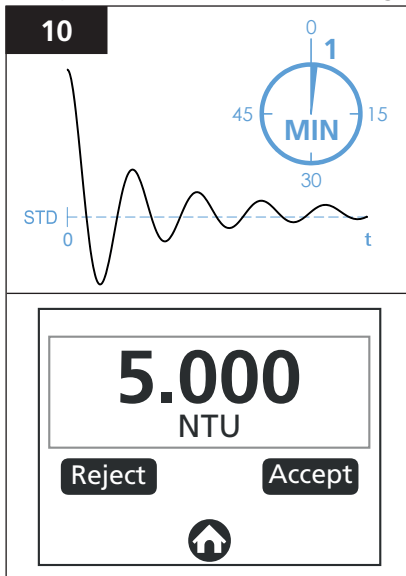
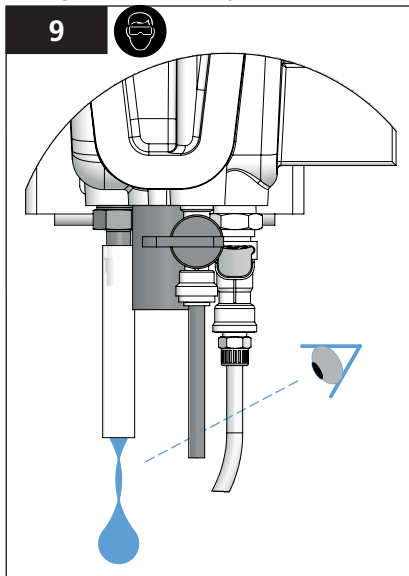
**CHEMICAL EXPOSURE; USE PROPER SAFETY EQUIPMENT AND PROTOCOLS**

Introduce the Lovibond® T-CAL<sub>plus</sub>® calibrant into the Flow Body



1. Connect the Lovibond® T-CAL<sub>plus</sub>® calibrant to the Service Port via the Calibration Tube.
2. Allow standard to completely fill the flow body. The Flow Body is considered filled when excess standard can be observed to flow from the Outlet.
3. Wait approximately 1 minute after the flow body is filled before accepting the calibration; (the turbidity value should not be drifting up or down before accepting the calibration value).

Filling the Flow Body with Lovibond® T-CALplus® calibrant and calibrating



\*The Flow Body is filled when standard is observed flowing<sup>1</sup> from the Outlet Fitting.  
(allow at least 1 discharge cycles to occur for Flow Bodies equipped with a Flow Sensor).

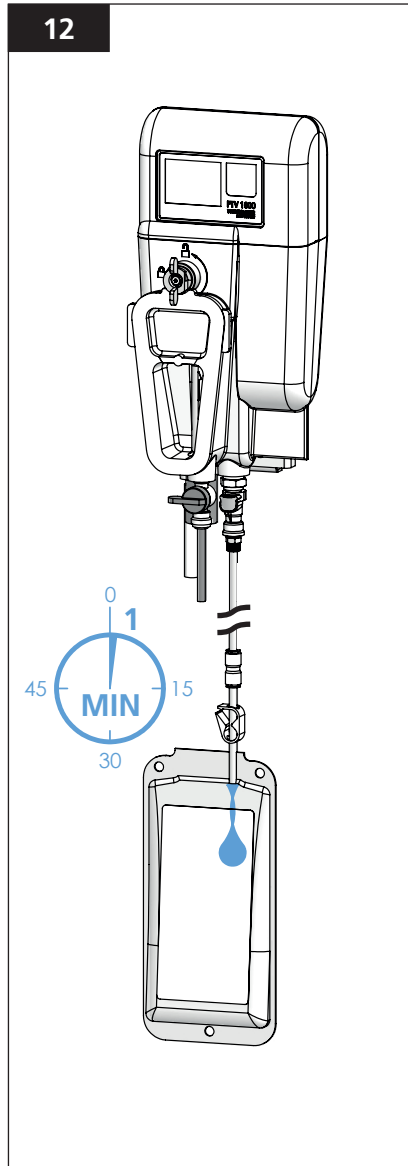
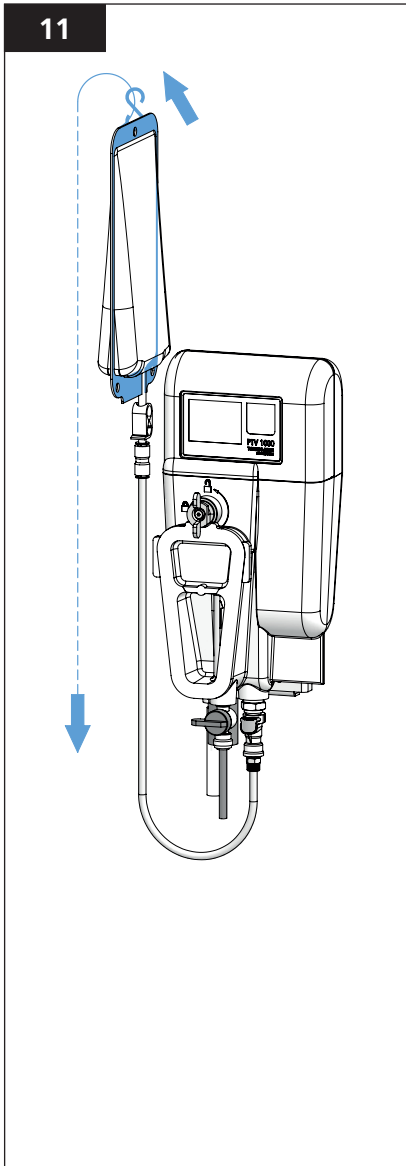
At the completion of calibration, a retrievable record is added to the Calibration Log; (refer to 'Calibration & Verification Logs' in the Calibration Offset Adjustment & Logs section within this manual

**NOTICE**

The slope or gain of the calibration is verified to be within a factor of 0.5 and 2.0 of the factory stored calibration. A calibration 'FAIL' means that the slope of the calibration is outside the gain limits and the previous calibration will persist.

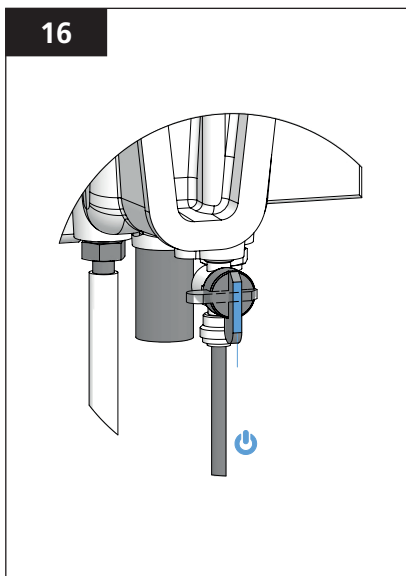
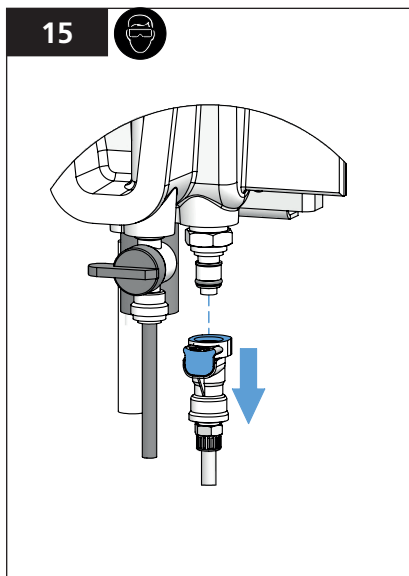
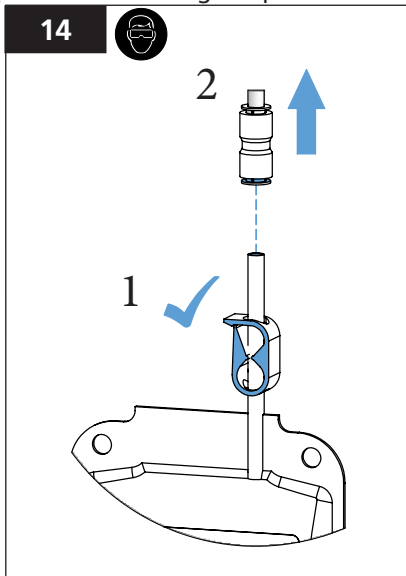
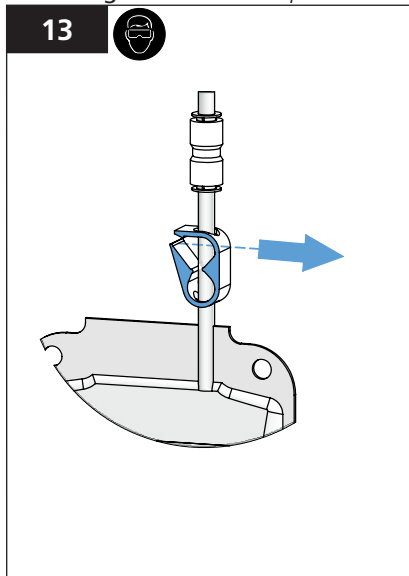
## GB Calibration

Collecting used Lovibond® T-CALplus® calibrant for disposal





Collecting the used T-CALplus® for disposal and restoring sample flow



1. Rinse the **BLUE** Calibration Tube with filtered water after use and store in a clean, dry plastic bag to prevent contamination.

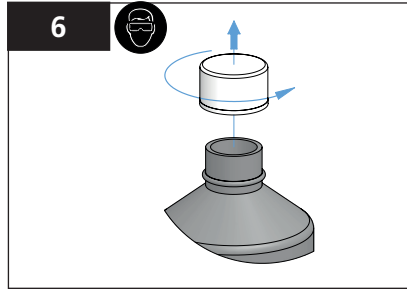
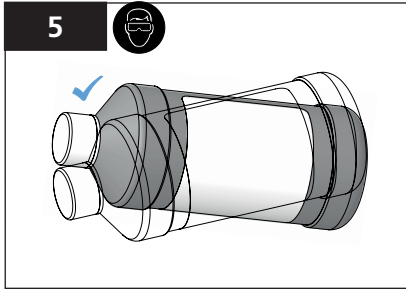
**NOTICE**

The **BLUE** Calibration Tube is reusable; **DO NOT DISCARD**

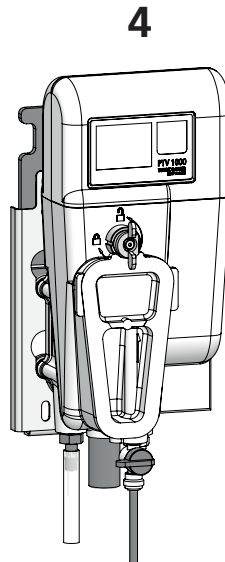
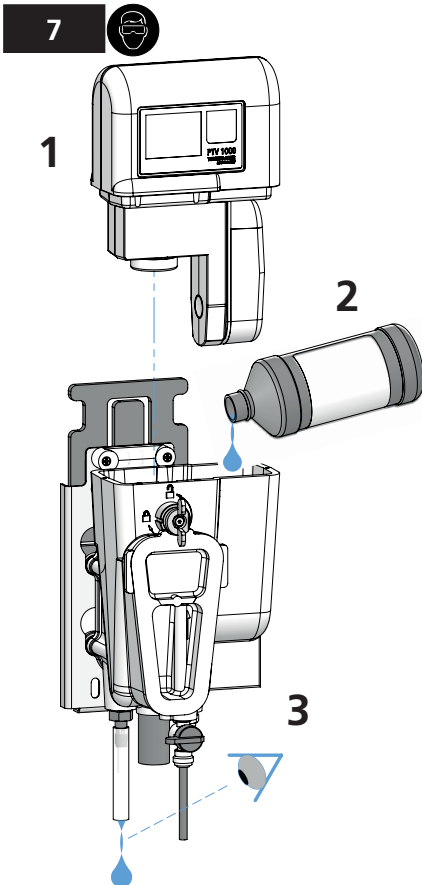
## GB Calibration

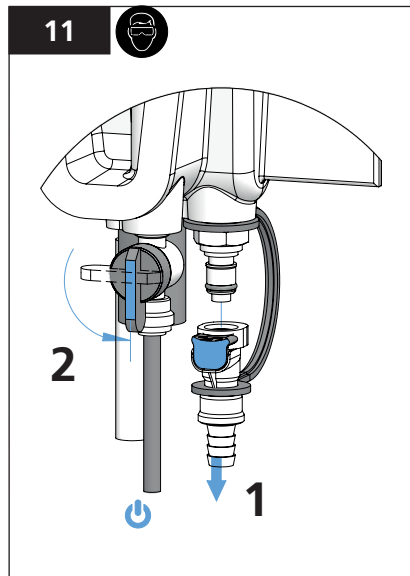
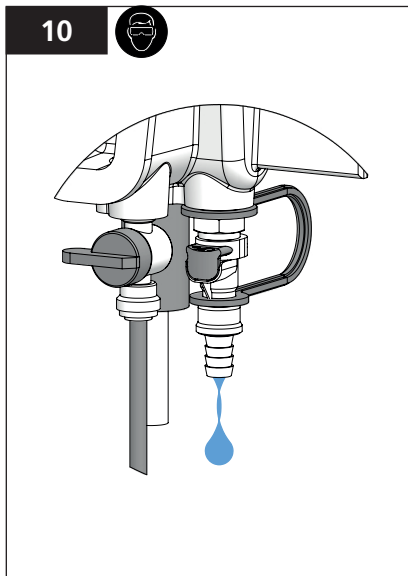
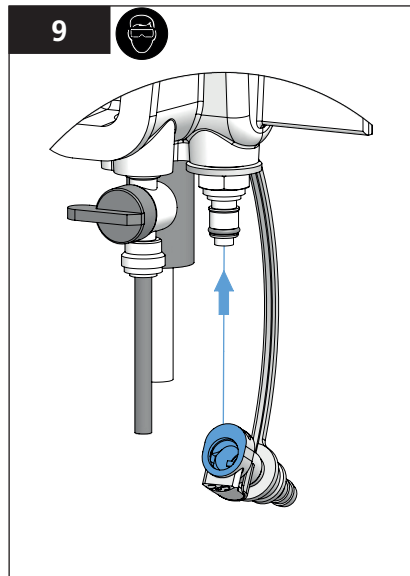
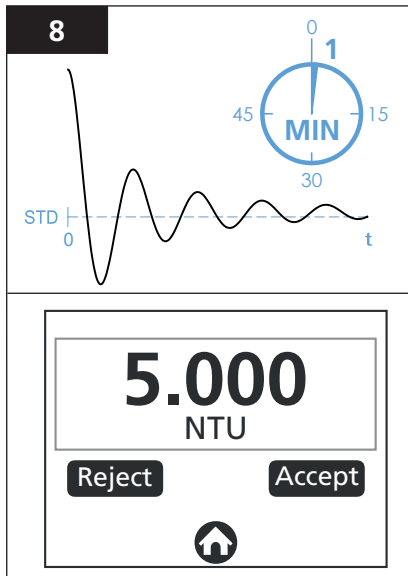
### Calibration using T-CAL® (stabilized formazin, bottled calibrant)

Before beginning, refer to the beginning of the Calibration Section and **follow illustrations 1 THROUGH 4** for 'Draining the Flow Body'.



\*Slosh contents back and forth in bottle to mix calibrant, **DO NOT SHAKE**





**NOTICE**

**DISPOSE OF USED CALIBRANT IN COMPLIANCE WITH ALL LAWS GOVERNING THE DISPOSAL OF CHEMICAL WASTE.**

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## **GB Calibration Offset Adjustment & Logs**

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### Calibration Offset Adjustment using a Grab Sample



**CALIBRATION OFFSET ADJUSTMENT IS NOT PERMITTED BY CERTAIN REGULATORY ENTITIES. CHECK ALL REGULATIONS BEFORE ADDING AN OFFSET TO THE CALIBRATION.**

1. Select Grab Sample Cal in the Calibration menu on the 'HOME' screen. *(For best results, it is recommended that the reference instrument be in close proximity of the turbidimeter when performing a calibration offset adjustment).* The recommended and default Offset Adj value = 0.
2. Ensure the grab sample vial is clean, (rinse at least 3X with sample) then collect a sample at the output fitting of the turbidimeter; *(allow the sample sufficient time to degas prior to measurement).* Follow the instructions and recommendations provided with the reference instrument for measuring samples.
3. The Calibration Offset Adjustment is limited to 0.05 NTU/FNU.

### Calibration & Verification Logs

The calibration and verification logs contain a historical record of the parametric values of the instrument at the time at which the log was generated. The log files are stored within the Measurement Module. Log files can be viewed or exported via the smart device interface.

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## Verification

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Verification is a procedure that ensures the instrument is measuring correctly. At the completion of any of the verification methods, a retrievable record is added to the Verification Log.

### NOTICE

Verification does not change the calibration or any of the other operating parameters of the turbidimeter.

### WARNING

Chemical Exposure; Use proper safety equipment including eye protection and adhere to all safety protocols when using chemicals.

### Verification using Lovibond® T-CALplus® calibrant, *(best practice)*

1. For wet verification using T-CALplus® calibrant, select 'WET STANDARD' in the 'VERIFICATION' menu on the 'HOME' screen.
2. Follow the illustrations provided for calibration; (refer to 'Calibration' in the Calibration Section within this Manual).

### Verification using a grab-sample

1. Select 'GRAB SAMPLE' in the 'VERIFICATION' menu on the 'HOME' screen. *(For best results, it is recommended that the reference instrument be in close proximity of the turbidimeter when performing a 'grab-sample' verification).*
2. Ensure the grab sample vial is clean, then collect a sample at the Output Fitting of the turbidimeter; *(allow the sample sufficient time to degas prior to measurement).* Follow the instructions and recommendations provided with the reference instrument for measuring samples.

### Verification using a Dry Verification Device

1. Select 'DRY STANDARD' in the 'VERIFICATION' menu on the 'HOME' screen.
2. Refer to the instruction provided with the Dry Verification Device for performing this type of verification.

### NOTICE

The dry verification baseline is nullified when a 'new' calibration is accepted. A 'new' dry verification baseline must be stored after calibration *before* a dry verification can be performed.

### Verification FAIL *(mitigation / corrective action)*

The default pass/fail criteria for verification 'PASS' is to for the instrument reading to be within 10 percent of the standard or baseline value, or a difference in reading of less than 0.05 FNU/NTU of the grab-sample value.

1. If the instrument issues a 'FAIL' verification message, clean the turbidimeter; (refer to the 'Cleaning' in the Maintenance Section within this manual).
2. Perform a calibration; (refer to 'Calibration' in the Calibration Section within this document).

## General Cleaning Guidelines

Clean as experience dictates. Unexpected variability in readings, erratic readings or an increase in the historical baseline of an instrument, (Verification **FAIL**), may indicate the need to clean. note: The **BLACK** Cleaning Tube is reusable, **DO NOT DISCARD!**

 **WARNING**

**CHEMICAL EXPOSURE RISK;** Use proper safety equipment including eye protection and abide to all safety protocols when using chemicals.

Lovibond® Cleaning Solutions are high purity, non-abrasive cleaning solutions that have been specifically formulated to remove organic buildup and scale without damage to the Instrument.



Cleaning Option	When to Use
Detergent Solution	Surfactant solution used in conjunction with a micro-fiber cloth for the manual removal dirt and debris.
Cleaning Solution	Chemical Cleaner that can be used in systems where the sample contains higher levels of organics and scale or where-biofilms are more likely to form.
Scale Remover	Always used in conjunction with the Cleaning Solution, the Scale Remover works to remove scale, especially caused by the high levels of iron and/or manganese in the sample.

## Cleaning Instructions

**Lovibond® Cleaning Solution** is a chemical cleaner that is introduced into the Flow Body via the quick-disconnect fitting at the Service Port. Use only the **BLACK** Cleaning Tube accessory with the Cleaning Solution. Allow the cleaning solution to work for 5 minutes before draining back into the bag for disposal. Refer to 'Calibration' using T-CAL<sup>plus</sup>® steps 6 through 16 in the Calibration section of this document for preparing, introducing and collecting reagents packaged in bags.



**Lovibond® Weak Acid Scale Remover (WASR)** is supplied in powdered form. Supply the Cleaning Solution via the Service Port, quick-disconnect fitting using the **BLACK** Cleaning Tube accessory. Dissolve the WASR into 20 to 25ml of Distilled water and then pour into the Flow Body. Allow the cleaning solution to work for 5 minutes before draining back into the bag for disposal.

**Lovibond® Detergent Solution.** Add two dashes (approximately 2 ml) of detergent solution to a partially filled (with clean water) flow body. Using a Microfiber Pad, manually wipe down the inside of the flow body and other surfaces to ensure the removal of dirt or other debris.

Rinse away cleaning solutions and debris with low-turbidity water, (water less than 0.05 FNU/NTU).

**NOTICE**

**DISPOSE OF USED CLEANING SOLUTIONS IN COMPLIANCE WITH ALL LAWS GOVERNING THE DISPOSAL OF CHEMICAL WASTE.**

**NOTICE**

**ONLY USE MICRO-FIBER CLOTHS** for cleaning optical surfaces or any of the polished surfaces which contact the sample.

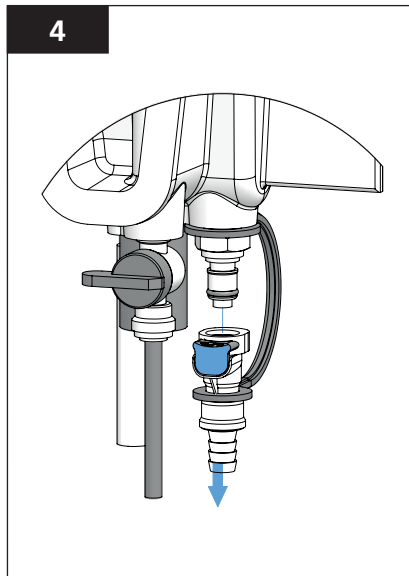
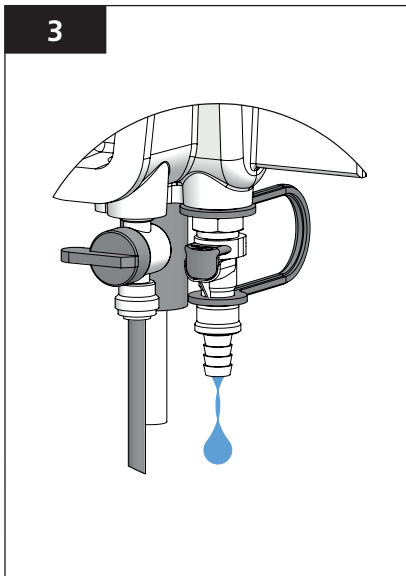
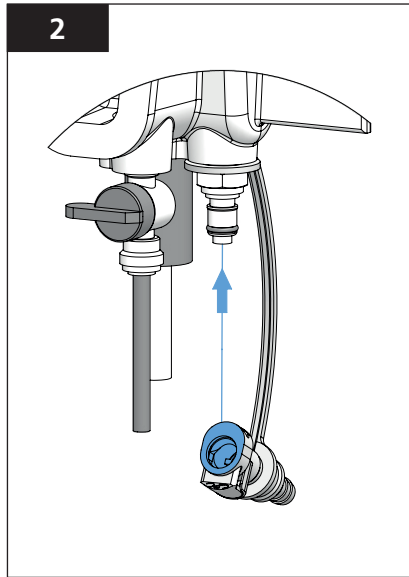
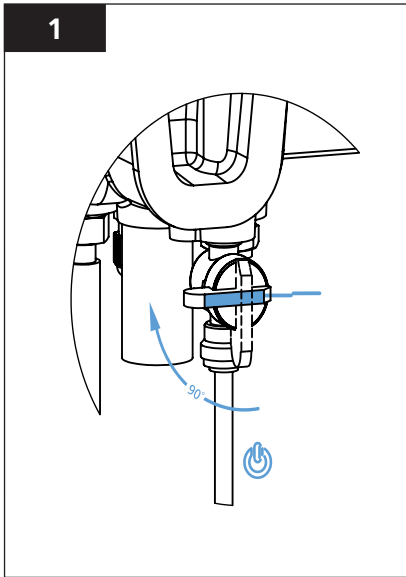
**NOTICE**

**DO NOT SCRUB OR USE ABRASIVE CLEANERS** on the optical surfaces or any of the surfaces which contact the sample.

**Spill Control/Remediation**

1. Identify all chemicals or materials of the spill.
2. Refer to MSDS/SDS data sheets for information regarding precautions, safety wear and protocols for the chemicals or materials of the spill.
3. Control the spill in accordance to all facility safety protocols.
4. *DISPOSE OF SPILL CONTROL/REMEDIATION MATERIALS AND RECOVERED CHEMICALS IN COMPLIANCE WITH ALL LAWS GOVERNING THE DISPOSAL OF CHEMICAL WASTE.*

Draining the Flow Body

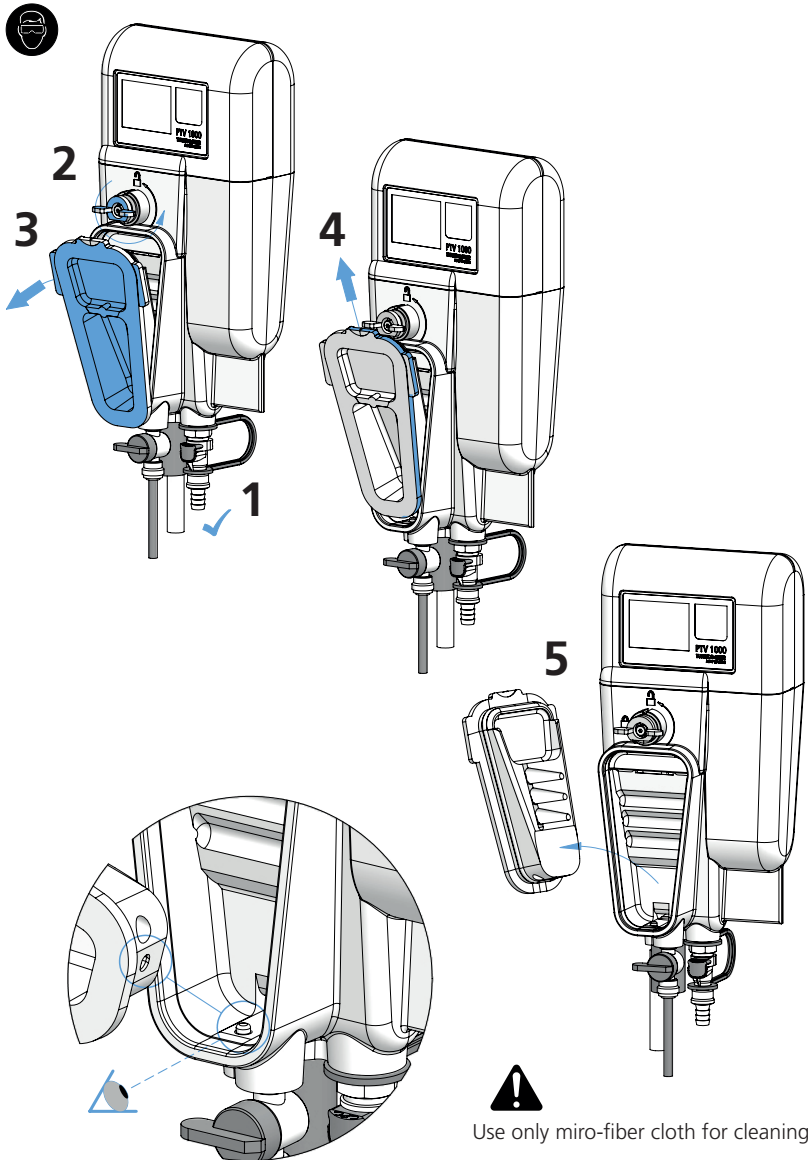


When Flow Body has been drained, proceed with cleaning the body with the cleaning solution of choice. See General Cleaning Guidelines and Cleaning Instructions



### Cleaning the bubble trap

Check that the sample flow is stopped and that the Drain Fitting is connected to the Service Port before opening the Front Cover.



Use only miro-fiber cloth for cleaning.

\*To reinstall Front Cover; 1st seat heel of Front Cover onto pin in Flow Body.

Troubleshooting

Table 5 - Troubleshooting		
Symptom	Possible Cause	Solution
Calibration Failure	Calibrant not properly Prepared.	Re-make the standard.
Low sample flow	Inadequate inlet pressure	Confirm head pressure is within specifications
Inadequate sample flow	Flow control valve plugged.	Clean out valve (reverse flow through valve).
Calibration Failure (gain adjust is too low)	Flow Body not cleaned properly.	Clean instrument.
	Water on Collimating Lens.	Dry Collimating Lens with micro-fiber cloth.
Display not powered	Power connector is not secure	Remove and inspect pins are not damaged. Re-connect power cord to measurement module.
Sudden measurement noise after service	Illuminator pathway is wet	Dry illuminator pathway with soft cloth. Carefully place measurement module slowly onto body to prevent splash back onto illuminator pathway.
Low Detector Signal	Dirt or Scale on the 90 degree detector window.	Clean in accordance with the instructions provided within this manual.
	Beam strength is low	Clear any obstruction in illuminator ray path.
Elevated readings after service.	High zero electronics reading.	Flush instrument with low turbidity water.
		Perform new zero electronics.

Table 5 - Troubleshooting (Continued)		
High measurement variability	Sample flow too high.	Reduce sample flow.
	Signal averaging is set too low.	Increase signal averaging (recommend 60 to 90 seconds)
	Bubble reject is not turned on.	Turn bubble reject 'on'.
	High pressure drop close to inlet of turbidimeter.	Reduce pressure in more than one stage away from the turbidimeter.
	Condensate present on collimation lens.	Reduce sample temperature to 5°C below ambient temperature.
		Clean collimating lens in accordance with the instructions provided within this document.
Large particles within sample	Grab sample to confirm; no action required.	
Flow Icon yellow.	Sample flow rate is high or to low.	Adjust sample flow to between 40 and 80 ml/minute.
	Float is not moving	Open rear cover and inspect Float for damaged or obstruction.
		Replace siphon tube.
	Water inside float.	Remove waste chamber cover and replace float.
Flow monitor cable disconnected or damaged.	Check flow monitor cable connection.	
Flow Icon grey	No Communication with Flow sensor	Flow Sensor not present or disabled
Alarm Bell red	Alarm condition triggered	Press Alarm Bell to view alarm status.
<i>Bluetooth</i> <sup>®</sup> Fails to Connect	Signal strength is weak.	Move the Smart Device closer to instrument to increase signal strength.
		Confirm instrument is powered on.
<i>Bluetooth</i> <sup>®</sup> Icon grey	no <i>Bluetooth</i> <sup>®</sup> detected	<i>Bluetooth</i> <sup>®</sup> disabled.
No bars on <i>Bluetooth</i> <sup>®</sup> Icon	Signal strength is weak	Move the Smart Device closer to instrument to increase signal strength.

## GB Maintenance Part Kits

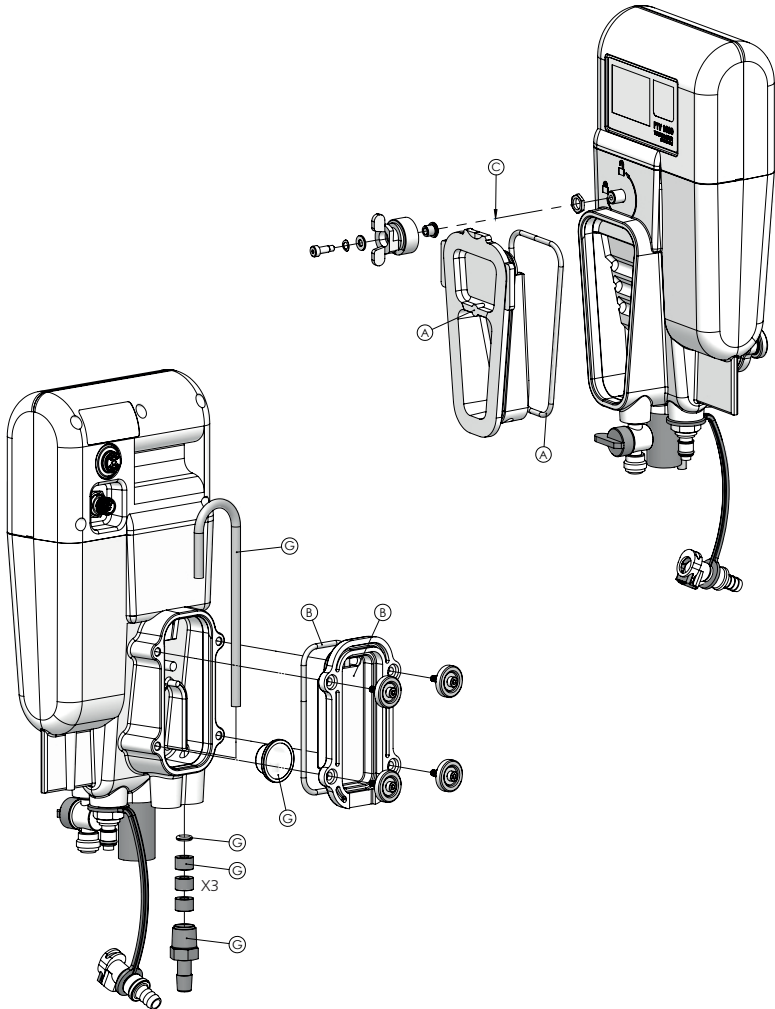
Parts Kits are letter coded; refer to 'Accessories & Replacement Parts' section for details.

### NOTICE

**DO NOT USE OILS OR GREASE ON THE O-RING SEALS OF THE TURBIDIMETER.**

### HINT

Before installing covers; apply a wetting solution of 1 part (Dawn® Original) Dishwashing Liquid to 256 parts water, to lubricate the radial O-ring seals and housing seats.



## GB Maintenance Parts Kit

Seat O-ring in Flow Body before screwing in Beam Dump (Kit 'D').

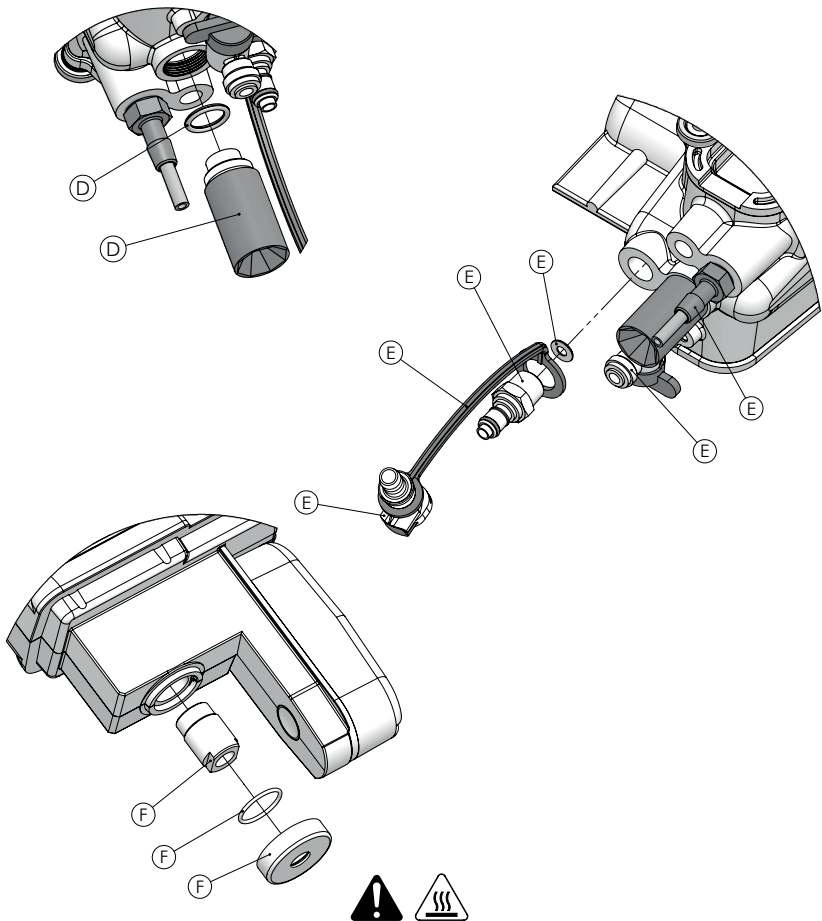


Table 6 - Repair Part Kits

A	Kit, Bubble Trap Cover and O-Ring
B	Kit, Waste Chamber Cover and O-Ring
C	Kit, Bubble Trap Latch & Hardware
D	Kit, Beam Dump & O-ring
E	Kit, Flow Body Fittings, Tubing & Lanyard
F	Kit, Collimating Lens Assembly, O-Ring & Guard
G	Kit, Siphon Tube, Float, Outlet Fitting, O-ring & Spacers

## **GB** Accessories & Replacement Parts

Item Description	Part Number
<b>Calibration and Verification Supplies</b>	
T-CAL <sup>plus</sup> ®, 0.30 NTU Standard for Verification	48010035
T-CAL <sup>plus</sup> ®, 1.00 NTU Standard for Verification	48010135
T-CAL <sup>plus</sup> ®, 5.00 NTU Standard for Calibration	48010235
T-CAL <sup>plus</sup> ®, 20.0 NTU Standard for Calibration	48010335
T-CAL® Standard, 0.30 NTU, 500 ml	48011050
T-CAL® Standard, 1.00 NTU, 500 ml	48011150
T-CAL® Standard, 5.00 NTU, 500 ml	48012250
T-CAL® Standard, 20.0 NTU, 500 ml	48012350
Formazin Stock Solution, 4000 NTU, 100 ml	194141
Formazin Stock Solution, 4000 NTU, 250 ml	194142
Formazin Stock Solution, 4000 NTU, 500 ml	192130
T-CAL <sup>plus</sup> ® Calibration Tube Assembly, (blue)	19806-062
Dry Verification Device, (less than 1 NTU)	19806-111
Dry Verification Device, (greater than 10 NTU)	19806-110
<b>Cleaning Supplies</b>	
Detergent Solution	54011010
Cleaning Solution	54010435
Scale Remover	54013003
Complete Cleaning Kit <i>Includes: Detergent Solution, Cleaning Solution and Scale Remover with a Rinse Bottle and microfiber pad.</i>	19806-63
Cleaning Accessory Kit <i>Includes: Rinse Bottle (500 ml) and Cleaning Pad</i>	19806-112
Cleaning Tube Assembly (black)	19806-072
Cleaning Pad, 10 Pack	19806-803
Microfiber Cloth	197635
Rinse Bottle, 500 ml	420056
<b>Maintenance and Repair Kits</b>	
Bubble Trap Replacement Kit, Cover and O-Ring <i>Reference View A, Maintenance Parts Kit Section</i>	19806-077
Kit, Drain Cover (Waste Chamber Cover and O-Ring) <i>Reference View B, Maintenance Parts Kit Section</i>	19806-081

## **GB** Accessories & Replacement Parts

<b>Item Description</b>	<b>Part Number</b>
Kit, Knob for bubble trap (Bubble Trap Latch & Hardware) <i>Reference View C, Maintenance Parts Kit Section</i>	19806-079
Kit, Beam Dump Replacement (Beam Dump & O-ring) <i>Reference View D, Maintenance Parts Kit Section</i>	19806-078
Kit, Fittings and Tubing (Flow Body Fittings, Tubing & Lanyard) <i>Reference View E, Maintenance Parts Kit Section</i>	19806-059
Kit, Illuminator Lens Assembly (Collimating Lens Assembly, O-Ring & Guard) <i>Reference View F, Maintenance Parts Kit Section</i>	19806-085
Kit, Replacement Siphon Tube (Siphon Tube, Float, Outlet Fitting, O-ring & Spacers) <i>Reference View G, Maintenance Parts Kit Section</i>	19806-080
<b>Installation Supplies</b>	
Installation Kit, Tools	19806-075
Installation Kit, Connectors	19806-086
Mounting Disc Assembly, single disc	19806-106
Kit, Mounting Cleat Assembly	19806-082
<b>Cables, Connects Measurement Module to PCM</b>	
<b>For sensors without Flow Sensor</b>	
Measurement Module Cable (no Flow Sensor)	19806-574
<b>For sensors with Flow Sensor</b>	
Splitter Cable, Measurement Module	19806-212
12 Conductor Straight Cable	19806-572
<b>Additional Accessories</b>	
Panel Mount Assembly	19806-088
Fluidics Manager	19806-056
Tablet Holder, Wall Mount	19806-521
Constant Head Device	19806-058
Hook, Reagent Bag	19806-569
Float, Flow Sensor	19806-054
Rotometer Kit	19806-087

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