InWater Tracker

Portable TGP Meter User Manual

InWater Technologies

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1. InWater Tracker Overview

The InWater Tracker is a handheld meter with a 2.4" display, push-button interface, and re-chargeable battery. It can log probe data to internal memory, which can be transferred to a computer via USB.

When connected to an InWater TGP probe, the meter will display real-time total dissolved gas pressure (TGP) in mmHg and % saturation, barometric pressure (BP) in mmHg, temperature in Celsius (degC) and ΔP (TGP-BP).

1.1. What's Included

InWater Tracker Handheld Meter	
InWater TGP Probe	
USB charging and data cable	
TGP Maintenance Kit (includes a syringe and brush)	
Storage Bin	
User Manual	

1.2. Getting Started

1 Connect the probe - Connect the TGP probe to the female M8 connector on the Tracker (left-side connector).

2 Connect the M8 sealing cap attached to the base of the TGP probe cable to the USB connector (male m8 connectr) on the Tracker. The cap is used to protect the USB connector while while the Tracker is in use.

3 Power up the meter by holding the power button. The probe will be automatically detected after a few seconds.

1.3. Keypad Functions

Power	Hold for 2 seconds to power Tracker on or off
Menu	Toggles between main screen and main menu.
Esc	Revert to previous menu or cancel user selection
Enter	Confirm menu selection or user input. Hold for 2 seconds to capture data point.
Left/right	In home screen, scroll between the home screen and secondary data screen In menus, scroll digit places for numeric entry
Up/down	Toggle display parameters, scroll menu items, scroll numeric entry

1.4. USB Battery Charging and Data Transfer

<u>Charging</u>
Connect the USB cable to the Tracker and to a USB Port on a computer or to an AC/DC USB charger (not included) to charge the device.

<u>Data Transfer</u>
Connect the USB Charging and Data cable to the Tracker and to a computer's USB port. Follow the directions in Section 2.7.

1.5. Home screen

The home screen will appear on start-up. The information displayed includes two user selectable parameters (Figure 1, left). To select which channels are displayed on the home screen, scroll through options using the **Up Arrow** for top parameter and the **Down Arrow** for the bottom parameter. To switch to the secondary data screen, which shows all channels at once, press the **Right or Left Arrow** (Figure 1, right).
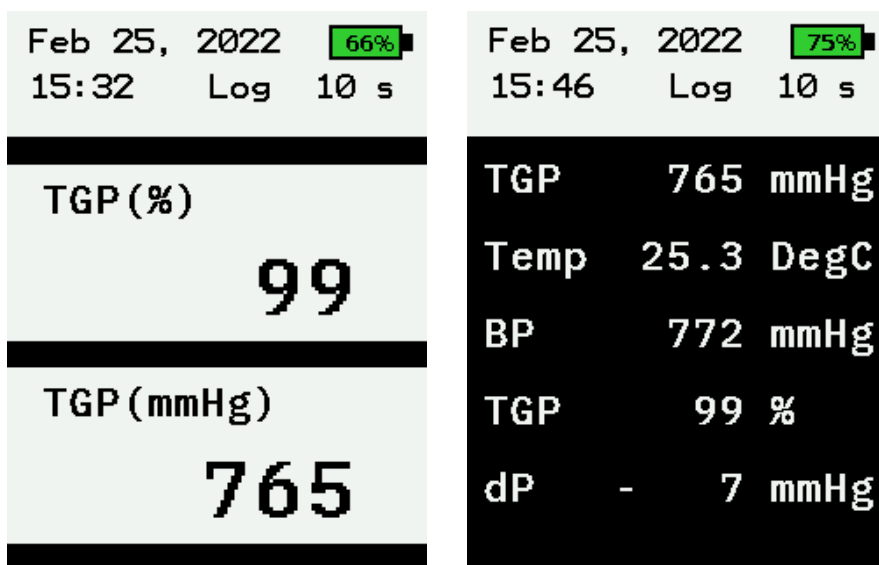

Figure 1. The Tracker's Home screen with a TGP probe (left). All channels viewed at once (right).

2. Settings and functions

2.1. Main menu

To access the Main Menu, press the **Menu** button and use the **Up/Down arrows** to move through the menu items (Figure 2). Press **Enter** to select.

2.2. Numeric entry

When numeric entry is required, the values are adjusted by selecting the place value (i.e. 1s, 10s, 100s) and scrolling through the number in each place. The **Left/Right Arrows** switch place value, **Up/Down Arrows** increase/decrease the value. **Enter** is pressed to confirm the entry. **Esc** is pressed to cancel the entry.

*Figure 2. The menu screen. Press **Menu or Esc** to return to previous screen.*

2.3. Calibration

All TGP measurement systems come pre-calibrated from the factory. The TGP probe has sensors for TGP and Temperature. The Tracker meter itself has an onboard barometric pressure (BP) sensor. The recommendations for calibration the 3 sensors is as follows:

1) The TGP sensor has a long-term stability of +- 0.5 mmHg, so calibration is not necessary.
2) The TGP sensor should periodically be adjusted with a 1-point calibration. The default and recommended procedure is to use the BP sensor as the reference for the 1-point calibration as follows:
   i. Remove the probe from water, dry off and allow to stabilize for 15 minutes.
   ii. Press **Menu** and then highlight CALIBRATION and press **Enter**. Highlight TGP mmHg and press **Enter**. Highlight 1 Point Cal and press **Enter**.
   iii. The default calibration value (in mmHg) will be set equal to the current value from the BP Sensor. Press **Enter** to complete the calibration.
3) The temperature sensor is calibrated using the same steps as for the TGP sensor but using an external temperature source for reference.

Figure 3. The Calibration menu

A "2 Point Calibration" is generally unnecessary and should not be undertaken without first consulting InWater Technologies Technical Support.

Due to inherent limitations common to all TGP probes, the probe must be periodically removed from in-situ measurement and dried completely prior to calibrating. In most cases this should be done once
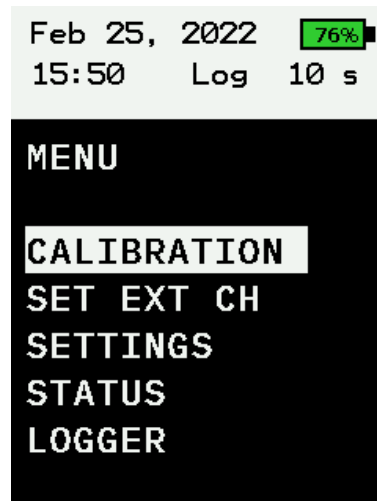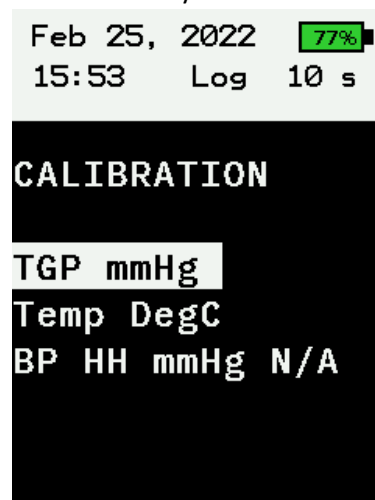
every 3 weeks. If the probe is used in water with temperatures above 20 degrees C, this should be done more frequently than every 3 weeks

2.4. Set Ex Ch
Not applicable with the TGP probe.

2.5. Settings Menu
The settings menu has the following options for configuring the Tracker.
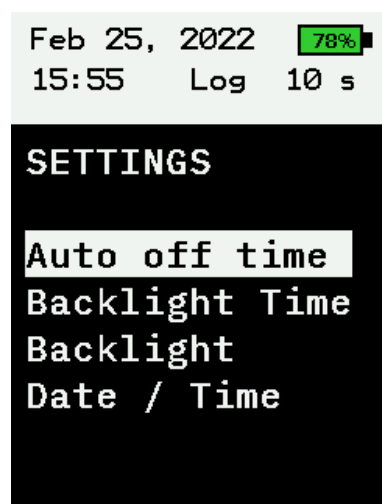

Figure 4. The Settings menu

Auto off time
The Tracker can be set to automatically shut down after a set amount of time with no button presses. This helps to conserve battery in case the Tracker is not in use but has not been shut down by the user. The Tracker will never automatically shut down if Automatic data logging is enabled.

Backlight Time
The Tracker can be set to turn off the LCD backlight after a set amount of time with no button presses. While the display is timed out, the Tracker will continue to take readings from the probe and log data (if Automatic logging is configured). Once any button on the Tracker is pressed, the display will come back on. Using this feature can help extend the Tracker battery life.

Backlight
The backlight intensity can be adjusted. Higher intensity allows for better visibility, however, it will reduce the Tracker battery life. Using the lowest intensity will provide the longest battery life. Use **Up/Down Arrows** to increase/decrease the backlight Intensity (5-15). The default setting is 10.

Date / Time
Change the date and time using **Up/Down Arrows** increase/decrease values. To move down one line press **Enter**. To move up one line press **Esc.**

2.6. Status

The status menu displays the following data for user reference.

SN: The serial number of the Tracker.

Man Date: the date the Tracker was manufactured (YYMMDD).

FW rev: Firmware revision.

BAT mV: Battery voltage (in millivolts).

Probe Stats: Diagnostic information for probe communication

Figure 5: The Status menu

2.7. Datalogging

The Tracker can log data to its internal memory, either automatically or manually.

To log Manually, from the home screen or secondary data screen, hold the **Enter** button for 2 seconds. The **Log indicator** in the banner will briefly read **Captured** indicating the data point was successfully saved to the data log.

To log automatically, the user sets a log interval, and data is atomically logged based upon that interval. While auto logging is active, manual data points can also still be captured using the method above.

The LOGGER Main menu has the following options.

Auto Log

The Auto Log menu gives the following information:

1) Logger status: **ON / OFF**
2) Log start: **Month Day Hour:Minute** of the first record in the data log
3) Log end: **Month Day Hour:Minute** of the last record in the data log
4) Records: Number of records / Maximum number of records available

Automatic logging can be toggled **ON** or **OFF** using the **Up Arrow**.

Logger Setup

The logger setup menu gives the following configuration options for the logger:

Figure 6: The Datalogging menu

1) Select Log Ch: Select the channels to be logged. Use the **Up** and **Down** buttons to scroll through the list. Use **Left** or **Right** buttons to toggle the channel on or off. When the channel is set to log, an **L** is displayed to the left of the channel. When logging is disabled for that channel, the **L** is now shown.
2) Rate (s): The rate in seconds at which data points are saved. 10 seconds is the minimum value

Erase Data

When data points are captured to the data log – either manually or automatically – the data is appended to the log. This means old data will stick around in the log file as new data it added. To erase all the data in the log and start fresh, use the **Erase Data** function. Select **Erase Data** and click **Enter**. The Tracker will confirm you want to erase the data. Click **Enter** and the data in the data log will be permanently erased.

Data Transfer

The logged data can be transferred to a computer using this function. The computer must be running TeraTerm to capture the data. Follow the steps below to complete the data transfer.

1) Download and install TeraTerm from our website www.inwatertech.com/product/tracker
2) Turn the Tracker on and connect it to the computer with the USB cable.
3) Run TeraTerm. A prompt will appear to initialize a new connection. Select the Serial option and use the dropdown menu to select the appropriate COM port: "USB Serial Device", then click OK.
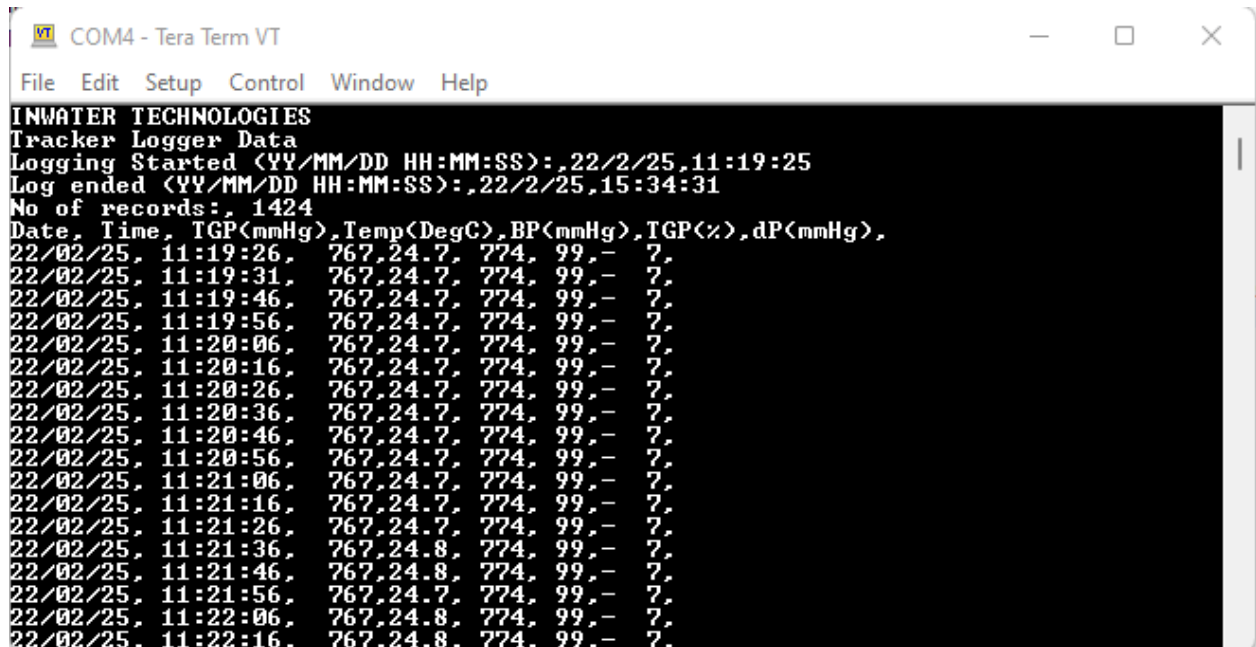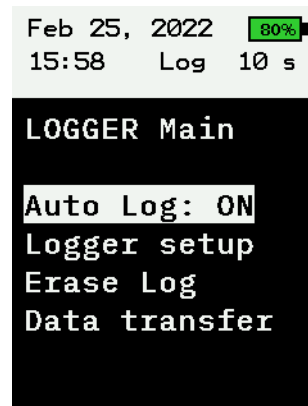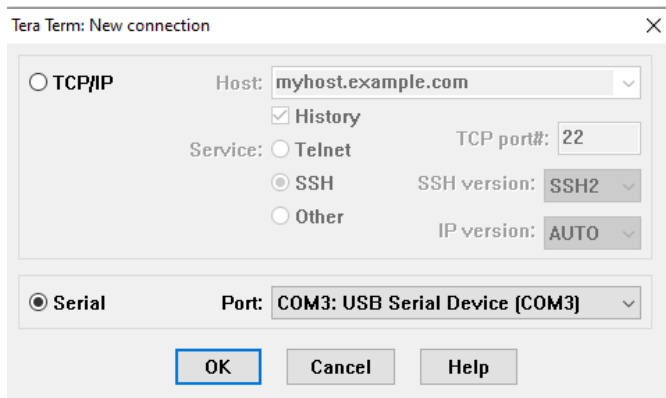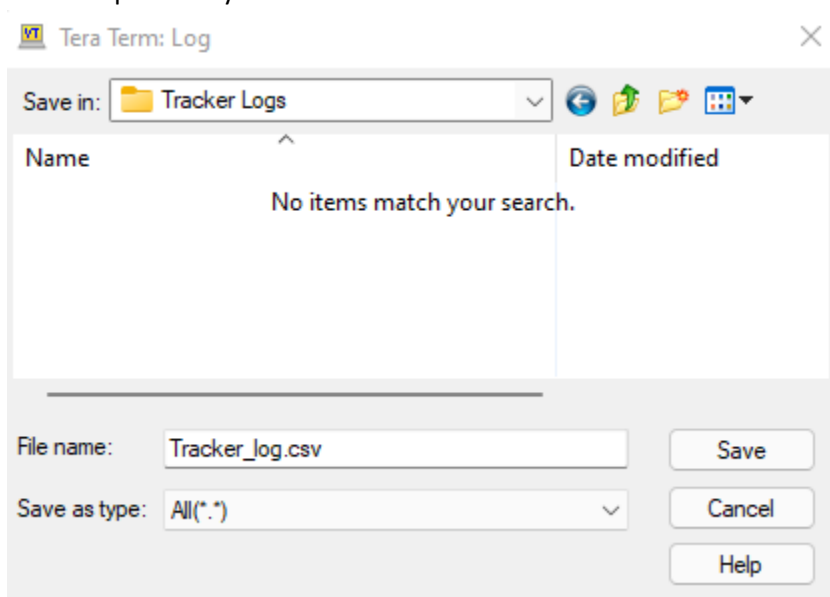
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4) Click **File > Log…** and chose a location and filename for the data file. Use a **.csv** file extension so the file will open nicely in Excel.

5) On the Tracker, navigate to the **Logger** menu, and select **Data Transfer**.
6) Press **Enter** to start the data transfer, or **Esc** to abort.
7) Once **Enter** is pressed and the data transfer starts, the data will stream in the TeraTerm window.

8) Once the Tracker indicates the data transfer is complete, close the TeraTerm window.
9) The **.csv** data log file is now ready to be opened in Excel or Notepad.

3. Service and Maintenance

3.1. Normal Periodic Use

After each measurement session:

1) Remove the probe from the water and rinse it immediately to prevent residue from drying on the membrane tubing.

2) Slide off the protective tubing shield.

3) Rinse off the membrane tubing with clean fresh water and gently shake the probe dry.

4) Allow up to 4 hours for the probe to dry out (*more time might be required in cold damp environments).

5) Store dry at room temperature.

6) If the probe is being used frequently, it may help to have a spare cartridge to swap in while the other cartridge is drying out.

3.2. Continuous Use

In some applications the TGP probe is left continuously submerged in water. Under such circumstances, eventually water condenses as small droplets on the internal walls of the tubing. As these droplets grow in size, they will eventually coalesce resulting in "cross-bridging". The pressure detected by the sensor will produce a difficult-to-define average of the actual TGP. Cross-bridging can lead to excess water accumulation inside the tubing.

Excess water in the tubing can damage the pressure transducer if actual contact is made with the pressure sensitive wafer.

The time taken for such a condition to arise is inversely proportional to water temperature. i.e: the higher the water temperature, the faster the bridging will occur.

In summary, the frequency of probe maintenance is site and condition specific.
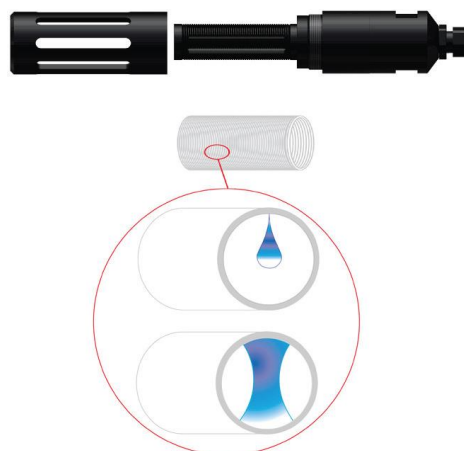
AS A GUIDELINE, THE PROBE SHOULD BE REMOVED FROM THE WATER ON A ROUTINE BASIS EVERY THREE WEEKS FOR CLEANING. (based on water temp of 15Deg C)

3.3. Check for damaged or broken membrane tube

If the membrane tube is compromised in any way, TGP readings will be wrong. A simple way to check the integrity of the tubing is to observe the TGP readings as the probe is steadily immersed in water. A fast increase (several mmHg per second) in displayed values indicates a damaged or broken membrane tube. Replace the cartridge and recalibrate. The recommended method to check for a faulty membrane cartridge is to use the syringe test as shown on the following page.

- Inspect the tubing for any visible signs of damage. If damaged or broken, replace the cartridge. Otherwise leave the probe in air until there is no sign of water present in the tubing.
- Re-calibrate if necessary.

Note: A need for an unusual degree of calibration correction could mean that the pressure sensor has been damaged by the bulk water
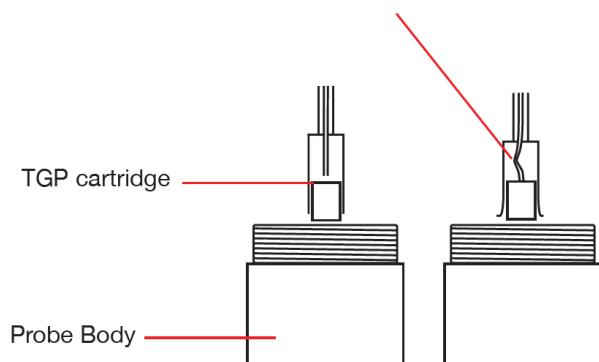
3.4. Changing the Membrane Cartridge

Occasion may arise where the membrane tubing becomes damaged resulting in erroneous readings. This is typically displayed as a sharp increase in TGP when the probe is in water with values that remain

high over time. To fix this issue, the membrane cartridge must be replaced. It is crucial that the probe not remain in water as this can damage the sensor and electronics within. Use the following steps to change the membrane cartridge:

1) Carefully unscrew the protective guard from the probe body. Slide the membrane cartridge away from the probe body, being careful not to damage or stress the membrane tubing which connects to the stainless-steel sensor port in the center of the probe body.

2) Pinch the head of the membrane tube; carefully separate the membrane tubing from the sensor port and set the now completely detached membrane assembly aside.
3) Install the new membrane cartridge by pressing the tubing over the sensor port until the tubing is within 1 mm from the base of the sensor port. Slide the membrane cartridge over the temperature sensor and sensor port.
4) Inspect the tubing where it meets the sensor port to ensure the inner tubing has not collapsed.
5) Screw the protective cover to the probe body, over the membrane cartridge.

3.5. Membrane Cartridge Testing

If the membrane cartridge becomes damaged, clogged, or filled with water, the TGP readings will be inaccurate. It's important to routinely inspect the membrane cartridge. There are 3 ways to inspect the membrane cartridge.

1) Observe the TGP readings as the probe is steadily immersed in water. A fast increase (several mmHg per second) in displayed values indicates a damaged or broken membrane tube.
2) Visually inspect the membrane cartridge. The membrane cartridge should be clean and free of kinks or holes.
3) If a hole in the tubing is suspected, the syringe test can be done to identify leaks in the tubing as follows.

3.6. Silastic tubing test (TGP Syringe test)

1) Remove the membrane cartridge from the TGP probe.
2) Using the included syringe, draw the syringe plunger back half way back.

3) Attach the cartridge tubing to the end of the syringe.

[front view]

4) Place the cartridge in a container of water and gently apply pressure to the plunger.

5) If resistance is felt in the syringe when pressed and no bubbles appear from the cartridge when placed underwater, there are no holes in the tubing. This indicates that the unit is good.
   If bubbles appear from the cartridge when placed underwater, there are holes in the Silastic tubing. This indicates that the unit needs to be replaced.

4.   Specifications

	Measured / Derived	Measurement Range	Resolution
Total Gas Pressure (mmHg TGP)	Measured	0–1550 mmHg	1 mmHg
Barometric Pressure (mmHg BP)	Measured	0–1550 mmHg	1 mmHg
Temperature (C)	Measured	0.0–40 °C	0.2 °C
Total Gas Pressure (TGP %)	Derived	0 - 200%	1%
ΔP (mmHg TGP – BP)	Derived	1550 - 1550 mmHg	1 mmHg

Probe dimensions	Length: 19 cm (7.4 in) Diameter: 4.2 cm (1.6 in)
Handheld meter dimensions	Length: 16 cm (5.1 in) Width: 8.4 cm (3.3 in) Height: 2.8 cm (1.1 in)
Probe weight	0.45 kg (1.0 lbs)
Handheld meter weight	0.18 kg (0.4 lbs)
Temperature range	Storage / Operating: -5 °C to +60 °C
Response time	Typical: 5 minutes (90%) ***Response time is improved by insuring there is water flow past the probe. However, this is a passive measurement and therefore can require up to 1 hour for accurate measurements.
Power	2000 mAh Li-ion Polymer battery
Battery runtime	Up to 8 hours
Connector – Probe	4-pin male M8, IP-67
Connector – USB	4-pin female M8, IP-67
Probe Cable	5 m (16 ft), 4 conductor, thermoplastic elastomer jacket Custom lengths available upon request
Charger cable	0.9 m (3 ft) USB cable
Display	Colour 6.1 cm (2.4") LCD graphic display
Datalogging	Manual or continuous logging (11,000 records)
Warranty	1-year warranty