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**DATAFLOW SYSTEMS PTY LTD**

LOW COST DATA RECORDING SENSORS

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# Odyssey Pressure & Temperature Water Depth Logger.

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## Principal of Operation.

At any given level, liquids exert equal pressure in all directions and water pressure increases linearly as depth increases. The difference between atmospheric pressure and the water around the sensor head exerts a force on a flexible diaphragm of the sensor. Electronics inside the logger converts that signal into a proportional electrical value. Pressure exerted on the sensor is the difference in pressure between the atmospheric pressure and water pressure or can be considered as water pressure above the atmospheric pressure. This pressure difference is directly proportional to the height of the vertical column of water above the sensor. Since atmospheric pressure varies with location and time, pressure sensors have a vent tube attached to it that provides a reference to the atmospheric pressure

## Installation.

### Above Ground Water Level Recording

The pressure sensor should be mounted inside PVC or galvanised iron stilling well, if it is being used for above ground water level measurements. Holes should be drilled in the stilling well to allow the water level in the stilling well to equalise with the water being measured. If the measurement is in a flowing stream then the holes should be at right angles to the flow direction, otherwise the water level in the stilling well will be higher or lower than the actual stream level, depending on whether the holes face up stream or down stream. A secure nylon or stainless steel wire should be used to secure the top vent cap to the stilling well pipe. A mounting hole has been drilled in the vent cap for this purpose.

### Below Ground Water Level Recording

If the pressure sensor is being used to measure ground water in water well then the sensor should be positioned so that the vent cap is at least 1 metre above the expected maximum water height. Nylon cord or stainless steel woven wire can be attached to the spigot on the top of the vent cap and used to lower the sensor to the required depth.

## Calibration.

Factory calibration data is supplied with the temperature/pressure logger on a CD and this should be used to calibrate data for the normal operations of the loggers. The calibration data for the pressure and the temperature sensors needs to be transferred to the Odyssey software using the Set Calibration Data option of the software. For more information please refer to the Odyssey Data Logging Software handbook.

Recalibration of the pressure and temperature sensors is only done if the logger is being used for a special purpose or there is suspected drift in the logged data. Recalibration can be done using the following methods.

### Temperature – Trace Mode.

Maintain the recorder at a stable air temperature for about 30 minutes with the top cap removed and the data cable connected to the recorder and the computer. Read data from the logger in trace mode. When the data is stable, write down the raw data value and the temperature recorded by an independent thermometer. Repeat this procedure at a different temperature. It must be at least 10°C different to the first value. The greater the better. Enter the raw values and temperatures into the calibration software. Temperature sensor calibration is linear.

### Temperature - Recording Mode.

Set the scan time to 30 seconds and start the recorder. Maintain the recorder at a stable air or water temperature for about 30 minutes. Record the air/water temperature and the time. Change the temperature by at least 10°C. After another 30 minutes record the temperature and the time. Stop the recorder and download the data. Using the Edit Data software, find the raw data values at the times you recorded the temperatures. Use this data in the calibration software. Temperature sensor calibration is linear.

The slope of the calibration should fall in the range 40 to 56. The offset must be greater than -120.

### Pressure – Trace Mode.

The pressure sensor sensing element is located 40mm from the end of the brass vent tube at the bottom of the pressure sensor housing. If a water filled pipe or bore is available the recorder can be set to scan at 10 second intervals then lowered down the pipe. Hold the recorder at each level for 1 to 5 minutes. Record the start and stop times at each level. Download the data when finished, and enter it into the calibration software. The final accuracy must be greater than 99.99%.

First level - the tip of the recorder should be just touching the water surface.

Recording depth:

	5m	10m	20m
2 <sup>nd</sup> level	1m	2m	4m
3 <sup>rd</sup> level	2m	4m	8m
4 <sup>th</sup> level	3m	6m	12m
5 <sup>th</sup> level	4m	8m	16m
6 <sup>th</sup> level	5m	10m	20m

If no water filled pipe is available, compressed air can be used, so long as it is calibrated to water depth. Care must be taken not to exceed the pressure limits of the recorder otherwise the pressure sensor can be damaged. The method of calibration can be done in trace mode, recording the raw value when it becomes stable.

## Pressure Venting.

To achieve maximum accuracy all underwater pressure sensors must be vented to atmosphere, this removes atmospheric pressure variations from the water height measurement. The sensor designed for the Odyssey recorder uses a very tough vent tube to vent the sensor to atmospheric pressure. The top of the vent tube has a suspension and vent opening unit. This unit has provision for fitting a suspension line if the vent unit is to be suspended below ground level in ground water level measurements.

The vent unit at the top of the air vent tube contains a hydrophobic Teflon filter. This filter will prevent water from entering the air vent tube. However care must be taken to ensure the vent housing is positioned so that it would never be submerged under water. If the filter is allowed to become submerged, the filter may become blocked. This will prevent the pressure sensor from being vented to the atmosphere.

## Memory Storage Capacity.

Pressure and Temperature logger is a dual channel recorder and it stores 4 bytes per reading. The amount of memory is capable of recording 16382 records. The time span in days can be calculated by dividing 16382 by the number of logs per day.

Example. A scan time of 30 minutes has 48 recordings each day. The total number of days is \*341 days.

When the memory is full the recorder shuts down.

**\*Note:** When using a long scan time it is possible for the battery to expire before the memory becomes full.