# Barometric Pressure Sensors

**Overview:**

Barometric pressure is an important parameter in monitoring weather systems. Changes read by a barometric pressure sensor indicate weather front movement. Most weather stations include a barometric pressure sensor as one parameter they monitor. Barometric pressure transmitters are also used for many other applications including ocean buoys, ships, airports, and many more. Horizons major use for barometric pressure sensors is to determine the extent to which atmospheric gases can be dissolved in water (primarily dissolved oxygen). When a dissolved oxygen sensor is calibrated in air-saturated water, the barometric pressure must be known to calculate the equilibrium concentration of oxygen. Barometric pressure can also be used when monitoring water level at sites that do not have vented pressure transducers. Barometric pressure correction also needs to be applied to confined aquifers in order to get correct water level.

**Horizons only records true (uncorrected) values of barometric pressure.**

The following sites have a barometric pressure sensor installed:

- Lake Koitiata
- Lake Horowhenua at Weir
- Rangitikei at Onepuhi
- Rangitikei at Mangaweka
- Mangatainoka at Pahiatua Town Bridge
- Manawatu at Teachers College
- Manawatu at Weber Road
- Manawatu at Victoria Ave *
- Whangaehu at Tukino Repeater
- Whanganui at Town Bridge
- Manawatu at Hopelands

- Ngahere Park Climate Station –(RAWS –maintained only)
- Spriggins Park Climate Station –(NIWA maintained)

**Required Specifications:** [1 hPa (SI unit) = 1 millibar)]

- Accuracy ±1.5 hPa
- Precision ±0.03 hPa
- Resolution ±0.1 hPa
- Range 800-1100 hPa

**Current accepted sensors are:**

- Campbell CS100 (Setra 278)
- Vaisala PTB110
- Setra 278
- Delta OHM (HD9408T)
- In-Situ SmartTroll MP *
- In-Situ Aquatroll 400 *
- YSI Pro DSS *

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* Note: sensors marked with "*" are approved field meters.

**Installation:**

Sensors need to be installed in a protected enclosure, in which condensation does not form. In order for the sensor to detect the external pressure, the enclosure needs to be vented to the atmosphere. Connectors and venting tubes need to point downwards to avoid condensation.


| Wire Colour | Function |
|---|---|
| Blue | VOUT – Pressure signal out |
| Red | SUPPLY – 12Vdc Power In |
| Black | GND – Ground |
| Yellow | AGND – Signal Ground |
| Green | EXT. TRIG – External Trigger |
| Clear | Shield |

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**Validation:**

The primary reference sensor for water quality is Manawatu at Victoria Avenue is validated against the barometer at Palmerston Airport, as well as trend analysis with barometers located at other hydrological monitoring sites. If variations/errors are observed then the sensor will be either replaced or sent away for repair. Validation and calibration history will be recorded inside the asset management system.

Notes:

(i) Manawatu at Victoria Avenue primary sensor vs. Palmerston North Airport: Regular Manawatu at Victoria Avenue site inspections will record the air pressure at Palmerston North Airport (both corrected to sea level and uncorrected values should be obtained) The difference between the corrected for sea level and uncorrected readings at Palmerston North airport is 4hPa. Ensure the check value is the uncorrected (lower) of the two readings.

(ii) Manawatu at Victoria Avenue sensor vs. handheld field meters: All handheld meters are checked against the Manawatu at Victoria Avenue sensor prior to use with both values recorded. All In-Situ checks and validations should be undertaken at the Manawatu at Victoria Avenue site / water quality lab (except when there is a requirement to calibrate off site). Field meters are in turn used to validate barometric pressure sensors installed at hydrological monitoring stations.

**Check Data:**

Barometric pressure sensors installed at hydrological monitoring stations need to be checked every three months (minimum). Typically, the sites are checked during the SOE sampling monthly.

**Quality coding / NEMS**

There are currently no NEMS standards relating to barometric pressure. Horizons will adopt the NEMS standards when they have been developed and approved in a final form.

Horizons QC codes for barometric pressure:
**QC600 Good Quality,** will be given to data that falls within ± 2.5 hPa of the check data.
**QC500 Fair Quality,** will be given to data that falls within the range ±5.0 – 2.5 hPa of the check data.
**QC400 Poor Quality,** data that may be compromised or greater than ±5.0 hPa
**QC300 Poor Quality,** synthetic record, derived from calculations
**QC200 Poor Quality,** data that has not been verified.
**QC100 Poor Quality,** missing record.

**Processing notes:**

1) Prior to September 24 2012, YSI's* were calibrated to the Te Matai Rd barometer.
After this date, the Victoria Avenue sensor became the primary reference sensor and this resulted in a step change in the barometric pressure readings from the hand held YSI's*. YSI* Pro 7 was unaffected as this one was never adjusted to Te Matai Rd (science's meter).

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2) YSI handheld sensors phased out with SmartTroll MP's 1/6/2016 as primary reference checks
3) Aquatroll 400's supplemented the SmartTroll MP's from August 2019