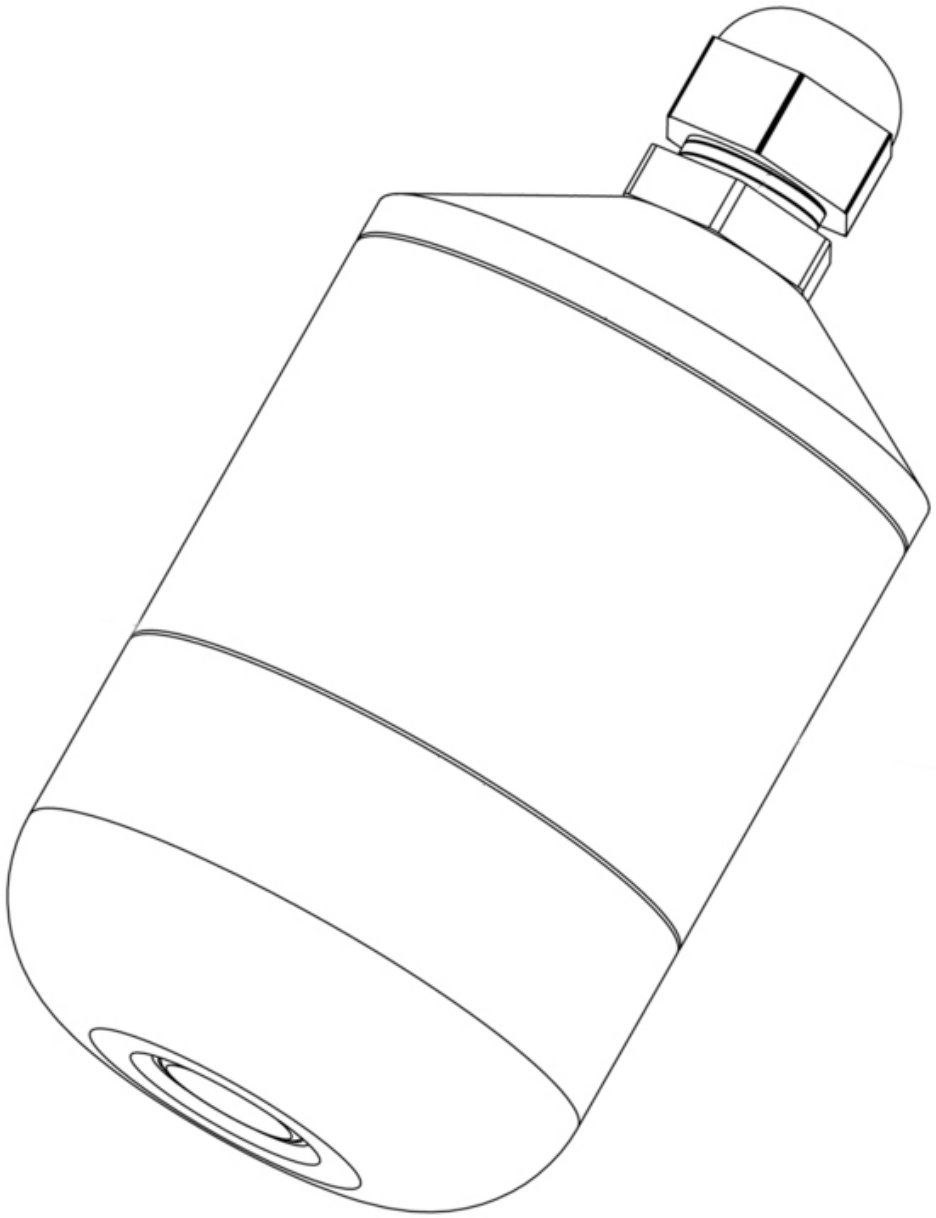
P4! SMART PROBE

Dissolved Oxygen



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Systems Inc.

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Warranty

WARRANTY AND CONDITIONS

Point Four Systems Inc. warrants its equipment under normal use against any and all defects from the date of purchase for a period of one (1) year from the date of purchase. Any failure resulting from defective parts or faulty workmanship, as determined during evaluation by Point Four Systems Inc., will be repaired or replaced under warranty.

Point Four Systems Inc.'s obligation under the warranty is conditional upon:
a) such equipment being installed, consistently used and maintained in accordance with Point Four Systems Inc.'s written instructions, specifications and safeguards.
b) the defect(s) not being the result of misuse, neglect, accident or improper application nor of any user attempts at modification or repair.
c) the purchaser reporting to Point Four Systems Inc. any defect within seven (7) days of its occurrence. Point Four Systems Inc. may request that the equipment in question be returned to Point Four Systems Inc.'s premises at the purchaser's cost within two (2) weeks of notification. Point Four may also require a written report by the purchaser of the circumstances in which the defect occurred.
d) the purchaser certifies acceptance of the warranty as set out.

LIMITS OF LIABILITY

Point Four Systems Inc.'s obligations specifically exclude any liability whatsoever for claims by the purchaser or user or any other persons or parties:

a) in respect of merchantability or fitness for a particular purpose.
b) for any special, indirect, incidental or consequential damages resulting from the use, or as a result of a malfunction of the equipment.
c) for personal injury or any medical or disability claims or for compensation arising therefrom.

This warranty and the conditions, limitations and exclusions is accepted by the purchaser as the only authorized and applicable warranty and that there are no other warranties or conditions, oral or written, expressed or implied.

Overview

The PT4 Smart Oxygen Probe can measure both dissolved oxygen and oxygen in gas, and can be used in fish farms, sewage treatment works and similar as well as to measure air, pure oxygen, other gases, oils, wine etc.

The Smart Oxygen Probe consists of an upper part with cable gland, electronic circuitry, a part with cathode and anode, and a cap with membrane and electrolyte. When measuring dissolved oxygen it functions correctly with liquid movement down to 1 cm/s.

The Smart Oxygen Probe is virtually maintenance free - just wipe the membrane and check the calibration from time to time, the frequency depending on the actual conditions. PT4 Smart Oxygen Probe do not need regular service.

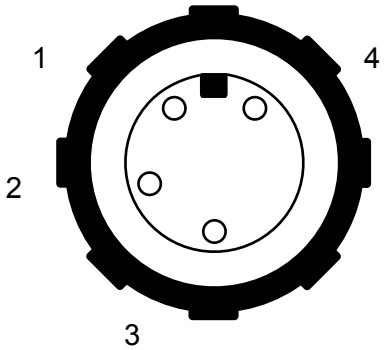
Changing the membrane is only necessary if the membrane should be damaged or if, after long use (years) it is not possible to calibrate up to the calibration value. The procedure, which renovates the probe completely, is simple and an be performed by anyone who can follow the instructions in this manual. Spares are shipped with the probe.

OPERATION & INSTALLATION

The smart oxygen probe has been designed to work with Point Four Systems' family of monitoring & control systems. It is also configured for direct connection to a PC.

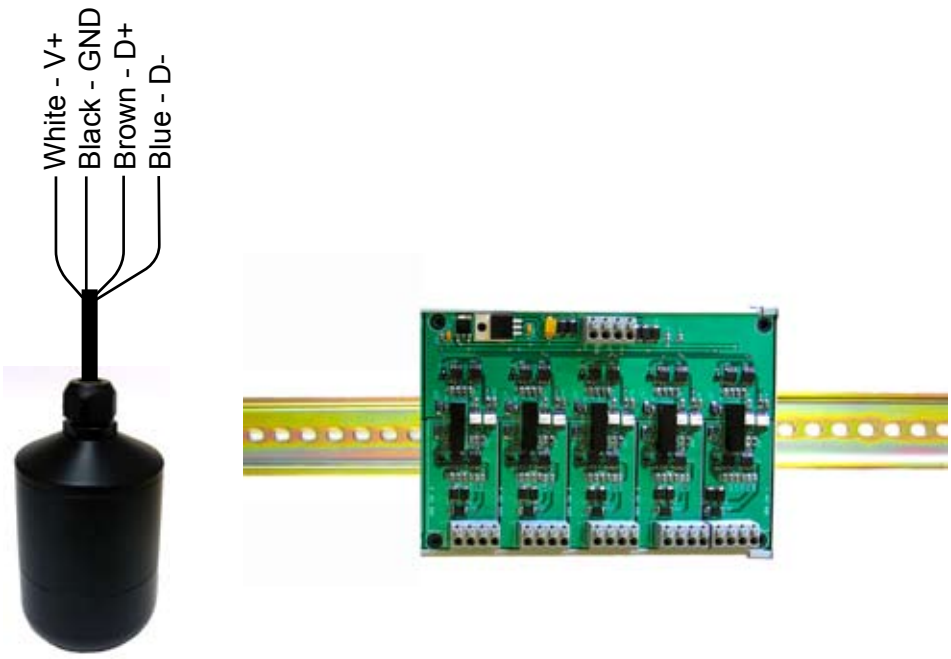
PT4 ION:
The PT4 ION is a 10 probe multi channel display/controller unit. Its main function is to read and display information transmitted on the ION databus as well as provide control information to the Relay Output Card (ROC10). The main controller has two communication ports that allow it to transfer data from the main databus to a PC, a touch panel display, or through satellite communication.

Depending on system configuration the conductivity probe connects either directly to the main unit, or to a supplied junction box. Traditional galvanic isolation is not required.



IP67 connector

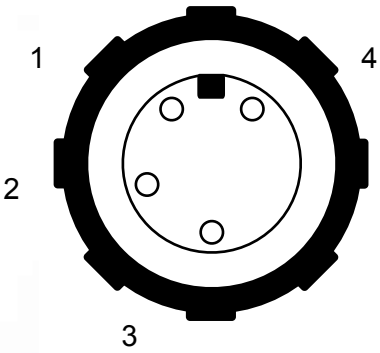
Pin 1	Blue	D-
Pin 2	Brown	D+
Pin 3	Black	GND
Pin 4	White	V+



Probe Connected to Signal Isolation Card (SIC) in PT4 ION

PT4 Tracker:
The PT4 Tracker is a single probe handheld portable display unit, capable of displaying up to 10 probe variables simultaneously. The unit is powered via a rechargeable NimH battery system and includes a programmable built-in datalogger. (optional)

The smart oxygen probe connects directly to the Tracker's right probe port via a IP67 water tight connector.



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RS485 Modbus Connection

A Modbus map is provided for each specific sensor. The Modbus map contains all of the probe information such as variables, units, calibration data and serial numbers. This information is held in various registers throughout the map. For simplicity, the key registers have been illustrated below:

Communication Settings:

COM Port should be configured as follows:

Baud Rate = 9600
Data Bits = 8
Parity = Even
Stop Bits = 1
Flow Control = None

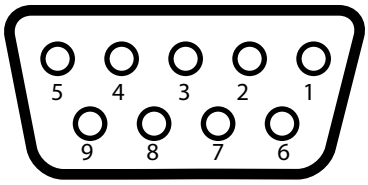
Supported Modbus Commands:

Read Holding Registers (Floating Point, Integer)
Preset Multiple Registers (Floating Point, Integer)
Force Coil (Numeric Value)

Key Registers:

*** Some programs require subtraction from 40001 to get register value ***

40032 Oxygen PV measured in mg/l	Mem Qty 2, Floating Point
40034 Temperature PV measured in Deg C	Mem Qty 2, Floating Point
40036 Salinity Compensation for mg/l in ppt	Mem Qty 2, Floating Point
40019 Modbus Node Address (1-32)	Mem Qty 1, Integer



Taking Measurements

Follow proper sampling procedures when using this probe:

- Sensor must be 1 foot below surface for in-situ measurement.
- Avoid water back eddies in streams or “dead spots” in tanks.
- Insure probe placement does not hinder operation of the sensor located at the tip of the probe (avoid mud or gravel).
- Avoid strain and stress on cable and cable entry to probe.
- Avoid bubbles as they can cause erroneous readings.

Site Installation

- A proper location needs be selected prior to the installation of the probe.
- A suitable location will be away from sources of heat, electrical interference, and gas injection (diffusers, air stones, etc.).
- Attention must be paid to insure the probe cable is not run too close to any high voltage AC loads that might cause interference on the data lines.
- Make sure that the probe is not likely to suffer mechanical disturbance or damage like shock from hitting the inner sidewall of a tank. Mounting brackets, and sampling chambers are available.
- Also insure you mount the probe where the membrane of the probe has suitable movement to replenish sample directly over the membrane greater than or equal to 1 cm/sec.
- The probe must be installed in a location that is accessible to the user in order to allow for easy service when needed.

Calibration: When to Calibrate the Probe?

Under ideal conditions (in air) the probe can keep its calibration for many months. In water, the actual conditions (e.g. the nature of deposit build-up) and the desired accuracy will dictate calibration frequency. To determine if calibration is necessary, perform the following steps:

1. Remove the probe from its measuring medium (i.e. water or gas).
2. Gently wipe the membrane with a soft cloth or tissue to remove any biofouling or debris.
3. Inspect the membrane for punctures, air bubbles, or scratches. If any of these are present, the probe must be serviced (refer to the “service procedure” section).
4. Allow the probe to equilibrate to air temperature. This can take up to an hour for a 10°C temperature change in air.
5. The meter should now read 101% saturation, plus or minus 2%. If the reading is above or below this expected value, calibration is necessary.

Dissolved Oxygen Calibration

6. Using the keypad, press “MENU”.
7. Select “Calibrate”, press “ENTER”.

   For the PT4 ION, select the correct ID# for the Oxy/Temp probe you wish to calibrate, press “ENTER”.
8. Select [Oxy %Sat], then press “ENTER”.
9. Select [1 Pt Cal], press “ENTER”.
10. Use navigation arrows to set %Sat to 101.0, then press “ENTER”.
11. “CALIBRATION OK” will be displayed for a moment. Calibration is now complete.
12. You can select another probe for calibration (PT4 ION only), or press “MENU” to return to the primary display.

Barometric Pressure (BP) Compensation:

The PT4 ION controller and the PT4 Tracker meter contain a barometric pressure sensor. This sensor is automatically linked to each probe that requires a barometric pressure input. This eliminates the need for altitude compensation.

Temperature Calibration

What is needed:

- Large bucket of water
- Certified thermometer (Deg C)

1. Fully submerge probe & thermometer in a bucket of water
2. Press [Menu] on ION or Tracker
3. Select [Calibration] & press [Enter]
4. Select [Temp Deg C] & press [Enter]
5. Select [1 Point Cal] & press [Enter]
6. Enter the value from the thermometer reading using the [navigation arrows]
7. Stir water with probe
8. Press [Enter]
9. Calibration screen reads [CALIBRATION OK]

* If screen displays [UNSUCCESSFUL] then repeat from step 4.

Salinity Compensation (if required):

Note that salinity compensation only affects dissolves oxygen readings in mg/L (ppm)

1. Use a refractometer, salinity meter, etc. to obtain the salinity (ppt) of the sampling medium.
2. Using the keypad on the PT4 ION or PT4 Tracker, press “MENU”.
3. Select “External Channels”, press “ENTER”.

   For the PT4 ION, select the correct ID# for the Oxy/Temp probe that requires salinity compensation, press “ENTER”.
4. Select “Sal ppt”, press “ENTER”.
5. Use the navigation arrows, enter the value obtained from the salinity meter (in ppt), then press “ENTER”.
6. You can select another probe for calibration (PT4 ION only), or press “MENU” to return to the primary display

Specification

Measurements & Dimensions

Measured:	Measurement Range	Resolution	Accuracy
Dissolved Oxygen [% Sat]	0 - 500 %Sat	0.1 %Sat	+/- 0.2 %Sat
Temperature [^{O}C]	0 - 40 ^{O}C	0.1 ^{O}C	+/- 0.2 °C
Derived			
Dissolved Oxygen [mg/L]	0 - 50 mg/L	0.1 mg/L	+/- 0.2 mg/L

Probe Properties	
Measurement Principal	Membrane covered galvanic cell
Response Time	~ 90% @ 30 seconds
Min Flow Rate	1 cm/sec
Max. Operating Depth	60m [200 ft]
Operating Temperature	0 - 50 ^{O}C
Material	Delrin
Power	5 -12 V DC [5mA]
Output	Digital RS485 (Modbus Protocol)

Length	Diameter	Weight
11.4 cm [4.5”]	5.8 cm [2.3”]	1 lbs w/ 5m of cable

SPARE PARTS

Part No.	
1OXSS003	10 piece membrane set % Sat
1OXSS011	Spare membrane cap with fitted membrane
1OXSS130	50 ml of electrolyte
1OXSS131	250 ml of electrolyte
1OXSS134	1 litre of electrolyte
1OXSS033	Spare anode Type III
1PTAG001	Probe Wiper for stagnant water conditions
1OXSA701	Mount assembly for wastewater installations

* Subject to Change without Notice