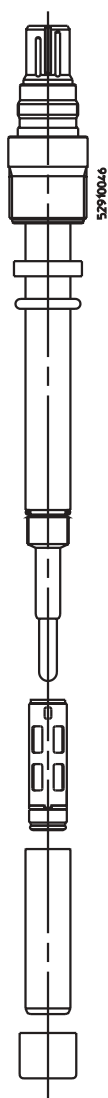


InPro 6050 Series O₂ Sensors

Instruction manual



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1. Product description

1.1. Utilization, conformity, identification

The InPro 6050 is a polarographic oxygen sensor designed for the simultaneous measurement of dissolved oxygen and temperature in water applications. The robust detachable connector VP (Vario Pin) provides the same, waterproof performance of fixed cable electrodes, with the advantage of a detachable connector for easy sensor maintenance and replacement.

The serial number is engraved on the sensor thread for traceability.

1.2. Key data and characteristics

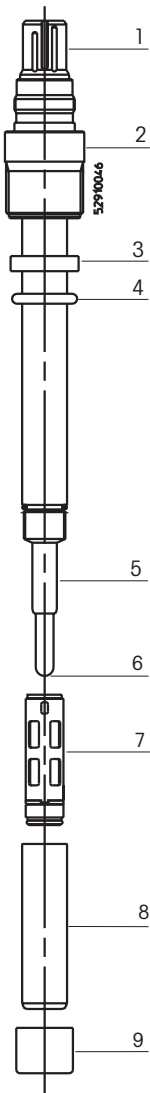
Technical data

Length	120 mm
Diameter	12mm
Connector	VarioPin connector VP-4G IP 68
Cable	VP Cable
Temperature sensor	NTC
Material	
Shaft	PPS
Membrane	T-96 Teflon/Silicone/Teflon (reinforced with steel mesh)
O-Rings	Viton [®] , silicone

Working conditions

Temperature range	0...60°C
Humidity	0...100%
Media	The sensor is designed for use in water

1.3. Equipment features and scope of delivery



- 1 VP Connector
- 2 Pg 13.5 threaded sleeve
- 3 Washer
- 4 O-ring
- 5 Anode
- 6 Cathode
- 7 Membrane body
- 8 Cap sleeve
- 9 Protection cap

The oxygen sensor is shipped with a T-96 type membrane body in place. This membrane type has an additional Teflon layer on the process side for increased durability. It also has a built-in temperature device (NTC) that allows compensation for membrane permeability.

2. Safety

2.1. Signs and symbols

The following symbols are used in this instruction manual:

Danger: warning of a danger which could be fatal or lead to severe bodily harm



Caution: warning of a possibly dangerous situation which could lead to minor injuries and/or material damage



Notice: reference to working methods which facilitate use of equipment



2.2. Safety precautions

Please read this instruction manual entirely before using the sensor.

The InPro 6050 is built under the strict quality guidelines for ISO 9001.

3. Your equipment

3.1. Design/description

The sensor is made of:

- A VP (VarioPin) connector
- A plastic shaft which contains an anode (silver) and a cathode
- A membrane body filled with electrolyte
- A plastic cap sleeve

3.2 Functions

This sensor technology is based on a polarographic O₂ measurement (Clark type), which can be summarized as follows:

- It consists of a working electrode (cathode), a counter electrode (anode) and an oxygen permeable membrane which separates the electrodes from the medium.
- The transmitter supplies a constant voltage to the cathode (polarization voltage). We recommend a -675mV polarization voltage for aqueous applications.
- The oxygen molecules migrate from the medium to the electrodes through the membrane and are reduced at the cathode. At the same time an oxidation takes place at the anode. The electrolyte completes the electric circuit between the anode and the cathode.

3.3 Integration in measuring system

A complete measuring loop consists of a sensor, a cable and a transmitter

4. Start-up

4.1. Installation

Before installation, we recommend you to:

- change the electrolyte as described in § 6.3 (you do not need to change the membrane body)
- visually check the membrane for cracks or indents (in case of damaged membrane, the membrane body must be changed)

The sensor can be installed in pipes by using a flow-through housing (InFlow 751) or a stationary housing (InFit 761). The sensor can also be immersed directly in a tank by using an immersion housing (InDip 550/524).

Please refer to the instruction manuals of these housings for installation instructions.

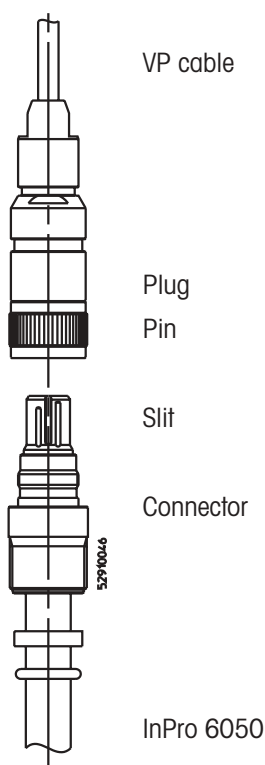
Important: to guarantee a tight seal, a washer must be used together with an O-ring.



The sensor should be installed in a place where there is enough fluid circulation (at least 1 liter per hour should pass by the head of the sensor). Placing the sensor in a dead spot would lead to false results. If the sensor is installed in a pipe, it is preferable to install it at an angle against the flow to achieve the best possible measurement.

4.2. Connection

To connect the sensor to the transmitter, a VP cable should be used. This ensures a secure link between the transmitter and the sensor under harsh industrial conditions. The robust watertight IP 68 connector housing guarantees maximum process safety. The slit of the connector should be aligned with the pin of the plug, and the two parts should be then screwed tightly together.



For instructions concerning the connection of the VP cable to the transmitter, please refer to the transmitter instruction manual.



4.3. Initial start-up

Notice: The protective cap at the tip of the sensor should be removed before putting the sensor into operation.



When the sensor is installed for the first time or has been disconnected from the voltage source (polarization voltage from the transmitter or polarization module) for longer than 5 minutes, the sensor must be polarized before calibration or the first measurements. This can be achieved by connecting the sensor to the transmitter or a polarization module for at least six hours. The recommended polarization voltage is -675mV .

5. Operation

5.1. Operation of the equipment

Once the sensor is properly calibrated (see § 6.4) and installed, you should refer to the instruction manual of the transmitter to learn how to operate the complete system.

5.2. Measurement in power and failure

In case of power failure for more than **10-15 minutes** the sensor must be repolarized over a period of 6 hours (see Chapter 4.3).

In case of drop out for 5 to 15 minutes, the sensor must be polarized for 45 minutes.

In case of a power drop-out less than 5 minutes, a polarization time of 10 minutes is sufficient.

5.3. Errors and corrective actions

Make sure the sensor is mounted properly in a vertical position (VP connector up), or at a 15° angle (against the flow) to prevent the accumulation of air bubbles on the sensor head.

5.4. Storage

The sensor and the membrane must be cleaned before storing the sensor.

The sensor can be stored for several months, provided it is filled with O₂ electrolyte and the protective cap is placed over the membrane. To avoid the 6-hour polarization requirement after storage, the sensor can be stored connected to a polarization module.

6. Maintenance

When used in water applications, the sensor is designed to require minimal service. However in some cases it can be necessary to recalibrate the sensor or to change the electrolyte or the membrane body.

6.1. Safety precautions

Danger: the electrolyte has an alkaline pH-value of 13. Contact of the electrolyte with the skin, especially mucous membrane or eyes, should be avoided. If such contact occurs, the affected area should be well rinsed with running water. Get medical attention if adverse signs appear.



As contact with the electrolyte is very likely during the exchange of electrolyte or membrane body, the use of protective gloves is recommended.

6.2. Cleaning and care

The sensor can be gently cleaned with soapy water (or with a mild bleach) and rinsed thoroughly.

Inspect the membrane. If it has cracks or shows longer response time, then it should be replaced as follows:

6.3. Replacing the membrane and the electrolyte

Please follow the following instructions to change the membrane body and the electrolyte:

- a) Unscrew the cap sleeve from the shaft and carefully pull it off the sensor.
- b) Pull off the membrane body from the interior body. If it remains inside the cap sleeve, eject by pushing it with the flat finger tip. Before electrolyte is refilled, the membrane body must be removed from the cap sleeve.
- c) Clean the interior body with a soft tissue.
- d) Check the O-rings for mechanical defects and replace if necessary.
- e) Half fill the membrane body with O₂ electrolyte and make sure it is bubble-free. Air bubbles can be removed by carefully tipping on the membrane body.
- f) Slowly slip the membrane body over the interior body while holding the sensor in a vertical position.
The excess electrolyte will be displaced and should be wiped off with a paper tissue.
- g) Carefully slip the cap sleeve over the fitted membrane body and screw it down. The cap sleeve must be clean and dry.
- h) After each replacement of the electrolyte or of the membrane, the sensor must be polarized over a period of 6 hours.
- i) When the sensor is polarized and connected to the transmitter, it is necessary to start by recalibrating the system.

6.4. Calibrating the sensor

- For an air calibration, the sensor must be removed from the medium, gently cleaned and dried. Water droplets on the membrane must be removed, as they prevent the sensor from being correctly calibrated.
- To calibrate in water or sample medium, you must know the exact oxygen concentration and ensure that equilibrium between the air and the medium is reached (this may take quite a long time). Make sure that all other parameters (temperature and pressure) are constant during the calibration. Please note also that a minimum flow rate is necessary.
- For detailed calibration instructions, please refer to the transmitter instruction manual.
- In case of an error message from the transmitter after a calibration, clean the sensor, change the electrolyte and replace the membrane if this is damaged.

6.5. Troubleshooting and rectification work

On a regular basis, you can take the sensor out of the water, clean and dry it. If it gives a reading of 100% saturation, the sensor does not need to be recalibrated.

If the sensor gives too high or too low values, it should be recalibrated.

After a long storage time (more than 6 months) or after a certain period of time in operation (typically one year for water applications), the electrolyte should be replaced. Replace damaged membranes as necessary.

If after a calibration the sensor still gives too high or too low values, you should change the electrolyte and the membrane.

7. Shut down and waste disposal

7.1. Shut down

Simply unplug the sensor from the VP cable.

7.2. Waste disposal

The electrolyte contains a concentrated alkali. It must be diluted (or neutralized) before it is poured down the drain.

The sensor itself is made of materials which are not harmful to the environment and can be disposed of according to local and state regulations.

8. Spare parts

InPro 6050 sensor	52 200 851
Membrane body, single T-96	52 200 071
Membrane kit (4 membrane bodies, spare O-rings, 25ml electrolyte) T-96	52 200 024
Electrolyte (25ml)	34 100 2016
Connecting cable with VP connector and open cable end	
VP6-ST/1 m	52 300 107
VP6-ST/5 m	52 300 109
VP6-ST/10 m	52 300 110
VP6-ST/15 m	52 300 144
VP6-ST/20 m	52 300 141
VP6-ST/35 m	52 300 184
O ₂ Polarizer OPM 500 VP	52 200 835
O ₂ Simulator VP	52 200 832
Recommended transmitters	
O ₂ Transmitter 4050e	52 121 106
O ₂ Transmitter 4100e	52 121 103
Recommended housings	
Immersion:	
InDip 550-1500, PVC Pg 13.5	52 401 671
Flow-through:	
InFlow 751 PVC d50 DN40 Pg 13.5	52 400 251
Direct mounting:	
InFit 761-NPT 3/4" PVC	52 401 521

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