Version 3.01
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TPS Models ED1 and ED1M
Dissolved Oxygen Electrode

1. *Introduction*

The latest ED1 and ED1M Dissolved Oxygen sensors represent a significant step forward from previous models…

- ***Detachable cable***
  The detachable cables means that you can have a long cable for field use and a short cable for laboratory use, with just one Dissolved Oxygen sensor. The detachable cable also allows the ED1 to be used with any compatible TPS portable or benchtop Dissolved Oxygen meter simply by changing the cable.

  One of the primary causes of sensor failure is a damaged cable. If this should occur to your sensor, the detachable cable can be replaced at a much lower cost than replacing the entire sensor.

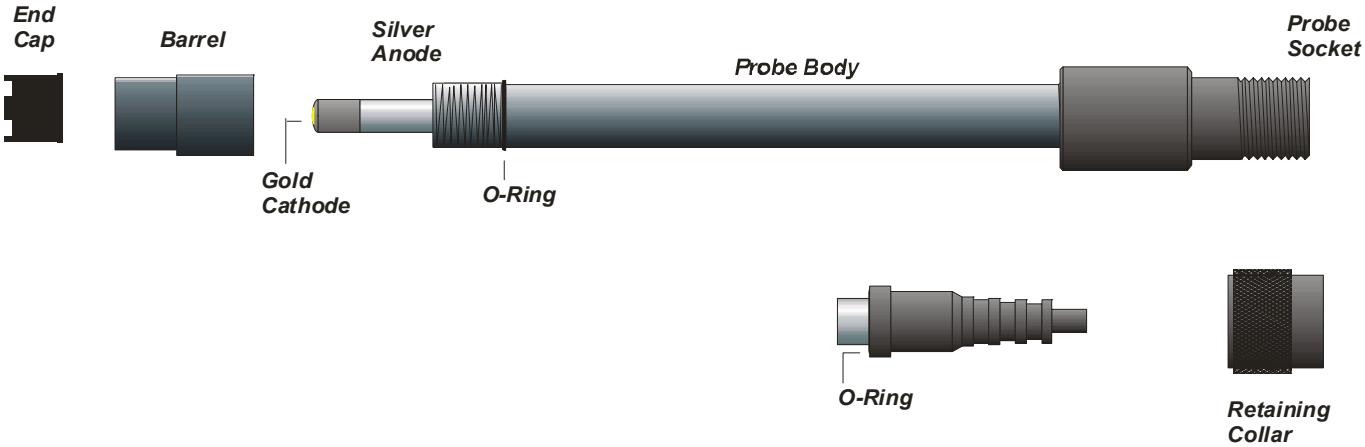
- ***Silver tube on stem***
  In some applications, such as Gold Mining and Sewerage Treatment, the silver anode may become tarnished by Sulphide ions. The new ED1 design employs a silver tube as a part of the main probe stem, instead of the traditional silver wire. This silver tube may be cleaned by sanding with fine wet-and-dry sandpaper to return it to as-new condition.

- ***Fixed thread length***

  A fixed thread length ensures that correct tension is placed on the membrane everytime the membrane and filling solution is changed. There is no longer the risk of overstretching the membrane or leaving the membrane too loose. This helps give consistent and accurate results.

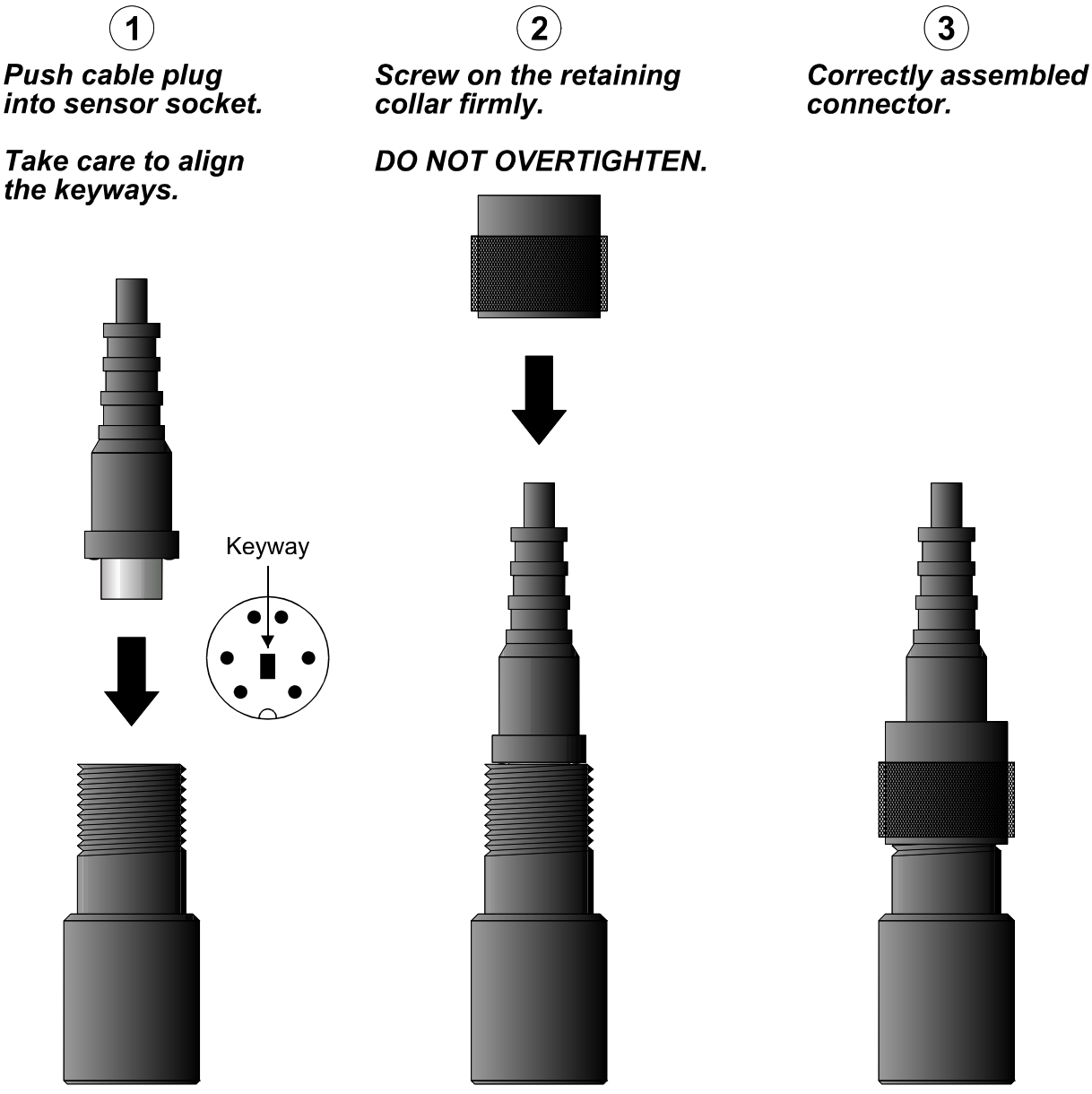
- ***Smaller Gold Cathode***
  A smaller gold cathode means lower electrical current, which in turn results in lower consumption of Dissolved Oxygen at the tip of the sensor. All of this means that the sensor requires a lower stirring rate than the previous model when taking measurements.

2. *ED1 and ED1M Probe Parts*



3. Fitting the Detachable Cable

1. Ensure that the plug on the cable is fitted with an O-ring. This is vital for waterproofing the connection. If the O-ring is missing, fit a new 8 mm OD x 2mm wall O-ring.
2. Align the key-way in the plug with the socket at the top of the sensor and push the plug into place. Screw on the retaining collar firmly. DO NOT OVERTIGHTEN.
3. To avoid the possibility of moisture ingress into the plug and socket area, do not remove the detachable cable unless necessary.



4. Replacing the Membrane

If the membrane has been punctured or is suspected of leaking around the edges, it must be replaced.

1. Unscrew the small black barrel from the sensor end. Lay the body and exposed stem down carefully.

   DO NOT TOUCH the gold cathode or the silver anode with the fingers, as this leaves grease which must then be chemically cleaned off.

   Use clean methylated spirits and a clean cloth or tissue if this occurs.

2. Carefully pull off the probe end cap from the barrel, and remove the old membrane.

   Inspect it carefully for any sign of tearing, holes etc. as this may give a clue as to the reason for incorrect probe performance. The probe tip and barrel should be rinsed off with distilled water.

3. Cut a 25 x 25 mm new piece of membrane from the material supplied with the probe kit, and hold this over the barrel end with thumb and forefinger. Make sure there are no wrinkles. Carefully push the cap back into place. Check that there are no wrinkles in the plastic. If so, redo.

4. Trim the excess membrane off with a sharp blade. Half fill the barrel with filling solution. **DO NOT OVER-FILL.**

5. Screw the barrel on to the main body.

   Any excess filling solution and air bubbles will be expelled via the channels on the thread of the probe body. No air bubbles should be trapped between the cathode and the membrane.

   The membrane should form a smooth curve over the gold cathode and form a seal around the shoulder of the stem (see the diagram over the page).

6. To check for leaks, the following test can be done. The probe should be washed off and put into fresh or distilled water. If the membrane is leaking (even slowly), it will be possible to see electrolyte "streaming" from the tip by viewing obliquely in a bright light. This test uses the effect of differential refractive index and is quite sensitive.

1. Unscrew barrel. Do not touch Gold or Silver on stem.

2. Remove end cap and old membrane.
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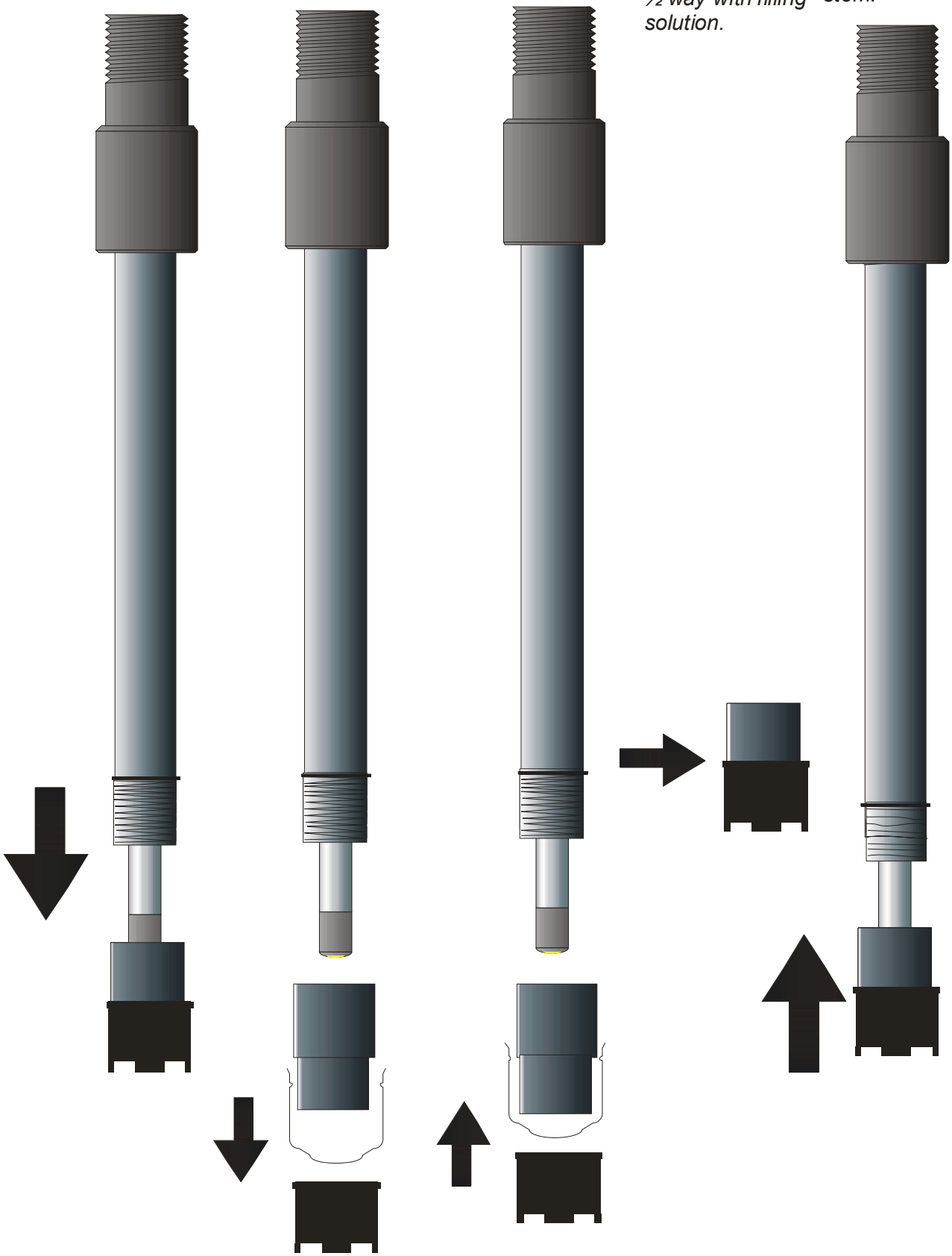
3. Fit new 25 x 25mm piece of membrane, and replace end cap.

4. Trim excess membrane with a sharp blade. Fill barrel approx ½ way with filling solution.

5. Screw barrel back on to probe body. Do not touch Gold or Silver on stem.



5. Cleaning the ED1

ONLY IF the probe interior has been exposed to chemicals through a torn membrane, should the gold cathode and/or silver anode be cleaned. This should first be attempted with methylated spirits and a soft cloth or tissue. If this fails, they can be GENTLY cleaned with No 800 wet & dry sandpaper. The gold surface must **NOT** be polished – the roughened nature of the surface is quite important. Care should be taken not to treat the gold cathode too roughly as it may become damaged.

6. Notes on Sample Stirring

Stirring is absolutely essential with this type of probe. A steady stirring rate must be provided for the probe. Hand stirring is generally sufficient to provide a peak oxygen reading. Do not stir so fast as to make bubbles, as this will change the Oxygen content of the water being measured.

To see how much stirring is required, try the following…

Shake a sample of water vigorously to get the oxygen content to 100%. Turn on your meter, and after it has polarised (approx 1 minute), calibrate the meter to 100% Saturation. Rest the probe in this sample (without stirring), and watch the oxygen reading fall away. Now stir the probe slowly and watch the reading climb. If you stir very slowly, the reading may increase, but not to its final value. As the stirring rate is increased, the reading will increase until it reaches a final stable value when the stirring rate is sufficient.

When the probe is submerged, it may be jiggled up and down in the water (on the cable) to provide stirring. The stirring problem is discussed rather more fully in the electrode section of the instrument handbook.

7. Storing the ED1

When storing the electrode overnight or for a few days, place it into a beaker of distilled water. This stops the gap between the membrane and the gold cathode drying out.

When storing the electrode for more than a week, unscrew the barrel, empty out the electrolyte Re-fit the barrel loosely, so that the membrane is not touching the gold cathode. There is no limit to the time the electrode can be stored in this way. Fit a new membrane and re-fill the electrode before its next use.

8. Troubleshooting

Symptom	Possible Causes	Remedy
Reading in air too low to calibrate	1. Gap between membrane and gold cathode has dried out. 2. Membrane is dirty, torn or wrinkled. 3. Filling solution is chemically depleted.	1. Replace membrane and filling solution. 2. Replace membrane and filling solution 3. Replace membrane and filling solution.
Unstable readings, cannot zero, or slow response.	1. Gap between membrane and gold cathode has dried out. 2. Membrane is dirty, torn or wrinkled.	1. Replace membrane and filling solution. 2. Replace membrane and filling solution.
Discoloured Gold cathode	1. The electrode has been exposed to pollutants.	1. Clean as per section 5, or return to the factory for service.
Blackened Silver anode wire.	2. The electrode has been exposed to pollutants, such as Sulphide.	2. Clean as per section 5, or return to the factory for service.

Please Note
The Warranty conditions on electrodes do not cover mechanical or physical abuse of the electrode, either deliberate or accidental.