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DOE-45PA Dissolved Oxygen Sensor



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The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient-connected applications.

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Part 1 - Introduction

A new modular dissolved oxygen sensor is now being supplied for replacement and upgrade of DOTX-45 D.O. monitoring systems. The new sensor provides the advantages of the original modular sensor with the economy of a rebuildable module that greatly reduces the operating cost of the system.

The new sensor is designed to interface with the DOTX-45 transmitter electronics without adjustment. All that's required is to remove the original DOE-45P sensor from its mounting assembly and install the new sensor in its place. On units with software version **V2.05** or earlier, Tear Diagnostics should be turned OFF. Figure 1 below shows the typical installation of this sensor with the DOTX-45 monitor.

Operation of the DOTX-45 monitoring system does not change. Refer to your DOTX-45 manual for instructions on calibrating the system once installation of the sensor is complete.

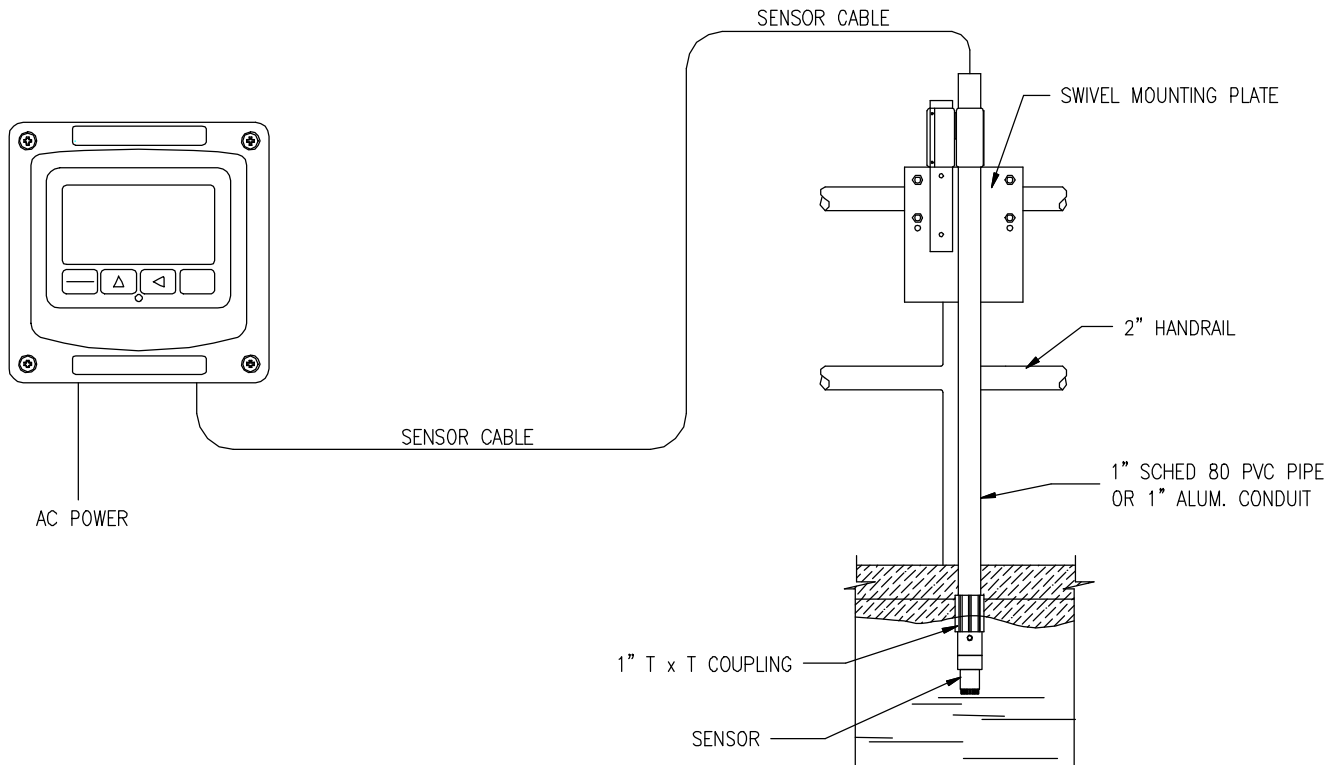


Figure 1-1 D.O. SYSTEM DIAGRAM WITH SUBMERSIBLE SENSOR

Part 2 – Electrical Connection

The replacement sensor has the same number of wire connections as the original sensor but the color code is slightly different. Figure 2 and Figure 3 shows the proper connection of the sensor to the transmitter. Note that the new sensor no longer contains a yellow conductor. This has been replaced with either a brown or an orange conductor.

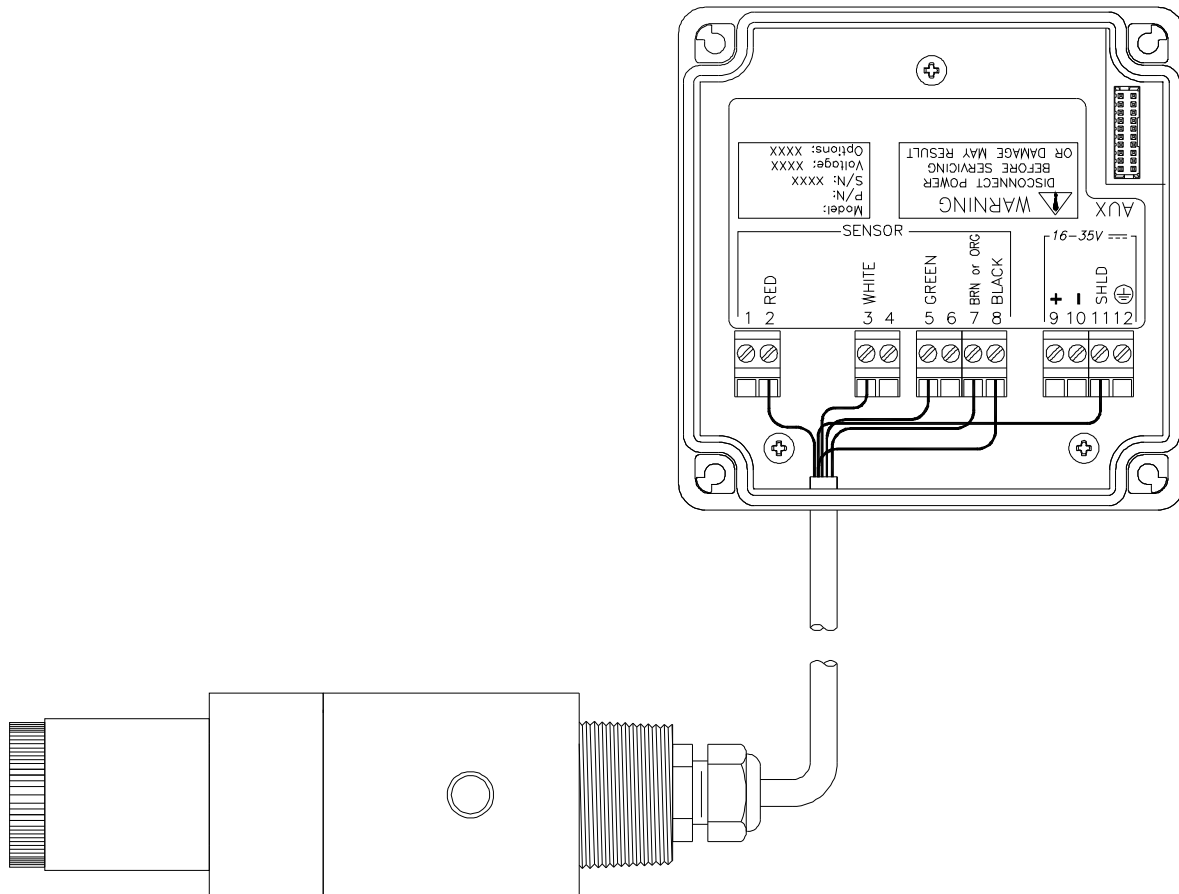


Figure 2-1 SUBMERSIBLE SENSOR WIRING DIAGRAM

2.1 D.O. SENSOR ASSEMBLY

The oxygen sensor is shipped dry. It will not operate until it is prepared by adding electrolyte and a membrane. Preparation of the sensor for operation must be done carefully. The procedure should be done by a qualified technician, and it should only be done when the system is ready for operation. Until then, it is best to leave the sensor in the condition in which it is received.

Submersible oxygen sensors are made up of two separate parts, a submersion holder that also contains the temperature compensating element and a sensing module. The sensing module screws into the holder, with an o-ring providing a water tight connection. Figure 2-2 below shows the assembly.

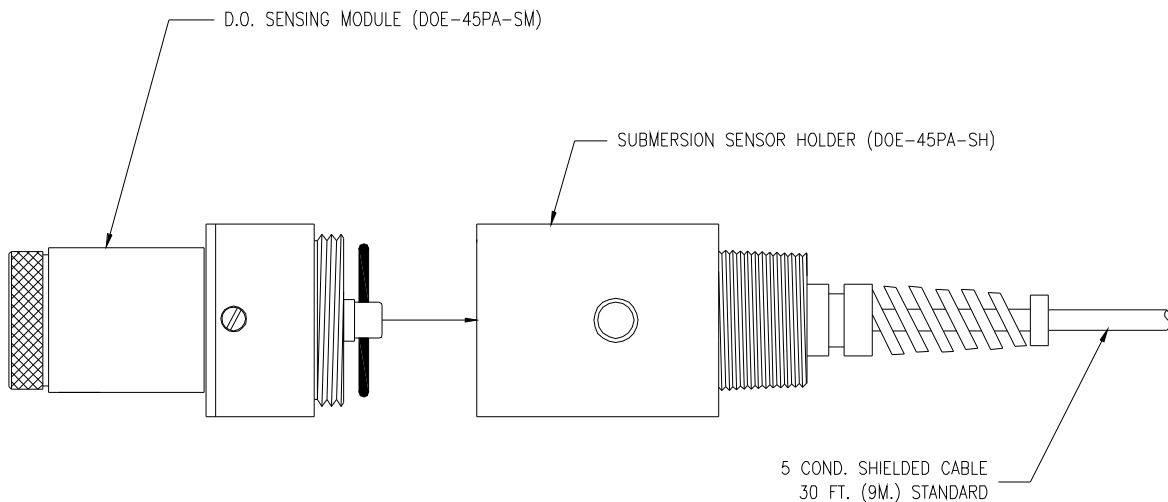


Figure 2-2 SUBMERSIBLE D.O. SENSOR ASSEMBLY

Sensing modules contain the main measuring components, and are the main component requiring service. Figure 5-2 below shows an exploded view of the D.O. sensing module.

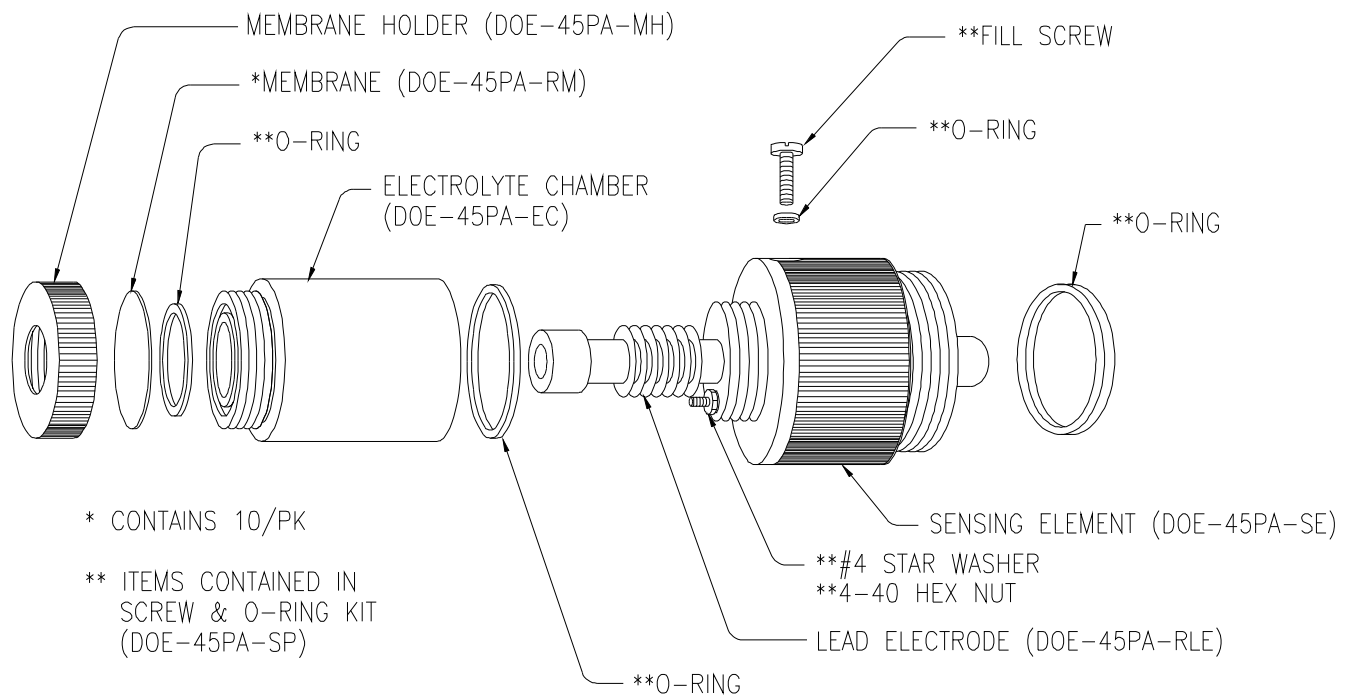


Figure 2-3 SUBMERSIBLE D.O. SENSING MODULE ASSEMBLY

Follow the procedure below to prepare the D.O. sensing module for operations:

1. Unscrew the electrolyte canister from the assembled module and also remove the vent screw from the side of the body.
2. Remove the membrane cap from the bottom of the canister and discard the protective membrane. O-rings are contained in grooves on both the bottom and top of the canister. Be sure that these o-rings remain in place.
3. From the package of membranes supplied with the sensor, place a new membrane into the membrane cap. The membrane is the clear plastic disk and is separated from other membranes by a paper spacer.
4. Screw the membrane cap onto the canister until you feel the o-ring compress. Hand tight compression is all that is needed. Do not use tools to tighten. The membrane should be flat across the bottom of the canister without wrinkles.
5. Fill the canister with electrolyte until the level reaches the bottom of the internal threads in the canister.

6. Slowly screw the canister onto the sensor body. A small amount of electrolyte will run out of the hole from which the vent screw was removed. Place a paper towel around the sensor to absorb the electrolyte overflow. The electrolyte is slightly caustic and should be rinsed off of skin if contact occurs. Tighten the canister until the o-ring at the top of the canister is compressed. Once again, do not use tools to tighten.
7. Shake excess electrolyte from the vent hole on the side of the sensor and replace the vent screw.

The sensing module is now ready for operation. The membrane should be stretched tightly across the tip of the sensor.

CAUTION: When handling the assembled sensor, do not set the sensor on its tip or damage to the membrane will result. Severe impacts on the tip of the sensor from dropping or other misuse may cause permanent damage to the sensor.

Part 3 - Maintenance

The DOE-45 Dissolved Oxygen Monitor will generally provide unattended operation over long periods of time. With proper care, the system should continue to provide measurements indefinitely. For reliable operation, maintenance on the system must be done on a regular schedule. Keep in mind that preventive maintenance on a regular schedule is much less troublesome than emergency maintenance that always seems to come at the wrong time.

3.1 Sensor Maintenance

Virtually all of the maintenance required for operation of the D.O. Monitor is sensor related. The electronics are generally trouble free. They are burned in at the factory and will likely have a problem only if random component failure occurs.

Sensor maintenance is required for accurate measurements. The primary requirement is simply to keep the sensor membrane clean. The membrane is a polymer material that is resistant to anything that will be encountered in water streams. However, deposits or biological growth can form on the surface of the membrane, and these deposits will reduce the sensitivity to oxygen. Normally, these coatings can be removed by simply wiping the membrane with a soft cloth or paper towel.

Should a coating form on the membrane that does not wipe off, it is best to change the membrane. Chemical cleaning may work as well, but a new membrane is a more reliable solution. To change a membrane, follow the Sensor Assembly procedure in this manual. Do not reuse the electrolyte from the sensor when changing a membrane. Always refill with fresh electrolyte. The electrolyte is stable and does not have a limited shelf life.

Even if no buildup is apparent on the membrane, it should be changed on a regular schedule. The recommended membrane change interval is every 6 months. The actual membrane life is often in excess of one year, but periodic preventive maintenance will simply avoid having to do service on an emergency basis.

While the sensor is disassembled for membrane changing, examine the condition of the o-rings on both ends of the electrolyte canister. If the o-rings show any signs of damage, replace them with new ones from the spare parts kit. It is good practice to change these o-rings once a year, regardless of their condition.

3.2 LEAD ANODE REPLACEMENT

Galvanic D.O. sensors consume the lead electrode during normal operation. As oxygen is measured, lead is converted to lead oxide, and after a period of time, the lead is expended. The lead electrode in Omega's D.O. sensor can be easily replaced, and replacement should be done automatically every 12 months.

The lead electrode is the thick lead wire wrapped around the sensor body see Figure 4. It is connected through a stainless steel post with a nut and star washer. To change the lead electrode, remove the nut and washer and unwrap the old lead. Loop the end of a new lead electrode around the post and replace the nut and washer. Tighten the nut firmly but do not over tighten as damage to the sensing module can result. Wrap the remainder of the lead around the sensor body. There is no need to secure the other end of the lead.

D.O. SOLUBILITY VS. TEMPERATURE

<u>TEMP.</u>	<u>D.O.</u>	<u>TEMP.</u>	<u>D.O.</u>
0 (32)	14.62	26 (79)	8.11
1 (34)	14.22	27 (81)	7.97
2 (36)	13.83	28 (83)	7.83
3 (37)	13.46	29 (84)	7.69
4 (39)	13.11	30 (86)	7.56
5 (41)	12.77	31 (88)	7.43
6 (43)	12.45	32 (90)	7.30
7 (45)	12.14	33 (92)	7.18
8 (46)	11.84	34 (93)	7.06
9 (48)	11.56	35 (95)	6.95
10 (50)	11.29	36 (97)	6.84
11 (52)	11.03	37 (99)	6.73
12 (54)	10.78	38 (101)	6.62
13 (55)	10.54	39 (102)	6.51
14 (57)	10.31	40 (104)	6.41
15 (59)	10.08	41 (106)	6.31
16 (61)	9.87	42 (108)	6.21
17 (63)	9.66	43 (110)	6.12
18 (64)	9.47	44 (111)	6.02
19 (66)	9.28	45 (113)	5.93
20 (68)	9.10	46 (115)	5.84
21 (70)	8.91	47 (117)	5.74
22 (72)	8.74	48 (119)	5.65
23 (73)	8.58	49 (120)	5.56
24 (75)	8.42	50 (122)	5.48
25 (77)	8.26		

SPARE PARTS

<u>PART NO.</u>	<u>DESCRIPTION</u>
DOE-45PA	Submersible D.O. Sensor with 30' cable
DOE-45PA -SM	Submersible D.O. sensing module
DOE-45PA -SE	Submersible D.O. sensing element body
DOE-45PA -SH	Submersible D.O. Sensing Holder Assembly with 30' cable
DOE-45PA -EC	Electrolyte chamber
DOE-45PA -MH	Membrane holder, type 316 stainless steel
DOE-45PA -RLE	Replacement lead electrode
DOE-45PA -RM*	Membranes, 5 mil., pkg. of 10
DOE-45PA -SP *	Spare Parts Kit, screw & o-ring
DOE-45PA -DOE *	D.O. electrolyte, 4 oz (120 cc)

Note: Instrument is supplied with sufficient spare parts for 6-12 months of operation. For 2 year spare parts inventory, 3 each of the items marked with an asterisk (*) should be ordered.



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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