12mm Dissolved Oxygen Sensor

Care and Use Instructions

How Dissolved Oxygen Sensors Work

Your Dissolved Oxygen (DO) Probe is a galvanic electrochemistry device; i.e. it does not require power from your meter or controller to generate its signal. The 12mm DO Probe will provide a millivolt signal proportional to the concentration of oxygen in the water. DO probes do not measure oxygen directly. They measure the partial pressure of oxygen in the water, which is directly proportional to the percent saturation of oxygen in the water. The concentration (mg/L or ppm) can be calculated based upon the oxygen solubility, temperature, salinity, and total atmospheric pressure.

Your Dissolved Oxygen Probe consist of a cathode, anode, and an electrolyte separated from your process fluid by an oxygen permeable membrane. The oxygen passing through the membrane reacts with the cathode, giving up electrons, which produce an electrical current.

Electrical Connections

DO1200

Red wire of Sensor:	Cathode(+)
Black wire of Sensor:	Anode (-)
or	
BNC center pin:	Cathode(+)
BNC shell:	Anode (-)

DO1200TC (after 6/15/09)

Red:	Cathode (+)
Black:	Anode (-)
Green:	Temperature
White:	Temperature

Getting Your DO Sensor Ready to Use

Your DO1200 or DO1200TC sensor is ready for immediate use.

Membrane Types

Two types of membrane materials for DO sensors are offered: either PTFE of HDPE. Teflon (PTFE) offers excellent durability and moderate rate speed of response while HDPE offers fast response and higher output (better resolution) but less mechanical strength. Your sensor is supplied with a premembraned cap preinstalled. Additional pre-membraned caps are available in DOKit1200/H or DOKit1200/T (includes electrolyte).

Calibration

The simplest method to calibrate your Dissolved Oxygen Probe is in saturated air. This technique works because when the water is air saturated, then the partial pressure of air in the water will be the same as it is in air. Therefore, the millivolt output of the DO Probe in air corresponds to 100% saturation in water. Make sure to remove most water drops from membrane when calibrating in air (membrane should be moist).

You may also bubble oxygen or air into your process fluid to oxygen saturate the fluid and calibrate the DO Probe in line. The millivolt output of the DO Probe under these conditions will corresponds to 100% saturation.

Using either of the above calibration techniques, the ratio of the DO Probe's millivolt output in water to the above saturated millivolt output corresponds to the percent saturation of oxygen in the water being measured.

% Saturation = (mV in water/ mV in air) x 100

If you want a two-point calibration, a saturated solution of sodium sulfite will provide a zero oxygen environment. The DO Probe will take several minutes to reach zero millivolts after submersion into the saturated sodium sulfite.

To calibrate your instrument for concentration readout (mg/L or ppm), with the DO Probe providing 100% saturation output, adjust your meter/controller to read the ppm value shown in the attached tables for the temperature and salinity at atmospheric pressure at the measurement site. If measurement is being made at pressures other than ambient, use the tables on pages four and five or using the following formula:

DOppm (pressure corrected) = DOppm from table x Barometric pressure (mmHg)/ 760mmHg

Parts covered by this product data sheet include:
DO1200, DO1200TC, DO1200-T, DO1200-T-TC, DO1200-KIT, DO 1200-T-KIT

Form: InstrDO1200 [Rev: 2011-03-24]

Sensor Re-Conditioning

1. Unscrew the pre-membraned cap from the tip of the sensor and discard (FIG 1).
2. Remove the cap from the bottle of DO electrolyte solution (DO1200KIT/H or DO1200KIT/T). Remove the 10mL syringe from packaging and attach yellow hub needle to end of syringe as shown in FIG 2.
3. Use needle and syringe to withdraw solution from bottle as shown in FIG 3.
4. Insert needle into one of the four holes surrounding the silver cathode. Squeeze bottle to inject fill solution. Inject solution until it leaks out of a fill hole (SEE FIG 4).
5. Replace cap by threading on sensor clockwise (Opposite of FIG 1).

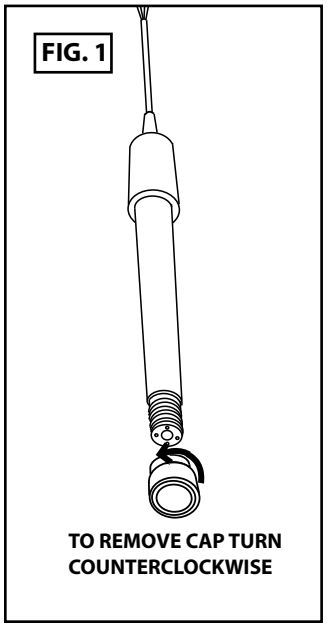
Sensor Storage

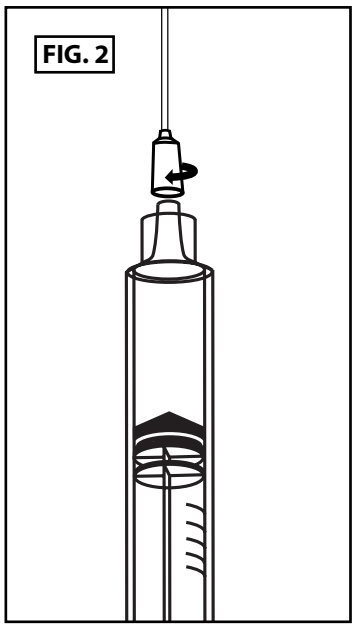
If long-term storage of probes is required, remove pre-membraned cap and probe leaving only a little solution on the membrane to keep it wet. Leaving a full volume of electrolyte in DO probe long-term without use will deplete the probes' anode. Remove electrolyte from sensor with syringe.

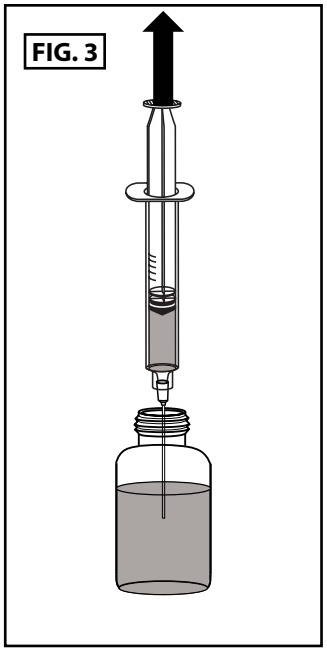
SPECIFICATIONS

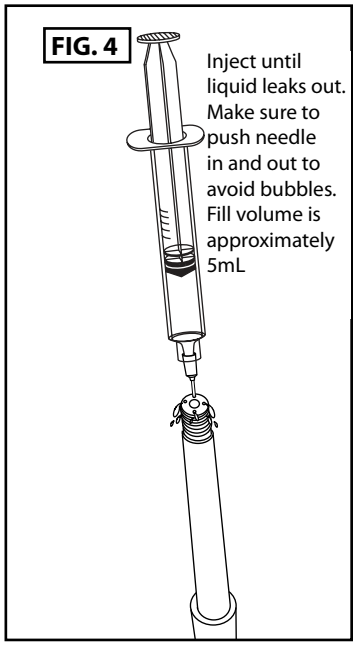
Output at 100% Saturation	
HDPE Membrane:	36-54 mV
PTFE Membrane:	24-42 mV
Output at 0% Saturation	
HDPE Membrane:	< 1mV
PTFE Membrane:	< 1mV
Temperature Range	
Max:	50 deg C
Min:	0 deg C
Accuracy	+ 2% when measuring temp equal cal temp.
Response Time	
HDPE Membrane:	5 minutes to reach 95% of final reading
PTFE Membrane:	
Water Flow Rate	Min 2 inch/second across membrane.
Wetted Materials	
Body:	Epoxy
Membrane:	PTFE or HDPE and Noryl

Wiring:	**DO1200**	**DO1200TC**
	Red = Cathode	Orange = cathode
	Black = Anode	Orange stripe = anode
	or	Blue = temperature (optional)
	BNC center = Cathode (+)	Blue stripe = temperature
	BNC shell = Anode (-)	(optional)









Form: InstrDO1200 [Rev: 2011-03-24]

TEMPERATURE		SALINITY- in parts per thousand (ppt)								
deg C	deg F	0	5	10	15	20	25	30	35	40
0	32	14.6	14.11	13.64	13.18	12.74	12.31	11.9	11.5	11.11
1	33.8	14.2	13.73	13.27	12.83	12.4	11.98	11.58	11.2	10.83
2	35.6	13.81	13.36	12.91	12.49	12.07	11.67	11.29	10.91	10.55
3	37.4	13.45	13	12.58	12.16	11.76	11.38	11	10.64	10.29
4	39.2	13.09	12.67	12.25	11.85	11.47	11.09	10.73	10.38	10.04
5	41	12.76	12.34	11.94	11.56	11.18	10.82	10.47	10.13	9.8
6	42.8	12.44	12.04	11.65	11.27	10.91	10.56	10.22	9.89	9.57
7	44.6	12.13	11.74	11.37	11	10.65	10.31	9.98	9.66	9.35
8	46.4	11.83	11.46	11.09	10.74	10.4	10.07	9.75	9.44	9.14
9	48.2	11.55	11.19	10.83	10.49	10.16	9.84	9.53	9.23	8.94
10	50	11.28	10.92	10.58	10.25	9.93	9.62	9.32	9.03	8.75
11	51.8	11.02	10.67	10.34	10.02	9.71	9.41	9.12	8.83	8.56
12	53.6	10.77	10.43	10.11	9.8	9.5	9.21	8.92	8.55	8.3
13	55.4	10.53	10.2	9.89	9.59	9.3	9.01	8.74	8.47	8.21
14	57.2	10.29	9.98	9.68	9.38	9.1	8.82	8.55	8.3	8.04
15	59	10.07	9.77	9.47	9.19	8.91	8.64	8.38	8.13	7.88
16	60.8	9.86	9.56	9.28	9	8.73	8.47	8.21	7.97	7.73
17	62.6	9.65	9.36	9.09	8.82	8.55	8.3	8.05	7.81	7.58
18	64.4	9.45	9.17	8.9	8.64	8.39	8.14	7.9	7.66	7.44
19	66.2	9.26	8.99	8.73	8.47	8.22	7.98	7.75	7.52	7.3
20	68	9.08	8.81	8.56	8.31	8.07	7.83	7.6	7.38	7.17
21	69.8	8.9	8.64	8.39	8.15	7.91	7.69	7.46	7.25	7.04
22	71.6	8.73	8.48	8.23	8	7.77	7.54	7.33	7.12	6.91
23	73.4	8.56	8.32	8.08	7.85	7.63	7.41	7.2	6.99	6.79
24	75.2	8.4	8.16	7.93	7.71	7.49	7.28	7.07	6.87	6.68
25	77	8.24	8.01	7.79	7.57	7.36	7.15	6.95	6.75	6.56
26	78.8	8.09	7.87	7.65	7.44	7.23	7.03	6.83	6.64	6.46
27	80.6	7.95	7.73	7.51	7.31	7.1	6.91	6.72	6.53	6.35
28	82.4	7.81	7.59	7.38	7.18	6.98	6.79	6.61	6.42	6.25
29	84.2	7.67	7.46	7.26	7.06	6.87	6.68	6.5	6.32	6.15
30	86	7.54	7.33	7.14	6.94	6.75	6.57	6.39	6.22	6.05
31	87.8	7.41	7.21	7.02	6.83	6.65	6.47	6.29	6.12	5.96
32	89.6	7.29	7.09	6.9	6.72	6.54	6.36	6.19	6.03	5.87
33	91.4	7.17	6.98	6.79	6.61	6.44	6.26	6.1	5.94	5.78
34	93.2	7.05	6.86	6.68	6.51	6.33	6.17	6.01	5.85	5.69
35	95	6.93	6.75	6.58	6.4	6.24	6.07	5.92	5.76	5.61
36	96.8	6.82	6.65	6.47	6.31	6.14	5.98	5.83	5.68	5.53
37	98.6	6.72	6.54	6.37	6.21	6.05	5.89	5.74	5.59	5.45
38	100.4	6.61	6.44	6.28	6.12	5.96	5.81	5.66	5.51	5.37
39	102.2	6.51	6.34	6.18	6.03	5.87	5.72	5.58	5.44	5.3
40	104	6.41	6.25	6.09	5.94	5.79	5.64	5.5	5.36	5.22

Form: InstrDO1200 [Rev: 2011-03-24]

TEMP (°C)	PRESSURE (TORR)									
	750	755	760	765	770	775	780	785	790	795
0	14.37	14.47	14.57	14.66	14.76	14.86	14.95	15.05	15.15	15.24
1	13.98	14.08	14.17	14.27	14.36	14.45	14.55	14.64	14.73	14.83
2	13.61	13.70	13.79	13.88	13.97	14.07	14.16	14.25	14.34	14.43
3	13.25	13.34	13.43	13.52	13.61	13.69	13.78	13.87	13.96	14.05
4	12.90	12.99	13.08	13.16	13.25	13.34	13.42	13.51	13.60	13.68
5	12.57	12.66	12.74	12.83	12.91	13.00	13.08	13.16	13.25	13.33
6	12.25	12.34	12.42	12.50	12.58	12.67	12.75	12.83	12.91	13.00
7	11.95	12.03	12.11	12.19	12.27	12.35	12.43	12.51	12.59	12.67
8	11.66	11.74	11.81	11.89	11.97	12.05	12.13	12.21	12.29	12.36
9	11.38	11.45	11.53	11.61	11.68	11.76	11.84	11.91	11.99	12.07
10	11.11	11.18	11.26	11.33	11.41	11.48	11.56	11.63	11.71	11.78
11	10.85	10.92	10.99	11.07	11.14	11.21	11.29	11.36	11.43	11.51
12	10.60	10.67	10.74	10.81	10.89	10.96	11.03	11.10	11.17	11.24
13	10.36	10.43	10.50	10.57	10.64	10.71	10.78	10.85	10.92	10.99
14	10.13	10.20	10.27	10.34	10.41	10.48	10.54	10.61	10.68	10.75
15	9.91	9.98	10.05	10.11	10.18	10.25	10.32	10.38	10.45	10.52
16	9.70	9.77	9.83	9.90	9.96	10.03	10.10	10.16	10.23	10.29
17	9.50	9.56	9.63	9.69	9.76	9.82	9.89	9.95	10.01	10.08
18	9.30	9.37	9.43	9.49	9.56	9.62	9.68	9.75	9.81	9.87
19	9.12	9.18	9.24	9.30	9.36	9.43	9.49	9.55	9.61	9.67
20	8.93	9.00	9.06	9.12	9.18	9.24	9.30	9.36	9.42	9.48
21	8.76	8.82	8.88	8.94	9.00	9.06	9.12	9.18	9.24	9.30
22	8.59	8.65	8.71	8.77	8.83	8.89	8.95	9.01	9.06	9.12
23	8.43	8.49	8.55	8.61	8.66	8.72	8.78	8.84	8.90	8.95
24	8.28	8.33	8.39	8.45	8.50	8.56	8.62	8.67	8.73	8.79
25	8.13	8.18	8.24	8.29	8.35	8.41	8.46	8.52	8.57	8.63
26	7.98	8.04	8.09	8.15	8.20	8.26	8.31	8.37	8.42	8.48
27	7.84	7.89	7.95	8.00	8.06	8.11	8.17	8.22	8.27	8.33
28	7.70	7.76	7.81	7.86	7.92	7.97	8.02	8.08	8.13	8.18
29	7.57	7.63	7.68	7.73	7.78	7.84	7.89	7.94	7.99	8.05
30	7.44	7.50	7.55	7.60	7.65	7.70	7.76	7.81	7.86	7.91
31	7.32	7.37	7.42	7.47	7.52	7.58	7.63	7.68	7.73	7.78
32	7.20	7.25	7.30	7.35	7.40	7.45	7.50	7.55	7.60	7.65
33	7.08	7.13	7.18	7.23	7.28	7.33	7.38	7.43	7.48	7.53
34	6.97	7.02	7.07	7.11	7.16	7.21	7.26	7.31	7.36	7.41
35	6.86	6.90	6.95	7.00	7.05	7.10	7.15	7.19	7.24	7.29
36	6.75	6.79	6.84	6.89	6.94	6.98	7.03	7.08	7.13	7.18
37	6.64	6.69	6.73	6.78	6.83	6.88	6.92	6.97	7.02	7.06
38	6.53	6.58	6.63	6.67	6.72	6.77	6.81	6.86	6.91	6.95
39	6.43	6.48	6.52	6.57	6.62	6.66	6.71	6.75	6.80	6.85
40	6.33	6.38	6.42	6.47	6.51	6.56	6.60	6.65	6.70	6.74
41	6.23	6.28	6.32	6.37	6.41	6.46	6.50	6.55	6.59	6.64
42	6.13	6.18	6.22	6.27	6.31	6.36	6.40	6.45	6.49	6.53
43	6.04	6.08	6.13	6.17	6.21	6.26	6.30	6.35	6.39	6.43
44	5.94	5.99	6.03	6.07	6.12	6.16	6.20	6.25	6.29	6.33
45	5.85	5.89	5.94	5.98	6.02	6.06	6.11	6.15	6.19	6.24
46	5.76	5.80	5.84	5.88	5.93	5.97	6.01	6.06	6.10	6.14
47	5.67	5.71	5.75	5.79	5.83	5.88	5.92	5.96	6.00	6.05
48	5.57	5.62	5.66	5.70	5.74	5.78	5.83	5.87	5.91	5.95
49	5.49	5.53	5.57	5.61	5.65	5.69	5.73	5.78	5.82	5.86
50	5.40	5.44	5.48	5.52	5.56	5.60	5.64	5.68	5.72	5.77

[1]To convert pressure (inches of Hg) to pressure (mm of Hg (torr)), multiply by 25.4.

Form: InstrDO1200 [Rev: 2011-03-24]

Concentration (mg/L) of Dissolved O_2 at Saturation by Temperature and Barometric Pressure[1]

	PRESSURE (Inches Hg.)									
TEMP(c)	29.5	29.7	29.9	30.1	30.3	30.5	30.7	30.9	31.1	31.3
0	14.37	14.47	14.57	14.66	14.76	14.86	14.95	15.05	15.15	15.24
1	13.98	14.08	14.17	14.27	14.36	14.45	14.55	14.64	14.73	14.83
2	13.61	13.70	13.79	13.88	13.97	14.07	14.16	14.25	14.34	14.43
3	13.25	13.34	13.43	13.52	13.61	13.69	13.78	13.87	13.96	14.05
4	12.90	12.99	13.08	13.16	13.25	13.34	13.42	13.51	13.60	13.68
5	12.57	12.66	12.74	12.83	12.91	13.00	13.08	13.16	13.25	13.33
6	12.25	12.34	12.42	12.50	12.58	12.67	12.75	12.83	12.91	13.00
7	11.95	12.03	12.11	12.19	12.27	12.35	12.43	12.51	12.59	12.67
8	11.66	11.74	11.81	11.89	11.97	12.05	12.13	12.21	12.29	12.36
9	11.38	11.45	11.53	11.61	11.68	11.76	11.84	11.91	11.99	12.07
10	11.11	11.18	11.26	11.33	11.41	11.48	11.56	11.63	11.71	11.78
11	10.85	10.92	10.99	11.07	11.14	11.21	11.29	11.36	11.43	11.51
12	10.60	10.67	10.74	10.81	10.89	10.96	11.03	11.10	11.17	11.24
13	10.36	10.43	10.50	10.57	10.64	10.71	10.78	10.85	10.92	10.99
14	10.13	10.20	10.27	10.34	10.41	10.48	10.54	10.61	10.68	10.75
15	9.91	9.98	10.05	10.11	10.18	10.25	10.32	10.38	10.45	10.52
16	9.70	9.77	9.83	9.90	9.96	10.03	10.10	10.16	10.23	10.29
17	9.50	9.56	9.63	9.69	9.76	9.82	9.89	9.95	10.01	10.08
18	9.30	9.37	9.43	9.49	9.56	9.62	9.68	9.75	9.81	9.87
19	9.12	9.18	9.24	9.30	9.36	9.43	9.49	9.55	9.61	9.67
20	8.93	9.00	9.06	9.12	9.18	9.24	9.30	9.36	9.42	9.48
21	8.76	8.82	8.88	8.94	9.00	9.06	9.12	9.18	9.24	9.30
22	8.59	8.65	8.71	8.77	8.83	8.89	8.95	9.01	9.06	9.12
23	8.43	8.49	8.55	8.61	8.66	8.72	8.78	8.84	8.90	8.95
24	8.28	8.33	8.39	8.45	8.50	8.56	8.62	8.67	8.73	8.79
25	8.13	8.18	8.24	8.29	8.35	8.41	8.46	8.52	8.57	8.63
26	7.98	8.04	8.09	8.15	8.20	8.26	8.31	8.37	8.42	8.48
27	7.84	7.89	7.95	8.00	8.06	8.11	8.17	8.22	8.27	8.33
28	7.70	7.76	7.81	7.86	7.92	7.97	8.02	8.08	8.13	8.18
29	7.57	7.63	7.68	7.73	7.78	7.84	7.89	7.94	7.99	8.05
30	7.44	7.50	7.55	7.60	7.65	7.70	7.76	7.81	7.86	7.91
31	7.32	7.37	7.42	7.47	7.52	7.58	7.63	7.68	7.73	7.78
32	7.20	7.25	7.30	7.35	7.40	7.45	7.50	7.55	7.60	7.65
33	7.08	7.13	7.18	7.23	7.28	7.33	7.38	7.43	7.48	7.53
34	6.97	7.02	7.07	7.11	7.16	7.21	7.26	7.31	7.36	7.41
35	6.86	6.90	6.95	7.00	7.05	7.10	7.15	7.19	7.24	7.29
36	6.75	6.79	6.84	6.89	6.94	6.98	7.03	7.08	7.13	7.18
37	6.64	6.69	6.73	6.78	6.83	6.88	6.92	6.97	7.02	7.06
38	6.53	6.58	6.63	6.67	6.72	6.77	6.81	6.86	6.91	6.95
39	6.43	6.48	6.52	6.57	6.62	6.66	6.71	6.75	6.80	6.85
40	6.33	6.38	6.42	6.47	6.51	6.56	6.60	6.65	6.70	6.74
41	6.23	6.28	6.32	6.37	6.41	6.46	6.50	6.55	6.59	6.64
42	6.13	6.18	6.22	6.27	6.31	6.36	6.40	6.45	6.49	6.53
43	6.04	6.08	6.13	6.17	6.21	6.26	6.30	6.35	6.39	6.43
44	5.94	5.99	6.03	6.07	6.12	6.16	6.20	6.25	6.29	6.33
45	5.85	5.89	5.94	5.98	6.02	6.06	6.11	6.15	6.19	6.24
46	5.76	5.80	5.84	5.88	5.93	5.97	6.01	6.06	6.10	6.14
47	5.67	5.71	5.75	5.79	5.83	5.88	5.92	5.96	6.00	6.05
48	5.57	5.62	5.66	5.70	5.74	5.78	5.83	5.87	5.91	5.95
49	5.49	5.53	5.57	5.61	5.65	5.69	5.73	5.78	5.82	5.86
50	5.40	5.44	5.48	5.52	5.56	5.60	5.64	5.68	5.72	5.77

[1]To convert pressure (inches of Hg) to pressure (mm of Hg (torr)), multiply by 25.4.

Form: InstrDO1200 [Rev: 2011-03-24]