

MADECO Optical Dissolved Oxygen Sensor

Model : MDDOS300

User manual

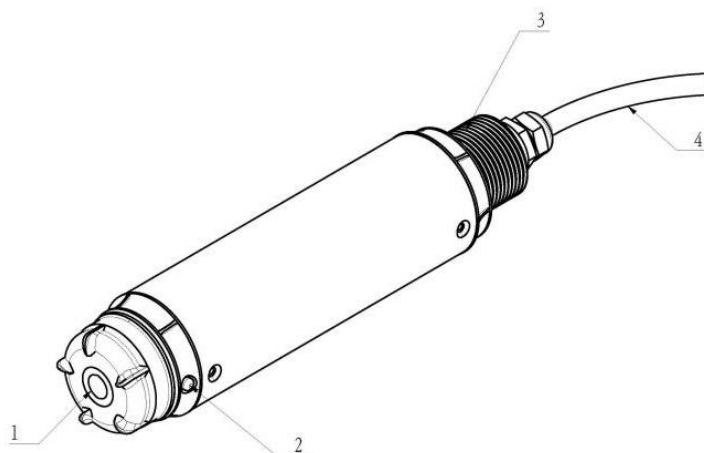


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1.Specifications

Specification		Details
Wetted materials	probe body	316 stainless steel body and screws
		Viton, O-ring
		Modified PPS, sensor end and cable end
	sensor cap	Acrylic
Measurement range	dissolved oxygen	0 to 20 ppm (0 to 20 mg/L) ;
		0 to 40 ppm at 25°C (0 to 40 mg/L) Optional,
		0 to 60 ppm at 25°C (0 to 60 mg/L) Optional,
		0 to 100% saturation
		0 to 200% saturation Optional,
		0 to 300% saturation Optional,
	temperature	0 to 50 °C (32 to 122 °F)
Measurement accuracy	dissolved oxygen	Below 5 ppm: ± 0.2 ppm
		Above 5 ppm: ± 0.3 ppm
	temperature	± 0.2 °C (±0.36 °F)
Repeatability		0.1 ppm (mg/L)
Response time		T ₉₀ < 40 seconds
		T ₉₅ < 60 seconds
Resolution		0.01 ppm (mg/L); 0.1% saturation; 0.1 °C
Storage temperature		0 to 50 °C
Storage temperature		-20 to 70 °C
Calibration/verification		Air calibration: One point, 100% water-saturated air Zero calibration: One point, Anaerobic water Sample calibration: Comparison with standard instrument
Minimum flow rate		Not required
Probe immersion depth and pressure limits		Pressure Limits at 34 m (112 ft.), 345 kPa (50 psi) maximum; accuracy may not be maintained at this depth
Sensor cable		10 m (30 ft) integral cable Up to 100 m possible with extension cables Up to 1000 m with junction box
Probe dimensions		Diameter x length: 49.53 x 138 mm (1.95 x 5.43 in.)
Probe weight		1.33 kg (contain 10m cable), package 0.22 kg
Power requirements		12 VDC, 0.10 A, 1.2 W
IP classification		IP68
Interferences		No interferences from the following: : H ₂ S, pH, K ⁺ , Na ⁺ , Mg ²⁺ , Ca ²⁺ , NH ₄ ⁺ , Al ³⁺ , Pb ²⁺ , Cd ²⁺ , Zn ²⁺ , Cr (total), Fe ²⁺ , Fe ³⁺ , Mn ²⁺ , Cu ²⁺ , Ni ²⁺ , Co ²⁺ , CN ⁻ , NO ₃ ⁻ , SO ₄ ²⁻ , S ²⁻ , PO ₄ ³⁻ , Cl ⁻ , Anion Active Tensides, Crude Oils, Cl ₂ < 4 ppm
Warranty		1 years

Specifications are subject to change without notice.

2. General information

2.1 General information

In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website.

2.2 Safety information

NOTICE

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment. Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

2.3 Product overview

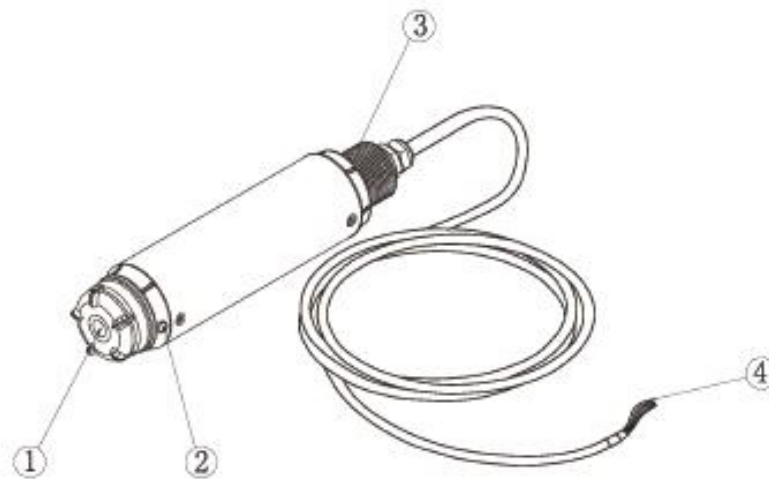
DANGER

Chemical or biological hazards. If this instrument is used to monitor a treatment process and/or chemical feed system for which there are regulatory limits and monitoring requirements related to public health, public safety, food or beverage manufacture or processing, it is the responsibility of the user of this instrument to know and abide by any applicable regulation and to have sufficient and appropriate mechanisms in place for compliance with applicable regulations in the event of malfunction of the instrument.

This sensor is designed to work with a controller for data collection and operation. The sensor can be used with several controllers. Refer to the controller-specific user manual for more information.

The primary applications for this sensor are municipal and industrial wastewater applications. LDO sensor technology does not consume oxygen, and can measure DO concentration in low or no-flow applications. Refer to Figure 1.

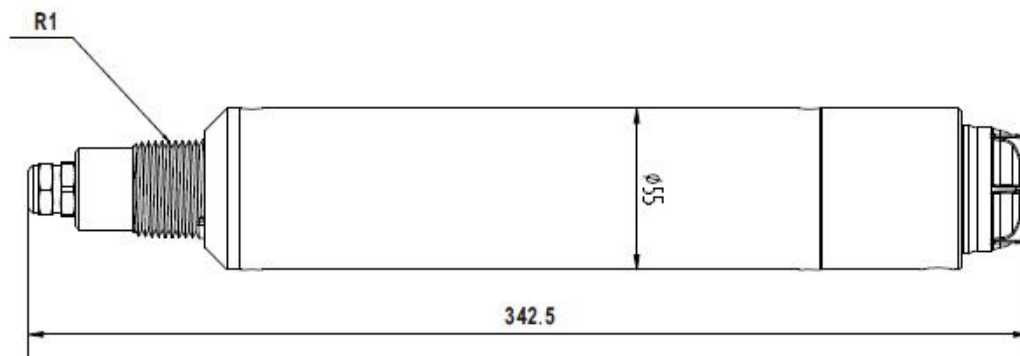
Figure 1. optical dissolved oxygen sensor



1. Sensor cap	3. 1-inch NPT
2. temperature sensor	4. Sensor outgoing line

2.4 Product dimensions

Figure 2. optical dissolved oxygen sensor's dimensions



4. Modbus RTU Register Definition

Item	Register	Address	Data Type	Size	Mode	Description
1	Dissolved Oxygen Value	0	Float	2	R	
2	saturation	2	Float	2	R	
3	temperature	4	Float	2	R	
4	slope	6	Float	2	R/W	range: 0.01-10
5	zero	8	Float	2	R/W	range: $\pm 20\%$
6	Temperature offset	10	Float	2	R/W	range: $\pm 100^{\circ}\text{C}$
7	Salinity	12	Float	2	R/W	Input data unit is ppt or ‰
8	Atmospheric Pressure	14	Float	2	R/W	Input data unit is Kpa
9	Responses time	16	int	1	R/W	1-60
10	Buad rate	17	int	1	R/W	0-4 (4800、9600、19200、38400、57600) /default 9600
11	Slave ID	18	int	1	R/W	1-247/default 3
12	Serial number	19	int	1	R	Serial number high
13	Serial number	20	int	1	R	Serial number middle
14	Serial number	21	int	1	R	Serial number low
15	Setting default	22	int	1	R/W	Input 33: Restore default Responses time (10s) 、Salinity(0)、Atmospheric pressure(101.325), temperature offset(0)
16	Calibration default	23	int	1	R/W	Input Restore default slope (1)、offset(0), zero value(0)
17	Air Calibration	24	int	1	R/W	Input 1, complete air calibration。
18	Zero calibration	25	int	1	R/W	Input 1, complete zero calibration 。
19	Dissolved oxygen offset	26	Float	2	R/W	Dissolved oxygen offset, range: $\pm 20\text{ppm}$
20	Temperature calibration low point	40	Float	2	R/W	Input standard temperature value
21	Temperature calibration high point	42	Float	2	R/W	Input standard temperature value
22	Sensor cap select	44	int	1	R/W	0: Manufacturers;1: Hach
23	Protocol select	45	int	1	R/W	0: current protocol;1:old protocol
24	Change Slave ID at unknow ID	46	int	1	R/W	When the baud rate is correct, Slave ID set to 0, enter the destination address to register address 46。Slave ID will set to the destination address
25	Reset Slave ID and buad rate	47	int	1	R/W	When the baud rate is correct, Slave ID set to 0, Enter 99 to register address 47。Slave ID will set to 1,Buad rate will set to 19200

5. Maintenance

In order to obtain the best measurement effect, it is necessary to maintain the sensor regularly. The maintenance mainly includes cleaning the sensor, checking whether the sensor is damaged, and regular calibration.

5.1 Clean

It is recommended to clean the sensor at regular intervals (generally every month, depending on the site environment) to ensure the accuracy of measurement.

Clean the outer surface of the sensor with water flow. If there are still debris left, please wipe it with a wet soft cloth. Do not place the sensor in the direct sunlight or the place that can be reached by radiation. In the whole service life of the sensor, if the total exposure time reaches one hour, it will cause the aging of the fluorescent cap, which will lead to the error of the fluorescent cap and display the wrong reading.

5.2 Damage check

Check the appearance of the sensor to see if there is any damage. If so, please contact the after-sales service center for replacement in time, so as to prevent the sensor from being damaged due to water intrusion.

5.3 Storage

A. When not in use, the protective cap should be covered to avoid direct sunlight or exposure. In order to protect the sensor from freezing, store the Do probe in a place where freezing will not occur.

B. Clean the probe before long-term storage. Avoid the equipment in the delivery box or plastic container with anti electric shock. Avoid touching and scraping the fluorescent cap with hands or other hard objects.

C. The fluorescent cap is strictly prohibited from direct sunlight or exposure.

5.4 Fluorescent Cap replacement

When the fluorescent cap of the sensor is damaged, it is necessary to replace the fluorescent cap. In order to ensure the accuracy of measurement, it is recommended to replace fluorescent cap once a year or when the fluorescent cap is seriously damaged during routine inspection.

6. Enter a salinity correction value

6.1 Enter a salinity correction value

Dissolved oxygen measurements in saline samples can show an apparent DO value that is very different from the actual DO value. To correct for the influence of dissolved salts in a sample, enter a salinity correction factor.

Note: If the presence or amount of salinity in the process is unknown, consult with the treatment facility engineering staff.

1. Use a conductivity meter to measure the conductivity of the sample in mS/cm at a reference temperature of 20 °C (68 °F).
2. Use Table 1 to estimate the salinity correction factor in parts per thousand (‰) saturation.

Note: The chloride ion concentration, in g/kg is equal to the chlorinity of the sample. Salinity is calculated with

the formula: $\text{Salinity} = 1.80655 \times \text{chlorinity}$.

3. Enter the salinity correction factor and confirm.

Table 1 Salinity saturation (‰) per conductivity value (mS/cm)

mS/cm	‰	mS/cm	‰	mS/cm	‰	mS/cm	‰
5	3	16	10	27	18	38	27
6	4	17	11	28	19	39	28
7	4	18	12	29	20	40	29
8	5	19	13	30	21	42	30
9	6	20	13	31	22	44	32
10	6	21	14	32	22	46	33
11	7	22	15	33	23	48	35
12	8	23	15	34	24	50	37
13	8	24	17	35	25	52	38
14	9	25	17	36	25	54	40
15	10	26	18	37	26		