Instruction Manual αlpha-DO500 2-Wire Dissolved Oxygen Transmitter Dissolved Oxygen/°C meter





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Preface

This manual serves to explain the use of the α **lpha-DO 500 Transmitter**. The manual functions in two ways, firstly as a step by step guide to help the user operate the instrument. Secondly, it serves as a handy reference guide. This instruction manual is written to cover many anticipated applications of the α lpha-DO 500 Transmitter. If you have doubts in the use of the instrument, please do not hesitate to contact the nearest Eutech Instruments Authorised Distributor.

The information presented in this manual is subject to change without notice as improvements are made, and does not represent a commitment on part of Eutech Instruments.

Eutech Instruments cannot accept any responsibility for damage or malfunction of the unit due to improper use of the instrument.

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1. Introduction

1.1 Before You Begin

We thank you for purchasing the α lpha-DO 500 Transmitter.

The construction of the α lpha-DO 500 Transmitter employs leading edge technology and complies with safety regulations currently in force. Notwithstanding this, improper use could lead to hazards for the user or a third-party, and/or adverse effects on the plant or other equipment. Therefore, the operating instructions must be read and understood by the persons involved before work is started with the α lpha-DO 500 Transmitter.

The instruction manual must always be stored close at hand, in a place accessible to all people working with the α lpha-DO 500 Transmitter.

If you have questions, which are not or insufficiently answered in this instruction manual, please contact your authorized supplier. They will be glad to assist you.

1.2 Intended Use

 α lpha-DO 500 Transmitters are intended solely for dissolved oxygen (DO) and temperature measurement, as described in this instruction manual.

Any other use, or use not mentioned here, that is incompatible with the technical specifications is deemed inappropriate. The operator is solely responsible for any damage arising from such use.

Other prerequisites for appropriate use include:

- Comply with the instructions, notes and requirements set out in this instruction manual.
- Comply with all local safety regulations concerning safety at work.
- Comply with all information and warnings in the documentation dealing with the products used together with the α lpha-DO 500 Transmitter (housings, sensors, etc.).
- Comply with local environmental and operational conditions.

1.3 Safety Instructions

- The α lpha-DO 500 Transmitter should be installed and operated only by personnel familiar with the instrument and who are qualified for such work.
- A defective Transmitter must neither be installed nor put into service.



- The α lpha-DO 500 Transmitter must only be operated under the specified operating conditions (see section 5.9).
- The $\alpha \text{lpha-DO}$ 500 Transmitter must not be repaired by the customer.
- No modifications to the αlpha-DO 500 Transmitter are allowed. The manufacturer/supplier accepts no responsibility for damage caused by unauthorized modifications. The risk is borne entirely by the user.

1.4 Taking Out of Service / Correct Disposal of the Unit

Taking out of Service

- First disconnect the unit from the power supply and then undo all electrical connections.
- Remove the unit from the wall / panel.

Correct Disposal of the Instrument

When the DO Transmitter is permanently taken out of service, obey the local environmental regulations for correct disposal or send the instrument to your local distributor, they will take care of proper disposal.

2. Getting Started

2.1 Description of Instrument

The Eutech Instruments' **alpha-DO 500 Transmitter** is used for measuring dissolved oxygen and temperature values. The dissolved oxygen values can be measured using industrial dissolved oxygen sensors. The temperature values can be measured using 2-wire or 3-wire Pt100 sensors. The DO Transmitter can be used for applications such as water treatment and monitoring, galvanic-decontamination, chemical processing, food processing, clean or wastewater control and neutralization processes.

The α **lpha-DO 500 Transmitter** has many user-friendly and safety features which include:

- Push-button keypad for calibration and setup
- Built-in non-volatile memory to ensure that calibration and other information are not erased if power supply fails
- Menu-driven program that simplifies setup
- Automatic temperature compensation (ATC)
- Manual temperature compensation setting without the ATC probe, with independent setting for calibration and process temperature
- Large dual display LCD for easy reading with clear multiple annunciators, operational mode indicators and error indicators.
- Galvanically isolated current output of 4 to 20mA
- Hold function to freeze output current (22mA)
- Out of range current indication (3.8mA)
- Protection against electromagnetic interference

2.2 Measurement and Control System

A typical measurement system consists of:

- A αlpha-DO 500 Transmitter
- A dissolved oxygen sensor with integrated or separate Pt100 temperature sensor
- An appropriate measurement cable
- An immersion, flow or process assembly
- A chart recorder



2.3 Connecting Peripherals

2.3.1 Connection Terminals

Remove Back Cover:

Remove the screws from the four corners at the back of the DO Transmitter. Remove the back cover. The connectors are exposed on the back PCBA as shown in the Figure 1 below.

Connectors:

- SL2 12 to 24 V DC power
- SL1 Dissolved Oxygen electrode & Temperature probe connections (wiring has to be done in the detachable connector



Figure 1: Outer Side of Back PCBA

SL1 Connections	SL 2 Connections
1. DO Input, +ve terminal	1. DC Power Supply +ve terminal
2. DO Input, -ve terminal	2. DC Power Supply -ve terminal
3. No Connection	3. No Connection
4. No Connection	
5. PT100 Compensate (Short to pin 6 for 2-wire RTD)	
6. PT100 Sense	
7. PT100 Ground	
8. No Connection	

2.3.2 Connecting Dissolved Oxygen Electrode

Refer the instruction sheet that comes with your Dissolve Oxygen electrode to identify polarity (+ve and –ve) of DO wires.

- 1. Connect DO +ve wire to Pin 1 of SL1 connector
- 2. Connect DO -ve wire to Pin 2 of SL1 connector

2.3.3 Connecting Temperature Probe

For Automatic Temperature Compensated (ATC) readings, a 100Ω Pt RTD temperature probe (2-wire or 3-wire) can be connected to the Transmitter.

3-Wire Probe:

- 1. Connect PT100 compensate wire to **Pin 5** of SL1 connector
- 2. Connect PT100 sense wire to Pin 6 of SL1 connector
- 3. Connect PT100 GND wire to Pin 7 of SL1 connector

2-Wire Probe:

- 1. Short **Pin 5 & 6** of SL1 connector using a small piece of wire.
- 2. Connect PT100 sense wire to Pin 6 of SL1 connector
- 3. Connect PT100 GND wire to **Pin 7** of SL1 connector

2.4 Installation

2.4.1 Mechanical Dimensions



2.4.2 Wall Mount



2.4.3 Panel Mount



2.5 Display & Keypad

2.5.1 Display Overview

The Liquid Crystal Display (LCD) of the α lpha-DO 500 Transmitter has two alpha-numerical displays (Upper and a Lower).

- **Upper display:** Measured dissolved oxygen reading (in % saturation or ppm or mg/l) is displayed when the Transmitter is in normal operation (measurement) mode.
- **Lower display:** Measured temperature value is displayed when the Transmitter is in normal operation (measurement) mode. In Calibration mode, calibration points are displayed here.

The two displays indicate function names, options & settings in Setup mode. Refer 'Appendix 2 – Abbreviations Used in LCD' for more details.

The LCD also consists of various mode indicators, status annunciators and unit of measurement indicators.



Lower Display

Mode	Indicators
MUCUC.	maicators

MEAS	Measurement mode (Refer Section 3.1)			
SETUP	Setup mode (Refer Section 5)			
CAL	Calibration mode (Refer Section 4)			
Status A	Status Annunciators			
READY	Appears when the reading is stable			
HOLD	Appears in Setup mode and Calibration mode to indicate that the relay function is frozen			
ATC	Appears when Automatic Temperature Compensation (ATC) is enabled. Not visible when Manual Temperature Compensation (MTC) is enabled. Flashes if the temperature probe is faulty in its ATC mode. (<i>Refer Section 5.4</i>)			
ERR	Appears when an error occurs			
	Buffer annunciator. Appears in calibration mode or viewing calibrated point			
Ţ	Electrode annunciator. Appears when viewing electrode properties or during calibration error			

Units of Measurement Indicators			
%	Dissolved Oxygen in Percentage Saturation		
ppm	Dissolved Oxygen in Parts Per Million		
mg/l	Dissolved Oxygen in milligram per liter		
°C	Temperature in Celsius (Refer Section 5.4)		

2.5.2 Key Functions



Key	Description
CAL	Enter Calibration mode
	Enter Setup mode.
	Access sub screens (parameters) within a group of settings in Setup mode.
\bigcirc	Confirm (save) setup parameters and numerical values
	Start/Confirm calibration in Calibration mode.
	Select a group of settings in Setup mode.
	Select parameters and increment/decrement numerical values in Setup and Calibration modes.
$\overline{\mathbf{v}}$	(When pressed continuously, speed of values increment/decrement increases)
\bigcirc	Returns to Measurement mode when both keys are pressed simultaneously.

3. Normal Operation

3.1 Measurement mode

When the DO Transmitter is powered on, the display shows all the LCD segments briefly, and then automatically enters into the **Measurement mode**.



The mode indicator '**MEAS**' at the top of the display indicates that the Transmitter is in Measurement mode. The upper alpha-numerical display shows the measured dissolved oxygen value, while the lower display shows the temperature value. The indicator "%", "ppm" or "mg/l" at the upper right side of the display indicates the current measurement mode. (Refer section 5.2 for switching measurement modes)

NOTE: To guarantee accurate readings, the measuring system (the DO Transmitter and the sensor) must be calibrated regularly.

From measurement mode you can access:

- Calibration mode (by pressing CAL key)
- Setup mode (by pressing ENT key)

For more details, refer section 4 for Calibration mode and section 5 for Setup mode.)

3.2 Menu Overview



4. Calibration Mode

4.1 Entering Calibration Mode

While in measurement mode, press **CAL** key to access calibration mode. LCD indicates '**CAL dO**'.



NOTES:

- To exit calibration mode at any time during calibration, **press** ▲ and ▼ keys simultaneously (escape). The DO Transmitter returns to the measurement mode and the old calibration values remain active.
- The calibration is always carried out in the units of measurement (mg/l or ppm or %) selected in setup mode.

4.2 Calibration in mg/l or ppm of Oxygen

The DO Transmitter is capable of calibration of up to 2 points for dissolved oxygen. All new calibration values will automatically override existing calibration data. Make sure the unit of measurement is set to mg/l or ppm. (Refer Section 5.2 for switching unit of measurements).

If you wish to abort the DO calibration, press \blacktriangle and \triangledown keys simultaneously and the DO Transmitter reverts to measurement mode.

4.2.1 1-Point Calibration

The 1-point calibration is done at **high-point** using **8.24 mg/l** of dissolved oxygen solution.



- From measurement mode **press CAL key** to enter calibration mode as described in section 4.1. The LCD shows '**CAL Do**'. **Press ENT key** to begin calibration.
- 2 Select 1-point calibration: The display shows '1Pt CAL'. If '2Pt CAL' is shown, press ▲ or ▼ key to select '1Pt CAL'.

Press ENT key to confirm the selection.

The buffer annunciator appears in LCD. The lower display shows 'HI', indicating the high-point is being calibrated. Immerse the electrode in 8.24 mg/l dissolved oxygen solution. Immerse the temperature probe in the solution if ATC is enabled. The upper display shows the measured value of dissolved oxygen of the solution. Allow the reading to stabilize. LCD shows '**READY**' annunciator when the reading is stable.

Press \blacktriangle or \lor key to adjust the reading to 8.24 mg/l. The Transmitter allows adjusting up to $\pm 50\%$ of the measured value.

Press ENT key to confirm the reading.

- **NOTE:** The transmitter does not accept the calibration and shows calibration error if the displayed (measured) value is more than $\pm 50\%$ of the high-point value.
- 4 The calibration is completed. The DO Transmitter reverts to measurement mode.

NOTES:

- If the displayed value is more than ±10% of the high-point value, the Transmitter indicates a calibration error by showing 'ERR' and blinking electrode annunciator. If this happens, press ▲ and ▼ keys together to return to measurement mode. Restart the calibration from Step1.
- To exit from calibration mode without confirming calibration, press ▲ and ▼ keys together.
- When calibrating with manual temperature compensation, the Transmitter automatically changes from preset 'process temperature' to 'calibration temperature'. After leaving calibration mode, the transmitter switches back to the 'process temperature'. (Refer section 5.4 for temperature settings)

4.2.2 2-Point Calibration

The 2-point calibration is carried out at Low-point (zero dissolved oxygen solution) and then at high-point using **8.24 mg/l** of dissolved oxygen solution.



- From measurement mode **press CAL key** to enter calibration mode as described in section 4.1. The LCD shows '**CAL Do**'. **Press ENT key** to begin first calibration point.
- 2 Select 2-point calibration: The display shows '1Pt CAL'. Press ▲ or ▼ key to select '2Pt CAL'.

Press ENT key to confirm the selection.

The buffer annunciator appears in LCD. The lower display shows 'LO', indicating the low-point is being calibrated. Immerse the electrode in a low level of dissolved oxygen solution (0.0 mg/l). Immerse the temperature probe in the solution if ATC is enabled. The upper display shows the measured value of dissolved oxygen of the solution. Allow the reading to stabilize. LCD shows '**READY**' annunciator when the reading is stable.

Press ENT key to confirm the reading.

NOTE: The transmitter proceeds to the second point of calibration if the displayed reading is less than 10% of the high-point value.

NOTE: The transmitter does not accept the calibration and shows calibration error if the displayed (measured) value is more than 10% of the high-point value.

4 If the low-point calibration is successful, the Transmitter proceeds to the second point. The lower display shows '**HI**'. Take the electrode out of low oxygen solution and immerse it in a higher dissolved oxygen concentration (8.24 mg/l) solution.

The upper display shows the measured value of dissolved oxygen of the solution. Allow the reading to stabilize. LCD shows '**READY**' annunciator when the reading is stable.

Press \blacktriangle or \lor key to adjust the reading to 8.24 mg/l. The Transmitter allows adjusting up to $\pm 50\%$ of the measured value.

Press ENT key to confirm the reading.

- **NOTE:** The transmitter does not accept the calibration and shows calibration error if the displayed (measured) value is more than 50% of the high-point value.
- **5** The calibration is completed. The DO Transmitter reverts to measurement mode.

NOTES:

- If the displayed value is more than ±10% of the high-point value, the Transmitter indicates a calibration error by showing 'ERR' and blinking electrode annunciator. If this happens, press ▲ and ▼ keys together to return to measurement mode. Restart the calibration from Step1.
- To exit from calibration mode without confirming calibration, press ▲ and ▼ keys together.
- When calibrating with manual temperature compensation, the Transmitter automatically changes from preset 'process temperature' to 'calibration temperature'. After leaving calibration mode, the transmitter switches back to the 'process temperature'. (Refer section 5.4 for temperature settings)

4.3 Calibration in% Saturation of Oxygen

The DO Transmitter is capable of calibrating up to 2 points for dissolved oxygen. All new calibration values will automatically override existing calibration data. Make sure the unit of measurement is set to %. (Refer Section 5.2 for switching unit of measurements).

If you wish to abort the operation during DO calibration, press \blacktriangle and \blacktriangledown keys simultaneously and the DO Transmitter reverts to measurement mode.

4.3.1 1-Point Calibration

The 1-point calibration is done in air (100% oxygen saturation).



- 1 From measurement mode **press CAL key** to enter calibration mode as described in section 4.1. The LCD shows '**CAL Do**'. **Press ENT key** to begin first calibration point.
- Select 1-point calibration: The display shows '1Pt CAL'. If '2Pt CAL' is shown, press ▲ or ▼ key to select '1Pt CAL'.

Press ENT key to confirm the selection.

3 The buffer annunciator appears in LCD. The lower display shows '100.0'. Allow the electrode to equilibrate in air. The upper display shows the measured value of dissolved oxygen saturation. Allow the reading to stabilize. LCD shows '**READY**' annunciator when the reading is stable.

Press ENT key to confirm the reading.

- **NOTE:** The transmitter does not accept the calibration and shows calibration error if the displayed (measured) value is not within 50% to 150%.
- **4** The calibration is completed. The DO Transmitter reverts to measurement mode.

NOTES:

• If the displayed value is not within 50% to 150%, the Transmitter

indicates a calibration error by showing '**ERR**' and blinking electrode annunciator. If this happens, **press** ▲ **and** ▼ **keys** together to return to measurement mode. Restart the calibration from Step1.

- To exit from calibration mode without confirming calibration, press ▲ and ▼ keys together.
- When calibrating with manual temperature compensation, the Transmitter automatically changes from preset 'process temperature' to 'calibration temperature'. After leaving calibration mode, the transmitter switches back to the 'process temperature'. (Refer section 5.4 for temperature settings)

4.3.2 2-Point Calibration:

The 2-point calibration is carried out with standard DO buffer of 0% oxygen saturation and then in air (100% oxygen saturation)



- From measurement mode **press CAL key** to enter calibration mode as described in section 4.1. The LCD shows '**CAL Do**'. **Press ENT key** to begin first calibration point.
- Select 2-point calibration: The display shows '1Pt CAL'. Press ▲ or ▼ key to select '2Pt CAL'.

Press ENT key to confirm the selection.

The buffer annunciator in appears in LCD. The lower display shows **'0.0**'. Immerse the electrode in 0% standard DO buffer solution. Immerse the temperature probe in the solution if ATC is enabled. The upper display shows the measured value of dissolved oxygen of the solution. Allow the reading to stabilize. LCD shows '**READY**' annunciator when the reading is stable. Press ENT key to confirm the reading.

NOTES:

- The transmitter proceeds to the second point of calibration if the displayed reading is less than 10%
- The transmitter does not accept the calibration and shows calibration error if the displayed (measured) value is more than 10%
- If the 0% calibration is successful, the Transmitter proceeds to the second point. The lower display shows '**100.0**'. Take the electrode out of 0% oxygen solution, rinse in clean water, dry it and then allow the electrode to equilibrate in air. The upper display shows the measured value of dissolved oxygen saturation. Allow the reading to stabilize. LCD shows '**READY**' annunciator when the reading is stable.

Press ENT key to confirm the reading.

- **NOTE:** The transmitter does not accept the calibration and shows calibration error if the displayed (measured) value is not with 50% to 150%
- **5** The calibration is completed. The DO Transmitter reverts to measurement mode.

NOTES:

- If the displayed value is more than ±10% of the high-point value, the Transmitter indicates a calibration error by showing 'ERR' and blinking electrode
 annunciator. If this happens, press ▲ and ▼ keys together to return to measurement mode. Restart the calibration from Step1
- To exit from calibration mode without confirming calibration, press ▲ and ▼ keys together
- When calibrating with manual temperature compensation, the Transmitter automatically changes from preset 'process temperature' to 'calibration temperature'. After leaving calibration mode, the transmitter switches back to the 'process temperature' (Refer section 5.4 for temperature settings)

5. Setup Mode

5.1 Enter Setup mode

The setup mode allows you to customize the settings of the DO Transmitter to suite your requirements. While in measurement mode, **press the ENT key** to access setup mode. LCD shows '**SETUP**' mode indicator and the first page of setup (**OFS** – offset settings). **Press** \blacktriangle or \lor key to access other pages of the setup mode. To exit from setup mode any time press \blacktriangle and \blacktriangledown keys simultaneously (escape). The Transmitter returns to measurement mode.



5.2 Configuration Settings

Configuration settings let you configure the DO Transmitter to different units of measurements (%, mg/l or ppm) set salinity and pressure values.



- From measurement mode **press ENT key** to enter setup mode as described in section 5.1. The LCD shows the first screen of setup mode (**COF**). **Press ENT key** to access configuration setting (COF).
- Selecting unit of measurement for DO: The display shows the 'SEt Unit'. The right corner of the LCD shows currently configured unit of measurement for dissolved oxygen.

Press ▲ or ▼ key to select the desired unit of measurement (% or ppm or mg/I). Press ENT key to confirm your selection.

If ppm or mg/l is selected for unit of measurement:

3 Setting salinity value: The lower display shows 'SAL'. The upper display shows currently configured salinity value. (default is 0.0 ppt)

Press \blacktriangle or \lor key to adjust the upper display to the required salinity value. Allowable range is 0.0 to 50.0ppt.

Press ENT key to confirm the value.

NOTE: This screen does not appear if % was selected in step 2. The DO transmitter moves to step 4.

- Setting units of measurement for pressure: The upper display shows 'PrE'. The lower display shows currently configured unit of measurement for pressure. Press ▲ or ▼ key to select the required unit of measurement for pressure (Hg or PSI or Bar). Press ENT key to confirm the selection.
- **5** Setting pressure value: The upper display shows previously set pressure value (if any); otherwise it shows the default value. The lower

display shows the unit measurement selected in the step 4.

Press ▲ or ▼ key to set the required pressure value. **Press ENT key** to confirm the value. The Transmitter reverts to **COF** screen.

Press ▲ or ▼ key to access other setup screens or press ▲ and ▼ key simultaneously (escape) to return to measurement mode.

5.3 Offset Settings

In applications where continuous DO measurement is required, it may not be convenient to remove the electrode for calibration. In such cases, an on-line offset adjustment is recommended. The DO Transmitter allows you set an offset of up to \pm **2.00ppm** or \pm **2.00 mg/l** or \pm **10.0%** to compensate for errors in the electrode.

The DO Transmitter adds or subtracts the offset value from the measured DO value and displays the corrected value. However, if you need to offset the value beyond the average offset you would expect in your application type, consider a full calibration or even electrode replacement.



From measurement mode press ENT key to enter setup mode as described in section 5.1. The LCD shows the first screen of setup mode (COFS). Press ▲ or ▼ key to select offset settings screen (OFS).

Press ENT key to access offset settings (OFS).

The Transmitter displays the current offset value (if any) for 2 seconds and switches to the next screen.

- Selecting to modify offset: The upper display shows 'OFS'. Press ▲ or
 ▼ key to select 'YES' or 'nO'.
 - Select YES to set an offset (or adjust the existing offset)
 - Select **nO** to skip offset adjustment

Press ENT key to confirm your selection.

If 'YES' was selected:

3 Adjust the offset value: The upper display shows the currently configured offset value (if any), otherwise zero. The lower display shows currently measured DO reading (including the current offset value). Allow the reading to stabilize. LCD shows '**READY**' annunciator when the reading is stable.

Press \blacktriangle or \triangledown key to adjust the upper display to required offset.

Press ENT key to confirm the value. The Transmitter reverts to **OFS** screen.

If 'nO' was selected:

The existing offset value (if any) is unaffected and the Transmitter reverts to **OFS** screen.

5.4 Temperature Settings

Temperature settings allow you to enable or disable Automatic Temperature Compensation (ATC) of the Transmitter.

Set the Transmitter to manual temperature compensation (disable ATC) when the temperature of sample or process liquid is constant and a temperature probe is not available. When you disable ATC, the Transmitter allows you to set your **process temperature (P°C)** and **calibration temperature (C°C)**. This allows calibration at a different temperature other than the process temperature.



From measurement mode press ENT key to enter setup mode as described in section 5.1. The LCD shows the first screen of setup mode (COF). Press ▲ or ▼ key to select temperature settings screen (SEt °C).

Press ENT key to access temperature settings (SEt °C).

Enable/disable ATC: The upper display shows '**AtC**'. The lower display shows the last configured ATC selection ('**On**' or '**OFF**').

Press \blacktriangle or \lor key to enable (AtC On) or disable (AtC OFF) automatic temperature compensation.

Press ENT key to confirm your selection.

If ATC enabled (AtC On):

3 Setting temperature offset: The upper display shows the last configured temperature offset value (if any), otherwise zero. The lower display shows currently measured temperature reading (including last configured offset value). LCD shows 'ATC' annunciator in lower-right corner.

Place a thermometer, which is known to be accurate, in your sample or process liquid. Make sure your temperature probe is placed in the same liquid. Compare the stabilized temperature reading displayed on the Transmitter with the thermometer. If there is a difference between the two readings (offset), you can adjust the reading of the Transmitter. **Press** \blacktriangle or \checkmark key to adjust the lower display to the correct temperature value.

As the lower display value changes, the Transmitter adjusts the upper display reading automatically to suit the new offset value. Up to ± 10 °CF offset is allowed.

Press ENT key to confirm the value. The Transmitter reverts to **SET °C** screen.

If ATC disabled (AtC OFF):

Setting process temperature: The lower display shows 'P°C' and the upper display shows the last configured process temperature.
 Press ▲ or ▼ key to adjust the upper display to desired process temperature. Allowable range: 0.0 to 100.0°C.

Press ENT key to confirm the process temperature.

6 Setting calibration temperature: The lower display shows 'C°C' and the upper display shows the last configured calibration temperature. Press ▲ or ▼ key to adjust the upper display to desired calibration temperature. Allowable range: 0.0 to 100.0°C.

Press ENT key to confirm the calibration temperature. The Transmitter reverts to **SET °C** screen.

5.5 Range Settings

The range settings allow you to map the Transmitter output current range (4-20 mA) to dissolve oxygen reading range (Zoom window). You can define the lowest DO reading of the Transmitter to 4mA (LO) and the highest DO reading to 20mA (HI). The current output can then be connected to a chart recorder to plot the DO variations.

Unit of	Zoom Window	
Measurement	Default Lower Limit (LO)	Default Upper Limit (HI)
% saturation	0.00	199.9
ppm	0.00	19.9
mg/l	0.00	19.9



From measurement mode **press ENT key** to enter setup mode as described in section 5.1. The LCD shows the first screen of setup mode (**COF**). **Press ▲ or ▼ key** to select range settings screen (**SEt rng**).

Press ENT key to access range settings (SEt rng).

Select lower limit: The lower display shows 'LO'. The upper display shows the last configured lower limit, otherwise the default lower limit. Press ▲ or ▼ key to adjust the upper display to desired value.

Press ENT key to confirm the value.

3 Select upper limit: The lower display shows 'HI'. The upper display shows the last configured upper limit, otherwise the default upper limit. Press ▲ or ▼ key to adjust the upper display to desired value.

Press ENT key to confirm the value. The Transmitter reverts to **SET rng** screen.

5.6 Hold Settings

When you switch the Transmitter to calibration mode or setup mode, the transmitter goes to the 'HOLD' status (indicating '**HOLD**' in the display) and freezes the current output at a specific value. Hold setting allows you to define the output current of the Transmitter when the Transmitter is in 'HOLD' status.



From measurement mode **press ENT key** to enter setup mode as described in section 5.1. The LCD shows the first screen of setup mode (**COF**). **Press ▲ or ▼ key** to select hold settings screen (**SEt HLd**).

Press ENT key to access hold settings (SEt HLd).

- 2 The upper display shows '**HLd**' and the lower display shows the last configured hold setting ('**On**' or '**OFF**'). **Press** ▲ or ▼ key to select the required choice for hold.
 - Select On to freeze the current output at 22mA
 - Select **OFF** to freeze the current output at its **last measured value**.
 - **NOTE:** The last current output value depends on the last measured DO reading and the range settings defined in the section 5.5

Press ENT key to confirm your selection. The Transmitter reverts to **SET HLd** screen.

Press ▲ or ▼ key to access other setup screens or press ▲ and ▼ key simultaneously (escape) to return to measurement mode.

5.7 Out of Range Settings

When the Transmitter measures a dissolved oxygen value which does not fall within the DO range (Zoom window) defined in the 'Range Settings', the reading is said to be 'out of range'. Out of range setting allows you to define the output current of the Transmitter when the Transmitter measures an 'out of range' DO reading.



From measurement mode press ENT key to enter setup mode as described in section 5.1. The LCD shows the first screen of setup mode (COF). Press ▲ or ▼ key to select out of range settings screen (SEt org).

Press ENT key to access out of range settings (SEt org).

- The upper display shows 'org' and the lower display shows the last configured out of range setting ('On' or 'OFF'). Press ▲ or ▼ key to select the required choice.
 - Select **On** to set output current to **3.8mA**
 - Select **OFF** to set output current to the boundary values:
 - That is: To set output current to **4mA** when DO reading goes bellow lower limit of the zoom window and,

To set output current to **20mA** when the DO reading goes above the upper limit of the zoom window.

Press ENT key to confirm your selection. The Transmitter reverts to **SET org** screen.

5.8 Viewing Calibration Point

Calibration setting lets you view the high-point at which the calibration has been performed in the Transmitter.



From measurement mode press ENT key to enter setup mode as described in section 5.1. The LCD shows the first screen of setup mode (COF). Press ▲ or ▼ key to select viewing calibration settings screen (CAL).

Press ENT key to view calibration settings (CAL).

- The buffer annunciator appears in the LCD. The upper display shows the value of the high-point at which the calibration has been carried out. The corresponding unit of measurement of calibration is displayed.
 - **NOTE:** If the Transmitter has not been calibrated yet for the currently selected unit of measurement, the LCD shows an empty reading ("---") in the upper display.

Press ENT key to exit calibration settings screen. The Transmitter reverts to **SET CAL** screen.

5.9 Viewing Electrode Condition

The electrode condition (correction factor=K) is an indication of its current working condition with respect to its original condition. The correction factor is calculated and stored in the Transmitter each time calibration is done.

Electrode Correction Factor (K) = <u>Theoretical reading of the electrode</u>

Default reading of the electrode



From measurement mode press ENT key to enter setup mode as described in section 5.1. The LCD shows the first screen of setup mode (COF). Press ▲ or ▼ key to select viewing electrode condition screen (ELE).

Press ENT key to view electrode condition (ELE).

- ² The electrode annunciator appears in the LCD. The upper display shows the current correction factor of the electrode (**K**)
 - **NOTE:** If the Transmitter has not been calibrated yet for the currently selected unit of measurement, the LCD shows an empty reading ("---") in the upper display.

Press ENT key to exit the electrode condition screen. The Transmitter reverts to **ELE** screen.

5.10 Resetting

Resetting restores the Transmitter to its factory default settings. It resets the calibration to factory defaults without resetting other parameters of the Transmitter.



From measurement mode press ENT key to enter setup mode as described in section 5.1. The LCD shows the first screen of setup mode (COF). Press ▲ or ▼ key to select resetting screen (rSt).

Press ENT key to access resetting (rSt).

- The upper display shows 'rSt'. The lower display shows 'CAL'. Press ▲ or ▼ key to select :
 - **CAL :** to reset calibration values to factory defaults, when confirmed by pressing ENT key
 - FCt: to reset all the parameters, including calibration, when confirmed by pressing ENT key
 - NOTE: You can press ▲ and ▼ keys simultaneously (escape) to exit resetting mode if you do not wish to reset the Transmitter at this time.

Press ENT key to confirm the resetting selection. The Transmitter performs reset function. LCD indicates that the reset has been performed by blinking your selection ('CAL' or 'FCt'). The Transmitter reverts to **rSt** screen.

Press ▲ or ▼ key to access other setup screens or press ▲ and ▼ key simultaneously (escape) to return to measurement mode.

6. Technical Specifications

General Specification	
(a) Dissolved Oxygen (% saturation)	
Measuring Range	0.00 to 199.9 %
Resolution	0.1 %
Relative Accuracy	± 1.5% of full-scale reading
(b) Dissolved Oxygen (ppm or mg/l)	
Measuring Range	0.00 to 19.99 ppm or 0.00 to 19.99 mg/l
Resolution	0.01 ppm or 0.01 mg/l
Relative Accuracy	± 1.5% of full-scale reading
(c) Temperature	
Measuring range	0.0 to +100.0 °C
Resolution	0.1 °C
Relative accuracy	± 0.5 ℃
Sensor	Pt100 (2 wire or 3 wire)
Calibration	
(a) Dissolved Oxygen	
Number of calibration points	1 or 2 points
(b) Temperature	
Offset Adjustment	± 10 °C
Compensation	
Temperature Compensation	Automatic or Manual (0 to 50 °C)
Pressure Compensation	0.74 to 3.00 BAR
	550 mmHg to 2250 mmHg (225 cmHg)
	10.7 to 43.5 PSI
	(Manual setting and automatic correction)
Salinity Compensation	0.0 to 50.0 ppt
	(Manual setting and automatic correction)
Output Parameters	
Output Current	4 to 20 mA (Galvanically Isolated)
Over/Under Range Output Current	ON Select : 3.8 mA
	OFF Select: 4 mA (under range), 20 mA (over range)
HOLD Output Current	ON Select : 22 mA
	OFF Select : Last measured current
Load Resistance	600 ohms (max.) at 24V
Display	
LCD	7 segments display with symbols for status information
Electrical Data and Connections	
DO Input	Screw Terminal (3.5mm pitch)
Connection terminal	8-pin & 3-pin terminal blocks

Other			
Power Input	12 to 24 VDC		
Dimensions (W x H x D)	96mm x 96mm x 66 mm		
Weight (Estimated)	210g		
Ambient Temp. operating range	0 to 40 °C		
Maximum Relative Humidity	80% up to 31 °C decreasing linearly to 50% at 40°C		

7. List of Accessories

7.1 Eutech Instruments

Transmitter Replacement and Accessories

Item Description	Order Code
Alpha-DO 500 Transmitter	ECDOCTP0500
General Purpose Epoxy-body Dissolved Oxygen Electrode with PT100, range: 0.50 - 20 ppm, 5m cable length, tinned open-ended	ECDOGEN-S
Special Purpose Epoxy-body Low Dissolved Oxygen Electrode with PT100, range: 0.03 -20 ppm, 5m cable length, tinned open-ended.	ECDOTPII-S
Set of 5 O-rings & membranes (DOGEN-S)	01X241605
Set of 5 O-rings & membranes (DOTPII-S)	01X241606
Large O-ring (DO GENS/TPIIS)	32X246702
Tool for DOGEN-S Membrane Housing	15X241503
DO Refilling Electrolyte for EC-DOGEN-S (480ml bottle)	ECDOGENSOLNBT
DO Refilling Electrolyte for EC-DOTPII-S (480ml bottle)	ECDOTPIISOLNBT

7.2 Oakton Instruments

Controller Replacement and Controller Accessories

Item Description	Order Code
Alpha-DO 500 Transmitter	35151-10
General purpose epoxy-body dissolved oxygen electrode with Pt100 temperature sensor, 0-20 ppm, 10 foot cable length, tinned open-ended.	35201-50
DO probe maintenance kit; Includes 2 Teflon membranes, 2 membrane O-rings, 1 body seal O-ring, 125mL electrolyte	35201-70
Set of 5 O-rings & Teflon membranes	35201-65
Replacement electrolyte solution for 35201-50, 500 mL	35640-71

NOTE:

• To order **Oakton** accessories, contact the nearest Oakton distributor

8. Troubleshooting

Problem	Ca	nuse	Sc	olution
Power on, but no display		Loose connections Power cables not in correct	a)	Ensure cables make good contact
	c)	polarity (+ & -) Incorrect output voltage of	b)	Re-wire loop cables with correct polarity
	•)	the power supply	c)	Use a power supply with specified output voltage
Unstable dissolved oxygen reading	a) b)	Air bubbles in electrode Dirty electrode	a)	Tap electrode to remove air bubbles
•	,	,	b)	Clean electrode and recalibrate
Oscillating temperature readings	a)	Electrical noise interference	a)	Ensure shield wire is properly connected to pin 7
Slow response	a)	Dirty / Oily electrode	a)	Clean electrode
Blinking ATC	a)	No temperature probe connection during ATC mode	a)	Ensure temperature sensing cable makes good contact
Blinking electrode annunciator	a)	Error in calibration	a)	Ensure calibration standard solution is not contaminated. Ensure electrode is clean.
Or (Dissolved oxygen)	a)	Dissolved oxygen electrode is not connected	a)	Ensure electrode makes good contact with Transmitter
Or (Temperature)	a)	Temperature probe is not connected when ATC enabled	a)	Ensure electrode makes good contact with Transmitter

9. General Information

9.1 Warranty

Eutech Instruments warrants this product to be free from significant deviations in material and workmanship for a period of one year from the date of purchase. If repair is necessary and not the result of abuse or misuse within the warranty period, please return by freight pre-paid and amendment will be made without any charge. Eutech Instrument Customer Service Dept. will determine if the product problem is due to deviations or customer abuse. Out-of-warranty products will be repaired on an exchange basis at cost.

9.2 Return of Goods

Before returning goods for any reason whatsoever, the Customer Service Dept. has to be informed in advance. Items must be carefully packed to prevent damage during shipment, and insured against possible damage or loss. Eutech Instruments/ Oakton Instruments will not be responsible for any damage resulting from careless or insufficient packing.

Warning: Shipping damage as a result of inadequate packaging is the user's/distributor's responsibility. Please follow the guidelines below before shipment.

9.3 Guidelines for Returning Unit for Repair

Use the original packaging material if possible when shipping the unit for repair. Otherwise wrap it with bubble pack and use a corrugated box for additional protection. Include a brief description of any faults suspected for the convenience of Customer Service Dept., if possible.

9.4 Maintenance and Cleaning

Maintenance

The α lpha DO 500 Transmitter contains no user repairable components. Please contact Eutech Instruments or its distributor if there is any problem with the unit.

Cleaning

To remove dust, dirt and spots, the external surfaces of the DO Transmitter may be wiped with a damp, lint-free cloth. A mild household cleaner can also be used if necessary.

10. Appendices

10.1 Appendix 1 – Salinity vs. Temperature (@ 760mmHg)

The following table shows the Dissolved Oxygen values at different salinity values, at different temperatures, at barometric pressure of 760 mmHg. For other pressure levels, the Transmitter automatically corrects the value based on the pressure value input.

Temp	erature		Sa	alinity (p	pt)	
°C	°F	0	10	20	30	40
0	32.0	14.6	13.8	13.0	12.1	11.3
1	33.8	14.2	13.4	12.6	11.8	11.0
2	35.6	13.8	13.1	12.3	11.5	10.8
3	37.4	13.4	12.7	12.0	11.2	10.5
4	39.2	13.1	12.4	11.7	11.0	10.3
5	41.0	12.7	12.1	11.4	10.7	10.0
6	42.8	12.8	11.8	11.1	10.5	9.8
7	44.6	12.1	11.5	10.9	10.2	9.6
8	46.4	11.8	11.2	10.6	10.0	9.4
9	48.2	11.5	11.0	10.4	9.8	9.2
10	50.0	11.3	10.7	10.1	9.6	9.0
11	51.8	11.0	10.5	9.9	9.4	8.8
12	53.6	10.7	10.3	9.7	9.2	8.6
13	55.4	10.5	10.1	9.5	9.0	8.5
14	57.2	10.3	9.9	9.3	8.8	8.3
15	59.0	10.1	9.7	9.1	8.6	8.1
16	60.8	9.8	9.5	9.0	8.5	8.0
17	62.6	9.6	9.3	8.8	8.3	7.8
18	64.4	9.4	9.1	8.6	8.2	7.7
19	66.2	9.2	8.8	8.5	8.0	7.6
20	68.0	9.1	8.7	8.3	7.8	7.4
21	69.8	8.9	8.6	8.1	7.7	7.3
22	71.6	8.7	8.4	8.0	7.6	7.1
23	73.4	8.6	8.3	7.9	7.4	7.0
24	75.2	8.4	8.1	7.7	7.3	6.9
25	77.0	8.2	8.0	7.6	7.2	6.7
26	78.8	8.1	7.8	7.4	7.0	6.6
27	80.6	8.0	7.7	7.3	6.9	6.5
28	82.4	7.8	7.6	7.1	6.8	6.4
29	84.2	7.7	7.4	7.0	6.6	6.3
30	86.0	7.6	7.3	6.9	6.5	6.1
31	87.8	7.4	7.1	6.7	6.4	6.0
32	89.6	7.3	7.0	6.6	6.3	5.9
33	91.4	7.2	6.9	6.5	6.2	5.8
34	93.2	7.1	6.8	6.5	6.1	5.7
35	95.0	7.0	6.7	6.4	6.0	5.6
36	96.8	6.8	6.5	6.2	5.9	5.5
37	98.6	6.7	6.4	6.1	5.8	5.4
38	100.4	6.6	6.3	6.0	5.7	5.3
39	102.2	6.5	6.3	5.9	5.6	5.2
40	104.0	6.4	6.3	5.8	5.5	5.2

10.2 Appendix 2 – Abbreviations Used in LCD

Abbreviation	Description
AtC	Automatic Temperature Compensation
bAr	Pressure in Bar
bUFF	Buffer
CAL	Calibration
CHg	Pressure in centimeter of mercury
C°C	Calibration Temperature
ELE	Electrode condition
FCt	Factory defaults
Hg	Pressure in millimeter of mercury
HI	High limit
HLd	Hold
LO	Low limit
OFS	Offset
Or	Reading is over range
Org	Out of range
P°C	Process Temperature
PrE	Pressure
PSI	Pressure in pounds per square inch
rng	Range
rSt	Reset
Set	Setting
Unt	Unit
Ur	Reading is under range
1.Pt	1-point calibration
2.Pt	2-point calibration

For more information on Eutech Instruments' products, contact your nearest distributor or visit our website listed below:

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