EXPERTS IN WATER CHEMISTRY SINCE 1903

4165P Ultra Portable Dissolved Oxygen Analyzer

4165P-002E-Rev 1.0

WALTRON CUSTOMER COMMITMENT

This instruction manual is a technical guide to aid the customer in the set-up, operation, and maintenance of their new Waltron measuring system. Waltron provides continuous product improvement and reserves the right to make any modifications to the information contained herein without notice.

Technical questions concerning this product should be addressed to:

Waltron Technical Service Department
Flemington, New Jersey
Phone: (908)-534-5100
Fax: (908)-534-5546
www.waltron.net

Please be ready to provide the following information:

- Date analyzer was purchased
- Analyzer model and serial number
- Recent maintenance history
- Calibration values, dates, and detailed description of problem

Waltron's technical expertise and extensive experience provides personalized solutions to the water quality industry. It is Waltron's commitment to provide the customer with timely and accurate technical service and support.

Waltron fully expects the customer to be satisfied with the quality, performance, and cost of this product.

If there are any questions or concerns regarding this product, please feel free to contact Waltron at (908)-534-5100.

Thank you for choosing Waltron!

Please note the Waltron mailing and shipping address:

Waltron Bull & Roberts, LLC
25 Minneakoning Road, Suite 101
Flemington, NJ 08822

SAFETY

Please observe proper safety and handling precautions when installing, operating, maintaining, and servicing this product. The following should be noted and adhered to:

- Read and understand this manual before working with analyzer.
- Pay special attention to warning labels on enclosures, containers, packages and chemicals.
- Only qualified personnel should be involved in the installation, operation, and servicing of the analyzer.
- Follow safety precautions when operating this analyzer in conditions of high pressure and/or temperature.
- Keep analyzer chemicals away from heat and extreme temperatures. Reagent powders must be kept dry.
- Follow all regulations and warning labels when disposing of chemicals. Do not mix chemicals.

To obtain analyzer safety information or Safety Data Sheets (SDS), please contact Waltron or visit the website at www.waltron.net .

WARRANTY AGREEMENT

If, within one year from the date of shipment, the customer experiences any equipment defects or is not satisfied with the analyzer manufacturing, Waltron will repair, or at its option, replace any defective part(s) free of charge. This warranty requires that the defective part(s) be returned to Waltron with shipping charges prepaid.

At Waltron discretion, a Technical Service Specialist may be sent out to repair or replace the defective part(s) on location. Traveling time and expenses of the Technical Service Specialist is at the customer's expense.

Equipment sent to Waltron must be appropriately packaged and the following information must be provided prior to returning to Waltron:

- The Return Authorization (RA) number assigned to the customer by the Waltron Technical Service Department
- Customer name, address and department
- Name and telephone number of the individual responsible for returning items for repair
- Brief problem description

Ship to Waltron service center:

Waltron Bull & Roberts, LLC
25 Minneakoning Road, Suite 101
Flemington, NJ 08822

The Waltron Warranty Agreement:

- Covers expendable sensors for one month after shipment and reusable electrodes for six months after shipment.
- Does not apply to damages occurred during shipping.
- Warranty will be nullified if goods have been used for purposes other than those for which they are intended or if any seal has been removed, broken or tampered with or if the Waltron trademark or serial number has been removed, defaced, or altered.
- Does not cover expendable supply items such as reagents, tubing and electrolytes.
- Does not cover misuse or mistreatment by the user.
- Does not cover previous repair or alteration by unauthorized individuals.

Waltron does not assume responsibility for contingent liability through alleged failure or failures of products or product accessories.

CHECKLIST OF MATERIALS

- To ensure customer satisfaction, Waltron does its best to provide adequate and timely packaging and shipping services. Please perform the following after receiving a shipment:

- Inspect all shipping containers upon receipt and record any visible damage. If there are any outward signs of damage, please retain all containers and packages for inspection by the carrier. Please retain all packing material so that it can be used for future moving and shipping needs.

- Check all items received against those on the packing list. Chemicals are usually shipped in a separate package and will be itemized accordingly.

- Verify that the number of packages received agrees with the packing list and shipping papers.

- Notify both Waltron and the carrier if any problems occur.

Important Notice:

- All analyzers are inspected and tested prior to shipment.
- In normal use, the unit should require only minor maintenance and should operate correctly and without fault over a long period of time.
- Failure to carry out correct maintenance procedures may result in inaccurate analyzer readings.

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1 INTRODUCTION

I.1.1 GENERAL OVERVIEW

The 4165P Ultra Portable Luminescent Dissolve Oxygen Analyzer is set up and fully factory calibrated, ready for measurement out of the box.

The 4165P Ultra Portable is a microprocessor-controlled advanced technology portable luminescent dissolved oxygen analyzer. The internal power source is a rechargeable Nickel Metal Hydride high performance battery. It is charged via the external wide range AC power via the IEC 320 Plug and socket.

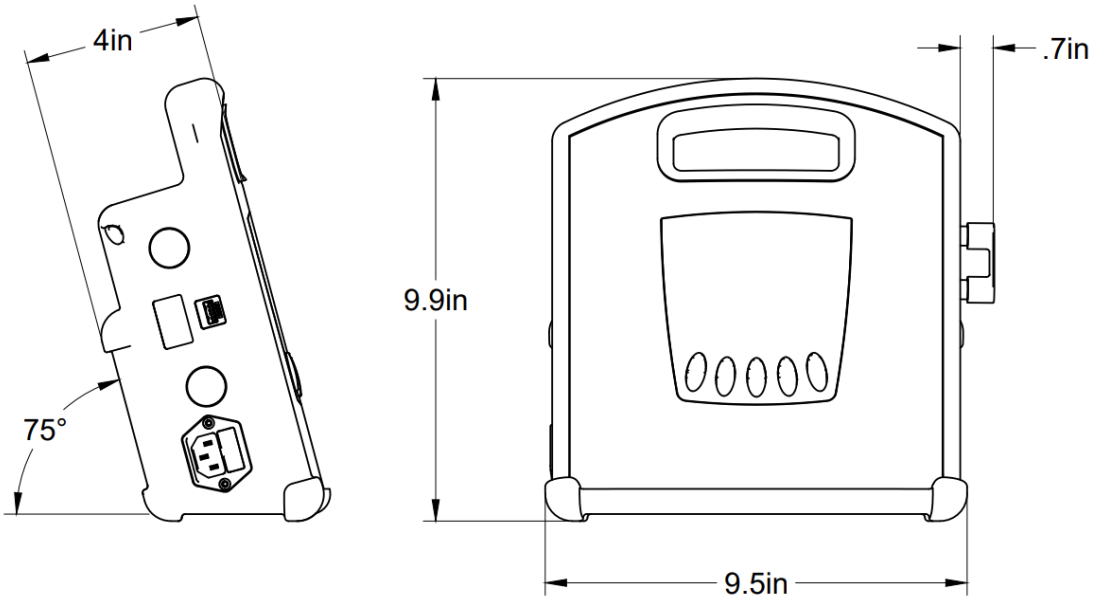
The instrument will continue to operate with the AC input connected and simultaneously charge the battery

A single 4-20mA output can connect to any 4-20mA compatible device and is typically connected using the Waltron available data logger item no. 4165P-035

The interface is a multifunction LCD display with a back light and the menus are accessed by the tactile press function buttons.

Simple inlet and outlet quick connect specialized low O2 permeability hoses are used for the sample Ultra Pure DI Water connections

B. 1.2 GENERAL SPECIFICATIONS



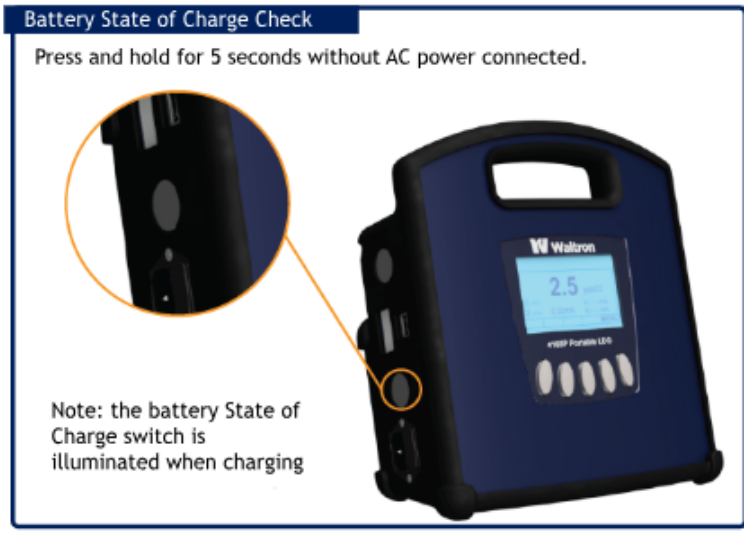
Ambient Operating Conditions:	Temperature 0 to +55°C, Relative Humidity 5 to 95%, non-condensing.
Display:	3¾“240x128 dot LCD Module
Display Backlight:	Can be set to flash to indicate the instrument’s alarm status. Automatic shut off after 2 minutes. Pressing any button will illuminate
Buttons:	5 tactile feedback micro-switched, silicone rubber
Current Outputs Specifications:	Single current output as standard 0-20mA or 4-20mA into 750 ohms max, fully isolated to 2kV. Expandable up to 5% of any operating range and offset anywhere in that range.
EMC:	S.I. 2016/1091 & 2014/30/EU using BS EN 61326-1: 2013.
Safety/Low Voltage Directive:	S.I. 2016/1101 & 2014/35/EU using BS EN 61010-1: 2010.
Power Supply:	Universal 90-265V AC, 8W max.
Instrument Housing:	UL 94-V0 PC/ABS.
Ingress Protection Rating (IEC 60529 Protection Rating):	IP65.

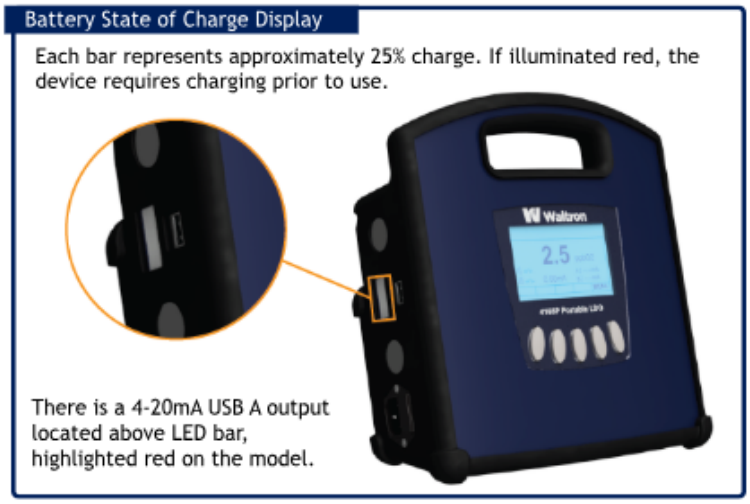
Weight:	Maximum 3.5Kg (instrument only).

2 INSTRUMENT LAYOUT

2.1 Battery State of Charge

Below is the instrument layout with the information on the user interface.





I.2.2 BATTERY CHARGING

The system uses a high performance NiMH battery with a continuous usage of 8+ hours when fully charged and ambient temperature at 20C. To check the battery State of Charge, press and hold the button as highlighted above. Hold for 5 seconds and the battery level indicator will light up. There are 4 bars which each indicate approx 25% of the battery charge. The AC power must not be connected when checking the battery level.
Charging the battery will take 6 hours from discharge and the system is switched off. With the battery fully discharged and the AC power applied the analyzer can be switched and used. In this mode the battery will trickle charge and will require at least 12 hours for full charge.

II.2.2 MASTER POWER SWITCH

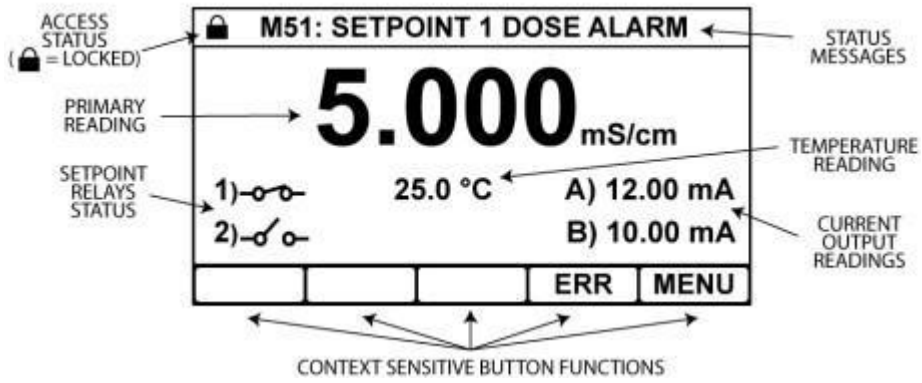
The master power switch will turn the analyzer completely off. The battery State of Charge will remain active and if the AC is connected the charging LED ring around the State of Charge will illuminate, indicating that the battery is charging.

Power on the unit using the push button master system switch. Wait for 1 minute while the system initializes and is ready to be connected for measurement.

3 USER INTERFACE

The 4165P uses a 3¾" 240x128 dot LCD Module to display the primary reading and temperature, show operational status and to provide an intuitive user interface. This is accompanied by 5 control buttons whose function varies depending upon which screen the user is viewing. The button function is indicated by the control section at the bottom of the display.

C. 3.0.1 THE FRONT SCREEN



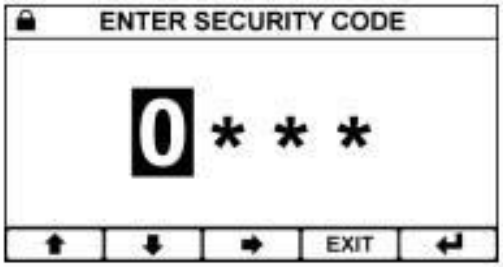
The main menu is split into two main sections. The top shows the current menu you are currently in whether there are further menu options below. The bottom section shows the current options for that menu which may be selected by moving the cursor with the arrow buttons and pressing the enter button. The exit button is used to return to the previous menu. If no buttons are pressed after 2 minutes the instrument will default back to the front screen.

D.

E. 3.0.2 SECURITY CODE ACCESS

To protect the instrument setup from unauthorized or accidental tampering, a security access code system is present. This is implemented via the instrument's menu system which operates in two modes, "locked" as indicated by a padlock symbol and "unlocked" as indicated by a key symbol. The locked mode allows the user to observe the instrument's configuration but without the ability to change it. If the user wishes to change a setting, then the "Security Code" menu will appear that will prompt them to enter the security code which will then change the instrument mode to "unlocked". Once unlocked, the user can change any setting without having to re-enter the security access code, however the instrument will automatically lock itself if no further buttons are pressed after 2 minutes 30 seconds.

The default security access code is <u>1000.</u>

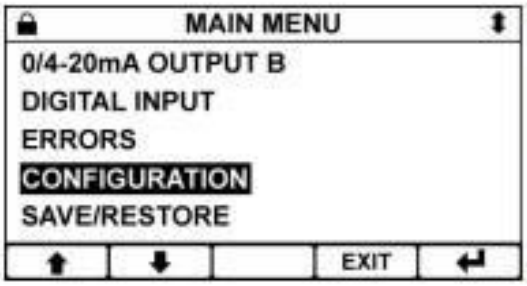


Enter the required Access Code.

If the code is incorrect the user will be prompted to try again. If the code is correct the padlock at the top of the screen will turn to a key and the unit will be unlocked.

3.1 CONFIGURATION

The configuration menu enables the user to configure the basic operating parameters of the instrument.

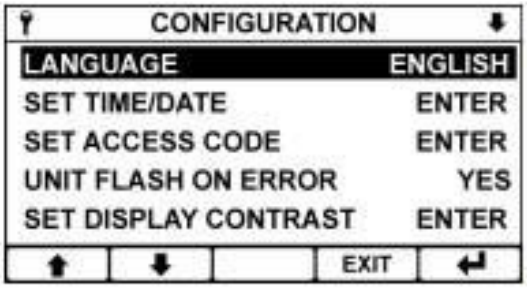


Main Menu

From the front screen press the menu button to show the main menu options and select Configuration.

↑/↓ – Select Option
EXIT – Return to Front Screen
↵ – Enter Option

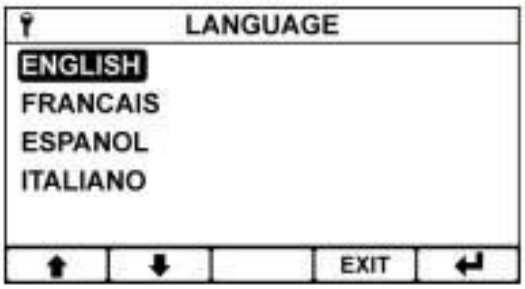
I.3.2 LANGUAGE



Configuration Menu

Select the function you wish to configure.

↑/↓ – Select Option
EXIT – Return to Main Menu
↵ – Enter Option

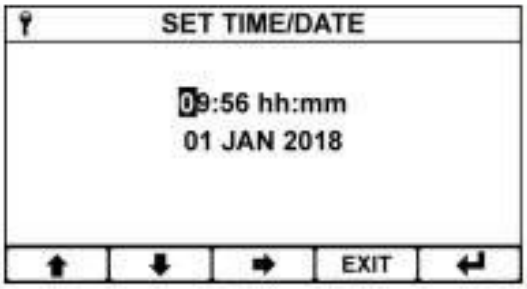


Language

The 4165P has the ability to support multilingual menus. The language of choice can be selected from this menu.

↑/↓ – Select Option
EXIT – Cancel
↵ – Save Selection

II.3.3 DATE AND TIME

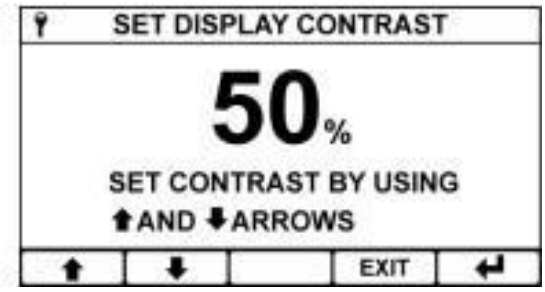


Set Time/Date

Sets the instrument's time and date.

↑/↓ – Increase / Decrease Digit / Item
→ – Select Next Digit / Item
EXIT – Cancel
↵ – Save Time

III. 3.4 SET DISPLAY CONTRAST



Set Contrast

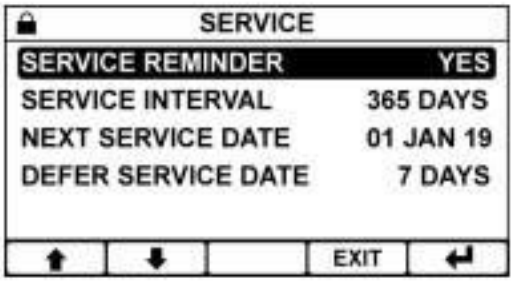
This allows the user to adjust the contrast of the display to compensate for environmental conditions that may affect the readability of the display.

↑/↓ – Adjust Contrast
EXIT – Return to Configuration Menu
↵ – Enter Option

IV.

v.3.5 SERVICE

The 4165P features a service reminder system that will inform the user when the instrument is due for its service.

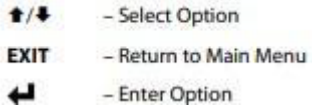


Service Alarm

Service alarm configuration:

- Service Reminder – Turn the service alarm on or off. Requires service security code prior to use.
- Service Interval – Set the Service Interval. Requires service security code prior to use.
- Next Service Date – Sets the exact service date. Requires service security code prior to use.
- Defer Service Date – Only appears once the service interval has expired. Increases the service interval

by an extra 7 days. Requires standard security code prior to use.



2. 4 CONNECTING AND MEASURING

Use both supplied connecting hoses. Both ¼" and ⅜" ID hoses are supplied. These are specialized ultra low 02 permeability hoses and connections to maintain high precision Dissolved Oxygen measurements.

(Remove the Protective Cap)
Ultra Pure Water Inlet Connection

(Remove the Protective Cap)
Ultra Pure Water Outlet Connection

With Waltron's Luminescent Dissolved Oxygen Technology, measurement is independent of flow rate, providing that the sample being measured is refreshed each time. NOTE: Ensure that the sample pressure is below 147 PSIG (10 BAR 1000 Kpa)

3. Power on the 4165P and wait for 1 minute for initialization.
4. Connect the hoses and start the UPW flow. Wait for 15 minutes to ensure that a rinse down occurs.
5. The 4165P will refresh the measurement every 20 seconds

6. 5 TROUBLESHOOTING

NOTE: THERE ARE NO USER SERVICEABLE PARTS INSIDE THE UNIT

The 4165P has been designed to include a wide range of self-diagnostic tests, some of which are performed at switch on, and some on a continuous basis. This guide aims to provide a route to diagnosing and correcting any faults that may occur during normal operation. The table shown previously in this section gives a list of what the 4165P generates, along with their probable causes. If after these checks the fault has not been cleared contact Waltron. Please have as much of the following information available as possible in any communication with Waltron, to enable quick diagnosis and correction of the problem.

- Serial number of the instrument.
- The approximate date of purchase.
- Details of the program settings and application.
- Electrical environment and supply details.
- Circumstances under which the fault occurred.
- The nature of the fault or faults.

. Any error messages that are displayed.

7. 6 SPARE PARTS - CONSUMABLES - ACCESSORIES

Spare Parts Listing - Description	Part No.
4165P LDO PORTABLE ANALYZER 0-200ppb	4165P-01-A01
4165P LDO PORTABLE ANALYZER 0-2000ppb	4165P-02-A01
4165P LDO PORTABLE ANALYZER 0-22ppm	4165P-03-A01
1/4" Ultra Low O2 Permeability Hose - Inlet/Outlet - 1M	4165P-039
3/8" Ultra Low O2 Permeability Hose - Inlet/Outlet - 1M	4165P-040
AC Power Cord Black NEMA 5-15P To IEC 320-C13 - 2M - USA	4165P-046
Protective Cap for Inlet/Outlet	4165P-047
Consumables - Description	**Part No.**
Zero Oxygen Water, 200ml bottle, Single - Zero Calibration	K6000-112
Zero Oxygen Water, 200ml bottles, 4-Pack - Zero Calibration	K6000-121
Oil-Resistant Buna-N O-Ring Inlet/Outlet connectors	4165P-031
Accessories - Description	**Part No.**
USB Data Logger	4165P-035
Padded Soft Carry Case	4165P-015
Water Proof - Shock Proof IP67 Industrial Carrying Case	4165P-049

8. 7 ERROR MESSAGES

Switch On Diagnostic Errors

E01: Read/Write Error
Try switching the unit off and then on again. If the message persists, consult with Waltron, as this unit may require to be returned for repair.

E02: Data Error
The instrument configuration has for some reason become corrupted. Try switching the unit off and then on again. If the message persists use the Default Instrument function in the Save/Restore menu or consult with Waltron, as this unit may require a repair.

E03: Storage Error
The save setup configuration has for some reason become corrupted. Try switching the unit off and then on again. If the message persists use the delete setup function in the Save/Restore menu or consult with Waltron, as this unit may require a repair.

E04: Factory Error
The factory configuration has for some reason become corrupted. Try switching the unit off and then on again. If the message persists, consult with Waltron, as this unit may require to be returned for repair.

E05: User Cal Error
The instrument user calibration has for some reason become corrupted. Try switching the unit off and then on again. If the message persists use the Default Instrument function in the Save/Restore menu or consult with Waltron, as this unit may require a repair.

Sensor Input Errors

E23: Sensor Over Range
The sensor reading is greater than the specified upper limit, check channel settings, Sensor condition and connections. If the message persists, consult with Waltron.

E24: Sensor Under Range
The sensor reading is less than the specified lower limit, check channel settings, Sensor condition and connections. If the message persists, consult with Waltron.

E31: Temperature Over Range
The temperature reading is greater than the specified upper limit, check channel settings, Sensor condition and connections. If the message persists, consult with Waltron.

E32: Temperature Under Range
The temperature reading is less than the specified lower limit, check channel settings, Sensor condition and connections. If the message persists, consult with Waltron.

Setpoint Status

M51: Setpoint 1 Dose Alarm

M52: Setpoint 2 Dose Alarm
The dose alarm for the setpoint is active.

M90: Setpoint 1 Triggered

M91: Setpoint 2 Triggered
The setpoint has been triggered. (Only shows when setpoint flash on trigger is enabled.)

Current Output Errors

E61: Output A Hardware

E71: Output B Hardware
The current output circuit has detected an error in the current output loop; this is most commonly due to either a broken loop or too large a load resistor.

E62: Sensor < OP A Zero

E72: Sensor < OP B Zero
The sensor input level is below that set for the current output zero.

E63: Sensor > OP A Span

E73: Sensor > OP B Span
The sensor input level is greater than that set for the current output span.

E64: Sensor > OP A Zero

E74: Sensor > OP B Zero
The sensor input level is greater than that set for the current output zero.

E65: Sensor < OP A Span

E66: Sensor < OP B Span
The sensor input level is below that set for the current output span.

Service Messages

M80: Service Due
The Planned Service interval for this unit has expired. Please contact Waltron.

M81: Calibration Due
The user entered calibration interval has expired. Please contact Waltron.

M82: Service Mode Active
The unit is currently in service mode, the setpoints and current outputs may not respond as configured. Please contact Waltron.

A. 8 SPECIFICATIONS

4165P Ultra-Portable Luminescent Dissolved Oxygen | General Specification	
Display	3.75” 240 x 128 dot LCD module
Display backlight	Can be set to flash to indicate and instrument alarm status
Languages	English, French, Spanish and Italian
Operating Buttons	5, Silicone rubber tactile feedback micro-switched
Current output specification USB A connector	Single current output, selectable 0-20mA or 4-20mA into 750 ohms max, fully isolated to 2Kv. Expendable across full operating range and offset anywhere in that range. Loop fault detection
Temperature accuracy	+/- 0.5 C
Operator adjustment (temperature)	+/- 50 C or +/- 122 F
Range of temperature compensation	-10 C to + 150 C (+14 F to + 302 F) for full specification
Ambient operating conditions	Temperature -20 to +55 C, relative humidity 5 to 95%, non-condensing
Ambient temperature variation	+/- 0.01% of range / C (typical)
EMC	2014/30/EU using BS EN 61326-1: 2013
Low voltage directive	2014/35/EU using BS EN 61010-1: 2010
RoHS directive	2011/65/EU using BS EN 50581:2012
Power supply	90-265vAC 15W max
Instrument housing	UL 94-VO ABS
Ingress protection rating	IP66
Weight	6.5 lbs. (3 kg)
Battery type	NiMH rechargeable
State of charge	LED Battery state of charge indicator (momentary push button)
Master on/off power switch	LED illuminated on/off

4165P Ultra-Portable Luminescent Dissolved Oxygen | Performance Specification	
Range	0-200 ppb, 0-2000ppb, 0-22ppm
Accuracy	+/- 0.6 ppb at 1 ppb / 2 % of the measured value
Sample Rate	One sample every 20 Secs
Current Output	USB A, 4-20 mA
Calibration	Every 2 years (including sensor spot renewal)
Sample Medium	Liquid
Sample Temperature	32-131 F (0 -55 C)
Sample Pressure	Maximum of 145 psig (10 bar)
Sample Interferences	None (except for aromatic organic solvents; chlorine gas will damage sensor spot
Sample Connection	1/4” and 3/8” quick disconnects
System Runtime on battery	10 hours continuous use
System Charge time	6 hours from total discharge