150 & 450 Series Waterproof Handheld Meter
pH/mV Operation Instructions

EUTECH INSTRUMENTS Technology Made Easy ...   **OAKTON®**

Models:

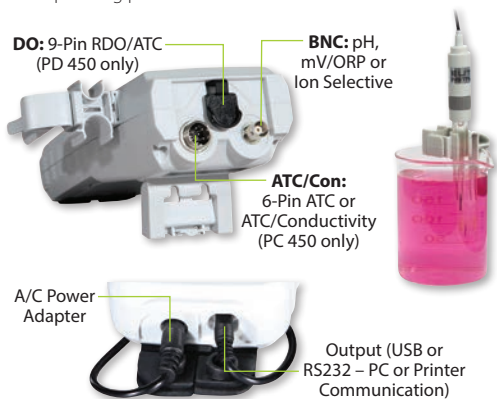| pH 150	pH 450	PC 450	PD 450
pH/mV	pH/mV/ISE	pH/mV/Con	pH/mV/DO

Getting Started/Connections

After installing (2) AA batteries and/or connecting the optional 110/220 VAC power supply, connect the desired sensors to the corresponding ports.

DO: 9-Pin RDO/ATC (PD 450 only)

BNC: pH, mV/ORP or Ion Selective

ATC/Con: 6-Pin ATC or ATC/Conductivity (PC 450 only)

A/C Power Adapter

Output (USB or RS232 – PC or Printer Communication)

12 mm and 16 mm probes can utilize the **Grip-Clip™** to attach one or more sensors to a beaker and to the instrument as needed. The stand can be extended as shown above or used for wall-mounting.

Keypad Functions

⏻	Press once to power ON in the mode that was previously used. Press again to turn backlight on for one minute or off (450 series only). Hold for 3 seconds to power OFF.
CAL / MEAS / BACK	Toggle between measurement and calibration modes. In SETUP mode, BACK serves to return to the previous menu option or setting.
ENTER / HOLD	Confirm calibration values in CAL mode. Confirm selections in SETUP mode. Freeze or release the measured reading.
SETUP	Customize instrument settings and preferences. (See also **Setup Programs**)
MODE	Toggle between available measurement types.
SAVE ▲	Save measurement into memory. Increase value or scroll up in SETUP or manual calibration.
VIEW ▼	Recall saved values from memory. Decrease value or scroll down in SETUP or manual calibration.
🖨	Send output data to printer or computer. (450 series only).

Setup Programs

To access the settings below, press **SETUP**. Up/down arrows will display the available options. Press **ENTER** to accept the desired setting, or **BACK** to return to the previous option and/or exit.

Configuration Options
• Ready indicator **ON** / **OFF** / or Automatic **HOLD** when stable
• Choose **°C**elsius or **°F**ahrenheit

pH Buffer Options
• Select the desired pH Buffer Calibration Group:
  USA (1.68, 4.01, 7.00, 10.01, 12.45) or
  NIST (1.68, 4.01, 6.86, 9.18, 12.45) or
  DIN (1.09, 3.06, 4.65, 6.79, 9.23, 12.75) or
  MAN (manual adjustment of any custom pH values that are ≥1 pH unit apart. 450 series only)
• Select number of calibration points

Select Calibration Due Reminder
• Set number of days from **0-60** for desired parameter

View Calibration Data
• Press **ENTER** to view each point that is calibrated.

View Electrode Data
• Press **ENTER** to view mV **Offset** and **Slope %** of the measured reading.

System Settings
• Data Logging:
  MANUAL upon key press only
  TIMED interval. Choose (**SEC** / **MIN** / **HOUR**) interval.
• Automatic shut off after 10 minutes. Choose **ON** or **OFF**.
• Clock Settings:
  Date: Choose **USA** (MM/DD/YYYY) or **Euro** (DD/MM/YYYY).
  Time: Choose (**24HR or 12HR**). If 12HR, choose **AM** or **PM**.
• Set Printer Type:
  CSV (Comma Separated Values) – best format for computer
  Printer (Text) – best format for printer.
  Choose Manual (**MAN**) upon key press or **TIMED** interval.
  If timed, choose (**SEC** / **MIN** / **HOUR**).

Reset
• **NO**. Exits from reset menu options without action.
• **FACTORY RESET**. Returns all settings except date/time and ATC calibration to factory default values after **ENTER** is pressed then restarts meter.
• **DATA RESET**. Erases data stored in memory while retaining other settings after **ENTER** is pressed.
• **CALIBRATION RESET**. Erases non-ATC calibration data while retaining other settings after **ENTER** is pressed.

pH Calibration

For best results, periodic calibration with known, accurate standards is recommended. Calibrate with standards that bracket your intended measuring range while including a neutral standard (pH 7.00 or 6.86). For example, if you expect to measure samples from pH 6.2 to pH 9.5, calibration with 4.01, 7.00, and 10.01 standards will work well. Provide stirring for best results. After calibration with two or more points, the active slope segment of the measurement will be visible on the bottom display during measurement. 100 % slope will be shown if only one calibration point is performed and "- - -" if no calibration is performed. The meter will automatically return to measurement mode upon successful completion of the number of specified calibration points. To specify a different number of pH calibration points, see **pH Buffer Options**.

Using Automatic Buffer Recognition
1. While in pH measurement mode, dip the pH and ATC sensor(s) into your first standard, then press **CAL**. The primary display will search for the nearest standard value, while the secondary display will show the un-adjusted value.
2. When the "**READY**" indicator appears, press **ENTER** to accept. The primary reading will flash "**DONE**".
3. Rinse your electrode(s) then dip into the next pH standard. The primary display will search for the nearest standard value that has not yet been calibrated, while the secondary display will show the unadjusted value. When the "**READY**" indicator appears, press **ENTER** to accept.
4. To calibrate another pH standard repeat Step 3 or press **MEAS** to return to pH measurement mode.

Using Manual Recognition / Custom Buffers (450 Series Only)
1. While in pH measurement mode, dip the pH and ATC sensor(s) into your first standard then press **CAL**.
2. When the **READY** indicator appears, use up/down arrows to adjust the primary reading to match the standard value at the measured temperature, then press **ENTER**.
3. Rinse your electrode(s) then repeat Step 2 with a standard that is ≥1 pH unit from the previous standard value.
4. To calibrate another pH standard, repeat Step 3 or press **MEAS** to return to pH measurement mode.

mV Offset Adjustment
1. While in mV measurement mode, dip the ORP and ATC sensors into a solution with a known mV value (i.e. Zobel, Light's, quinhydrone, or iodide/triiodide) and stir.
2. When the "**READY**" indicator appears, use up/down arrows to adjust the primary reading to match the mV value at the measured temperature, then press **ENTER**. The meter allows an adjustable maximum value of ±200 mV from the factory default mV value. When an offset has been stored successfully, R.mV replaces mV.

Temperature Calibration/Manual ATC
1. Press **CAL** from any measurement, then press **MODE**.
2. Skip to step 3 for manual ATC, otherwise, dip the temperature sensor into a solution with a known accurate temperature. The upper display shows the active temperature while the lower display shows the factory default temperature without adjustment.
3. Use up/down arrows to adjust the upper display. Press **ENTER** to accept the calibration temperature. The maximum adjustable value is ±10 °C (or ±18 °F) from factory default.

Error Messages

ERR "ERR" will appear when an error condition exists or the incorrect key is pressed. Common examples include:
• Pressing **ENTER** during calibration before the "**READY**" indicator appears. Wait for the "**READY**" indicator before pressing **ENTER**.
• **UR** (Under Range)   • **OR** (Over Range)

Intended Use, Maintenance & Precautions

These handheld meters use sensors to detect various parameters for water-based measurements. For routine maintenance disconnect the power cord or battery, then dust or wipe the display using a damp cloth. If necessary, warm water or a mild water based detergent can be used. Immediately remove any spilled substance from contact with the meter using the proper cleaning procedure for the type of spill.
• Do not use this equipment in potentially explosive atmospheres.
• Refer to the electrode instructions for use, storage and cleaning.
• Ensure that no liquid enters the instrument.
• Do not use any aggressive cleaning chemicals (solvents or similar agents).
• There are no user serviceable parts inside. Attempts to service internal parts may void the warranty.
• **WARNING:** No modification of this equipment is allowed.

Instrument Operating Conditions	
Operating Ambient Temp.	5 to 45 °C
Operating Relative Humidity	5 to 85 %, non-condensing
Storage Temp.	-20 to +60 °C
Storage Relative Humidity	5 to 85 %, non-condensing
Pollution	Degree 2
Overvoltage	Category II
Weight	500 g
Size (L x W x H)	21.15 x 9.87 x 5.85 cm
Regulatory & Safety	CE, TUV 3-1, FCC Class A
Power Rating	DC Input: 9 VDC 1 A
Battery Requirement	2 x AA (LR6) 1.5 V batteries (replace batteries when battery sign blinks)
Vibration	Shipping/handling per ISTA #1A
Shock	Drop test in packaging per ISTA #1A
Enclosure (Designed To Meet)	IP67 (using rubber covers)
Universal Power Adapter Operating Conditions	
Operating Ambient Temp.	0 to 50 °C
Operating Relative Humidity	0 to 90 %, non-condensing
Storage Temp.	-20 to +75 °C
Storage Relative Humidity	0 to 90 %, non-condensing
Pollution	Degree 2
Overvoltage	Category II
Power Rating	I/P: 100 - 240 V, 50/60 Hz, 0.3A O/P: 9 VDC 1 A

450 Series Waterproof Handheld Meter
Dissolved Oxygen Operation Instructions

EUTECH INSTRUMENTS Technology Made Easy ...   **OAKTON**®
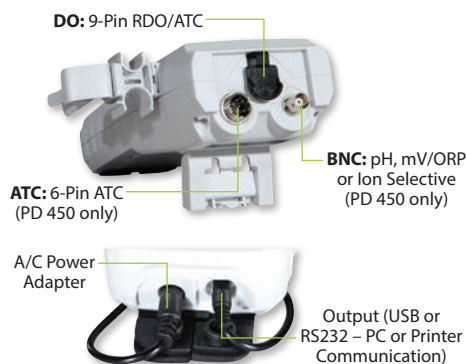
Models:

DO 450
DO/Temperature

PD 450
pH/mV/DO/Temperature

Getting Started/Connections

After installing (2) AA batteries and/or connecting the optional 110/220 VAC power supply, connect the desired sensors to the corresponding ports.

DO: 9-Pin RDO/ATC

BNC: pH, mV/ORP or Ion Selective (PD 450 only)

ATC: 6-Pin ATC (PD 450 only)

A/C Power Adapter

Output (USB or RS232 – PC or Printer Communication)

The stand can be extended as shown above or used for wall-mounting.

Keypad Functions

⏻ / ☀	Press once to power ON in the mode that was previously used. Press again to turn backlight on for one minute or off. Hold for 3 seconds to power OFF.
CAL MEAS BACK	Toggle between measurement and calibration modes. In SETUP mode, BACK serves to return to the previous menu option or setting.
ENTER HOLD	Confirm calibration values in CAL mode. Confirm selections in SETUP mode. Freeze or release the measured reading.
SETUP	Customize instrument settings and preferences. (See also **Setup Programs**)
MODE	Toggle between available measurement types.
▲ **SAVE**	Save measurement into memory. Increase value or scroll up in SETUP or manual calibration.
VIEW ▼	Recall saved values from memory. Decrease value or scroll down in SETUP or manual calibration.
🖨	Send output data to printer or computer.

Setup Programs

To access the settings below, press **SETUP**. Up/down arrows will display the available options. Press **ENTER** to accept the desired setting, or **BACK** to return to the previous option and/or exit.

Configuration Options
- Ready indicator **ON** / **OFF** / or Automatic **HOLD** when stable
- Choose **°C**elsius or **°F**ahrenheit

RDO Setup Options
- Choose units (**%** saturation, **mg/L**, or **ppm**)
- Choose number of calibration points **1** (no zero) or **2** (includes zero)
- Set compensation pressure in kPa (**60.0 - 113.3**), or mmHg, (**450.0 - 850.0**), salinity correction (**0.0 - 45.0** ppt)

RDO Info
- Remaining Cap Life (# Days)
- Probe Serial Number (####)
- Year of Probe Manufacture (####)
- Date of Probe Manufacture (DD.MM)

Select Calibration Due Reminder
- Set number of days from **0-60**

View Calibration Data (for the parameter being measured)
- Press **ENTER** to view each point that is calibrated.

View Electrode Data (for the parameter being measured)
- Press **ENTER** to view electrode data (Torr / % saturation).

System Settings
- Data Logging:
  MANUAL upon key press only
  TIMED interval. Choose (**SEC / MIN / HOUR**) interval.
- Automatic shut off after 10 minutes. Choose **ON** or **OFF**.
- Clock Settings:
  Date: Choose **USA** (MM/DD/YYYY) or **Euro** (DD/MM/YYYY).
  Time: Choose (**24HR or 12HR**). If 12HR, choose **AM** or **PM**.
- Set Printer Type:
  CSV (Comma Separated Values) – best format for computer.
  Printer (Text) – best format for printer.
  Choose Manual (**MAN**) upon key press or **TIMED** interval.
  If timed, choose (**SEC / MIN / HOUR**).

Reset
- **NO**. Exits from reset menu options without action.
- **FACTORY RESET**. Returns all settings except date/time and ATC calibration to factory default values after **ENTER** is pressed then restarts meter.
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Dissolved Oxygen Calibration

Perform daily calibration for best results. Dissolved oxygen levels vary with temperature, barometric pressure, and salinity, so calibration must be performed with consideration of these factors. It is necessary to adjust the barometric pressure and salinity values and calibrate the temperature prior to performing any DO calibration or measurement. For probe operation, refer to RDO Operation Instructions.

The 450 series can accept one or two calibration values; typically 100 % using saturated air or air-saturated water, and 0 % using zero oxygen solution. If calibrating for 0 % oxygen, note that the meter will take several minutes to reach 0 % saturation value and constant stirring is not required.

100 % Saturation Automatic Calibration

1. Rinse the probe well with clean water. From % saturation mode, press **CAL**.
2. The primary display will show the calibration value, while the secondary display shows the unadjusted value and the lower display shows the measured temperature.
3. Place the probe in the optional calibration chamber or a saturated oxygen environment (air or air saturated water) & wait for the reading to stabilize. Press **ENTER** to accept.

0 % Saturation Automatic Calibration

1. Rinse the probe well with clean water. From % saturation mode, press **CAL**.
2. The primary display will show the calibration value, while the secondary display shows the unadjusted value and the lower display shows the measured temperature.
3. Submerse probe in zero oxygen calibration solution and stir. Wait for the reading to stabilize – this can often take more than 10 minutes. Wait for the reading to stabilize. Press **ENTER** to accept.

mg/L or ppm Manual Calibration

1. Rinse the probe well with clean water. From mg/L or ppm mode, press **CAL**.
2. The primary display will show the calibration value, while the secondary display shows the unadjusted value and the lower display shows the measured temperature.
3. Place the probe into a sample of known oxygen concentration (i.e. determined by titration or another instrument). Wait for the reading to stabilize. Press ▼/▲ to adjust the value and **ENTER** to accept.

Temperature Calibration/Manual ATC

1. Press **CAL** from any measurement, then press **MODE**.
2. Skip to step 3 for manual ATC, otherwise, dip the temperature sensor into a solution with a known accurate temperature. The upper display shows the active temperature while the lower display shows the factory default temperature without adjustment.
3. Use up/down arrows to adjust the upper display. Press **ENTER** to accept the calibration temperature. The maximum adjustable value is ±10 °C (or ±18 °F) from factory default.

Error Messages

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- **UR** (Under Range) • **OR** (Over Range)

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- Do not use this equipment in potentially explosive atmospheres.
- Refer to the electrode instructions for use, storage and cleaning.
- Ensure that no liquid enters the instrument.
- Do not use any aggressive cleaning chemicals (solvents or similar agents).
- There are no user serviceable parts inside. Attempts to service internal parts may void the warranty.
- **WARNING:** No modification of this equipment is allowed.

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Operating Relative Humidity	5 to 85 %, non-condensing
Storage Temp.	-20 to +60 °C
Storage Relative Humidity	5 to 85 %, non-condensing
Pollution	Degree 2
Overvoltage	Category II
Weight	500 g
Size (L x W x H)	21.15 x 9.87 x 5.85 cm
Regulatory & Safety	CE, TUV 3-1, FCC Class A
Power Rating	DC Input: 9 VDC 1 A
Battery Requirement	2 x AA (LR6) 1.5 V batteries (replace batteries when battery sign blinks)
Vibration	Shipping/handling per ISTA #1A
Shock	Drop test in packaging per ISTA #1A
Enclosure (Designed To Meet)	IP67 (using rubber covers)
Universal Power Adapter Operating Conditions	
Operating Ambient Temp.	0 to 50 °C
Operating Relative Humidity	0 to 90 %, non-condensing
Storage Temp.	-20 to +75 °C
Storage Relative Humidity	0 to 90 %, non-condensing
Pollution	Degree 2
Overvoltage	Category II
Power Rating	I/P: 100 - 240 V, 50/60 Hz, 0.3A O/P: 9 VDC 1 A

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