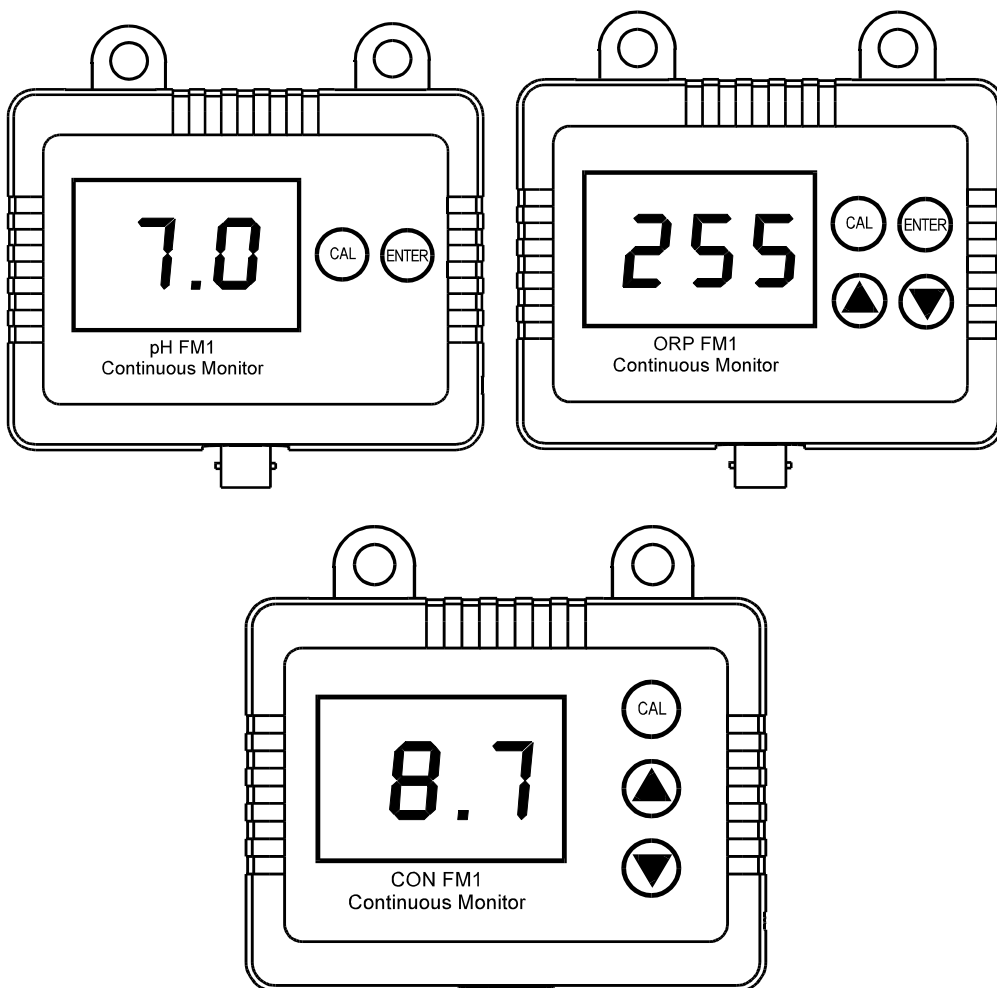


Instruction Manual

24-hour Continuous Field Monitors

pH, ORP, and Conductivity



OAKTON[®]



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INSTRUMENTS

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68X254901

Rev. 5 08/03

Preface

This manual serves to explain the use for all models of the Field Monitors for pH, ORP, and Conductivity (each model sold separately). If there are doubts in the use of this meter, please do not hesitate to contact the Authorized Distributor.

Eutech Instruments/ Oakton Instruments cannot accept any responsibility for damage or malfunction to the meter caused by improper use of the instrument.

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

Note: Eutech Instruments Pte Ltd/ Oakton Instruments reserves the right to make improvements in design, construction, and appearance of our products without notice.

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Eutech Instruments Pte Ltd

Oakton Instruments

Rev.5 08/03

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1 INTRODUCTION

Thank you for purchasing this pH, ORP, or Conductivity Field Monitor.

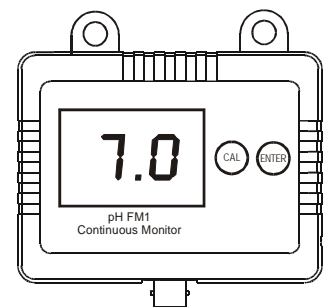
The Field Monitor Series feature microprocessor technology, which gives it many reliable, user-friendly features. These monitors were designed for long-term low-maintenance use. Just plug in the AC adapter, calibrate and the unit is ready for continuous monitoring. No batteries required.

2 FRONT PANEL

The front panel consists of a 3-digit LED display, 2 keys for the pH Monitor, 4 keys for the ORP Monitor, and 3 keys for the Conductivity Monitor.

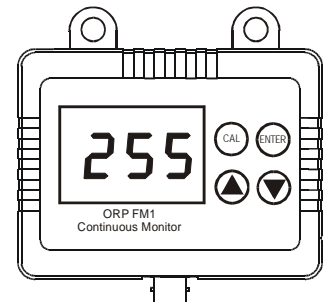
2.1 *Keys for pH Monitor*

- CAL The CAL key switches monitor into calibration mode from measurement mode. In calibration mode CAL switches monitor back to measurement mode. See page 3 for details.
- ENTER Press the ENTER key to confirm the calibration while in calibration mode.



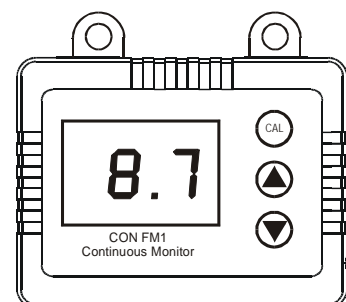
2.2 *Keys for ORP Monitor*

- CAL The CAL key switches monitor into calibration mode from measurement mode. In calibration mode CAL switches monitor back to measurement mode. See page 5 for details.
- ENTER Press the ENTER key to confirm the calibration while in calibration mode.
- ▲ The ▲ Up/Increment key scrolls value up in calibration mode.
- ▼ The ▼ Down/Decrement key scrolls value down in calibration mode.



2.3 *Keys for Conductivity Monitor*

- CAL The CAL key switches monitor into calibration mode from measurement mode. In the calibration mode, pushing CAL key confirms the calibration value and returns to measurement mode. See page 7 for details.
- ▲ The ▲ Up/Increment key scrolls value up in calibration mode.
- ▼ The ▼ Down/Decrement key scrolls value down in calibration mode.



Pressing ▲ and ▼ together while in calibration mode switches the monitor back to measurement mode from calibration mode.

3 CONNECTING THE PROBE

The pH or ORP monitor uses any standard pH or ORP electrode with a BNC connector. The probe for the Conductivity monitor is hard-wired into the unit, no connection is necessary.

NOTE: Keep connector dry and clean. Do not touch connector with soiled hands.

3.1 *To connect the pH or ORP probe:*

Slide the BNC connector of the probe over the BNC connector socket on the monitor. Make sure the slots of the connector are in line with the posts of the socket. Rotate and push the connector clockwise until it locks. See Figure 1.

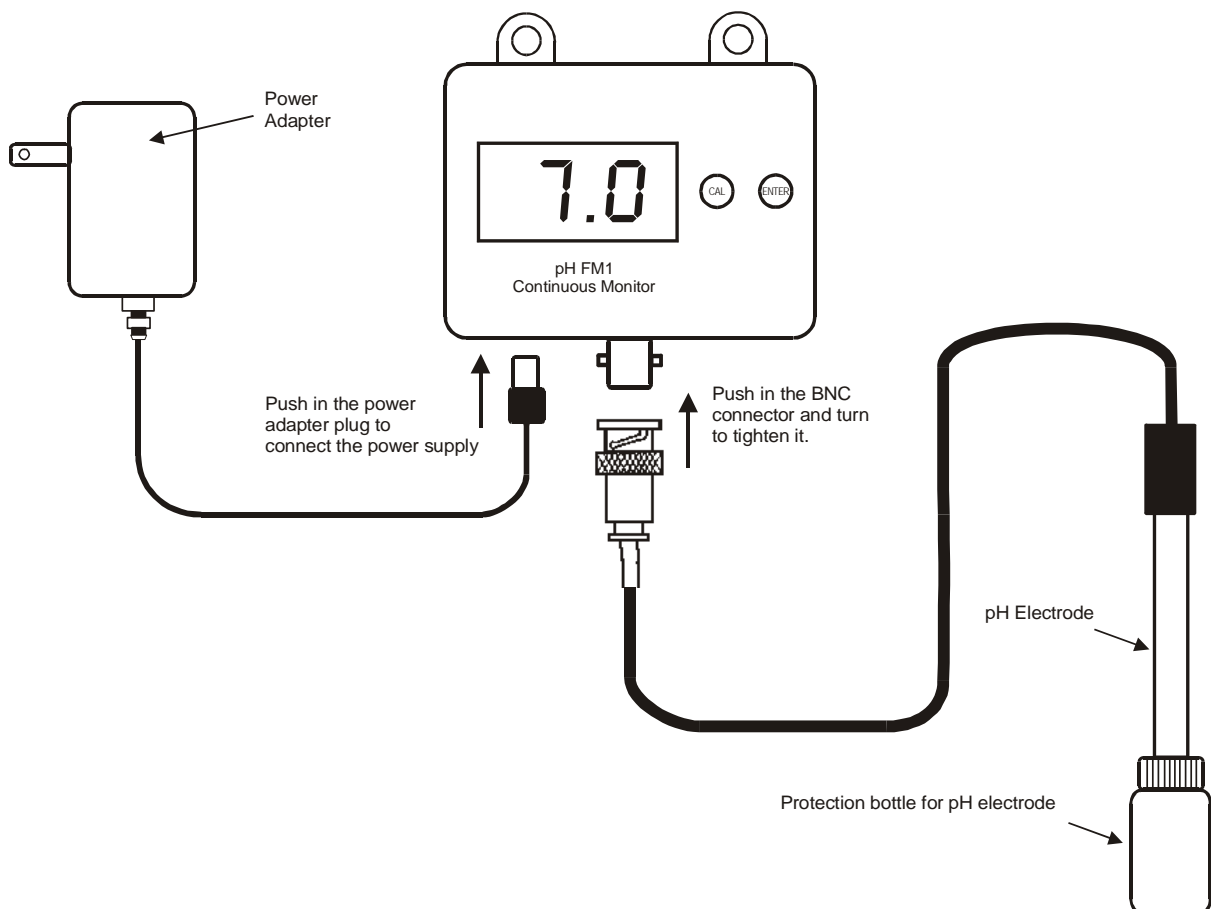


Figure 1 - Connection diagram for Field Monitor

To remove probe, push and rotate the connector counter-clockwise. While holding onto the metal part of the connector, pull probe away from the meter.

CAUTION: Do not pull on the probe cord or the probe wires might disconnect.

4 pH CALIBRATION

This section is applicable for the following models:

- Eutech Instruments: EC-PHFM1ST11 & EC-PHFM1ST21
- Oakton Instruments: 35623-00, and -05 only

4.1 *Important Information on pH Monitor Calibration*

This monitor has 3 pH calibration points: 4, 7 and 10 with automatic buffer recognition. For best accuracy, calibrate to all 3 pH points close to the temperature of the solution you will be monitoring, starting with pH 7. We recommend that you perform at least a 2-point calibration—at pH 7 first followed by pH 4 or pH 10 depending on the range of the operation. You can also perform a 1-point calibration, but make sure that the buffer value is close to the sample value you are measuring.

Calibration should be performed regularly to ensure accuracy. Frequency of calibration will vary and should be checked regularly until the required schedule has been determined.

Be sure to remove the protective electrode storage bottle or rubber cap of the probe before calibration or measurement. If the electrode has been stored dry, wet the probe in tap water for 10 minutes before calibrating or taking readings to saturate the pH electrode surface and minimize drift.

Do not reuse buffer solutions after calibration. Contaminants in the solution can affect the calibration, and eventually the accuracy of the measurements.

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NOTE: All new calibration data will over-ride existing calibration data.

4.2 pH Calibration

1. Plug in the pH monitor to turn on. The monitor will be in pH measurement mode.
2. Rinse the probe thoroughly with de-ionized water or a rinse solution. Do not wipe the probe; this causes a build-up of electro-static charge on the glass surface.
3. Dip the probe into the calibration buffer pH 7. The end of the probe must be completely immersed into the sample. Stir the probe gently to create a homogeneous sample.
4. Press the CAL key to enter the calibration mode. "CA" will flash on the display for a second and then a value close to pH 7.0 will flash.
5. Let the electrode soak in the buffer until reading is stable, stirring occasionally (time will vary depending on temperature and electrode condition). When the display has flashed the same pH value for 15 seconds or more, press the ENTER key. "CO" will flash on the display. The reading should now display pH 7.0. See Figure 2.

If necessary, repeat steps 2 through 5 for the remainder of the buffer values (pH 4.0 and 10.0).

Immerse pH electrode into buffer solution, for example, pH 7

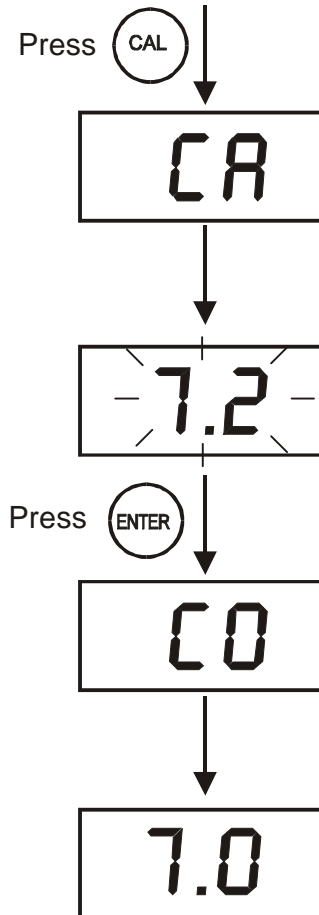


Figure 3 - pH Calibration

5 ORP CALIBRATION

This section is applicable for the following models:

- Eutech Instruments: EC-ORPFM1ST11 & EC-ORPFM1ST21
- Oakton Instruments: 35649-00 and -05 only

5.1 Important Information on ORP Monitor Calibration

Typically ORP measurements are taken on a relative basis and calibration is not required. This monitor has ± 100 mV offset adjustment, adjustable in 5 mV increments. Choose a calibration standard that is close to your working condition.

Calibration should be performed regularly to ensure accuracy. Frequency of calibration will vary and should be checked regularly until the required schedule has been determined.

Be sure to remove the protective electrode storage bottle or rubber cap of the probe before calibration or measurement. If the electrode has been stored dry, wet the probe in tap water for 10 minutes before calibrating or taking readings to saturate the ORP electrode surface and minimize drift.

Do not reuse calibration solutions after calibration. Dispose of any used calibration solution. Contaminants in the solution can affect the calibration, and eventually the accuracy of the measurements.

IMPORTANT: ORP offset adjustment is limited to ± 100 mV from the original reading. Adjustable in 5 mV increments.

NOTE: All new calibration data will over-ride existing calibration data.

5.2 ORP Calibration

1. Plug in the ORP monitor to turn on. The monitor will be in ORP measurement mode.
2. Rinse the probe thoroughly with de-ionized water or a rinse solution. Do not wipe the probe; this causes a build-up of electro-static charge on the surface.
3. Dip the probe into the calibration standard. The end of the probe must be completely immersed into the sample. Let probe soak 2 to 5 minutes or until readings stabilizes.
4. Press the CAL key to enter the calibration mode. "CA" will flash on the display for a second and then a value close to the calibration standard will flash.
5. Press the ▲ or ▼ keys to adjust the display to match the calibration standard value. Press the ENTER key. "CO" will flash on the display. The reading should now display the same value as the calibration standard. See Figure 3.

Immerse ORP electrode into a calibration standard solution, for example, 255 mV

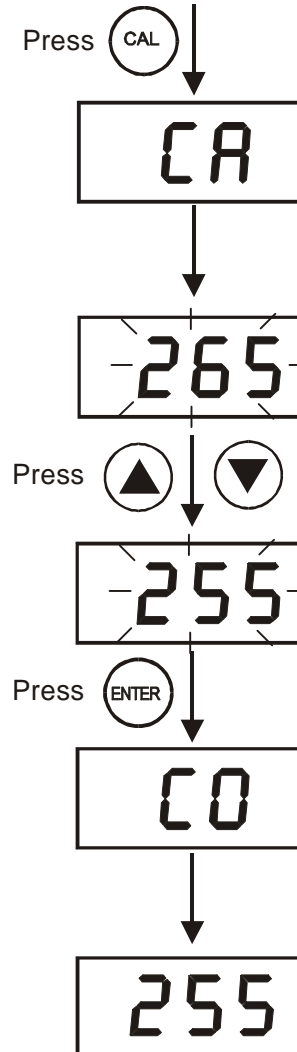


Figure 5 - ORP Calibration Procedure

6 CONDUCTIVITY CALIBRATION

This section is applicable for the following models:

Description	Eutech Instruments	Oakton Instruments
Conductivity FMCON 1 with Conductivity electrode and 110/120 VAC power adapter.	EC-CONFM1ST11	35660-00
Conductivity FMCON 1 with Conductivity electrode and 220/230 VAC power adapter.	EC-CONFM1ST21	35660-05
Conductivity FMCON 2 with Conductivity electrode and 110/120 VAC power adapter.	EC-CONFM2ST11	35660-02~
Conductivity FMCON 2 with Conductivity electrode and 220/230 VAC power adapter.	EC-CONFM2ST21	35660-07~
Conductivity FMCON 3 with Conductivity electrode and 110/120 VAC power adapter.	EC-CONFM3ST11	35660-04~
Conductivity FMCON 3 with Conductivity electrode and 220/230 VAC power adapter.	EC-CONFM3ST21	35660-09~

6.1 *Important Information on Conductivity/TDS Monitor Calibration*

This monitor has $\pm 30\%$ adjustment. Adjustable in 0.1 mS increments. Choose a calibration standard that is close to your working solution.

Calibration should be performed regularly to ensure accuracy. Frequency of calibration will vary and should be checked regularly until the required schedule has been determined.

Do not reuse calibration solutions after calibration. Dispose of any used calibration solution. Contaminants in the solution can affect the calibration, and eventually the accuracy of the measurements.

NOTE: All new calibration data will over-ride existing calibration data. Minimum calibration value is 2.5 mS.

Adjustments and Minimum Calibration Value are according to specific conductivity meter model:

Models	Calibration Adjustments	Minimum Calibration Value
FM CON 1	0.1 mS increments	2.5 mS
FM CON 2	10 μ S increments	250 μ S
FM CON 3	1 μ S increments	37.5 μ S

6.2 Conductivity Calibration

1. Plug in the Conductivity monitor to turn on. The monitor will be in conductivity measurement mode.
2. Rinse the probe thoroughly with de-ionized water or a rinse solution, then rinse with a small amount of calibration solution.
3. Dip the probe into the calibration solution. Immerse the probe tip at least 2 cm into the solution. Stir the probe gently to create a homogeneous sample.
4. Press the CAL key to enter the calibration mode. "CA" will flash on the display for a second and then a value close to the calibration standard will flash.
5. Press the ▲ or ▼ keys to adjust the display to match the calibration standard value. Press the CAL key. "CO" will flash on the display. The reading should now display the same value as the calibration standard. See Figure 4.

Immerse conductivity electrode into a standard solution, for example, 4 mS

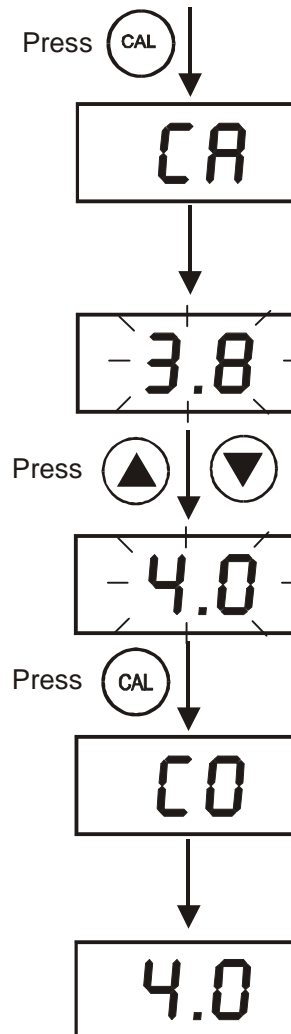
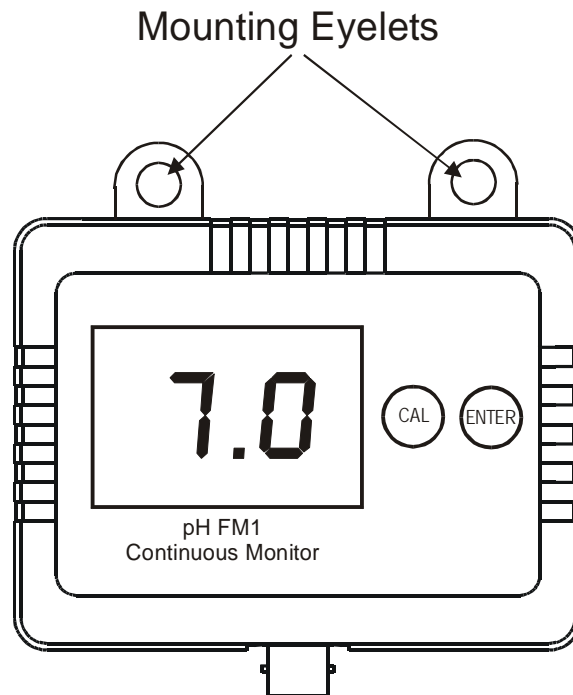


Figure 7 - Conductivity Calibration Procedure

7 MONITORING

Once the monitor is calibrated it is ready for monitoring. The monitor has two eyelet holes. Mount the monitor where it can be easily viewed.

See figure below.



8 ELECTRODE CARE AND MAINTENANCE

Since your pH/ORP electrode is susceptible to dirt and contamination, clean it every one to three months depending on the extent and condition of use. Like batteries, a pH/ORP electrode has limited life. Depending on the environment and the solution it is immersed in, it may last from 6 to 12 months, or longer. Knowing when to change your pH/ORP electrode usually comes after some experience. It is best to have another pH/ORP tester such as pHScan/ pHTestr 1, Waterproof pHScan/ pHTestr WP2, or ORPScan/ ORPTestr as reference.

8.1 *pH/ORP electrode storage*

For best results, always keep the pH/ORP bulb wet. Use the protective electrode storage bottle filled with electrode storage solution (0.1M KCl) or pH 7 for overnight and long term storage. DO NOT store in distilled water. The sensor should never be stored dry. If left dry, soak in tap water or pH 7.0 buffer solution overnight.

8.2 pH/ORP electrode cleaning

- Salt deposits: Dissolve the deposits by immersing the electrode in tap water for ten to fifteen minutes. Then thoroughly rinse with distilled water.
- Oil/Grease film: Wash electrode pH/ORP bulb gently in some detergent and water. Rinse electrode tip with distilled water or use a general-purpose electrode cleaner (see ordering information).
- Clogged reference junction: Heat a diluted KCl solution to 60 to 80 °C. Place the sensing part of the electrode into the heated solution for about 10 minutes. Allow the electrode to cool in some unheated KCl solution.

8.3 Conductivity electrode

For general cleaning, the use of deionized water will be sufficient. Rinse the electrode thoroughly in the deionized water. After cleaning, wipe the electrode dry. Never touch the metal sensors.

For intensive cleaning, when the electrode is contaminated, wash it carefully with a mild detergent, after which wash thoroughly with deionized water. Always ensure that there are no blockages of the electrode cavity. If there is, use a gentle jet of water to dislodge any particles that may have been stuck there.

9 TROUBLE-SHOOTING GUIDE

Problem	Cause	Solution
No display	a). Power adapter is not connected properly or is faulty.	a). Check that power adapter and its wire are in place and making good contact. b). Check power supply.
Unstable readings	a). Air bubbles in probe. b). Dirty probe. c). Probe not deep enough in sample. d). External noise pickup or induction caused by nearby electric motor.	a). Tap probe to remove bubbles. b). Clean the probe and re-calibrate. c). Make sure sample entirely covers the probe sensors. d). Move or switch off interfering motor.
No response	a). Broken probe.	a). Replace probe
Slow response	a). Dirty / Oily probe.	a). Clean probe. See "Electrode Care & Maintenance" section.

10 ERROR MESSAGES

Or	Ur	Er 1
<p><u>pH</u></p> <p>When pH value is more than 14.0 pH</p>	<p>When pH value is less than 0.0 pH</p>	<p>Displays when there is an error in calibration.</p>
<p><u>ORP</u></p> <p>When ORP value is more than 995 mV.</p>	<p>When ORP value is less than 0 mV</p>	
<p><u>Conductivity</u></p> <p>When Conductivity value is more than 10.0 mS.</p>	<p>When Conductivity value is less than 0 mS.</p>	<p>Displays when there is an error in calibration.</p>

11 SPECIFICATIONS

SPECIFICATIONS	pH	ORP	Conductivity		
			FM CON1	FM CON2	FM CON3
Range	0.0 to 14.0 pH	0 to 995 mV	0 to 10.0 mS	0.0 to 990 μ S	0.0 to 150 μ S
Accuracy	± 0.1 pH	± 5 mV	± 0.2 mS/cm	± 20 μ S/cm	± 2 μ S/cm
Resolution	0.1 pH	5 mV	0.1 mS/cm	10 μ S/cm	1 μ S/cm
Calibration	Up to 3 points; pH 4.0, 7.0 & 10.0	Single- point, Offset ± 100 mV	Single- point, $\pm 30\%$ full scale		
Automatic Buffer Recognition	Yes				
Automatic Temperature Compensation			Yes		
Operating Temperature	0 to 50 °C (0 to 120 °F)				
Inputs	BNC	BNC	Permanently wired		
Display	3-digit LED (Red)				
Environmental Requirements	Operating: 0 to 50 °C (0 to 120 °F) Storage: - 10 to 60 °C (14 to 140°F) Humidity Limits: 10 to 95% RH (non condensing)				
Power Requirements	AC / DC Adapter 9 V, 200 mA				
Dimension / Weight	Meter: 19 x 10 x 6 cm; 80 g Boxed: 24 x 23 x 7 cm; 550 g				

12 METERS AND ACCESSORIES

Meters

Item	Eutech Instruments Ordering Code	Oakton Instruments Ordering Code
pH Field Monitor with pH electrode , 1 Strip of 10 pH 7 buffer tablets and 110/120 VAC power adapter.	EC-PHFM1ST11	35623-00
pH Field Monitor with pH electrode , 1 Strip of 10 pH 7 buffer tablets and 220/230 VAC power adapter.	EC-PHFM1ST21	35623-05
ORP Field Monitor with ORP electrode and 110/120 VAC power adapter.	EC-ORPFM1ST11	35649-00
ORP Field Monitor with ORP electrode and 220/230 VAC power adapter.	EC-ORPFM1ST21	35649-05
Conductivity FMCON 1 with Conductivity electrode and 110/120 VAC power adapter.	EC-CONFM1ST11	35606-00
Conductivity FMCON 1 with Conductivity electrode and 220/230 VAC power adapter.	EC-CONFM1ST21	35606-05
Conductivity FMCON 2 with Conductivity electrode and 110/120 VAC power adapter.	EC-CONFM2ST11	35660-02
Conductivity FMCON 2 with Conductivity electrode and 220/230 VAC power adapter.	EC-CONFM2ST21	35660-07
Conductivity FMCON 3 with Conductivity electrode and 110/120 VAC power adapter.	EC-CONFM3ST11	35660-04
Conductivity FMCON 3 with Conductivity electrode and 220/230 VAC power adapter.	EC-CONFM3ST21	35660-09

Electrodes and Accessories

General Purpose, Epoxy-body double junction pH Combination Electrode, 12x146 mm, 1-m cable length	EC-FE72522-01B	35641-51
General Purpose Epoxy-body double junction ORP Electrode, 12x146 mm, 1-m cable length	EC-FE79602-01B	35649-51
110/120 VAC Power Adapter (50/60 Hz) 2-pin type	EC-120-ADA	35615-07
220/230 VAC Power Adapter (50/60 Hz) 2-pin type	EC-220-ADA	35615-08

Calibration Solutions

Item	Eutech Instruments Ordering Code	Oakton Instruments Ordering Code
pH 4.01 buffer solution, 480 ml bottle (1 pint)	EC-BU-4BT	00654-00
pH 7.00 buffer solution, 480 ml bottle (1 pint)	EC-BU-7BT	00654-04
pH 10.01 buffer solution, 480 ml bottle (1 pint)	EC-BU-10BT	00654-08
pH 4.01 buffer sachets, 20 ml x 20 pcs.	EC-BU-4BS	35653-01
pH 7.00 buffer sachets, 20 ml x 20 pcs.	EC-BU-7BS	35653-02
pH 10.01 buffer sachets, 20 ml x 20 pcs.	EC-BU-10BS	35653-03
12.88 mS KCl Calibration Solution in 480-ml leak-proof bottle (1 pint)	EC-CON-1288BT	00606-10
2,764 μ S KCl Calibration Solution in 480-ml leak-proof bottle (1 pint)	EC-CON-2764BT	00653-20
10 μ S conductivity standard sachet, 20 ml x 20 pcs	EC-CON-10BS	35653-09
447 μ S Conductivity Sachets (20 units x 20 ml per box)	EC-CON-447BS	35653-10
1,413 μ S Conductivity Sachets(20 units x 20 ml per box)	EC-CON-1413BS	35653-11
2,764 μ S Conductivity Sachets(20 units x 20 ml per box)	EC-CON-2764BS	35653-12
15,000 μ S Conductivity Sachets(20 units x 20 ml per box)	EC-CON-15000BS	35653-13

13 WARRANTY

The Field Monitor series is supplied with a **1-year** warranty from manufacturing defects and electrodes for **6 months** from the date of purchase unless otherwise stated.

If repair or adjustment is necessary and has not been the result of abuse or misuse within the designated period, please return – freight pre-paid – and correction will be made without charge. Eutech Instruments/ Oakton Instruments will determine if the product problem is due to deviations or customer misuse.

Out of warranty products will be repaired on a charged basis.

Exclusions

The warranty on your instrument shall not apply to defects resulting from:

- Improper or inadequate maintenance by customer
- Unauthorized modification or misuse
- Operation outside of the environment specifications of the products

14 RETURN OF ITEMS

Authorization must be obtained from our Customer Service Department or authorized distributor before returning items for any reason. A “Return Goods Authorization” (RGA) form is available through our Authorized Distributor. Please include data regarding the reason the items are to be returned. For your protection, items must be carefully packed to prevent damage in shipment and insured against possible damage or loss. Eutech Instruments/ Oakton Instruments will not be responsible for damage resulting from careless or insufficient packing. A restocking charge will be made on all unauthorized returns.

NOTE: Eutech Instruments Pte Ltd/ Oakton Instruments reserves the right to make improvements in design, construction, and appearance of products without notice.

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

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