

# ORP METER

## PO 650

(OPERATING MANUAL)



**TECHNICAL SPECIFICATIONS:**

<b>METER</b>	
1. Physical dimensions Panel cut out	105 X 105 X 120 mm 92 mm X 92mm
2. Enclosure	ABS Weather proof/IP 65
3. Mounting	Field/Panel
4. Parameter sampling rate	< 2 seconds
5. Resolution	1
6. Accuracy	± 2% of FSD
7. Power supply	230V A.C./110V A.C./24V D.C.
8. Alarms	Separate LED indication for High & Low ORP value
8. Alarms/Control relays	Individual high & low relay (programmable through entire range with settable control delay & hysteresis)
9. Display	4 Digit 7 SEGMENT LED
10. Calibration/Set point	Using front panel keypad.
11. Output	4-20 mA D.C.Current } (Optional) RS-485
12. Range	-1900 mV to +1900 mV
<b>SENSOR</b>	
1. Overall dimension	140 mm(L) X 32 mm(W)
2.Type	Flow through/Tank(Optional)
3.Sensor O/P	Milli Volt
4.Electrode material	Glass bulb with epoxy body
5.Process connection	3/4" / 1/2" BSP M
6.Integral cable	1 core shielded
7.Application	Water
8.Temperature	0-60°C
9.Max. Pressure	Not meant for pressurized line

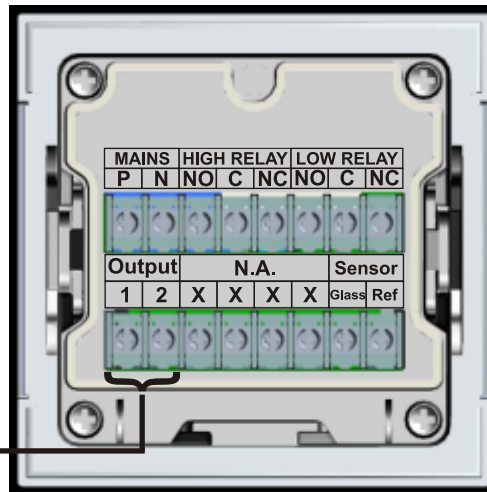
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**GETTING ACQUAINTED WITH THE METER:**

This meter is user friendly & easy to understand. Its operation will be clear when we go through all the parts of the meter.

1. **SENSOR** : It is the main part of the ORP Meter. It has two electrodes : One reference and one measuring electrode enclosed in glass tubing. This is dipped into the line of which ORP is to be measured, it senses the ORP and sends a signal to the meter.
2. **METER** : This is the unit that processes the information received from the sensor and displays Actual ORP in the line. This unit also controls the ORP by transmitting signals to dosing pumps, hooters, valves etc through inbuilt relays.

**WIRING CONNECTIONS:**

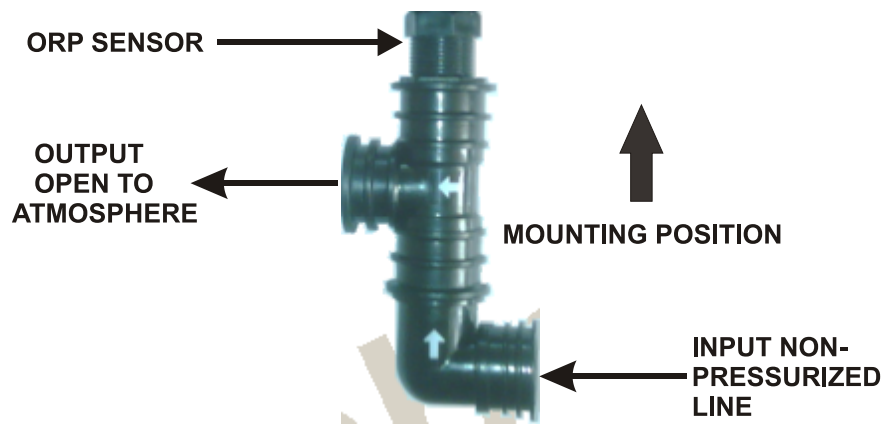


Part no.	Description	Terminal details	1	2
PO-650 2 2 N	With relay output only	Not appl.	X	X
PO-650 2 2 C	4-20 mA current O/P with relays	Current O/P	+	-
PO-650 2 2 R	RS-485 O/P with relays	RS 485 O/P(Tx)	+	-

### INSTALLATION GUIDELINES:

#### SENSOR:

- The ORP sensor is normally supplied with 3/4" installation fitting with female threading.
- The sensor should be mounted **vertically** in the line.
- The sensor shall be connected in the sampling line only as the sensor body is not meant for the pressurized line.
- The fitting can be connected to the sampling point by flexible tubing.

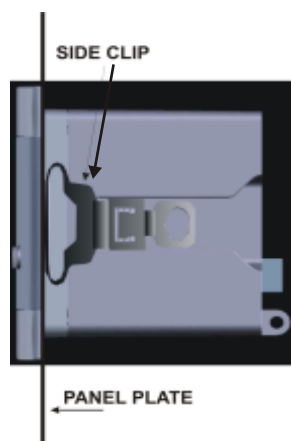


#### METER:

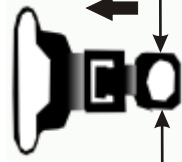
The meter is designed to suit field, panel as well as sensor mounting as shown below.

#### MOUNTING POSSIBILITIES

##### PANEL MOUNT APPLICATION



Press this downwards & Push forward to lock



Press this downwards & Pull out to unlock.



##### SENSOR MOUNT APPLICATION



**METER OPERATION:**

In regular operation, the ORP Meter displays the actual ORP in the Line. Pressing the view key display will scroll through all the settings in the ORP meter.

**PROGRAMMING THE SET POINT:**

For programming the set point go as per following table

KEY TO BE PRESSED	DISPLAY
MENU	St Hi (Set High)
MENU	Previously set high ORP value
Use ACK. & VIEW key to set high ORP value	
MENU	HYS1 (Hysteresis* 1)
MENU	Previously set Hysteresis value
MENU	St Lo ( Set Low)
MENU	Previously set low ORP value
Use ACK. & VIEW key to set Low ORP value	
MENU	HYS2 (Hysteresis* 2)
MENU	Previously set Hysteresis value
MENU	TEmp(Temperature)
MENU	Previously set temp. value
Use ack. & view key to set temp value	
MENU	END

**Hysteresis (hys1):**

The %age value for which the relay will not reset after getting energised. For eg. If the high ORP value is set at 180 and the hysteresis is kept at 10% then the high relay will get energised the moment ORP exceeds 180 (after the set control delay) and will remain energized until the ORP value falls to 162. And similar is the case with hyst2 i.e. for low ORP. Eg. If low set point is -180 with 10% hysteresis, the relay gets reset only when the ORP goes over -162. (Normally, both hysteresis values are kept at 10%).

Low set point should be lower than the high set point else meter will show Serr.

**ON SITE CALIBRATION OF METER:**

The ORP Meter supplied comes duly calibrated by experienced professionals from our factory. In case the need arises for onsite calibration please follow the below procedure:

Before starting the calibration procedure ensure availability of standard millivolt(mV) solutions.

KEY TO BE PRESSED	DISPLAY
VIEW & ACK	PASS then 0000
ENTER THE PASSWORD 0123 USING VIEW & ACK. KEY	
MENU	Calb
MENU*	SInG(in case of Single point calibration)
ACK	Dual(in case of Two point calibration)
MENU	Pnt 1
Dip the sensor in 200 mV standard solution,wait till reading stabilizes	
MENU	Acrd(Actual reading)
ACK	SETC
Using VIEW & ACK. key set value to 200	
MENU	Pnt 2 (second point of calibration)
Dip the sensor in 100 mV solution, wait till reading stabilizes	
ACK	SETC
Using VIEW & ACK. key set value to 100	
MENU	END
MENU	Actual reading

\*In case of single point calibration,Dip sensor in standard mV solution & follow below guideline.

MENU	SInG
MENU	ConS
MENU	Previously set value.
Use VIEW & ACK.key to set the constant to match the readings.	
MENU	End
MENU	Actual reading

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**Note :** In case the actual reading for zero and span differ by 40% then the meter will show Sensor error and start showing readings as per previous calibration.

### OPERATION MODES

The meter can be operated in three modes (based on relay operation):

1. **CONTROL MODE:** In this mode, the relay gets energized and will be time proportionately energized between the set value and the hysteresis.e.g.If the high value is kept at 180 with 10% hysteresis , between the ORP values of 180 & 198 high relay would operate in an ON/OFF cycle(total cycle time 10 seconds).  
The ON time increases as the ORP value approaches 198 beyond which relay remains energized. The same operation will be for Low ORP value.
2. **ALARM MODE:** In this there are two options:
  - i) **AcK (Acknowledge) :** In this mode, the relay will get energized and reset once Ack. key is pressed.
  - ii) **nAck (No Acknowledge) :** In this mode relay will be energized as long as pH value is across the set point. One can't reset the relay with Ack. Key
3. **AUTO RESET MODE:** In this mode, the relay gets automatically reset after 2 seconds.

KEY TO BE PRESSED	DISPLAY
VIEW & ACK.Simultaneously	PASS
ENTER PASSWORD 0234 USING ACK. & VIEW KEY	
MENU	Cdly ( control delay)*
What is this ? This is the delay for which processor will ignore increase/decrease in pH value & will energise relay after this much time (in seconds).	
MENU	0010
Use ACK. & VIEW key to change this time	
MENU	rlop
Use ack. key to make it AUtr(Auto reset) or CntL(Control)	
MENU	Ack
Use ACK. key to make it nAck	
MENU	END
MENU	Actual reading

### IN CASE OF 4-20mA OUTPUT:

In case of field transmitter, the meter takes the sensor input & gives 4-20mA output current. The factory settings for ZERO (value of ORP at which transmitter would give 4 mA current) & SPAN (value of ORP at which transmitter would give 20 mA current) are:

Reading(mV)	Current Output(mA)
-500	4mA
+500	20mA

To change the Zero & Span settings follow the guideline below:

KEY TO BE PRESSED	DISPLAY
VIEW & ACK	PASS
ENTER THE PASSWORD 0678 USING VIEW & ACK. KEY	
MENU	Type
MENU	Norm
MENU	Zero
MENU	Previously set ZERO value
Use VIEW & ACK.key to change the value	
MENU	SPAN
MENU	Previously set SPAN value
Use VIEW & ACK.key to change the value	
MENU	END

Instrument also works as 4\_20 mA current simulator. It gives 4 mA & 20 mA current for the calibration of other instruments. Follow the below guideline:

KEY TO BE PRESSED	DISPLAY
VIEW & ACK	PASS
ENTER THE PASSWORD 0420 USING VIEW & ACK. KEY	
MENU	4 mA
Instrument will give 4 mA current	
MENU	20 mA
Instrument will give 20 mA current	

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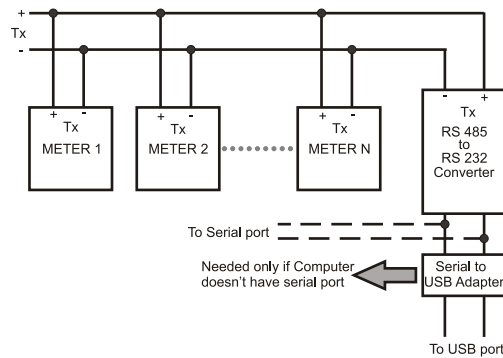
MENU	End
MENU	Actual reading

**IN CASE OF RS-485 OUTPUT:**

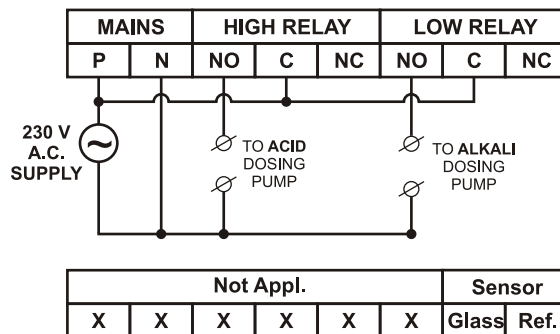
In case of pH meter with RS-485 output,if number of instruments are connected through same wire then each instrument should have it's specific address(called as meter address).To set the meter address follow the below guideline.

<b>KEY TO BE PRESSED</b>	<b>DISPLAY</b>
VIEW & ACK	PASS
ENTER THE PASSWORD 0345 USING VIEW & ACK. KEY	
MENU	Addr Previously set meter address
Use VIEW & ACK.key to change the address.	
MENU	Actual value

**Connection diagram for number of meters(with Rs485 O/P) to Computer:**



**TYPICAL WIRING DIAGRAM OF A DOSING PUMP THROUGH RELAY :**



**TROUBLESHOOTING:**

TROUBLE	PROBABLE CAUSE	ACTION
<b><u>DURING COMMISSIONING</u></b>		
Fluctuating readings	Sensor not dipped in the line properly	Loop the outlet tubing such that the tee always remains flooded with water
	Wrong wiring	Connect the wires as per drawing
	Sensor not sensing	Disconnect the sensor, by removing the wires then by shorting the input terminals, check the reading, the reading is around 0000, then change the sensor.
<b><u>DURING CALIBRATION</u></b>		
Meter shows sensor error	Difference between actual reading of span and zero is less than 40%	Recalibrate the meter
<b><u>DURING NORMAL SERVICE</u></b>		
Display Shows Erroneous reading	Sensor not dipped in the line properly	Loop the outlet tubing such that the tee always remains flooded with water
Meter shows sensor error	Sensor output may be more or less than the min. or max. values	Recalibrate the meter. If problem persists change the sensor
No display	High voltage	Check MOV/FUSE, if it is burnt then replace it with new one
Frequent Fuse failure	MOV short	Replace MOV* as well as FUSE**

\*MOV 14mm Dia. and 320V AC

\*\* FUSE -- 500mA

**Follow the guideline below for better results.:**

<b>DOS</b>	<b>DON'TS</b>
Do turn ORP meter OFF before disconnecting electrode.	Do not touch the bottom part of ORP electrode with your hands, especially the bulb or reference junction.
Do rinse the ORP electrode thoroughly with deionized water before measuring a new sample.	Do not scratch or damage the ORP electrode bulb. This may totally break electrode or result in erroneous readings
Do standardize your ORP sensor frequently for the most accurate results.	Do not use reference junction with fast flowing reference junction in small samples where flow of reference solution could contaminate the sample.
Do mount ORP sensor in a sampling line vertically.	Do not mount the sensor in any housing other than the supplied one
	Do not put the sensor in pressurized line. Ensure the output is always kept open to atmosphere.
	Do not extend the sensor cable.