MICRO-RX Series

Instruction **Manual**

- MICRO-RX1

ORP MONITORING & DOSING CONTROLLER

(with Solution Ground (ie. Earth) Probe for elimination of ground loop interference)

IMPORTANT NOTE: **DO NOT PRESS ANY 2 BUTTONS SIMULTANEOUSLY, UNLESS PERFORMING CALIBRATION.**

Supplied by:

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Note: On-going product development at Convergent Water Controls may lead to changes in the specifications of this product.

Warranty: This product is guaranteed for a period of 12 months from installation date. The warranty applies to manufacturing or component defects which may cause the unit to malfunction under specified conditions. The guarantee does not cover damage due to abuse, tampering or improper installation.

Disclaimer: Convergent Water Controls will not be held liable for any consequential damage or loss arising resulting from product malfunction.

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1. INTRODUCTION

The MICRO-RX1 measures and controls the Oxidation Reduction Potential (ie. ORP) as read by an ORP (Redox) electrode. To ensure stable readings free from any ground loop interference, the unit measures ORP with respect to an earth probe which eliminates any spurious signals. This earth probe is supplied with the unit and must be inserted with the ORP electrode in the solution. When an oxidising agent, such as chlorine or bromine, is dosed into the measured solution, it will cause an increase in ORP. When the measured solution is diluted (ie. some of the oxidising agent removed or consumed), or a reducing agent is added, then the ORP electrode will report a decrease in ORP.

The MICRO-RX1 is a dosing controller, ie. the output activates a dosing pump or N/C solenoid, or de-activates a N/O solenoid, when the system ORP drops below the mV setpoint.

Components of an ORP Control System (dosing an oxidising agent) are:

1. ORP controller (eg. MICRO-RX1)
2. ORP probe (eg. IH30) & probe holder (eg. PRM-H2-V)
3. Earth Probe
4. Suitable Dosing pump (eg. LMI) or Brominator (eg. BROM-01) sized large enough to deliver enough oxidising agent to perform suitable ORP correction. If a brominator is used, the MICRO-RX1 will activate a N/C solenoid instead of a dosing pump.

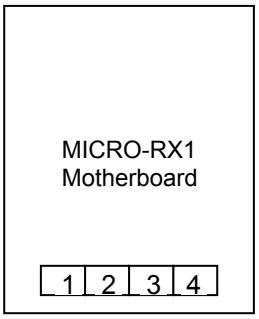
2. INSTALLATION

2.1 Mounting the Controller

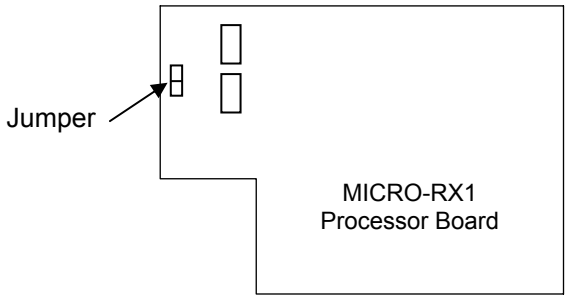
Mount the MICRO-RX1 on a flat vertical surface away from extreme heat, humidity or areas where temperature variations are extreme, ideally at eye-level to allow good visibility of the LCD display. Also ensure that a 240VAC mains power point is located nearby.

2.2 Electrical Wiring Information

The diagrams below show the Motherboard of the controller (in the base of the box) and the Processor Board of the controller (in the lid of the box).



1. Active 240VAC supply
2. Neutral 240VAC supply
3. Active for Pump/Solenoid
4. Neutral for Pump/Solenoid



NOTE: The jumper indicated above should be removed or placed on only one of the 2 adjacent pins.
The BNC connection for the ORP electrode and the connection for the Earth Probe are situated on the outside of the enclosure at the bottom left hand side.

2.3 Probe Installation

The ORP electrode is the heart of the system. Please take extra care in determining the type and location of the probe. The ORP electrode has a very high output impedance and is susceptible to interference if not installed correctly.

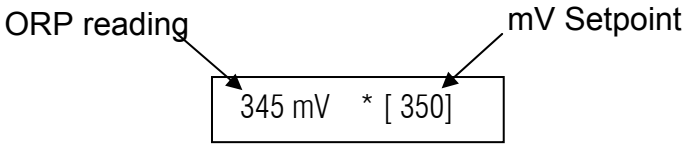
Plan the installation such that the ORP electrode is as close as possible to the controller. If the probe needs to be located further away from the ORP controller, an extension cable must be obtained. The further the probe is away from the controller, the greater the effect of electrical interference will be. This may degrade the signal from the probe and causes incorrect readings. Never attempt to extend the probe cable by means of a terminal block or soldered connection. This will leave the connection open to interference or moisture, which will affect the accuracy of the system. Always have the connection (when using an extension cable) in a waterproof junction box.

The Earth Probe supplied must be inserted into the same solution as the ORP electrode. The controller uses common mode rejection technology to eliminate any electrical interference on the ORP electrode.

3. COMMISSIONING

3.1 Start-Up

After power-up, the MICRO-RX1 controller is ready to perform ORP indication and control. All the relevant information is displayed on the LCD display as explained below.



Display **during normal operation**: ORP of solution as reported by ORP probe as well as SETPOINT(shown between square brackets)

Display **during programming**: Programming information

Note: Flashing * indicates that the pump/solenoid is activated.

3.2 Calibration

Calibration should not be necessary, as the unit is factory calibrated. Should the readout on the screen differ from the titration measured or the reading seems to have drifted up or down, try cleaning the electrode tip first. Should calibration still be necessary, the following can be performed, **BUT ONLY by a qualified technician with an accurate mV simulator/voltage source**:

IMPORTANT: AS THE UNIT NEEDS TO BE POWERED, BE VERY CAREFUL NOT TO TOUCH ANY OF THE SCREW TERMINALS OR THE CIRCUIT BOARDS, AS THEY MAY BE LIVE, AND CAN RESULT IN ELECTRIC SHOCK, OR EVEN DEATH.

1. Remove the lid of the controller
2. Move the jumper so that it is positioned to bridge the 2 adjacent pins (see diagram in section 2.2)
3. Apply 0mV to the BNC plug with probe disconnected.
4. Hold down the ▣ button and ⇩ button simultaneously until the display reads:

ZERO

Release the buttons and the display will read:

0 mV [350]

5. Apply 150mV to the BNC plug with probe disconnected.
6. Hold down the ▣ button and ↑ button simultaneously until the display reads:

SLOPE

Release the buttons and the display will read:

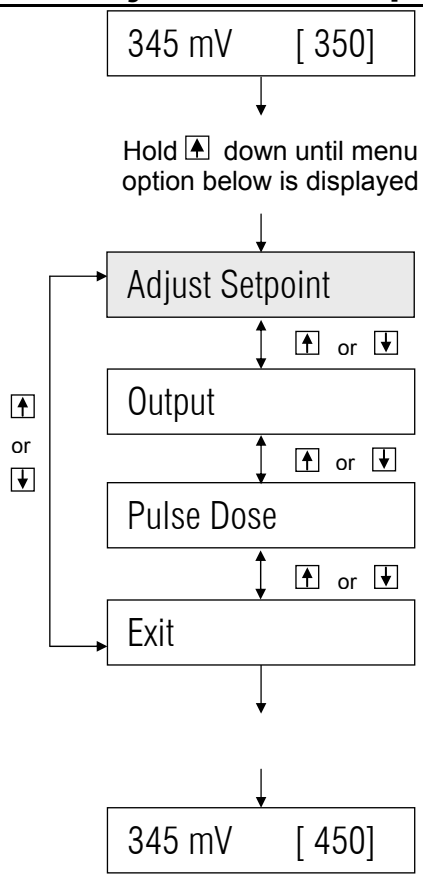
150 mV [350]

7. Remove the jumper and then place it on only one of the adjacent pins.
8. Replace the controller LID, ensuring the gasket is in place.

NOTE: Instead of moving the jumper (as in Step 2) in order to calibrate, a short circuit between the external Earth Probe connector and the chassis of the BNC, will product the same effect.

4. PROGRAMMING STEPS IN DETAIL

4.1 Adjust ORP Setpoint



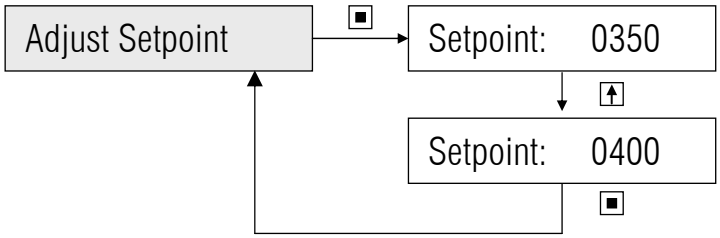
This is the desired ORP value of the process. To determine the setpoint, proceed as follows:

With the ORP electrode installed, ensure that a stable reading is displayed.

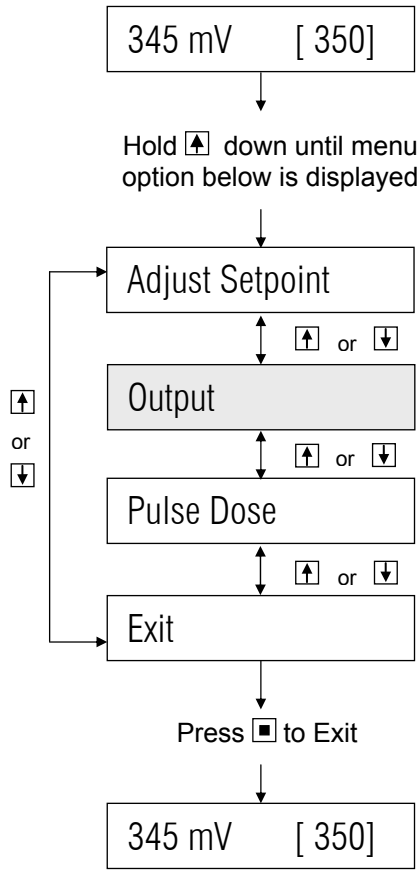
Slowly add the oxidising agent manually. The reading on the LCD display should increase. Titrate the solution and keep on adding the oxidising agent until the desired level of ORP is reached. This level relates to the desired concentration (ie. ppm).

Record the readout on the display (left-hand side) and program this value as the Setpoint.

Example:
Increasing factory default setpoint of 350 mV to a new setting of 400 mV



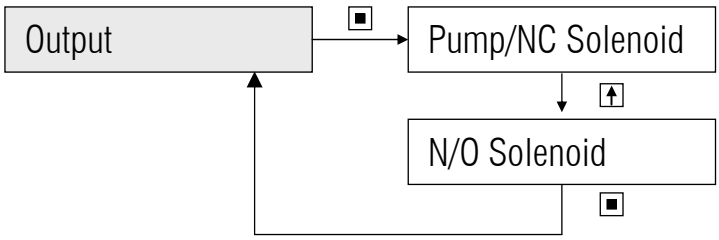
4.2 Select Output Type



The MICRO-RX1 is a dosing controller, ie. the output activates a dosing pump or N/C solenoid, or de-activates a N/O solenoid, when the system ORP drops below the mV setpoint.

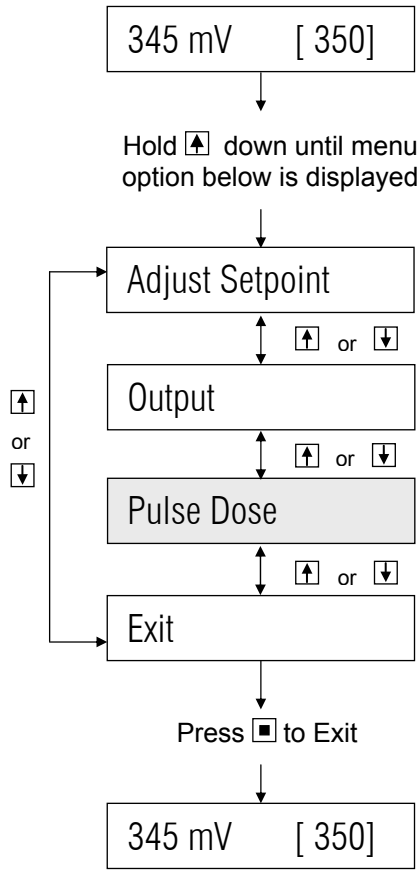
To leave the MICRO-RX1 in its default setting of activating a dosing pump or N/C Solenoid continue to Step 4.3. This is the most common setting.

Example:
Changing the default output setting to activate a N/O solenoid



Note: Ensure that the output type is set correctly, as an incorrect setting can result in overdosing, or no dosing at all.

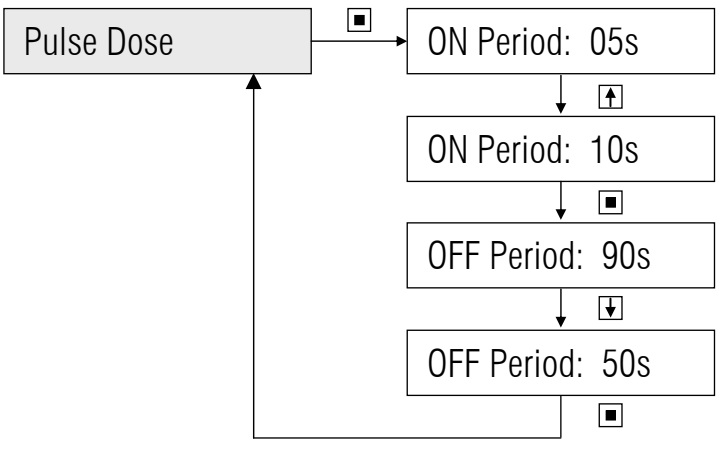
4.3 Set Pulse Dose / Duty Cycle on Output



To leave the Pulse Dose/Duty Cycle in its default state, exit out of the menu. This is the factory default setting of ON/OFF=05s/90s which means that the pump will dose with this cycle setting when the system ORP is just below the mV Setpoint. Automatic adjustment of these times occurs when the mV level changes, explained below:

When a chemical product is dosed for ORP correction, some time is required for agents to react. Depending upon the location of the dosing point and the volume of water in the system, it may take some time before the chemicals reach the ORP electrode. If the response is slow, overdosing can occur due to the delay between dosing and measurement.

To overcome this problem, the controller has two timers that regulate the duty of the dosing pump. These timers are the ON and OFF times of the PULSE DOSE. Each ON time is followed by an OFF time and repeated until the setpoint is reached. This action prevents overdosing.



The MICRO-RX1 only uses the programmed duty cycle when the measured ORP is very close to the mV setpoint. As soon as the measured ORP starts to deviate away from the mV setpoint, the controller adjusts the duty cycle automatically in order to bring the system ORP back to the mV setpoint more quickly. The duty cycle is adjusted in 1% error incrememements.

The ON and OFF periods are linked to the percentage error between the measured ORP and the mV setpoint. The value for continuous operation is 50% below setpoint (ie. the duty cycle is overridden and the output is on continuously).

Put simply, the ON period of the duty cycle is lengthened and the OFF period is shortened, the further the measured ORP is away from the mV setpoint.

If the system takes a long time to reach the setpoint, the ON time should be lengthened.

4.4 Priming of Dosing Pump / Testing Solenoid

At any stage during normal operation, when the output is not activated, the ▣ button can be pressed to manually activate the output, in order to give power to the output device (ie. pump or solenoid). The ▣ button can simply be pressed again to cancel the test (ie. by deactivating the output).

5. FACTORY SETTINGS / PROGRAMMABLE OPTIONS

Item	Factory Setting	Option	Note
Setpoint	350 mV	10 to 990 mV (set in 10 mV increments)	Desired system ORP
Output	Pump/NC Solenoid	Pump/NC Solenoid N/O Solenoid	
Pulse Dose ON Period	5 sec	1-99 sec	Dose Time
Pulse Dose OFF Period	90 sec	1-99 sec	Reaction Time

6.SPECIFICATIONS

Power Supply:	220 – 240 VAC
Fuse:	2A/250VAC
Inputs:	ORP Probe/Electrode (Optional) Earth Probe (standard) Flow switch and low tank level options available on request
Control Algorithm:	Logarithmic proportional, ie.: duty cycle (ON/OFF times) is directly proportional to the % error between the measured ORP and the mV setpoint. At setpoint, programmed ON/OFF is used. At 50% below setpoint, OFF = 0 – 1sec Resolution of duty cycle adjustment: 1 % error.
Standard Outputs:	240VAC applied to Pump/Solenoid Output – 5 Amp rated.
Measured ORP Resolution:	1 mV
Controller Enclosure rating:	IP55 (ie. completely weatherproof)
Operating Temperature:	0 - 50°C
Memory backup:	EEPROM. Data retention of 10 years min.