Quick Start Guide
00825-0100-3494, Rev AA
June 2019

Rosemount™ Hx438

Amperometric Steam Sterilizable Dissolved Oxygen Sensors

ROSEMOUNT™

EMERSON.

Safety Information

⚠ WARNING

High pressure and temperature

Failure to reduce the pressure and temperature may cause serious injury to personnel.

Before removing the sensor, reduce the process pressure to 0 psig and cool down the process temperature.

Do not exceed temperature and pressure limitations of 266 °F (130 °C) and 43 psig (400 kPa, 4 bar).

⚠ WARNING

The electrolyte is highly alkaline.

Protect your hands with gloves and use safety goggles.

Avoid contact of the electrolyte with the skin, eyes, and mucous membranes.

1 Plan

1.1 Unpack and inspect

Procedure

1. Inspect the outside of the carton for any damage.
2. If damage is detected, contact the carrier immediately.
3. Inspect the hardware.
4. Make sure all the items in the packing list are present and in good condition.
5. Notify the factory if any part is missing.

1.2 Specifications

Table 1-1: Rosemount Hx438 dissolved oxygen sensor specifications

Hx438 Dissolved Oxygen Sensor	Material and Units
Operating Temperature Range	32 to 266 °F (0 to 130 °C)
Maximum Pressure	43 psig (400 kPa abs, 4 bar)
Measurement Range	0 to 20 ppm or 0 to 250% saturation, depending on instrument
Wetted Materials	Stainless steel and EPDM
Process Connections	PG 13.5 thread
Cable Connector	Standard 4-pin
Cable Compatibility	Standard 4-pin connector cable
Compatible Mounting Accessory	Insertion Mounting Assembly
Compatible Transmitters	Rosemount Transmitter Models 56, 1056, 5081, and 1066
Temperature Compensation	22K NTC

2 Install

2.1 Preparing the sensor

Procedure

1. Remove the plastic cap carefully which covers the sensing end of sensor.
2. Avoid causing a vacuum by gently and slowly twisting the sensor and cap until it is removed.
3. Sensor is shipped dry, so electrolyte must be added prior to installation.
4. Remove membrane cartridge.
5. Add 1.5 ml of electrolyte to the membrane cartridge.
6. Screw membrane cartridge back onto sensor body.

2.2 Connecting the sensor to the trasmitter

Procedure

1. Wire the sensor to the transmitter.
2. Apply power to the transmitter.
3. Make the sensor ready for calibration after two hours.

   The polarization time is necessary to get stable signals from the sensors
4. If the sensor is disconnected from the transmitter for a short time, allow the sensor to stabilize for at least two times longer than the time was disconnected.

   Time needed for stabilization should not exceed two hours.

2.3 Mount the sensor

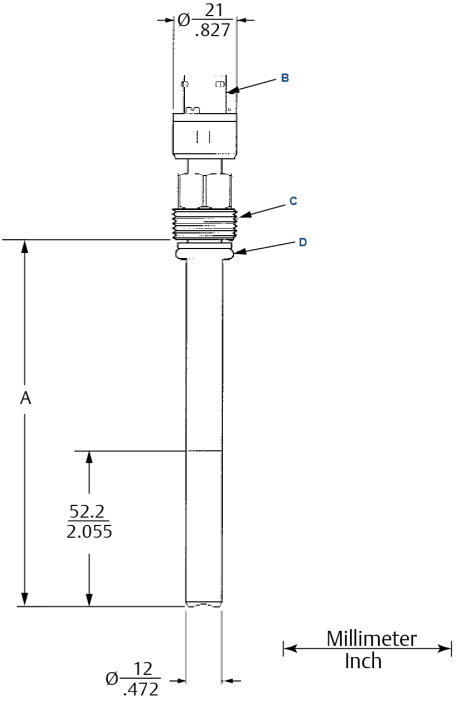
Procedure

Use PG 13.5 process thread to mount the sensor.

NOTICE

Do not install the sensor upside down.

Figure 2-1: Dimensional Drawing for Rosemount Hx438-01



A.

Sensor part number	A dimension	
	in.	mm
Hx438-01	4.725	120

B. *4-pin connector*
C. *Free rotating PC 13.5 screw thread*
D. *O-ring*

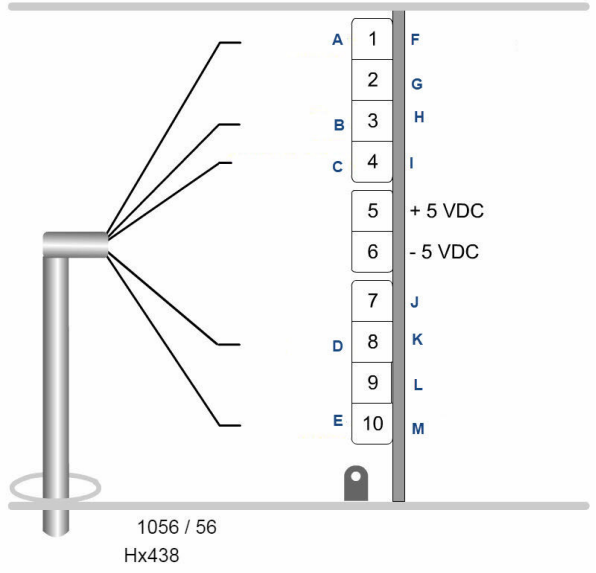
2.4 Wire the sensor to the transmitter

Procedure

Wire the sensor to the transmitter.

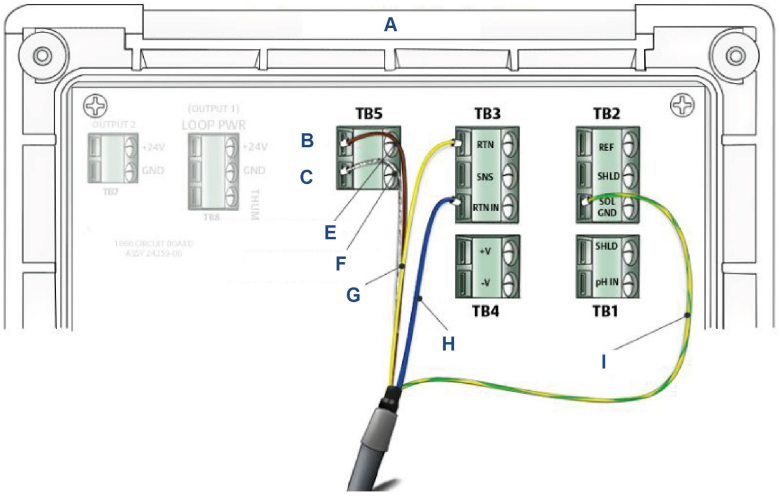
See wiring diagrams below.

Figure 2-2: Wiring for Rosemount™ 1056 and 56 Transmitter



A. *Yellow*
B. *Blue*
C. *Yellow/green*
D. *Brown*
E. *Clear*
F. *Resistance temperature device return*
G. *Resistance temperature device sense*
H. *Resistance temperature device in*
I. *Resistance temperature device shield*
J. *Anode shield*
K. *Anode*
L. *Cathode shield*
M. *Cathode*

Figure 2-3: Wiring for Rosemount 1066 Transmitter



A. Hinge inside of front panel
B. Anode
C. Cathode
D. TB5/input-anode-brown
E. TB5/input-cathode-clear
F. TB3/resistance temperature device-return-yellow
G. TB3/resistance temperature device/resistance temperature device in-blue
H. TB2/reference and solution ground-solution ground-yellow/green

Follow recommended order.

a. TB4/anode and cathode
    1. Anode
    2. Cathode

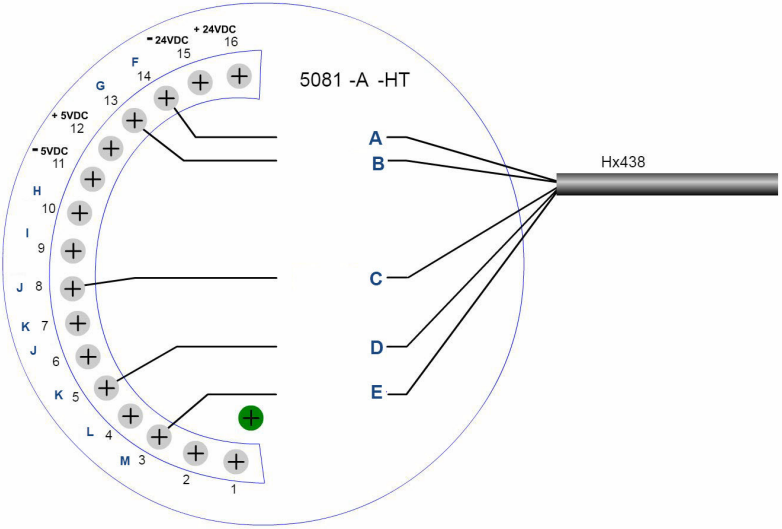
b. TB3/resistance temperature device
    1. Return
    2. Sense
    3. Resistance temperature device in

c. TB2/solution ground
    1. No connection
    2. No connection

3. Solution ground

Note
TB1, TB4, TB6, and TB& not used for oxygen and ozone sensor wiring. TB1, TB2, and TB4 may be used for pH sensor wiring if free chlorine measurement requires live pH input.

Figure 2-4: Wiring for Rosemount 5081 Transmitter



A. Clear
B. Brown
C. Yellow/green
D. Blue
E. Yellow
F. Cathode
G. Anode
H. mV in
I. Drain
J. Solution ground
K. Reference
L. Resistance temperature device in
M. Resistance temperature device sense
N. Resistance temperature device return

3 Calibrate

3.1 Sterilizing the sensor

Procedure

1. Before autoclaving the sensor, cover the connector end of the sensor with a tight protective cap (PN 242000).
2. If the connector end gets wet despite the protective cap, dry the connector with pressurized air or hair dryer.

   Drying prevents corrosion and damage to insulation.

Note
No protection is necessary, when doing in-situ sterilization.

3.2 Dismounting the sensor

Procedure

1. Unscrew the free rotating PG 13.5 threaded connector.
2. Pull the sensor out of the process or mounting assembly.

3.3 Calibrate

Prerequisites

Before calibrating the sensor, refer to the transmitter instruction manual for more details on calibration.

Prerequisites

Make sure that the sensor is operated for at least two hours before zeroing and calibrating.

Procedure

1. Place the sensor in nitrogen gas or in water containing about 5% sodium sulfite to make it zero.

   If using nitrogen gas, make sure that the membrane is dry.
2. Once the reading is stable, zero the sensor. Refer to transmitter instruction manual.
3. If sodium sulfite is used to zero the sensor, rinse the sensor with water and gently dry the membrane.
4. Place the sensor in water-saturated air. Once the reading is stable, complete the full scale calibration. Refer to transmitter instruction manual.

5. Calibration can also be done using air-saturated water or air-saturated medium.

   Altough the sensor has an extremely low oxygen consumption rate, the liquid should be gently stirred during calibration.

4 Maintaining and troubleshooting

4.1 Maintaining the sensor

Procedure

1. Periodically check the sensor response in air and nitrogen.
2. Place the sensor in air. Allow the reading to become stable and note the value.

   Also, note the sensor current, which should be between 40 and 80 nA.
3. Place the sensor in nitrogen. A small plastic bag with a stream of nitrogen gas discharging into the bottom works well.
4. After one minute, the sensor current should be less than 2% of the value in air.

4.2 Replacing the electrolyte and the membrane cartridge

Replace the membrane cartridge (membrane kit PN 9160487) as follows:

Procedure

1. Hold the sensor vertically with the membrane pointing down. Carefully unscrew the membrane cartridge.
2. Carefully clean the tip of the glass body with the polishing cloth included with membrane kit, or clean with the polishing tool in one direction only.

⚠ CAUTION

Glass Body Damage
Do not polish in circular motion. Failure to correctly polish the glass body may result in permanent damage to the equipment.

NOTICE

When replacing the membrane cartridge, do not touch the anode wire.

3. Rinse the sensor under running water and dry it carefully.
4. Check the small O-ring above the glass body. If it is damaged, replace it.
5. Use the plastic pipette in the membrane kit to add 2 ml of electrolyte solution to the new membrane cartridge.
6. Carefully screw the cartridge onto the sensor shaft.

   If too much electrolyte solution was used, the excess will be pushed out.
7. Wash off the excess electrolyte with water.

4.3 Replace the cathode

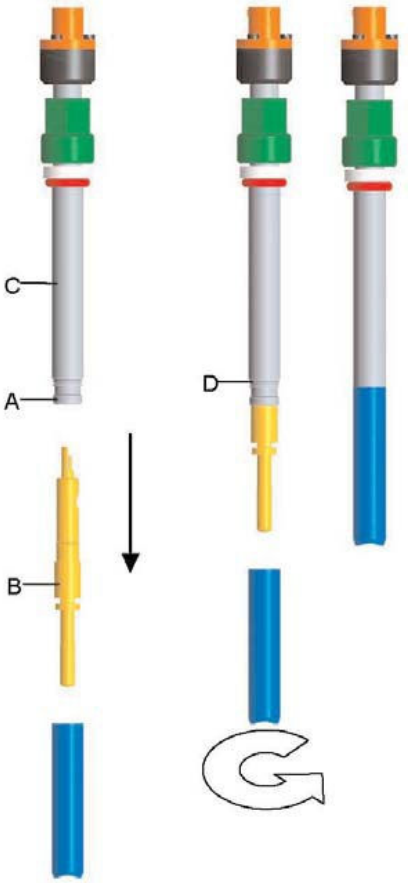
If the sensor stil lhas a sluggish response to saturated air and/or too small current in air, then the cathode should be replaced.

Procedure

1. Put the sensor in an upright position and carefully unscrew the membrane cartridge.

   Note
   The membrane should be changed whenever the cathode is replaced.
2. Flush the replaceable cathode with deionized water then dry the metal parts. Do not touch anode and cathode.

Figure 4-1: Replacing the Cathode



A. Sensor shaft thread
B. Cathode - metal part
C. Sensor shaft
D. Cathode O-ring

3. Hold the cathode on the metal part (B) in front of the thread (A) and the sensor on the shaft (C) and pull apart. Just pull, do not turn.
4. Check that all contacts are dry and clean.
5. Replace cathode. (Part number 24262-00) Rotate the cathode until the correct position is found and then push cathode into the shaft.

6. Check the small O-ring (D) above the cathode. Replace if damaged.
7. Add 1.5 ml of electrolyte into the new membrane cartridge.

NOTICE

The pipette must NOT touch the membrane itself.

8. Screw the membrane cartridge onto the sensor shaft.
   Any spillage of electrolyte should be rinsed away with water.

4.4 Troubleshoot

Table 4-1: Troubleshoot

Current in air too high (>80 nA at 25 °C)		Sluggish response		Current in air too low (<40 nA at 25 °C)	
Problem	**Solution**	**Problem**	**Solution**	**Problem**	**Solution**
Very thin or defective membrane	Replace with new membrane cartridge	Contaminated, fouled, or dirty membrane	Clean membrane or replace with new membrane cartridge	Contaminated, fouled, or dirty membrane	Clean membrane or replace with new membrane cartridge
Defective glass body or connector	Return to Emerson	Loose membrane	Replace with new membrane cartridge	Dried out electrolyte film	Loosen membrane cartridge and tighten
Poisoned anode	Return to Emerson	Dried out electrolyte film	Loosen membrane cartridge and tighten	Cathode contaminated by silver	Clean cathode with polishing paper. If cleaning does not restore the sensor, then replace the cathode
Cathode contaminated by silver	Clean cathode with polishing paper. If cleaning does not restore the sensor, then replace the cathode	Cathode contaminated by silver	Clean cathode with polishing paper. If cleaning does not restore the sensor, then replace the cathode	Exhausted electrolyte	Return to Emerson

Table 4-1: Troubleshoot *(continued)*

Current in air too high (>80 nA at 25 °C)		Sluggish response		Current in air too low (<40 nA at 25 °C)	
Problem	**Solution**	**Problem**	**Solution**	**Problem**	**Solution**
-	-	-	-	Defective glass body or connector	Fill with new electrolyte

FDA Approved Membrane replacement kit, which includes electrolyte solution and polishing paper, is PN 9160487.

5 Accessories

Part number	Description
Cable accessories	
9160493	5 m (16.4 ft). 4-pin connector, bare wire on transmitter end
Mounting accessories	
9160478	Insertion 70 mm insertion, use 120 mm sensor
9160484	Service kit for insertion mounting assembly
9160483	15° weld-in socket, G 1¼ in. thread, 44 mm
Servicing accessories	
9160487	Service kit for sensors, includes three FDA approved membranes modules, O-rings, polishing tool, 20 ml electrolyte
9160489	30 ml bottle electrolyte
242000	Third party labeled connector cap for 4-pin connector for autoclaving (compatible with Rosemount™ Hx438-01)
24262-00	Third party labeled replacement anode/cathode cartridge

The 4-pin connector cable is offered in three lengths.

The insertion mounting assembly can be used to mount the Rosemount Hx438-01 into the process tanks or pipes.

The weld-in socket is used to mount the insertion mounting assembly into tanks or pipes.

Figure 5-1: Weld-in Socket

Quick Start Guide
00825-0100-3494, Rev. AA
June 2019

GLOBAL HEADQUARTERS
6021 Innovation Blvd.
Shakopee, MN 55379
+1 866 347 3427
+1 952 949 7001
liquid.csc@emerson.com

EUROPE
Emerson Automation Solutions
Neuhofstrasse 19a PO Box 1046
CH-6340 Baar
Switzerland
+41 (0) 41 768 6111
+41 (0) 41 768 6300
liquid.csc@emerson.com

MIDDLE EAST AND AFRICA
Emerson Automation Solutions
Emerson FZE
Jebel Ali Free Zone
Dubai, United Arab Emirates, P.O. Box 17033
+971 4 811 8100
+971 4 886 5465
liquid.csc@emerson.com

ASIA-PACIFIC
Emerson Automation Solutions
1 Pandan Crescent
Singapore 128461
Republic of Singapore
+65 6 777 8211
+65 6 777 0947
liquid.csc@emerson.com

Linkedin.com/company/Emerson-Automation-Solutions
twitter.com/rosemount_news
Facebook.com/Rosemount
youtube.com/RosemountMeasurement

ROSEMOUNT™

EMERSON™