Quick Start Guide
00825-0100-3140, Rev AA
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Rosemount™ 140/141/142

Contacting Conductivity Sensors

ROSEMOUNT™

EMERSON™

Essential instructions

Read this page before proceeding!

Emerson designs, manufactures, and tests its products to meet many national and international standards. Because these instruments are sophisticated technical products, you must properly install, use, and maintain them to ensure they continue to operate within their normal specifications. You must adhere to the following instructions and integrate them into your safety program when installing, using, and maintaining Emerson's Rosemount products. Failure to follow the proper instructions may cause any one of the following situations to occur: loss of life, personal injury, property damage, damage to this instrument, and warranty invalidation.

- Read all instructions prior to installing, operating, and servicing the product.
- If you do not understand any of the instructions, contact your Emerson representative for clarification.
- Follow all warnings, cautions, and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation, and maintenance of the product.
- Install equipment as specified in the installation instructions of the appropriate Reference Manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, use qualified personnel to install, operate, update, program, and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Emerson. Unauthorized parts and procedures can affect the product's performance, place the safe operation of your process at risk, and VOID YOUR WARRANTY. Look-alike substitutions may result in fire, electrical hazards, or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified people, to prevent electrical shock and personal injury.

Note
The information contained in this document is subject to change without notice.

⚠ CAUTION

Sensor/Process Application Compatibility

The wetted sensor materials may not be compatible with process composition and operating conditions. Application compatibility is entirely the responsibility of the user.

⚠ CAUTION

Before removing the sensor, be absolutely certain the process pressure is reduced to 0 psig and the process temperature is at safe level.

⚠ WARNING

Physical access

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

Contents

1 Specifications

Table 1-1: Rosemount 140 Contacting Conductivity Sensor Specifications

Cell constants	
0.1 and 1.0/cm (nominal, to within ±5%)	
Wetted materials	
Electrodes	316 stainless steel
Body	316 stainless steel
Insulator	Polyetheretherketone (PEEK)
O-rings	Viton®
Temperature range	
Standard	32 to 302 °F (0 to 150 °C)
High temperature	32 to 392 °F (0 to 200 °C)
Pressure	
100 psig (791 kPa) maximum	
Vacuum	
At 1.6-in. Hg (5.2 kPa), air leakage is less than 0.005 SCFM (0.00013 m^3/min.)	
Junction box	
Cast aluminum	
Process connection	
1-in. (25.4 mm) male pipe thread (MPT) through 1-in. (25.4 mm) full port ball valve (retractable)	
Weight/shipping weight	
5 lb./6 lb. (2.5 kg/3.0 kg)(1)	

(1) Weights rounded up to nearest whole lb. or 0.5 kg.

Table 1-2: Rosemount 141 Contacting Conductivity Sensor Specifications

Cell constants	
0.2 and 1.0/cm (nominal, to within ±5%)	
Wetted materials	
Electrodes	316 stainless steel
Body	316 stainless steel

Table 1-2: Rosemount 141 Contacting Conductivity Sensor Specifications *(continued)*

Insulator	PEEK
O-rings	Viton
Temperature and pressure	
See Figure 1-1.	
Vacuum	
At 1.6-in. Hg (5.2 kPa), air leakage is less than 0.005 SCFM (0.00014 m^3/min.)	
Junction box	
Cast aluminum	
Process connection	
¾-in. (19.1 mm) MPT	
Weight/shipping weight	
2 lb./3 lb. (1.0 kg/1.5 kg)(1)	

(1) Weights rounded up to nearest whole lb. or 0.5 kg.

Table 1-3: Rosemount 142 Contacting Conductivity Sensor Specifications

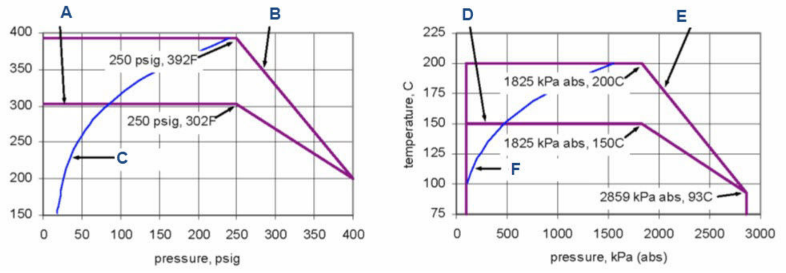
Wetted materials	
Electrodes	316 stainless steel
Body	316 stainless steel
Insulator	PEEK (high temperature option)
	PCTFE (low temperature option)
O-rings	Viton
Temperature and pressure	
See Figure 1-1.	
Vacuum	
At 1.6-in. Hg (5.2 kPa), air leakage is less than 0.005 SCFM (0.00014 m^3/min.)	
Junction box	
Cast aluminum	
Process connection	
¾-in. (25.4 mm) MPT	

Table 1-3: Rosemount 142 Contacting Conductivity Sensor Specifications *(continued)*

Weight/shipping weight
2 lb./3 lb. (1.0 kg/1.5 kg)(1)

(1) Weights rounded up to nearest whole lb. or 0.5 kg.

Figure 1-1: Rosemount 141 and 142 Sensor Pressure/Temperature Graphs

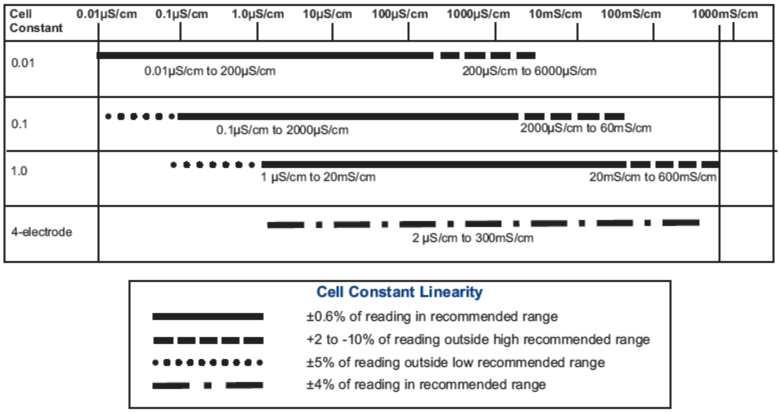


A. Standard
B. High temperature
C. Saturated steam
D. Standard
E. High temperature
F. Saturated steam

Table 1-4: Specifications for PN 23724-00 Ball Valve Kit

Wetted materials
316 stainless steel except PTFE seat and seals in ball valve

Figure 1-2: Performance Specifications: Contacting Conductivity - Recommended Range



2 Installation

2.1 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.

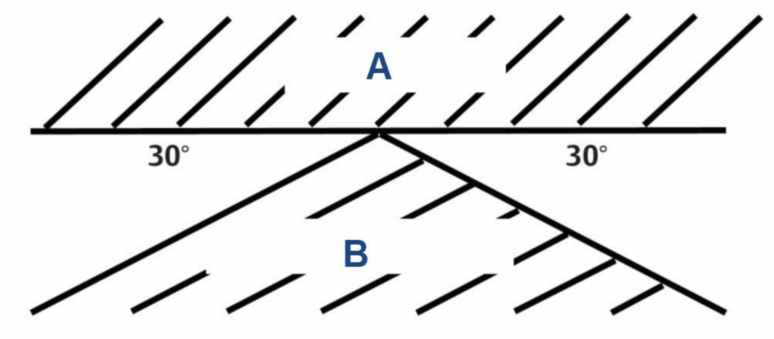
2.2 Install sensor

Keep ¼ in. (6 mm) clearance between electrodes and piping. The electrodes must be completely submerged in the process liquid, i.e., to the level of the threaded connection.

See Figure 2-1 for recommended orientation and installation.

If the sensor is installed in a side stream with the sample draining to open atmosphere, bubbles may accumulate on the electrodes. Trapped bubbles will cause errors. As bubbles accumulate, the conductivity reading drops. To control bubble formation, apply a small amount of back pressure to the drain.

Figure 2-1: Sensor Orientation



A. Trapped air
B. Trapped sludge

2.3 Install with ball valve kit (PN 23724-00)

If the ball valve assembly is already in place and the process line is pressurized, refer to Insert the sensor.

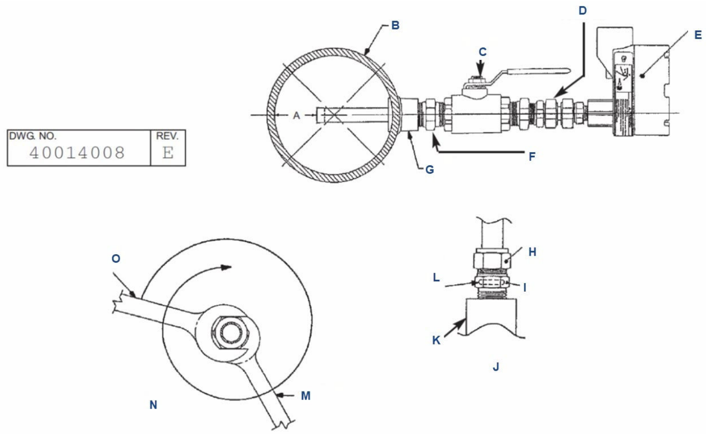
Procedure

1. Install the sensor in either a 1-in. (25.4 mm) national pipe thread (NPT) weldalet or in a 1-in. (25.4 mm) pipe tee.
2. Remove the plastic shipping cap from the sensor.

3. Screw the 1-in. (25.4 mm) hex nipple into the weldalet or pipe tee. Use pipe tape on the threads.

   See Figure 2-2.

Figure 2-2: Install with Ball Valve Kit (PN 23724-00)



A. *Radius of ball valve kit*
B. *Process piping*
C. *Ball valve*
D. *Sensor compression fitting*
E. *Sensor*
F. *1-in. (25.4 mm) NPT hex nipple*
G. *Weldalet*
H. *Put wrench A here and turn.*
I. *Put wrench B here.*
J. *Side view*
K. *Ball valve*
L. ***⚠ CAUTION***

   Process O-ring must be in place and is critical.

   Replace if worn or dirty.

M. *Wrench B*
N. *Top view*
O. *Wrench A*

4. Position the sensor for easy access to the ball valve handle, sensor compression fitting nut, and junction box.
5. Make sure the ball valve is in the fully open position.

6. Finger tighten the sensor compression fitting nut.

   Do not over tighten because the next step is to press the sensor into the process pipe.

7. Insert the sensor tube until the sensor tip is no closer than 1 in. (25.4 mm) from the far wall of the process pipe.

   See Figure 2-2.

8. Tighten the sensor compression fitting nut to hold the sensor tip in position.

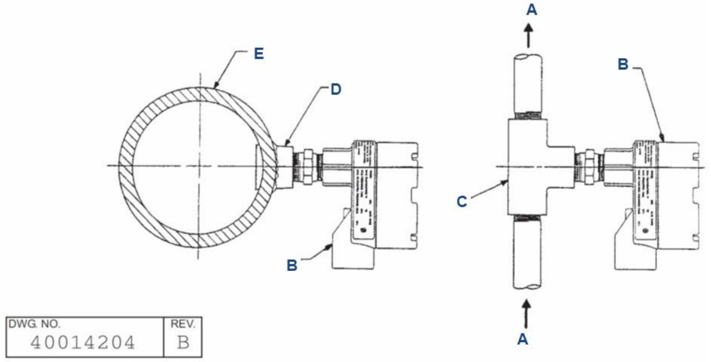
2.4 Install Rosemount 141 sensor

Procedure

1. Install the sensor in a ¾-in. (25 mm) national pipe thread (NPT) weldalet or in a 1-in. (25.4 mm) pipe tee.
2. Remove the plastic shipping cap from the sensor.
3. Screw the sensor into the fitting. Use pipe tape on the threads.

   See Figure 2-3.

Figure 2-3: Install Rosemount 141 Sensor



A. Flow
B. Sensor
C. Tee
D. Weldalet
E. Process piping

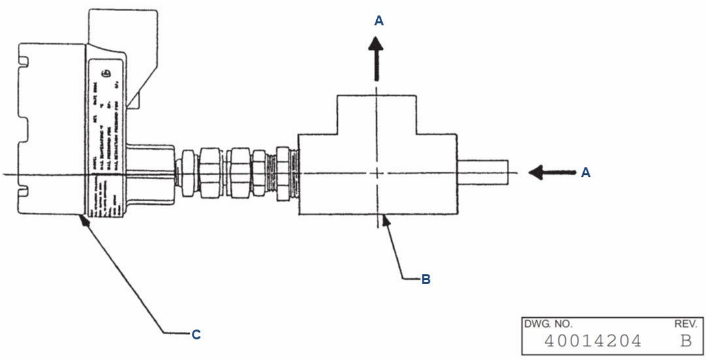
2.5 Install Rosemount 142 sensor

Procedure

1. Install the sensor in a ¾-in. (25 mm) national pipe thread (NPT) weldalet or in a 1-in. (25.4 mm) pipe tee.

   See Figure 2-4.

Figure 2-4: Install 142 Sensor



A. Flow
B. Tee
C. Sensor

2. Remove the plastic shipping cap from the sensor.
3. Screw the sensor into the fitting. Use pipe tape on the threads.

Important
Do not tighten the sensor compression fitting until the sensor is correctly positioned.

4. If necessary, loosen the sensor compression fitting and position the sensor so that the tip of the sensor is at least 1 in. (25.4 mm) from the far wall of the pipe.
5. Tighten the compression fitting using the procedure shown in Figure 2-2.

3 Wire Rosemount 140, 141, and 142 sensors

Terminals in the junction box are not numbered.

For other wiring diagrams not shown below, please refer to the Liquid Transmitter Wiring Diagrams. All Rosemount 140 series sensors have a junction box mounted on the back of the sensor. Figure 3-1 shows wiring connections in the junction box. Rosemount 141 and 142 sensors have one gray wire (shown). The Rosemount 140 sensor has two gray wires attached to the terminal.

Figure 3-1: Sensor Junction Box Wiring

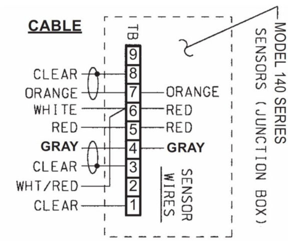


Table 3-1: Wire Color and Connections in Sensor

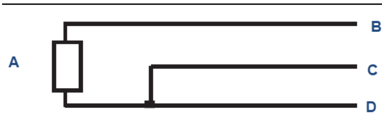
Color	Function
Gray	Connects to outer electrode
Clear	Coaxial shield for gray wire
Orange	Connects to inner electrode
Clear	Coaxial shield for orange wire
Red White with red stripe White	 *A. RTD* *B. RTD in* *C. RTD sense* *D. RTD return*
Clear	Shield for all RTD lead wires

Figure 3-2: Rosemount 140/141/142 Sensor Wiring to Rosemount 1056, 56, and 1057 Transmitters

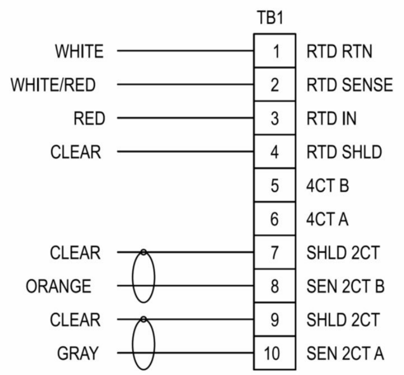


Table 3-2: Rosemount 140/141/142 Sensor Wiring to Rosemount 1056, 56, and 1057 Transmitters

Terminal number	Wire color	Connects to
1	White	RTD return
2	White/red	RTD sense
3	Red	RTD in
4	Clear	RTD shield
5	N/A	4CT B
6	N/A	4CT A
7	Clear	Shield 2 count
8	Orange	Sensor 2CT B
9	Clear	Shield 2 count
10	Gray	Sensor 2CT A

Figure 3-3: Rosemount 140/141/142 Sensor Wiring to Rosemount 1066 Transmitter

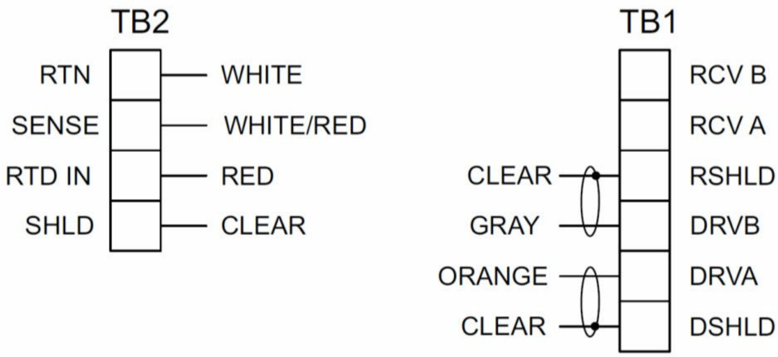


Table 3-3: Rosemount 140/141/142 Sensor Wiring to Rosemount 1066 Transmitter

Terminal block number	Wire color	Connects to
TB1	N/A	Receive B
TB1	N/A	Receive A
TB1	Clear	R shield
TB1	Gray	Drive B
TB1	Orange	Drive A
TB1	Clear	D shield
TB2	White	Return
TB2	White/red	Sense
TB2	Red	RTD in
TB2	Clear	Shield

Figure 3-4: Rosemount 140/141/142 Sensor Wiring to Rosemount 5081 Transmitter

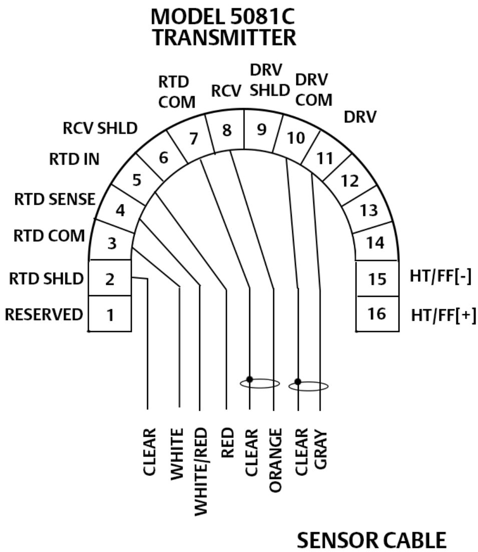


Table 3-4: Rosemount 140/141/142 Sensor Wiring to Rosemount 5081 Transmitter

Terminal number	Wire color	Connects to	Terminal number	Wire color	Connects to
1	N/A	Reserved	9	N/A	Drive shield
2	Clear	RTD shield	10	Clear	Drive common
3	White	RTD common	11	Gray	Drive
4	White/red	RTD sense	12	N/A	N/A
5	Red	RTD in	13	N/A	N/A
6	N/A	N/A	14	N/A	N/A
7	Clear	Receive common	15	N/A	HART®/ FOUNDATION™ Fieldbus (-)
8	Orange	Receive	16	N/A	HART/ FOUNDATION Fieldbus (+)

4 Retract and insert the Rosemount 141 sensor

Rosemount 141 sensors are retractable.

⚠ WARNING

Before retracting the sensor, be absolutely certain that the process pressure is less than 100 psig (791 kPa) and the process temperature is at a safe level.

4.1 Retract the sensor

Procedure

1. Push in on the sensor junction box and slowly loosen the sensor compression fitting nut by reversing the sensor tightening procedure as listed in Figure 2-2.
2. When the sensor compression nut is completely unscrewed, slowly ease the sensor out until the flared tip of the electrode rests firmly within the body of the compression fitting body.
3. Close the ball valve completely.
4. **⚠ CAUTION**

   Before removing the sensor, be sure the ball valve is completely closed.

   Unscrew the compression fitting body from the reducing bushing and remove the sensor from the ball valve assembly.

4.2 Insert the sensor

⚠ CAUTION

Make sure the process O-ring is clean, lubricated, and in place before installing the center. Replace if worn.

⚠ CAUTION

Do not open the ball valve yet.

⚠ CAUTION

The system pressure must be less than 100 psig (791 kPa).

Procedure

1. Thread the sensor compression fitting body into the reducing bushing in the rear of the ball valve and tighten.

⚠ CAUTION

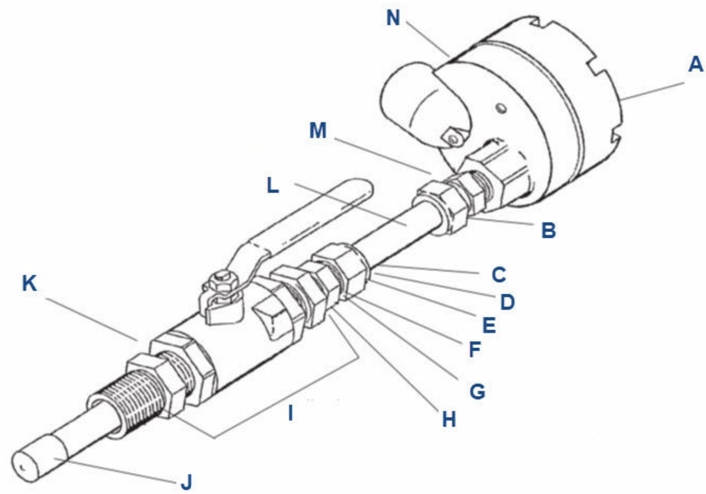
Damage to the sensor could result.

Do not push past this point.

⚠ WARNING

If the sensor comes free of the valve, refer to Figure 2-2 and Figure 4-1 and verify that the valve and associated fittings are as shown. Do not proceed until the sensor is correctly restrained.

Figure 4-1: Rosemount 140 with Ball Valve Kit (PN 23724-00)



A. *Junction box cover*
B. *Junction box compression fitting (PN 931020)*
C. *Sensor compression fitting nut, included in kit (PN 23730-00)*
D. *Polyetheretherketone (PEEK) split ring (inside)*
E. *PEEK ferrule (inside)*
F. *Compression fitting body, included in kit (PN 23730-00)*
G. *Viton® O-ring (inside) (PN 9550200)*
H. *Reducing bushing*
I. *Ball valve kit (PN 23724-00)*
J. *Flared mechanical stop*
K. *1-in. (25.4 mm) national pipe thread (NPT) hex nipple*
L. *Sensor tube*
M. *Nylon ferrule (inside)*
N. *Junction box*

2. Slowly open the valve.

⚠ WARNING

Stand clear of the sensor.

3. Insert the sensor up to the desired insertion depth and turn the sensor compression fitting nut until it is finger tight.

4. Position the entire sensor for easy access to the ball valve handle, sensor compression fitting nut, and junction box terminal block.
5. Tighten sensor compression fitting nut.

⚠ CAUTION

For initial installation of the sensor, tighten the compression fitting nut 1¼ turns after finger tight.

If it is a reinstallation, turn no more than ¼ to ½ additional turns.

5 Remove and reinstall the Rosemount 142 sensor

5.1 Remove the sensor

⚠ WARNING

Before removing the sensor, be absolutely certain that the process pressure is reduced to 0 psig and the process temperature is lowered to a safe level.

Procedure

1. Reduce process temperature and pressure to a safe level. If necessary, drain the process line.
2. Loosen the sensor compression fitting and slowly slide the sensor from the pipe fitting or weldalet.

5.2 Reinstall the sensor

Procedure

1. Slide the sensor into the process fitting and position the sensor the way it was originally installed.

   ⚠ CAUTION

   The sensor tube takes a permanent set and could become weakened if the new set is adjacent to the original set.

   Be sure the sensor is in the original position.

2. Tighten the sensor compression fitting ¼ to ½ turn after it is finger tight.

6 Calibrate and maintain

6.1 Calibrate the sensor

Emerson does not calibrate the Rosemount 140/141/142 sensors at the factory. The cell constant on the label is a nominal value only. The true cell constant can differ from the nominal value by as much as ±five percent.

For improved accuracy, calibrate the sensor using either a solution of known conductivity or a referee meter and sensor. If using a standard solution, choose one having conductivity in the recommended operating range for the sensor cell constant.

Do not use standard solutions having conductivity less than about 100 µS/cm for calibration. They are susceptible to contamination by atmospheric carbon dioxide, which can alter the conductivity by a variable amount as great as 1.2 µS/cm (at 77 °F [25 °C]). Because 0.01/cm sensors must be calibrated in low conductivity solutions, it is best to calibrate them against a referee meter and sensor.

6.1.1 Calibrate using a standard solution

If using a standard solution, choose one having conductivity in the recommended operating range for the sensor cell constant.

Procedure

1. Immerse the rinsed sensor in the standard solution and adjust the transmitter reading to match the conductivity of the standard.
2. Calibrate the sensor.

   For an accurate calibration:

   a. Choose a calibration standard near the midpoint of the recommended conductivity range for the sensor.

   b. Do not use calibration standards having conductivity less than 100 µS/cm.

   c. Turn off automatic temperature compensation in the transmitter.

   d. Use a standard for which the conductivity as a function of temperature is known.

   e. Use a good quality calibrated thermometer with an error rate less than ±0.1 °C to measure the temperature of the standard.

   f. Follow good laboratory practice. Rinse the beaker and sensor at least twice with standard. Be sure the rinse solution reaches between the inner and outer electrodes by tapping and swirling the sensor while it is immersed in the standard.

g. Be sure air bubbles are not trapped between the electrodes. Place the sensor in the standard and tap and swirl to release bubbles. Note the reading and repeat. If readings agree, no trapped bubbles are present. Repeat until two subsequent readings agree.

6.1.2 Calibrate using a reference meter and sensor

Take the following precautions for a successful calibration:

1. If the normal conductivity of the process liquid is less than about 1.0 µS/cm, adjust the conductivity so that it is near the upper end of the operating range.

   The difference between the conductivity measured by the process and reference meter usually has both a fixed (constant error) and relative (proportional error) component. Because the cell constant calibration assumes the error is proportional only, calibration at low conductivity allows the fixed component to have an outsized influence on the result.

   For example, assume the only difference between reference meter and process sensor is fixed, and the process sensor always reads 0.002 µS/cm high. If the process sensor is calibrated at 0.100 µS/cm, the new cell constant will be changed by 0.100/0.102 or two percent. If the sensor is calibrated at 0.500 µS/cm, the change will be only 0.500/0.502 or 0.4 percent.

   Calibration at higher conductivity produces a better result, because it minimizes the effect of the offset.

2. Orient the sensors so that air bubbles always have an easy escape path and cannot get trapped between the electrodes.

3. Turn off automatic temperature compensation in the transmitter.

   Almost all process conductivity transmitters feature automatic temperature compensation in which the transmitter applies one of several temperature correction algorithms to convert the measured conductivity to the value at a reference temperature, typically 77 °F (25 °C).

   Although temperature correction algorithms are useful for routine measurements, do not use them during calibration for the following two reasons:

   a. No temperature correction is perfect. If the assumptions behind the algorithm do not perfectly fit the solution being measured, the temperature-corrected conductivity will be in error.

   b. If the temperature measurement itself is in error, the corrected conductivity will be in error.

The purpose of calibrating the sensor is to determine the cell constant. To minimize the error in the cell constant, eliminate all sources of avoidable error, e.g., temperature compensation.

4. Keep tubing runs between the sensors short and adjust the sample flow as high as possible. Short tubing runs and high flow ensure that the temperature of the liquid does not change as it flows from one sensor to another.

   If the process temperature is appreciably different from ambient, high flow may not be enough to keep the temperature constant. In this case, you may need to pump sample at room temperature from a reservoir through the sensors. Because such a system is likely to be open to atmosphere, saturate the liquid with air to prevent drift caused by absorption of atmospheric carbon dioxide.

5. To prevent contamination of low conductivity (< 1 µS/cm) process liquids, use clean tubing to connect the sensors. To prevent drift caused desorption of ionic contaminants from tube walls, keep the sample flow greater than 6 ft./sec (1.8 m/sec).

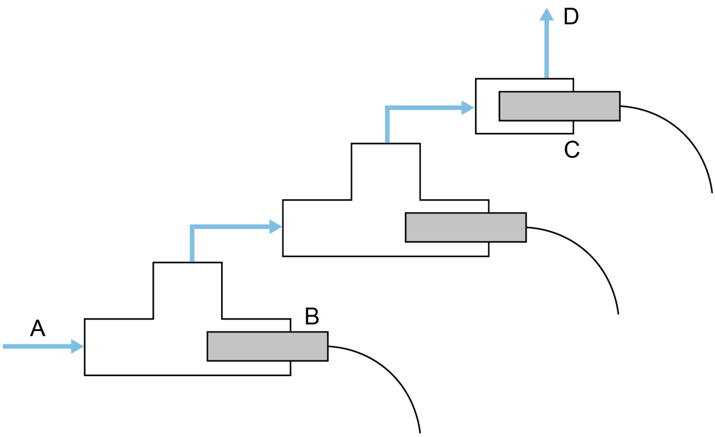
Procedure

1. Connect the process sensors and reference sensor in series and allow the process liquid to flow through all sensors.

2. Calibrate the process sensor by adjusting the process transmitter reading to match the conductivity measured by the reference meter.

   See Figure 6-1 for the calibration setup.

Figure 6-1: In Process Calibration Setup



A. Sample inlet
B. In process sensors
C. Reference sensor
D. Sample output

Note
Figure 6-1 shows two process sensors connected in series with a reference sensor. The horizontal sensor orientation ensures good circulation of the process liquid past the electrodes. The staircase orientation provides an escape path for bubbles.

This method is ideal for calibrating the sensors used in low conductivity water (0.01/cm cell constants), because the calibration system is closed and cannot be contaminated by atmospheric carbon dioxide.

6.1.3 Calibrate using a grab sample

Use the grab sample method when it is impractical to remove the sensor for calibration or to connect a reference sensor to the process line.

Procedure

Take a sample of the process liquid, measuring its conductivity using a reference instrument and adjusting the reading from the process transmitter to match the measured conductivity.

Take the sample from a point as close to the process sensor as possible.

Keep temperature compensation turned on. There is likely to be a lag time between sampling and analysis, so temperature is likely to change.

Be sure the reference and process instruments are using the same temperature correction algorithm.

Only use grab sample calibration when the conductivity is fairly high.

a. The temperature compensation algorithm will most likely be linear slope.

b. Confirm that both instruments are using the same temperature coefficient in the linear slope calculation.

c. If the reference meter does not have automatic temperature correction, calculate the conductivity at 77 °F (25 °C) using the equation:

$$C_{25} = \frac{C_t}{1 + \alpha\left(t - 25\right)}$$

where: C_{25} = the conductivity at 25 °C
C_t = the conductivity at t °C
α = the temperature coefficient expressed as a decimal fraction

d. Confirm the temperature measurements in both the process and reference instruments are accurate, ideally to within ±0.5 °C.

e. Follow good laboratory practice when measuring the conductivity of the grab sample.

- Rinse the beaker and sensor at least twice with sample. Be sure the rinse solution reaches between the inner and outer electrodes by tapping and swirling the sensor while it is immersed in the sample.

- Be sure air bubbles are not trapped in the sensor. Place the sensor in the sample and tap and swirl to release bubbles. Note the reading. Then, remove the sensor and return it to the sample. Tap and swirl again and note the reading. If the two readings agree, there are no trapped bubbles. If they do not agree, bubbles are present. Continue the process until two subsequent readings agree.

- While measuring, do not allow the sensor to touch the sides and, particularly, the bottom of the beaker. Keep at least ¼-in. (6 mm) clearance.

f. Be sure to compensate for process conductivity changes that might have occurred while the grab sample was being tested. Rosemount conductivity transmitters (Rosemount 1056, 1066, and 56) do this automatically. They save the value of the process conductivity at the time the sample was taken and use that value to calculate the new cell constant when you enter the result of the grab sample test. Older transmitters do not remember the process conductivity value. Therefore, you must enter a value adjusted by an amount proportional to the change in the process conductivity. For example, suppose the process conductivity is 810 µS/cm when the sample is taken and 815 µS/cm when the test result is entered. If the grab sample conductivity is 819 µS/cm, enter (815/810) x 819 or 824 µS/cm.

6.2 Clean the sensor

Procedure

Use a warm detergent solution and a soft brush or pipe cleaner to remove oil and scale.

You can also use isopropyl alcohol to remove oily films. Avoid using strong mineral acids to clean conductivity sensors.

6.3 Check the Rosemount 140 retraction restraint

The integrity of the Rosemount 140 will become compromised if the flared tip of the electrode is allowed to blow out against the compression fitting body.

Procedure

If a blowout occurs, replace the sensor.

6.4 Replace Rosemount 140 sensor seal

If the process seal is leaking owing to a pitted or uneven sensor tube, you need to replace the sensor. If the sensor tube surface is smooth and clean, yet the process seal is leaking, the process O-ring is damaged and requires replacement according to the following procedure. You can obtain replacement parts from the process fitting rebuild kit (PN 23731-00).

Procedure

1. Recover the junction box with attached compression fitting body, nut, and compression fitting from the sensor for reuse.
    a) Unscrew the junction box cover and set aside.
    b) Mark and disconnect the electrical connections from the terminal block.
    c) Remove the junction box compression fitting nut from the compression fitting body and separate the junction box from the sensor tube.

2. Remove the nylon ferrule and snap ring and discard them. Remove and save the junction box compression fitting nut.
3. Slide off the sensor compression fitting nut and set aside for reuse. Slide off the remaining polyetheretherketone (PEEK) ferrule and split ring and discard them.
4. Slide off the sensor compression fitting body and replace the Viton® O-ring. Lubricate the O-ring with the barium based lubricant provided.
5. Wrap the threads of the sensor compression fitting body with pipe tape and slide the body on to the sensor tube.
6. Slide on a new PEEK ferrule, beveled side facing the electrode tip, and a new PEEK split ring, flared end towards electrode tip. Slide on the compression fitting nut and thread it onto the compression fitting body. Finger tighten.
7. Reinstall the junction box on the sensor tube. Finger tighten the junction box compression fitting nut. Use a wrench to turn the nut a ¼ to ½ additional turn.

7 Troubleshoot

7.1 Off-scale reading

Potential cause

Wiring is incorrect.

Recommended action

Verify and correct wiring.

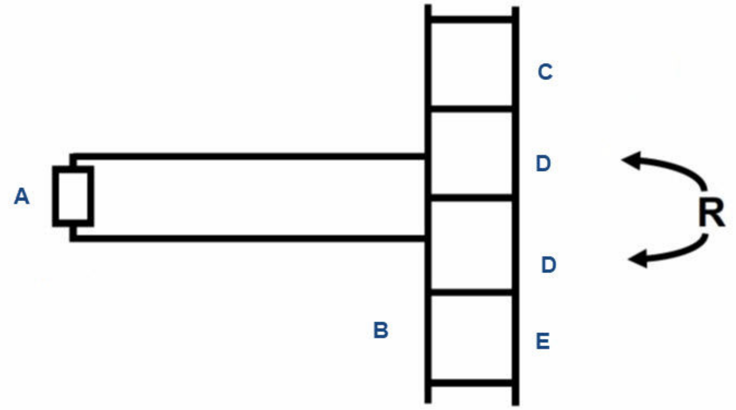
Potential cause

Temperature element is open or shorted.

Recommended action

Check temperature element for open or short circuits.
See Figure 7-1.

Figure 7-1: Checking the Temperature Element



A. Resistance temperature device (RTD)
B. Terminal strip in sensor junction box
C. Orange
D. Red
E. Gray

Potential cause

Sensor is not in process stream.

Recommended action

Submerge sensor completely in process stream.

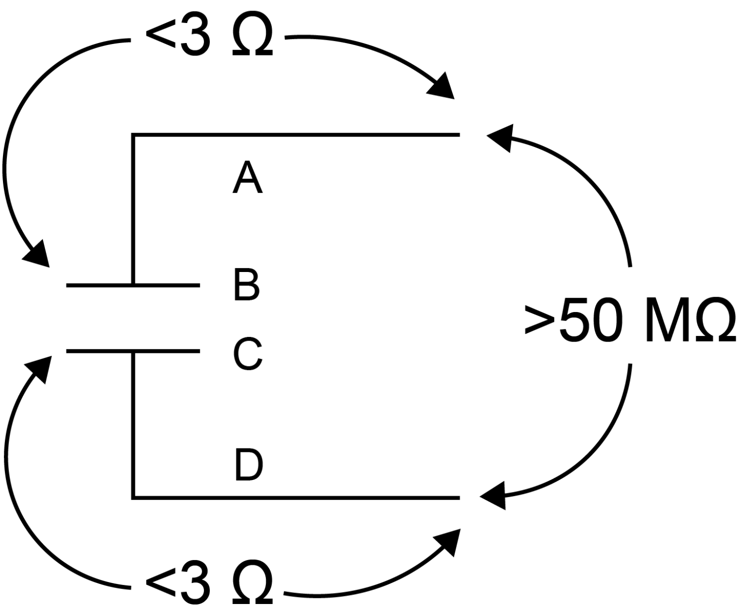
Potential cause

Sensor has failed.

Recommended action

Perform isolation checks.
See Figure 7-2.

Figure 7-2: Checking the Continuity and Leakage



A. Orange
B. Inner
C. Outer
D. Gray

7.2 Noisy reading

Potential cause

Sensor is improperly installed in process stream.

Recommended action

Submerge sensor completely in process stream.

7.3 Reading seems wrong (lower or higher than expected)

Potential cause

Bubbles trapped in sensor.

Recommended actions

1. Ensure the sensor is properly oriented in pipe or flow cell.
   See Figure 2-1.
2. Apply back pressure to flow cell.

Potential cause

Wrong temperature correction algorithm is being used.

Recommended action

Check that the temperature correction is appropriate for the sample.

See transmitter Reference Manual for more information.

Potential cause

Wrong cell constant.

Recommended action

Verify that the correct cell constant has been entered in the transmitter and that the cell constant is appropriate for the conductivity of the sample.

See transmitter Reference Manual.

7.4 Sluggish response

Potential cause

Electrodes are fouled.

Recommended action

Clean electrodes.

Potential cause

Sensor is installed in dead area in piping.

Recommended action

Move sensor to a location more representative of the process liquid.

7.5 Check the temperature element

Procedure

Disconnect leads and measure resistance shown.

The measured resistance should be close to the value in the following table.

Temperature (°C)	Resistance in ohms
	Pt 100
0	100.0
10	103.9
20	107.8
30	111.7
40	115.5
50	119.4

See Figure 7-1.

7.6 Check the continuity and leakage

Procedure

Disconnect electrode leads and measure resistance and continuity as shown in Figure 7-2.

The sensor must be dry when checking resistance between electrode leads.

8 Accessories

Table 8-1: Sensor Accessories

Part number	Description
23747-06	Junction box for a remote cable connection
9200275	Connecting cable, unterminated, specify length
23747-00	Connecting cable, terminated, specify length
05010781899	Conductivity standard SS-6, 200 µS/cm, 32 oz. (0.95 L)
05010797875	Conductivity standard, SS-6A, 200 µS/cm, 1 gal. (3.78 L)
05010782468	Conductivity standard, SS-5, 1000 µS/cm, 32 oz. (0.95 L)
05010783002	Conductivity standard SS-5A, 1000 µS/cm, 1 gal. (3.78 L)
05000705464	Conductivity standard, SS-1, 1409 µS/cm, 32 oz. (0.95 L)
05000709672	Conductivity standard, SS-1A 1409 µS/cm, 1 gal. (3.78 L)

Table 8-2: Rosemount 140 Sensor Accessories

Part number	Description
23724-00	Ball valve kit
23730-00	Process compression fitting, ¾-in. (19.1 mm) national pipe thread (NPT)
23731-00	Process fitting rebuild kit
9310120	Junction box compression fitting
9550200	O-ring 2-116, Viton®

Table 8-3: Rosemount 142 Sensor Accessories

Part number	Description
33107-01	Compression fitting, ¾ in. (19.1 mm)
9310063	Ferrule, ¾ in. (19.1 mm)
9310066	Compression nut, ¾-in. (19.1 mm)

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