Quick Start Guide
LIQ-QSG-404, Rev N
June 2017

Rosemount™ 404

Contacting Conductivity Sensor

ROSEMOUNT™

EMERSON™

NOTICE

ROSEMOUNT (“SELLER”) SHALL NOT BE LIABLE FOR TECHNICAL OR EDITORIAL ERRORS IN THIS MANUAL OR OMISSIONS FROM THIS MANUAL. SELLER MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THIS MANUAL AND, IN NO EVENT, SHALL SELLER BE LIABLE FOR ANY SPECIAL OR CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF PRODUCTION, LOSS OF PROFITS, ETC.

PRODUCT NAMES USED HEREIN ARE FOR MANUFACTURER OR SUPPLIER IDENTIFICATION ONLY AND MAY BE TRADEMARKS/ REGISTERED TRADEMARKS OF THESE COMPANIES.

THE CONTENTS OF THIS PUBLICATION ARE PRESENTED FOR INFORMATIONAL PURPOSES ONLY, AND WHILE EVERY EFFORT HAS BEEN MADE TO ENSURE THEIR ACCURACY, THEY ARE NOT TO BE CONSTRUED AS WARRANTIES OR GUARANTEES, EXPRESSED OR IMPLIED, REGARDING THE PRODUCTS OR SERVICES DESCRIBED HEREIN OR THEIR USE OR APPLICABILITY. WE RESERVE THE RIGHT TO MODIFY OR IMPROVE THE DESIGNS OR SPECIFICATIONS OF SUCH PRODUCTS AT ANY TIME.

SELLER DOES NOT ASSUME RESPONSIBILITY FOR THE SELECTION, USE, OR MAINTENANCE OF ANY PRODUCT. RESPONSIBILITY FOR PROPER SELECTION, USE, AND MAINTENANCE OF ANY SELLER PRODUCT REMAINS SOLELY WITH THE PURCHASER AND END-USER.

WARRANTY

1. LIMITED WARRANTY: Subject to the limitations contained in Section 2 herein and except as otherwise expressly provided herein, Rosemount (“Seller”) warrants that the firmware will execute the programming instructions provided by Seller, and that the Goods manufactured or Services provided by Seller will be free from defects in materials or workmanship under normal use and care until the expiration of the applicable warranty period. Goods are warranted for twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Seller, whichever period expires first. Consumables and Services are warranted for a period of 90 days from the date of shipment or completion of the Services. Products purchased by Seller from a third party for resale to Buyer (“Resale Products”) shall carry only the warranty extended by the original manufacturer. Buyer agrees that Seller has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products. If Buyer discovers any warranty defects and notifies Seller thereof in writing during the applicable warranty period, Seller shall, at its option, promptly correct any errors that are found by Seller in the firmware or Services, or repair or replace F.O.B. point of manufacture that portion of the Goods or firmware found by Seller to be defective, or refund the purchase price of the defective portion of the Goods/Services. All replacements or repairs necessitated by inadequate maintenance, normal wear and usage, unsuitable power sources, unsuitable environmental conditions, accident, misuse, improper installation, modification, repair, storage or handling, or any other cause not the fault of Seller are not covered by this limited warranty, and shall be at Buyer's expense. Seller shall not be obligated to pay any costs or charges incurred by Buyer or any other party except as may be agreed upon in writing in advance by an authorized Seller representative. All costs of dismantling, reinstallation and freight, and the time and expenses of Seller's personnel for site travel and diagnosis under this warranty clause shall be borne by Buyer unless accepted in writing by Seller. Goods repaired and parts replaced during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Seller and can be amended only in a writing signed by an authorized representative of Seller. Except as otherwise expressly provided in the Agreement, THERE ARE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESSED OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, OR ANY OTHER MATTER WITH RESPECT TO ANY OF THE GOODS OR SERVICES. It is understood that corrosion or erosion of materials is not covered by our guarantee.
2. LIMITATION OF REMEDY AND LIABILITY: SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE. THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF WARRANTY HEREUNDER SHALL BE LIMITED TO REPAIR, CORRECTION, REPLACEMENT, OR REFUND OF PURCHASE PRICE UNDER THE LIMITED WARRANTY CLAUSE IN SECTION 1 HEREIN. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT, OR OTHERWISE), SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE TO BUYER OF THE SPECIFIC GOODS MANUFACTURED OR SERVICES PROVIDED BY SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. THE TERM “CONSEQUENTIAL DAMAGES” SHALL INCLUDE, BUT NOT BE LIMITED TO, LOSS OF ANTICIPATED PROFITS, LOSS OF USE, LOSS OF REVENUE, AND COST OF CAPITAL.

Safety Information

⚠ WARNING!

HIGH PRESSURE AND TEMPERATURE HAZARD

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

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

⚠ CAUTION!

EQUIPMENT DAMAGE

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

Contents

1 Plan

1.1 Unpacking and Inspection

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 404 contacting conductivity sensor specifications

Wetted Materials	
Electrodes	Titanium
Insulator	Glass Filled PEEK
Body	Option -16: PVC
	Option -17: 303 Stainless Steel
O-ring	EPDM
Fittings	Option -16: Polyethylene
	Option -17: 316 Stainless Steel
Temperature Range	
Option -16	32 to 140 °F (0 to 60 °C)
Option -17	32 to 212 °F (0 to 100 °C)
Pressure	
Option -16	100 psig (791 kPa abs) at 77 °F (25 °C); 20 psig (239 kPa abs) at 140 °F (60 °C)
Option -17	100 psig (791 kPa abs) maximum
Process Connection	
Option -16	3/8 in. barbed tubing connector
Option -17	Compression fitting for 3/8 in. OD tubing. Fittings can be removed to leave ¼ in. FNPT ports.
Cell Constants	
0.01 and 0.1/cm	
Cable Length	
10 ft (3.1 m) standard; 50 ft (15.2 m) optional	

1.3 Ordering Information

Table 1-2: Rosemount 404 contacting conductivity sensor ordering information

Model	Sensor Type
404	Contacting Conductivity Sensor
Cell Constant	
11	0.01/cm
12	0.1/cm
Flow Cell Type	
16	PVC
17	Stainless Steel
Temperature Compensation	
_	Pt-1000(1)
54	Pt-100
Options	
_	No selection
50	Extended Integral Cable Length (50 ft; 15 m)
Typical Model Number: 404-12-17_-50	

(1) Recommended for use with Rosemount transmitters 1056, 56, 1057, 1066, and 5081.

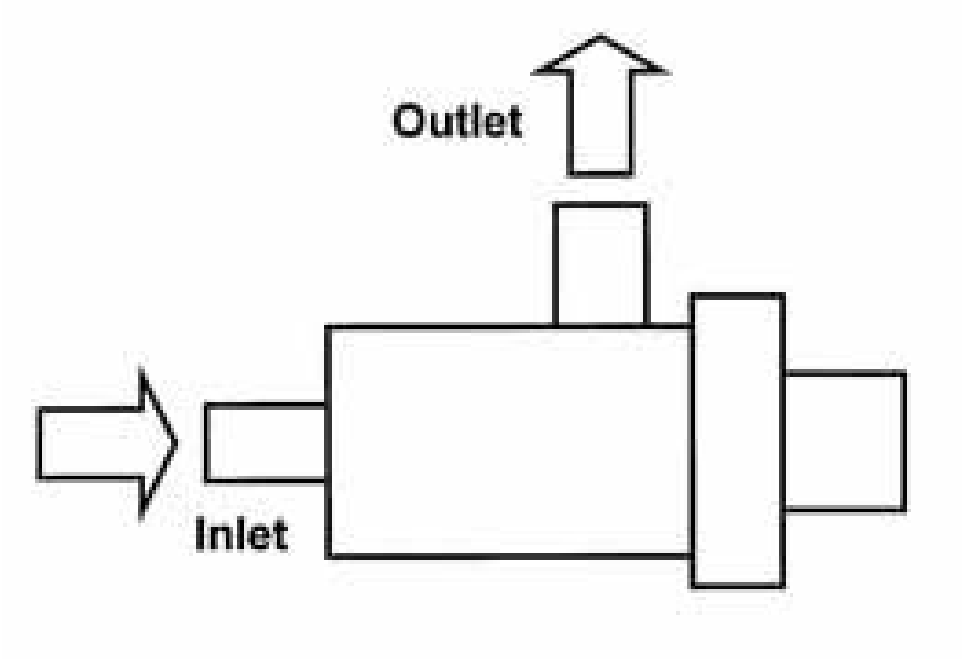
2 Install

2.1 Sensor Installation

If the sensor is installed in a sidestream with the sample draining to open atmosphere, bubbles may accumulate on the electrodes.

Trapped bubbles will cause errors. Normally, as bubbles accumulate the conductivity reading drifts down. To control bubble formation, apply a small amount of back pressure to the sensor.

Figure 2-1: Rosemount 404 contacting conductivity sensor installation



2.2 Electrical Installation

For additional wiring information on this product, please refer to the *Liquid Transmitters Wiring Diagrams*

Table 2-1: Wire color and connections in sensor

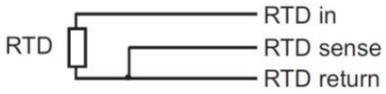
Color	Function
Gray	Connects to outer electrode
Clear	Coaxial shield for gray wire
Orange	Connects to inner electrode
Clear	Coaxial shield for orange wire
Red	
White with red stripe	
White	
Clear	Shield for all RTD lead wires

Figure 2-2: Wiring for Rosemount 56 and 1056 transmitters

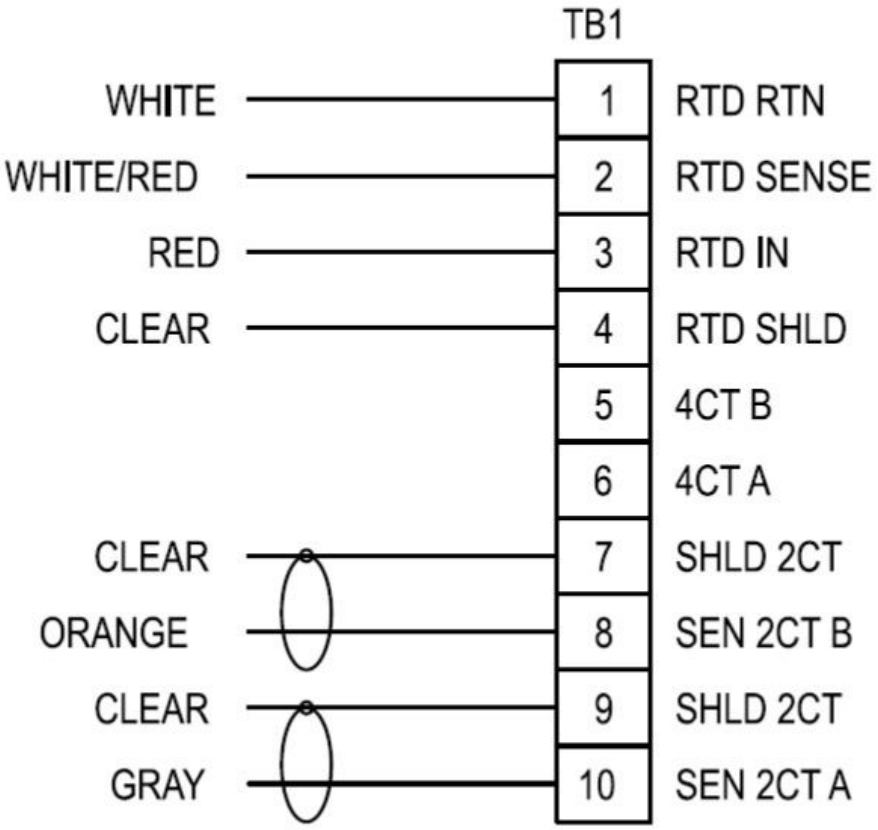


Figure 2-3: Wiring for Rosemount 1066 transmitter

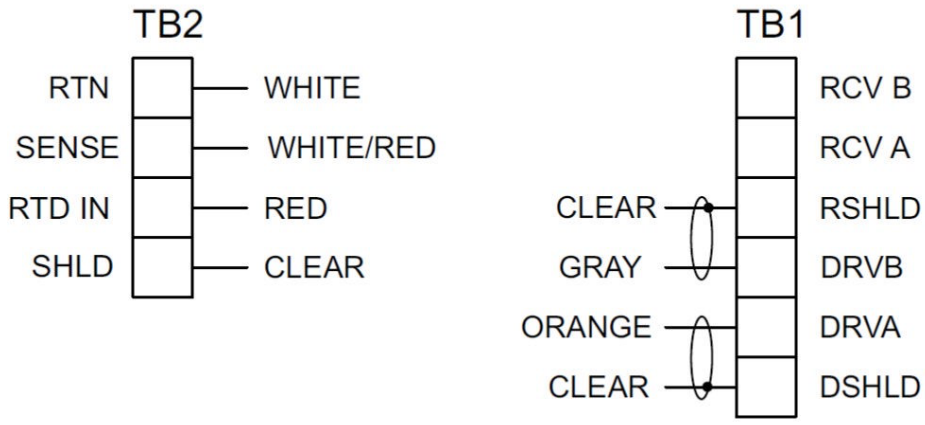
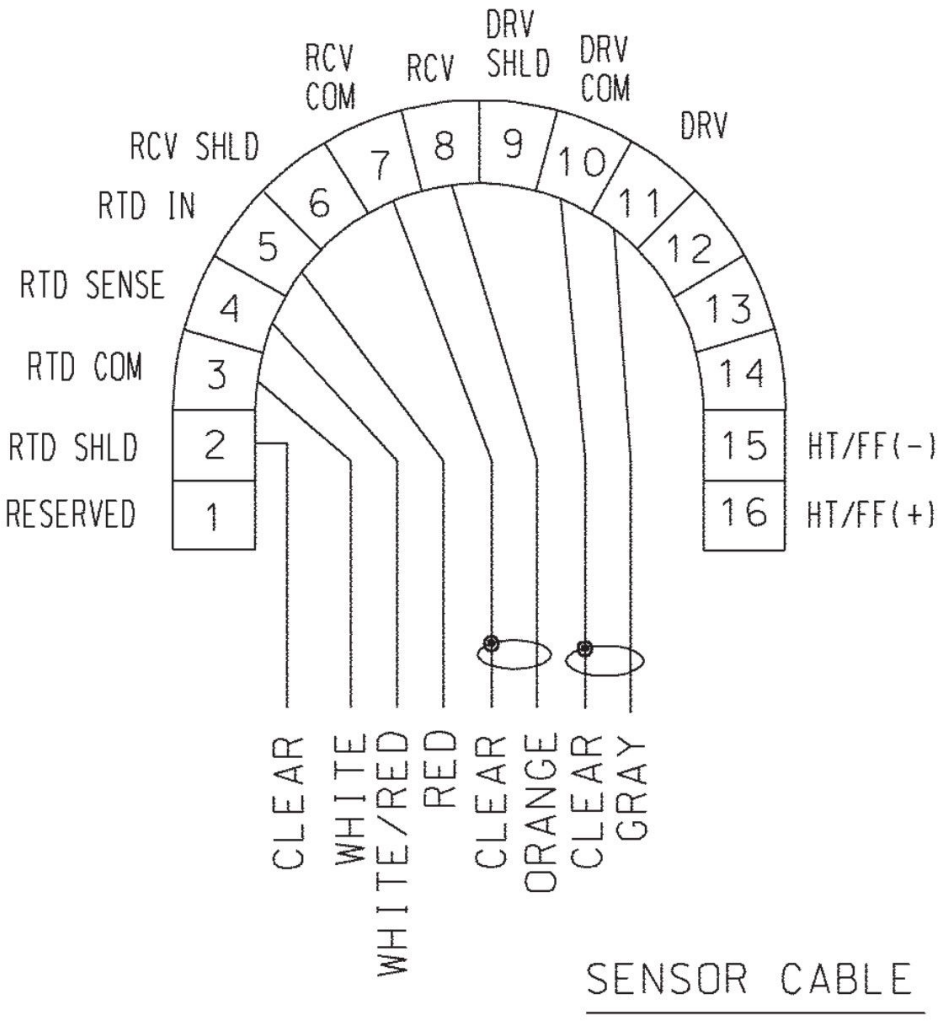


Figure 2-4: Wiring for Rosemount 5081 transmitters



2.2.1 Wiring through junction box

If wiring connections are made through a remote junction box (PN 23550-00), wire point-to-point. Use cable 23747-00 (factory-terminated) or 9200275 (no terminations).

3 Calibration and maintenance

3.1 Cleaning the sensor

The Rosemount 404-17 (stainless steel body) sensor can be taken apart for cleaning. However, in some cases, disassembling and reassembling the sensor can cause the cell constant to change as much as 1%.

For maximum accuracy, the cell constant should be rechecked after the sensor has been reassembled. The Rosemount 400-16 (PVC body) sensor cannot be taken apart.

Use a warm detergent solution and a soft brush or pipe cleaner to remove oil and scale. Isopropyl alcohol (rubbing alcohol) can also be used to remove oily films. Avoid using strong mineral acids to clean conductivity sensors.

3.2 Calibrating the sensor

Rosemount 404 contacting conductivity sensors are calibrated at the factory and do not need calibration when first placed in service.

Simply, enter the cell constant printed on the label into the transmitter. After a period of service, the sensor may require calibration. Because Rosemount 404 sensors have a flow-through design, they are best calibrated against a referee meter and sensor where the two sensors are connected in series with the same liquid flowing through both.

For more information about calibrating contacting conductivity sensors, refer to application sheet *ADS 43-024*.

4 Troubleshooting

4.1 Troubleshooting

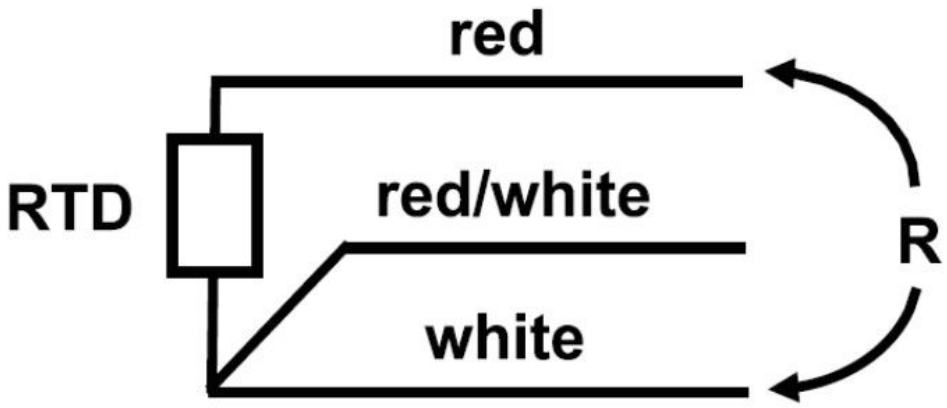
Table 4-1: Rosemount 404 contacting conductivity sensor troubleshooting

Problem	Probable Cause	Solution
Off-scale reading	Wiring is wrong.	Verify wiring.
	Temperature element is open or shorted.	Check temperature element for open or short circuits. See *Figure 4-1*.
	Sensor is not in process stream.	Be sure sensor is completely submerged in process stream.
	Variopol cable is not properly seated.	Loosen connector and reseat.
	Sensor has failed.	Perform isolation checks. See *Figure 4-2*.
Noisy reading	Sensor is improperly installed in process stream.	Be sure sensor is completely submerged in process stream.
	Variopol cable is not properly seated.	Loosen connector and reseat.
Reading seems wrong (lower or higher than expected)	Bubbles trapped in sensor.	Be sure sensor is properly oriented in pipe or flow cell. See *Figure 2-1*. Apply back pressure to flow cell.
	Wrong temperature correction algorithm.	Check that temperature correction is appropriate for the sample. See transmitter manual for more information.
	Wrong cell constant.	Verify that the correct cell constant has been entered in the analyzer and that the cell constant is appropriate for the conductivity of the sample. See transmitter manual.
Sluggish response	Electrodes are fouled.	Clean electrodes.
	Sensor is sampling a dead area.	Move sample line to a location more representative of the process liquid.

Table 4-2: Measured resistance and temperature

Temperature	Resistance	
Pt 100	Pt 1000	
0 °C	100.0 Ω	1000 Ω
10 °C	103.9 Ω	1039 Ω
20 °C	107.8 Ω	1078 Ω
30 °C	111.7 Ω	1117 Ω
40 °C	115.5 Ω	1155 Ω
50 °C	119.4 Ω	1194 Ω

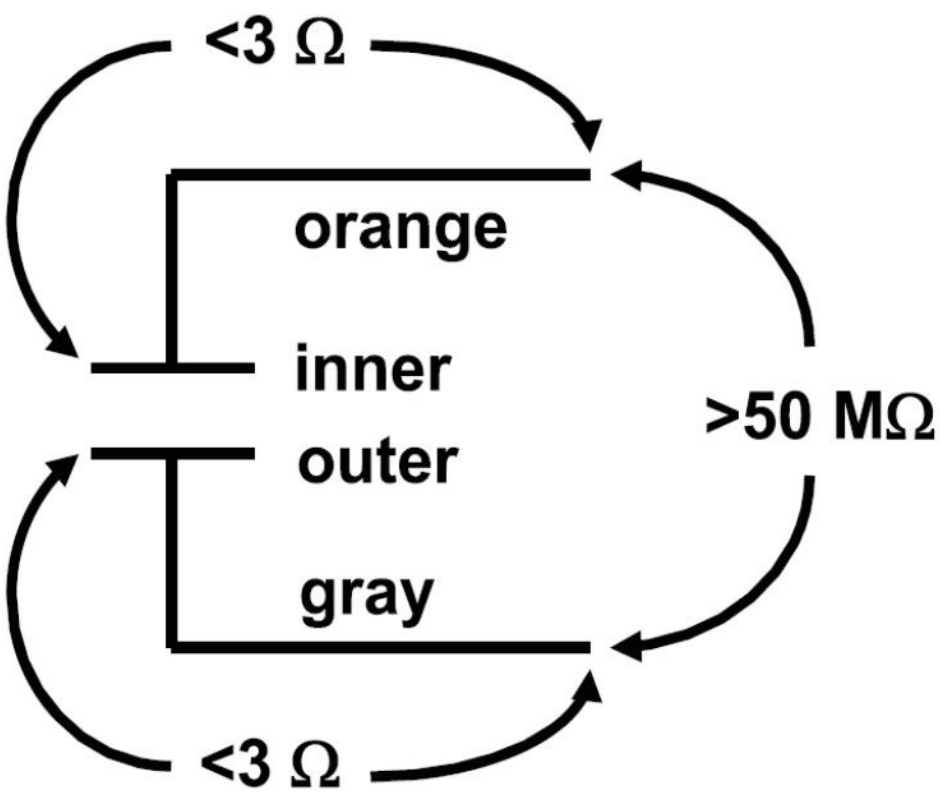
Figure 4-1: Checking temperature element



Disconnect leads and measured resistance as shown in *Figure 4-1*.

The measured resistance should be close to the value shown in *Table 4-2*.

Figure 4-2: Checking continuity and leakage



Disconnect electrode leads and measure resistance and continuity as shown in *Figure 4-2*.

The sensor must be dry when checking resistance between electrodes.

5 Accessories

Table 5-1: Rosemount 404 contacting conductivity sensor accessories information

Part number	Description
23550-00	Remote junction box without preamplifier
23747-00	Interconnect cable, prepped (must specify length)
9200275	Extension cable, unprepped (must 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, 100k0 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)
9210004	Conductivity standard, 2000 µS/cm, 16 oz

LIQ-QSG-404
Rev N
2017

www.Emerson.com/RosemountLiquidAnalysis
Emerson Automation Solutions
8200 Market Blvd
Chanhassen, MN 55317
Toll Free +1 800 999 9307
F +1 952 949 7001
liquid.csc@emerson.com
www.Emerson.com/RosemountLiquidAnalysis

EUROPE
Emerson Automation Solutions
Neuhofstrasse 19a P.O. Box 1046
CH-6340 Baar
Switzerland
T + 41 (0) 41 768 6111
F + 41 (0) 41 768 6300
liquid.csc@emerson.com
www.Emerson.com/RosemountLiquidAnalysis

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

ASIA-PACIFIC
Emerson Automation Solutions
1 Pandan Crescent
Singapore 128461
Singapore
T +65 777 8211
F +65 777 0947
liquid.csc@emerson.com
www.Emerson.com/RosemountLiquidAnalysis

ROSEMOUNT™

EMERSON™