6081-C  
Contacting Conductivity Transmitter

Essential Instructions – Read this before proceeding

Rosemount Analytical 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. The following instructions must be adhered to and integrated into your safety program when installing, using, and maintaining Rosemount Analytical 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 this Instruction Manual is not the correct manual, telephone 1-800-654-7768 and the requested manual will be provided. Save this Instruction Manual for future reference.
- If you do not understand any of the instructions, contact your Rosemount 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.
Essential Instructions (continued)

- Install your equipment as specified in the Installation Instructions of the appropriate Instruction 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 Rosemount. Unauthorized parts and procedures can affect the product’s performance and place the safe operation of your process at risk. 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 persons, to prevent electrical shock and personal injury.

Note

The Rosemount 6081 and all other wireless devices should be installed only after the 1420 Wireless Gateway has been installed and is functioning properly. Wireless devices should also be powered up in order of proximity from the 1420 Wireless Gateway, beginning with the closest. This will result in a simpler and faster network installation.

Note

Shipping considerations for wireless products (Power Modules):
The unit was shipped to you without the power module installed. Please remove the power modules from the unit prior to shipping.

Primary lithium power modules are regulated in transportation by the U. S. Department of Transportation, and are also covered by IATA (International Air Transport Association), ICAO (International Civil Aviation Organization), and ARD (European Ground Transportation of Dangerous Goods). It is the responsibility of the shipper to ensure compliance with these or any other local requirements. Please consult current regulations and requirements before shipping.

The power module with the wireless unit contains two “C” size primary lithium/thionyl chloride power sources.

Each power module contains approximately 5 grams in each pack. Under normal conditions, the power module materials are self-contained and are not reactive as long as the power modules and the pack integrity are maintained. Care should be taken to prevent thermal, electrical or mechanical damage. Contacts should be protected to prevent premature discharge.

Power module hazards remain when cells are discharged. Power modules should be stored in a clean and dry area. For maximum power module life, storage temperature should not exceed 30 °C

⚠️ WARNING

Use only with Rosemount Smart Power Module PN 701PBKKF or PN 00753-9220-0001

⚠️ WARNING

Potential Electrostatic Hazard – The plastic antenna may present a potential electrostatic ignition hazard and must not be rubbed or cleaned with a dry cloth.

⚠️ WARNING

Mechanical Spark Hazard – The 6081 enclosure is made of aluminum alloy and given a protective polyurethane paint finish. However, care should be taken to protect it from impact or abrasion if located in Zone 0. This applies to any Intrinsically Safe installation, whether the Class, Division or Zone system is used.
Quick Start Guide - 6081 Contacting Conductivity Transmitter

1. Install the Power Module inside the rear enclosure. Follow the installation instructions on p.9 “Power Module Installation”.
2. Wire the sensor to the transmitter. Refer to the sensor instruction sheet for details.
3. Once the connections are secure and verified, install the Power Module to power to the transmitter.
4. When the transmitter is powered up for the first time, Quick Start screens appear. Using Quick Start is easy.
   a. A blinking field shows the position of the cursor.
   b. Use the ◄ or ► key to move the cursor left or right. Use the ▲ or ▼ key to move the cursor up or down or to increase or decrease the value of a digit. Use the ▲ or ▼ key to move the decimal point.
   c. Press ENTER to store a setting. Press EXIT to leave without storing changes. Pressing EXIT also returns the display to the previous screen.
5. Choose a local language.
6. Choose measurement: Sensor type: 2-Electrode, 4-Electrode.
7. Select measurement: conductivity, resistivity, TDS, salinity or one of the % concentration choices.
8. Enter cell constant: for the sensor. Refer to the tag attached to the sensor.
9. Select wireless update rate. Select ENTER to choose the default update rate of 60 seconds or enter a value from 1 second to 3,600 seconds (60 minutes).
10. Choose temperature units: °C or °F
11. Choose Yes to Setup the Wireless Network or No if the Network ID and the Join Key have already been entered.
12. Enter the 5-digit Wireless Network ID. This ID number must match the Network ID of the 1420 Wireless Gateway.
13. Enter the 8-digit Network Join Key number 1 of 4 to match the 1420 Wireless Gateway. See the Note below for clarification.
14. Enter the 2nd, 3rd, and 4th set of Network Join Key numbers, to match the Model 1420 Wireless Gateway.
15. The transmitter will exit Quick Start and display the live measurement screen.
16. To change the Network ID or Join Key, HART address, or measurement-related settings from the default values, and to set security codes, press MENU. Select Program and follow the prompts. Refer to the appropriate menu tree.
17. To return the transmitter to default settings, choose Reset Analyzer in the Program menu.

Note regarding Wireless Device Configuration

In order to communicate with the 1420 Wireless Gateway, and ultimately the Information System, the transmitter must be configured to communicate with the wireless network. This step is the wireless equivalent of connecting wires from a transmitter to the information system. Using a Field Communicator or AMS, or the local keypad on the device, enter the Network ID and Join Key so that they match the Network ID and Join Key of the gateway and other devices in the network. The Network Join Key consists of four (4) blocks, each with an eight digit code. The code of each block must match its corresponding block in the 1420 in order for the 6081 to join the network. If the Network ID and Join Key are not identical, the transmitter will not communicate with the network. The Network ID and Join Key may be obtained from the 1420 Wireless Gateway on the Setup>Network>Settings page on the web server. The final device network configuration piece is the Update Rate. This is 60 seconds by default. This may be changed at commissioning, or at any time via AMS or the 1420 Wireless Gateway’s web server. The Update Rate should be between 1 second and 3,600 seconds. When device configuration is completed, remove the power module and replace the rear cover of the transmitter until the time of actual live installation in the process. Properly tighten the screws and install plugs or cable gland fittings in the conduit openings to prevent the entry of moisture during storage.

Note

For installation and operation at high elevations, slight convex bulging of the front keypad overlay is possible. If bulging occurs, it is recommended to unscrew the two Philips head screws that fasten the front cover to the central housing to release any internal pressure. This will equalize the device’s internal pressure to the ambient atmospheric pressure. Re-tighten the two Philips head screws to secure the front cover before device installation or operation. Make sure to perform the pressure equalization in a clean, dry area.
Figure 2. Menu Tree for 6081 Contacting Conductivity Wireless Transmitter
Product Description
When used with appropriate sensors, the 6081-C can measure conductivity, resistivity, total dissolved solids or custom curve variables in the range of 0–600 mS/cm of a liquid and transmit data wirelessly with a radio transceiver which uses HART 7 communication protocol. The instrument has a local operator interface consisting of a keyboard and LCD display which can be used to observe process parameters or to configure the 6081. This instrument is available with approvals for use in hazardous areas.

General Specifications
Enclosure: Cast aluminum. NEMA 4X. IP66
Dimensions: 6.55" x 5.40" x 5.15" (166mm x 137mm x 131mm).
Conduit Openings: 3/4” FNPT
Ambient Temperature: -4 to 149 °F (-20 to 65 °C)
Storage Temperature: -22 to 158 °F (-30 to 70 °C)
Relative Humidity: 0 to 95% (non-condensing)
Weight/Shipping Weight: 7 lbs/8 lbs (3.2/3.6 kg)
Digital Communications: HART 7 Wireless HART™

Wireless Specifications
Output: Wireless HART V7
Transmit Rate: User selectable, 1/sec. to 1/60 min (via Smart Wireless Gateway or AMS™)
Measurement update rate: 1/sec. to 1/60 min
Antenna: PBT/PC integrated omni-directional antenna
Radio Frequency: 2.4 GHz DSSS
Transmission distance - line of sight: about 600 ft (ideal RF conditions and power module condition)
Power: Lithium thionyl chloride long life power module
Power Module Life (estimated): Four years at once per minute update rate, 25 °C ambient, and minimum display usage.

Functional Specifications
Measurements: conductivity in the range 0 to 600,000 μS/cm (600mS/cm). Measurement choices are conductivity, resistivity, total dissolved solids, salinity, and %concentration. The % concentration selection includes the choice of five common solutions (0–12% NaOH, 0–15% HCl, 0–20% NaCl, and 0–25% or 96–99.7% H2SO4).
Input filter: time constant 1–999 sec, default 2 sec.
Response time: 3 seconds to 100% of final reading
Salinity: uses Practical Salinity Scale
Information and Status: Information screens display cell constant, zero offset in air, zero offset in water, RTD offset, faults and warnings, ambient temperature, radio transmission status, network ID number, Power Module voltage and estimated life, transmitter model, and software version.

The conductivity concentration algorithms for these solutions are fully temperature compensated. Three temperature compensation options are available: manual slope (X%/°C), high purity water (dilute sodium chloride), and cation conductivity (dilute hydrochloric acid). Temperature compensation can be disabled, allowing the analyzer to display raw conductivity.

Note
Selected 4-electrode, high range contacting conductivity sensors are compatible with 6081-C.
Display: 2-line, 16 character display supports display of μS/cm, mS/cm, MΩ-cm, % concentration, and ppm units. Display shows temperature.

Recommended Sensors:
140 Retractable Conductivity
141 Insertion High Conductivity
142 Insertion Low Conductivity
150 Insertion/Submersion Conductivity
400/VP Screw-In Low Conductivity
401 Screw-In High Conductivity
402/VP Retractable Conductivity
403/VP Sanitary Conductivity
404 Low Flow Conductivity
410/VP Four Electrode Sensor
Diagnostics: The internal diagnostics can detect:
- CPU Error
- RTD Error
- Temperature High Warning
- Temperature Low Warning
- Sense Line Open Warning
- Negative Reading Warning
- Out of Range Warning
- % of Range Warning
- Need Factory Cal Warning
- Need Curve Setup Warning
- Battery V Low Warning
- EE Chksum Error
- EE Write Error
- Keyboard Stuck Warning

Once a fault or warning is detected, the display will show a message describing the problem.

Sensor Temperature Range: -10 to 200 °C (PT1000)

Approvals:
- RFI/EMI:
  - EN-61326
  - EN 301 489-1 V1.2 2002
  - EN 301 489-17: V1.4.1 2002
  - EN 60950-1: 2001
  - EN 300 328 V 1.6.1 (2004-11)

Hazardous Location Approvals

Intrinsic Safety:

Special Conditions of Use:
1. The 6081 enclosure is made of aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in zone 0. This applies to any Intrinsically Safe installation, whether the Class, Division or Zone system is used.

2. Potential Electrostatic Hazard – The plastic antenna may present a potential electrostatic ignition hazard and must not be rubbed or cleaned with a dry cloth.

Intrinsically Safe,

Class 1, Division 1
- Groups ABCD/T4
- Ta = -20 °C to +65 °C – 1400322; IP66
- Class 1 Zone 0, AEx ia IIC T4
- Ta = -20 °C to +65 °C – 1400322; IP66

Complies with FM standards:
- FM3600:1998
- FM3611: 2004
- FM3810: 2005
- ANSI/IEC 60529:2004

Class I, Division 1, Groups A/B/C & D
Class II, Division 1, Groups E/F & G
Class III
- T4 Tamb : -20 to +65 °C
- Type 4x, IP66
- CE 1180 II1G
- Baseefa 10 ATEX 0149X
- Ex ia IIC T4 Ga (-20°C ≤ Ta ≤ +65°C)
- (source CE cert-6081 Baseefa)


Non-Incendive

Nonincendive, Class I, Division 2,
- Groups A-D/T4
- Ta = -20 °C to +65 °C

Environmental: The operating atmosphere of the transmitter must be consistent with the appropriate hazardous location certifications.

Class I, Division 2, Groups A, B, D
- Dust Ignition Proof
- Class II, Division 2, Groups F & G
- NEMA 4/4X Enclosure
- T4 Tamb : -20 to +65 °C
Contacting Conductivity

**Temperature Specifications - Two Electrode Sensors**

<table>
<thead>
<tr>
<th>Temperature Range</th>
<th>0–200 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Accuracy Pt-1000, 0–50 °C</td>
<td>± 0.1 °C</td>
</tr>
<tr>
<td>Temperature Accuracy Pt-1000, Temperature &gt; 50 °C</td>
<td>± 0.5 °C</td>
</tr>
</tbody>
</table>

**Recommended Sensors for Conductivity**

All Rosemount Analytical ENDURANCE 400 series conductivity sensors (Pt 1000 RTD) and PUR-Sense 410VP sensor.

**Performance Specifications**

**Two-Electrode Contacting Conductivity Linearity**

<table>
<thead>
<tr>
<th>Cell Constant</th>
<th>Loop Range µS/cm</th>
<th>Loop Linearity (@ 25 °C ambient)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0.01 to 0.03</td>
<td>1.5% of reading +/- 0.0005 µS/c+m</td>
</tr>
<tr>
<td>0.005</td>
<td>0.03 to 6.0</td>
<td>3% of reading</td>
</tr>
<tr>
<td>0.1</td>
<td>0.5 to 50</td>
<td>1.5% of reading</td>
</tr>
<tr>
<td>0.1</td>
<td>50 to 600</td>
<td>3% of reading</td>
</tr>
<tr>
<td>1.0</td>
<td>50 to 6000</td>
<td>0.5% of reading</td>
</tr>
<tr>
<td>1.0</td>
<td>6000 to 20,000</td>
<td>3% of reading (with capacitance correction OFF: default)</td>
</tr>
<tr>
<td>1.0</td>
<td>6000 to 50,000</td>
<td>3% of reading (with capacitance correction ON)</td>
</tr>
</tbody>
</table>

**Four Electrode Contacting Conductivity Linearity**

<table>
<thead>
<tr>
<th>Loop Range µS/cm</th>
<th>Loop Linearity (@ 25 °C ambient)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.03 µS/cm to 600 mS/cm</td>
<td>+/- 4% of reading +/- 1 µS/cm</td>
</tr>
</tbody>
</table>

**Contacting Conductivity Calibration Procedure**

**Entering the Cell Constant**

All cell constants can be located on the cable label of the conductivity probe.

1. Press MENU to light up the display. Press MENU again. The main menu appears. Choose Calibrate. Press ENTER.
2. Choose Conductivity. Press ENTER.
3. Scroll right with the right arrow key.
4. Choose Enter Cell Constant.
5. Enter the actual cell constant as printed on the sensor tag attached to the sensor cable.
6. Press ENTER. All conductivity readings will reference this sensor-specific cell constant.
7. Press EXIT once.
Note
The cell constant you have entered is changed after the Standardizing Conductivity procedure is performed. For contacting sensors that only show nominal cell constants, do not change it back to the value as shown on the probe label.

Zeroing the Instrument
This procedure is used to compensate for small offsets to the conductivity signal that are present even when there is no conductivity to be measured. This procedure is affected by the length of extension cable and should always be repeated if any changes in extension cable or sensor have been made. Electrically connect the conductivity probe as it will actually be used and place the measuring portion of the probe in air. Complete the following procedure. Verify that the sensor is actually in air. If the displayed value is not very close to zero, then press ENTER. The transmitter will establish a new zero.

1. If continuing from the previous procedure, the screen on the left will appear.
2. Choose Conductivity. Press ENTER.
3. Choose Zero. Press ENTER.
   After a few seconds, the display will return to a value of 0 μS/cm and may then change slightly. A slight variation from zero is to be expected, and the procedure may be repeated several times, if necessary. A successful zero is indicated with a message of ”Updated Zero Offset”.
   An unsuccessful zero will result if the conductivity reading is more than 1000 μS/cm or if the reading is too unstable.
   The ”Sensor Zero Fail, Offset too high” message indicates the reading is too high for the zero routine. If repeated attempts do not result in an acceptable zero, there is a good chance that there is a wiring problem.
4. After electronic zeroing, the Conductivity menu screen will appear.

Sensor Wiring

Note
For additional wiring information on this product, including sensor combinations not shown here, please refer to either our online wiring programs or the Manual DVD enclosed with each product.
1056, 1057, 56, 5081, 6081, 54e, and XMT:
http://www3.emersonprocess.com/raihome/sp/liquid/wiring/XMT/ 1066 and sensors with SMART preamps:
1055:
http://www3.emersonprocess.com/raihome/sp/liquid/wiring/1055/

General Information
The 6081-C is compatible with Rosemount Analytical 2-electrode and 4-electrode contacting conductivity sensors from Emerson Process Management.

Sensor Wiring
To assist in sensor wiring, please refer to the one of the following resources:
1. Sensor Instruction Sheet – provided with each shipped sensor. Detailed wiring drawings show terminal block connections for each sensor lead.

Note
All sensor wiring must be rated for ≥70 °C.
The following drawing identifies each terminal block lead position for pH sensors.

**Figure 5. 6081-C Sensor Wiring & Connection Points for Contacting Conductivity**

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**Power Module Installation / Replacement**

The expected power module (PN 701PBKKF or PN 00753-9220-0001) life is four years at reference conditions. This section describes the procedure for initial installation and replacement of the power module (PN 701PBKKF or PN 00753-9220-0001). The new power module should be stored in a safe place with a controlled environment until the 6081 is ready for live operation. Note that the power module is packed separately from the 6081 wireless transmitter upon delivery and must be installed initially.

For initial installation or replacement of the power module, follow these steps using a Philips-head screwdriver:

1. Unscrew the two long machine screws to remove the rear cover of the 6081. Separate the rear cover from the central housing by manually prying the sections apart. Do not use screwdrivers or tools to separate these housing parts. The parts are sealed with an o-ring.

2. Before installation, note the safety warning, disposal instructions and part information on the connection side label of the power module.

3. With the 6081 front display section facing away from you, align the power module pack with the curved surface of the pack facing towards you and the small protruding connector facing away from you. Make sure to align the power module and its keyed connector with the connection receptacle in the middle of the instrument’s terminal block area.

4. With gentle pressure, insert the keyed connector on the power module into the receptacle (labeled Power Module Connection on the drawing). The power module seats in the connection receptacle with an o-ring.

5. Confirm that the power module is fully inserted in the receptacle and properly aligned with the surrounding terminal block.

6. Replace the rear cover of the 6081 with the two screws to secure it to the central housing. Tighten screws and verify operation. Correct installation the rear cover will ensure that the power module is properly secured to power the transmitter.

7. **DO NOT RETURN SHIP THE USED POWER MODULE** to Rosemount Analytical. Dispose of spent power modules as a hazardous material in accordance with government regulations.

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**WARNING**

Use only with Rosemount SMART Power Module (PN 701PBKKF or PN 00753-9220-0001)
Mounting

Mounting on a Flat Surface

Figure 6. Wall Mounting Installation for 6081.

Use Pipe/Wall Mounting Bracket Kit, PN23820-00

Note: PN 23820-00 mounting bracket kit includes mounting hardware for pipe mounting only. Wall mounting hardware to be provided by customer. Only use suitable fasteners and hardware to securely fasten the bracket and transmitter to the wall surface.
Pipe Mounting

The pipe mounting kit (PN 23820-00/01) accommodates 1–½ in. pipe

Figure 7. Pipe Mounting Installation for 6081.

Use Pipe/Wall Mounting Bracket Kit, PN23820-00
Figure 8. FM IS Installation
Figure 9. CSA IS Installation
Figure 10. ATEX IS Installation