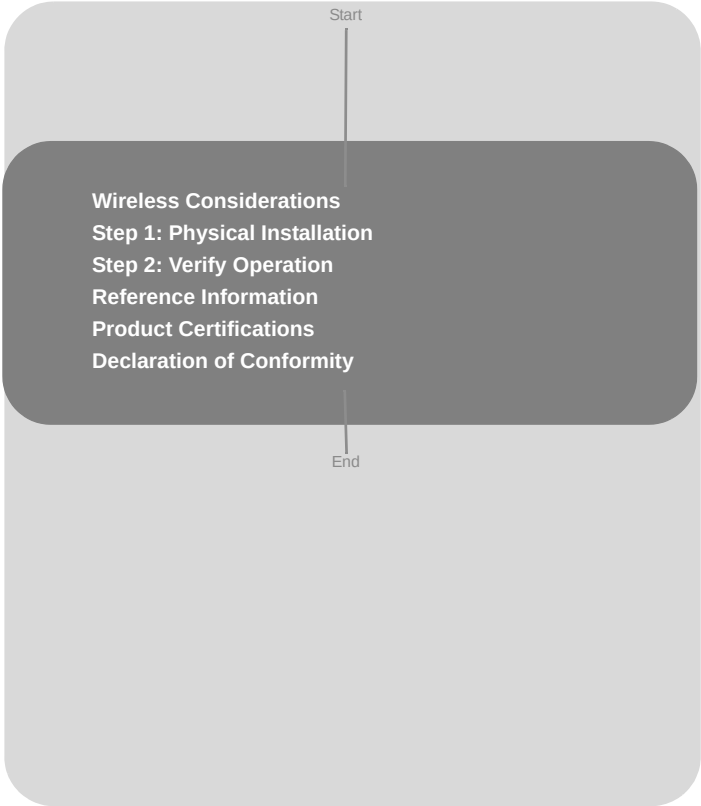
Rosemount 648 Wireless Temperature Transmitter



Discontinued Product

ROSEMOUNT®

www.rosemount.com

EMERSON™
Process Management

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⚠ IMPORTANT NOTICE

This installation guide provides basic guidelines for the Rosemount® 648. It does not provide instructions for detailed configuration, diagnostics, maintenance, service, troubleshooting, or installations. Refer to the Rosemount 648 Reference Manual (Document No. 00809-0100-4648) for more instruction. The manual and this QIG are also available electronically on www.rosemount.com.

⚠ WARNING

Explosions could result in death or serious injury:

Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Please review the Product Certifications section for any restrictions associated with a safe installation.

- Before connecting a Rosemount Field Communicator in an explosive atmosphere, ensure the instruments are installed in accordance with intrinsically safe or non-incendive field wiring practices. Electrical shock can result in death or serious injury.
- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock. This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions. This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.
- The Power Module may be replaced in a hazardous area. The Power Module has surface resistivity greater than one gigaohm and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.

⚠ IMPORTANT NOTICE

Shipping considerations for wireless products:

The unit was shipped to you without the Power Module installed. Please remove the Power Module prior to shipping the unit.

Each Power Module contains two “C” size primary lithium batteries. Primary lithium batteries 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.

WIRELESS CONSIDERATIONS

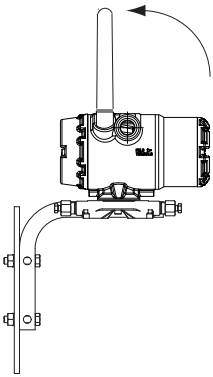
Power Up Sequence

The Rosemount 648 and all other wireless devices should be installed only after the Smart Wireless Gateway (“Gateway”) has been installed and is functioning properly. Wireless devices should also be powered up in order of proximity from the Gateway, beginning with the closest. This will result in a simpler and faster network installation. Enable Active Advertising on the Gateway to ensure that new devices join the network faster. For more information see the Smart Wireless Gateway Manual (Doc. No. 00809-0200-4420).

Antenna Position

The antenna should be positioned vertically, either straight up or straight down, and it should be approximately 3 ft. (1 m) from any large structure, building, or conductive surface to allow for clear communication to other devices.

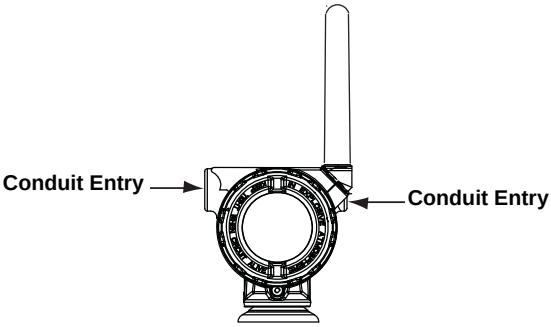
Figure 1.



Conduit Entry

Upon installation, ensure that each conduit entry is either sealed with a conduit plug using approved thread sealant, or has an installed conduit fitting or cable gland with appropriate threaded sealant.

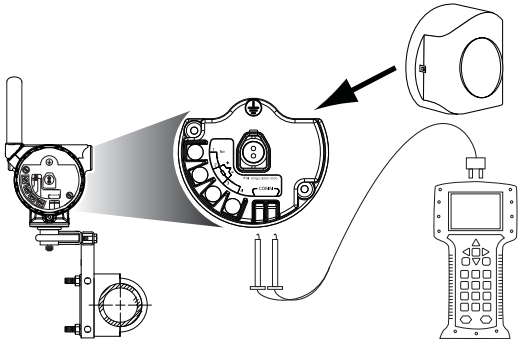
Figure 2.



Field Communicator Connections

The Power Module needs to be installed in the device for the Field Communicator to interface with the 648. Field communication with this device requires a Field communicator using the correct 648 wireless DD. The correct DD for the available protocol should be selected. Refer to Figure 3 below for instructions for connection of the Field Communicator to the 648.

Figure 3. Connection Diagram



STEP 1: PHYSICAL INSTALLATION

The Rosemount 648 can be installed in one of two configurations: Direct Mount, where the thermocouple or sensor is connected directly to the 648 housing's conduit entry, or Remote Mount, where the thermocouple or sensor is mounted separate from the 648 housing, then connected to the 648 using conduit. Choose the installation sequence that corresponds to the mounting configuration.

Direct Mount

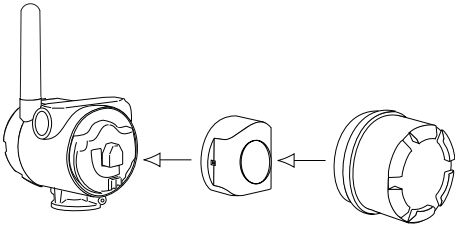
The direct mount installation should not be used when installing with a Swagelok® fitting.

1. Install the sensor according to standard installation practices. Be sure to use an approved thread sealant on all connections.
2. Attach the 648 housing to the sensor using the threaded conduit entry.
3. Attach the sensor wiring to the terminals as indicated on the wiring diagram.
4. Connect the Power Module.

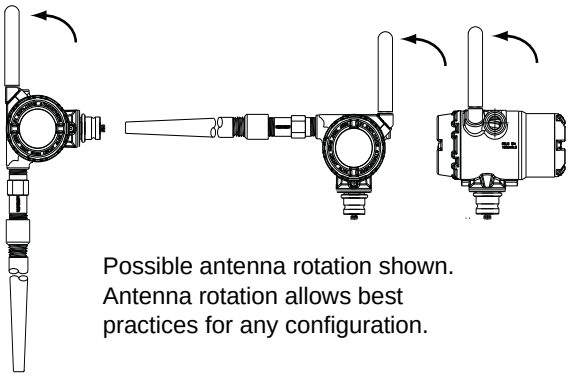
NOTE:

Wireless devices should be powered up in order of proximity from the Smart Wireless Gateway, beginning with the closest device to the Gateway. This will result in a simpler and faster network installation.

STEP 1 CONTINUED...



5. Close the housing cover and tighten to safety specification. Always ensure a proper seal by installing the electronics housing covers so that metal touches metal, but do not over tighten.
6. Position the antenna such that it is **vertical**, either straight up or straight down. The antenna should be approximately three ft. (0,91 m) from any large structures or buildings, to allow clear communication to other devices.



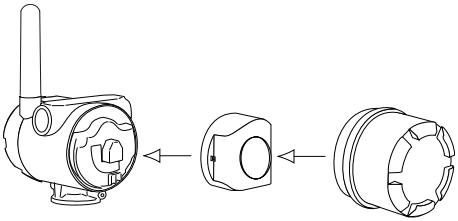
Possible antenna rotation shown. Antenna rotation allows best practices for any configuration.

Remote Mount

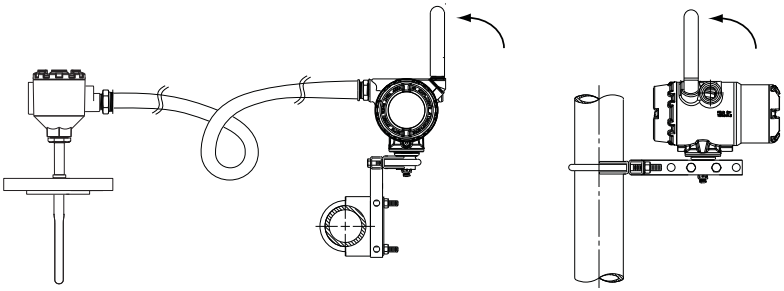
1. Install the sensor according to standard installation practices. Be sure to use an approved thread sealant on all connections.
2. Run wiring (and conduit, if necessary) from the sensor to the 648.
3. Pull the wiring through the threaded conduit entry of the 648.
4. Attach the sensor wiring to the terminals as indicated on the wiring diagram.
5. Connect the Power Module.

NOTE:
Wireless devices should be powered up in order of proximity from the Wireless Gateway, beginning with the closest device to the Gateway. This will result in a simpler and faster network installation.

STEP 1 CONTINUED...



6. Close the housing cover and tighten to safety specification. Always ensure a proper seal by installing the electronics housing covers so that metal touches metal, but do not over tighten.
7. Position the antenna such that it is **vertical**, either straight up or straight down.The antenna should be approximately three feet (0,91 m) from any large structures or buildings to allow clear communication to other devices.

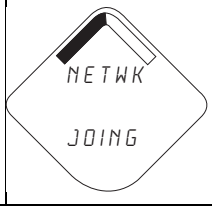
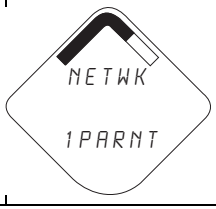
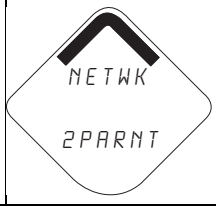


STEP 2: VERIFY OPERATION

Operation can be verified in four locations: at the device via the LCD, by using the Field Communicator, at the Gateway via the Smart Wireless Gateway's integrated web server, or via AMS™ Suite: Intelligent Device Manager.

Local Display

During normal operation, the LCD should display the PV value at the update rate up to 1 minute intervals. Refer to the Rosemount 648 Manual for error codes and other LCD messages. Press the **Diagnostic** button to display the **TAG, Device ID, Network ID, Network Join Status** and **Device Status** screens.

Searching for Network	Joining Network	Connected with 1 Parent	Connected with 2 Parents
			

Field Communicator

To verify operation using a Field Communicator, refer to the Fast Key Sequence in Table 1. Select the Radio State parameter to verify operation. For connecting to a Field Communicator, refer to Figure 3: Connection Diagram on page 4.

Table 1. 648 Fast Key Sequence

Function	Key Sequence	Menu Items
Network	1, 3, 3	Smart Power, Network ID, Set Join Key, **Radio State**

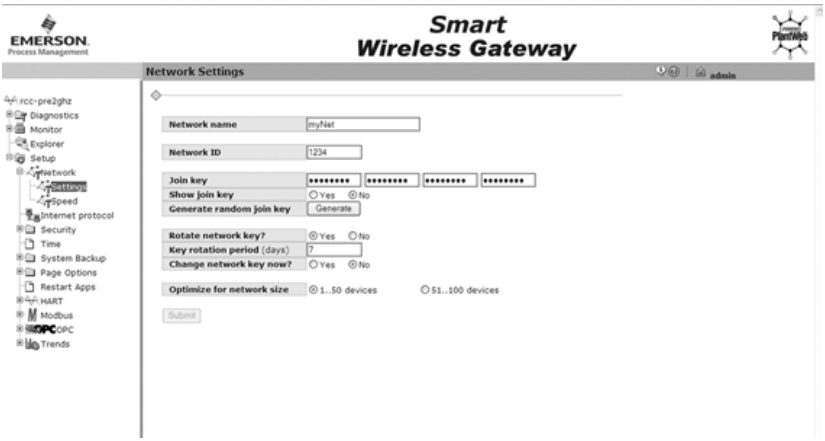
Smart Wireless Gateway

In the integrated web interface from the Gateway, navigate to the **Explorer>Status** page. This page shows whether the device has joined the network and if it is communicating properly.

NOTE:
It may take several minutes for the device to join the network.

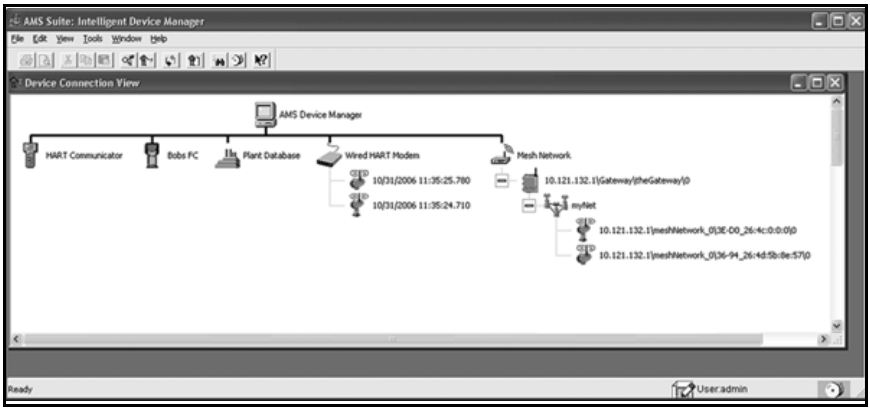
NOTE:
If the device joins the network and immediately has an alarm present, it is likely due to sensor configuration. Check the sensor wiring (see Rosemount 648 Terminal Diagram on page 9) and the sensor configuration (see 648 Fast Key Sequence on page 9).

Figure 4. Smart Wireless Gateway Network Settings



AMS™ Suite: Intelligent Device Manager

When the device has joined the network, it will appear in the Device Manager as illustrated below.



Troubleshooting

If the device is not joined to the network after power up, verify the correct configuration of the Network ID and Join Key, and verify that Active Advertising has been enabled on the Smart Wireless Gateway. The Network ID and Join Key in the device must match the Network ID and Join Key of the Gateway.

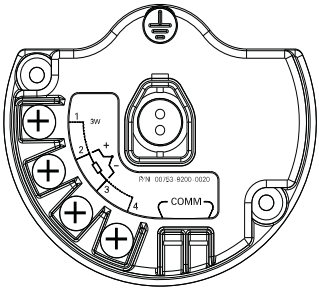
The Network ID and Join Key may be obtained from the Smart Wireless Gateway on the **Setup>Network>Settings** page on the web server (see Figure 4: Smart Wireless Gateway Network Settings on page 7). The Network ID and Join Key may be changed in the wireless device by using the following Fast Key sequence.

Function	Key Sequence	Menu Items
Network	1, 3, 3	Smart Power, **Network ID**, **Set Join Key**, Radio State

If the Field Communicator fails to communicate with the 648, open the LCD cover and verify that the communication switch, located next to the LCD, is in the ON position. After this step, verify that the 648 is communicating with the handheld device.

REFERENCE INFORMATION

Figure 5. Rosemount 648 Terminal Diagram



NOTE:
In order to communicate with a Field Communicator, the device must be powered by connecting the Power Module.

Table 2. 648 Fast Key Sequence

Function	Key Sequence	Menu Items
Device Information	1, 3, 5, 2	Tag, Date, Descriptor, Message, Model, Model Number I, Model Number II, Model Number III, Write Protect, Revision Numbers, Transmitter Serial Numbers, Device ID, Distributor
PV Range Values	1, 3, 4, 1	Lower Range Point, Upper Range Point, Unit, Apply Values, Lower Sensor Limit, Upper Sensor Limit, Minimum Span
Sensor Trim	1, 2, 2, 1	Lower Sensor Trim, Upper Sensor Trim, Recall Factory Trim, Active Calibrator
Wireless	1, 3, 3	Smart Power, Network ID, Set Join Key, Radio State
Sensor Configuration	1, 3, 2, 1	Sensor Configuration, Temp Sensor Setup, Cal VanDusen, Sensor S/N

Figure 6. Series 65, Series 68, Series 78, and 58C Lead Wire Configurations

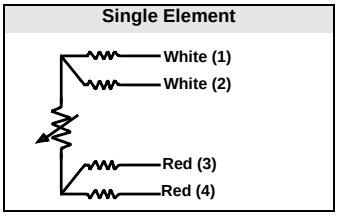


Figure 7. Series 183 Thermocouple Lead Wire Configurations

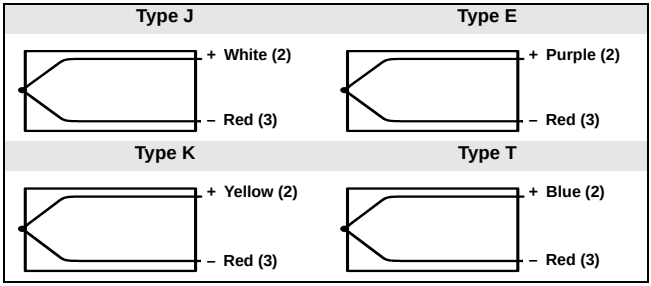
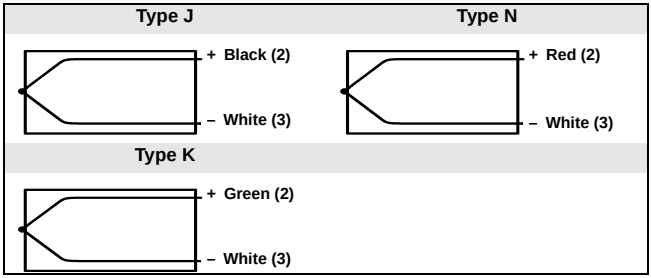


Figure 8. Series 185 Thermocouple Lead Wire Configurations



NOTE:
The wiring diagrams shown above apply only to Rosemount sensors.

PRODUCT CERTIFICATIONS

Approved Manufacturing Locations

Rosemount Inc. – Chanhassen, Minnesota, USA
Emerson Process Management GmbH & Co. - Karlstein, Germany
Emerson Process Management Asia Pacific Private Limited - Singapore

European Union Directive Information

The most recent revision of the European Union Declaration of Conformity can be found at www.emersonprocess.com

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

Electro Magnetic Compatibility (EMC) (2004/108/EC)

Emerson Process Management complies with the EMC Directive.

Radio and Telecommunications Terminal Equipment Directive (R&TTE)(1999/5/EC)

Emerson Process Management complies with the R&TTE Directive.

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation.

This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certificates

North American Certifications

Factory Mutual (FM) Approvals

I5 FM Intrinsically Safe, Non-incendive
Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G.
Zone Marking: Class I, Zone 0, AEx ia IIC
Temperature Codes T4 (T_{amb} = -50 to 70 °C)
T5 (T_{amb} = -50 to 40 °C)
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Dust Ignition-proof for Class II/III, Division 1, Groups E, F, and G.
Ambient temperature limits: -50 to 85 °C
Intrinsically Safe and Non-incendive when installed in accordance with Rosemount drawing 00648-1000.
For use with Rosemount Power Module P/N 753-9220-0001 only.
Enclosure Type 4X/IP66/IP67

N5 FM Non-incendive and Dust Ignition-proof
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Dust Ignition-proof for Class II/III, Division 1, Groups E, F, and G.
Ambient temperature limits: -50 to 85 °C
For use with Rosemount Power Module P/N 753-9220-0001 only.
Enclosure Type 4X/IP66/IP67

Canadian Standards Association (CSA)

I6 CSA Intrinsically Safe
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D.
Temp Code T3C
Enclosure Type 4X/IP66/IP67
For use with Rosemount Power Module P/N 753-9220-0001 only.
Intrinsically Safe when installed per Rosemount drawing 00648-1020.

European Certifications

I1 ATEX Intrinsic Safety
Certificate No.: Baseefa07ATEX0011X Ex II 1G
Ex ia IIC T5 (T_a = -60 °C to 40 °C)
Ex ia IIC T4 (T_a = -60 °C to 70 °C)
IP66/IP67

Special Conditions for Safe Use (X)

1. The antenna may present a potential electrostatic ignition hazard and must not be rubbed or cleaned with a dry cloth.
2. The enclosure is made of an aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0 environment.

   For use with Rosemount Power Module P/N 753-9220-0001 only.
   Intrinsically Safe when installed per Rosemount drawing 00648-1020.

CE 1180

Table 3. Sensor Parameters

Sensor	
U_o = 6.6 V	
I_o = 26 mA	
P_o = 42.6 mW	
C_o = 10.9 uF	
L_o = 500 mH	

International Certifications

I7 IECEx Intrinsic Safety
Certificate No.: IECEx BAS 07.0007X
Ex ia IIC T6 (T_{amb} = -60 °C to 50 °C)
Ex ia IIC T5 (T_{amb} = -60 °C to 75 °C)
IP66/IP67

Special Conditions for Safe Use (X)

1. The antenna may present a potential electrostatic ignition hazard and must not be rubbed or cleaned with a dry cloth.
2. The enclosure is made of an aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0 environment.

   For use with Rosemount Power Module P/N 753-9220-0001 only.
   Intrinsically Safe when installed per Rosemount drawing 00648-1020.

CE 1180

Table 4. Sensor Parameters

Sensor	
U_o = 6.6 V	
I_o = 26 mA	
P_o = 42.6 mW	
C_o = 10.9 uF	
L_o = 500 mH	

Japanese Certifications

I4 TIIS Intrinsic Safety
Ex ia IIC T4
Certificate TC18194. Various configurations available. Consult factory for certified assemblies.

China (NEPSI) Certifications

I3 China Intrinsic Safety
Certificate No.: GYJ071412
Ex ia IIC T4/T5

Table 5. Sensor Parameters

Sensor	
U_o = 6.6 V	
I_o = 26 mA	
P_o = 42.6 mW	
C_o = 11 uF	
L_o = 25 uH	

Special Conditions for Safe Use:

1. The cable entry of wireless temperature transmitter should be protected to ensure the degree of protection of the enclosure IP 20 (GB4208-1993) at least.
2. Associated apparatus should be installed in a safe location and, during installation, operation, and maintenance, the regulations of the instruction manual have to be strictly observed.
3. End users are not permitted to change any components insides.
4. During installation, use, and maintenance of the wireless temperature transmitter, observe the following standards:
   a. GB3836.13-1997 “Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres”
   b. GB3836.15-2000 “Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)”
   c. GB3836.16-2006 “Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)”
   d. GB50257-1996 “Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering”

Radio Power Label - see Figure 9 - indicates output power configuration of the radio. Devices with this label are configured for output power less than 10 mW e.i.r.p. At time of purchase, the customer must specify ultimate country of installation and operation.

Figure 9.

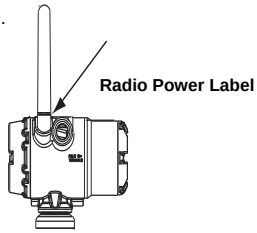


Figure 10. Rosemount 648 Wireless Declaration of Conformity

ROSEMOUNT

CE

EC Declaration of Conformity

No: RMD 1065 Rev. C

We,

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317-9685
USA

declare under our sole responsibility that the product,

Model 648 Wireless Temperature Transmitter

manufactured by,

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317-9685
USA

to which this declaration relates, is in conformity with the provisions of the European Community Directives, including the latest amendments, as shown in the attached schedule.

Assumption of conformity is based on the application of the harmonized standards and, when applicable or required, a European Community notified body certification, as shown in the attached schedule.

(signature)

6-3-2011
(date of issue)

Tim Layer
(name - printed)

Vice President Quality
(function name - printed)

EMERSON.
Process Management

ROSEMOUNT

CE

Schedule
No: RMD 1065 Rev. C

EMC Directive (2004/108/EC)

All Models with "Operating Frequency and Protocol Code 1"
EN 61326-1:1997 with amendments A1, A2, and A3

All Models with "Operating Frequency and Protocol Code 3"
EN 61326-1:2006 and EN 61326-2-3:2006

R&TTE Directive (1999/5/EC)

All Models with "Output Code X" and "Operating Frequency and Protocol Code 1"
EN 301 489-1: V 1.2.1 2002, EN 301 489-17: V1.4.1 2002
EN 60950-1: 2001
EN 300 328 V 1.6.1 (2004-11)

CE①

Country	Restriction
Bulgaria	General authorization required for outdoor use and public service
France	Outdoor use limited to 10mW e.i.r.p.
Italy	If used outside of own premises, general authorization is required
Norway	May be restricted in the geographical area within a radius of 20km from the center of Ny-Alesund
Romania	Use on a secondary basis. Individual license required.

CE **All Models with "Output Code X" and "Operating Frequency and Protocol Code 3"**
EN 301 489-1: V 1.2.1 2002, EN 301 489-17: V1.4.1 2002
EN 61010-1: 2001 (Second Addition)
EN 300 328 V 1.6.1 (2004-11)

CE①

All Models with "Output Code X" and "Operating Frequency and Protocol Code 3"
With the Extended Range Antenna option code "WM"

Country	Restriction
Bulgaria	General authorization required for outdoor use and public service
France	Outdoor use limited to 10mW e.i.r.p.
Italy	If used outside of own premises, general authorization is required
Norway	May be restricted in the geographical area within a radius of 20km from the center of Ny-Alesund
Romania	Use on a secondary basis. Individual license required.

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Process Management

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ROSEMOUNT

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Schedule
No: RMD 1065 Rev. C

ATEX Directive (94/9/EC)

Model 648 Wireless Temperature Transmitter

Certificate: Baseefa07ATEX0011X
Intrinsically Safe - Equipment Group II, Category 1 G
Ex ia IIC T4(-60°C ≤ Ta ≤ +70°C)
Ex ia IIC T4(-60°C ≤ Ta ≤ +40°C)

Harmonized Standards Used:
EN60079-0: 2006; EN60079-11: 2007

ATEX Notified Body for EC Type Examination Certificate
Baseefa [Notified Body Number: 1180]
Rockhead Business Park, Staden Lane
Buxton, Derbyshire SK17 9RZ
United Kingdom

ATEX Notified Body for Quality Assurance
Baseefa [Notified Body Number: 1180]
Rockhead Business Park, Staden Lane
Buxton, Derbyshire SK17 9RZ
United Kingdom

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