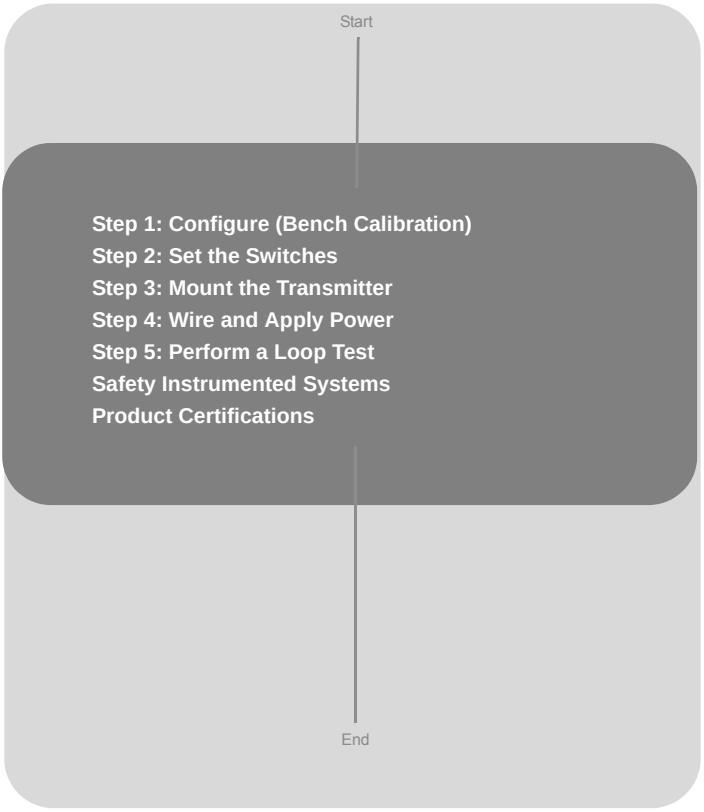
Quick Installation Guide
00825-0100-4021, Rev DA
November 2009

Rosemount 3144P HART Temperature Transmitter



HART COMMUNICATION PROTOCOL CE

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⚠ IMPORTANT NOTICE

This installation guide provides basic guidelines for the Rosemount 3144P. It does not provide instructions for detailed configuration, diagnostics, maintenance, service, troubleshooting, explosion-proof, flameproof, or intrinsically safe (I.S.) installations. Refer to the 3144P reference manual (document number 00809-0100-4021) 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 approvals section of this manual for any restrictions associated with a safe installation.

In an Explosion-proof/Flame-proof installation, do not remove the transmitter covers when power is applied to the unit.

Process leaks may cause harm or result in death

- Install and tighten thermowells or sensors before applying pressure.
- Do not remove the thermowell while in operation.

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.

STEP 1: CONFIGURE (BENCH CALIBRATION)

The Rosemount 3144P communicates using a 375 Field Communicator (communication requires a loop resistance between 250 and 1100 ohms) or AMS. Do not operate when power is below 12 Vdc at the transmitter terminal. Refer to the 3144P Reference Manual (document number 00809-0100-4021) and 375 Field Communicator Reference Manual (document number 00809-0100-4276) for more information.

Update the 375 Field Communicator Software

The 375 Field Communicator Field Device Revision Dev v4, DD v1 or greater is required to fully communicate with the 3144P. The Device Descriptors are available with new communicators or can be loaded into existing communicators at any Emerson Process Management Service Center.

Perform the following steps to determine if an upgrade is required.

1. Connect the sensor (see the wiring diagram located on the inside of the housing cover)
2. Connect the bench power supply to the power terminals (“+” or “–”).
3. Connect a 375 Field Communicator to the loop across a loop resistor or at the power/signal terminals on the transmitter.
4. The following message will appear if the communicator has a previous version of the device descriptors (DDs).

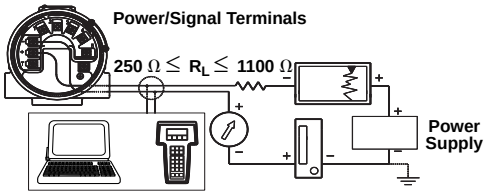
   NOTICE: Upgrade the communicator software to access new XMTR functions. Continue with old description?

   NOTE:
   If this notice does not appear, the latest DD is installed.

   If the latest version is not available, the communicator will communicate properly, but when the transmitter is configured some new capabilities may not be visible.

   To prevent this from happening, upgrade to the latest DD or answer NO to the question and default to the generic transmitter functionality.

Figure 1. Connecting a Communicator to a Bench Loop.



STEP 1 CONTINUED...

Verify Transmitter Configuration

The HART Fast Key sequences in Table 1 may be used for transmitter configuration and startup.

Table 1. HART Fast Key Sequences

Function	HART Fast Keys
Active Calibrator	1, 2, 2, 1, 3
Alarm Values	1, 3, 4, 2, 1
Analog Output	1, 1, 4
Average Temperature Setup	1, 3, 3, 2
Average Temperature Configuration	1, 3, 3, 2
Burst Mode	1, 3, 4, 3, 3
Burst Option	1, 3, 4, 3, 4
Calibration	1, 2, 2
Clear Log	1, 2, 1, 6
Configure *Hot Backup*	1, 3, 3, 4
Configuration	1, 3
D/A Trim	1, 2, 2, 2
Damping Values	1, 3, 4, 1, 3
Date	1, 3, 5, 2
Descriptor	1, 3, 5, 3
Device Information	1, 3, 5
Diagnostics and Service	1, 2
Differential Temperature Setup	1, 3, 3, 1
Differential Temperature Configuration	1, 3, 3, 1
Drift Alert	1, 3, 3, 5
Filter 50/60 Hz	1, 3, 6, 1
First Good Temperature Setup	1, 3, 3, 3
First Good Temperature Configuration	1, 3, 3, 3
Hardware Revision	1, 4, 1
Hart Output	1, 3, 4, 3
Intermittent Sensor Detect	1, 3, 6, 2
Intermittent Threshold	1, 3, 6, 3
Loop Test	1, 2, 1, 1
LRV (Lower Range Value)	1, 3, 4, 1, 1
LSL (Lower Sensor Limit)	1, 3, 4, 1, 5
Master Reset	1, 2, 1, 3
Message	1, 3, 5, 4
Meter Options	1, 3, 4, 4
Open Sensor Holdoff	1, 3, 6, 4
Percent Range	1, 1, 5
Poll Address	1, 3, 4, 3, 1
Process Temperature	1, 1
Process Variables	1, 1
Range Values	1, 3, 4, 1
Review	1, 4
Scaled D/A Trim	1, 2, 2, 3

Function	HART Fast Keys
Sensor 1 Configuration	1, 3, 2, 3
Sensor 2 Configuration	1, 3, 2, 4
Sensor Limits	1, 3, 2, 2
Sensor 1 Serial Number	1, 3, 2, 3, 3
Sensor 2 Serial Number	1, 3, 2, 4, 3
Sensor 1 Setup	1, 3, 2, 3
Sensor 2 Setup	1, 3, 2, 4
Sensor Trim	1, 2, 2, 1, 1
Sensor Type	1, 3, 2, 1
Sensor 1 Unit	1, 3, 2, 3, 1
Sensor 2 Unit	1, 3, 2, 4, 1
Software Revision	1, 4, 1
Status	1, 2, 1, 4
Tag	1, 3, 5, 1
Terminal Temperature Setup	1, 3, 2, 5
Test Device	1, 2, 1
Transmitter-Sensor Matching	1, 3, 2, 1
URV (Upper Range Value)	1, 3, 4, 1, 2
USL (Upper Sensor Limit)	1, 3, 4, 1, 6
Variable Mapping	1, 3, 1
View Log	1, 2, 1, 5
Wires	1, 3, 2, 1
2-wire Offset Sensor 1	1, 3, 2, 3, 6
2-wire Offset Sensor 2	1, 3, 2, 4, 6

Input/Verify Callendar Van-Dusen Constants

If Transmitter-Sensor Matching is being used with this combination of a transmitter and sensor, verify the constants input. When using two sensors, repeat Steps 1 – 5 for the second sensor.

1. At the **Home** screen, select *1 Device Setup*, *3 Configuration*, *2 Sensor Config*, *1 Change Type/Conn., 1 Sensor 1 (*Select *Sensor 2* two sensors). Set the control loop to manual. Select **OK**
2. Select *Cal VanDusen* at the **Enter Sensor Type** prompt.
3. Select the appropriate number of wires at the **Enter Sensor Connection** prompt.
4. Enter the R_o, Alpha, Beta, and Delta values from the stainless steel tag attached to the special-order sensor.
5. Select **OK** after you return the control loop to automatic control.

STEP 2: SET THE SWITCHES

The Security and Failure Mode Switches are located on the top center of the electronics module. Follow the steps below to set the switches.

Without a LCD Display

1. Set the loop to manual (if applicable) and disconnect the power.
2. Remove the electronics housing cover.
3. Set the switches to the desired position. Reattach housing cover.
4. Apply power and set the loop to automatic control.

With a LCD Display

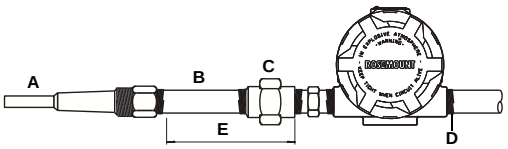
1. Set the loop to manual (if applicable) and disconnect the power.
2. Remove the electronics housing cover.
3. Unscrew the LCD display screws and slide the meter straight off.
4. Set the switches to the desired position.
5. Reattach the LCD display and electronics housing cover (consider LCD display orientation – rotate in 90 degree increments).
6. Apply power and set the loop to automatic control.

STEP 3: MOUNT THE TRANSMITTER

Mount the transmitter at a high point in the conduit run to prevent moisture from draining into the transmitter housing.

Typical Field Mount Installation

1. Mount the thermowell to the process container wall. Install and tighten thermowells. Perform a leak check.
2. Attach any necessary unions, couplings, and extension fittings. Seal the fitting threads with an approved thread sealant, such as silicone or PTFE tape (if required).
3. Screw the sensor into the thermowell or directly into the process (depending on installation requirements).
4. Verify all sealing requirements.
5. Attach the transmitter to the thermowell/sensor assembly. Seal all threads with an approved thread sealant, such as silicone or PTFE tape (if required).
6. Install field wiring conduit into the open transmitter conduit entry (for remote mounting) and feed wires into the transmitter housing.
7. Pull the field wiring leads into the terminal side of the housing.
8. Attach the sensor leads to the transmitter sensor terminals (the wiring diagram is located inside the housing cover).
9. Attach and tighten both transmitter covers.



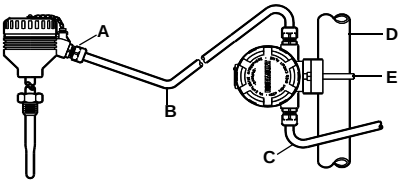
3144-0433QIG

A = Thermowell
B = Extension (Nipple)
C = Union or Coupling
D = Conduit for Field Wiring (dc power)
E = Extension Fitting Length

STEP 3 CONTINUED...

Typical Remote Mount Installation

1. Mount the thermowell to the process container wall. Install and tighten thermowells. Perform a leak check.
2. Attach a connection head to the thermowell.
3. Insert sensor into the thermowell and wire the sensor to the connection head (the wiring diagram is located inside the connection head).
4. Mount the transmitter to a 2-in. (50 mm) pipe or a panel using one of the optional mounting bracket (B4 bracket is shown below).
5. Attach cable glands to the shielded cable running from the connection head to the transmitter conduit entry.
6. Run the shielded cable from the opposite conduit entry on the transmitter back to the control room.
7. Insert shielded cable leads through the cable entries into the connection head / transmitter. Connect and tighten cable glands.
8. Connect the shielded cable leads to the connection head terminals (located inside the connection head) and to the sensor wiring terminals (located inside the transmitter housing).



644-0000b05b

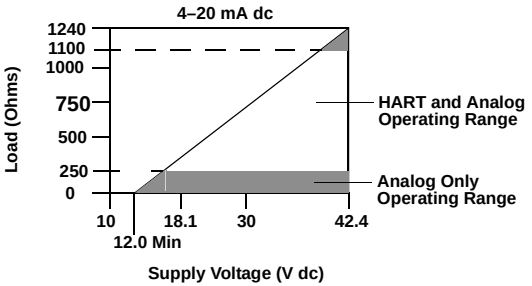
A = Cable Gland
B = Shielded Cable from Sensor to Transmitter
C = Shielded Cable from Transmitter to Control Room
D = 2-in. (50 mm) pipe
E = B4 Mounting Bracket

STEP 4: WIRE AND APPLY POWER

- Wiring diagrams are located inside the terminal block cover.
- An external power supply is required to operate the transmitter.
- The power required across the transmitter power terminals is 12 to 42.4 V DC (the power terminals are rated to 42.4 V DC). To prevent the possibility of damaging the transmitter, do not allow terminal voltage to drop below 12.0 Vdc when changing the configuration parameters.

Load Limitations

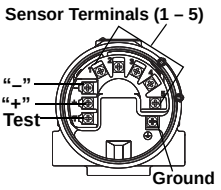
Maximum Load = 40.8 X (Supply Voltage - 12.0)(1)



(1) Without transient protection (optional).

Power the Transmitter

1. Remove the terminal block cover.
2. Connect the positive power lead to the "+" terminal. Connect the negative power lead to the "–" terminal.
3. Tighten the terminal screws.
4. Reattach and tighten the cover.
5. Apply power.



Wiring Diagram

3144P Single-Sensor

2-wire RTD and Ohms

3-wire RTD and Ohms**

4-wire RTD and Ohms

T/Cs and Millivolts

RTD with Compensation Loop*

* *Transmitter must be configured for a 3-wire RTD in order to recognize an RTD with a compensation loop.*
** *Rosemount provides 4-wire sensors for all single-element RTDs. You can use these RTDs in 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.*

3144P Dual-Sensor

ΔT/Hot Backup/Dual Sensor with 2 RTDs*

ΔT/Hot Backup/Dual Sensor with 2 Thermocouples*

ΔT/Hot Backup/Dual Sensor with RTDs/ Thermocouples *

ΔT/Hot Backup/Dual Sensor with RTDs/ Thermocouples*

ΔT/ Hot Backup/Dual Sensor with 2 RTDs with Compensation Loop*

* *Rosemount provides 4-wire sensors for all single-element RTDs. You can use these RTDs in 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.*

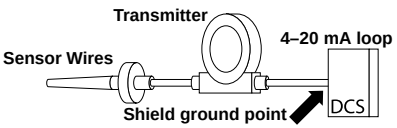
Ground the Transmitter

Ungrounded Thermocouple, mV, and RTD/Ohm Inputs

Each process installation has different requirements for grounding. Use the grounding options recommended by the facility for the specific sensor type, or begin with grounding Option 1 (the most common).

Option 1 (recommended for ungrounded transmitter housing):

1. Connect signal wiring shield to the sensor wiring shield.
2. Ensure the two shields are tied together and electrically isolated from the transmitter housing.
3. Ground shield at the power supply end only.
4. Ensure that the sensor shield is electrically isolated from the surrounding grounded fixtures.

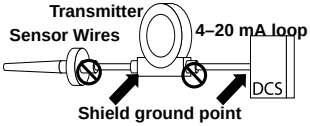


Connect shields together, electrically isolated from the transmitter

STEP 4 CONTINUED...

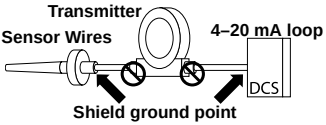
Option 2 (recommended for grounded transmitter housing):

1. Connect sensor wiring shield to the transmitter housing (only if the housing is grounded).
2. Ensure the sensor shield is electrically isolated from surrounding fixtures that may be grounded.
3. Ground signal wiring shield at the power supply end.



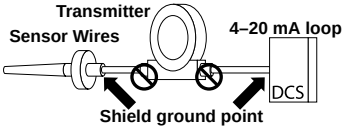
Option 3:

1. Ground sensor wiring shield at the sensor, if possible.
2. Ensure that the sensor wiring and signal wiring shields are electrically isolated from the transmitter housing and other fixtures that may be grounded.
3. Ground signal wiring shield at the power supply end.



Grounded Thermocouple Inputs

1. Ground sensor wiring shield at the sensor.
2. Ensure that the sensor wiring and signal wiring shields are electrically isolated from the transmitter housing and other fixtures that may be grounded.
3. Ground signal wiring shield at the power supply end.



STEP 5: PERFORM A LOOP TEST

The Loop Test verifies transmitter output, loop integrity, and operation of any recorders or similar devices installed in the loop.

Initiate a loop test:

1. Connect an external ampere meter in series with the transmitter loop (so the power to the transmitter goes through the meter at some point in the loop).
2. From the **Home** screen, select *1 Device Setup*, *2 Diag/Serv*, *1 Test Device*, *1 Loop Test*. The communicator displays the loop test menu.
3. Select a discreet milliampere level for the transmitter to output. At **Choose Analog Output** select *1 4mA*, *2 20mA* or select *4 Other* to manually input a value between 4 and 20 milliamperes. Select **Enter** to show the fixed output. Select **OK**.
4. In the test loop, check the transmitter's actual mA output and the HART mA reading are the same value. If the readings do not match, either the transmitter requires an output trim or the current meter is malfunctioning.
5. After completing the test, the display returns to the loop test screen and allows the user to choose another output value. To end the Loop Test, Select *5 End* and **Enter**.

Initiate Simulation Alarm

1. From the Home screen, select *1 Device Setup, 2 Diag/Serv, 1 Test Device, 1 Loop Test, 3 Simulate Alarm*.
2. The transmitter will output alarm current level based on the configured alarm parameter and switch settings.
3. Select *5 End* to return the transmitter to normal conditions.

SAFETY INSTRUMENTED SYSTEM (SIS)

When using a 3144P transmitter, the following guidelines should be followed. For additional Safety Instrumented Systems information consult the Rosemount 3144P reference manual (document number 00809-0100-4021). The manual is available electronically on www.rosemount.com or by contacting a sales representative.

3144P Safety Certified Identification

All safety certified 3144P transmitters require safety certified electronics.

To identify a safety certified transmitter, verify one of the following:

1. See a yellow tag affixed to outside of transmitter.
2. Verify the option code QT in the model string.

Installation

No special installation is required in addition to the standard installation practices outlined in this document. Always ensure a proper seal by installing the electronics housing cover(s) so that metal contacts metal.

Environmental limits are available in the 3144P Product Data Sheet (document number 00813-0100-4021). This document can be found at www.rosemount.com.

The loop should be designed so the terminal voltage does not drop below 12 Vdc when the transmitter output is 24.5 mA.

Position the security switch to the “ON” position to prevent accidental or deliberate change of configuration data during normal operation.

SIS Configuration

Use any HART-compliant master to communicate with and verify configuration of the 3144P SIS (see "Table 1: HART Fast Key Sequences" to verify configuration). DD revision 3144P SIS Dev. 4 Rev 1 or greater is required.

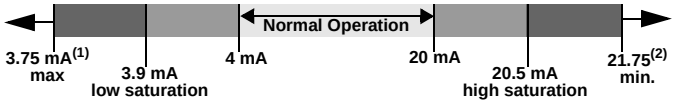
User-selected damping will affect the transmitter’s ability to respond to changes in the applied process. The *damping value + response time* should not exceed the loop requirements.

NOTES

1. Transmitter output is not safety-rated during the following: configuration changes, multidrop, loop test. Alternative means should be used to ensure process safety during transmitter configuration and maintenance activities.

2. DCS or safety logic solver should be configured to match transmitter configuration. Figure 2 identifies the Rosemount alarm and saturation levels. (Alarm and saturation values are user-configurable.) Position the alarm switch to the required HI or LO alarm position. With a HART communicator, select
the alarm and saturation levels using the following HART fast keys
1 Device Setup, *3 Configuration*, *4 Dev Output Config*, *2 Alarm/Saturation*, *2 AO Levels*.

Figure 2. Rosemount Standard Alarm Levels



(1) Transmitter Failure, hardware alarm in LO position.
(2) Transmitter Failure, hardware alarm in HI position.

3. Some detected faults are indicated on the analog output at a level above high alarm or below low alarms regardless of the alarm levels configured.
4. For specific saturation and alarm level settings, see the reference manual (00809-0100-4021).

Operation and Maintenance for Safety Instrumented Systems

The following proof tests are recommended. In the event that an error is found in the safety functionality, proof test results and corrective actions taken must be documented at www.rosemount.com/safety.

Use "Table 1: HART Fast Key Sequences" to perform Loop Test, Review – Device Variables, and view Status. See the 3144P Reference Manual for additional information.

The required proof test intervals will depend on the transmitter configuration and the temperature sensor(s) in use. Refer to the FMEDA report and reference manual for further information.

Abbreviated Proof Test

Conducting the Abbreviated Proof Test will detect approximately 63% of transmitter DU failures and approximately 90% of temperature sensor(s) DU failures, not detected by the 3144P safety-certified automatic diagnostics, for a typical overall assembly coverage of 72%.

1. Using Loop Test enter the milliampere value representing a high alarm state.
2. Check the reference meter to verify the mA output corresponds to the entered value.
3. Using Loop Test enter the milliampere value representing a low alarm state.
4. Check the reference meter to verify the mA output corresponds to the entered value.
5. Use a HART communicator to view detailed device status to ensure no alarms or warnings are present in the transmitter.
6. Check that sensor value(s) are reasonable in comparison to a basic process control system (BPCS) value.
7. Document the test results per the plant's requirements.

Extended Proof Test

Conducting the Extended Proof Test, which includes the Abbreviated Proof Test, will detect approximately 96% of transmitter DU failures and approximately 99% of temperature sensor(s) DU failures, not detected by the 3144P safety-certified automatic diagnostics, for a typical overall assembly coverage of 97%.

1. Execute the Abbreviated Proof Test.
2. Perform a minimum two point sensor verification check. If two sensors are used, repeat for each sensor. If calibration is required for the installation, it may be done in conjunction with this verification.
3. Verify that the housing temperature value is reasonable.
4. Document the test results per the plant's requirements.

Inspection

Visual Inspection

Not required

Special Tools

Not required

Product Repair

All failures detected by the transmitter diagnostics or by the proof-test must be reported. Feedback can be submitted electronically at *www.emersonprocess.com/rosemount/safety/certtechdocumentation.htm*.

The 3144P is repairable by major component replacement.

SIS Reference

Certification

3144P is designed, developed, and audited to be compliant to IEC 61508 Safety certified SIL 2 Claim Limit (redundant in SIL 3).

Specifications

The 3144P must be operated in accordance to the functional and performance specifications provided in the 3144P reference manual.

The 3144P Safety Certified specifications are the same as the 3144P.

Start-up time

Performance within specifications is achieved within 6 seconds after power is applied to the transmitter when the damping is set to 0 seconds.

Failure Rate Data

The FMEDA report includes failure rates and common cause Beta factor estimates. This report is available at www.rosemount.com/safety.

3144P Safety Certified Safety Failure Values

Safety accuracy: 2.0%(1) or 2 °C, whichever is greater.

Safety response time - 5.0 seconds

Self-diagnostics Test Interval: At least once per hour

Product Life

50 years – based on worst case component wear-out mechanisms, not based on the wear-out of process sensors.

(1) A 2% variation of the transmitter mA output is allowed before a safety trip. Trip values in the DCS or safety logic solver should be derated by 2%.

PRODUCT CERTIFICATIONS

Rosemount 3144P With HART / 4–20 mA

Approved Manufacturing Locations

Rosemount Inc. – Chanhassen, Minnesota, USA

Rosemount Temperature GmbH – Germany

Emerson Process Management Asia Pacific – 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)

Rosemount Inc. complies with the ATEX Directive.

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

EN 61326-2-3:2006 and EN 61326-1:2006

Hazardous Locations Installations

North American Certifications

Factory Mutual (FM) Approvals

I5 FM Intrinsically Safe and Nonincendive:
Certificate Number: 3012752
Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G.
Temperature codes: T4A (T_{amb} = – 60 to 60 °C)
T5 (T_{amb} = – 60 to 50°C)
Zone Marking: Class I, Zone 0, AEx ia IIC
T4 (T_{amb} = – 50 to 60 °C)
Intrinsically Safe when installed in accordance with control drawing 03144-0321.
Nonincendive for use in Class I, Division 2, Groups A, B, C, and D. Suitable for use in Class II / III, Division 2, Groups F and G.
Nonincendive when installed in accordance with Rosemount drawings 03144-0321.
Temperature codes: T6 (T_{amb} = – 60 to 60 °C),
T5 (T_{amb} = – 60 to 85°C)

E5 Explosionproof for Class I, Division 1, Groups A, B, C, D.
Dust Ignition-Proof for use in Class II/III, Division 1, Groups E, F, and G.
Certificate Number: 3012752
Explosionproof and Dust Ignition-Proof when installed in accordance with Rosemount drawing 03144-0320. Indoor and outdoor use. Type 4X.
Temperature code: T5 (T_{amb} = – 50 to 85 °C)

NOTE
For Group A, seal all conduits within 18 inches of enclosure; otherwise, conduit seal not required for compliance with NEC 501-15(A)(1).

Nonincendive for use in Class I, Division 2, Groups A, B, C, and D. Suitable for use in Class II/III, Division 2, Groups F and G. Non-incendive when installed in accordance with Rosemount drawing 03144-0321.
Temperature codes: T5 (T_{amb} = – 60 to 85 °C),
T6 (T_{amb} = – 60 to 60 °C)

Canadian Standards Association (CSA) Approvals

I6 CSA Intrinsically Safe and Division 2
Certificate Number: 1242650
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1; Suitable for Class I, Division 2, Groups A, B, C, and D. Intrinsically Safe and Division 2 when installed per Rosemount drawing 03144–0322.

K6 Combination of I6 and the following:
Explosion Proof for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 hazardous locations. Factory sealed.

European Certifications

E1 ATEX Flameproof Approval (Zone 1)
Certificate Number: KEMA01ATEX2181X
ATEX Category Marking ⟨Ex⟩ II 2 G
Ex d IIC T6 (T_{amb} = –40 to 70 °C)
Ex d IIC T5 (T_{amb} = –40 to 80 °C)
Max supply voltage: 55 Vdc

Special Conditions for Safe Use (X):
1. For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

ND ATEX Dust Ignition Proof Approval
Certificate Number: KEMA01ATEX2205
ATEX Category Marking ⟨Ex⟩ II 1 D
Ex tD A21 T95 °C (T_{amb} = –40 to 85 °C)
Max supply voltage: 55 Vdc

N1 ATEX Type n Approval (Zone 2)
Certificate Number: BAS01ATEX3432X
ATEX Category Marking ⟨Ex⟩ II 3 G
Ex nL IIC T6 (T_{amb} = –40 to 50 °C)
Ex nL IIC T5 (T_{amb} = –40 to 75 °C)
U_i = 55V

Special Conditions for Safe Use (X):

1. The transmitter is not capable of withstanding the 500 v insulating test required by Clause 9.1 of EN50021:1999. This condition must be taken into account during installation.

I1 ATEX Intrinsic Safety Approval (Zone 0)
Certificate Number: BAS01ATEX1431X
ATEX Category Marking ⟨Ex⟩ II 1 G
Ex ia IIC T6 (T_{amb} = –60 to 50 °C)
Ex ia IIC T5 (T_{amb} = –60 to 75 °C)

Table 2. Input Entity Parameters

Power/Loop		Sensor	
U_i = 30 V dc	C_i = 5 nF	U_o = 13.6 V	C_i = 78 nF
I_i = 300 mA	L_i = 0	I_o = 56 mA	L_i = 0
P_i = 1.0 W		P_o =190 mW	

Special Conditions for Safe Use (x):

1. The transmitter is not capable of withstanding the 500V insulation test as defined in Clause 6.4.12 of EN50 020. This condition must be taken into account during installation.

International Certifications

IECEx Certifications

E7 IECEx Flameproof Approval
Certificate Number: IECEx KEM 09.0035X
Ex d IIC T6 (T_{amb} = -40 to 70 °C)
Ex d IIC T5 (T_{amb} = -40 to 80 °C)
Max supply voltage: 55 V

Special Conditions for Safe Use (X):

1. For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

NF IECEx Dust Ignition Proof Approval
Certificate Number: IECEx KEM 09.0036
Ex tD A21 T95 °C (T_{amb} = -40 to 85 °C)
Max supply voltage: 55 Vdc
Consult factory for NF availability

N7 Type N Approval
Certificate Number: IECEx BAS 07.0003X
Ex nA nL IIC T6 (T_{amb} = –40 to 50 °C)
Ex nA nL IIC T5 (T_{amb} = –40 to 75 °C)
U_i = 55 V

Special Conditions for Safe Use (x):

1. When fitted with the transient terminal options, the apparatus is not capable of withstanding the 500V electrical strength test as defined in Clause 6.8.1 of IEC 60079-15: 2005. This must be taken into account during installation.

I7 Intrinsic Safety Approval
Certificate Number: IECEx BAS 07.0002X
Ex ia IIC T6 (T_{amb} = –60 to 50 °C)
Ex ia IIC T5 (T_{amb} = –60 to 75 °C)

Table 3. Input Entity Parameters

Power/Loop		Sensor	
U_i = 30 V	C_i = 5 nF	U_o = 13.6 V	C_i = 78 nF
I_i = 300 mA	L_i = 0	I_o = 56 mA	L_i = 0
P_i = 1.0 W		P_o = 190 mW	

Special Conditions for Safe Use (x):

1. When fitted with the transient terminal options, the apparatus is not capable of withstanding the 500V electrical strength test as defined in Clause 6.4.12 of IEC 60079-11: 1999. This must be taken into account during installation.

Brazilian Certifications

Centro de Pesquisas de Energia Eletrica (CEPEL) Approval

I2 INMETRO Intrinsic Safety
Certificate Number: CEPEL-Ex-0723/05X
BR-Ex ia IIC T6 (T_{amb}= -60 to 50 °C)
BR-Ex ia IIC T5 (T_{amb}= -60 to 75 °C)
IP66W

Special Conditions for Safe Use (x):

1. The apparatus enclosure may contain light metals. The apparatus must be installed in such a manner as to minimize the risk of impact or friction with other metal surfaces.
2. A transient protection device can be fitted as an option, in which the equipment will not pass the 500V test.

E2 INMETRO Flameproof
Certificate Number: CEPEL-EX-0307/2004X
BR-Ex d IIC T6 (T_{amb}= -40 to 65 °C)
BR-Ex d IIC T5 (T_{amb}= -40 to 80 °C)

Special Conditions for Safe Use (x):

1. The accessory of cable entries or conduit must be certified as flameproof and needs to be suitable for use conditions.
2. For ambient temperature above 60 ºC, cable wiring must have minimum isolation temperature 90 ºC, to be in accordance to equipment operation temperature.
3. Where electrical entry is via conduit, the required sealing device must be assembly immediately close to enclosure.

Japanese Certifications

E4 TIIS Flameproof
Various configurations available. Consult factory for certified assemblies.

China (NEPSI) Certifications

I3 China Intrinsic Safety
Ex ia IIC T4
Certificate Number: GYJ06586/GYJ06587

Special Conditions for Safe Use (x):

1. The temperature of the process medium must be less than +121 ° C.
2. The ambient temperature range is from -40 °C to + 60 ° C.
3. Safety Parameters:

Table 4. NEPSI Input Entity Parameters HART Protocol, including SIS

Input Parameters	RTD Terminals
U_i = 30 V	U_o = 14.1 V
I_i = 300 mA	I_o = 18.6 mA
P_i = 1.0 W	P_o = 65.7 W
C_i = 0.023 μ F	C_o = 0.63 μ F
L_i = 0 mH	L_o = 93.3 mH

4. The cable entry of the temperature transmitter must be protected to ensure the degree of protection of the enclosure to IP 20(GB4208-1993) at least.
5. The terminals for connection to power supply of the temperature transmitter must be connected to an associated apparatus certified by NEPSI in accordance with GB 3836.1-2000 and GB 3836.4-2000 to establish an intrinsic safety system. The following requirements must be fulfilled:

$U_o \leq U_i$	$C_o \geq C_i + C_c$
$I_o \leq I_i$	$L_o \geq L_c + L_i$
$P_o \leq P_i$	

Where:

C_c, L_c the distributed capacitance and inductance of the cables

U_o, I_o, P_o maximum output parameters of the associated apparatus

C_o, L_o maximum external parameters of the associated apparatus

6. The terminals for connection to sensor of temperature transmitter must be connected to an intrinsic safety sensor certified by NEPSI in accordance with GB 3836.1-2000 and GB 3836.4-2000 to establish an intrinsically safe system. The following requirements must be fulfilled:

$U_i \geq U_o$	$C_i \leq C_o - C_c$
$I_i \geq I_o$	$L_i \geq L_c - L_o$
$P_o \geq P_i$	

Where:

C_c, L_c the distributed capacitance and inductance of the cables

U_i, I_i, P_i maximum input parameters of intrinsically safe sensor

C_i, L_i maximum internal paramaters of intrinsically safe sensor

7. The cables between temperature transmitter, associated apparatus and sensor are 2-core shielded cables (the cables must have insulated shield). The cable core section area should be much than 0.5 mm^2. The shielded has to be grounded in non-hazardous area and isolated from the housing. The wiring has to not be affected by electromagnetic disturbance.
8. 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.
9. End users are not permitted to change the internal components or hardware of the device.
10. During installation, operation, and maintenance of the 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. GB50257-1996 “Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering.”

E3 China Flameproof
Ex d IIC T6
Certificate Number: GYJ06583/GYJ06584

Special Conditions for Safe Use (x):

1. Device must only be subjected to the ambient temperature range from -40 °C to + 70 °C.
2. The temperature of the process medium must be less than + 80 °C.
3. The ground connection must be properly and reliably connected within the enclosure of the device.
4. During installation, use and maintenance of the temperature transmitter, observe the warning “Don’t open the cover when the circuit is live.”
5. During installation, there should be no mixture harm to the flameproof housing.
6. When installing in hazardous locations, the cable entry must be certified by NEPSI with protection type Ex d II C, in accordance with GB3836.1-2000 and GB3836.2-2000. Five full threads must be engaged when the cable entry is assembled to the temperature transmitters.
7. The diameter of the cable must observe the instruction manual of cable entry. The compressing nut should be fastened. The aging of seal ring should be changed in time.
8. Maintenance must be performed in a non-hazardous location.
9. The end user is not permitted to change any of the internal components or hardware of the device.
10. During installation, operation, and maintenance of the 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. GB50257-1996 “Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering.”

Combination Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

KA Combination of K1 and K6
KB Combination of K5 and K6
K1 Combination of E1, N1, I1 and ND
K7 Combination of E7, N7, and I7
K5 Combination of I5 and E5
K6 CSA Combination

Additional Certifications

American Bureau of Shipping (ABS) Type Approval

ABS Type Approval for temperature measurements in hazardous locations on ABS Classed Vessels, Marine and Offshore Installations. Type Approval is based on Factory Mutual (FM) Approvals; therefore, specify order code K5. Please contact your Emerson Process Management representative if a copy of the certification is required. Consult factory for availability.

Bureau Veritas (BV) Type Approval Shipboard

Consult factory for availability.

Det Norske Veritas (DNV) Type Approval for Shipboard and Offshore Installations

DNV rules for classifications of ships and mobile offshore units for temperature measurements in the following locations:

Table 5. Applications / Limitations

Location	Class
Temperature	D
Humidity	B
Vibration	B/C
Enclosure	D

NOTE

The transient protector (option code T1) is required when requesting DNV Type Approval. Additionally, hazardous locations approvals may be required (based on shipboard location) and will need to be specified by the Hazardous Locations option code.

Please contact your Emerson Process Management representative if a copy of the certification is required.

GOSTANDART

Tested and approved by Russian Metrological Institute.

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