Reference Manual
00809-0100-4952, Rev CA
May 2016

Rosemount™ Pipe Clamp Sensor

EMERSON™
Process Management

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Rosemount™ 0085 Pipe Clamp Sensor

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

The United States has two toll-free assistance numbers and one International number.

Customer Central

1-800-999-9307 (7:00 A.M. to 7:00 P.M. CST)

International

1-(952) 906-8888

National Response Center

1-800-654-7768 (24 hours a day)
Equipment service needs

⚠WARNING

Explosions could result in death or serious injury.

- Do not remove the housing cover in explosive atmospheres when the circuit is live.
- Before connecting a Field Communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- Verify the operating atmosphere of the sensor is consistent with the appropriate hazardous locations certifications.
- Housing cover must be fully engaged to meet explosion-proof requirements.

Failure to follow these installation guidelines could result in death or serious injury.

- Make sure only qualified personnel perform the installation.

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and the terminals.

⚠CAUTION

The products described in this document are NOT designed for nuclear-qualified applications. Using non-nuclear qualified products in applications that require nuclear-qualified hardware or products may cause inaccurate readings.

For information on Rosemount nuclear-qualified products, contact your local Emerson™ Process Management Sales Representative.

This device is intended for use in temperature monitoring applications and should not be used in control and safety applications.

Section 1 Introduction

1.1 Using this manual

This product manual provides installation, configuration, troubleshooting, and maintenance instructions for the Rosemount™ 0085 Pipe Clamp Sensor.

Section 2: Installation

- Installation flowchart and checklist
- Receiving and inspection
- Functional limitations
- Mounting and installation
- Wiring to transmitter/connection head

Section 3: Troubleshooting

- Service support
- Return of materials

Appendix A: Specifications and Reference Data

- Ordering information
- Dimensional drawings

Appendix B: Product Certifications

- Product certifications
- Installation drawings

1.2 Product recycling/disposal

Recycling of equipment and packaging should be taken into consideration and disposed of in accordance with local and national legislation/regulations.

Section 2 Installation

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Receiving and inspection . . . . . page 4
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2.1 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Refer to the following safety messages before performing any operation in this section.

⚠ WARNING

Explosions could result in death or serious injury.

- Do not remove the housing cover in explosive atmospheres when the circuit is live.
- Before connecting a Field Communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- Verify the operating atmosphere of the sensor is consistent with the appropriate hazardous locations certifications.
- Housing cover must be fully engaged to meet explosion-proof requirements.

Failure to follow these installation guidelines could result in death or serious injury.

- Make sure only qualified personnel perform the installation.

2.2 Receiving and inspection

The Rosemount™ 0085 Pipe Clamp Sensor comes in several different types of materials and clamp sizes so it's important to inspect and verify the appropriate model was delivered before installation.

Upon receipt of the shipment, check the packing list against the material received and the purchase order. Report any damage to the carrier.

2.3 Considerations

Information in this manual applies to circular pipes only. Consult Emerson™ Process Management Customer Central for instruction regarding other uses.

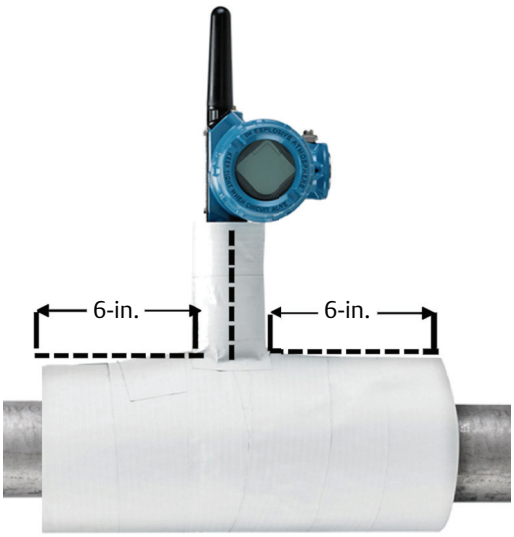
2.3.1 Limitations

Functional

The most accurate and repeatable surface temperature measurement occurs with the following insulation best practices:

- Use weather proof insulation with aluminum cladding.
- Apply a minimum of six inches of installation on each side of the pipe clamp sensor.
- Insulate the sensor extension.
- Install insulation with minimal gaps to isolate sensor as much as possible from ambient conditions.

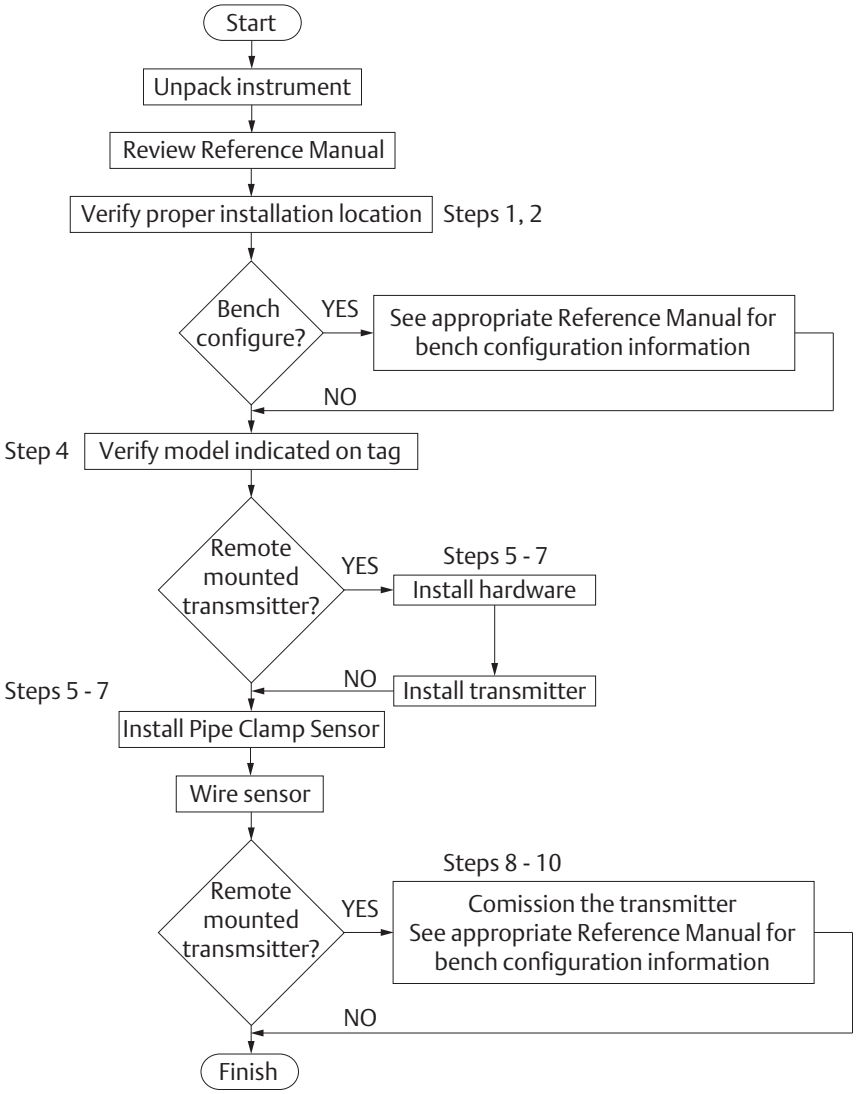
Figure 2-1. Pipe Clamp Insulation Drawing



2.4 Installation flowchart and checklist

Figure 2-2 is an installation flowchart that provides guidance through the installation process. Following the figure, an installation checklist has been provided to verify that all critical steps have been taken in the installation process. The checklist numbers are indicated in the flowchart.

Figure 2-2. Installation Chart



The following list is a summary of the steps required to complete a pipe clamp sensor installation.

1. Determine where the pipe clamp sensor is to be placed within the piping system.
2. Establish the proper orientation as determined by the intended application.
3. Confirm the configuration.
4. Mount the sensor and tighten the clamp bolts.
5. Check the fit-up of the instrument assembly to the pipe.
6. Check for full contact between RTD sensor tip and pipe.
7. Wire the instrument.
8. Supply power to the transmitter.
9. Commission the instrument.

2.5 Mounting

2.5.1 Tools and supplies

Tools required include the following:

- Open end or combination wrenches (spanners) pipe clamp bolts and nuts: 16 mm ($^{11}/_{16}$-in.), 18 mm ($^{3}/_{4}$-in.), 24 mm (1-in.), 30 mm ($^{13}/_{16}$-in.), 36 mm ($1^{7}/_{16}$-in.)
- Adjustable wrench: 40 mm ($1^{1}/_{2}$-in.) jaw
- Standard screwdrivers: 3.5 mm ($^{1}/_{8}$-in.) and 6 mm ($^{1}/_{4}$-in.)
- #1Phillip's screwdriver
- Hex wrench: 3 mm ($^{9}/_{64}$-in.)
- Wire cutters/strippers

Supplies required include the following:

- Pipe compound or PTFE tape (where local piping codes allow)

2.6 Installation

2.6.1 Standard

Step 1: determine the proper orientation

The pipe clamp sensor should be mounted in a secure position to ensure there is no rotational movement after installation. The mounting best practice is to install the sensor vertically.

Step 2: install the pipe clamp sensor

Mount the pipe clamp sensor and tighten the bolts.

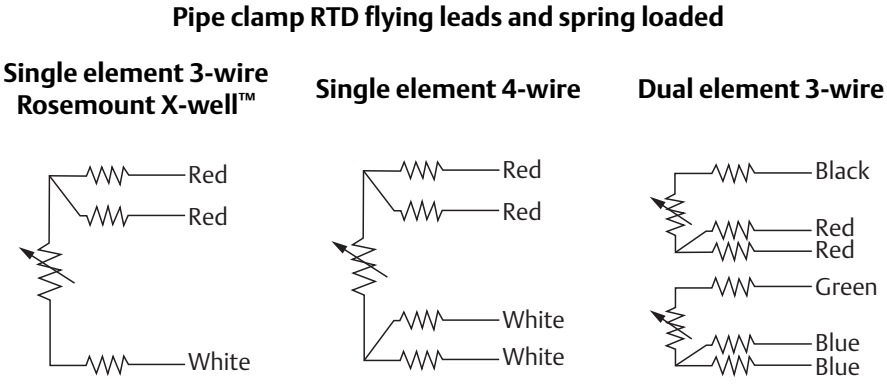
Step 3: install the transmitter

See appropriate transmitter reference manual for sensor-transmitter installation.

Step 4: commission the transmitter

See appropriate transmitter reference manual for transmitter commissioning instructions.

Figure 2-3. Sensor Lead Wire Termination



2.6.2 Rosemount X-well Technology

Rosemount X-well Technology is only available as a Rosemount 648 Wireless Temperature Transmitter and Rosemount 0085 Pipe Clamp Sensor assembly. In general, pipe clamp sensor installation best practices shall be followed with Rosemount X-well Technology specific requirements noted below:

1. Direct mounting of transmitter on pipe clamp sensor is required for Rosemount X-well Technology to properly function.
2. Transmitter head shall be placed away from dynamic external temperature sources such as a boiler.
3. Insulation (1/2-in. thick minimum) is required over the sensor clamp assembly and sensor extension up to transmitter head to prevent heat loss. Apply a minimum of six inches of insulation on each side of the pipe clamp sensor. Care should be taken to minimize air gaps between insulation and pipe.

Note
DO NOT apply insulation over transmitter head.

4. A clean contact surface is recommended to ensure sensor to pipe contact. The use of thermal grease or paste is not recommended as it may negatively impact the accuracy of the calculation.
5. Although it will come factory configures as such, ensure the pipe clamp RTD sensor is assembled in a 3-wire configuration. See Figure 2-3 for more information.

Section 3 Troubleshooting

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3.1 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Refer to the following safety messages before performing any operation in this section.

⚠ WARNING

Explosions could result in death or serious injury.

- Do not remove the housing cover in explosive atmospheres when the circuit is live.
- Housing cover must be fully engaged to meet explosion-proof requirements.
- Before connecting a communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and the terminals.

3.2 Service support

If a malfunction is suspected despite the absence of a diagnostic message on the communicator display, follow the procedures described below to verify the Rosemount™ Pipe Clamp Sensor, transmitter, and process connections are in good working order. Always approach the most likely and easiest-to-check conditions first.

Symptom	Possible source	Corrective action
Transmitter does not communicate with Field Communicator	Loop wiring	Check the revision level of the transmitter device descriptors (DDs) stored in your communicator. The communicator should report Dev v4, DD v1 (improved), or reference “Field Communicator” for previous versions. Contact Emerson™ Process Management Customer Central for assistance.
		Check for a minimum of 250 ohms resistance between the power supply and Field Communicator connection.
		Check for adequate voltage to the transmitter. If a Field Communicator is connected and 250 ohms resistance is properly in the loop, then the transmitter requires a minimum of 12.0 V at the terminals to operate (over entire 3.5 to 23.0 mA operating range), and 12.5 V minimum to communicate digitally.
		Check for intermittent shorts, open circuits, and multiple grounds.

Symptom	Possible source	Corrective action
High output	Sensor input failure or connection	Connect a Field Communicator and enter the transmitter test mode to isolate a sensor failure.
		Check for a sensor open circuit.
		Check if the process variable is out of range.
	Loop wiring	Check for dirty or defective terminals, interconnecting pins, or receptacles.
	Power supply	Check the output voltage of the power supply at the transmitter terminals. It should be 12.0 to 42.4 Vdc (over entire 3.5 to 23.0 mA operating range).
	Electronics module	Connect a Field Communicator and enter the transmitter test mode to isolate module failure.
		Connect a Field Communicator and check the sensor limits to ensure calibration adjustments are within the sensor range.
Erratic output	Loop wiring	Check for adequate voltage to the transmitter. It should be 12.0 to 42.4 Vdc at the transmitter terminals (over entire 3.5 to 23.0 mA operating range).
		Check for intermittent shorts, open circuits, and multiple grounds.
		Connect a Field Communicator and enter the loop test mode to generate signals of 4 mA, 20 mA, and user-selected values.
	Electronics module	Connect a Field Communicator and enter the transmitter test ode to isolate module failure.
Low output or no output	Sensor element	Connect a Field Communicator and enter the transmitter test mode to isolate module failure.
		Check if the process variable is out of range.
	Loop wiring	Check for adequate voltage to the transmitter. It should be 12.0 to 42.4 Vdc at the transmitter terminals (over entire 3.5 to 23.0 mA operating range).
		Check for shorts and multiple grounds.
		Check for proper polarity at the signal terminal.
		Check the loop impedance.
		Connect a Field Communicator and enter the loop test mode.
		Check wire insulation to detect possible shorts to ground.
	Electronics module	Connect a Field Communicator and check the sensor limits to ensure calibration adjustments are within the sensor range.
		Connect a Field Communicator and enter the transmitter test mode to isolate an electronic module failure.

3.3 Return of materials

To expedite the return process, call the Rosemount National Response Center toll-free at 800-654-7768. This center, available 24 hours a day, will assist you with any needed information or materials.

⚠ The center will ask for the following information:

- Product model
- Serial numbers
- The last process material to which the product was exposed

The center will provide:

- A return material authorization (RMA) number
- Instructions and procedures that are necessary to return goods that were exposed to hazardous substances

Note
If a hazardous substance is identified, a Material Safety Data Sheet (MSDS), required by law to be available to people exposed to specific hazardous substances, must be included with the returned materials.

Appendix A Specifications and Reference Data

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How to order Rosemount X-well Technology . . . . . page 16
Dimensional drawings . . . . . page 18

A.1 Ordering information

Table A-1. Rosemount™ Pipe Clamp Sensor Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product description				
0085	Non Intrusive Pipe Clamp Sensor				
Code	**Connection head**		**IP rating**	**Conduit entry**	
C	Connection head Rosemount, aluminum		66/68	M20 × 1.5	★
D	Connection head Rosemount, aluminum		66/68	1/2-in. NPT	★
G	Connection head Rosemount, stainless steel		66/68	M20 × 1.5	★
H	Connection head Rosemount, stainless steel		66/68	1/2-in. NPT	★
N	No connection head		66/68	N/A	★
1	Connection head Rosemount, aluminum with LCD display cover		66/68	M20 × 1.5	★
2	Connection head Rosemount, aluminum with LCD display cover		66/68	1/2-in. NPT	★
3	Connection head Rosemount, stainless steel with LCD display cover		66/68	M20 × 1.5	★
4	Connection head Rosemount, stainless steel with LCD display cover		66/68	1/2-in. NPT	★
Sensor connection					
3	Spring loaded adapter				★
5	Spring loaded adapter with terminal block				★
Sensor type			**Temperature range**		
P1	RTD, single element, 4-wire, silver tip		-50 to 300 °C (-58 to 572 °F)		★
P2	RTD, dual element, 3-wire, silver tip		-50 to 300 °C (-58 to 572 °F)		★
P3	RTD, single element, 4-wire, nickel tip		-200 to 300 °C (-328 to 572 °F)		★
P4	RTD, dual element, 3-wire, nickel tip		-200 to 300 °C (-328 to 572 °F)		★
Extension type		**Head connection**	**Instrument connection**	**Material**	
J	Nipple-union	None	1/2-in. NPT	Stainless steel	★
N	No extension (sensor only option)				★
Extension length (N) in mm					
0080	80 mm				★
0150	150 mm				★
XXXX	Non standard lengths 200–500 mm (available in 50 mm increments)				

Table A-1. Rosemount™ Pipe Clamp Sensor Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Pipe clamp material					
N	No clamp (sensor only option)				★
P	ASTM 304 SST (1.4301)				★
B	Duplex F51 (1.4462)				
C	Carbon steel (1.0037)				
Inner diameter (D)[1]		**Suitable pipe size (inch)**	**Suitable pipe size (DIN)**	**Clamp/bolt dimensions**	
0022	22 mm	1/2-in.	DN15	30 × 5 mm, M10	★
0034	34 mm	1-in.	DN25	30 × 5 mm, M10	★
0061	61 mm	2-in.	DN50	40 × 6 mm, M12	★
0089	89 mm	3-in.	DN80	40 × 6 mm, M12	★
0115	115 mm	4-in.	DN100	50 × 8 mm, M16	★
0140	140 mm	5-in.	DN125	50 × 8 mm, M16	★
0169	169 mm	6-in.	DN150	50 × 8 mm, M16	★
0220	220 mm	8-in.	DN200	50 × 8 mm, M16	★
0273	273 mm	10-in.	DN250	60 × 8 mm, M20	★
0027	27 mm	3/4-in.	DN20	30 × 5 mm, M10	
0030	30 mm	N/A	DN25	30 × 5 mm, M10	
0043	43 mm	1 1/4-in.	DN32	30 × 5 mm, M10	
0049	49 mm	1 1/2-in.	DN40	30 × 5 mm, M10	
0077	77 mm	2 1/2-in.	DN65	40 × 6 mm, M12	
0159	159 mm	N/A	DN150	50 × 8 mm, M16	
0306	306 mm	N/A	N/A	60 × 8 mm, M20	
0324	324 mm	12-in.	DN300	60 × 8 mm, M20	
0356	356 mm	14-in.	DN350	60 × 8 mm, M20	
0368	368 mm	N/A	DN350	60 × 8 mm, M20	
0407	407 mm	16-in.	DN400	60 × 8 mm, M20	
0458	458 mm	18-in.	DN450	70 × 10 mm, M24	
0508	508 mm	20-in.	DN500	70 × 10 mm, M24	
0521	521 mm	N/A	DN500	70 × 10 mm, M24	
0610	610 mm	24-in.	DN600	70 × 10 mm, M24	
0660	660 mm	26-in.	N/A	70 × 10 mm, M24	
0720	720 mm	N/A	N/A	70 × 10 mm, M24	
0762	762 mm	30-in.	N/A	70 × 10 mm, M24	
0813	813 mm	32-in.	DN790	70 × 10 mm, M24	
0915	915 mm	36-in.	DN900	70 × 10 mm, M24	
1016	1016 mm	40-in.	DN1000	70 × 10 mm, M24	

Table A-1. Rosemount™ Pipe Clamp Sensor Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

1070	1070 mm	42-in.	N/A	70 × 10 mm, M24	
1219	1219 mm	48-in.	N/A	70 × 10 mm, M24	
Corrosion protection inlay					
N	None				★
A	Material NBR				

Options (include with selected model number)

Sensor options		
A1	Single element class A sensor from -50 to 300 °C (-58 to 572 °F)	★
A2	Dual element class A sensor from -50 to 300 °C (-58 to 572 °F)	★
Assemble to option		
XA	Assemble sensor to specific temperature transmitter	★
Cable gland options		
G2	Cable gland, Ex d, brass, 7.5–11.9 mm	★
G7	Cable g land, M20 × 1.5, Ex e, blue, polyamide, diam 5–9 mm	★
Product certifications		
E1	ATEX Flameproof	★
E7	IECEx Flameproof and Dust	★
E5	FM Explosion-proof	★
E6	CSA Explosion-proof	★
EM	Technical Regulations Customs Union (EAC) Flameproof	★
Cover chain option		
G3	Cover chain (only available with Rosemount connection head material codes C, D, G, and H)	★
Product certifications		
LT	Special material to meet extended temperature rage of -51 °C	★
Typical pipe clamp model number:	**0085 C 3 P 1 J 0080 P 0061 N**	
Replacement sensor only model number:	**0085 N3 P 1 N 0080 N 0061 N**	

1. When selecting this option in regards to Rosemount X-well Technology, refer to "How to order Rosemount X-well Technology" on page 16.

A.2 How to order Rosemount X-well Technology

Rosemount X-well Technology is only available as a Rosemount 648 Wireless Temperature Transmitter and Rosemount 0085 Pipe Clamp Sensor direct mount assembly.

The Rosemount 648 Wireless option code requirements are:

PT	Temperature measurement assembled with Rosemount X-well Technology
XA	Sensor specified separately and assembled to transmitter
C1	Custom configuration of date, descriptor, message, and wireless parameters (requires CDS with order)

The Rosemount 0085 Pipe Clamp Sensor option code requirements are:

N	No connection head
3	Sensor connection
P1	Sensor type
J	Extension type
0080	Extension length
XA	Assemble sensor to specific temperature transmitter

Rosemount X-well assemblies are available in most Rosemount 0085 Pipe Clamp sensor diameter sizes depending on the pipe schedule. The pipe diameters that correspond to the pipe schedules are:

Pipe schedule 40 and 80		
Code	**Suitable pipe size**	
	inch	**DIN**
0022	1/2-in.	DN15
0027	3/4-in.	DN 20
0034	1-in.	DN 25
0043	1 1/4-in.	DN 32
0049	1 1/2-in.	DN 40
0061	2-in.	DN 50
0077	2 1/2-in.	DN 65
0089	3-in.	DN 80
0115	4-in.	DN 100
0140	5-in.	DN 125
0169	6-in.	DN 150
0220	8-in.	DN 200
0273	10-in.	DN 250

Pipe schedule 40 and 80		
Code	**Suitable pipe size**	
	inch	**DIN**
0324	12-in.	DN 300
0356	14-in.	DN 350
0407	16-in.	DN 400
0458	18-in.	DN 450
0508	20-in.	DN 500
0610	24-in.	DN 600
0660	26-in.	N/A
0762	30-in.	DN 790
0813	32-in.	DN 900
0915	36-in.	DN 1000
1016	42-in.	N/A
1070	42-in.	N/A
1219	48-in.	N/A

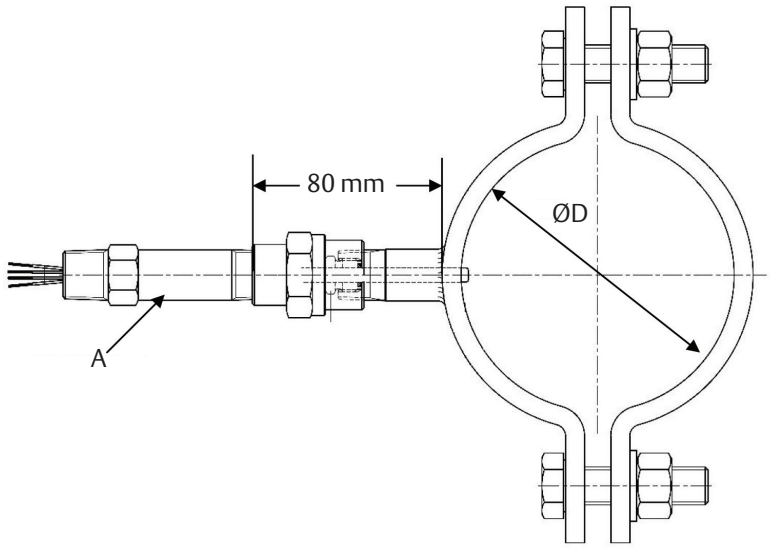
Pipe schedule 120		
Code	**Suitable pipe size**	
	inch	**DIN**
0115	4-in.	DN 100
0140	5-in.	DN 125
0169	6-in.	DN 150
0220	8-in.	DN 200
0273	10-in.	DN 250
0324	12-in.	DN 300
0356	14-in.	DN 350
0407	16-in.	DN 400
0458	18-in.	DN 450
0508	20-in.	DN 500
0610	24-in.	DN 600

Note
For pipe schedules larger than 120, consult factory for more information.

Typical model number of the assembly:	**648 D X 1 D 1 NA WA3 WK1 M5 PT C1 XA** **0085 N 3 P1 J 0080 C 0169 N XA**

A.3 Dimensional drawings

Figure A-1. Pipe Clamp Sensor Assembly



A. 1/2-in. NPT spring loaded adapter

Appendix B Product Certifications

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B.1 European Directive Information

A copy of the EC Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EC Declaration of Conformity can be found at EmersonProcess.com/Rosemount.

B.2 Ordinary Location Certification

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

B.3 Installing Equipment in North America

The US National Electrical Code® (NEC) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions. The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

B.4 North America

E5 FM Explosionproof and Dust-Ignitionproof
Certificate: 0R7A2.AE
Standards: FM Class 3600- 2011, FM Class 3615-2006, FM Class 3810-2005, ANSI/NEMA 250-1991
Markings: XP CL I, DIV 1, GP B, C, D, T6; DIP CL II/III, DIV 1, GP E, F, G, T6; Type 4X; Installed per 00068-0013

E6 CSA Explosionproof, Dust-Ignitionproof
Certificate: 1063635
Standards: CAN/CSA C22.2 No. 0-M91, CSA Std. C22.2 No. 25-1966, CSA Std. C22.2 No. 30-M1986, CSA Std. C22.2 No. 94-M91, CSA Std. C22.2 No. 142-M1987, CSA Std. C22.2 No. 213-M1987
Markings: XP Class I Groups B, C, and D; DIP Class II Groups E, F, G; Class III; Class I Div. 2 Groups A, B, C, D; Class I Zone 1 Group IIB+H2; Class I Zone 2 Group IIC; Installed per 00068-0033

B.5 Europe

E1 ATEX Flameproof
Certificate: FM12ATEX0065X
Standards: EN60079-0:2012, EN60079-1:2007
Markings: Ⓔx II 2 G Ex d IIC T6...T1 Gb

Special Conditions for Safe Use (X):

1. See certificate for ambient temperature range.
2. The non-metallic label may store an electrostatic charge and become a source of ignition in Group III environments.
3. Guard the LCD display cover against impact energies greater than 4 joules.
4. Consult the manufacturer if dimensional information on the flameproof joints is necessary.d

B.6 International

E7 IECEx Flameproof
Certificate: IECEx FMG 12.0022X
Standards: IEC60079-0:2011, IEC60079-1:2007
Markings: Ex d IIC T6...T1 Gb

Special Conditions for Safe Use (X):

1. See certificate for ambient temperature range.
2. The non-metallic label may store an electrostatic charge and become a source of ignition in Group III environments.
3. Guard the LCD display cover against impact energies greater than 4 joules.
4. Consult the manufacturer if dimensional information on the flameproof joints is necessary.

B.7 EAC

EM Explosionproof/ Flameproof
Certificate: TC RU C-US.GB05.B.00895
Standards: GOST R IEC 60079-0:2011,
GOST IEC 60079-1:2011
Markings: 1Ex d IIC T6...T1 Gb X; T6 (-50 °C to 40 °C),
T5...T1 (-50 °C to 60 °C) IP66

Special Condition for Safe Use (X):

1. See certificate.

B.8 Installation drawings

Figure B-1. FM Explosionproof Temperature Measurement Assembly (E5) 00068-0013, Rev AG

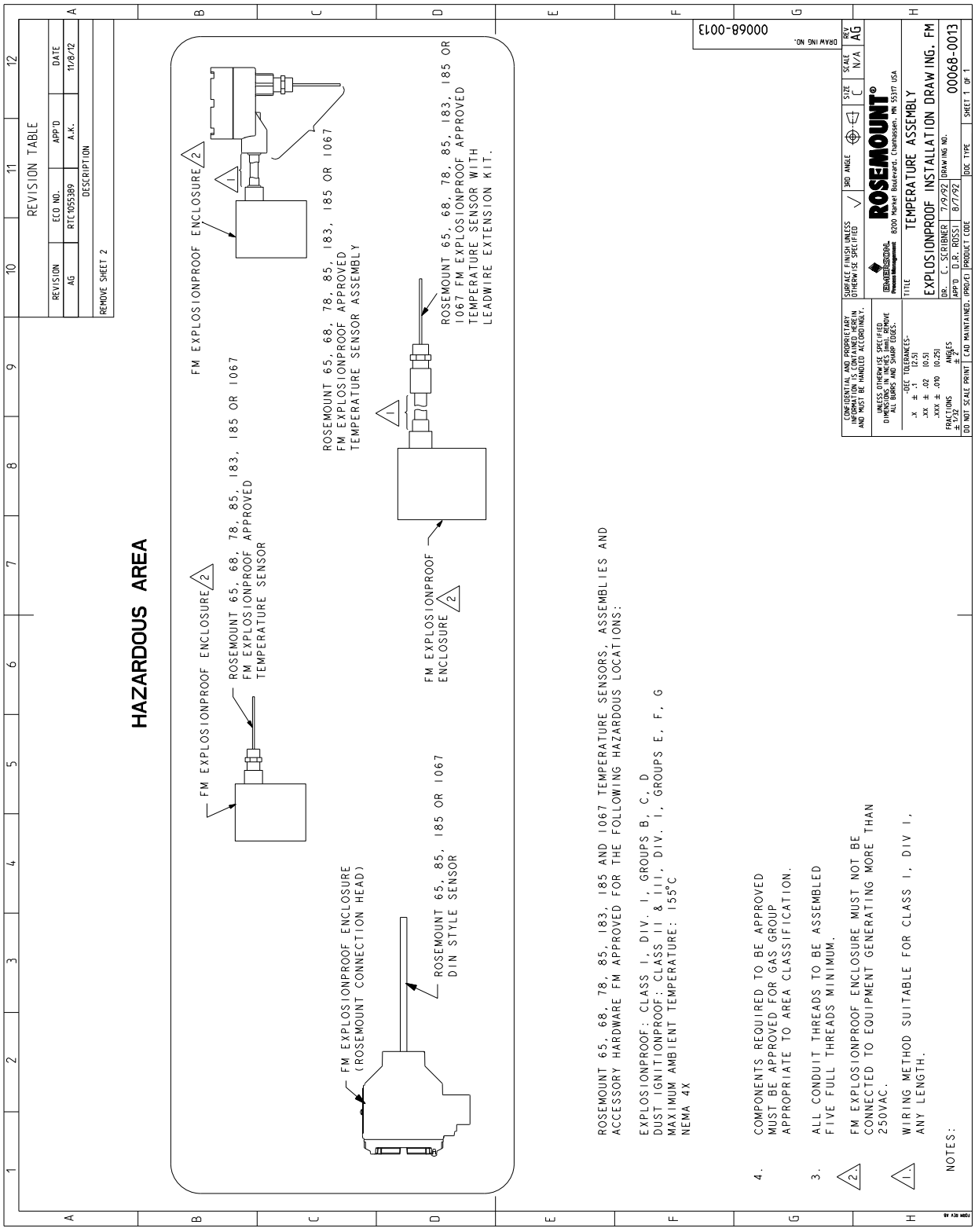
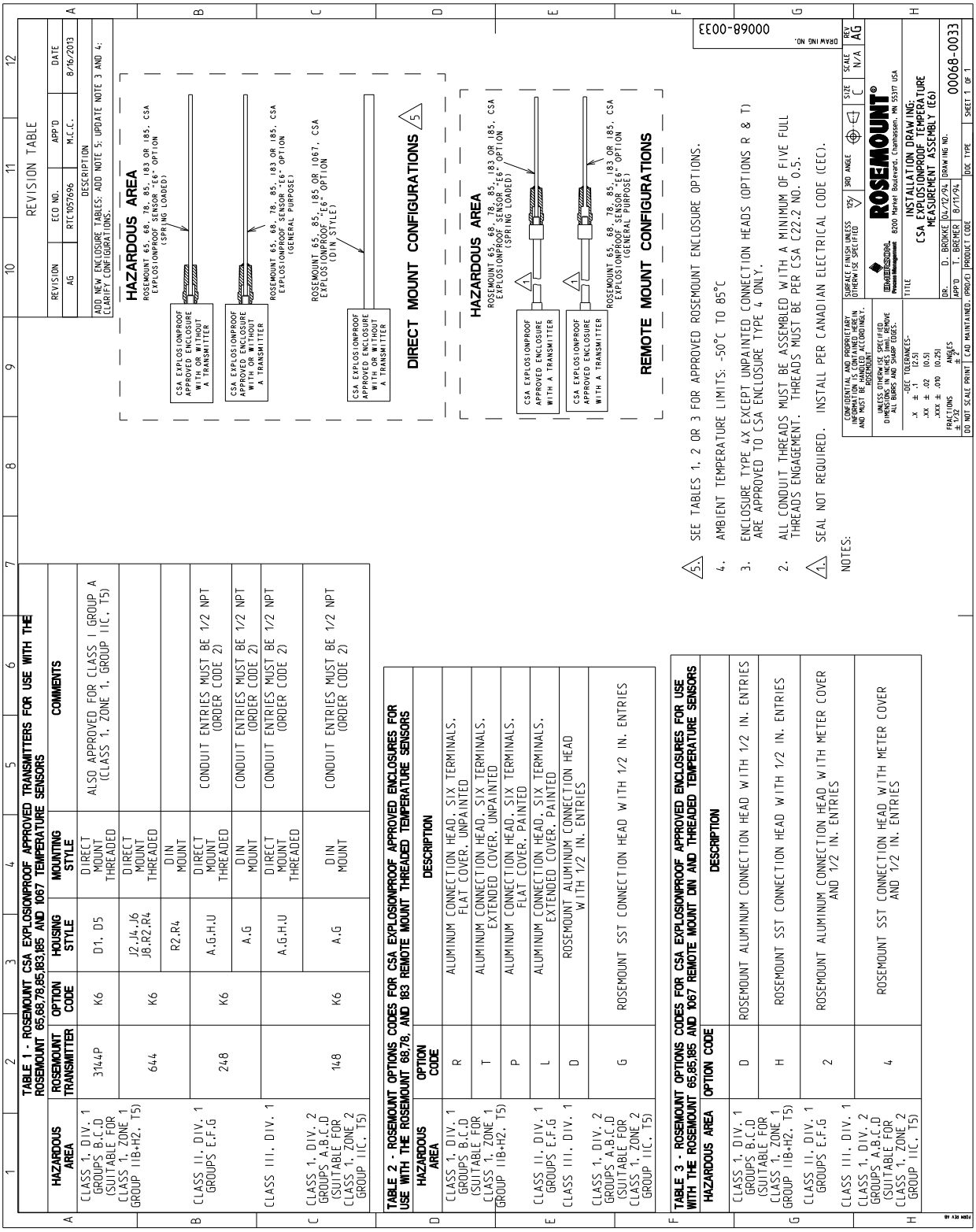


Figure B-2. CSA Explosionproof Temperature Measurement Assembly (E6) 00068-0033, Rev AG



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