

Rosemount™ 2088, 2090F, and 2090P Pressure Transmitter

with 4–20 mA HART® and 1–5 Vdc Low Power
HART Protocol (Revision 5 and 7)



HART
COMMUNICATION PROTOCOL

NOTICE

This guide provides basic guidelines for Rosemount 2088, 2090F, and 2090P Transmitters. It does not provide instructions for configuration, diagnostics, maintenance, service, troubleshooting, Explosion-proof, Flameproof, or intrinsically safe (I.S.) installations. See the Rosemount 2088 Reference Manual (document number 00809-0100-4108) for more information. This manual is also available electronically on www.EmersonProcess.com/Rosemount.

⚠ WARNING

Explosions could result in death or serious injury.

Installation of these transmitters in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Review the approvals section of the Rosemount 2088 Reference Manual for any restrictions associated with a safe installation.

- Before connecting a HART-based 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.
- In an Explosion-proof/Flameproof installation, do not remove the transmitter covers when power is applied to the unit.

Process leaks may cause harm or result in death.

- To avoid process leaks, only use the O-ring designed to seal with the corresponding flange adapter.

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and the terminals. High voltage that may be present on leads can cause electrical shock.

Conduit/cable entries

- Unless marked, the conduit/cable entries in the transmitter housing use a 1/2-14 NPT thread form. Only use plugs, adapters, glands or conduit with a compatible thread form when closing these entries.

Contents

System readiness	3	Verify transmitter configuration	9
Mount the transmitter	4	Trim the transmitter	14
Set the switches	6	Product Certifications	16
Connect the wiring and power up	7		

System readiness

Confirm HART Revision capability

- If using HART based control or asset management systems, confirm the HART capability of those systems prior to transmitter installation. Not all systems are capable of communicating with HART Revision 7 Protocol. This transmitter can be configured for either HART Revision 5 or 7.
- For instructions on how to change the HART revision of your transmitter, see page 13.

Confirm correct device driver

- Verify the latest Device Driver (DD/DTM™) is loaded on your systems to ensure proper communications.
- Download the latest Device Driver files at www.EmersonProcess.com or www.HARTComm.org.

Note

The Rosemount 2088, 2090F, and 2090P Transmitters all use Rosemount 2088 device revisions and drivers.

1. Download the latest DD at www.EmersonProcess.com or www.HARTComm.org.
2. In the *Browse by Member* dropdown menu, select **Emerson™ Process Management**.
3. Select desired product.
 - a. Reference [Table 1](#), *Find Device Driver Files* column to find the correct device driver.

Table 1. Rosemount 2088 Device Revisions and Files

Software release date	Identify device		Find device driver files		Review instructions	Review functionality
	NAMUR software revision ⁽¹⁾	HART software revision ⁽²⁾	HART universal revision	Device revision ⁽²⁾	Manual document number	Changes to software ⁽³⁾
January 2013	1.0.0	01	7	10	AA	See Footnote 3 for list of changes.
			5	9		
January 1998	N/A	178	5	3	N/A	N/A

1. NAMUR software revision is located on the hardware tag of the device. HART software revision can be read using a HART capable configuration tool.
2. Device driver file names us Device and DD Revision, e.g. 10_01. HART Protocol is designed to enable legacy device driver revisions to continue to communicate with new HART devices. to access new functionality, the new device driver must be downloaded. it is recommended to download new device driver files to ensure full functionality.
3. HART Revision 5 and 7 Selectable, Local Operator Interface, Scaled Variable, Configurable Alarms, Expanded Engineering Units.

Step 1: Mount the transmitter

Rosemount 2088

Mount directly to the impulse line without using an additional mounting bracket or mount directly to a wall, panel, or two-inch pipe using an optional mounting bracket.

Rosemount 2090P

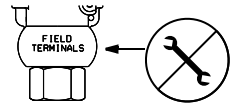
Mount directly to the process pipe using an existing weld spud, or have a skilled welder install a new weld spud using a TIG welder. See reference manual for complete welding instructions (document number 00809-0100-4690). Improper installation may result in weld spud distortion. Upright or horizontal position mounting is recommended to allow proper draining of vent.

Rosemount 2090F

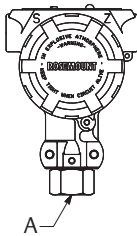
Mount directly to the process pipe using a standard sanitary fitting (either a 1.5- or 2-in. Tri Clamp connection). Upright or horizontal position mounting is recommended to allow proper draining of vent.

Figure 1. Transmitter Direct Mounting

Do not apply torque directly to the electronics housing. To avoid damage, apply torque only to the hex-shaped process connection.

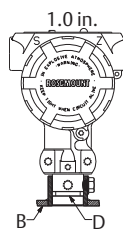
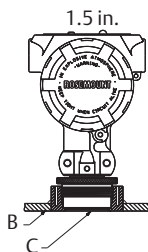


Rosemount 2088

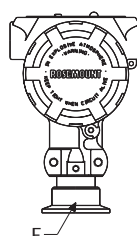


- A. $\frac{1}{2}$ -14 NPT female process connection
- B. Vessel wall
- C. Weld spud

Rosemount 2090P



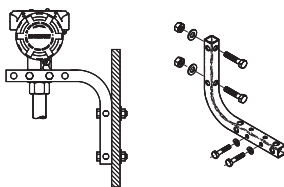
Rosemount 2090F



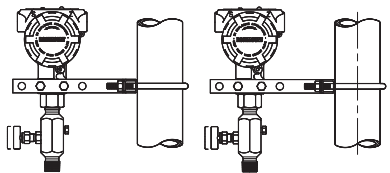
- D. O-ring
- E. $1\frac{1}{2}$ - or 2-in. Tri Clamp connection

Figure 2. Panel and Pipe Mounting

Panel mount

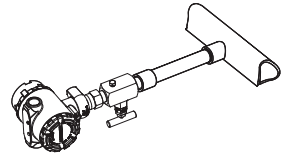


Pipe mount



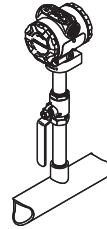
Liquid flow applications

1. Place taps to the side of the line.
2. Mount beside or below the taps.
3. Mount the transmitter so the drain/vent valves are oriented upward.



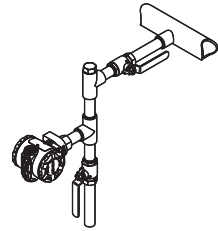
Gas flow applications

1. Place taps in the top or side of the line.
2. Mount level or above the taps.



Steam flow applications

1. Place taps to the side of the line.
2. Mount beside or below the taps.
3. Fill impulse lines with water.



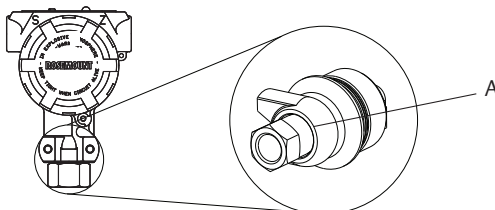
Gage transmitter orientation

The low side pressure port (atmospheric reference) on the in-line gage transmitter is located in the neck of the transmitter, behind the housing. The vent path is 360° around the transmitter between the housing and sensor. (See [Figure 3](#).)

⚠ CAUTION

Keep the vent path free of any obstruction, including but not limited to paint, dust, and lubrication by mounting the transmitter so the contaminants can drain away.




Figure 3. Gage Low Side Pressure Port



A. Low side pressure port (atmospheric reference)

Step 2: Set the switches

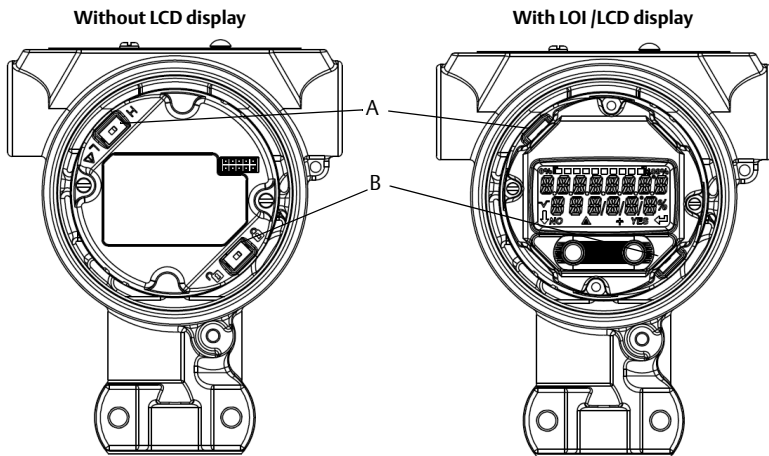
Set alarm and security switch configuration before installation as shown in Figure 4.

- The alarm switch sets the analog output alarm to high or low. Default alarm is high.
- The security switch allows () or prevents () any configuration of the transmitter. Default security is off ().

Use the following procedure to change the switch configuration:

1. If the transmitter is installed, secure the loop, and remove power.
2. Remove the housing cover opposite the field terminal side. Do not remove the instrument cover in explosive atmospheres when the circuit is live.
3. Slide the security and alarm switches into the preferred position using a small screwdriver.
4. Reattach the transmitter cover. The cover must be fully engaged to comply with explosion-proof requirements.

Figure 4. Transmitter Electronics Board

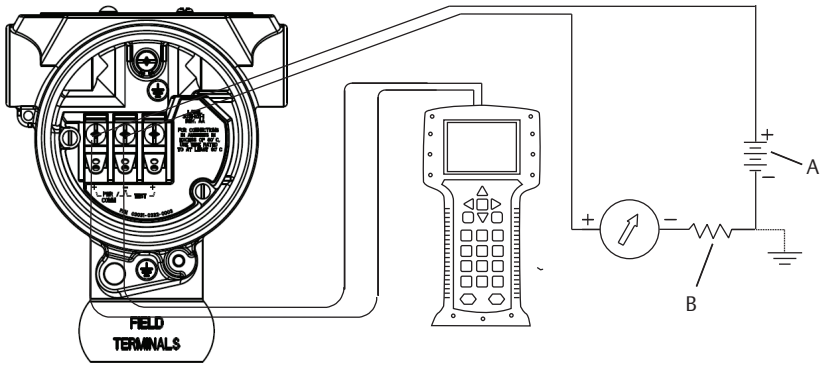


A. Alarm
B. Security

Step 3: Connect the wiring and power up

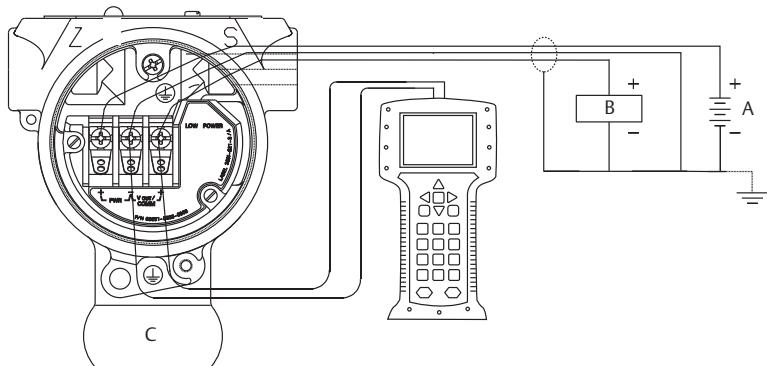
Shielded twisted pair cable should be used for best results. Use 24 AWG or larger wire that does not exceed 5000 feet (1500 meters) in length. If applicable, install wiring with a drip loop. Arrange the drip loop so the bottom is lower than the conduit connections and the transmitter housing.

Figure 5. Wiring the Transmitter (4–20 mA HART)



- A. Vdc supply
- B. $R_t \geq 250$ (necessary for HART communication only)

Figure 6. Wiring the Transmitter (1–5 Vdc Low Power)



- A. Power supply
- B. Voltmeter
- C. Field terminals

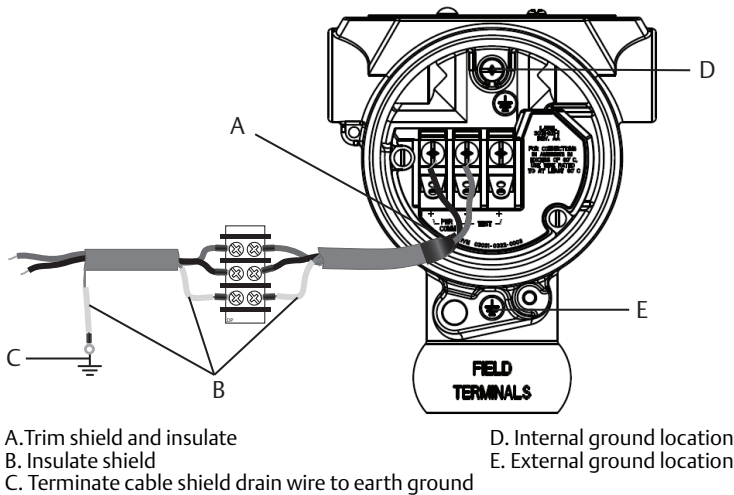
⚠ CAUTION

- Installation of the transient protection terminal block does not provide transient protection unless the transmitter case is properly grounded.
- Do not run signal wiring in conduit or open trays with power wiring, or near heavy electrical equipment.
- Do not connect the powered signal wiring to the test terminals. Power could damage the test diode in the terminal block.

Use the following steps to wire the transmitter:

1. Remove the housing cover on the field terminals side.
2. Connect the leads and shown in [Figure 5](#) or [Figure 6](#).
3. Ground housing to fulfill local grounding regulations.
4. Ensure proper grounding. It is important that the instrument cable shield:
 - Be trimmed close and insulated from touching the transmitter housing
 - Be connected to the next shield if cable is routed through a junction box
 - Be connected to a good earth ground at the power supply end
5. If transient protection is needed, refer to section [Grounding for transient terminal block](#) for grounding instructions.
6. Plug and seal unused conduit connections.
7. Replace the housing cover.

Figure 7. Grounding



Grounding for transient terminal block

Ground termination is provided on the outside of the electronics housing and inside the terminal compartment. These grounds are used when the transient protection terminal blocks are installed. It is recommended that 18 AWG or larger wire is used to connect housing ground to earth ground (internal or external).

If the transmitter is currently not wired for power up and communication, follow procedures 1-7 of “[Connect the wiring and power up](#)” on page 7. When the transmitter is properly wired, refer to [Figure 7](#) for internal and external transient grounding locations.

Step 4: Verify transmitter configuration

Verify the configuration using any HART capable configuration tool or local operator interface (LOI) - option code M4. Configuration instructions for a Field Communicator and LOI are included in this step. See Rosemount 2088 Reference Manual (document number 00809-0100-4108) for configuration instructions using AMS™ Device Manager.

Verifying configuration with a Field Communicator

A Rosemount 2088 DD must be installed on the Field Communicator to verify configuration. Fast Key sequences vary depending on device and DD revisions. Use the [Determine Fast Key sequence table](#) process below to identify the appropriate fast key sequences.

Field Communicator user interface

Determine Fast Key sequence table

1. Connect Field Communicator to Rosemount 2088, 2090F, or 2090P.
2. If *Home* screen matches [Figure 8](#), refer to [Table 2](#) for Fast Key sequences.
3. If *Home* screen matches [Figure 9](#):
 - a. Perform Fast Key sequence 1, 7, 2 to identify Field Revision and HART Revision.
 - b. Refer to [Table 3](#) and the appropriate column based on your Field Revision and HART Revision for Fast Key sequences.

Note

Emerson recommends installing the latest DD to access the complete functionality. Visit www.EmersonProcess.com or www.HARTComm.org

Figure 8. Traditional Interface

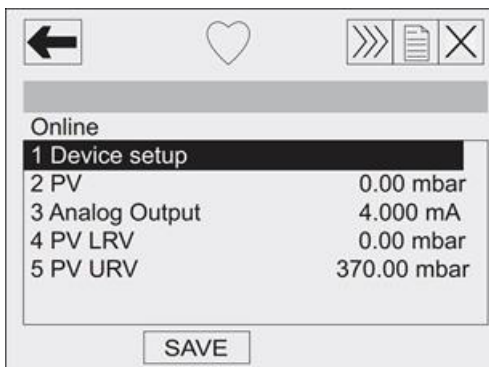
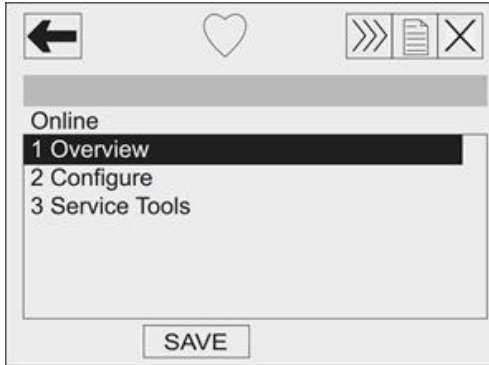


Figure 9. Device Dashboard

**Note**

A check (✓) indicates the basic configuration parameters. At minimum, these parameters should be verified as part of the configuration and startup procedure.

Table 2. Traditional Interface Fast Key

	Function	Fast Key sequence
✓	Analog Output Alarm	1, 4, 3, 2, 4
	Burst Mode Control	1, 4, 3, 3, 3
	Burst Option	1, 4, 3, 3, 4
	Calibration	1, 2, 3
✓	Damping	1, 3, 5
	Date	1, 3, 4, 1
	Descriptor	1, 3, 4, 2
	Digital To Analog Trim (4–20 mA Output)	1, 2, 3, 2, 1
	Disable Local Span/Zero Adjustment	1, 4, 4, 1, 7
	Field Device Info	1, 4, 4, 1
	Keypad Input	1, 2, 3, 1, 1
	Loop Test	1, 2, 2
	Lower Range Value	4, 1
	Lower Sensor Trim	1, 2, 3, 3, 2
	Message	1, 3, 4, 3
	Meter Type	1, 3, 6, 1
	Number of Requested	1, 4, 3, 3, 2
	Output Trim	1, 2, 3, 2
	Percent Range	1, 1, 2
	Poll Address	1, 4, 3, 3, 1
✓	Range Values	1, 3, 3
	Rerange	1, 2, 3, 1

Table 2. Traditional Interface Fast Key

Function	Fast Key sequence
Scaled D/A Trim (4–20 mA)	1, 2, 3, 2, 2
Self Test (Transmitter)	1, 2, 1, 1
Sensor Info	1, 4, 4, 2
Sensor Trim (Full Trim)	1, 2, 3, 3
Sensor Trim Points	1, 2, 3, 3, 5
Status	1, 2, 1, 2
✓ Tag	1, 3, 1
Transmitter Security (Write Protect)	1, 3, 4, 4
✓ Units (Process Variable)	1, 3, 2
Upper Range Value	5, 2
Upper Sensor Trim	1, 2, 3, 3, 3
Zero Trim	1, 2, 3, 3, 1

Note

A check (✓) indicates the basic configuration parameters. At minimum, these parameters should be verified as part of the configuration and startup procedure.

Table 3. Device Dashboard Fast Keys

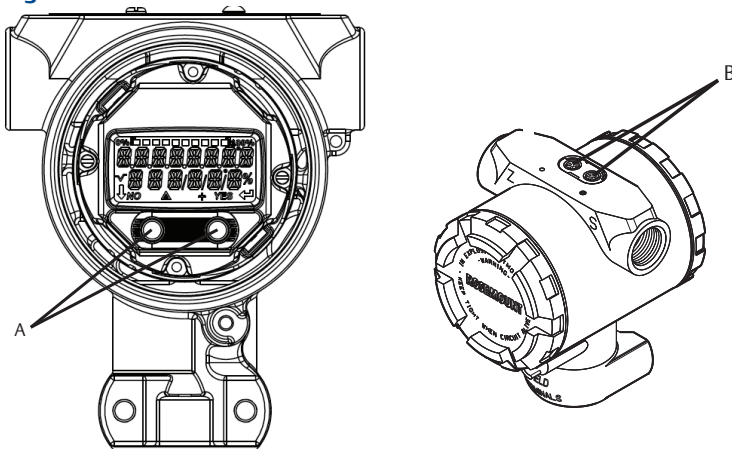
Function	Fast Key Sequence		
	Rev 3	Rev 5	Rev 7
Field Revision	HART 5	HART 5	HART 7
✓ Alarm and Saturation Levels	N/A	2, 2, 2, 5, 7	2, 2, 2, 5, 7
✓ Damping	2, 2, 1, 2	2, 2, 1, 1, 5	2, 2, 1, 1, 5
✓ Range Values	2, 2, 2	2, 2, 2	2, 2, 2
✓ Tag	2, 2, 6, 1, 1	2, 2, 7, 1, 1	2, 2, 7, 1, 1
✓ Transfer Function	2, 2, 1, 3	2, 2, 1, 1, 6	2, 2, 1, 1, 6
✓ Units	2, 2, 1, 1	2, 2, 1, 1, 4	2, 2, 1, 1, 4
Burst Mode	2, 2, 4, 1	2, 2, 5, 3	2, 2, 5, 3
Custom Display Configuration	2, 2, 3	2, 2, 4	2, 2, 4
Date	2, 2, 6, 1, 4	2, 2, 7, 1, 3	2, 2, 7, 1, 4
Descriptor	2, 2, 6, 1, 5	2, 2, 7, 1, 4	2, 2, 7, 1, 5
Digital to Analog Trim (4-20 mA Output)	3, 4, 2	3, 4, 2	3, 4, 2
Disable Configuration Buttons	2, 2, 5, 2	2, 2, 6, 3	2, 2, 6, 3
Rerange with Keypad	2, 2, 2	2, 2, 2, 1	2, 2, 2, 1
Loop Test	3, 5, 1	3, 5, 1	3, 5, 1
Upper Sensor Trim	3, 4, 1, 1	3, 4, 1, 1	3, 4, 1, 1
Lower Sensor Trim	3, 4, 1, 2	3, 4, 1, 2	3, 4, 1, 2
Message	2, 2, 6, 1, 5	2, 2, 7, 1, 5	2, 2, 7, 1, 6

Function	Fast Key Sequence		
	Rev 3	Rev 5	Rev 7
Field Revision			
HART Revision	HART 5	HART 5	HART 7
Sensor Temperature/Trend	3, 3, 2	3, 3, 3	3, 3, 3
Digital Zero Trim	3, 4, 1, 3	3, 4, 1, 3	3, 4, 1, 3
Password	N/A	2, 2, 6, 4	2, 2, 6, 5
Scaled Variable	N/A	3, 2, 2	3, 2, 2
HART Revision 5 to HART Revision 7 switch	N/A	2, 2, 5, 2, 3	2, 2, 5, 2, 3
Long Tag	N/A	N/A	2, 2, 7, 1, 2
Find Device	N/A	N/A	3, 4, 5
Simulate Digital Signal	N/A	N/A	3, 4, 5

Verifying configuration with Local Operator Interface (LOI)

The optional LOI can be used for commissioning the device. The LOI is a two-button design with internal and external buttons. The internal buttons are located on the display of the transmitter, while the external buttons are located underneath the top metal tag. To activate the LOI push any button. LOI button functionality is shown on the bottom corners of the display. See [Table 5](#) and [Figure 11](#) for button operation and menu information.

Figure 10. Internal and External LOI Buttons



- A. Internal buttons
- B. External buttons

Note

See [Figure 12](#) on [page 15](#) to confirm external button functionality.

Table 4. LOI Button Operation

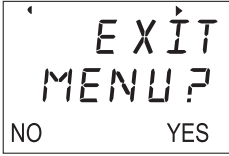
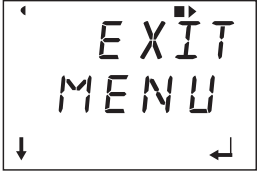
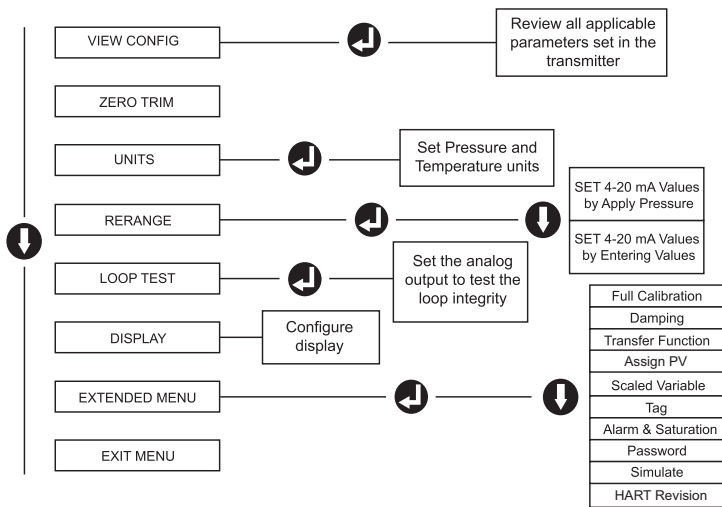
Button		
Left	No	SCROLL
Right	Yes	ENTER

Figure 11. LOI Menu



Switch HART revision mode

If the HART configuration tool is not capable of communicating with HART Revision 7, the Rosemount 2088, 2090F, or 2090P will load a Generic Menu with limited capability. The following procedures will switch the HART revision mode from the Generic Menu:

1. Manual Setup > Device Information > Identification > Message

- a. To change to HART Revision 5, Enter: “**HART5**” in the *Message* field.
- b. To change to HART Revision 7, Enter: “**HART7**” in the *Message* field.

Step 5: Trim the transmitter

Devices are calibrated by the factory. Once installed, it is recommended to perform a zero trim on gage and differential pressure transmitters to eliminate error due to mounting position or static pressure effects. A zero trim can be performed using either a Field Communicator or configuration buttons.

For instructions using AMS, see the Rosemount 2088 Reference Manual (document number 00809-0100-4108).

Note

When performing a zero trim, ensure the equalization valve is open and all wet legs are filled to the correct level.

⚠ CAUTION

It is not recommended to zero an absolute transmitter.

1. Select trim procedure.
 - a. Analog zero trim – Sets the analog output to 4 mA.
 - Also referred to as a “rerange,” it sets the lower range value (LRV) equal to the measured pressure.
 - The display and digital HART output remains unchanged.
 - b. Digital zero trim – Recalibrates the sensor zero.
 - The LRV is unaffected. The pressure value will be zero (on display and HART output). 4 mA point may not be at zero.
 - This requires that the factory calibrated zero pressure is within a range of 3% of the URL [$0 \pm 3\% \times \text{URL}$].

Example

$$\text{URV} = 250 \text{ inH}_2\text{O}$$

Applied Zero Pressure = $+ 0.03 \times 250 \text{ inH}_2\text{O} = + 7.5 \text{ inH}_2\text{O}$ (compared to factory settings) values outside this range will be rejected by the transmitter

Trimming with a Field Communicator

1. Connect the Field Communicator, see “[Connect the wiring and power up](#)” on [page 7](#) for instructions.
2. Follow the HART menu to perform the desired zero trim.

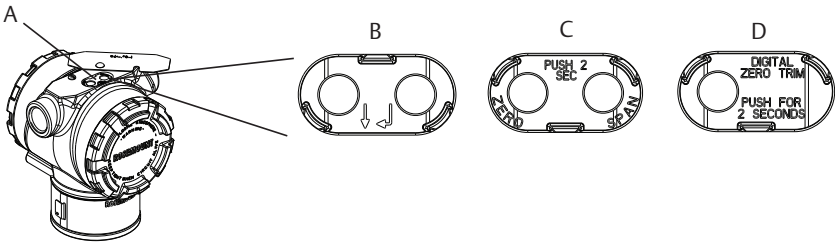
Table 5. Zero Trim Fast Keys

	Analog zero (Set 4 mA)	Digital zero
Fast Key Sequence	3, 4, 2	3, 4, 1, 3

Trimming with configuration buttons

A zero trim is to be performed using one of the three possible sets of external configuration buttons located under the top tag.

To access the configuration buttons, loosen the screw and slide the tag on the top of the transmitter. Confirm the functionality using [Figure 10](#).

Figure 12. External Configuration Buttons

- A. Configuration buttons
- B. LOI
- C. Analog zero and span
- D. Digital zero

Use the following procedures to perform a Zero Trim:

Perform trim with LOI (option M4)

1. Set the transmitter pressure.
2. See [Figure 10 on page 12](#) for the operating menu.
 - a. Select **Rerange** to perform an analog zero trim.
 - b. Select **Zero Trim** to perform a digital zero trim.

Perform trim with analog zero and span (option D4 or standard on Rosemount 2090F and 2090P)

1. Set the transmitter pressure.
2. Press and hold the **zero** button for two seconds to perform an analog zero trim.

Perform trim with digital zero (option DZ)

1. Set the transmitter pressure.
2. Press and hold the **zero** button for two seconds to perform a digital zero trim.

Product Certifications

Rev 1.1

Approved Manufacturing Locations

Rosemount Inc. - Chanhassen, Minnesota, USA
 Emerson Process Management GmbH & Co. - Wessling, Germany
 Emerson Process Management Asia Pacific Private Limited - Singapore
 Emerson (Beijing) Instrument Co., Ltd - Beijing, China

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 www.rosemount.com.

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).

North America

- E5** USA Explosionproof (XP) and Dust-Ignitionproof (DIP)
 Certificate: 1V2A8.AE
 Standards: FM Class 3600 - 2011, FM, Class 3615 - 2006, FM class 3616 - 2011, FM Class 3810 - 2005, ANSI/NEMA 250 - 1991
 Markings: XP CL I, DIV 1, GP B, C, D; DIP CL II, DIV 1, GP E, F, G; CL III; T5(-40 °C ≤ T_a ≤ +85 °C); Factory Sealed; Type 4X
- I5** USA Intrinsic Safety (IS) and Nonincendive (NI)
 Certificate: 0V9A7.AX
 Standards: FM Class 3600 - 1998, FM Class 3610 - 2010, FM Class 3611 - 2004, FM Class 3810 - 1989
 Markings: IS CL I, DIV 1, GP A, B, C, D; CL II, DIV 1, GP E, F, G; Class III; DIV 1 when connected per Rosemount drawing 02088-1018; NI CL 1, DIV 2, GP A, B, C, D; T4(-40 °C ≤ T_a ≤ +70 °C); Type 4x

Special Condition for Safe Use (X):

1. The Model 2088 transmitter with the transient terminal block (Option code T1) will not pass the 500 Vrms dielectric strength test and this must be taken into account during installation.

C6 Canada Explosionproof, Intrinsic Safety and Nonincendive

Certificate: 1015441

Standards: CAN/CSA C22.2 No. 0-M91 (R2001), CSA Std C22.2 No. 25-1966, CSA Std C22.2 No. 30-M1986, CAN/CSA-C22.2 No. 94-M91, CSA Std C22.2 No. 142-M1987, CAN/CSA-C22.2 No. 157-92, CSA Std C22.2 No. 213-M1987, ANSI-ISA-12.27.01-2003


Markings: Explosionproof for Class I, Division 1, Groups B, C and D; Class II, Groups E, F, and G; Class III; Intrinsically Safe Class I, Division 1 when connected in accordance with Rosemount drawing 02088-1024, Temperature Code T3C; Ex ia; Class I Division 2 Groups A, B, C and D; Type 4X; Factory Sealed; Single Seal(2088 only)

Europe

ED ATEX Flameproof

Certificate: KEMA97ATEX2378X

Standards: EN60079-0:2006, EN60079-1:2007, EN60079-26:2007


Markings:  II 1/2 G Ex d IIC T6/T4, T6(-40 °C ≤ T_a ≤ +40 °C), T4(-40 °C ≤ T_a ≤ +80 °C);**Special Conditions for Safe Use (X):**

1. This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

I1 ATEX Intrinsic Safety

Certificate: BAS00ATEX1166X

Standards: EN60079-0:2012, EN60079-11:2012

Markings:  II 1 G Ex ia IIC T5/T4 Ga, T5(-55 °C ≤ T_a ≤ +40 °C), T4(-55 °C ≤ T_a ≤ +70 °C)**Table 6. Input Parameters**

Parameters	HART
Voltage U _i	30 V
Current I _i	200 mA
Power P _i	0.9 W
Capacitance C _i	0.012 μF

Special Condition for Safe Use (X):

1. The apparatus is not capable of withstanding the 500 V insulation test required by EN60079-11. This must be taken into account when installing the apparatus.

N1 ATEX Type n

Certificate: BAS00ATEX3167X

Standards: EN60079-0:2012, EN60079-15:2010


Markings:  II 3 G Ex nA IIC T5 Gc (-40 °C ≤ T_a ≤ +70 °C)**Special Condition for Safe Use (X):**

1. This apparatus is not capable of withstanding the 500 V insulation test required by EN60079-15. This must be taken into account when installing the apparatus.

ND ATEX Dust

Certificate: BAS01ATEX1427X

Standards: EN60079-0:2012, EN60079-31:2009

Markings:  II 1 D Ex t IIIC T50 °C T₅₀₀ 60 °C Da**Special Conditions for Safe Use (X):**

1. The user must ensure that the maximum rated voltage and current (36 volts, 24 milliamps, d.c.) are not exceeded. All connection to other apparatus or associated apparatus shall have control over this voltage and current to a category 'ib' circuit.
2. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
3. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
4. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
5. The 2088/2090 sensor module must be securely screwed in place to maintain the ingress protection of the enclosure.

International

E7 IECEx Flameproof

Certificate: IECEx KEM 06.0021X

Standards: IEC60079-0:2004, IEC60079-1:2003, IEC60079-26:2004,

Markings: Zone 0/1 Ex d IIC T4/T6 T6(-20 °C ≤ T_a ≤ +40 °C), T4(-20 °C ≤ T_a ≤ +80 °C);
Ex tD A22 IP66 T90 °C**Special Condition for Safe Use (X):**

1. The material of the diaphragm shall not be subject to environmental conditions that might adversely affect the partition wall.

I7 IECEx Intrinsic Safety

Certificate: IECEx BAS 12.0071X

Standards: IEC60079-0:2011, IEC60079-11:2011

Markings: Ex ia IIC T5/T4 Ga, T5(-55 °C ≤ T_a ≤ +40 °C), T4(-55 °C ≤ T_a ≤ +70 °C)

Table 7. Input Parameters

Parameter	HART
Voltage U _i	30 V
Current I _i	200 mA
Power P _i	0.9 W
Capacitance C _i	0.012 μF

Special Conditions for Safe Use (X):

1. When fitted with a transient suppression terminal block, the Model 2088 is incapable of passing the 500 V isolation test. This must be taken into account during installation.
2. The enclosure may be 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 a Zone 0 environment.

N7 IECEx Type n

Certificate: IECEx BAS 12.0072X

Standards: IEC60079-0:2011, IEC60079-15:2010

Markings: Ex nA IIC T5 Gc (-40 °C ≤ T_a ≤ +70 °C)**Special Condition for Safe Use (X):**

1. When fitted with a transient suppression terminal block, the Model 2088 is incapable of passing the 500 V isolation test. This must be taken into account during installation.

NK IECEx Dust

Certificate: IECEx BAS12.0073X

Standards: IEC60079-0:2011, IEC60079-31:2008

Markings: Ex t IIIC T50 °C T₅₀₀ 60 °C Da**Table 8. Input Parameters**

Parameter	HART
Voltage U _i	36 V
Current I _i	24 mA

Special Conditions for Safe Use (X):

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient temperature range of the apparatus and capable of withstanding a 7J impact test.

Brazil

I2 INMETRO Intrinsic Safety

Certificate: UL-BR 13.0246X

Standards: ABNT NBR IEC60079-0:2008 + Errata 1:2011, ABNT NBR IEC60079-11:2009

Markings: Ex ia IIC T5/T4 Ga, T5(-55 °C ≤ T_a ≤ +40 °C), T4(-55 °C ≤ T_a ≤ +70 °C)**Table 9. Input Parameters**

Parameter	HART
Voltage U _i	30 V
Current I _i	200 mA
Power P _i	0.9 W
Capacitance C _i	0.012 μF

Special Conditions for Safe Use (X):

1. When fitted with a transient suppression terminal block, the Model 2088 is incapable of passing the 500 V isolation test. This must be taken into account when installing the equipment.
2. The enclosure may be 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.

China

E3 China Flameproof

Certificate: GYJ111062 (2088 series); GYJ111064 (2090 series)

Standards: GB3836.1-2000, GB3836.2-2010

Markings: Ex d IIC T6/T4, T6(-20 °C ≤ T_a ≤ +40 °C), T4(-20 °C ≤ T_a ≤ +80 °C)

Special Conditions of Use (X):

1. The ambient temperature is as follows:

T _a	Temperature class
-20 °C ≤ T _a ≤ 80 °C	T4
-20 °C ≤ T _a ≤ 40 °C	T6

2. The earth connection facility on the enclosure should be connected reliably.
3. During installation in hazardous location, cable glands, conduits, and blanking plugs, certified by state-appointed inspection bodies with Ex d IIC type of protection, should be used.
4. During installation, use and maintenance in explosive gas atmospheres, observe the warning "Do not open when energized."
5. During installation, there should be no mixture harm to flameproof housing.
6. End user is not permitted to change any components insides, but to settle the problem in conjunction with manufacturer to avoid damage to the product.
7. Maintenance should be done in non-hazardous location.
8. During installation, use and maintenance of this product, observe the following standards: GB3836.13-1997, GB3836.15-2000, GB3836.16-2006, GB50257-1996

I3 China Intrinsic Safety

Certificate: GYJ111063X (2088 series); GYJ111065 (2090 series)

Standards: GB3836.1-2000, GB3836.4-2000

Markings: Ex ia IIC T4

Special Conditions for Safe Use (X):

1. This apparatus is not capable of withstanding the 500 V r.m.s. insulation test required by Clause 6.4.12 of GB3836.4-2000.
2. The ambient temperature is:

T _a	Temperature Class
-55 °C ≤ T _a ≤ 40 °C	T5
-55 °C ≤ T _a ≤ 70 °C	T4

3. Intrinsically safe parameters:

Parameter	HART
Voltage U _i	30 V
Current I _i	200 mA
Power P _i	0.9 W
Capacitance C _i	12 nF
Inductance L _i	0 mH

4. The product should be used with Ex-certified linear associated apparatus to establish explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of the product and associated apparatus.
5. The cables between this product and associated apparatus should be shielded cables (the cables must have insulated shields). The shield has to be grounded reliably in a non-hazardous area.
6. End users are not permitted to change any internal components, but to settle the problem in conjunction with the manufacturer to avoid damage to the product.
7. During installation, use and maintenance of this product, observe the following standards: GB3836.13-1997, GB3836.15-2000, GB3836.16-2006, GB50257-1996

N3 China Type n (2088 only)

Certificate: GYJ15.1108X

Standards: GB3836.1-2000, GB3836.8-2003

Markings: Ex nA nL IIC T5 Gc (-40 °C ≤ T_a ≤ +70 °C)**Special Conditions for Safe Use (X):**

1. The apparatus is not capable of withstanding the 500 V r.m.s. insulation test required by GB3836.8-2003.
2. The ambient temperature range is -40 °C ≤ T_a ≤ +70 °C.
3. Maximum input voltage: 50 V.
4. Cable glands, conduit or blanking plugs, certified by NEPSI with Ex e or Ex n protection types should be used on external connections and redundant cable entries.
5. Maintenance should be done in non-hazardous location.
6. End users are not permitted to change any internal components, but to settle the problem in conjunction with manufacturer to avoid damage to the product.
7. During installation, use and maintenance of this product, observe the following standards: GB3836.13-2013, GB3836.15-2000, GB3836.16-2006, GB50257-1996

Japan

E4 Japan Flameproof (2088 only)

Certificate: TC20869, TC20870

Markings: Ex d IIC T5

Technical Regulations Customs Union (EAC)

EM, IM, KM Contact an Emerson Process Management representative for more information

Combinations

- K1** Combination of ED, I1, ND, and N1
- K2** Combination of E2 and I2 (2088 only)
- K5** Combination of E5 and I5
- K6** Combination of C6, ED, and I1
- K7** Combination of E7, I7, NK, and N7
- KB** Combination of K5 and C6
- KH** Combination of ED, I1, K5

Conduit Plugs and Adapters

IECEX Flameproof and Increased Safety

Certificate: IECEX FMG 13.0032X

Standards: IEC60079-0:2011, IEC60079-1:2007-04, IEC60079-7:2006-07

Markings: Ex de IIC Gb

ATEX Flameproof and Increased Safety

Certificate: FM13ATEX0076X

Standards: EN60079-0:2012, EN60079-1:2007, EN60079-7:2007

Markings: II 2 G Ex de IIC Gb

Table 10. Conduit Plug Thread Sizes

Thread	Identification mark
M20 × 1.5	M20
$\frac{1}{2}$ - 14 NPT	$\frac{1}{2}$ NPT
G $\frac{1}{2}$ A	G $\frac{1}{2}$

Table 11. Thread Adapter Thread Sizes

Male thread	Identification mark
M20 × 1.5 – 6H	M20
$\frac{1}{2}$ - 14 NPT	$\frac{1}{2}$ - 14 NPT
$\frac{3}{4}$ - 14 NPT	$\frac{3}{4}$ - 14 NPT
Female thread	Identification mark
M20 × 1.5 – 6H	M20
$\frac{1}{2}$ - 14 NPT	$\frac{1}{2}$ - 14 NPT
PG 13.5	PG 13.5
G $\frac{1}{2}$	G $\frac{1}{2}$

Special Conditions for Safe Use (X):

1. When the thread adapter or blanking plug is used with an enclosure in type of protection increased safety "e" the entry thread shall be suitably sealed in order to maintain the ingress protection rating (IP) of the enclosure.
2. The blanking plug shall not be used with an adapter.
3. Blanking Plug and Threaded Adapter shall be either NPT or Metric thread forms. G $\frac{1}{2}$ and PG 13.5 thread forms are only acceptable for existing (legacy) equipment installations.

Additional Certifications

- SBS** American Bureau of Shipping (ABS) Type Approval (2088 only)
 Certificate: 09-HS446883D-3-PDA
 Intended Use: Measurement of either gauge or absolute pressure for liquid, gas, and vapor
 ABS Rules: 2014 Steel Vessels Rules 1-1-4/7.7, 1-1-Appendix 3, 4-8-3/1.7, 4-8-3/13.1, 4-8-3/13.3.1 & 13.3.2, 4-8-4/27.5.1



- SBV** Bureau Veritas (BV) Type Approval (2088 only)
 Certificate: 23156/A2 BV
 Requirements: Bureau Veritas Rules for the Classification of Steel Ships
 Application: Class notations: AUT-UMS, AUT-CCS, AUT-PORT and AUT-IMS;
 Pressure transmitter type 2088 cannot be installed on diesel engines.

- SDN** Det Norske Veritas (DNV) Type Approval (2088 only)
 Certificate: A-14185
 Intended Use: Det Norske Veritas' Rules for Classification of Ships and High Speed and Light Craft; Det Norske Veritas' Offshore Standards
 Application:

Location Classes	
Temperature	D
Humidity	B
Vibration	A
EMC	B
Enclosure	D

- SLL** Lloyds Register (LR) Type Approval (2088 only)
 Certificate: 11/60002
 Application: Environmental categories ENV1, ENV2, ENV3 and ENV5

Figure 13. Rosemount 2088 and 2090 Declaration of Conformity

ROSEMOUNT			
EC Declaration of Conformity No: RMD 1010 Rev. I			
<i>We,</i>			
Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317-6985 USA			
<i>declare under our sole responsibility that the product,</i>			
Models 2088 & 2090 Pressure Transmitters			
<i>manufactured by,</i>			
Rosemount Inc. 12001 Technology Drive Eden Prairie, MN 55344-3695 USA	<i>and</i>	8200 Market Boulevard Chanhassen, MN 55317-9687 USA	
<i>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.</i>			
<i>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.</i>			
 _____ (signature)		<u>4 Aug 2015</u> _____ (date of issue)	
<u>KELLY KLEIN</u> _____ (name - printed)		<u>VP - GLOBAL QUALITY</u> _____ (function name - printed)	

ROSEMOUNT**EC Declaration of Conformity****No: RMD 1010 Rev. I****EMC Directive (2004/108/EC)****All Models 2088 and 2090 Pressure Transmitters**

EN 61326-1:2013
EN 61326-2-3:2013

ATEX Directive (94/9/EC)**Model 2088/2090 Pressure Transmitter****BAS00ATEX1166X Intrinsic Safety Certificate**

Equipment Group II Category 1 G
Ex ia IIC T5 Ga (-55°C ≤ Ta ≤ +40°C)
Ex ia IIC T4 Ga (-55°C ≤ Ta ≤ +70°C)
Harmonized Standards Used:
EN60079-11:2012
Other Standards used:
EN60079-0:2012

BAS00ATEX3167X Type n Certificate

Equipment Group II Category 3 G
Ex nA IIC T5 Gc (-40°C ≤ Ta ≤ +70°C)
Harmonized Standards Used:
EN60079-15:2010
Other Standards used:
EN60079-0:2012

BAS01ATEX1427X Dust Certificate

Equipment Group II Category 1 D
Ex t IIIC T50°C T₅₀₀60°C Da
Harmonized Standards Used:
EN60079-31:2009
Other Standards Used:
EN60079-0:2012

KEMA97ATEX2378X Flameproof Certificate

Equipment Group II Category 1/2 G
Ex d IIC T4 (-40° ≤ Ta ≤ +80°C)
Ex d IIC T6 (-40° ≤ Ta ≤ +40°C)
Harmonized Standards Used:
EN60079-1:2007; EN60079-26:2007
Other Standards Used:
EN60079-0:2006

(A review against EN60079-0:2009, which is harmonized, shows no significant changes relevant to this equipment so EN60079-0:2006 continues to represent "State of the Art".)

ROSEMOUNT

EC Declaration of Conformity
No: RMD 1010 Rev. I

ATEX Notified Bodies for EC Type Examination Certificate

DEKRA (KEMA) [Notified Body Number: 0344]
Utrechtseweg 310, 6812 AR Arnhem
P.O. Box 5185, 6802 ED Arnhem
The Netherlands
Postbank 6794687

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

含有China RoHS管控物质超过最大浓度限值的部件型号列表 Rosemount 2088, 2090F, and 2090
List of Rosemount 2088, 2090F, and 2090 Parts with China RoHS Concentration above MCVs

部件名称 Part Name	有害物质 / Hazardous Substances					
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr +6)	多溴联苯 Polybrominated biphenyls (PBB)	多溴联苯醚 Polybrominated diphenyl ethers (PBDE)
电子组件 Electronics Assembly	X	O	O	O	O	O
壳体组件 Housing Assembly	X	O	O	X	O	O
传感器组件 Sensor Assembly	X	O	O	X	O	O

本表格系依据SJ/T11364的规定而制作。

This table is proposed in accordance with the provision of SJ/T11364.

O: 意为该部件的所有均质材料中该有害物质的含量均低于GB/T 26572所规定的限量要求。

O: Indicate that said hazardous substance in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

X: 意为在该部件所使用的的所有均质材料里，至少有一类均质材料中该有害物质的含量高于GB/T 26572所规定的限量要求。

X: Indicate that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.



Global Headquarters

Emerson Process Management

6021 Innovation Blvd
Shakopee, MN 55379, USA

+1 800 999 9307 or +1 952 906 8888

+1 952 949 7001

RFQ.RMD-RCC@EmersonProcess.com

North America Regional Office

Emerson Process Management

8200 Market Blvd.
Chanhassen, MN 55317, USA

+1 800 999 9307 or +1 952 906 8888

+1 952 949 7001

RMT-NA.RCCRFQ@Emerson.com

Latin America Regional Office

Emerson Process Management

1300 Concord Terrace, Suite 400
Sunrise, Florida, 33323, USA

+1 954 846 5030

+1 954 846 5121

RFQ.RMD-RCC@EmersonProcess.com

Europe Regional Office

Emerson Process Management Europe GmbH

Neuhofstrasse 19a P.O. Box 1046
CH 6340 Baar
Switzerland

+41 (0) 41 768 6111

+41 (0) 41 768 6300

RFQ.RMD-RCC@EmersonProcess.com

Asia Pacific Regional Office

Emerson Process Management Asia Pacific Pte Ltd

1 Pandan Crescent
Singapore 128461

+65 6777 8211

+65 6777 0947

Enquiries@AP.EmersonProcess.com

Middle East and Africa Regional Office

Emerson Process Management

Emerson FZE P.O. Box 17033,
Jebel Ali Free Zone - South 2
Dubai, United Arab Emirates

+971 4 8118100

+971 4 8865465

RFQ.RMTMEA@Emerson.com

Standard Terms and Conditions of Sale can be found at:

www.Emerson.com/en-us/pages/Terms-of-Use.aspx

The Emerson logo is a trademark and service mark of Emerson Electric Co. AMS, Rosemount, and Rosemount logotype are registered trademarks of Emerson Process Management.

HART is a registered trademark of FieldComm Group.

All other marks are the property of their respective owners.

© 2016 Emerson Process Management. All rights reserved.