Rosemount[™] 3051HT Hygienic Pressure Transmitter









- Hygienic design conforms to 3-A® and EHEDG standards
- Reference accuracy of 0.065% with high performance option
- Demonstrated best-in-class performance during SIP/CIP for process temperatures up to 302 °F (150 °C)
- Rangeability of 100:1
- Unparalleled 5 year stability reduces calibration frequency
- 4–20 mA/HART® output and AMS[™] Suite: Intelligent Device Manager compatibility ensures easier configurations, calibrations, and operation
- Proven technology from Emerson[™] Process Management improves process reliability and robustness



Now you can have the best, most reliable performance... in a hygienic package

The Rosemount 3051HT Hygienic Pressure Transmitter brings best-in-class performance, application expertise, and operational and maintenance cost savings to the biotechnology, pharmaceuticals, and food and beverage industries.

Hygienic design conforms to hygienic standards

The hygienic design of the Rosemount 3051HT features 32 μ -in. Ra mechanically polished and 15 μ -in. Ra electropolished wetted surfaces. The stainless steel design is free of voids and crevices to ensure easy cleaning and wipe downs. The Rosemount 3051HT is also 3-A and EHEDG approved and is designed according to strict ASME BPE guidelines.

Demonstrated best-in-class performance during CIP/SIP processes

The Rosemount 3051HT was designed and thoroughly tested to ensure that it minimizes temperature induced errors and recovers rapidly and repeatably from CIP/SIP processes. This is called "batch to batch repeatability" and can reduce your downtime between cleaning cycles, enabling faster turnarounds and increased plant availability.

Proven Emerson technology improves process reliability and robustness

The Rosemount 3051HT uses the same proven sensor and electronics technology found in other industry leading Rosemount transmitters from Emerson. This ensures the transmitter to be robust and reliable, which improves your process consistency and increases your plant availability.

Unparalleled stability reduces calibration frequency

Competitor devices can drift out of specification in just a few months and require re-calibration, consuming your time and money while risking regulatory non-compliance. The Rosemount 3051HT provides better stability so you can confidently extend calibration frequencies to reduce maintenance costs.

4–20 mA/HART output and AMS Suite compatibility ensures easier configurations, calibrations and operation

Lower maintenance costs with AMS Suite software, improve device performance and enable easier configuration and setup. Combining AMS Suite with the Rosemount 3051HT can also provide you with advanced functionality including predictive diagnostics and audit trail information to make FDA compliance simpler and paper free.

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Ordering Information

Table 1. Rosemount 3051HT Hygienic In-line Pressure Transmitter 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					
3051HT	Hygienic Pressure Transmitter			*	
Pressure	type				
G	Gage				*
A	Absolute				*
Performa	ince				
	Range 1–3		Range 0		
A	High performance 0.065% span accuracy and 5-year sta	bility	High performance 0.065% span accur	racy and 1-year stability	*
В	Standard performance 0.075% span accuracy and 3-year sta	bility	Standard performa 0.075% span accur	ance racy and 1-year stability	*
Pressure	range				
	3051HTG ⁽¹⁾		3051HTA		
0	-5 to 5 psi (-0,34 to 0,34 bar-g)		N/A		*
1	-14.7 to 30 psi (-1,01 to 2,1 bar-g)		0 to 30 psia (0 to 2,1 bar-a)		*
2	-14.7 to 150 psi (-1,01 to 10,3 bar-g)		0 to 150 psia (0 to 10,3 bar-a)		*
3	-14.7 to 300 psi (-1,01 to 20,7 bar-g)		N/A		*
Transmit	ter output				
A	4–20 mA with digital signal based on HART protocol			*	
Sensor fil	l fluid				
3	Neobee® M-20				*
Housing	 material				
1	Crevice-free polished 316 Stainless Steel			*	
2 ⁽²⁾	Aluminum				*
Conduit 6	entry size				
A	¹ /2-14 NPT				*
Process c	onnection style ⁽³⁾				
	Туре	Size	Diaphragm	Upper housing/extension	
T32	Tri Clamp	1 ¹ /2-in.	316L SST	316L SST	*
T42	Tri Clamp	2-in.	316L SST	316L SST	*

Table 1. Rosemount 3051HT Hygienic In-line Pressure Transmitter 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.

Options (include with selected model number)

Extended P	roduct Warranty		
WR3	3-year limited warranty	*	
WR5	5-year limited warranty	*	
PlantWeb™	diagnostics functionality		
DA0	Power advisory HART diagnostic	*	
Display and	interface options ⁽⁴⁾		
M4	LCD display with Local Operator Interface	*	
M5	LCD display	*	
Configurati	on buttons		
D4	Analog zero and span	*	
DZ	Digital zero trim	*	
Wetted sur	face finish ⁽⁵⁾		
F2	Mechanically polished and electropolished to R $_a$ < 15 μ -in. (0.38 μ -m)	*	
Transient te	erminal block		
T1	Transient protection terminal block	*	
Software co	Software configuration ⁽⁶⁾		
C1	Custom software configuration	*	
Alarm level	s		
C4	NAMUR alarm and saturation levels, high alarm	*	
CN	NAMUR alarm and saturation levels, low alarm	*	
CR	Custom alarm and saturation signal levels, high alarm (requires C9 and Configuration Data Sheet)	*	
C7	Custom alarm and saturation signal levels, low alarm (requires C9 and Configuration Data Sheet)	*	
СТ	Low alarm (standard Rosemount alarm and saturation levels)	*	
Special cleaning			
P2	Cleaning for special services		
P3	Cleaning for <1 PPM Chlorine/Fluorine		
Wetted sur	face finish certification		
Q16	Surface finish certification	*	
Calibration certification			
Q4	Calibration certificate	*	
QP	Calibration certificate and tamper evident seal	*	

Table 1. Rosemount 3051HT Hygienic In-line Pressure Transmitter 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.

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Material tra	Material traceability certification		
Q8	Material traceability certification per EN 10204 3.1	*	
Certificate	Certificate of compliance to 3-A		
QA	Certificate of compliance to 3-A	*	
Certificate of compliance to ASME BPE ⁽⁷⁾			
QB	Certificate of compliance to ASME BPE	*	
Certificate of compliance to EHEDG ⁽⁸⁾			
QE	Certification of compliance to EHEDG	*	

- Rosemount 3051HTG lower range limit varies with atmospheric pressure. Does not meet EHEDG requirements. All process wetted parts have surface finish of $R_a < 32 \,\mu$ -in (0.81 μ -m) standard unless otherwise specified. Housing material option 1 comes with polycarbonate cover standard. Housing material option 2 comes with Al and glass cover standard. Meets ASME BPE surface designation SF4. CDS required with order, available with output code A only. Available only with wetted surface finish option F2. Available only with housing material option 1.

Specifications

Performance specifications

For zero-based spans, reference conditions, Neobee M-20 oil fill, SST materials, $1^1/2$ -in. Tri Clamp process connections, silicone gasket material, clamping torque of 45 in-lb, digital trim values set to equal range points.

Reference accuracy

Stated reference accuracy equations include terminal based linearity, hysteresis, and repeatability.

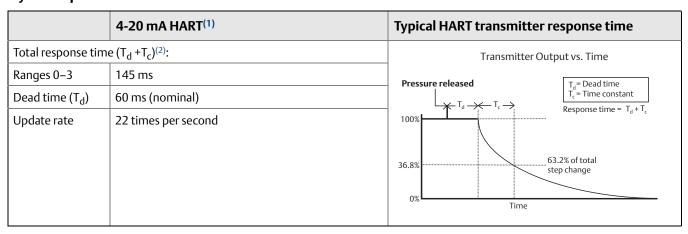
Range	High performance 3051HT (option A)	Standard performance 3051HT (option B)
Range 0	$\pm 0.065\%$ of span For spans less than 5:1, accuracy = $\pm \left(0.0075 \left[\frac{URL}{Span} \right] + 0.065 \right)\%$ of span	$\pm 0.075\%$ of span For spans less than 5:1, accuracy = $\pm \left(0.03 \left[\frac{URL}{Span}\right] + 0.055\right)\%$ of span
Range 1	±0.065% of span For spans less than 5:1, accuracy = $\pm \left(0.0075 \left[\frac{URL}{Span} \right] + 0.065 \right) \% \text{ of span}$	$\pm 0.075\%$ of span For spans less than 5:1, accuracy = $\pm \left(0.009 \left[\frac{URL}{Span} \right] + 0.045 \right)\%$ of span
Range 2	$\pm 0.065\%$ of span For spans less than 10:1, accuracy = $\pm \left(0.0075 \left[\frac{URL}{Span} \right] \right)\%$ of span	$\pm 0.075\%$ of span For spans less than 10:1, accuracy = $\pm \left(0.009 \left[\frac{URL}{Span}\right]\right)\%$ of span
Range 3	±0.065% of span For spans less than 2:1, accuracy = $\pm \left(0.020 \left[\frac{URL}{Span} \right] + 0.065 \right) \% \text{ of span}$	$\pm 0.075\%$ of span For spans less than 2:1, accuracy = $\pm \left(0.022 \left[\frac{URL}{Span}\right] + 0.075\right)\%$ of span

Long term stability

±50 °F (28 °C) temperature changes, and up to 300 psi (20,68 bar) line pressure

Range	High performance 3051HT (option A)	Standard performance 3051HT (option B)
Range 0	±0.2% of URL for 1 year	±0.2% of URL for 1 year
Ranges 1–3	±0.125% of URL for 5 years	±0.1% of URL for 3 years

Dynamic performance



- 1. Dead time and update rate apply to all models and ranges; analog output only.
- 2. Nominal total response time at 75 °F (24 °C) reference conditions.

Ambient temperature effect per 50 °F (28 °C)

Range	Ambient temperature effect	
Range 0	±(0.35% URL + 0.20% span)	
Range 1	±(0.10% URL + 0.20% span)	
Range 2	±(0.05% URL + 0.075% span)	
Range 3	±(0.10% URL + 0.075% span)	

Batch to batch repeatability

One batch is an exposure to steam in place (SIP) with a process temperature of 284 $^{\circ}$ F (140 $^{\circ}$ C) for 4 hours.

Range	Batch to batch repeatability
Range 0	±0.20% URL for 60 batches (0.010 psi, 0,89 mbar)
Range 1	±0.05% URL for 60 batches (0.015 psi, 1,03 mbar)
Range 2	±0.02% URL for 60 batches (0.030 psi, 2,07 mbar)
Range 3	±0.065% URL for 60 batches (0.195 psi, 13,44 mbar)

Mounting position effects

Zero shifts to ± 2.5 inH₂O (6,22 mbar), which can be calibrated out. No span effect.

Vibration effect

Less than $\pm 0.1\%$ of URL when tested per the requirements of IEC 60770 control room level.

Electromagnetic compatibility (EMC)

Meets all industrial environment requirements of EN61326. Maximum deviation < 1% Span during EMC disturbance.⁽¹⁾

 During surge event, device may exceed maximum EMC deviation limit or reset; however, device will self-recover and return to normal operation within specified start-up time.

Transient protection (option code T1)

Tested in accordance with IEEE C62.41.2-2002, Location Category B

6 kV crest (0.5 μ s-100 kHz)

3 kA crest (8 \times 20 μ s)

6 kV crest (1.2 \times 50 μ s)

Functional specifications

Range and sensor limits

a)		Range and sensor limits		
Range	Minimum span	URL	LF	RL
2	•	UKL	3051HTA	3051HTG ⁽¹⁾
0	1.00 psi (0,069 bar)	5.00 psi (0,34 bar)	N/A	–5.00 psig (–0,34 bar)
1	1.00 psi (0,069 bar)	30.00 psi (2,07 bar)	0 psia (0 bar)	–14.70 psig (–1,01 bar)
2	1.50 psi (0,10 bar)	150.00 psi (10,34 bar)	0 psia (0 bar)	–14.70 psig (–1,01 bar)
3	15.00 psi (1,03 bar)	300.00 psi (20,68 bar)	N/A	-14.70 psig (-1,01 bar)

^{1.} Assumes atmospheric pressure of 14.70 psia (1,01 bar-a).

Service

Liquid, gas, and vapor applications

4-20 mA HART (output code A)

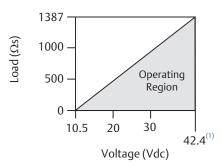
Power supply

External power supply required. Standard transmitter (4–20 mA) operates on 10.5–42.4 Vdc with no load.

Load limitations

Maximum loop resistance is determined by the voltage level of the external power supply described by:

Max. Loop Resistance = 43.5 (Power Supply Voltage - 10.5)



Communication requires a minimumloop resistance of 250 ohms.

1. For CSA approval, power supply must not exceed 42.4 V.

Indication

Optional two-line LOI/LCD display

Optional configuration buttons

Configuration buttons need to be specified:

Digital zero trim (option code DZ) changes digital value of the transmitter and is used for performing a sensor zero trim.

Analog zero span (option code D4) changes analog value and can be used to rerange the transmitter with an applied pressure.

Output

Two-wire 4–20 mA, user selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to HART protocol.

The Rosemount 3051 comes with Selectable HART Revisions. Digital communications based on HART Revision 5 (default) or Revision 7 (option code HR7) protocol can be selected. The HART revision can be switched in the field using any HART based configuration tool or the optional local operator interface (M4).

Power advisory diagnostics

Power advisory diagnostics pro-actively detect and notify you of degraded electrical loop integrity before it can affect your process operation. Example loop problems that can be detected include water in the terminal compartment, corrosion of terminals, improper grounding, and unstable power supplies.

The device dashboard presents the diagnostics in a graphical, task-based interface that provides single-click access to critical process/device information and descriptive graphical troubleshooting.

Local operator interface (LOI)

The LOI utilizes a two-button menu with internal and external/terminal side configuration buttons. Internal buttons are always configured for LOI. External buttons can be configured for either LOI (option code M4), Analog zero and span (option code D4) or digital zero trim (option code DZ). See Rosemount 3051 Reference Manual for LOI configuration menu.

Sensor overpressure limits

■ Range 0: 60 psi (4,14 bar)

■ Range 1: 150 psi (10,34 bar)

■ Range 2: 300 psi (20,68 bar)

■ Range 3: 600 psi (41,36 bar)

Note

Overpressure limit is dependent on the clamp/pressure adapter or sensor rating (whichever is lower).

Sensor burst pressure

■ All Ranges: 900 psi (62,05 bar)

Temperature limits

Ambient

32 to 185 °F (0 to 85 °C) 175 °F with LCD display

Storage

-22 to 185 °F (-30 to 85 °C)

Process temperature limits

32 to 302 °F (0 to 150 °C)

Process temperatures above 185 °F (85 °C) require lowering the ambient limits by a 1.5:1 ratio:

Max. ambient temperature in °F = 185 — $\frac{(ProcessTemp - 185)}{1.5}$

Max. ambient temperature in °C = $85 - \frac{(ProcessTemp - 85)}{1.5}$

Turn-on time

Performance within specifications less than two seconds after power is applied to the transmitter

Damping

Analog output response to a step input change is user-selectable from zero to 60 seconds for one time constant. This software damping is in addition to sensor module response time.

Failure mode alarm

HART 4-20mA (output code A)

If self-diagnostics detect a sensor or microprocessor failure, the analog signal is driven either high or low to alert the user. High or low failure mode is user-selectable with a jumper/switch on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is configured to standard, NAMUR-compliant, or custom levels (see Alarm Configuration below). The values for each are as follows:

Table 2. Alarm Configuration

	High alarm	Low alarm
Default	≥ 21.75 mA	≤ 3.75 mA
NAMUR compliant ⁽¹⁾	≥ 22.5 mA	≤ 3.6 mA
Custom levels ⁽¹⁾	20.2-23.0 mA	3.4-3.8 mA

Analog output levels are complaint with NAMUR recommendation NE 43, see option codes C4 or C5.

Humidity limits

0–100% relative humidity

Physical specifications

Material selection

Emerson Process Management provides a variety of Rosemount products with various product options and configurations including materials of construction that can be expected to perform well in a wide range of applications. The Rosemount product information presented is intended as a guide for the purchaser to make an appropriate selection for the application. It is the purchaser's sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product materials, options, and components for the particular application. Emerson is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product options, configuration, or materials of construction selected.

Process connections

- 11/2 -in. Tri Clamp
- 2 -in. Tri Clamp

Process-wetted parts

Isolation diaphragm

316L Stainless Steel

Process connector

316L Stainless Steel

Surface finish

- R_a < 32 μ -in. (0.81 μ -m) mechanically polished (standard on all connections)
- R_a < 15 μ-in. (0.38 μ-m) mechanically polished and electropolished (requires wetted surface finish option F2)

Non-wetted parts

Electronics housing

316 SST or low-copper aluminum

Enclosures meet NEMA® Type 4x, IP66, IP68, and IP69K when properly installed.

LOI and LCD display covers

- Non-glass, polycarbonate LCD display cover with SST housing material (option 1)
- Low-copper aluminum and glass LCD display cover with low-copper aluminum housing material (option 2)

Sensor module fill fluid

Neobee M-20 (FDA Approved)

Shipping weight for Rosemount 3051HT

3.44 lb (1,56 kg) with SST housing, LCD display with polycarbonate cover, and $1^{1}/2$ -in. Tri Clamp connection

Product Certifications

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.

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).

Altitude	Pollution degree
5000 m max	4 (metallic enclosures) 2 (non-metallic LCD display cover)

3-A

All Rosemount 3051HT Transmitters are 3-A approved and labeled. A certificate of compliance is also available (option QA).

EHEDG

All Rosemount 3051HT Transmitters with polished stainless steel housings (housing material option1) are EHEDG approved and labeled. A certificate of compliance is also available (option QE).

ASME-BPE

All Rosemount 3051HT Transmitters with option F2 and the following connections are designed to ASME-BPE SF4 standards:

T32: 11/2-in. Tri Clamp

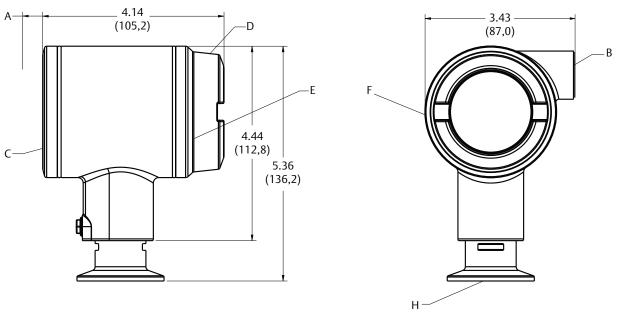
T42: 2-in. Tri Clamp

A self-certified certificate of compliance to ASME-BPE is also available (option QB).

Dimensional Drawings

Figure 1. Rosemount 3051HT

Polished 316 SST



- A. 0.75 (20) clearance for cover removal
- B. ¹/2–14 NPT conduit connection
- C. Terminal connections
- D. Optional display cover
- E. Transmitter circuitry

- F. Certifications tag
- G. $2 \times 1/4$ –20 UNC-2B mounting holes
- H. 1¹/₂ Tri Clamp
 - (See ordering table for other options.)

Options

Standard configuration

Unless otherwise specified, transmitter is shipped as follows:

Engineering units	psi (all ranges)
4 mA (1 Vdc)	0 (engineering units)
20 mA (5 Vdc)	Upper range limit
Output	Linear
LCD display	Installed or none
Alarm	High
Software tag	(Blank)

Custom configuration

If option code C1 is ordered, the customer may specify the following data in addition to the standard configuration parameters.

- Output information
- Transmitter information
- LCD display configuration
- Hardware selectable information
- Signal selection
- Scaled variable
- and more

For Rosemount 3051 with HART protocol, refer to the Rosemount 3051 Configuration Data Sheet.

Tagging (3 options available)

- Tag may be permanently stamped on transmitter nameplate upon request, 56 characters maximum.
- Tag may be stored in transmitter memory. Character limit is dependent on protocol.
 - HART Revision 5: 8 characters
 - HART Revision 7: 32 characters

Output information

Output range points must be the same unit of measure. Available units of measure for pressure include:

torr	psf ⁽¹⁾	cmH ₂ O @ 4 °C ⁽¹⁾
atm	inH ₂ O	mH ₂ O @ 4 °C ⁽¹⁾
Pa	inH ₂ O @ 4 °C	inHg
kPa	inH ₂ O @ 60 °F	mmHg
MPa	ftH ₂ O	cmHg @ 0 °C ⁽¹⁾
hPa ⁽¹⁾	ftH ₂ O @ 4 °C ⁽¹⁾	mHg @ 0 °C ⁽¹⁾
mbar	ftH ₂ O @ 60 °F ⁽¹⁾	g/cm²
bar	mmH ₂ O	kg/m ⁽¹⁾
psi	mmH ₂ O @ 4 °C	kg/cm

Field configurable only, not available for factory calibration or custom configuration (option code C1 "Software configuration").

Display and interface options

M4 Digital Display with Local Operator Interface (LOI)

Available for 4–20 mA HART

M5 Digital Display

- Two-line, eight-digit LCD display for 4–20 mA HART
- Direct reading of digital data for higher accuracy
- Displays user-defined flow, level, volume, or pressure units
- Displays diagnostic messages for local troubleshooting
- 90-degree rotation capability for easy viewing

Configuration buttons

Rosemount 3051 will ship with no buttons unless option D4 (analog zero and span), DZ (digital zero), or M4 (LOI) for local configuration buttons are specified.

External or rear/terminal side

Table 3. Button Configuration⁽¹⁾

Option codes	Internal	External or rear/terminal side
DZ	N/A	Digital zero trim
D4	N/A	Analog zero and trim
M4	LOI	LOI ⁽²⁾
M4 + DZ	LOI	Digital zero trim
M4 + D4	LOI	Analog zero and trim

^{1.} Housing material option 1 comes with rear/terminal-side buttons; housing material option 2 comes with external buttons.

Transient protection (option code T1)

Tested in accordance with IEEE C62.41.2-2002, Location Category B $\,$

6 kV crest (0.5 μ s-100 kHz)

3 kA crest (8 \times 20 μ s)

6 kV crest (1.2 \times 50 μ s)

^{2.} Not provided with housing material option 1.

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