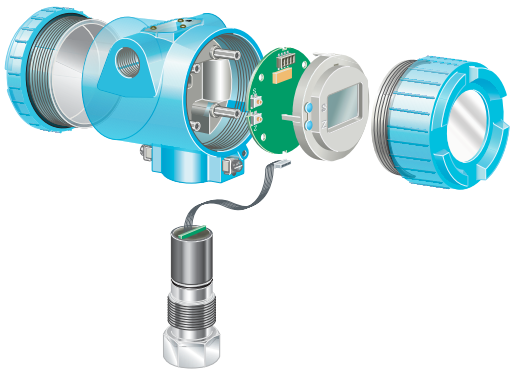
GE
Measurement & Control

RTX 1000H Series

Versatile Transmitters for a World of Pressure



GE Measurement & Control is renowned for the design and manufacture of compact and rugged high performance pressure sensors and related products for extremely accurate and reliable measurements.

To adjust span, the RTX 1000H uses a simple set-up routine using push buttons located on the electronics board. When calibration is complete, a switch locks the push buttons out of the main circuit, eliminating this potential source of drift to ensure optimum long term operational stability.

The RTX 1000H extends the range to include a fully rangeable transmitter utilizing the industry standard HART® protocol. This provides enhanced performance and digital two-way communication. In addition, any span can be set within a 1:1 to 100:1 ratio of the pressure module upper range limit (URL).

Features

- URL's from 30 psi to 20,000 psi (2 bar to 1400 bar)
- Up to 100:1 rangeability
- 'Best in class' performance
- Hastelloy C diaphragm supplied as standard
- Aluminum or stainless electronics housing
- NAMUR compliant alarm outputs

Proven Technologies

GE has its own comprehensive and technologically advanced silicon processing facility. Silicon has excellent performance characteristics and is readily adapted for many applications, from process and subsea to race car and aerospace.

RTX 1000H Flexibility

The RTX 1000H series provides a choice of user rangeable pressure transmitters with HART® digital signal superimposed, offering turndowns up to 100:1 and ranging from 0.75 psi to 20,000 psi.

High Performance

The RTX 1000H provides accuracy up to 0.075% including non-linearity, hysteresis and repeatability effects. This helps the user to achieve optimum process efficiency and ultimate product quality.

Ease of Use

Zero/span push buttons and a simple configuration routine reduce user set-up and calibration time. A separate terminal on the terminal block allows a meter to be connected to check calibration without breaking into the 4-20mA loop.

Low Cost of Ownership

The RTX 1000H offers high value performance and reliable long term service. For example, 5 year stability is better than 0.2%, keeping recalibration checks and process downtime to a minimum.

Media Compatibility

A Hastelloy C276 diaphragm and 316L stainless steel pressure port are supplied as standard for compatibility with a wide range of hostile media. For severe or hygienic process conditions, an all Hastelloy C276 or all Inconel 625 pressure port can be supplied..

Harsh Environments

The optional stainless steel electronics housing is cost-effective for applications such as offshore oil and gas or in hygienic environments such as food and beverage or pharmaceutical facilities.

Sensing Excellence

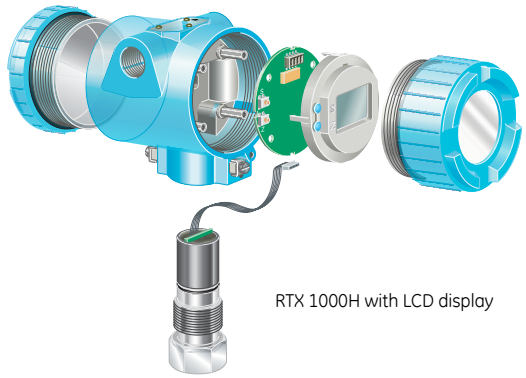
At the heart of the instrument is a micro-machined silicon sensing element. Micro-machining defines the thickness and area of the silicon which forms the pressure sensitive diaphragm and a fully active four-arm strain gauge bridge is diffused into the appropriate regions. Silicon has excellent mechanical properties being perfectly elastic and free from hysteresis, and the 'atomically' diffused gauges provide high output signals and high overload capabilities.

The basic sensor is housed within a high integrity glass to metal seal, providing both electrical and physical isolation from the pressure media. The Hastelloy isolation diaphragm is electron beam welded to this seal and transmits applied pressure to the sensor via a silicone fluid filling.

Intelligent Electronics

The electronics assembly utilizes microprocessor technology to create a compact circuit with the minimum of components while producing an extremely stable signal unaffected by shifts in ambient temperature. User selectable switches provide direct access to damping adjustment, high or low failure alarm and write protection to inhibit any unauthorized change of instrument configuration.

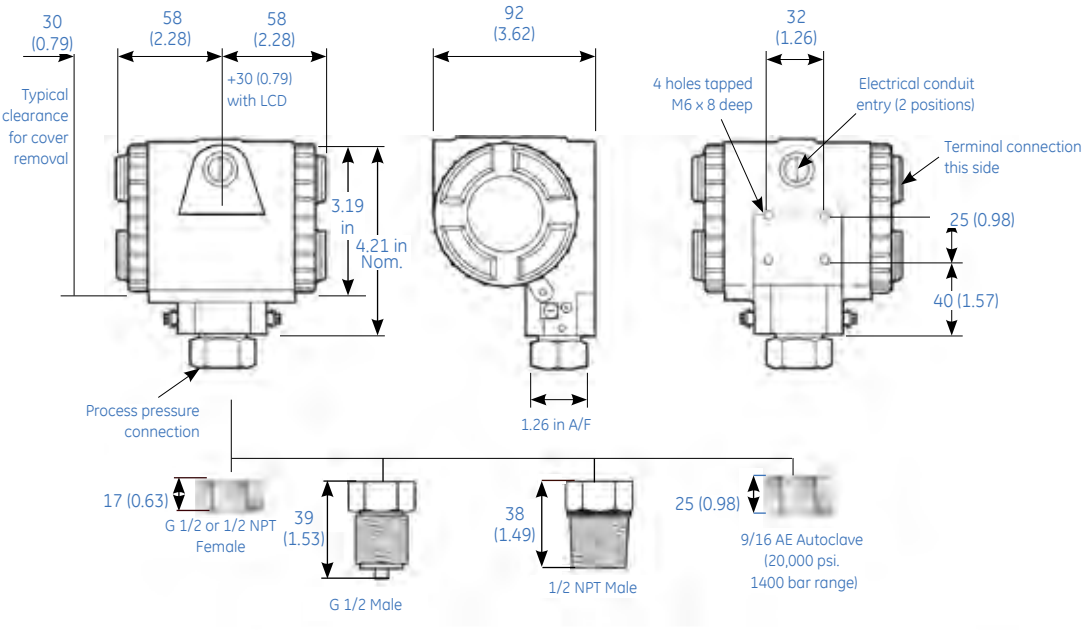
The electronics are enclosed in a compact and lightweight aluminum alloy housing which, in most cases, enables direct mounting to the process, eliminating the need for additional hardware. Alternatively, a stainless steel housing is available.



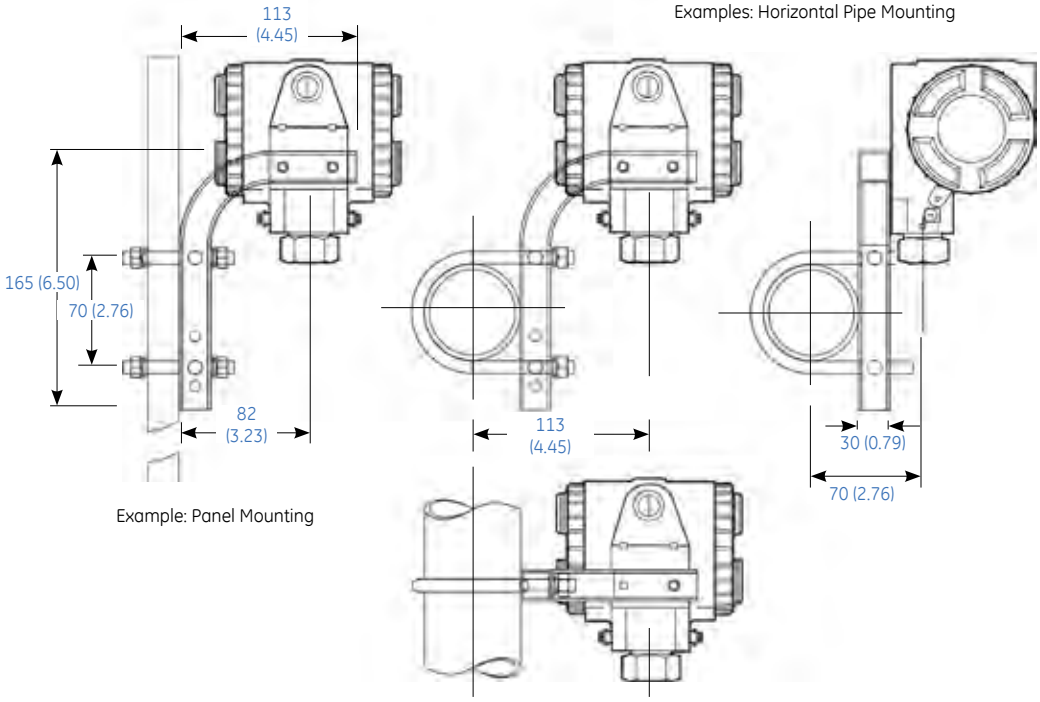
RTX 1000H with LCD display

4-20 mA Pressure Transmitters

Installation Drawings



Installation - With Optional Mounting Bracket



Note: All dimensions in mm (inches).

Standard Specifications

Pressure Measurement

Pressure Ranges
Standard ranges which can be calibrated to intermediate span/pressure unit:
0 to 30 psi (2 bar) gauge or absolute
0 to 100 psi (7 bar) gauge or absolute
0 to 300 psi (20 bar) gauge or absolute
0 to 1000 psi (70 bar) gauge or absolute
0 to 3000 psi (200 bar) sealed gauge or absolute
0 to 10,000 psi (700 bar) sealed gauge or absolute
0 to 20,000 psi (1400 bar) sealed gauge or absolute

Range Adjustment
Full 4 - 20mA output change for any user span setting within Upper Range Limit (URL) as below:

1 - 100% URL
Note: 30 psi (2 bar) device can be adjusted down to a span of 0.75 psi (0.05 bar)

Zero offset - for absolute configurations:
0 - 99% URL
For gauge configurations, the zero (4 mA) output can be set anywhere within the range below:
-15 psi (-1 bar) to 99% URL
e.g., 30 psi (2 bar) gauge device can be set 4-20 mA for -15 to 15 psi (-1 to 1 bar). Down ranged to 3 psi (0.2 bar) span, 4-20 mA can be set anywhere within range to a zero offset of 26 psi (1.8 bar), e.g., calibrated range of 26 to 30 psi (1.8 to 2 bar). See Ordering Information for exceptions.

Overpressure
Rated pressure can be exceeded by the following multiples without degrading performance:
4x URL 2000 psi (135 bar) max for ranges 30 psi (2 bar) to 1000 psi (70 bar)
2x URL 13,000 psi (900 bar) max for ranges 3000 psi (200 bar) to 10,000 psi (700 bar)
29,000 psi (2000 bar) max for range 20,000 psi (1400 bar)

Pressure Containment
High pressure application as below may damage sensor but process media leakage will not occur:
6x URL 3000 psi (200 bar) max ranges 30 psi (2 bar) to 1000 psi (700 bar) gauge
3000 psi (200 bar) for ranges up to 1000 psi (70 bar) absolute
20,000 psi (1400 bar) for ranges 3000 to 10,000 psi (200 to 700 bar) sealed gauge or absolute
30,000 psi (2100 bar) for range 20,000 psi (1400 bar) sealed gauge or absolute

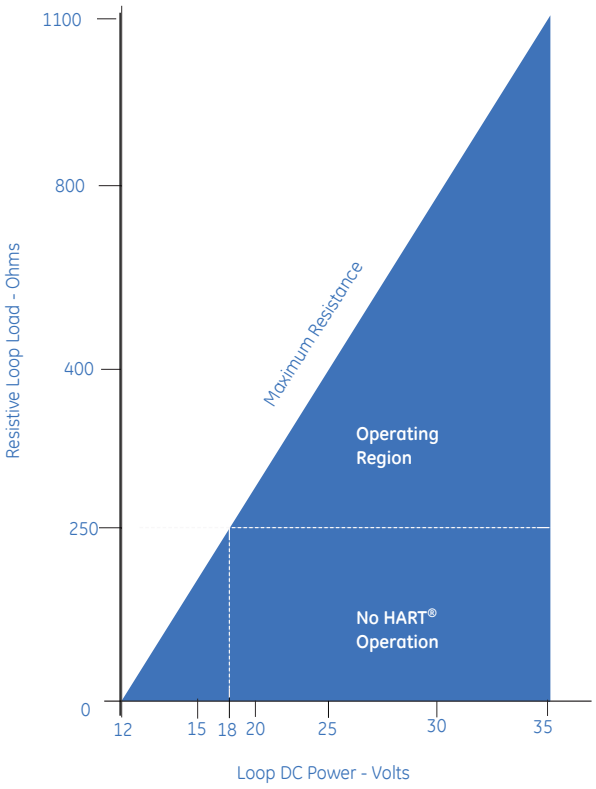
Process Media
Any liquid, gas or vapor compatible with Hastelloy C276 diaphragm and 316 stainless steel or Hastelloy C276 body. NB. 20,000 psi range: compatible with Inconel 625. RTX1010H and RTX1020H models constructed from materials compliant with NACE MR 0175.

Output Current
4 - 20mA (2 wire configuration).
HART® digital signal superimposed.

Failure Mode (NAMUR NE 43 compliant)
If pressure is applied outside upper or lower range settings, output saturates at Under Range 3.8 mA Over Range 20.5mA. Display flashes out of range.

In the event of failure, output will be driven to <3.6mA or >21 mA (user configurable) and, if installed, the display will confirm the alarm status.

Transmitter Supply Voltage



Performance

Accuracy
For calibrated Span >= 10% URL: 0.075% Span including non-linearity, hysteresis and repeatability.
For calibrated Span < 10% URL:
(0.025% + 0.005 [URL/Span])% Span

Long Term Stability
At standard reference conditions, maximum calibration change 0.2% URL over a 5 year period.

Time Response
100 ms time constant (63% response to step change in pressure with damping set to 0.1 sec).

Operating Temperature Ranges

Ambient	-40° to 185°F* (-40 to 85°C)
Process	-40° to 250°F (-40 to 120°C)
Compensated	-40° to 185°F (-40 to 85°C)
*(LCD option	-4° to 160°F (-20 to 70°C)

Temperature Effects
-40°F to 185°F (-40°C to 85°C), maximum output deviation from room temperature calibration at 72°F (23°C): 0.1% configured span+0.2% reading+0.1% URL
(Reading expressed as % of configured span).

Mounting Position Effect
Negligible effect. The 'g' offset effect can be adjusted via zero controls.

Vibration Resistance
Negligible effect at 5g from 5Hz to 2kHz.

Humidity Limit
0-100% RH.

Damping
Adjustable 0.1 to 30 seconds.

Physical

Electrical Connections
1/2 - 14 NPT, PG13.5 or M20 Female conduit entry.

Process Connections
Ranges up to 10,000 psi: G 1/2 Female,
1/2 NPT Female,
G 1/2 male to BS EN 837-1 (DIN 16288),
1/2" NPT Male.
20,000 psi range: 13/16"- 16 UN Female with 60° cone (9/16" AE medium tube autoclave fitting).

Electrical Housing
Low copper aluminium alloy with epoxy painted coating or stainless steel. Sealed to NEMA 4X, IP 66 and 67.

Shipping Weight
Aluminium Housing: 2.7 lbs (1.25 kg) (without options)
Stainless Steel Housing: 6 lbs (2.75 kg) (without options).

Hazardous Area Approvals

(O) None

(I) ATEX Intrinsically Safe & Dust
Ex II 1G Ex ia IIC Ga T4 (-40°C ≤ Ta ≤ +80°C)
Ex ia IIC Ga T5 (-40°C ≤ Ta ≤ +40°C)
Ex II 2D Ex tb IIIC T120°C Db IP6X (-40°C ≤ Ta ≤ +80°C)

(D) ATEX Flameproof & Dust
Ex II 2G Ex d IIC T5 Gb (-40°C ≤ Ta ≤ +80°C)
Ex II 2D Ex tb IIIC T120°C Db IP6X (-40°C ≤ Ta ≤ +80°C)

(F) FM and CSA

Intrinsically Safe:	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 T3A (80°C max), T4 (40°C max)
Explosionproof:	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 T5 (80°C max)
Non-incendive:	Class I, Division 2, Groups A, B, C, D Class II, Division 2, Groups F, G Class III, Division 2 T5 (80°C max), T6 (40°C max)

CE Marking
Product is CE marked for electromagnetic compatibility directive 2004/108/EC, pressure equipment directive 97/23/EC, and on hazardous area approval options I and D, use in potentially explosive atmospheres 94/9/EC.
EMC: BS EN 61000-6-1: 2007, BS EN 61000-6-2: 2005, BS EN 61000-6-3: 2007, BS EN 61000-6-4: 2007, BS EN 61326-1: 2006, BS EN 61326-2-3: 2006.
PED: Pressure accessory, Category I.
"Maximum Span" range is equivalent to maximum working pressure (Ps) as referred to in the PED.

Options

(A) Digital indicator: Graphic display;
(B) Mounting bracket for 2" pipe/panel, supplied in 316 stainless steel.
(C) Material traceability for pressure containment parts to EN 10204 Type 3.1 material certification.

Calibration Standards

Products manufactured by GE Measurement & Control are calibrated against precision calibration equipment which is traceable to International Standards.

Continuing development sometimes means specification changes without notice.

Ordering Information

1) Model Number

Please determine the specific model number required by appropriate selection from the following coded areas (example is given below):

RTX 10 Base Model Number

Code	Diaphragm	Process Wetted body	Fill Fluid
00	Hastelloy C*	316 Stainless Steel*	Silicone Oil
10	Hastelloy C*	Hastelloy C*	Silicone Oil
20	Inconel 625	Inconel 625	Silicone Oil

Code	Output
H	4 - 20 mA + HART

Code	Max Span	Min Span
07	0-2 bar (0 - 30 psi)	50 mbar (0.75 psi) for Gauge, 100 mbar (1.5 psi) for Absolute
10	0-7 bar (0 - 100 psi)	70 mbar (1 psi) for Gauge, 100 mbar (1.5 psi) for Absolute
13	0-20 bar (0 - 300 psi)	200 mbar (3 psi)
16	0-70 bar (0 - 1,000 psi)	700 mbar (10 psi)
18	0-200 bar (0 - 3,000 psi)	2 bar (30 psi)
22	0-700 bar (0 - 10,000 psi)	7 bar (100 psi)
24	0-1400 bar (0 - 20,000 psi)*	14 bar (200 psi)

Code	Type
A	Absolute
G	Gauge (sealed gauge for ranges above 70 bar (1000 psi)

Code	Process Connection
1	G1/2 female
2	1/2 - 14 NPT female
3	G1/2 male to BS EN 837-1 (DIN 16288)
4	1/2" NPT male
5	9/16 AE medium pressure tube autoclave fitting*

Code	Electrical Entry
M	M20 female
N	1/2 - 14 NPT female (via adaptor)
P	PG 13.5 female (via adaptor)

Code	Electronics Housing
O	Aluminium Alloy
S	Stainless Steel

Code	Approval
O	None
I	ATEX Intrinsically Safe & Dust
D	ATEX Flameproof & Dust
F	FM/CSA Intrinsically Safe / Explosion Proof / Non Incendive**

Code	Options
O	None
LH	Digital Indicator
B	Mounting Bracket
T	EN 10204 Type 3.1 Material Certification

RTX 10 00 H - 07 - G - 2 - N - O - D - LHB **Typical Model Number**

* For pressure range 1400 bar (20,000 psi) units, specify RTX 1020H-24-x-5-x-x-x-xxx.
For 20,000 psi device (range code 24) diaphragm and process wetted body is Inconel 625.
Available with process connection code 5 only and approvals options O or I.
Process connection code 5/Autoclave fitting applies to range code 24 (0 - 20,000 psi) only

** Approval code F (FM, CSA) requires electrical entry code N (1/2 - 14 NPT female)

In addition to the specific model number, the following must be specified:

2) Regional Configuration

Options:

Europe — The content of the user manual, calibration certificate (and ATEX hazardous area installation instructions if required), are localized for the European market. The maximum working pressure (MWP) is specified and marked in "bar". Only ATEX hazardous location approvals are available (as an option).

North America — The content of the user manual, calibration certificate (and CSA and FM hazardous area installation instructions if required) are localized for the North American market. The maximum working pressure (MWP) is specified and marked in "psi". Only CSA and FM hazardous location approvals are available (as an option).

Note: The unit of measurement for the configured (calibrated) span may be different to that for the MWP. Refer to the Pressure Range Units section below for available options.

Note: Customers requiring no hazardous area approval may choose either the European or North American regional configuration.

Note: The available hazardous locations approvals are defined in the "Hazardous Area Approvals" section of the datasheet.

3) Output Configuration

Also known as "ranging," this is used to set the 4-20 mA span, calibration units and optional LCD.

If different values than zero-based and maximum span as defined in specific model code are required, values need to be specified in accordance with the following instructions.

The RTX10*0H is generally downrangeable 100:1 (refer to the table below for exceptions), so the Pressure Lower Range Value (LRV) (4 mA) and Pressure Upper Range Value (URV) (20 mA) points should be chosen anywhere in the range -1 bar to MWP observing the following rules:

1. URV - LRV >= 1% MWP
2. If reverse output is required, then LRV > URV (and LRV - URV >= 1% MWP).

Pressure Range Code	MWP	Max. downranging Ratio (Min. Pressure)
07G	2 bar/30 psi G	40:1 (50 mbar/0.75 psi)
07A	2 bar/30 psi A	20:1 (100 mbar/1.5 psi)
10G	7 bar/100 psi G	100:1 (70 mbar/1 psi)
10A	7 bar/100 psi A	70:1 (100 mbar/1.5 psi)
13*	20 bar/300 psi	100:1 (200 mbar/3 psi)
16*	70 bar/1,000 psi	100:1 (700 mbar/10 psi)
18*	200 bar/3,000 psi	100:1 (2 bar/30 psi)
22*	700 bar/10,000 psi	100:1 (7 bar/100 psi)
24*	1400 bar/20,000 psi	100:1 (14 bar/200 psi)

*G-Gauge, A - Absolute, * - Gauge, Sealed Gauge or Absolute*

4) Pressure Units

Any of the following units may be chosen:

HART Code	Units	HART Code	Units
1	inH_2O @ 68°F	9	g/cm^2
2	inHg @ 0°C	10	kg/cm^2
3	ftH_2O @ 68°F	11	Pa
4	mmH_2O @68°F	12	kPa
5	mmHg @ 0°C	13	torr
6	psi	14	atm
7	bar	57	%
8	mbar		

The display (if fitted) is normally configured 0.0—100.0%FS.

5) ATEX IS/Flameproof Installation Instruction Language

Options: English (Default), Spanish/English, Portuguese/English, French/English, Italian/English, German/English.

6) Optional Pressure Tests:

This test is optional. Omit specifying if not required. If required, test a, b or c is to be specified.
a. 1.1 x Full Scale (URL) for 5 minutes duration. Available on RTX1000H, RTX1010H and RTX1020H.
b. 1.5 x Full Scale (URL) for 5 minutes duration:
Pressure test not to exceed 900 bar (13,000 psi) maximum for RTX1000H and RTX1010H, 2000 bar (29,000 psi) maximum for RTX1020H.
c. Pressure elevated to 1500 bar (22,500 psi) for 5 minutes, reduced to 0 bar (0 psi) for 5 minutes, then raised to 1500 bar (22,500 psi) for 15 minutes: Available on RTX1020H (Inconel variant) only.

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