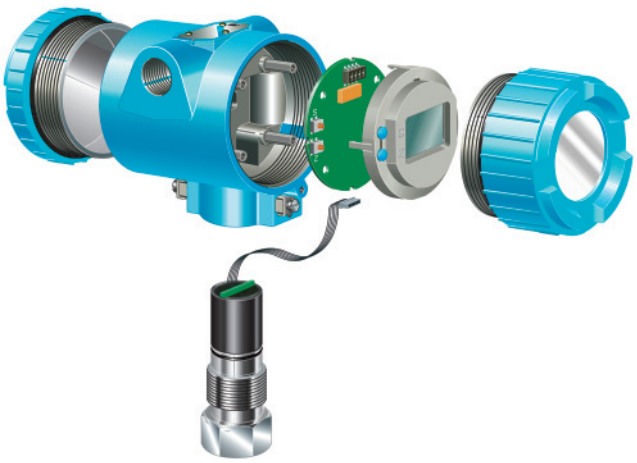
GE
Measurement & Control

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 zero and 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, 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

- Upper Range Limits (URLs) from 3.5 bar to 1400 bar (50 psi to 20,000 psi)
- Up to 100:1 rangeability
- 'Best in class' performance
- Aluminum or stainless steel 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 50 mbar to 1400 bar (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 and 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 4-20 mA 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% URL, keeping recalibration checks and process downtime to a minimum.

Media Compatibility

A 316L stainless steel pressure port and a 316L stainless steel or Hastelloy C276 diaphragm 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 isolation diaphragm is electron beam welded to this seal and transmits applied pressure to the sensor via a silicone fluid filling.

Intelligent Electronics

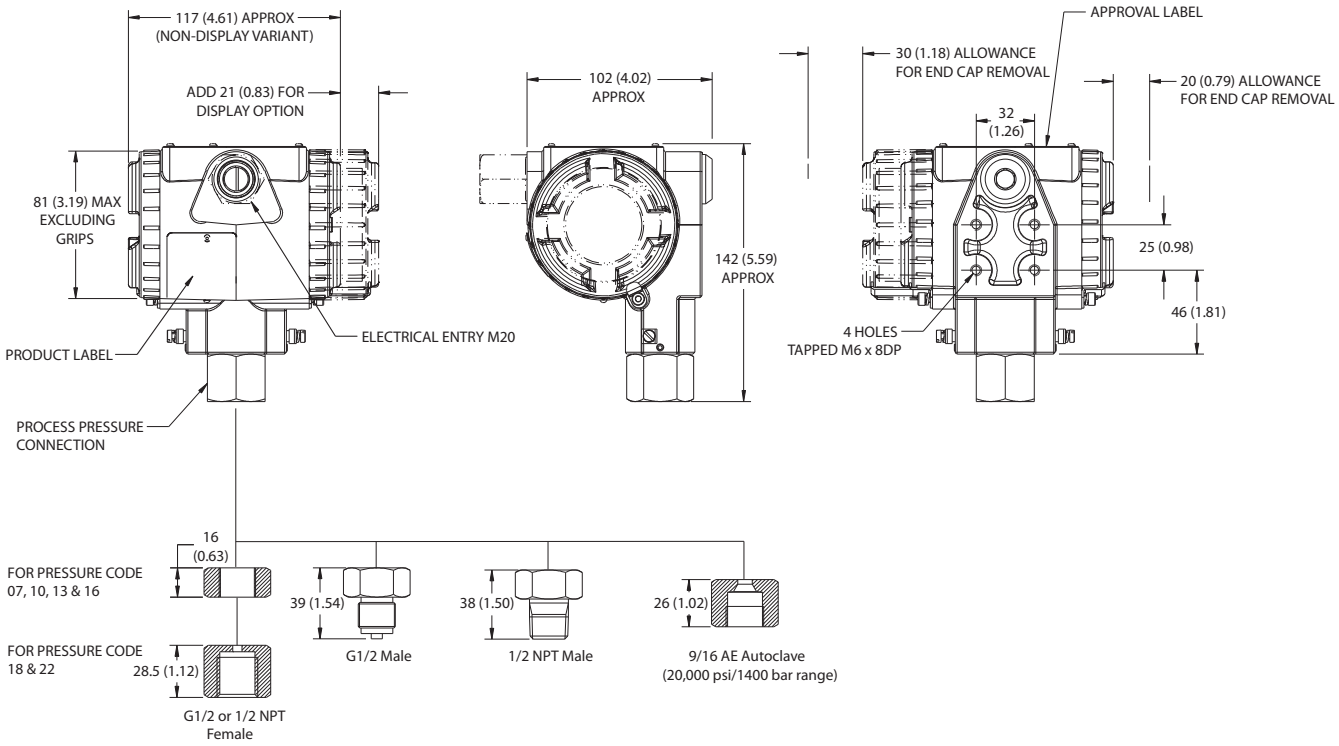
The electronics assembly utilizes microprocessor technology to create a compact circuit with a minimum of components while producing an extremely stable signal unaffected by shifts in ambient temperature. User selectable switches provide direct access to damping adjustment, high or low failure alarm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

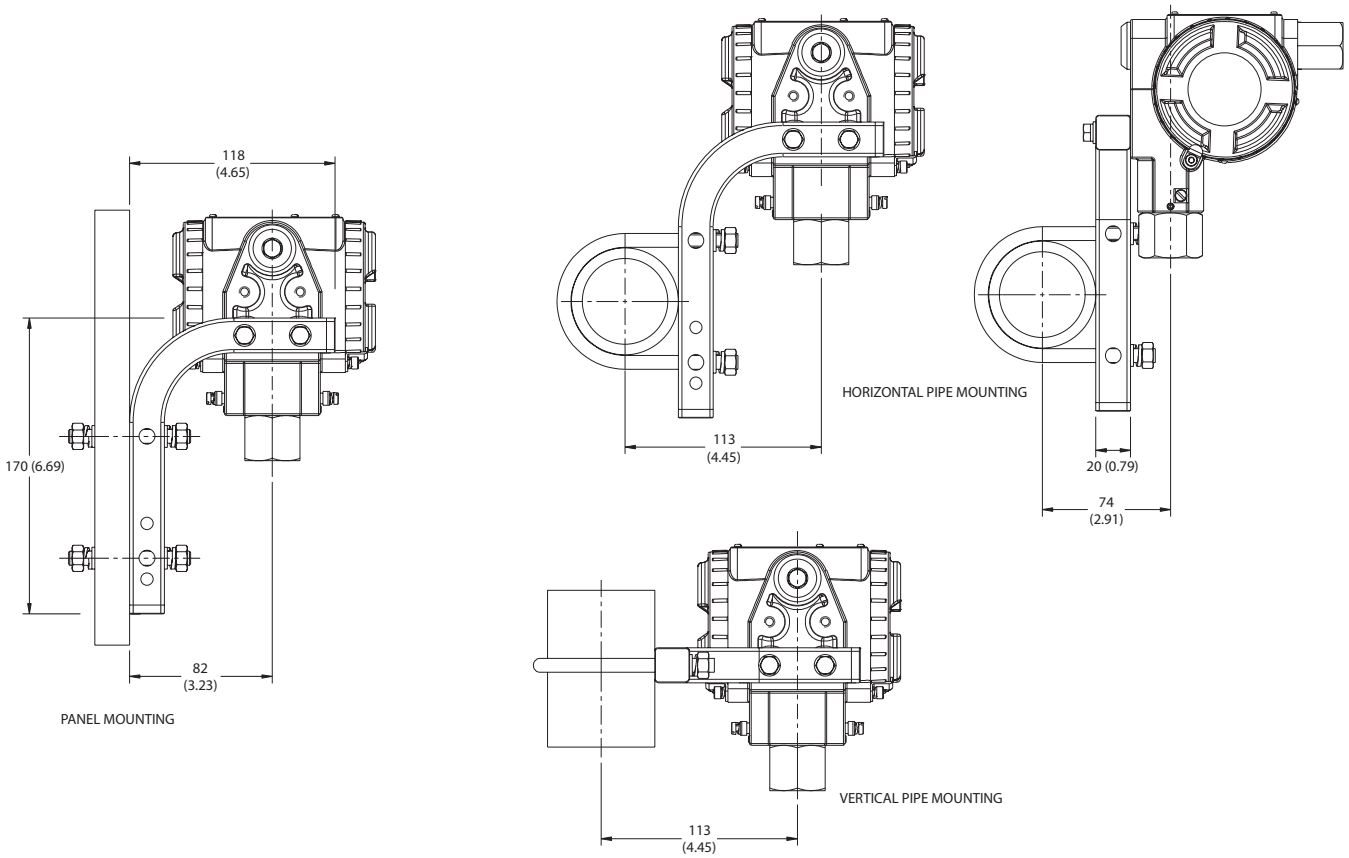
RTX 1000H with LCD display

Dimensions (4-20 mA Pressure Transmitters)

Installation Drawings - Without Optional Mounting Bracket



Installation Drawings - With Optional Mounting Bracket



Note: All dimensions are in mm (inches).

Standard Specifications

Pressure Measurement

Pressure Ranges
Standard ranges which can be configured to intermediate span/pressure unit:

- 3.5 bar (50 psi) gauge or absolute
- 7 bar (100 psi) gauge or absolute
- 20 bar (300 psi) gauge or absolute
- 70 bar (1000 psi) gauge or absolute
- 200 bar (3000 psi) sealed gauge or absolute
- 700 bar (10,000 psi) sealed gauge or absolute
- 1400 bar (20,000 psi) sealed gauge or absolute

Range Adjustment

- Full 4 - 20 mA output change for any user span setting within Upper Range Limit (URL) as below:
  1 - 100% URL

Note: A 3.5 bar (50 psi) gauge device can be adjusted down to a span of 0.05 bar (0.75 psi) gauge. 3.5 bar (50 psi) and 7 bar (100 psi) absolute devices can be adjusted down to a span of 0.1 bar (1.5 psi) absolute.

- Zero offset - for absolute reference:
  0 - 99% URL
- For gauge reference, the zero (4 mA) output can be set anywhere within the range below:
  -1 bar (-15 psi) to 99% URL

Example 1: *A 3.5 bar (50 psi) gauge device can be set to 4-20 mA for -1 to 2.5 bar (-15 to 35 psi).*

Example 2: *A 3.5 bar (50 psi) absolute device can be down-ranged to 0.35 bar (5 psi) span and the zero offset adjusted to give 4-20 mA for 0.85 to 1.2 bar (12 to 17.5 psi) absolute.*

*See **Ordering Information** for exceptions.*

Overpressure
Rated pressure can be exceeded by the following multiples without degrading performance:

- 4x URL 135 bar (2000 psi) max for ranges 3.5 bar (50 psi) to 70 bar (1000 psi)
- 2x URL 900 bar (13,000 psi) max for ranges 200 bar (3000 psi) to 700 bar (10,000 psi)
- 2000 bar (29,000 psi) max for range 1400 bar (20,000 psi)

Pressure Containment
High pressure application as below may damage sensor but process media leakage will not occur:

- 6x URL 200 bar (3000 psi) max for ranges 3.5 bar (50 psi) to 70 bar (1000 psi) gauge
- 200 bar (3000 psi) for ranges up to 70 bar (1000 psi) absolute
- 1200 bar (17,400 psi) for ranges 200 to 700 bar (3000 to 10,000 psi) sealed gauge or absolute
- 2100 bar (30,000 psi) for range 1400 bar (20,000 psi) sealed gauge or absolute

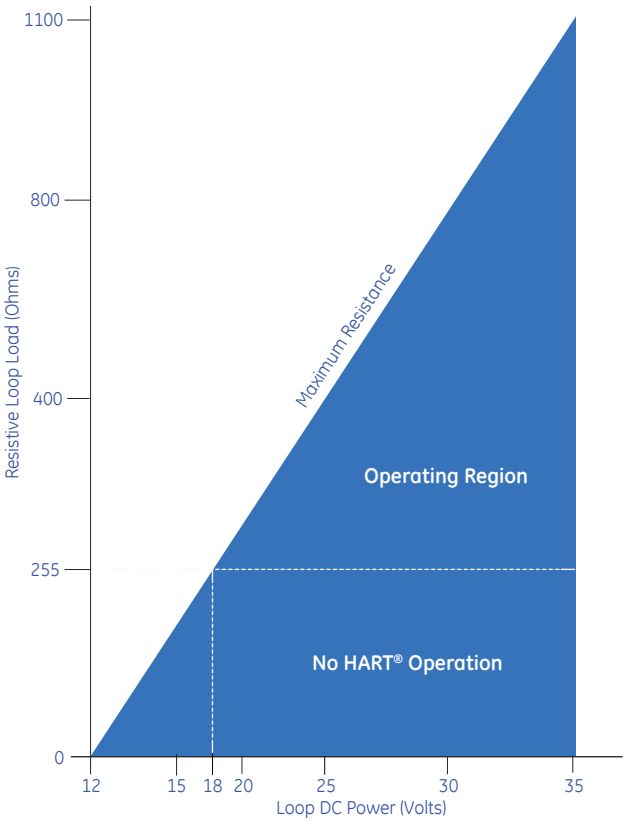
Process Media
Any liquid, gas or vapor compatible with Hastelloy C276 and/or 316L stainless steel

NB. 1400 bar (20,000 psi) range: compatible with Inconel 625. RTX1010H and RTX1020H models constructed of materials compliant with NACE MR 0175.

Output Current
4 - 20 mA (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 or Over Range 20.5 mA:* Display flashes out of range.
In the event of failure, output will be driven to <3.6 mA or >21 mA (user configurable) and, if installed, the display will confirm the alarm status.

Transmitter Supply Voltage



Performance

Accuracy
For configured Span ≥ 10% URL: ±0.075% Span, including non-linearity, hysteresis and repeatability
For configured Span < 10% URL:
±(0.025% + 0.005 [URL/Span])% Span

Long Term Stability
At standard reference conditions, maximum calibration change of ±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°C to 85°C (-40°F to 185°F)*, **
- Process: -40°C to 120°C (-40F° to 250°F)**
- Compensated: -40°C to 85°C (-40F° to 185°F)

**LCD option limited to -20°C to 70°C (-4F° to 160°F)*
***Limited to 40°C (104°F) or 80°C (176°F) by hazardous area certifications*

Temperature Effects
-40°C to 85°C (-40°F to 185°F), maximum output deviation from room temperature calibration at 22°C (72°F): ±(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 5 Hz to 2 kHz

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 700 bar (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

1400 bar (20,000 psi) range:
- 9/16" AE medium tube autoclave fitting

Electrical Housing
Low copper aluminium alloy with polyester painted coating or stainless steel. Sealed to NEMA 4X, IP66 & 67.

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

Hazardous Area Approvals

(O) None

(I) ATEX & IECEx Intrinsically Safe
Ⓔx II 1G Ex ia IIC Ga T4 (-40°C ≤ Ta ≤ +80°C)
Ex ia IIC Ga T5 (-40°C ≤ Ta ≤ +40°C)

(D) ATEX & IECEx Flameproof
Ⓔx II 2G Ex d IIC Gb T5 (-40°C ≤ Ta ≤ +80°C)

(N) ATEX & IECEx Non Sparking (Type n)
Ⓔx II 3G Ex nA IIC Gc T4 (-40°C ≤ Ta ≤ +80°C)
Ex nA IIC Gc T5 (-40°C ≤ Ta ≤ +40°C)

(F) FM Approved (US and Canada)
Intrinsically Safe: Class I, II, III, Division 1, Groups A, B, C, D, E, F, G Exia
T3A (-40°C ≤ Ta ≤ +80°C)*
T4 (-40°C ≤ Ta ≤ +40°C)
**Except Class II and III*

Explosionproof: Class I, Division 1, Groups A, B, C, D
T5 (-40°C ≤ Ta ≤ +80°C)

Dust-Ignition Proof: Class II, III, Division 1, Groups E, F, G
T5 (-40°C ≤ Ta ≤ +80°C)

Non-incendive: Class I, Division 2, Groups A, B, C, D
T5 (-40°C ≤ Ta ≤ +80°C)
T6 (-40°C ≤ Ta ≤ +40°C)

Control Drawing X-A3-0551
Single Seal (-40°C to +120°C)

(K) Combined (I, D, N and F)

CE Marking
Product is CE marked for electromagnetic compatibility directive 2014/30/EU, pressure equipment directive 2014/68/EU*, and on hazardous area approval options I, D, N, and K, use in explosive atmospheres 2014/34/EU.

**Sound engineering practice applies for pressure ranges ≤ 1000 bar (14,500 psi).*

Options

(LH) Digital indicator: Graphic display

(B) Mounting bracket for 2" pipe/panel, supplied in 316 stainless steel. Available as a separate part number SO1000B.

(T) 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.

Note: 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):

RTX10 Base Model Number

Code	Diaphragm	Process Wetted body	Fill Fluid
00	Hastelloy C276*	316L Stainless Steel	Silicone Oil
10	Hastelloy C276	Hastelloy C276	Silicone Oil
20	Inconel 625	Inconel 625	Silicone Oil

Code	Output
H	4 - 20 mA + HART

Code	Max Span	Min Span
07	3.5 bar (50 psi)	50 mbar (0.75 psi) for Gauge, 100 mbar (1.5 psi) for Absolute
10	7 bar (100 psi)	70 mbar (1 psi) for Gauge, 100 mbar (1.5 psi) for Absolute
13	20 bar (300 psi)	200 mbar (3 psi)
16	70 bar (1,000 psi)	700 mbar (10 psi)
18	200 bar (3,000 psi)	2 bar (30 psi)
22	700 bar (10,000 psi)	7 bar (100 psi)
24**	1400 bar (20,000 psi)	14 bar (200 psi)

Code	Type
A	Absolute
G	Gauge
S	Sealed Gauge

Code	Process Connection
1	G1/2 female
2	1/2 - 14 NPT female
3	G1/2 male
4	1/2 - 14 NPT male
5**	9/16 AE autoclave

Code	Electrical Entry
M	M20 female
N***	1/2 - 14 NPT female (via adaptor)
P	PG13.5 female (via adaptor)

Code	Electronics Housing
O	Aluminium Alloy
S	Stainless Steel

Code	Approval
O	None
I	ATEX and IECEx Intrinsically Safe
D	ATEX and IECEx Flameproof
N	ATEX and IECEx Non-sparking
F***	FM Approved (US and Canada) Combined Intrinsically safe/Explosion Proof/Non-incendive
K***	Combined options I, N, D and F

Code	Options
O	None
LH	Digital Indicator
B	Mounting Bracket
T	Material Traceability 3.1

RTX10 00 H - 07 G - 2 - N - O - D - LHB (Typical Model Number)

* 316L Stainless Steel on 200 bar (3,000 psi) and 700 bar (10,000 psi) units

** For pressure range 1400 bar (20,000 psi) units, specify RTX1020H-24x-5-x-x-x-xxxx. Available with process connection code 5 only and approvals options O, I or N.

*** Approval codes F and K require electrical entry code N (1/2 - 14 NPT female)

Ordering Information

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

2) Output Configuration

State the required configured range:

- Configured range Low (4 mA) = [desired pressure]
- Configured range High (20 mA) = [desired pressure]

Also known as "ranging," this is used to set the 4-20 mA span, the calibration units and the 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 down-rangeable 100:1 (see 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 within the range of -1 bar to URL, observing the following rules:

- URV - LRV ≥ 1% URL
- If reverse output is required, then LRV > URV and LRV - URV ≥ 1% URL.

Pressure Range Code	MWP	Max. downranging Ratio (Min. Pressure)
07G	3,5 bar/50 psi G	70:1 (50 mbar/0.75 psi)
07A	3.5 bar/50 psi A	35:1 (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*

3) 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		

Note: The display (if fitted) is normally configured for 0.0 - 100.0% FS.

4) Optional Pressure Tests

- This test is optional and may be omitted if not required.
- If the test is required, *Test a, b* or *c* must 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 or 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

Example Ordering Instructions

By following the instructions in this section, a typical order such as the example below will result:

1. Model Number: RTX1000H-07G-2-N-O-D-LHB
2. Configured Range: 4 mA = 0 psi, 20 mA = 40 psi
3. Pressure Units: Hart Code 6, psi
4. Optional Pressure Tests: Test a

www.gemeasurement.com

920-508C