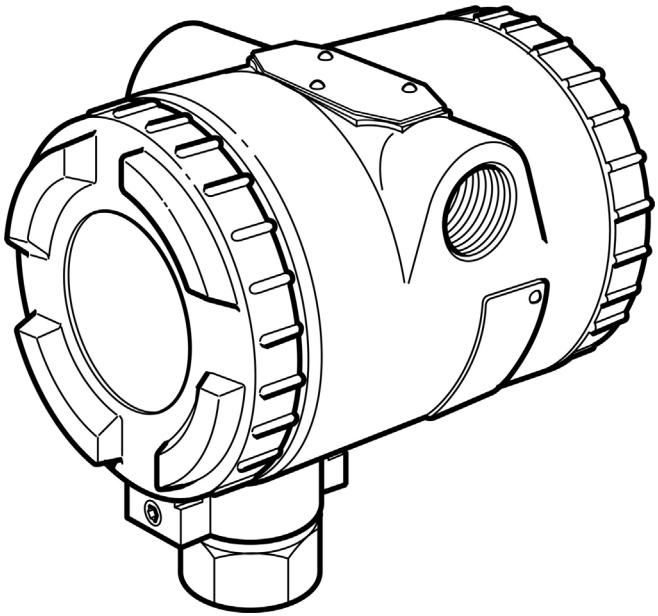
GE Infrastructure
Sensing

Druck RTX 1000H series

HART® Pressure transmitter

User manual - KA297



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Safety

To use this equipment safely, you must use the data and procedures in these publications:

- The “Calibration data and instructions” for the equipment
- The applicable CSA or FM Approvals 'Control Drawing' (Hazardous or Classified areas only)
- This user manual

These publications contain instructions to operate the equipment and maintain it in a safe condition. To prevent damage or injury:

- Obey all warnings and cautions.
- Use the equipment only for the specified applications.
- Operate the equipment only in the specified limits.

To install and use the equipment, use only approved engineers who have the necessary skills and qualifications.

Hazardous (Classified) areas

Some versions of this equipment are certified for use in hazardous (classified) areas. For these versions, GE supplies 'Control Drawings' with additional installation data. The 'Control Drawings' are:

- CSA 'Control Drawing' - KA337
- FM Approvals 'Control Drawing' - KA253

Abbreviations

The abbreviations in this publication are as follows:

Note: Abbreviations are the same in the singular and plural.

a	absolute pressure
A/D	analog to digital
AWG	American wire gage
CSA	Canadian Standards Association
D/A	digital to analog
DAC	digital to analog convertor
DIN	Deutsche Industrie Norm
DIP	dual inline package
DPM	digital pressure module
°C	degrees Celsius
°F	degrees Fahrenheit
EEPROM	electrically erasable programmable read-only memory
EMC	electromagnetic compatibility
FM	Factory Mutual Approvals
FS	full-scale
g	gage pressure
HART®	highway addressable remote transducer
HHC	hand held communicator
in	inch (")
inH_2O	inches of water
IS	intrinsically safe
kg	kilogram
lb	pound
LCD	liquid crystal display
LRL	lower range limit
LRV	lower range value
m	meter
mA	milliampere

max	maximum
mbar	millibar
µF	microfarads
mH	millihenry
min	minimum/minute
mm	millimeter
MWP	maximum working pressure
MSDS	materials specification data sheet
NAMUR	Normenarbeitsgemeinschaft für Mess- und Regeltechnik (An association of users of process control technology)
PCB	printed circuit board
psi	pound-force per square inch
PTFE	polytetrafluoroethylene
PV	primary variable
RH	relative humidity
RTX	Rangeable Transmitter
s	seconds
sg	specific gravity
TSL	terminal straight line
URL	upper range limit
URV	upper range value
V	volt
V d.c.	volts direct current
Ω	ohm

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1 DESCRIPTION

1.1 Introduction

The Druck RTX 1000H series is a process pressure transmitter that measures the pressure of liquid, gas or vapor and gives an analog output proportional to the applied pressure. The transmitter is available in a compact and lightweight metal housing with facilities for direct mounting to pipeline installations. The type of housing is specified in the order.

The transmitter uses the HART® protocol to give digital two-way communication. The HART® protocol gives easy access to the process data and makes it possible to adjust the transmitter operation. For example: to make accurate adjustments to the zero and span. There are also push-buttons and switches on the electronics module to adjust the transmitter operation.

1.2 About the Electronics Housing (Figure 1-1)

The electronics housing contains a digital pressure module (DPM), electronics module, connecting cables and the terminal block.

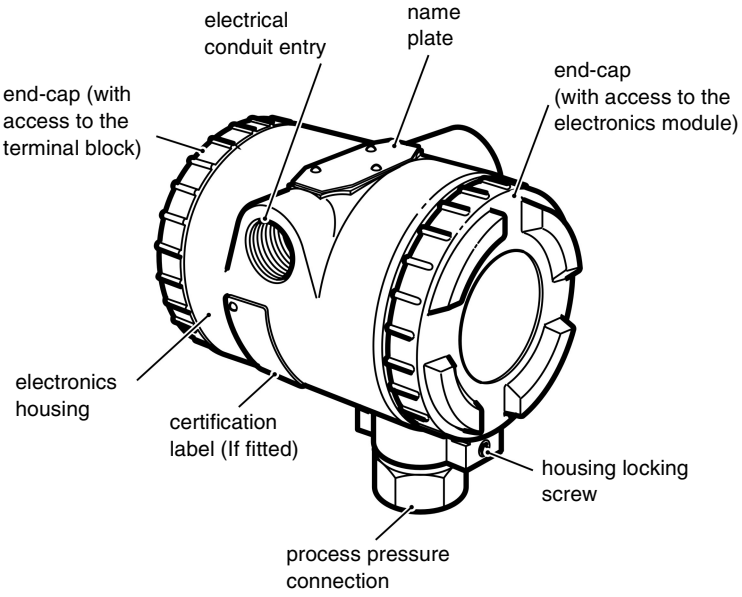


Figure 1-1: General view

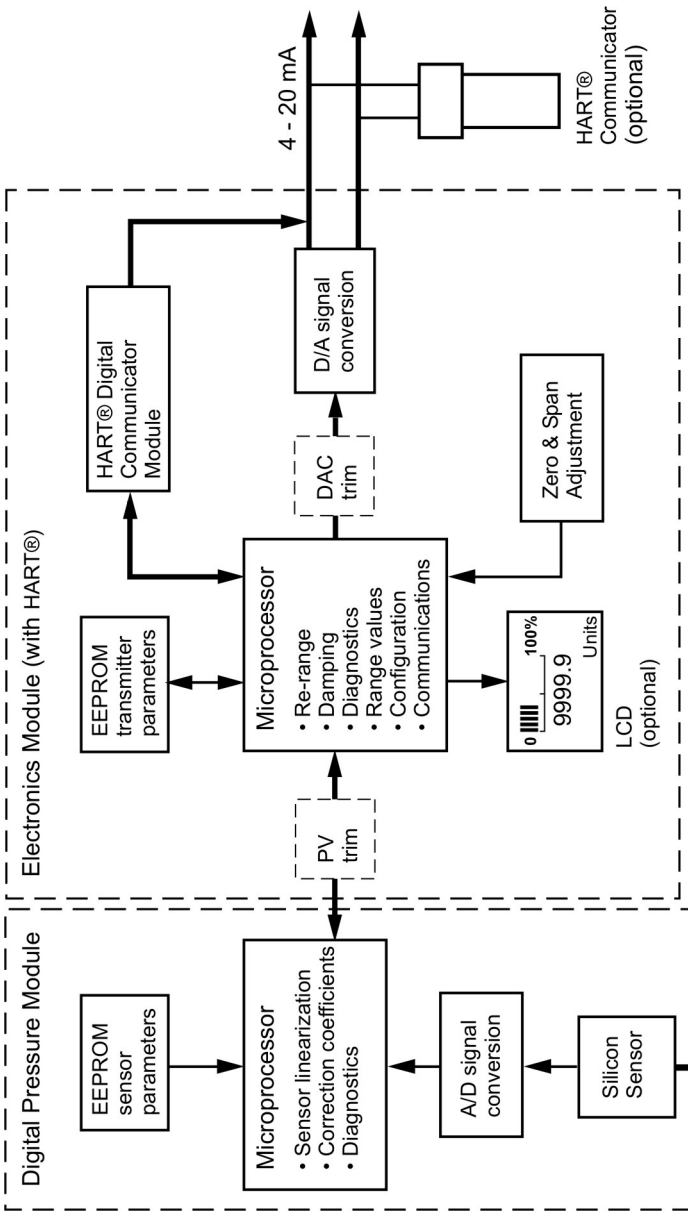


Figure 1-2: Transmitter schematic diagram

Digital Pressure Module (DPM) - (Figure 1-2)

The sensing element in the DPM is constructed from a micro-machined silicon diaphragm assembly bonded to a stainless steel or Hastelloy body. A Hastelloy isolation diaphragm and silicone fluid isolates the sensing element from the process media.

The sensor piezo-resistors, diffused into the surface of the silicon diaphragm, produce a signal in response to applied pressure. The accuracy of the sensor element is enhanced by measuring the residual errors over its operating temperature and pressure range and applying digital compensation in the transmitter electronics.

Electronics Module (Figure 1-2)

The electronics module uses microprocessor technology to give a compact circuit with the minimum of components. The module produces an extremely stable signal unaffected by changes in ambient temperature.

The HART® communication module gives digital two-way communications. The HART® protocol gives easy access to the process data and makes it possible to adjust the transmitter configuration from any point in the loop.

An optional LCD module shows the applied pressure value in two ways:

- as a % of calibrated span represented by a bar graph
- as a value in the applicable engineering units.

The LCD shows the Primary Variable (PV) value for the applied pressure. The LCD value is not affected by the re-range facilities.

1.3 Identification Codes (Table 1-1)

Table 1-1 shows the identification codes for the transmitter. Before you install the transmitter, use this table to make sure that the data on the transmitter is correct.

Table 1-1: Identification codes

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	Notes
07	0 - 30 psi	0 - 0.3 psi	Gage or absolute
10	0 - 100 psi	0 - 1 psi	Gage or absolute
13	0 - 300 psi	0 - 3 psi	Gage or absolute
16	0 - 1,000 psi	0 - 10 psi	Gage or absolute
18	0 - 3,000 psi	0 - 30 psi	Sealed gage or absolute
22	0 - 10,000 psi	0 - 100 psi	Sealed gage or absolute
24	0 - 20,000 psi **	0 - 200 psi	Sealed gage or absolute

Code	Type
A	Absolute
G	Gage *(sealed gage for ranges above 1,000 psi)*

Code	Process Connection
1	G½ female
2	½-14 NPT female
3	G½ male to BS EN 837-1 (DIN 16288)
4	½ NPT male
5	9/16" tube Autoclave Engineers medium pressure, SF562CX20 female ***

Code	Electrical Entry
N	½-14 NPT female (via adaptor)

Code	Electronics Housing	End-caps
0	Aluminum Alloy	Aluminum Alloy
S	Stainless Steel	Nickel plated aluminum bronze

Code	Approvals
0	Safe area
F	FM & CSA IS / Explosionproof / Division 2

Code	Options
0	None
LH	Digital indicator
B	Bracket mounting
T	DIN 3.1B material certificate

Example identification code

RTX10 00 H 07 G 2 N 0 0 0

* Only available with range code 24, process connection code 5. Not available with CSA or FM approval.

** Range code 24 (0-20,000 psi) only applies to RTX 1020 models.

*** Process connection code 5 (autoclave fitting) only applies to range code 24.

2 TECHNICAL DATA

2.1 Pressure Ranges

The transmitter is supplied in one of the standard (zero based) ranges or it can be calibrated to any acceptable intermediate span. Refer to Table 1-1.

The transmitter label shows the factory calibrated range and the maximum working pressure (MWP). The upper range limit (URL) = MWP.

2.2 Environment Data

Service ..... Liquid, gas or vapor
Pollution Degree..... 2
Installation (over-voltage) Category II

Temperature

ambient (Not CSA or FM approved)..... -40°F to +185°F (- 40°C to +85°C)
(LCD Option)..... -4°F to +158°F (- 20°C to +70°C)
ambient (CSA or FM approved) ..... minimum: - 40°F (-40°C)
.....maximum: Refer to the product approval label.
process.....-40°F to +248°F (- 40°C to +120°C)
compensated..... -40°F to +185°F (- 40°C to +85°C)

Humidity limit

.....0 - 100% RH

2.3 Performance Data

Range adjustment

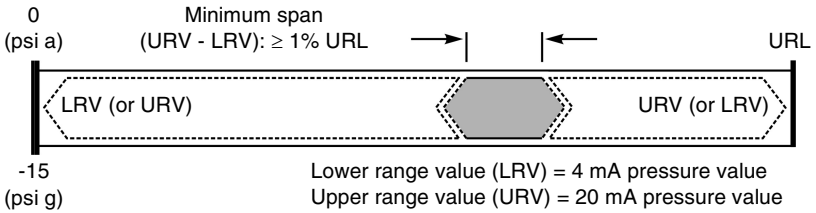


Figure 2-1: Range limits

Figure 2-1 shows the limits for range adjustment. For example:

Span: The minimum span available for a 30 psi device is 0.3 psi (100:1 down-ranging).

Zero offset: A 30 psi (MWP) gage device can give 4 to 20 mA in the range -15 psi to 30 psi. For example: If the span is 0.3 psi, 4 to 20 mA is available anywhere in the range up to a maximum zero offset of 29.7 psi (calibrated range = 29.7 to 30 psi).

Accuracy

For a calibrated span ≥ 10% of URL: 0.075% Terminal Straight Line (TSL).
For a calibrated span < 10% of URL: (0.025% + 0.005 [URL/Span] %TSL.

These values include non-linearity, hysteresis and repeatability.

Long term stability

At standard reference conditions, the maximum change in calibration is not more than 0.2% URL in a five year period.

Time response

Update rate (Compensated pressure reading)..... 100ms
Damping (DIP switch selection) .....0.1 or 1 s to reach 63% of final value
Damping (HART® adjusted).....0.1 to 30 s to reach 63% of final value

Temperature effects

For the compensated temperature range, the maximum output deviation from the room temperature calibration at 73.4°F (23°C):

0.1% configured span + 0.2% reading + 0.1% URL
(where the reading is expressed as % of the configured span)

Mounting position effect

Negligible effect.

Alarm/Error conditions (NAMUR NE 43 compliant)

Alarm output (< 3.6 or > 21 mA)..... DIP Switch selected option (Table 4-1)
(This function is always in operation)
Under range ..... 3.8 mA minimum
Over range .....20.5 mA maximum

An optional LCD module shows the applicable alarm/error data (Table 5-1). If the pressure is not between the upper or lower range limits, the pressure value on the display will flash.

Turn-on time

..... 2 seconds

Electronics housing

Material ..... Aluminum alloy with polyester powder coating
or..... Stainless steel with nickel plated aluminum bronze end-caps
Environmental protection IP67
CSA/FM approved units..... NEMA 4X

Overpressure

These pressure values will not degrade performance:

..... 4 x URL (2,000 psi max) for ranges: 30 psi to 1,000 psi
..... 2 x URL (13,000 psi max) for ranges: 3,000 psi to 10,000 psi
..... 30,000 psi for 20,000 psi range

Pressure containment

These pressures may damage the sensor but there is no leakage of the process media.

..... 6 x URL (3,000 psi max) for ranges: 30 psi to 1,000 psi gage
..... 3,000 psi for ranges up to 1,000 psi absolute
..... 20,000 psi for ranges: 3,000 psi to 10,000 psi sealed gage and absolute
..... 30,500 psi for 20,000 psi range

Process media

A liquid, gas or vapor compatible with a fully welded assembly that includes:

- A Hastelloy C276 diaphragm, and a body that is made of either 316 stainless steel or Hastelloy C276. Complies with NACE MR-01-75.
- Inconel 625 (20,000 psi range, range code 24 only).

Sensor fill fluid

..... Silicone oil

Output current

(two wire configuration) ..... 4 - 20 mA

The output is proportional to the calibrated pressure range. The HART® digital signal is superimposed on the output.

Supply voltage (at the terminals)

Safe area..... 12 to 35 V d.c.

Hazardous (Classified) area..... minimum: 12 V d.c.

..... maximum: Refer to Control Drawing KA253 or KA337 for the applicable conditions

HART® receive impedance data

Transmitter equivalent resistance (Rx) ..... 40 KΩ

Transmitter equivalent capacitance (Cx)..... 13 nF

2.4 Physical Data

Electrical/Process connections

..... Refer to Table 1-1

Dimensions

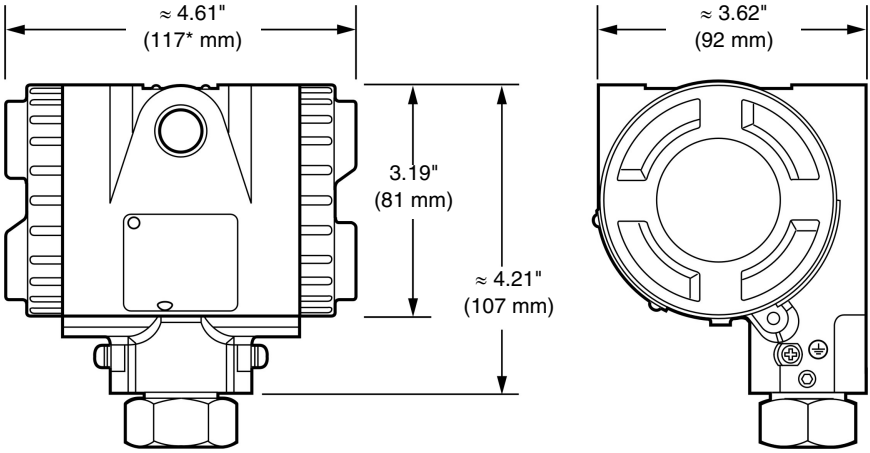
..... Refer to Figure 2-2, 2-3

Weight (without options)

Aluminum housing..... ≈ 2.51 lb (1.14 kg)
Stainless steel housing .....≈ 5.95 lb (2.7 kg)

Options

- Digital indicator: polarity sign + 5 digits, bar graph, and units
  - Aluminum option .....Add ≈ 0.35 lb (0.16 kg)
  - Stainless steel option.....Add ≈ 0.66 lb (0.3 kg)
- Mounting bracket/bolts (stainless steel)
- Material traceability for pressure containment parts to EN10204 3.1B



*LCD indicator option: 5.43" (138 mm)

Dimensions in inches (millimeters) - illustrations not to scale

Figure 2-2: Dimensions (Transmitter)

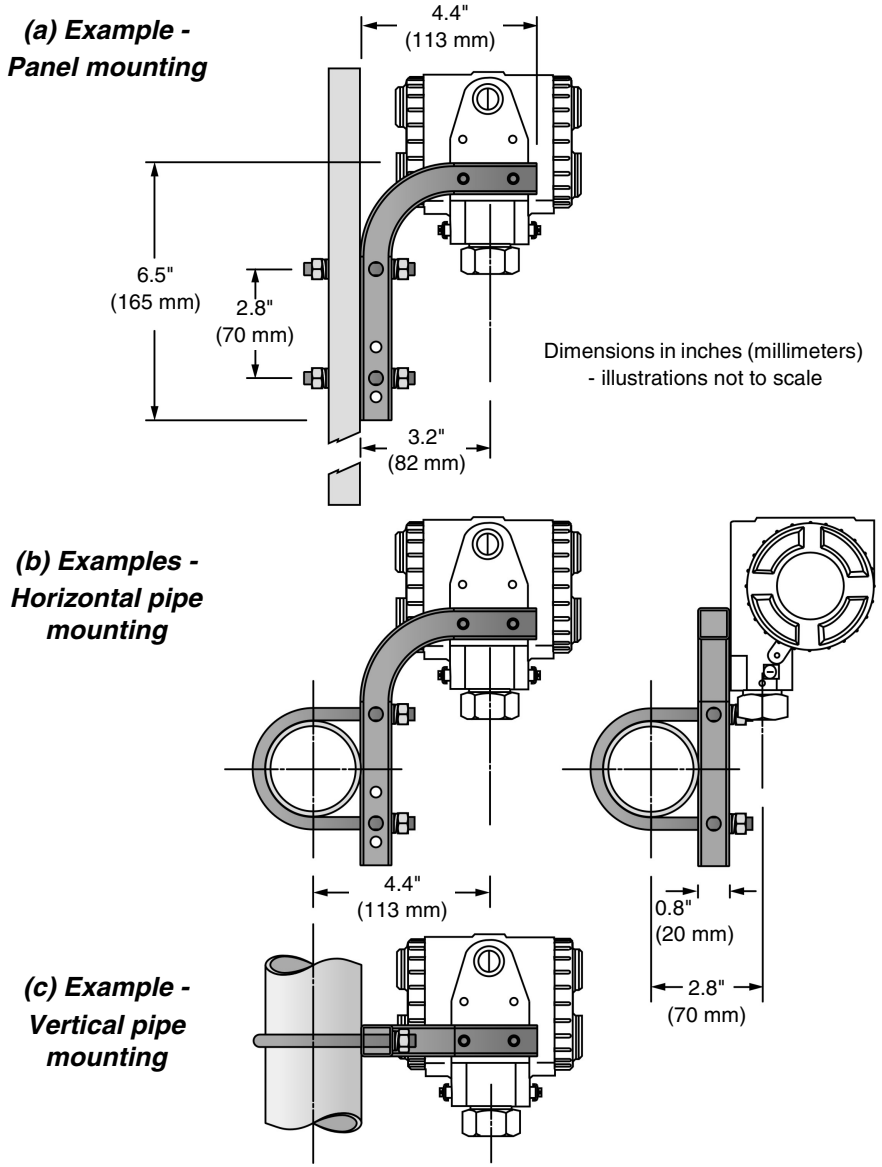


Figure 2-3: Dimensions (Optional mounting bracket)

3 INSTALLATION

Note: If the equipment is certified for use in a hazardous (classified) area, refer to the applicable "Control Drawing" for additional data.

3.1 Introduction

The following procedures detail the correct installation of the unit.

Use qualified plant installation personnel and follow good engineering practice at all times.

WARNINGS:

1. **Observe appropriate local safety instructions.**
2. **Before installation, examine all fittings and equipment for damage and make sure that all equipment is to the correct pressure rating.**
3. **Use the identification code on the transmitter to make sure that it has the correct specification for the installation (refer to Table 1-1).**

3.2 Special Tools and Equipment

The following special tools and equipment are required.

Note: Equivalent substitutes can be used.

Special tools

- Applicable torque wrench
- Druck UPS-II [to measure current output]
- Multimeter [to measure loop resistance]

Materials

- Piping - the necessary length and rating depends on the distances
- Fittings to connect the above items including (but not limited to):
  - Pipe tee (steam or high temperature liquid)
  - Pipe fittings
- Pipe compound or Teflon tape (where local piping codes allow)
- Loctite PST sealant

3.3 Location and Mounting (Figure 3-3)

Although designed to withstand harsh industrial environments, the transmitter should be located to minimize the following:

- Vibration
- Ambient temperature fluctuations
- Physical impact or shock

3.4 To Rotate the LCD Module Thru 90° (Figure 3-1)

If applicable, use the following procedure to turn the optional LCD module in the electronics housing.

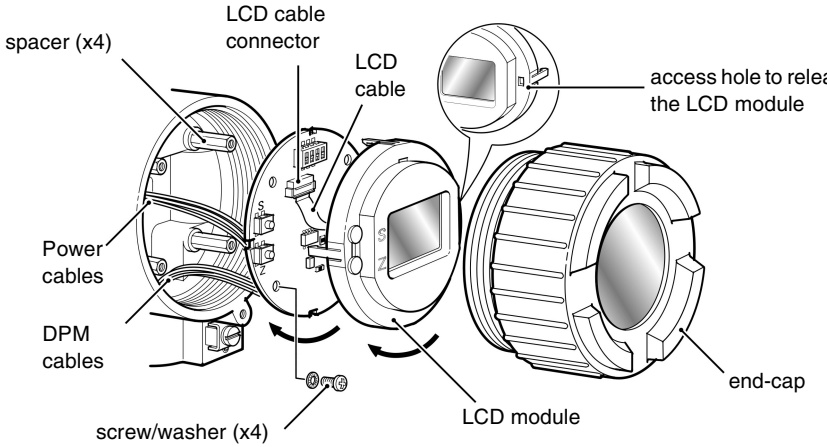


Figure 3-1: LCD module - Turn thru 90°

1. Isolate the power supply to the transmitter.
2. Remove the end-cap.
3. Insert an applicable tool into the access hole and release the first leg of the LCD module. Then carefully release the module.
4. To disconnect the LCD cable, release the clamp on the LCD cable connector and carefully remove the cable.
5. Remove each screw/washer (x4).
6. Turn the PCB thru 90° until the screw holes align with the spacers again.
7. Tighten each screw/washer (x4) back in position, but make sure that there is not too much force on the cables, and that they are not caught.

8. Reconnect the LCD cable.
9. With the LCD module at the correct angle, push the module into the new position until the legs are fully engaged.
10. Attach the end-cap.

3.5 To Rotate the Housing (Figure 3-2)

CAUTION: Do not rotate the electronics housing on the transmitter more than 180 degrees relative to the pressure connection.

Two locking screws (hexagon socket screws) lock the electronics housing to the sensor body. To rotate the housing, loosen both of the screws and rotate the housing. When the angle is correct, tighten the screws.

Note: Do not remove the locking screws.

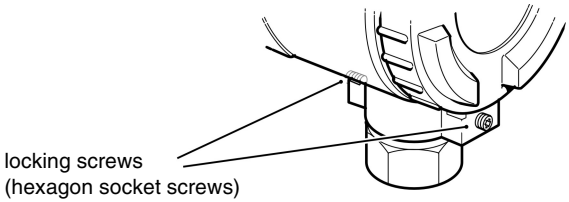


Figure 3-2: Housing locking screws

3.6 Impulse Piping (Figure 3-3)

The purpose of arranging impulse piping for the specific application is to maintain a single phase of fluid in the piping and transmitter. Liquid applications should maintain a liquid state and allow any air or gas formation to travel up and away from the transmitter. Gas applications should allow the formation of liquids to drain down and away from the transmitter.

The pipe or tubing used for connection must be rated for continuous operation at the pipeline designed pressure and temperature. Threaded pipe fittings create voids (where air can be trapped) and increase the possibility of leaks. When installing the connecting tubing or impulse piping, the following apply:

- Horizontally installed impulse piping must slope at least 1" per foot (approximately 75 mm per meter). For liquid and steam applications the piping must slope down towards the transmitter. For gas applications the piping must slope down away from the transmitter.
- Impulse piping should be kept as short as possible and maintained at ambient temperature avoiding fluctuations and gradients.

- Installations outdoors for liquid or saturated gas service may require insulation and heat tracing to prevent freezing.
- For installations where the transmitter is more than 6 feet (1.8 m) from the tapping, the impulse piping must be supported to prevent sagging and vibration.
- Impulse piping must be located in protected areas or against walls or ceilings. If routed across a floor, protective coverings or kick plates must be used. High temperature piping or equipment should be avoided.
- Appropriate pipe sealing compound rated at the design piping temperature must be used on all threaded connections. When making threaded connections between stainless steel fittings, Loctite PST Sealant is recommended.

3.7 The Transmitter Pressure Connections

The recommended connection uses a two-valve manifold connected between the transmitter and the process pressure. Before connecting the transmitter remove the protection caps and carefully inspect the sealing face and threaded bore of the connection for damage.

Liquid service connections (Figure 3-3a)

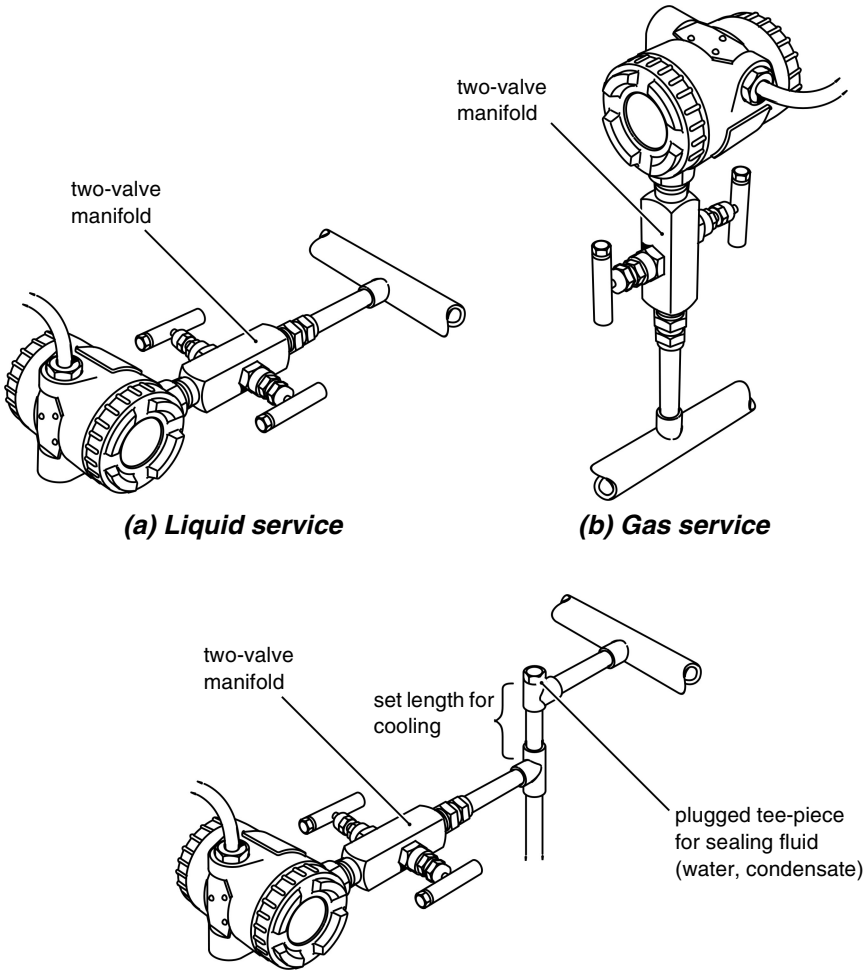
Liquid measurement connections should be made to the side of the process line to avoid deposits of sediment. The transmitter should be mounted beside or below the connection so that gases vent into the process line.

Gas service connections (Figure 3-3b)

Gas measurement connections should be made to the top or side of the process line. The transmitter should be mounted beside or above the connection allowing any liquid to drain into the process line.

Steam service connections (Figure 3-3c)

Steam measurement connections should be made to the side of the process line. The transmitter should be mounted below the connection so that the piping remains filled with condensate. Live steam must not come into contact with the transmitter; to prevent this the lines should be filled with water or condensate.



(a) Liquid service

(b) Gas service

(c) Steam service

Figure 3-3: Piping arrangements

3.8 Liquid Level Measurement

Gage pressure transmitters can be used to measure liquid level in an open or vented tank by measuring the hydrostatic pressure head. The head pressure can be calculated by multiplying the liquid height above the transmitter diaphragm by the specific gravity of the liquid.

The tank's volume and shape does not affect the head pressure. If the transmitter is mounted below the zero point (minimum level) of the measured range, zero suppression will be required.

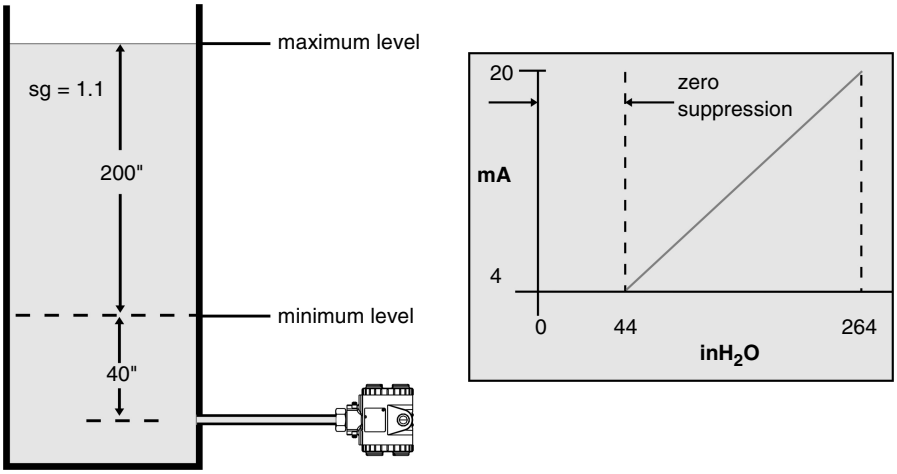


Figure 3-4: Open tank level measurement

Calculations

Min. level	=	(40" x 1.1) inH_2O
	=	44" inH_2O
Max level	=	([40 + 200] x 1.1) inH_2O
	=	(240 x 1.1) inH_2O
	=	264 inH_2O
Range	=	44 to 264 inH_2O
(Span	=	220 inH_2O)

3.9 Electrical Data

Note: If the equipment is certified for use in a hazardous (classified) area, refer to the applicable "Control Drawing" for additional data.

WARNING: Switch off and isolate the power supply before connecting or disconnecting the transmitter.

CAUTIONS:

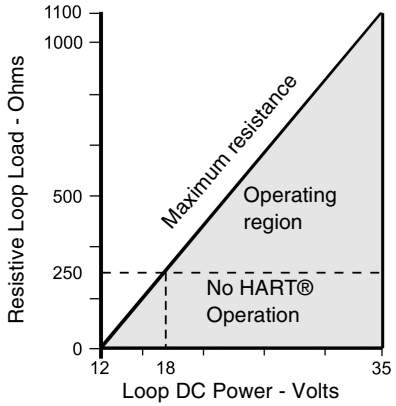
1. **The transmitter uses DC power in a 2-wire system to control current through a resistive load.**
2. **Do not apply more than 35 Volts to the loop circuit. The transmitter may be damaged.**

General

The electrical installation must comply with local wiring codes and standards. To get the full performance from the transmitter, carefully choose the wiring scheme to be used and take care connecting the transmitter.

Power and maximum load (Figure 3-5)

The total loop resistance must include the connection wire resistance.



Note:

For HART® operation, the minimum loop resistance is 250 Ω.

Figure 3-5: Power and load requirements

Wire selection (Table 3-1)

To get the best EMC performance, use shielded twisted pair cable for the field wiring.

- Select a wire gage for the required total length so the transmitter operates within the load requirements.
- When using external power supplies, make sure the connection polarity allows current to flow into the +ve terminal and out of the -ve terminal. Refer to Figure 3-7.

Table 3-1: Wire resistance

AWG	Wire Diameter		Loop Resistance	
	Inches	mm	Ohms/Foot	Ohms/Meter
16	0.0508	1.291	0.0082	0.0264
18	0.0403	1.024	0.0128	0.0418
20	0.0320	0.812	0.0204	0.0666
22	0.0254	0.644	0.0322	0.1060
24	0.0201	0.511	0.0514	0.1680

Note: The typical values for resistance per length are doubled as the circuit is a direct current loop.

Electrical conduit (Figure 3-6)

Use electrical conduit in accordance with local wiring codes. The electronics housing has two threaded holes for electrical conduit connections. The configuration in Figure 3-6 prevents moisture getting into the housing. If conduit is not used, use the correct cable gland/plugs to seal the housing.

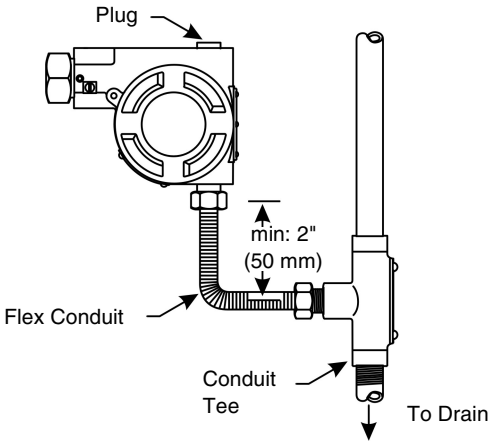
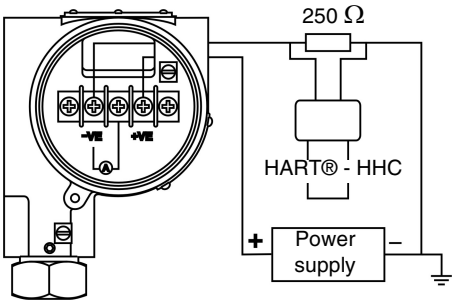


Figure 3-6: Electrical conduit configuration

Electrical connections (Figure 3-7)

The transmitter is a 2-wire loop powered device. The marks +ve and -ve identify the polarity of the connection terminals.

A label in the transmitter shows how to use the third terminal to measure the output current from the transmitter. In hazardous (classified) areas, do not use this third terminal.



Note:

For HART® operation, the minimum loop resistance is 250 Ω.

Figure 3-7: Transmitter connections

Because the transmitter circuit is isolated from the housing, one of the signal wires (+ve or -ve) can be earthed (grounded) if necessary.

3.10 System Checks

Leak test

Before the system is filled and/or commissioned, do a leak test with compressed air (or other inert compressed gas) or water. The minimum test pressure must be equal to the normal operating pressure. The maximum pressure is the MWP.

- Apply pressure at a convenient point on the system.
- Apply an applicable leak test solution to the impulse piping, valves, transmitter connections and joints.
- Look for a continuous stream of bubbles.
- Bleed the system.
- Do all the necessary repairs, and test the system again.
- Return the system to the original configuration.

Transmitter test

Connect the necessary instruments to monitor the pressure signal. If necessary, connect a milliammeter to measure the output from the transmitter.

- Apply power to the transmitter.
- Apply the applicable pressure.
- Monitor the pressure signal.

Refer to the 'Operation' section for the procedures to set up and operate the transmitter.

4 OPERATION

Note: If the equipment is certified for use in a hazardous (classified) area, refer to the applicable "Control Drawing" for additional data.

4.1 General

CAUTION: DO NOT over-pressurize the system.

Pressure ranges

The transmitter label shows the factory calibrated range and the maximum working pressure (MWP).

Start up procedure

When power is supplied to the transmitter, the output is set to the applicable alarm level (Refer to Table 4-1). When the start up sequence is complete, the output changes to give the applicable process value.

During start up, the display (if applicable) shows the parameter data for the transmitter. This includes:

1. SOFTWARE: Software version
2. UNITS: Pressure units
3. URV: Upper Range Value + applicable units
4. LRV: Lower Range Value + applicable units
5. TRANSFER: Shows that the transmitter uses a linear transfer function
6. DAMPING: Damping value in seconds
7. EE PROTECT: Write protect status (on/off)
8. ALARM: Specified alarm level (high: > 21 mA, low: < 3.6 mA)

When the start up sequence is complete, the display shows the PV value for the applied pressure and the applicable units (Figure 4-1).

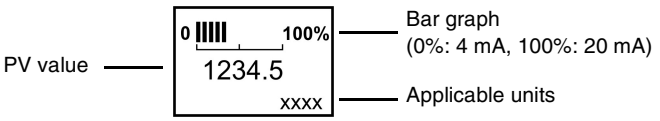


Figure 4-1: Display - Normal operation

Alarm/Error conditions

Refer to the 'Maintenance' section.

4.2 Manual Configuration Facilities (Figure 4-2)

The manual configuration facilities (DIP switches and push buttons) are in the electronics module. To get access to the electronics module:

1. Remove the end-cap (with access to the electronics module).
2. If applicable, release the LCD module to get access to the DIP switches.
   - Insert an applicable tool into the access hole, and release the first leg of the LCD module. Then carefully release the module.

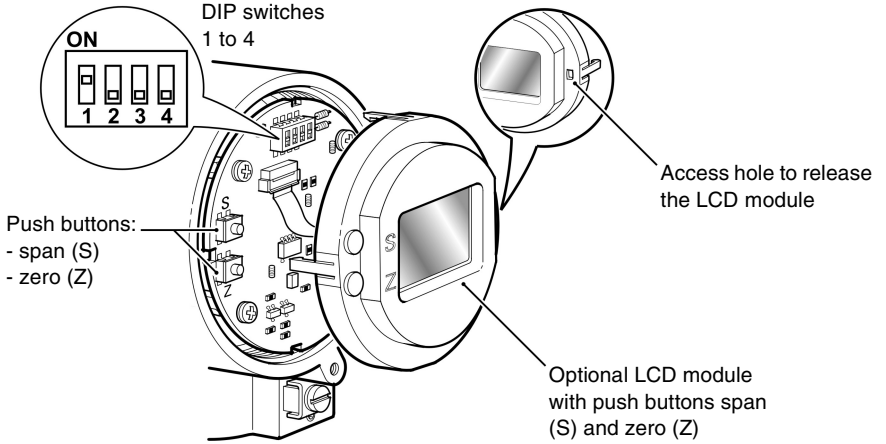


Figure 4-2: Location of DIP switches and push buttons

Table 4-1: DIP switch operation

DIP Switch	Function	Set ON	Set OFF
1	Write Protection	To prevent accidental changes to the EEPROM values.	1) To change values for span and zero. 2) To set up the display - if applicable.
2	Alarm level	To use the high NAMUR alarm (> 21 mA) when there is a transmitter fault.	To use the low NAMUR alarm (< 3.6 mA) when there is a transmitter fault.
3	Damping	To use the ON_Damping factor. Default = 1 s	To use the OFF_Damping factor. Default = 0.1 s
4	Not used	-	-

4.3 Manual Configuration - Calibration

To get accurate results, do the calibration in conditions where the pressure and temperature are stable.

Equipment

- A precision pressure calibrator such as the Druck DPI 605 or DPI 610/615. The accuracy of the supplied pressure must be better than ±0.075%.
- In safe areas, a 12 to 35 Volt DC power supply (separate or part of another system)
- Fittings and tubing as required

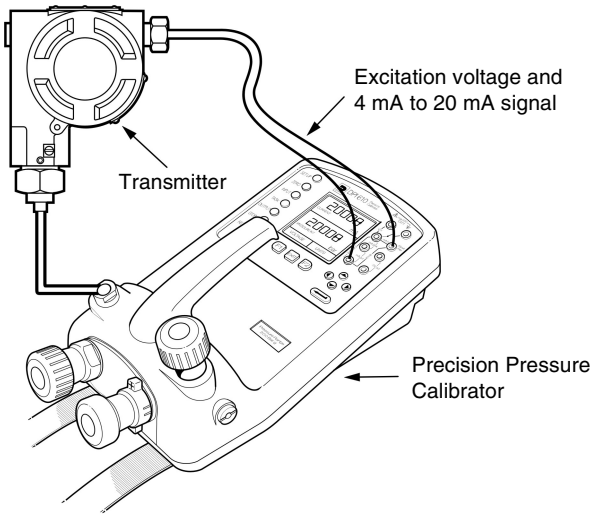


Figure 4-3: Calibration set-up for safe areas

Calibration ranges

Set any span value from 1 - 100% of the URL. Refer to the 'Technical Data' section.

Procedure to adjust the range (No LCD)

1. Set DIP switch 1 to OFF (write protect - OFF).
2. To set the pressure for the lower range value (LRV):
   a. Press the S and Z buttons together, and supply the LRV pressure.
   b. To set the LRV, press the Z button.
3. To set the pressure for the upper range value (URV):
   a. Press the S and Z buttons together, and supply URV pressure.
   b. To set the URV, press the S button.
4. To prevent accidental changes to the new values, set DIP switch 1 to ON.

To leave the set up procedure without saving a value:

- Press the S and Z buttons together OR
- Do not press the buttons for 25 seconds.

If a value is not in the applicable range, the value is ignored.

Procedure to adjust the range (LCD option) - (Figure 4-4)

Note: The push buttons on the LCD module only work when it is attached to the PCB.

1. Set DIP switch 1 to OFF (write protect - OFF).
2. Press S and Z together:
3. Press Z:

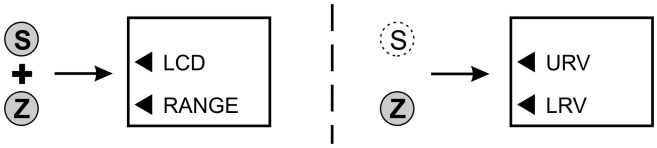


Figure 4-4: LCD - Range selection

4. To set the pressure for the lower range value (LRV):
   a. Supply the applicable LRV pressure.
   b. Press the Z button.
5. To set the pressure for the upper range value (URV):
   a. Supply the applicable URV pressure.
   b. Press the S button.
6. To prevent accidental changes to the new values, set DIP switch 1 to ON.

   Note: The LCD shows the PV value for the applied pressure. The LCD value is not affected by the re-range facilities. Refer to the 'Description' section.

To leave the set up procedure without saving a value:

- Press the S and Z buttons together OR
- Do not press the buttons for 25 seconds.

If a value is not in the applicable range, the display shows error code 00. The specified value is ignored.

4.4 Manual Configuration - LCD (Figure 4-5)

There are three items to set up for the optional LCD: the pressure units, the decimal point position, and the display contrast.

Note: The push buttons on the LCD module only work when it is attached to the PCB.

1. Set DIP switch 1 to OFF (write protect - OFF).
2. Press S and Z together:
3. Press S:

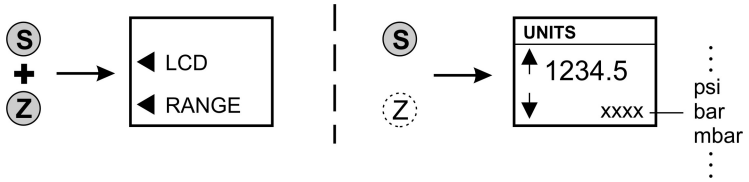


Figure 4-5: Selection sequence - LCD configuration

4. UNITS: Use the S and Z buttons to step through the available units.

   Wait 5 seconds or press S and Z together to go to the DECIMAL display.
5. DECIMAL: Use the S and Z buttons to move the decimal position. There is a maximum number of decimal places for each unit.

   Wait 5 seconds or press S and Z together to go to the CONTRAST display.
6. CONTRAST: Use the S and Z buttons to adjust the contrast.

   Wait 5 seconds or press S and Z together to return to normal operation.
7. To prevent accidental changes to the new values, set DIP switch 1 to ON.

5 MAINTENANCE

Note: If the equipment is certified for use in a hazardous (classified) area, refer to the applicable "Control Drawing" for additional data.

5.1 General

The transmitter contains no moving parts and requires a minimum of maintenance.

Visual inspection

- Inspect the transmitter for damage and corrosion. Any damage to the transmitter must be assessed. If the housing is no longer sealed against water and/or dust, the transmitter must be replaced.

Cleaning

- Clean the transmitter case with a damp lint-free cloth and mild detergent.
- Corrosion must be removed and the area of corrosion cleaned and, if necessary, neutralized.
- If the product has been in contact with hazardous or toxic materials, obey all the applicable MSDS references and precautions when handling.

5.2 Fault Finding

If the measured pressure goes above URV or goes below LRV, the output signal will saturate at the following values:

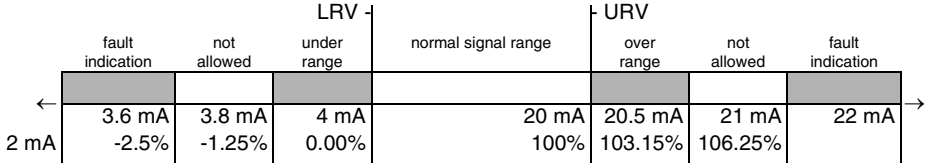


Figure 5-1: Fault finding from the output signal

Fault indications

If there is a specified fault condition, the transmitter output changes to the specified NAMUR alarm level. The alarm level is set by the position of DIP switch 2 (refer to Table 4-1).

If applicable, the optional display shows an alarm code to help identify the fault. Table 5-1 shows some of the codes. If there are several fault conditions, the alarm code is the sum of all the applicable codes.

Table 5-1: LCD alarm/error codes

Code	Possible cause	To correct the error
⚠ 02 ALARM	Too much positive or negative pressure.	Supply pressure in the specified limits for the device.
	DPM error	Power off, wait 25 seconds, then power on again.
⚠ 04 ALARM	DPM data not received	Power off, wait 25 seconds, then power on again.
	LCD adjustment has loosened the DPM cable connection on the PCB.	Examine the DPM cable connection (Figure 3-1).
⚠ 08 ALARM	LCD adjustment has loosened the DPM cable connection on the PCB.	Examine the DPM cable connection (Figure 3-1).
⚠ 00 ERROR	Configuration error. The range is not in the specified limits for the device.	Refer to section 2 for the specified range limits.
	Configuration error. DIP switch 1 set to ON (Write protect).	Set DIP switch 1 to OFF, then follow the procedures in Section 4.

If you cannot identify the code or the fault condition does not change, contact an approved service agent.

Over/under range

If the measured pressure goes above or below the set range of the transmitter, the electronics module causes the transmitter output to change.

When the measured pressure is under range, the transmitter output continues below the 4.0 mA level until it reaches 3.8 mA (Figure 5-1). When the measured pressure is over range, the transmitter output continues above the 20.0 mA level until it reaches 20.5 mA (Figure 5-1).

If applicable, the optional display will also show a flashing pressure value.

5.3 Returned Goods Procedure

To repair or calibrate the transmitter, return it to the applicable GE Service Department.

To contact our Service Department, select “Contact Us”” on the web site: www.gesensing.com, and get a Returned Material Authorization (RMA) number.

Please supply these details:

Product (i.e. RTX 1000H)

Pressure range

Serial number

Details of defect/work to be undertaken

Calibration traceability requirements

Operating conditions

Safety Precautions

To prevent possible injury when we receive the product, you must also tell us if the product has been in contact with hazardous or toxic materials. Please supply the applicable MSDS references and precautions.

Important Notice

Service or calibration by unauthorized sources will affect the warranty and may not guarantee further performance. If the equipment has “Hazardous (Classified) area” approval, the approval will also be invalid.