Rosemount™ 1408H Level Transmitter

Non-Contacting Radar

- Optimized for food and beverage applications
- Hygienically certified to 3-A° and EHEDG, process wetted parts comply with FDA and EC 1935/2004
- Designed to withstand tank cleaning processes as well as external washdowns (IP69 and IP6K9K rated)
- 4-20 mA output and IO-Link deliver ease of integration to existing or new systems
- Cost-effective FMCW radar with 80 GHz technology
Introduction

Optimized for food and beverage applications

The Rosemount 1408H Level Transmitter provides accurate continuous level measurements in the food and beverage industry. The transmitter is hygienically certified to 3-A® and EHEDG, and the process wetted parts comply with FDA and EC 1935/2004. It is designed to withstand clean-in-place (CIP) and steam-in-place (SIP) processes as well as external washdowns (IP69 and IP6K9K rated).

Figure 1: Features and Benefits

A. Polished stainless steel housing
B. M12 connector for simple commissioning
C. Wide choice of hygienic adapters
D. CIP/SIP capable

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Wide variety of connections

The G1 process connection is compatible with a full suite of hygienic process connection adapters. Furthermore, the compact design of the transmitter allows it to be installed in tight spaces and small vessels.

![Image of transmitter installation](image)

Easy integration with IO-Link

The Rosemount 1408H provides both conventional 4-20 mA and digital switch outputs, enabled by IO-Link connectivity. This supports easy integration into any automation system.

Each IO-Link system consists of an IO-Link master and one or more IO-Link devices (sensors and actuators). The connection between the master and the device is established via unshielded standard cables using standard connectors such as M12. Process data, events and parameters are transferred to the master via IO-Link. The IO-Link master then transfers the data to the controller (PLC) and its fieldbus or industrial ethernet network.

**Figure 2: Example of an IO-Link System**

![Diagram of IO-Link system](image)

- A. Industrial ethernet
- B. Programmable logic controller (PLC)
- C. Industrial Fieldbus
- D. IO-Link master
- E. IO-Link devices

Non-contacting radar technology

Non-contacting radar technology is ideal for a wide range of applications as it is maintenance-free, has a top-down installation that reduces the risk of leakages, and is unaffected by process conditions such as density, viscosity, temperature, pressure, and pH.

The Rosemount 1408H uses Frequency Modulated Continuous Wave (FMCW) technology and smart algorithms to maximize measurement accuracy and reliability, even in small tanks and challenging fast-filling vessels.
Application examples

Storage tank
Gain insights into your tank and ensure production runs smoothly without interruption.

Mixing tanks
Ensure correct filling and storage levels in tanks with agitators.

Batch filling
Optimize the batch filling process.

CIP process
Reliable level measurement during and after cleaning, plus optimization of cleaning agent storage.
Ordering information

Online product configurator

Many products are configurable online using our Product Configurator. Select the Configure button or visit our website to start. With this tool’s built-in logic and continuous validation, you can configure your products more quickly and accurately.

Specifications and options

See the Specifications and options section for more details on each configuration. Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See the Material selection section for more information.

Related information

Performance specifications
Functional specifications
Physical specifications
Material selection

Model codes

Model codes contain the details related to each product. Exact model codes will vary; an example of a typical model code is shown in Figure 3.

Figure 3: Model Code Example

<table>
<thead>
<tr>
<th>1408H</th>
<th>CA Q4 Q8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

1. Required model components
2. Additional options (variety of features and functions that may be added to products)

Note

Additional options will not be included in the model string printed on the Rosemount 1408H transmitter. For product reorder, make sure to include any desired optional options in the model string.
Rosemount 1408H Level Transmitter

The Rosemount 1408H is a non-contacting radar transmitter for continuous level measurements primarily in the food and beverage industry.

Required model components

Model

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Thread type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1408H</td>
<td>Level Transmitter</td>
<td>G1</td>
</tr>
</tbody>
</table>

Additional options

Process connection type
The hygienic process connection adapter comes with an EPDM O-ring. Other O-Rings are available as accessories.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>1½-in. Tri Clamp (ISO 2852 / DIN 32676)</td>
<td>3-A®, EHEDG, FDA, CRN</td>
</tr>
<tr>
<td>C2</td>
<td>2-in. Tri Clamp (ISO 2852 / DIN 32676)</td>
<td>3-A, EHEDG, FDA, CRN</td>
</tr>
<tr>
<td>DC</td>
<td>DN32 Dairy Coupling (DIN 11851)</td>
<td>FDA</td>
</tr>
<tr>
<td>DA</td>
<td>DN40 Dairy Coupling (DIN 11851)</td>
<td>FDA</td>
</tr>
<tr>
<td>D2</td>
<td>DN50 Dairy Coupling (DIN 11851)</td>
<td>FDA</td>
</tr>
<tr>
<td>VF</td>
<td>VARIVENT® Type F</td>
<td>3-A, EHEDG, FDA</td>
</tr>
<tr>
<td>VN</td>
<td>VARIVENT Type N</td>
<td>3-A, EHEDG, FDA</td>
</tr>
<tr>
<td>WD(1)</td>
<td>D50 weld-in adapter</td>
<td>3-A, EHEDG, FDA, CRN</td>
</tr>
<tr>
<td>BZ</td>
<td>Mounting bracket including lock nut</td>
<td>N/A</td>
</tr>
</tbody>
</table>

(1) A welding mandrel is available as accessory.

Related information

Type 1 Drawing

Special quality assurance

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4</td>
<td>Calibration data certificate</td>
</tr>
</tbody>
</table>

Material traceability certification
Not available with mounting bracket.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q8</td>
<td>Material traceability certification per EN 10204 3.1 (2.1 for non-metallic)</td>
</tr>
</tbody>
</table>
# Spare parts and accessories

## Hygienic process connection adapters

<table>
<thead>
<tr>
<th>Description</th>
<th>Approval</th>
<th>Material certificate</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1½-in. Tri Clamp (ISO 2852 / DIN 32676)</td>
<td>3-A®, EHEDG, FDA, CRN</td>
<td>Yes</td>
<td>FB-1001Q8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>FB-1001</td>
</tr>
<tr>
<td>2-in. Tri Clamp (ISO 2852 / DIN 32676)</td>
<td>3-A, EHEDG, FDA, CRN</td>
<td>Yes</td>
<td>FB-1002Q8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>FB-1002</td>
</tr>
<tr>
<td>DN32 Dairy Coupling (DIN 11851)</td>
<td>FDA</td>
<td>Yes</td>
<td>FB-1020Q8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>FB-1020</td>
</tr>
<tr>
<td>DN40 Dairy Coupling (DIN 11851)</td>
<td>FDA</td>
<td>Yes</td>
<td>FB-1021Q8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>FB-1021</td>
</tr>
<tr>
<td>DN50 Dairy Coupling (DIN 11851)</td>
<td>FDA</td>
<td>Yes</td>
<td>FB-1022Q8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>FB-1022</td>
</tr>
<tr>
<td>VARIVENT® Type F</td>
<td>3-A, EHEDG, FDA</td>
<td>Yes</td>
<td>FB-1010Q8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>FB-1010</td>
</tr>
<tr>
<td>VARIVENT Type N</td>
<td>3-A, EHEDG, FDA</td>
<td>Yes</td>
<td>FB-1011Q8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>FB-1011</td>
</tr>
<tr>
<td>DS0 Weld-in Adapter</td>
<td>3-A, EHEDG, FDA, CRN</td>
<td>Yes</td>
<td>FB-1041Q8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>FB-1041</td>
</tr>
<tr>
<td>G1 Welding Mandrel(3)</td>
<td>N/A</td>
<td>No</td>
<td>FB-6041</td>
</tr>
</tbody>
</table>

(1) The adapter comes with an EPDM O-ring. Other O-Rings are available.
(2) Material Traceability Certification per EN 10204 3.1.
(3) Absorbs heat and prevents warping during welding of FB-1041.

## Hygienic adapter O-rings

<table>
<thead>
<tr>
<th>Description</th>
<th>Approval</th>
<th>Pack quantity</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FKM</td>
<td>3-A, FDA</td>
<td>1 pc</td>
<td>FB-3001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 pcs</td>
<td>FB-3002</td>
</tr>
<tr>
<td>EPDM</td>
<td>3-A, EHEDG, FDA</td>
<td>5 pcs</td>
<td>FB-3003</td>
</tr>
</tbody>
</table>
### Process connection adapters and flanges

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-in. flange for non-pressurized applications</td>
<td>01408-5000-0002</td>
</tr>
<tr>
<td>3-in. flange for non-pressurized applications</td>
<td>01408-5000-0003</td>
</tr>
<tr>
<td>4-in. flange for non-pressurized applications</td>
<td>01408-5000-0004</td>
</tr>
<tr>
<td>1½-in. NPT thread</td>
<td>01408-5000-0005</td>
</tr>
<tr>
<td>2-in. NPT thread</td>
<td>01408-5000-0006</td>
</tr>
<tr>
<td>D50 weld adapter</td>
<td>01408-5000-0007</td>
</tr>
</tbody>
</table>

### Mounting bracket

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting bracket including antenna extension and lock nut</td>
<td>01408-5000-0001</td>
</tr>
</tbody>
</table>

### Cables and connectors

<table>
<thead>
<tr>
<th>Description</th>
<th>Length</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hygienic wireable terminal connector - M12 female (angled) to screw terminals</td>
<td>N/A</td>
<td>FB-4000</td>
</tr>
<tr>
<td>Hygienic cable - M12 female (angled) to flying lead (4 x 22AWG)</td>
<td>6.6 ft. (2 m)</td>
<td>FB-4002</td>
</tr>
<tr>
<td></td>
<td>16.4 ft. (5 m)</td>
<td>FB-4005</td>
</tr>
<tr>
<td></td>
<td>32.8 ft. (10 m)</td>
<td>FB-4010</td>
</tr>
<tr>
<td></td>
<td>65.6 ft. (20 m)</td>
<td>FB-4020</td>
</tr>
<tr>
<td></td>
<td>164 ft. (50 m)</td>
<td>FB-4050</td>
</tr>
<tr>
<td>Hygienic patch cable - M12 female (angled) to M12 male</td>
<td>1.97 ft. (0.6 m)</td>
<td>FB-4106</td>
</tr>
<tr>
<td></td>
<td>3.3 ft. (1 m)</td>
<td>FB-4101</td>
</tr>
<tr>
<td></td>
<td>6.6 ft. (2 m)</td>
<td>FB-4102</td>
</tr>
<tr>
<td></td>
<td>16.4 ft. (5 m)</td>
<td>FB-4105</td>
</tr>
<tr>
<td></td>
<td>32.8 ft. (10 m)</td>
<td>FB-4110</td>
</tr>
</tbody>
</table>

(1) For IO-Link, the maximum cable length is 65.6 ft. (20 m) between device and master.

### IO-Link Masters

<table>
<thead>
<tr>
<th>Description</th>
<th>IO-Link ports</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosemount IO-Link Master Hub with PROFINET® interface</td>
<td>4</td>
<td>FB-5104</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>FB-5108</td>
</tr>
<tr>
<td>Rosemount IO-Link Master Hub with EtherNet/IP® interface</td>
<td>4</td>
<td>FB-5204</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>FB-5208</td>
</tr>
<tr>
<td>Rosemount IO-Link USB Communicator</td>
<td>1</td>
<td>FB-5301</td>
</tr>
</tbody>
</table>
Configuration software

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosemount IO-Link Assistant</td>
<td>FB-5401</td>
</tr>
</tbody>
</table>

Performance specifications

General

Reference conditions

- Measurement target: Stationary metal plate, no disturbing objects
- Temperature: 59 to 77 °F (15 to 25 °C)
- Ambient pressure: 14 to 15 psi (960 to 1060 mbar)
- Relative humidity: 25-75%
- Damping: Default value, 2 s

Instrument accuracy (under reference conditions)

±0.08 in. (±2 mm)(1)

Repeatability

±0.04 in. (±1 mm)

Ambient temperature effect

±0.04 in. (±1 mm)/10 K

Sensor update rate

Minimum 1 update per second (typically 5 updates per second)

Maximum level rate

200 mm/s

Measuring range

Maximum measuring range

33 ft. (10 m)(2)

---

(1) Refers to inaccuracy according to IEC 60770-1 when excluding installation dependent offset. See the IEC 60770-1 standard for a definition of radar specific performance parameters and if applicable corresponding test procedures.

(2) Measurement is possible up to 49 ft. (15 m) if there is good reflection of the product surface (dielectric constant >10, i.e. water based media). Note though that a combination of adverse process conditions, such as heavy turbulence, foam, and condensation, together with products with poor reflection may affect the measuring range.
Accuracy over measuring range

Figure 4 illustrates the accuracy over measuring range at reference conditions.

Figure 4: Accuracy Over Measuring Range

- **A. Device Reference Point**
- **B. Accuracy in inches (millimeters)**
- **C. Distance in inches (millimeters)**

Environment

**Vibration resistance**

2 g at 10-1000 Hz according to IEC 61298-3, level “field with general application”

**Electromagnetic compatibility (EMC)**

- EMC Directive (2014/30/EU): EN 61326-1
- NAMUR recommendations NE21 (only 4-20 mA output)

**Pressure Equipment Directive (PED)**

Complies with 2014/68/EU article 4.3

**Radio approvals**

  - ETSI EN 302 372
  - EN 62311
- Part 15 of the FCC Rules
- Industry Canada RSS 211

**Related information**

Product certifications
Functional specifications

General

Field of application
Continuous level measurements in the hygienic industry.

Minimum dielectric constant
2

Measurement principle
Frequency Modulated Continuous Wave (FMCW)

Frequency range
77 to 81 GHz

Maximum output power
3 dBm (2 mW)

Internal power consumption
< 2 W (normal operation at 24 Vdc, no outputs)
< 3.6 W (normal operation at 24 Vdc, digital and analog outputs active)

Humidity
0 - 100% relative humidity, non-condensing

Turn-on time
< 15 s(3)

Outputs
The transmitter provides two configurable outputs:

- Output 1  Digital output / IO-Link mode
- Output 2  Digital output or active 4-20 mA analog output

Digital output
Switching signal for high and low level limits (using the same pin)

(3) Time from when power is applied to the transmitter until performance is within specifications.
**Output type**
PNP/NPN configurable

**Switching function**
Normally open

**Permanent current rating**
< 50 mA

**Maximum voltage drop**
2.5 V

**4-20 mA analog output**

**Load limitations**
Maximum loop resistance is determined by the voltage level of the external power supply:

Maximum Loop Resistance = \(43.5 \times (\text{External Power Supply Voltage} - 18) + 600 \ \Omega\)

**Figure 5: Load Limits**
![Diagram showing load limits]

A. Loop Resistance (Ω)
B. External Power Supply Voltage (Vdc)

**Analog signal on alarm**
The transmitter automatically and continuously performs self-diagnostic routines. If a failure or a measurement error is detected, the analog signal will be driven offscale to alert the user. High or low failure mode is user-configurable.

**Table 1: Signal on Alarm**

<table>
<thead>
<tr>
<th>Level</th>
<th>Custom levels</th>
<th>NAMUR NE43 (default)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>3.5 to 4.0 mA</td>
<td>3.5 mA (NAMUR ≤ 3.6 mA)</td>
</tr>
<tr>
<td>High</td>
<td>20.0 to 22.5 mA</td>
<td>21.5 mA (NAMUR ≥ 21.0 mA)</td>
</tr>
</tbody>
</table>
**Analog saturation levels**
The transmitter will continue to set a current that corresponds to the measurement until reaching the associated saturation limit (and then freeze).

**Table 2: Saturation Levels**

<table>
<thead>
<tr>
<th>Level</th>
<th>Custom levels</th>
<th>NAMUR NE43 (default)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>3.5 to 4.0 mA</td>
<td>3.8 mA</td>
</tr>
<tr>
<td>High</td>
<td>20.0 to 22.5 mA</td>
<td>20.5 mA</td>
</tr>
</tbody>
</table>

**IO-Link specifications**

**IO-Link revision**
1.1

**Transfer type**
COM2 (38.4 kBaud)

**SIO mode**
Yes

**IO-Link master port**
Class A

**Minimum cycle time**
6 ms

**Configuration**

**IO-Link configuration tools**
Examples:
- Rosemount IO-Link Assistant (available as accessory)
- FDT® frame applications, e.g. PACTware

**Damping**
User selectable (default is 2 s, minimum is 0 s)

**Output units**
- Level: in., m
- Temperature: °F, °C
- Signal strength: mV
Output variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>4-20 mA</th>
<th>DO1 and DO2</th>
<th>Digital, service tools using IODD</th>
<th>IO-Link PDIn (to the PLC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Distance (ullage)</td>
<td>N/A</td>
<td>N/A</td>
<td>✓</td>
<td>N/A</td>
</tr>
<tr>
<td>Electronics temperature</td>
<td>N/A</td>
<td>N/A</td>
<td>✓</td>
<td>N/A</td>
</tr>
<tr>
<td>Signal strength</td>
<td>N/A</td>
<td>N/A</td>
<td>✓</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Process pressure

-15 to 116 psig (-1 to 8 bar)
Atmospheric pressure at temperatures below -4 °F (-20 °C)

Note
The flanges must be used only in non-pressurized applications.

Temperature limits

Process temperature

With adapter
-4 to 302 °F (-20 to 150 °C)

Without adapter
-40 to 302 °F (-40 to 150 °C)

Ambient temperature

-40 to 176 °F (-40 to 80 °C)
The ambient temperature limits may be further restricted by the process temperature as described by Figure 6.

Figure 6: Ambient Temperature vs. Process Temperature
**Storage temperature**

-40 °F to 194 °F (-40 °C to 90 °C)

**Physical specifications**

**Material selection**

Emerson 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.

**Transmissible Spongiform Encephalopathy (TSE) declaration**

This declaration is applicable to the Rosemount 1408H when fitted with the hygienic adapter and O-ring.

Emerson certifies no process wetted components used in this product contain substances of animal origin. Materials used in the production or processing of wetted components for this product meet the requirements stated in EMA/410/01 Rev. 3 and ISO 22442-1:2015. Wetted components in this product are considered free of TSE.

**Related information**

*Product certifications*

**Food and Drug Administration (FDA) declaration**

When fitted with the hygienic adapter and O-ring, the process wetted components used in this product conform to FDA 21CFR110, Subpart C: Food and Drug Administration - Current Good Manufacturing Practice In Manufacturing, Packing, Or Holding Human Food.

**Related information**

*Product certifications*

**Housing and enclosure**

**Process connection**

ISO 228/1-G1 thread with a wide choice of hygienic adapters

**Materials**

Polished stainless steel 316L (EN 1.4404)

**Transmitter weight**

1.1 lb (0.5 kg)\(^{(4)}\)
Ingress protection
- IP66/68(5)/69 (IEC 60529)
- IP6K9K (ISO 20563:2013)
- NEMA® 4X
The stated ingress protection only applies when plugged in using a suitable M12 connector that has the appropriate ingress protection.

Hygienic adapters

Materials
316L (EN 1.4435)

Mounting bracket

Materials
- Bracket and device holder: Stainless steel 316L
- Lock nut: Stainless steel A4

Surface finishes

Process wetted parts
- $R_a < 30 \, \mu\text{-in.} \ (0.76 \, \mu\text{-m})$ for polymeric parts
- $R_a < 16 \, \mu\text{-in} \ (0.4 \, \mu\text{-m})$ for metallic parts

Non-wetted parts
- $R_a < 30 \, \mu\text{-in.} \ (0.76 \, \mu\text{-m})$ for stainless steel housing

Material exposed to tank atmosphere

With adapter
- PTFE sealing: PTFE fluoropolymer
- Adapter: 316L (EN 1.4435)
- Hygienic O-ring: EPDM or FKM

(4) Adapter not included.
(5) IP68 at 9.8 ft. (3 m) for more than 30 minutes.
Without adapter
- PTFE sealing: PTFE fluoropolymer
- O-ring: FVMQ
- G1 thread: 316L (EN 1.4404)
- Profile ring: FKM

**Electrical connection**

**Power supply**
The transmitter operates on 18-30 Vdc at the transmitter terminals.

**Connector type**
M12 (A-coded)

**Protection class**
III

**Wiring diagram**
*Figure 7: Connection*

![Wiring diagram]

**Table 3: Pin Assignment**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire color(1)</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BN Brown</td>
<td>L+</td>
<td>24 V</td>
</tr>
<tr>
<td>2</td>
<td>WH White</td>
<td>OUT2</td>
<td>Digital output or active 4-20 mA analog output</td>
</tr>
<tr>
<td>3</td>
<td>BU Blue</td>
<td>L-</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>BK Black</td>
<td>OUT1/IO-Link</td>
<td>Digital output or IO-Link mode</td>
</tr>
</tbody>
</table>

(1) According to IEC 60947-5-2.

**Installation considerations**

Before installing the transmitter, follow recommendations for mounting position, sufficient free space, nozzle requirements, etc.

**Mounting position**

When finding an appropriate location on the tank for the transmitter, the conditions of the tank must be carefully considered.
Consider the following guidelines when mounting the transmitter:

- For optimal performance, the transmitter should be installed in locations with a clear and unobstructed view of the product surface.
- The transmitter should be mounted with as few internal structures as possible within the signal beam.
- Do not mount close to or above the inlet stream.
- Do not mount the transmitter on a manway cover.
- Do not position the transmitter directly over a side manway door.
- Multiple Rosemount 1408H transmitters can be used in the same tank without interfering with each other.

**Figure 8: Recommended Mounting Position**

**Free space requirements**

If the transmitter is mounted close to a wall or other tank obstruction such as heating coils and ladders, noise might appear in the measurement signal. See Table 4 for recommended clearance.

**Figure 9: Free Space Requirements**

**Table 4: Distance to Tank Wall (L)**

<table>
<thead>
<tr>
<th>Minimum</th>
<th>Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 in. (200 mm)</td>
<td>½ of tank radius</td>
</tr>
</tbody>
</table>
Inclination

The transmitter should be mounted vertically to ensure a good echo from the product surface. See Figure 10 for recommended maximum inclination.

**Figure 10: Inclination**

![Diagram showing inclination](image)

- **Max. 3°**
- **90°**

Non-metallic tanks

Nearby objects outside the tank may cause disturbing radar echoes. Wherever possible, the transmitter should be positioned so that objects close to the tank are kept outside the signal beam.

Related information

Product certifications
**Beam angle and beam width**

The transmitter should be mounted with as few internal structures as possible within the signal beam.

**Figure 11: Beam Angle and Beam Width**

**Beam angle (α)**

10°

**Beam width**

See Table 5 for beam width at different distances.

**Table 5: Beam Width**

<table>
<thead>
<tr>
<th>Distance (D)</th>
<th>Beam width (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.6 ft. (2 m)</td>
<td>1.2 ft. (0.4 m)</td>
</tr>
<tr>
<td>13.1 ft. (4 m)</td>
<td>2.3 ft. (0.7 m)</td>
</tr>
<tr>
<td>19.7 ft. (6 m)</td>
<td>3.5 ft. (1.1 m)</td>
</tr>
<tr>
<td>26.2 ft. (8 m)</td>
<td>4.6 ft. (1.4 m)</td>
</tr>
<tr>
<td>32.8 ft. (10 m)</td>
<td>5.8 ft. (1.8 m)</td>
</tr>
</tbody>
</table>
Nozzle requirements

To allow the microwaves to propagate undisturbed, the nozzle dimensions should be kept within the specified limits as given in Table 6. The inside of the nozzle must be smooth (i.e. avoid bad welding, rust, or deposit).

Figure 12: Mounting in Nozzles

Table 6: Nozzle Requirements

<table>
<thead>
<tr>
<th>Nozzle diameter (D)</th>
<th>Maximum nozzle height (H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 in. (25 mm)</td>
<td>3.9 in. (100 mm)</td>
</tr>
<tr>
<td>1.5 in. (40 mm)</td>
<td>5.9 in. (150 mm)</td>
</tr>
<tr>
<td>2 in. (50 mm)</td>
<td>7.9 in. (200 mm)</td>
</tr>
<tr>
<td>3 in. (80 mm)</td>
<td>11.8 in. (300 mm)</td>
</tr>
<tr>
<td>4 in. (100 mm)</td>
<td>15.8 in. (400 mm)</td>
</tr>
<tr>
<td>6 in. (150 mm)</td>
<td>23.6 in. (600 mm)</td>
</tr>
</tbody>
</table>

For 3-A® and EHEDG applications, the allowed nozzle height is further restricted to ensure cleanability.

Table 7: Nozzle Height in 3-A and EHEDG Applications

<table>
<thead>
<tr>
<th>Standard</th>
<th>Maximum nozzle height (H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-A</td>
<td>Must not exceed 2 x Nozzle diameter (D) nor 5 in. (127 mm)</td>
</tr>
<tr>
<td>EHEDG</td>
<td>Must not exceed Nozzle diameter (D) – 0.95 in. (24 mm)</td>
</tr>
</tbody>
</table>

Product certifications

See the Rosemount 1408H Product Certifications document for detailed information on the existing approvals and certifications.
Dimensional drawings

Figure 13: Rosemount 1408H

A. ISO 228/1-G1 thread  
B. M12 connector (A-coded)  
C. Hygienic process connection adapter

Dimensions are in inches (millimeters).

Figure 14: Mounting Bracket

Dimensions are in inches (millimeters).
Bracket hole pattern

Figure 15: Hole Pattern

Dimensions are in inches (millimeters).

Related information
Type 1 Drawing