Reference Manual
00809-0100-2405, Rev AB
July 2025

Rosemount™ 2405 Monitoring Hub

ROSEMOUNT™

EMERSON™

Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that potentially raises safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

⚠ WARNING

Failure to follow safe installation and servicing guidelines could result in death or serious injury.

Use the monitoring hub only as specified in this Reference Manual.

The monitoring hub must be installed, connected, commissioned, operated, and maintained by suitably qualified personnel only, observing national and local requirements that may apply.

The monitoring hub must be installed according to the Rosemount 2405 Product Certifications document and Control Drawing.

Before commissioning the monitoring hub, ensure that the supply voltage matches the voltage specifications on the main label.

Do not use damaged equipment.

Repair, e.g. substitution of components, etc. may jeopardize safety and is under no circumstances allowed.

Refer to the Reference Manual for instructions on how to handle damaged equipment, troubleshooting, and take the monitoring hub out of service.

⚠ WARNING

Electrical shock could cause death or serious injury.

Ensure that the monitoring hub is not powered when opening the lid and making terminal connections.

If the monitoring hub is installed in a high voltage environment and a fault condition or installation error occurs, high voltage may be present on leads and terminals.

⚠ WARNING

Battery safety

This device contains built-in lithium-ion batteries which should not be replaced by the customer.

Batteries may explode or cause burns if disassembled, crushed, or exposed to fire or high temperatures.

If the batteries are damaged, avoid contact with eyes, skin, and clothing. Ensure adequate ventilation. Prevent material from contaminating soil and from entering sewers or waterways.

⚠ WARNING

Physical access

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental in protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

⚠ CAUTION

Pollution protection

Ensure that during installation or maintenance no moisture or dirt can get inside the instrument.

To maintain the housing protection, ensure that the housing lid is closed during operation and locked, if necessary.

⚠ CAUTION

This device complies with Part 15 of the Federal Communication Commission (FCC) Rules. Operation is subject to the following conditions:

This device may not cause harmful interference.

This device must accept any interference received, including interference that may cause undesired operation.

Contents

1 Introduction

1.1 Before you begin

NOTICE

Read this manual before working with the product. For personal and system safety and for optimum product performance, ensure that you thoroughly understand the contents before installing, using, or maintaining this product.

For technical assistance, contacts are listed below:

Customer Central

Technical support, quoting, and order-related questions.

- United States - 1-800-999-9307 (7:00 am to 7:00 pm CST)
- Asia Pacific - 65 777 8211

North American Response Center

Equipment service needs.

- 1-800-654-7768 (24 hours a day — includes Canada)

Outside of these areas, contact your local Emerson representative.

1.2 Using this manual

The sections in this manual provide information on installing, configuring, operating, and maintaining the Rosemount™ 2405 Monitoring Hub.

The sections are organized as follows:

Monitoring hub overview provides a description of the monitoring hub, information on typical applications, and an introduction to the monitoring hub function.

Installation contains mechanical and electrical installation instructions.

Configuration provides instructions on configuration of the monitoring hub using the display.

Operation contains operation techniques.

Service and troubleshooting provides troubleshooting techniques for the most common operating problems.

Specifications and reference data supplies reference and specification data.

Configuration parameters provides extended information about the configuration parameters.

1.3 Symbols on the product

When this symbol (⚠) is marked on the product, be sure to consult the product documentation to find out the nature of the potential hazards and any actions which have to be taken to avoid them.

1.4 Product certifications

See the Rosemount 2405 Product Certifications document for detailed information on the existing approvals and certifications.

1.5 Product recycling/disposal

Recycling of equipment and packaging should be taken into consideration and disposed of in accordance with local and national legislation or regulations.

2 Monitoring hub overview

2.1 Monitoring hub functions

Intuitive user interfaces

The monitoring hub provides two user interfaces:

- A graphical field display together with physical buttons to navigate through the software application
- Web interface

Both interfaces are used for configuration, and to visualize the system and measured values.

Calculations

The monitoring hub is pre-programmed with standard tank shapes. A 50-point programmable look-up table is provided for non-standard tank shapes.

In addition, the monitoring hub performs inventory calculations including volume, volume utilization, volume rate, and level rate, based on level measurement readings.

Sensor inputs

There are two sensor inputs available for sensor connection using HART® multidrop. Up to four sensors can be connected to each sensor input. Sensors connected to the same input are loop powered.

Digital inputs

There are four digital input ports available where the monitoring hub functionality is linked to other external events. The digital inputs can be individually setup to perform various control actions whenever activated.

Relay control functions

The monitoring hub provides six freely assignable relay outputs. The relays can be set up to be triggered by user-defined tank alarms, system failure alarms, or digital inputs.

Output of values as an isolated 4–20 mA signal

The analog output is for transmitting the measured or calculated value as a 4–20 mA signal. There are three analog outputs available.

Data logging

The monitoring hub provides simple report and documentation handling through logged data. All tank data, as well as event data and audit logs are easily accessible and shareable by the web interface. Measurement values and calculations are summarized over a span of 24 hours and visualized in graphs via the interfaces.

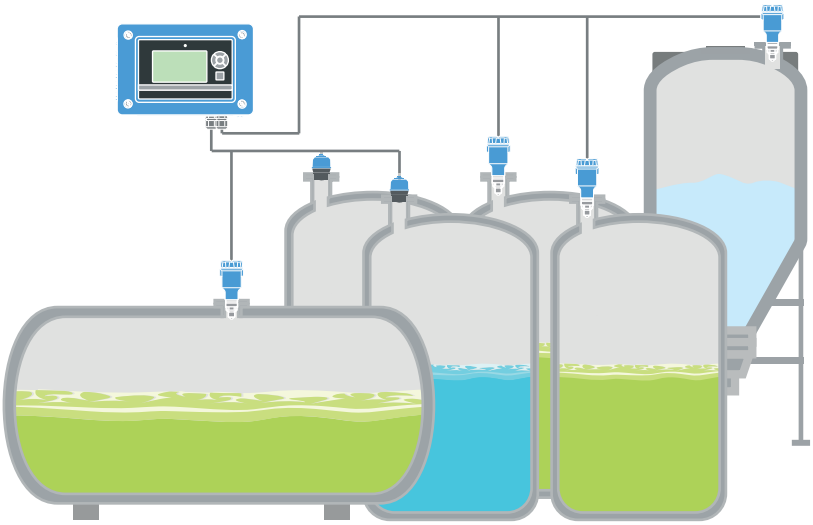
Modbus® TCP/IP communication to host

The Ethernet port can be used for Modbus TCP/IP connection to host systems, such as Rosemount TankMaster WinView and Rosemount TankMaster Mobile. By simply connecting the monitoring hub to the existing LAN network, communication over Ethernet is established.

2.2 Application examples

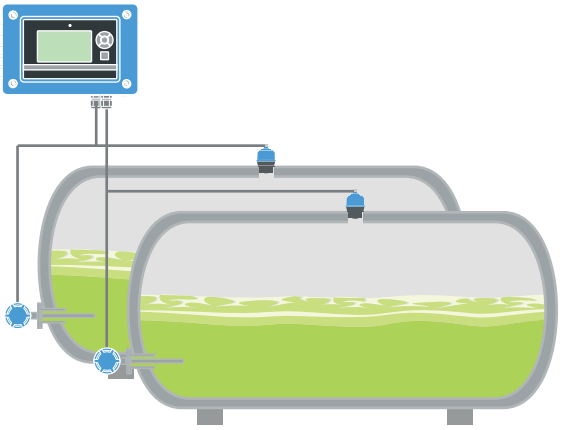
Level measurement and inventory control of the chemical storage process vessels

Manual tank inventory checks often result in inefficiencies, inaccuracies, and stock issues. A tank monitoring system automates the inventory management and provides real-time insights, improving inventory control and supply reliability.



Level and temperature measurement for control in chlorine storage tanks

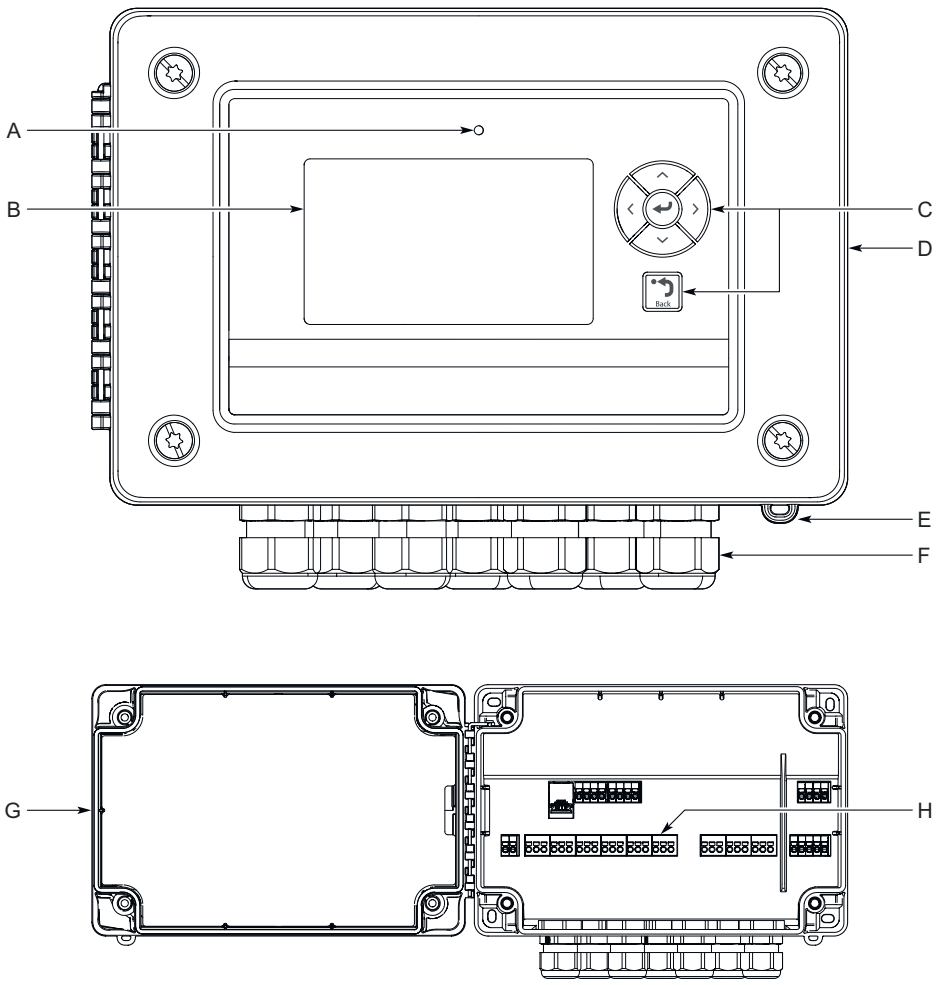
In water and wastewater plants, chlorine is essential for disinfecting water and preventing harmful bacterial growth. Maintaining optimal temperature and inventory levels in chlorine storage tanks ensures a consistent disinfection process, accurate dosing, and chemical stability.



2.3 Components of the monitoring hub

Figure 2-1 shows the various parts of the monitoring hub.

Figure 2-1: Rosemount 2405 Components



A. Light Emitting Diode (LED) for status and error information
B. Display
C. Keypad
D. Main label, including manufacturing year
E. Sealing arc
F. Cable entries
G. Lid
H. Terminal board and ports

2.4 Web interface

The Rosemount 2405 has a web-based graphical user interface that provides functions such as:

- Configuration of sensors and system
- Status views of the monitoring hub, field devices, and system
- Firmware upgrade
- Downloading of data log files

Related information

Web interface

3 Installation

3.1 Safety messages

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3.2 Installation considerations

Note
The Rosemount 2405 is an associated apparatus according to IEC/EN 60079-11. The Rosemount 2405 is designed for non-hazardous (safe) area installation, however it can power and take input from intrinsically safe transmitters installed in a hazardous area.

General

- The Rosemount 2405 is classified type A in accordance with European EMC directive 2014/30/EU. To ensure electro-magnetic compatibility, in any member country, the Rosemount 2405 should not be installed in a residential area.
- Non-intrinsic safe circuits must be limited to Overvoltage category II, according to IEC 60664-1.
- The maximum value of U_m=250 Vac may be applied to terminals of non-intrinsically safe circuits.
- Ambient temperature range: -40 to +140 °F (-40 to +60 °C)(1)

Mounting and installation

- Do not mount the Rosemount 2405 on a structure that is subject to vibration, or in a position where damage may be caused by impact, thermal stress or liquid ingress.
- Do not mount the Rosemount 2405 in a position where it might come into contact with aggressive substances, e.g. acidic liquids or gases that may attack metals or solvents that may affect polymeric materials.
- The Rosemount 2405 is suitable for mounting outside, but this should be above any flood level, away from any overflow path, and away from direct sunlight.
- The mass of the unit is 3.7 lb (1.7 kg). To conform with safety requirements, the wall on which the unit is mounted should be capable of supporting four times this weight.
- Do not mount the Rosemount 2405 in a position where it might be exposed to mechanical damage or friction. The Rosemount 2405 can withstand an impact of maximum 6.8 Joule.
- Mount the Rosemount 2405 as shown in Mount the Rosemount 2405 on pipe/wall.

Use as associated apparatus

- The intrinsically safe terminals of the Rosemount 2405 may be connected to certified equipment used in a hazardous area.
- Keep the separation distances between all non-intrinsically safe circuits and intrinsically safe circuits according to IEC/EN 60079-14.
- If the shield terminal 42 or 71 is used, terminal 41 must be connected to a high integrity earth/ground point.

Wiring

- Ensure that cable glands and connections to the Rosemount 2405 are done in accordance with local and national standards. Use cable glands, conduits and plugs that fulfil IP66/IP67 and Type 4X to reach IP66/IP67 and Type 4X rating on the Rosemount 2405.
- Cable runs should be separate from any high voltage or mains cables to avoid crosstalk or interference.

(1) Display reading: -4 to +140 °F (-20 to +60 °C).

- Use an external circuit breaker rated at maximum 10 A in order to ensure that power supply can be safely disconnected when wiring and servicing the Rosemount 2405. The circuit breaker shall be suitable located, easily reached and marked as disconnecting device.
- Wires for mains connection should be tied together to prevent from accidental loosening.
- Field wiring shall be rated for 31 °F (17 °C) above maximum ambient temperature.
- Do not connect wires to the terminal block at temperatures below 23 °F (-5 °C).
- Consider power budget for loop powered field devices.

Maintenance

- To ensure the Rosemount 2405 functionality, periodic visual inspection is recommended for:
  - Secure mounting
  - No mechanical damages or corrosion
  - Worn or otherwise damaged cables

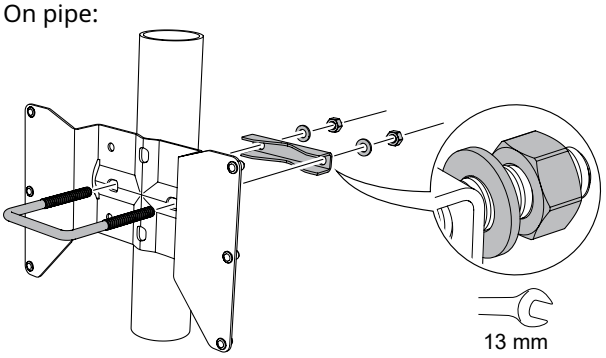
3.3 Mount the monitoring hub on pipe/wall

The mounting instruction includes the wall and pipe mounting kit and the weather protection accessories. Both items are ordered separately, refer to the Rosemount 2405 Product Data Sheet.

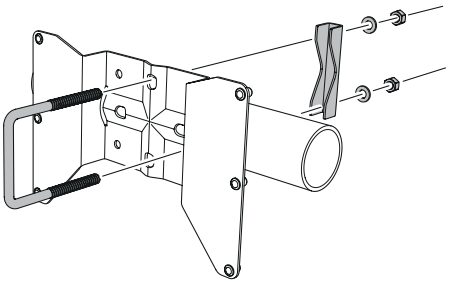
Procedure

1. Mount the bracket on the pipe/wall.

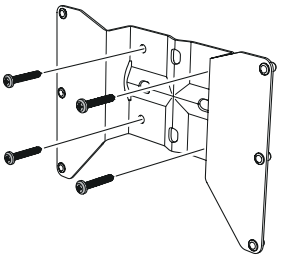
   On pipe:

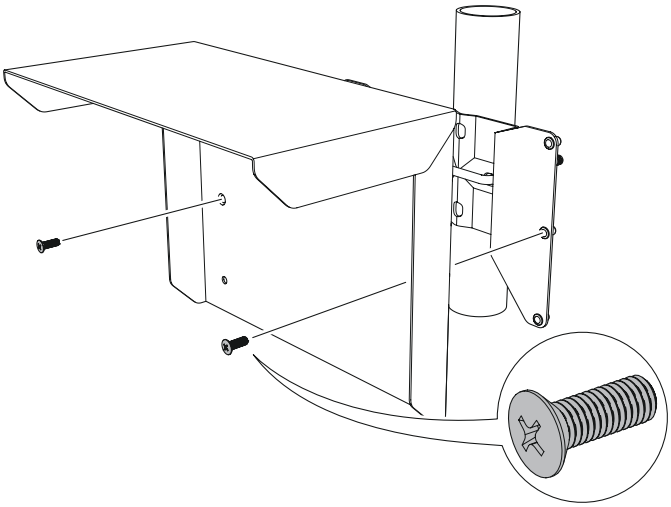
   or

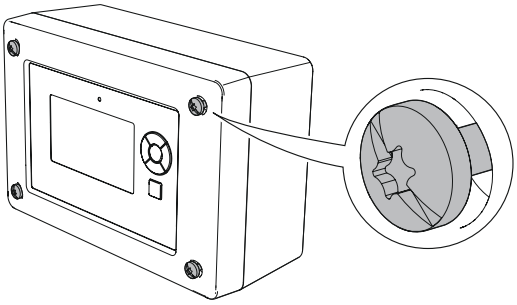
   On wall:

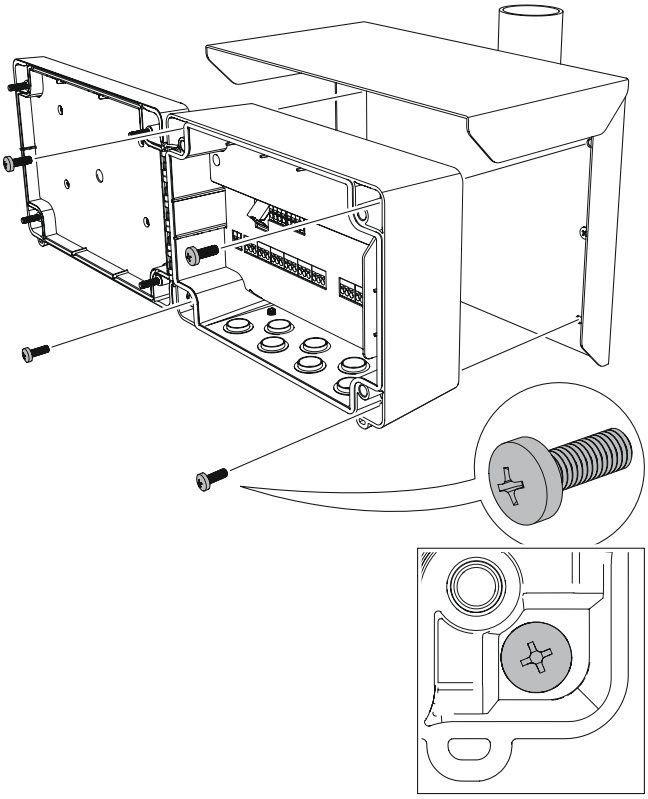
2. Mount the weather protection, using the enclosed screws.

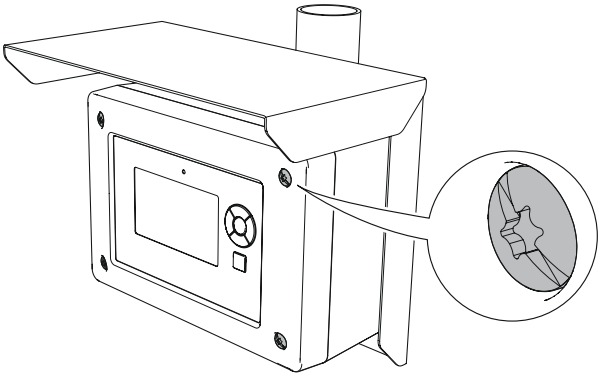
3. Loosen the four screws on the lid.



4. Mount the monitoring hub.



5. Close the lid and tighten the four screws to torque 1.1 lb-ft (1.5 Nm).



3.4 Prepare the electrical connections

3.4.1 Cable selection

The cable diameter must be suitable for the cable gland used to ensure the seal effect of the cable gland (IP protection).

3.4.2 Cable glands

The Rosemount 2405 housing has seven entries for M20 cable glands.

Table 3-1: Cable Diameter for Glands, in. (mm)

	Cable gland	Ethernet cable gland
Cable Ø	0.16-0.51 (4-13)	0.27 (6.9)

Table 3-2: Tightening Torque for Cable Glands Ordered From Emerson, lb-ft (Nm)

Item	Cable gland	Ethernet cable gland
Cable gland	3.0 (4.0)	3.3 (4.5)
Top nut	2.2 (3.0)	3.3 (4.5)

3.4.3 Adapter for conduit hubs

The Rosemount 2405 can be installed with conduit hubs. The conduit hub must be installed with a M20 to ½ NPT adapter mounted to the support plate.

Table 3-3: Tightening Torque for Adapter Ordered From Emerson, lb-ft (Nm)

Item	Torque
Adapter, M20 thread	5.2 (7.0)

3.4.4 Plugs

The plugs are used to seal unused entries.

Table 3-4: Tightening Torque for Plugs Ordered From Emerson, lb-ft (Nm)

Item	Torque
Plug	1.5 (2.0)
Top nut	1.5 (2.0)

3.4.5 Terminal connection type

Spring loaded terminals

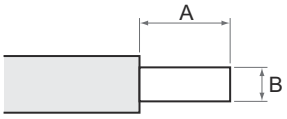
3.4.6 Conductors

Ensure that you use cables suitable for the terminal blocks.[2][3]

Table 3-5: Cables Suitable for Rosemount 2405 Terminal Blocks

Conductor connection	Cross-sectional area		Stripping length
	mm^2	AWG	
Solid	0.2-2.5	24-14	10 mm
Flexible	0.2-2.5	24-14	10 mm
Flexible, Ferrule without plastic collar	0.25-2.5	24-14	8 mm
Flexible, Ferrule with plastic collar	0.25-1.5	24-16	8 mm

Figure 3-1: Conductor Stripping Length and Cross-Sectional Area



A. Stripping length, see Table 3-5
B. Cross-sectional area, see Table 3-5

3.4.7 Power supply and sensor wire cross-section

Appropriate cross-sectional area of wires must be used in order to prevent a too high voltage drop to the connected power supply and sensor. Use 0.75 mm^2 to 2.5 mm^2 (18 AWG to 14 AWG) in order to minimize the voltage drop.

(2) For additional sensor wiring recommendations, refer to Power supply and sensor wire cross-section.
(3) Use Copper, Copper-Clad Aluminum, or Aluminum Conductors.

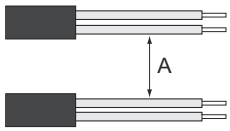
3.4.8 Sensor cable insulation

Cables connected to the intrinsically safe circuits (sensor input 1 and 2) shall be insulated according to IEC 60079-11.

Sufficient sensor cable insulation can be achieved through any of the following options:

- The part of the sensor cable that is stripped from outer insulation must be separated from other cables by at least 0.4 in (10 mm).

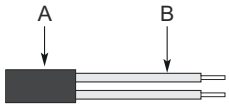
Figure 3-2: Cable Separation



A. Cable separated from other cables by at least 0.4 in (10 mm).

- Cable outer insulation thickness shall be minimum 0.04 in. (1.0 mm), and cable inner insulation thickness shall be minimum 0.008 in. (0.2 mm).

Figure 3-3: Cable Insulation Thickness



A. Cable outer insulation thickness: Minimum 0.04 in. (1.0 mm)
B. Cable inner insulation thickness: Minimum 0.008 in. (0.2 mm)

3.4.9 Power supply

The Rosemount 2405 accepts supply voltage 24-48 Vdc (-15% to +10%), or 100-240 Vac 50/60 Hz (-15% to +10%)

3.4.10 Power consumption

Maximum 12 W

3.4.11 Grounding

Make sure grounding is done according to national and local electrical codes. Failure to do so may impair the protection provided by the equipment. Grounding requirements are dependent on application type:

Ex application with shielded cables

- Connect cable shield to terminal 42 (terminal 71 for sensor input 2)
- Connect terminal 41 to a high integrity earth/ground point

The ground point must fulfill requirements for connection into hazardous area.

Non-Ex application with shielded cables

- Connect cable shield to terminal 42 (terminal 71 for sensor input 2)
- Connect terminal 41 to instrument earth/ground point

Ex or Non-Ex application with unshielded cables

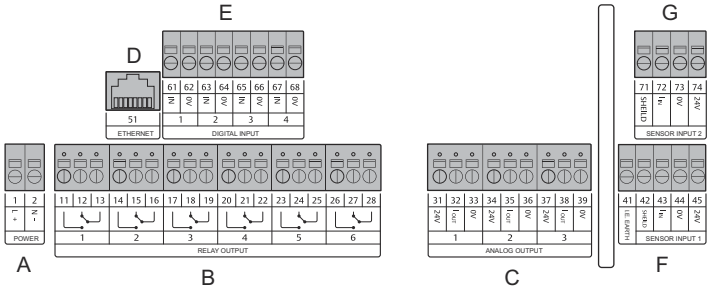
Grounding is not necessary for unshielded sensor cables. Leave terminals 41, 42 and 71 unconnected.

3.4.12 Protective earth

The metal support plate should always be grounded in accordance with national and local electrical codes. Failure to do so may impair the protection provided by the equipment. The most effective grounding method is direct connection to earth ground with minimal impedance. There is a grounding screw connection with ring terminal on the metal support plate. Ground wire cross-section area should be 1.5 mm^2 to 2.5 mm^2 (16 AWG to 14 AWG).

3.4.13 Terminal board and ports

Figure 3-4: Ports and Terminals - Rosemount 2405



A. Power supply
B. Relay outputs
C. Analog outputs
D. Ethernet
E. Digital inputs
F. Sensor input 1 (intrinsically safe terminal)
G. Sensor input 2 (intrinsically safe terminal)

Table 3-6: Terminal Assignment - Rosemount 2405

Terminal	Designation	Function
1	L +	Power, Line / DC +
2	N -	Power, Neutral / DC -
11	NO 1	Relay output 1, normally open
12	NC 1	Relay output 1, normally closed
13	COM 1	Relay output 1, common
14	NO 2	Relay output 2, normally open
15	NC 2	Relay output 2, normally closed
16	COM 2	Relay output 2, common
17	NO 3	Relay output 3, normally open
18	NC 3	Relay output 3, normally closed
19	COM 3	Relay output 3, common
20	NO 4	Relay output 4, normally open
21	NC 4	Relay output 4, normally closed
22	COM 4	Relay output 4, common
23	NO 5	Relay output 5, normally open
24	NC 5	Relay output 5, normally closed
25	COM 5	Relay output 5, common
26	NO 6	Relay output 6, normally open
27	NC 6	Relay output 6, normally closed
28	COM 6	Relay output 6, common
31	24V	Analog output 1, 24 V
32	I_{OUT} 1	Analog output 1, I_{OUT}
33	0V	Analog output 1, 0 V
34	24V	Analog output 2, 24 V
35	I_{OUT} 2	Analog output 2, I_{OUT}
36	0V	Analog output 2, 0 V
37	24V	Analog output 3, 24 V
38	I_{OUT} 3	Analog output 3, I_{OUT}
39	0V	Analog output 3, 0 V
41	I.E. Earth	Instrument earth
42	Shield	Sensor input 1, shield
43	I_{IN}1	SensorInput 1, I_{IN}
44	0V	Sensor input 1, 0 V
45	24V	Sensor input 1, 24 V
51	Ethernet	Ethernet(1)
61	IN 1	Digital input 1, IN

Table 3-6: Terminal Assignment - Rosemount 2405 *(continued)*

Terminal	Designation	Function
62	0V	Digital input 1, 0 V
63	IN 2	Digital input 2, IN
64	0V	Digital input 2, 0 V
65	IN 3	Digital input 3, IN
66	0V	Digital input 3, 0 V
67	IN 4	Digital input 4, IN
68	0V	Digital input 4, 0 V
71	Shield	Sensor input 2, shield
72	$I_{IN}2$	Sensor input 2, I_{IN}
73	0V	Sensor input 2, 0 V
74	24V	Sensor input 2, 24 V

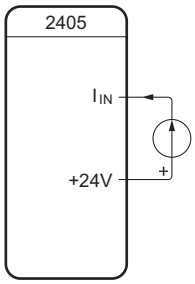
(1) In case the monitoring hub is connected to a Local Area Network (LAN) via Modbus TCP, ensure the connection is secure and no unauthorized personnel can grant access.

3.4.14 Wiring diagrams

Sensor input connections

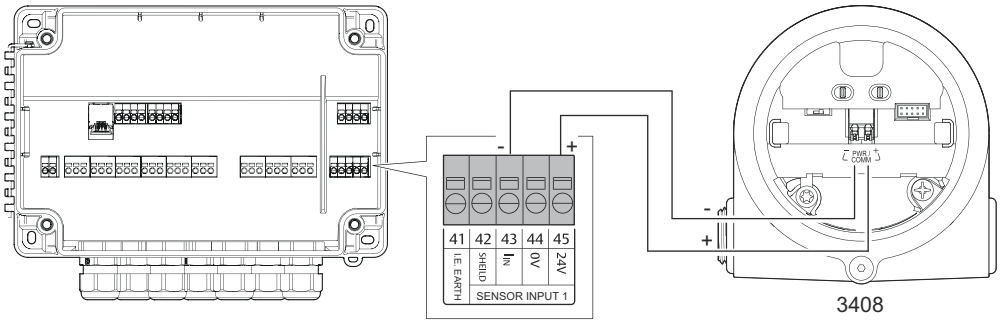
Loop-powered sensors are connected as shown in Figure 3-5.

Figure 3-5: Sensor Input - Loop Powered, Safe or Hazardous



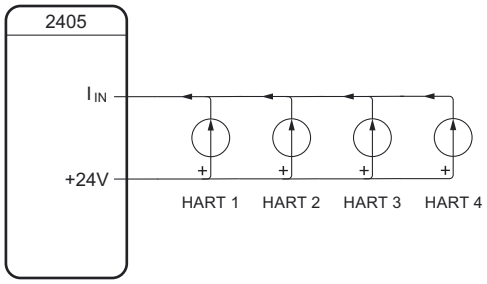
See Figure 3-6 for an example where the Rosemount 3408 is connected to the Rosemount 2405 sensor input 1.

Figure 3-6: Example: 3408 Connected to 2405 Sensor Input 1



In the Rosemount Tank Gauging system devices can be “daisy-chained” thus reducing the number of external junction boxes. Loop-powered HART® multidrop sensors are connected as shown in Figure 3-7.

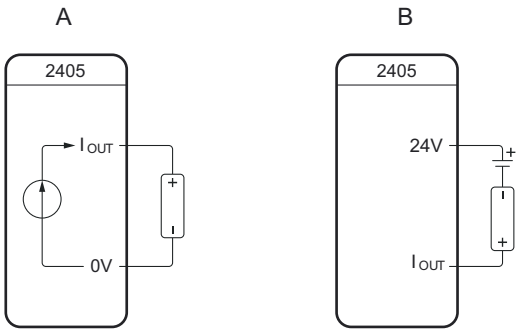
Figure 3-7: Sensor Input - Loop Powered: HART Multidrop, Safe or Hazardous



Analog output connections

The analog output may be connected in internally-powered or loop-powered mode. In loop-powered mode, an external power source is required.

Figure 3-8: Analog Output



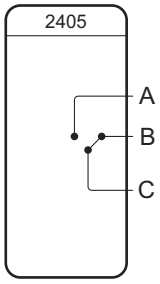
A. Internal power
B. Loop power

Relay output connections

The monitoring hub relay outputs are available for normally closed and normally open relay connections.

Limit range: 250 Vac 8 A/24 Vdc 8 A resistive load.

Figure 3-9: Relay Output

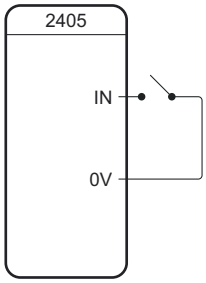


A. Normally open
B. Normally closed
C. Common

Digital input connections

The digital potential-free contact inputs are connected as shown in Figure 3-10. Limit range: Output voltage 14 V, Output current 6 mA.

Figure 3-10: Digital Input



3.5 Connect wiring and power up

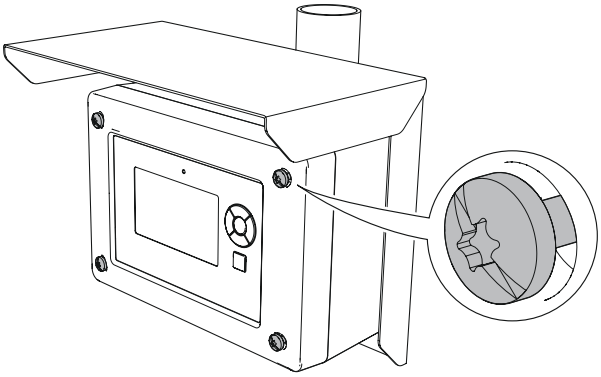
Prerequisites

Consider performing sensor configuration prior to field installation.

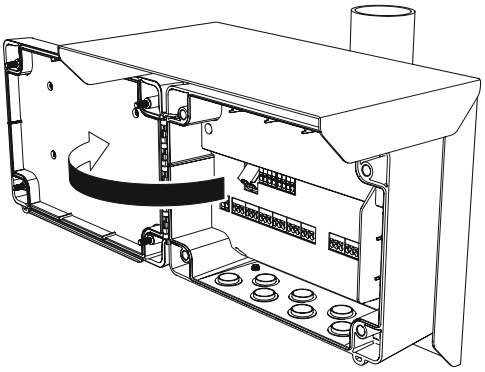
Procedure

1. ⚠ Ensure the power supply is disconnected.

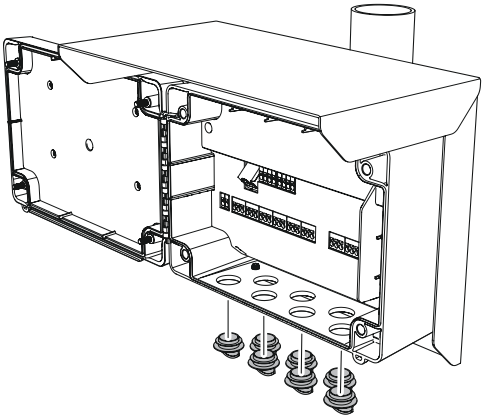
2. Unscrew the four screws on the lid.



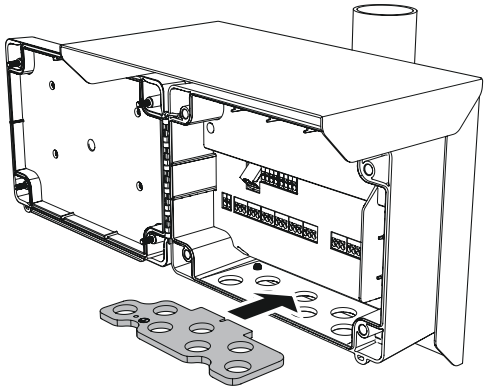
3. Open the lid.



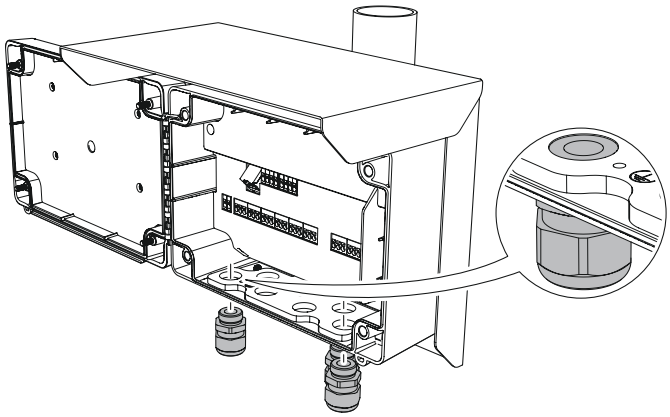
4. Remove the plastic plugs.



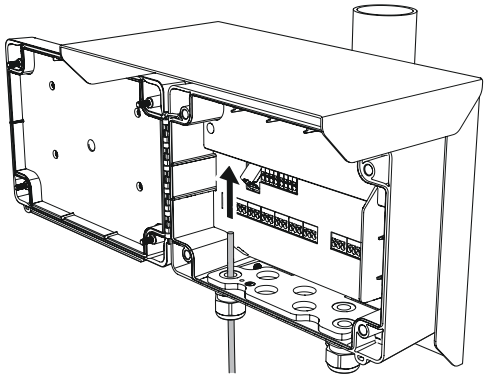
5. Place the support plate into position.



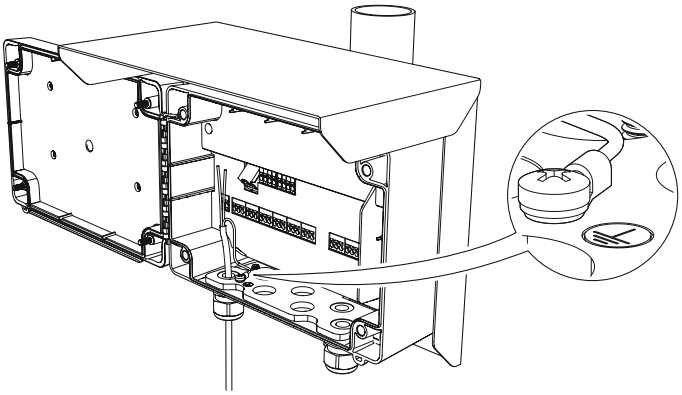
6. Mount the cable glands.



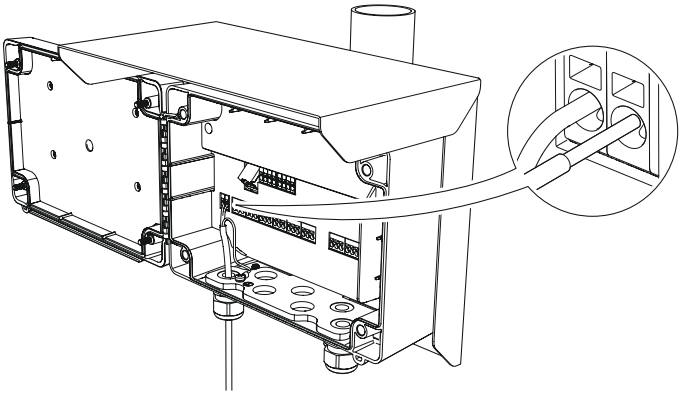
7. Pull the power cable through the cable gland.



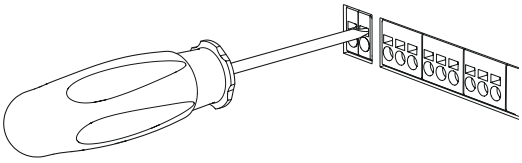
8. Connect the protective earth ground to the support plate with the ring terminal, grounding screw (M4), and spring washer included in the delivery.



9. Connect the power supply wires to the terminal compartment.

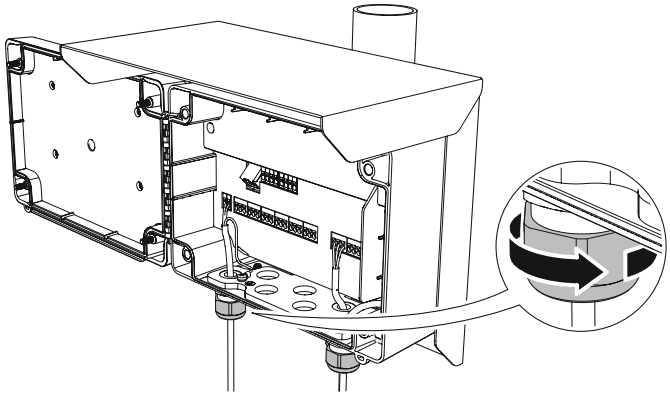


Note
When connecting a flexible (stranded) conductor, use a small flat head screwdriver to press down and hold the terminal connection open.

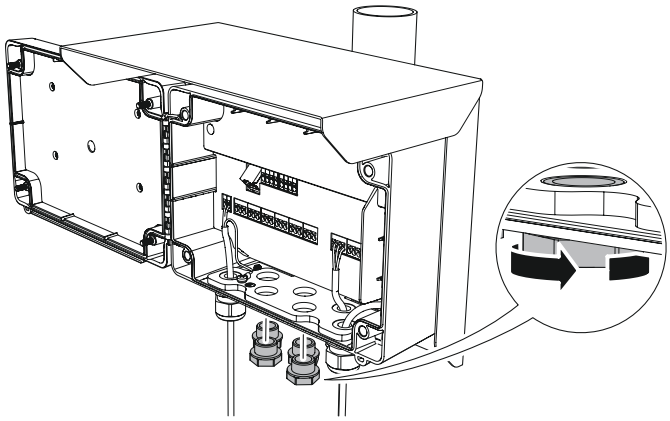


10. Connect the cables to the terminal compartments suitable for your application (see Prepare the electrical connections).
11. Ensure proper grounding (see Grounding).

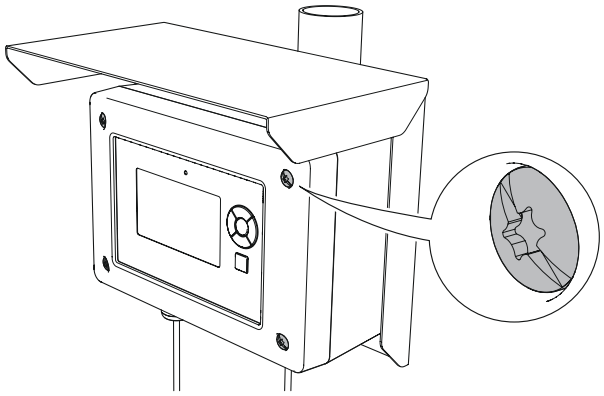
12. Tighten the cable glands (see Cable glands and Adapter for conduit hubs).



13. Seal unused port with the plugs (see Plugs).



14. Close the lid and tighten the four screws to torque 1.1 lb-ft (1.5 Nm).



15. Connect the power supply.

    During start-up, approximately 30 seconds, the display prompts the following screen:

    Once the start-up procedure is finished, the display prompts the following screen:

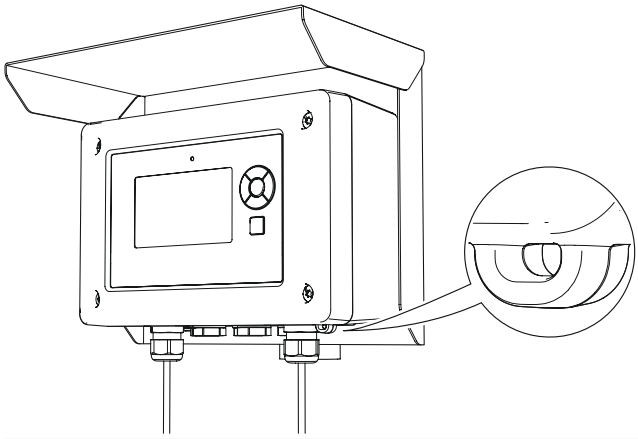
Postrequisites

Continue with configuration.

3.6 Securing lid

To prevent unauthorized access, the Rosemount 2405 lid can be secured by using the sealing arc.

Figure 3-11: Sealing arc to secure the lid



4 Configuration

4.1 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that potentially raises safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

⚠ WARNING

Failure to follow safe installation and servicing guidelines could result in death or serious injury.

Use the monitoring hub only as specified in this Reference Manual.

The monitoring hub must be installed, connected, commissioned, operated, and maintained by suitably qualified personnel only, observing national and local requirements that may apply.

The monitoring hub must be installed according to the Rosemount 2405 Product Certifications document and Control Drawing.

Before commissioning the monitoring hub, ensure that the supply voltage matches the voltage specifications on the main label.

Do not use damaged equipment.

Repair, e.g. substitution of components, etc. may jeopardize safety and is under no circumstances allowed.

Refer to the Reference Manual for instructions on how to handle damaged equipment, troubleshooting, and take the monitoring hub out of service.

⚠ WARNING

Electrical shock could cause death or serious injury.

Ensure that the monitoring hub is not powered when opening the lid and making terminal connections.

If the monitoring hub is installed in a high voltage environment and a fault condition or installation error occurs, high voltage may be present on leads and terminals.

⚠ WARNING

Battery safety

This device contains built-in lithium-ion batteries which should not be replaced by the customer.

Batteries may explode or cause burns if disassembled, crushed, or exposed to fire or high temperatures.

If the batteries are damaged, avoid contact with eyes, skin, and clothing. Ensure adequate ventilation. Prevent material from contaminating soil and from entering sewers or waterways.

⚠ WARNING

Physical access

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental in protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

⚠ CAUTION

Pollution protection

Ensure that during installation or maintenance no moisture or dirt can get inside the instrument.

To maintain the housing protection, ensure that the housing lid is closed during operation and locked, if necessary.

⚠ CAUTION

This device complies with Part 15 of the Federal Communication Commission (FCC) Rules. Operation is subject to the following conditions:

This device may not cause harmful interference.

This device must accept any interference received, including interference that may cause undesired operation.

4.2 Overview

This chapter provides information about configuration and configuration tools. Appendix Configuration parameters provides extended information about the configuration parameters.

4.3 Configuration tools

Local display

The keypad function buttons are used to navigate the local display menu system where configuration is performed.

Web interface

The Rosemount 2405 web interface can be used to perform system configuration, and to make changes to existing sensor configuration.

Related information

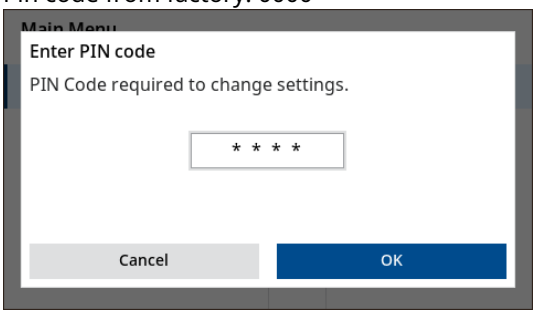
Menu tree
Web interface

4.4 Local display user authorization

Authorized access is required for several actions on the local display, such as configuration. When initiating certain actions, the user will be prompted to enter a PIN code to proceed, and a specific authorization message will be presented.

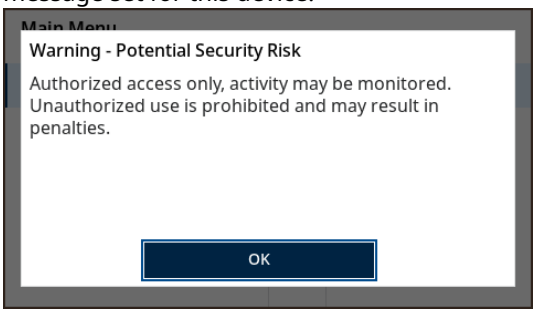
Procedure

1. In the ***Enter PIN*** code window, input your PIN code.
   Pin code from factory: 0000



   a) Select **OK**, and press the enter key button to proceed.

2. The ***Warning - Potential Security Risk*** window appears, displaying the authorized message set for this device.



   a) Select **OK** to comply with the terms, and press the enter key button to proceed.

Postrequisites

It is recommended to change PIN code after first login.

Related information

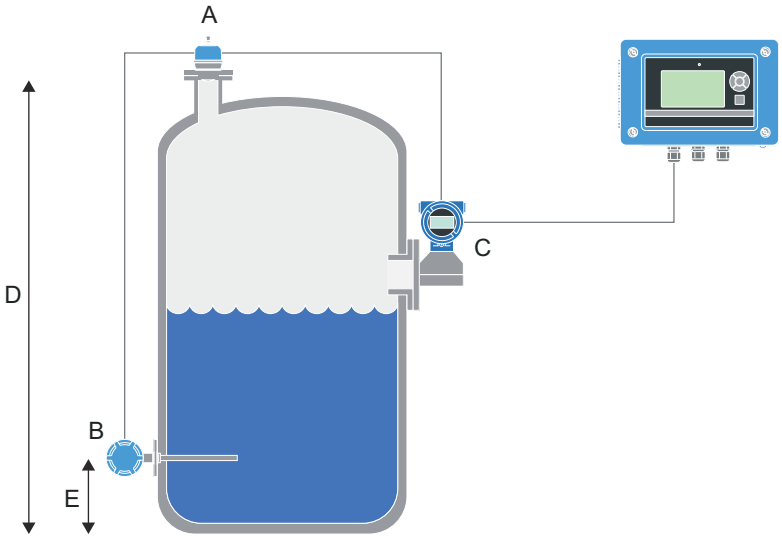
Customize authentication message
Set pin code for device access
Permissions overview

4.5 Sensor configuration

4.5.1 Example: Configure three sensors

This configuration example provides step-by-step instructions for setting up three types of sensors: level, pressure, and temperature. Figure 4-1 illustrates the configuration details, including sensor types and specific settings for each sensor.

Figure 4-1: Example: Three sensors; level, pressure, and temperature



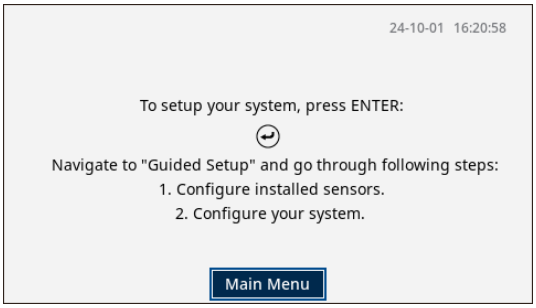
A. Level sensor: Rosemount 1208C
B. Pressure sensor: Rosemount 2051, gauge pressure
C. Temperature sensor: Rosemount 3144P
D. Reference Height (level sensor): 15 m
E. Installation Height (temperature sensor): 1 m

Prerequisites

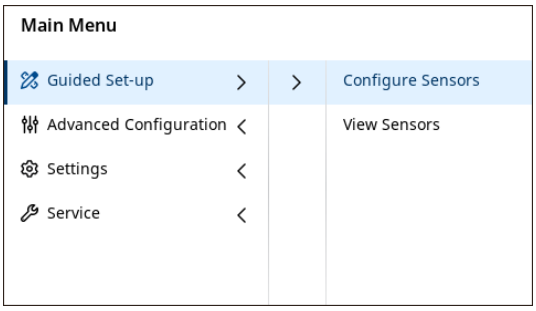
- Only one sensor should be connected at a time.
- The sensor must be configured and installed on the same Sensor Input.
- Maximum four sensors can be configured and installed on each Sensor Input.

Procedure

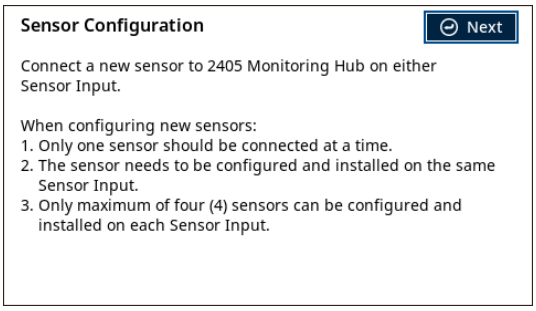
1. From the Display´s startup screen select **Main Menu**, and press the enter key button to proceed.



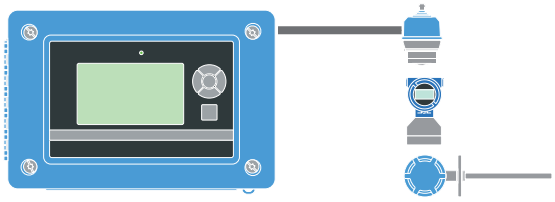
2. In the ***Main Menu*** window, select **Guided Set-up** → **Sensor Configuration** → **Configure Sensors**.



3. The ***Sensor Configuration*** window appears.

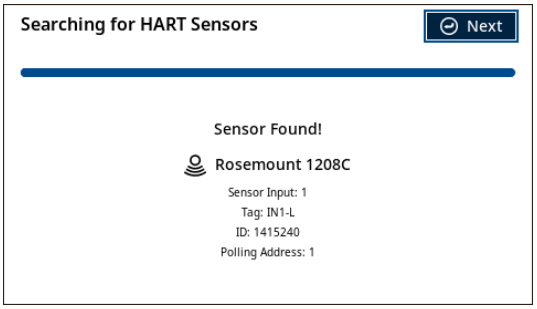


   a) Connect the first sensor (1208C) for configuration, to Sensor Input 1 terminals.



   b) Select **Next**, and press the enter key button to confirm the sensor is connected.

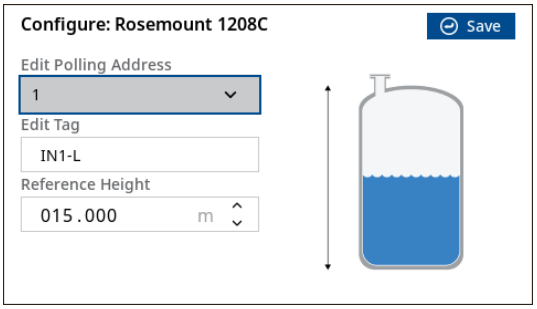
4. Once the monitoring hub has found the sensor, the ***Searching for HART Sensors*** window appears.



   a) Verify the correct sensor in found.

   b) Select **Next**, and press the enter key button to proceed.

5. In the ***Configure: Rosemount 1208C*** window, do the following:



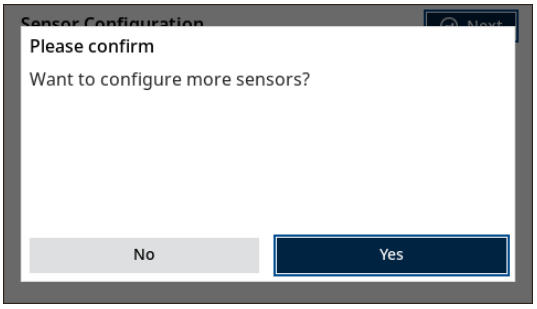
   a) In the ***Edit Polling Address*** list, select **1**.

   b) In the ***Edit Tag*** box, enter **IN1-L**.

   c) In the ***Reference Height*** list, enter `015.000` m.

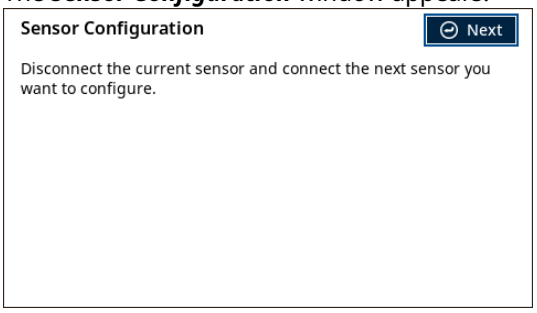
   d) Select **Save** and press the enter key button to confirm your settings.

6. The ***Please confirm*** window appears.



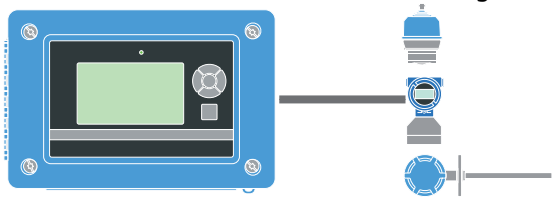
   a) To configure more sensors select **Yes**, and press the enter key button.

7. The ***Sensor Configuration*** window appears.



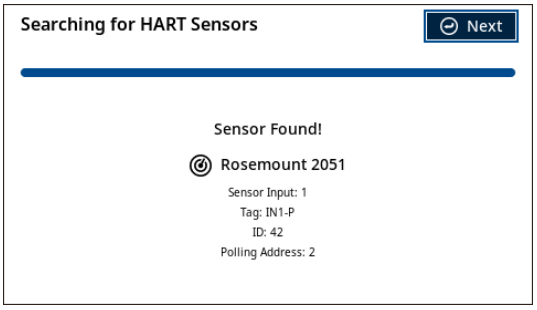
   a) Disconnect the configured sensor.

   b) Connect the second sensor (2051) to configure, to Sensor Input 1 terminals.



   c) Select **Next**, and press the enter key button.

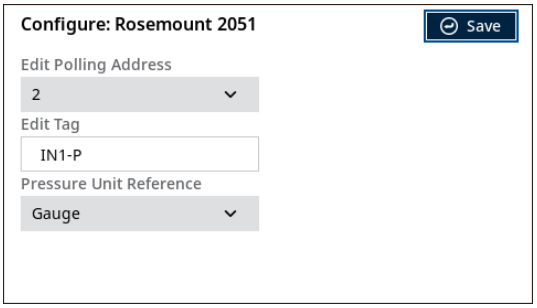
8. The ***Searching for HART Sensors*** window appears.



   a) Verify the correct sensor in found.

   b) Select **Next**, and press the enter key button to proceed.

9. In the ***Configure: Rosemount 2051*** window, do the following:



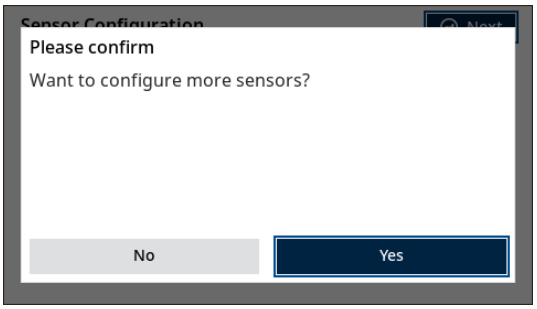
   a) In the ***Edit Polling Address*** list, select **2**.

   b) In the ***Edit Tag*** box, enter **IN1-P**.

   c) In the ***Pressure Unit Reference*** list, select **Gauge**.

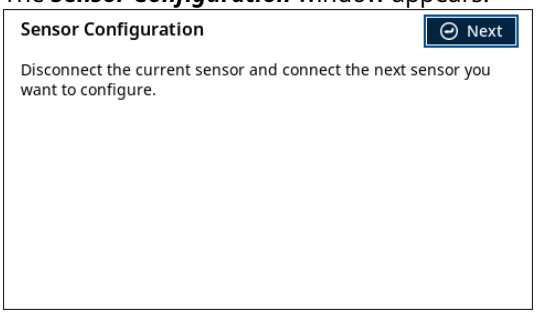
   d) Select **Save** and press the enter key button to confirm your settings.

10. The ***Please confirm*** window appears.



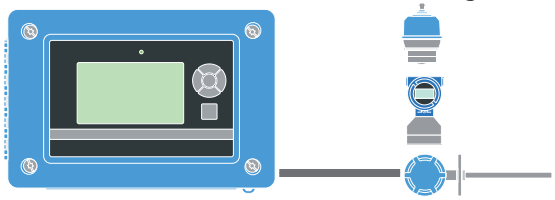
   a) To configure more sensors select **Yes**, and press the enter key button.

11. The ***Sensor Configuration*** window appears.



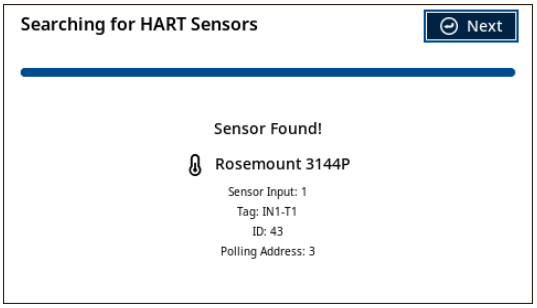
   a) Disconnect configured sensor.

   b) Connect the third sensor (3144P) to configure, to Sensor Input 1 terminals.



   c) Select **Next**, and press the enter key button to proceed.

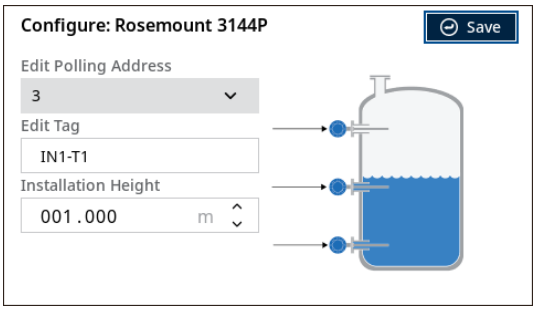
12. The ***Searching for HART Sensors*** window appears.



    a) Verify the correct sensor in found.

    b) Select **Next**, and press the enter key button to proceed.

13. In the ***Configure: Rosemount 3144P*** window, do the following:



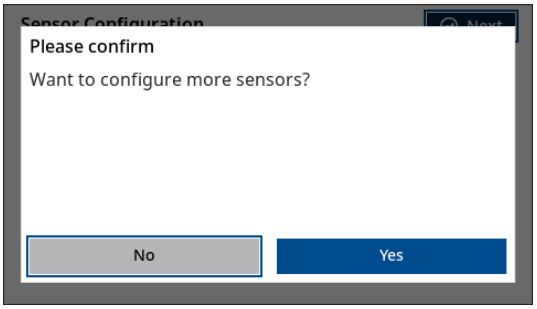
    a) In the ***Edit Polling Address*** list, select **3**.

    b) In the ***Edit Tag*** box, enter **IN1-T1**.

    c) In the ***Installation Height*** list, enter `001.000` m.

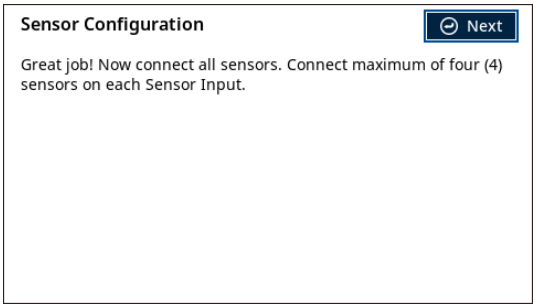
    d) Select **Save** and press the enter key button to confirm your settings.

14. The ***Please confirm*** window appears.

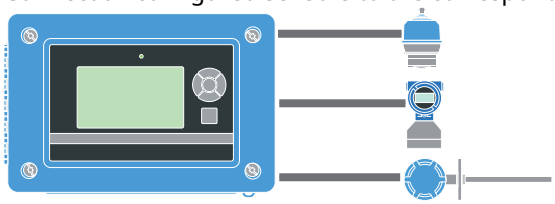


    a) Select **No**, and press the enter key button to not configure any additional sensors.

15. The ***Sensor Configuration*** window appears.

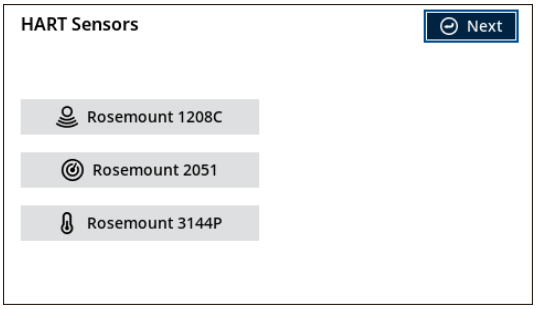


    a) Connect all configured sensors to the corresponding Sensor Input.



    b) Select **Next**, and press the enter key button to proceed.

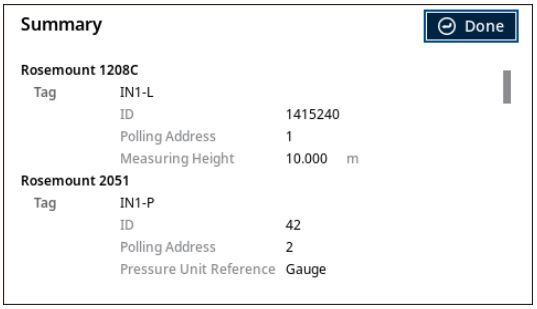
16. The ***HART Sensors*** window appears.



    a) Verify all connected sensors are listed properly.

    b) Select **Next**, and press the enter key button to proceed.

17. The ***Summary*** window appears.



    a) Verify the configured sensor settings are correct.

    b) Select **Done**, and press the enter key button to return to the main screen.

Postrequisites

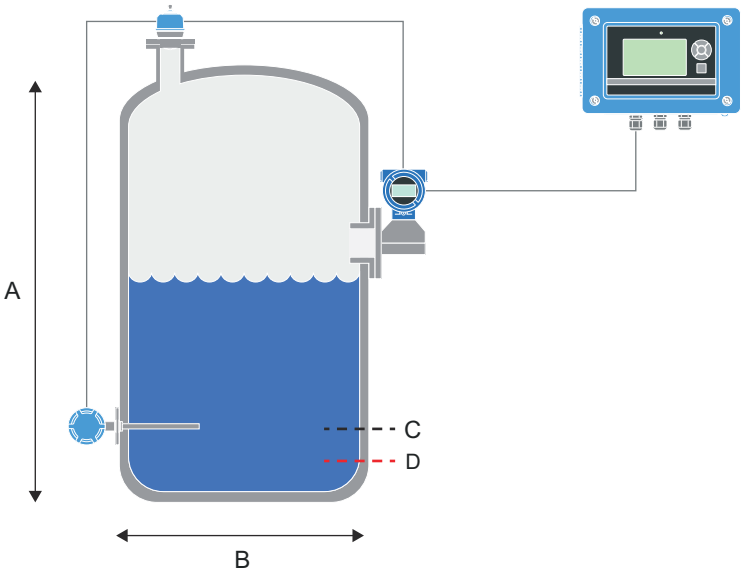
Configure system using local display or web interface.

4.6 System configuration

4.6.1 Example: Configure one tank with three sensors

This configuration example provides step-by-step instructions for setting up one tank with three types of sensors: level, pressure, and temperature. Figure 4-2 illustrates the configuration details tank dimensions and tank alarm settings.

Figure 4-2: Example: One tank with three sensors; level, pressure, and temperature



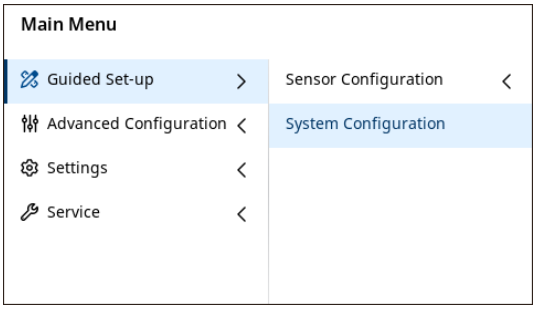
A. Tank dimensions: Height 14.5 m
B. Tank dimensions: Width 4 m
C. Tank Alarm (low level): Off when 0.9 m
D. Tank Alarm (low level): On when 0.7 m

Prerequisites

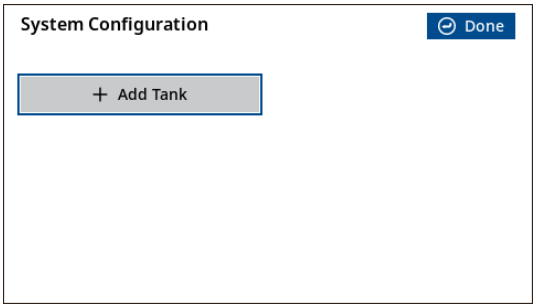
- Sensor configuration is required before system configuration. For example as shown in Example: Configure three sensors.

Procedure

1. In the ***Main Menu*** window, select **Guided Set-up** → **System Configuration**.

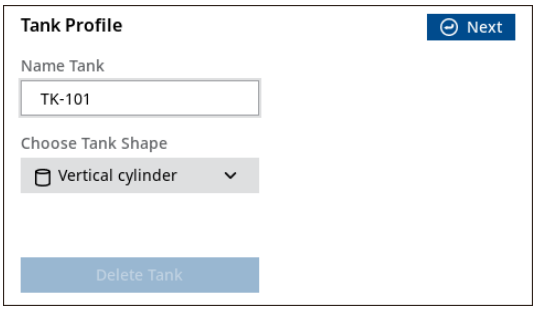


2. In the ***System Configuration*** window, select **+ Add Tank**.



   a) Select **Done**, and press the enter key button to proceed.

3. In the ***Tank Profile*** window, do the following:

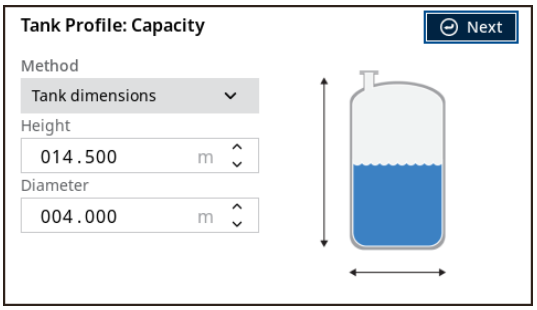


   a) In the ***Name Tank*** box, enter **TK-101**.

   b) In the ***Choose Tank Shape*** list, select **Vertical cylinder**.

   c) Select **Next**, and press the enter key button to proceed.

4. In the ***Tank Profile: Capacity*** window, do the following:



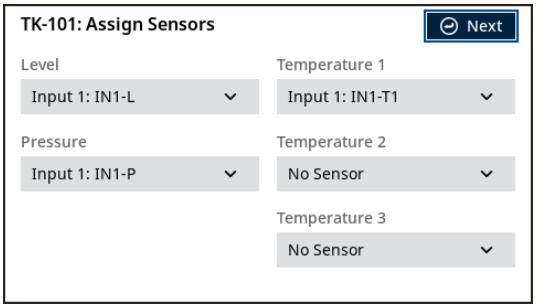
   a) In the ***Method*** list, select **Tank dimensions**.

   b) In the ***Height*** list, enter `015.000` m.

   c) In the ***Diameter*** list, enter `004.000` m.

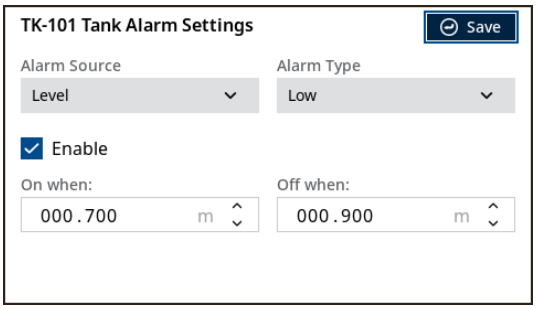
   d) Select **Next**, and press the enter key button to proceed.

5. In the ***Assign Sensors*** window, do the following:



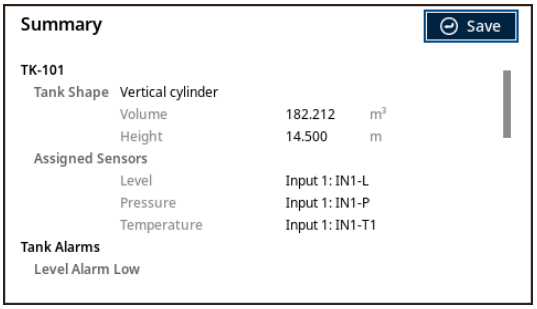
   a) In the ***Level*** list, select **Input 1: IN1-L**.
   b) In the ***Pressure*** list, select **Input 1: IN1-P**.
   c) In the ***Temperature 1*** list, select **Input 1: IN1-T1**
   d) Select **Next**, and press the enter key button to proceed.

6. In the ***Tank Alarms*** window, do the following:



   a) Select the **Enable** check box to enable the tank alarm.
   b) In the ***Alarm Source*** list, select **Level**.
   c) In the ***Alarm Type*** list, select **Low**.
   d) In the ***On when:*** box, enter `00000.700` m.
   e) In the ***Off when:*** box, enter `00000.900` m.
   f) Select **Next**, and press the enter key button to proceed.

7. The ***Summary*** window appears.



   a) Verify that the tank is properly configured.
   b) Select **Done**, and press the enter key button to return to the main screen.

4.7 Configure device settings

4.7.1 Set date and time

Use the Date/Time settings menu to select date format, and set current date and time.

Procedure

1. From the Display´s **Main menu** select **Settings** → **Date/Time**.
2. In the ***Set Date and Time*** window, do the following:

   a) In the *Date Format* list, select desired format.

   b) In the *Date* box, enter current date.

   c) In the *Time* box, enter current time.

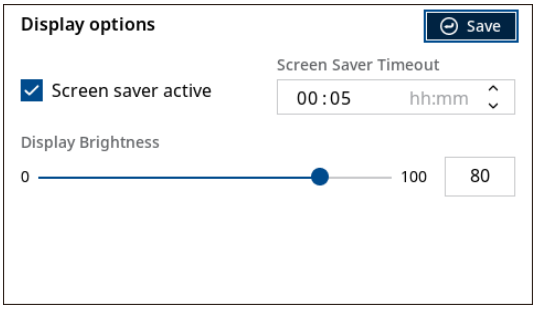
3. Select **Save**, and press the enter key button to confirm your settings.

4.7.2 Set up display

Use the Display settings menu to set the screen saver timeout and adjust the display brightness.

Procedure

1. From the Display´s **Main menu** select **Settings** → **Display**.
2. In the ***Display options*** window, do the following:



   a) Select the **Screen saver active** check box to enable the screen saver. In the ***Screen Saver Timeout*** box, enter desired time.

   b) Use the left and right key buttons to move the **Display Brightness** slider in order to adjust the display brightness.

   Default: 80

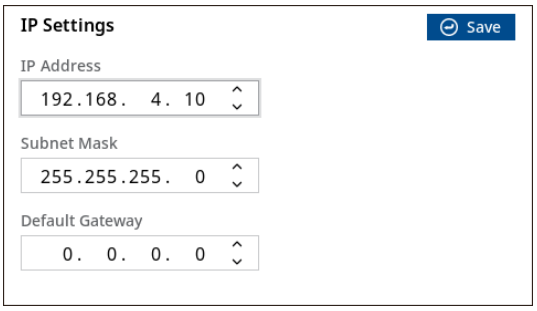
3. Select **Save**, and press the enter key button to confirm your settings.

4.7.3 Set device IP address

Use the IP settings menu to enter the desired IP address settings. The monitoring hub IP address from factory is: 192.168.4.10.

Procedure

1. From the Display´s **Main menu** select **Settings** → **Date/Time**.
2. In the ***IP Settings*** window, do the following:



   a) In the ***IP Address*** box, enter desired IP address.

   b) In the ***Subnet Mask*** box, enter desired subnet mask.

   c) In the ***Default Gateway*** box, enter desired default gateway.

3. Select **Save**, and press the enter key button to confirm your settings.

4.7.4 Set HART®-IP remote access

Procedure

1. From the Display´s **Main menu** select **Settings** → **Remote Services** → **HART IP**.
2. In the ***HART IP*** window, do the following:

   a) In the **Port** box enter desired port for HART-IP. It can be adjusted to match host system settings.

   Default port: 5094.

   b) Optional: Select the **Bridge function enabled** check box to enable host systems to access the HART sensors through the Rosemount 2405 by using it as a bridge device.

3. Select **Save**, and press the enter key button to confirm your settings.

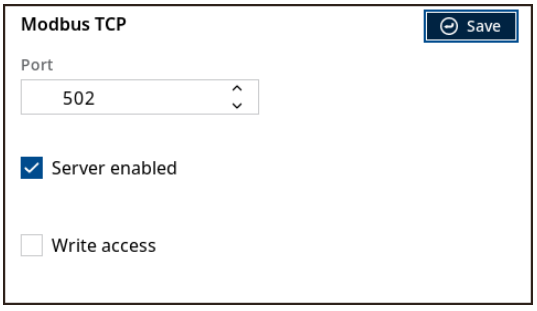
Related information

HART-IP

4.7.5 Set Modbus® TCP remote access

Procedure

1. From the Display´s **Main menu** select **Settings** → **Remote Services** → **Modbus TCP**.
2. In the ***Modbus TCP*** window, do the following:



   a) In the **Port** box enter desired TCP/IP port for Modbus TCP. It can be adjusted to match host system settings.

      Default port: 502.

   b) Select/deselect check boxes to enable/disable desired remote services:

Modbus TCP	Description
Server enabled	Option to enable Modbus TCP/IP connectivity. Unselect to disable the connectivity in case no data access from host system is required.
Write access	Option to allow connected Modbus TCP/IP client to change monitoring hub configuration using holding registers. Unselect to set the Modbus TCP/IP connectivity to read-only mode. Default: unselected

3. Select **Save**, and press the enter key button to confirm your settings.

Related information

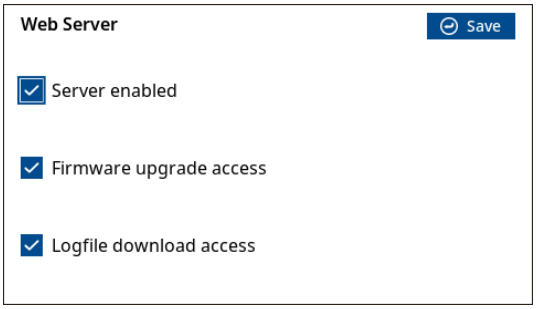
Modbus register table

4.7.6 Set web server remote access

Procedure

1. From the Display´s **Main menu** select **Settings** → **Remote Services** → **Web Server**.

2. In the ***Web Server*** window, select/deselect check boxes to enable/disable desired remote services:



Web Server	Description
Server enabled	Option to enable HTTP connectivity. Unselect to disable the connectivity in case web interface access is not required.
Firmware upgrade access	Option to allow monitoring hub firmware upgrade through the web interface. Unselect to disable this functionality in case firmware upgrade should not be accessible by web interface users.
Logfile download access	Option to allow monitoring hub download of log files through the web interface. Unselect to disable this functionality in case logfile download should not be accessible by web interface users.

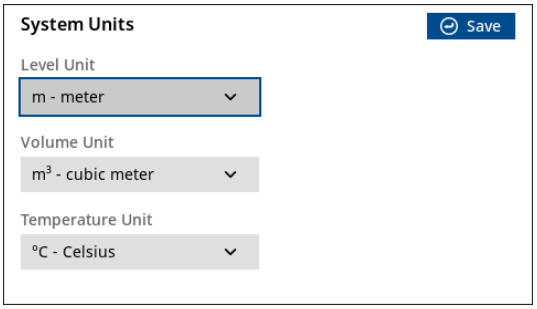
3. Select **Save**, and press the enter key button to confirm your settings.

4.7.7 Set system units

The system units settings determine how measured data is presented on the local display, web interface, and in the Modbus registers. The Rosemount 2405 automatically converts sensor measured values to match the selected system units, even if the connected sensors are configured to use different units.

Procedure

1. From the Display´s **Main menu** select **Settings** → **System Units**.
2. In the ***System Units*** window, do the following:



a) In the ***Level Unit*** list, select desired system units:
   - m - meter

- ft - feet and inches
- ft - feet decimal

b) In the ***Volume Unit*** list, select desired system units:

- m^3 - cubic meter
- l - liter
- ft^3 - cubic feet
- bbl - barrel
- US gal - US gallon
- UK gal - UK gallon

c) In the ***Temperature Unit*** list, select desired system units:

- °C - Celsius
- °F - Fahrenheit

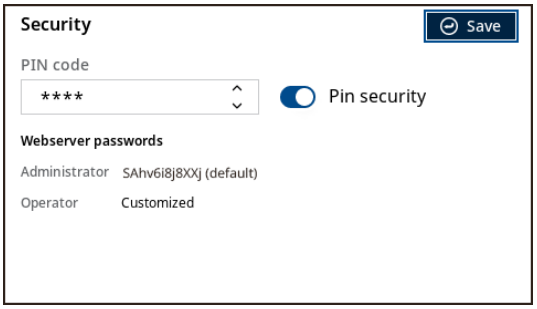
3. Select **Save**, and press the enter key button to confirm your settings.

4.7.8 Set pin code for device access

Use the Security menu to change the PIN code. You can also enable or disable the PIN code setting. PIN code from factory: 0000

Procedure

1. From the Display´s **Main menu** select **Settings** → **Security**.
2. In the ***Security*** window, do the following:



a) In the **PIN code** box, enter desired four-digit device pin code.

b) Use the **Pin security** toggle button to enable or disable the PIN code function.

3. Select **Save**, and press the enter key button to confirm your settings.

Related information

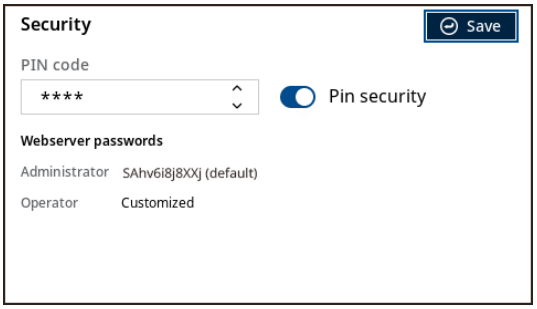
Local display user authorization

4.7.9 View web interface password

Use the security menu to view the factory-assigned password for both the operator and administrator access levels to the web interface. If either password has been changed, it will be indicated here as: Customized.

Procedure

1. From the Display´s **Main menu** select **Settings** → **Security**.
2. The passwords are listed under ***Webserver passwords*** in the ***Security*** window.



Related information

Reset web user passwords
Change web interface password

5 Operation

5.1 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that potentially raises safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

⚠ WARNING

Failure to follow safe installation and servicing guidelines could result in death or serious injury.

Use the monitoring hub only as specified in this Reference Manual.

The monitoring hub must be installed, connected, commissioned, operated, and maintained by suitably qualified personnel only, observing national and local requirements that may apply.

The monitoring hub must be installed according to the Rosemount 2405 Product Certifications document and Control Drawing.

Before commissioning the monitoring hub, ensure that the supply voltage matches the voltage specifications on the main label.

Do not use damaged equipment.

Repair, e.g. substitution of components, etc. may jeopardize safety and is under no circumstances allowed.

Refer to the Reference Manual for instructions on how to handle damaged equipment, troubleshooting, and take the monitoring hub out of service.

⚠ WARNING

Electrical shock could cause death or serious injury.

Ensure that the monitoring hub is not powered when opening the lid and making terminal connections.

If the monitoring hub is installed in a high voltage environment and a fault condition or installation error occurs, high voltage may be present on leads and terminals.

⚠ WARNING

Battery safety

This device contains built-in lithium-ion batteries which should not be replaced by the customer.

Batteries may explode or cause burns if disassembled, crushed, or exposed to fire or high temperatures.

If the batteries are damaged, avoid contact with eyes, skin, and clothing. Ensure adequate ventilation. Prevent material from contaminating soil and from entering sewers or waterways.

⚠ WARNING

Physical access

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental in protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

⚠ CAUTION

Pollution protection

Ensure that during installation or maintenance no moisture or dirt can get inside the instrument.

To maintain the housing protection, ensure that the housing lid is closed during operation and locked, if necessary.

⚠ CAUTION

This device complies with Part 15 of the Federal Communication Commission (FCC) Rules. Operation is subject to the following conditions:

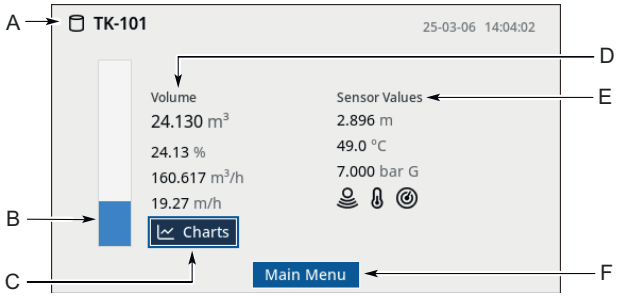
This device may not cause harmful interference.

This device must accept any interference received, including interference that may cause undesired operation.

5.2 Display

The monitoring hub display serves as an interface for the user to visualize sensor values and calculated values.

Figure 5-1: Typical Display Presentation



A. Tank name and tank shape
B. Bar graph of volume
C. Button to view current charts
D. Calculated values
E. Sensor values
F. Button to access the Main menu

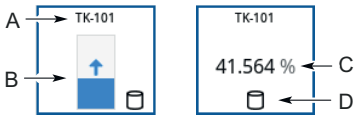
5.2.1 Tank data presentation

The Rosemount 2405 supports tank cards of various design for presentation of tank data on the local display.

Small tank card

The small tank card displays only the volume utilization.

Figure 5-2: Small Tank Card Parameters

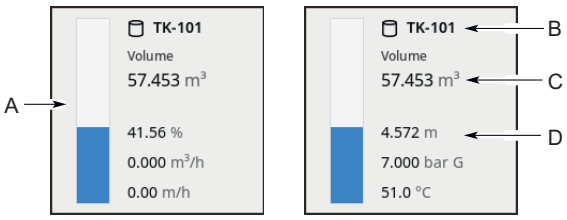


A. Tank name
B. Bar graph (with tank movement indicator)
C. Value
D. Tank shape

Large tank card

The large tank card displays four tank parameters, volume, and tank alarm lines.

Figure 5-3: Large Tank Card Parameters



A. Bar graph
B. Tank name and tank shape
C. Volume value
D. Sensor measurements or calculated values

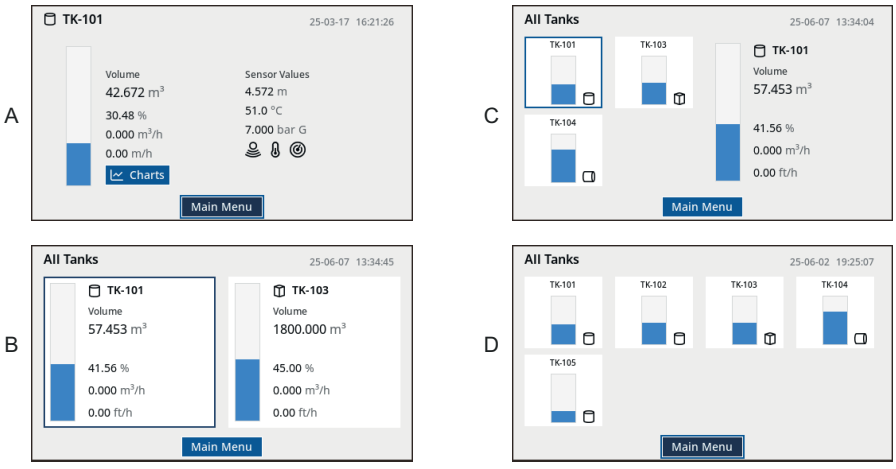
Tank card presentation

The presentation of tank cards on the local display varies based on the number of tanks in the system, as shown in Figure 5-4.

- One tank: The tank view displays complete tank overview
- Two tanks: Two large tank cards
- Three or four tanks: All tanks are displayed as small tank cards
- Five to eight tanks: All tanks are displayed as small tank cards

.

Figure 5-4: Tank Card Options



A. One tank
B. Two tanks
C. Three tanks
D. Five tanks

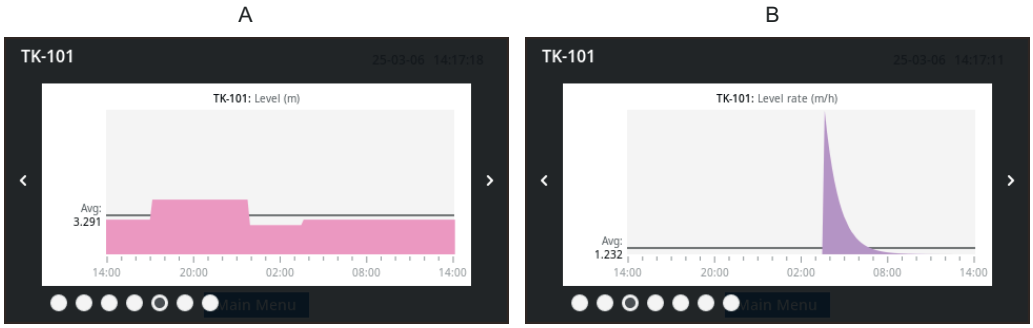
Related information

Tank card setup

5.2.2 Tank charts view

The Rosemount 2405 tank chart provides the last 24 hours tank log data in a graph. There is one view available for each tank parameter, providing a clear overview of recent tank activity. Figure 5-5 shows two chart view examples, displaying graphs for level and level rate.

Figure 5-5: Tank Charts Examples



A. Level chart
B. Level rate chart

Access the charts view by selecting the chart button, available in both the tank view and on the large tank card. Use the left and right arrow key buttons to navigate through the different chart views.

5.2.3 Variable screens

The monitoring hub can display the following variables:

Table 5-1: LCD Display Variables

Parameter	Description
Level	The current level measurement value
Level rate	The current calculated level rate value
Pressure	The current pressure measurement value
Temperature	The current average liquid temperature measurement value
Volume	The current calculated volume value
Flow rate	The current calculated flow rate value
Utilization	The current TOV calculated volume utilization

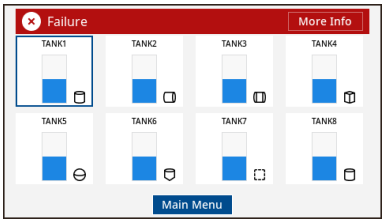
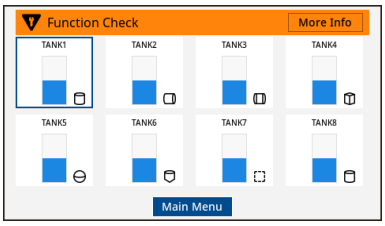
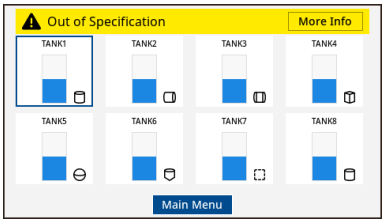
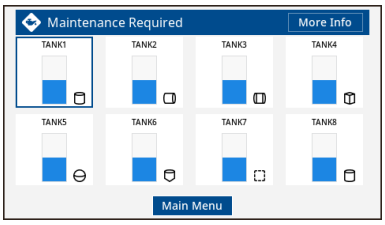
Related information

Volume utilization
Level Rate
Flow Rate
Average liquid temperature

5.2.4 Status presentation on display

The overall monitoring hub status is presented on the display main screen. Diagnostic alerts are reported when there is a device malfunction. The different fault categories are displayed in Table 5-2.

Table 5-2: Presentation of Monitoring Hub Status Images as per NAMUR NE 107

Status image	Category	Description
	Failure	At least one Failure alert is active.
	Function Check	At least one Function Check alert is active (and no active Failure alert).
	Out of Specification	At least one Out of Specification alert is active (and no active Failure or Function Check alert).
	Maintenance Required	At least one Maintenance Required alert is active (and no active Failure, Function Check, or Out of Specification alert).

5.3 Keypad

The keypad function buttons are used to navigate through the software menu system, to configure and setup the monitoring hub.

Table 5-3: Keypad Function Buttons

Button	Action
	The enter button is used to access the menu system, select a menu option, or to confirm settings.
	The up arrow button is used to move upwards when navigating the menu system, or to scroll through a list of options. When editing a parameter value, the up arrow button is used to increase a digit or character.

Table 5-3: Keypad Function Buttons *(continued)*

Button	Action
	The down arrow button is used to move downwards when navigating the menu system, or to scroll through a list of options. When editing a parameter value, the down arrow button is used to decrease a digit or character.
	The left arrow button is used to move left when navigating the menu system. When editing a parameter value, the left arrow button is used to move left to another digit or character.
	The right arrow button is used to move right when navigating the menu system. When editing a parameter value, the right arrow button is used to move right to another digit or character.
	When navigating the menu system, the back button is used to return to a previous menu level or the main screen. At other times, e.g. while editing, the button is used to restore a setting that is being edited.

5.4 Light emitting diode

There is one Light Emitting Diode (LED) located on the front of the Rosemount 2405 for status and error information.

5.4.1 LED status presentation

The overall Rosemount 2405 status is indicated by the LED color code. Diagnostic alerts are reported when there is a device malfunction, the different fault categories are displayed in Table 5-4.

Table 5-4: LED Color Codes as per NAMUR NE 107

LED color	Category	Description
Red	Failure	At least one Failure alert is active.
Orange	Function Check	At least one Function Check alert is active (and no active Failure alert).
Yellow	Out of Specification	At least one Out of Specification alert is active (and no active Failure or Function Check alert).
Blue	Maintenance Required	At least one Maintenance Required alert is active (and no active Failure, Function Check, or Out of Specification alert).

5.4.2 LED start-up information

When the Rosemount 2405 is starting up, the LED indicates possible hardware or software errors as shown in Table 5-5.

Table 5-5: LED Error Indication at Start-Up

Color	Blink interval	Description
Green	0.5 seconds	Normal boot in progress
Green	2 seconds	Firmware upgrade in progress
Yellow	2 seconds	Recovery phase in progress

Table 5-5: LED Error Indication at Start-Up *(continued)*

Color	Blink interval	Description
Red	0.5 seconds	Critical failure, unknown reason
Red	1second	Critical failure, no good firmware found or broken flash
Red	2 seconds	Critical failure, bad RAM or SDRAM

5.5 Read data from Modbus® register

The Rosemount 2405 Monitoring Hub stores measurement data, calculated values, and status information in Modbus input registers. Configuration settings are stored in holding registers.

The monitoring hub Ethernet port can be used for Modbus TCP/IP connection to host systems. By connecting the monitoring hub to an existing LAN network, the input and holding registers can be scanned in queries from a Modbus master, such as a local PC or host system.

Related information

Modbus register table

6 Service and troubleshooting

6.1 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that potentially raises safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

⚠ WARNING

Failure to follow safe installation and servicing guidelines could result in death or serious injury.

Use the monitoring hub only as specified in this Reference Manual.

The monitoring hub must be installed, connected, commissioned, operated, and maintained by suitably qualified personnel only, observing national and local requirements that may apply.

The monitoring hub must be installed according to the Rosemount 2405 Product Certifications document and Control Drawing.

Before commissioning the monitoring hub, ensure that the supply voltage matches the voltage specifications on the main label.

Do not use damaged equipment.

Repair, e.g. substitution of components, etc. may jeopardize safety and is under no circumstances allowed.

Refer to the Reference Manual for instructions on how to handle damaged equipment, troubleshooting, and take the monitoring hub out of service.

⚠ WARNING

Electrical shock could cause death or serious injury.

Ensure that the monitoring hub is not powered when opening the lid and making terminal connections.

If the monitoring hub is installed in a high voltage environment and a fault condition or installation error occurs, high voltage may be present on leads and terminals.

⚠ WARNING

Battery safety

This device contains built-in lithium-ion batteries which should not be replaced by the customer.

Batteries may explode or cause burns if disassembled, crushed, or exposed to fire or high temperatures.

If the batteries are damaged, avoid contact with eyes, skin, and clothing. Ensure adequate ventilation. Prevent material from contaminating soil and from entering sewers or waterways.

⚠ WARNING

Physical access

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental in protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

⚠ CAUTION

Pollution protection

Ensure that during installation or maintenance no moisture or dirt can get inside the instrument.

To maintain the housing protection, ensure that the housing lid is closed during operation and locked, if necessary.

⚠ CAUTION

This device complies with Part 15 of the Federal Communication Commission (FCC) Rules. Operation is subject to the following conditions:

This device may not cause harmful interference.

This device must accept any interference received, including interference that may cause undesired operation.

6.2 Diagnostic messages per NAMUR NE 107

Diagnostic alerts are reported when there is a device malfunction. The alert messages are presented on the display main screen with recommended actions.

The diagnostic messages in this section are organized according to the four NAMUR NE 107 alert categories.

6.2.1 HART® sensor not responding

Category Failure

Cause

The HART sensor with polling address 1/2/3/4 connected to Sensor Input 1/2 not responding.

Recommended actions

1. Check wiring between monitoring hub and sensor.
2. Check sensor.

6.2.2 HART® sensor reports invalid measurement

Category Failure

Cause

The HART sensor connected to Sensor Input 1/2 reports invalid measurement value.

The calculated values are invalid.

Recommended actions

Check sensor.

6.2.3 Digital Input fault indication

Category Failure

Cause

Digital Input indicates fault condition.

Recommended actions

Check source of digital input causing the error.

6.2.4 Electronics failure, I/O board

Category Failure

Cause

An electronics error in I/O board has occurred.

Recommended actions

1. Restart the monitoring hub.
2. If the condition persists, replace the monitoring hub.

6.2.5 Field calibration fault

Category Failure

Cause

Analog field calibration failed.

The calculated values are invalid

Recommended actions

1. Reset the field calibration.
2. Redo the field calibration again.
3. If the condition persists, replace the monitoring hub.

6.2.6 Electronics failure, Sensor Input

Category Failure

Cause

An electronics error between I/O board and Sensor Input has occurred.

Recommended actions

1. Restart the monitoring hub.
2. If the condition persists, replace the monitoring hub.

6.2.7 Device memory failure

Category Failure

Cause

A device memory error has occurred.

Recommended actions

1. Restore default settings, restart and reconfigure.
2. If the condition persists, replace the monitoring hub.

6.2.8 Startup failure

Category Failure

Cause

Monitoring repeatedly failed to start up with current configuration settings.

Recommended actions

1. Check supply voltage is within range and restart.
2. Restore default settings, restart and reconfigure.
3. If the condition persists, replace the monitoring hub.

6.2.9 Software error

Category Failure

Cause

The software in the monitoring hub encountered a problem and stopped running which may cause invalid calculated values.

Recommended actions

1. Restart the monitoring hub.
2. Restore default settings and reconfigure the monitoring hub.
3. Check/update firmware in the monitoring hub.
4. If the condition persists, replace the monitoring hub.

6.2.10 Analog Output out of range

Category Function Check

Cause

The configured span for Analog Output is too small.

Recommended actions

Increase analog output span by adjusting configuration.

6.2.11 Alarm suppression enabled

Category Function Check

Cause

Alarm suppression is enabled, and the monitoring hub is thus not reporting alarm-on-screen, nor on analog outputs or relay outputs.

Recommended actions

1. If this behavior is not desired, turn off alarm suppression.
2. If the condition persists, restart the monitoring hub.

6.2.12 Demo mode active

Category Function Check

Cause

The monitoring hub is in demo mode and is not reporting actual information.

Recommended actions

1. If this behavior is not desired, stop demo mode.
2. If the condition persists, restart the monitoring hub.

6.2.13 Keypad key stuck

Category Maintenance Required

Cause

One or more keys are stuck in pressed state.

Recommended actions

1. Try clicking all buttons repeatedly to become unstuck.
2. If the condition persists, restart the monitoring hub.
3. If the condition persists, replace the monitoring hub.

6.2.14 HART® secondary master connected

Category Maintenance Required

Cause

Monitoring hub has disabled communication to all HART sensors configured in Sensor Input.

To resume communication between monitoring hub and HART sensors:

Recommended actions

1. Disconnect the HART Secondary Master.
2. If the condition persists, restart the monitoring hub.

6.2.15 Invalid customer KPI chain

Category Maintenance Required

Cause

Monitoring hub unable to initiate secure web communication.

Recommended actions

1. Reset usage of customer KPI.
2. Download a new KPI chain.

6.2.16 HART® sensor outside sensor limits

Category Out of Specifications

Cause

The HART sensor connected to Sensor Input reports measurement outside sensor limits.

The calculated values may be affected.

Recommended actions

Check sensor operating range.

6.2.17 HART® sensor outside output range

Category Out of Specifications

Cause

The HART sensor connected to Sensor Input reports measurement outside output range.

The calculated values may be affected.

Recommended actions

Check sensor operating range.

6.2.18 Linearized variable out-of-range

Category Out of Specification

Cause

The level measurement in tank is outside the configured height range for volume.

Accuracy of volume calculation may be degraded.

Recommended actions

Check values in volume look-up table.

6.2.19 Electronics temperature out-of-range

Category Out of Specification

Cause

The temperature of the electronics board has exceeded the operating range.

Recommended actions

Verify ambient temperature is within the operating range.

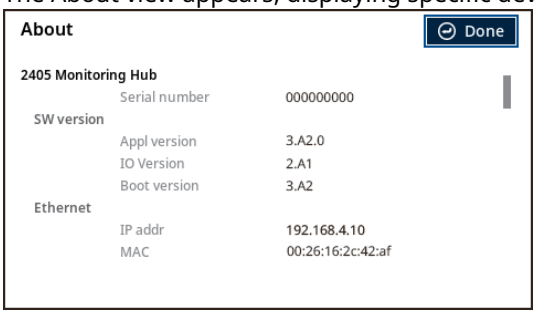
6.3 Local display service menu

6.3.1 View the about information

The About view presents monitoring hub information such as; serial number, software version, Ethernet IP address, and licenses.

Procedure

1. From the Display´s ***Main menu***, select **Service** → **About**.
   The About view appears, displaying specific device information:



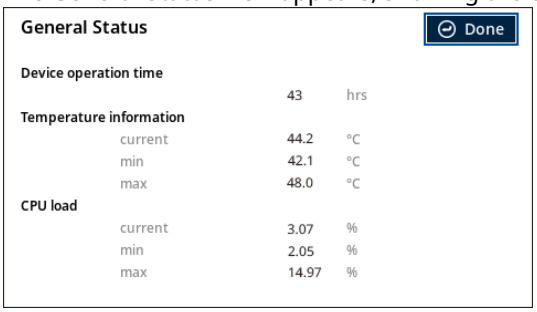
2. Select **Done**, and press the enter key button to return to the main screen.

6.3.2 Check device status

The General Status view presents monitoring hub status information such as; device operation time, temperature, and CPU load.

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Status** → **General**.
   The General Status view appears, showing the current monitoring hub status:

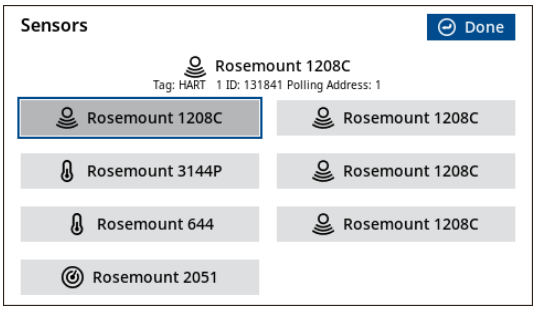


2. Select **Done**, and press the enter key button to return to the main screen.

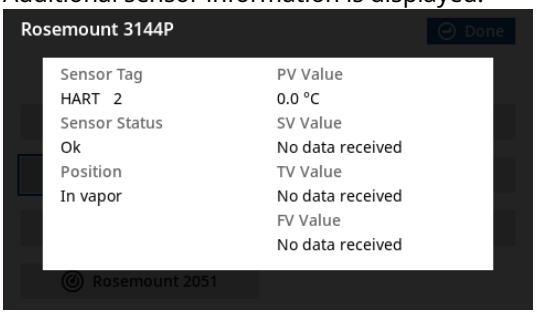
6.3.3 Check sensor status

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Status** → **Sensors**.
2. The Sensor Status view shows the status of all connected sensors. To view additional information about a specific sensor, select the desired sensor button and press the enter key button.



Additional sensor information is displayed.

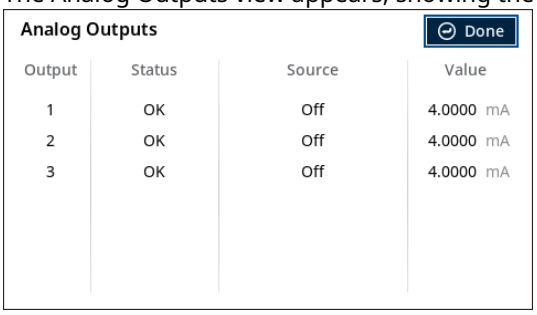


3. Select **Done**, and press the enter key button to return to the main screen.

6.3.4 Check analog outputs status

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Status** → **Analog Outputs**.
   The Analog Outputs view appears, showing the current analog outputs status:

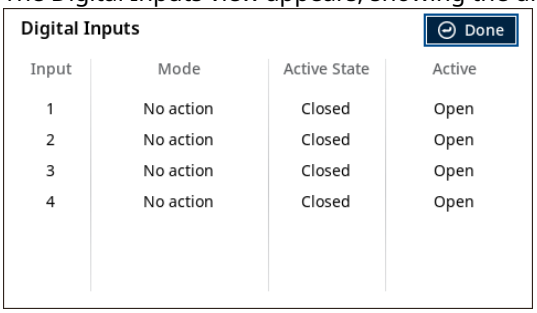


2. Select **Done**, and press the enter key button to return to the main screen.

6.3.5 Check digital input status

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Status** → **Digital Inputs**.
   The Digital Inputs view appears, showing the digital inputs status:



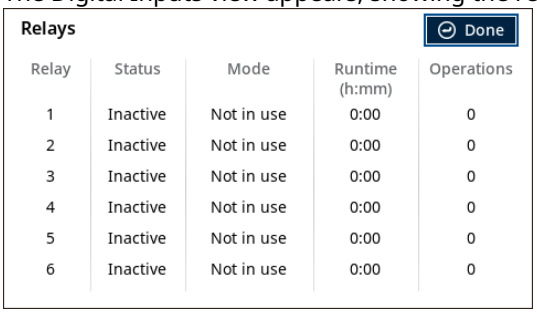
Input	Mode	Active State	Active
1	No action	Closed	Open
2	No action	Closed	Open
3	No action	Closed	Open
4	No action	Closed	Open

2. Select **Done**, and press the enter key button to return to the main screen.

6.3.6 Check relays status

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Status** → **Relays**.
   The Digital Inputs view appears, showing the relays status:



Relay	Status	Mode	Runtime (h:mm)	Operations
1	Inactive	Not in use	0:00	0
2	Inactive	Not in use	0:00	0
3	Inactive	Not in use	0:00	0
4	Inactive	Not in use	0:00	0
5	Inactive	Not in use	0:00	0
6	Inactive	Not in use	0:00	0

2. Select **Done**, and press the enter key button to return to the main screen.

6.3.7 Reset configuration

This function resets the monitoring hub configuration to factory settings (user configuration is overwritten).

Prerequisites

Note
Resetting the monitoring hub configuration to factory default can not be reversed.

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Reset** → **Configuration**.
2. Select OK to confirm factory reset.

6.3.8 Reset failure alarms

To clear failure alarms that are no longer applicable due to changes in configuration:

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Reset** → **Failure Alarms**.
2. Select **OK** to confirm failure alarm reset.

6.3.9 Reset field calibration

To reset field calibration to factory settings:

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Reset** → **Field calibration**.
2. Select **OK** to confirm field calibration reset.

Related information

Perform field calibration of analog output

6.3.10 Reset tank logs

To erase all tank log memory entries:

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Reset** → **Tank Logs**.
2. Select **OK** to remove all entries in tank logs.

Related information

Tank Logs

6.3.11 Reset web user certificate

To remove custom certificates and revert to default self-signed certificates:

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Reset** → **Web User Certificate**.
2. Select **OK** to confirm web user certificate reset, standard certificates will be used instead.

Related information

Upload web server certificate file

6.3.12 Reset web user passwords

This function resets all web interface user passwords to factory settings.

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Reset** → **Web User Passwords**.
2. Select **OK** to confirm all web user passwords will be reset to default settings.

Related information

Change web interface password
View web interface password

6.3.13 Restore to factory settings

This function resets the monitoring hub to factory settings.

Prerequisites

Note
Resetting the monitoring hub to factory default settings can not be reversed.

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Reset** → **Factory Reset**.
2. Select **OK** to confirm the factory reset.

6.3.14 Perform field calibration of analog output

Use this function to calibrate the analog output by comparing the actual output current with the nominal 4 mA and 20 mA currents. Calibration is done at factory and the analog output does not normally need to be recalibrated.

Prerequisites

Note
This function should only be performed if there is a clear deviation on an analog output. Calibrating against an incorrect or unstable reference may worsen the issue rather than resolve it.

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Field calibration**.
2. Select desired analog output.

Option	Description
Output 1	Analog output 1
Output 2	Analog output 2
Output 3	Analog output 3

3. Ensure the measuring equipment is connected to the Analog output terminals.
4. Select the **Output 4 mA** button to apply 4 mA to the analog output.
5. Enter the read analog output value in the **Analog Output Current (mA)** field, and press the enter key button.
6. Select **Next**, and press the enter key button.
7. Select the **Output 20 mA** button to apply 20 mA to the analog output.
8. Enter the read analog output value in the **Analog Output Current (mA)** field, and press the enter key button.
9. Select **Done**, and press the enter key button.
   The analog output calibration is completed.

10. To validate the calibration, select the **Output 4 mA** button and verify the value in measuring unit.
11. To validate the calibration, select the **Output 20 mA** button and verify the value in measuring unit.
12. Select **Save**, and press the enter key button.

Related information

Reset field calibration

6.3.15 Use the demo mode

The demo mode can be used to demonstrate and test the monitoring hub. It simulates HART® sensors to make the system appear as real sensors are connected.

When demo mode is activated, four tanks are automatically configured with simulated sensor values. During this mode, sensor configuration is disabled for both the local display and web interface. However, the user can still perform system and advanced configurations through both interfaces.

Available demo mode options:

- Demo mode with custom values
- Demo mode with default values

Use the demo mode with custom values

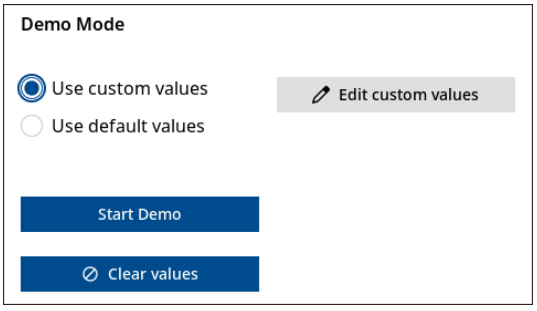
The demo mode with custom values allows the user to define their own simulated sensor values.

Prerequisites

Note
Activating demo mode will permanently remove all existing sensor and tank configurations.

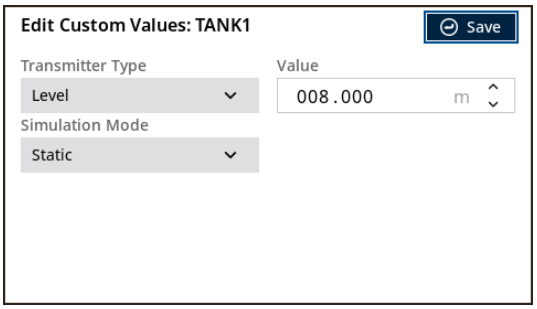
Procedure

1. From the Display´s ***Main menu***, select **Service** → **Demo Mode**.
2. In the ***Demo Mode*** window select the **Use custom values** radiobutton.



3. Optional: Select the **Clear values** button to clear any previous saved custom demo values.
4. Select the **Edit custom values** button to customize the simulation values.
5. In the ***Demo Mode / Edit Custom Values*** window select the desired tank and press the enter key button to proceed.
6. In the ***Edit Custom Values: TANK*** window select the desired simulation settings.

Example



a) In the **Transmitter Type** list select desired sensor. There are four demo sensors available:

- Level
- Pressure
- Temperature 1
- Temperature 2

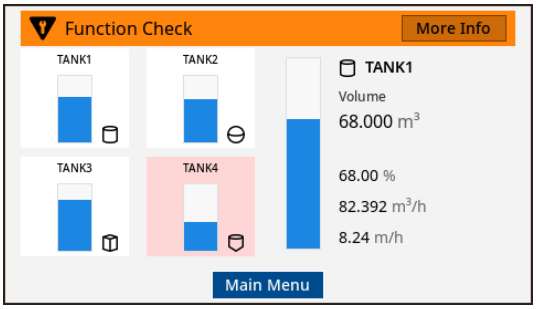
b) In the **Simulation Mode** list select desired simulation mode for the selected sensor.

Simulation Mode	Description
No Simulation	The selected sensor is set to be excluded from the simulation.
Dynamic	The simulated sensor value is set to change based on the selected corresponding value inputs.
Static	The simulated sensor value is set to a fixed value.

c) In the **Value** field select the desired value.

d) Select **Save** and press the enter key button to confirm your settings.

7. Select **Start Demo** and press the **OK** button to activate the demo mode. Simulated sensor values are shown:



Postrequisites

To exit demo mode; select **Main Menu** → **Service** → **Demo Mode** → **Stop Demo**. When proceeding with regular configuration, it is recommended to also select **Clear values**, to ensure that any temporary demonstration data is removed.

Use demo mode with default values

Prerequisites

Note
Activating demo mode will permanently remove all existing sensor and tank configurations.

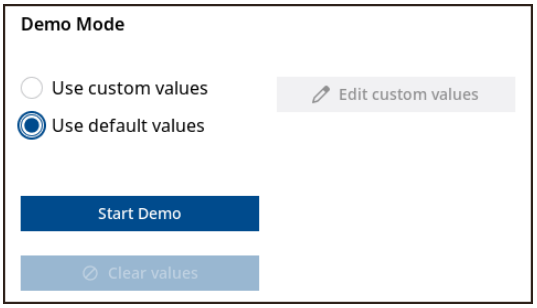
Predefined sensor values are used to simulate typical operating conditions. See Table 6-1 for predefined sensor values.

Table 6-1: Demo Mode: Sensor Default Values

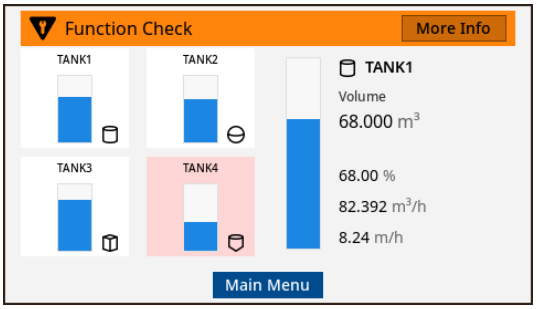
Demo sensor	Reference/ Installation height	Dynamic/ Static	Value/ Max Value	Value/ Min Value	Step	Time
Level 1	10 m	Dynamic	9 m	5 m	0.1 m	00:01.00
Temp 1	8 m	Static	50 °C	50 °C	N/A	N/A
Temp 2	4 m	Static	60 °C	60 °C	N/A	N/A
Pressure	N/A	Static	100 bar	100 bar	N/A	N/A
Level 2	10 m	Static	6 m	6 m	N/A	N/A
Level 3	7 m	Dynamic	6.5 m	0.5 m	0,05 m	00:01.00
Level 4	10 m	Dynamic	9 m	2 m	0,05 m	00:01.00

Procedure

1. From the Display´s ***Main menu***, select **Service** → **Demo Mode**.
2. In the ***Demo Mode*** window select the **Use default values** radiobutton.



3. Select **Start Demo** and press the **OK** button to activate the demo mode. Simulated sensor values are shown:



Postrequisites

To exit demo mode; select **Main Menu** → **Service** → **Demo Mode** → **Stop Demo**. When proceeding with regular configuration, it is recommended to also select **Clear values**, to ensure that any temporary demonstration data is removed.

A Specifications and reference data

A.1 General specifications

A.1.1 Power supply

Power consumption

Maximum 12 W

Supply voltage

- DC: 24-48 Vdc -15% to +10%
- AC: 100-240 Vac 50/60 Hz -15% to +10%

Fuse

2 A, 350 V

A.1.2 Start-up time

Approximately 30 seconds

A.1.3 Write protection

Yes

A.1.4 Memory card

Built-in memory card for logging function, up to 200.000 data points can be logged.

A.1.5 Display

Type

4.3 inch 480 x 272, backlit TFT LCD module color

Output units

- Level: m, feet, feet & inches
- Volume: m^3, l, ft^3, barrels (bbl), US gal, UK gal
- Volume utilization: %
- Level rate: m/h, ft/h
- Flow rate: m^3/h ,l/min, barrel/h, ft^3/h, US gal/h, UK gal/h
- Pressure: psiA, psiG, barA, barG, Pa A, Pa G, kPa A, kPa G, kg/(cm^2)
- Temperature: °C, °F
- Signal strength: mV

A.1.6 Field communication

HART® multi-drop

Supported transmitters

- Rosemount 1208C Level and Flow Transmitter
- Rosemount 3408 Level Transmitter
- Rosemount 5408 Level Transmitter
- Rosemount 5300 Level Transmitter
- Rosemount 3100 Level Transmitter
- Rosemount 2051 Pressure Transmitter
- Rosemount 3051 Pressure Transmitter
- Rosemount 3144 Temperature Transmitter
- Rosemount 644 Temperature Transmitter
- Rosemount 248 Temperature Transmitter
- Generic support for level, temperature and pressure HART® transmitters from other vendors

A.1.7 Host communication

The Rosemount 2405 Monitoring Hub communicates with host systems, such as Rosemount TankMaster WinView and Rosemount TankMaster Mobile, via Modbus® TCP. The Rosemount 2405 also supports HART® IP protocol, which enables tunneling of HART commands from field devices to host.

Ethernet

Modbus® TCP connection to host system, and/or web interface access for service functions and data log download

- 10/100 Mbps
- RJ45 connector

A.1.8 Keypad

Six buttons; up, down, left, right, back, and enter

A.1.9 Light emitting diode (LED)

One multi-colored LED for health status

A.1.10 Permissions overview

Table A-1: Configuration

Function	Local display	Web interface	
	PIN code required	Operator	Administrator
Search and add HART sensors	Yes	No	No
Configure HART sensors	Yes	No	Yes
Configure tanks	Yes	No	Yes
Configure analog outputs, digital inputs, relays, and tank alarms	Yes	No	Yes
Configure Tank Card setup	No	No	No

Table A-2: Monitoring/status

Function	Local display	Web interface	
	PIN code required	Operator	Administrator
Monitor tanks	No	Yes	Yes
View tank log graphs	No	Yes	Yes
Status of monitoring hub	No	Yes	Yes
Status of sensors, analog outputs, digital inputs, and relays	No	Yes	Yes
Failure alarms table	N/A	Yes	Yes
Tank alarms table	N/A	Yes	Yes

Table A-3: Settings

Function	Local display	Web interface	
	PIN code required	Operator	Administrator
Date and time settings	Yes	No	Yes
Display settings	Yes	No	No
IP settings	Yes	No	No
Security settings	Yes	No	No
Remote services settings	Yes	No	No
System units settings	No	Yes	Yes

Table A-4: Service

Function	Local display	Web interface	
	PIN code required	Operator	Administrator
Info and status of monitoring hub	No	Yes	Yes
Status of sensors, analog outputs, digital inputs, and relays	No	No	Yes
Factory reset	Yes	No	No

Table A-4: Service *(continued)*

Function	Local display	Web interface	
	PIN code required	Operator	Administrator
Tank log reset, Field calibration reset, and Failure alarm reset	Yes	No	No
Activate demo mode and configure sensor value simulations	Yes	No	No
Analog output field calibration	Yes	No	No
Download data logs	N/A	No	Yes
Upgrade firmware	N/A	No	Yes

Related information

Local display user authorization
Web interface

A.2 Electrical specifications

A.2.1 Relay outputs

Six relay outputs

250 Vac 8 A/24 Vdc 8 A resistive load

A.2.2 Analog outputs

Three analog outputs

Signal range

4-20 mA

Accuracy

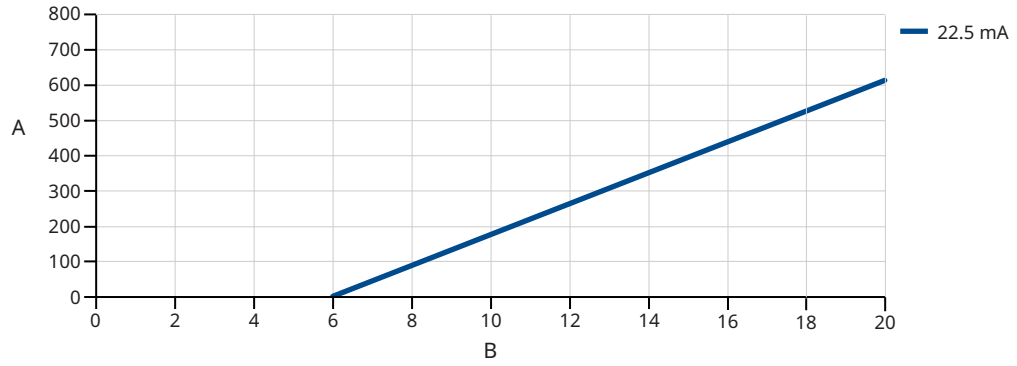
±0.02 mA (0.1% of 20 mA)

Resolution

12 bit

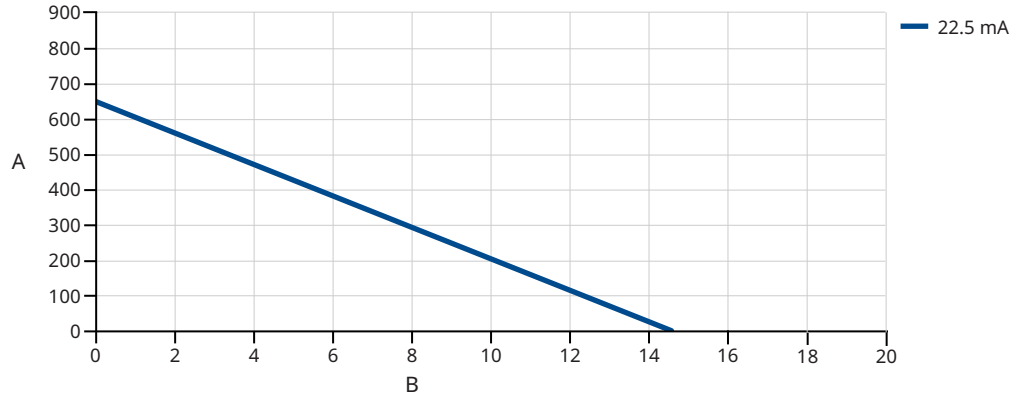
Maximum load

Figure A-1: Loop Resistance: Loop Power, Analog Output



A. Loop resistance [Ω]
B. Load voltage [V]

Figure A-2: Loop Resistance: Internal Power, Analog Output



A. Loop resistance [Ω]
B. Load voltage [V]

Power supply out

24 Vdc

Analog signal on alarm

The Rosemount 2405 automatically and continuously performs self-diagnostic routines. If a failure or a calculated value error is detected, the analog signal will be driven offscale to alert the user. The fixed analog signal on alarm is user-configurable.

Table A-5: Signal on Alarm

Standard	High	Low
Rosemount standard	21.75 mA	3.75 mA
NAMUR NE43	22.5 mA	3.6 mA

Analog saturation levels

The Rosemount 2405 will continue to set a current that corresponds to the calculated value until reaching the associated saturation limit (and then freeze).

Table A-6: Saturation Levels

Standard	High	Low
Rosemount standard	≥ 20.8 mA	≤ 3.9 mA
NAMUR NE43	≥ 20.5 mA	≤ 3.8 mA

A.2.3 Digital inputs

Four digital inputs, for use with potential-free contacts

Output voltage

14 V

Output current

6 mA

A.2.4 Sensor inputs

Two inputs, isolated from ground, for loop-powered multi-drop HART® transmitters

Load limitations

Minimum output voltage is 13.5 Vdc. The maximum loop resistance quoted ensures there will be at least 12 Vdc available at the transmitter.

Table A-7: Minimum Terminal Output Voltages

Load current (mA)	Rosemount 2405 terminal voltage (Vdc)	Maximum loop resistance (Ohms)
3.75	20.25	2200
4.0	20.16	2040
20.0	14.32	120
21.75	13.77	81
22.5	13.5	66

A.3 Mechanical specifications

A.3.1 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 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.

A.3.2 Materials

Housing

Polycarbonat Copolymer

Wall and pipe mounting kit

SST 316L

Weather protection

SST 316L

A.3.3 Weight

3.7 lb (1.7 kg)

A.3.4 Cable/conduit entries

- Seven M20 cable entries
- Support plate in stainless steel with M20 threads for cable glands or NPT adapters/ conduit hubs

A.3.5 Terminal connection type

Spring loaded terminals

A.4 Environmental specifications

A.4.1 Temperature limits

Ambient temperature

-40 to +140 °F (-40 to +60 °C)[4]

Storage temperature

-40 to +140 °F (-40 to +60 °C)

A.4.2 Humidity

0 - 100% relative humidity

(4) Display reading: -4 to +140 °F (-20 to +60 °C).

A.4.3 Electrical safety

EN 61010-1:2010 (LVD)

A.4.4 Ingress protection

- Enclosure meets IP66/IP67 according to IEC 60529
- Enclosure meets Type 4X according to UL50E

A.4.5 Impact protection

Enclosure withstands 7 Joule

A.4.6 Maximum vibration

Vibration according to IEC 61298-3, level "field with general application"

A.4.7 Installation category

Overvoltage category II (according to IEC 60664-1)

A.4.8 Pollution degree

Degree 2 according to IEC 61010-1

A.4.9 Metrology sealing possibility

Yes

A.4.10 Transient/built-in lightning protection

Surge

IEC 61000-4-5, 1 kV line-to-line, 2 kV line to ground

Burst

IEC 61000-4-4, 2 kV

A.4.11 Electromagnetic compatibility

Emission and Immunity: EMC directive 2014/30/EU, EN 61326-1

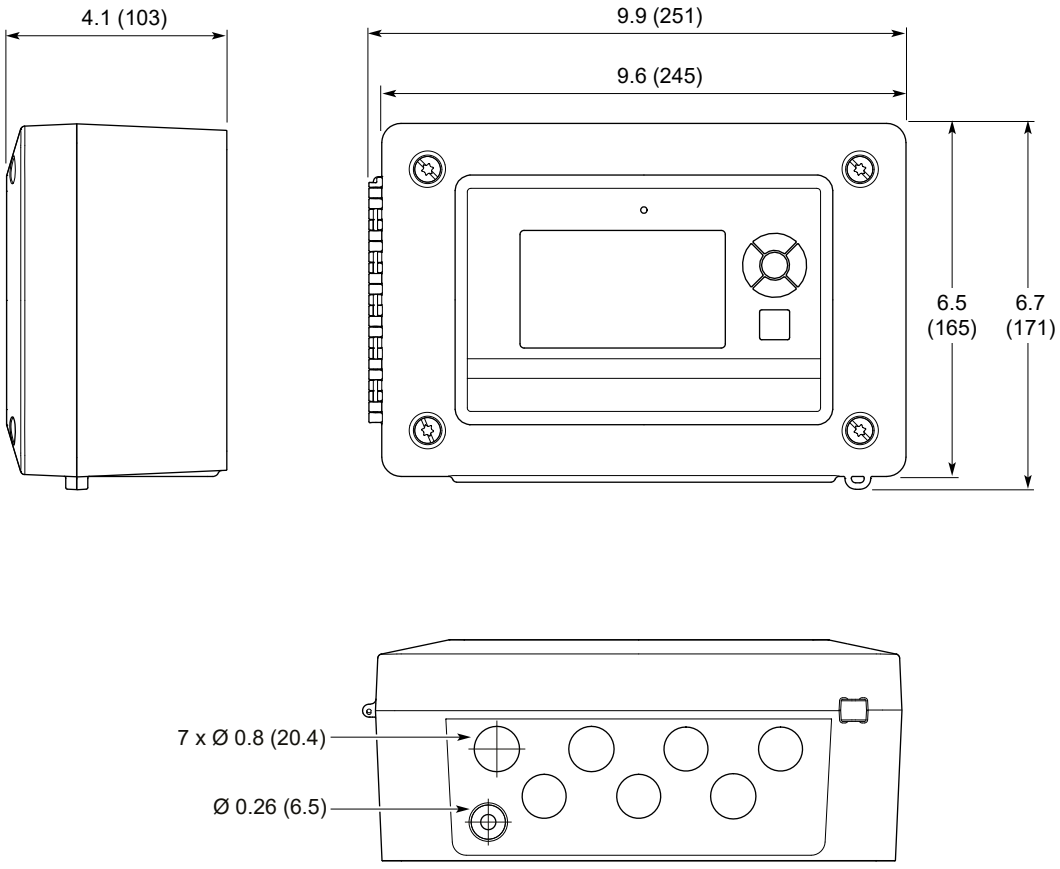
A.4.12 Maximum altitude

6560 ft. (2000 m)

A.5 Dimensional drawings

A.5.1 Monitoring hub

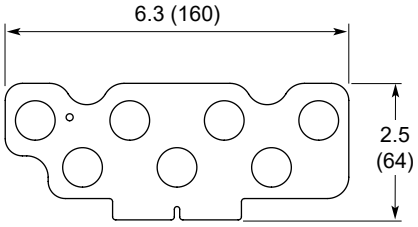
Figure A-3: Rosemount 2405



Dimensions are in inches (millimeters).

A.5.2 Support plate

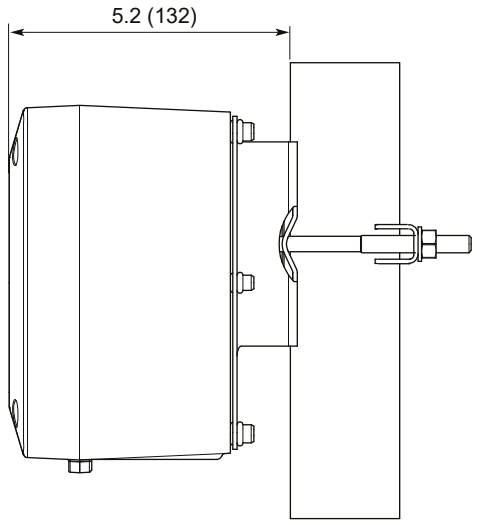
Figure A-4: Support Plate



Dimensions are in inches (millimeters).

A.5.3 Wall and pipe mounting kit

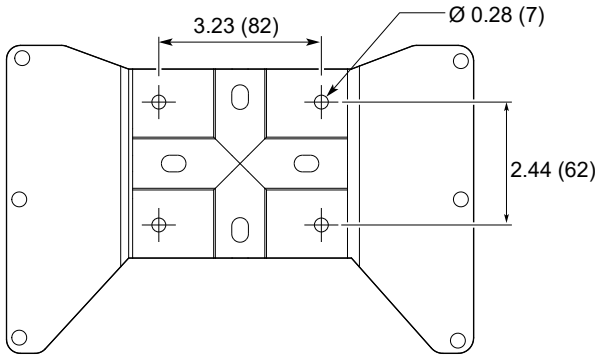
Figure A-5: Mounting Bracket



Dimensions are in inches (millimeters).

Bracket hole pattern

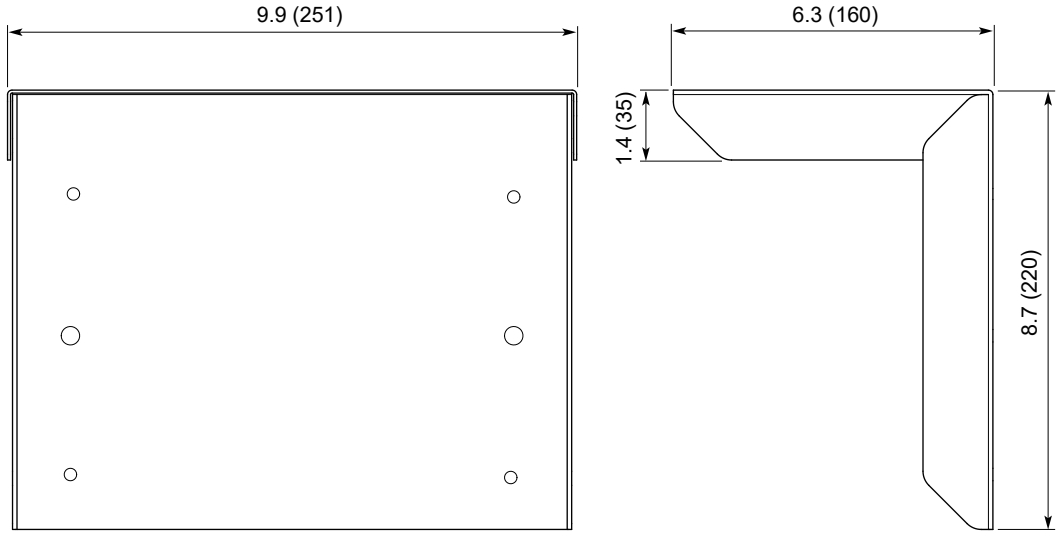
Figure A-6: Hole Pattern for Wall Mounting



Dimensions are in inches (millimeters).

A.5.4 Weather protection

Figure A-7: Weather protection



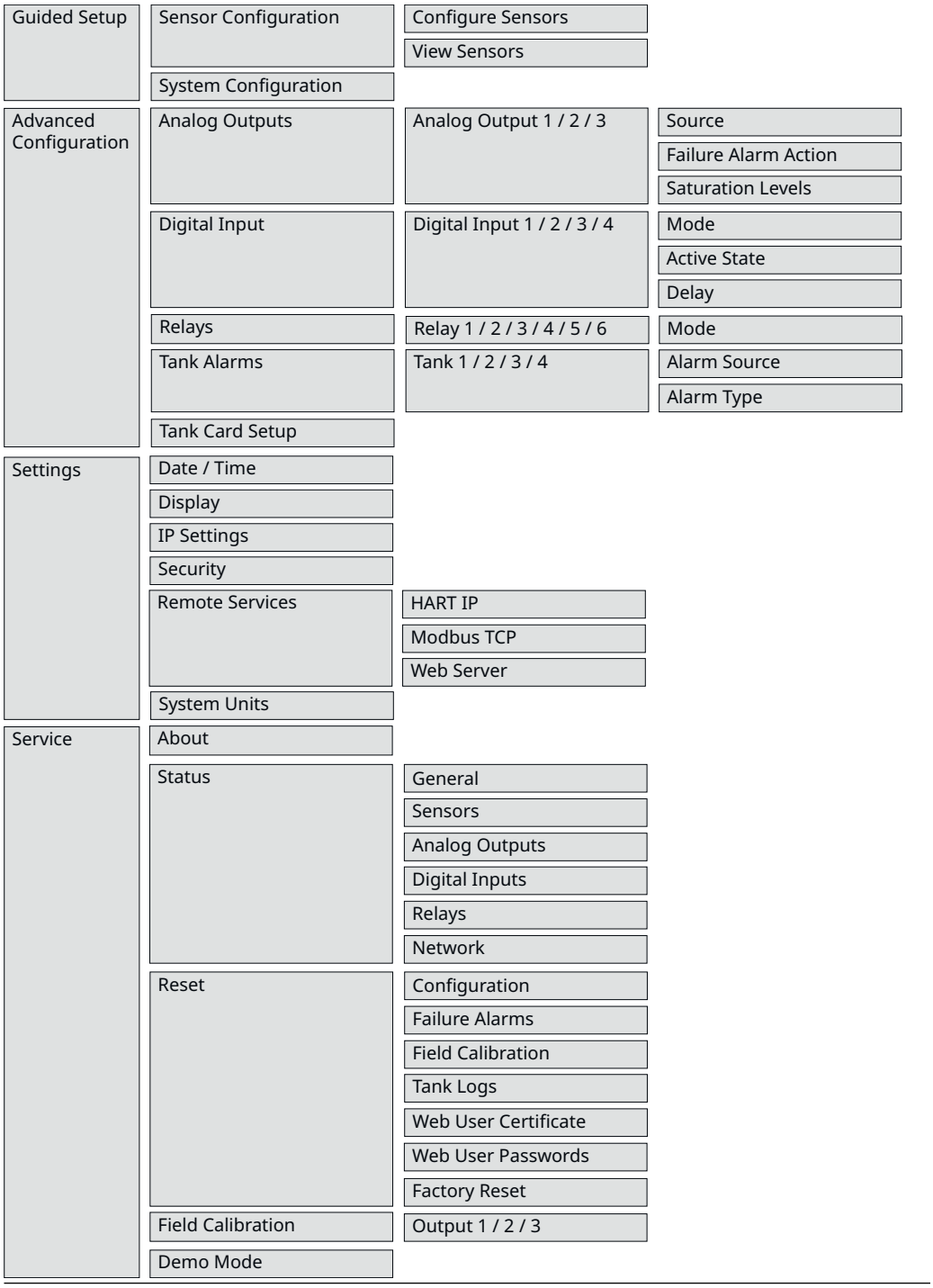
Dimensions are in inches (millimeters).

B Configuration parameters

B.1 Menu tree

Figure B-1 shows the menu tree for the Rosemount 2405 local display.

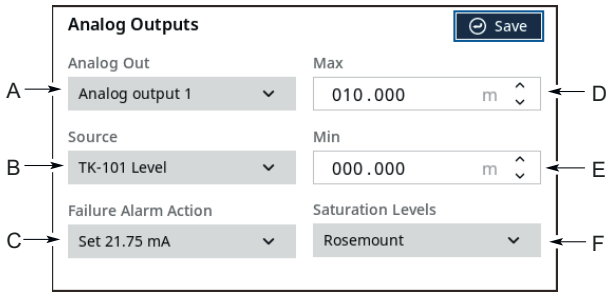
Figure B-1: Rosemount 2405 Local Display Menu Tree



B.2 Analog output

The current output is for transmitting a monitoring hub calculated value as a 4–20 mA signal. There are three selectable analog outputs available.

Figure B-2: Analog output settings



A. Selected analog output
B. Analog output source for current tank
C. Failure alarm action
D. Max: 10 meters represented by 20 mA
E. Min: 0 meters represented by 4 mA
F. Saturation Levels

B.2.1 Source

The Source option is used to select source value for a specific tank to be transmitted by the current outputs.

Table B-1: Source Values for Analog Outputs

Option	Description
Off	Analog output not used.
TANK# Level	Select desired tank and set analog output source to level.
TANK# Level rate	Select desired tank and set analog output source to level rate.
TANK# Pressure	Select desired tank and set analog output source to pressure.
TANK# Temperature	Select desired tank and set analog output source to average liquid temperature.
TANK# Volume	Select desired tank and set analog output source to volume.
TANK# Flow rate	Select desired tank and set analog output source to flow rate.
TANK# Utilization	Select desired tank and set analog output source to utilization.

Related information

Volume utilization
Level Rate
Flow Rate
Average liquid temperature

B.2.2 Range values

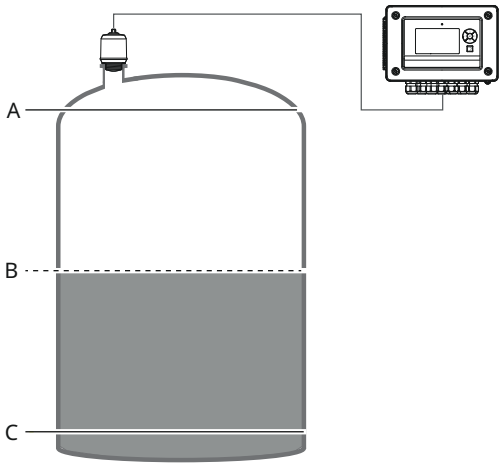
The Min and Max range values are used to set the source values that correspond to the analog output values 4 mA and 20 mA.

Table B-2: Analog Output Range Values

Parameter	Description
Min	Select the monitoring hub calculated value to be represented by a 4 mA signal.
Max	Select the monitoring hub calculated value to be represented by a 20 mA signal.

Figure B-3 displays an example with range values 0 to 10 meters. Therefore, a monitoring hub calculated value of 5 meters would be output as a 12 mA signal by the analog output.

Figure B-3: Example: Monitoring Hub Calculated Value Range 0 to 10 Meters



A. Max: 10 meters represented by 20 mA
B. 5 meters represented by 12 mA
C. Min: 0 meters represented by 4 mA

B.2.3 Failure alarm action

The Failure alarm action is used to determine how an active alarm is indicated on the current output.

Table B-3: Analog output failure alarm action options

Option	Description
Set 3.6 mA (NAMUR)	Fix current output to 3.6 mA to force a low current limit alarm (default setting).
Set 3.75 mA (Rosemount)	Fix current output to 3.75 mA to force a low current limit alarm.
Hold current output	Freeze the current output at the present value.
Set 21.0 mA	Fix current output to 21 mA to force high current limit alarm.
Set 21.75 mA (Rosemount)	Fix current output to 21.75 mA to force high current limit alarm.
Set 22.5 mA (NAMUR)	Fix current output to 22.5 mA to force high current limit alarm.

B.2.4 Saturation levels

The monitoring hub will continue to set a current that corresponds with the calculated value until reaching the upper/lower limit i.e. saturated (and then freeze).

Table B-4: Analog Output Saturation Levels Options

Option	Description
Rosemount	Set analog output saturation levels according to Rosemount standard (default setting).
NAMUR	Set analog output saturation levels according to NAMUR standard.

B.3 Digital inputs

For applications where the monitoring hub functionality is linked to other external events, there are four digital input ports for accepting contact closure signals. The digital inputs can be individually setup to perform various control actions (e.g. raise an alarm) whenever activated.

B.3.1 Digital input actions

The digital inputs can be setup to perform an action whenever they are triggered.

Available digital input actions are listed in Table B-5.

Table B-5: Digital Input Action Settings

Option	Description
No action	The digital input has no allocated action (default setting).
Failure alarm	A failure alarm is activated for the specific digital input.
Write protection	The monitoring hub is write-protected while digital input is active.
Alarm suppression	If an alarm condition is present when the digital input is active, a message is displayed indicating the alarm is being overridden. Alarm relay is held on.

B.3.2 Active state

The logic of a digital input for triggering an action can be changed by using the Active state option.

Table B-6: Digital Input Active State Settings

Option	Description
Closed	Action is triggered when the voltage-free contact is closed (default setting).
Open	Action is triggered when the voltage-free contact is open.

B.3.3 Delay

If a delay is needed before an action is performed, the Delay option can be set for that specific digital input. The action is carried out after the preset time expires.

Table B-7: Digital Input Delay Settings

Value	Description
hh:mm:ss	Set desired digital input delay in hour, minute and seconds. Default: 0 seconds.

B.4 Relay output

The monitoring hub provides six freely assignable relay outputs, available for controlling alarms etc.

B.4.1 Relay mode

The relay mode is used to assign a particular function to a specific relay output.

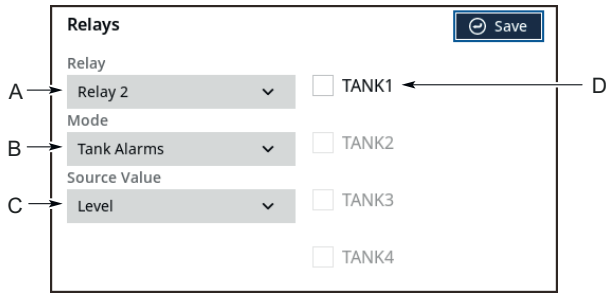
Table B-8: Relay Mode Options

Option	Description
Not in use	The selected relay is not used.
Tank Alarm	A relay can be configured to be energized while a specific set of Tank alarms are active.
Digital Input	A relay can be configured to be energized while a specific digital input is active, or several digital inputs are all active.
Failure Alarms	A relay can be configured to be kept energized as long as no Failure Alarms are active, and then de-energized while Failure Alarms are active.

Relay configuration for tank alarms

A relay can be configured to be energized while a specific set of tank alarms are active. Figure B-4 shows an example of how a relay is configured for tank alarms.

Figure B-4: Relay configuration for tank alarms



A. Selected relay to configure
B. Mode: Tank Alarms
C. Selected source value, for example Level
D. Tank 1 has been configured for tank alarm source Level, and can therefore be enabled for Relay 2

Note
Multiple tank alarms can be configured for each relay.

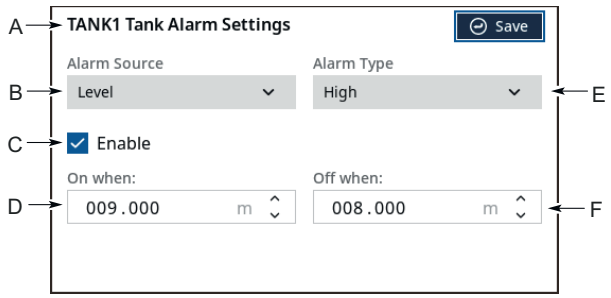
Related information

Tank alarms

B.5 Tank alarms

The tank alarms configuration forms a part of the system configuration. In addition, tank alarms can be setup using the Advanced configuration menu on the local display or the Configuration menu in the Web interface.

Figure B-5: Tank alarm settings



A. *Selected tank*
B. *Alarm source: Level, Pressure, Temperature, Volume, or Utilization*
C. *Select **Enable** box to activate tank alarm settings*
D. *On when: Selected value for the tank alarm to be activated*
E. *Alarm type: High alarm, Low alarm, Out-of-limits alarm, or Rate of change alarm*
F. *Off when: Selected value for the tank alarm to be deactivated*

Note
Each tank can have multiple tank alarms enabled, for example both a high level alarm and a low volume alarm.

Related information

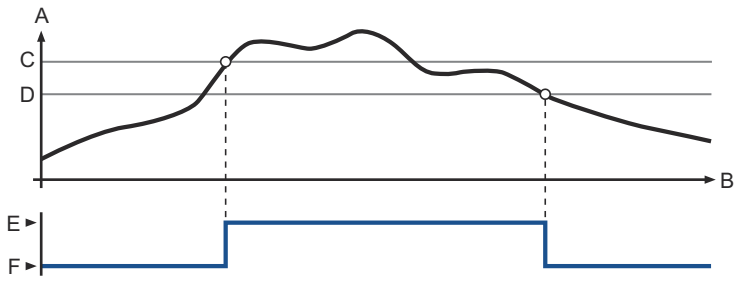
Tank alarm types

B.5.1 Tank alarm types

High alarm

The high tank alarm uses the On when and Off when settings to define a high alarm for the selected alarm source value. The tank alarm is active when the value exceeds the On when value and remains active until the value drops below the Off when value.

Figure B-6: Example: High Alarm



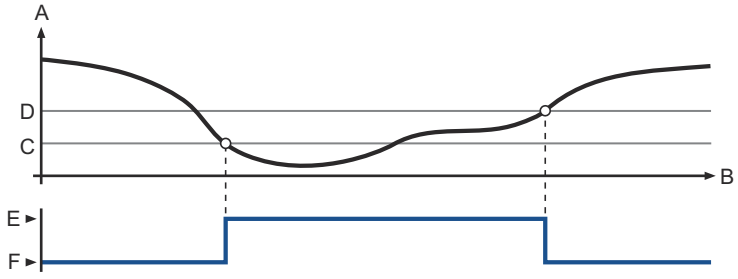
A. Alarm source
B. Time
C. On when
D. Off when
E. Tank alarm active
F. Tank alarm inactive

Tip
By setting the Off when slightly below the On when, you achieve a hysteresis function for the high alarm to avoid it going on and off if the alarm source value fluctuates near the On when value.

Low alarm

The low tank alarm uses the On when and Off when settings to define a low alarm for the selected alarm source value. The tank alarm is active when the value falls below the On when value and remains inactive until the value exceeds the Off when value.

Figure B-7: Example: Low Alarm



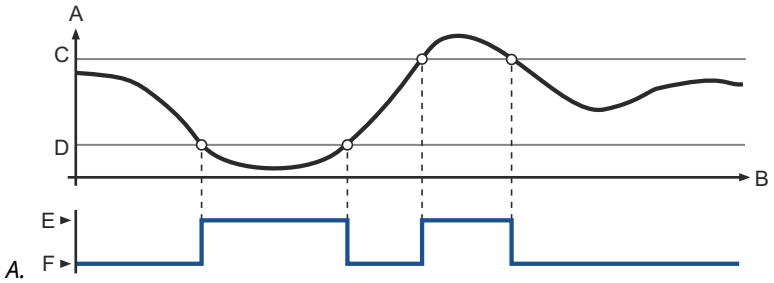
A. Level
B. Time
C. On when
D. Off when
E. Tank alarm active
F. Tank alarm inactive

Tip
By setting the Off when slightly above the On when, you achieve a hysteresis function for the low alarm to avoid it going on and off if the alarm source value fluctuates near the On when value.

Out-of-limits alarm

This tank alarm uses the On when settings to define the normal operating range for the alarm source value. The tank alarm is active while the alarm source value exceeds the On when above or while it is less than the On when below.

Figure B-8: Example: Out-of-Limits Alarm



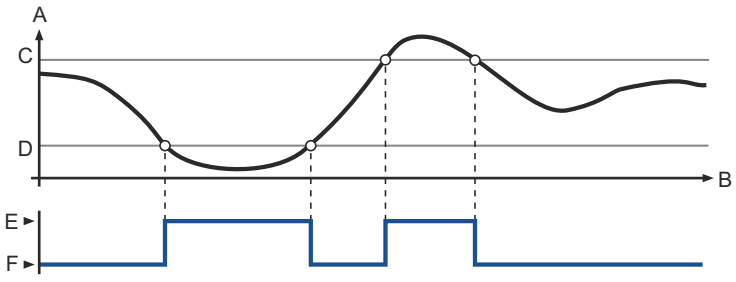
A.
B. Level
C. Time
D. On when above
E. On when below
F. Tank alarm active
G. Tank alarm inactive

Rate of change alarm

A rate of change for the selected alarm source value is calculated every 5 seconds in units of source value per minute, e.g. m^3/min if source value unit is m^3.

The rate of change tank alarm uses the On when settings to define the normal operating range for the rate of change. The limits are set in units of source value per minute. The tank alarm is active while the rate of change exceeds the On when above or while it is less than the On when below.

Figure B-9: Example: Rate of Change Alarm



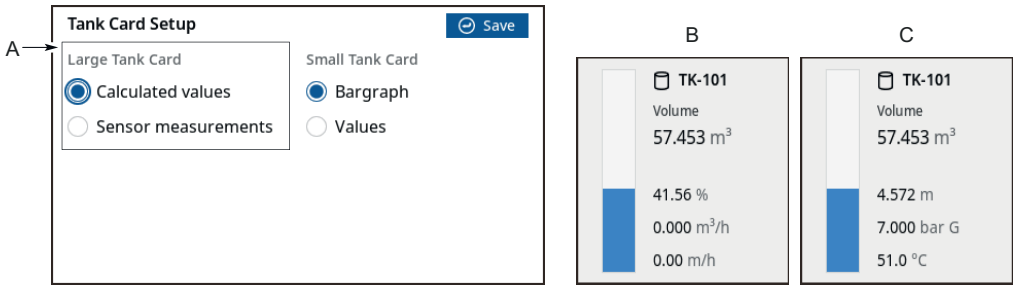
A. Level
B. Time
C. On when above
D. On when below
E. Tank alarm active
F. Tank alarm inactive

Typically, where the selected alarm source value is a liquid level or volume measurement, the RoC tank alarm can be used to warn of a quickly rising or falling liquid level.

B.6 Tank card setup

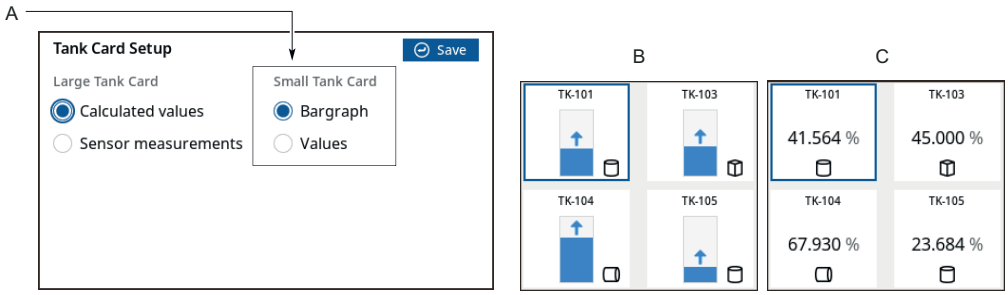
The tank card setup is used to define which values to be displayed on the main screen during operation. Configuration options are available for both the large tank card and the small tank cards

Figure B-10: Large tank card options



A. Large tank card options: Calculated values or Sensor measurements
B. Calculated values (default)
C. Sensor measurements

Figure B-11: Small tank card options



A. Small tank card options: Bargraph or Values
B. Bargraph (default)
C. Values

Related information

Tank data presentation

B.7 Calculations

B.7.1 Volume profiles

The Rosemount 2405 can use level measurements to calculate the volumetric contents of a linear shaped, closed vessel e.g. a vertical cylinder or rectangular vessel.

The monitoring hub can also use level measurements to calculate the volumetric contents of a non-linear shaped, closed vessel. The monitoring hub has a library of popular non-linear tank shapes, for example horizontal cylinder with flat ends, spherical vessel, and horizontal cylinder with domed ends. A 50-point programmable look-up table is provided for non-standard applications.

The pre-defined volume calculation profiles are based on the assumption that volume is 0.0 when measured liquid height (level) is 0.0. The sensor input must be configured accordingly.

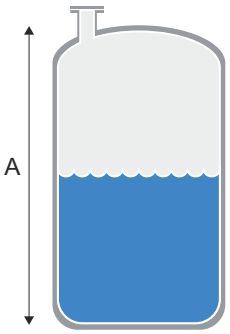
Vertical cylinder

There are two capacity methods available for the vertical cylinder tank shape: Maximum volume and Tank dimensions.

Maximum volume

The monitoring hub can use the maximum volume calculation parameters to calculate the volumetric contents of a vertical cylinder.

Figure B-12: Maximum volume for vertical cylinder



A. Height

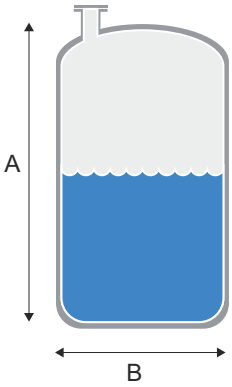
Table B-9: Maximum volume calculation parameters

Parameter	Description
Height	Enter the height (level) at which the maximum volume occurs.
Volume	Enter the maximum contents volume of the tank.

Tank dimensions

The monitoring hub can use the tank dimensions to calculate the volumetric contents of a vertical cylinder.

Figure B-13: Tank dimensions for vertical cylinder



A. Height
B. Diameter

Table B-10: Tank dimensions calculation parameters

Parameter	Description
Height	Enter the tank height.
Diameter	Enter the tank diameter.

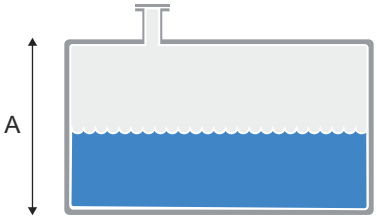
Horizontal cylinder flat

There are two capacity methods available for the horizontal cylinder flat tank shape: Maximum volume and Tank dimensions.

Maximum volume

The monitoring hub can use the maximum volume calculation parameters to calculate the volumetric contents of a horizontal cylinder flat.

Figure B-14: Maximum volume for horizontal cylinder flat



A. Diameter

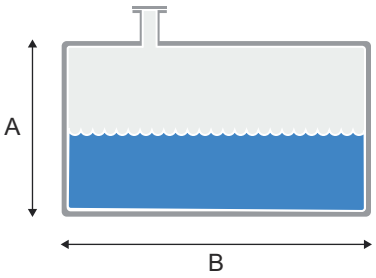
Table B-11: Maximum volume calculation parameters

Parameter	Description
Height	Enter the tank diameter.
Volume	Enter the maximum contents volume of the tank.

Tank dimensions

The monitoring hub can use the tank dimensions to calculate the volumetric contents of a horizontal cylinder flat.

Figure B-15: Tank dimensions for horizontal cylinder flat



A. Diameter
B. Length

Table B-12: Tank dimensions calculation parameters

Parameter	Description
Diameter	Enter the tank diameter.
Length	Enter the tank length.

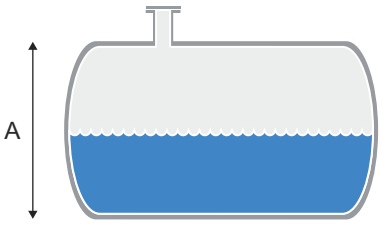
Horizontal cylinder domed

The capacity method for the horizontal cylinder domed tank shape is Maximum volume.

Maximum volume

The monitoring hub can use the maximum volume calculation parameters to calculate the volumetric contents of a horizontal cylinder domed.

Figure B-16: Maximum volume for horizontal cylinder domed



A. Diameter

Table B-13: Maximum volume calculation parameters

Parameter	Description
Diameter	Enter the tank diameter.
Volume	Enter the maximum contents volume of the tank.

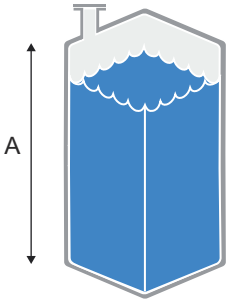
Rectangular

There are two capacity methods available for the rectangular tank shape: Maximum volume and Tank dimensions.

Maximum volume

The monitoring hub can use the maximum volume calculation parameters to calculate the volumetric contents of a rectangular tank.

Figure B-17: Maximum volume for rectangular tank



A. Height

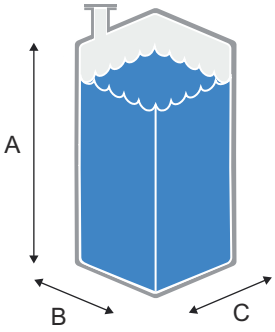
Table B-14: Maximum volume calculation parameters

Parameter	Description
Height	Enter the height (level) at which the maximum volume occurs.
Volume	Enter the maximum contents volume of the tank.

Tank dimensions

The monitoring hub can use the tank dimensions to calculate the volumetric contents of a rectangular tank.

Figure B-18: Tank dimensions for rectangular tank



A. Height
B. Length
C. Width

Table B-15: Tank dimensions calculation parameters

Parameter	Description
Height	Enter the tank height.
Length	Enter the tank length.
Width	Enter the tank width.

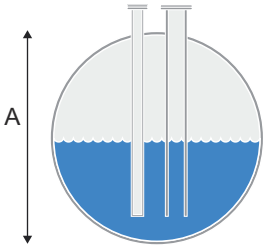
Spherical

The available capacity method for the spherical tank shape is Maximum volume.

Maximum volume

The monitoring hub can use the maximum volume calculation parameters to calculate the volumetric contents of a vertical cylinder.

Figure B-19: Maximum volume for spherical tank



A. Height

Table B-16: Maximum volume calculation parameters

Parameter	Description
Height	Enter the height (level) at which the maximum volume occurs.
Volume	Enter the maximum contents volume of the tank.

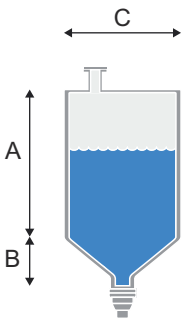
Conical bottom

The capacity method for the conical bottom tank shape is Tank dimensions.

Tank dimensions

The monitoring hub can use the tank dimensions to calculate the volumetric contents of a conical bottom tank.

Figure B-20: Tank dimensions for conical bottom tank



A. Cylinder Height
B. Cone Height
C. Top Diameter

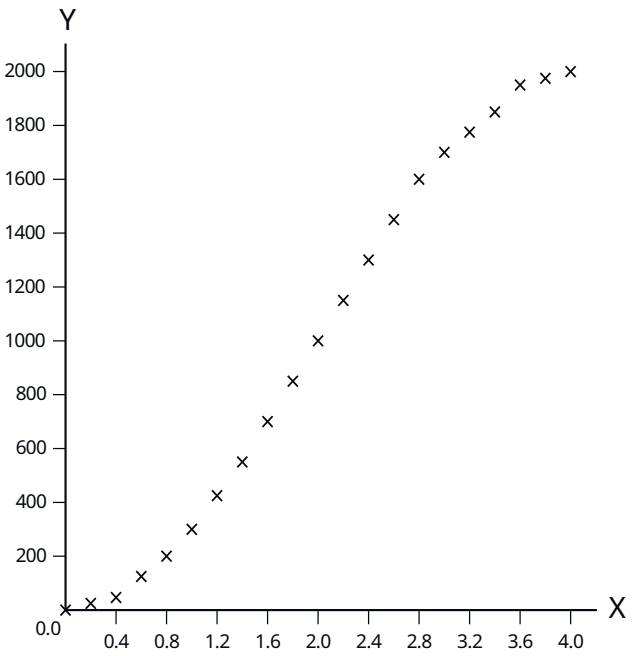
Parameter	Description
Cylinder Height	Enter the cylinder height.
Cone Height	Enter the cone height.
Top Diameter	Enter the top diameter.

50 point look-up volume profile table

The 50-point look-up table can be used to pre-program the controller for custom volume calculation profiles.

Each point in the look-up table is a Cartesian coordinate (X,Y). The X value represents a level, and the Y value is the corresponding volume. The X points are user-defined intervals, typically in equal increments of maximum height, and must be entered in increasing order of X values. X values are entered in the selected engineering unit for level measurement, while Y values are entered in the selected engineering unit for volume.

Figure B-21: X: Actual level, Y: Corresponding volume



B.7.2 Volume utilization

The calculated volume utilization indicates how full the tank is, in percent. It is calculated as (current volume / maximum volume) each time the volume changes.

B.7.3 Level Rate

If the level sensor is configured to provide level rate as its secondary variable (SV) via HART®, the Rosemount 2405 will use this value directly as the level rate for that tank. Note that the sensor must configured separately to provide level rate, this is not performed by the monitoring hub.

If no level rate is provided by the sensor, the Rosemount 2405 calculates it internally by measuring the change in level over time. The calculated level rate value is updated every minute. The level rate unit is current level unit per hour.

B.7.4 Flow Rate

The Rosemount 2405 calculates the flow rate by measuring the change in volume over time. The calculated flow rate value is updated every minute. The flow rate unit is current volume unit per hour.

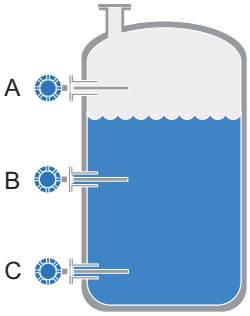
B.7.5 Average liquid temperature

The calculated average liquid temperature is defined as the average temperature of the product in the tank.

The Rosemount 2405 continuously monitors which temperature sensors are currently below the product surface, by comparing the current product level with the configured position of each temperature sensor. Only temperature sensors positioned lower than

the current level are included in the average liquid temperature calculation, as shown in Figure B-22. If no sensors are positioned below the product surface, the average liquid temperature value is invalid.

Figure B-22: Average liquid temperature, three temperature sensors



A. Temperature sensor 3 (currently not included in the average liquid temperature calculation)
B. Temperature sensor 2
C. Temperature sensor 1

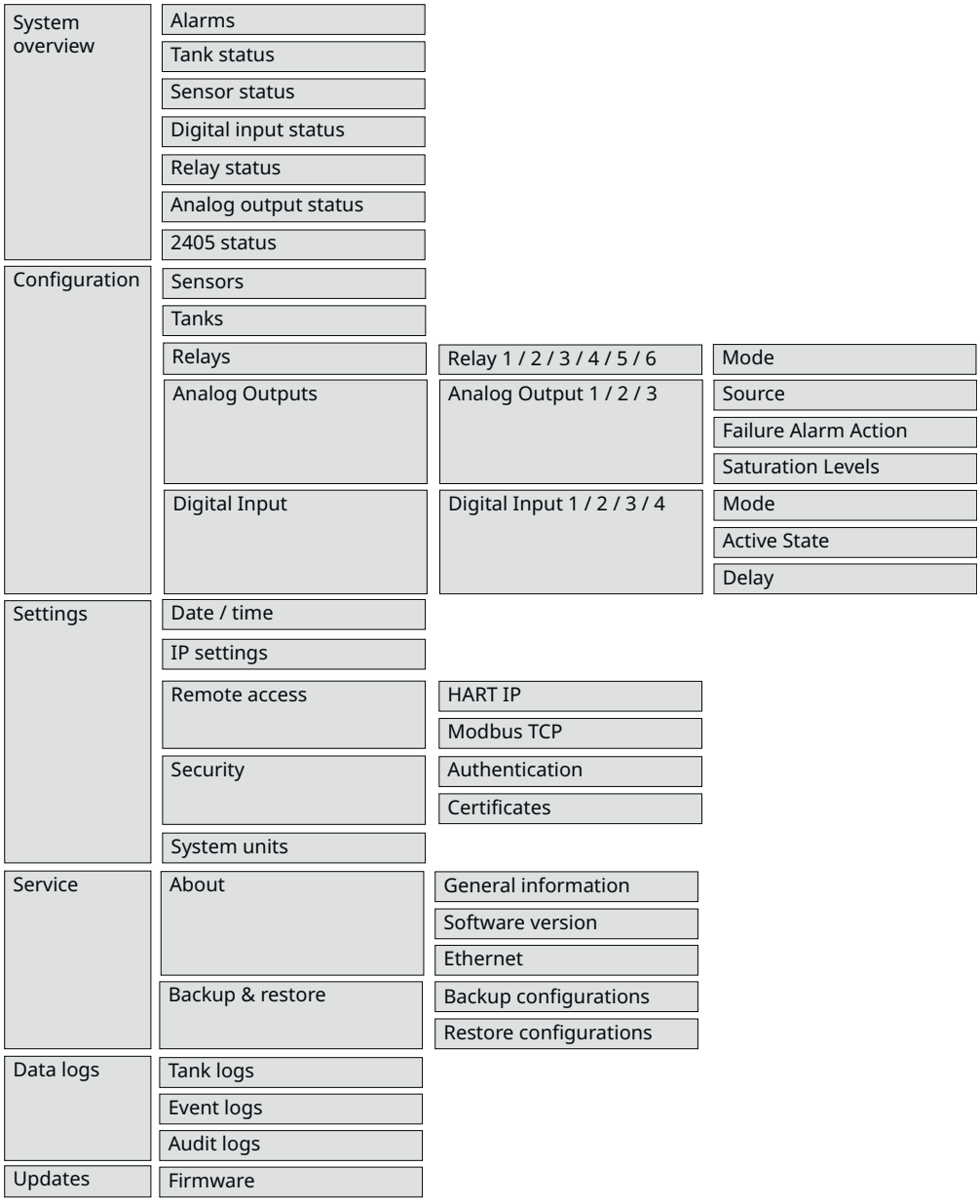
C Web interface

The Rosemount 2405 web-based graphical user interface provides several configuration, operation and service functions.

C.1 Web interface menu tree

Figure C-1 shows the menu tree for the Rosemount 2405 web interface.

Figure C-1: Rosemount 2405 Web Interface Menu Tree



C.2 Access the web interface

The Rosemount 2405 provides several protection levels to prevent unauthorized changes. In order to change device configuration you must be logged on to the appropriate user access level.

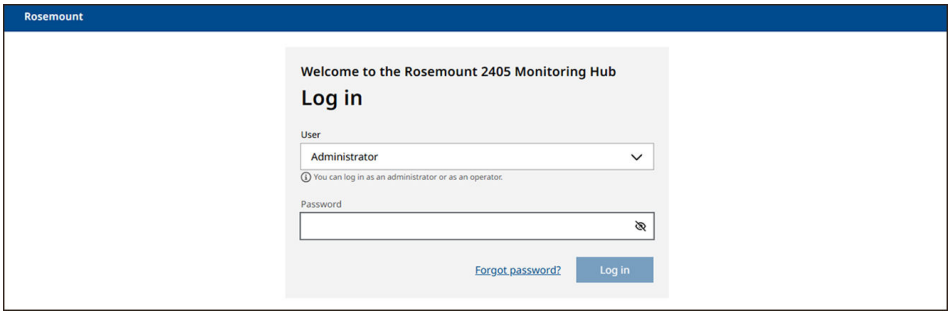
There are two user access levels available for the web interface: **Administrator** and **Operator**. A randomized, factory-assigned password is provided for initial access. The assigned password can be viewed on the local display under the Security menu.

Table C-1: User access levels

User	Access level
Operator	The operator user can monitor the general status of the tanks/sensors/alarms. Operator is not allowed to change any configurations in the system.
Administrator	The administrator user has full access to the system and can configure the system, add or configure tanks, and set alarms.

Procedure

1. Connect a laptop to the monitoring hub´s Ethernet port.
2. Set your laptop Ethernet port to a static IP address on the same subnet as the monitoring hub.
3. Enter the monitoring hub´s IP address into your web browser.
   IP address from factory: https:// 192.168.4.10
4. Continue through the security message.
5. Enter the appropriate user name and password.



6. Once you are logged in, the web interface appears with a number of menus.

Postrequisites

It is recommended to change passwords after first login.

Related information

Permissions overview
Menu tree
Change web interface password
View web interface password

C.3 Change web interface password

It is recommended to change passwords after first login.

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select the icon at the top right.
3. Select **Change password**.
4. Enter the current password for the user in the **Enter old password** field.
5. Enter the new password in the **Enter new password** field.
6. Repeat the same new password in the **Repeat new password** field.
7. Select the **Change** button to save your new password.

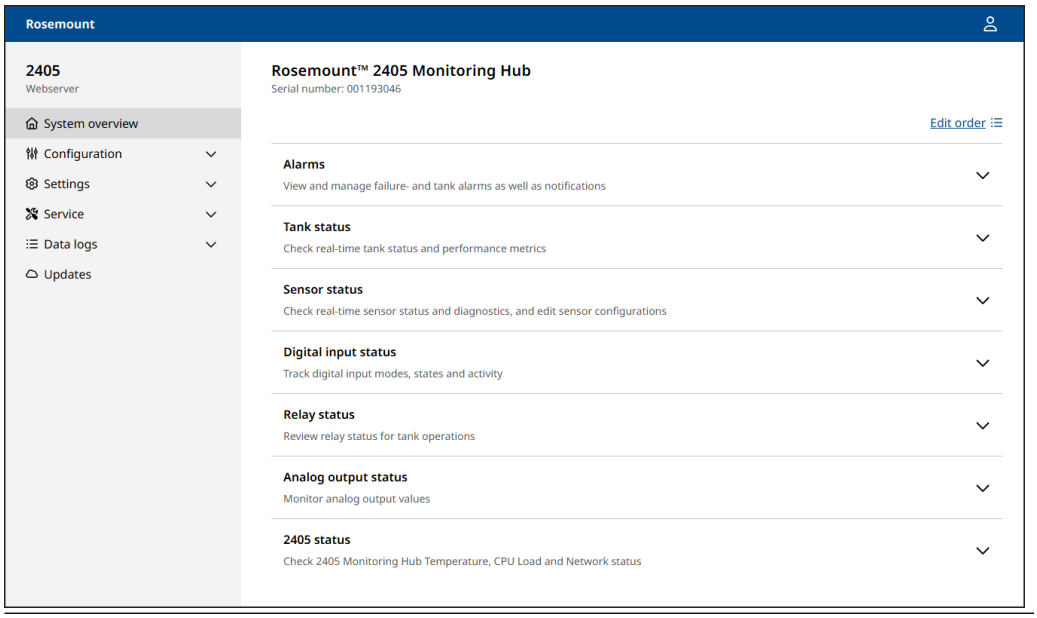
Related information

Reset web user passwords
View web interface password

C.4 System overview

The System overview presents a consolidated view of the system's operational status. To view more detailed information, select the desired menu option.

Figure C-2: System overview view in the Web Interface



Tip

To reorder the System overview menus, simply drag a menu item to a new position in the list and drop it where you want it to appear.

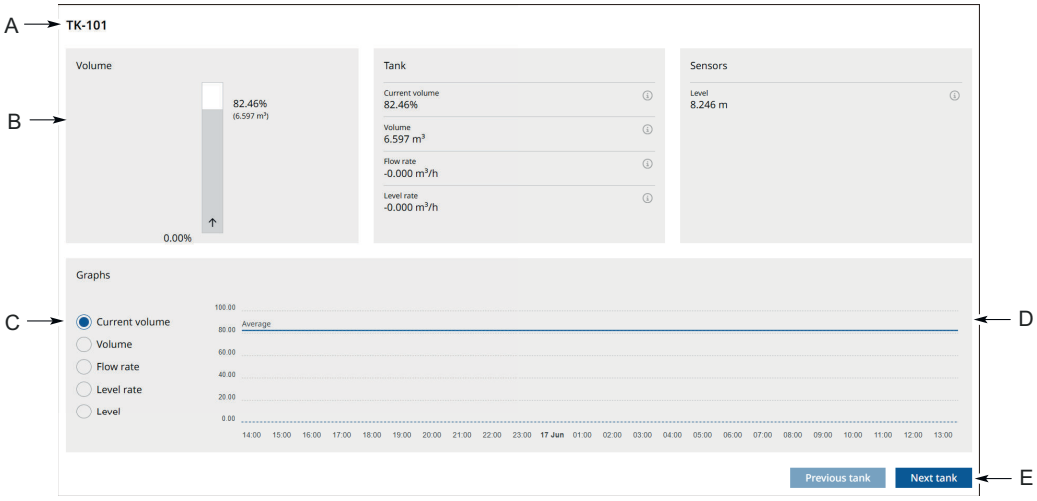
Table C-2: System Overview Menus

Menu	Description	
Alarms	Failure alarms (NAMUR)	Present failure alarm is displayed with recommended actions.
	Tank alarms	Recent tank alarms are listed. Triggered and cleared time stamp also shown.
Tank status	Available tanks are listed with corresponding tank data values. Select desired tank to view all tank data and charts, as shown in View tank data.	
Sensor status	All connected sensors are listed. Each sensor row can be expanded to show current sensor configuration. Refer to Configure sensors for more information.	
Digital input status	Digital input mode, active state configuration, and current state.	
Relay status	Current relay status, relay mode, run time, and number of operations performed for each relay.	
Analog output status	Presentation of analog outputs status, configured source, and current value,	
Rosemount 2405 status	Temperature information	Monitoring hub temperature information (current, minimum, and maximum)
	CPU load	Displays the CPU load status (current, minimum, and maximum)
	Network status	Current connection status for network cable, Modbus® client, HART®-IP client, and web client.

C.4.1 View tank data

Access the detailed tank data view by selecting desired tank in the Tank status menu from the System overview.

Figure C-3: Tank Data View



A. Tank name
B. Bargraph of volume, all calculated values, and sensor values
C. Select tank data parameter to be displayed in the graph
D. Graph of selected tank data parameter
E. Buttons to navigate through available tanks

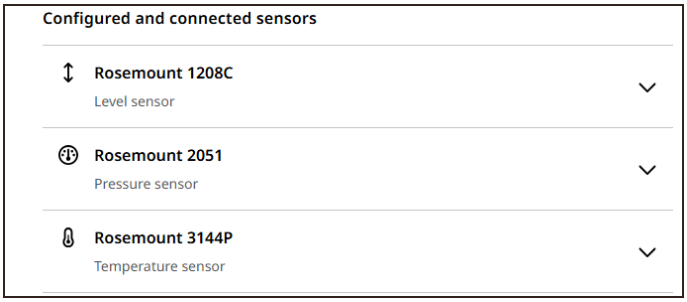
C.5 Configuration

C.5.1 Configure sensors

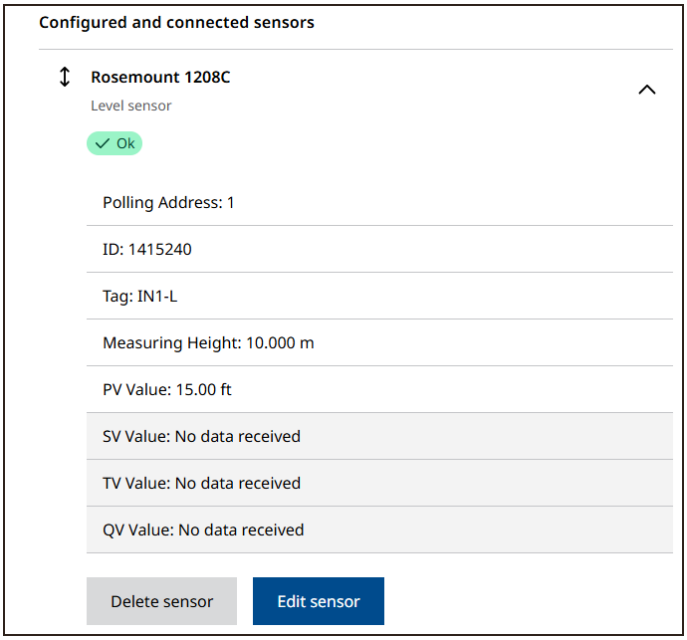
Sensors can only be added to the system by using the Rosemount 2405 local display. The web interface can be used to view connected sensors and edit sensor configuration as described in this section.

Procedure

1. In the Web interface, select **Configuration** → **Sensors**.
2. In the ***Configured and connected sensors*** list, select desired sensor.



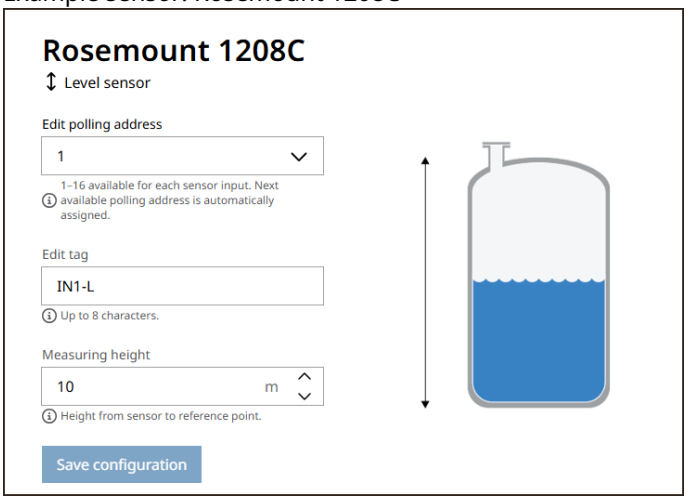
3. In the detailed sensor configuration view, do the following:



   a) Optional: Select **Delete sensor** to delete selected sensor.

   b) Select **Edit sensor** to make changes to the configuration.

4. In the senor configuration view, enter desired changes to the current configuration.
   Example sensor: Rosemount 1208C



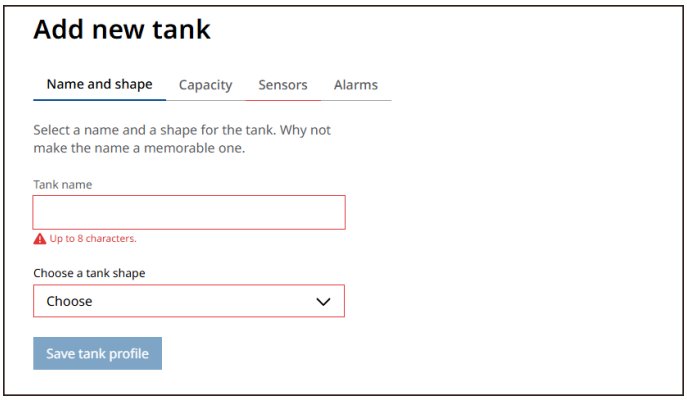
5. Select **Save configuration** to confirm your settings.

C.5.2 Add tank

Use the configuration menu in the Web interface to add tanks to the Rosemount 2405.

Procedure

1. In the Web interface, select **Configuration** → **Tanks**.
2. In the ***Tank Configuration*** view, select **Add tank**.
3. In the ***Add new tank*** view, navigate through the tabs: ***Name and shape***, ***Capacity***, ***Sensors***, and ***Alarms***.



Enter the desired configuration settings in each tab. Make sure to save your changes before continuing to the next tab.

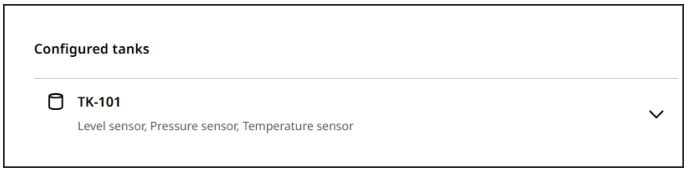
C.5.3 Edit tank configuration

Use the configuration menu in the Web interface to edit an existing tank configuration.

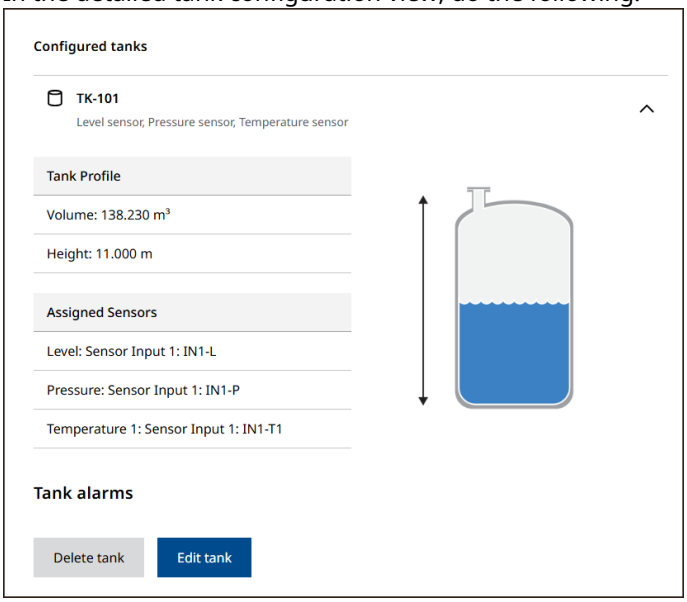
Procedure

1. In the Web interface, select **Configuration** → **Tanks**.

2. In the ***Configured tanks*** list, select desired tank.



3. In the detailed tank configuration view, do the following:

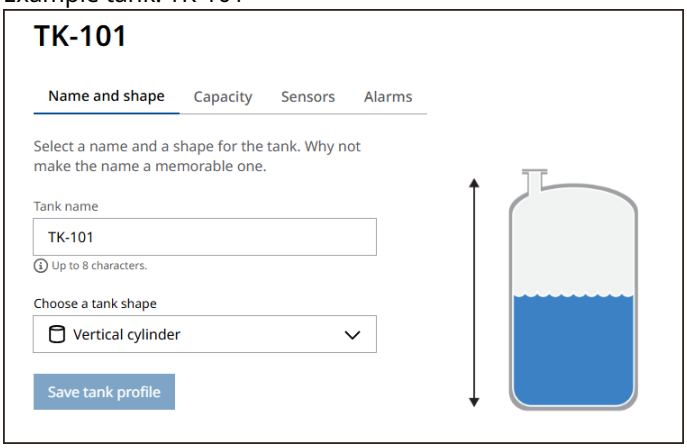


   a) Optional: Select **Delete tank** to delete selected tank.

   b) Select **Edit tank** to make changes to the configuration.

4. In the tank configuration view, navigate through the tabs: ***Name and shape***, ***Capacity***, ***Sensors***, and ***Alarms***.

   Example tank: TK-101



   Enter desired changes to the current configuration. Make sure to save your changes before continuing to the next tab.

C.5.4 Configure relays

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Configuration** → **Relays**.
3. In the ***Relays*** window, do the following:
   a) Select desired relay tab, for example Relay 1.
   b) In the ***Mode*** list, select tank and source option, for example Digital Input.
4. Select **Save** to confirm your settings.

Related information

Relay mode

C.5.5 Configure analog output

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Configuration** → **Analog output**.
3. In the ***Analog output*** window, do the following:
   a) In the ***Analog Out*** list, select desired analog output, for example Analog output 1.
   b) In the ***Source*** list, select tank and source option, for example Tank1 Level.
   c) In the ***Failure Alarm Action*** lists select desired state, for example Set 21.75 mA.
   d) Use the ***Max*** and ***Min*** lists to set the source values that correspond to the analog output values 4 mA and 20 mA.
   e) In the ***Output Alarm Mode*** list, select desired analog output alarm mode, for example Rosemount.
4. Select **Save** to confirm your settings.

Related information

Source
Range values
Failure alarm action
Saturation levels

C.5.6 Configure digital inputs

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Configuration** → **Digital input**.

3. In the ***Digital input*** window, do the following:
   a) In the ***Digital In*** list, select desired digital input, for example Digital input 1.
   b) In the ***Mode*** list, select desired mode, for example Failure alarm.
   c) In the ***Active State*** list, select desired state, for example Open.
   d) In the ***Delay*** list, select desired delay time.
4. Select **Save** to confirm your settings.

Related information

Digital input actions
Delay
Active state

C.6 Settings

C.6.1 Set date and time

Use the Date/Time settings menu in the Web Interface to select date format.

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Settings** → **Date/time**.
3. In the ***Set Date and Time*** window, select desired format in *Date Format* list.
4. Select **Save settings** to confirm your settings.

C.6.2 Set IP address

Use the IP settings menu to enter the desired IP address settings.

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Settings** → **IP settings**.
3. In the ***IP Settings*** window, do the following:
   a) In the ***IP Address*** box, enter desired IP address.
   Monitoring hub IP address from factory: 192.168.4.10.
   b) In the ***Subnet Mask*** box, enter desired subnet mask.
   c) In the ***Default Gateway*** box, enter desired default gateway.
4. Select **Save settings** to confirm your settings.

C.6.3 Set HART®-IP remote access

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Settings** → **Remote access** → **HART IP**.

3. In the ***HART IP*** window, do the following:
   a) In the **Port** box enter desired port for HART-IP. It can be adjusted to match host system settings.
      Default port: 5094.
   b) Optional: Select the **Bridge function enabled** check box to enable host systems to access the HART sensors through the Rosemount 2405 by using it as a bridge device.
4. Select **Save settings** to confirm your settings.

C.6.4 Set Modbus® TCP remote access

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Settings** → **Remote access** → **Modbus TCP**.
3. In the ***Modbus TCP*** window, do the following:
   a) In the **Port** box enter desired TCP/IP port for Modbus TCP. It can be adjusted to match host system settings.
      Default port: 502.
   b) Select/deselect check boxes to enable/disable desired remote services:

Modbus TCP	Description
Server enabled	Option to enable Modbus TCP/IP connectivity. Unselect to disable the connectivity in case no data access from host system is required.
Write access	Option to allow connected Modbus TCP/IP client to change monitoring hub configuration using holding registers. Unselect to set the Modbus TCP/IP connectivity to read-only mode.

4. Select **Save settings** to confirm your settings.

C.6.5 Customize authentication message

The monitoring hub display is protected by a PIN code to avoid unauthorized configuration changes. An authorization information message is displayed after each user PIN login on the monitoring hub display. To customize this message do the following:

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Settings** → **Security**.
3. In the ***Authentication message*** window, enter desired message.
   Default: Authorized access only, activity may be monitored. Unauthorized use is prohibited and may result in penalties.
4. Select **Save settings** to confirm your changes.

Related information

Local display user authorization

C.6.6 Upload web server certificate file

Custom web server certificates can be uploaded to replace the default self-signed certificates.

Prerequisites

The certificate must use a 1024-bit RSA key.

The certificate file and the corresponding key file must be in either .pem or .crt format.

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Settings** → **Security** → **Certificates**.
3. Select the **Select certificate file** button.
    a) Browse to the certificate file and select **Open**.
4. Select the **Select key file** button.
    a) Browse to the key file and select **Open**.
5. Select the **Upload certificate** button.

Postrequisites

Restart the web browser and reconnect to apply and begin using the new certificate.

Related information

Reset web user certificate

C.6.7 Set system units

The system units settings determine how measured data is presented on the local display, web interface, and in the Modbus registers. The Rosemount 2405 automatically converts sensor measured values to match the selected system units, even if the connected sensors are configured to use different units.

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Settings** → **System units**.
3. In the ***System Units*** window, do the following:
    a) In the ***Level Unit*** list, select desired system units:
        - m - meter
        - ft - feet and inches
        - ft - feet decimal
    b) In the ***Volume Unit*** list, select desired system units:
        - m^3 - cubic meter
        - l - liter
        - ft^3 - cubic feet

- bbl - barrel
- US gal - US gallon
- UK gal - UK gallon

c) In the ***Temperature Unit*** list, select desired system units:

- °C - Celsius
- °F - Fahrenheit

4. Select **Save settings** to confirm your settings.

C.7 Service

C.7.1 View the about information

The About view in the Web interface presents monitoring hub information such as; serial number, software version, Ethernet IP address, and licenses.

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Service** → **About**.
   The About view appears, displaying specific device information.

C.7.2 Create a backup of the current configuration

The current Rosemount 2405 supports functionality that lets you backup configuration files, strapping tables, tank names, and registers. This is a useful option in case you, for example, need to replace a monitoring hub. Then you can easily configure the new monitoring hub by uploading the system backup.

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Service** → **Backup and restore**.
3. Select the **Backup configurations** button to store the backup file.
   Depending on the particular web browser that is used, the backup file will be downloaded to the default folder for file downloading on the PC, or you may choose the desired destination folder.

Postrequisites

Once the backup file is downloaded, the file can be moved to the preferred location.

C.7.3 Upload backup file to the monitoring hub

System configuration can be restored by uploading backup files to the monitoring hub.

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Service** → **Backup and restore**.
3. Select **Restore configurations**.

4. Browse to the backup file and select **Open**.
5. Select the **Initiate restore** button.
   When finished, a message appears that the restore was successfully completed.
6. Select the **OK** button.

C.8 Data logs

The web interface supports three types of data logs: Tank logs, Event logs, and Audit logs.

C.8.1 Tank Logs

Tank logs store all data related to a tank's operation, including measurements and events. They provide a detailed history for monitoring behavior and diagnosing issues. Tank log data is available for 24 hours.

Download tank log file to a PC

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Service** → **Data logs** → **Tank Logs**.
3. In the **Choose tanks** list select desired tanks to be included in the tank log file.
4. Select **Generate CSV-file**.
   Depending on the particular web browser that is used, the log file will be downloaded to the default folder for file download on the PC, or you may choose the desired destination folder.
5. Once the log file is downloaded, the file can be moved to the preferred location.

C.8.2 Event logs

Event logs include failure alarms, relay state change events, request error events, and tank alarm events. Event logs are filterable by event type and date.

View and download event log file to a PC

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Service** → **Data logs** → **Event Logs**.
   Available events are displayed in the ***All event logs*** view.
3. Optional: To filter events by type, use the **Choose events** list to select desired events to be included in the view. Select from:
   - Error events
   - Start up events
   - Relay events
   - Failure alarms
   - Tank alarms
4. Optional: To filter events by a specific time range, use the **From** and **To** boxes to define desired time range. Only events occurring within the selected range will be displayed.

5. Select the **Apply filter** button to view the events filtered by your selections.
6. To download event log file, select **Generate CSV-file**.

   Depending on the particular web browser that is used, the log file will be downloaded to the default folder for file download on the PC, or you may choose the desired destination folder.
7. Once the log file is downloaded, the file can be moved to the preferred location.

C.8.3 Audit logs

Audit logs include access events, reset events, and configuration change events. The Audit logs are filterable by event type and dates.

View and download audit log file to a PC

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Service** → **Data logs** → **Audit Logs**.
3. Optional: To filter events by type, use the **Choose events** list to select desired events to be included in the view. Select from:
   - Access events
   - Configuration change events
   - Reset events
   - Demo mode events
4. Optional: To filter events by a specific time range, use the **From** and **To** boxes to define desired time range. Only events occurring within the selected range will be displayed.
5. Select the **Apply filter** button to view the events filtered by your selections.
6. To download audit log file, select **Generate CSV-file**.

   Depending on the particular web browser that is used, the log file will be downloaded to the default folder for file download on the PC, or you may choose the desired destination folder.
7. Once the log file is downloaded, the file can be moved to the preferred location.

C.9 Update firmware

Note
The firmware upgrade process must not be interrupted. When upgrading, do not unplug power supply or close the web browser until the process is complete. In case the upgrade process was interrupted, repeat the procedure.

Prerequisites

Upgrade requires a valid firmware file from Emerson.

Procedure

1. Open the Web interface for the Rosemount 2405.
2. Select **Updates** → **Select firmware file**.
3. Browse to the firmware file and select **Open**.

After pressing the **Open** button a progress bar will be visible to indicate remaining time. When the upgrade is done, the system will switch to the log on window.

Note
Upgrading the firmware may take several minutes. The system may seem unresponsive during the upgrade but will eventually reboot and come back online. Use the refresh function in the web browser to check if the web interface is back online.

4. Verify that the presented firmware version is updated by opening the **Updates** tab once the firmware upgrade is completed.

D Modbus® register table

D.1 Introduction

The Rosemount 2405 Monitoring Hub stores measurement data, calculated values, and status information in Modbus® input registers. Configuration settings are stored in holding registers.

The input registers can be scanned in queries from a Modbus client using Modbus TCP/IP communication. Connect to the Rosemount 2405 at its configured IP address and Modbus port (default port 502). It responds to any Modbus address (1-255). This appendix lists the available registers.

Modbus register addressing

These register lists use the PDU addressing format, with registers addresses starting at 0. PDU input register 0 would be referred to as register number 30001.

Modbus word order

For 32-bit registers of DWORD (unsigned double word) and FLOAT (IEEE-754 floating point) types, the Rosemount 2405 use “little-endian” word order.

D.2 FC03 holding register area

This section presents the predefined register area available in the monitoring hub.

Table D-1: System Units

Register #	Register Name	Type	Unit	Description
112	LevelUnit	DWORD	Enum	Engineering Unit for Level values: 44: Feet 45: Meter 263: Feet and inches
114	VolumeUnit	DWORD	Enum	Engineering Unit for Volume values: 40: US gallon 41: Liter 42: UK gallon 43: Cubic meter 46: Barrels 112: Cubic feet
116	TemperatureUnit	DWORD	Enum	Engineering Unit for Temperature values: 32: °C 33: °F
120	LevelRateUnit	DWORD	Enum	Engineering Unit for Level Rate values: 120: m/h 247: ft/h

Table D-1: System Units *(continued)*

Register #	Register Name	Type	Unit	Description
122	FlowRateUnit	DWORD	Enum	Engineering Unit for Flow Rate values: 19: m^3/h 30: UK gallons/hour 130: Cubic feet/hour 134: Barrels/hour 136: US gallons/hour 138: Liter/hour

Table D-2: Tank Names and Shapes

Register #	Register Name	Type	Unit	Description
10002	Tank1-Type	DWORD	Enum	Tank shape for Tank 1: 0: Not Defined 8: User Defined 9: Conical 10: Horizontal Cylinder with domed ends 11: Horizontal Cylinder with flat ends 12: Spherical 13: Vertical Cylinder 14: Rectangular
10004	Tank1-Name0_3	DWORD	ASCII	First 4 characters of tank name
10006	Tank1-Name4_7	DWORD	ASCII	Last 4 characters of tank name
10026	Tank2-Type	DWORD	Enum	Tank shape for Tank 2: 0: Not Defined 8: User Defined 9: Conical 10: Horizontal Cylinder with domed ends 11: Horizontal Cylinder with flat ends 12: Spherical 13: Vertical Cylinder 14: Rectangular
10028	Tank2-Name0_3	DWORD	ASCII	First 4 characters of tank name
10030	Tank2-Name4_7	DWORD	ASCII	Last 4 characters of tank name
10050	Tank3-Type	DWORD	Enum	Tank shape for Tank 3: 0: Not Defined 8: User Defined 9: Conical 10: Horizontal Cylinder with domed ends 11: Horizontal Cylinder with flat ends 12: Spherical 13: Vertical Cylinder 14: Rectangular
10052	Tank3-Name0_3	DWORD	ASCII	First 4 characters of tank name
10054	Tank3-Name4_7	DWORD	ASCII	Last 4 characters of tank name

Table D-2: Tank Names and Shapes *(continued)*

Register #	Register Name	Type	Unit	Description
10074	Tank4-Type	DWORD	Enum	Tank shape for Tank 4: 0: Not Defined 8: User Defined 9: Conical 10: Horizontal Cylinder with domed ends 11: Horizontal Cylinder with flat ends 12: Spherical 13: Vertical Cylinder 14: Rectangular
10076	Tank4-Name0_3	DWORD	ASCII	First 4 characters of tank name
10078	Tank4-Name4_7	DWORD	ASCII	Last 4 characters of tank name
10098	Tank5-Type	DWORD	Enum	Tank shape for Tank 5: 0: Not Defined 8: User Defined 9: Conical 10: Horizontal Cylinder with domed ends 11: Horizontal Cylinder with flat ends 12: Spherical 13: Vertical Cylinder 14: Rectangular
10100	Tank5-Name0_3	DWORD	ASCII	First 4 characters of tank name
10102	Tank5-Name4_7	DWORD	ASCII	Last 4 characters of tank name
10122	Tank6-Type	DWORD	Enum	Tank shape for Tank 6: 0: Not Defined 8: User Defined 9: Conical 10: Horizontal Cylinder with domed ends 11: Horizontal Cylinder with flat ends 12: Spherical 13: Vertical Cylinder 14: Rectangular
10124	Tank6-Name0_3	DWORD	ASCII	First 4 characters of tank name
10126	Tank6-Name4_7	DWORD	ASCII	Last 4 characters of tank name
10146	Tank7-Type	DWORD	Enum	Tank shape for Tank 7: 0: Not Defined 8: User Defined 9: Conical 10: Horizontal Cylinder with domed ends 11: Horizontal Cylinder with flat ends 12: Spherical 13: Vertical Cylinder 14: Rectangular
10148	Tank7-Name0_3	DWORD	ASCII	First 4 characters of tank name
10150	Tank7-Name4_7	DWORD	ASCII	Last 4 characters of tank name

Table D-2: Tank Names and Shapes *(continued)*

Register #	Register Name	Type	Unit	Description
10170	Tank8-Type	DWORD	Enum	Tank shape for Tank 8: 0: Not Defined 8: User Defined 9: Conical 10: Horizontal Cylinder with domed ends 11: Horizontal Cylinder with flat ends 12: Spherical 13: Vertical Cylinder 14: Rectangular
10172	Tank8-Name0_3	DWORD	ASCII	First 4 characters of tank name
10174	Tank8-Name4_7	DWORD	ASCII	Last 4 characters of tank name

D.3 FC04 input register area

This section presents the predefined register area available in the monitoring hub. Engineering unit for each value depends on System Units as per table above.

Overall Rosemount 2405 device status information is available in the below registers:

Table D-3: Device Status

Register #	Register Name	Type	Unit	Description
1000	DeviceStatus	DWORD	Bitfield	Bit 1: Device Warning Bit 7: Device Error Bit 18: Write Protected
1002	DeviceError	DWORD	Bitfield	Bit 0: RAM Error Bit 1: FPROM Error Bit 2: HREG Error Bit 3: Software Error Bit 4: Other Memory Error Bit 5: System Error Bit 6: Display Error Bit 7: Auxiliary Error Bit 8: Configuration Error
1004	DeviceWarning	DWORD	Bitfield	Bit 0: RAM Warning Bit 1: FPROM Warning Bit 2: HREG Warning Bit 3: Software Warning Bit 4: Other Memory Warning Bit 5: System Warning Bit 6: Display Warning Bit 7: Auxiliary Warning Bit 8: Configuration Warning

Table D-4: Tank Data Organized by Value Type

Register #	Register Name	Type	Unit	Description
8000	Tank1_Status	DWORD	Bitfield	Status for Tank measurement values: Bit 0: Simulated Level Bit 1: Invalid Level Bit 2: Communication Failure for Level Bit 3: Simulated Avg Liquid Temperature Bit 4: Invalid Avg Liquid Temperature Bit 5: Communication Failure for Liquid Temp. Bit 6: Simulated Vapor Pressure Bit 7: Invalid Vapor Pressure Bit 8: Communication failure for pressure Bit 9: Simulated TOV Bit 10: Invalid TOV Bit 11: Communication failure for TOV Bit 12: Level not used Bit 13: Average Temperature not used Bit 14: Vapor Pressure not used Bit 15: TOV not used
8002	Tank2_Status	DWORD	Bitfield	
8004	Tank3_Status	DWORD	Bitfield	
8006	Tank4_Status	DWORD	Bitfield	
8008	Tank5_Status	DWORD	Bitfield	
8010	Tank6_Status	DWORD	Bitfield	
8012	Tank7_Status	DWORD	Bitfield	
8014	Tank8_Status	DWORD	Bitfield	
8016	Tank1_Level	FLOAT	(1)	Level for Tank 1
8018	Tank2_Level	FLOAT	(1)	Level for Tank 2
8020	Tank3_Level	FLOAT	(1)	Level for Tank 3
8022	Tank4_Level	FLOAT	(1)	Level for Tank 4
8024	Tank5_Level	FLOAT	(1)	Level for Tank 5
8026	Tank6_Level	FLOAT	(1)	Level for Tank 6
8028	Tank7_Level	FLOAT	(1)	Level for Tank 7
8030	Tank8_Level	FLOAT	(1)	Level for Tank 8
8032	Tank1_LevelRate	FLOAT	(1)	Level rate for Tank 1
8034	Tank2_LevelRate	FLOAT	(1)	Level rate for Tank 2
8036	Tank3_LevelRate	FLOAT	(1)	Level rate for Tank 3
8038	Tank4_LevelRate	FLOAT	(1)	Level rate for Tank 4
8040	Tank5_LevelRate	FLOAT	(1)	Level rate for Tank 5
8042	Tank6_LevelRate	FLOAT	(1)	Level rate for Tank 6
8044	Tank7_LevelRate	FLOAT	(1)	Level rate for Tank 7
8046	Tank8_LevelRate	FLOAT	(1)	Level rate for Tank 8
8048	Tank1_VaporPressure	FLOAT	(1)	Vapor pressure for Tank 1
8050	Tank2_VaporPressure	FLOAT	(1)	Vapor pressure for Tank 2
8052	Tank3_VaporPressure	FLOAT	(1)	Vapor pressure for Tank 3
8054	Tank4_VaporPressure	FLOAT	(1)	Vapor pressure for Tank 4
8056	Tank5_VaporPressure	FLOAT	(1)	Vapor pressure for Tank 5
8058	Tank6_VaporPressure	FLOAT	(1)	Vapor pressure for Tank 6
8060	Tank7_VaporPressure	FLOAT	(1)	Vapor pressure for Tank 7

Table D-4: Tank Data Organized by Value Type *(continued)*

Register #	Register Name	Type	Unit	Description
8062	Tank8_VaporPressure	FLOAT	(1)	Vapor pressure for Tank 8
8064	Tank1_AvgLiquidTemp	FLOAT	(1)	Average liquid temperature for Tank 1
8066	Tank2_AvgLiquidTemp	FLOAT	(1)	Average liquid temperature for Tank 2
8068	Tank3_AvgLiquidTemp	FLOAT	(1)	Average liquid temperature for Tank 3
8070	Tank4_AvgLiquidTemp	FLOAT	(1)	Average liquid temperature for Tank 4
8072	Tank5_AvgLiquidTemp	FLOAT	(1)	Average liquid temperature for Tank 5
8074	Tank6_AvgLiquidTemp	FLOAT	(1)	Average liquid temperature for Tank 6
8076	Tank7_AvgLiquidTemp	FLOAT	(1)	Average liquid temperature for Tank 7
8078	Tank8_AvgLiquidTemp	FLOAT	(1)	Average liquid temperature for Tank 8
8080	Tank1_TempElementStatus	DWORD	Bitfield	Status for temperature sensors in Tank: Bit 0: Simulated value for element 1 Bit 1: Simulated value for element 2 Bit 2: Simulated value for element 3 Bit 3: Invalid value for element 1 Bit 4: Invalid value for element 2 Bit 5: Invalid value for element 3 Bit 6: Communication failure for element 1 Bit 7: Communication failure for element 2 Bit 8: Communication failure for element 3 Bit 9: Element 1 in liquid Bit 10: Element 2 in liquid Bit 11: Element 3 in liquid Bit 12: Element 1 in vapor Bit 13: Element 2 in vapor Bit 14: Element 3 in vapor Bit 15: Element 1 not used Bit 16: Element 2 not used Bit 17: Element 3 not used
8082	Tank2_TempElementStatus	DWORD	Bitfield	
8084	Tank3_TempElementStatus	DWORD	Bitfield	
8086	Tank4_TempElementStatus	DWORD	Bitfield	
8088	Tank5_TempElementStatus	DWORD	Bitfield	
8090	Tank6_TempElementStatus	DWORD	Bitfield	
8092	Tank7_TempElementStatus	DWORD	Bitfield	
8094	Tank8_TempElementStatus	DWORD	Bitfield	
8096	Tank1_TempElement1	FLOAT	(1)	Temperature for sensor 1 in Tank 1
8098	Tank2_TempElement1	FLOAT	(1)	Temperature for sensor 1 in Tank 2
8100	Tank3_TempElement1	FLOAT	(1)	Temperature for sensor 1 in Tank 3
8102	Tank4_TempElement1	FLOAT	(1)	Temperature for sensor 1 in Tank 4
8104	Tank5_TempElement1	FLOAT	(1)	Temperature for sensor 1 in Tank 5
8106	Tank6_TempElement1	FLOAT	(1)	Temperature for sensor 1 in Tank 6
8108	Tank7_TempElement1	FLOAT	(1)	Temperature for sensor 1 in Tank 7
8110	Tank8_TempElement1	FLOAT	(1)	Temperature for sensor 1 in Tank 8
8112	Tank1_TempElement2	FLOAT	(1)	Temperature for sensor 2 in Tank 1
8114	Tank2_TempElement2	FLOAT	(1)	Temperature for sensor 2 in Tank 2
8116	Tank3_TempElement2	FLOAT	(1)	Temperature for sensor 2 in Tank 3
8118	Tank4_TempElement2	FLOAT	(1)	Temperature for sensor 2 in Tank 4
8120	Tank5_TempElement2	FLOAT	(1)	Temperature for sensor 2 in Tank 5

Table D-4: Tank Data Organized by Value Type *(continued)*

Register #	Register Name	Type	Unit	Description
8122	Tank6_TempElement2	FLOAT	(1)	Temperature for sensor 2 in Tank 6
8124	Tank7_TempElement2	FLOAT	(1)	Temperature for sensor 2 in Tank 7
8126	Tank8_TempElement2	FLOAT	(1)	Temperature for sensor 2 in Tank 8
8128	Tank1_TempElement3	FLOAT	(1)	Temperature for sensor 3 in Tank 1
8130	Tank2_TempElement3	FLOAT	(1)	Temperature for sensor 3 in Tank 2
8132	Tank3_TempElement3	FLOAT	(1)	Temperature for sensor 3 in Tank 3
8134	Tank4_TempElement3	FLOAT	(1)	Temperature for sensor 3 in Tank 4
8136	Tank5_TempElement3	FLOAT	(1)	Temperature for sensor 3 in Tank 5
8138	Tank6_TempElement3	FLOAT	(1)	Temperature for sensor 3 in Tank 6
8140	Tank7_TempElement3	FLOAT	(1)	Temperature for sensor 3 in Tank 7
8142	Tank8_TempElement3	FLOAT	(1)	Temperature for sensor 3 in Tank 8
8144	Tank1_VolumeUtilization	FLOAT	%	Volume utilization for Tank 1 in percent
8146	Tank2_VolumeUtilization	FLOAT	%	Volume utilization for Tank 2 in percent
8148	Tank3_VolumeUtilization	FLOAT	%	Volume utilization for Tank 3 in percent
8150	Tank4_VolumeUtilization	FLOAT	%	Volume utilization for Tank 4 in percent
8152	Tank5_VolumeUtilization	FLOAT	%	Volume utilization for Tank 5 in percent
8154	Tank6_VolumeUtilization	FLOAT	%	Volume utilization for Tank 6 in percent
8156	Tank7_VolumeUtilization	FLOAT	%	Volume utilization for Tank 7 in percent
8158	Tank8_VolumeUtilization	FLOAT	%	Volume utilization for Tank 8 in percent
8160	Tank1_TotalObservedVolume	FLOAT	(1)	Liquid volume in Tank 1
8162	Tank2_TotalObservedVolume	FLOAT	(1)	Liquid volume in Tank 2
8164	Tank3_TotalObservedVolume	FLOAT	(1)	Liquid volume in Tank 3
8166	Tank4_TotalObservedVolume	FLOAT	(1)	Liquid volume in Tank 4
8168	Tank5_TotalObservedVolume	FLOAT	(1)	Liquid volume in Tank 5
8170	Tank6_TotalObservedVolume	FLOAT	(1)	Liquid volume in Tank 6
8172	Tank7_TotalObservedVolume	FLOAT	(1)	Liquid volume in Tank 7
8174	Tank8_TotalObservedVolume	FLOAT	(1)	Liquid volume in Tank 8
8176	Tank1_FlowRate	FLOAT	(1)	Flow rate for Tank 1
8178	Tank2_FlowRate	FLOAT	(1)	Flow rate for Tank 2
8180	Tank3_FlowRate	FLOAT	(1)	Flow rate for Tank 3
8182	Tank4_FlowRate	FLOAT	(1)	Flow rate for Tank 4
8184	Tank5_FlowRate	FLOAT	(1)	Flow rate for Tank 5
8186	Tank6_FlowRate	FLOAT	(1)	Flow rate for Tank 6
8188	Tank7_FlowRate	FLOAT	(1)	Flow rate for Tank 7
8190	Tank8_FlowRate	FLOAT	(1)	Flow rate for Tank 8

(1) Engineering unit depends on System Units as per table above.

D.3.1 Tank Data organized by Tank

To identify a specific tank data register number, combine the values from the two tables Table D-5 and Table D-6.

Register Number = Starting Register + Register Offset

Table D-5: Tank Data - Starting Register

Tank #	Starting Register
Tank 1	2000
Tank 2	2100
Tank 3	2200
Tank 4	2300
Tank 5	2400
Tank 6	2500
Tank 7	2600
Tank 8	2700

Table D-6: Tank Data - Register Offset

Register Offset	Register Name	Type	Unit	Description
0	Tank#_Name0_3	DWORD	ASCII	First 4 characters of tank name
2	Tank#_Name4_7	DWORD	ASCII	Last 4 characters of tank name
4	Tank#_Type	DWORD	Enum	Tank shape for Tank #: 0: Not defined 8: User defined 9: Conical 10: Horizontal cylinder with domed ends 11: Horizontal cylinder with flat ends 12: Spherical 13: Vertical cylinder 14: Rectangular
6	Reserved			Reserved
8	Tank#_Level	FLOAT	(1)	Measured Level for Tank #
10	Tank#_LevelUnit	DWORD	Enum	Engineering Unit for Level values: 44: Feet 45: Meter 263: Feet and Inches

Table D-6: Tank Data - Register Offset *(continued)*

Register Offset	Register Name	Type	Unit	Description
12	Tank#_LevelStatus	DWORD	Enum	Status for Level for Tank #: 0: OK 1: Invalid value 2: Not configured 3: Invalid input value 4: Invalid configuration 5: User defined invalid configuration 6: Temperature sensor not in liquid 7: Not enough samples 8: OK calculated value 9: Invalid calculated value
14	Tank#_LevelRate	FLOAT	(1)	Measured Level Rate for Tank #
16	Tank#_LevelRateUnit	DWORD	Enum	Engineering Unit for Level Rate values: 120: m/h 247: ft/h
18	Tank#_LevelRateStatus	DWORD	Enum	Status for Level Rate for Tank #: 0: OK 1: Invalid value 2: Not configured 3: Invalid input value 4: Invalid configuration 5: User defined invalid configuration 6: Temperature sensor not in liquid 7: Not enough samples 8: OK calculated value 9: Invalid calculated value
20	Reserved			Reserved
22	Tank#_Pressure	FLOAT	(1)	Measured Vapor Pressure for Tank #
24	Tank#_PressureUnit	DWORD	Enum	Engineering Unit for Pressure values: 175: Psi A 256: Psi G 257: Bar A 258: Bar G 259: Pa G 260: Pa A 261: kPa G 262: kPa A

Table D-6: Tank Data - Register Offset *(continued)*

Register Offset	Register Name	Type	Unit	Description
26	Tank#_PressureStatus	DWORD	Enum	Status for Pressure for Tank #: 0: OK 1: Invalid value 2: Not configured 3: Invalid input value 4: Invalid configuration 5: User defined invalid configuration 6: Temperature sensor not in liquid 7: Not enough samples 8: OK calculated value 9: Invalid calculated value
28	Reserved			Reserved
30	Reserved			Reserved
32	Reserved			Reserved
34	Tank#_Temperature1	FLOAT	(1)	Measured Temperature for Sensor 1 in Tank #
36	Tank#_Temperature2	FLOAT	(1)	Measured Temperature for Sensor 2 in Tank #
38	Tank#_Temperature3	FLOAT	(1)	Measured Temperature for Sensor 3 in Tank #
40	Tank#_Temperature1Status	DWORD	Enum	Status for Temperature 1 for Tank #: 0: OK 1: Invalid value 2: Not configured 3: Invalid input value 4: Invalid configuration 5: User defined invalid configuration 6: Temperature sensor not in liquid 7: Not enough samples 8: OK calculated value 9: Invalid calculated value
42	Tank#_Temperature2Status	DWORD	Enum	Status for Temperature 2 for Tank #: 0: OK 1: Invalid value 2: Not configured 3: Invalid input value 4: Invalid configuration 5: User defined invalid configuration 6: Temperature sensor not in liquid 7: Not enough samples 8: OK calculated value 9: Invalid calculated value

Table D-6: Tank Data - Register Offset *(continued)*

Register Offset	Register Name	Type	Unit	Description
44	Tank#_Temperature3Status	DWORD	Enum	Status for Temperature 3 for Tank #: 0: OK 1: Invalid value 2: Not configured 3: Invalid input value 4: Invalid configuration 5: User defined invalid configuration 6: Temperature sensor not in liquid 7: Not enough samples 8: OK calculated value 9: Invalid calculated value
46	Tank#_Temperature	FLOAT	(1)	Average Liquid Temperature for Tank #
48	Tank#_TemperatureUnit	DWORD	Enum	Engineering Unit for Temperature values: 32: °C 33: °F
50	Tank#_TemperatureStatus	DWORD	Enum	Status for Temperature for Tank #: 0: OK 1: Invalid value 2: Not configured 3: Invalid input value 4: Invalid configuration 5: User defined invalid configuration 6: Temperature sensor not in liquid 7: Not enough samples 8: OK calculated value 9: Invalid calculated value
52	Tank#_Volume	FLOAT	(1)	Total Observed Volume for Tank #
54	Tank#_VolumeUtilization	FLOAT	%	Volume Utilization in percent for Tank #
56	Tank#_VolumeUnit	DWORD	Enum	Engineering Unit for Volume values: 40: US Gallon 41: Liter 42: UK Gallon 43: Cubic meter 46: Barrels 112: Cubic feet

Table D-6: Tank Data - Register Offset *(continued)*

Register Offset	Register Name	Type	Unit	Description
58	Tank#_VolumeStatus	DWORD	Enum	Status for Volume for Tank #: 0: OK 1: Invalid value 2: Not configured 3: Invalid input value 4: Invalid configuration 5: User defined invalid configuration 6: Temperature sensor not in liquid 7: Not enough samples 8: OK calculated value 9: Invalid calculated value
60	Tank#_VolumeUtilizationSts	DWORD	Enum	Status for Volume for Tank #: 0: OK 1: Invalid value 2: Not configured 3: Invalid input value 4: Invalid configuration 5: User defined invalid configuration 6: Temperature sensor not in liquid 7: Not enough samples 8: OK calculated value 9: Invalid calculated value
62	Tank#_FlowRate	FLOAT	(1)	Flow Rate for Tank #
64	Tank#_FlowRateUnit	DWORD	Enum	Engineering Unit for Flow rate values: 19: m^3/h 30: UK Gallons/hour 130: Cubic feet/hour 134: Barrels/hour 136: US Gallons/hour 138: Liter/hour
66	Tank#_FlowRateStatus	DWORD	Enum	Status for Flow Rate status for Tank #: 0: OK 1: Invalid value 2: Not configured 3: Invalid input value 4: Invalid configuration 5: User defined invalid configuration 6: Temperature sensor not in liquid 7: Not enough samples 8: OK calculated value 9: Invalid calculated value

Table D-6: Tank Data - Register Offset *(continued)*

Register Offset	Register Name	Type	Unit	Description
68	Tank#_Alarm	DWORD	Bitfield	Currently active alarms for Tank #: Bit 0: High Level alarm Bit 1: Low Level alarm Bit 2: Level Out-of-Limits alarm Bit 3: Level Rate alarm Bit 4: High Volume alarm Bit 5: Low Volume alarm Bit 6: Volume Out-of-Limits alarm Bit 7: Flow Rate alarm Bit 8: High Temperature alarm Bit 9: Low Temperature alarm Bit 10: Temperature Out-of-Limits alarm Bit 12: High Pressure alarm Bit 13: Low Pressure alarm Bit 14: Pressure Out-of-Limits alarm Bit 16: High Volume Utilization alarm Bit 17: Low Volume Utilization alarm Bit 18: Volume Utilization Out-of-Limits alarm
70	Tank#_AlarmStatus	DWORD	Bitfield	Enabled alarms for Tank #: Bit 0: High Level alarm Bit 1: Low Level alarm Bit 2: Level Out-of-Limits alarm Bit 3: Level Rate alarm Bit 4: High Volume alarm Bit 5: Low Volume alarm Bit 6: Volume Out-of-Limits alarm Bit 7: Flow Rate alarm Bit 8: High Temperature alarm Bit 9: Low Temperature alarm Bit 10: Temperature Out-of-Limits alarm Bit 12: High Pressure alarm Bit 13: Low Pressure alarm Bit 14: Pressure Out-of-Limits alarm Bit 16: High Volume Utilization alarm Bit 17: Low Volume Utilization alarm Bit 18: Volume Utilization Out-of-Limits alarm

(1) Engineering unit depends on System Units as per table above.

E HART®-IP

The Rosemount 2405 Monitoring Hub includes a HART-IP interface to enable remote configuration and diagnostics of the HART devices from an asset management system that supports HART-IP gateways, such as AMS Device Manager.

The Rosemount 2405 supports HART-IP network commands to enumerate sensor input channels and connected devices, and to tunnel HART commands to those connected devices, as per the HART Network Management Specification (HCF_SPEC-085).

Table E-1: Supported HART-IP Gateway Commands

Command	Description
0	Read unique identifier
74	Read I/O system capabilities
75	Poll sub-device
77	Send command to sub-device
84	Read sub-device identity summary

Related information

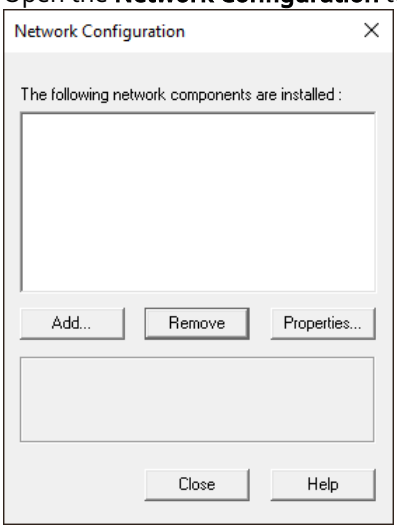
Set HART-IP remote access

E.1 Connect to Rosemount 2405 from AMS Device Manager

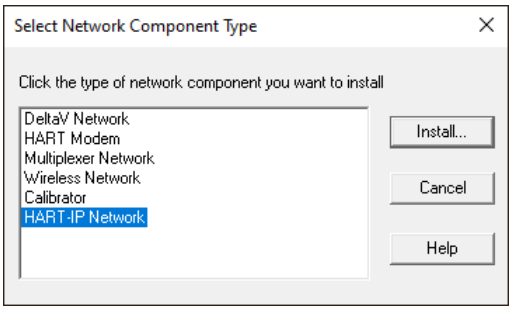
This section describes how to set up AMS Device Manager to connect to a Rosemount 2405 Monitoring Hub and access the HART® devices.

Procedure

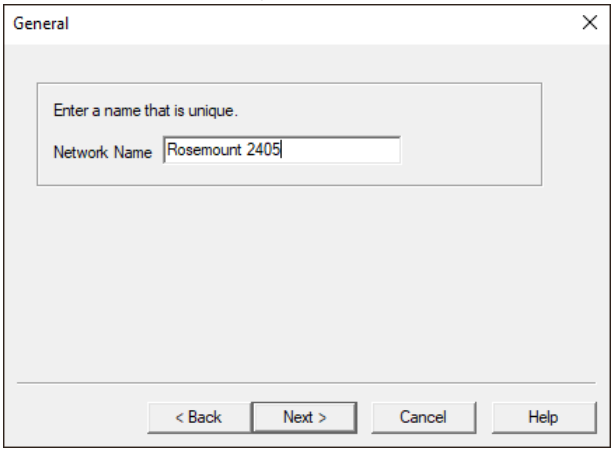
1. Open the **Network Configuration** tool and select the **Add** button.



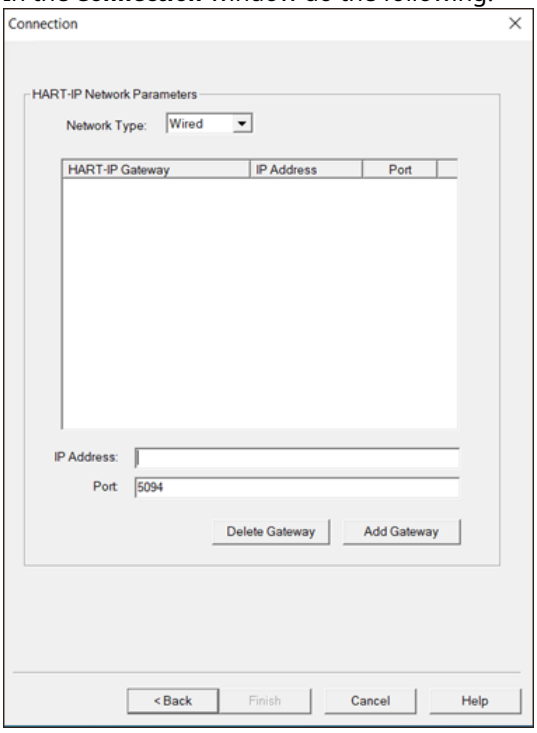
2. In the **Select Network Component Type** window, select **HART-IP Network** and press the **Install** button.



3. Select **Next** to proceed.
4. In the **General** window, enter desired network name. Select **Next** to proceed.



5. In the ***Connection*** window do the following:



a) In the **Network Type** list select **Wired**.

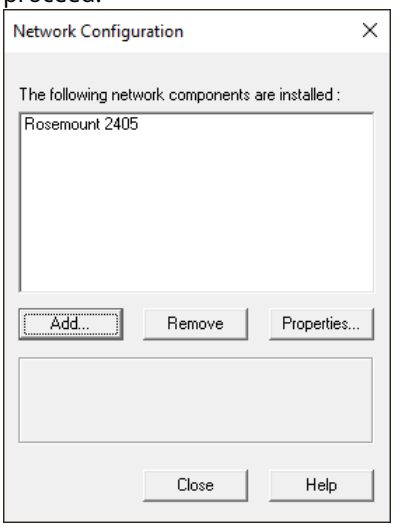
b) In the **IP Address** box, enter desired IP address.
IP address from factory: 192.168.4.10

c) In the **Port** box, enter the Rosemount 2405 port.
Default port: 5094.

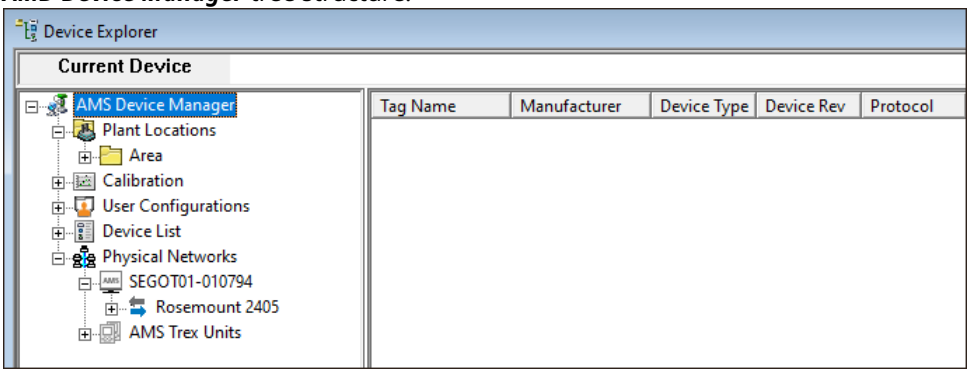
d) Press the **Add Gateway** button.

e) Press the **Finish** button.

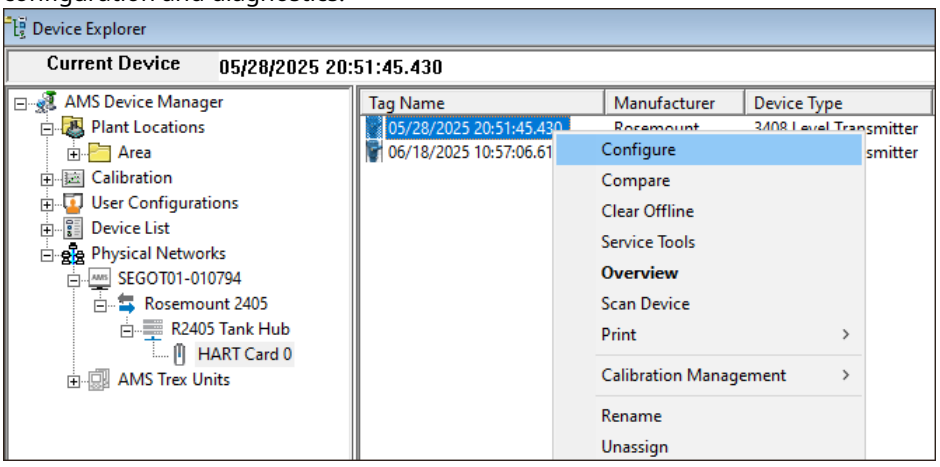
6. The Rosemount 2405 is added to the list of networks. Select the **Close** button to proceed.



7. The new ***Rosemount 2405*** will now appear in the ***Physical Networks*** section of the ***AMD Device Manager*** tree structure.



8. Expand the ***Rosemount 2405*** icon in the tree structure to view any connected HART devices.
9. Select any of the HART devices under the Rosemount 2405, and select the **Configure** option in the context menu to access its DD or FDI user interface for further configuration and diagnostics.

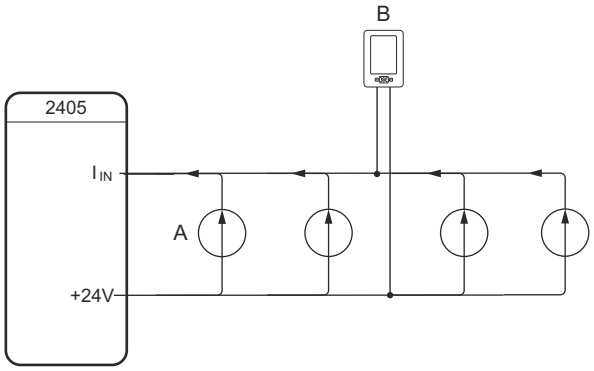


F Secondary HART® master

A HART handheld communicator can be used for service and configuration of the HART sensors connected to the Rosemount 2405.

Connect the handheld communicator at a suitable connection point on the HART loop, and set it to connect to externally powered sensors. The Rosemount 2405 will be the power supply and it has the built-in 250 Ω load resistance required for HART communication. Set the handheld communicator to be a secondary HART master.

Figure F-1: Handheld communicator connected to the HART loop



A. HART sensors
B. Handheld communicator

While the handheld communicator is connected, data collection from the sensors will be paused in the Rosemount 2405 and a Maintenance Required Alert will be shown on the local display and in the web interface, indicating this condition.

Note
Be sure to disconnect the handheld communicator after service to resume normal operation.

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