

Rosemount™ 2410 Tank Hub



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1 About this guide

This Quick Start Guide provides basic guidelines for installation and configuration of the Rosemount 2410 Tank Hub.

NOTICE

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

For equipment service or support needs, contact your local Emerson Automation Solutions/Rosemount Tank Gauging representative.

Spare Parts

Any substitution of non-recognized spare parts may jeopardize safety. Repair, e.g. substitution of components etc, may also jeopardize safety and is under no circumstances allowed.

Rosemount Tank Radar AB will not take any responsibility for faults, accidents, etc caused by non-recognized spare parts or any repair which is not made by Rosemount Tank Radar AB.

⚠ CAUTION

Make sure that there is no water or snow on top of the lid when it is opened. This may damage the electronics inside the housing.

⚠ CAUTION

Be careful when opening the lid in very low temperatures. High humidity and temperatures far below the freezing point may cause the gasket to get stuck to the lid. In that case you may use a heating fan to warm the housing in order to release the gasket. Be careful not to use excess heat which may damage the housing and electronics.

⚠ CAUTION

The products described in this document are NOT designed for nuclear-qualified applications. Using non-nuclear qualified products in applications that require nuclear-qualified hardware or products may cause inaccurate readings. For information on Rosemount nuclear-qualified products, contact your local Emerson Sales Representative.

⚠ WARNING

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

Ensure only qualified personnel perform the installation.

Use the equipment only as specified in this manual. Failure to do so may impair the protection provided by the equipment.

Do not perform any service other than those contained in this manual unless you are qualified.

Substitution of components may impair Intrinsic Safety.

⚠ WARNING

Explosions could result in death or serious injury

Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

Do not remove the gauge cover in explosive atmospheres when the circuit is alive.

⚠ WARNING

High voltage that may be present on leads could cause electrical shock.

Avoid contact with the leads and terminals.

Ensure the mains power to the device is off and the lines to any other external power source are disconnected or not powered while wiring the device.

⚠ WARNING

Electrical shock could cause death or serious injury.

Use extreme caution when making contact with the leads and terminals.

⚠ 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 to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

2 Overview

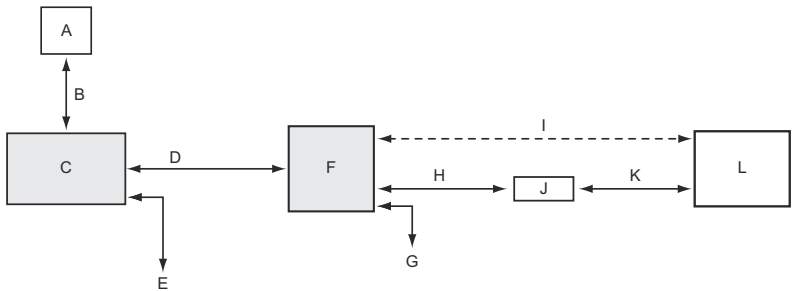
2.1 Communication

The Rosemount Tank Gauging system supports various communication interfaces between a Rosemount 2410 and a TankMaster PC or other host computers as illustrated in [Figure 2-1](#) to [Figure 2-3](#).

Both the Primary bus and the Secondary bus can be used for either TRL2 Modbus (standard) or RS485 Modbus communication⁽¹⁾.

On the Secondary bus you may use other communication protocols as well, such as Enraf, Varec etc.

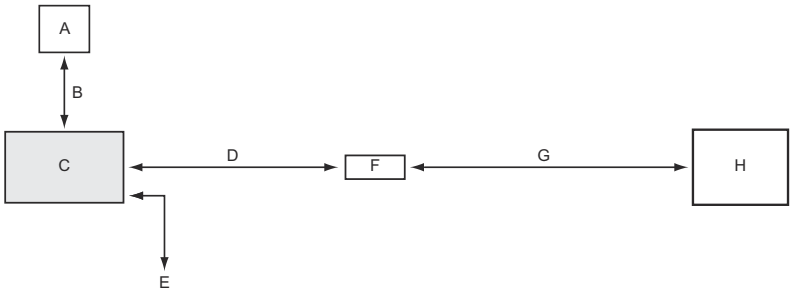
Figure 2-1: Typical Configuration of a Rosemount 2410 and 2460 System Hub Connected to PC/Host



- A. Field devices
- B. Tankbus
- C. Rosemount 2410
- D. Primary bus: TRL2 Modbus, RS485 Modbus
- E. Secondary bus: Enraf and others, HART 4-20 mA analog output/ input
- F. Rosemount 2460
- G. DCS
- H. TRL2 Modbus, RS485 Modbus
- I. RS232
- J. Modem
- K. USB / RS232
- L. TankMaster

⁽¹⁾ See [Cabling for the TRL2/RS485 Bus](#) for information on cable requirements.

Figure 2-2: Typical Configuration of a Rosemount 2410 Connected to PC/Host

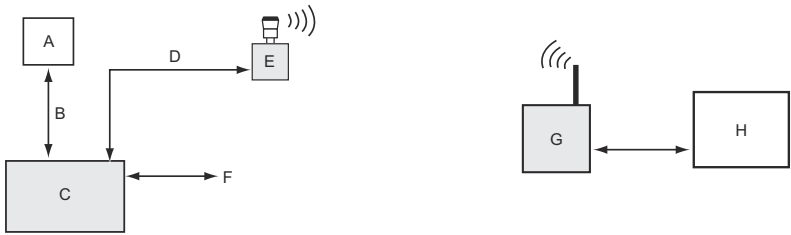


- A. Field devices
- B. Tankbus
- C. Rosemount 2410
- D. Primary bus: TRL2 Modbus, RS485 Modbus
- E. Secondary bus: Enraf and others, HART 4-20 mA analog output/ input
- F. Modem
- G. USB / RS232
- H. TankMaster

A THUM Adapter, connected to the Intrinsically Safe Secondary⁽²⁾ bus, allows wireless communication between a Rosemount 2410 Tank Hub and an Emerson Wireless Gateway.

⁽²⁾ The Non-IS Secondary Bus can not be used simultaneously with the IS HART 4-20 mA Secondary Bus.

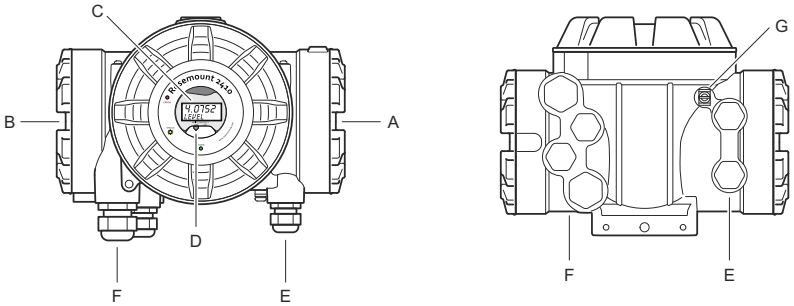
Figure 2-3: Typical Configuration of a Rosemount 2410 with Wireless Connection to Emerson Wireless Gateway and PC/Host



- A. Field devices
- B. Tankbus
- C. Rosemount 2410
- D. Secondary bus (IS): WirelessHART
- E. Emerson Wireless THUM Adapter
- F. Primary bus: TRL2 Modbus, RS485 Modbus
- G. Emerson Wireless Gateway
- H. TankMaster

2.2 Components

Figure 2-4: Rosemount 2410 Components



- A. Intrinsically safe terminal compartment*
 - B. Non-intrinsically safe terminal compartment*
 - C. Integral display (optional)*
 - D. Write protection switch*
 - E. Cable entries for IS connection (two ½ - 14 NPT)*
 - F. Cable entries for Non-IS connection (two ½ - 14 NPT, two ¾- 14 NPT)*
 - G. Grounding terminal*
-

3 General information

3.1 Service support

For service support contact the nearest Emerson Automation Solutions /Rosemount Tank Gauging representative. Contact information can be found on the web site www.Emerson.com.

3.2 Product certifications

See the Rosemount 2410 [Product Certifications](#) document for detailed information on the existing approvals and certifications.

3.3 Product recycling/disposal

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

4 Installation

4.1 Installation considerations

The Rosemount 2410 Tank Hub may be installed on various locations at the plant. Mounting at the tank foot may be convenient when you would like to have easy access to measuring data, diagnostics and other information on the optional integral display.

The tank hub can also be mounted on the tank roof if this is the preferred location. In case the tank hub is exposed to long periods of sunshine, a sunshade should be used to prevent it from being heated to temperatures above the maximum operating temperature.

Ensure that environmental conditions are within specified limits as listed in the Rosemount 2410 [Product Data Sheet](#).

Ensure that the Rosemount 2410 is installed such that it is not exposed to higher temperature than specified in the Rosemount 2410 [Product Data Sheet](#).

The multi-tank version of the Rosemount 2410 Tank Hub is able to serve several tanks. In that case it may be placed at a suitable location further away from the tanks.

The Rosemount 2410 is designed with two Tankbus terminals and several cable entries which allows alternative cable routing to suit various requirements.

Do not install the Rosemount 2410 in non-intended applications, for example environments where it may be exposed to extremely intense magnetic fields or extreme weather conditions.

Important

Check the Rosemount 2410 Tank Hub for any signs of damage prior to installation. Ensure that the glass on the integral display is undamaged, and O-rings and gaskets are in good condition.

4.1.1 Installation planning

It's recommended to plan the installation in order to ensure that all components in the system are properly specified. The planning stage should include the following tasks:

- Make a plan of the site and specify suitable locations for the devices
- Consider power budget
- Specify cabling and connections (for example whether devices will be "daisy-chained" or not)

- Specify cable glands that will be needed for the various devices
- Specify location of terminators on the Tankbus
- Make a note of identification codes such as Unit ID/Device ID of each device
- Assign Modbus® addresses for level gauges and other tank devices to be used in the tank databases of the Rosemount 2410 and the Rosemount 2460

Related information

[Rosemount Tank Gauging System Configuration Manual](#)
[Electrical installation](#)

4.2 Mechanical installation

The Rosemount 2410 is designed for mounting on a pipe stand or on a wall.

4.2.1 Pipe mounting

Prerequisites

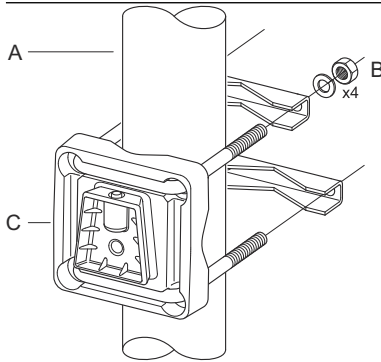
Note

Ensure that the Rosemount 2410 is installed to minimize vibration and mechanical shock.

Procedure

1. Attach the bracket to the pipe.

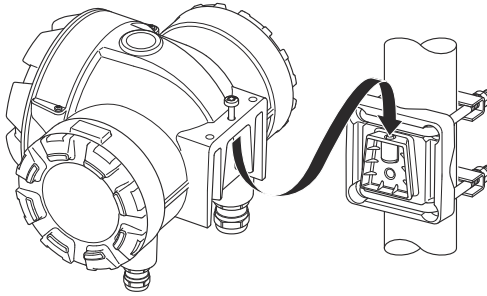
Ensure that the Rosemount 2410 is placed in a direction so that the display is clearly visible and wiring can be properly connected.



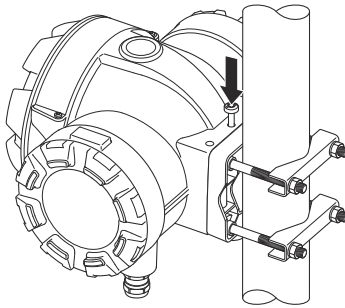
- A. 1 - 2 inches
 - B. 4 nuts and washers
 - C. Bracket
-

2. Tighten the nuts. Use moderate torque to ensure that the bracket does not break.

3. Attach the tank hub to the bracket by sliding it from the top downwards.



4. Secure the tank hub to the bracket by tightening the screw.



4.2.2 Wall mounting

Prerequisites

Note

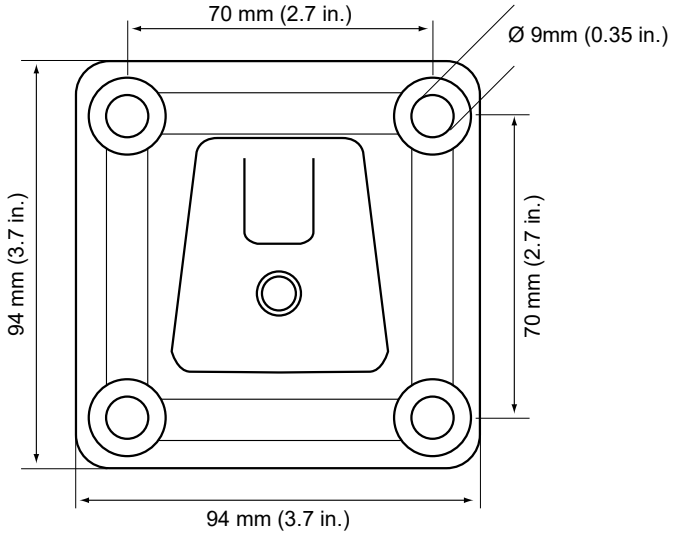
Ensure that the Rosemount 2410 is installed such that vibration and mechanical shock is minimized.

Procedure

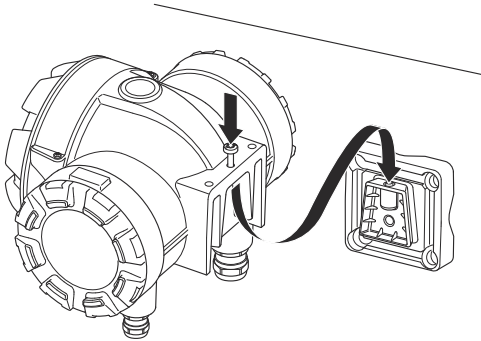
1. Mount the bracket on the wall by using four M8 screws and flat washers.

Note

Countersunk screws are not suitable.



2. Attach the tank hub to the bracket and tighten the screw.



4.3 Electrical installation

4.3.1 Cable entries

The Rosemount 2410 electronics housing has four $\frac{1}{2}$ - 14 NPT and two $\frac{3}{4}$ - 14 NPT entries. The connections must be made in accordance with local or plant electrical codes.

Make sure that unused ports are properly sealed to prevent moisture or other contamination from entering the terminal block compartment of the electronics housing.

Note

Use the enclosed metal plugs to seal unused ports. The plastic plugs mounted at delivery are not sufficient as seal!

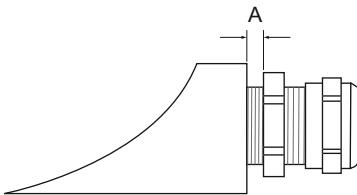
Note

Thread sealing (PTFE) tape or paste on male threads of conduit is required to provide a water/dust tight conduit seal and to meet the required degree of ingress protection as well as to enable future removal of the plug/gland.

Note

NPT is a standard for tapered threads. Tightening torque is not given by the standard. Common recommendation is to tighten the NPT gland by hand and then use a wrench to tighten the NPT gland. Keep in mind that over tightening may be detrimental for the sealing function or even damage the threads in the housing. Engage the gland with 5 to 6 threads. Note that there will be a number of threads left outside the housing as in [Figure 4-1](#).

Figure 4-1: Cable Entry with NPT Threaded Gland



A. The NPT threaded gland leaves a number of threads outside the housing

Glands must meet the following requirements for the Non-IS cable entries:

- Ex de explosion protection
- IP class 66 and 67

- material: metal (recommended)

4.3.2 Power supply

The Rosemount 2410 Tank Hub accepts supply voltage 48 - 240 Vac (50/60 Hz) and 24 - 48 Vdc. The Rosemount 2410 provides intrinsically safe power to all devices connected to the Tankbus.

4.3.3 Cable selection for power supply



Cables must be suitable for the supply voltage and approved for use in hazardous areas, where applicable. For instance, in the U.S., explosion-proof conduits must be used in the vicinity of the vessel.

Suitable conduits with sealing device or flame proof cable glands must be used depending on local requirements.

Appropriate cross sectional area of wires must be used in order to prevent a too high voltage drop to the connected device. Use 0.75 mm² to 2.5 mm² (18 AWG to 13 AWG) in order to minimize the voltage drop.

4.3.4 Grounding

The housing 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 are grounding screw connections inside the terminal compartments which are identified by ground symbols:  / . There is also a grounding screw on the housing.

Note

Grounding the device via threaded conduit connection may not provide sufficient ground.

Grounding - Tankbus

Signal wiring of the fieldbus segment (Tankbus) can not be grounded. Grounding one of the signal wires may shut down the entire fieldbus segment.

Shield wire ground

Tankbus

To protect the fieldbus segment (Tankbus) from noise, grounding techniques for shield wire usually require a single grounding point for shield wire to avoid creating a ground loop. The ground point is typically at the power supply.

The Rosemount Tank Gauging devices are designed for “daisy-chain” connection of shield wiring in order to enable a continuous shield throughout the Tankbus network.

Primary/Secondary Bus

Cable shield for the Primary and Secondary Bus should normally be grounded at host or System Hub end only.

4.3.5 Cable selection for the Tankbus

Use shielded twisted pair wiring for the Rosemount 2410 Series in order to comply with FISCO⁽³⁾ requirements and EMC regulations. The preferred cable is referred to as type “A” fieldbus cable. The cables must be suitable for the supply voltage and approved for use in hazardous areas, where applicable. In the U.S. explosion-proof conduits may be used in the vicinity of the vessel.

We recommend cable size 1.0 mm² or 18 AWG in order to facilitate wiring. However, cables within the range 0.5 to 1.5 mm² or 20 to 16 AWG can be used.

The FISCO FOUNDATION™ Fieldbus specification requires that cables for the Tankbus comply with the following cable parameters:

Table 4-1: FISCO Cable Parameters

Parameter ⁽¹⁾	Value
Loop resistance	15 Ω/km to 150 Ω/km
Loop inductance	0.4 mH/km to 1 mH/km
Capacitance	45 nF/km to 200 nF/km
Maximum length of each spur ⁽²⁾ cable	60 m in apparatus class IIC and IIB
Maximum cable length including trunk ⁽³⁾ and spurs	1000 m in apparatus class IIC and 1900 m in apparatus class IIB

- (1) For further information see requirements of the IEC 61158-2 standard.
- (2) A spur is an unterminated part of the network.
- (3) A trunk is the longest cable path between two devices on the fieldbus network, and is the part of the network which has terminations at both ends. In the Rosemount Tank Gauging system, a trunk is typically located between the Rosemount 2410 Tank Hub and a segment coupler or the last device in a daisy-chain configuration.

(3) See IEC 61158-2

4.3.6 Power budget

The Rosemount 2410 Tank Hub delivers 250 mA to the Tankbus. In wireless systems a Rosemount 2410 Tank Hub equipped with active analog inputs/outputs may deliver 200 mA. The number of tanks served by the tank hub depends on the type of connected field devices and their power consumption⁽⁴⁾. Power consumption per field device is listed in [Table 4-2](#).

Table 4-2: Power Consumption for Various Rosemount Tank Gauging Devices

Field device	Power consumption
Rosemount 5900S Radar Level Gauge	50 mA
Rosemount 5900C Radar Level Gauge	50 mA
Rosemount 5900S Radar Level Gauge, 2-in-1 solution	100 mA
Rosemount 5300 Level Transmitter	21 mA
Rosemount 5408 Level Transmitter	21 mA
Rosemount 2230 Graphical Field Display	30 mA
Rosemount 2240S Multi-input Temperature Transmitter	30 mA including 565, 566 and 765 temperature sensors
Rosemount 644 Temperature Transmitter	12 mA
Rosemount 3051S, and Rosemount 2051 Pressure Transmitters	18 mA

The Rosemount 2410 Tank Hub is available in a single tank version as well as a multiple tank version which supports up to 10 tanks⁽⁵⁾.

4.3.7 Tankbus

The Rosemount Tank Gauging system is easy to install and wire. Devices can be “daisy-chained” thus reducing the number of external junction boxes.

In a Rosemount Tank Gauging system devices communicate with a Rosemount 2410 Tank Hub via the intrinsically safe Tankbus. The Tankbus complies with the FISCO⁽⁶⁾ FOUNDATION Fieldbus standard.

⁽⁴⁾ *May be fewer than the 16 devices per segment, stated in the FOUNDATION™ Fieldbus standard.*

⁽⁵⁾ *Maximum five Rosemount 5300 level transmitters.*

The Rosemount 2410 acts as power supply to the field devices on the Tankbus. A FISCO system enables more field devices to be connected to the segment compared to conventional IS systems based on the entity concept.

The tank hub is designed for use in hazardous area Zone 1 (Class 1, Division 1) and communicates with field devices via the intrinsically safe Tankbus.

Related information

[Rosemount 2410 Reference Manual](#)

Termination

A terminator is needed at each end of a FOUNDATION™ Fieldbus network. A trunk is defined as the longest cable path between two devices on the fieldbus network. In the Rosemount Tank Gauging system, a trunk is typically located between the Rosemount 2410 Tank Hub and a splitter or the last device in a daisy-chain configuration. Generally, one terminator is placed in the fieldbus power supply, and the other one in the last device in the fieldbus network.

Note

Ensure that there are **two** terminators on the fieldbus.

In a Rosemount Tank Gauging system the Rosemount 2410 Tank Hub acts as power supply. Since the tank hub normally is the first device in the fieldbus segment, the built-in termination is enabled at factory.

Other devices such as the standard version of the Rosemount 5900S Radar Level Gauge, the Rosemount 2230 Graphical Field Display, and the Rosemount 2240S Multi-input Temperature Transmitter also have built-in terminators which can easily be enabled by inserting a jumper in the terminal block when necessary.

When adding new devices at the end of an existing FOUNDATION Fieldbus network, the termination is moved to the farthest field device in order to fulfill the requirement on locating the terminator at the end of the trunk. However, in case a field device is added to the network with a short cable, this rule may be slightly bent by leaving the terminator in its original position.

(6) FISCO=Fieldbus Intrinsically Safe Concept

4.3.8 Non-IS compartment wiring

The non-IS explosion-proof/flameproof compartment has a terminal block for connecting power supply, communication buses to host systems, relay outputs, and HART® 4-20 mA analog input and output.

Prerequisites

Note

Ensure that o-rings and seats are in good condition prior to mounting the cover in order to maintain the specified level of ingress protection. The same requirements apply for cable inlets and outlets (or plugs). Cables must be properly attached to the cable glands.

Procedure

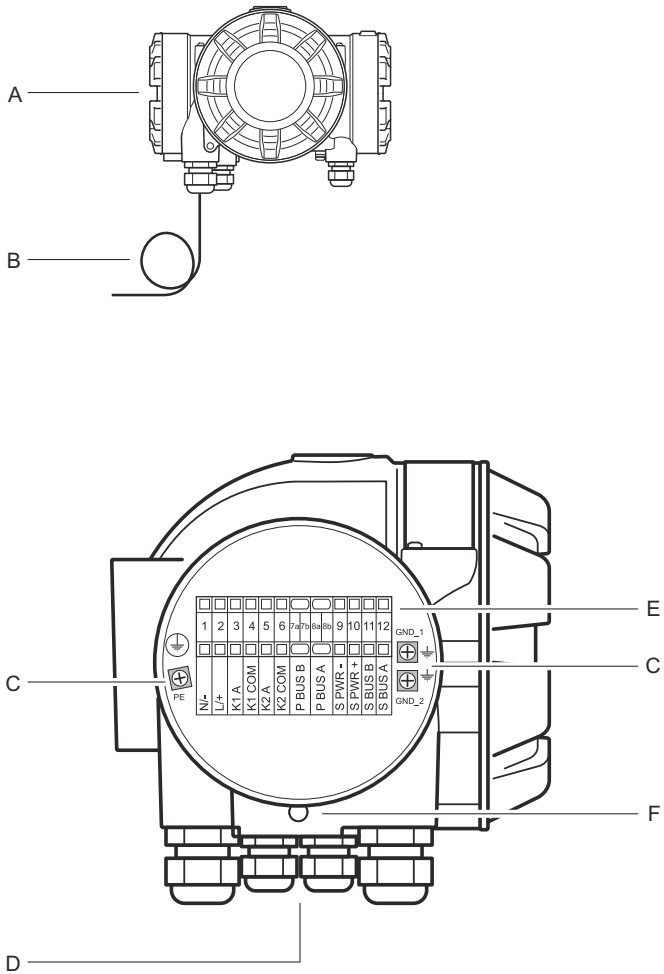
1. ⚠ Ensure that the power supply is switched off.
2. Ensure that the cover jam screw (F) (see [Figure 4-2](#)) is completely threaded into the housing. It is intended to disallow the removal of the transmitter cover in flameproof environments without the use of tooling. The cover jam screw is threaded into the housing at factory.
3. Remove the cover on the non-IS terminal compartment.
4. Run the wires through the cable gland/conduit. Install wiring with a drip loop in such a way that the lower part of the loop is under the cable/conduit entry.
5. Connect wires to the terminal block. See [Table 4-4](#) for information on the terminal block connections.
6. Use the enclosed metal plug to seal any unused port.
7. ⚠ Tighten the conduits/cable glands.
8. ⚠ The cover on the terminal compartment should be tightened to mechanical stop (metal to metal). Make sure the cover is fully engaged to meet explosion-proof requirement and to prevent water from entering the terminal compartment.
9. Loosen the cover jam screw until it contacts the cover. Turn the jam screw an additional 1/2 turn counterclockwise to secure the cover.

Note

Application of excessive torque may strip the threads.

10. Verify that the cover cannot be removed.

Figure 4-2: Non-IS Terminal Compartment

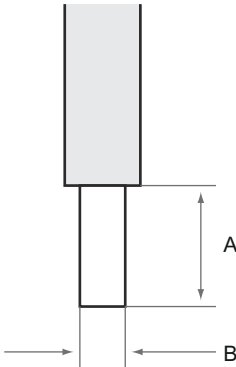


- A. Non-IS compartment
- B. Wiring with drip loop
- C. Ground screws
- D. Cable entries
- E. Terminal block
- F. Cover jam screw

Conductor recommendations

Ensure that you use cables suitable for the terminal block of the Rosemount 2410. The terminal block is designed for cables that meet the specifications as illustrated in [Figure 4-3](#).

Figure 4-3: Conductor and Insulation Requirements



- A. Stripping length: 10 mm
- B. Conductor cross-sectional area, see [Table 4-3](#)

Table 4-3: Terminal Connection for Details for End User

Type	Rated (V)	Rated (A)	Strip length (mm)	Solid wire size (mm ²)	Stranded wire size (mm ²)	Flexible wire size (mm ²)	Clamping range (mm ²)	Resistance (MΩ)
ZDUB 2.5-2	550	21	10	0.5 - 4	0.5 - 2.5	0.5 - 2.5	0.13 - 4	1.33

No other wire sizes or types than the ones specified in instructions must be used. The terminal blocks must either be mounted next to another block of the same type and size or with an end plate.

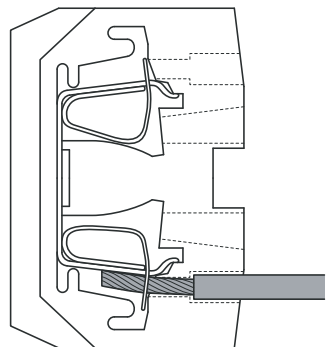
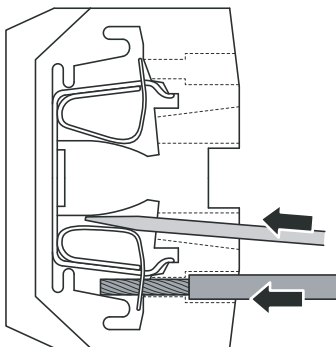
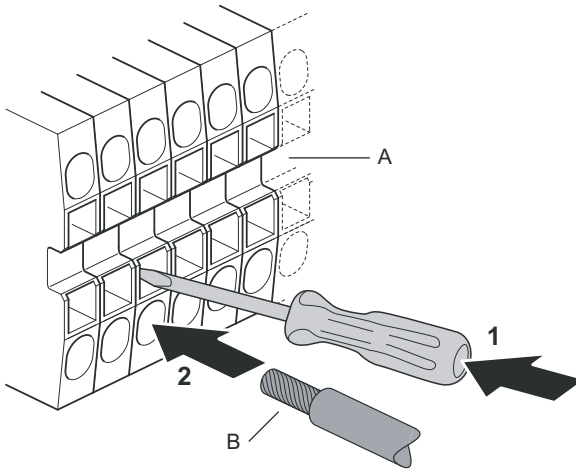
Manually cut cross connections and cross connections with blank ends (ZQV's >>=20 poles) shall not be used.

Connect the conductor to the terminal block

Procedure

Use a screw driver to insert the conductor into the terminal block as illustrated in [Figure 4-4](#)

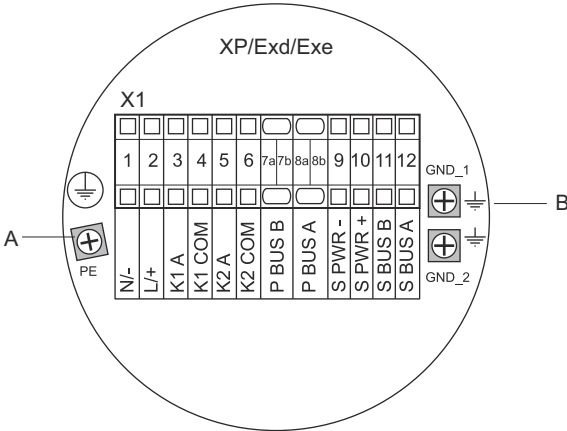
Figure 4-4: Connecting the Conductor to the Terminal Block



- A. Terminal block
- B. Conductor

4.3.9 Non-IS terminal block

Figure 4-5: Terminal Block in the Explosion-proof/flameproof Compartment



- A. Ground screw
- B. Ground screws for communication bus shields

Table 4-4: Terminal Assignment for Non-intrinsically Safe Side (XP/Exd/Exe)

Terminal	Designation	Function
1	N / -	Power, Neutral / DC -
2	L / +	Power, Line / DC +
3	K1 A	Relay 1 output (optional). Hardware configurable NO/NC.
4	K1 com	Relay 1 common
5	K2 A	Relay 2 output (optional). Hardware configurable NO/NC.
6	K2 com	Relay 2 common
7a/7b	P Bus B	Primary communication bus
8a/8b	P Bus A	
9	S Pwr -	Secondary bus power - (optional)
10	S Pwr +	Secondary bus power + (optional)
11	S Bus B	Secondary communication bus - (optional)

Table 4-4: Terminal Assignment for Non-intrinsically Safe Side (XP/Exd/Exe) (continued)

Terminal	Designation	Function
12	S Bus A	Secondary communication bus + (optional)
PE	PE	Power supply protective ground
GND_1	GND_1	Housing chassis/shield Primary bus
GND_2	GND_2	Housing chassis/shield Secondary bus

Power supply

The Rosemount 2410 accepts supply voltage 24-48 Vdc and 48-240 Vac (50/60 Hz).

Primary communication bus

In a standard configuration the Rosemount 2410 communicates with a host or a Rosemount 2460 System Hub via TRL2 Modbus or RS-485 Modbus protocol.

Secondary communication bus

The secondary bus can be used for communication using a number of protocols such as TRL2 Modbus, HART 4-20 mA, Enraf, Varec and L&J.

Relay outputs

There are two optional relay outputs. You can choose Normally Open (NO) or Normally Closed (NC) by setting a switch.

NO and NC refers to the contact position when a relay is deenergized. This is also referred to as the Alarm state. The terminology can be summarized as follows:

Table 4-5: Designation of Relay Contact Positions

Normally Closed (NC)		Normally Open (NO)	
Deenergized	Energized	Deenergized	Energized
Closed	Open	Open	Closed
Not active	Active	Not active	Active
Alarm (Reset)	Normal	Alarm (Reset)	Normal

Note

Ensure that maximum current through the relays does not exceed the specifications in the Rosemount 2410 [Product Data Sheet](#).

Related information

[Rosemount 2410 Reference Manual](#)

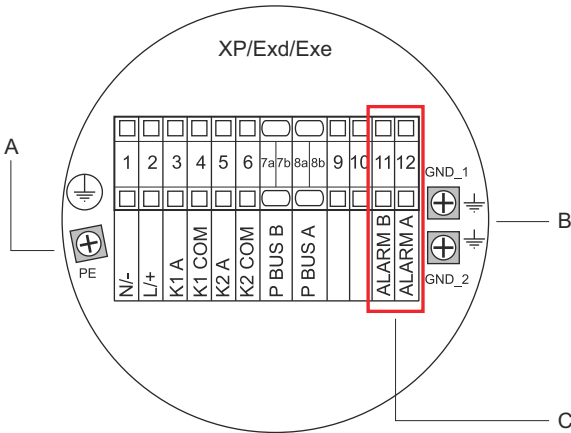
Non-IS terminal block for SIL safety systems

For Safety Integrity Level (SIL) systems the Rosemount 2410 has a terminal block on the Non-IS side with connection to a SIL Alarm Relay output.

Note

This terminal block is used for tank hubs ordered with Safety certification (SIS) model code 3.

Figure 4-6: Non-IS (XP/Exd/Exe) Terminal Block



- A. Ground screw
- B. Ground screws
- C. SIL Relay

Table 4-6: Terminal Assignment for SIL Version of the Rosemount 2410 Non-IS Terminal Block

Terminal	Designation	Function
1	N / -	Power, Neutral / DC -
2	L / +	Power, Line / DC +
3	K1 A	Relay 1 output (optional). Hardware configurable NO/NC.
4	K1 com	Relay 1 common
5	K2 A	Relay 2 output (optional). Hardware configurable NO/NC.

Table 4-6: Terminal Assignment for SIL Version of the Rosemount 2410 Non-IS Terminal Block (continued)

Terminal	Designation	Function
6	K2 com	Relay 2 common
7a/7b	P Bus B	Primary communication bus
8a/8b	P Bus A	
9		Not used
10		Not used
11	Alarm B	SIL Alarm Relay B
12	Alarm A	SIL Alarm Relay A
PE	PE	Protective power supply ground
GND_1	GND_1	Housing chassis/shield Primary bus
GND_2	GND_2	Housing chassis/shield Secondary bus

4.3.10 IS compartment wiring

The IS compartment has a terminal block for connecting the intrinsically safe Tankbus for communication with field devices on the tank. This terminal block is also used for intrinsically safe HART 4-20 mA analog input/output communication.

Prerequisites

Note

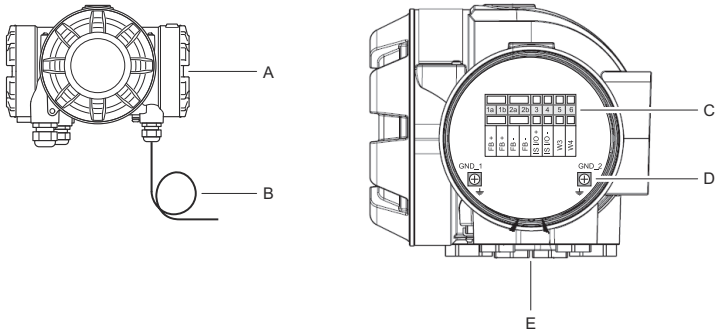
Ensure that o-rings and seats are in good condition prior to mounting the cover in order to maintain the specified level of ingress protection. The same requirements apply for cable inlets and outlets (or plugs). Cables must be properly attached to the cable glands.

Procedure

1. ⚠ Make sure that the power supply is switched off.
2. Remove the cover on the IS terminal compartment.
3. Pull the cable through the cable gland/conduit. Install cables with a drip loop in such a way that the lower part of the loop is under the cable/conduit entry.
4. Connect wires according to [Table 4-7](#).
5. Use the enclosed metal plug to seal any unused port.
6. Tighten the conduit/cable gland.
7. ⚠ The cover on the terminal compartment should be tightened to mechanical stop (metal to metal). Make

sure the cover is fully engaged to meet explosion-proof requirement and to prevent water from entering the terminal compartment.

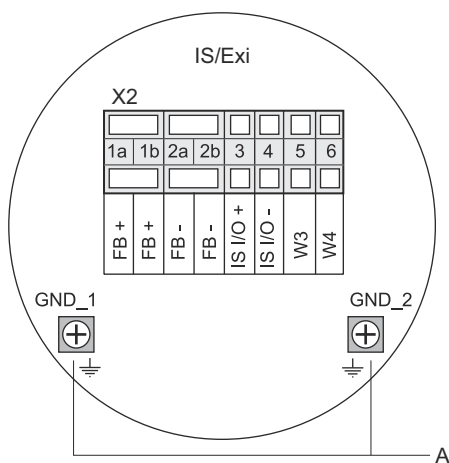
Figure 4-7: IS terminal compartment



- A. IS compartment
- B. Wiring with drip loop
- C. Terminal block
- D. Ground screws
- E. Cable entries

4.3.11 Intrinsically safe terminal block

The Intrinsically safe side of the Rosemount 2410 Tank Hub connects to the Tankbus which communicates with field devices on the tank.

Figure 4-8: Intrinsically Safe Terminal Block

A. Ground screws

Table 4-7: Terminal Assignment for Intrinsically Safe Side

Terminal	Designation	Function
1a	FB +	Intrinsically Safe Tankbus positive (+) terminal
1b	FB +	Intrinsically Safe Tankbus positive (+) terminal
2a	FB -	Intrinsically Safe Tankbus negative (-) terminal
2b	FB -	Intrinsically Safe Tankbus negative (-) terminal
3	IS I/O+	IS Input/Output + HART / 4-20 mA (Secondary Bus)
4	IS I/O -	IS Input/Output - HART / 4-20 mA (Secondary Bus)
5	W3	Not used (future option)
6	W4	
GND_1	GND_1	Housing chassis/Tankbus shield
GND_2	GND_2	Housing chassis/Tankbus shield

Tankbus

The devices on the tank communicates with the Rosemount 2410 via the intrinsically safe Tankbus. All field devices in the Rosemount Tank Gauging system have built-in communication modems for FISCO FOUNDATION™ Fieldbus (FF) communication and will automatically

communicate with the Rosemount 2410 when connected to the Tankbus.

Optional secondary bus

In addition to the Tankbus an optional intrinsically safe bus is available for communication with devices not compatible with FOUNDATION™ Fieldbus. It allows you to connect devices for intrinsically safe HART 4-20 mA analog input/output communication.

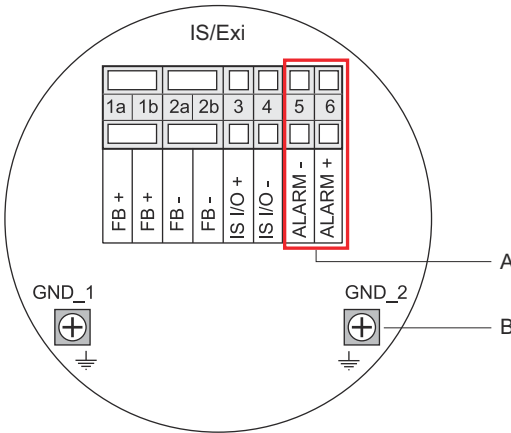
IS terminal block for SIL safety systems

For Safety Integrity Level (SIL) systems the Rosemount 2410 has a terminal block with a SIL Alarm output for connection to a Rosemount 5900S Radar Level Gauge.

Note

This terminal block is used for tank hubs ordered with Safety certification (SIS) model code 3.

Figure 4-9: IS/Exi Terminal Block for SIL Systems



- A. SIL Alarm
- B. Ground screws

Table 4-8: Terminal Assignment for SIL Version of the Rosemount 2410 IS Terminal Block

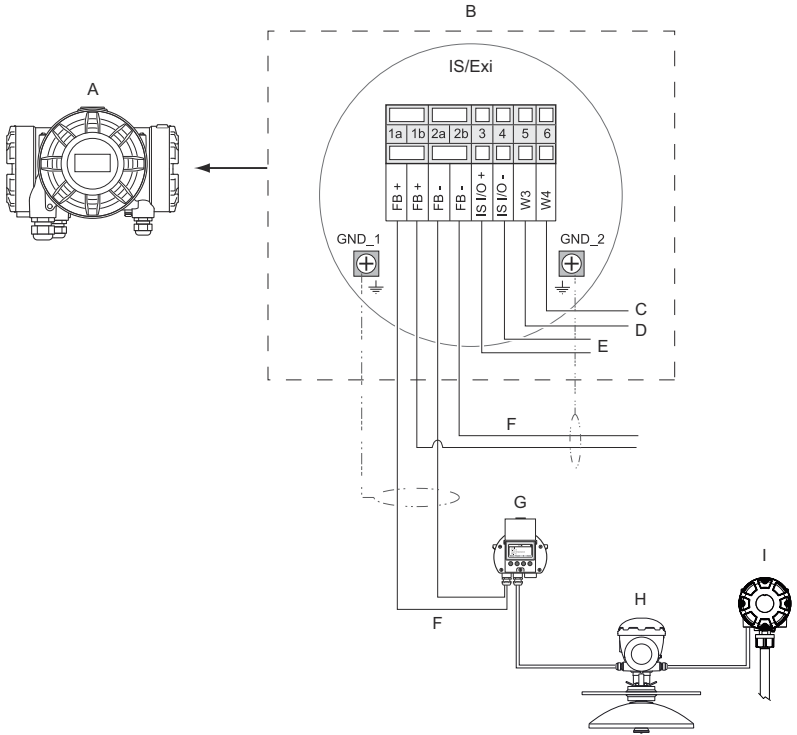
Terminal	Designation	Function
1a	FB +	Intrinsically Safe Tankbus positive (+) terminal
1b	FB +	Intrinsically Safe Tankbus positive (+) terminal
2a	FB -	Intrinsically Safe Tankbus negative (-) terminal

Table 4-8: Terminal Assignment for SIL Version of the Rosemount 2410 IS Terminal Block (continued)

Terminal	Designation	Function
2b	FB -	Intrinsically Safe Tankbus negative (-) terminal
3	IS I/O+	IS Input/Output +
4	IS I/O -	IS Input/Output -
5	Alarm -	SIL Alarm input - (connect to terminal block on Rosemount 5900S)
6	Alarm +	SIL Alarm input+ (connect to terminal block on Rosemount 5900S)
GND_1	GND_1	Housing chassis/Tankbus shield
GND_2	GND_2	Housing chassis/Tankbus shield

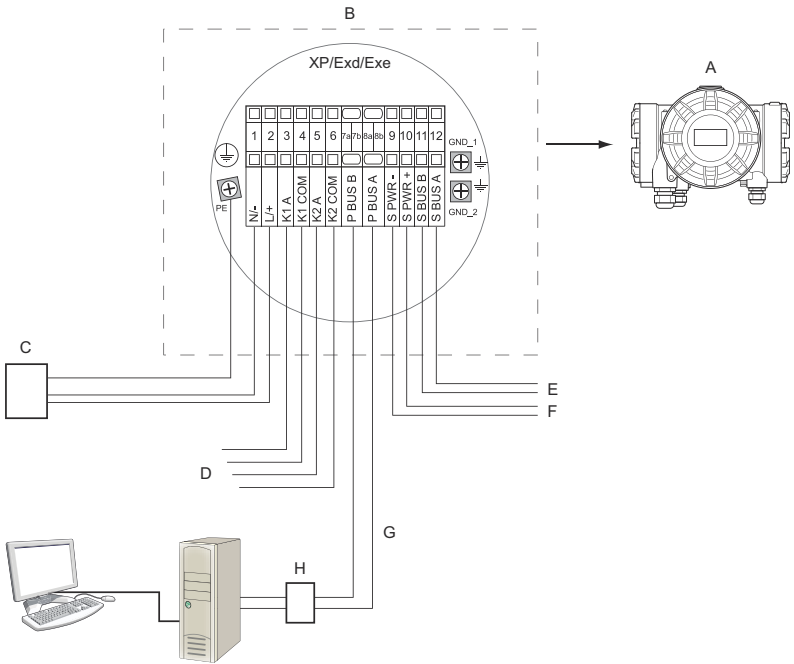
4.3.12 Wiring diagrams

Figure 4-10: Wiring Diagram on the Intrinsically Safe (IS/Exi) Side



- A. Rosemount 2410
- B. Terminal block on intrinsically safe side
- C. Not used (future option)
- D. SIL systems: Alarm
- E. IS secondary bus
- F. Intrinsically safe Tankbus
- G. Rosemount 2230
- H. Rosemount 5900S
- I. Rosemount 2240S

Figure 4-11: Wiring Diagram on the Non-intrinsically Safe (XP/Exd/Exe) Side



- A. Rosemount 2410
- B. Terminal block on Non-intrinsically safe side
- C. Power supply
- D. Relay outputs
- E. Secondary bus
- F. Secondary power
- G. Primary bus
- H. Modem

5 Configuration

5.1 Introduction

A Rosemount Tank Gauging system includes a wide range of devices for tank monitoring. It is a flexible and scalable system which can be adapted to various applications and small or large tank farms. A typical system includes one or more of the following devices:

- control room PC with Rosemount TankMaster program for operational control
- Rosemount 2460 System Hub that collects measurement data from Rosemount 2410 Tank Hubs
- Rosemount 2410 Tank Hub which collects measurement data from field devices on the tanks
- various field instruments such as the Rosemount 5900S Radar Level Gauge, Rosemount 2240S Multi-input Temperature Transmitter, Rosemount 2230 Graphical Field Display, Rosemount 3051S Pressure Transmitter
- Emerson Wireless Gateway and Emerson Wireless THUM Adapter for wireless communication between field devices and control room host system

See the Rosemount Tank Gauging [System Data Sheet](#) for a comprehensive description of the components in a Rosemount Tank Gauging system.

5.2 Configuration tools

The Rosemount 2410 Tank Hub is configured by using the Rosemount TankMaster WinSetup configuration program. WinSetup is a user-friendly software package that includes basic configuration options as well as advanced configuration and service functions.

See **Related information** for tips on sections and documents with more information.

Related information

[Configuration using TankMaster WinSetup](#)

[Rosemount Tank Gauging System Configuration Manual](#)

[Rosemount Wireless Tank Gauging System Reference Manual](#)

5.3 Basic configuration of a Rosemount 2410 Tank Hub

This is a general description of how to configure a Rosemount 2410 Tank Hub. The Rosemount Tank Gauging [System Configuration Manual](#) provides a detailed description of how to use the Rosemount TankMaster WinSetup program as a configuration tool for the Rosemount 2410.

Communication

Depending on the particular system configuration, a Rosemount 2410 Tank Hub may communicate directly with a host computer or via a Rosemount 2460 System Hub.

In case the Rosemount 2410 is connected to a Rosemount 2460 System Hub, you will have to specify which communication protocol channel to be used.

The Rosemount 2410 has default Modbus® address=247. The address should be changed to the recommended address range. The Modbus address must match the address specified in the Rosemount 2460's tank database.

The Rosemount 2410 Tank Hub can be used in a *WirelessHART* system by connecting an Emerson Wireless THUM™ Adapter. The THUM adapter allows the Rosemount 2410 to communicate with a host system via an Emerson Wireless Gateway.

Tank database

The Rosemount 2410 has a tank database that maps field devices to tanks. It also stores Modbus addresses of level gauges and auxiliary tank devices (ATD) such as the Rosemount 2240S Multi-input Temperature Transmitter. The Modbus addresses are used for communication with Rosemount 2460 System Hub and host computers.

Device tags

For each tank, device tags are specified for the level gauge and the auxiliary tank devices (ATD). ATD devices include all instruments on the tank except the level gauge. Device tags are used as identifiers in TankMaster.

Integral display

The Rosemount 2410 can be configured to present measurement data on the optional integral display. The display alternates between the selected items at a rate given by the Display Toggle Time parameter.

Measurement data such as Level, Level Rate, Free Water Level and many other tank variables can be displayed.

Measurement units for Level, Level Rate, Volume, Temperature, Density, and Pressure can be specified regardless of which units are used for presentation in, for example, the TankMaster programs.

5.4 Configuration using TankMaster WinSetup

A Rosemount 2410 Tank Hub can easily be installed and configured by using the TankMaster Winsetup configuration program. The WinSetup installation wizard guides you through the basic configuration of a Rosemount 2410.

See **Related information** for tips on sections and documents with more information.

Related information

[Rosemount Tank Gauging System Configuration Manual](#)

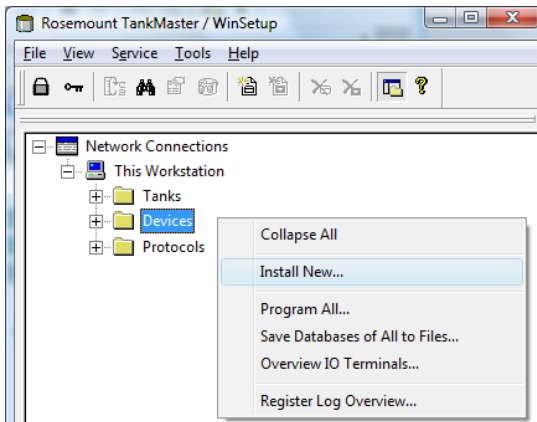
[Rosemount Wireless Tank Gauging System Reference Manual](#)

5.4.1 Installation wizard

The TankMaster WinSetup wizard is the recommended tool for installing the Rosemount 2410 and supports basic configuration. To start the installation wizard:

Procedure

1. In the WinSetup workspace select the **Devices** folder.



2. Right-click and select **Install New**, or from the menu bar select **Devices** → **Install New**.
3. Choose device type Rosemount 2410 Tank Hub.

4. Follow the instructions in the installation wizard.

Need help?

See the Rosemount Tank Gauging [System Configuration Manual](#) for more information on using the TankMaster WinSetup program to configure the Rosemount 2410.

5.4.2 Advanced configuration

Advanced options such as the Secondary Bus, Relay Output and Hybrid Density are available in the **Rosemount 2410 Properties** window.

Related information

[Rosemount 2410 Reference Manual](#)

6 Operation

6.1 Integral display

The Rosemount 2410 Tank Hub can be equipped with an optional integral display for presentation of measurement data and diagnostics. When the device is switched on, the display presents information such as device model, communication protocol (Modbus[®], Enraf, etc.) and address, relay configuration, software version, serial number, unit ID, and write protection status. See [Table 6-2](#) for more information on start-up information.

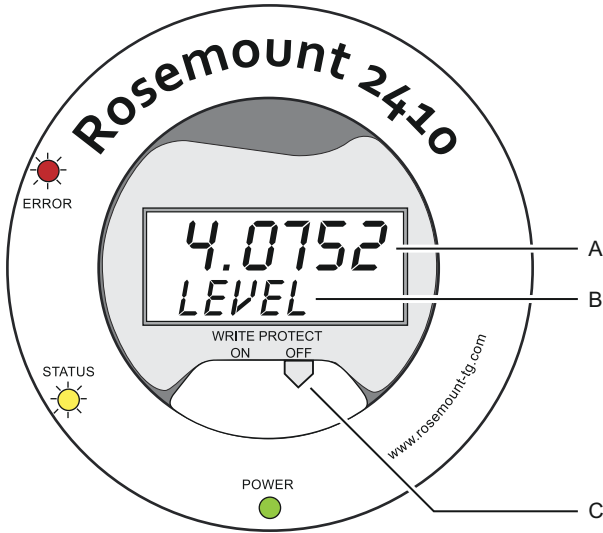
When the Rosemount 2410 is up and running the display presents Level, Signal Amplitude, Volume and other measurement variables depending on how the display is configured. The available parameters are listed in [Table 6-1](#).

The display has two rows for data presentation. The upper row shows tank name (up to six characters) and measurement values. The lower row shows variable type and measurement unit.

You can specify which variables to present on the display by using a configuration tool such as the Rosemount TankMaster WinSetup program.

The display toggles between different measurement values and units at a rate which can be configured by using the WinSetup program.

Figure 6-1: The Rosemount 2410 Integral Display



- A. Measurement value
- B. Toggling between measurement variable and measurement unit
- C. Write protection switch

Table 6-1: Measurement Variables and Presentation on the Rosemount 2410 Display

Variable	Presentation on display	Description
Level	LEVEL	Product level
Ullage	ULLAGE	Distance from the upper reference point to the product surface
Level Rate	LRATE	The speed of level movement up or down
Signal Strength	SIGN S	Signal amplitude of the surface echo
Free Water Level	FWL	Free water level at the bottom of the tank
Vapor Pressure	VAP P	Automatic or manual Vapor Pressure value
Liquid Pressure	LIQ P	Automatic or manual Liquid Pressure value
Air Pressure	AIR P	Automatic or manual Air Pressure value
Ambient Temperature	AMB T	Automatic or manual Ambient Temperature value
Vapor Average Temperature	VAP T	Average temperature of vapor above the product surface
Liquid Average Temperature	LIQ T	Average temperature for all spot sensors submersed in liquid
Tank Average Temperature	TANK T	Average value of all temperature sensors in the tank
Spot 1 Temperature	TEMP 1	Temperature value for spot sensor no. 1
Spot n Temperature	TEMP n	Temperature value for spot sensor no. "n"
Spot 16 Temperature	TEMP 16	Temperature value for spot sensor no. 16
Observed Density	OBS D	Automatic or manual Observed Density
Reference Density	REF D	Product density at standard reference temperature 15 °C (60 °F)
Volume	TOV	Total observed volume
Flow Rate	F RATE	Flow rate
User Defined 1	UDEF 1	Up to 5 user defined variables
Tank Height	TANK R	Distance from Tank Reference Point to Zero Level
Delta Level	ΔLVL	The difference between two level values

6.2 Start-up information

When the Rosemount 2410 starts up, all LCD segments light up for approximately 5 seconds. The start-up information appears on the display when the software initialization procedure is finished. The Primary Bus configuration appears first, followed by the Secondary Bus configuration. Each item appears a few seconds on the display:

Table 6-2: Start-up Information on the Rosemount 2410 Display

Item	Example
Model number and type (multiple / single tank version). Single tank version is required for Rosemount 2410:SIS.	Rosemount 2410 MULTI
Primary communication bus hardware option (TRL2, RS485, Enraf GPU, HART® master, HART slave, other emulation options)	PR HW RS-485 HART M HART S SIL AR
Primary communication bus protocol	PRI MODBUS
Primary Bus communication address	ADDR 247
Primary Bus communication settings (Baud rate, stop bits and parity)	9600 1 0

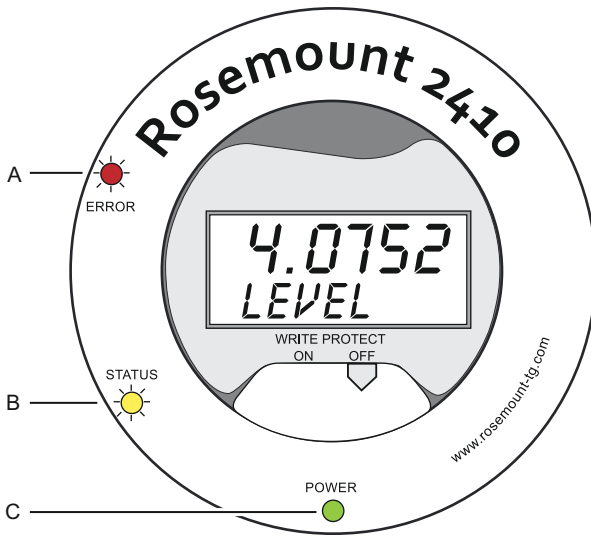
Table 6-2: Start-up Information on the Rosemount 2410 Display
(continued)

Item	Example
Secondary communication bus hardware option (TRL2, Enraf GPU, HART wireless, HART master, HART slave, other emulation options)	EN GPU HART W HART M HART S SIL AR
Secondary communication bus protocol	SEC ENRAF
Secondary Bus communication address	10
Secondary Bus communication settings (Baud rate, stop bits and parity)	1200 1 0
Software version	1.B1 SW
Serial number	SN 12 345678
Unit ID (when Modbus is available on Primary or Secondary bus)	UNID 23456
Write protection status (ON/OFF)	ON W PROT
Relay option	--K2 RELAY

6.3 LED

There are three Light Emitting Diodes (LED) on the Rosemount 2410 front for status and error information.

Figure 6-2: The Rosemount 2410 has Three LEDs



- A. Error LED (Red)
- B. Status LED (Yellow)
- C. Power On LED (Green)

The following color codes are used for the Rosemount 2410 LEDs:

Table 6-3: LED Color Codes

LED Type	Color	Description
Power On	Green	The green LED indicates that the Rosemount 2410 is powered on.
Status	Yellow	The yellow Status LED blinks at a constant rate of one flash every other second in normal operation to indicate the Rosemount 2410 software is running
Error	Red	The red Error LED is turned off in normal operation. If an error occurs, the Error LED flashes a sequence that corresponds to a certain error code.

6.3.1 LED start-up information

When the Rosemount 2410 is starting, both the Status and the Error LEDs indicate possible hardware or software errors as shown in [Table 6-4](#):

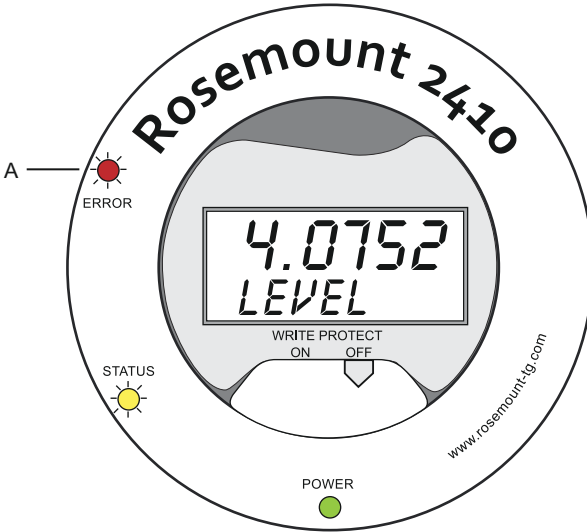
Table 6-4: LEDs Are Used for Error Indication at Rosemount 2410 Start-up

Error type	Status LED	Error LED	Description
Hardware	Blinking	Blinking	Status and Error are blinking simultaneously
Checksum	Blinking	Blinking	Status and Error are toggling
Other	On	Blinking	Unknown error

6.3.2 Error LED

In normal operation the Error LED (Red) is turned off. In case a device error occurs, the LED will flash a sequence that corresponds to the error code followed by a five second pause.

Figure 6-3: Error Codes are Presented by the Error LED



A. Error LED (Red)

The following errors codes may appear:

Table 6-5: LED Error Codes

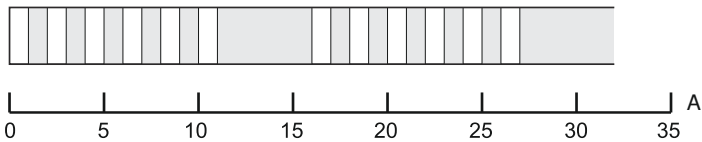
Code	Error type
1	FPROM
2	HREG
3	Software
4	Other memory error
5	System
6	Display
7	Aux
8	FF stack
9	Tankbus
10	Host communication
11	Data manager
12	Configuration

Example

In case of a device error, the red LED will repeat a flash sequence that corresponds to the particular type of error that occurred. For example, in case of a Display error (code=6), the LED will show a sequence of 6 flashes followed by a 5 seconds pause. After the pause the flashing starts over again in the same manner. This flash/pause sequence will be continuously repeated.

Display error (code 6) appears with the following Error LED (red) flash sequence as illustrated in [Figure 6-4](#):

Figure 6-4: Error Code Flash Sequence



A. Seconds

6.4 Specifying display variables

The Rosemount 2410 can be configured to present measurement data on the optional integral display. Measurement data such as Level, Level Rate, Free Water Level and many other tank variables can be displayed.

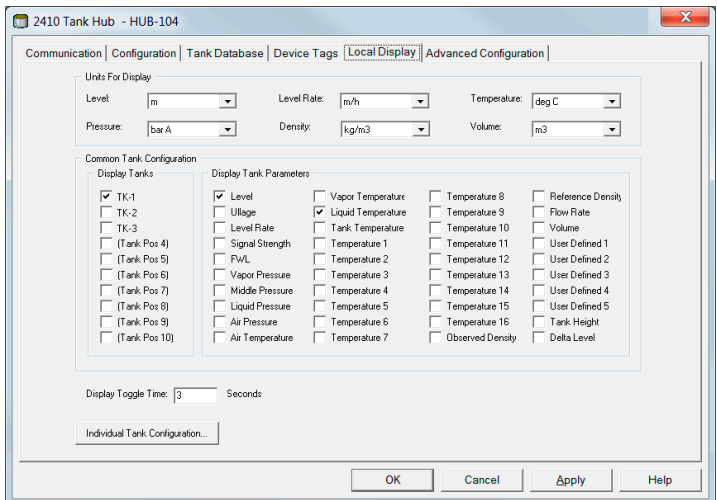
Measurement units for Level, Volume, Temperature, Density, Pressure, and Weight can be specified.

The display will alternate between the selected items at a rate given by the **Display Toggle Time** parameter.

When the Rosemount 2410 is installed and configured, the display can easily be set up with the Rosemount TankMaster WinSetup program to show tanks and measurement variables. The current display settings can be changed at any time in the **Rosemount 2410 Local Display** window as shown below:

Procedure

1. In the **Rosemount TankMaster WinSetup** configuration program, right-click the Rosemount 2410 icon.
2. Choose the **Properties** option.
3. In the **Rosemount 2410 Tank Hub** window, select the **Local Display** tab.

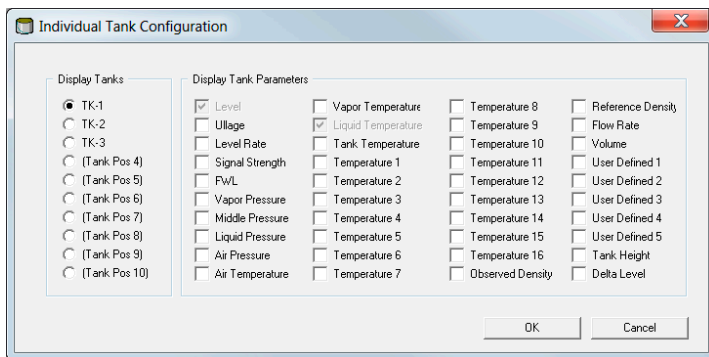


4. Select the desired tanks and tank parameters such as Level, Temperature, Vapor Pressure, or any other preferred tank parameter⁽⁷⁾.

5. Choose measurement units for the Rosemount 2410 integral display.

The first time the **Local Display** tab is opened, the same measurement units are used as specified in the TankMaster WinSetup **Server Preferences/Units** window.

6. Click the **Individual Tank Configuration** button in case you would like to specify different display settings for different tanks.



7. Click the **OK** button to save the configuration and close the window.
8. In the **Rosemount 2410 Tank Hub** window click the **OK** button to save the configuration and close the window.

Need help?

See the Rosemount Tank Gauging [System Configuration Manual](#) for more information on using the TankMaster WinSetup PC software to configure the Rosemount 2410 Tank Hub.

(7) Note that limited data is available for Rosemount 2410: SIS Tank Hub. This means that not all variables are displayed.



Quick Start Guide
00825-0100-2410, Rev. AA
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For more information: [Emerson.com](https://www.emerson.com)

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