Quick Start Guide
00825-0100-2460, Rev AB
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Rosemount™ 2460 System Hub

for tank gauging systems

ROSEMOUNT™

EMERSON

Contents

1 About this guide

This Quick Start Guide provides basic guidelines for installation and configuration of the Rosemount 2460 System 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.

Ensure that the lid on the housing is closed during operation.

⚠ 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.

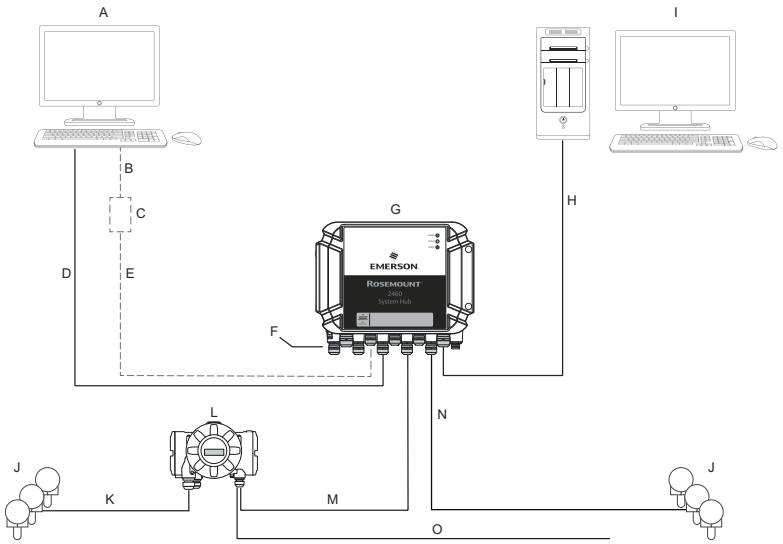
Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

2 Overview

2.1 Communication

The Rosemount Tank Gauging system supports various communication interfaces for field devices, TankMaster PC and other host computers.

Figure 2-1: Typical Configuration of a Rosemount 2460 System Hub



A. TankMaster™
B. USB, RS232
C. Modem
D. Ethernet (Modbus® TCP), RS232, RS485
E. TRL2, RS485
F. Host and Field ports
G. Rosemount 2460 System Hub
H. Ethernet (Modbus® TCP), TRL2, RS232, RS485
I. Other hosts
J. Field devices
K. Tankbus
L. Rosemount 2410 Tank Hub
M. Primary bus: TRL2, RS485
N. TRL2, RS485, other vendors
O. Secondary bus: Enraf®, Whessoe and others, HART® 4-20 mA analog output/input

The Rosemount 2460 System Hub collects measurement data from field devices and transmits the data to a host system. It also handles communication from a host to the field devices.

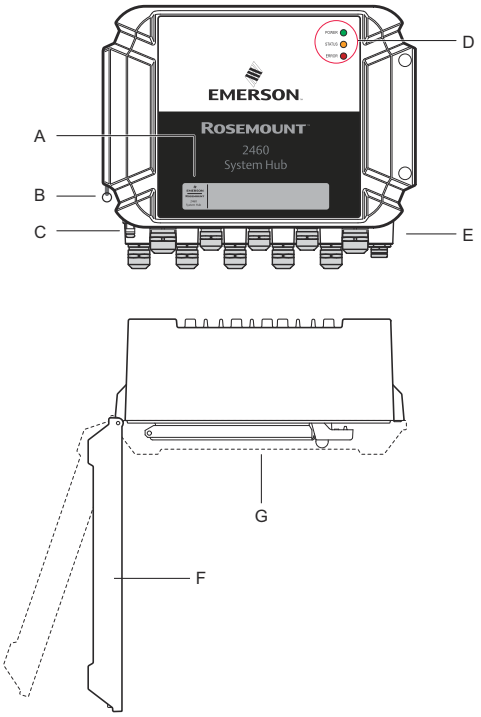
The Rosemount 2460 supports a number of host communication interface standards such as Ethernet, TRL2, RS485, and RS232. TRL2 and RS485 are supported for field device communication also, as well as other standards such as Enraf and Digital Current Loop (Whessoe).

2.2 Components

This section shows the various parts of the Rosemount 2460 System Hub.

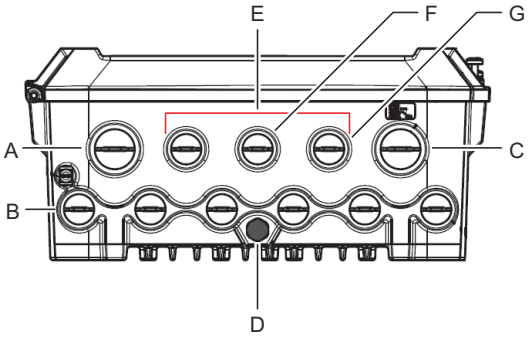
Note
The Rosemount 2460 is designed for use in non-hazardous areas.

Figure 2-2: Rosemount 2460 System Hub Front and Top View



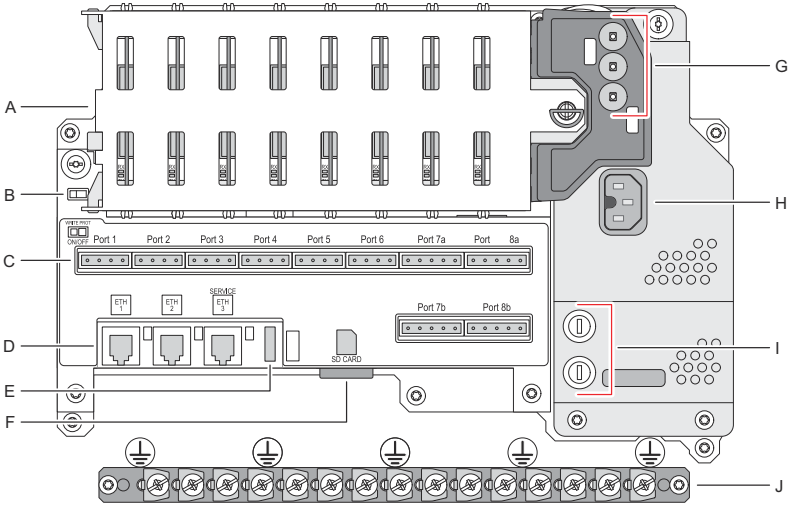
A. *Main label*
B. *Locking ring for securing lid*
C. *External ground terminal (M5 screw, flat, lug dimension max. 10 x 4 mm)*
D. *LEDs for status and error messages*
E. *Cable entries (Nine (9) M20 x 1.5, Two (2) M25 x 1.5)*
F. *Lid (can be removed by removing the locking ring)*
G. *Terminal compartment with communication boards and ports*

Figure 2-3: Cable Entries



A. Cable entry M25
B. Cable entries (6 x M20 x 1.5)
C. Cable entry M25 (power)
D. Membrane
E. Cable entries (3 x M20 x 1.5)
F. Cable entry for Ethernet connection ETH 1
G. Cable entry for Ethernet connection ETH 2

Figure 2-4: Inside the Rosemount 2460 System Hub



A. Communication boards
B. Write protection switch
C. Terminal board / ports (1 to 8)
D. Ethernet ports
E. USB port
F. SD memory card slot
G. LEDs (power=green, status=yellow, error=red)
H. Power input connector (IEC C16)
I. Fuses
J. Ground bar

Note
For signal/shield wire ground only.

2.2.1 Write protection switch

The Rosemount 2460 System Hub is equipped with a write protection switch for preventing unauthorized changes of the 2460 configuration database.

Figure 2-5: Write protection

A. Write protection switch

In addition to the switch, the Rosemount 2460 supports software write protection.

3 General information

3.1 Symbols

Table 3-1: Symbols

	The CE marking symbolizes the conformity of the product with the applicable European Community Directives.
	Protective Earth
	Ground
	Caution - see reference manual

3.2 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.

3.3 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 Section overview

This section covers installation considerations and instructions for mechanical and electrical installation.

4.2 Installation considerations

The Rosemount 2460 System Hub may be installed on various non-hazardous locations at the plant.

- In case the system hub is exposed to long periods of sunshine, a sunshade should be used to prevent the system hub from being heated to temperatures above the maximum operating temperature. Sunshade is to be manufactured and designed locally to suit the installation.
- Ensure that environmental conditions are within specified limits.
- Ensure that the system hub is installed such that it is not exposed to higher pressure and temperature than specified.
- Do not install the system hub in non-intended applications, for example environments where it may be exposed to extremely intense magnetic fields or extreme weather conditions.
- Use an external circuit breaker in order to ensure that power supply can be safely disconnected when wiring and servicing the system hub. The circuit breaker shall be easily accessible and appropriately labeled.
- In case devices from other vendors will be connected to the system hub, ensure that correct modem cards are installed for the field ports that will be used.
- Ensure that correct firmware version is used that supports the desired communication options and features.

In case Rosemount TankMaster is used for configuration of the system hub consider the following:

- Ensure that TankMaster version 6.B6 or higher is used for Rosemount 2460 configuration.
- TankMaster 6.C0 and higher is required for configuration of Enraf communication on field ports.
- TankMaster 6.D0 and higher is required for configuration of redundant system hubs.
- TankMaster 6.G0 and higher is required for using redundant field ports.

Important
Check the system hub for any signs of damage prior to installation.

Ensure that O-rings and gaskets are in good condition.

Check that all modems are firmly mounted in their slots and cannot move.

Related information

Rosemount 2460 reference manual

4.2.1 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 (Rosemount 2410 Tank Hub)
- Make a note of identification codes such as Unit ID/Device ID of each device
- Assign communication addresses for level gauges and other tank devices to be stored in the Tank Databases(1) of the Rosemount 2460 System Hub and Rosemount 2410 Tank Hub

(1) *See the Rosemount Tank Gauging System Configuration Manual (Document no. 00809-0300-5100) and the Rosemount 2410 Tank Hub Reference Manual for more information.*

4.3 Mechanical installation

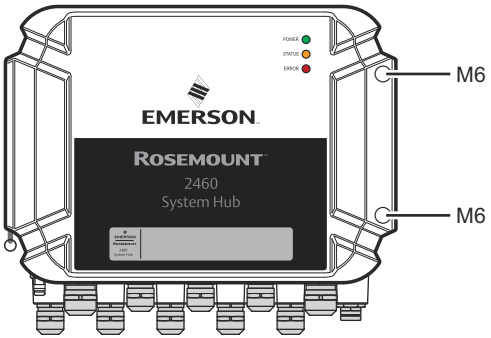
The housing of the Rosemount 2460 is designed with four holes for attaching it to a wall using four screws. See also Mechanical Installation Drawing D7000001-927 for further information.

Prerequisites

Note
Ensure that the Rosemount 2460 is installed in a way that minimizes vibration and mechanical shock.

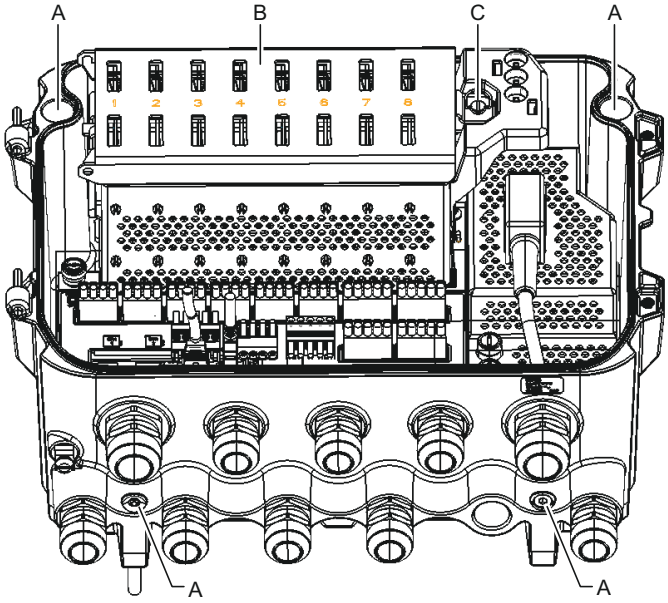
Procedure

1. Mark the positions of the four screws to be used for attaching the system hub to the wall. A mounting template (see Figure 4-1) is shipped with the system hub which may be used for this purpose.
2. Drill four holes with appropriate size to fit screw diameter 6 mm.
3. Loosen the two screws (M6 x 2) that keep the lid in closed position and open the lid.



4. Attach the system hub to the wall. There are four holes on the housing to be used for the screws.

   The required screw dimension is given by Figure 4-2.



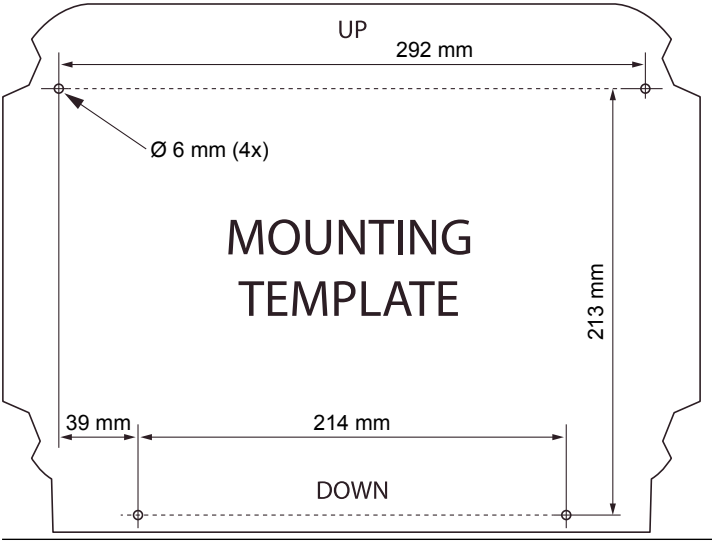
A. Holes (x4) for attaching the system hub to a wall
B. Communication board compartment
C. Lock ring

5. ⚠ Ensure that the Lock ring (C) on the cover to the communication board compartment is folded so that it does not prevent the lid from being properly closed. Close the lid and ensure that it is fully engaged to prevent water from entering the terminal compartment. Torque the two screws to 4 Nm (35 in.-lb).

4.3.1 Mounting template

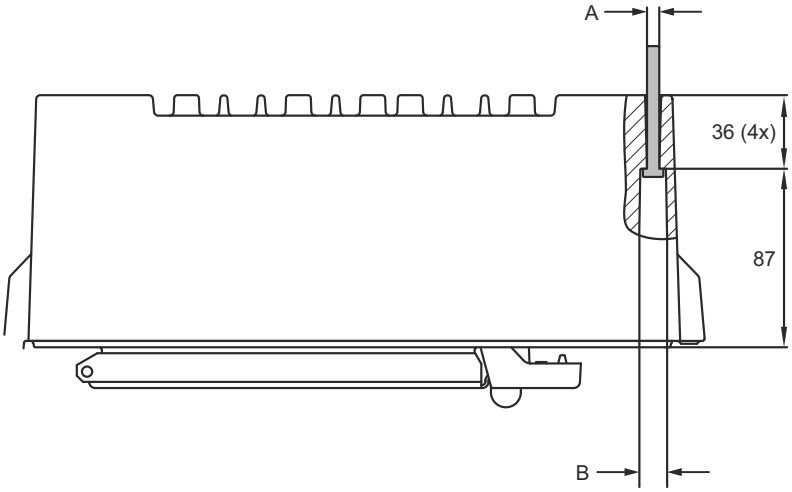
A mounting template is shipped with the Rosemount 2460 which can be used to mark the position of the holes (see Figure 4-1).

Figure 4-1: Mounting Template with Hole Pattern for the Rosemount 2460 System Hub



Ensure that the four screws meet the specifications given in Figure 4-2.

Figure 4-2: Rosemount 2460 System Hub Dimensions



A. Four holes Ø 6.5 mm
B. Ø 12.5 mm (4x); Maximum dimension of screw head

Dimensions are in mm.

4.4 Electrical installation

4.4.1 Electrical installation drawing

See Electrical Installation Drawing D7000001-928 for further information.

4.4.2 Cable entries

The Rosemount 2460 housing has nine M20 x 1.5 and two M25 x 1.5 entries. Connections must be made in accordance with local or plant electrical codes.

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

NOTICE

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.

Use the enclosed metal plugs to seal unused cable entries in order to achieve required level of ingress protection. The plastic plugs mounted at delivery are not sufficient as seal.

4.4.3 Power supply

The Rosemount 2460 System Hub accepts supply voltage 100 - 250 Vac (50/60 Hz) and 24 - 48 Vdc.

Note
The Rosemount 2460 is polarity insensitive for DC voltage input.

4.4.4 Cable selection for power supply

Appropriate cross sectional area of wires must be used in order to prevent a high voltage drop to the connected device. Recommended cable size is 0.75 mm^2 to 2.1 mm^2 (18 AWG to 14 AWG) in order to minimize the voltage drop.

4.4.5 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 is a grounding screw on the housing which is identified by ground symbol ⏚.

Inside the Rosemount 2460's terminal compartment there is a ground bar with screw connections identified by ground symbols ⏚. The ground bar shall only be used for connecting signal related ground wires, e.g. shield ground connections from the field bus harness. The protective earth ground connection shall be connected to the system hub via the dedicated power board IEC plug and the external grounding screw on the housing.

Connect shield to ground at one end only, otherwise a ground loop may occur.

NOTICE

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

4.4.6 Connecting to a Rosemount 2460 System Hub

There are several ways to connect a Rosemount 2460 System Hub to a host system:

- from a Host Port using TRL2 bus
- from a Host Port using RS232 or RS485
- via Ethernet Eth1 port

The TRL2 Bus requires a twisted and shielded pair cable with a cross-sectional area of 0.50 to 2.5 mm^2 (20 to 14 AWG). A Rosemount 2180 Field Bus Modem (FBM) is used to connect the system hub to TankMaster or other host computer.

A service PC can be connected to the Ethernet Eth3 port for configuration and maintenance.

For RS232 communication, wiring cross-sectional area must be at least 0.25 mm^2 (24 AWG or similar). The typical maximum length of the RS232 connection is 30 m at baud rate 4800.

Table 4-1: Data Rate and Maximum Distances for RS232 Communication

Baud rate (bps)	Distance (m)
2400	60
4800	30
9600	15
19200	7.6

Communication ports for hosts and field devices

The Rosemount 2460 System Hub has eight ports for communication interface boards. It is equipped with interface boards for field device communication and host communication. The specific configuration is specified in the ordering information. Communication boards can easily be exchanged if needed.

Port 8 is used for TankMaster communication. Port 7 is used for host or TankMaster communication as specified in the ordering information.

Port 1 to Port 4 are used for field device communication.

Ports 5 and 6 can be used for host or field device communication as specified in the ordering information. This allows you to vary the number of field and host ports depending on the specific requirements.

Table 4-2 shows various configuration options for a system hub.

Table 4-2: Port Configuration Options

Ports	1	2	3	4	5	6	7	8
Alternative 6+2 (standard)	Field Port	Field Port	Field Port	Field Port	Field Port	Field Port	Host Port	Host Port
Alternative 5+3	Field Port	Field Port	Field Port	Field Port	Field Port	Host Port	Host Port	Host Port
Alternative 4+4	Field Port	Field Port	Field Port	Field Port	Host Port	Host Port	Host Port	Host Port

4.4.7 Wiring

The terminal compartment has a terminal board for connecting communication buses to host systems and field devices. The terminal compartment also has a connection for power supply. Ethernet connections are available for LAN communication.

Prerequisites

Note
Ensure that gasket 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.

   Note
   If any uncertainty exists whether power supply is off or not, ensure that loose cable ends don't run through the cover on the power board.

2. ⚠ Loosen the two captive screws and open the lid (see Figure 4-3).

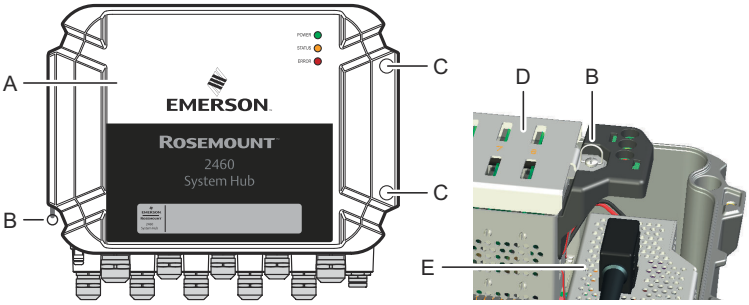
   Note
   The lid can be removed from the housing for easier access when open more than 25°. Remove the locking ring and carefully slide the lid upwards 21 mm or more. Be careful not to drop it on the floor.

3. Run wires through a cable gland. Install wiring with a drip loop in such a way that the lower part of the loop is under the cable entry.
4. Connect wires to the terminal block.
   - See Figure 4-4 for information on terminal block bus connections.
   - See Wiring diagrams for examples on how to connect the Rosemount 2460 to various host systems and field devices.
   - For wiring of **redundant** system hubs see Figure 4-16.
5. Use the enclosed metal plugs to seal any unused cable entries.
6. ⚠ Tighten the conduits/cable glands.
7. ⚠ Make sure that the Lock ring on the cover to the communication board compartment is folded so that it does not prevent the lid from being properly closed.

8. ⚠ Attach the lid in case it was removed from the housing and close it. Torque the two screws to 4 Nm (35 in.-lb). Ensure that it is fully engaged to prevent water from entering the terminal compartment.

Front view

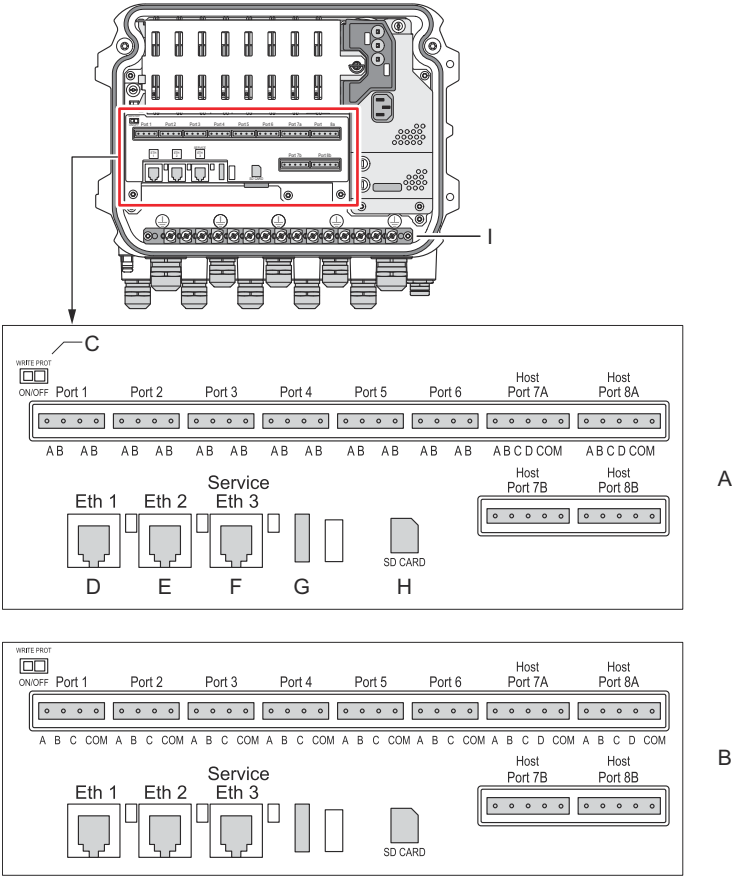
Figure 4-3: Rosemount 2460 Front View



A. Lid
B. Lock ring
C. Captive screws x 2
D. Cover for communication board compartment
E. Power Board

4.4.8 Terminal board and ports

Figure 4-4: Ports and Terminals



A. TRL2, RS485, ENRAF
B. Other interfaces
C. Write Protection Switch ON/OFF
D. Ethernet 1
E. Ethernet 2
F. Ethernet 3 / Service
G. USB A 2.0
H. SD card
I. Ground bar for cable shield

Table 4-3: Terminal Assignment

Terminal	Designation	Function
Port 1	Field device	Communication bus for field devices.
Port 2		
Port 3		
Port 4		
Port 5	Field device/ Host	Port 5 and 6 can be configured for field or host communication.
Port 6		
Port 7a	Host/ TankMaster	Communication bus for host. Ports designated “a” and “b” are connected in parallel. Supports electrical interface TRL2, RS485, RS422, and RS232.
Port 7b		
Port 8a	TankMaster	Communication bus for TankMaster. Ports designated “a” and “b” are connected in parallel. This port supports electrical interface TRL2, RS485, RS422, and RS232.
Port 8b		
ETH 1	Standard Ethernet port	Ethernet communication bus. ETH1 is used for DCS/host communication via Modbus TCP. In case the Rosemount 2460 is connected to a Local Area Network (LAN) via Modbus TCP, ensure the connection is secure and no unauthorized personnel can grant access.
ETH 2		ETH 2 is an Ethernet communication bus for connection of redundant system hub. ETH 2 is disabled for standalone systems, but enabled for connection to redundant pair in redundant systems.
ETH 3	Service	Ethernet communication bus for service purposes. Use this port to access the Web interface for the 2460.
USB A 2.0	USB	Port for USB stick(1) for saving log files.
SD card	SD	Memory card(1) reader for saving log files.
Ground bar		For connection of cable shields.

(1) USB sticks and SD cards should be FAT32 formatted.

Pin mapping for 4 pole and 5 pole connectors

Figure 4-5: Port 1-6 for TRL2, RS485, and Enraf

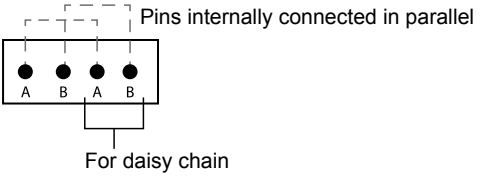


Figure 4-6: Port 1-6 for Other Interfaces

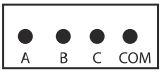
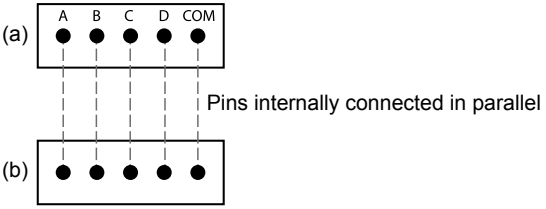


Figure 4-7: Port 7-8



Bus connections

Table 4-4: Bus Connections to Port 1 - 6 Standard

Interface	A	B	A(1)	B(1)
TRL2	(A and B polarity independent)			
RS485 (2-wire) (Modbus, Whessoe 550/660, GPE) Internally referenced to signal ground	A	B	A	B
Enraf BPM	(A and B polarity independent)			

(1) For daisy-chain

Table 4-5: Bus connections to Host Port 7- 8

Interface	A	B	C	D	COM
TRL2	(A and B polarity independent)		N/A	N/A	N/A
RS485 / 422 (2-wire)(1)	A	B	N/A	N/A	GND
RS485 / 422 (4-wire)	RD + (A')	RD - (B')	TD + (A)	TD - (B)	GND
RS232	RxD	TxD	N/A	N/A	GND

(1) Recommended for redundant systems

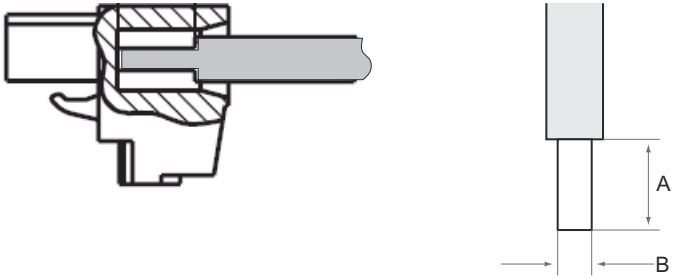
Conductors

Ensure that you use cables suitable for the terminal blocks that are supplied by Emerson for the Rosemount 2460 System Hub.

Table 4-6: Cables Suitable for Terminal Blocks Supplied by Emerson

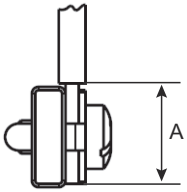
Conductor connection	Maximum (mm^2)	AWG
Solid	4	11
Flexible	2.5	13
Flexible, Ferrule with plastic collar	1.5	16

Figure 4-8: Conductor Stripping Length and Cross-sectional Area



A. Stripping length: 7 mm
B. Cross-sectional area, see Table 4-6

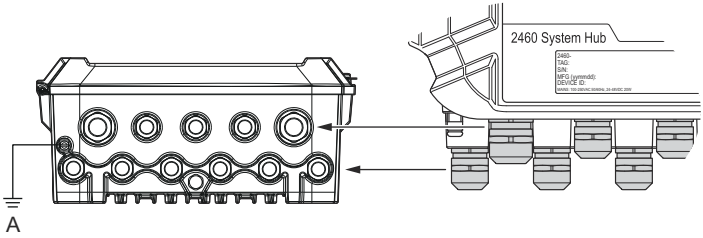
Figure 4-9: Stripping Length for Connection to Ground Bar



A. Stripping length: 15 mm

Cable glands

Figure 4-10: Cable Entries with Glands and External Ground



A. External ground

Table 4-7: Tightening Torque (Nm) for Glands Supplied by Emerson

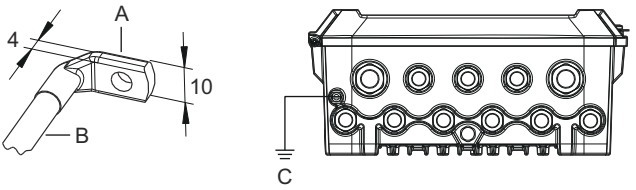
Item	Thread	
	M20	M25
Body	7	10
Top Nut	4	7

Table 4-8: Cable Diameter (mm) for Glands

	Thread	
	M20	M25
Cable Ø	6 - 13	9 - 17

4.4.9 Ground lug

Figure 4-11: Ground Lug Dimensions

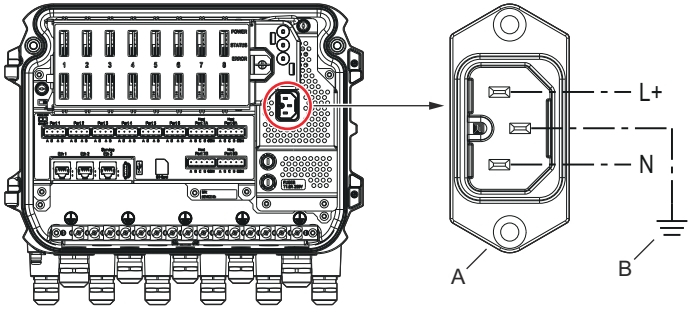


A. Ground lug
- *Cable lug thickness maximum 4 mm*
- *Cable lug height maximum 10 mm*

B. Cable size minimum 4 mm^2 or AWG 11
C. External ground screw M5

4.4.10 Power supply connection

Figure 4-12: Power Supply Connection



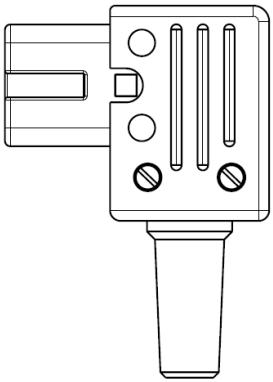
A. 24 - 48 Vdc; 100 - 250 Vac; 50 - 60 Hz; Max 20 W
B. Protective ground

Power connector

Note
Connector is of type IEC C16.

Note
Connector is supplied by factory.

Figure 4-13: Power Connector Supplied by Emerson



Note
Use connector type IEC C16 only.

Table 4-9: Torque Values for Power Connector Assembly

Item	Max torque
Terminals	0.8 Nm
Cable clamp	1.2 Nm
Cover	1.2 Nm

Cable size

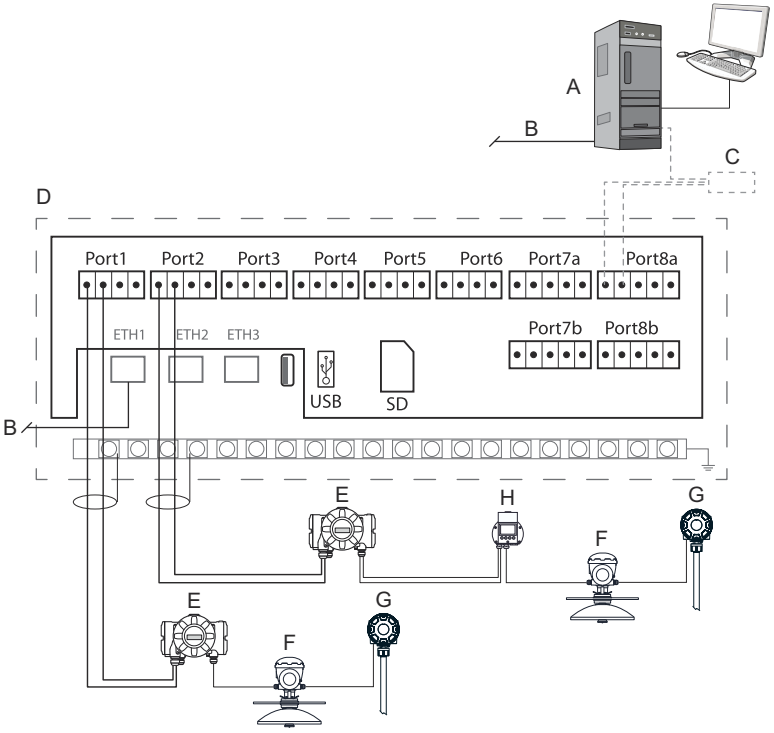
Table 4-10: Cable and Wire Size for Power Cord

Power cord connector supplied by manufacturer	
Wire (x3)	Max. 2.1 mm^2
Cable	Max. 10 mm

4.4.11 Wiring diagrams

The communication ports can be configured for various combinations of field device and host communication. In the standard configuration Port1 to Port 6 are connected to field devices and Port 7 and Port 8 are used for host communication.

Figure 4-14: Rosemount 2460 System Hub Connected to Field Devices and TankMaster PC



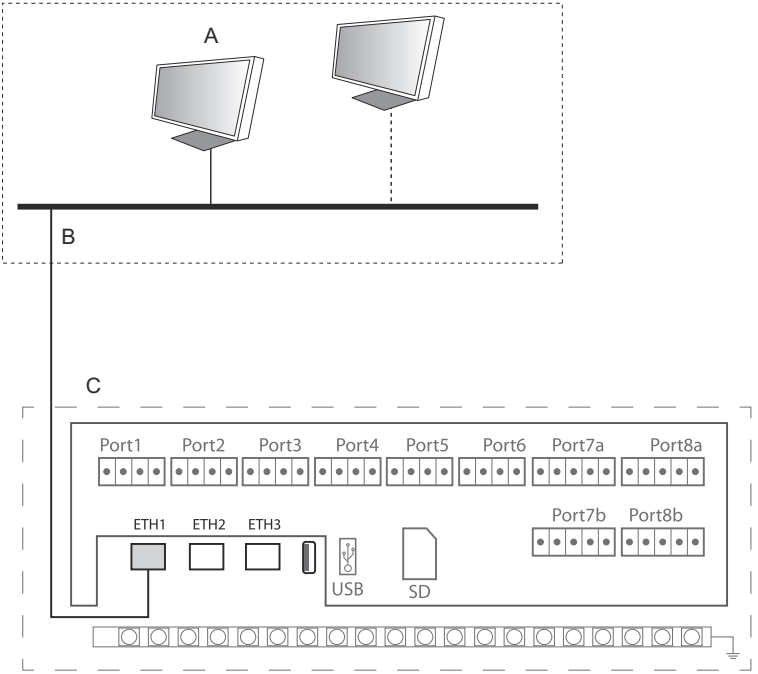
A. Rosemount TankMaster PC
B. Ethernet (ETH1)
C. Rosemount 2180 Field Bus Modem
D. Rosemount 2460 terminal board
E. Rosemount 2410 Tank Hub
F. Rosemount 5900S Radar Level Gauge
G. Rosemount 2240S Temperature Transmitter
H. Rosemount 2230 Field Display

Note that the actual configuration of host and field device ports may differ from the examples in this section. See Connecting to a Rosemount 2460

System Hub for more information on configuration options for the Field and Host ports. See also installation drawings for more information.

Figure 4-15 shows a wiring diagram with a Rosemount 2460 connected to a host system via Modbus TCP.

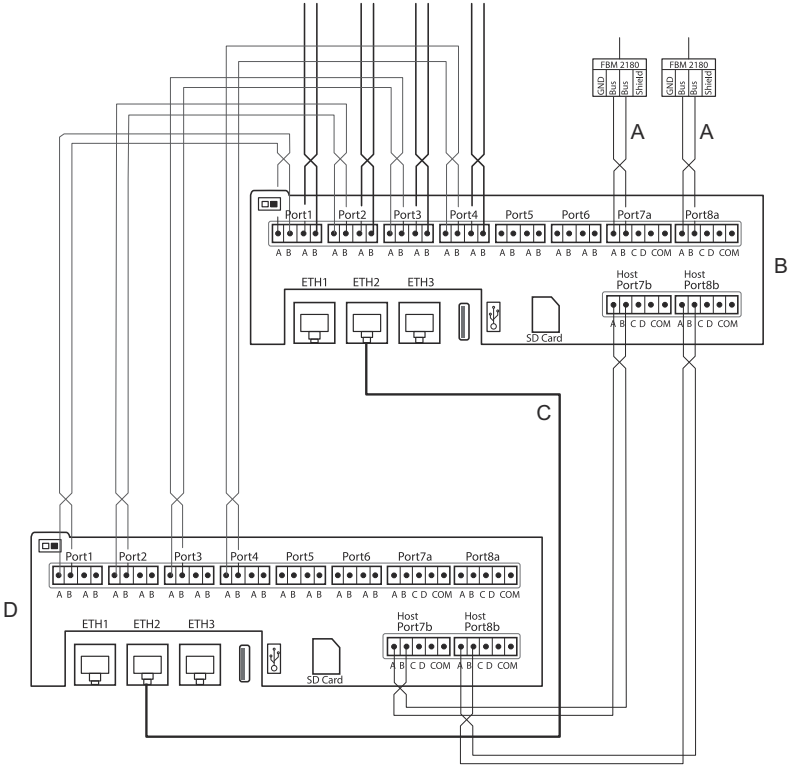
Figure 4-15: Rosemount 2460 Connected to Host System Via Eth 1 Port and Modbus TCP



A. Host system
B. Modbus TCP
C. Rosemount 2460 terminal board

Figure 4-16 shows two system hubs in a redundant system. The Primary and Backup system hubs are connected to each other via Ethernet port ETH2.

Figure 4-16: Example of Wiring Diagram with Redundant Rosemount 2460 System Hubs



A. TRL2 bus to host
B. Rosemount 2460 primary unit
C. Ethernet cable for redundancy connection
D. Rosemount 2460 backup unit

5 Configuration

5.1 Overview

This section contains information on how to setup a Rosemount 2460 System Hub in a Rosemount Tank Gauging System. The description is based on using the ***TankMaster WinSetup*** configuration program.

5.2 Setting up a Rosemount 2460 System Hub

5.2.1 Introduction

A Rosemount 2460 System Hub is easy to install and configure by using the ***TankMaster Winsetup*** configuration program. The WinSetup installation wizard guides you through the basic configuration to start up a Rosemount 2460.

Host communication via the Ethernet 1 port (ETH1) and Modbus TCP protocol can be setup by using the Web based Graphical User Interface (GUI). See the Rosemount 2460 Reference Manual for more information.

5.2.2 Installation procedure

Installation of a Rosemount 2460 System Hub in a Rosemount Tank Gauging system includes the following basic steps:

Procedure

1. Ensure that a plan is available for all tanks and devices with tag names, communication addresses, number of temperature elements and other data that is needed for a system setup.
2. In case devices from other vendors will be connected see the Rosemount 2460 Reference Manual for more information.
3. Ensure that the system hub is properly wired and up and running. Check that the Power LED is on and the Status LED indicates normal operation.
4. (Redundancy). Ensure that the two system hubs are properly wired including the cable for redundancy connection.

   Note
   Note that configuration of redundant Rosemount 2460 is supported by TankMaster 6.D0 and higher versions.

5. Ensure that the ***TankMaster WinSetup*** configuration program is up and running.
6. In ***TankMaster WinSetup***, setup the appropriate protocol channel[(2)] in the TankMaster host PC. This step will ensure that communication between the TankMaster PC and the Rosemount 2460 is established.

7. In ***TankMaster WinSetup***, start the device **installation wizard** and configure the system hub :
    a) In the WinSetup workspace, click the right mouse button on the **Devices** folder and select **Install new**.
    b) Specify device type (2460) and name tag.
    c) Check that the correct communication channel is enabled and verify communication with the TankMaster host computer.
    d) Verify that the Host ports and Field ports are using the right protocols for communication with TankMaster work stations or other host systems, and with field devices such as the Rosemount 2410 Tank Hub and the Rosemount 5900S Radar Level Gauge.
    e) Configure the tank database. See configuration examples that illustrate how the tank databases of the Rosemount 2460 and the Rosemount 2410 are related to each other in Tank databases of the Rosemount 2460 and the Rosemount 2410.
    f) (Redundancy). Perform a redundancy configuration in case the system has a pair of redundant system hubs. This is included as part of the installation wizard.
    g) Finish the installation wizard and verify that the system hub appears in the Rosemount TankMaster workspace. Now the Rosemount 2460 will be able to communicate with the host system and collect data from field devices.
8. In case the Rosemount 2460 communicates with a host system via the Ethernet 1 port and Modbus TCP protocol, open the Web based Graphical User Interface for configuration.

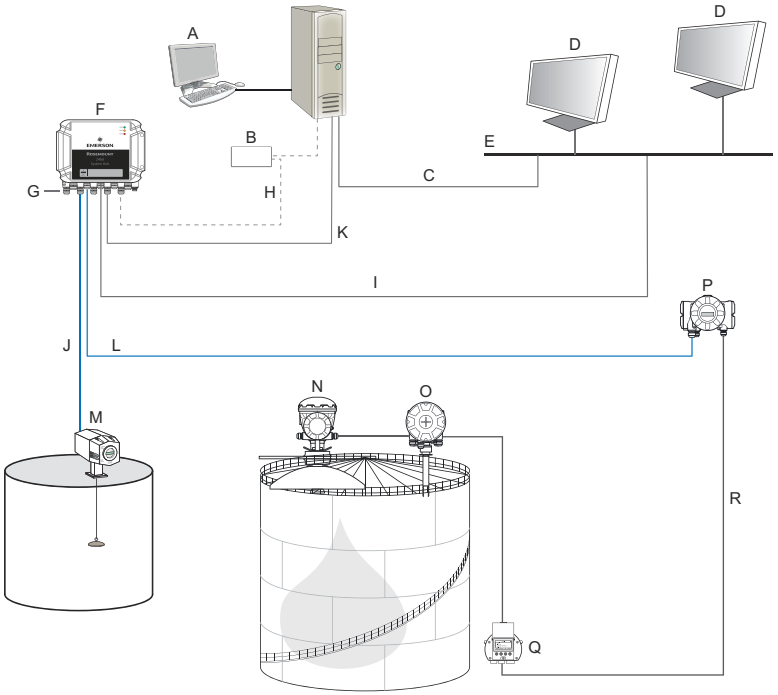
Related information

Rosemount Tank Gauging System Configuration manual
Rosemount 2460 Reference Manual
Wiring
Wiring diagrams
Redundancy configuration

(2) See the Rosemount Tank Gauging System Configuration Manual for more information on how to configure communication protocol channels.

System architecture

Figure 5-1: Rosemount Tank Gauging System Architecture



A.	Rosemount TankMaster	J.	TRL2, Enraf BPM, DCL, RS485
B.	Modem	K.	Modbus TCP (Ethernet)
C.	Modbus TCP (Ethernet)	L.	TRL2, RS485
D.	Host/DCS	M.	Gauges and transmitters from other vendors
E.	Plant network	N.	Rosemount 5900S Radar Level Gauge
F.	Rosemount 2460 System Hub	O.	Rosemount 2240S Temperature Transmitter
G.	Field/Host Ports	P.	Rosemount 2410 Tank Hub
H.	TRL2, RS232, RS485	Q.	Rosemount 2230 Display
I.	Modbus TCP (Ethernet)	R.	Tankbus

5.2.3 Tank databases of the Rosemount 2460 and the Rosemount 2410

In a typical Rosemount Tank Gauging system, a Rosemount 2460 System Hub collects measurement data from a number of tanks via one or more Rosemount 2410 Tank Hubs. For proper communication with the control room PC and the Rosemount TankMaster operator's interface, Modbus addresses need to be assigned to the field devices on the tank. These addresses are stored in the system hub's and tank hub's tank databases.

In the tank hub's database, the Rosemount 2240S Temperature Transmitter and the Rosemount 2230 Graphical Field Display (and other non-level devices) are handled as a single **Auxiliary Tank Device** (ATD). Two Modbus addresses are used for each tank, one for the level gauge and one for the ATD.

The ATD includes any supported non-level device such as the Rosemount 2240S Multi-Input Temperature Transmitter and the Rosemount 2230 Graphical Field Display. Other devices such as the Rosemount 3051S Pressure Transmitter may also be included in the ATD. The ATD address represents all these devices. Each position in the Rosemount 2460 tank database represents one tank.

In case the level gauge is a Rosemount 5900S 2-in-1, you will need to configure two level device addresses for the Rosemount 5900S gauge. See the Rosemount Tank Gauging System Configuration Manual (Document No. 00809-0300-5100) for a detailed description of how to configure the tank database with a Rosemount 5900S 2-in-1.

One Rosemount 2410 Tank Hub for each tank

In this example a Rosemount 2460 System Hub is connected to two tanks, each of which has a separate Rosemount 2410 Tank Hub.

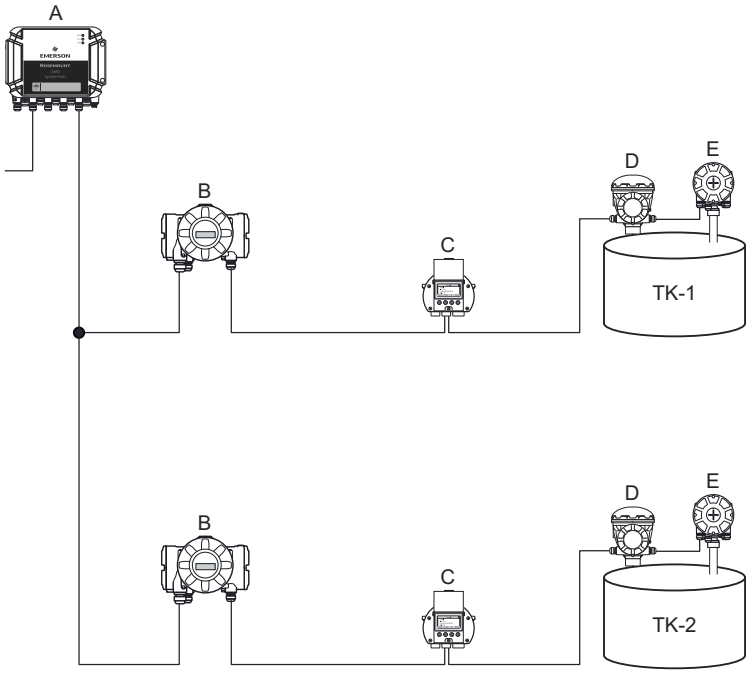
Each tank has a Rosemount 5900S Radar Level Gauge, a Rosemount 2240S Multi-Input Temperature Transmitter, and a Rosemount 2230 Graphical Field Display. The Modbus address configuration is summarized in Table 5-1.

Table 5-1: Example of Modbus Address Configuration for Rosemount 2410 Tank Hubs and Connected Devices on Two Tanks

Tank	Rosemount 2410 Tank Hub	Rosemount 5900S Level Gauge	ATD (2230, 2240S)
	Modbus Address		
TK-1	101	1	101
TK-2	102	2	102

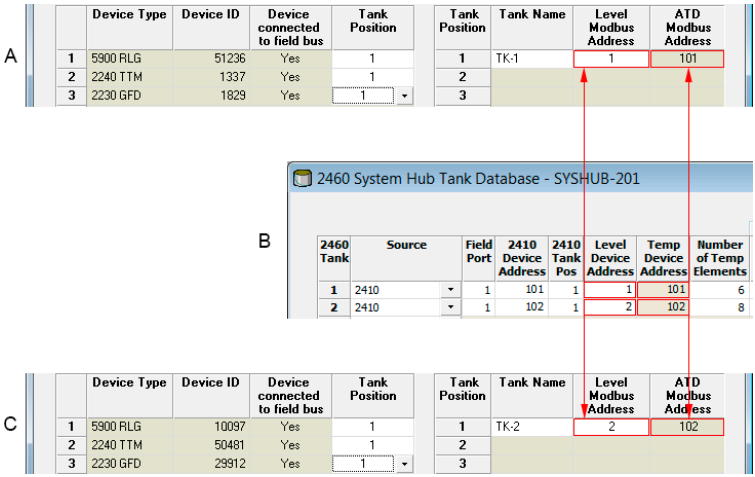
For each tank, the Level Device address and ATD Modbus address in the Rosemount 2460 System Hub's tank database must be equal to the corresponding addresses in the Rosemount 2410 Tank Hub's tank database.

Figure 5-2: Two Tanks Each of which Equipped with a Rosemount 2410 Tank Hub



A. Rosemount 2460 System Hub
B. Rosemount 2410 Tank Hub
C. Rosemount 2230 Graphical Field Display
D. Rosemount 5900S Level Gauge
E. Rosemount 2240S Temperature Transmitter

Figure 5-3: Tank Databases in System Hub and Tank Hubs



A. Rosemount 2410 Tank Hub on tank TK-1
B. Rosemount 2460 System Hub
C. Rosemount 2410 Tank Hub on tank TK-2

Multiple tanks connected to a single Rosemount 2410 Tank Hub

In this example a Rosemount 2460 System Hub is connected to a Rosemount 2410 Tank Hub that serves three tanks. The temperature device on tank 1 has the same Modbus address as the tank hub itself. The other temperature devices on tank 2 and 3 have separate Modbus addresses.

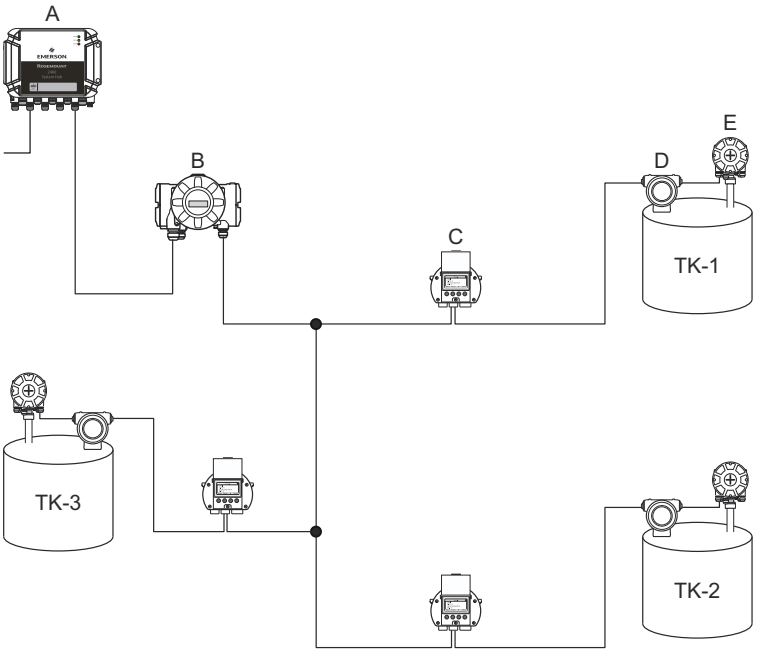
Figure 5-4 shows an example of a system with a Rosemount 2460 System Hub connected to a Rosemount 2410 Tank Hub. The Rosemount 2410 collects measurement data from three tanks. Each tank is equipped with a Rosemount 5408 Radar Level Transmitter, a Rosemount 2240S Temperature Transmitter, and a Rosemount 2230 Graphical Field Display. The Modbus address configuration is summarized in Table 5-2.

Table 5-2: Modbus Address Configuration for Tank Hub and Field Devices on Three Tanks

Tank	Rosemount 2410 Tank Hub	Rosemount 5408 Level Transmitter	ATD (2230, 2240S)
	Modbus Address		
TK-1	101	1	101
TK-2	101	2	102
TK-3	101	3	103

Note that each ATD has its own Modbus address. Only the first one has the same address as the Rosemount 2410 Tank Hub.

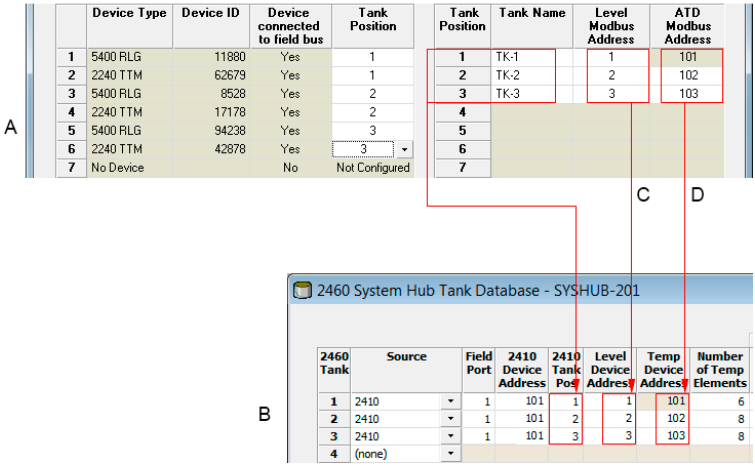
Figure 5-4: Three Tanks Connected to a Single Rosemount 2410 Tank Hub



A. Rosemount 2460 System Hub
B. Rosemount 2410 Tank Hub
C. Rosemount 2230 Graphical Field Display
D. Rosemount 5408 Level Transmitter
E. Rosemount 2240S Temperature Transmitter

In the tank database of the Rosemount 2410 Tank hub, the Rosemount 2240S temperature transmitter and the Rosemount 2230 display are grouped into an Auxiliary Tank Device (ATD). The **ATD Modbus** address has to be stored in the **Temperature Device** address field in the tank database of the Rosemount 2460 System Hub as illustrated in Figure 5-5. The Modbus addresses of the level devices must also be stored in both the 2410 and the 2460 tank databases.

Figure 5-5: Tank Databases in System Hub and Tank Hubs



A. Tank Database for a Rosemount 2410 Tank Hub that serves three tanks
B. Rosemount 2460 System Hub
C. Level device address
D. Auxiliary Tank Device (ATD) address

Note that in this example a single Rosemount 2410 Tank Hub serves three tanks. The tanks are mapped to tank position 1, 2, and 3 in the Rosemount 2410 Tank Hub's tank database.

In the tank database of the Rosemount 2460 System Hub, you will have to configure **2410 Tank Position** in order to be able to configure the correct Temperature Device Addresses for the three tanks.

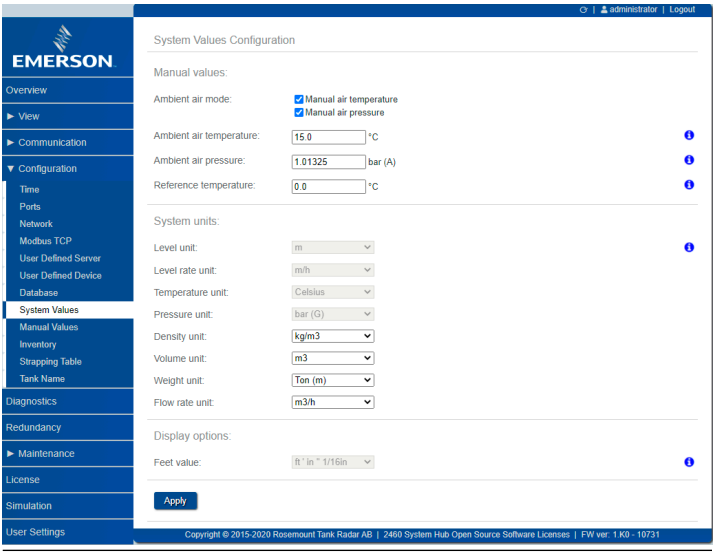
5.2.4 System setup

The ***System Values*** window lets you specify parameters and units for inventory calculations.

Procedure

1. Log in to the Web interface.
2. Select **Configuration → System Values**.

Figure 5-6: System Parameters and Units



Manual values

Select the appropriate check boxes in case you like to use manual values for ambient air temperature and pressure, and type the desired values into the input fields.

Reference temperature

The Rosemount 2460 System Hub performs inventory calculations according to the *API Manual of Petroleum Measurement Standards Chapter 12, Section 1*, at the standard reference temperature 15°C (60°F). This is the default reference temperature.

Other reference temperatures can be specified in the **Reference Temperature** input field. Ensure that correct RT volume table, for example 54B-2004, is used for the product.

System units

Level, Level Rate, Temperature, and Pressure units are configured in TankMaster WinSetup configuration program.

Display options for Feet unit

In case **Feet** is selected as measurement unit for **Level**, the **Feet Display** option lets you choose the desired display option. You may choose to present as decimal or fraction: ft' in" 1/16 in.

5.2.5 Redundancy configuration

Setting up a redundant pair of Rosemount 2460 System Hubs can be performed by using TankMaster WinSetup or the system hub's Web Graphical User Interface.

Preconditions for redundancy setup

The following conditions must be met to allow setting up two Rosemount 2460 System Hubs for redundancy operation:

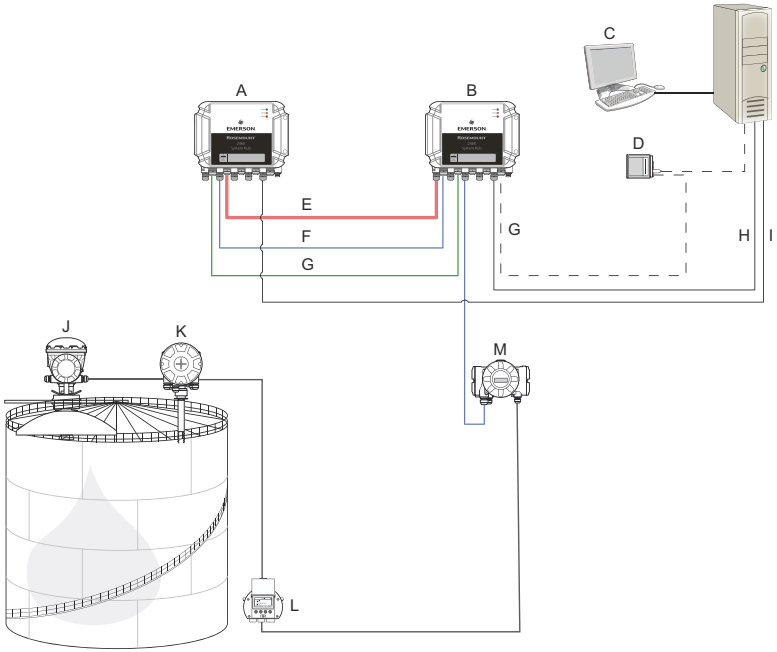
- The same firmware version on both System Hubs
- Firmware version 1.C0 or higher
- Rosemount TankMaster version 6.D0 or higher
- For Modbus TCP; Rosemount TankMaster version 6.F0 or higher
- No warnings or errors
- License;
  - the same maximum number of tanks
  - redundancy option enabled on both system hubs
  - the same number of Modbus TCP clients
- The same modem board setup(3) (number of boards, modem type, and modem locations)
- Hardware write protection disabled
- Software write protection disabled

Basically all model codes except **Housing**, **Cable/Conduit Connections**, and **Options** need to be identical for the Primary and Backup system hubs.

(3) Modem boards supported for redundancy: TRL2 Modbus, RS485, Enraf BPM

System Architecture with redundant system hubs

Figure 5-7: Rosemount Tank Gauging System Architecture with Redundant System Hubs



A.	Rosemount 2460 System Hub (backup)	H.	Modbus TCP (Primary)
B.	Rosemount 2460 System Hub (primary)	I.	Modbus TCP (Backup)
C.	Host System	J.	Rosemount 5900S Radar Level Gauge
D.	Modem	K.	Rosemount 2240S Temperature Transmitter
E.	Redundancy cable	L.	Rosemount 2230 Display
F.	Field Ports	M.	Rosemount 2410 Tank Hub
G.	Host Ports		

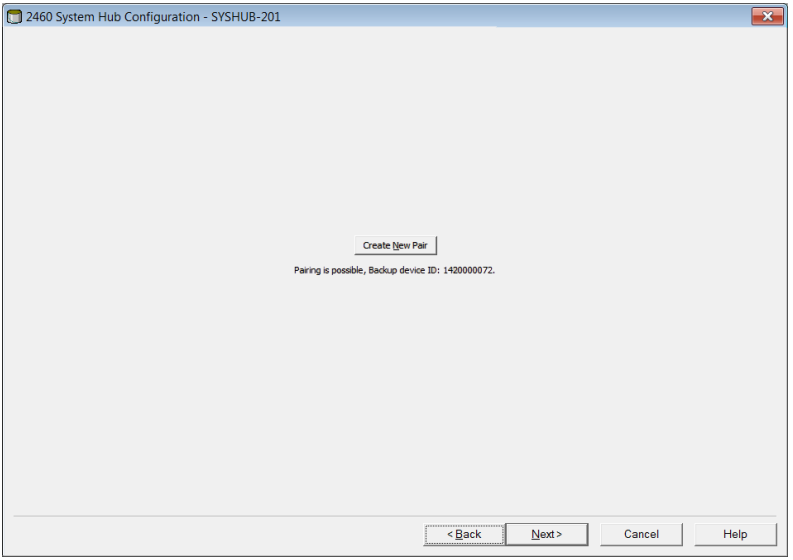
Redundancy setup in TankMaster WinSetup

This section describes the redundancy setup in the WinSetup configuration wizard for the Rosemount 2460 System Hub.

Prerequisites

The installation wizard for the Rosemount 2460 includes the option to setup a redundant pair of Rosemount 2460 System Hubs as long as certain conditions are fulfilled. In case all requirements for pairing are fulfilled, the following text appears: “Pairing is possible, Backup device ID:xx”.

Figure 5-8: Redundancy Page in WinSetup Installation Wizard



Procedure

Click the **Create New Pair** button to start the redundancy synchronization procedure.

Figure 5-9: Redundancy Pairing

When finished, a message appears that the database synchronization was successfully completed. The system hubs will be paired as a Primary and a Backup device.

Redundancy window

Once the synchronization process is successfully finished, the ***Redundancy*** window presents the current status and other information for the two system hubs.

Figure 5-10: Redundant System Hubs

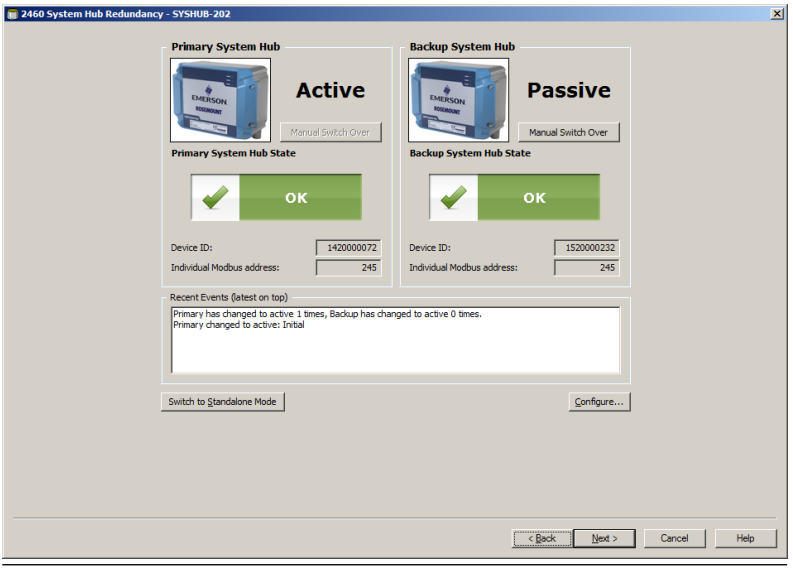


Table 5-3: Redundancy Configuration

Item	Description
Manual Switch Over button	Active/Passive mode can be changed manually. The Active device communicates with the host system and responds to requests for measurement data, status information, and diagnostics. This option can be useful for testing that both system hubs function properly as Active and Passive.
State	If the status is OK, a green check box is displayed. Otherwise a list of warnings and errors will be displayed.
Device ID	Each device has a unique identification number which can be used, for example, when setting up Modbus addresses.
Individual Modbus address	The redundant system hubs can be given individual Modbus addresses in case you need to be able to communicate separately with each system hub.
Recent events	Number of times that the Primary and Backup devices have changed to active state, as well various error messages and warnings.
Switch to standalone mode button	It is possible to un-pair the two devices in the redundancy system by using the Switch to Standalone Mode button. When un-pairing the system, the active device will change mode to standalone. The passive device will load the default configuration database (CDB) and the default communication parameters (including Modbus address 245) to make sure it will not disturb communication on Host and Field ports after un-pairing the system hubs. Consequently, the host system will lose contact with the backup device until proper communication settings are reset.
Configure button	This button lets you configure specific redundancy options such as fail-over, take-over, and passive device communication.

Configure button

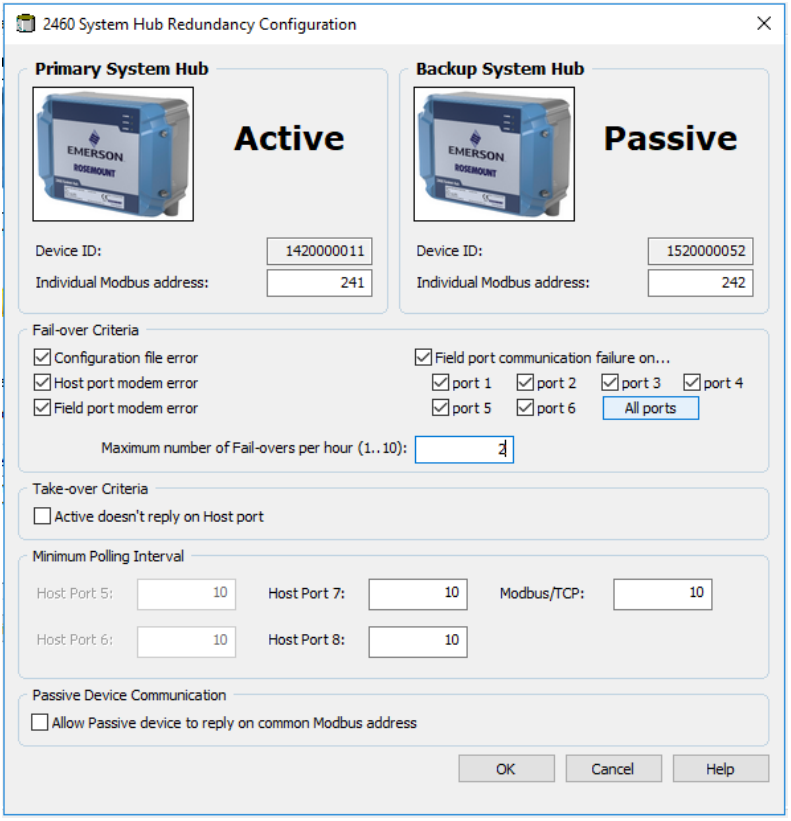
You may configure various options for fail-over and other redundancy related issues. You may also set separate Modbus addresses for the two system hubs.

Procedure

In the ***System Hub Redundancy*** window, click the **Configure** button to open the ***2460 System Hub Redundancy Configuration*** window.

System hub redundancy configuration window

Figure 5-11: System Hub Redundancy Configuration



Individual Modbus address

By setting individual Modbus addresses for the Primary and Backup devices, a host system may communicate with each device separately. This is useful, for example, for verifying the current status of each device.

Minimum Polling Interval

If the host system uses a longer poll interval in the communication than the configured value, the system will report error.

Entry fields for Host Ports 5 and 6 will only be enabled if the ports are configured as host ports. Entry fields for Modbus TCP will only be enabled if Modbus TCP license option is enabled.

Fail-over criteria

Table 5-4: Fail-over Criteria

Criteria	Description
Configuration file error (default)	Configuration database (CDB) is corrupt.
Host port modem error (default)	A Host port modem has failed or been removed.
Field port modem error (default)	A Field port modem has failed or been removed.
Field port communication failure	No response from any field device on a Field port. This option is most useful for redundant field bus wiring where each Rosemount 2460 has separate field bus wiring.
Field port communication failure on…	Individual port configuration for Field Port communication failure.
Maximum number of Fail-overs per hour (1..10)	Maximum number of fail-overs per hour in order to prevent an oscillating behavior i.e. switching back and forth between Primary and Backup device. In case fail-overs tend to occur frequently, the reason behind should be investigated and fixed.

Take-over criteria

There may be situations when you would like the passive device to take over as the active device even if no fail-over criteria is fulfilled. For example, in case the active device does not respond to Host requests, the passive device may take over and become the active device. The **Active doesn't reply on Host port** option does not work if the Primary and Backup system hubs are wired to separate host ports which is the case when, for example, using the RS232 communication interface.

Passive device communication

In case the Primary and Backup system hubs are connected to different ports on the host system, the same Modbus address can be used for communication with the two system hubs. Then there is no need to use individual Modbus addresses for the Primary and Backup devices. When communicating with a host system via RS232 interface, separate host ports must be used, and the **Allow Passive device to reply on common Modbus address** option needs to be enabled.

Finish the installation wizard

Once the redundancy configuration is finished:

Procedure

In the ***2460 System Hub Redundancy*** window, click the **Next** button.

Postrequisites

Finish the installation wizard as described in Installation procedure.

Redundancy setup via Web graphical user interface

This section describes how to use the the Web graphical interface for redundancy setup of a Rosemount 2460 System Hub. The setup includes two basic steps:

- Paring; two system hubs are setup as a redundant pair
- Redundancy configuration; addresses and fail-over criteria are configured

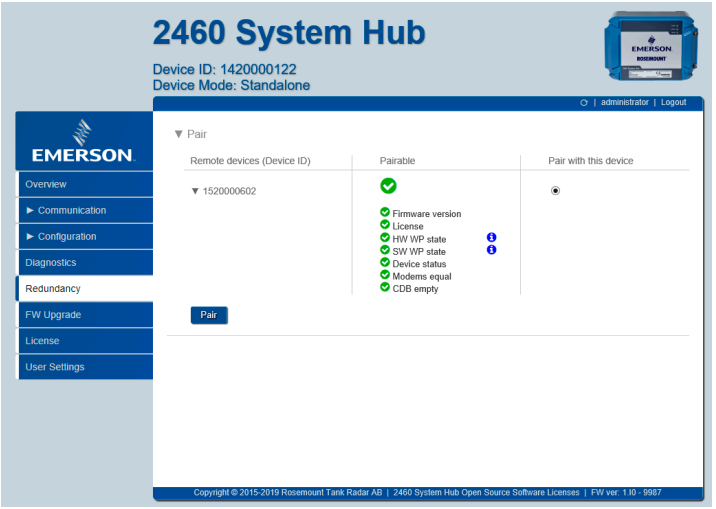
Pairing

Prerequisites

For the system hubs to be able to pair, ensure that the preconditions are fulfilled.

Procedure

1. Log in to the Web interface.
2. Select the **Redundancy** tab.
3. Expand the **Pair** option.
4. Verify that the other system hub is pairable, i.e. all requirements for pairing are marked with a green button.



5. If the two system hubs (Primary and Backup) are ready for pairing, click the **Pair** button to start the synchronization process.

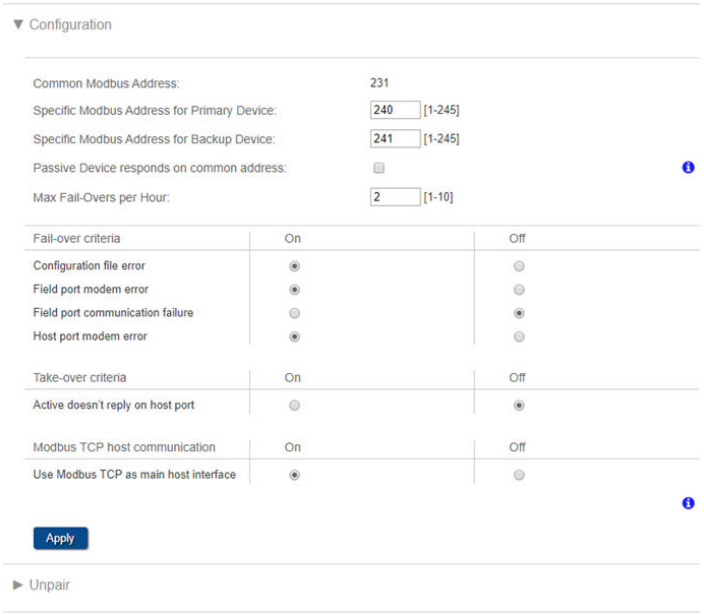
Redundancy configuration procedure

Once the synchronization is finished you may configure the system hubs for redundancy operation.

Procedure

1. In the Web interface, select the **Redundancy** tab.

2. Expand the **Configuration** option.



3. Configure the device.

Example

Redundancy configuration overview

Table 5-5: Redundancy Configuration Overview

Item	Description
Primary Device ID Backup Device ID	Each device has a unique identification number.
Redundancy status	If status is OK, a green check box is displayed. You may expand the Status list to view further details. In case status is not OK, a list of warnings and errors will be displayed.
Manual switch over	Active/Passive mode can be changed manually. The Active device communicates with the host system and responds to requests for measurement data, status information, and diagnostics. This option can be useful for testing that both system hubs function properly as Active and Passive.
Configuration	See Table 5-6.
Unpair	It is possible to un-pair the two devices in the redundancy system. When un-pairing the redundant system hubs, the active device will change mode to standalone. The passive device will load the default configuration database and the default Modbus address (245) to make sure it will not disturb communication on Host and Field ports after unpairing the system hubs.

Table 5-6: Redundancy Configuration Options

Item	Description
Common Modbus Address	Common Modbus address is the standard setting. Primary and Backup system hubs use the same Modbus address.You may use this option in case Primary and Backup system hubs are connected to different host ports. Then the same Modbus address can be used instead of individual addresses.
Specific Modbus Address for Primary Device / Specific Modbus Address for Backup Device	The redundant system hubs can be given individual Modbus addresses in case you need to be able to communicate separately with each system hub. This is useful, for example, for verifying the current status of each device.
Passive device responds on common address	In case the Primary and Backup system hubs are connected to different ports on the host system, the same Modbus address can be used for communication with the two system hubs. Then there is no need to use individual Modbus addresses for the Primary and Backup devices. When communicating with a host system via RS232 interface, separate host ports must be used, and the **Allow Passive device to reply on common Modbus address** option needs to be enabled.
Max Fail-Overs per Hour	Maximum number of fail-overs per hour in order to prevent an oscillating behavior i.e. switching back and forth between Primary and Backup device. In case fail-overs tend to occur frequently, the reason behind should be investigated and fixed.
Fail-over criteria	Criteria for primary device failure that will make the backup device to take over.
Take-over criteria	Criteria that will make the backup device to take over even in case there is no primary device failure.
Use Modbus TCP as main host interface	If Modbus TCP is used for communication with the host system and no Host Ports are used, it is necessary to enable this function. If not set the passive system hub will not take over as active device when the active is powered off or fails.

6 Operation

6.1 Start-up procedure

When the system hub is starting up, the LEDs are lit up and turned off in a certain order to indicate proper operation. In case an error is detected during the start-up procedure the red LED remains turned on.

Start-up:

1. All LEDs are turned on
2. Within 0.5 seconds the yellow (Status) LED is turned off.
3. When the start-up procedure is finished, the red (error) LED is turned off. In case an error is detected during the start-up procedure, the error LED will start blinking according to the appropriate error code.
4. The green (power) LED remains lit when the system hub is powered on.

6.2 Runtime operation

After the start-up procedure is finished the system hub enters runtime mode.

The red Error LED will be turned off. If an error occurs, the LED will start to blink.

In runtime mode the yellow status LED will blink at a rate given by the current operational mode.

Quick Start Guide
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For more information: **Emerson.com**

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