Manual Supplement
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Rosemount™ 2410 Tank Hub

Sakura emulation instruction

ROSEMOUNT™

EMERSON™

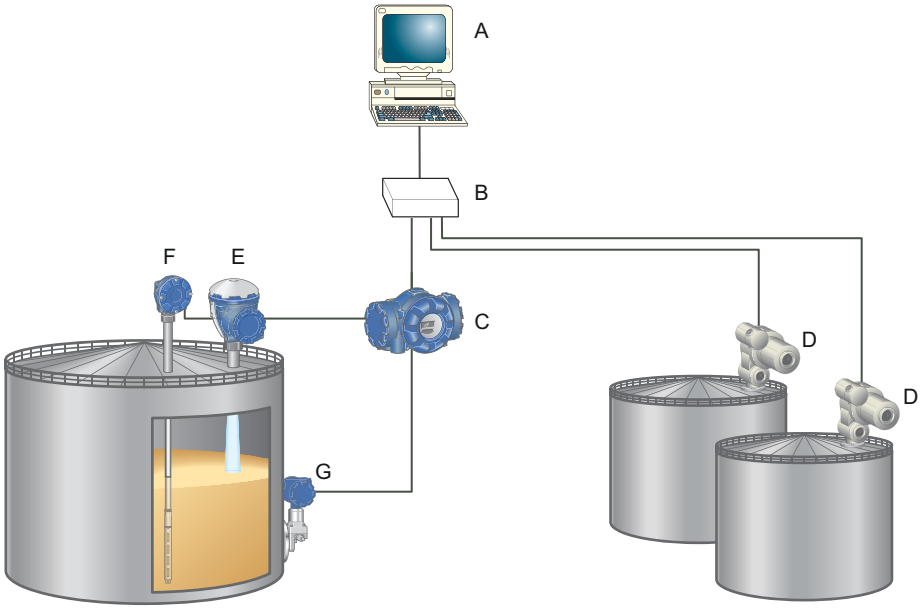
Contents

1 Introduction

The purpose of this document is to provide guidelines on how to change from other manufacturer's devices to Rosemount equipment by exchanging gauges. When a gauge is replaced with a Rosemount gauge, it is necessary to configure the Rosemount 2410 Tank Hub for emulation.

The Rosemount field devices, for example Rosemount 5900 Radar Level Gauge and Rosemount 2240S Temperature Transmitter, are connected to the tank hub using the intrinsically safe Tankbus as usual. Emulation is done in the tank hub only. Each tank hub can emulate up to 10 tanks (10 separate gauges)[(1)].

Figure 1-1: Rosemount Devices Replacing Old Gauges in an Existing Sakura System



A. Existing Sakura host
B. Existing data polling unit
C. Rosemount 2410 Tank Hub
D. Sakura gauges
E. Rosemount 5900S Radar Level Gauge
F. Rosemount 2240S Temperature Transmitter with sensor
G. Rosemount 3051S Pressure Transmitter

(1) Tank hub version "Multiple tanks" can emulate up to 10 tanks (10 gauges). Tank hub version "Single tank" can emulate up to 2 tanks (2 gauges).

1.1 Emulation capabilities

Emulation enables the replacement of old devices with Rosemount devices in another vendor's existing tank gauging system. The Rosemount device will perform just like the replaced gauge, using the other vendor's protocol to communicate.

By using the other vendor's field and control room communication protocol with modern Rosemount tank gauging devices, the legacy system can be modernized step-by-step. The legacy system can be upgraded while tanks are in operation and existing wiring can be re-used.

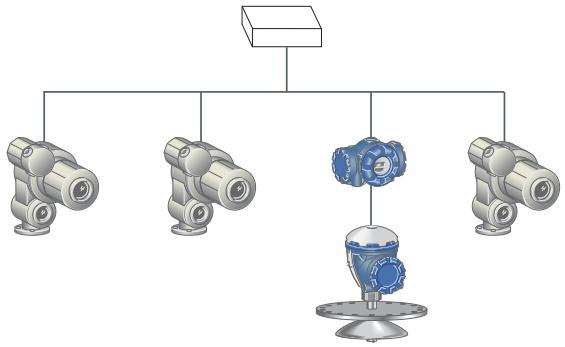
The tank hub can emulate replaced devices, acting as either slave or master. The tank hub slave emulation is described in this document.

Tank hub acting as slave

When an old gauge from another vendor is replaced with a tank hub connected to a Rosemount field device, the tank hub will act as a slave answering requests and sending data upwards towards the host.

A stepwise "bottom-up" upgrade is done by replacing legacy gauges to begin with, and changing the complete control system at a later occasion.

Figure 1-2: Tank Hub Slave Emulation



1.2 Sakura system characteristics

1.2.1 Sakura protocol overview

The tank hub supports two versions of the Sakura protocol: Sakura MDP and Sakura V1, each supporting up to 10 tank positions[2]. The tank hub automatically detects which protocol to use, based on the received requests from the Sakura host.

Sakura MDP protocol

The Sakura MDP protocol is sometimes also called “old Sakura protocol” or Sakura binary. The Sakura MDP protocol includes one request type.

Sakura V1 protocol

The Sakura V1 protocol is sometimes called “new Sakura protocol” or Sakura ASCII. The Sakura V1 protocol includes several request types. The tank hub identifies the request type, and replies with the corresponding response type.

Electrical interface and protocol

Table 1-1: Sakura Electrical Interface and Protocol Options

Protocol	Electrical interface
Sakura MDP	Sakura Non-IS 2-wire bus
Sakura V1	

1.2.2 Sakura response data

Table 1-2 shows supported response data for the Sakura MDP and Sakura V1 protocols.

Table 1-2: Sakura Protocol Response Data

	Sakura MDP	Sakura V1
Level	✓	✓
Ullage	✗	✓
Average liquid temperature	✓	✓
Average vapor temperature	✗	✓
Sixteen spot temperatures	✗	✓
Free water level	✗	✓
Pressure (Vapor, middle or liquid)	✗	✓
Alarm status	✓	✓
Observed density[1]	✗	✓

(1) Maximum 3 tank positions.

(2) Tank hub version “Multiple tanks” can emulate up to 10 tanks (10 gauges). Tank hub version “Single tank” can emulate up to 2 tanks (2 gauges).

1.3 Rosemount 2410 Tank Hub communication

The tank hub has slots for two independent communication boards, primary and secondary field bus, for TRL2 Modbus®, RS485 Modbus, emulation, or wireless communication.

Support for Sakura emulation is selected in the model code, refer to Rosemount 2410 Product Data Sheet for more information. There are two alternatives available for Sakura emulation:

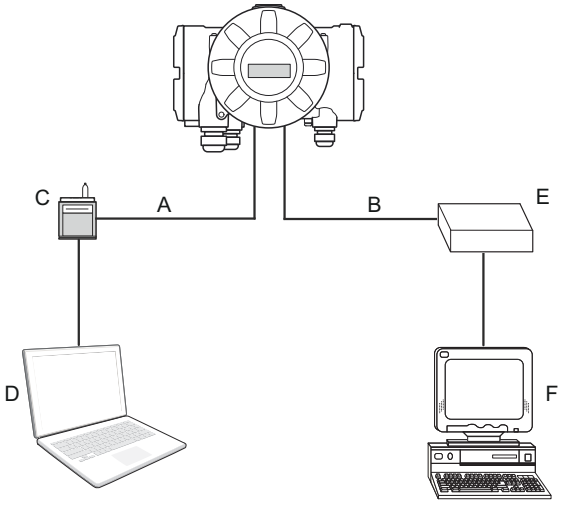
- Example 1: Sakura MDP/V1 on secondary bus
  Sakura is available on the secondary bus, where the primary bus can be used for regular TRL2 or RS485 communication.
- Example 2: Wireless communication in combination with Sakura emulation
  Sakura is available on the primary bus, where the secondary bus is used for *Wireless*HART® for normal communication.

Example 1: Sakura MDP/V1 on secondary bus

The Sakura MDP/V1 interface is connected to the Rosemount 2410 secondary field bus.

Configuration is usually performed with a FBM connected to the primary bus. The primary bus can be used for regular TRL2 or RS485 Modbus communication.

Figure 1-3: Configuration on Primary Bus and Emulation on Secondary Bus



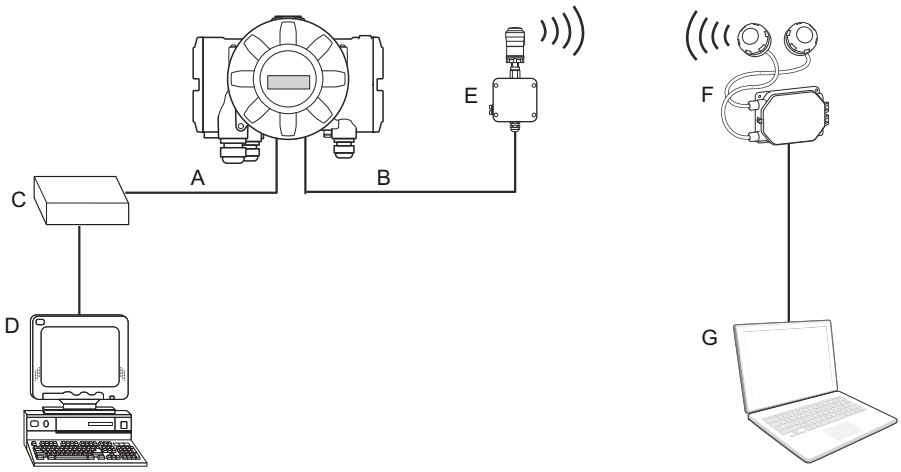
A. Primary bus: TRL2 Modbus
B. Secondary bus: Sakura MDP/V1
C. FBM
D. Rosemount TankMaster™ PC
E. Sakura converter
F. Sakura host

Example 2: Wireless communication in combination with Sakura emulation

The tank hub supports Emerson's wireless technology, which is based on *Wireless*HART, the emerging industry standard for wireless field networks. The Emerson Wireless THUM™ Adapter acts as a wireless data link between the tank hub and an Emerson Wireless Gateway.

The tank hub can simultaneously combine wireless and Sakura communication. The primary field bus communicates via Sakura MDP/V1, and the secondary field bus via *Wireless*HART. With this tank hub communication configuration, control room redundancy is achieved.

Figure 1-4: Emulation on Primary Bus and Wireless Communication on Secondary Bus

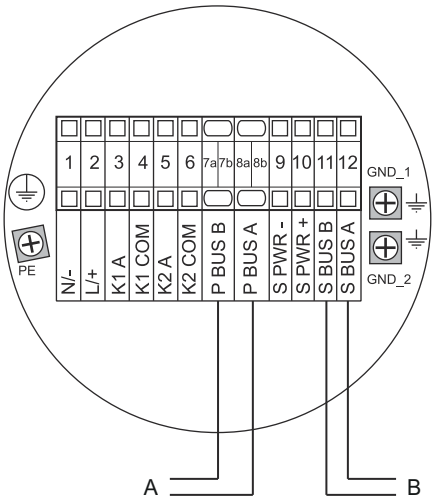


A. Primary bus: Sakura MDP/V1
B. Secondary bus: WirelessHART
C. Sakura converter
D. Sakura host
E. Emerson Wireless THUM Adapter
F. Emerson Wireless Gateway
G. Rosemount TankMaster PC

2 Electrical installation

2.1 Rosemount 2410 Tank Hub connections

Figure 2-1: Terminal Block in the Explosion-Proof/Flameproof Compartment



A. Primary field bus
B. Secondary field bus

Table 2-1: Terminal Assignment for Non-Intrinsically Safe Side

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 (Sakura X-wire)
8a/8b	P Bus A	Primary communication bus (Sakura Y-wire)
9	S Pwr -	Secondary bus power - (N/A for Sakura)
10	S Pwr +	Secondary bus power + (N/A for Sakura)
11	S Bus B	Secondary communication bus - (Sakura X-wire)
12	S Bus A	Secondary communication bus + (Sakura Y-wire)
PE	PE	Power supply protective ground
GND_1	GND_1	Housing chassis/shield Primary bus
GND_2	GND_2	Housing chassis/shield Secondary bus

3 Configuration

The Rosemount 2410 Tank Hub is configured by using the TankMaster WinSetup configuration program(3). WinSetup is a user-friendly software package that includes basic configuration options as well as advanced configuration and service functions.

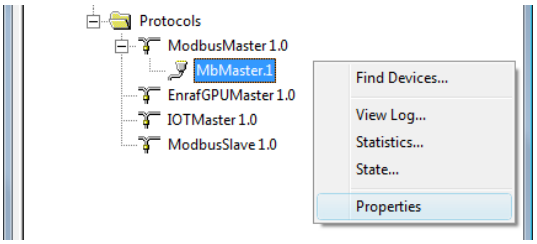
Configuration of the Rosemount 2410 emulation function can be performed with the WinSetup program using the FBM or a RS485 converter, depending on the tank hub configuration. A tank hub where the secondary field bus communicates via *Wireless*HART®, can be configured by wireless communication with an Emerson Wireless Gateway.

3.1 Set up Modbus communication protocol

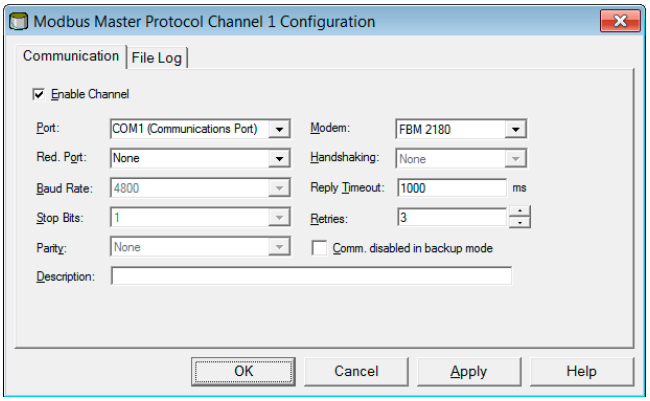
This section describes how to configure the Modbus Master protocol channel for communication. To specify PC communication port and the standard communication parameters, do the following:

Procedure

1. Open the **Protocols** folder in the ***TankMaster WinSetup*** workspace window.
2. Select the **Modbus Master** icon.



3. Right click the proper **MBMaster** icon and select **Properties** to configure the protocol channel.
4. Select the **Communication** tab.



(3) *See the Rosemount Tank Gauging System Configuration Manual for more information on how to use the TankMaster WinSetup software to configure the Rosemount 2410 Tank Hub.*

5. Set the communication parameters:

Table 3-1: Communication Parameters

	FBM	RS485 converter
Port	The COM port the FBM is connected to	The COM port the converter is connected to
Baud rate	4800	9600
Stop bits	1	1
Parity	None	None
Modem	FBM 2180	RS-485
Handshaking	None	RTS/CTS
Reply timeout	1000 ms	1000 ms
Retries	3	3
Description	Text describing the configured channel	Text describing the configured channel

6. Select the **Enable Channel** check box to activate the protocol channel.
7. Select **OK** to store the current configuration and close the configuration window.

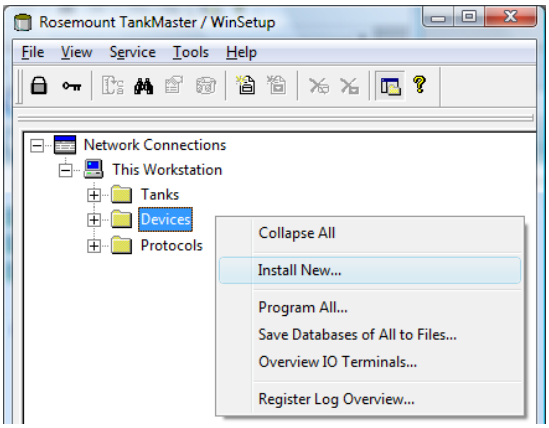
3.2 Install Rosemount 2410 Tank Hub in WinSetup

The TankMaster WinSetup wizard is the recommended tool for installing the tank hub. The installation wizard manages basic configuration of the tank hub.

Perform the following steps to start the installation wizard in TankMaster WinSetup:

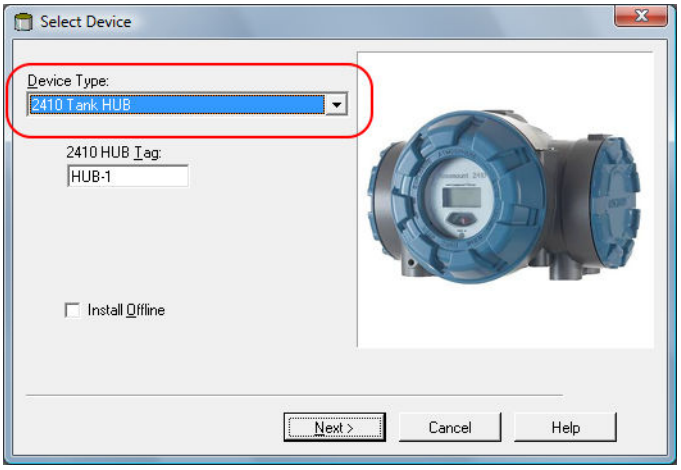
Procedure

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

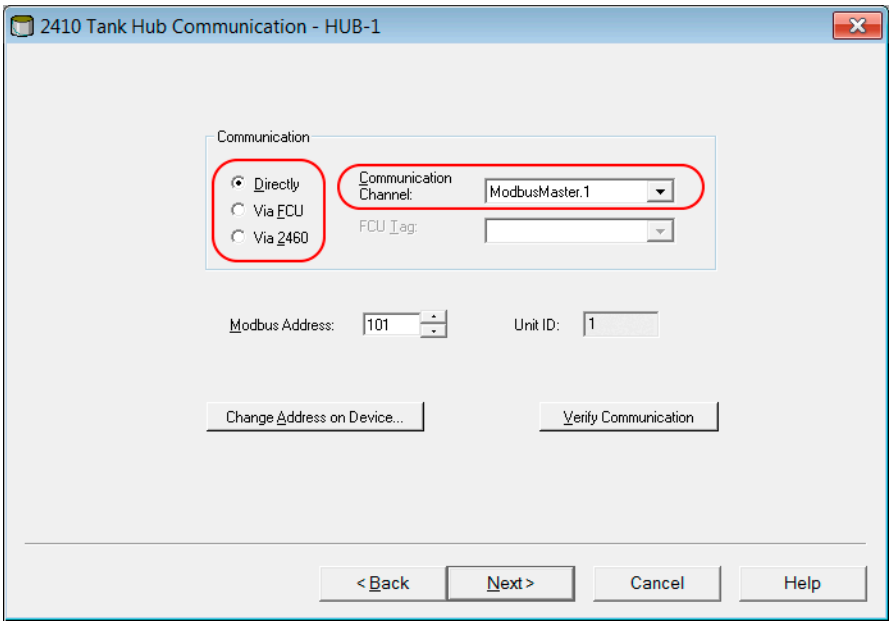


2. Right click and select **Install New** or, from the ***Service*** menu, select the **Devices/ Install New** option. The ***Select Device*** window opens.

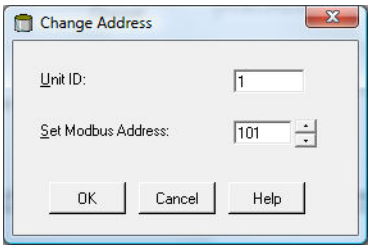
3. From the ***Device Type*** drop-down list, select the **2410 Tank Hub** option.



4. Type a name in the ***2410 HUB Tag*** field. The 2410 Hub Tag will be used as an identifier for the tank hub in various windows and dialogs.
5. Select **Next**. The ***2410 Tank Hub Communication*** window opens.
6. Ensure TankMaster communicates directly with the tank hub and that the proper communication channel is chosen.



7. Default Modbus Address is 247 for the tank hub. It is recommended to change it to an address between 101-199. To change the adress, do the following:
   a) In the ***2410 Tank Hub Communication*** window select **Change Address on Device...** to open the ***Change Address*** window.



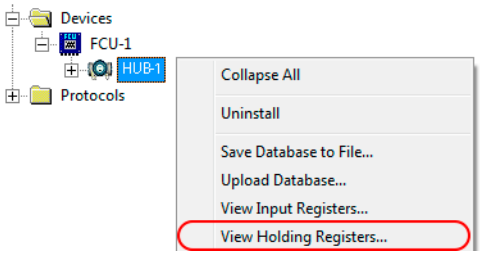
   b) Enter the **Unit ID** and select the new Modbus Address. When changing the device address, the Unit ID is used as a unique identifier of the device. The Unit ID can be found on a label mounted on the device.
   c) Select **OK** to confirm the address settings and close the ***Change Address*** window.
   d) In the ***2410 Tank Hub Communication*** window select **Verify Communication** to check that communication is established between the TankMaster work station and the tank hub. The **Unit ID** will appear when TankMaster detects the tank hub.
8. In the ***2410 Tank Hub Communication*** window select **Next** to continue the installation procedure of the tank hub.
9. Continue configuration of the tank hub following the standard installation procedure.

3.3 Configure specific variables for emulation

The tank hub holding registers are used to configure the Sakura emulation variables.

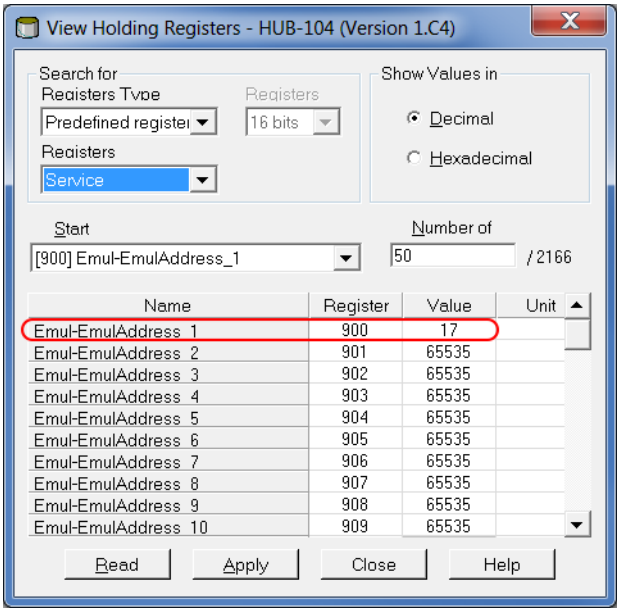
Procedure

1. In the ***TankMaster WinSetup*** workspace window, right click the tank hub device icon.
2. To view the holding registers, select the **View Holding Registers** option.



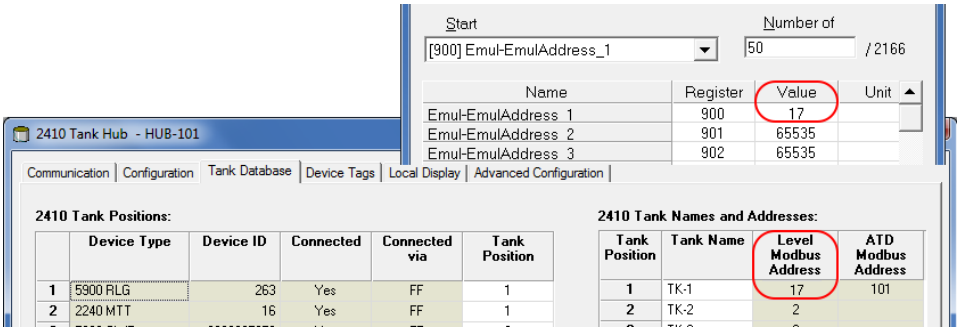
Note
When replacing a Sakura gauge with a Rosemount device, the Rosemount device must have the same Sakura address as the gauge being replaced.

3. Enter the required emulation address in holding registers 900-909,**Value** field. Valid Sakura MDP addresses are 0-255, and valid Sakura V1 addresses are 0-99.[4]



Tip

In the **Tank Database** tab, set the Modbus address to the same as the chosen Sakura address for each device.



(4) Emulation address is by default set to "65535" for tank positions that are not in use.

3.4 Verify Sakura communication parameters

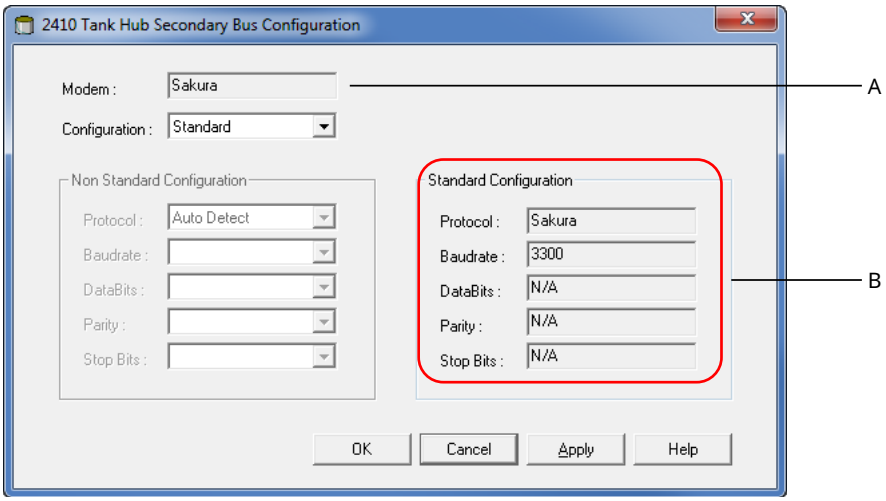
The tank hub supports Sakura bus baud rate between 300 and 5000 baud. When a Sakura modem has been detected by the tank hub, the communication parameters for the interface are automatically configured:

Bus baud rate	300-5000
Data bits	8
Parity	None
Start bit	1
Stop bits	1

Procedure

1. In the ***TankMaster WinSetup*** workspace window, right click the Rosemount 2410 icon and select **Properties**.
2. Select the **Configuration** tab, and continue by selecting the **Secondary Bus** button.
3. Check that the modem is detected and that the correct communication parameters are configured.

Figure 3-1: Secondary Bus Configuration



A. The Sakura modem is detected.
B. Configured communication parameters.

Postrequisites

It is recommended to keep the auto-configured baud rate. However, the Sakura bus baud rate can be configured. See section Change baud rate.

3.5 Start Sakura emulation

Procedure

1. If not already connected, connect the tank hub to the Sakura host.
2. The tank hub will now act like a Sakura gauge.

4 Troubleshooting

4.1 Communication status

Table 4-1: Troubleshooting Chart

Problem	Cause
No communication with the tank hub using TRL2 bus or RS485.	1. Incorrect Modbus address. 2. Incorrect communication parameter settings. Check LCD Display during startup, for used settings.
No communication with the tank hub using the Sakura bus, and no Sakura bytes are received (input register 1256).	1. Tank hub software is older than 1.F1. 2. Sakura bus is not connected correctly. 3. Tank hub Sakura modem is not detected, see the ModemInfo input registers. 4. Sakura bus baud rate is not detected, see the ModemInfo input register 45173, SakuraBaudRate.
No communication with the tank hub using the Sakura bus, but the tank hub is receiving Sakura requests (input register1256).	1. Host Sakura address is not the same as configured in the tank hub. 2. The tank hub is responding to fast. Change the RxToTx time, see Table 5-12.
Sakura level value is received by the host but is incorrect.	1. Tank hub invalid level. 2. Sakura address is not in correct tank hub tank position.
Sakura temperature value is received by the host but is incorrect.	1. Tank hub invalid temperature. 2. Sakura address is not in correct tank hub tank position.

Check message status

Verify that communication is working properly by checking the input registers as described in Table 4-2. See Table 4-3 for troubleshooting actions.

Table 4-2: Messages Input Registers

Register number	Input register	Description
1256	RecMessages	Total queries received
1258	MessagesToMe	Number of received queries addressed to me
1260	SentMessages	Number of sent messages

Table 4-3: Messages Troubleshooting Chart

Symptom	Action
Input register RecMessages does not enumerate	Check that: • Sakura cables are properly connected • The tank hub is in Sakura mode
Input register MessagesToMe does not enumerate	Check that the Sakura address is correct
Input register SentMessages does not enumerate	Check that the host is sending proper requests

5 Optional configuration and settings

5.1 Engineering units

The tank hub automatically converts all measurement values to the correct engineering unit. No additional configuration is needed.

5.2 Average Liquid Temperature

The normal tank hub configuration is sufficient, no additional configuration is needed.

5.3 Observed density

The normal tank hub configuration is sufficient, no additional configuration is needed.

5.4 Free water level

The normal Rosemount 2240S Temperature Transmitter configuration is sufficient, no additional configuration is needed.

5.5 Change baud rate

The tank hub modem supports Sakura bus baud rate between 300 and 5000 baud. The modem detects the baud rate automatically when receiving data on the Sakura bus. The detected baud rate value can be read from input register SecondaryBus-ExtBaudrate (1255).

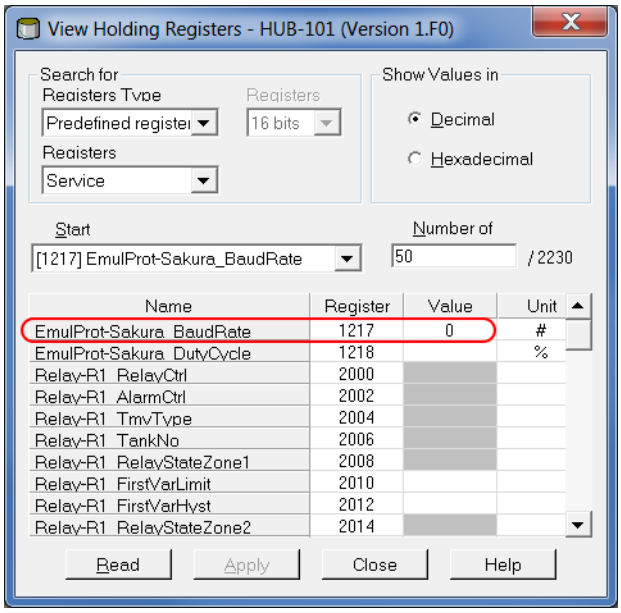
The bus baud rate can be changed by using holding register Sakura_BaudRate (1217), see Table 5-1.

Table 5-1: Configure Sakura Bus Baud Rate

Holding register	Register number	Default value	Description
Sakura_BaudRate	1217	0	The automatic baud rate detection is enabled by default (recommended). To change the bus baud rate, write the desired baud rate to the value field.

Figure 5-1 shows an example where holding register Sakura_BaudRate (1217) is set to value 0. The automatic baud rate detection is enabled.

Figure 5-1: Example: Holding Register Sakura_BaudRate (1217) Set to Value 0



Note
The baud rate value is only updated after restart or if the Sakura bus is idle for at least 60 seconds.

5.6 Invalid level measurements

The tank hub reply on the Sakura host level request can be customized if the level value is invalid.

Use holding register Sakura_LevelErrorConfig (1211) to customize your reply configuration, see Table 5-2. This configuration is applicable on all tank positions.

Table 5-2: Holding Register Sakura_LevelErrorConfig 1211

Value	Value definition	Description
0	Default	The tank hub will reply with the default level value 99999.9 mm. It is recommended to keep the configuration as Default.
1	Last Valid	The tank hub will reply with the last good level value.
2	Invalid Value	The tank hub will reply with the level value that is present in the tank hub even if the level is considered to be invalid.
3	User Defined	The tank hub will reply will level value configured in holding registers 1204 and 1205 (see Table 5-3).

Figure 5-2 shows an example where holding register Sakura_TempErrorConfig (1211) is set to value 0. The tank hub will reply with the default level value 99999.9 mm.

Figure 5-2: Example: Holding Register Sakura_TempErrorConfig (1211) Set to Value 0

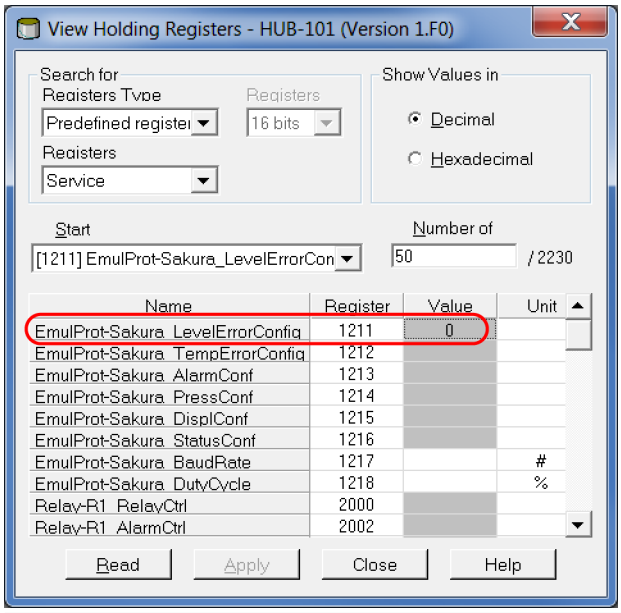


Table 5-3: User Defined Invalid Level Value

Input register	Register number	Default value	Description
Emul_Level_ErrVal_m	1204	0	Meter part of the user defined invalid level value.
Emul_Level_ErrVal_1_10_mm	1205	0	1/10 mm part of the user defined invalid level value.

5.7 Invalid temperature measurements

The tank hub reply on the Sakura host temperature request can be customized if the temperature value is invalid.

Use holding register Sakura_TempErrorConfig (1212) to customize your reply configuration, see Table 5-4. This configuration is applicable on all tank positions.

Table 5-4: Holding Register Sakura_TempErrorConfig (1212)

Value	Definition	Description
0	Default	The tank hub will reply with default temperature value 999.9 °C. It is recommended to keep the configuration as Default.
1	Last Valid	The tank hub will reply with the last good temperature value.
2	Invalid Value	The tank hub will reply with the temperature value that is present in the tank hub even if the temperature is considered to be invalid.(1)
3	User Defined	The tank hub will reply with the temperature value configured in holding register 1206 (see Table 5-5).

(1) Note that the tank hub will use -300.0 °C to indicate invalid temperature (configurable in holding register 6096).

Figure 5-3 shows an examplewhere holding register Sakura_TempErrorConfig (1212) is set to value 1. The tank hub will reply with the latest good temperature value.

Figure 5-3: Example: Holding Register Sakura_TempErrorConfig (1212) Set to Value 1

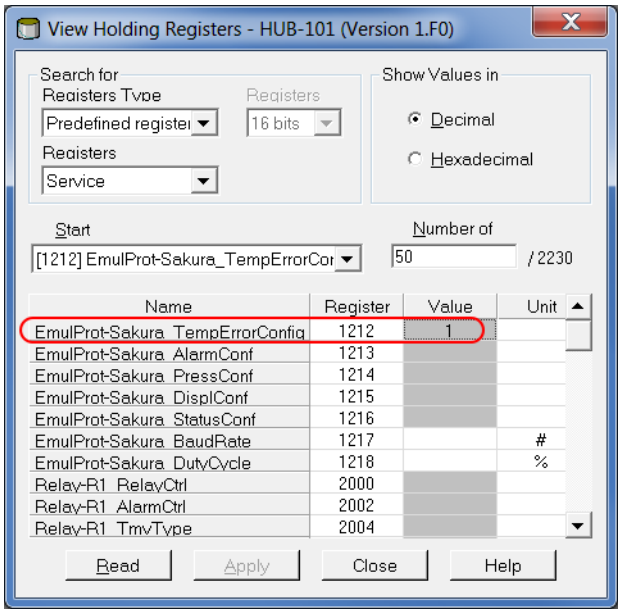


Table 5-5: User Defined Invalid Temperature Value

Input register	Register number	Default value	Description
Emul_Temp_ErrVal_1_10_C	1206	0	User defined invalid temperature value in 1/10 °C.

5.8 Miscellaneous control register

Use holding register Sakura_MiscControl (1210) to set some optional configuration bits, see Enable/disable MiscCtrl configuration bits and Table 5-6. This configuration is applicable on all tank positions.

Table 5-6: Holding Register Sakura_MiscControl 1210

Bit	Name	Default value	Description
0	Level mapping signed	0x0	The level range is by default 0.0 - 99999.9 mm. By setting bit 0, the level range is changed to -49999.9 - 50000 mm.(1)
1	Non Standard Error Status	0x0	The error status value range is by default 0x30 - 0x33. By setting bit 1, the error status value range is changed to 0x40 - 0x43.(1)
2	Invalid Temp As Sensor Error	0x0	By setting bit 2, invalid temperature will be indicated as error status “Sensor error”.(1)
3	Device Error As Under Tension	0x0	By setting bit 3, device error will be indicated as error status “Under Tension”, Note that this error status will overwrite both “Over tension” and “Sensor error”.
4	Device Error As Over Tension	0x0	By setting bit 4, device error will be indicated as error status “Over Tension”. Note that if bit 3 is set, bit 4 will have no impact.
5	Invalid Level As Under Tension	0x0	By setting bit 5, invalid level will be indicated as error status “Under tension”. Note that if this bit is not set, the invalid level will be indicated as “Over tension”.
6	Enable Digital Relay Status	0x0	By setting bit 6, the state of the relay inputs K1 and K2 (energized or deenergized) can be read from the Sakura V1 Digital Status byte for some responses. See Digital input for more information.(1)
8	Enable MML Diagnostics	0x0	This is an advanced feature that can be used during maintenance. By setting bit 8, the modem will send up diagnostic info that can be read through the tank hub input registers. Since this may affect the normal operation of the Sakura emulation, it is not recommended to use this feature, except during maintenance.(2)
9	Enable SINGLE MDP RESP	0x0	Advanced feature that should normally not be used except during testing. By setting bit 9, the host can only clock out one response message compared to the default three identical responses.(3)

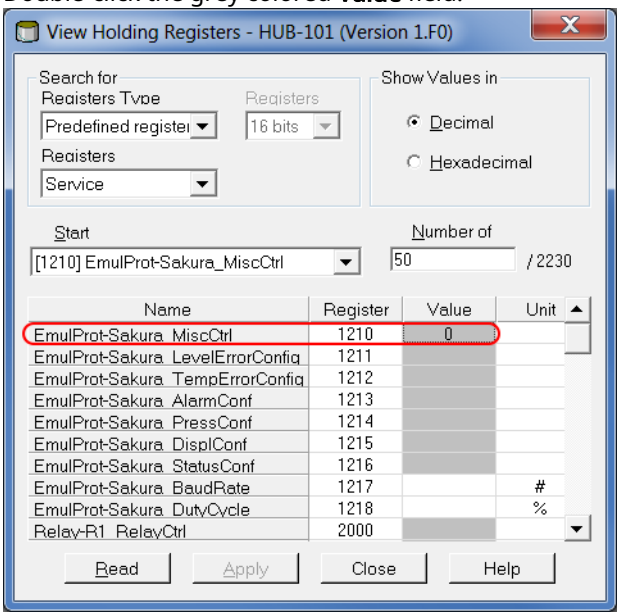
(1) Note that this bit is only valid for the Sakura V1 protocol.
(2) Note that the tank hub must be restarted or the Sakura bus communication must be idle for at least one minute.
(3) Note that this bit is only valid for the Sakura MDP protocol.

5.8.1 Enable/disable MiscCtrl configuration bits

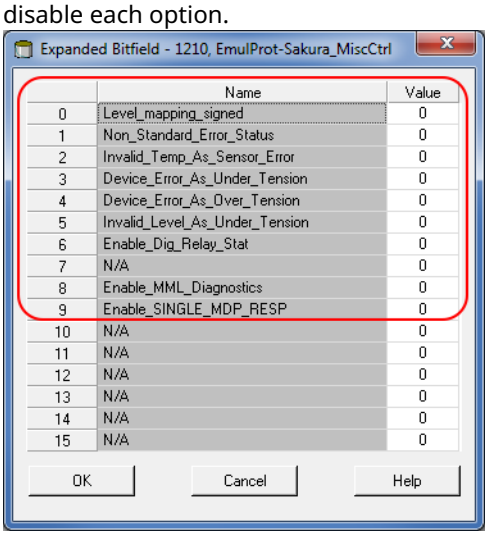
To configure the MiscCtrl bits, do the following:

Procedure

1. Double-click the grey colored **Value** field.



2. In the ***Expanded Bitfield - 1200*** window, double-click the **Value** field to enable/disable each option.



5.9 Error status

Some of the Sakura responses includes an error status. The error status values are specified in Table 5-7.

It is possible to configure the tank hub error status and to change the error status value range from 30h-33h to 40h-43h. The error status configuration is described in Table 5-6.

Table 5-7: Error Status

Value	Decoded ASCII char	Description
30h	0	No error
31h	1	Over Tension
32h	2	Under Tension
33h	3	Sensor error

5.10 Alarms

An alarm status is included in some of the Sakura V1 protocol responses. There are two alarms available: Alarm 1 and Alarm 2. The alarm status value is customized as described in Table 5-8.

Table 5-8: Alarm Status

Value	Decoded ASCII char	Description
30h	0	No alarm
31h	1	Alarm 1
32h	2	Alarm 2
33h	3	Alarm 1 and Alarm 2

The following inputs can be mapped to the alarms:

- High and/or low alarm level limits
- Digital input relays K1 and K2

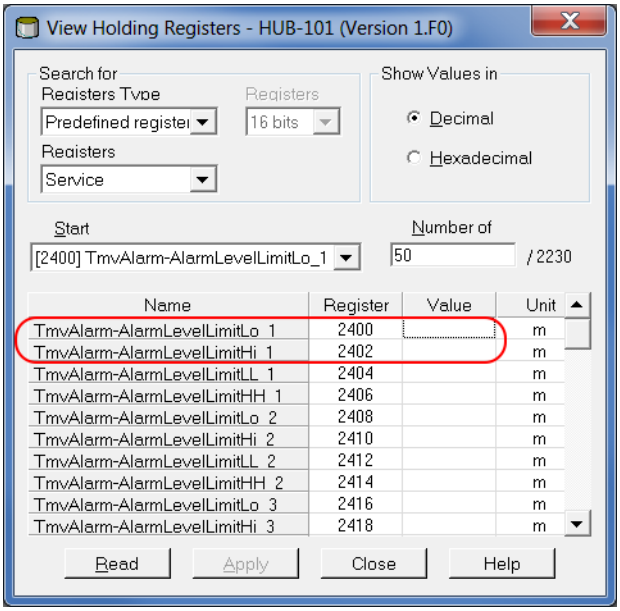
The desired alarm options are enabled in holding register Sakura_Alarm_Conf (1213), and the alarm level limits are configured in the generic TMV Alarm holding registers (one set of parameters for each tank position).

5.10.1 Configure Sakura V1 alarms

To configure the Sakura V1 alarms, do the following:

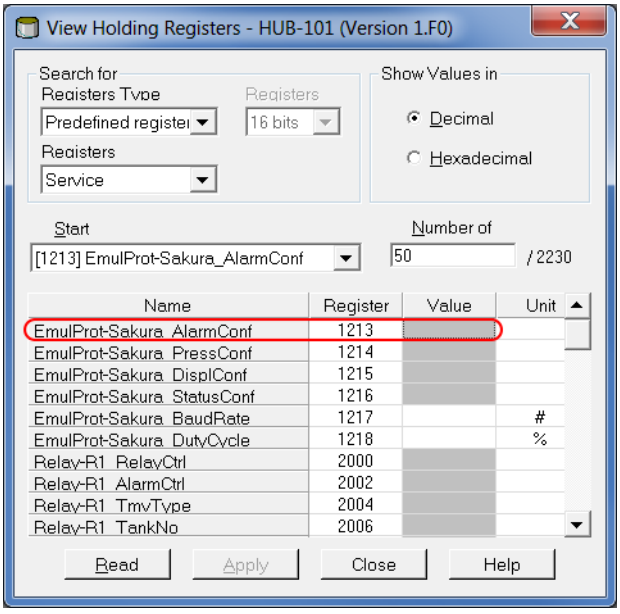
Procedure

1. Specify the desired alarm level limits (High and Low) in the generic TMV Alarm holding registers for desired tank positions, holding register block 2400-2478.

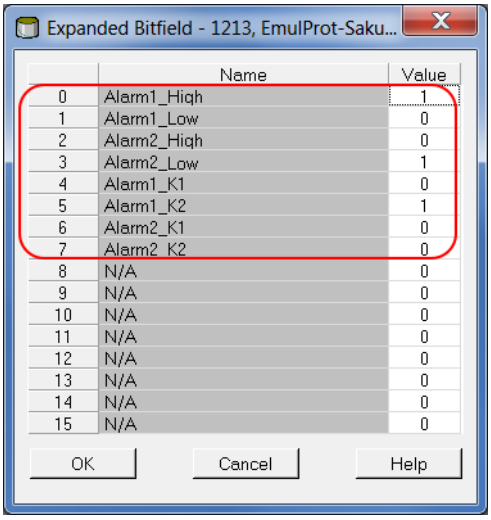


Example: Holding register 2400 and 2402 are used to set alarm level limits for tank position 1.

2. Enable desired Alarm 1 and/or Alarm 2 options in holding register 1213.
   a) Double-click the grey colored **Value** field.

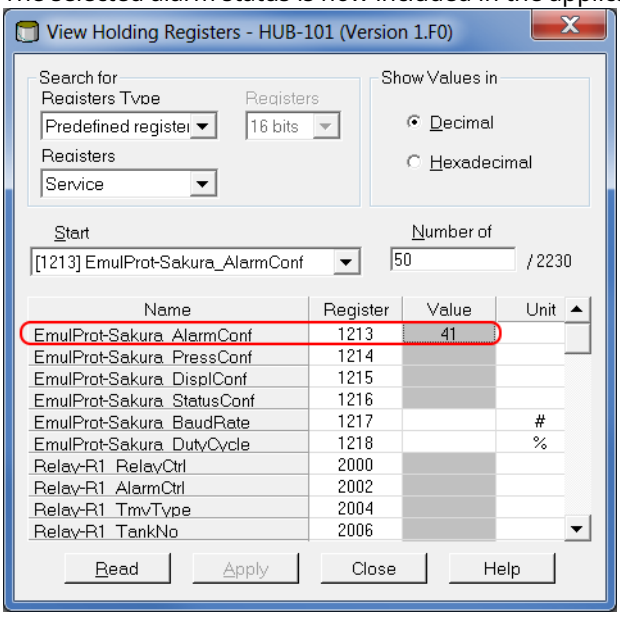


b) In the ***Expanded Bitfield - 1213*** window, double-click the **Value** field to enable/disable each option.



Example: Alarm 1 is enabled for high level alarm and relay K2. Alarm 2 is enabled for low level alarm.

The selected alarm status is now included in the applicable Sakura V1 responses.



5.11 Digital input

The K1 and K2 relay input status can be included in the Sakura V1 protocol response. The digital input value is customized as shown in Table 5-9.

Table 5-9: Digital Input Values

Value	Decoded ASCII char	Description
30h	0	K1 and K2 energized (or function disabled by holding register MiscCtrl bit 6, see Table 5-6)
31h	1	K1 de-energized and K2 energized
32h	2	K1 energized and K2 de-energized
33h	3	K1 and K2 de-energized

Note
This function must be enabled by the MiscCtrl register status bit 6. See Table 5-6.

5.12 Pressure value

There are three pressure values in the Sakura V1 protocol: P1, P2, and P3. They are by default configured as:

- P1: Liquid pressure
- P2: Middle pressure
- P3: Vapor pressure

For backward compatibility with Rosemount Rex, the Liquid pressure value can be remapped to P2 and/or P3. This is done in holding register Sakura_PressConf (1214). If Liquid pressure is remapped, Vapor pressure will be used for the other pressure requests that are not remapped.

Table 5-10: Holding Register 1214, Bit Configuration

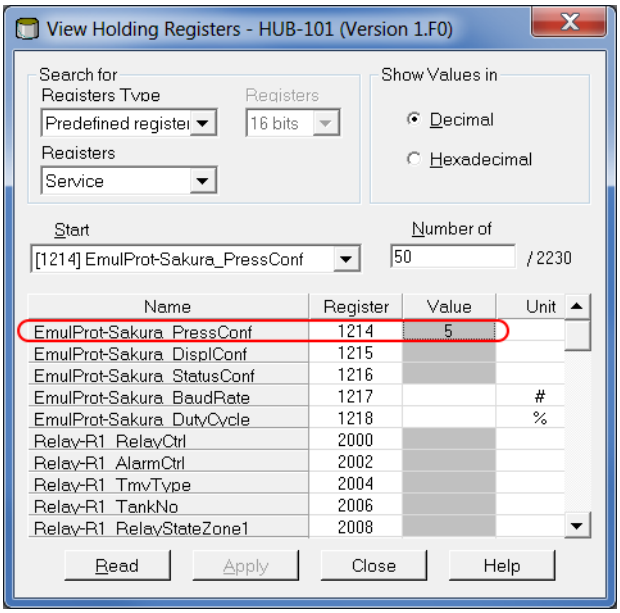
Bit 2, P3_Liquid	Bit 1, P2_Liquid	Bit 0, P1_Liquid	Pressure values
0	0	0	Default: P1 = Liquid pressure, P2 = Middle pressure and P3 = Vapor pressure
0	0	1	P1 = Liquid pressure, P2 = Middle pressure and P3 = Vapor pressure
0	1	0	P2 = Liquid pressure, P1 = P3 = Vapor pressure
0	1	1	P1 = P2 = Liquid pressure, P3 = Vapor pressure
1	0	0	P3 = Liquid pressure, P1 = P2 = Vapor pressure
1	0	1	P1 = P3 = Liquid pressure, P2 = Vapor pressure
1	1	0	P2 = P3 = Liquid pressure, P1 = Vapor pressure
1	1	1	P1 = P2 = P3 = Liquid pressure.

5.12.1 Remap pressure value

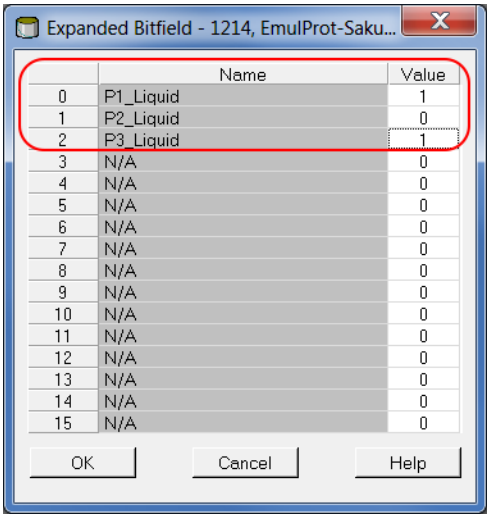
To remap the pressure value, follow these steps:

Procedure

1. Double-click the **Value** field with the grey background color.



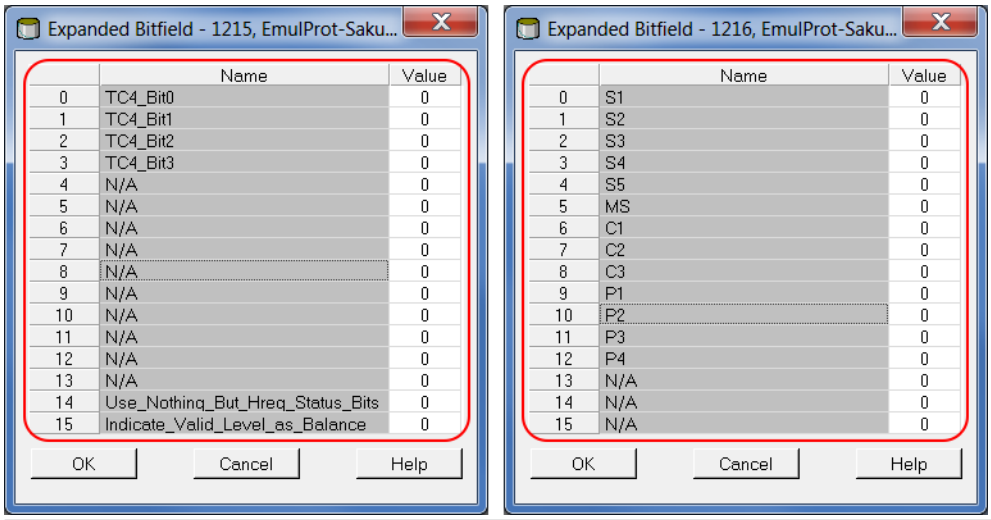
2. In the ***Expanded Bitfield - 1214*** window, double-click the **Value** field to enable/disable each option.



5.13 MDP status bits

In the Sakura MDP response, there are a number of status bits that can be manually configured. These status bits can be customized by the expanded bitfield windows of holding register Sakura _DisplConf (1215) and Sakura _StatusConf (1216). See Figure 5-4.

Figure 5-4: Sakura MDP Status Bits



Status bit 14 and 15 in holding register Sakura _DisplConf (1215) can be used to control the use of the other status bits, see Table 5-11.

Table 5-11: Holding Register Sakura_DisplConf 1215, BIt 14 and 15

Bit	Name	Default value	Description
14	Use Nothing But Hreg Status Bits	0x0	By setting bit 14, the status bits will always be sent as the status bits are set in holding register 1215 and 1216. If bit 14 is not set, the status bits from holding register 1215 and 1216 will still be used except status bits C1, C2, P1, P2, P3, TC4_Bit0, TC4_Bit1, TC4_Bit2 and TC4_Bit3. These bits will be set according to the request and level status.
15	Indicate Valid Level as Balance	0x1	By setting bit 15, an invalid level value will be indicated by status bits (P1, TC4_Bit2 and TC4_Bit3). Note that bit 14 will override bit 15.

5.14 Advanced communication settings

In some cases, response time or other communication parameters used by the Sakura host system or field devices may differ from the standard values. In these situations, the communication parameters can be changed in the tank hub modem settings by writing to the holding registers described in Table 5-12.

Table 5-12: Advanced Communication Settings

Holding register	Register number	Default value	Description
ResponseTimeout	757	0	Maximum time in ms from the request to when the reply has to be transmitted by the tank hub. If set to 0, the protocols default response time will be used.
GapTimeout	758	0	Maximum time in ms between characters in a request. If set to 0, an appropriate gap timeout will be calculated from the used baud rate.
RxToTxTime	759	0	Minimum time in ms from the request to the response. If set to 0, the default response time for the used protocol will be used.
TxToRxTime	760	0	Minimum time in ms from the response to the request. If set to 0, the default response time for the used protocol will be used.
ActiveBeforeTx	761	0	Active wait period (RTS) in ms before start of transmission. If set to 0, the default response time for the used protocol will be used.
ActiveAfterTx	762	0	Active wait period (RTS) in ms after start of transmission. If set to 0, the default response time for the used protocol will be used.

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