



**ATLANTIC**  
**CONTROLS**



**BELCO**  
**Tank Gauging Project**  
**Final Proposal**



**June 7<sup>th</sup>, 2010**

## Table of Contents

- 1.0 Commercial Summary**
- 2.0 Detailed Proposal**
- 3.0 General and Technical Comments**
- 4.0 Terms and Conditions**
- 5.0 Technical Literature**



## Tank Gauging Proposal



### **1.0 Commercial Summary – Final**

Item	Project	Description – BELCO Tank Gauging Network	Unit Price (CDN\$)	Delivery (weeks)
001	Final BOM	<b>Supply of Instrumentation for Tank Gauging Project (Radar/Ultrasonic – Wireless Network)</b>	\$ 151,779.04	16 weeks

- A. FOB Montreal, QC
- B. Currency: CDN
- C. Documentation: Instruction Manuals & Arrangement Drawings (included in unit prices above)
- D. Delivery: Estimated delivery above is from receipt of an enterable order <sup>(1, 2)</sup>

(1) Upon receipt of the Purchase Order, Atlantic Controls (ACL) will proceed with a complete review in order to determine if there are any discrepancies with its proposal. Typically, a week or less is required in order for us to complete this review. Should there be any discrepancies (pricing, valve construction, documentation/QA requirements, T&C's, bid exceptions not reflected in the PO, etc...), these would have to be clarified and agreed upon. Once all issues are clarified, the order is considered enterable. Our quoted delivery begins once the order is considered enterable.

(2) Our quoted delivery does not take into account any of the following: hold points, witness points, review and approval of documents, inspection notice, holidays, and change orders. These will directly impact delivery as they will hold the fabrication process. Since these activities are beyond our control, we will not be held accountable for their impact on the delivery schedule. The quoted delivery is for a typical order unaffected by these elements. Note that final documentation is typically compiled and submitted 2 weeks after the shipment of the last unit in the contract.

- E. Payment Terms: Net 30 days
- F. Warranty: Goods are warranted for twelve (12) months from the date of initial installation or eighteen (18) months from date of shipment by Seller, whichever period expires first.
- G. Sales Taxes and Duty: Extra
- H. Price validity: 30 days
- I. **Total for 5 day Service FAT in NFLD is not included above. Amount to be confirmed following the visit.**



## Tank Gauging Proposal



### **2.0 Detailed Proposal – Final Bill of Materials**

*Cust. Ref:* Formal Proposal – Final  
*Project no:* Tank Gauging Survey  
*Customer:* Cahill Instrumentation

*ACL Ref:* 71932  
*Date:* June 7<sup>th</sup>, 2010  
*Consultant*

## MAIN PROJECT - BILL OF MATERIALS



June 7th, 2010

Martin White

Detailed Proposal Ref. 71932 - Final  
Cahill Instrumentation - Tank Monitoring



Item	Qty	Model	Description	Unit Sell (CAN\$)	Net Sell (CAN\$)
<b>Rosemount/Saab Tank Gauging (Fuel and Sludge Tanks)</b>					
1.1	8	RTG40B-PRO-S0SP1SR0000	Product Description: SAAB RTG40B Pro Transmitter Gauge	\$6,859.00	\$54,872.00
	S		standard accuracy: +/- 10 mm		
	0		no optional software		
	S		CSA approval		
	P		Ultra wide power supply: 24 -240 VDC/AC		
	1S		Primary output: Smart Wireless IS Active		
	R		2210 display unit for remote mounting		
	0		Secondary output: none		
	0		Volume calculation: three pre-configured tank shapes included		
	0		Measuring range: 0-50 m		
	0		Special information: None		
1.2	8	PRO-26SPV0	Product description: SAAB Antenna	\$940.00	\$7,520.00
	2		Cone Antenna		
	6S		6-in cone, 316L SST		
	P		Sealing: PTFE		
	V		O-ring material: Viton		
	0		Special: None		
1.3	8	PRO-THUM	Product Description: SAAB Pro THUM Wireless Hart Adapter (JB/MTG & cable)	\$1,462.00	\$11,696.00
1.4	8	Top Mounting Flange	Product Description: Mounting Flange for 6 in Cone Antenna - 6" 150# SST	\$435.00	\$3,480.00
<b>Rosemount Ultrasonic Level Transmitters (Lube Oil Tanks)</b>					
2.1	4	3105	Product Description: Rosemount 3100 Ultrasonic	\$1,553.00	\$6,212.00
	H		4-20 mA output with HART communication		
	A		aluminum housing		
	1		1/2" NPT conduit entries		
	F		PVDF wetted materials		
	RC		2" NPT threaded process connection		
	I5		FM Intrinsically Safe		
2.2	4	751	Product Description: Rosemount 751 Remote Field Indicator	\$860.00	\$3,440.00
	A		4-20 mA input signal		
	M4		Linear LCD meter, 0-100 scale		
	E5		FM explosion proof		
	B		mounting bracket for 2 in pipe or flat surface		
2.3	4	THUM	Product Description: THUM Wireless Hart Adapter (with JB/MTG and cable)	\$1,462.00	\$5,848.00
<b>Rosemount Wireless Hart Gateway</b>					
3	1	1420A2A3A4N5WL4	Product Description: Smart Wireless Gateway	\$5,899.64	\$5,899.64
	1420		Product Description: Smart Wireless Gateway		
	A		Power Input: 24 VDC, 500 mA		
	2		Ethernet Communications - Physical: Dual Ethernet		
	A3		Operating Frequency & Protocol: User Configurable Burst Rate, 2.4GHz DSSS, WirelessHART		
	A		Serial Communication: Modbus RTU via RS485		
	4		Ethernet Communication - Data: webserver, modbus TCP/IP, AMS, OPC		
	N5		Product Certifications: FM Division 2, Non-incendive		
	WL4		Remote Omni-antenna kit, 10 ft and 40 ft cables, lightning arrestor		
<b>Rosemount 702 Wireless Transmitter (long range repeater)</b>					
4	2	702DX22D1I5WA3WM1B4	Product Description: 702 Discrete Transmitter (to be used as repeater)	\$2,794.70	\$5,589.40
	702		Discrete Transmitter		
	D		Wireless Field Mount		
	X		Output: wireless		
	22		Measurement: Dual Discrete Inputs (N/A for this project)		
	D		Dual Compartment housing - Aluminum		
	1		Conduit Threads: 1/2 " NPT		
	I5		FM Intrinsically Safe, non-incendive, dust ignition proof		
	WA3		User configurable update rate, 2.4 GHz DSSS, Wireless HART		
	WM1		Extended Range, integral antenna		



June 7th, 2010  
Martin White  
Detailed Proposal Ref. 71932 - Final  
Cahill Instrumentation - Tank Monitoring



	B4	Universal L mounting bracket for 2-inch pipe mount - SST (long life power module included in price but shipped loose)		
<b>SAAB Tankmaster Workstation Hardware and Software</b>				
5.1	1	TM20CN000000	SAAB Tankmaster with Qty 2 remote clients	\$22,435.00
		20	Tankmaster WinOPI with Tankserver for up to 20 tanks	
		C	Host Communication: TM Communication Module - <b>OPC Ready</b>	
		N	Network Enabled	
		0	Custody Transfer: none	
		0	Default batch handling	
		0	HTG: none	
		0	Customization: none	
		0	Redundance: none	
5.2	2	TM Network Client	Cost Extra for each Remote Client (Qty 2 offered) - NOT HARDWARE	\$8,401.00
			Precision T3500 Minitower; English Win XP Pro; 2.53GHz (min) Dual-Core CPU; No Monitors; Dual Monitor Capable; Ext. Spkrs; Two 160G (min) SATA drives; RAID 1, 3G RAM; 16 X DVD-CDRW, Three Ethernet Ports	\$3,090.00
5.3	1	VE2539M99L01		
5.4	1	DELL_LCD	Dell 22" LCD Screen	\$395.00
<b>On-site walkthrough and Evaluation</b>				
6	1		Includes travel time, lodging and expenses for individual/s to visit site.	\$2,000.00
<b>5 Days Service / Start-up Assistance for FAT - NFLD</b>				
7	1	Service Rates	Service Rate: \$ 125/hr	TBD
			Travel Rate: \$ 105/hr	TBD
			Hourly Rate for hours in excess of 8 hours, up to 12 hours per day will be at 1.5 X normal rates. Rates for hours in excess of 12 hours, weekends and holidays will be 2 x normal rate.	
			Normal Work Hours 8 am to 5 pm Monday to Friday	
			Other Travel Charges: Mileage at \$ 0.55/km	
			Other expenses ie, Travel, accommodations and meals are Cost + 10 %.	
<b>Telephone Support (Start-up)</b>				
8	1	Telephone Support	Bank of Hours for Telephone Support - Rate: \$ 125/hr	\$2,500.00
			Recommend Allocating 20 hours for this project	
				Total (CAN\$) \$151,779.04

**MAIN PROJECT - Recommended Spare Parts**

June 7th, 2010

Martin White

Detailed Proposal Ref. 71932 - Final  
Cahill Instrumentation - Tank Monitoring**Start-Up and Operational Spares**

Item	Qty	Model	Description	Unit Sell (CAN\$)	Net Sell (CAN\$)
			<b>Rosemount Smart Wireless THUM Adaptors</b>		
1	2	THUM	Product Description: THUM Wireless Hart Adapter (with JB/MTG and cable)	\$1,462.00	\$2,924.00
1	1	THUM	Product Description: THUM Wireless Hart Adapter (NO JB/Cable)	\$1,140.00	\$1,140.00
			<b>Rosemount 702 Wireless Transmitter</b>		
2	1	702DX22D1I5WA3WK1B4	Product Description: 702 Discrete Transmitter	\$2,288.37	\$2,288.37
		702	Discrete Transmitter		
		D	Wireless Field Mount		
		X	Output: wireless		
		22	Measurement: Dual Discrete Inputs (N/A for this project)		
		D	Dual Compartment housing - Aluminum		
		1	Conduit Threads: 1/2 " NPT		
		I5	FM Intrinsically Safe, non-incendive, dust ignition proof		
		WA3	User configurable update rate, 2.4 GHz DSSS, Wireless HART		
		WK1	Long Range, integral antenna		
		B4	Universal L mounting bracket for 2-inch pipe mount - SST		
			(long life power module included in price but shipped loose)		

**Total (CAN\$) \$6,352.37**

**Optional Project Additions**

June 7th, 2010

Martin White

Detailed Proposal Ref. 71932 - Final

Cahill Instrumentation - Tank Monitoring



Item	Qty	Model	Description	Unit Sell (CAN\$)	Net Sell (CAN\$)
			<b>CSI 9420 Wireless Transmitter</b>		
1.1	1	B9420WA1L	Product Description: Wireless Vibration Transmitter	\$2,991.19	\$2,991.19
			CSI 9420 Wireless Machinery Health Transmitter		
			Dual Low Power input (accelerometer)		
			User Configurable Wireless Transmit Rate		
			Output: 2.4 GHz Wireless HART		
			LCD Display		
1.2	1	MHM-89002	Smart Power Module for CSI 9420	\$310.28	\$310.28
1.3	1	A9420WFM	CSI 94XX Wireless Field Mount	\$89.78	\$89.78
1.4	2	A0394R1-1	Low Power Accelerometer, Right Angle, Green Jacket 0 30 feet of cable	\$486.68	\$973.36
1.5	1	MHM-62401	1/2 inch Cable Gland for Standard Accelerometer Cable	\$42.53	\$42.53
			<b>AMS Device Manager</b>		
2	1	AMS Package	Product Description: AMS Device Manager Application	see see proposal	proposal
			Server Plus Station, 25 Tag's		
			Smart Wireless System Interface, 25 Tags		
			AMS Wireless SNAP-ON		
			<i>(please refer to proposal issued separately for additional detail and pricing)</i>		

**Total (CAN\$) \$4,407.14**



## Tank Gauging Proposal



### **3.0 General and Technical Comments**

#### **Final Comments:**

Please refer to the "Belco Wireless Audit Report" which was sent prior to this finalized proposal. The general and technical comments below applied to our proposal prior to the site audit and some of which no longer apply. In the audit report, final recommendations have been made for the bill of material & installation best practices.

#### **General Comments (*Prior to Site Survey*)**

1. The equipment prices provided in this proposal are firm. However, the overall scope and/or bill of materials is subject to change pending the results of the walkthrough on-site. The suitability of wireless technology and the number of gateways required is to be evaluated on-site. We trust you use these figures toward a preliminary project total cost.
2. In regard to surge protection, we have not included this in our proposal. This is an installation practice that we do not typically assist with. We feel that it would be best left with your team. Please let us know if this is a problem.
3. In regard to the site survey, we have included a price adder for this individual/s to travel and perform this service. In terms of timing, we are somewhat flexible. The individual/s visiting site will need some notice in order to coordinate travel etc. At this point, we do not know exactly who will be providing this service, but this can be confirmed at a later time.
4. During the site walkthrough, the topic of startup services and assistance will also be addressed. This is not included in the proposal as it is difficult to determine what, if any services will be required. The walkthrough will better define the bill of materials and also identify any specific implementation/startup challenges.

*Cust. Ref:* Formal Proposal – Final  
*Project no:* Tank Gauging Survey  
*Customer:* Cahill Instrumentation

*ACL Ref:* 71932  
*Date:* June 7<sup>th</sup>, 2010  
*Consultant*



## Tank Gauging Proposal



### **3.0 General and Technical Comments (cont)**

#### **Technical Comments (Prior to Site Survey):**

1. As previously discussed, a larger cone antenna for the Pro gauges will result in a more concentrated beam width and hence, fewer echoes. For this proposal, I have offered 6 inch cone antennas which will require a 6 inch nozzle and mounting flange etc. Also per our conversations, I have included the 6 inch diameter top mounting flange for the installation.
2. Following the on-site walkthrough, we will have a better understanding of the wireless mesh and the number of required gateways. The location of the gateway/s should be optimized to ensure the most reliable data transfer and network strength but also to minimize the associated equipment cost etc. Previously we had discussed the possibility of utilizing 2 or possibly 3 gateways which would in turn relay all of the wireless information back to a central location (ie. The location of the workstation). However, there is one potential obstacle in the communication topology. If there are multiple gateways in the mesh, they will not be able to speak with one another and relay information. In the event that Qty 1 gateway is insufficient, then each gateway will require its own hardwire connection to the workstation. For the purpose of this proposal, I have included Qty 2 wireless gateways. Please keep in mind that there could be additional costs associated with the hardwire connections between the 1420 and the workstation PC. (ie. Ethernet Cabling and potentially a small network switch).
3. The 3100 Ultrasonic process connection is 2" male NPT (PVDF material) and it is designed to be mounted in a PVC flange. We can supply a 2" NPT to 2", 3", 4" or 6" flange piece separately if necessary. For the moment, it has not been included in our proposal. If you can confirm the size of the existing and/or future mounting nozzle, we can provide pricing for this piece.
4. As discussed, wireless technology is not intended for safety shutdown applications. It's for monitoring and some control applications.
5. The scope of the management software has changed which is the primary reason for this Revised submittal. We are now offering a fully licensed Tankmaster package as opposed to Tankmaster "View". This is primarily to address the need for alarms and the possibility of remote clients in the future. We have presented a 20 Tank option but some of the functionality is flexible. The package offered is for one client and the cost adder is shown for each additional client in the BOM. For remote clients, the network enable feature must be specified in the Tankmaster package.

Alternatively, if the other workstations are for viewing only, the "Network Enable" option in the software is not necessary. We could use the Tankmaster Net package (over and above the software) with 3 users. This allows up to 3 users to login via a webbrowser and view tank levels etc.

***Note: If the customer just wants 1 workstation with the ability to output data to their DCS, we do not need the remote clients or Tankmaster NET. Please confirm what functionality is required.***



## Tank Gauging Proposal



### **4.0 Terms and Conditions**

*Cust. Ref:* Formal Proposal – Final  
*Project no:* Tank Gauging Survey  
*Customer:* Cahill Instrumentation

*ACL Ref:* 71932  
*Date:* June 7<sup>th</sup>, 2010  
*Consultant*

## TERMS AND CONDITIONS OF SALE

These terms and conditions, the attendant quotation or acknowledgment, and all documents incorporated by reference therein, binds seller (Laurentian Controls Inc) hereinafter the Seller, and the buyer, hereinafter Buyer, and constitutes the entire agreement (Agreement) between Buyer and Seller for the provision of services (Services) and/or the sale of goods (Goods) including (except as provided in Section 10) firmware incorporated therein.

**1. PRICES:** Unless otherwise specified by Seller, Seller's price for the Goods and/or Services shall remain in effect for thirty (30) days after the date of Seller's quotation or acceptance of the order for the Goods/Services, whichever is delivered first, provided an unconditional, complete authorization for the immediate manufacture and shipment of the Goods and/or provision of Services pursuant to Seller's standard order processing procedures is received and accepted by Seller within such time period. If such authorization is not received by Seller within such thirty (30) day period, Seller shall have the right to change the price for the Goods/Services to Seller's price in effect for the Goods/Services at the time the order is released to final manufacture. Prices for Goods do not cover storing, installing, standing up or maintaining Goods unless expressly stated in Seller's quotation. Notwithstanding the foregoing, the price for Goods/Services sold by Seller, but manufactured by others, shall be Seller's price in effect at the time of shipment to Buyer.

**2. DELIVERY, ORDER ACCEPTANCE AND DOCUMENTATION:** All shipping dates are approximate and are based upon Seller's prompt receipt of all necessary information from Buyer to properly process the order. Notwithstanding any provisions to the contrary in this or other documents related to this transaction, and regardless of how price was quoted, whether FOB, FAS, EXW or otherwise, legal title to the Goods and risk of loss thereto shall transfer to Buyer upon delivery to the freight carrier at the shipping point. Seller shall provide Buyer with that data/documentation which is specifically identified in the quotation. If additional copies of data/documentation or non-standard data/documentation are to be provided by Seller, they shall be provided to Buyer at Seller's price then in effect. Data/documentation marked as confidential or proprietary may not be reproduced or used for any purpose other than the purpose for which it was provided and may not be disclosed to third parties without the prior written permission of Seller.

**3. EXCUSE OF PERFORMANCE:** Seller shall not be liable for delays in performance or for non-performance due to failure or interruption of computer or telecommunication systems, acts of God, war, riot, fire, terrorism, labor trouble, unavailability of materials or components, explosion, accident, compliance with governmental requests, laws, regulations, orders or actions, or other unforeseen circumstances or causes beyond Seller's reasonable control. In the event of such delay, the time for performance or delivery shall be extended by a period of time reasonably necessary to overcome the effect of the delay.

**4. TERMINATION AND SUSPENSION BY BUYER:** Buyer may terminate or suspend its order for any or all of the Goods/Services covered by the Agreement only upon Seller's written consent or pursuant to Seller's applicable policy or practices covering such termination or suspension.

**5. LIMITED WARRANTY:** Subject to the limitations contained in Section 6 herein, Seller warrants that the licensed firmware embodied in the Goods will execute the programming instructions provided by Seller, and that the Goods manufactured by Seller will be free from defects in material or workmanship under normal use and care and Services will be performed by trained personnel using proper equipment and instrumentation for the particular Service provided. The foregoing warranties will apply until the expiration of the applicable warranty period. Goods are warranted for twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Seller, whichever period expires first. Consumables and Services are warranted for a period of 90 days from the date of shipment or completion of the Services. Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer. Buyer agrees that Seller has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products. If Buyer discovers any warranty defects and notifies Seller thereof in writing during the applicable warranty period, Seller shall, at its option, correct any errors that are found by Seller in the firmware or Services or repair or replace F.O.B. point of manufacture that portion of the Goods or firmware found by Seller to be defective, or refund the purchase price of the defective portion of the Goods/Services. All replacements or repairs necessitated by inadequate maintenance, normal wear and usage, unsuitable power sources or environmental conditions, accident, misuse, improper installation, modification, repair, use of unauthorized replacement parts, storage or handling, or any other cause not the fault of Seller are not covered by this limited warranty, and shall be at Buyer's expense. Seller shall not be obligated to pay any costs or charges incurred by Buyer or any other party except as may be agreed upon in writing in advance by Seller. All costs of dismantling, reinstallation and freight and the time and expenses of Seller's personnel and representatives for site travel and diagnosis under this warranty clause shall be borne by Buyer unless accepted in writing by Seller. Goods repaired and parts replaced by Seller during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Seller and can be amended only in a writing signed by Seller. THE WARRANTIES AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE. THERE ARE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE OR ANY OTHER MATTER WITH RESPECT TO ANY OF THE GOODS OR SERVICES.

**6. LIMITATION OF REMEDY AND LIABILITY:** SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE. THE REMEDIES OF BUYER SET FORTH IN THIS AGREEMENT ARE EXCLUSIVE. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE TO BUYER OF THE SPECIFIC GOODS MANUFACTURED OR SERVICES PROVIDED BY SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. THE TERM "CONSEQUENTIAL DAMAGES" SHALL INCLUDE, BUT NOT BE LIMITED TO, LOSS OF ANTICIPATED PROFITS, REVENUE OR USE AND COSTS INCURRED INCLUDING WITHOUT LIMITATION FOR CAPITAL, FUEL AND POWER, AND CLAIMS OF BUYER'S CUSTOMERS.

**7. PATENTS:** Subject to the limitations contained in Section 6, Seller shall defend any suits brought against Buyer based on a claim that use of the Goods sold by Seller constitutes an infringement of a valid patent of the United States, and shall pay any damages awarded therein against Buyer, provided that Buyer promptly notifies Seller in writing of the filing of such suit or the threat thereof, permits Seller to control completely the defense or compromise of such claim of infringement, and provides all reasonable assistance and cooperation requested by Seller for the

defense of such suit. In the event that only the Goods sold by Seller are held to be infringing in such suit and their use is enjoined, Seller shall, at its sole option and expense, provide a commercially reasonable alternative, including, but not limited to, procuring for Buyer the right to continue using the Goods, replacing them with a non-infringing product or modifying them so they become non-infringing. Buyer agrees that Seller shall not be liable for infringement, and that Buyer shall fully indemnify Seller therefore, if infringement is based upon the use of Goods in connection with goods not sold by Seller or in a manner for which the Goods were not designed by the Seller or if the Goods were not designed by the Seller or if the Goods were designed by the Buyer or were modified by or for the Buyer in a manner to cause them to become infringing.

**8. TAXES:** Any tax or governmental charge payable by the Seller because of the manufacture, sale or delivery of the Goods, or provision of Services, may at Seller's option be added to the price herein specified. The foregoing shall not apply to taxes based upon Seller's net income.

**9. TERMS OF PAYMENT:** Unless otherwise agreed by Seller, and subject to the approval of Seller's Credit Department, items are EXW shipping point, net 30 days from date of Seller's invoice in Canadian currency, except for applicable milestone payments or export shipments for which Seller may require other arrangements. Freight charges may include shipping and handling charges, and Buyer shall pay all such charges. If any payment owed to Seller hereunder is not paid when due, it shall bear interest, at a rate to be determined by Seller which shall not exceed the maximum rate permitted by law, from the date on which it is due until it is received. Seller shall have the right, among other remedies, either to terminate the Agreement or to suspend further deliveries under this and/or other agreements with Buyer in the event Buyer fails to make any payment hereunder when due. Buyer shall be liable for all expenses attendant to collection of past due amounts, including attorneys' fees.

**10. SOFTWARE AND FIRMWARE:** Notwithstanding any other provision herein to the contrary, Seller or applicable third party owner shall retain all rights of ownership and title in its respective firmware and software, including all copyrights relating to such firmware and software and all copies of such firmware and software. Except as otherwise provided herein, Buyer is hereby granted a non-exclusive, royalty-free license to use firmware and software, and copies of firmware and software, incorporated into the Goods only in conjunction with such Goods and only at the Buyer's plant site where the Goods are first used. Buyer's use of certain firmware (as specified by Seller) and all other software shall be governed exclusively by Seller's and/or third party owner's applicable license terms.

**11. BUYER SUPPLIED DATA:** To the extent that Seller has relied upon any data or information supplied by Buyer to Seller ("Data"), in the selection or design of the Goods and/or provision of the Services and the preparation of Seller's quotation, and the Data is inadequate or inaccurate, any warranties or other provisions contained herein which are affected by such conditions shall be null and void.

**12. RETURNS:** Goods may only be returned for credit upon prior approval by the seller and subject to a re-stocking charge to be determined by the Seller. The amount of credit shall be subject to further reduction in an amount to be determined by seller depending upon the condition of the goods when returned to seller. All returned goods must be returned freight prepaid by the buyer.

**13. GENERAL PROVISIONS:** (a) Buyer shall not assign its rights or obligations under the Agreement without Seller's prior written consent. (b) There are no understandings, agreements or representations, express or implied, not specified in the Agreement. (c) No action, regardless of form, arising out of transactions under the Agreement, may be brought by either party more than two (2) years after the cause of action has accrued. (d) Any modification of these terms and conditions must be set forth in a written instrument signed by a duly authorized representative of Seller. (e) This contract is to be construed according to the laws of the Province of Quebec and the federal laws of Canada applicable thereto. (f) UNLESS OTHERWISE SPECIFICALLY PROVIDED IN SELLER'S QUOTATION, GOODS AND SERVICES HEREUNDER ARE NOT INTENDED FOR USE IN ANY NUCLEAR OR NUCLEAR RELATED APPLICATIONS. Buyer (i) accepts Goods and Services in accordance with the restriction set forth in the immediately preceding sentence, (ii) agrees to communicate such restriction in writing to any and all subsequent purchasers or users and (iii) agrees to defend, indemnify and hold harmless Seller from any and all claims, losses, liabilities, suits, judgments and damages, including incidental and consequential damages, arising from use of Goods and Services in any nuclear or nuclear related applications, whether the cause of action be based in tort, contract or otherwise, including allegations that the Seller's liability is based on negligence or strict liability. (g) The 1980 United Nations Convention on Contracts for the International Sale of Goods does not apply to this Agreement. (h) If any provision of the Agreement is invalid under any statute or rule of law, such provision, to that extent only, shall be deemed to be omitted without affecting the validity of the remainder of the Agreement.



Material Requisition No: 60005-L21-J-MR-00001-001



## **5.0 Technical Literature**

*Cust. Ref:* Formal Proposal - Final  
*Project no:* Tank Gauging Survey  
*Customer:* Cahill Instrumentation

*LCL Ref:* 71932  
*Date:* June 7<sup>th</sup>, 2010  
*Consultant*

# Smart Wireless Gateway

- *Gateway connects WirelessHart™ self-organizing networks with any host system*
- *Easy configuration and management of self-organizing networks*
- *Easy integration into control systems and data applications through serial and Ethernet connections*
- *Seamless integration into AMS® Device Manager and DeltaV™*
- *Greater than 99% reliability with industry proven security*
- *WirelessHART™ capabilities extends the full benefit of PlantWeb® to previously inaccessible locations*



**WirelessHART**  
Expanding the Possibilities

## Contents

Success With Smart Wireless .....	page 2
WirelessHART... The Industry Standard .....	page 3
Specifications .....	page 5
Product Certifications .....	page 6
Dimensional Drawings.....	page 7
Ordering Information .....	page 9
Accessories and Spare Parts .....	page 10



**EMERSON**  
Process Management

# Smart Wireless Gateway

## Success With Smart Wireless

### Self-Organizing Networks

With reliability and ease of use, self-organizing networks are perfect in any environment. Multiple communication paths and automatic path configuration result in over 99% reliability and allows you to deploy your instrumentation without a site survey, saving you time and money.

### Open Integration

With a variety of options, the Smart Wireless Gateway gives you the freedom to choose the Smart Wireless Solutions best suited for your installation:

**Flexible:** Using OPC or Modbus TPC allows flexible integration of your wireless network with any host system.

**Serial:** The Smart Wireless Gateway supports Modbus RTU for integration into legacy host systems.

**PlantWeb:** The Smart Wireless Gateway natively integrates into any PlantWeb® architecture for ease of use in commissioning your wireless network.

**Stand Alone:** Every Gateway comes with a web interface that provides a stand alone host interface to manage your wireless network, without a dedicated host system.

### Layered Security Keeps Your Network Safe

Emerson Process Management's layered approach to wireless network security ensures that your network stays protected. The network devices implement Encryption, Authentication, Verification, Anti-Jamming and Key Management methods to ensure that data transmissions are secure.

### AMS Wireless Configurator

AMS Wireless Configurator uses the power of Enhanced EDDL to assist in the setup and configuration of your Smart Wireless Field Devices and is shipped with every Smart Wireless Gateway.

### Powers PlantWeb



The Smart Wireless Gateway powers PlantWeb® by giving you access to intelligent devices using WirelessHART technology and seamlessly integrating them into AMS™ Suite software and the DeltaV™ or Ovation™ systems.

### Rugged Housing

The Smart Wireless Gateway is suitable for field mounting in any Zone 2/Division 2, general purpose area and is NEMA 4x/IP65 rated. So, the Gateway can be mounted directly in the process environment.

## SMART WIRELESS SOLUTIONS

### Smart Wireless Field Devices

Emerson Process Management has a family of Smart Wireless products to integrate different measurement types into a self-organized network that optimizes plant performance and reduces risk to personnel. The different measurement types offered include pressure, temperature, discrete, position monitoring, pH, and vibration.

### Smart Wireless THUM™ Adapter

The Smart Wireless THUM Adapter incorporates data from any wired HART™ device into the self-organizing network, enhancing plant performance and extending asset life.

### AMS® Wireless SNAP-ON™

The AMS Wireless SNAP-ON application helps to plan and validate your wireless network using best practices. It allows for viewing of communication details graphically in real time, and helps maintain the health of your entire self-organizing network.

## WirelessHART... The Industry Standard

### Self-Organizing, Adaptive Mesh Routing

- No wireless expertise required, devices automatically find the best communication paths
- Network continuously monitors paths for degradation and repairs itself
- Adaptive behavior provides reliable, hands-off operation and simplifies network deployments, expansion and reconfiguration
- Supports both star and mesh topologies

### Industry Standard Radio with Channel Hopping

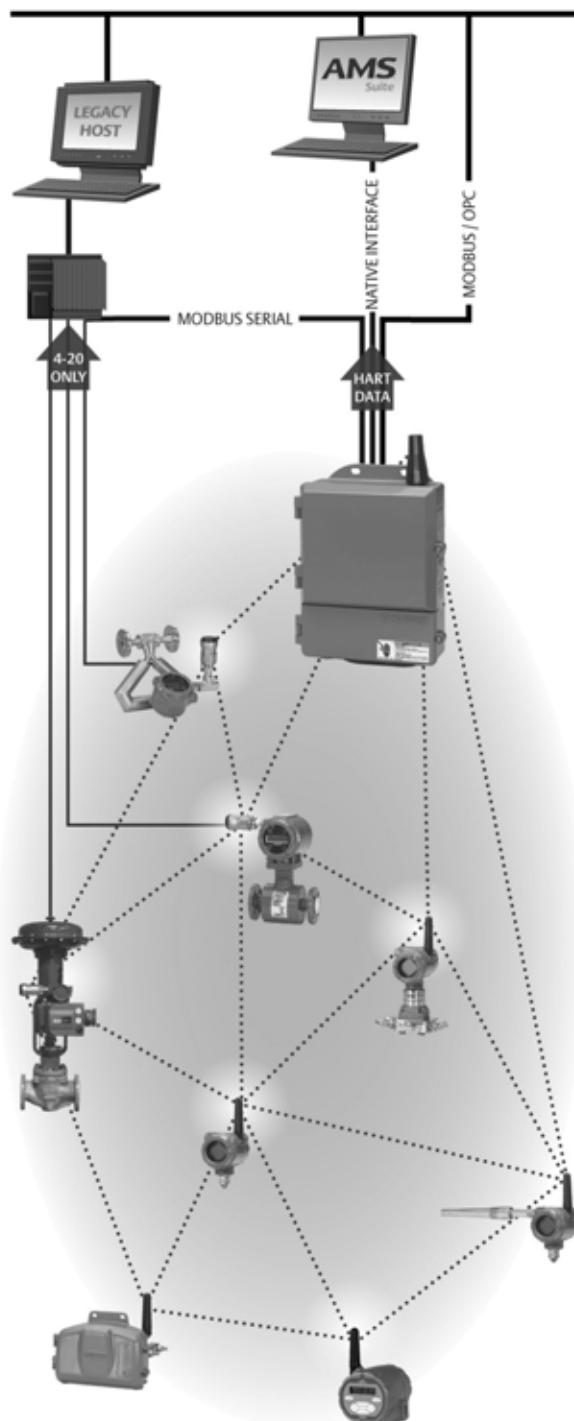
- Standard IEEE 802.15.4 radios
- 2.4 GHz ISM band sliced into 16 radio-channels
- Continually “hop” across channels to avoid interference and increase reliability
- Direct sequence spread spectrum (DSSS) technology delivers high reliability in challenging radio environment

### Self-Healing Network

- If an obstruction is introduced into the mesh network, devices will automatically find the best alternate communication path. This alternate path will be created and the information will continue to flow.

### Seamless Integration to Existing Hosts

- Transparent and seamless integration
- Same control system applications
- Gateways connect using industry protocols



# Smart Wireless Gateway

## Smart Wireless Gateway

Flexible Connectivity Options and Easy Device Configuration

### Host Integration with DeltaV™ and Ovation®

- Gain real-time information on process and assets with intuitive operator interface
- Native interface between control system and gateway



### Flexible Integration

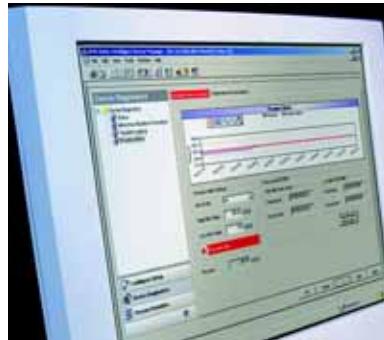
- Smart Wireless Gateway connects legacy hosts, Serial Modbus®, and Ethernet or OPC output

### Device Specifications

- Update rate: User Selectable 8, 16, 32 second or 1 to 60 minutes
- Network Size: Up to 100 devices
- Output: Ethernet, Modbus, OPC, Serial
- Approvals: FM, CSA, ATEX, IECEx

### Complete Asset Management with AMS Device Manager

- Manage predictive diagnostics from wired and wireless field devices to identify problems before the process is affected
- Streamline wireless device configuration through Smart Wireless Gateway



**WirelessHART**  
Expanding the Possibilities

### Other Interfaces

- Web interface and AMS Wireless Configurator are standard with every gateway for set-up and initial configuration of wireless devices
- Data historian connectivity for documentation and compliance information

## Specifications

### Functional Specifications

**Input Power**

24 V dc

500 millamps required to power the Smart Wireless Gateway module.

**Environmental**

Operating Temperature Range:  
-40 to 140 °F (-40 to 60 °C)

Operating Humidity Range:  
10-90% relative humidity

**EMC Performance**

Complies with EN61326-1:2006.

**Antenna Options**

Integrated Omnidirectional Antenna  
Optional remote mount Omnidirectional Antenna

### Physical Specifications

**Weight**

10 lb (4.54 kg)

**Material of Construction****Housing**

Low-copper aluminum, NEMA 4X

**Paint**

Polyurethane

**Cover Gasket**

Silicone Rubber

**Antenna**

PBT/PC integrated Omnidirectional Antenna

**Certifications**

Class I Division 2 (U.S.)

Equivalent Worldwide

### Communication Specifications

**Isolated RS485**

2-wire communication link for Modbus RTU multidrop connections

Baud rate: 57600, 38400, 19200, or 9600

Protocol: Modbus RTU

Wiring: Single twisted shielded pair, 18 AWG. Wiring distance is approximately 4,000 ft. (1,524 m).

**Ethernet**

10/100base-TX Ethernet communication port

Protocols: Modbus TCP, OPC, https (for Web Interface)

Wiring: Cat5E shielded cable. Wiring distance 328 ft. (100 m).

**Fiber Optic Ethernet (optional)**

100BaseFx optical Ethernet communication port

Wavelength: 1300 nm center

Multimode

SC connectors

Protocols: Modbus, TCP, OPC, https (for Web Interface)

Wiring: 50/125 um or 62.5/125 um fiber, 2.48 miles (4.0 k,) maximum distance.

**Modbus**

Supports Modbus RTU and Modbus TCP with 32-bit floating point values, integers, and scaled integers.

Modbus Registers are user-specified.

**OPC**

OPC server supports OPC DA v1, v2, v3

### Self-Organizing Network Specifications

**Protocol**

WirelessHART, 2.4 - 2.5 GHz DSSS.

**Maximum Network Size**

100 Devices

**Supported Device Update Rates**

8 sec. to 60 min.

**Network Size/Latency**

100 Devices: up to 10 sec.

50 Devices: up to 5 sec.

**Data Reliability**

&gt;99%

### System Security Specifications

**Ethernet**

Secure Sockets Layer (SSL)- enabled (default) TCP/IP communications

**Smart Wireless Gateway Access**

Role-based Access Control (RBAC) including Administrator, Maintenance, Operator, and Executive. Administrator has complete control of the gateway and connections to host systems and the self-organizing network.

**Self-Organizing Network**

AES-128 Encrypted WirelessHART, including individual session keys. Drag and Drop device provisioning, including unique join keys and white listing.

**Internal Firewall**

User Configurable TCP ports for communications protocols, including Enable/Disable and user specified port numbers. Inspects both incoming and outgoing packets.

## Product Certifications

### Approved Manufacturing Locations

Rosemount Inc. – Chanhassen, Minnesota, USA  
Emerson Process Management GmbH & Co. - Karlstein, Germany  
Emerson Process Management Asia Pacific Private Limited - Singapore  
Beijing Rosemount Far East Instrument Co., Limited - Beijing, China

### Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

### FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions. This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

### Ordinary Location Certification for FM

As standard, the Gateway has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

### North American Certifications

N5 FM Division 2, Non-Incendive  
Certificate Number: 3028321  
Nonincendive for Class I, Division 2, Groups A, B, C, and D.  
Dust Ignition-proof for Class II, III, Division 1,  
Groups E, F, and G; Indoors/outdoor locations;  
NEMA Type 4X  
Temperature Code: T4 (-40 °C < T<sub>a</sub> < 60 °C)

### Canadian Standards Association (CSA)

N6 CSA Division 2, Non-Incendive  
Certificate Number: 1849337  
Suitable for Class I, Division 2, Groups A, B, C, and D.  
Dust Ignition-proof for Class II, Groups E, F, and G;  
Suitable for Class III Hazardous Locations.;  
Install per Rosemount drawing 01420-1011.  
Temperature Code: T4 (-40 °C < T<sub>a</sub> < 60 °C)  
CSA Enclosure Type 4X

### European Union Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at [www.rosemount.com](http://www.rosemount.com). A hard copy may be obtained by contacting your local sales representative.

#### ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

#### Electro Magnetic Compatibility (EMC) (2004/108/EC)

Emerson Process Management complies with the EMC Directive.

#### Radio and Telecommunications Terminal Equipment Directive (R&TTE)(1999/5/EC)

Emerson Process Management complies with the R&TTE Directive



### European Certification

- N1 ATEX Type n  
See note below  
Certificate Number: Baseefa 07ATEX0056X  
ATEX Marking: Ex II 3 G  
EEx nA NI IIC T4 (-40 °C < T<sub>a</sub> < 60 °C)  
ND ATEX Dust Ignition-proof  
Certificate Number: Baseefa 07ATEX0057  
EX tD A 22 IP66 T135 (-40 °C < T<sub>a</sub> < 60 °C)  
EEx nA nl IIC T4 T4 (-40 °C < T<sub>a</sub> < 60 °C) II 3D  
Vmax = 28V  
N7 IECEx Type n  
See note below  
Certificate Number: IECEx BAS 08.0012X  
Ex nC IIC T4 (-40 °C <= T<sub>a</sub> <= 60 °C)  
Rated Voltage: 28V  
NF IECEx Dust Ignition-proof  
Certification Number: IECEx BAS 07.0013  
Ex tD A22 IP66 T135 (-40 °C < T<sub>a</sub> < 60 °C)  
V<sub>max</sub> = 28V

#### Conditions of Installing N1 and N7:

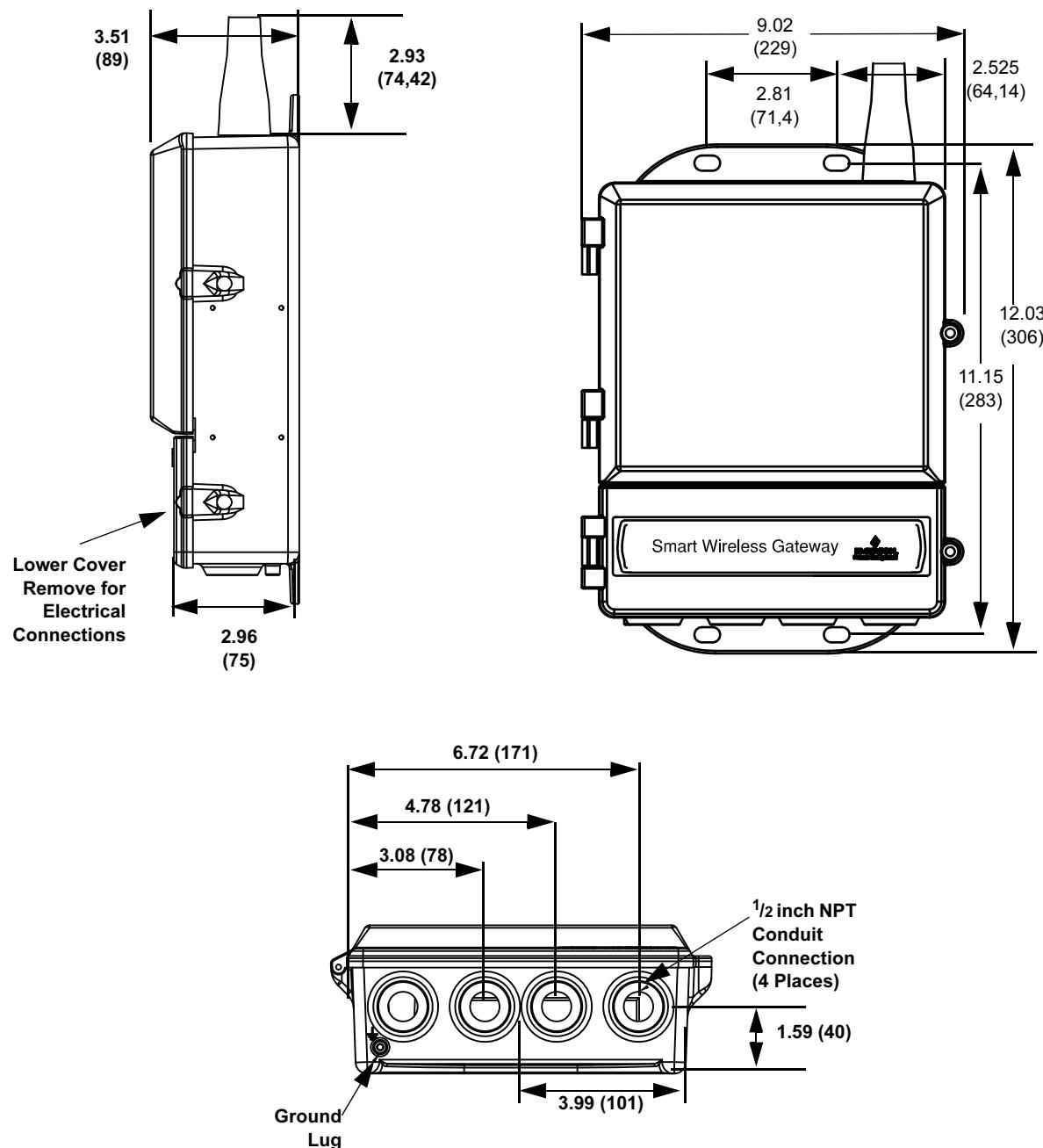
The Apparatus is not capable of withstanding the 500V insulation test required by Clause 9.4 of EN 60079-15: 2005. This must be taken into account when installing the apparatus.

### Combinations of Certifications

KD Combination of N5, N6, and N1.

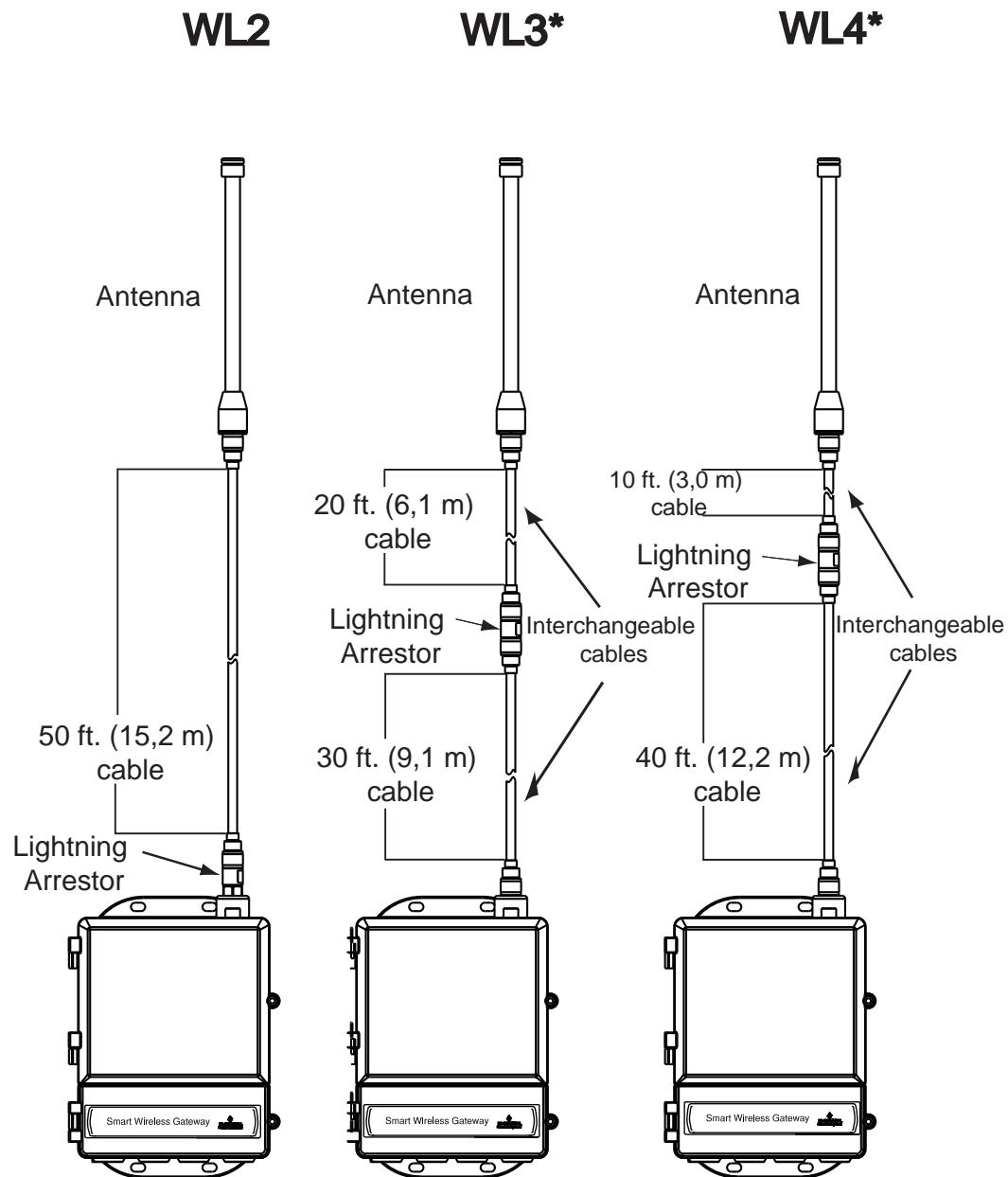
## Dimensional Drawings

FIGURE 1. Smart Wireless Gateway (Dimensions are in inches (millimeters)



# Smart Wireless Gateway

## Remote Omni-Antenna Kit



The Remote Omni-Antenna kit includes sealant tape for remote antenna connection, as well as mounting brackets for the antenna, Lightning Arrestor, and the Smart Wireless Gateway.

***Lightning protection is included on all the options. WL3 and WL4 provide lightning protection along with the ability to have the gateway mounted indoors, the antenna mounted outdoors, and the lightning arrestor mounted at the building egress.***

***\*Note that the coaxial cables on the remote antenna options WL3 and WL4 are interchangeable for installation convenience.***

## **Ordering Information**

<b>Model</b>	<b>Product Description</b>
1420	Smart Wireless Gateway
<b>Code</b>	<b>Power Input</b>
A	24 VDC, 500 mA
<b>Code</b>	<b>Ethernet Communications - Physical Connection</b>
1	Ethernet <sup>(1)</sup> <sup>(2)</sup>
2	Dual Ethernet <sup>(3)</sup> <sup>(4)</sup>
3	Fiber Optic Ethernet <sup>(5)</sup> <sup>(6)</sup>
<b>Code</b>	<b>Wireless Update Rate, Operating Frequency, and Protocol</b>
A3	User Configurable Update Rate, 2.4 GHz DSSS, WirelessHART™ <sup>(7)</sup>
<b>Code</b>	<b>Serial Communication</b>
N	None
A	Modbus RTU via RS485 <sup>(7)</sup>
<b>Code</b>	<b>Ethernet Communication - Data Protocols</b>
2	Webserver, Modbus TCP/IP, AMS Ready
4	Webserver, Modbus TCP/IP, AMS Ready, OPC
5	DeltaV Ready <sup>(8)</sup>
<b>Code</b>	<b>Other Options</b>
<b>Product Certifications</b>	
N5	FM Division 2, Non-incendive
N6	CSA Division 2, Non-incendive
N1	ATEX Type n
ND	ATEX Dust Ignition-proof
N7	IECEx Type n
NF	IECEx Dust Ignition-proof
KD	FM & CSA Division 2, Non-incendive and ATEX Type n
<b>Adapters</b>	
J1	CM 20 Conduit Adapter
J2	PG 13.5 Conduit Adapter
J3	3/4 NPT Conduit Adapter
<b>Antenna Options<sup>(9)</sup></b>	
WL2	Remote Omni-Antenna Kit, 50 ft. (15.2 m) cable, Lightning Arrestor
WL3	Remote Omni-Antenna Kit, 20 ft. (6.1 m) and 30 ft. (9.1 m) cables, Lightning Arrestor
WL4	Remote Omni-antenna Kit, 10 ft. (3.0 m) and 40 ft. (12.2 m) cables, Lightning Arrestor

**Typical Model Number:** 1420 A 1 A3 A 2 N5

(1) Single active 10/100 baseT Ethernet port with RJ45 connector.

(2) Additional ports disabled.

(3) Dual active 10/100 baseT Ethernet ports with RJ45 connectors.

(4) Multiple active ports have separate IP addresses, firewall isolation, and no packet forwarding.

(5) 1300nm Multimode Optical fiber connection with separate SC connectors for Rx and Tx.

(6) Includes features of Option 1

(7) Convertible to RS232 via adaptor

(8) Includes Webserver, Modbus TCP/IP, AMS Ready, OPC,

(9) The WL2 - WL4 options require minor assembly.

## Accessories and Spare Parts

TABLE 1. Accessories

Item Description	Part Number
AMS® Wireless SNAP-ON™, 1 Gateway License	01420-1344-0001
AMS Wireless SNAP-ON, 5 Gateway Licenses	01420-1344-0002
AMS Wireless SNAP-ON, 10 Gateway Licenses	01420-1344-0003
AMS Wireless SNAP-ON, 5-10 Upgrade Licenses	01420-1344-0004
Serial Port HART Modem and Cables only	03095-5105-0001
USB Port HART Modem and Cables only	03095-5105-0002

**Product Data Sheet**

00813-0200-4420, Rev AA  
January 2009

**Smart Wireless Gateway**

---

## Product Data Sheet

00813-0200-4420, Rev AA  
January 2009

## Smart Wireless Gateway

Standard Terms and Conditions of Sale can be found at [www.rosemount.com\terms\\_of\\_sale](http://www.rosemount.com\terms_of_sale)

The Emerson logo is a trade mark and service mark of Emerson Electric Co.

Rosemount and the Rosemount logotype are registered trademarks of Rosemount Inc.

PlantWeb is a registered trademark of one of the Emerson Process Management group of companies.

HART and WirelessHART are registered trademarks of the HART Communication Foundation

All other marks are the property of their respective owners.

Modbus is a trademark of Modicon, Inc.

© 2008 Rosemount Inc. All rights reserved.

**Emerson Process Management**  
**Rosemount Inc.**  
8200 Market Boulevard  
Chanhassen, MN 55317 USA  
T (U.S.) 1-800-999-9307  
T (International) (952) 906-8888  
F (952) 949-7001

**Emerson Process Management**  
Blegistrasse 23  
P.O. Box 1046  
CH 6341 Baar  
Switzerland  
T +41 (0) 41 768 6111  
F +41 (0) 41 768 6300

**Emerson FZE**  
P.O. Box 17033  
Jebel Ali Free Zone  
Dubai UAE  
T +971 4 883 5235  
F +971 4 883 5312

**Emerson Process Management**  
**Asia Pacific Pte Ltd**  
1 Pandan Crescent  
Singapore 128461  
T +65 6777 8211  
F +65 6777 0947  
Service Support Hotline: +65 6770 8711  
Email: Enquiries@AP.EmersonProcess.com



**EMERSON**  
Process Management

# SMART WIRELESS THUM™ ADAPTER

## ROSEMOUNT WIRELESS TANK GAUGING

WirelessHART

## Reach more tanks at less cost

Rosemount wireless tank gauging gives you access to tank gauging data that was previously out of reach, either technically or economically. Greatly reducing field wiring leads to huge savings in infrastructure, design and labor required for installation and commissioning.

### Better utilization of tank capacity

Tank gauging data from remotely located tanks, previously collected manually or not at all, can now be integrated into the system. This will result in more efficient tank capacity utilization, more accurate inventory and better loss control.

### Cut costs and save time with a wireless installation

Costs associated with wiring, additional hardware, and labor easily drive up the budget for any tank farm expansion project, large or small. However, Emerson's Smart Wireless solutions enable cost-effective implementation of new measurement points. In addition, compared to other systems, the time between project start-up and an up-and-running Smart Wireless tank gauging system is drastically reduced.



TankRadar Rex with the Smart Wireless THUM Adapter powers the PlantWeb digital plant architecture by delivering more advanced field intelligence for better decision-making to help you achieve unparalleled efficiency and productivity.



### Key benefits

- Complete automatic tank gauging using WirelessHART
- Large cabling cost savings
- Reach tank areas with poor infrastructure
- Redundant communication in already wired systems
- Enables advanced diagnostics in emulation applications

### EASY TO USE. EASY TO INTEGRATE.

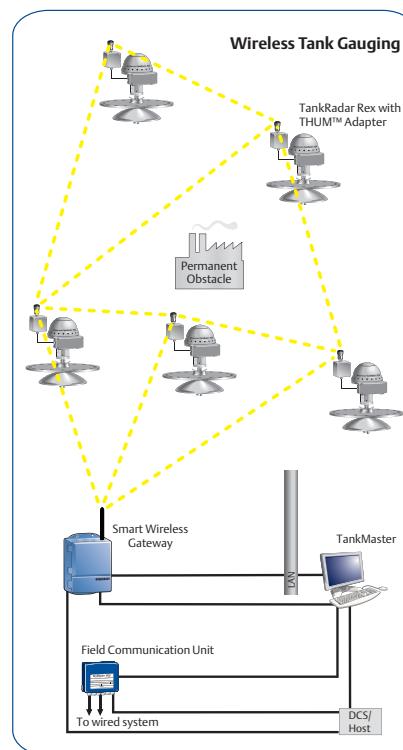
The Smart Wireless THUM Adapter provides the wireless interface between the TankRadar Rex or TankRadar Pro radar gauge and the TankMaster inventory software or host/DCS system.

The self-organizing mesh network automatically finds the best way around any fixed or temporary obstacle. All wireless devices communicate with TankMaster or a host/DCS system through the Smart Wireless Gateway.

Each wireless node in a tank gauging system consists of either a Rosemount TankRadar Rex or TankRadar Pro gauge, connected to mains power and supplied with a THUM adapter.

These nodes can easily join an existing Emerson Smart Wireless network or form their own network.

Emerson's Smart Wireless technologies put valuable information within reach – easily and cost effectively.



### Is the wireless mesh network secure and reliable enough for critical tank gauging data?

Yes. All data is protected by encryption, authentication, verification and anti-jamming.

### What type of tank gauging data can the THUM adapter provide?

The wireless transmission supports important measurement data handled by the gauge, such as level, temperature, water level and pressure.

### How do I handle configuration of the radar gauges in a wireless system?

The THUM adapter can route any HART® command to the radar gauge which allows full configuration of the TankRadar Rex or TankRadar Pro when using AMS.

## BETTER INVENTORY AND IMPROVED LOSS CONTROL

The Smart Wireless THUM Adapter can transmit up to four variables and additional HART® status information at a user configurable update rate. Access to this new information enables you to fully optimize your tank operations and improve inventory control.

### Selectable PV, SV, TV and QV HART variable

- Level
- Level Rate
- Average Temperature
- Water Level
- Tank Pressure (liquid/vapor)

### Status Information

- Relay Status
- Approved Level
- Approved Temperature
- Signal Strength
- Device Status

## ADVANCED CONFIGURATION AND DIAGNOSTICS

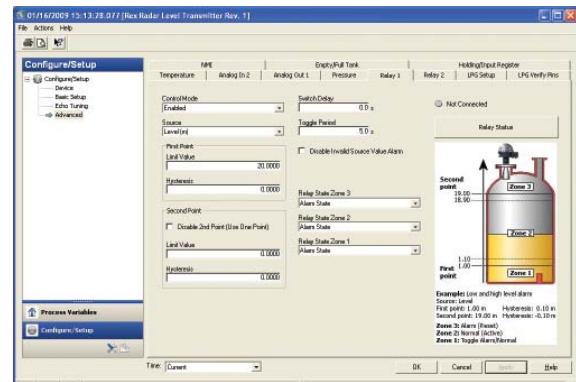
The THUM adapter can route any data to the radar gauge which allows full configuration and diagnostics using the AMS or the 375 Field Communicator:

- Antenna selection, reference heights, and temperature measurements
- LPG configuration, relay setup, and advanced echo tuning
- Detailed device status information, hardware and software options

## TECHNICAL INFORMATION

The THUM adapter is supplied with a mounting kit when delivered together with TankRadar Rex and TankRadar Pro. The mounting kit allows the THUM adapter to be installed away from the radar gauge at the best possible tank roof position.

Mechanical installation:	Vertical or horizontal, 1 to 2-in. pipe.
THUM adapter burst rate:	User selectable. 8 seconds to 60 minutes.
Loop resistance:	220 Ω for Pro and 680 Ω for Rex. (Included in mounting kit.)



Rex advanced configuration window in AMS.



## Rosemount TankRadar Rex

TankRadar Rex is designed to deliver reliable tank inventory data with custody transfer accuracy, for all tank farm and refinery applications. Instrument level accuracy is  $\pm 0.5$  mm (0.020 in.) It features built-in multiple temperature inputs, analog input/output and relay outputs for complete inventory and custody transfer functions. Furthermore, TankRadar Rex is third-party assessed and considered to be SIL 2 suitable. It is also TÜV-tested for overfill protection.

## Rosemount TankRadar Pro

TankRadar Pro is a powerful, multi-purpose radar level gauge for all types of bulk storage applications. It has an instrument level accuracy of up to  $\pm 3$  mm (0.12 in.) and temperature inputs, making it ideal for inventory control. In addition, it is TÜV-tested for overfill protection.

**Emerson Process Management**  
**Rosemount Tank Gauging**  
Box 13045  
S-402 51 Göteborg  
SWEDEN

Phone: +46 31 337 00 00  
Fax: +46 31 25 30 22  
E-mail: sales.rtg@Emerson.com  
[www.rosemount-tg.com](http://www.rosemount-tg.com)

©2009 Emerson Process Management. All rights reserved.

The Emerson logo is a trademark and service mark of Emerson Electric Co. Rosemount, THUM, PlantWeb, and AMS are marks of one of the Emerson Process Management family of companies. All other marks are property of their respective owners.

The contents of this publication are presented for information purposes only, and while effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or service described wherein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice.

## PRODUCT INFORMATION

# Saab TankRadar® PRO

## The ultimate radar level gauge



**Saab TankRadar PRO is the ultimate radar level gauge with excellent reliability in a wide range of applications. Its high performance and maintenance free operation make it a highly economical solution. It is easy to install and highly flexible through interchangeable gauge heads and antennas.**



**Configuration of the radar level gauge is easily performed via the RadarMaster or TankMaster software or via a display unit.**

**Saab TankRadar PRO offers high accuracy level measurement in applications such as chemical and petrochemical storage tanks, pharmaceutical plants and tank terminals.**

### Suitable for

- Storage tanks
- Chemical & petrochemical industry
- Pharmaceutical plants
- Pipeline terminals
- Refineries
- Cement, powder, wood chips and other solid material applications

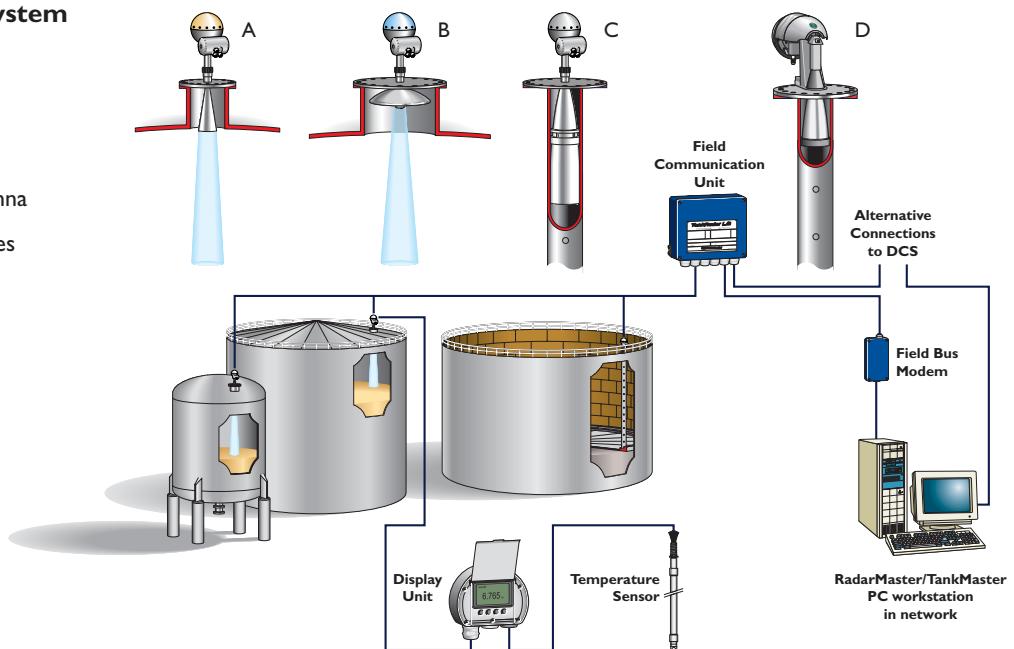
### Features

- Excellent reliability
- No maintenance
- Easy installation
- Accuracy  $\pm 3, 5$  or  $10$  mm depending on model
- No moving parts and non-contact level measuring
- Optional temperature measurement
- Interactive setup using Windows based software or via gauge-mounted or remote display unit
- High sensitivity for detection of weak echoes in solid applications and from turbulent surfaces
- Analog 4-20 mA superimposed with HART®, and digital Profibus® DP, FOUNDATION™ fieldbus or TRL/2 bus outputs

Specifications	
<b>Operating principle</b>	10 GHz FMCW-radar
<b>Instrument accuracy</b>	±3 mm (±0.12 in.), ±5 mm (±0.2 in.) or ±10 mm (±0.4 in.) depending on model
<b>Power supply</b>	Ultra wide 24-240 V DC or AC 0-60 Hz
<b>Display/configuration</b>	Local display, remote display, RadarMaster PC software
<b>Primary output</b>	Saab TRL/2 bus (FSK with Modbus protocol) or Profibus® DP, analog 4-20 mA, active or passive + digital HART®, FOUNDATION™ fieldbus
<b>Secondary output</b>	Analog 4-20 mA current loop, active or passive
<b>Temperature measurement</b>	Up to 6 spot elements per tank with common return, PT100 via display unit
<b>Tank connection</b>	Ø 2 to 20 in.
<b>Antennas</b>	Cone, parabolic, process seal and still-pipe cone
<b>Antenna materials wetted parts</b>	Stainless steel SS 316L, PTFE, Quartz, Viton, Kalrez
<b>Tank temperature</b>	-40 to 400 °C (-40 to 752 °F)
<b>Ambient temperature</b>	-40 to 70 °C (-40 to 158 °F)
<b>Measuring range</b>	0-50 m (0-165 ft) default, 0-99 m (0-325 ft) special configuration
<b>Ex approval</b>	ATEX/CENELEC: Ex II 1G / EEx de [ib/ia] IICt6 FM: Explosion proof Class I, Div. I & 2, Groups A, B, C and D. CSA: EEx de IICt6. FTZU: EEx de ib IICt6. GOST: EEx de ib [ia/ib] IICt4.
<b>Weight</b>	8 kg (18 lbs.)

### Saab TankRadar PRO system

- A: 8 inch cone antenna
- B: Parabolic antenna
- C: Still-pipe cone antenna
- D: The RTG 3900-series



### Emerson Process Management

**Saab Rosemount**  
Box 130 45, SE-402 51 Göteborg, SWEDEN  
Tel: +46 31 337 00 00. Fax: +46 31 25 30 22  
E-mail: sales.srt@emersonprocess.com  
[www.saabrosemount.com](http://www.saabrosemount.com)

  
**EMERSON**<sup>TM</sup>  
Process Management

# Rosemount 3100 Series

## Ultrasonic Level Transmitters

The Rosemount 3100 Series is a loop-powered ultrasonic transmitter designed for reliable continuous level measurement.

### **THE 3100 SERIES FEATURES:**

- Non-contacting measurement with no moving parts
- Integral LCD and push-buttons as standard for on-site programming
- Continuous measurement of level or distance-to-surface. Volume or open channel flow calculations for The Rosemount 3102 and Rosemount 3105
- Two integral signal relays for The Rosemount 3102
- Easy to install and configure
- Rugged aluminum housing and PVDF wetted material
- Two-wire direct current loop-powered



### **Contents**

Measurement Principle . . . . .	page 2
Special Features . . . . .	page 2
Selecting a Rosemount 3100 Series Transmitter . . . . .	page 4
System Integration . . . . .	page 5
Installation Best Practices . . . . .	page 6
Specifications . . . . .	page 8
Temperature and Pressure Ratings . . . . .	page 10
Load Limitations . . . . .	page 10
Product Certifications . . . . .	page 11
Dimensional Drawings . . . . .	page 13
Ordering Information . . . . .	page 15

## Reliability in a Universal Package

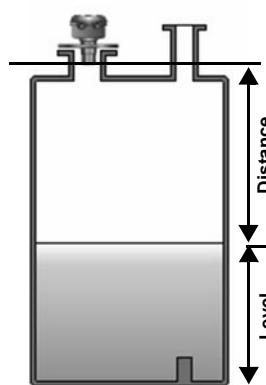
The Rosemount 3100 Series is a liquid level transmitter based on ultrasonic technology that is suitable for many liquid applications.

### MEASUREMENT PRINCIPLE

Ultrasonic pulse signals are transmitted and reflected from the liquid surface. The transmitter 'listens' for reflected signals (echoes) and measures the time-delay between transmitting and receiving.

The distance to the liquid surface is automatically calculated using the computed time-delay.

$$\text{Distance} = \text{Speed of sound in air} * (\text{Time-delay} / 2)$$



An integral temperature sensor continuously measures the air temperature around the transmitter. It then computes the *speed of sound in air*, automatically compensating the *Distance* for temperature effects.

The 3102 and 3105 have a Remote Temperature Sensor option.

The Distance measurement can be sent through the 4–20 mA or HART® output.

### Level Measurement

When programmed with the bottom reference of the application, usually the tank bottom, the transmitter will calculate the liquid depth (Level).

The calculated Level can be sent through the 4–20 mA or HART output.

### Volume Measurement

The Rosemount 3102 and Rosemount 3105 can calculate the volume of liquid in a tank. The transmitter has a library of profile shapes for selection.

The calculated Volume can be sent through the 4-20 mA or HART output.

### Open Channel Flow Measurement

The Rosemount 3102 and Rosemount 3105 can also calculate the rate of liquid flow in an open channel. The transmitter has a library of standard open channel flow structure profiles, but also supports a user-defined flow profile that is plotted or calculated.

A ten-point strapping table for non-standard tank shapes and flow structures can be input into the transmitter.

The calculated Flow Rate can be sent through the 4–20 mA or HART output.

### SPECIAL FEATURES

#### Advanced software features

- Learn routine (false echo registration)
 

The transmitter can learn to ignore up to four false echoes, caused by the pulse signal reflecting off obstructions, until the actual level is seen.
- Empty tank mapping
 

When a tank is empty, the transmitter can learn to ignore up to four false echoes, without the need for user interaction.
- Present depth
 

When the tank is not empty, the bottom reference can be automatically reset to the sum of a known user-entered depth and the distance to the surface.
- Set as empty
 

When the tank is empty, the bottom reference can be automatically reset to the measured distance.
- Distance offset
 

The distance to the surface can be adjusted by a user-entered positive or negative offset value.
- Level offset
 

The level can be adjusted by a user-entered positive or negative offset value.
- Bottom blanking
 

The transmitter can be set to ignore an area of the tank bottom, if there is an obstruction, to avoid false echoes.

#### Relays on The Rosemount 3102

- Two integral relays for control functionality.

## Product Data Sheet

00813-0100-4840, Rev. AC

February 2008

# Rosemount 3100 Series

### Integral display and push buttons

The central area of the display allows up to five alphanumeric measurement or data characters to assist when programming.

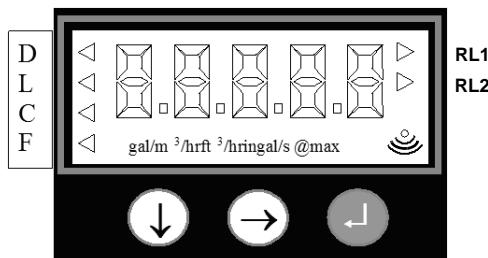
On The Rosemount 3102 and 3105, to the left of the central area are **four arrow icons**, only one of which will be lit at any one time to indicate the measurement chosen by the user:

- D (Distance-to-surface)
- L (Level)
- C (Content / Volume)
- F (Flow)

On The Rosemount 3102, to the right of the central area are **two arrow icons** that indicate the status of the transmitter relay outputs RL1 and RL2. When lit, they indicate that the relay contact is closed.

Under the central area is a list of measurement units, where the transmitter will light the measurement units chosen.

To the right of the measurement units is an **echo received icon** made up of three arc segments that indicate the strength of the echo received.



Integral push-buttons and display



### Remote temperature sensor option

All models have an integrated sensor to automatically compensate for temperature effects.

For transmitter installations where the integral temperature sensor is not representative of the air / medium temperature in the process, the use of an **external temperature sensor** improves reliability.

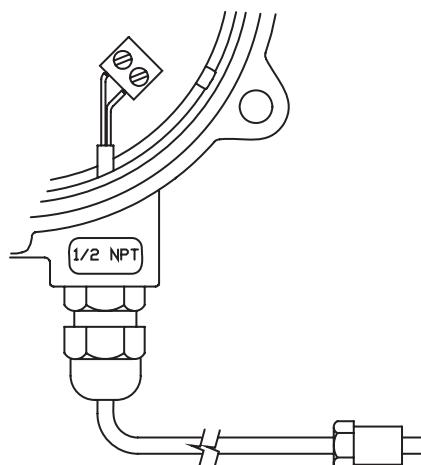
The sensor is installed in between the transmitter and the liquid surface, or in a shaded area of an open channel.



### Sensor Specification:

- Stainless steel type 316 body with locknut (shown above)
- M10 thread, 0.24-in. (6-mm) maximum panel thickness
- Sensor working temperature: -40 to 185 °F (-40 to 85 °C)
- Cable working temperature: -4 to 176 °F (-20 to 80 °C)
- Cable 16.4 ft (5 m) long, single twisted pair

### Rosemount 3102/3105 Transmitter



External temperature sensor

## Selecting a Rosemount 3100 Series Transmitter

### Overview of models

The Rosemount 3101 is for simple level or distance measurements over a range of 1 to 26 ft (0,3 to 8 m), and a 4–20 mA signal output.

The 3102 has two integral relays for level or distance measurements over a range of 1 to 36 ft (0,3 to 11 m). It also features volume and open channel flow calculations, and a 4–20 mA / HART output.

The 3105, certified Intrinsically Safe, is for level or distance measurements over a range of 1 to 36 ft (0,3 to 11 m) in hazardous areas. It also features volume and open channel flow calculations, and a 4–20 mA / HART output.

### Housing

The housing is available in aluminum, and has two 1/2–14 NPT cable/conduit entries.

Option of M20 x 1.5 conduit/cable adaptors.

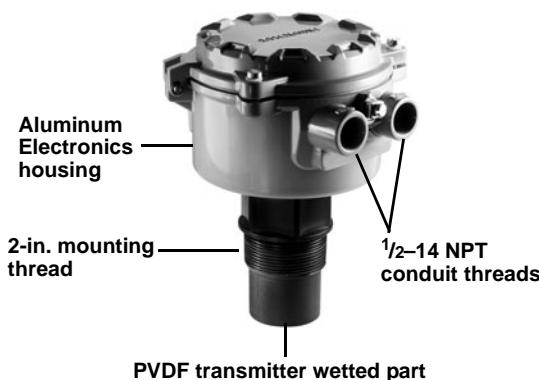
Wetted parts are made of corrosion resistant PVDF.

### Process Connection

#### Threaded Connection

Threads: 2-in. BSPT or 2-in. NPT.

Optional flange accessories: See page 18.



### Electrical connections

(For full specification, see page 8)

#### Power supply

The 3100 Series requires an external power supply:

3101: 12 to 30 Vdc

3102: 12 to 40 Vdc

3105: 12 to 40 Vdc, (12 to 30 Vdc in hazardous area)

### Signal output

The 3101 has an analog 4–20 mA output, which is powered by the voltage supplied to the transmitter.

The 3102 and 3105 have a 4–20 mA output with HART communication, powered by the voltage supply to the transmitter.

### Relay outputs

The 3102 has two relay outputs, powered by the voltage supply to the transmitter.

### Remote temperature sensor

All models have an integrated sensor for automatically compensating for temperature effects.

The 3102 and 3105 have support for connecting a Rosemount Remote Temperature Sensor, an optional accessory (see page 18) that automatically overrides the integral sensor and provides dynamic temperature compensation.

### Measurements and Calculations

3101: Level, or distance to the surface.

3102: Level (or distance), volume, open channel flow.

3105: Level (or distance), volume, open channel flow.

### Measurement range

3101: 1 to 26 ft (0,3 to 8 m)

3102: 1 to 36 ft (0,3 to 11 m)

3105: 1 to 36 ft (0,3 to 11 m)

### Product certifications

(For a summary of certifications, see page 11.)

#### Non-hazardous area installation

The 3101 and 3102 are available for:

- FM and CSA Ordinary Location installation.

#### Hazardous area installation

The 3105 is available for:

- FM Intrinsically Safe/Non-incendive installation.
- CSA Intrinsically Safe/Non-incendive installation.
- ATEX and IECEx Intrinsically Safe installation.

#### NOTE:

Product certifications are selected using the Ordering Information (starting on page 15).

## System Integration

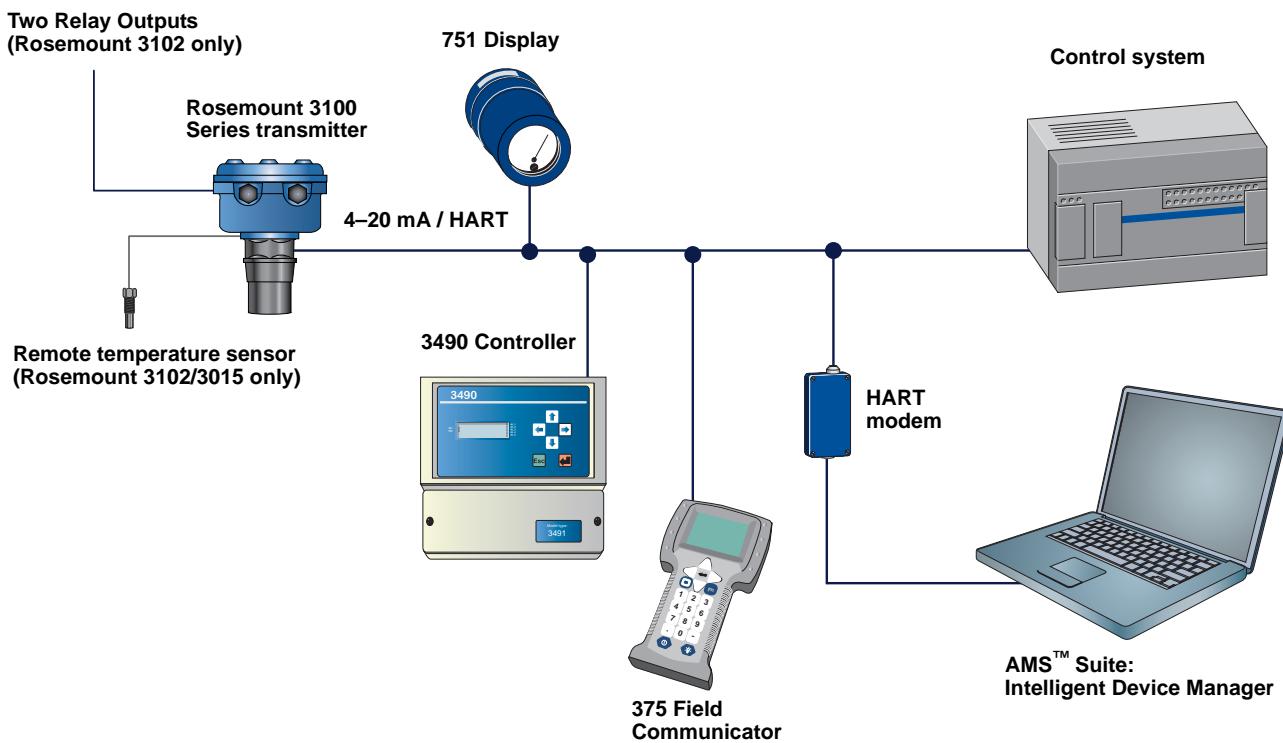
The Rosemount 3100 Series transmitter uses the same two wires for power supply and communication.

The 3100 Series requires an external power supply:

- 3101: 12 to 30 Vdc
- 3102: 12 to 40 Vdc
- 3105: 12 to 40 Vdc (30 Vdc in hazardous area).

Measurement data is transmitted as an analog 4–20 mA signal as standard.

On The Rosemount 3102 and Rosemount 3105, a digital HART signal is superimposed on the 4–20 mA signal.



The Rosemount 3100 Series transmitter powers PlantWeb® with easier configuration, lower installation costs, higher reliability and device diagnostics that enable predictive intelligence, reduce operating costs and improve plant availability.

## Installation Best Practices

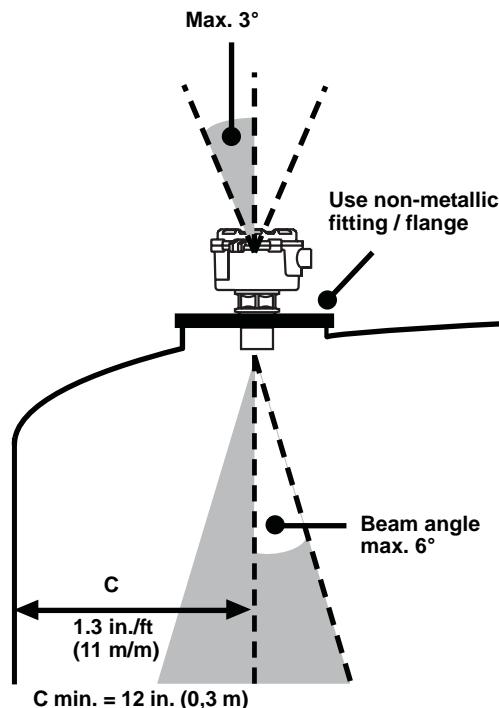
Correct location of the transmitter is essential for the reliable operation of any ultrasonic level measurement system.

**NOTE:**

The Rosemount 3100 Series is designed to be mounted in a *non-metallic fitting or flange*. Please check optional PVC flange accessories on page 18.

### Mounting considerations

- a) The transmitter should be mounted above the liquid surface using the 2-in. thread provided. To help mounting, optional flanges and bracket kits are available - see page 18.
- b) Mount the transmitter vertically to ensure a *maximum echo size* received.
- c) Obstructions within the beam angle generate strong false echoes; so position the transmitter to avoid this situation.
- d) To avoid detecting unwanted objects in the tank or well, maintain a distance of at least 1.3 in. from the center line of the transmitter for every foot (11 cm for every meter) range to the obstruction.
- e) It is recommended the transmitter be mounted no closer than 12 in. (0.3 m) to the wall to avoid losing echo size.
- f) Avoid applications where heavy condensation could form on the transmitter.
- g) If the transmitter is mounted in a stand-off or nozzle, the transmitter face should protrude at least 0.2 in. (5 mm) into the tank. If this is not possible, see "Mounting in a nozzle or stand-off" on page 7.
- h) In environments where direct sunlight can cause high surface temperatures on exposed instruments, a sun-shade, or remote temperature sensor option, is recommended.



### Liquid surface conditions

- a) Foaming liquids (which are poor ultrasonic reflectors) can reduce the size of the returned echo. An ultrasonic transmitter should be mounted over an area of clear liquid.
- b) Do not mount the transmitter directly over any inlet stream.
- c) Liquid surface turbulence is not a problem, unless it is excessive. Normally, the effects of turbulence are minor and excessive turbulence can be fine-tuned on site, if necessary.
- d) A still-pipe can be used to avoid foam and turbulence.

### In-tank effects

- a) Stirrers or agitators can cause a vortex, so try to mount the transmitter off-center of any vortex to maximize the return echo.
- b) As stirrer blades become uncovered, they create echoes as they pass through the ultrasonic beam. The transmitter can be tuned on-site to ignore these false echoes.

## Product Data Sheet

00813-0100-4840, Rev. AC

February 2008

## Rosemount 3100 Series

### Mounting in a nozzle or stand-off

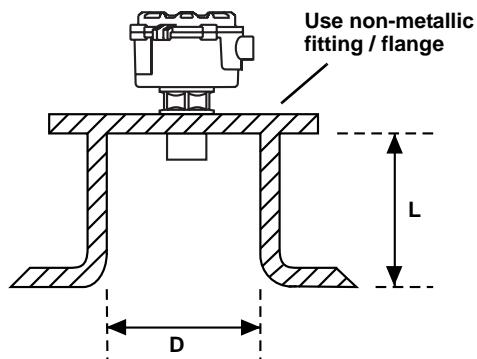
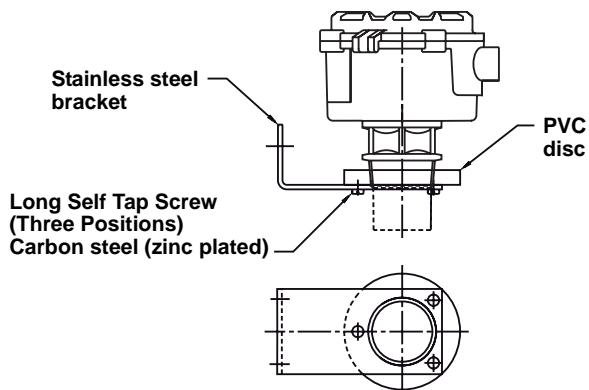


TABLE 1.

Nozzle Diameter Size (D)	Maximum Nozzle Length (L)
DN50 (2 in.)	3/4 in. (18 mm)
DN80 (3 in.)	4 in. (100 mm)
DN100 (4 in.)	4 in. (100 mm)
DN125 (5 in.)	8 in. (200 mm)
≥DN150 (6 in.)	14 in. (350 mm)

### Mounting with optional bracket kit



Note:

Combined weight of bracket and disc  
is approximately 1 lb (0,5 kg).

### NOTE

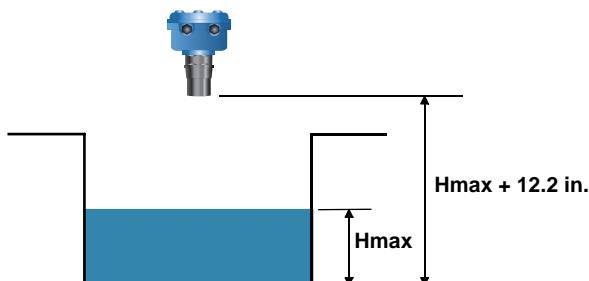
Dimension drawings for optional bracket kits are on page 14. See also ordering information on page 18.

### Open Channel Flow installations (Rosemount 3102 and Rosemount 3105)

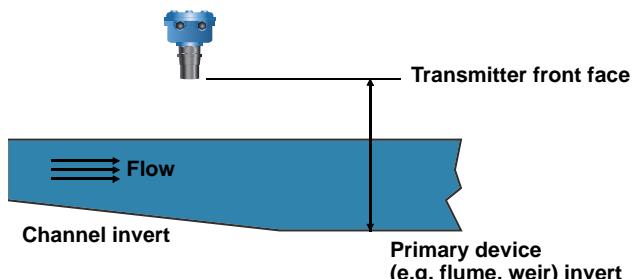
There are normally two distinct parts to an open channel flow measurement system; the primary element (flow structure) and the secondary element (head measurement instrumentation). For accurate open channel flow measurement, both parts of the system must be accurately installed.

The transmitter should be positioned at the correct distance upstream from the flow structure at a height that is, at least, equal to the maximum flow depth plus the blanking distance (dead zone) of the transmitter (see below).

A minimum distance of 12.2 in. (0,31 m) is recommended.



It is important that the *bottom reference* of the transmitter measures the distance of the center of the invert of the primary device (see below), and NOT the distance to the channel bottom directly below the transmitter.



### NOTES:

- The liquid surface at the point of measurement must be stable, smooth, and have a uniform approach velocity. It must not be affected by baffles, foam, hydraulic jumps or any other object that may cause flow disruption.
- The primary element should be free from any situation where it is likely to 'drown' (refer to the relevant Standard for further information)

## Specifications

<b>General</b>	
Product	Rosemount 3100 Series level transmitters: The 3101: Level and Distance measurement. The 3102: Level, Distance, Volume, and Open channel flow measurement with two integral signal relays. The 3105: Level, Distance, Volume, and Open channel flow measurement for hazardous locations.
Measurement principle	Ultrasonic, time-of-flight.
<b>Measuring performance</b>	
Measurement range	Rosemount 3101: 1 to 26 ft (0,3 to 8 m) Rosemount 3102: 1 to 36 ft (0,3 to 11 m) Rosemount 3105: 1 to 36 ft (0,3 to 11 m)
Level resolution	Better than $\frac{1}{16}$ " (1 mm)
Level accuracy	Rosemount 3101: $\pm 0.2$ in. (5 mm) for <3.3 ft (1 m), $\pm 0.5\%$ of measured distance for >3.3 ft (1 m) The 3102 and The 3105: $\pm 0.1$ in. (2.5 mm) <3.3 ft (1 m), $\pm 0.25\%$ of measured distance for >3.3 ft (1 m) under reference conditions <sup>(1)</sup>
Blanking distance (Dead Zone)	12 in. (0,3 m)
Update interval	1 second
<b>Display / Configuration</b>	
Integral Display	4/5 digit display for live measurement, and for configuration purposes.
Output Units	For Level or distance-to-surface: m, ft, in, or none For Contents: l, $m^3$ , gal, or $ft^3$ For Flow: l/s, l/m, $m^3/hr$ , gal/s, gal/m, $ft^3/m$ (cfm), $ft^3/hr$ , or none
Output Variables	Rosemount 3101: Level, or distance-to-surface Rosemount 3102: Level (or distance-to-surface), Content (Volume), and Flow. Rosemount 3105: Level (or distance-to-surface), Content (Volume), and Flow.
Configuration tools	Standard integral push-buttons with LCD. 375 Field Communicator. Rosemount 3490 Series Universal Control Unit. Rosemount AMS(TM) Suite
<b>Electrical</b>	
Power supply	Loop-powered (two-wire) Rosemount 3101: 12 to 30 Vdc Rosemount 3102: 12 to 40 Vdc Rosemount 3105: 12 to 40 Vdc (non-hazardous area), 12 to 30 Vdc (hazardous area).
Earthing	None required.
Current Output	Rosemount 3101: Analog 4–20 mA Rosemount 3102: Analog 4–20 mA, HART. Rosemount 3105: Analog 4–20 mA, HART.
Signal on alarm	Standard: Low = 3.75 mA. High = 21.75 mA. Namur NE43: Low = 3.6 mA. High = 22.5 mA
Saturation levels	Standard: Low = 3.9 mA. High=20.8 mA. Namur NE43: Low = 3.8 mA. High = 20.5 mA
Relay output (on Rosemount 3102)	Two integral signal relays, SPST rated 1A @ 30VDC (inductive) and 2A @ 30VDC (resistive)
Electrical parameters	$U_i = 30$ V, $I_i = 120$ mA, $P_i = 0.82$ W, $L_i = 108 \mu H$ , $C_i = 0$ nF.
Cable entry	1/2" - 14 NPT conduit entries for cable glands. Option: M20 x 1.5 conduit/cable adaptor.
Output Cabling	Single twisted-pair and shielded, min. 0.22 mm <sup>2</sup> (24 AWG), max. 1.5 mm <sup>2</sup> (15 AWG).
<b>Materials of construction</b>	
Wet-side material	PVDF.
Body and cover material	Polyurethane-covered Aluminum.
Cover seal	Silicone rubber.
Cover screws	316 Stainless Steel.
Transducer body seal	EPDM.
<i>Continued on next page</i>	

## Product Data Sheet

00813-0100-4840, Rev. AC

February 2008

## Rosemount 3100 Series

Mechanical	
Mounting thread size	2-in. NPT, or 2-in. BSP. Optional flange accessories available.
Measuring	
Temperature compensation	Rosemount 3101: Automatic Integral temperature compensation. Rosemount 3102: Automatic Integral temperature compensation. Optional remote temperature sensor for dynamic temperature compensation. <sup>(2)</sup> Rosemount 3105: Automatic Integral temperature compensation. Optional remote temperature sensor for dynamic temperature compensation. <sup>(2)</sup>
Environment	
Ambient temperature	Rosemount 3101: –4 to 158 °F (–20 to 70 °C) Rosemount 3102 and Rosemount 3105: –40 to 158 °F (–40 to 70 °C) <sup>(3)</sup>
Process temperature	Rosemount 3101: –4 to 158 °F (–20 to 70 °C) Rosemount 3102 and Rosemount 3105: –22 to 158 °F (–30 to 70 °C)
Process pressure	–4 to 44 psi (–0,25 to 3,0 bar)
Ingress protection	NEMA 4X, IP 66.
Electromagnetic compatibility	EN61326 (Class B)
Certifications	CE-mark, FM, CSA, ATEX, or IECEx - dependent on order code.

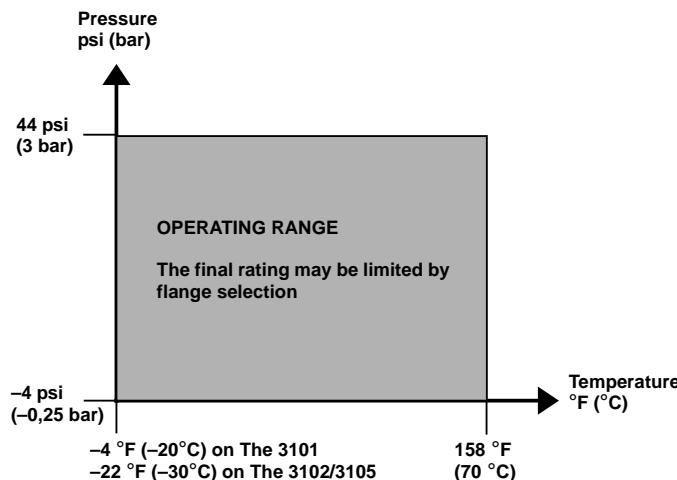
(1) Temperature: 68 °F (20 °C), Pressure: 101.3 kPa (atmospheric pressure), and Relative Humidity: 65%.

(2) See page 18 for optional accessories.

(3) See page 11 onwards for approval temperature ranges.

## Temperature and Pressure Ratings

The process temperature/pressure rating depends on the design of the transmitter in combination with the flange materials.

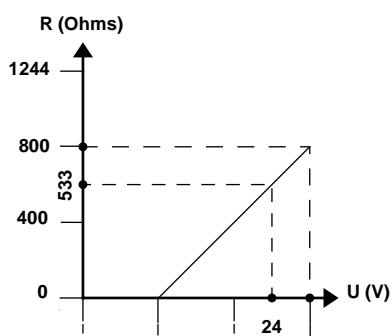


Process temperature and pressure diagram for Rosemount 3100 Series

## Load Limitations

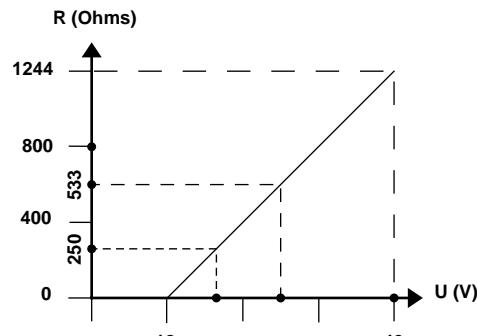
A HART® Communicator requires a minimum load resistance of 250 Ohm within the loop in order to function properly. Communication with Rosemount 3490 Universal Controller does not require additional resistance. The maximum load resistance can be determined from these diagrams:

Non-Intrinsically Safe Installations

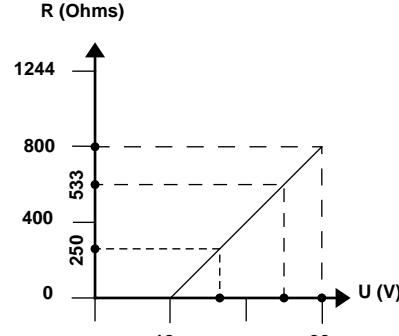


Rosemount 3101

Intrinsically Safe Installations



Rosemount 3102 and Rosemount 3105



Rosemount 3105

### NOTE

R = Maximum Load Resistance  
 U = External Power Supply Voltage

# Product Data Sheet

00813-0100-4840, Rev. AC

February 2008

# Rosemount 3100 Series

## Product Certifications

### ORDINARY LOCATION CERTIFICATION FOR FM (ROSEMOUNT 3101 AND 3102)

#### G5 Project ID: 3024095

The transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

### ORDINARY LOCATION CERTIFICATION FOR CSA (ROSEMOUNT 3101 AND 3102)

#### G6 Project ID: 1878089

The transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by CSA, a nationally recognized testing laboratory as accredited by the Standards Council of Canada (SCC).

#### Special conditions for safe use:

- For this CSA approval, the power for the Rosemount 3100 Series must be supplied from a Rosemount 3490 Series Control Unit, or from a class 2 or SELV source.

### EUROPEAN DIRECTIVE INFORMATION

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at [www.rosemount.com](http://www.rosemount.com). A hard copy may be obtained by contacting your local sales office.

#### ATEX Directive (94/9/EC)

Complies with the ATEX Directive.

#### Pressure Equipment Directive (PED) (97/23/EC)

3100 Series is outside the scope of PED Directive.

#### Electro Magnetic Compatibility (EMC) Directive

EN61326 (Class B)

#### CE-mark

Complies with applicable directives

The 3101 (EMC)

The 3102 (EMC)

The 3105 (EMC, ATEX)

### HAZARDOUS LOCATIONS CERTIFICATIONS (ROSEMOUNT 3105)

#### Factory Mutual (FM) Approvals

##### Factory Mutual (FM) Intrinsically Safe Approval

###### I5 Project ID: 3024095

Intrinsically Safe for Class I, Div. 1, Groups A, B, C and D  
Intrinsically Safe for Class I, Zone 0, AEx ia IIC  
Temperature Code: T4 at 60 °C, max ambient  
Temperature Code: T6 at 55 °C, max ambient

Control Drawing: 71097/1216

Ui = 30 V, li = 120 mA, Pi = 0.82 W, Li = 108 µH, Ci = 0 µF

##### Factory Mutual (FM) Non-Ignitive Approval

###### I5 Project ID: 3024095

Non-Ignitive for Class I, Div. 2, Groups A, B, C and D  
Non-Ignitive for Class I, Zone 2, AEx nA IIC  
Temperature Code: T4 at 60 °C, max ambient  
Temperature Code: T6 at 55 °C, max ambient

Control Drawing: 71097/1216

Ui = 30 V, li = 120 mA, Pi = 0.82 W, Li = 108 µH, Ci = 0 µF

#### Canadian Standards Association (CSA) Approvals

##### Canadian Standards Association (CSA) Intrinsically Safe Approval

###### I6 Project ID: 07 CSA 1878089

Intrinsically Safe for Class I, Div. 1, Groups A, B, C, and D  
Intrinsically Safe for Class I, Zone 0, Ex ia IIC  
Temperature Code:  
T4 (T<sub>amb</sub> -40 to 60 °C)  
T6 (T<sub>amb</sub> -40 to 55 °C)

Control Drawing: 71097/1218

Ui = 30 V, li = 120 mA, Pi = 0.82 W, Li = 108 µH, Ci = 0 µF

##### Canadian Standards Association (CSA) Non-Ignitive Approval

###### I6 Project ID: 07 CSA 1878089

Non-Ignitive for Class I, Div. 2, Groups A, B, C, and D  
Non-Ignitive for Class I, Zone 2, Ex nL IIC  
Temperature Code:  
T4 (T<sub>amb</sub> -40 to 60 °C)  
T6 (T<sub>amb</sub> -40 to 55 °C)

Control Drawing: 71097/1218

Ui = 30 V, li = 120 mA, Pi = 0.82 W, Li = 108 µH, Ci = 0 µF

### ATEX Intrinsically Safe Approval

- I1 Certificate: Sira 06ATEX2260X  
Intrinsically Safe for II 1 G, EEx ia IIC  
Temperature Class:  
T4 ( $T_{amb}$  -40 to 60 °C)  
T6 ( $T_{amb}$  -40 to 55 °C)

$Ui = 30 \text{ V}$ ,  $li = 120 \text{ mA}$ ,  $Pi = 0.82 \text{ W}$ ,  $Li = 108 \mu\text{H}$ ,  $Ci = 0 \mu\text{F}$

#### Special conditions for safe use:

1. All transmitter models have external plastic parts, which could present a risk of ignition due to electrostatic charge build-up. They shall not be directly installed in any process where its enclosure might be charged by the rapid flow of non-conductive media.
2. All transmitter models shall only be cleaned with a damp cloth.
3. When the transmitter housing uses aluminum alloy in its construction, this presents a risk of ignition due to impact and shall be taken into consideration on installation and use.

### IECEx Approval

- I7 Certificate: IECEx SIR 06.0068X  
Intrinsically Safe for Zone 0, Ex ia IIC  
Temperature Class:  
T4 ( $T_{amb}$  -40 to 60 °C)  
T6 ( $T_{amb}$  -40 to 55 °C)

$Ui = 30 \text{ V}$ ,  $li = 120 \text{ mA}$ ,  $Pi = 0.82 \text{ W}$ ,  $Li = 108 \mu\text{H}$ ,  $Ci = 0 \mu\text{F}$

#### Special conditions for safe use:

1. All transmitter models have external plastic parts, which could present a risk of ignition due to electrostatic charge build-up. They shall not be directly installed in any process where its enclosure might be charged by the rapid flow of non-conductive media.
2. All transmitter models shall only be cleaned with a cloth.
3. When the transmitter housing uses aluminum alloy in its construction, this presents a risk of ignition due to impact and shall be taken into consideration on installation and use.

# Product Data Sheet

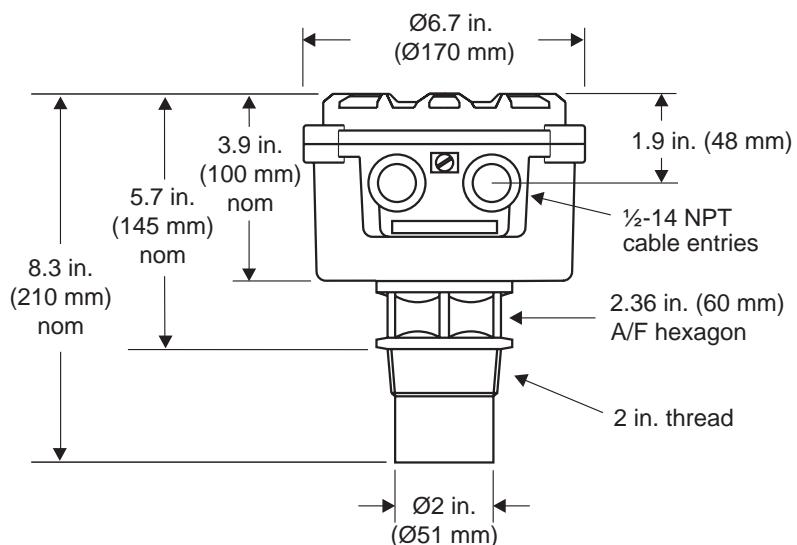
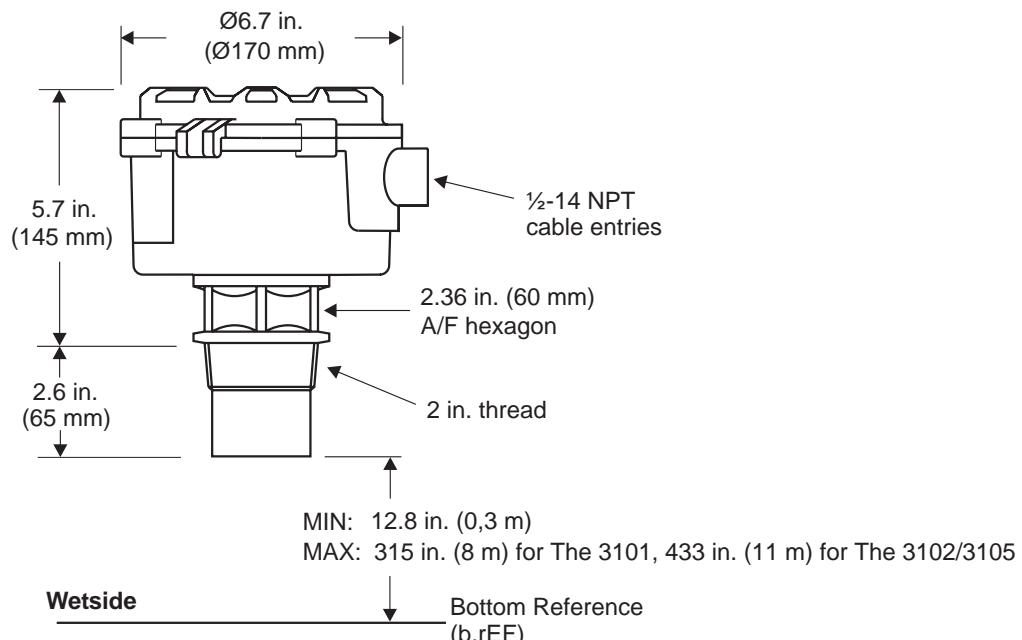
00813-0100-4840, Rev. AC

February 2008

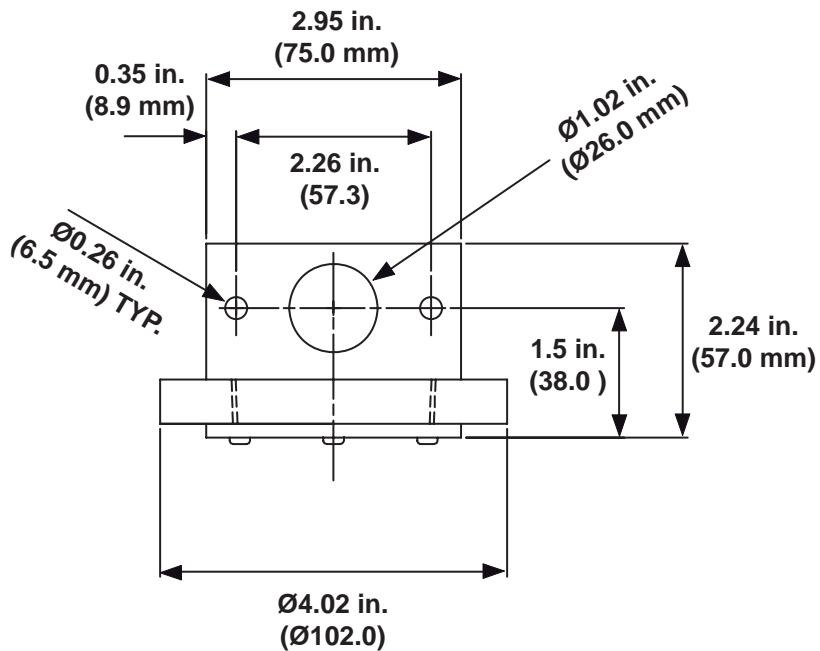
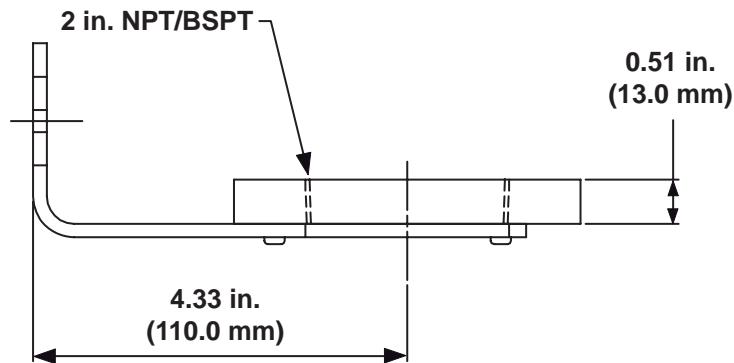
# Rosemount 3100 Series

## Dimensional Drawings

### Threaded Mounting



## 2-in. NPT/BSPT Bracket Kits



# Product Data Sheet

00813-0100-4840, Rev. AC

February 2008

# Rosemount 3100 Series

## Ordering Information

### The Rosemount 3101, Level of liquids

Model	Product Description
3101	Ultrasonic level transmitter
Code	Signal Output
L	4–20 mA
Code	Housing Material
A	Polyurethane-covered Aluminum
Code	Conduit / Cable Threads
1	½ –14 NPT
2	M20 x 1.5 adaptor
Code	Wet-side material
F	PVDF
Code	Process Connection
RC	2-in. NPT thread <sup>(1)</sup>
SC	2-in. BSPT thread <sup>(2)</sup>
Code	Certificates
NA	No certification
G5	FM Ordinary Location
G6	CSA Ordinary Location
Code	Options
Tag Plate	
ST	Stainless Steel engraved tag plate
WT	Laminated paper tag plate

(1) Choosing this option implies US (Imperial) units of measurement are required for the default configuration. Configuration can be changed on-site.

(2) Choosing this option implies Metric units of measurement are required for the default configuration. Configuration can be changed on-site.

Example model order code: 3101-L-A-1-F-RC-G5-ST

### The Rosemount 3102, Level, Volume or Flow of liquids

<b>Model</b>	<b>Product Description</b>
3102	Ultrasonic level transmitter with 2 integral relays
<b>Code</b>	<b>Signal Output</b>
H	4–20 mA with HART® communication
<b>Code</b>	<b>Housing Material</b>
A	Polyurethane-covered Aluminum
<b>Code</b>	<b>Conduit / Cable Threads</b>
1	½–14 NPT
2	M20 x 1.5 adaptor
<b>Code</b>	<b>Wet-side material</b>
F	PVDF
<b>Code</b>	<b>Process Connection</b>
RC	2-in. NPT thread <sup>(1)</sup>
SC	2-in. BSPT thread <sup>(2)</sup>
<b>Code</b>	<b>Certificates</b>
NA	No certification
G5	FM Ordinary Location
G6	CSA Ordinary Location
<b>Code</b>	<b>Options</b>
<b>Alarms</b>	
C4	Namur alarm and saturation levels; high alarm.
C5	Namur alarm and saturation levels; low alarm.
C8	Low alarm setting with standard Rosemount alarm and saturation levels.
<b>Tag Plate</b>	
ST	Stainless Steel engraved tag plate
WT	Laminated paper tag plate

(1) Choosing this option implies US (Imperial) units of measurement are required for the default configuration. Configuration can be changed on-site.

(2) Choosing this option implies Metric units of measurement are required for the default configuration. Configuration can be changed on-site.

Example model order code: 3102-H-A-1-F-RC-G5-C4-ST

# Product Data Sheet

00813-0100-4840, Rev. AC

February 2008

# Rosemount 3100 Series

## The Rosemount 3105, Level, Volume or Flow of liquids

Model	Product Description
3105	Ultrasonic level transmitter for hazardous areas
Code	Signal Output
H	4–20 mA with HART® communication
Code	Housing Material
A	Polyurethane-covered Aluminum
Code	Conduit / Cable Threads
1	½ –14 NPT
2	M20 x 1.5 adaptor
Code	Wet-side material
F	PVDF
Code	Process Connection
RC	2-in. NPT thread <sup>(1)</sup>
SC	2-in. BSPT thread <sup>(2)</sup>
Code	Certificates
I1	ATEX Intrinsically Safe
I5	FM Intrinsically Safe and Non-Incendive
I6	CSA Intrinsically Safe and Non-Incendive
I7	IEC Ex Intrinsically Safe
Code	Options
Alarms	
C4	Namur alarm and saturation levels; high alarm.
C5	Namur alarm and saturation levels; low alarm.
C8	Low alarm setting with standard Rosemount alarm and saturation levels.
Tag Plate	
ST	Stainless Steel engraved tag plate
WT	Laminated paper tag plate

(1) Choosing this option implies US (Imperial) units of measurement are required for the default configuration. Configuration can be changed on-site.

(2) Choosing this option implies Metric units of measurement are required for the default configuration. Configuration can be changed on-site.

Example model order code: 3105-H-A-1-F-RC-I5-ST

### Spare Parts and Accessories

Code	Accessory/Spare
<b>Accessories</b>	
03100-1001-0001	2-in. NPT to 2-in. ANSI Class 150 PVC Flange
03100-1001-0002	2-in. NPT to 3-in. ANSI Class 150 PVC Flange
03100-1001-0003	2-in. NPT to 4-in. ANSI Class 150 PVC Flange
03100-1001-0004	2-in. NPT to 6-in. ANSI Class 150 PVC Flange
03100-1002-0001	2-in. BSPT to DN50 PN16 PVC Flange
03100-1002-0003	2-in. BSPT to DN80 PN16 PVC Flange
03100-1002-0004	2-in. BSPT to DN100 PN16 PVC Flange
03100-1002-0005	2-in. BSPT to DN150 PN16 PVC Flange
03100-1003-0001 <sup>(1)</sup>	2-in. NPT Mounting Bracket
03100-1003-0002 <sup>(1)</sup>	2-in. BSPT Mounting Bracket
03100-0001-0001	Remote Temperature Sensor (Rosemount 3102 and Rosemount 3105 only)
03100-0001-0002	1/2-14 NPT to M20 x 1.5 Conduit Adaptor (Pack of two)

(1) See *Mounting with optional bracket kit* on page 7, and *dimension drawings* on page 14.

**Product Data Sheet**

00813-0100-4840, Rev. AC

February 2008

**Rosemount 3100 Series**

---

**NOTES:**

## Product Data Sheet

00809-0100-4840, Rev. AC

February 2008

# Rosemount 3100 Series

## Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

### Pressure – Level or Interface Measurement

Emerson has a complete line of Rosemount pressure transmitters and remote seals for measuring level or interfaces in liquid applications. Optimize performance with direct mount, Tuned Seal systems:

- Rosemount 3051S\_L, 3051L, and 1151LT Liquid Level Transmitters
- Rosemount 1199 Remote Diaphragm Seals with direct mount or capillary connections

### Vibrating Fork Switches – Point Level Detection

The Rosemount 2100 Series is developed for reliable point level detection of liquids and consists of:

- Rosemount 2110 Compact Vibrating Fork Liquid Level Switch
- Rosemount 2120 Full-featured Vibrating Fork Liquid Level Switch

### Guided Wave Radar – Level and Interface Measurement

Multivariable, loop-powered Guided Wave Radar transmitters with a wide range of probe styles to fit different liquids and solids applications. The product line consists of:

- Rosemount 3300 Series – Versatile and easy-to-use transmitter with proven reliability
- Rosemount 5300 Series – Accurate, high performance transmitter with FOUNDATION™ fieldbus support

### Non-contacting Radar – Level Measurement

The Rosemount non-contacting radar family consists of:

- Rosemount 5400 Series Transmitters – Loop-powered transmitter with a wide range of antennas, for liquid level measurement in most applications and process conditions
- Rosemount 5600 Series Transmitters – Transmitters with ultra-high sensitivity for measurement of level in liquids and solids, even for the most challenging applications

### Non-contacting Ultrasonic – Level Measurement

The Rosemount 3100 Series ultrasonic level transmitters provide continuous non-contacting level measurement of liquids. The range consists of:

- Rosemount 3101 for simple continuous level measurement
- Rosemount 3102 for continuous measurement with two integral relays for local control functionality
- Rosemount 3105 Intrinsically safe certified version for hazardous areas

*The Emerson logo is a trademark and service mark of Emerson Electric Co.*

*Rosemount and the Rosemount logotype are registered trademarks of Rosemount Inc.*

*PlantWeb is a registered trademark of one of the Emerson Process Management group of companies.*

*HART is a registered trademark of the HART Communication Foundation.*

*DeltaV is a registered trademark of Emerson Process Management group of companies.*

*All other marks are the property of their respective owners.*

*Standard Terms and Conditions of Sale can be found at [www.rosemount.com/terms\\_of\\_sale](http://www.rosemount.com/terms_of_sale)*

### Emerson Process Management, Rosemount Inc.

#### The Americas

Emerson Process Management  
8200 Market Boulevard  
Chanhassen, MN 55317 USA  
T (U.S.) 1-800-999-9307  
T (International) (952) 906-8888  
F (952) 949-7001

#### Europe, Middle East & Africa

Emerson Process Management  
Shared Services Ltd.  
Heath Place  
Bognor Regis  
West Sussex PO22 9SH  
England  
Tel 44 1243 845500  
Fax 44 1243 867554

#### Asia Pacific

Emerson Process Management  
Singapore Pte Ltd.  
1 Pandan Crescent  
Singapore 128461  
Tel 65 6777 8211  
Fax 65 6777 0947  
[AP.RMT-Specialist@emerson.com](mailto:AP.RMT-Specialist@emerson.com)

[www.rosemount.com](http://www.rosemount.com)



**EMERSON**  
Process Management

# Rosemount 751 Field Signal Indicator

## **ROSEMOUNT 751**

- Available with a LCD or analog meter
- Compact, rugged, and designed for industrial environments
- Available with explosion-proof and intrinsic safety certifications
- Provides flexible mounting options



CE

## **Content**

Specifications .....	page 3
Product Certifications .....	page 5
Dimensional Drawings.....	page 6
Ordering Information .....	page 7

## Transcend Your Integral Meter Display with the Rosemount 751

The Rosemount 751 Field Signal Indicators provide a means of displaying important process variables. These devices operate with any two-wire transmitter that measures input variables such as pressure, flow, liquid level, or temperature. Rosemount indicators are ideal for installations where an integral meter would be difficult to view.

Rosemount 751 Indicators are designed for use in industrial environments where all-weather performance is necessary. These units are vibration- and corrosion-resistant, and explosion-proof or intrinsically safe. An LCD meter or analog meter may be ordered to meet specific application requirements.

### LCD Meter

The LCD meter may be configured from a 4 mA point of -999 to a 20 mA point of 9999 with a linear or square-root response. A 20-segment bar graph at the bottom of the display directly represents the 4–20 mA signal.

Changing the 4 mA and 20 mA points is easy. Just remove the housing and meter covers, and press the meter faceplate buttons. The meter can be rotated in 90-degree increments within the enclosure for convenient viewing.

### Analog Meter

With the analog meter, several meter scaling options are available to suit special application requirements with  $\pm 2$  percent of calibrated span accuracy. Linear 0 to 100 percent meter scaling is adequate for the majority of measurement applications. With a flow transmitter, a logarithmic 0 to 100 percent flow scale is available. As an option, the user can specify special meter scaling for direct readout in psi, gph, °F, °C, or other convenient engineering units.

The large, 2 $\frac{1}{4}$ -inch diameter meter face has a 2-inch long scale for easy readability. A zero adjustment is located on the meter faceplate (accessible with the housing cover removed). The meter can be rotated within the enclosure for convenient viewing in 90-degree increments.

## Product Data Sheet

00813-0100-4378, Rev EA

March 2008

Rosemount 751

# Specifications

## HOUSING SPECIFICATIONS

### Physical Specifications

#### Materials of Construction

##### Enclosure

Low-copper aluminum

##### Paint

Polyurethane

##### O-rings

Buna N

##### Meter Mounting Materials

Noryl® plastic

#### Electrical Connections

3-pole terminal block with 8–32 nickel-plated brass screw terminals, with 3/4–14 NPT conduit. (Stainless steel 3/4- to 1/2-inch reducer available as an option.)

#### Enclosure Rating

NEMA Type 4x. CSA Type 4x. IP66.

#### Weight

Indicator only: 1.8 kg (4 lb)

Indicator with optional mounting bracket: 2.27 (5 lb)

## LCD METER SPECIFICATIONS

### Functional Specifications

#### Input Signal

4–20 mA dc

#### Display

##### 4 mA Point Limits

–999 to 1000

##### Span limits

200 to 9999

The sum of the 4 mA point and span must not exceed 9999. Adjustments are made using non-interactive zero and span buttons.

#### Display Options

Standard display response is linear with mA input. Optional square root or filtered response may be selected.

#### Overload Limitations

666 mA, maximum

#### Temperature Limits

##### Storage

–40 to 85 °C (–40 to 185 °F)

##### Operating

–20 to 70 °C (–4 to 158 °F)

–40 to –20 °C (–40 to –4 °F)

loop is intact and the meter is not damaged

#### Humidity Limitation

0 to 95% non-condensing relative humidity

#### Update Period

750 ms

#### Response Time

Responds to changes in input within a maximum of two update periods. If the filter is activated, then the display responds to the change within nine update periods.

#### Voltage Drop

0.7 V dc typical, 1.0 V dc maximum

### Performance Specifications

**Digital Display Resolution**

0.05% of calibrated range  $\pm$  1 digit

**Analog Bar Graph Resolution**

5.0% of calibrated range

**Indication Accuracy**

0.25% of calibrated range  $\pm$  1 digit

**Stability**

0.1% calibrated range  $\pm$  1 digit per six months

**Temperature Effect**

0.01% of calibrated range per  $^{\circ}$ C on zero

0.02% of calibrated range per  $^{\circ}$ C on span over the operating temperature range

**Power Interrupt**

All calibration constants are stored in EEPROM memory and are not affected by power loss.

**Failure Mode**

LCD meter failure will not affect transmitter operation.

**Under/Over Range Indication**

Input current < 3.5 mA: Display blank

Input current > 22.0 mA: Display flashes 112.5% of full scale value or 9999, whichever is less

### Physical Specification

**Meter Size**

2 $\frac{1}{4}$ -inch diameter face with four 1 $\frac{1}{2}$ -inch high characters

### ANALOG METER SPECIFICATIONS

#### Functional Specifications

**Input Signal**

- 4–20 mA dc
- 10–50 mA dc
- 40–200 mV

**NOTE:**

Maximum series resistance is ten ohms for ammeters.

**Meter Indication**

0 to 100% linear scale

0 to 100% flow scale

Special optional ranges

**Overload Limitation**

150% of rated end scale value for two minutes

**Temperature Limits**

-40 to 65  $^{\circ}$ C (-40 to 150  $^{\circ}$ F)

**Humidity Limits**

0 to 100% relative humidity

**Zero Adjustment**

Adjustment screw on face of meter

### Performance Specifications

**Indication Accuracy**

$\pm$ 2% of calibrated span

**Temperature Effect**

Less than 2% of full scale at any point within the temperature limits

### Physical Specification

**Meter Size**

2 $\frac{1}{4}$ -inch diameter face with 2-inch long scale

# Product Data Sheet

00813-0100-4378, Rev EA

March 2008

Rosemount 751

## Product Certifications

### HAZARDOUS LOCATIONS CERTIFICATIONS

#### North American Certifications

##### Factory Mutual (FM) Approvals

- E5** Certificate Number: 0T2H8.AE  
Explosion-Proof for Class I, Division 1, Groups B, C, and D.  
Dust-Ignition Proof for Class II, Division 1, Groups E, F, and G.  
Dust-ignition Proof Class III, Division 1
- I5** Certificate Number: 0T9H2.AX  
Intrinsically safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount Drawing 01151-0214.  
Nonincendive for Class I, Division 2, Groups A, B, C, and D.
- K5** Combination of E5 and I5  
NEMA Enclosure Type 4X  
Entity Parameters:  

$V_{max}$ = 40 V	A-G
$I_{max}$ = 165 mA	A-G
$I_{max}$ = 225 mA	C,D,E,F,G
$C_i$ = 0	A-G
$L_i$ = 0	A-G
- E3** NEPSI Flameproof  
Certificate Number: GYJ04107  
Ex ia IIC T6 (except acetylene)

##### Canadian Standards Association (CSA) Approvals

- Certificate Number: 33332-225
- E6** Explosion-Proof for Class I, Division 1, Groups C and D;  
Dust-Ignition Proof for Class II, Division 1, Groups E, F, and G;  
Dust-Ignition Proof for Class III, Division 1; Suitable for  
Class I, Division 2, Groups A, B, C, and D.  
CSA ENCLOSURE TYPE 4X
- I6** Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when installed per the Rosemount Drawing 00751-0068.
- C6** Combination of E6 and I6

#### Australian Certifications

- E7** SAA Flameproof  
Certification AUS Ex 494x  
Ex d IIB + H2 T6 ( $T_{amb} = 40^\circ C$ )  
Class I, Zone 1  
DIP T6 ( $T_{amb} = 40^\circ C$ )  
Class II  
IP65

##### CONDITIONS OF CERTIFICATION (X):

For transmitters having NPT or PG cable entry thread, an appropriate flameproof thread adaptor shall be used to facilitate application of certified flameproof cable glands.  
Only SAA certified flameproof temperature sensors shall be used with the Model 444 Temperature Transmitter if fitted directly into the tapped entry of the enclosure.

**I7** SAA Intrinsic Safety

Certification AUS Ex 122x  
Ex ia IIC  
T6 ( $T_{amb} = -20^\circ$  to  $40^\circ C$ )  
T5 ( $T_{amb} = -20^\circ$  to  $70^\circ C$ )  
Class I, Zone 0  
IP66

##### CONDITIONS OF CERTIFICATION (X):

The equipment has been assessed to the "Entity" concept and upon installation the barrier/entity parameters must be taken into account.

Entity Parameters:

$U_i$  = 30 V  
 $I_i$  = 200 mA  
 $C_i$  = 0.0  $\mu$ F  
 $C_i$  = 0  
 $L_i$  = 0 mH

#### European Certifications

- E8** ATEX Flameproof  
Certificate Number: CESI03ATEX263  
ATEX Marking: Ex II 2 G  
EEx d IIC T6 ( $-20^\circ C \leq T_{amb} \leq 60^\circ C$ )  
IP65  
Entity Parameters:  
 $V_{max}$  = 60 Vdc
- I8** ATEX Intrinsic Safety  
Certificate Number: Baseefa03ATEX0448X  
ATEX Marking: Ex II 1 G  
EEx ia IIC  
T5 ( $-60^\circ C \leq T_{amb} \leq 80^\circ C$ );  
T6 ( $-60^\circ C \leq T_{amb} \leq 40^\circ C$ )

##### SPECIAL CONDITION FOR SAFE USE (X):

1. The apparatus enclosure may contain light metals. The apparatus must be installed in such a manner as to minimize the risk of impact or friction with other metal surfaces.

Entity Parameters:

$U_i$  = 60V  
 $I_i$  = 200 mA  
 $L_i$  = 0  
 $C_i$  = 0

**N1** ATEX Type N

Certificate Number: Baseefa03ATEX0454  
ATEX Marking: Ex II 2 G  
EEx nA II T6 ( $-40^\circ C \leq T_{amb} \leq 70^\circ C$ )  
IP54  
Rated Voltage = 5V

## Dimensional Drawings

FIGURE 1. Rosemount 751 Field Signal Indicator

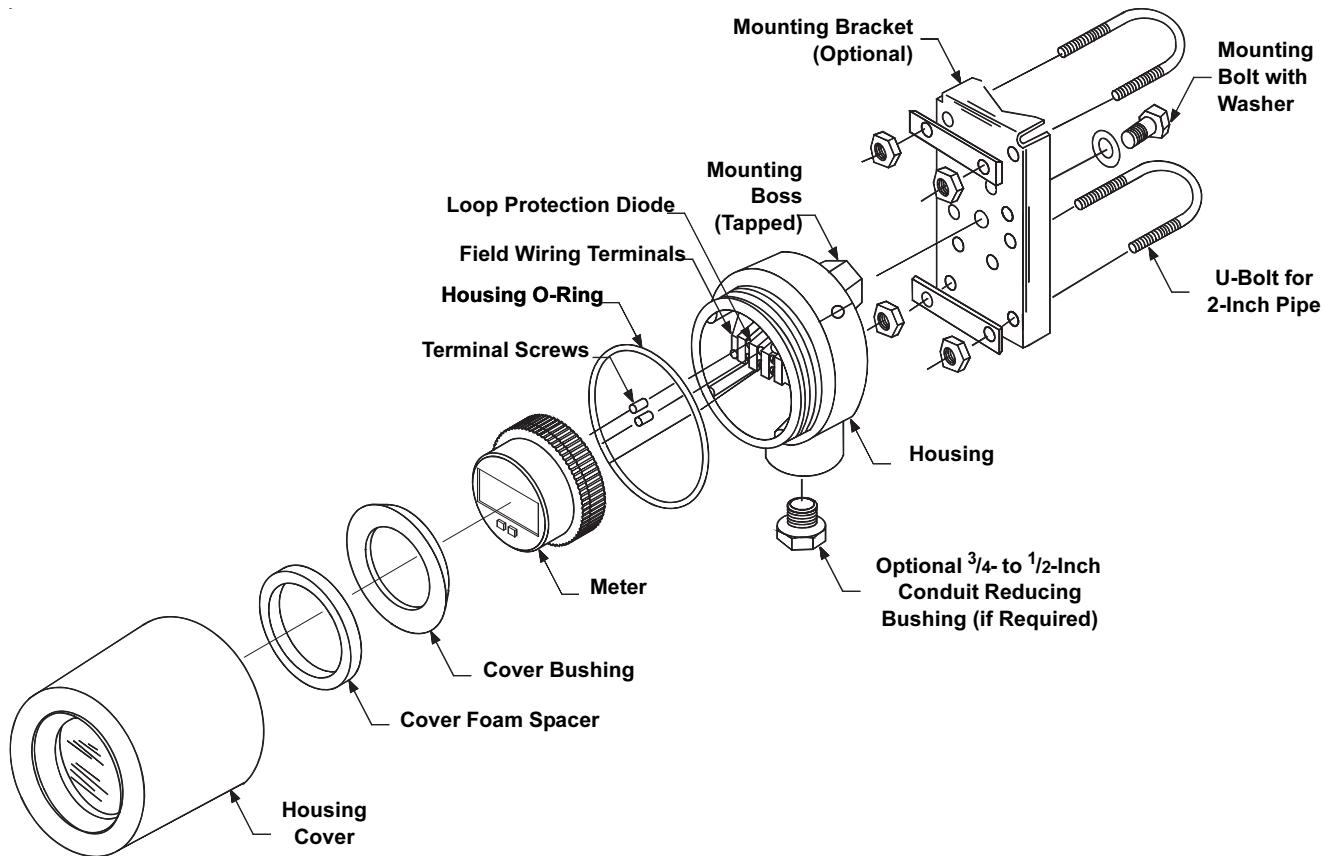
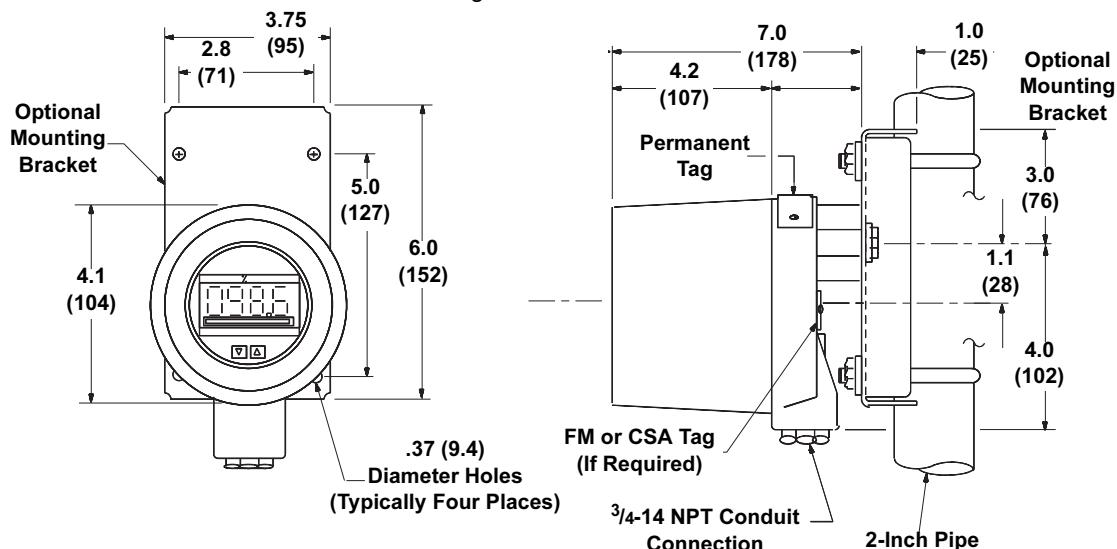


FIGURE 2. Rosemount 751 Dimensional Drawing



**NOTE:**  
Dimensions are in inches (millimeters)

## Product Data Sheet

00813-0100-4378, Rev EA

March 2008

Rosemount 751

## Ordering Information

Model	Product Description
751	Remote Signal Indicator
Code	Input Signal
A	4–20 mA dc
B	10–50 mA dc (Not Available with LCD Meter)
C	40–200 mV dc (Not Available with LCD Meter)
Code	Meter Scale
M1	Linear Analog Meter, 0–100% Scale
M2	Square Root Analog Meter, 0–100% Flow
M3	Special Scaling Analog Meter (specify range)
M6	Square Root Analog Meter, 0–10 √
M4 <sup>(1)</sup>	Linear LCD Meter, 0–100% Scale
M7 <sup>(1)</sup>	Special Scale LCD Meter (specify range, mode, and engineering units)
M8 <sup>(1)</sup>	Square Root LCD Meter, 0–100% Flow
M9 <sup>(1)</sup>	Square Root LCD Meter, 0–10 √
Code	Product Certificates
NA	No Approval Required
E3	NEPSI Flameproof
E5	FM Explosion-Proof
E6	CSA Explosion-Proof
E7	SAA Flameproof
E8	ATEX Flameproof
I5	FM Intrinsic Safety and Non-incendive
I6	CSA Intrinsic Safety
I7	SAA Intrinsic Safety
I8	ATEX Intrinsic Safety
N1	ATEX Type N Non-incendive
C6	CSA Intrinsic Safety, Non-incendive, and Explosion-proof approval combination
K5	FM Intrinsic Safety, Non-incendive, and Explosion-proof approval combination
Code	Options
Mounting Bracket	
B	Mounting Bracket for Flat Surface or 2-inch Pipe
Reducer	
C	Stainless Steel Reducer ¾- to ½-inch for Conduit Connection (See Figure 1 for reference.)
Bar Code Tag	
BT	Customer Specified Barcode Tag

Typical Model Number: 751 A M1 NA BC

(1) May be reconfigured in the field.

### Tagging

The indicator will be tagged, at no charge, in accordance with customer requirements. All tags are stainless steel. The standard tag is permanently attached to the indicator. Tag character height is 1/16 inch (1.6 mm). A wired-on tag is available upon request.

## Product Data Sheet

00813-0100-4378, Rev EA

March 2008

# Rosemount 751

Standard Terms and Conditions of Sale can be found at [www.rosemount.com\terms\\_of\\_sale](http://www.rosemount.com\terms_of_sale)

Rosemount and the Rosemount logotype are registered trademarks of Rosemount Inc.

PlantWeb is a mark of one of the Emerson Process Management companies.

All other marks are the property of their respective owners.

Cover Photo: 751-00ab

### Emerson Process Management

#### Rosemount Division

8200 Market Boulevard  
Chanhassen, MN 55317 USA  
T 1-800-999-9307  
T (International) (952) 906-8888  
F (952) 949-7001

[www.rosemount.com](http://www.rosemount.com)

#### Emerson Process Management

Heath Place  
Bognor Regis  
West Sussex PO22 9SH  
England  
Tel 44 (1243) 863 121  
Fax 44 (1243) 867 5541

#### Emerson Process Management

Asia Pacific Private Limited  
1 Pandan Crescent  
Singapore 128461  
T (65) 777 8211  
F (65) 777 0947  
[Enquiries@AP.EmersonProcess.com](mailto:Enquiries@AP.EmersonProcess.com)



# Rosemount TankMaster

So advanced that it's easy to use



The Emerson logo is a trademark and servicemark of Emerson Electric Co. Rosemount TankMaster is a trademark of Rosemount Tank Radar AB. IFIX is a trademark of Intellution Inc. InTouch is a trademark of Wonderware Corporation. Microsoft, Microsoft Office, and Windows XP are trademarks and registered trademarks of Microsoft Corporation. Enraf is a trademark of Enraf B.V. Endress+Hauser is a trademark of Endress+Hauser (International) Holding AG.

The contents of this publication are presented for information purposes only, and while effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, expressed or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice. Rosemount Tank Radar AB accepts no responsibility for any errors that may appear in this description.

**Emerson Process Management**  
**Rosemount Tank Gauging**  
Box 13045  
SE-402 51 Göteborg  
SWEDEN  
Phone: +46 31 337 00 00  
Fax: +46 31 25 30 22  
E-mail: Sales.RTG@Emerson.com  
[www.rosemount-tg.com](http://www.rosemount-tg.com)

**North America:** Rosemount Tank Gauging North America Inc. Houston, Texas. Tel: 1-800-SAAB TNK. E-mail: sales.rtg.hou@Emerson.com **Middle East:** Rosemount Tank Gauging Middle East SPC, Bahrain. Tel: +973 17 22 66 10. E-mail: khawaja@rosemounttg.com.bh **INDIA:** Rosemount Tank Gauging India Pvt. Ltd., Pune. Tel: +91 20 6721 1500. E-mail: pune@tankradar.in **UK:** Radar Tank Gauging Ltd., Wokingham. Tel: +44 (0) 118 973 6670. E-mail: info@radartg.com **LATIN AMERICA & CARRIBEAN:** Rosemount Tank Gauging, Tel: +58 212 242 0237, E-mail: Miguel.Fattal@Emerson.com **OTHER COUNTRIES:** Find your local representative at [www.rosemount-tg.com](http://www.rosemount-tg.com)

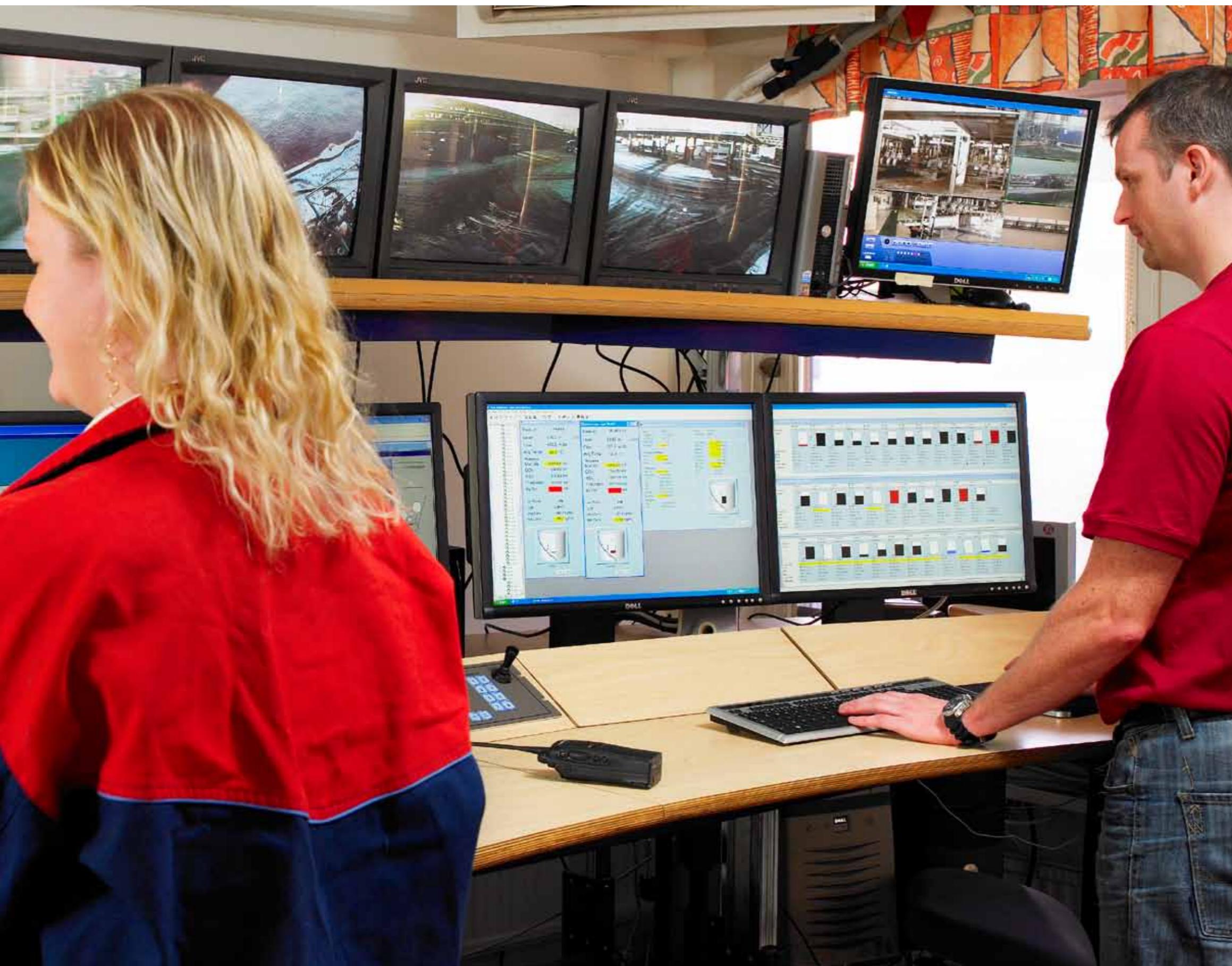
**ROSEMOUNT®**  
Tank Gauging

© Rosemount TankRadar AB – Ref.no 205010 En. Third edition, Rev C, November 2009.

  
**EMERSON**  
Process Management

**ROSEMOUNT®**  
Tank Gauging

  
**EMERSON**  
Process Management



## The easy way to control your tank farm conditions

It takes only one word to describe the new Rosemount TankMaster tank inventory system –Easy. Both to work with and to install on a PC. It makes it easy for operators to have full control and for engineers to configure and service tanks. Of course, the system is easy to connect with other systems as well as other Windows programs.

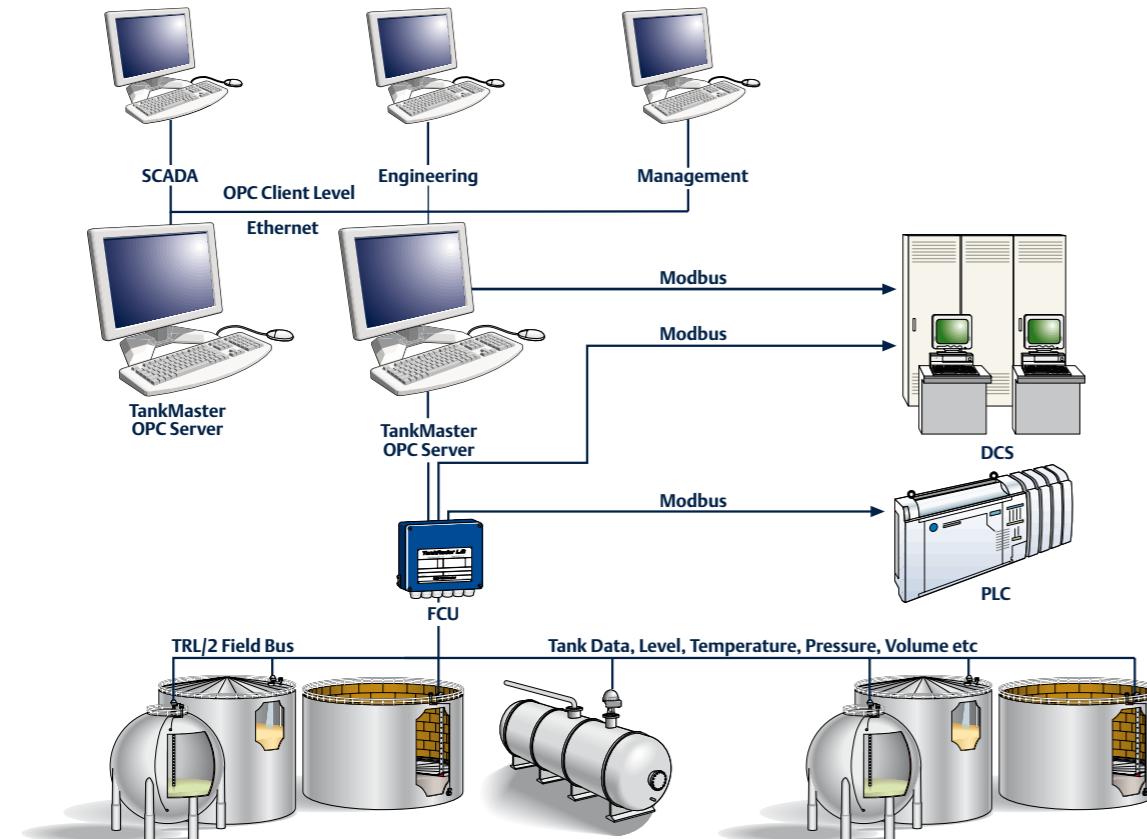
TankMaster is the powerful Human Machine Interface (HMI) for tank inventory management. It provides configuration, service, set up, inventory and custody transfer functions for the Rosemount Tank Gauging systems. All calculations are based on current API and ISO standards.

TankMaster can communicate with Microsoft® programs and OPC compatible systems like Intellution's iFIX® and Wonderware's InTouch®. By sharing data with users on all levels of the enterprise, operators and plant management are better equipped to make timely decisions.

TankMaster is developed and supported by Emerson Process Management. This ensures that you get a reliable leading edge system with full technical and global support. In other words – you get a system that is so advanced that it's easy to use.

*Tank inventory management in action.*

## User - friendly and efficient features



### Real time tank gauging data

Getting all tank gauging data such as level, temperature, water interface and pressure at a glance, you can automatically calculate volume and mass for your inventory and custody transfer tanks. This will maximize the plant effectiveness, increase productivity, and reduce costs. The operator will be able to respond faster to changing tank farm conditions.

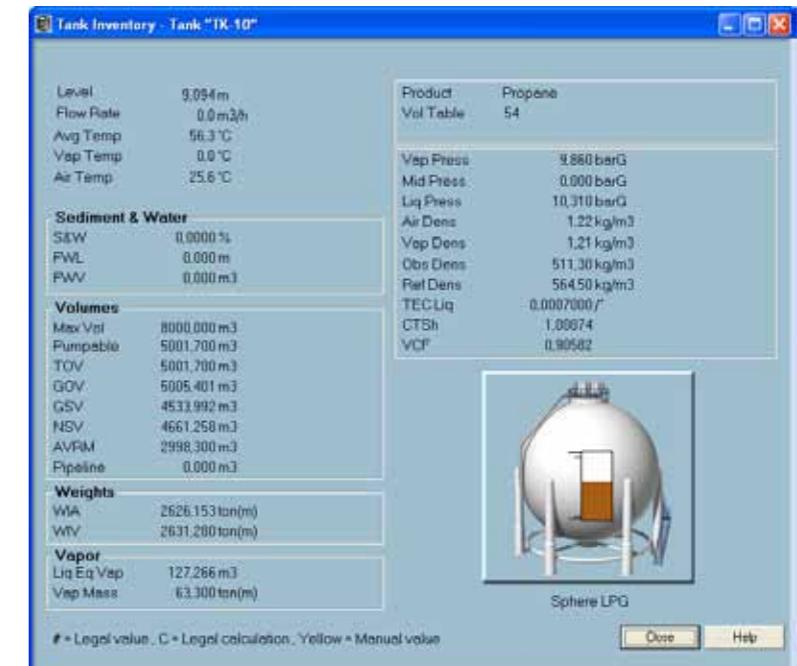
### Real time inventory calculations based on API and ISO

TankMaster quickly and accurately calculates inventory data, giving you full control over your tank farm. Inventory calculations include gross and net volumes as well as mass calculations, according to current API tables (6, 54, 24, A-D), ISO and other major standards. Tank capacity tables (1000 strapping points) for cylindrical and spherical tanks are also supported. Liquid and mass calculations of vapor in LPG are made according to ISO 4267.



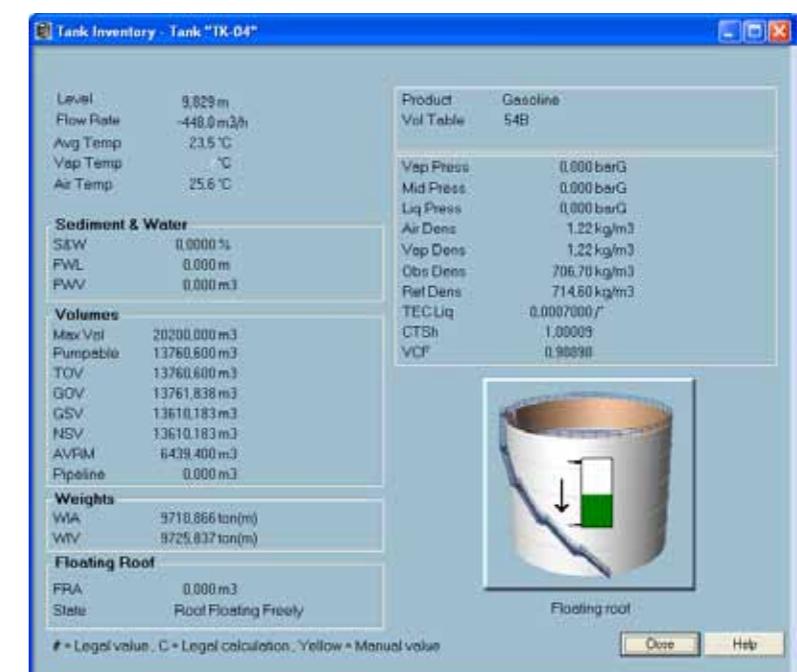
### Hybrid tank gauging

With a high accuracy hybrid tank gauging system you can eliminate the need for manual density sampling. With tank gauging data as level, pressure and temperature you get automatic density measurements and mass calculations from the TankMaster system. The density measurements are made in real time just like the level measurement.



### API calculator

You can easily keep your reference density updated with TankMaster's API calculator. By keying in temperature, observed density and an appropriate API table, TankMaster automatically calculates your reference density. This ensures that you get new accurate data. The API calculator is the perfect option if you don't have an automatic hybrid tank gauging system.



### Windows XP environment

You work in the familiar Windows® XP environment, with full access to the Windows XP security settings and all other features you can find in the operating system.

### OPC server with browser

TankMaster uses OPCData Access 2.0 (OLE for Process Control), an open industry standard, which eliminates the need for costly customized software integration. With the OPC server and the browser it is easy to import all custody transfer and inventory data to other OPC clients such as different DCS:s, PLC:s, Scada systems, or Microsoft Office® programs. This way, operators and plant management are better armed to make timely decisions as they work with distributed inventory and tank gauging data. (Website OPC Foundation: [www.opcfoundation.org](http://www.opcfoundation.org))



## Full network capabilities

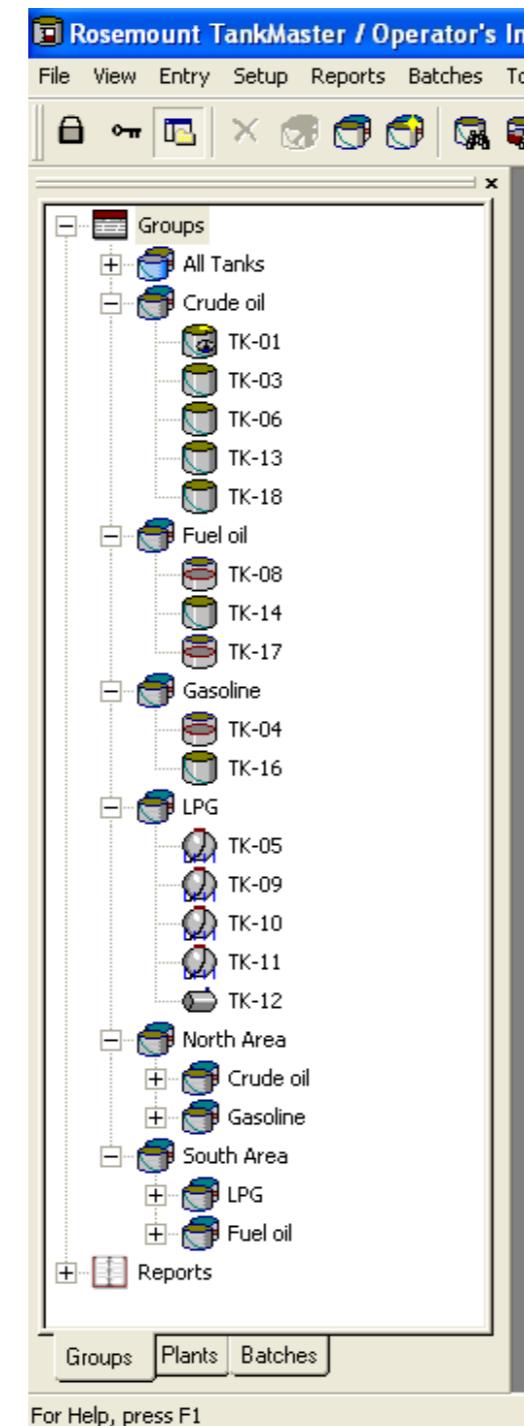
The networking function makes it possible to work with TankMaster from any PC in the network. Updated real-time data are available on all TankMaster client PCs improving the corporate communication. The operator can install tanks, handle tank gauging and inventory data and accept alarms everywhere, by simply consulting a PC nearby. Authority for alarm handling can be distributed in the network. If you have many control rooms you can decide who will be responsible for which tanks in the tank farm, giving high safety.

## User friendly navigation

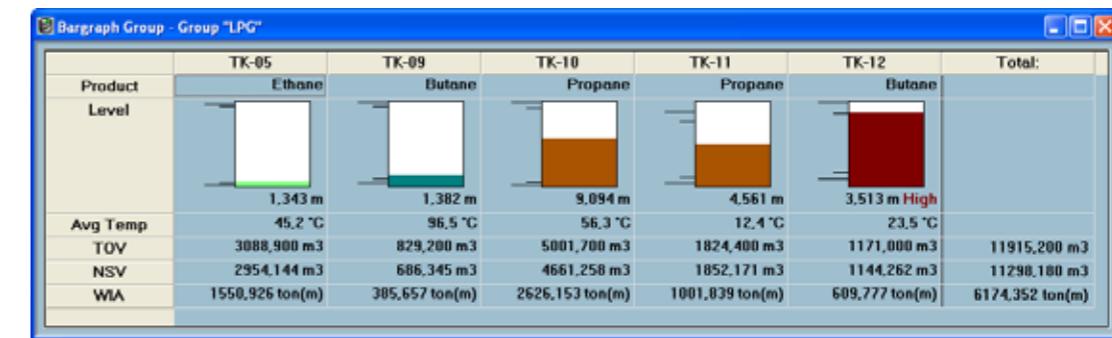
The “tank farm explorer” makes it easy to navigate in TankMaster. Just like in “Windows explorer” it is possible to expand and minimize fields and get direct group and tank access by double-clicking the specific group or tank icon.

## Interactive configuration and installation

A wizard will guide you through the interactive installation and configuration of the transmitters. The wizard guide is based on graphics and explicit messages. Additional help functions are always available. After the installation you can easily see which transmitters and data acquisition units that belong to a tank.



For Help, press F1

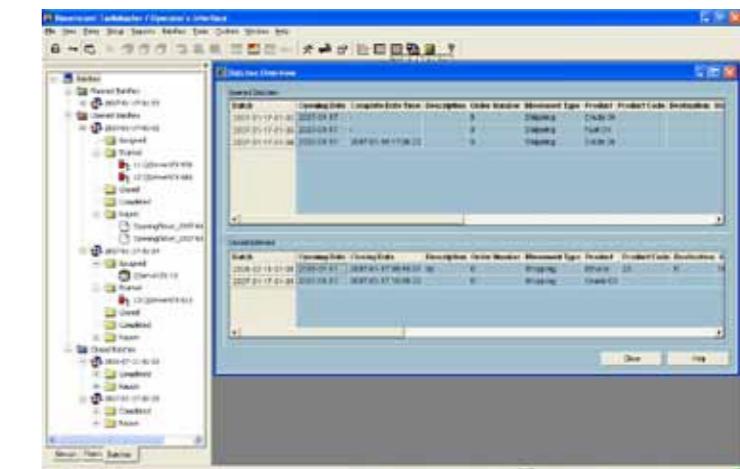


## Advanced group configuration

You can easily organize the tanks in e.g. geographical or product groups, with associated sub groups. For example, you can choose to see the actual tank gauging and inventory data in a bargraph group, giving a quick overview of tank farm activity. Or view only tanks with changing levels, in a tank movement group. Arrows inform the operator whether the tank is being filled or emptied.

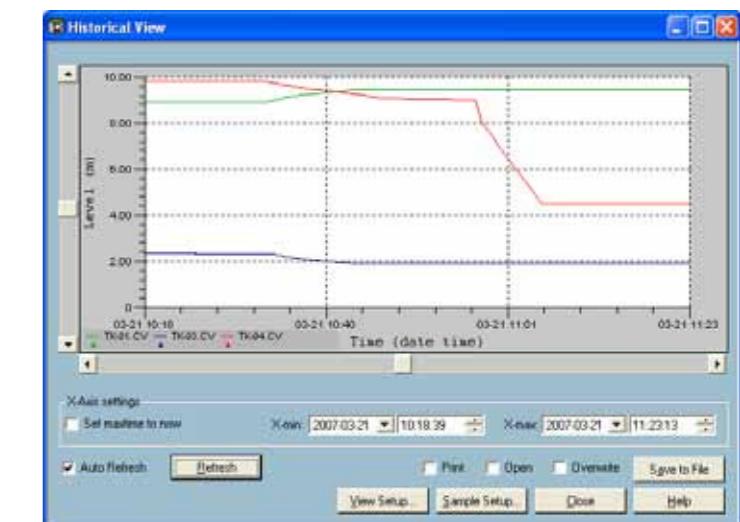
## Batch

The powerful batch function provides live batch status about all batches planned for the future, the ones that are running and also for finished batches. Information about finished batches is also available in Access database files. The user decides if the batch should be based on level, volume or mass. Status windows are available for which the user can overview each batch – when the batch was started, how much has been transferred, when the batch will be finished / remaining time, and also information entered by the user.



## Historical data sampling

The operator can collect historical data for reliable follow up. More than 100,000 samples per tank can be saved periodically. The reports are generated directly from TankMaster and saved to file. In TankMaster you get a graph of the historical trends.



## Real time view

In TankMaster you can see real time tank gauging data directly in a graph. You can follow e.g. a tank level graphically and save the result to a file. By using a print key program you can print out your graph.

## Automatic reports

TankMaster automatically generates standard reports for each shift, every twenty-four hours or at other intervals specified by the operator. Two types of standard reports can be generated, LogReports or MassBalanceReports, which are arranged by tanks or groups. You can adjust the parameters in the reports. All activities have a time stamp for reliable follow up.

## Reports via e-mail

Standard reports can automatically be sent via email to suitable destinations selected from each workstation for quick follow up. The e-mails are based on time of day or shift. This feature requires that you have a mail server in your network.

## Reports to Microsoft Office programs

The OPC server makes it possible to generate customized reports in Microsoft Office® programs such as Excel. This way, you can get your own plant specific reports. This special feature requires integration between TankMaster and third party complementary programs.

## Alarm limits

Alarm limits can be set up for level, level rate, average temperature, vapor temperature, analog inputs, vapor pressure, and liquid pressure. You may choose the desired limits for HiHi (Alarm threshold for the extreme high condition), Hi (Alarm threshold for the high condition), Lo (Alarm threshold for the low condition) and LoLo (Alarm threshold for the extreme low condition).

## Leakage alarms

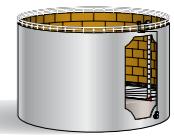
When you expect no level changes in your tank for a time period you can activate a leakage alarm. If the net volume or level changes more than a predefined leakage volume or leakage level, you will get an alarm, giving you increased safety and environmental protection.



Alarm Log - Group "All Tanks"						
	Time	Server/Alias	Object	Parameter	Alarm	Status
1	2007-03-21 12:33:30	Local Server	TK-04	Level	Low	Ack
2	2007-03-21 12:33:28	Local Server	TK-03	Level	LoLo	Ack
3	2007-03-21 12:33:23	Local Server	TK-01	Level	HiHi	Ack
4	2007-03-21 12:33:20	Local Server	TK-04	Level	Low	Off
5	2007-03-21 12:33:16	Local Server	TK-03	Level	LoLo	Off
6	2007-03-21 12:33:12	Local Server	TK-01	Level	HiHi	Off
7	2007-03-21 12:33:02	Local Server	TK-04	Level	Low	On
8	2007-03-21 12:32:44	Local Server	TK-03	Level	LoLo	On
9	2007-03-21 12:32:27	Local Server	TK-01	Level	HiHi	On

## Reliable alarm handling

TankMaster features alarm summary, alarm log and alarm event log for safe and reliable alarm handling. When an alarm occurs, a bell rings and the alarm icon starts to blink. The operator can set different sounds for each alarm type. Alarms are customized at any station in the network and a client signature is saved at every acknowledgement. You can view all alarms in the system or divide the alarms per group or per tank.



## Alarms via e-mail

Alarms can be automatically sent via e-mail to suitable destinations selected from each workstation, based on time of day or shift, for quick follow up.

## Alarms to mobile phones

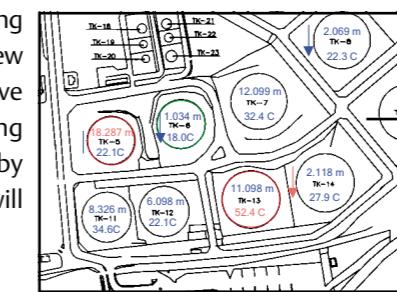
Alarms can be sent to mobile telephones or pagers making the operator mobile. This feature depends on the mobile operator in your country and your e-mail possibilities.

## User manager

For safety reasons, different access rights per user can be set. The users can log on and log off from TankMaster without restarting the program. In the alarm log you can e.g. track who acknowledged a certain alarm. When the shift is over the operator logs out and the new operator takes over and logs in. TankMaster has four different access levels: view, operator, supervisor, and administrator, where each has five User Sub-Access Levels. This gives a total of 20 unique access levels. Different Access Levels can be set for each window in TankMaster.

## Audit log for events

For reliable follow up, events can be stored in an audit log. With the event log you can follow up when and by whom a parameter was changed. If you have many users in the system this is an excellent way to keep track of changes in the system.



## Customized views

In TankMaster you can change general and specific tank view and setup windows. You have a number of options to design your TankMaster as you like; you can either modify the existing windows or build completely new ones. For example you can have a photo of your own plant giving a quick realistic view and just by clicking a specific tank you will get corresponding tank data.

## Metrologically sealed data

TankMaster is designed for use as a legally approved custody transfer system according to the requirements of a number of metrological institutes. The hardware key will in this case be exchanged for a metrologically approved key, which is sealed to the parallel port on the PC and cannot be removed. Legally approved measuring values are clearly indicated on the screen.



## Scada / DCS communication via OPC

TankMaster has an open OPC structure, making it easy to connect a Scada / DCS system that handles OPC, e.g. Intellution's iFIX® or Wonderware's InTouch®. With this function, all users in the network can easily use the tank gauging and inventory data.

## Scada / DCS communication via MODBUS

From TankMaster you can get tank gauging and inventory data by using the Modbus protocol. You connect your Scada / DCS system on the serial com port (RS-232) on the PC.

## Easy translation

TankMaster can easily be translated to the language you choose in the Translation kit. Users can change text in the dialogs and menus and verify translated text on site. Any language is possible.

## Integration with other tank gauging systems

In TankMaster there are interfaces to other vendor's systems. You can connect an Enraf® system to TankMaster and get the measured tank gauging data. Another possible TankMaster connection is to the Endress+Hauser's® MDPII unit. TankMaster can also read data from any system supporting Modbus RTU and/or OPC DA

## On-line help

In TankMaster an on-line help is available giving quick support in all windows. The users have also access to User's manuals in PDF format. Acrobat Reader is included in the TankMaster package which makes it possible to read the PDF files. With the guidelines and manuals you will be able to do an easy and quick installation.

## In-house development

TankMaster is 100% developed and supported by Emerson Process Management, which has over 25 years experience of reliable and accurate radar tank gauging systems. By choosing Rosemount TankMaster for your tank inventory you will be sure to get a reliable leading edge system with full technical and global support.

# Rosemount TankMaster™ product information



## TankMaster, standard packages Note 1

<b>TankMaster WinSetup</b>	Configuration only.
<b>TankMaster 5</b>	Complete system, 1-5 tanks, inventory calculations based on API and ISO, configuration, view and alarm handling, standard reports, API calculator.
<b>TankMaster 20</b>	Complete system, 1-20 tanks, inventory calculations based on API and ISO, configuration, view and alarm handling, standard reports, API calculator.
<b>TankMaster 50</b>	Complete system, 1-50 tanks, inventory calculations based on API and ISO, configuration, view and alarm handling, standard reports, API calculator.
<b>TankMaster Max</b>	Complete system, no limit on number of tanks, inventory calculations based on API and ISO, configuration, view and alarm handling, standard reports, API calculator.

## Standard Features

<b>Real time tank gauging data</b>	Allows faster response and calculations. Increases productivity and reducing costs.
<b>Reliable alarm handling</b>	Receive alarm summary, alarm log and alarm event log.
<b>Leakage alarms</b>	Detect if the level or volume exceeds your predefined level or volume leakage limit.
<b>Reports</b>	Configure scheduled reports. Reports can be saved as txt or pdf.
<b>Batch</b>	Create and run batches. Batch alerts. Batch stored for 24 hours.
<b>User-friendly navigation</b>	The interface is easy to learn and efficient to work with.
<b>Historical data sampling</b>	Follow up all activities in clear graphs.
<b>Real time view</b>	Follow all activities in clear and printable real time graphs.
<b>Audit log for events</b>	Follow up when and by whom a parameter was changed.
<b>On-line help</b>	Offers an quick support in any TankMaster window.
<b>Integration of other vendors</b>	Present data from other vendors' devices.
<b>Group configuration</b>	Create and name groups of tanks. Customize data visualization for each group.
<b>Interactive configuration and installation</b>	The built-in wizard ensures a correct configuration procedure.
<b>User manager</b>	Define different user access rights.
<b>E-mail feedback</b>	Receive alarms and reports by e-mail.
<b>Translation kit</b>	Translate the interface to your preferred language.

## Optional Features Note 2

<b>Redundancy</b>	Two computers running simultaneously ensure stability, even if one breaks down.
<b>Custody transfer</b>	Custody transfer windows with hardware key for custody transfer approvals.
<b>Customized views</b>	Edit / view your own general or specific tank view in TankMaster.
<b>Extended Batch</b>	365 days batch storage, possible to export. Recalculation. Includes Tank Transfer Calculator.
<b>OPC server (OPC 2.0)</b>	For connection between TankMaster and Scada / DCS / Microsoft Office via OPC (network or locally in the PC).
<b>OPC server (OPC 2.0) with Office Link</b>	For connection between TankMaster and Microsoft Office via OPC, including the Office Link program (third part program).
<b>Network clients</b>	Used for TankMaster clients in the network.
<b>Slave protocol</b>	For connection between TankMaster and Scada / DCS via MODBUS (RS-232).

## Future

<b>New functions</b>	Emerson Process Management will continue to develop Rosemount TankMaster. Please contact Emerson Process Management / Rosemount Tank Gauging if there is a feature that you are missing.
----------------------	--

### Note 1 - TankMaster standard packages:

The API-calculation feature includes real time inventory calculations and hybrid tank gauging.

### Note 2 - TankMaster options:

The OPC server includes the browser.