

2900 Float & Tape Transmitter

Precision absolute optical encoder instrument designed to provide accurate level and temperature information from the tank side to the control room

Varec®



FuelsManager®
Compatibility



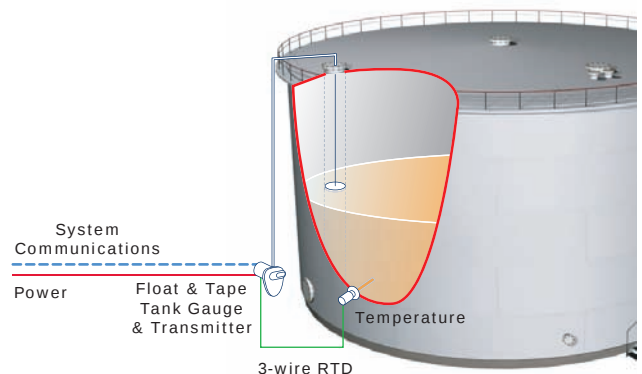
Benefits and Features

- Easy installation – mounts directly to most mechanical tank gauges, including Varec, GSI, L&J and Sakura
- Minimal service or repair with no parts to wear out – absolute encoder utilizes infrared optics and precision direct-drive gearing transmits accurate level reading to the control room
- First steps to complete inventory management – Integrate temperature measurement at the control room for volumetric calculations with an on-board 3-wire RTD temperature input
- Automation and control – activate alarms or relays with 2 discrete inputs as standard and an optional 2 inputs and 4 contact outputs
- Select a standard 20–65 VDC or an optional 40–240 VAC on-board power supply
- FM, CSA and ATEX approved for use in hazardous areas
- IP65, NEMA Type 4 enclosure rating

Applications

The 2900 Float & Tape Transmitter (FTT) is a precision digital instrument designed to mount directly to most mechanical float and tape tank gauges, such as the Varec 2500 Automatic Tank Gauge (ATG).

The 2900 FTT is explosion-proof and approved for use in hazardous locations, making it particularly suitable for use in bulk storage applications found in the oil and gas industry.



System Function and Design

Level Measurement

In response to changes in liquid level the mechanical level gauge rotates the 2900 FTT drive shaft. The 2900 FTT's precision direct-drive gearing turns two (2) encoder discs. Each disc contains reflective tracks that are read by optical infrared sensors. The encoded level is then converted to a specific field communications protocol by the main PCB and transmitted via a junction box or interface device to a control room inventory management system, such as FuelsManager®.

Temperature Measurement

The 2900 FTT is able to integrate a single spot temperature RTD's measurement and transmit this to the control room for volumetric calculations.

Control and Automation

The 2900 FTT is able to integrate 2 discrete input connections on the main PCB. An optional secondary PCB contains an additional 2 inputs, 4 contact outputs and the AC power supply option. These inputs/outputs can be used to maintain a safer working facility and provide basic automation and control by activating alarms or relays.

Installation Guidelines

The following information should be used as a guide only; please refer to the operation and maintenance manual for complete installation instructions. You are able to leave the tank in-service and the mechanical float gauge in place while you install and configure the 2900 FTT.

Before the 2900 FTT is connected to a mechanical float gauge at the tank side, check the following:

1. The mechanical float gauge is operating correctly.
2. There is sufficient space around the mechanical gauge to install the transmitter and accessories (such as conduit and cabling).
3. You have the correct transmitter/mechanical gauge adaptor if required.
4. You have the correct field connections at the gauge-head, ready to connect to the 2900 FTT (i.e. power, communications and temperature sensor wiring).

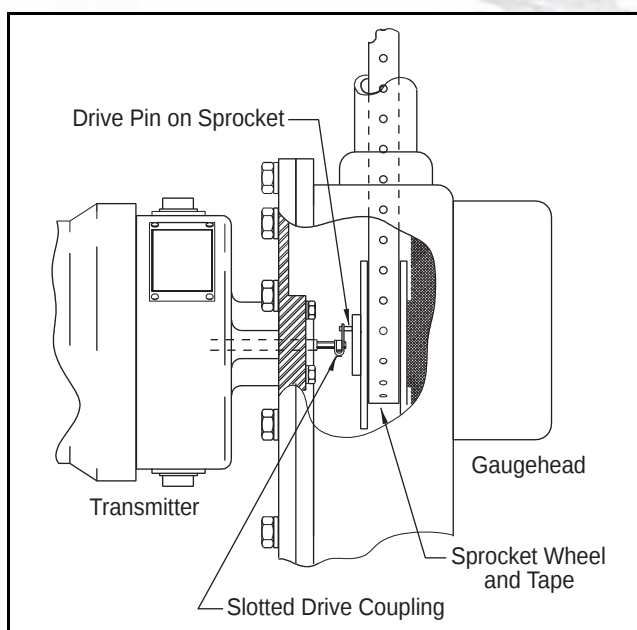
To mount the transmitter onto the gauge, the back cover of the mechanical float gauge must first be removed. Mount the 2900 FTT in place of the access cap, making certain that the "TOP" of the 2900 FTT housing lines up with the top of the back cover. Make certain that the slot in the 2900 FTT drive coupling engages with the pin on the tape sheave of the mechanical float gauge.

Wiring and Configuration

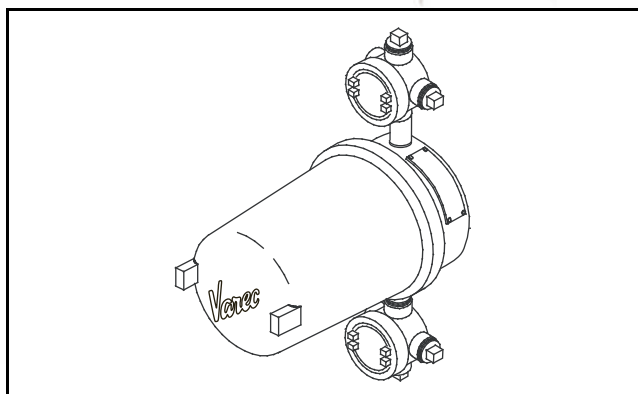
The 2900 FTT is configured after it has been installed onto the tank gauge and wired for operation. The rotary switches on the main PCB are used to configure the transmitter's baud rate, unit address, etc.

While the operator is calibrating the device, the LEDs, situated above the rotary switches, provide an indication that the transmitter matches the manual level reading and has been calibrated correctly.

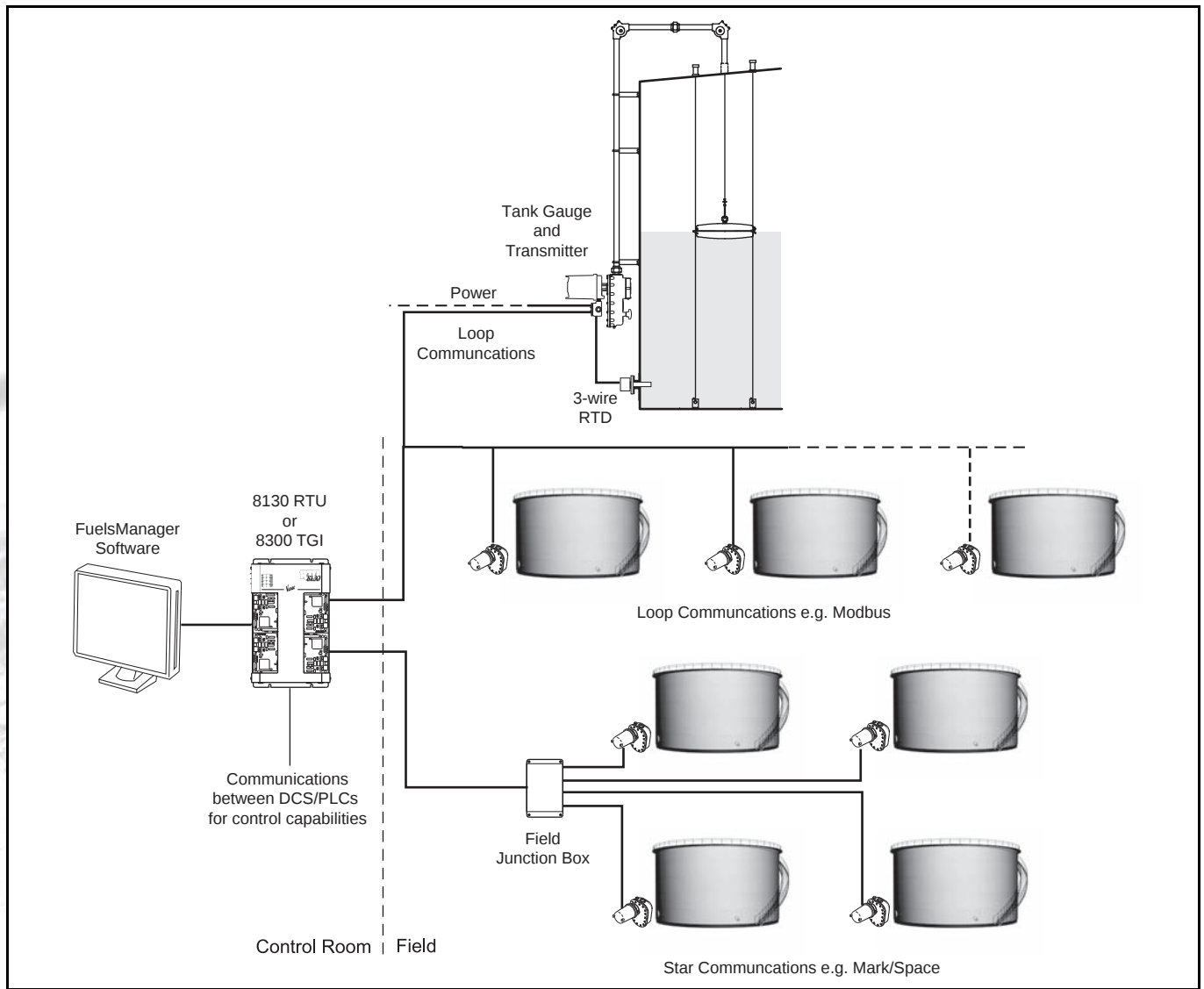
With the use of an elbow drive adapter, the 2900 can also be adapted to the 6700 Liquid Level Indicator (LLI).



Cross section – 2900 FTT connected to a 2500 Automatic Tank Gauge



2900 FTT (shown with two junction boxes)



2900 FTT System Diagram

Input and Output

All standard electronics for the 2900 FTT are contained on a single (main) PCB located on the encoder assembly. This includes DC power, field communications, a 3-wire temperature input and 2 discrete inputs. An optional secondary PCB contains an AC power supply, 2 additional discrete inputs and 4 contact outputs.

All wiring is terminated in junction boxes that contain 12 terminals and a single ground connector. A standard application would require a single junction box for communications, temperature and two SPDT contacts. For more complex applications, multiple junction boxes can be attached to the transmitter housing.

Input Power

The 2900 FTT can be supplied with AC or DC power options. Both options are galvanically isolated from the micro controller. Connect the power wires to the appropriate terminals in the junction box(es) supplied with the 2900 FTT.

Standard DC Supply

The main PCB board contains the standard DC power supply option of 20–65 volts DC.

Optional AC Power Supply

An additional PCB containing a 40–240 VAC 50/60 Hz power supply is also available.

Power Outage

The 2900 FTT utilizes an absolute encoder that maintains the correct level reading during and after a power outage. No additional configuration is required after a power outage. No battery back-up is required.

Note! Before connecting power wires to the 2900 FTT, ensure the power is switched off and the instrument is correctly grounded.

Field Communications

For integration with your tank inventory system, the following digital protocols (field communications) are available:

- Mark/Space
- EIA-485 MODBUS®
- GPE
- Whessoe Bus

The main PCB contains all connections and functionality for the communication option selected. All communications wiring must be connected to the appropriate terminals in the junction box(es) supplied with the 2900 FTT. All communications are optically isolated from the micro controller.

Main PCB functions	# Wires
Ground	1
Mark/Space	4 (includes DC power)
EIA-485 Modbus	3
L&J Tankway	4 (includes DC power)
GPE/Whessoe Bus	4 (includes DC power)
DC Power	2
Temperature	3
Input 1 – 2	2 each

Secondary PCB Functions	# Wires
AC Power	3
Input 3 – 4	2 each
Output Contact 1– 4	2 each

SPDT Contacts	# Wires
2 x SPDT Contacts	4
4 x SPDT Contacts	8

Temperature RTD Input

The 2900 FTT measures temperature directly using a high-accuracy 20-bit analog-to-digital converter. Temperature inputs can be either 3-wire RTD Copper (CU90, CU100) or Platinum (PT100). All wiring must be connected to the appropriate terminals in the junction box(es) supplied with the 2900 FTT.

Discrete Inputs

As standard, the 2900 FTT contains 2 discrete inputs for connection to ancillary devices, such as limit switches, pumps or valves. The 2900 FTT then provides an Open/Closed signal to the host system. All wiring must be connected to the appropriate terminals in the junction box(es) supplied with the 2900 FTT.

When the 40–240 VAC option is selected, an additional 2 discrete inputs are available. These additional inputs are located on the secondary PCB.

Contact Outputs

When the 40–240 VAC option is selected, 4 contact outputs are provided. These are software-driven "Normally Open/Closed" outputs. The outputs can be configured using a computer running ViewRTU or via a MODBUS interface. They can be set to trigger alarm lights, horns, etc. for temperature or level alarms. They have the following ratings:

- 0.6 A @ 125 Vac
- 1 A @ 30 Vdc
- 0.6 A @ 110 Vdc

Limit Switches

Two (2) or four (4) SPDT limit switches can be supplied as an option. They have the following ratings:

- 20 A @ 125, 250, 460 VAC
- 10 A @ 125 VAC Tungsten filament Lamp Load
- 1 HP @ 115 VAC, 2 HP @ 250 VDC
- 1/2 A @ 125 VDC, 0.25 A @ 250 VDC

The optional switches can be selected for normally open or normally closed operation. They are mechanically operated directly from the main drive gearing and can be independently configured to switch at any desired tank level.

Accessories

Spare Parts and Maintenance Kits

The 2900 FTT is designed and manufactured to provide accurate and reliable operation without an intensive maintenance schedule.

Varec can provide spare parts, maintenance kits, preventive maintenance advice, training and warranties. Please consult your Installation, Operations and Maintenance Manual or a Varec Sales Representative for more details.

Transmitter Adapter Kits

The following kits include the necessary parts, including an adaptor bracket to allow the 2900 FTT to mount to other manufacturers' tank gauges.

Part Number	Description
13-05956-102	Adapter kit for mounting to L&J 92514, 92020 and 92030 gauges
13-05956-202	Adapter kit for mounting to L&J 92006 and Whessoe Varec 2006, 2026 and 2036 gauges

Maintenance

Isolated Circuits

Power and communications are both isolated from the micro controller. The power supply utilizes galvanic isolation and the communications are optically isolated. The 2900 FTT can perform self-diagnostics to check and identify problems. If a problem is encountered, the 2900 takes itself off-line without closing the entire field communication loop.

Advanced Trouble-shooting and Diagnostics

A laptop computer running diagnostics software can be connected to the serial port on the main circuit board for advanced diagnostics and troubleshooting.

Software Upgrades

Your technician can quickly and easily install additional features and upgrade firmware on the 2900 FTT by removing the cover and installing an EPROM. No specialized training is required.

Technical Specifications

The following specifications apply to the 2900 FTT over the normal (ambient) operating temperature range.

General

Manufacturer	Varec, Inc.
Designation	2900 Float & Tape Transmitter
Function	Precision absolute optical encoder instrument designed to provide accurate level and temperature information from the tank side to the control room

System Design

Encoder	Absolute, Infrared Optical Reflective
Encoder discs	1/8" Fiberglass with gold-plated reflective tracks
Encoder sensors	Optical Infrared
Gearing system	Stainless Steel, Direct Drive

Functional

Available ranges	Feet: 0–96 ft; Meters: 0–29 m
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Physical

Net weight	13 lbs (5.9 kg)
Shipping weight	18 lbs (8.2 kg)
Enclosure	Explosion proof die-cast aluminum Rated IP65 (NEMA 4)
Conduit entries	2900 FTT Enclosure: 2 x 3/4" NPT (standard configuration uses one entry) Terminal junction box: 2 x 3/4" NPT

Environmental

Operating temperature	–20 °F and +185 °F (–28 °C and +85 °C)
Operating humidity	0 to 95% relative humidity non-condensing

Performance

Accuracy	+/- 1/16" (1.58 mm)
Repeatability	+/- 1/16" (1.58 mm)

Power

Power requirements	20 to 65 Vdc 40–240 Vac, 50/60 Hz, 500 mW, Nominal
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Operating voltage	20 Vdc – minimum 65 Vdc – maximum
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Field Communications

Mark / Space

No. of units	50+ (Depending on specifications; consult a Varec Engineer)
Mode	Low speed or high speed Mark/Space
Cable	Four (4) wire, twisted pairs

EIA-485 MODBUS

No. of units	32
Baud rate	1,200, 2,400, 4,800, 9,600 or 19,200
Cable	Three (3) wire
Distance	4,000 feet (1230 m)

GPE

No. of units	16
Baud rate	2,400 or 4,800
Cable	Four (4) wire

Whessoe Bus

No. of units	15 instruments per loop (connected to RTU)
Baud rate	1,200 / 2,400 bits/s
Cable	Four (4) wire, twisted pairs

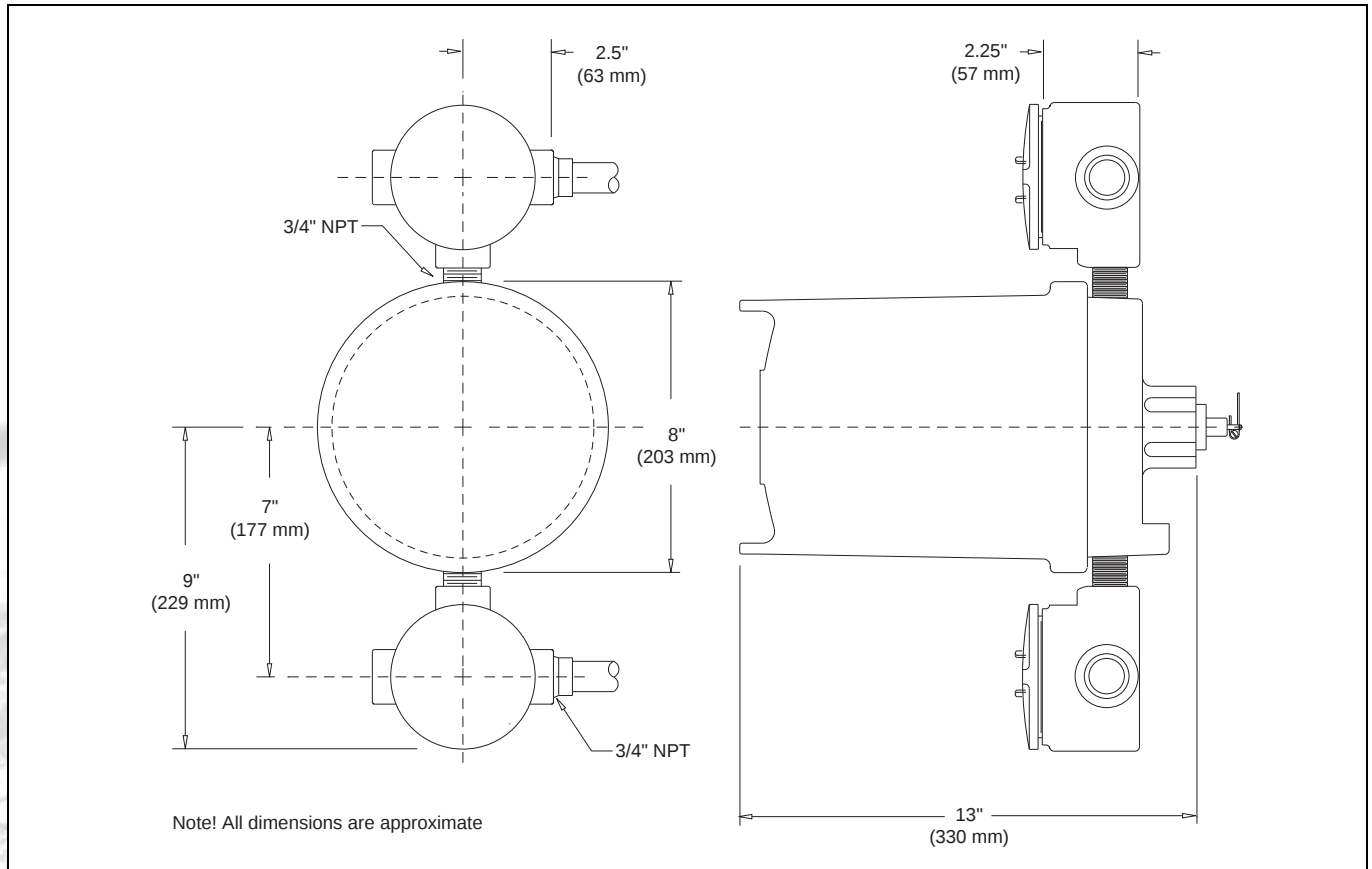
Certifications & Approvals

Factory Mutual (FM)
Class 1 Division 1, Groups C & D, T5 85° C max

CSA
Class 1 Division 1, Groups C & D, T5 85° C max

ATEX
Ex II 2G, Eexd II B T5, Ta+ 85° C Nemko 06 ATEX 1308

Product Dimensions



Order Codes

2900 Float & Tape Transmitter

		Housing	
	A	No housing required (electronics upgrade only)	
	B	Housing included (complete unit)	
		Power Input	
	0	20 - 65 VDC	
	1	40 - 240 VAC	
		<i>Option 1 includes 2 additional discrete inputs and 4 output contacts</i>	
		Communications	
	M4	Mark/Space	
	48	EIA-485 MODBUS	
	LJ	Tankway (L&J)	
	GE	GPE	
	WB	Whessoe Bus	
		Inputs/Outputs	
	0	No additional inputs / outputs	
	1	Two (2) additional discrete inputs and four (4) output contacts AC powered transmitter	
	2	Two (2) additional discrete inputs and four (4) output contacts DC powered transmitter	
		Limit Switches	
	0	No additional limit switches	
	2	Two (2) SPDT - Normally open limit switches	
	4	Four (4) SPDT - Normally open limit switches	
		Approvals	
	FM	Factory Mutual	
	AT	ATEX	
	CS	CSA	
N2900-			Complete product designation



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Your Official Representative

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