

LNG TankRadar®

Rosemount LNG Tank Gauging System

ROSEMOUNT®
Tank Gauging



EMERSON™
Process Management

Reliable and accurate level gauging in LNG tanks

Radar is the fastest growing technology for level gauging in Liquefied Natural Gas (LNG) tanks. No wonder – in a huge tank that may not be opened for years, containing a hazardous cryogenic liquid, you need a maintenance free gauging system that delivers reliable and accurate level data throughout the entire service life of the tank.

Modern storage facilities for LNG are large, complex and technically advanced structures. The planning, design and building of an LNG tank requires enormous investments with long payback times. For this reason, you need to choose intelligent solutions right from the beginning that will help maximize the tank's output while minimizing operating and maintenance costs. As a result, the tank's owner will be able to realize a quicker return on investment.

Rosemount TankRadar Rex from Emerson is one such intelligent solution. TankRadar Rex measures the LNG level without any physical contact with the LNG surface, and without any components inside the tank that may require service. The system provides continuous, reliable and highly accurate level data, for the entire service life of the LNG tank.



LNG level gauging with SIL 2 functional safety

Rosemount TankRadar Rex has been third party assessed and is considered suitable for use in Safety Integrity Level (SIL) 2 safety functions according to IEC 61511 (the decision to use proven-in-use devices, however, is always with the end user).

Emerson's technology leadership in radar gauging is based on 30 years of industrial experience and continuous development of customer benefits.



Rosemount Tank Radar Rex

The ultimate radar gauge for LNG storage

To reliably measure the level in an LNG tank, a radar gauge needs a sufficiently strong echo from the LNG surface. Thanks to its unique technical design features, Rosemount TankRadar Rex accomplishes this difficult task with ease.

Radar level gauging offers the benefits of a top-down, non-contact measurement system without any vulnerable components installed inside the tank. However, most radar gauges cannot overcome the difficulties associated with a boiling LNG surface that is covered with vapor, the low dielectric constant of LNG, and the long measuring distance from the tank roof.

For TankRadar Rex, however, this is simply a standard application. Our customer references include successful LNG installations with measuring distances in excess of 70 m (230 ft).

Advanced signal processing

The secret behind the success of TankRadar Rex is its advanced signal processing design, featuring a highly sensitive radar receiver. TankRadar Rex uses Frequency Modulated Continuous Wave (FMCW) technology for optimum signal strength from the LNG surface. The 4-inch stillpipe guides the radar signal, resulting in a strong, undisturbed echo from the surface of the liquid.

Maintenance free design

Thanks to its durable design, TankRadar Rex is virtually maintenance free. This means years of reliable operation, with highly accurate level data continuously delivered to your LNG management system.

All of the TankRadar Rex electronics are enclosed in the transmitter head outside the tank. In the unlikely event of a failure, you can easily replace the transmitter head with a certified spare and be back in operation in less than an hour.

Verification during operation

A patented reference device function enables measurement verification while the tank is in operation. Measured level values are compared to the known distance of a reference pin mounted in the stillpipe along with a deflection plate at the lower pipe end.

Digital accuracy reference

A radar gauge must have an internal reference in order to make the radar sweep absolutely linear. Each linearity deviation produces a corresponding inaccuracy. TankRadar Rex uses a digital crystal oscillator to achieve the highest precision. This provides the most stable reference possible using currently available technology.



Delivering accurate level data to your LNG management system

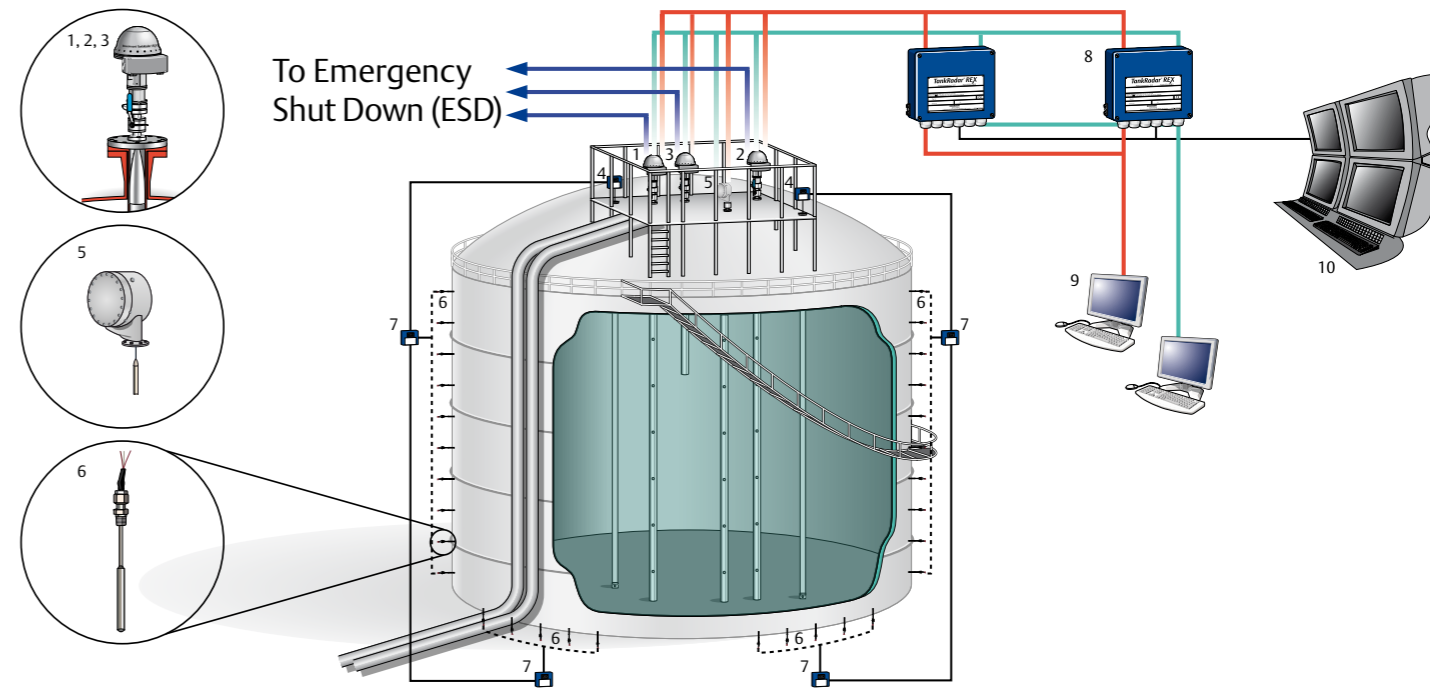
Rosemount TankRadar Rex is a highly versatile gauge that can easily be integrated into any LNG management system. It has inputs for temperature sensors, HART® based pressure sensors and other analog inputs as well as analog and relay outputs. All data is transmitted on the two-wire TRL/2 fieldbus. As an additional option, the gauge can be equipped with other output buses such as FOUNDATION™ fieldbus, RS 485, or Whessoe™ bus (Whessmatic™ 660).

We can provide you with anything from a single, ready-to-integrate TankRadar Rex to a complete LNG storage management system. Our customer references include a variety of successful installations and system deliveries.

The Rosemount LNG storage management system

Emerson is one of very few companies in the world that is able to supply complete LNG inventory solutions. The Rosemount LNG storage management system from Emerson provides you with highly reliable inventory and rollover prediction data including the following: LNG level, liquid temperature, density & temperature profiles, and skin temperature measurement for Cool Down Control and leak detection.

The illustration shows the scope of a typical complete system.



1. Primary Rex Level Gauge
2. Secondary Rex Level Gauge
3. High Level Alarm (HLA) Rex Gauge
4. Data Acquisition Unit (DAU) and Multiple Spot Thermometer (MST)
5. Level, Temperature and Density (LTD) Gauge

6. Temperature Sensors for Cool Down Control, skin temperature and leak detection
7. Temperature Transmitter
8. Field Communication Unit (FCU) with redundancy
9. Redundant PC-based LNG Inventory management system
10. Host system/DCS

System highlights

LNG Gauge RTG 3960

TankRadar Rex 3960 measures the LNG liquid level with an instrument accuracy of ± 0.5 mm (0.020 in.). It is virtually maintenance free and suitable for SIL 2 safety applications. However, should any service be required, a built-in ball valve enables the transmitter head to be dismantled without opening the tank.

TankRadar Rex can emulate most other gauges when integrated into an existing system. If redundant communication is required, TankRadar Rex can communicate via different protocols or buses simultaneously.

NL-Cryo MST sensor

A multi-spot thermometer is used to measure liquid average temperature in cryogenic applications such as LNG, with temperatures as low as -170 °C (-274 °F). The sensor can have up to 14 elements positioned at different heights. Durable stainless steel tube housing ensures maximum reliability and a long service life.

Cool Down & Leak Detection sensor

This is a small (6 mm diameter), yet highly reliable temperature sensor that accurately measures tank shell temperature in order to provide Cool Down Control and leak detection. The stainless steel sheath comes in customized lengths ranging from 0.3 to 50 meters.

Rosemount FCU 2160/2165/2175

This Field Communication Unit (FCU) is a data concentrator that continuously polls data from field devices such as tank gauges from various vendors, LTD profile meters, Data Acquisition Units, I/O Modules and other FCUs. The FCU stores data in a buffer memory and can service requests from any hosts and/or DCS systems using the Modbus protocol.

Rosemount DAU 2100

This Data Acquisition Unit (DAU) is used for connection of the NL-Cryo MST temperature sensors to the tank gauging system as well as for local level and temperature read-out. It is possible to connect an NL-Cryo MST sensor with up to 14 temperature elements for calculation of average liquid temperature. The intrinsically safe DAU is not only powered from the TankRadar Rex gauge, but it also communicates through the gauge.

Whesoe 1146 LTD

This is a Level, Temperature and Density (LTD) gauge based on Whesoe's single body concept. This LTD gauge samples 250 data points to construct a detailed and accurate temperature and density profile. Density and temperature profiles make it possible to detect liquid stratification in the tank. Communication occurs via a redundant Modbus. The LTD has a local digital display, showing both measured and diagnostic data.

Whesoe LNG Manager

In real time, the LNG Manager software monitors and displays all of the following: detailed tank information (level, temperature, density, trends), alarm events (periodic or on-demand reports), and shutdown alarm parameters. It uses standard and customized databases for volume correction calculation. It also allows access to maintenance menus in order to configure connected Whesoe gauges & transmitters.

Whesoe LNG Expert®

The LNG Expert software is based on Gaz de France's LNG Master. It handles all grades of LNG and automatically calculates their actual chemical composition. It continuously monitors data and calculates the expected evolution of eventual stratifications. In the event of an LNG rollover, it generates automatic alarms showing the remaining time to rollover, predicted boil-off gas (BOG) level during rollover and predicted pressure (rise) during rollover.



Consider it solved

Emerson is a world-class automation leader with a business model that emphasizes both project and operations needs. We combine superior products and technology with industry-specific engineering, consulting, project management and maintenance services.

Rosemount TankRadar from Emerson is the market leader aboard LNG vessels

The world's first radar tank gauging system with approved custody transfer accuracy for LNG vessels was launched in 1996 and soon rendered capacitance-based gauges obsolete. Today, the Rosemount TankRadar CTS from Emerson is installed in almost 7 out of 10 new LNG vessels.

The smart choice in process automation

The world's newest and largest LNG facilities utilize Emerson Process Management's automation solutions, featuring predictive intelligence, to provide enhanced enterprise level insight for better business decision-making and operational excellence. Join the growing numbers of LNG automation best practitioners.



Rosemount TankRadar® Rex. Better LNG tank gauging

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