MTG™ 3012

"Multi-function Tank (Gauge) Instrument"

The MTG™ 3012 "Multi-function Tank (Gauge) Instrument" provides direct economic benefits to multiple sectors of your business; Operations, Loss Control, Quality Assurance, Safety, Environmental, Maintenance, etc. The MTG™ 3012 provides more accurate and usable data than any other tank gauging instrument ever manufactured.

Easy integration with Distributed Control Systems (DCS) or HMI Software, the MTG™ 3012 measures or calculates all necessary data for volume to custody transfer accuracy within the transmitter head. MODBUS RTU registers are accessible for calculated data, measured data, diagnostics, and even sensor data in millivolts.

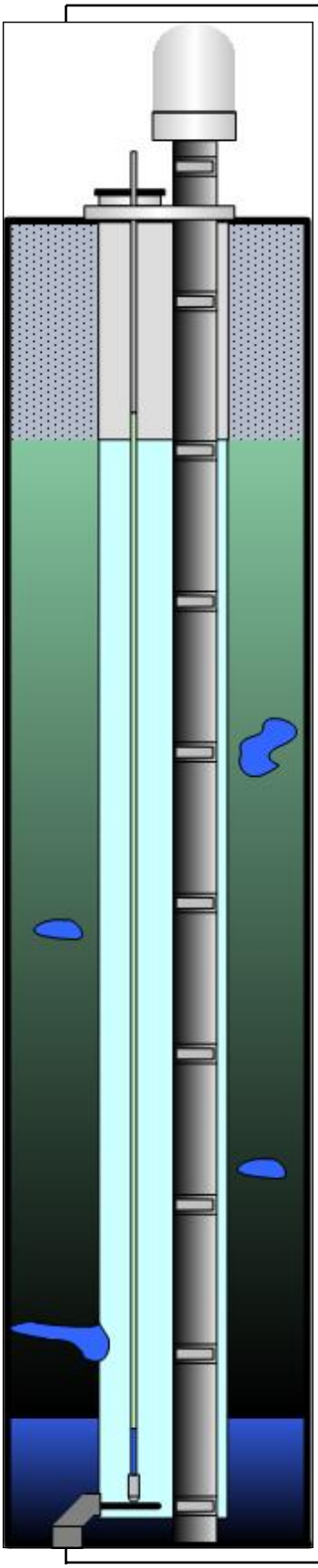
The GSI CIM local display provides I.S. Barriers, data concentration, protocol conversion, and topology conversion, etc. Gauging Systems Inc. has years of experience with Hardwire, Fiber Ethernet, Radio (Wireless Mesh Network, Spread Spectrum, WIFI, Blue Tooth, ZigBee), Cellular, Satellite, WEB, Internet, and Intranet (VPN) communications or combinations of these topologies, as well as I.S. low power solutions.

The MTG™ 3012 provides (measures and/or calculates) the following data:

- Volume by Hybrid Method (TOS, GOV, GSV, NSV)
- Volume by Hydrostatic Method
- Mass (Heel mass, Head mass, WIV)
- Level
- Multi-point spot temperature
- Average product temperature
- Multi-strata density
- Average product density (Reference density)
- Free water (or 2nd Product Interface)
- Entrained (emulsified) water
- Total water (Free Water Volume)
- Vapor Pressure
- Vapor temperature
- Flow rate by Mass
- Flow rate by Volume
- Atmospheric Pressure (Ambient Air Density)
- Atmospheric temperature (Ambient Air Temperature)
- Leak detection (Mass sensitivity and resolution)
- Redundancy - Optional (See the MTG^2™3024)

With the MTG™ 3012 data provided above you can think outside the box for tank gauging applications. This means think beyond Level and Temperature, think Volume and more. The MTG™ 3012 gives you the capability of adding additional benefits not normally associated with any tank gauge.

These capabilities provide economic, Loss control, operations, safety, and environmental justification for change in expectations and tank gauge technology. Read on..



Does your existing or proposed tank gauge provide the following functions? Could these functions be of economic benefit to you?

- The MTG™ 3012 "Multi-function Tank (Gauge) Instrument" is composed of multiple (4-12) sensor sections, each sensor section includes a high accuracy pressure transducers and a Class A, 100 Ohm Platinum, Four wire or Din RTD. Each sensor section provides multiple measured or calculated data variables that can be used for alarm purposes. Thus, a MTG™ 3012 can provide primary level and multiple alarm data variables from multiple sensors (Redundancy) . *Primary, third, fourth, fifth, etc. alarms for safety, environmental, and asset protection. Note: An independent secondary high level alarm or two tank gauges (See MTG^{2}™ 3024 Redundant Multi-function tank gauge) is recommended.*

- MTBF (reliability) is a realistic concern for all customers. As stated above, the MTG™ 3012 is comprised of multiple sensors. If a sensor should fail, the transmitter will simply turn off that sensor; provide a diagnostic indication of a failed sensor; and formulate all measurements or calculations from the multiple working sensors. A longer span between sensors in calculating level accuracy is the worst case scenario for a middle sensor failure. The two most critical sensors are the bottom sensor and vapor sensor. The MTG™ 3012 offers "*Optional* redundant bottom sensor and vapor sensor" or for critical applications see the MTG^{2}™ 3024 Redundant Multi-function Tank Gauge" (fully redundant transmitters and sensor arrays). *The MTG™ technology by design offers multiple levels of redundancy and a longer MTBF than any other tank gauge technology. It simply will not fail on the basis of a primary sensor failure.*

- The MTG™ 3012 MODBUS RTU communications allows the polling and data collection of the raw milli-volt readings directly from the sensors. Allowing the historical monitoring of these sensors for drift or other problems before they occur. Reducing MTBF, allowing preventative maintenance before a sensor fails, and increasing system reliability.

- Mass measurement provides the greatest sensitivity and resolution for sensing of product movement (unauthorized or authorized) and leak detection. *Safety, environmental, and asset protection.*

- If a tank gauge can provide Volume by Hydrostatic Method (Mass /Weight) without the direct influence of temperature expansion and contraction, will it provide a more accurate Volume measurement?

- The MTG™ 3012 measures both Atmospheric pressure and Vapor pressure, thus providing the capability of monitoring the tank for over pressure or the formation of a vacuum should pressure relief vents be improperly set, stick, or ice over, etc. *Safety, environmental, and asset protection.*

- By measuring vapor pressure you can monitor and provide information to regulate gas blanketing within a tank.

- From the measurement of vapor pressure, vapor temperature, and the number of tank cycles you can apply real data in hydrocarbon emissions reporting. *Possible PAD credits?*

- In the calculation of Volume by Hybrid Method, Ambient Air Temperature (MTG - Atmospheric Temperature), Ambient Air Density (MTG - Atmospheric pressure), Reference density (MTG - Multi-strata density), Free Water Volume (Free Water and MTG - Entrained Water Volume) and other data variables are needed to calculate NSV (Net standard volume) and eventually WIV (Weight in Vacuum, i.e., Mass). The MTG™ 3012 measures or calculates all of these variables, others gauge technologies don't (SWAG methodology).

- The MTG™ 3012 provides both Quantitative and Qualitative Measurement of petroleum based products. *Not just how much product.*

- From the measurement of Multi-strata density, Free water, and Entrained water you can determine the quality of the product and its inventory value. *Is the product you are paying for equal to the quality of the product you are receiving?*

- By monitoring Multi-strata densities, you can determine if the product is homogeneous or stratified and when mixing is required. *This is particularly helpful in determining product quality prior to packaging or shipment (sale) of product.*

- Multi-strata density, Free water, and Entrained water can help optimize the process of tank blending for benchmark crude, or any other in-tank blending applications. *The ability to see qualitative measurement in real-time. Particularly useful in the power industry when trying to optimize BTU's per gallon based upon specific gravity of fuel oil.*

- From the measurement of Multi-strata density, you can determine multiple interface layers of product and their location (height) within the tank. *Many processes require the exact knowledge of a water and product interface.*

- If a tank gauge supplied Multi-strata density over the entire height of the tank instead of average density, do you think it would provide a more accurarate measurement of reference density for the calculation of Volume or Inventory?

- The measurement of Free and Entrained water provides you a clear picture of total water in the tank to determine when to bleed water or when to add demulsifiers. *Free water measurement includes emulsified water and water outside of the gauge well sample.*

- If a tank gauge can accurately read total water in tank (Free, emulsified, & pockets of water), would it provide more accurate Volume or Inventory than a gauge measuring water level by capacitance, float, or displacer in one vertical plane? Or accuracy of the technology used?

- From the measurement of the spot temperature (at the height of the heating coils, you can determine if product is being over cooked or discolored (lubricants). *Providing operational benefit and loss control.*

- The monitoring of Multi-point spot temperature allows you to see the whole temperature profile of the tank, if heavier products are heated, mixed, and ready for transfer.

- The MTG™ 3012 is designed as a bottom referenced gauge (as standard). A slip flange with O-ring allows the gauge to stay bottom referenced even if the tank roof and walls move due to normal expansion during the filling or emptying of the tank. The measurement reference remains stable in comparison to tank top referenced gauge on tanks where a gauge well is not available for mounting of the ATG. An optional collar clamp is available for top referenced gauging when a tank bottom is found to be unstable or moving.

- GSI recommends the installation of the MTG™ 3012 "Multi-function Tank (Gauge) Instrument" within the gauge well using a split flange assembly that allows both MTG™ entry and a gauge hatch for reference manual hand lines and sampling. Why? Because it's the only way to directly compare an ATG (Automatic Tank Gauge) for accuracy or calibration purposes against the known reference, i.e., manual hand line and sample for Level, Temperature, Density, and Water. *Not all ATG's maintain manual access when installed for reference measurement in comparison of ATG accuracy, Why?*

- The MTG™ 3012 when installed within the same gauge well as the reference measurement, has no cumulative measurement error from the reference measurements due to measurements being taken at other physical tank locations on the tank, i.e., temperature averaging probe located outside the gauge well about 6' away, same with capacitance water measurement; density calculated from two pressure transducers on pipe legs outside the tank, etc. *Cumulative measurement error, not to mention potential installation error, or error based upon instrument quality and method.*

- The cost of ownership (instrument, structural tank modification, electrical, installation, training, and spare parts) for the MTG™ 3012 is low in comparison with other technologies that don't provided the equivalent capabilities, information, or measurement accuracy.

- The MTG™ 3012 is a single instrument *(Level gauge, Multi-point spot temperature probe, Multiple pressure transducers, Water sensing instrument, etc. combined in one probe).*

- The MTG™ 3012 requires only one tank top entry (Not multiple tank entries).

- Installation within the same gauge well as the manual reference measurements is required for the greatest measurement accuracy. *Without the need for a well tube, calibration pin, hinged flange structure, etc., i.e., just a 6" or larger split flange assembly (MTG access & manual hand line / sampling access)*

- The MTG™ 3012 is an Intrinsically Safe (IS) instrument. It operates at 7Vdc - 14Vdc power.

- The MTG™ 3012 power requirements are low enough to use alternative power sources (solar / wind with battery backup) and alternative communications methods. *(Mesh radio networks, Spread spectrum radio, WIFI, Blue Tooth, Zigbee, Cellular, Satellite, Fiber Ethernet, Hardwire, etc.)*

- The MTG™ 3012 requires only one electrical & conduit connection for both power and signal *(Separate electrical runs and conduit for power and for signal are not required with MTG™. No additional electrical runs & conduit are required for additional instruments).*

- The MTG™ 3012 uses MODBUS RTU protocol for direct digital communication output from the instrument without a need of multiple instrument integration *(Electrical standard, protocol or analog signal, engineering units, decimal places, etc.)*

- The MTG™ 3012 has No Moving Parts