

KING-GAGE®**Tank Liquid Level****Inventory Monitoring****Process Integration**

Liquid Level Bubbler Gauge Systems

Tank Level Gauges

- Remote Reading Volume, Depth or Weight
- Accurate, Reliable, Proven Technique
- Low Cost Installation, Easy to Maintain
- All Pneumatic (Non-Electrical) Operation

These industrial tank level indicating systems have been proven over decades of use. Based on the principle of the U-tube manometer, they work as frictionless hydrostatic balances. The known weight (or mass) of the liquid fill of the gauge is balanced against the pressure created by depth of liquid in a tank. Compared to other mechanical systems, there are no floats, gears or springs that might wear or bind. This makes these simple indicators both rugged and reliable.

5992 Hand Pump Gauge

The gauge provides on-demand indication (not continuous monitoring) for short and medium height tanks. This stand alone system uses an integral hand pump to pressurize and purge the liquid from the downpipe. Simply pump the gauge to quickly get indication of current tank level. The 5992 Hand Pump Gauge can be situated up to 100 feet from the tank, either indoors or outside.

5993 Tank Level Indicator

An acrylic rotameter controls the flow of compressed air to the downpipe in the tank. The continuous air flow purges the liquid from the downpipe creating air pressure equal to the weight of liquid corresponding to depth. The system provides continuous indication of liquid level and can be remotely located several hundred feet away.



Model 5992

Model 5993

Principles of Operation

The KING-GAGE system uses hydrostatic pressure measurement to determine liquid level. This pressure is created by the actual depth of liquid above the measurement point. Individual indicator scales are calibrated to the pressure range (depth), density (specific gravity) of the liquid and the volumetric capacity of the tank or compartment.

The KING-GAGE indicator works as a frictionless hydrostatic force balance. Within the glass display tube, a liquid fill rises in direct proportion to the magnitude of pressure applied. The indicating liquid used determines the actual pressure range of this instrument (refer to Determining Scale Range).

Bubbler (Downpipe) System - uses air to purge an open ended pipe extending down into the tank. Engaging the hand pump introduces a flow of air into the downpipe. Pressure is created as liquid is purged from the downpipe, increasing until an equilibrium point is reached (air pressure = hydrostatic pressure). Equilibrium is maintained by excess air escaping through the bottom of the downpipe (and bubbling up through the tank contents).

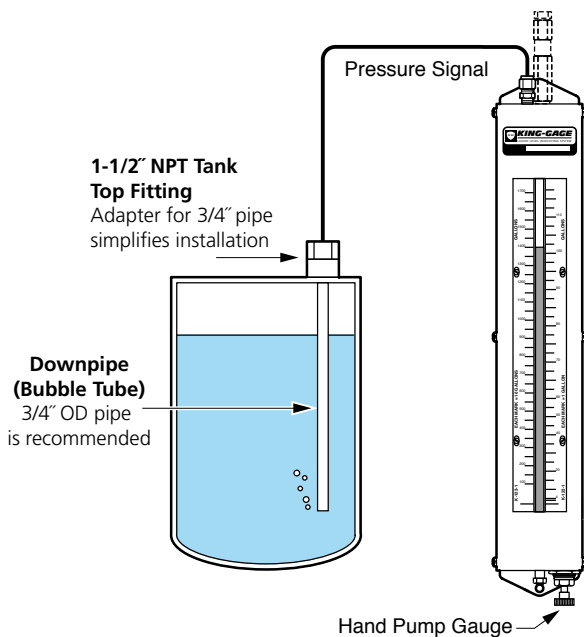
The resulting downstream pressure (within the pipe) is directly proportional to liquid depth. As depth increases, so does pressure. Conversely, as depth decreases, downstream pressure is equally reduced as excess air flows out the immersed end of the pipe.

Integral Hand Pump

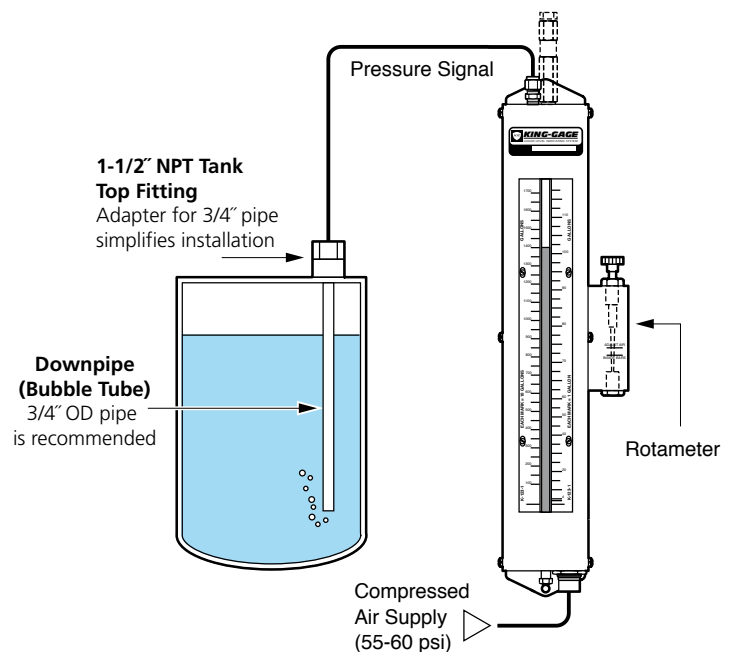
On the Model 5992, a manually operated pump introduces air flow through the system tubing to purge the downpipe. This permits on-demand measurement of liquid depth without having to continuously bleed air into the system. The hand pump eliminates the need for a compressed air supply.

Rotameter - Continuous Reading

Model 5993 requires a compressed air supply of 55-60 psig. The rotameter should be adjusted so that the float is set at the specified markings. The air flow rate is typically between 2-5 scfm.



**System using Model 5992
Hand Pump Gauge**



**System using Model 5993
with Compressed Air Supply**

Indicator Scale

Each system scale is individually calibrated and custom marked in any specified unit of measurement (depth, total weight or volume). An optional 2nd scale unit can be included to combine different measurements such as depth and volume. Scales are manufactured for the individual tank geometry and specific gravity of tank contents. Due to the factory calibrated scale, the KING-GAGE Tank Level Indicator can be used for almost any kind and shape of tank.

Scale markings include:

- Tank Designation
- Tank Units of Measure
- Product Density
- Tank Indicating Liquid
- Serial Number

Determining Scale Range

Overall length of the scale can vary depending upon the range and degree of readability necessary for the application. This "readability" refers to the minimum readable change in liquid depth that can be observed at the indicator.

Three factors determine scale length:

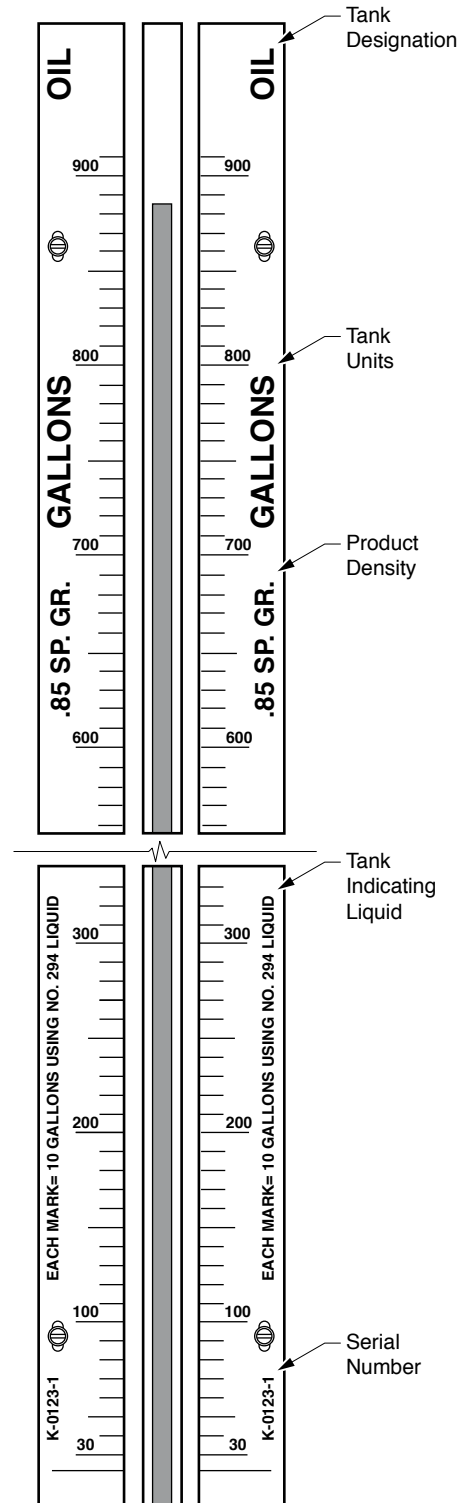
- Maximum tank depth
- Specific gravity (density) of tank contents
- Type of indicating liquid (scale factor)

A simple calculation using these factors will yield the minimum scale length required:

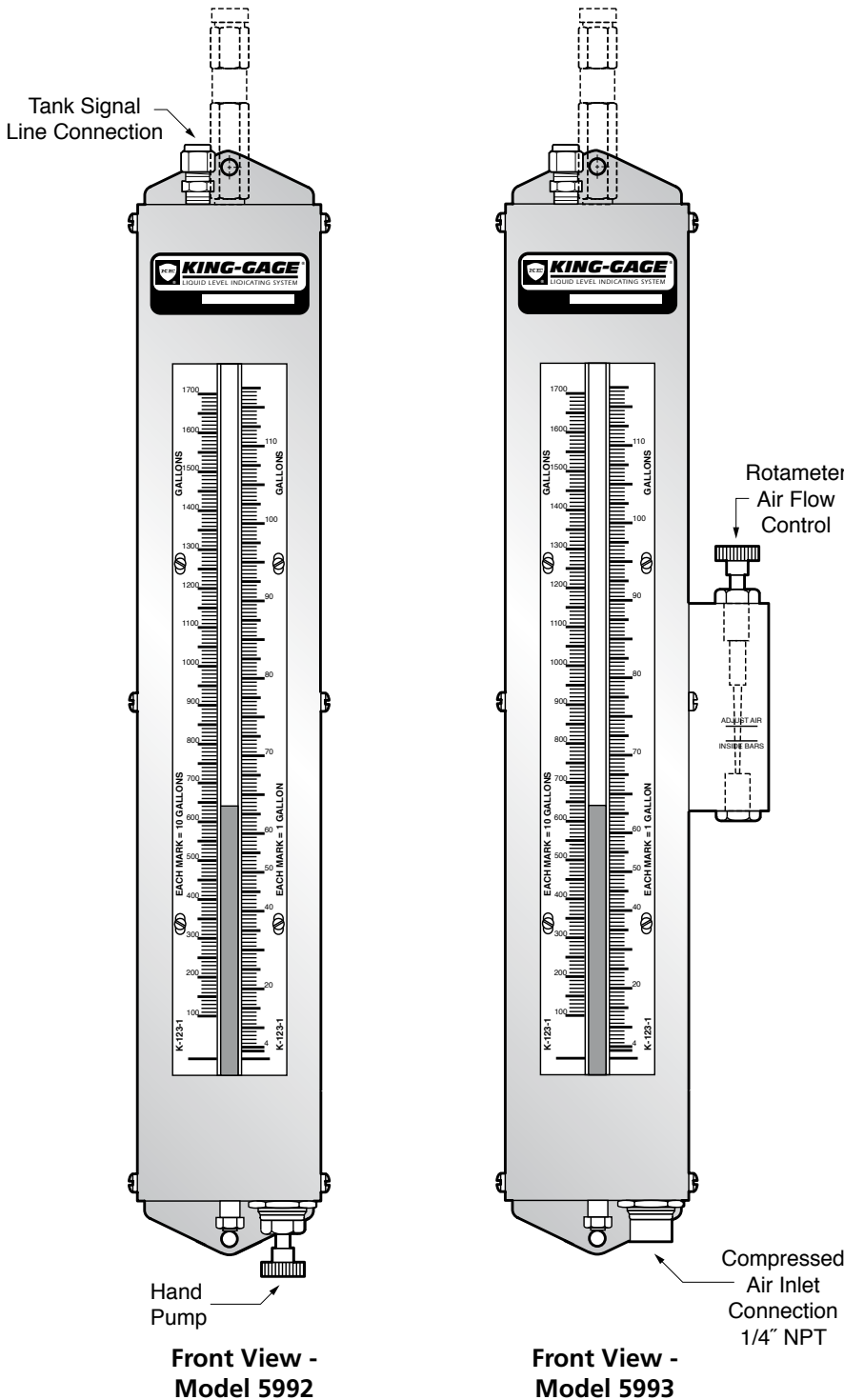
$$D \text{ (depth)} \times G \text{ (sp.gr.)} \times L \text{ (liquid scale factor)} = \text{Scale Length}$$

The resulting value represents the scale length in inches. Refer to the scale sizes available for the indicator and select one that will accommodate the calculated length.

Liquid	Color	Specific Gravity	Liquid Scale Factor
Mercury	Silver	13.546	0.074
No. 294	Red	2.940	0.337
No. 175	Purple	1.750	0.495



Detail - Indicator Scales



Specifications

Operating Principle

Well type manometer acts as a frictionless hydrostatic force balance. A liquid fill is raised in direct proportion to the magnitude of pressure applied. (Varies based on type of indicating liquid employed.)

Resolution

Infinite based on type of indicating liquid employed

Input Connection(s)

1/4" NPT tapped connection for typical tube fittings. Accepts pneumatic air/gas pressure input; high and low pressure inputs.

Materials of Construction

Formed channel indicator housing; brushed stainless steel (type 304). Heavy plate glass window; acrylic plastic window available as special order.

Wetted Parts

316 stainless steel liquid well and tubing

Indicating Tube

High strength fully annealed glass (Pyrex®)

Compressed Air Supply (Model 5993)

Compressed air supply that is clean dry and oil-free is required for operation of the system. Under normal operating conditions, supply pressure required is 55-60 psig.

Scale Ranges: 20", 35", 43", 51", 66"

Dimensions (inches)

Range	Overall Dim. (H x W x D)
20	29" x 4-3/8" x 2-7/8"
35	45" x 4-3/8" x 2-7/8"
43	53" x 4-3/8" x 2-7/8"
51	61" x 4-3/8" x 2-7/8"
66	77" x 4-3/8" x 2-7/8"



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