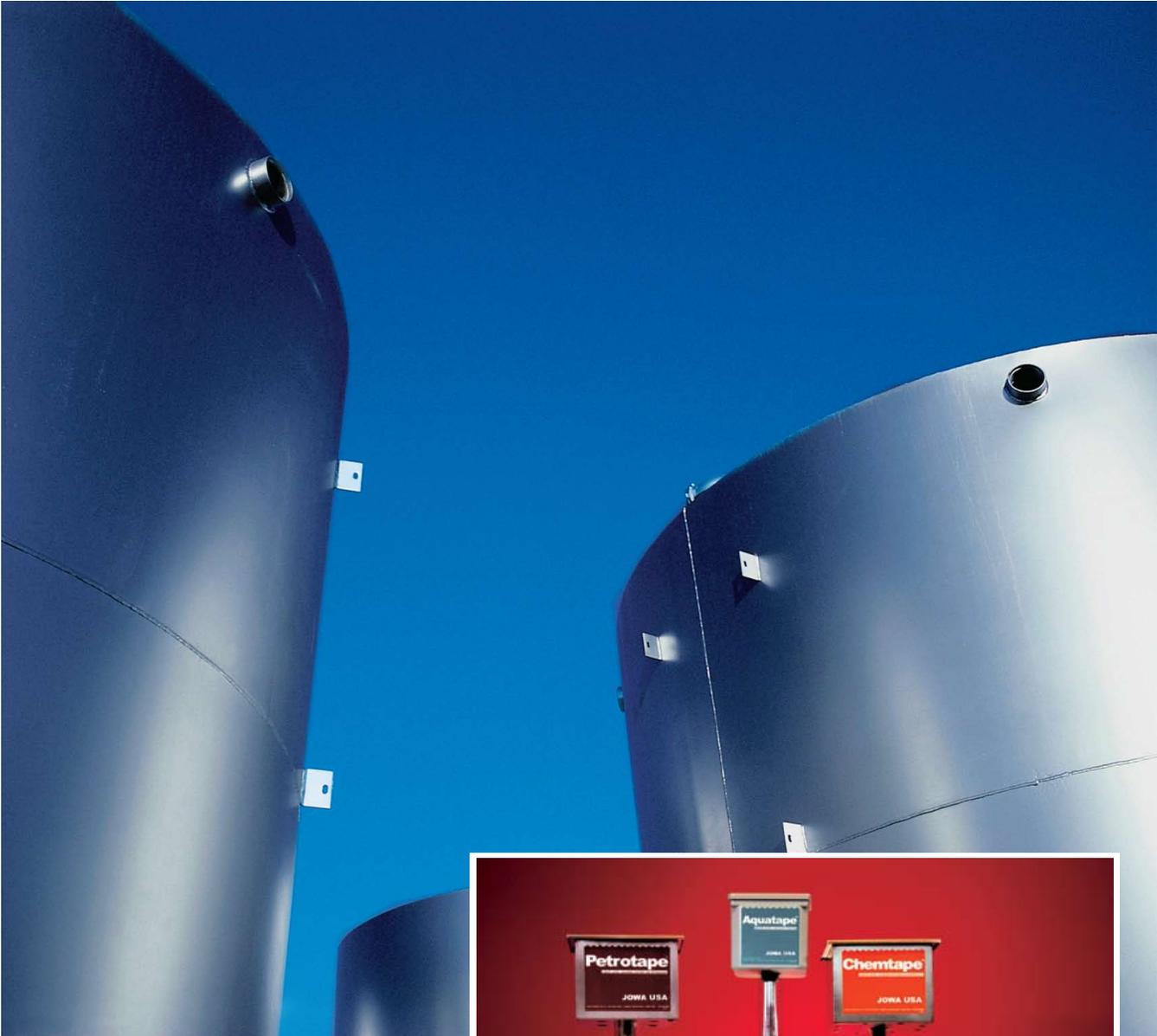


Liquid Level Gauging Solutions

Continuous Liquid Level Monitoring Systems



JOWA USA, Inc.

Level Gauging Solutions

With four decades of experience in level gauging, JOWA USA, Inc. supplies reliable level solutions to customers throughout the world. These solutions include our Metritape™ family of resistance-tape liquid level gauging products, ultrasonic level sensors, pressure transmitter level sensors and a wide range of meters, controllers and supporting instrumentation.

Resistance-tape Technology

Today, more than 25,000 of our resistance-tape level sensors are in use worldwide. This reliable gauge is used by dozens of major airport fuel facilities, and is the principal tank gauge on many of the world's largest, most sophisticated ocean going vessels and drilling rigs. Resistance-tape level gauges are used in hundreds of municipal and industrial water and wastewater treatment facilities and are increasingly the gauge of choice for monitoring industrial chemicals and petroleum products.

Operation Principle

The resistance-tape sensor is essentially an "electric tape measure" which converts distance along its length into resistance, measured in ohms (figure 1). The sensor's outer envelope jacket (1), is compressed by hydrostatic pressure causing the gold plated nichrome wire helix to contact the stainless steel base strip (2). The resulting resistance (3) indicates the length of active or uncontacted helix, and the distance from sensor top to liquid surface.

Resistance-tape Sensor
Inner Element



Resistance-tape
Operation Principle

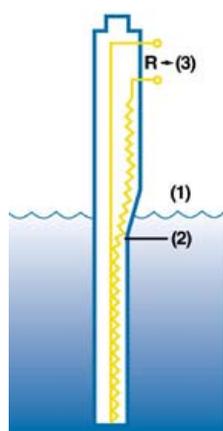


Figure 1



Aquatape™, Petrotape™, and Chemtape™ level gauges

The helix winding is gold plated nichrome, 4 turns/inch, 1000 ohms/meter (305 ohms/ft.) resistance gradient and provides 1/4" resolution.

Resistance-Tape Simply Works

Whether your application is an individual tank, a tank farm, a reservoir, or a river, our resistance-tape level gauge provides a reliable solution. That's because resistance-tape is remarkably different from other level gauges - in principle, appearance and performance.

Features and Benefits:

- No moving parts, nothing to wear out
- High reliability, virtually maintenance free
- Easy to install from tank-top, no need to empty the tank
- Completely Wireless options available; No Wire, No Power, No Problem
- Sensor is not adversely affected by agitation, foam, vapors, or product build up
- Stable output unaffected by specific gravity
- Calibration remains stable and drift-free
- Intrinsically safe for use in flammable liquids
- Temperature detectors can be added to sensor, no additional tank penetrations

Applications

Resistance-tape has been the solution for a wide range of level gauging applications and can meet your most demanding requirements for:

Water and Wastewater

The resistance-tape level sensor is ideal for sumps, tanks, ponds or streams because of its high resolution, stable output and simple pipe-mount installation. Since it has no moving parts and its output is not adversely affected by specific gravity and viscosity, resistance-tape is perfect for gauging raw sewage and sludge. Hundreds of municipalities and treatment plants use these reliable sensors in diverse applications including cooling ponds, digesters, groundwater, reservoirs, raw sewage, sludge pits and wet wells.

Slurries & Viscous Liquids

Resistance-tape has proven durability in the gauging of slurries and dense liquids. The sensor's smooth, non-mechanical design resists buildup and is unaffected by agitation. Heavy ores, syrups, viscous muds and high viscosity oils do not hinder its operation. Applications include coal slurries, drilling mud, iron ore slurries, lime slurries and pulp & paper.

Petroleum

The chemically inert surface of the resistance-tape sensor's outer sheath is ideal for gauging waxy crudes, heavy oils and refined products. Up to three temperature detectors can be built into the Level/Temp model which carries full intrinsic safety approvals. Applications include avgas, bunker C, crude, diesel oil, fuel oil, gasoline and jet fuel.

Chemicals

Organics, inorganics, solvents, toxic substances and chemical waste tanks have all been successfully gauged with resistance-tape level sensors. These rugged sensors can be installed, calibrated and tested without ever entering the tank. Applications include acetic acid, acetone, benzene, caustics, chromates, condensate, methanol, phenol, plating solutions, sulfuric acid, toluene and xylene.

Product Selection

The resistance-tape product line includes Aquatape™ for water and wastewater, Petrotape™ for petroleum and fuel, Chemtape™ for chemicals and petro-chemicals and the LA Series sensors for higher temperatures and pressures. Resistance-tape's linear, stable output is easily converted using a loop powered 4-20mA transmitter.

Resistance-tape Selection Matrix

SERVICE	MODEL	WETTED MATERIALS	HOUSING	LEVEL RANGE	TEMPERATURE RANGE
Water, Wastewater, Sewage	Aquatape	Polypropylene, Glass-filled Polypropylene, and Stainless Steel	6" x 6" x 6" PVC	3 - 50 feet	5 to 140°F (-15 to 60°C)
Crude Oil, Petroleum Products	Petrotape	Hastelloy™ C276, Nylon 12, and Stainless Steel	8" x 8" x 7" 304 Stainless Steel	3 - 100 feet	5 to 225°F (-15 to 107°C)
Chemicals	Chemtape	Hastelloy™ C276, Glass-filled Polypropylene, and Stainless Steel	8" x 8" x 7" 304 Stainless Steel	3 - 100 feet	5 to 225°F (-15 to 107°C)

All Models are FM approved for Hazardous Environments, include a 4-20mA transmitter and have options to add temperature detection.

Installation

These level gauges are easily installed from tank top by dispensing the flexible sensor from its reel into a customer supplied still pipe of PVC or steel. For some non-agitated tanks, a specially weighted sensor can be used without a stillpipe.



Flexible resistance-tape sensors are easily installed from tank top

Wireless Systems

The Wireless Resistance Transceiver, model WRT, is an ideal addition to any resistance-tape level sensor where power and signal wires are not available.

The FCC license-free WRT allows for level monitoring in places that were previously thought



Wireless model WRT & WBR allow for quick and easy installations

No Wires, No Power, No Problem



Resistance-tape level sensors are unaffected by agitation or foam

cost prohibitive due to the expense of running wire or adding a power source. The FM approved intrinsically safe field unit is suitable for installation in hazardous areas without the use of IS barriers. The power is derived from a 3.6V lithium battery that lasts 3 to 5 years with update rates as fast as once per second. The maximum line of sight range is 3,000 feet or 500 to 1000 feet for applications with obstructions.

The Wireless Base Radio, model WBR, can communicate with up to 50 field units. Software constantly monitors the presence of field units automatically detecting when new ones are added and indicating if any units are missing. The data output can be either 4-20mA or Modbus RTU. Options for a high gain pole and/or Yagi antenna are available to increase the range.

Multi-Channel Monitoring System

The MC-2200 system is designed for monitoring multiple tanks and is the basis for a simple reporting system. The MC-2200 accepts up to 22 analog inputs for monitoring, level, temperature or pressure. The user-friendly LCD and keypad shows tank data and allows easy access to the system setup parameters. When combined with the Wireless Base Radio it is the center of a powerful monitoring system.

MC-2200 Features:

- Low cost Inventory Monitoring
- Accepts up to 22 analog inputs
- User Configurable reporting schedule
- Simple setup through LCD and keypad

MC-2200 Options:

- Sends e-mail message with all input data
- Relays for local alarm lights and/or horns



Multi-Channel Monitoring System MC-2200 Series

MC-2200 Options (cont.):

- Modbus Interface for connection to Wireless Base Radio (WBR)
- Modem dial-in capability
- Access over Ethernet

Single Tank Monitoring System



Metrimeter Single Tank Monitoring System

Metrimeter

This single tank instrument directly interfaces with Metritape level and level / temperature sensors. It provides a 6-digit alphanumeric display, a 40-point bar graph display and six alarm and fault indicators. Through an extensive menu system, the meter may be set up and configured to match a customer's needs.

Features:

- Single tank instrument with digital and bar graph display
- Two input channels to monitor resistance-tape levels and temperature or overflow. Options available for 4 input channels
- Five alarm indicators plus one fault indicator and 3 relay outputs
- RS-485 serial interface
- Capable of remote alarm acknowledge and/or horn silence

Bulk Storage Level Gauging Solutions

Let us show you how technology and innovative design can:

Protect your workers -

Monitor tank levels and volumes from the comfort of your office. No more slips and/or falls climbing tanks.

Improve data management -

Optional hardware and software can import tank data into an Excel spreadsheet to incorporate into Inventory Management Software.

Avoid problems -

User settable high and low level alarms help prevent spills and run outs. Eliminate costly fines and headaches.

Save time and money -

Access remote sites via computer with a modem or the internet and avoid unnecessary travel.



Wireless Level System for monitoring Petroleum Products

The Right Choice

Choosing a JOWA USA monitoring system improves safety for employees and the environment, while at the same time gaining you operational benefits that save time and money. Packages are designed to meet the new SPCC overfill regulations.

Easy Installation

The systems are easy to install and the tank does not need to be drained or taken out of service as sensors are installed from the top. If you don't already have wire or power at the tank the wireless level system is the most cost effective method to monitor your tanks. A battery powered field unit mounted on top of your tank transmits level or temperature to a base radio.

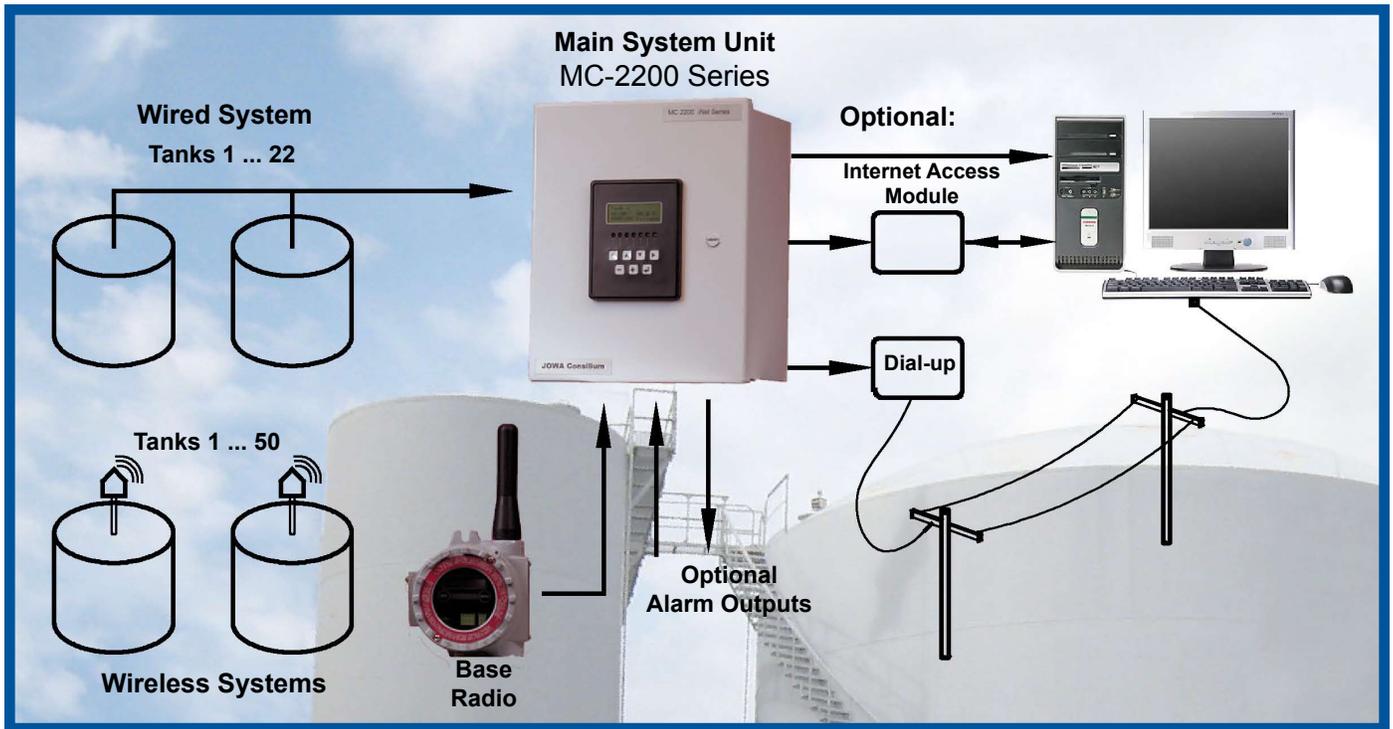


Fuel Storage Tanks with Wireless Level and Temperature Monitoring

Petrotape Wireless Level Gauge

The Petrotape Gauging System from JOWA USA is a cost effective solution for monitoring bulk fuel storage tanks. When it is combined with the Wireless Resistance Transceiver (WRT) and Base Radio (WBR) it is ideal where power and signal wires do not exist. This product allows for level monitoring in places that were previously cost prohibitive due to the expense of running wire or adding a power source.

The FCC license-free WRT mounts to the housing of the Petrotape and derives power from a 3.6 volt "C" sized Lithium battery. The battery lasts up to 5 years and can transmit the signal up to 3000'. Signals can be updated as fast as once per second and the Modbus output of the base radio connects easily to computerized monitoring systems.



Sample Installation

Sample System Overview

The first step in system design is to review the layout of the tanks and where they are in relation to the desired location for the display and reporting equipment. The choice to go with a wired or wireless system is mainly based on the cost of running wire. At sites where the tanks already have wiring or are close to the display location, the wires can be brought directly to the MC-2200. Where tanks are further away or obstructions such as roads or buildings exist, the wireless system would be the most cost effective. In this case the base radio is connected to the MC-2200 via a Modbus interface.

The MC-2200 can act as a stand alone display and alarm system or options can be added to connect to a computer over a modem, the internet, Ethernet or directly through a serial interface. Each system is tailored to meet customer requirements.

Non-Contact Level Monitoring



MS-30 Features

- Level monitoring to 30' (9.1M)
- Accuracy of $\pm 0.15\%$ of sensor range
- NEMA 4X, IP65 rated
- FM approved intrinsically safe
- Automatic Tank Profiling
- Two line, 7-digit LCD display

Ultrasonic

For those customers who require a non-contact level gauging solution, JOWA USA offers a high performance loop powered 2-wire Ultrasonic level transmitter.

The MS-30 can be used to measure level or open channel flow offering the features of line-powered systems without their expense.



JOWA USA has the solution to your level gauging needs.

Level Gauging

Resistance-tape
Ultrasonic
Pressure Cells

Displays

Panel Mount with Relays
Loop Powered I.S. and XP
NEMA 4 and 4X

Controllers

Duplex Pump Controller
MC-2200 Multi-channel

Wireless

WRT
WTT
WBR

Other Markets

JOWA USA provides level monitoring equipment to a wide range of industries. For over 40 years Marine customers have relied on our rugged resistance-tape technology and monitoring equipment for their Tankers, Barges, Container Ships and Drill Rigs.

Together with our parent company, JOWA AB, we also offer the following products:

Silver Ion & UV Water Sterilization (max. 66 gpm)
Oily Water Separators (max. 44 gpm)
Emulsion Breaking Units (max. 140 gpm)
Diesel Switch

Industrial Guarantee

If within 30 days of delivery of the product, the product does not perform in accordance with our published specifications, when installed in compliance with our requirements in an application within our performance specifications, the product may be returned to JOWA USA, Inc. Littleton, MA, freight prepaid, for full credit of the purchase price with the prior authorization of JOWA USA, Inc.

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