



Counterclockwise from below right: Traditional holding tank sensors are installed inside the tank at one-third intervals and often are inaccurate. SeeLevel systems have self-adhesive sending units that attach to the exterior of each tank and provide readings in percentages via a monitor panel. Removing a tab from the top of each sensor gives each one a unique identifier. The 720 series includes a chemical storage tank and automates the process of adding holding tank chemicals. The monitor panel for the 714 series remains illuminated so that all readings can be observed at a glance.



PHOTOS BY AUTHOR

SEELEVEL TANK MONITORING SYSTEMS

How full are your hold

ing tanks? External sensors provide the most accurate readings.



A motorhome is somewhat self-sufficient. It carries fresh water and hauls holding tanks that capture gray water from the sinks and black water from the toilet. The RV's tank monitoring system is designed to indicate how much fresh water remains and how much room is left in the holding tanks.

Such systems generally consist of probes placed at the bottom of the tank and at one-third tank level intervals. When fluid in the tank reaches a probe, a circuit is created with the bottom probe, causing a display panel light to illuminate. So, by pressing a button on the panel, the RV owner should know whether the tank is empty, one-third full, two-thirds full, or totally full.

Unfortunately, such systems are notoriously inaccurate. The sensors are inserted into the tank and come

in contact with the tank fluid. This makes them subject to fouling and corrosion. Readings become erratic, and the system becomes useless until the sensors are cleaned.

In addition, such systems provide only approximate readings. Say, for example, you plan to take a nice, long shower, so you check whether there is enough room in the gray tank. If the light for the one-third level is on, you might think two-thirds of the tank is available. But, unbeknownst to you, fluid in the gray tank is just below the two-thirds sensor, in which case the two-thirds light comes on shortly

after you start to shower. At shower's end, water from the gray tank backs up into the shower stall, because the tank is now full. The same holds true for the fresh-water tank. It may indicate one-third full, but it could be closer to two-thirds, so it's never clear how much water is left in the tank.

Fortunately, there is a solution: Garnet Technologies' SeeLevel II RV tank monitoring systems. Garnet provides tank monitoring systems for the petroleum industry and uses the same technology in its SeeLevel products. The sensors are attached

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externally to the tanks and never come in contact with the liquids within, which means they are not subject to fouling or corrosion and are basically maintenance-free.

In addition, the information displayed is more accurate, because the sensors are not limited to one-third tank level intervals. Each sensor strip has a number of segments that can report tank levels in 3 to 4 percent increments. A tank that is just below two-thirds full might, for example, indicate 62 percent on the SeeLevel digital display.

SeeLevel monitoring systems were introduced to the RV industry in 1998. Since then, more than 40,000 systems have been sold, many of which have been installed by RV manufacturers. Such systems also can be retrofitted into an RV equipped with internal tank sensors. Many RV dealers are installing SeeLevel systems in customers' RVs, but it also can be an easy do-it-yourself project for motorhome owners. And once a motorhome is outfitted with such a system, the owner has one less thing to worry about.

709 SERIES

The most popular SeeLevel II system is the 709 series, with prices starting at \$225. The various models include a wide selection of display panels to allow for different tank configurations. Panels can be outfitted with water heater and water pump switches with LED pilot lamps as

needed. The 709-A is equipped with alarms to trigger warnings when holding tanks reach high or low levels, all of which can be configured by the owner. The 709-RVC display includes these analog alarm features as well as an RV-C network interface so that it can communicate tank level information with a networked system, such as SeeLevel's 720 series Auto eVac system or SilverLeaf's Total Coach System. When a button on the panel is pressed for a particular tank, the easy-to-read red LED display illuminates and shows the tank's fluid level for five seconds. A second press of the button keeps the display illuminated for two minutes.

714 SERIES

The 714 series includes models 714 and 714-P. Both feature a vertically oriented display that is constantly lit, which eliminates having to press a button. Each tank has its own display, so all tank levels can be viewed simultaneously. The 714 series also can display outside temperature or the temperature in a basement bay. The system refreshes its data display in 10-second intervals and draws less than 200 milliamperes of power. The cost of the 714 model is \$499; the 714-P model, which costs \$515, includes a three-way pump switch at the bottom of the display panel.

All SeeLevel displays show battery voltage. Models designed for motorhomes with propane tanks also display accurate propane levels

by tapping into the existing sending unit in the propane tank. Multiple displays can be used with either system so that readings can be obtained inside the coach and while outside at the basement utility bay.

SENSOR TECHNOLOGY

SeeLevel systems obtain their readings through a series of dedicated sensors attached to the outside of each tank. Each sensor is a self-adhesive strip containing electronic circuitry. The components utilize capacitance technology, which is common in the petroleum industry and for aircraft fuel measurement. Garnet Technologies took it a step further and incorporated a digital process that allows all of the sensors to operate on a common single wire, plus ground.

The sensor strips emit a small radio wave that is transmitted from one side of the strip to the other. The signal passes through the tank's contents and is refracted and deflected from the receiving side of the sensor strip. A series of components along the length of the strip allows for reception every 3/4-inch, which yields readings that are within 3 percent of actual levels. The data is then calculated and shown in 2 percent increments on the display panel. A tank with an extremely thick coating of sludge might have to be cleaned in order to achieve accurate readings.

The strips are available in 12-inch or 6-inch lengths and can be trimmed with a scissors or utility knife to allow them to fit various tank heights. The 12-inch strips can be trimmed as far down as 4 1/2 inches, while the 6-inch strips can be trimmed down to 4 inches. Two strips can be installed in a stacked configuration to monitor a tank measuring up to 24 inches in height.

Each sensor must be programmed so that the system knows which tank it is monitoring. This is done via tabs on each sensor. Simply snip off the applicable tab (gray or black) to give each sensor a unique IP address. Nothing needs to be done to the fresh water sensor. In the case of stacked

The Auto eVac can be programmed to perform a number of functions, such as auto-filling the fresh-water tank, dumping the holding tanks, flushing the holding tanks, and adding chemicals.

sensors, the tab that says "top" needs to be removed from the top sensor. Otherwise, the sensor defaults to single or bottom operation. All of the sensors are then connected together (in what's called a common bus), and a ground connection is run back to the same ground plane as the consoles (usually the breaker panel ground). A pair of wires runs to the display panel, making it very easy to install. In most cases, the existing tank sensor wires can be reused.

AUTO EVAC SYSTEM

A recent innovation is the SeeLevel III 720 series Auto eVac system, which is capable of fully automating a motorhome's plumbing. The Auto eVac places a controller module in the basement that can be programmed to perform a number of functions, such as auto-filling the fresh-water tank, dumping the holding tanks, flushing the holding tanks, and adding chemicals. It interfaces with the SeeLevel 709 or 714 series monitoring panels, electric dump valves, and electric solenoid valves to control incoming fresh water flow to the tank and to supply the black-water-tank sprayer. Treatment chemicals can be placed in a basement tank, similar to a windshield washer reservoir, with 12-volt pumps. This setup also can be controlled by the SeeLevel III 720 system.

The Auto eVac is menu-driven, and an owner can set the sequence of draining, flushing, and chemical injection. A typical scenario would be: The black-water tank is dumped; the tank is flushed and cleaned; the gray-water tank is drained and its water chases the black water from the

drain hose; then chemicals are added to the gray- and black-water tanks and some water is added to the black-water tank for 15 to 20 seconds.

In all, a user can create four menu programs, each for different sequences. The user can control these functions manually via the touch-screen panel in the basement utility bay, or it all can be done by pressing the "auto" button. The system asks for confirmation that the sewer hose is hooked up; then it confirms, via sensors, that water pressure is present to ensure that tank flushing can happen.

Because of the system's complexity, installation of the Auto eVac might be a bit more than a do-it-yourself project, unless you are the hands-on type. But before long you can expect to see this innovative system installed on higher-end motorhomes as original equipment.

With a SeeLevel II system installed, motorhomes can eliminate the guesswork when gauging whether their coach's holding tanks are empty or full. Garnet's external sensors provide accurate tank level readings, and in much finer increments, to make dry camping easier. And Garnet's holding tank monitoring systems easily can be retrofitted to existing RVs, which makes them an attractive upgrade.

FURTHER INFO

Garnet Technologies Inc., C8931*
201 M&M Ranch Road
Granbury, TX 76049
(877) 668-7813 • (817) 587-8601
www.garnetinstruments.com/rv-shop
*FMCA commercial member **FMCA**



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