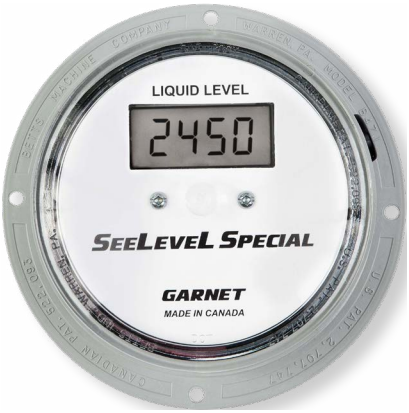
SeeLeveL Special™

Tank Truck Level Gauge



MODEL 808-P2
Enhanced Alarm Feature Version

IMPORTANT OPERATOR INFORMATION

DATE INSTALLED:_____

UNIT NUMBER:_____

COMPARTMENT: _____

DISPLAY CALIBRATION UNITS (e.g. inches, gallons): _____

MINIMUM TANK READOUT: _____

MAXIMUM TANK READOUT:_____

ALARM POINT (IF APPLICABLE):_____

SPILLSTOP EMPTY POINT (IF APPLICABLE): _____

SPILLSTOP HORN POINT (IF APPLICABLE):_____

SPILLSTOP SHUTDOWN POINT (IF APPLICABLE): _____

AUTOMATIC ALARM: WARNING LEVEL: _____

EMPTY LEVEL:_____

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GARNET
SEELEVEL SPECIAL™

Tank Truck Level Gauge

Enhanced Alarm Feature Version

MODEL 808-P2

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SAFETY SYMBOLS INFORMATION

"Notes", "Cautions", and "Warnings" have been used throughout this manual to bring special matters to the immediate attention of the reader.

NOTE: expands on information for any procedures.

CAUTION: explains safety information that could cause damage to the product, including data loss.

WARNING: explains dangers that might result in personal injury or death.

808-P2_v8.6 - 05-Aug-2021

CHAPTER 1 - OVERVIEW

Congratulations on purchasing the Garnet Instruments **SeeLevel Special™ Tank Truck Level Gauge model 808-P2**. The 808-P2 represents the state of the art in liquid level measurement equipment for transport applications. The 808-P2 is designed for reliable, accurate level measurement of sour or sweet crude oil, chemicals, acids, water, condensate, gasoline, or diesel fuel. The liquid level is determined by sensing the position of a magnetic float using a series of reed switches arranged in a vertical sensing bar. This technology has no moving parts except for the float, and can operate over a range of product temperatures from -40°C to +90°C (-40°F to +194°F).

The 808-P2 has been designed to withstand the vibration and shock encountered in mobile applications. The components are weatherproof, and the sender bar in the tank can withstand steaming temperatures. The 808-P2 operates entirely on internal batteries, with 12 volt truck power only being used to operate the back light (external alarms will require truck power).

The 808-P2 can display in any units, such as inches of level, gallons, barrels, or cubic metres of volume. It has two alarm outputs, one horn warning and one shutdown. These outputs have self-resetting bypass functionality for high level loading control.
In addition, the gauge can send data to the SpillStop™ and SeeLevel Access™ systems.

The SeeLevel™ 817-USB Truck Gauge Programmer is used to program the 808-P2 to read the desired calibration units, and to set the alarm points. The programmer is designed to be easily operated by people unfamiliar with electronics or computers.

CHAPTER 2 - ENHANCED ALARM FEATURES VERSION

The 808-P2 has some enhancements over the 808PA series. It uses new technology in the display to provide a number of new features:

1. The calibration memory has been changed to a flash memory device which is much more secure and does not require power to maintain the memory contents. This should result in a much more reliable operation, with less chance of a lost or corrupted calibration.
2. The display can be programmed with a magnet for 8 or 11 bit operation, to work with bars in either 1/3, 1/4, or 1/6 inch mode. If a sender bar ends up in the wrong mode, then the display will show bad light and the number of bits received. The previous displays would not accept bars in 11 bit (1/6 inch) mode. The mode is stored in the display in the same secure memory as the calibration.
3. The display has improved diagnostics:
   - If the wrong number of bits are received, then the display shows "bL:xx" where xx is the number of bits actually received.
   - By connecting together two end pins on the right hand side of the programming plug (looking at the back of the display), the display will show a basic inch calibration, which aids in troubleshooting to determine if the sender bar or display calibration is at fault.
   - If there is a fault during programming or if the memory is not functioning correctly, the display shows "Err".
   - If the memory does not have a valid value for the number of received bits (either 8 or 11) then the display shows "Prob".
   - If the display has no fiber connected and is exposed to strong light the display will show "Sun" indicating that sunlight is affecting the display. If a flickering light gets into the display opto then the display may show either "Sun" or "bL:xx" depending on the exact nature of the light getting in.
4. The optical receiver has been improved so it cannot be overloaded with too much light from the sender bar.
5. The display backlight has been changed for improved brightness and evenness of illumination. The color has been changed to yellow to make it easier to see.
6. The fiber optic connector is field replaceable, so if it is broken or fails, the display can be quickly returned to service.
7. The entire display has been miniaturized to fit into the lid of the enclosure. This greatly eases installation and servicing, since the gauge can be removed without having to unbolt the base of the enclosure. To remove the display, simply pop the lid off, undo the fiber, and disconnect the wires.

8. The display has the ability to drive a remote transmitter for applications which require the transfer of the data from the gauge to another piece of equipment.
9. The density of the product can be entered into the gauge to enhance measurement accuracy. The amount that the float sinks into the product is dependent on the density of the product, so by entering the density the accuracy of the gauge can be maintained as the density varies from load to load.
10. The alarm output functionality has been expanded. See chapter 3 for details.

CHAPTER 3 - GAUGE DESCRIPTION

The SeeLeveL™ gauge consists of a sender bar, a donut shaped float, a fiber optic interconnect cable, and a display. The sender bar is mounted vertically in the tank with the float sliding up and down around it in accordance with the fluid level. The sender bar sends the fluid level information via fiber optic cable to the display, which displays the level in appropriate units and operates the alarms, Spill Stop transmitter, and remote data transmitter.

The float contains magnets which activate reed switches inside the stainless steel sender bar to indicate the level of the fluid. The activated switches are detected by the microprocessor at the top of the bar. The microprocessor operates from a long life lithium battery giving about 10 years of life. The level information is relayed through the fiber optic cable to the display, the fiber being used to maintain electrical isolation between the sender bar and the display, allowing operation in flammable liquids.

The display converts the level information to volume according to the calibration programmed into it with the 817 Truck Gauge Programmer. The calibration can be in inches or volumetric units such as cubic metres or barrels. The tank level is shown on a backlit LCD (Liquid Crystal Display) giving good visibility in all lighting conditions. The display circuitry and LCD operate from a lithium battery giving nominally 8-10 years of life. The LCD back light is powered by 12 volt truck power. The entire display is enclosed in a Valox Betts box with a clear cover, which is durable enough to withstand indirect road spray.

The display contains four alarms which are programmed using the 817-USB Truck Gauge Programmer. They can be set to activate at any point in the tank. The alarms can be used to operate the SeeLeveL SpillStop system, or can be used to operate the two built-in alarm outputs. These outputs are available as transistors which complete a circuit to ground and can handle 1 amp of DC current at 24 volts.

> ⚠ **WARNING:** The use of alarms is intended as an emergency backup system only, and is not intended as a substitute for operator diligence during the loading process.

The display has a SpillStop transmitter for direct connection to a Garnet 815 SpillStop™ or 815-UHP SpillStop Ultra™ controller. The transmitter operates in accordance with the programmed alarm points 1, 2, and 3. This provides the user with automated horn warnings and automated control of PTO or hydraulic pump loading to prevent product spills due to inadvertent overfilling of the tank.

The display has two alarm outputs, one is a horn warning and the other is a shutdown. These outputs are transistors which complete a circuit to ground when turned on.

To take advantage of the automatic warning and shutdown capability, program the alarms as follows:

A1: Not used here, for SpillStop applications only

A2: Program as a shutdown alarm where you want the warning horn to sound, and the first shutdown to occur.

A3: Program as a shutdown near the bottom of the tank, this is the bypass reset point

A4: Program as a shutdown at the final high level shutdown point in the tank.

The system will then operate as follows:

- when the tank level is low (below **A3**) then the bypass is cleared, the horn warning output is off (open circuit) and the shutdown output is on (closed circuit to ground)
- when the level rises to the **A2** point, the horn output will turn on (closed circuit to ground) which will activate the warning horn.
- press the bypass button on the side of the display to turn off the horn output (turn off the horn).
- if loading is continued and the level rises to the **A4** point, then the shutdown output will turn off. The horn output remains off at this point. There is no way to bypass this, the fluid level must be lowered in order to turn the shutdown output back on.
- if the tank level drops below the **A2** point, but remains above the **A3** point, the bypass is not reset. In this case if the level rises above the **A2** point again, then the horn output will stay off. This prevents product sloshing from turning the horn back on.
- when the level drops below the **A3** point, then the bypass is cleared. If the level rises above the **A2** point after this, then the horn will sound.
- the bypass button only works once the horn is on, you cannot bypass before the level rises to the **A2** point. If the bypass button is held down as the level rises to the **A2** point, you have to release the button and press it again to turn off the horn.

Installation of the gauge consists of cutting a hole in the top of the tank and welding in a 1 inch coupler, and welding an anchor assembly to the bottom of the tank. The sender bar is cut to length, the end is sealed, and it is inserted from the top of the tank and fastened at the top with a compression fitting. The display is mounted at a convenient point on the truck, and 1/4" airline is connected from the sender head to the display to house the fiber optic cable. The cable is connected at each end, and the gauge is programmed. Snapping on the covers for the head and display completes the installation. The bar can be removed later for service by disconnecting the fiber, unscrewing the compression fitting, and pulling it out.

CHAPTER 4 - UNIQUE FEATURES

The SeeLeveL gauge has been designed for maximum ease of installation and servicing, and for best operational features. The anchor at the bottom of the tank provides a shock mount for the float, and holds the float in place while the bar is removed so no tank entry is required for sender bar replacement. If the new sender bar is cut to the same length as the old, no re-calibration is required.

The float is molded from polyethylene for high chemical resistance, good esthetic appearance, and high durability due to the "give" in the plastic. The light weight of the polyethylene allows the float size to be minimized while allowing it to float on the lowest density products.

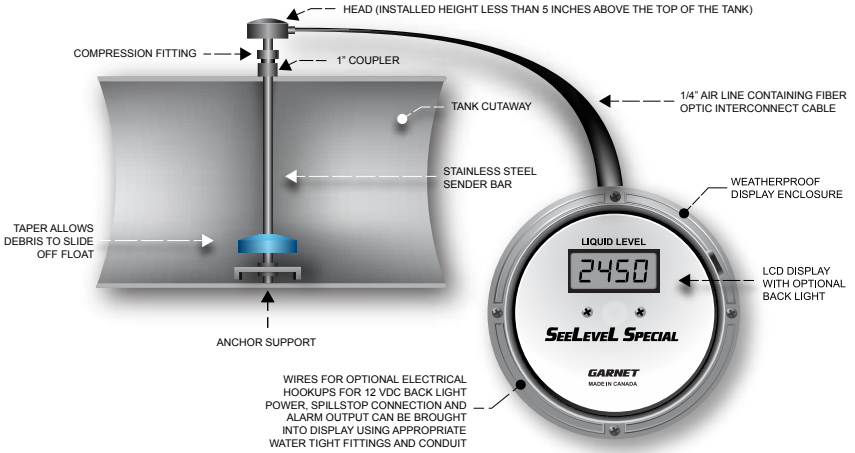
The sender bar has no moving parts and is completely filled with potting material to enhance reliability. The use of a digital rather than analog sensing technique lowers power consumption to permit battery operation, and ensures high accuracy with no drift or degradation. To accommodate different tank sizes, the bar is simply cut to length with a hacksaw, and the cut end sealed with a cap to prevent moisture or product contamination. This way only one size needs to be stocked, and a perfect fit is ensured. The sender head is very low in profile to satisfy rollover requirements; the maximum height is less than 5 inches above the top of the tank so that it will not protrude above the spillway.

The single fiber optic cable connecting the sender head to the display can be disconnected at both ends. There is approximately 10 times as much light as is required for operation available for the fiber, so no special fiber end preparation is required. The fiber ensures that even with faulty wiring into the display, no explosion hazard can exist.

The 808-P2 display enclosure used is waterproof and the internal circuitry is also protected against moisture by an internal panel and a coating on the circuit board. By being battery operated and not requiring truck power to operate (other than the LCD backlight), installation is simplified and reliability enhanced. The small size of the display box also makes it easy to find an appropriate mounting location. The backlit LCD display ensures that the gauge display is always visible, regardless of ambient lighting conditions.

The use of an on-site programmer eliminates downtime waiting for factory calibration parts, and allows easy reprogramming should the need arise. The entire display, including decimal point, is completely programmable to whatever units are desired. In addition to numbers, the letters F, U, L, and E can be programmed to provide displays such as FULL, E, etc. The alarm uses a transistor rather than a relay to increase current capability, eliminate sparking, and eliminate gauge battery power drain.

GENERAL MECHANICAL ASSEMBLY



CHAPTER 5 - SENDER BAR LIMITS OF RESISTIVITY

The temperature of the product being transported should be limited to approximately +90°C (+194°F). Damage to the float and sender bar can occur if this value is exceeded.

The tube used in the manufacturing of the sender bar is seamless 316 stainless steel. **It should be noted that certain corrosive products, as well as high concentrations of acid products, may attack the stainless steel and cause perforations to develop. It is the operator's responsibility to determine the products compatibility with the sender bar.**

> ⚠ **CAUTION: Perforation of the sender bar or heat damage is not warrantable.**

The LOCTITE® products used to secure the end cap can be attacked by certain chemicals as well. For reference, a chemical resistance chart from LOCTITE showing product compatibility with various chemicals can be found in the center of the manual.

The 680 retaining compound we specify is similar to Loctite #592, 567, 565, 569, 545, 580, 571, 242, 577, 572, 542, 565, 545, 243. If you require more information, please call the Loctite Corporation, in Canada, 1-800-263-5043, in USA, 1-800-562-8483.

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LOCTITE®

FLUID COMPATIBILITY CHART

for metal threaded fittings sealed with Loctite® Sealants

LIQUIDS, SOLUTIONS & SUSPENSIONS

LEGEND:
- ● All Loctité Anaerobic Sealants are Compatible Including #242, 243, 542, 545, 565, 567, 569, 571, 572, 577, 580, 592
- † Use Loctité #270, 271™, 277, 554
- ■ Not Recommended
- □ <10% (same as ●)
  >10% (same as ✻)
- ✻ <5% (same as ●)
  >5% (same as †)
- ◆ Use Loctité #242®, 243, 290, 565

Abrasive Coolant	●	Bagasse Fibers	●	Chlorobenzene Dry	●	Ferrous Chloride	●
Acetaldehyde	●	Barium Acetate	●	Chloroform Dry	●	Ferrous Oxalate	●
Acetate Solvents	●	Barium Carbonate	●	Chloroformate Methyl	●	Ferrous Sulfate10%	●
Acetimide	●	Barium Chloride	●	Chlorosulfonic Acid	■	Ferrous Sulfate (Sat)	●
Acetic Acid	●	Barium Hydroxide	□	Chrome Acid Cleaning	□	Fertilizer Sol	●
Acetic Acid	□	Barium Sulfate	●	Chrome Liquor	□	Flotation Concentrates	●
Acetic Acid - glacial	●	Battery Acid	□	Chrome Plating Bath	□	Fluoride Salts	●
Acetic Anhydride	●	Battery Diffuser Juice	●	Chromic Acid 10%	●	Fluorine, Gaseous or Liquid	■
Acetone	●	Bauxite (See Alumina)	●	Chromic Acid 50% (cold)	■	Fluorolube	●
Acetyl Chloride	●	Bentonite	●	Chromic Acid 50% (hot)	■	Fluosilic Acid	●
Acetylene (Liquid Phase)	●	Benzaldehyde	●	Chromium Acetate	●	Flux Soldering	●
Acid Clay	●	Benzene	●	Chromium Chloride	●	Fly Ash Dry	●
Acrylic Acid	●	Benzene Hexachloride	●	Chromium Sulfate	●	Foam Latex Mix	●
Acrylonitrile	●	Benzene in Hydrochloric Acid	●	Classifier	●	Foamite	●
Activated Alumina	●	Benzoic Acid	●	Clay	●	Formaldehyde (cold)	●
Activated Carbon	●	Benzotriazole	●	Coal Slurry	●	Formaldehyde (hot)	†
Activated Silica	●	Beryllium Sulfate	●	Coal Tar	●	Formic Acid (Dil cold)	●
Alcohol-Allyl	●	Bicarbonate Liquor	●	Cobalt Chloride	●	Formic Acid (Dil hot)	†
Alcohol-Amyl	●	Bilge Lines	†	Copper Ammonium Formate	●	Formic Acid (cold)	●
Alcohol-Benzyl	●	Bleach Liquor	●	Copper Chloride	●	Formic Acid (hot)	†
Alcohol-Butyl	●	Bleached Pulps	●	Copper Cyanide	●	Freon §	†
Alcohol-Ethyl	●	Borax § Liquors	●	Copper Liquor	●	Fuel Oil	●
Alcohol-Furfuryl	●	Boric Acid	●	Copper Naphthenate	●	Fuming Nitric Red	■
Alcohol-Hexyl	●	Brake Fluids	●	Copper Plating, Acid Process	●	Fuming Sulfuric	■
Alcohol-Isopropyl	●	Brine Chlorinated	●	Copper Plating, Alk. Process	●	Fuming Oleum	■
Alcohol-Methyl	●	Brine Cold	●	Copper Sulfate	●	Furfural	●
Alcohol-Propyl	●	Bromine Solution	†	Core Oil	●		
Alum-Ammonium	●	Butadiene	●	Corundum	●	Gallic Acid	✻
Alum-Chrome	●	Butyl Acetate	●	Creosote	●	Gallium Sulfate	●
Alum-Potassium	●	Butyl Alcohol	●	Creosote-Cresylic Acid	●	Gasoline-Acid Wash	●
Alum-Sodium	●	Butyl Amine	●	Cyanide Solution	●	Gasoline-Alk. Wash	●
Alumina	●	Butyl Cellosolve §	●	Cyanuric Chloride	●	Gasoline Aviation	●
Aluminum Acetate	●	Butyl Chloride	●	Cyclohexane	●	Gasoline Copper Chloride	●
Aluminum Bicarbonate	●	Butyl Ether - Dry	●	Cylinder Oils	●	Gasoline Ethyl	●
Aluminum Bifluoride	●	Butyl Lactate	●			Gasoline Motor	●
Aluminum Chloride	●	Butyral Resin	●	De-Ionized Water	●	Gasoline Sour	●
Aluminum Fluoride	●	Butyraldehyde	●	De-Ionized Water Low Conductivity	●	Gasoline White	●
Aluminum Hydroxide	■	Butyric Acid	□	Detergents	●	Gluconic Acid	●
Aluminum Hyposulfite	●			Developer, photographic	●	Glue-Animal Gelatin	●
Aluminum Iodide	●	Cadmium Chloride	●	Dextrin	●	Glue-Plywood	●
Aluminum Molybdate	●	Cadmium Plating Bath	●	Diacetone Alcohol	●	Glutamic Acid	●
Aluminum Nitrate	●	Cadmium Sulfate	●	Diammonium Phosphate	●	Glycerine Lye-Brine	■
Aluminum Oxalate	●	Calcium Acetate	●	Diamylamine	●	Glycerol	†
Aluminum Persulfate	●	Calcium Bisulfate	●	Diatomaceaus Earth Slurry	●	Glycine	●
Aluminum Phosphate	●	Calcium Carbonate	●	Diazo Acetate	●	Glycine Hydrochloride	●
Aluminum Picrate	●	Calcium Chlorate	●	Dibutyl Phthalate	●	Glycol Amine	●
Aluminum Sulfate	●	Calcium Chloride	●	Dichlorophenol	●	Glycolic Acid	●
Aluminum Sulfate Scrubber	●	Calcium Chloride Brine	●	Dichloro Ethyl Ether	●	Glyoxal	●
Aluminum Sulfide	●	Calcium Citrate	●	Dicyandamide	●	Gold Chloride	●
Ammonium Acetate	●	Calcium Ferrocyanide	●	Dielectric Fluid	●	Gold Cyanide	●
Ammonia Anhydrous	■	Calcium Formate	●	Diester Lubricants	●	Granodine	●
Ammonia Solutions	■	Calcium Hydroxide	●	Diethyl Ether Dry	●	Grape Pomace Graphite	●
Ammonium Bisulfite	●	Calcium Lactate	●	Diethyl Sulfate	●	Grease Lubricating	●
Ammonium Borate	●	Calcium Nitrate	●	Diethylamine	●	Green Soap	●
Ammonium Bromide	●	Calcium Phosphate	●	Diethylene Glycol	●	Grinding Lubricant	●
Ammonium Carbonate	●	Calcium Silicate	●	Diglycolic Acid	●	Grit Steel	●
Ammonium Chloride	●	Calcium Sulfamate	●	Dimethyl Formamide	●	Gritty Water	●
Ammonium Chromate	●	Calcium Sulfate	●	Dimethyl Sulfoxide	●	Groundwood Stock	●
Ammonium Fluoride	●	Calcium Sulfite	●	Dioxane Dry	●	GRS Latex	●
Ammonium Fluorosilicate	●	Camphor	●	Dioxidene	●	Gum Paste	●
Ammonium Formate	●	Carbitol	●	Dipentene - Pinene	●	Gum Turpentine	●
Ammonium Hydroxide	■	Carbolic Acid (phenol)	□	Diphenyl	●	Gypsum	●
Ammonium Hyposulfite	●	Carbon Bisulfide	●	Distilled Water (Industrial)	●		
Ammonium Iodide	●	Carbon Black	●	Dowtherm §	●	Halane Sol	●
Ammonium Molybdate	●	Carbon Tetrachloride	●	Drying Oil	●	Halogen Tin Plating	●
Ammonium Nitrate	●	Carbonic Acid	□	Dust-Flue (Dry)	●	Halowax §	●
Ammonium Oxalate	●	Carbowax §	●	Dye Liquors	●	Harvel-Trans Oil	●
Ammonium Persulfate	●	Carboxymethyl Cellulose	●			Heptane	●
Ammonium Phosphate	●	Carnauba Wax	●	Emery - Slurry	●	Hexachlorobenzene	●
Ammonium Picrate	●	Casein	●	Emulsified Oils	●	Hexadiene	●
Ammonium Sulfate	●	Casein Water Paint	●	Enamel Frit Slip	●	Hexamethylene Tetramine	●
Ammonium Sulfate Scrubber	●	Celite	●	Esters General	●	Hexane	●
Ammonium Sulfide	●	Cellosolve §	●	Ethyl Acetate	●	Hydrazine	●
Ammonium Thiocyanate	●	Cellulose Pulp	●	Ethyl Alcohol	●	Hydrazine Hydrate	●
Amyl Acetate	●	Cellulose Xanthate	●	Ethyl Amine	●	Hydrobromic Acid	□
Amyl Amine	●	Cement Dry/Air Blown	●	Ethyl Bromide	●	Hydrochloric Acid	■
Amyl Chloride	●	Cement Grout	●	Ethyl Cellosolve §	●	Hydrocyanic Acid	□
Aniline	●	Cement Slurry	●	Ethyl Cellosolve Slurry §	●	Hydroflouric Acid	■
Aniline Dyes	●	Ceramic Enamel	●	Ethyl Formate	●	Hydrogen Peroxide (dil)	●
Anodizing Bath	●	Ceric Oxide	●	Ethyl Silicate	●	Hydrogen Peroxide (con)	†
Antichlor Solution	●	Chalk	●	Ethylene Diamine	●	Hydroponic Sol	●
Antimony Acid Salts	●	Chemical Pulp	●	Ethylene Dibromide	●	Hydroquinone	●
Antimony Oxide	●	Chestnut Tanning	●	Ethylene Dichloride	●	Hydroxyacetic Acid	●
Antioxidant Gasoline	●	China Clay	●	Ethylene Glycol	●	Hypo	●
Aqua Regia	■	Chloral Alcoholate	●	Ethylenediamine Tetramine	●	Hypochlorous Acid	●
Argon	●	Chloramine	●				
Arneen §	●	Chlorinated Hydrocarbons	●	Fatty Acids	●	Ink	●
Arochlor §	●	Chlorinated Paperstock	●	Fatty Acids Amine	●	Ink in Solvent-Printing	●
Aromatic Gasoline	●	Chlorinated Solvents	●	Fatty Alcohol	●	Iodine in Alcohol	●
Aromatic Solvents	●	Chlorinated Sulphuric Acids	■	Ferric-Floc	●	Iodine-Potassium Iodide	●
Arsenic Acid	●	Chlorinated Wax	●	Ferric Chloride	●	Iodine Solutions	●
Asbestos Slurry	●	Chlorine Dioxide	■	Ferric Nitrate	●	Ion Exchange Service	●
Ash Slurry	●	Chlorine Liquid	■	Ferric Sulfate	●		
Asphalt Emulsions	●	Chlorine Dry	■	Ferrocence-Oil Sol	●		
Asphalt Molten	●	Chloroacetic Acid	□				

Ion Exclusion Glycol	●	Nickel Chloride	●	Oakite § Compound	●	Paint-Linseed Base	●
Irish Moss Slurry	●	Nickel Cyanide	●	Oil, Creosote	●	Paint-Water Base	●
Iron Ore Taconite	●	Nickel Fluoborate	●	Oil, Emulsified	●	Paint-Remover-Sol. Type	●
Iron Oxide	●	Nickel Ore Fines	●	Oil, Fuel	●	Paint-Vehicles	●
Isobutyl Alcohol	●	Nickel Plating Bright	●	Oil, Lubricating	●	Palmitic Acid	●
Isobutyraldehyde	●	Nickel Sulfate	●	Oil, Soluble	●	Paper Board Mill Waste	●
Isooctane	●	Nicotinic Acid	□	Oleic Acid, hot	●	Paper Coating Slurry	●
Isopropyl Alcohol	●	Nitrate Sol	●	Oleic Acid, cold	●	Paper Pulp	●
Isocyanate Resin	●	Nitration Acid(s)	■	Ore Fines-Flotation	●	Paper Pulp with Amun	●
Isopropyl Acetate	●	Nitric Acid	■	Ore Pulp	●	Paper Pulp with Dye	●
Isopropyl Ether	●	Nitric Acid10%	□	Organic Dyes	●	Paper Pulp, bleached	●
Itaconic Acid	●	Nitric Acid 20%	†	Oxalic Acid cold	●	Paper Pulp, bleached-washed	●
		Nitric Acid Anhydrous	■	Ozone, wet	■	Paper Pulp Chlorinated	●
Jet Fuels	●	Nitric Acid Fuming	■			Paper Groundwood	●
Jeweler's Rouge	●	Nitro Aryl Sulfonic Acid	●			Paper Rag	●
Jig Table Slurry	●	Nitrobenezene-Dry	●			Paper Stocks, fine	●
		Nitrocellulose	●			Paradichlorobenzene	●
Kaolin-China Clay §	●	Nitrofurane	●			Paraffin Molten	●
Kelp Slurry	●	Nitroguanidine	●			Paraffin Oil	●
Kerosene	●	Nitroparaffins-Dry	●			Paraformaldehyde	●
Kerosene Chlorinated	●	Nitrosyl Chloride	●			Pectin Solution Acid	●
Ketone	●	Norite Carbon	●			Pentachlorethane	●
		Nuchar	●			Pentaerythritol Sol	●
Lacquer Thinner	●					Perchlorethylene (Dry)	●
Lactic Acid	●					Perchloric Acid	□
Lapping Compound	●					Perchloromethyl Mercaptan	●
Latex-Natural	●					Permanganic Acid	■
Latex-Synthetic	●					Persulfuric Acid	■
Latex Synthetic Raw	●					Petroleum Ether	●
Laundry Wash Water	●					Petroleum Jelly	●
Laundry Bleach	●					Phenol Formaldehyde Resins	●
Laundry Blue	●					Phenol Sulfonic Acid	●
Laundry Soda	●					Phenolic Glue	●
Lead Arsenate	●					Phlorozine	●
Lead Oxide	●					Phosphate Ester	●
Lead Sulfate	●					Phosphatic Sand	●
Lignin Extract	●					Phosphoric Acid 85% hot	●
Lime Slaked	●					Phosphoric Acid 85% cold	†
Lime Sulfur Mix	●					Phosphoric Acid 50% hot	†
Liquid Ion Exchange	●					Phosphoric Acid 50% cold	†
Lithium Chloride	●					Phosphoric Acid 10% cold	●
LOX (Liquid 02)	■					Phosphoric Acid 10% hot	†
Ludox	●					Phosphorous Molten	●
Lye	■					Phosphotungstic Acid	●
						Photographic Sol.	●
Machine Coating Color	●					Phthalic Acid	●
Magnesite Slurry	●					Phytate	●
Magnesite	●					Phytate Salts	●
Magnesium Bisulfite	●					Pickling Acid, Sulfuric	●
Magnesium Carbonate	●					Picric Acid Solutions	●
Magnesium Chloride	●					Pine Oil Finish	●
Magnesium Hydroxide	●						
Magnesium Sulfate	●						
Maleic Acid	●						
Maleic Anhydride	●						
Manganese Chloride	●						
Manganese Sulfate	●						
Melamine Resin	●						
Menthol	●						
Mercaptans	●						
Mercuric Chloride	●						
Mercuric Nitrate	●						
Mercury	●						
Mercury Dry	●						
Methane	●						
Methyl Alcohol	●						
Methyl Acetate	●						
Methyl Bromide	●						
Methyl Carbitol	●						
Methyl Cellosolve §	●						
Methyl Chloride	●						
Methyl Ethyl Ketone	●						
Methyl Isobutyl Ketone	●						
Methyl Lactate	●						
Methyl Orange	●						
Methylamine	●						
Methylene Chloride	●						
Mineral Spirits	●						
Mixed Acid, Nitric/Sulfuric	■						
Monochloracetic Acid	●						
Morpholine	●						
Mud	●						
Nalco Sol.	●						
Naphtha	●						
Naphthalene	●						
Naval Stores Solvent	●						
Nematocide	●						
Neoprene Emulsion	●						
Neoprene Latex	●						
Nickel Acetate	●						
Nickel Ammonium Sulfate	●						

Loctite product numbers in red are worldwide or application-specific products

(This is a list of chemical stability only. It does not constitute approval for use in the processing of food, drugs, cosmetics, pharmaceuticals, and ingestible chemicals.) Loctité sealants are not recommended for use in pure oxygen or chlorine environments or in conjunction with strong oxidizing agents, an explosive reaction can result.

A Henkel Company

The "Flexible Solutions." ™ Specialists

NEW-LINE HOSE & FITTINGS

LOCTITE®

FLUID COMPATIBILITY CHART

for metal threaded fittings sealed with Loctite® Sealants

LIQUIDS, SOLUTIONS & SUSPENSIONS

LEGEND:
- ● All Loctite® Anaerobic Sealants are Compatible Including #242, 243, 542, 545, 565, 567, 569, 571, 572, 577, 580, 592
- † Use Loctite® #270, 271™, 277, 554
- ■ Not Recommended
- □ <10% (same as ●)
  >10% (same as†)
- ✱ <5% (same as ●)
  >5% (same as †)
- ◆ Use Loctite® #242®, 243, 290, 565

Plating Sol. as follows:

Brass Cyanide	●
Bronze-Cyanide	●
Chromium & Cadmium Cyanide	●
Cobalt Acid	●
Copper Acid	●
Copper Alk.	●
Gold Cyanide	●
Iron-Acid	●
Lead-Fluoro	●
Nickel Bright	●
Platinum	●
Silver-Cyanide	●
Tin-Acid	●
Tin Alk. Barrel	●
Zinc Acid	●
Zinc Alk. Cyanide	●
Polyacrylonitrile Slurry	●
Polypentek	■
Polysulfide Liquor	●
Polyvinyl Acetate Slurry	●
Polyvinyl Chloride	●
Porcelain Frit	●
Potash	□
Potassium Acetate	●
Potassium Alum. Sulfate	●
Potassium Bromide	●
Potassium Carbonate	●
Potassium Chlorate	●
Potassium Chloride Sol	●
Potassium Chromate	●
Potassium Cyanide Sol	●
Potassium Dichromate	●
Potassium Ferricyanide	●
Potassium Hydroxide	■
Potassium Iodide	●
Potassium Nitrate	●
Potassium Perchlorate	●
Potassium Permanganate	●
Potassium Persulfate	●
Potassium Phosphate	●
Potassium Silicate	●
Potassium Sulfate	●
Potassium Xanthate	●
Press Board Waste	●
Propionic Acid	●
Propyl Alcohol	●
Propyl Bromide	●
Propylene Glycol	●
Pumice	●
Pyranol	●
Pyridine	●
Pyrogallic Acid	●
Pyrogen Free Water	●
Pyrole	●
Pyromellitic Acid	●
Quebracho Tannin	●
Rag Stock Bleached	●
Rare Earth Salts	●
Rayon Acid Water	●
Rayon Spin Bath	●
Rayon Spin Bath spent	●
Resorcinol	●
River Water	●
Road Oil	●
Roccal	●
Rosin-Wood	●
Rosin in Alcohol	●
Rosin Size	●
Rubber Latex	●
Safrol	●
Salt Alkaline	●
Salt Electrolytic	●
Salt Refrg.	●
Sand-Air Blown Slurry	●
Sand-Air Phosphatic	●
Sea Coal	●
Sea Water	●
Selenium Chloride	●
Sequestrene	●
Sewage	●
Shellac	●
Shower Water	●
Silica Gel	●
Silica Ground	●
Silicone Tetrachloride	●
Silicone Fluids	●
Silver Cyanide	●
Silver Iodide-Aqu.	●
Silver Nitrate	●
Size Emulsion	●
Skelly Solve E, L	●
Slate to 400 Mesh	●
Soap Lye	■
Soap Solutions (Stearates)	●
Soap Stone Air Blown	●
Soda Pulp	●
Sodium Acetate	●
Sodium Acid Fluoride	●
Sodium Aluminate	●
Sodium Arsenate	●
Sodium Benzene Sulfonate	●
Sodium Bichromate	●
Sodium Bisulfite	●
Sodium Bromide	●
Sodium Carbonate	●
Sodium Chlorate	●
Sodium Chlorite	●
Sodium Cyanide	●
Sodium Ferricyanide	●
Sodium Formate	●
Sodium Glutamate	●
Sodium Hydrogen Sulfate	●
Sodium Hydrosulfite	●
Sodium Hydrosulfide	●
Sodium Hydrochloride	●
Sodium Hydroxide	■
Sodium Hydro. 20% cold	●
Sodium Hydro. 20% hot	†
Sodium Hydro. 50% cold	†
Sodium Hydro. 50% hot	■
Sodium Hydro. 70% cold	†
Sodium Hydro. 70% hot	■
Sodium Hypochlorite	●
Sodium Lignosulfonate	●
Sodium Metasilicate	●
Sodium Molten	●
Sodium Nitrate	●
Sodium Nitrite-Nitrate	●
Sodium Perborate	●
Sodium Peroxide	■
Sodium Persulfate	●
Sodium Phosphate-Mono	●
Sodium Phosphate-Tri	●
Sodium Potassium Chloride	●
Sodium Salicylate	●
Sodium Sesquicarbonate	●
Sodium Silicate	●
Sodium Silcofluoride	●
Sodium Stannate	●
Sodium Sulfate	●
Sodium Sulfide	●
Sodium Sulfite	●
Sodium Sulfhydrate	●
Sodium Thiocyanate	●
Sodium Thiosulfate	●
Sodium Tungstate	●
Sodium Xanthate	●
Solox-Denat. Ethanol	●
Soluble Oil	●
Solvent Naphthas	●
Sorbic Acid	●
Sour Gasoline	●
Soybean Sludge-Acid	●
Spensol Solution	●
Stannic Chloride	●
Starch	●
Starch Base	●
Stearic Acid	●
Steep Water	●
Sterilization Steam	●
Stillage Distillers	●
Stoddard Solvent	●
Styrene	●
Styrene Butadiene Latex	●
Sulfamic Acid	●
Sulfan-Sulfuric Anhydride	●
Sulfathiazole	■
Sulfite Liquor	●
Sulfite Stock	●
Sulfonated Oils	●
Sulfones	●
Sulfonic Acids	●
Sulfonyl Chloride	●
Sulfur Slurry	●
Sulfur Solution	●
in Carbon Disulfide	●
Sulphuric Acid 0-7%	†
Sulphuric Acid 7-40%	†
Sulphuric Acid 40-75%	†
Sulphuric Acid 75-95%	■
Sulphuric Acid 95-100%	■
Sulphurous Acid	†
Sulfuryl Chloride	●
Surfactants	●
Synthetic Latex	●
Taconite - Fines	●
Talc - Slurry	●
Tankage - Slurry	●
Tannic Acid (cold)	†
Tamin	●
Tar & Tar Oil	●
Tartaric Acid	●
Television Chemicals	●
Tergitol §	●
Terpineol	●
Tetraethyl Lead	●
Tetrahydrofuran	●
Tetranitromethane	●
Textile Dyeing	●
Textile Finishing Oil	●
Textile Printing Oil	●
Thiocyanic Acid	●
Thioglycollic Acid	●
Thionyl Chloride	●
Thiophosphoryl Chloride	●
Thiourea	●
Thorium Nitrate	●
Thymol	●
Tin Tetrachlorida	●
Tinning Sol. DuPont	●
Titania Paper Coating	●
Titanium Oxide Slurry	●
Titanium Oxy Sulfate	●
Titanium Sulfate	●
Titanium Tetrachloride	●
Toluol	●
Toluene	●
p-Toluene Sulfonic Acid	†
Transil Oil	●
Trichloracetic Acid	●
Trichlorethane 1,1,1	●
Trichlorethylene	●
Trichlorethylene-Dry	●
Tricresyl Phosphate	●
Triethanolamine	●
Triethylene Glycol	●
Trioxane	●
Tungstic Acid	●
Turpentine	●
UCON § Lube	●
Udylite Bath-Nickel	●
Undecylenic Acid	●
Unichrome Sol. Alk.	●
Uranium Salts	●
Uranyl Nitrate	●
Uranyl Sulfate	●
Urea Ammonia Liquor	●
Vacuum to 100 Micron	●
Vacuum below 100 Micr.	●
Vacuum Oil	●
Vanadium Pentoxide	●
Slurry	●
Varnish	●
Varsol-Naphtha Solv.	●
Versene §	●
Vinyl Acetate Dry or Chloride Monomer	●
Vinyl Chloride Latex Emul.	●
Vinyl Resin Slurry	●
Viscose	●
Vortex-Hydroclone	●
Water-Acid - Below pH7	●
Water pH7 to 8	●
Water Alkaline - Over pH8	●
Water Mine Water	●
Water Potable	◆
Water River	●
Water Sandy	●
Water "White" - low pH	●
Water "White" - high pH	●
Wax	●
Wax Chlorinated	●
Wax Emulsions	●
Weed Killer Dibromide	●
Weisberg Sulfate Plating	●
Wood ground pulp	●
Wort Lines	●
X-Ray Developing Bath	●
Xylene	●
Zelan	●
Zeolite Water	●
Zinc Acetate	●
Zinc Brites	●
Zinc Chloride	●
Zinc Cyanide-Alk.	●
Zinc Fines Slurry	●
Zinc Flux Paste	●
Zinc Galvanizing	●
Zinc Hydrosulfite	●
Zinc Oxide in Water	●
Zinc Oxide in Oil	●
Zinc Sulfate	●
Zincolate	●
Zirconyl Nitrate	●
Zirconyl Sulfate	●

GASES

Acetylene	●
Acid & Alkali Vapours	●
Air	●
Amine	●
Ammonia	●
Butane	●
Butadiene Gas/Liquid	●
Butylene Gas/Liquid	●
By-Product Gas (Dry)	●
Carbon Dioxide	●
Carbon Disulfide	●
Carbon Monoxide	●
Chloride Dry	●
Chlorine Dry	■
Chlorine Wet	■
Coke-oven Gas-cold	●
Coke-oven Gas-hot	†
Cyanogen Chloride	●
Cyanogen Gas	●
Ethane	●
Ether-see Diethyl Ether	●
Ethylene	●
Ethylene Oxide	●
Freon § (11-12-21-22)	†
Furnace Gas hot	†
Furnace Gas cold	●
Gas drip oil	●
Gas flue	●
Gas manufacturing	●
Gas natural	●
Helium	●
Hydrogen Gas-cold	●
Hydrogen Chloride	●
Hydrogen Cyanide	●
Hydrogen Sulfide wet & dry	●
Isobutane	●
Methane	●
Methyl Chloride	●
Natural gas dry	●
Nitrogen gas	●
Nitrous Oxide	●
Oil-Solvent Vapor	●
Oxygen	■
Ozone	■
Producer Gas 50 PSI	●
Propane	●
Propylene	●
Steam High Pressure (≤ 70 psi)	■
Steam Low Pressure (≤ 70 psi)	●
Sulfur Dioxide	●
Sulfur Dioxide dry	●
Sulfur Trioxide Gas	■
Sulfuric Acid Vapor	●

NOTE:
1. The above information does not constitute a recommendation of sealant use. It is intended only as a guide for considerate use by the purchaser with the expectation of favorable confirming test results. It is impossible to test sealant reaction with the multitude of chemicals in existence, therefore, compatibility can be given an estimated based on a wide variety of customer experience.
2. With the stringent action of such chemicals as Freon, strong cold acids and caustics, thorough evaluation is suggested. Sealant is not corrosive chemicals is not recommended.
3. Contact Loctite Corporation for use with chemicals not covered by this information.

§Listing(s) may be Brand Name(s) or Trademarks for chemicals of Corporations other than Loctite.

Loctite product numbers in red are worldwide or application-specific products.

(This is a list of chemical stability only. It does not constitute approval for use in the processing of foods, drugs, cosmetics, pharmaceuticals, and ingestible chemicals). Loctite® sealants are not recommended for use in pure oxygen or chlorine environments or in conjunction with strong oxidizing agents, explosive reaction can result.

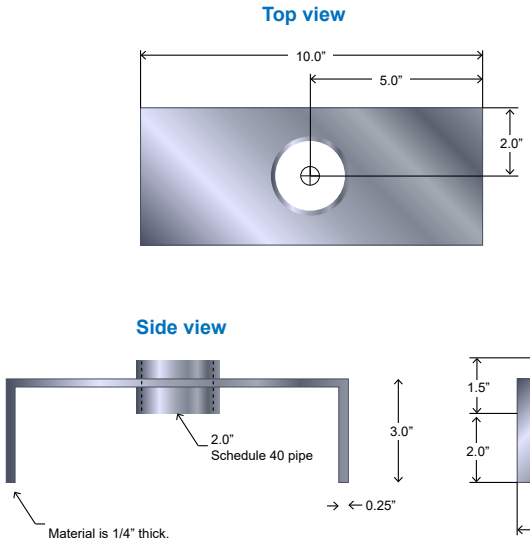
The "Flexible Solutions™" Specialists

NEW-LINE HOSE & FITTINGS
New-Line Hose & Fittings
2515 Eastbrook Parkway
Burnaby, BC V5C 5W2
1-800-661-HOSE (4673)
www.new-line.com

1. Pick a spot in the tank for the sender bar to be mounted. It should be as close to the middle of the tank as possible. Allow room for the head at the top of the sender bar. Make sure that the float will not contact any baffles or other obstructions in the tank. It is preferable if the float can be accessed from the hatch, to make any future service work easier. For this reason **do not** mount the float behind a baffle where it can't be reached from the hatch.
2. Drill or cut a hole in the top of the tank to mount a 1 inch NPT coupler (not provided). Weld the top coupler in place.
3. Slide the compression fitting over the sender bar, threads facing down, and insert the bar through the coupler and align it vertically in the tank. Determine how much length needs to be cut off the bottom of the bar. At a minimum the bar should be mounted 1 inch off the bottom of the tank to allow for tank expansion and contraction. For tanks greater than 75 inches in height, increase the gap to 1.5 inches. Cut the bar with a hack saw and trim exposed circuit board with a sharp knife. **Do not use a disk type cutoff saw since the heat generated will short circuit the internal circuit board.**
4. **Ensure that the compression fitting is on the bar** and clean the end of the bar and the inside of the end cap with Loctite 7070 Cleaner. Spray Loctite T7471 Primer onto both the end of the bar and the inside of the end cap. Allow the primer to dry for a few minutes. Apply a bead of Loctite 680 Retaining Compound around the bottom of the tube and around the top of the end cap. Place the cap onto the end of the tube with a twisting motion so that the retaining compound is smeared completely on the portion of the bar where the end cap is. To remove entrapped air, place the end on the floor and rock the bar until excess air has escaped. Keep the end cap in position by gently clamping the bar in a vise with the end against a solid object. Avoid setting the end cap against a cold floor, as this will slow the curing process. The curing time should be about an hour at room temperature.

   ⚠ **CAUTION: The Loctite must be set before the tank is put into service. Bar failure due to a leaking end cap is NOT covered by warranty.**

   Note that a kit with all the required Loctite products is available from Garnet. For further details on the Loctite products see Technical Service Bulletin #17 on our web site, www.garnetinstruments.com.



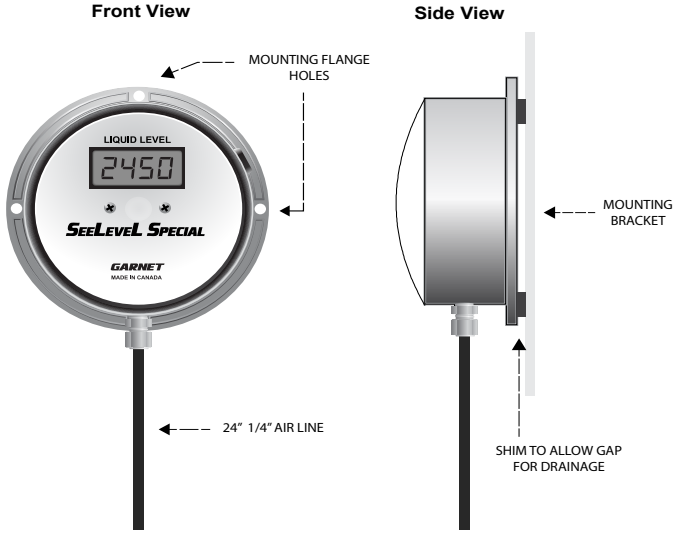
5. Make up an anchor by cutting a 4" X 16" piece of 1/4" thick material. Bend each end down at 90 degrees (see the diagram), so the resulting flat piece is about 4" X 10" inches with 3" sides. Drill a hole to insert a 2" schedule 40 pipe in the center of the plate, weld tube to plate. Insert the bar into the tank and slide the anchor assembly over the sensor bar with the "**U**" facing down. Align the sensor bar vertically and weld the anchor in place to the bottom of the tank. Pull the sensor bar up a bit and slide the float (cone side up) over the bar. Lower the bar back into the anchor. Tighten the base of the compression fitting into the coupler. Lift the bar 2" off the bottom of the tank, and tighten down the compression fitting nut. Raise and lower the float a few inches to set the bottom reading.
6. Pick a spot for the display. It should be easy to see and out of direct road spray and protected from driving rain. Mount the display enclosure using the mounting flange holes, being certain to shim the enclosure away from the mounting surface with the spacers provided to allow water drainage.

> ⚠ **CAUTION: Broken display enclosures caused by water freezing behind the enclosure are NOT covered by warranty.**

7. Route 1/4" Nylon air brake hose from the sender head to the display and fasten with **brass inserts** and **compression fittings** at each end (the brass inserts may be part of the fitting). If the holes are not pre-drilled in the display enclosure, drill holes into the Valox box close enough to the base of the box to avoid contacting the lid flange. Never drill holes into the top of the box since water will leak in. If the hole has been tapped too large, Teflon tape can be used on the fitting to ensure a proper seal. Make sure that the lid is not on the box when drilling to avoid damaging the display electronics.

At the lowest point in the air line insert a T fitting with approximately two feet of 1/4" airline hanging down to provide a drain for any water than may get into the system. If a T fitting is not feasible, put a fitting into the bottom of the display enclosure and route the 2 feet of 1/4" airline from there (see diagram below). If wiring is to be connected, drill and tap extra holes as needed into the enclosure. Feed the fiber optic cable through the hose, leaving about 12 inches extra at each end.

8. Cut the fiber ends square with a sharp knife and insert the fiber into the connectors at each end and tighten the connector lock nuts. Make sure that the fiber is loosely coiled inside the enclosure and is not pulled tight or bent sharp. The display should change from reading "no L" to some inch value as soon as the fiber is connected. If not, check that the fiber ends are clean and cut square, and that the fiber is fully inserted into the connectors at each end. If the display shows "bL: 8" or "bL:11" reprogram the sender bar or display for the correct mode (1/3 or 1/6 inch).
9. Inspect the head cap for casting flash, lightly sand or scrape off any casting protrusions. Make sure that there is grease on the rubber O-ring and snap on the head cap.
10. Program the gauge as directed in the programming section. To determine the bottom reading of the gauge, measure from the bottom of the tank to the middle of the straight vertical part of the float when the float is resting on the anchor. Do NOT set the gauge to read "**0**" at the bottom since this will not result in a correct reading when the float is actually floating on the product. In addition, if the gauge ever goes below "0" due to tank expansion, it will read some nonsensical value since this region has not been programmed.



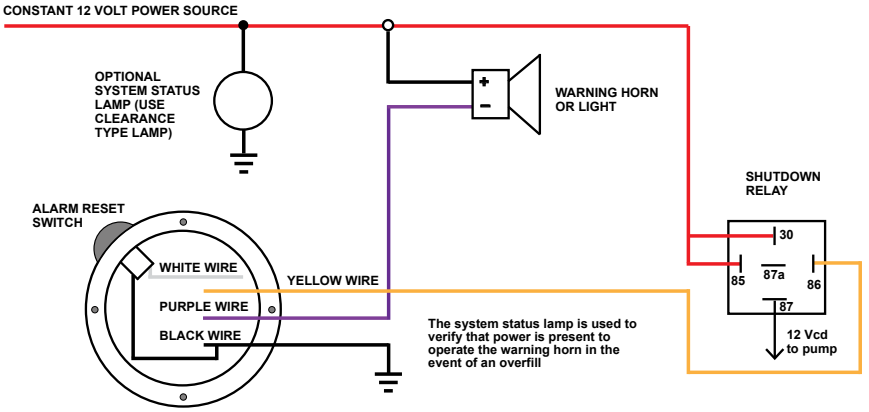
11. If wiring is used, route the wires into the display box using appropriate water tight fittings and conduit. Connect the **BLACK** wire to ground, the **RED** wire to a 12 volt clearance light circuit (this operates the LCD back light), and the **YELLOW** alarm wire to the alarm circuit (if used). The alarm wire completes a circuit to ground when active, so the other end of the circuit needs provide power. The **PURPLE** automatic alarm wire is connected to the negative side of a relay coil, with the positive side connecting to +12 volts. The relay contacts control power to the warning horn or light, this should be "PTO sensed" power. This means that the power is only supplied to the warning device when the PTO is engaged. The **GREEN** SpillStop wire goes to the compartment terminal on the 815, or to the Yellow wire of the 815-UHP. The **WHITE** switch wire goes to the white wire on the automatic alarm reset switch, with the black switch wire going to ground. To program the alarms and the SpillStop see the alarm programming section. Contact Garnet for information concerning the connection of the **GREEN/YELLOW** remote wire. Note that the **GREEN/YELLOW** wire may not be installed on all displays

Wiring Guide

Wire Color	**Operation**
Green	815-UHP SpillStop signal line
Yellow	Shutdown alarm output
Purple	Horn alarm output
Black	Ground
Red	+12VDC
Green/Yellow	SeeLeveL Access signal line

12. Inspect the display cap for casting flash, lightly sand or scrape off any casting protrusions. Make sure that there is grease on the rubber O-ring and snap on the display cap.
13. Verify gauge operation by lifting the float. Record the unit number, calibration units, minimum and maximum readout values, and any alarm points programmed in the IMPORTANT OPERATOR INFORMATION area on the front page of the manual. **The truck operator must be given the manual upon delivery with all front page data filled in.**

AUTOMATIC ALARM WIRING DIAGRAM



AN ADDITIONAL RELAY IS NEEDED IF THE HORN OR LIGHT DRAWS MORE THAN 1 AMP

CHAPTER 7 - SETTING DISPLAY DENSITY

When the gauge is calibrated with the correct offset, it is assumed that the density of the product is 0.90 (specific gravity is 90% of pure water). The amount that the float sinks into the product will vary somewhat with the density of the product, and hence the gauge reading will change slightly. For lower density product, the float will sink more, and so the gauge will read a bit low. For higher density product, the float will sink less (it will float higher), so the gauge will read a bit high. The following tables summarize float levels as they relate to the type of float and product density.

Plastic Truck Float Buoyancy

Product Specific Gravity	Amount Float Sinks (Inches)	Level Error (Inches)	Correction 1/3" Mode	(inches) 1/6" Mode
0.60	1.88	0.63	2/3	4/6
0.65	1.73	0.48	1/3	3/6
0.70	1.61	0.36	1/3	2/6
0.75	1.50	0.25	1/3	2/6
0.80	1.41	0.16	0	1/6
0.85	1.32	0.07	0	0
0.90	*1.25*	*0.00*	*0*	*0*
0.95	1.18	-0.07	0	0
1.00	**1.13**	**-0.13**	**0**	**0**
1.05	1.07	-0.18	0	-1/6
1.10	1.02	-0.23	0	-1/6
1.15	0.98	-0.27	-1/3	-2/6
1.20	0.94	-0.31	-1/3	-2/6

Nominal calibration is 1/2 way up straight side of float.
Bold indicates density of water

Stainless Steel Truck Float Buoyancy

Product Specific Gravity	Amount Float Sinks (Inches)	Level Error (Inches)	Correction 1/3" Mode	(inches) 1/6" Mode
0.60	2.92	0.97	3/3	6/6
0.65	2.69	0.75	2/3	4/6
0.70	2.50	0.56	2/3	3/6
0.75	2.33	0.39	1/3	2/6
0.80	2.19	0.24	0	1/6
0.85	2.06	0.11	0	0
0.90	1.94	0.00	0	0
0.95	1.84	-0.10	0	0
1.00	**1.75**	**-0.19**	**0**	**-1/6**
1.05	1.67	-0.28	-1/3	-2/6
1.10	1.59	-0.35	-1/3	-2/6
1.15	1.52	-0.42	-1/3	-2/6
1.20	1.46	-0.49	-1/3	-3/6

Nominal calibration is at the weld in center of float.
Bold indicates density of water

To compensate for density variations, the display can be set for the product density. When this is done, it will change the reading by the amount shown in the "Correction" column so that the gauge will read correctly. Note that the amount of variation with density is not large. The density correction will only be needed if the range of product densities is very wide.

If the gauge is put into raw inch mode by jumping pins 1 and 2 on the programming plug, the density correction has no effect. The density correction also has no effect on the calibration during programming or copying.

To set the density:

1. The display must be showing a valid reading in order to set the density. If "no L" or some other error message is showing, repair or connect the gauge before proceeding.
2. Press and hold the alarm reset button. After about 7 seconds the display will show the current density setting, for example, "C .90" indicates a current density setting of 0.90 which is the default. Release the button at this point.
3. If no further action is taken, the display will revert to normal operation after about 5 seconds with no change in the density setting. This is useful if you just want to check the current density setting.
4. To change the density setting, press and release the button repeatedly until the correct density is shown. This must be started before the 5 second time expires, otherwise start again at step 2. The "C" for "current density" on the display will change to "P" for "Program density" and the density will increase from the current setting in 0.05 increments for each button press. For example, if the current density is 0.90, then the display will show "P .95", "P1.00", "P1.05", "P1.10", "P1.15", "P1.20", then it will start over at "P .60", "P .65", and so on.
5. When the correct density is shown, stop pressing the button. After 5 seconds the display will show "Store" for 2 seconds, indicating that the new density value has been stored.
6. The display will then return to normal operation.

To program which float is being used:

1. Since the plastic and stainless steel floats have different buoyancies, the display must be programmed with the type of float used so the density correction will be accurate. This only needs to be done once during installation.
2. The display must be showing a valid reading in order to program the float type. If "no L" or some other error message is showing, repair or connect the gauge before proceeding.
3. Press and hold the alarm reset button. After about 7 seconds the display will show the current density setting, for example, "C .90" indicates a current density setting of 0.90 which is the default. Continue to hold down the button.
4. Put a magnet next to the display face by the "G" in Garnet, with the hole in the magnet facing left and right, not up and down.
5. The display will change to "PL F" or "SS F" depending on whether the display is currently programmed for a plastic or stainless steel float. When this happens, remove the magnet and release the button.

6. If no further action is taken, the display will revert to normal operation after about 5 seconds with no change in the float programming. This is useful if you just want to check the current float programming.
7. To change the float programming, press and release the button before the 5 second time expires, otherwise start again at step 3. Each time the button is pressed the float type will change.
8. When the correct float type is shown, programming is complete. After 5 seconds of no button activity, the display will show "StOr" for 2 seconds if the float type has been changed, indicating that the new float type has been stored.
9. The display will then return to normal operation.

CHAPTER 8 - 808-P2 PROGRAMMING INSTRUCTIONS

The 808-P2 provides an interactive programming experience. When the programming plug is connected to the gauge, the gauge display will show "Prog" within a couple of seconds. Do not start programming the gauge until "Prog" is shown. After the plug has been removed, the gauge display will show "donE" for a moment.

> ⚠ **NOTE:** It is not possible to directly copy the calibration from an 808, 808i, 808A or old style 810 to an 808-P2. The calibration will have to be re-entered using the procedure to calibrate a gauge from a table of calibration values.

Program the 808-P2 for the correct mode (1/3", 1/4", or 1/6"), alarm configuration or check the software revision:

1. The 808-P2 display can be used with the 808, 810, or 908 bars, which requires the installer to make sure that the display is programmed for the correct mode so that it will operate correctly with the sender bar used.
2. The 817-USB Truck Gauge Programmer is not needed for this operation. Only a magnet is required to change the mode.
3. Disconnect the fiber from the display and make sure that no ambient light is getting into the optical connector. The display must be showing "no L" in order to set the mode.
4. Hold the magnet next to the display face by the "G" in Garnet.
5. Within a couple of seconds, the display will show the software revision, for example 8.18. Continue to hold the magnet by the face.
6. After one second of showing the sofware revision, the display will show "C 1-3", "C 1-4" or "C 1-6" indicating the current mode that the display is set for (the "C" means "current"). Continue to hold the magnet by the face.
7. After 3 seconds of showing the current mode, the display will show "P 1-3" for 3 seconds, then it will show "P 1-6" for three seconds, then it will show "P 1-4" for three seconds (the "P" means "program"). Removing the magnet during the time that "P 1-3" is shown will program the mode at 1/3", removing the magnet during the time that "P 1-6" is shown will program the mode at 1/6", and removing the magnet during the time that "P 1-4" is shown will program the mode at 1/4". To confirm that the new mode has been stored in memory, the display will show "Stor" for one second after removing the magnet. (Some early models may not show the P1-4 mode; in this case use the P1-6 mode if a ¼" resolution bar is being used. Also, some early models may not show step 5 or step 8).

8. If the magnet is held in place the software revision number, which is useful for checking the generation of display will be shown again. Remove the magnet to resume normal operation. Removing the magnet at any time other than when "P 1-X" is shown will result in no change to the mode.
9. Double check the mode by holding the magnet in place until "C 1-X" is shown, and then immediately remove the magnet.

Program the 808-P2 gauge display into inches:

1. Turn on the programmer.
2. Make sure the inch mode is correct.
3. Select a memory location with **MEM LOC**.
4. Press the **INCH MEM** (SHIFT – 1) button to put inches into the memory. If the inches are already in memory from a previous calibration, it is not necessary to do it again, but make sure that they are the correct inches (1/3 or 1/6).
5. To program the alarm points, determine the level that they should be set at and whether they should be start up or shut down. The start up mode turns the alarm on as the tank level rises past the alarm point (i.e., the alarm is on at the top of the tank, and off at the bottom). The shut down mode turns the alarm off as the tank level rises past the alarm point (i.e., the alarm is on at the bottom of the tank, and off at the top).
6. If the automatic alarm (the purple wire) is to be used, program Alarm 4 as shut down at the point where the horn is to come on, and program Alarm 3 as shut down a few inches above where the float will sit at the bottom of the tank. The automatic alarm is a special output so that even though Alarm 4 is programmed as shut down, the horn will be turned on when the level rises above the Alarm 4 point, and then will turn off when the alarm is silenced. When the fluid level goes below the Alarm 3 point, the alarm will be re-armed so it will sound the next time the level goes above Alarm 4.
7. To set Alarm 1, use the **INCHES** buttons to obtain the desired set point on the CALIBRATION display, and then press the **ALARM SHUT DN** or **SHIFT-ALARM ST UP** button followed by the **1** button. When the operation is complete, repeat this procedure for the other alarms, pressing **2**, **3**, and then **4** after the **ALARM** button. If an alarm is not used it does not need to be programmed.

8. Make sure that the fibre from the sender bar is connected to the gauge display, and plug the programmer plug into the gauge display. Press the BAR button. The **INCHES** display should show some inch reading, if it shows "no L" or "bAd L' check the fibre connection and the bar mode (1/3 or 1/6 inch).

> ⚠ **NOTE:** The black fibre optic cable connector MUST be shaded from direct sunlight. See the information in the Description of Keypad Buttons section for further information.

9. Measure the distance from the bottom of the tank to the middle of the float, this is the bottom reading. Use the **OFFSET** buttons to obtain this reading on the CALIBRATION display. **NOTE**: The calibration offset is carried over when memory locations are changed.
10. Press the **PROG** button to transfer the calibration to the gauge.
11. When the operation is complete, unplug the programmer from the gauge and verify gauge operation.

Copy one 808-P2 gauge display to another (can also copy from an 808PA, 810P2, or an 810PS/810PS2):

1. Turn on the programmer.
2. Make sure the inch mode is correct.
3. Select a memory location with **MEM LOC**.
4. Plug the programmer plug into the gauge display to be copied from. Press the **COPY** button to copy the gauge calibration into memory.
5. When the operation is complete, unplug the programmer plug from the first gauge and plug it into the gauge display to be copied to. Press the **PROG** button to transfer the calibration to the second gauge.
6. When the operation is complete, unplug the programmer from the gauge and verify gauge operation.

Program an 808-P2 gauge display from a table of calibration values:

1. Obtain a table of inches versus volume
2. Turn on the programmer.
3. Make sure the inch mode is correct.
4. Select a memory location with **MEM LOC**.
5. Press the **CLEAR MEM** button to erase any previous calibration.

6. Starting at the 0 inch value of volume calibration, use the **0** to **9**, decimal, **E**, **F**, **L**, U, or **BL** buttons on the keypad to enter the calibration. Press the **ENTER** button to store the value in memory. When ENTER is pressed, the inches will go to the next value. If you make a mistake, use the **BACK** button to erase the entry, or if **ENTER** has already been pressed, use **INCHES** ↓ to go back to that inch value and re-enter the correct value. If more than 4 numbers are entered the previous ones will scroll off the left of the display. If **ENTER** is pressed before any numbers, nothing will happen.
7. After the table has been entered, use the **INCHES** buttons to review the table to make sure it is correct. If a calibration value is incorrect, simply re-enter it and press **ENTER**.
8. Continue with the same procedure as in Program the gauge display into inches from step 5. When setting the bottom reading, use the calibration table to look up the volume corresponding to the distance to the middle of the float. Use the **OFFSET** buttons to obtain this reading on the CALIBRATION display.

CHAPTER 9 - TROUBLESHOOTING GUIDE

There are only 4 serviceable components in the gauge: the float, the sender bar, the interconnecting fiber optic cable, and the display.

If the float is sunk, the display will read the bottom tank reading all the time. If the float is partially sunk, the reading may rise and then fall as the tank is filled. If the float has lost its magnets, the reading on the display will stay the same as the fluid level changes, or the reading may appear to stick at one value then suddenly jump to a much different value.

If the fiber is damaged or the sender bar is dead, the display will read "no L" on the display. If the light level is poor due to a damaged or excessively bent fiber, or if the fiber is not fully inserted, or if the display is not programmed for the same resolution as the sender, the display will show "bL:xx", where xx is the number of bits being received. If the fiber optic cable is disconnected from the display, a flashing red light should be visible from the end of the fiber.

If the display reads erratically, check for water inside the head or display, and for a poor end cap seal. If no problem can be seen, the display will require factory servicing.

To test a sender bar:

1. Make sure the sender is flashing about once a second from the optical connector. If it is not, the sender is dead and must be replaced.
2. If the sender is flashing, plug a piece of fiber into the sender optical connector and the other end of the fiber into the **OPTICAL INPUT** on the 817-USB Truck Gauge Programmer. The top left display shows the number of bits the bar is sending and the optical power. If the optical power is poor (less than 70), then check the fiber, if it is good and fully inserted then the bar output is defective and the bar must be replaced. Ensure that the number of bits is correct (1/3" is 8 bits and 1/6" is 11 bits). If the number of bits is not 8 or 11 then the bar is defective and must be replaced.
3. Press and hold for one second the **BAR TEST** button to put the programmer into the bar test mode. Verify the programmer is in the same mode as the bar being tested. The inch display will now show what the bar is putting out. Slowly run a float up the bar while watching the inch display to verify bar operation. If the bar does not operate correctly then it must be replaced. To return the programmer to normal operation press the **BACK** button.

4. If a programmer is not available, a quick test can be made of the bar by jumpering the two top pins on the programming plug in the display. This converts the display into reading raw inches only, the calibration is ignored. Run the float up and down on the bar to see if the inches change in a consistent manner. The bar should read around 80 to 85 inches when the float is near the top. The bottom reading will vary depending on the length of the bar.

> ⚠ **NOTE:** If the programmer or display is being used to test a bar outside in bright sunlight, the sunlight may penetrate right through the black **OPTICAL INPUT** housing and overwhelm the optical input. If this happens the programmer will appear to not respond to pressing the **BAR** or **BAR TEST** button. It will be necessary to shade the connector with your hand to ensure proper operation.

To test a display:

1. The display should show "no L" with no fiber connected. Note that if the optical connector on the display is exposed to ambient light the display may read "bd L" or "Sun". If neither of these is the case then the display is defective and must be replaced. Note that it is possible for the display to "hang up" and freeze its display if it is exposed to excessive static shock or strong radio signals. If this is the case it should automatically reset itself within a few seconds.
2. Press the appropriate mode button to match what the display should be. Plug a piece of fiber from the **OPTICAL OUTPUT** of the 817 Truck Gauge Programmer to the optical connector on the display. If the display shows "no L" then it is defective and must be replaced (make sure the end of the fiber going into the display is flashing!). If the display shows "bd L" then it may be in the wrong mode. Reprogram the mode according to the instructions in the programming section. If it does not respond then it is defective and must be replaced.
3. If the display shows some strange reading when the fiber is plugged in, it may need reprogramming. Copy the existing programming into an unused memory on the 817-USB (just in case) and then program the display in inches or a known good program. The display should show "prog" within a couple of seconds of plugging in the 817 plug, if not it is defective. After the 817-USB plug is removed the display should match the reading on the 817-USB calibration display, if it does not then the display is defective.

4. If only the alarms do not work then copy the calibration into the 817-USB to check if the points are programmed. If they are then connect a fiber from the 817-USB **OPTICAL OUTPUT** to the display optical connector. Connect the positive terminal of an ohm meter to the alarm wire, and the negative terminal of the ohm meter to the ground (green) wire. Use the inch up/down buttons on the 817 to run the display up to test the alarms. If the purple wire is being tested then make sure that **A2**, **A3** and **A4** are correctly programmed and run the display from below **A3** to make sure that previous bypassing is cleared.

Troubleshooting block diagrams are available on our website, www.garnetinstruments.com

CHAPTER 10 - SPECIFICATIONS

810-X SENDER BAR	
Resolution	8 mm (⅓")
Accuracy	+/- 6 mm (+/- ¼")
Bar construction	316 stainless steel seamless tube Enclosure: PBT plastic, lid is polycarbonate
Enclosure material	PBT plastic Lid: polycarbonate
Maximum tank height	Tank height up to 221 cm (87")
Battery power	Powered by a lithium battery with a lifetime of approximately 10 years
Product temperature range	-40°C to +90°C (-40°F to +194°F)
Float material	Medium density polyethylene. Stainless steel float available (optional upgrade).
Float size	Cylindrical, 216 mm (8 ½") in diameter, 89 mm (3 ½") high.
Float buoyancy	Sinks 25 mm (1") in water.

DISPLAY	
Material	Enclosure: PBT plastic Lid: polycarbonate
Size	Enclosure size: 152 mm (6") diameter, 67 mm (2 ⅝") deep.
Display type	Wide temperature LCD, 4 digit, 7 segment
Display size	12.7 mm (½") high digits
External power	Light behind the LCD is powered by 12 Vdc truck power
Battery power	Powered by a lithium battery with a lifetime of approximately 10 years
Temperature range	-40°C to +60°C (-40°F to +140°F) ambient

CHAPTER 11 - SERVICE & WARRANTY INFORMATION

The warranty will only apply if the warranty has been registered online from the Garnet Instruments registration web page.

Go online to /support.com/ and select "Register Warranty".

DISCLAIMER OF WARRANTY ON HARDWARE

Garnet Instruments warrants equipment manufactured by Garnet to be free from defects in material and workmanship under normal use and service for a period of three years from the date of sale from Garnet or an Authorized Dealer. The warranty period will start from the date of purchase or installation as indicated on the warranty card. Under these warranties, Garnet shall be responsible only for actual loss or damage suffered and then only to the extent of Garnet's invoiced price of the product. Garnet shall not be liable in any case for labor charges for indirect, special, or consequential damages. Garnet shall not be liable in any case for the removal and/or reinstallation of defective Garnet equipment. These warranties shall not apply to any defects or other damages to any Garnet equipment that has been altered or tampered with by anyone other than Garnet factory representatives. In all cases, Garnet will warrant only Garnet products which are being used for applications acceptable to Garnet and within the technical specifications of the particular product. In addition, Garnet will warrant only those products which have been installed and maintained according to Garnet factory specifications.

LIMITATION ON WARRANTIES

These warranties are the only warranties, expressed or implied, upon which products are sold by Garnet and Garnet makes no warranty of merchantability or fitness for any particular purpose in respect to the products sold. Garnet products or parts thereof assumed to be defective by the purchaser within the stipulated warranty period should be returned to the seller, local distributor, or directly to Garnet for evaluation and service. Whenever direct factory evaluation, service or replacement is necessary, the customer must first, by either letter or phone, obtain a Returned Material Authorization (RMA) from Garnet Instruments directly. No material may be returned to Garnet without an RMA number assigned to it or without proper factory authorization. Any returns must be returned freight prepaid to: Garnet Instruments, 286 Kaska Road, Sherwood Park, Alberta, T8A 4G7. Returned warranted items will be repaired or replaced at the discretion of Garnet Instruments. Any Garnet items under the Garnet Warranty Policy that are deemed irreparable by Garnet Instruments will be replaced at no charge or a credit will be issued for that item subject to the customer's request.

If you do have a warranty claim or if the equipment needs to be serviced, contact the installation dealer. If you do need to contact Garnet, we can be reached as follows:

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Garnet Instruments
286 Kaska Road
Sherwood Park, AB T8A 4G7
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