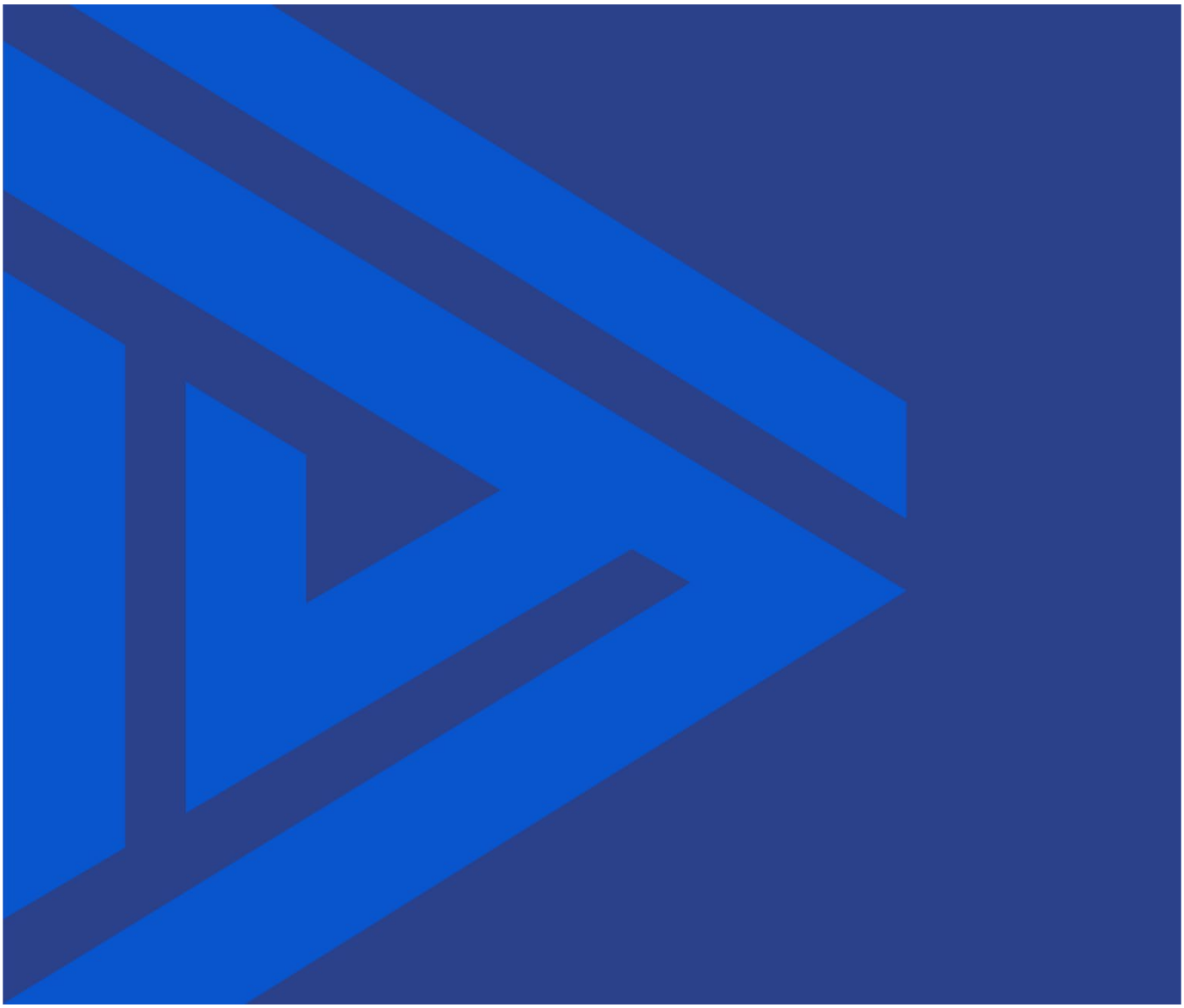
Pressure Series

Installation, Operation, and Maintenance Manual



Delta Controls
CORPORATION

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28 June 2021

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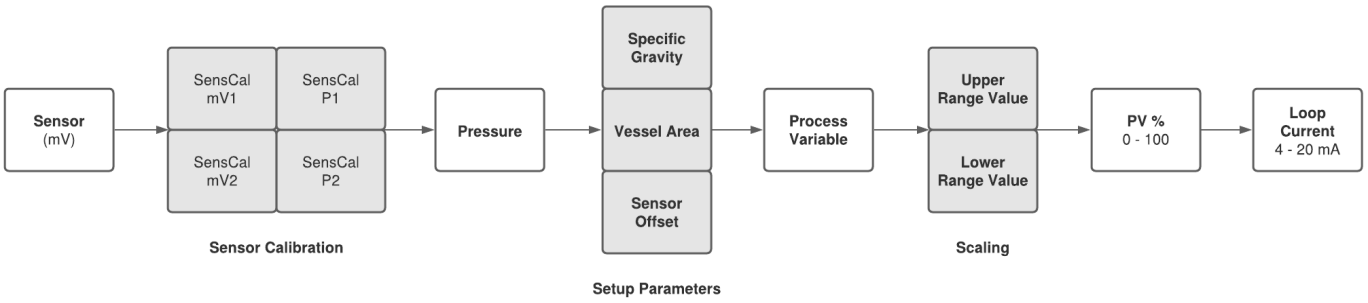
Delta Controls Corporation
Series 500 Pressure/Level Transmitter

DESCRIPTION

The Series 500 is a line of two-wire pressure transmitters designed to measure the pressure of liquids and gases. When connected to a pipeline, tank, vessel, duct, etc., the transmitter generates a 4–20 mA signal proportional to the pressure applied to its sensor. The two-wire operation allows both signal and power to be supplied on a single wire pair by varying the loop current with changes in applied pressure. Two-wire transmitters are insensitive to variations in supply voltage and loop resistance. They are also generally insensitive to electrical noise from motors, relays, switches, and industrial equipment.

THEORY OF OPERATION

A silicon diaphragm is doped to produce a strain gauge bridge. The pressure to be sensed is applied to one side of this silicon diaphragm. This causes the diaphragm to flex a minute amount, which creates a resistive unbalance in the bridge. This change, which is linearly proportional to the amount of pressure applied, creates a millivolt signal that is sensed by an electronics network. The millivolt signal is scaled using stored calibration parameters to produce a process variable, which may represent pressure, level, or volume. The process variable is then scaled using stored upper and lower range values to create a process variable representation between 0 percent to 100 percent. The percent value is then scaled to a 4–20 mA loop current.



Pressure or Level Transmitter Operation

Pressure Reference

Measured pressures can be referenced to almost any other pressure, including absolute zero (which is equivalent to a hard vacuum). Most pressure measurements are made in the presence of the earth's atmospheric pressure, and it is therefore convenient to use this pressure as a benchmark reference point. This pressure, which is due to the weight of the air pushing down on a given point, measures about 14.7 pounds per square inch (psi) at sea level and seldom varies more than 0.5 psi.

Gauge Pressure: These measurements are referenced to atmospheric pressure. The 4–20 mADC signal is proportional to the difference between the sensed pressure and atmospheric pressure.

Absolute Pressure: These ranges are referenced to absolute zero which is the equivalent of a hard vacuum. They are unaffected by variations in atmospheric pressure.

Using Pressure to Measure Liquid Level, Volume, or Mass

The difference in pressure between the surface of a liquid and a submerged point at the bottom of the vessel is directly proportional to the density of the liquid and the depth of the liquid. If the density of the liquid remains constant, the pressure at the bottom of a vessel provides an accurate indication of the level of liquid in the vessel. If the density of the liquid increases, and the level remains constant, then the pressure at the bottom of the vessel will increase proportionally to the increase in density.

The front of the sensor is exposed to the pressure at the bottom of the tank. The back of the sensor is exposed to atmospheric pressure. If the container is open, then the upper surface of the liquid is also exposed to atmospheric pressure. The net pressure sensed is only due to the height of liquid in the tank.

Some vented tanks have a vent trap to prevent release of vapors from the tank. These traps create a varying difference in pressure between the inside of the tank and the atmosphere. This difference is measured by the sensor and results in a measurement error.

If the specific gravity (SG) is known, the pressure can be converted to level where Kp is a unit conversion factor.

$$\text{Level} = \frac{\text{Pressure}}{\text{SG}} \cdot \text{Kp}$$

Additionally, for tanks with vertical walls, if the surface area of the liquid surface is known, the Volume and Mass can be calculated:

$$\text{Volume} = \frac{\text{Pressure}}{\text{SG}} \cdot \text{Area} \cdot \text{Kv} \qquad \text{Mass} = \text{Pressure} \cdot \text{Area} \cdot \text{Km}$$

Where Kv and Km are unit conversion factors.

PLEASE NOTE: Series 500 transmitters feature an integrated second channel measuring the pressure sensor bridge resistance and can be used to determine sensor temperature. Only units supplied with the 'TI' option are factory calibrated to provide meaningful temperature data.

INSTALLATION

- The following instructions pertain to all Series 500 transmitters. Check the Appendix for any model-specific instructions for your transmitter.
- Provide a mounting and hook-up arrangement in accordance with good instrument practice.
- Do not poke your finger or other objects into the sensing end of the transducer. The sensing element is sensitive, and the force of a finger or other objects pushing against the face of the sensor can damage it.
- Do not drop or bang the transducer. The sensing element can be damaged by sudden high 'G' shocks.
- Do not install the transmitter in locations where it can exceed its proof pressure rating. Exceeding the proof pressure of the transmitter can cause permanent damage to the sensor.
- The sensor face should be positioned away from inlet pipes, drains, etc. A flow of liquid across or against the face of the transmitter can change the pressure that is sensed and result in transmitted signal errors.
- If sedimentation is expected in an application, then install the sensor face above the level of sedimentation. Note that the transmitter will not sense the liquid level changes occurring below the transmitter sensing face.
- Conduit seals are required within 18 inches of an explosion-proof housing to prevent explosion migration. Conduit seals are still recommended for nonhazardous installations to prevent condensed water from running down the conduit and submerging the electronics module.

Vent Tube

The 500 series transmitters (ranges G1 to G8) have a vent tube built into the body of the unit. This tube connects atmospheric pressure to the back of the sensor, causing it to be the operational transmitter's reference. Be careful not to block this vent or allow it to become crimped. If the vent tube terminates inside a conduit, the conduit must not be sealed against changes in atmospheric pressure. If the housing is remoted and the process being measured is significantly colder than the ambient temperature, care should be taken that moisture does not condense in the vent tube. Such condensation can cause measurement errors. It is extremely difficult to remove the water from a vent tube once it has accumulated. It is best to provide some form of protection to prevent water condensation. Condensation protection consists of placing a desiccant bottle or an isolation bladder on the vent tube. These items are available from Delta Controls.

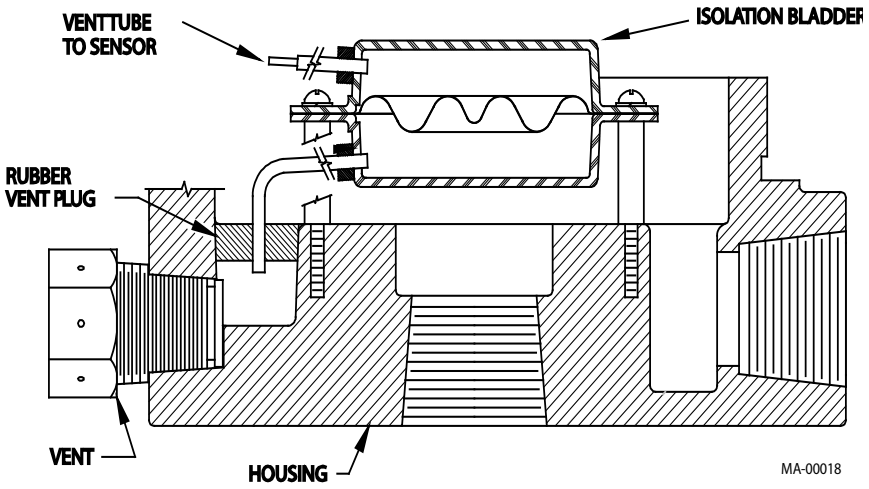
Seal Test Tube

The Model 591 has a seal test tube built into the cable (smaller than the vent tube). This tube allows users to verify body seal integrity when performing calibration, tests, or field repairs. The seal test tube is typically plugged at the top and only opened during testing of seal integrity. Care should be taken not to block the seal test tube at the body end of the cable, as this will cause false results during the seal test procedure.

Isolation Bladder Option

An Isolation Bladder uses a thin rubber diaphragm to transmit changes in atmospheric pressure to the back of the pressure sensor element while sealing out moisture and dust. The diaphragm moves as required to keep the pressure in the vent reference the same as the atmospheric pressure, yet the rubber barrier stops water vapor. It has the advantage of requiring no periodic maintenance, as does a desiccant dryer.

The isolation bladder is used by connecting the vent tube of the pressure sensor to one port of the bladder. The other port is connected to a tube running to the outside of the enclosure.



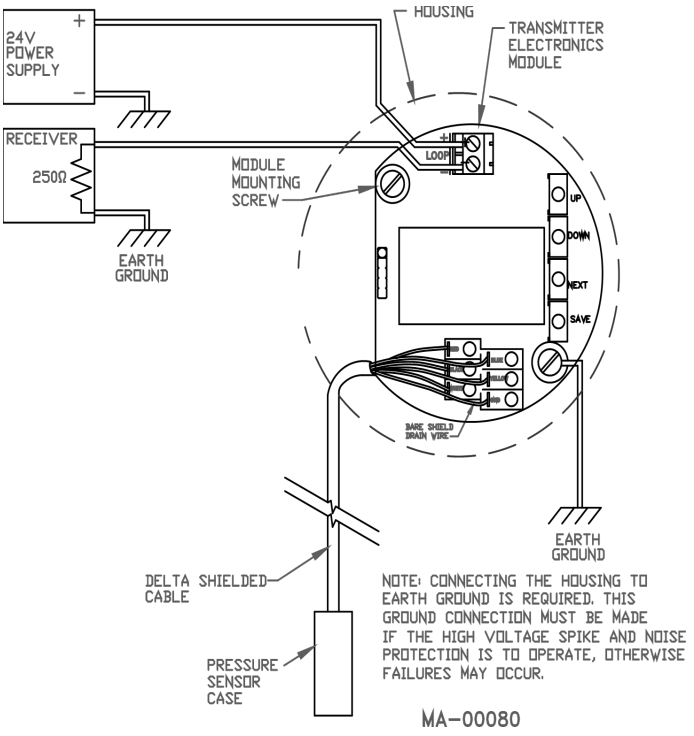
Optional Isolation Bladder Installed in Base of Electrical Housing

PLEASE NOTE: The higher range pressure sensors do not feature a vent since the error-causing changes in the atmospheric pressure are insignificant compared with the lower pressure ranges.

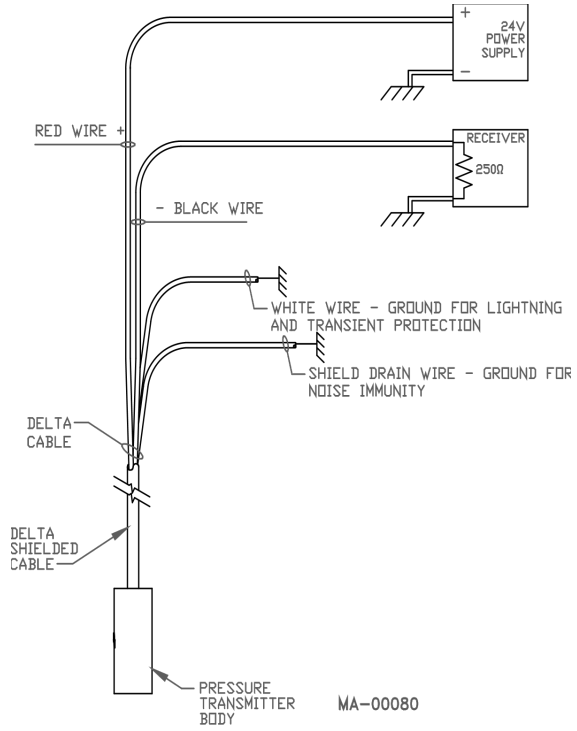
Electrical Connections

Electrical connections and wiring should be made in accordance with the National Electrical or other governing code. The transmitter is designed for two-wire, 4–20 mADC operation. A typical connection for models 552, 562, 563, 566, 572, and 592 is shown in the figure below.

Ensure that the proper polarity of the connections is observed. Because the model transmitter contains reverse polarity protection circuitry, reverse connections will not usually cause damage to the unit but will prevent proper operation.



WIRING DIAGRAM (Models 552, 562,563, 566, 572, 592)



WIRING DIAGRAM (Models 551, 565, 571, 591)

Grounding

For best results, the body/housing of the transmitter must be connected to a suitable earth ground. This usually is automatically accomplished by installing in a grounded tank, sump, or pipe. One point in the output current loop must also be grounded. This will reduce electrical noise that may create errors in the transmitter electronics. Note that the body of the transmitter is electrically isolated from the electronics. Grounding the instrument housing provides considerable protection against electrical noise, power surges, voltage spikes, and other power transients.

OPERATING THE 500 SERIES TRANSMITTER

Using the Internal Buttons and LCD Display

(Models 552, 562, 563, 566, 572, 592)

The Series 500 module user interface consists of an LCD display and four setup pushbuttons. The temperature characteristics of the display are such that it should only be calibrated when the ambient temperature is between 30 °F to 125 °F (0 °C to 50 °C). Beyond this temperature range, the transmitter will operate properly, but the display may be difficult to read.

Pushbutton	Purpose
SAVE	Pressing the SAVE button saves all calibration values. The display will indicate 'SAVING' to verify that the values are being saved.
UP	Pressing this button causes the value displayed to be decremented. Holding the button down causes the value to continue downward at an ever-increasing rate.
DOWN	Pressing this button causes the value displayed to be incremented. Holding the button down causes the value to continue upward at an ever-increasing rate.
NEXT	Pressing this button shifts the display to the next setup parameter.

Unlocking

To prevent accidental changes to the setup of the device, the device must be unlocked before any changes are made. Attempts to change a parameter while the unit is locked will cause 'LOCKED' to show up on the display.

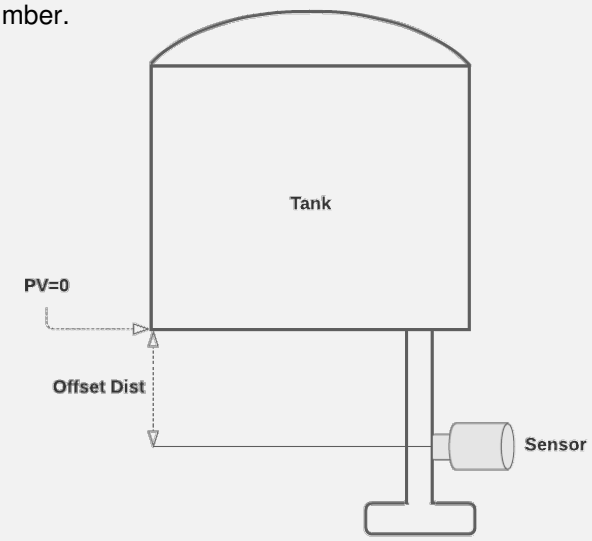
To unlock the unit, press and hold the NEXT button. While holding NEXT, press and release the DOWN button, then release the NEXT Button. The Lock will re-engage after one minute of button inactivity.

Setup Parameters

Access a parameter by pressing the NEXT button until the desired parameter is displayed.

Modify a selected parameter by first unlocking the unit as described above, then pressing the UP or DOWN button until the desired value is displayed. Press SAVE to save changes.

Parameter	Description
PV	*Process Variable* - For general pressure applications, this is the pressure. For level applications, this is the level, volume, or other units derived from pressure.
Loop mA	The current in milliamperes being sent by the transmitter.
Loop %	The current being sent by the transmitter as a percentage, where 0% represents 4 mA and 100% represents 20 mA.
Pressure	The measured pressure.
LRV 4 mA =	*Lower Range Value* - The process variable value corresponding to 4 mA.
URV 20 mA =	*Upper Range Value* - The process variable corresponding to 20 mA.
Press Units	*Units of measure for pressure*. Select from: psi – pounds per square inch bar – bar mbar – millibar kg/cm^2 – kilograms per square centimeter Pa – pascals kPa – kilopascals
Length Units	*Units of measure for level and length*. Choose from: ft – feet in – inches m – meters cm – centimeters mm – millimeters
Vol Units	*Units of measure for volume*. Choose from: gal – gallons l – liters m^3 – cubic meters yd^3 – cubic yards ft^3 – cubic feet in^3 – cubic inches
Mass Units	*Units of measure for mass*. Select from: kg – kilograms lb – pounds
PV Units	*Units of measure for the Process Variable*. Select from any of the Pressure, Length, Volume, or Mass units above.

Spec Grav	*Specific gravity* of the material being measured. This is used to convert from pressure to level, volume, or mass. If the PV is to be output in pressure units, this parameter can be disregarded.
Vessel Area	*Vessel Area* - the horizontal cross-sectional area of the tank or vessel. This is used to convert from level to volume or mass. If the PV is to be output in level or pressure units, this parameter can be disregarded.
Offset Dist	*Offset Dist* - the distance from the level of the sensor to the level corresponding to PV = 0. If the sensor is located below the PV = 0 point, enter the Offset Distance as a negative number. 

!	**PLEASE NOTE:** The following parameters can be accessed by pressing and holding the NEXT button while pressing and releasing the UP button, then releasing the NEXT button.
Version	Software revision number
ALRM ACTN	Programs the loop current behavior when internal diagnostics find a fault. 0 = drive high (above 22 mA), 1 = drive low (below 3.5 mA), 2 = hold last value, 3 = ignore fault.
HART® ADDR	This is the HART® address used to respond to HART® command 0.
LOOP CNTRL	Programs the loop current behavior under normal operation. 0 = Loop current follows process variable, 1 = Loop current fixed at 4 mA (used for multidrop HART®),

	2 = loop fixed; current can be manually set by adjusting the Loop mA parameter. Note that LOOP CNTRL = 2 is used for testing only and reverts back to 0 on device reset or cycling power.
DAMPING	The measurement time constant in seconds. Higher numbers provide more smoothing.
4 mA TRIM	The value used to trim the 4 mA value.
20 mA TRIM	The value used to trim the 20 mA value
SensCal P1	*Sensor Calibration point #1* - Enter a known value of pressure or level, typically zero or near the bottom of the measurement range, to calibrate the pressure sensor.
SensCal P2	*Sensor Calibration point #2* - Enter a known value of pressure or level, typically at or near full scale, to calibrate the pressure sensor.
Bridge kOhm	Used for troubleshooting, this value indicates the resistance of the pressure sensor bridge as measured from the Black wire to the White/Yellow shorted pair. The value should normally be between 2.2 kΩ and 3.5 kΩ. Numbers outside this range could indicate an open or shorted wire or a damaged pressure sensor.
MEM CMD	For factory use.

Initial Setup

To set up the instrument, use the following steps to enter or verify the parameters necessary for proper operation.

1. Select the desired units of measure for Pressure
2. Select the desired units of measure for Length. If the Process Variable (PV) is to be in pressure units, this selection can be disregarded.
3. Select the desired units of measure for Volume. If the PV is to be in pressure or length (level) units, this selection can be disregarded.
4. Select the desired units of measure for Mass. If the PV is to be in pressure, length, or volume units, this selection can be disregarded.
5. Select the units of measure for the Process Variable. This can be units of pressure, level (Length units), volume, or mass.
6. Enter the specific gravity of the measured which is typically 1.0 for water.
7. Enter the Tank Area. This is the area of the liquid surface in the tank. For example, a 36-inch diameter vertical cylindrical tank would have an area of:
   Area= πr^2 Area= π 182 = 1017.9 in^2
8. The units of measure are those chosen for length. For example, if ‘feet’ is selected as the length unit, enter the area in square feet. If the PV is to be output in level or pressure units, this parameter can be disregarded.
9. Enter the Offset Distance.
1. Enter the Lower Range Value. This is the PV value corresponding to 4 mA or 0%

10. Enter the Upper Range Value. This is the PV value corresponding to 2 mA or 100%
11. Press SAVE to ensure all selections are saved.

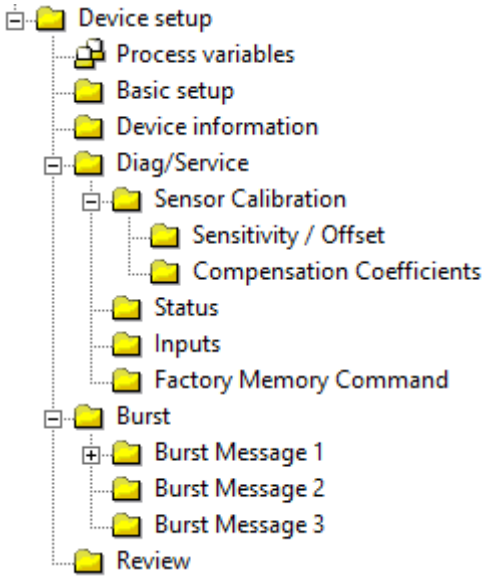
Sensor Calibration

2. Press and hold NEXT. While holding NEXT, press and release UP, then release NEXT. The unit should show the current software version.
3. Press and release NEXT until the display shows ‘SensCal P1’.
4. Apply a known pressure near zero-scale, typically zero, to the sensor.
5. Press the UP or DOWN buttons until the display shows the known pressure.
6. Press SAVE. The unit will read the current pressure value and assign the calibration value to that pressure.
7. Press the NEXT Button. The unit should show ‘SensCal P2’.
8. Apply a known pressure near full-scale to the sensor. For best results, this second calibration level should be as far separated from the first calibration point as possible.
9. Press the UP or DOWN buttons until the display shows the known pressure.
10. Press SAVE. The unit will read the current pressure value and assign the calibration value to that pressure.
11. Sensor calibration is complete.

OPERATING THE 500 SERIES TRANSMITTER WITH A HART® COMMUNICATOR

Complete control of all transmitter operating parameters are accessible through the use of a HART® communicator. HART® Device Definition files are available on the Delta Controls website, www.deltacnt.com. See document 00-50035 for complete field device specifications.

Hart® Menus and Data



Device Setup Menu

Process Variables Menu	
Value	**Description**
PV	The process variable being transmitted.
PV loop current	The current in mA being transmitted.
PV %rnge	The process variable being transmitted as a number between 0% to 100%.
PV URV	*Process Variable Upper Range Value* - the PV value corresponding to 20 mA. Shown on this menu for indication only – use the Basic Setup menu to change this value.
PV LRV	Process Variable Lower Range Value - the PV value corresponding to 4 mA. Shown on this menu for indication only – use the Basic Setup menu to change this value.
PV PDQ	Data quality of the measured value.
Pressure	The measured pressure.
Sensor Error	Displayed when a damaged sensor or sensor wiring problem is detected.
Maintenance Required	Internal diagnostics have detected a problem in the transmitter.
Device Variable Alert	Internal diagnostics have detected a problem that could render the measurement invalid.
Process applied to the primary variable is outside the operating limits of the field device	This alert is typically set during an overpressure or underpressure event.
PV Analog Channel Saturated	The calculated output current is greater than 21 mA or less than 3.9 mA.
PV Analog Channel Fixed	The 4 mA - 20 mA channel is held constant and is not responding to changes in measurement.

Field Device has more status available	HART® ‘more status available’ bit is set.
A reset or self-test of the field device has occurred, or power has been removed and re-applied.	Alert triggered by reset, self-test, or power loss.
Field Device has malfunctioned due to a hardware error or failure	Alert triggered by detected hardware malfunction or failure.

Basic Setup Menu	
Value	**Description**
Process Variable Units	Units of measure for the process variable. Select any Pressure, Length (Level), Mass, or Volume units below.
Pressure Units	Units of measure for pressure. Select psi, bar, mbar, kg/cm^2, Pa, or kPa.
Length Units	Units of measure for length or level. Select ft, m, in, cm, mm.
Mass Units	Units of measure for mass. Select kg or lb.
Volume Units	Units of measure for volume. Select gal, l, cu m, cu yard, cu ft, cu in.
Specific Gravity	*Specific gravity* of the liquid being measured. The specific gravity is the ratio of the density of the liquid to density of water. This value is necessary to convert pressure to level or volume, or mass. If the Process Variable is in units of pressure, this value can be disregarded.
PV URV	*Process Variable Upper Range Value* – this is the value corresponding to 20 mA.
PV LRV	*Process Variable Lower Range Value* – this is the value corresponding to 4 mA.
PV Damp	Measurement damping time constant in seconds.
Loop Current Mode	When enabled, the loop current responds to changes in pressure measurement. When disabled, the loop current is fixed at 4 mA. Set this to 'Disabled' for multidrop applications.
PV Alarm Type	Programs the transmitter behavior when an internal failure is detected such as a disconnected sensor wire or a damaged sensor. > – disregard the error and attempt to output the process variable. > Hi – drive the 4–20 mA output to 22 mA. > Lo – drive the 4–20 mA output to 3.8 mA. > Hold – hold the 4–20 mA output at the last known good reading.
Cross Sectional Area	Surface area of the liquid surface in the vessel. Units of measure are length units squared. This value is necessary to convert pressure to volume or mass. If the Process Variable is in pressure or level units, this value can be disregarded.

Offset	*Offset* - the distance from the level of the sensor to the level corresponding to PV = 0. If the sensor is located below the PV = 0 point, enter the Offset Distance as a negative number.

Device Information	
Value	**Description**
Manufacturer	Delta Controls Corporation
Model	5xx
Universal Rev	HART® Revision
Fld Dev Rev	Field Device Revision
Software Rev	Version of software running on the transmitter
Hardware Rev	Hardware revision of the transmitter
Dev ID	Unique transmitter identifier
Maximum number of device variables	*#*
Number of required preamble characters	*#*
Number of response preamble characters	*#*
Cfg chg count	Number of configuration changes that have occurred
Poll Addr	HART® polling address
Tag	User identifying information
Long Tag	User identifying information
Date	*User date field* - enter with any date desired such as last calibration date or date of installation. This date is for storage only and does not change until updated.

Descriptor	User Identifying information
Message	User information
Final assembly num	User information
Mains Frequency	Select either 50 Hz or 60 Hz, depending on the mains frequency in your country. This is used to optimize the measurement system to reject any electromagnetic interference from nearby AC power sources.

Diag/Service Menu	
Value	**Description**
Sensor Calibration	Menu that provides three ways to calibrate the sensor. The most common method is a 2-point calibration using Sensor Cal Pt1 and Pt2.
Sensor Cal Pt1	Calibrate the sensor by applying a known low pressure (typically zero) and enter that pressure.
Sensor Cal Pt2	Calibrate the sensor by applying a known pressure near the full-scale rating of the sensor and enter that pressure.
Sensitivity/Offset	These would typically be used when replacing a sensor in the field and where a 2-point calibration is not possible. The sensitivity and offset values would be provided with the replacement sensor. These values provide a rough calibration for the sensor. Note that the numbers provided would yield a calibration in pressure units of bar. If desiring other units of measure, the sensitivity number would need to be multiplied by an appropriate conversion factor.
Status	Displays the status values previously described on the process variables menu.
Device Reset	Use to restart the transmitter as if power were removed and reapplied.
Squawk	Use to verify which transmitter in a multidrop installation is being addressed. Causes a rectangle to briefly appear around the LCD display of the unit being squawked. Only applicable to transmitters with an integral LCD display.

Loop Test	Loop test is used to force the 4 mA – 20 mA output to a fixed desired current. The current will return to normal operation following a power failure or device reset.
D/A Trim	Use to calibrate the 4 mA - 20 mA output if a measurement discrepancy is found between the reported current output and the measured current output.
Inputs	Menu used for troubleshooting transmitter malfunctions. The menu reports the raw inputs from the sensor.
Factory Memory Command	Calibration and setup parameters can be saved in a special memory area of the transmitter if they need to be recalled to restore the transmitter to a known condition.
Restore Factory Values	Restore the transmitter to the configuration that was saved.
Save Factory Values	Save the current configuration for later recall.
1st Power on Defaults	Erase the current configuration and the saved configuration and restore the transmitter to pre-configuration factory defaults.
Burst	The transmitter supports 3 standard HART® Burst messages.
Review	Displays a summary of device information.

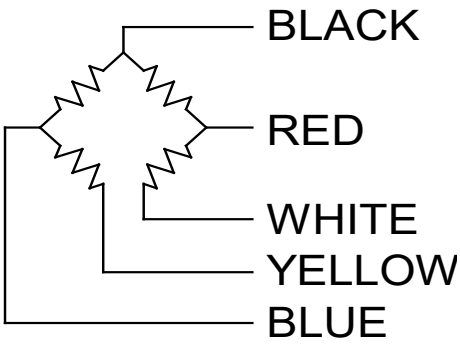
Sensor Calibration Using Hart®

In calibrating the sensor, enter the numbers in whatever units of measure you desire, i.e., bars, kpa, psi, inches of water, etc. The transmitter does not perform any unit conversion and reports the units of measure as 'undefined' in the HART® messages.

1. Navigate to Basic setup -> Diag/Service -> Sensor Calibration -> Sensor Cal Pt 1.
2. For pressure applications, apply a known pressure near zero-scale (typically zero) to the sensor. For level applications, set the level in the vessel to a known position in the tank, preferably at or near the lower end of the measurement range.
3. Enter the applied pressure (usually zero).
4. Navigate to Basic setup -> Diag/Service -> Sensor Calibration -> Sensor Cal Pt 2.
5. For pressure applications, apply a known pressure near full-scale to the sensor. For level applications, set the level in the vessel to a known position in the tank, preferably at or near the upper end of the measurement range. For best results, this second calibration level should be as far removed from the first calibration level as possible.
6. Enter the applied pressure. The unit will read the current pressure value and assign the calibration value to that pressure.
7. Sensor calibration is complete.

Ranging the Transmitter Using Hart®

1. Navigate to Device Setup -> Basic setup -> PV LRV
2. Enter the Process Variable value corresponding to 4 mA in the PV LRV value
3. Enter the Process Variable value corresponding to 20 mA in the PV URV value
4. Send the updates to the unit.



MA-00015

Sensor Schematic
(Models 552, 562, 563, 566, 572, 592)

MAINTENANCE AND REPAIR

If the vent tube is equipped with a desiccant cartridge option, it must be checked periodically. When the desiccant becomes saturated with water, it will change color from blue to pink. The desiccant must then be replaced with fresh desiccant for vent moisture protection to continue. If not replaced, the vent tube may fill with water and cause errors in the measurement output signal. Bladder-type isolators do not require servicing.

Periodic inspections of the sensor and are recommended for preventative maintenance. Cleaning intervals may need to be established depending on the process conditions. Please contact Delta Controls for further information.

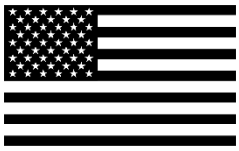
PLEASE NOTE: The higher range pressure sensors do not feature a vent since the error caused changes in the atmospheric pressure are insignificant compared with the lower pressure ranges.

PLEASE NOTE: Do not drop or bang the transducer. The sensor can be damaged by mechanical shock.

For Models 552, 562, 563, 566, 572, 592, if a problem is suspected, disconnect the sensor from the electronics module and check the value of each resistor shown in the sensor schematic. The resistance values should be between 2200 Ohms to 3800 Ohms and should be within one hundred Ohms of each other. If not, replace the defective sensor module and recalibrate the instrument. If the resistances are correct, replace the electronics module and recalibrate the instrument.

BASIC SPECIFICATIONS

Wetted Materials:	316 Stainless Steel and Fluorocarbon Rubber (FKM) basic
Loop Wiring:	2-wire, twisted pair
Sensor Wiring:	5-wire, shielded cable with shield and drain wire
Output Signal:	4 mADC – 20 mADC, Isolated
Supply Power:	13 VDC minimum to 35 VDC maximum
Max Loop OHMS:	550Ω @ 24 VDC; 1100Ω @ 35 VDC
Accuracy:	±0.5% of maximum range
Temperature Effect:	±0.02% per °F from 30 °F to 130 °F
Barometric Effect:	None, fully referenced to atmosphere
Hysteresis:	None measurable
Operating Temperature	
Sensor:	-20 °F to 220 °F
Electronics:	-20 °F to 220 °F
Proof Pressure:	2 times range; 35 psig minimum without damage 3 times range; 1000 psig minimum without rupture
Housing:	Environment proof 4X - PVC or aluminum material Explosion proof 7X - aluminum or stainless steel material



MADE IN THE U.S.A.

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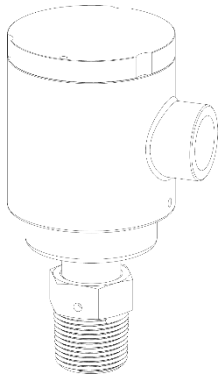
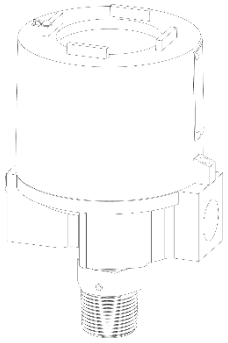
APPENDIX – MODEL SPECIFIC DESCRIPTIONS AND INSTALLATION NOTES



MODEL 551

The Model 551 is a general purpose two-wire pressure transmitter designed to measure the pressure of liquids and gases.

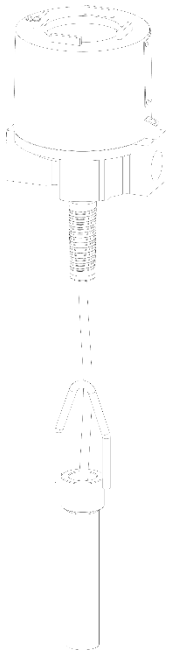
The 551's integral electronics provides a very small profile unit for mounting in places where space is limited.



MODEL 552

The Model 552 is a general purpose two-wire pressure transmitter designed to measure the pressure of liquids and gases.

The electronics module is separately potted and removable. The housing and module are mounted on the head of the sensor body or may be mounted remotely for reasons of convenience, safety, etc. The electronics module provides an LCD and pushbutton user interface.



MODEL 562

The Model 562 is a two-wire pressure transmitter designed to measure liquid level in pump pits, ground storage reservoirs, and tanks.

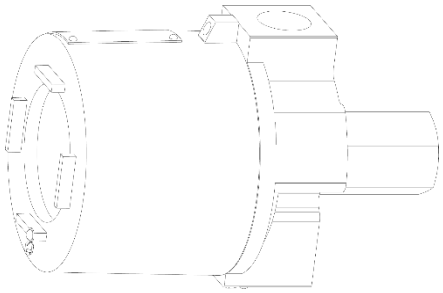
The electronics module is separately potted and removable. The housing and module are mounted on the head of the sensor body or may be mounted remotely for reasons of convenience, safety, etc. The electronics module provides an LCD and pushbutton user interface.

The sensor and isolation diaphragm are inserted down into the liquid or slurry from the top. The diaphragm is mounted flush in a lower body which faces downward and will not be plugged by sludge and sediment. It is held in place by a heavy-duty stem that is normally supported only at the top. This design allows the entire unit to be easily removed for inspection, calibration, etc.

The process connection is built with a 3/4-inch FPT for coupling to the stem pipe. It also has a 3/4-inch MPT nipple for mounting the electronics housing or cable seal-off. Stem pipes are shipped in sections if over 120 inches long. Run the sensor cable through the stem and process connection sections. Assemble the sensor, stem, and

process connection, taking care that the threaded joints do not leak. Use Teflon® tape or other appropriate measures to assure a proper 150-pound rated seal.

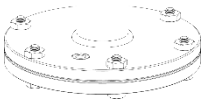
Stem pipes supplied by the customer must have clean cut threads and ends, which are free from burrs. Threads must be properly formed and produce a watertight seal.



MODEL 563

The Model 563 is a side inserted two-wire liquid level or pressure transmitter designed for services where the process liquid contains suspended solids or leaves heavy deposits. Plugging problems are minimized in the 563 by avoiding recesses and cavities in which the solids and deposits can collect. The sensing face of the diaphragm is placed far enough into the tank or vessel so that the solids do not collect or do not become rigid enough to cause measurement errors.

The electronics module is separately potted and removable. The housing and module are mounted on the head of the sensor body or may be mounted remotely for reasons of convenience, safety, etc. The electronics module provides an LCD and pushbutton user interface.



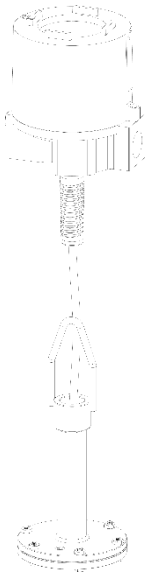
MODEL 565

The Model 565 is designed for use in sewage, wastewater, slurries, ponds, sumps, and tanks. Its primary advantage is that its large smooth rubber diaphragm, utilizing a ‘slack’ design, resists plugging, buildup, abrasion, and corrosion.

The integral electronics provides a very small profile unit for mounting in places where space is at a premium,

The sensor is supported from the top of tanks and pump pits by a rigid 1-inch pipe, or a flexible steel cable or a chain. A 6-inch or larger stilling well should be provided in deep pits if the liquid is agitated, heavily splashed, or has strong flowing currents in it.

The Model 565 is installed by lowering with a cable or mounting to a pipe to the bottom of a tank or pump pit.

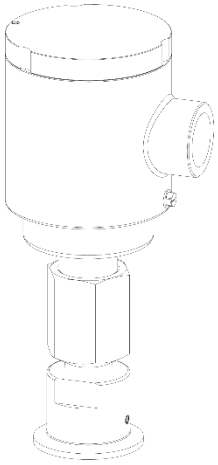


MODEL 566

The Model 566 is a pressure transmitter designed to measure liquid level in tanks, sumps, reservoirs, and pump pits. The sensor is easy to install in open pits, tanks, or stilling wells. The electronics module is separately potted and removable. The housing and module are mounted on the head of the sensor body or may be mounted remotely for reasons of convenience, safety, etc. The electronics module provides an LCD and pushbutton user interface.

The sensor is supported from the top of tanks, basins, and pump pits by a rigid 3/4-inch pipe or a flexible stainless steel cable. A 6-inch or larger stilling well should be provided if the liquid is strongly agitated, heavily splashed, or has strong flowing currents in it.

The Model 566 is installed by lowering it to the bottom of a tank or pit.

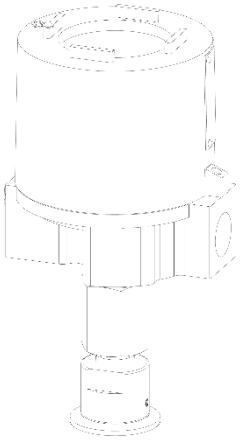


MODEL 571

This sanitary transmitter is intended for service in applications where frequent and thorough cleaning of the system components must be performed.

The integral electronics provides a very small profile unit for mounting in places where space is at a premium,

Note: DO NOT rotate the transmitter housing without holding the stem with a wrench. The stem is held in place by two large set screws. However, it is possible to defeat them with enough torque.



MODEL 572

This sanitary transmitter is intended for service in applications where frequent and thorough cleaning of the system components must be performed.

The electronics module is separately potted and removable. The housing and module are mounted on the head of the sensor body or may be mounted remotely for reasons of convenience, safety, etc. The electronics module provides an LCD and pushbutton user interface.

NOTE: DO NOT rotate the transmitter housing without holding the stem with a wrench. The stem is held in place by two large set screws. However, it is possible to defeat them with enough housing torque.

MODEL 591

The Model 591 is designed for use in wells, ponds, sumps, and tanks. The electronics and calibration adjustments are contained inside the body with the strain gage sensor.

The integral electronics provides a very small profile unit for mounting in places where space is at a premium,

The Model 591 is installed by lowering it to the bottom of a tank or down a well bore.

If the 591 is to be installed in a well with other equipment, such as a pump or other instrumentation, it is recommended that the 591 be installed in a 1-inch pipe mounted in the well bore. If this is not done, the cable can become entangled with wiring, or other down-hole hardware, preventing the 591 from being withdrawn from the well.

MODEL 592

The Model 592 is a pressure transmitter designed to measure liquid level in tanks, wells, reservoirs, and pump pits.

The electronics module is separately potted and removable. The housing and module are mounted on the head of the sensor body or may be mounted remotely for reasons of convenience, safety, etc. The electronics module provides an LCD and pushbutton user interface.

The Model 592 is installed by lowering it to the bottom of a tank or down a well bore.

If the 592 is to be installed in a well with other equipment, such as a pump or other instrumentation, it is recommended that the sensor be installed in a 1-inch pipe mounted in the well bore. If this is not done, the cable or sensor can become entangled with wiring, or other downhole hardware. It may then be difficult to remove the 592 from the well.

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