AUTOMATION PRODUCTS GROUP, INC.

Operator's Manual

LOE-2126
LOE-3136
LOE-6126

Internet Enabled Ultrasonic Sensor

Rev. B, 1/12

Automation Products Group, Inc.
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Warranty and Warranty Restrictions

APG warrants its products to be free from defects of material and workmanship and will, without charge, replace or repair any equipment found defective upon inspection at its factory, provided the equipment has been returned, transportation prepaid, within 24 months from date of shipment from factory.

THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES NOT EXPRESSLY SET FORTH HEREIN, WHETHER EXPRESSED OR IMPLIED BY OPERATION OF LAW OR OTHERWISE INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF
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No representation or warranty, express or implied, made by any sales representative, distributor, or other agent or representative of APG which is not specifically set forth herein shall be binding upon APG. APG shall not be liable for any incidental or consequential damages, losses or expenses directly or indirectly arising from the sale, handling, improper application or use of the goods or from any other cause relating thereto and APG's liability hereunder, in any case, is expressly limited to the repair or replacement (at APG's option) of goods.

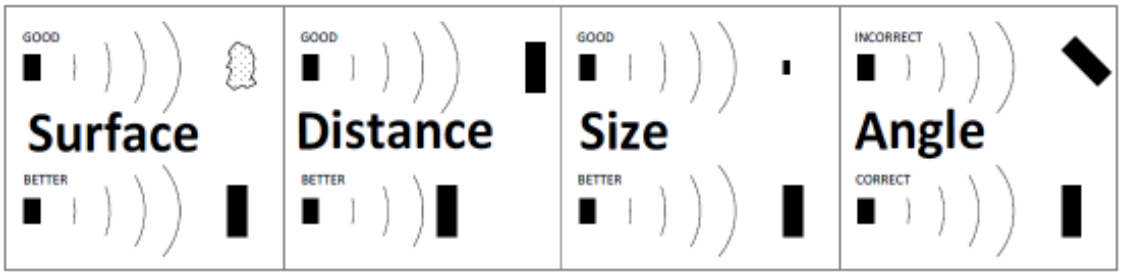
Warranty is specifically at the factory. Any on site service will be provided at the sole expense of the Purchaser at standard field service rates.

All associated equipment must be protected by properly rated electronic/ electrical protection devices. APG shall not be liable for any damage due to improper engineering or installation by the purchaser or third parties. Proper installation, operation and maintenance of the product becomes the responsibility of the user upon receipt of the product.

Returns and allowances must be authorized by APG in advance. APG will assign a Return Material Authorization (RMA) number which must appear on all related papers and the outside of the shipping carton. All returns are subject to the final review by APG. Returns are subject to restocking charges as determined by APG's "Credit Return Policy".

• Understanding Ultrasonics

Ultrasonic sensors use a transducer to transmit bursts of ultrasonic sound waves. Each burst contains a series of pulsed sound waves that emit in the shape of a cone, reflect off the target, and are detected by the sensor. The time required for the sound waves to travel to and from the target is converted into a distance measurement by the sensor. Ultrasonic sensing is affected by several factors including the target surface, distance, size, and angle. The following considerations will help ensure the best possible target conditions.



Surface

The ideal target surface is hard and smooth. This type of surface will reflect a greater amount of signal than a soft or uneven surface. Sound wave absorbent materials, such as granules and powders, will reduce the operating range of the sensor and decrease measurement accuracy.

Distance

Sound wave attenuation increases as the distance traveled increases. Therefore, targets at longer ranges require better reflective characteristics than targets that are closer to the sensor.

Size

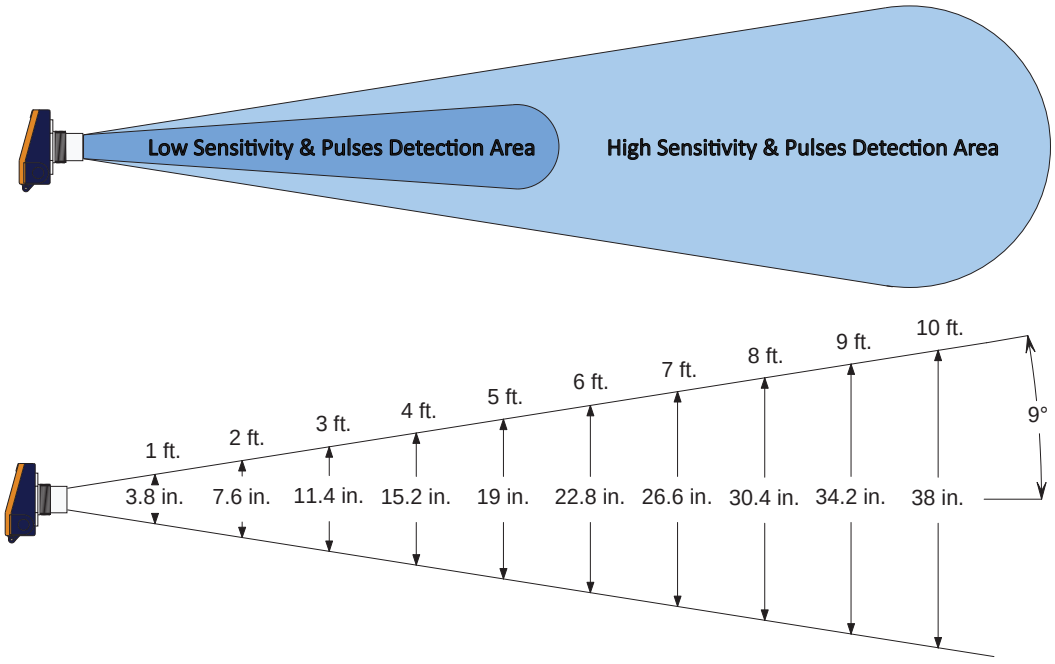
A large object will have a greater surface area to reflect the signal than a smaller one. Therefore, a large target will be detected at a greater distance than a small target. The surface area recognized as the target will generally be the portion closest to the sensor.

Angle

The inclination of the object's surface in relation to the sensor face will affect the strength of the reflected sound waves. Surfaces perpendicular to the sensor will reflect more signal directly back to the sensor. If a surface is more than a few degrees off perpendicular, enough of the signal will be reflected away from the sensor that the target will not be detected. Generally speaking, a target angle greater than 5 degrees off perpendicular will not be detected. The target angle becomes increasingly critical as the distance to the target increases**.**

Environmental Conditions

Temperature, humidity, vapors, dust, and pressure can affect the sensor's performance. APG ultrasonic sensors are designed to compensate for many of these conditions. However, if the conditions are extreme, sensor performance can be degraded enough to require the use of a longer-range sensor than normal conditions would require. Ultrasonic sensors may not be suitable for applications with heavy chemical vapors (such as solvents or gasoline), heavy dust or when significant surface foam is present.



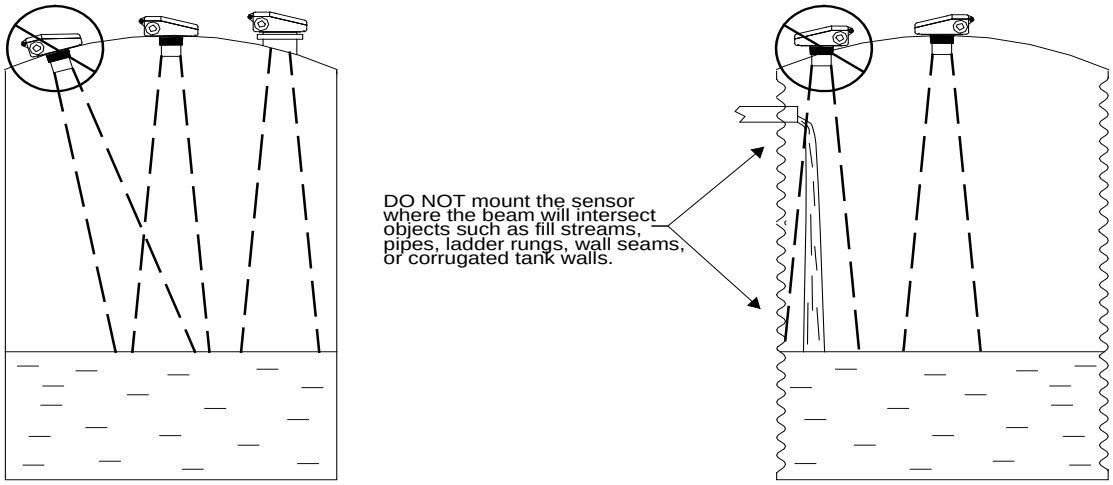
Typical beam spread of an ultrasonic sensor operating at maximum sensitivity setting.

Installation

The LOE must be mounted in a location with an unobstructed column of air to the target. The beam-spread chart on the previous page can be used as a rough guide to determine the required diameter of the air column for ranges of 10 feet or less. A 3 to 4 foot diameter air column is typically sufficient even at the maximum range of the sensor.

The sensor should be mounted to ensure the target does not come closer than the minimum sensing range (blanking distance).

The sensor should be mounted so that the sensor face is perpendicular to the target surface. Even just a few degrees off-perpendicular can cause a loss of echo condition. Proper alignment becomes increasingly important as the range to the target increases.



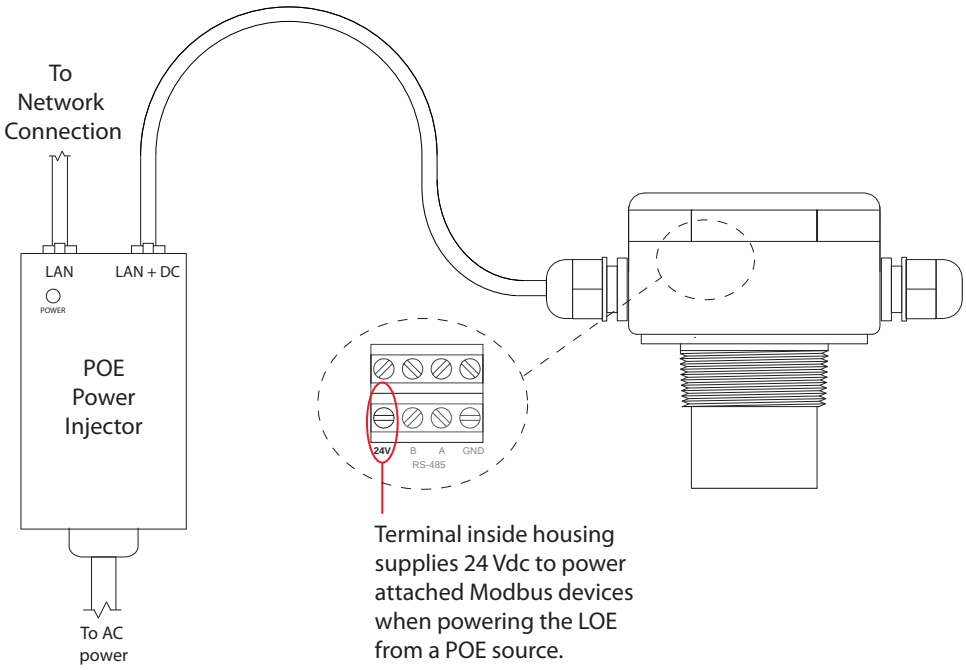
Stand Pipe Mounting

When using a stand pipe to raise the sensor above a tank, use a single seamless piece of pipe to provide the sound waves a smooth path to propagate into the tank. Because the sound waves becomes concentrated along the pipe walls, even small sharp edges, such as seams or burs, can cause errant readings.

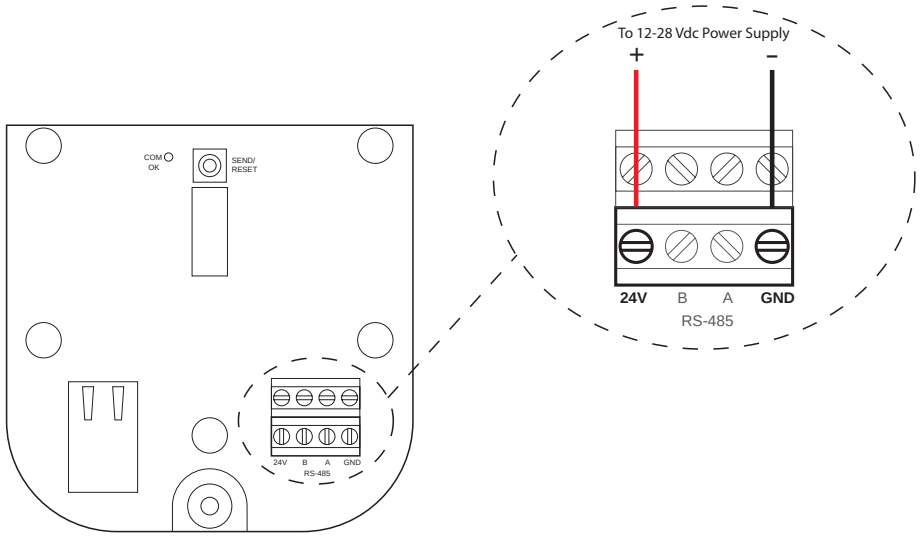
Powering the LOE

The LOE can be powered using a 48 V POE connection or a standard 12-28 Vdc power supply.

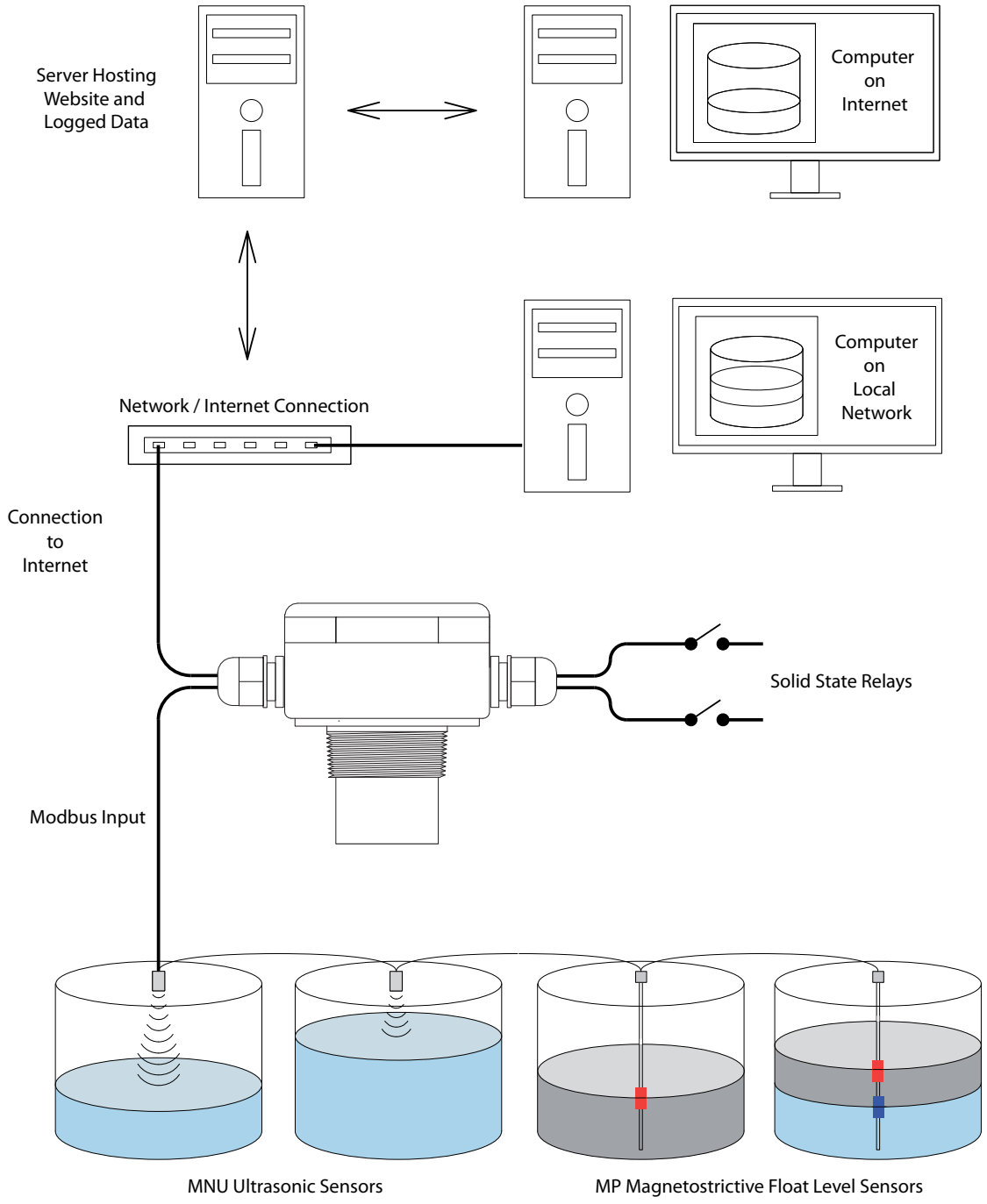
POE Wiring



12-28 Vdc Power Supply Wiring



Extended Network



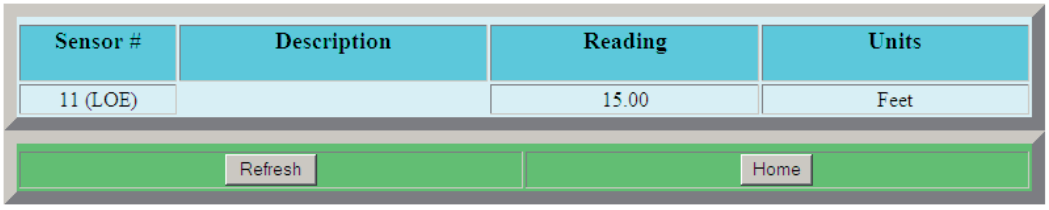
Sensor Setup via DHCP (automatic IP configuration)

Connect the LOE to a network that provides access to the internet, and apply power to the sensor. The COM LED should begin to flash once every 30 seconds, indicating the DHCP is attempting to establish communication with the web site. Once communication is established, the COM LED will illuminated.

NOTE: see Troubleshooting DHCP if COM LED continues to flash from more than 2-3 minutes.

Accessing the Internal Web Pages

To access the sensor's settings, open an Internet browser, and in the address bar enter: **loe_#** where # is the sensor's serial number beginning at the first whole number. For example if the serial number is L000001275, then you would enter **loe_1275** into the browser address bar. The following screen should appear:



NOTE: if typing the **loe_#** does not work, it may indicate the DHCP has saved a previous name for the IP assigned. Power down the sensor and have the System Administrator delete this name from the DHCP server.

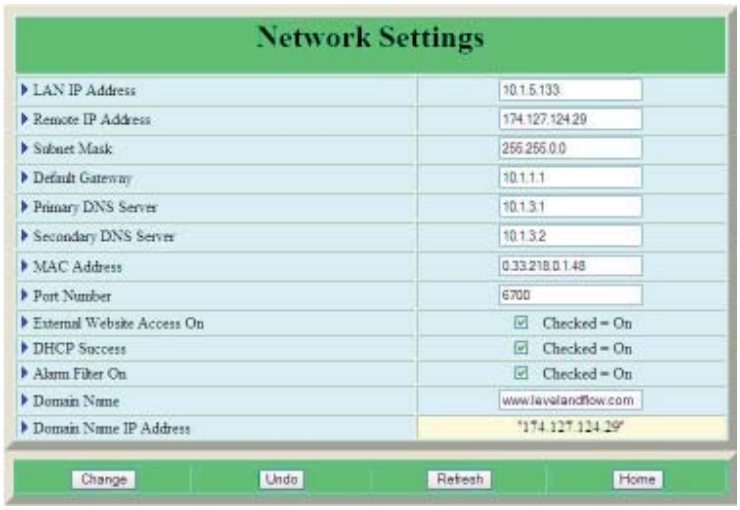
Next, click the "Home" button and use the following default login when prompted:

Username: **admin** Password: **password**

NOTE: use the Security link on the main page to set the desired Username and Password.

Chick the “Home” button again to enter the main page. The sensor parameters are described in the ensuing pages.

Network Settings



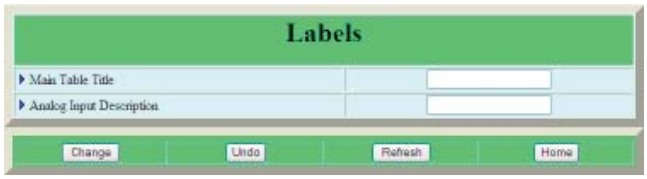
The Network Settings are provided for advanced users only and shouldn’t normally require changes. The LOE comes defaulted with DHCP enabled, meaning the sensor only requires access to internet and it will automatically connect to the www.levelandflow.com website and configure its own Network Settings.

NOTE: refer to page **18** for a description of the Alarm Filter function.

Security Settings

The Security Settings allow the user to set the username and password required to access the sensor settings. The default Username is **admin** and the Password is **password.**

Labels



Allows the user to assign custom labels to the Main Display. Labels apply only to the internal webpage--labels on the www.levelandflow.com website must be set through the website.

Basic Parameters

Basic Parameters

Parameters	Information	Values		Parameters	Information	Values
				Offset	-10.00 to +10.00 Feet	0.00
Sensitivity	0 to 100	85		Max Distance	2.00-15.00 Feet	15.00
Blanking	0 or 0.42-15.00 Feet	0.00	Change	Trip1 Dist	0.00-15.00 Feet	2.50
Pulses	0 to 20	16		Trip1 Window	0.00-15.00 Feet	1.00
Gain Control	0=Man,1=Auto,2=Hard,3=Soft	1		Trip1 Type	0-9 or 10-19 or 20-29	0
Average	1 to 32	20	Undo	Trip2 Dist	0.00-15.00 Feet	3.00
Window	0.00-15.00 Feet	0.25		Trip2 Window	0.00-15.00 Feet	1.00
Out of Range Samples	0 to 250	20		Trip2 Type	0-9 or 10-19 or 20-29	0
Sample Rate	1 to 5 Hertz	4		Retry Time	1 to 60 Seconds	30
Multiplier	0 to 1.999	1.000				
Temp Comp	0=Off,1=On	1		Remote Call in Time	1 to 86400 Seconds	0
				Remote Bytes	8 or 160	0
Distance	0.00-15.00 Feet	0.84 Feet	Refresh			
Signal Strength	0 to 100 (100=Best)	100		Trip1 Status	Green=ON Red=OFF	Trip1 ON
Temperature	Readout in Celsius	21 C	Home	Trip2 Status	Green=ON Red=OFF	Trip2 ON

Basic Parameters (continued)

Sensitivity

Controls the level of amplification applied to the target signal. The sensitivity setting is expressed as a percentage; 0 to 100%. When operating in Autosense mode, the Sensitivity setting acts as an upper limit constraint (see Gain Control for details).

Blanking

Sets the distance, beginning at the sensor face, to the point where the sensor will begin looking for target signals. All targets closer than the blanking distance will be ignored. The blanking should never be set to less than the minimum range specification of the sensor**.** If the target enters the blanking area, errant readings will occur.

NOTE: the LOE-6126 has the ability to track a target to as close as 1" from the sensor face. This feature is limited to targets that will remain perfectly perpendicular to the sensor face. This feature is enabled by setting the Gain Control to 1 (Autosense) and then setting the Blanking to 0.

Pulses

Controls the number of sound wave pulses being sent in each ultrasonic burst. The greater the number of pulses, the stronger the transmitted signal. When operating in Autosense mode, the Pulses setting acts as an upper limit constraint (see Gain Control for details).

Gain Control (0, 1, 2, 3)

Determines the method in which gain is applied to returning target signals. In Manual mode, the Sensitivity and Pules settings are applied as a static values. In Autosense Mode, the sensor self-adjusts the Pulses and Sensitivity levels (within the bounds of their respective settings) in order to optimize the signal strength.

0 = Manual Mode (static Sensitivity & Pulses values)
1 = Autosense (auto-adjusting Sensitivity & Pulses values)
2 = Hard-Target (increases gain slowly as distance increases)
3 = Soft-Target (increases gain quickly as distance increase)

Basic Parameters (continued)

Averaging

Defines the number of target readings that will be averaged together. Each qualified sample (see Filter Window and Out of Range Samples below) is placed into a first-in, first-out (FIFO) buffer and averaged with previous samples to generate a steady output. A higher Averaging setting will result in smoother readings, but will also result in slower the response time to rapid target changes.

Window

Sets the width of the target acceptance window. The target acceptance window is a zone, centered around the current target reading, within which any target detected will be considered legitimate and figured into the averaging buffer. Any target detected outside of the Window will be considered "out of range" and will be ignored based on the setting in the Out of Range Samples parameter (see below). The Filter Window extends both directions, both closer than and further away from, the current target reading. For example, if the sensor is detecting a target at 5 ft. and the Filter Window is set at 1 ft., then any target detected between 4 ft. and 6 ft. will be accepted.

Out of Range Samples

Determines the number of consecutive target readings that must fall outside of the acceptance window before the "out of range" target is recognized and included in the averaging buffer. For example, suppose the Out Of Range Samples is set to 10. If a target is suddenly detected outside of the acceptance window, it will be ignored until it has been detected for 10 consecutive samples, at which point it will be qualified as a legitimate target. If the "out of range" target was detected for only 9 consecutive samples before moving out of the sensing area, it would never be acknowledged as a target and the reading would stay with the last qualified target sample.

Sample Rate

Sets the interval between target readings. Options allow rates from once per second (1 Hz) to 5 times per second (5 Hz). It is highly recommended that the Sample Rate be set only as fast as is necessary for the application.

Basic Parameters (continued)

Multiplier

Sets the conversion Multiplier that will be applied to the sensor readings. The default is 1.000 (see note below) and typically does not need to be adjusted. However, since the speed of sound is not constant through all environments, the multiplier parameter allows the user to adjust for variations in atmosphere when maximum accuracy is required.

Temperature Compensation (0 = Off, 1 = On)

Used to enable or disable the internal temperature compensation of the sensor. Enabling the internal temperature compensation can reduce the effects of temperature changes by 50% or more, depending on the temperature gradient through the sensing range.

Offset

Used to adjust the zero reference point of the sensor. When the Offset is set to 0, the zero reference of the sensor is at the face of the transducer. Setting the Offset to a negative number will move the zero reference backward (behind the sensor face), while a positive setting will move the reference forward (in front of the sensor face).

Maximum Distance

Sets the distance (beginning from the sensor face) to the point where the sensor will stop looking for target signals. Targets detected beyond the Maximum Distance value will be ignored by the sensor.

Trip Point Relay Control

The standard version of the LOE comes equipped with two solid-state relay outputs (trip points), which can be programmed to perform one of several logic functions. In addition, the LOE can be configured to initiate immediate email and/or text message alerts whenever either of the trip relays activates or deactivates (see Immediate Website Alarms for more information).

NOTE: all Trip Point distance values are referenced from the face of the sensor, regardless of the type of calculated reading being performed by the sensor (level, volume, etc.). Refer to Trip Type chart for more information.

Trip Distance: sets the distance from the sensor face to the closest action point (refer to Trip Type chart).

Trip Window: sets the distance, beginning from the Trip Distance location, to the farthest action point (refer to Trip Type chart).

Trip Type: determines the type of operational logic performed by the trip point relay (see descriptions below and refer to the Trip Type chart).

Type 0 (Near): activates the relay when a target is closer than the Trip Distance. The Trip Window is not used with Trip Type 0.

Type 1 (Exclusive): activates the relay when a target is closer than the Trip Distance or farther than the Trip Distance + the Trip Window.

Type 2 (Hysteresis Near): When the target comes closer than the Trip Distance, the relay will activate and remain on until the target moves beyond the Trip Distance + Trip Window. The relay will then deactivate and remain off until the target once again comes closer than the Trip Distance. Used for emptying control or high alarm with hysteresis to prevent chatter.

Type 3 (Far): activates the relay when the target is beyond the Trip Distance. The Trip Window is not used with Trip Type 3.

Trip Point Relay Control (continued)

Type 4 (Inclusive): activates when the target is within the trip window. This can be used for various presence detection application.

Type 5 (Hysteresis Far): When the target moves beyond the Trip Distance + Trip Window, the relay will activate and remain on until the target moves closer than the Trip Distance. The relay will then deactivate and remain off until the target once again moves beyond the Trip Distance + Trip Window. Used for filling control or low alarm with hysteresis to prevent chatter.

Type 6: Disables the trip point relay.

Type 7 (Loss of Echo): the relay will activate if the sensor enters a loss of echo condition (no targets detected).

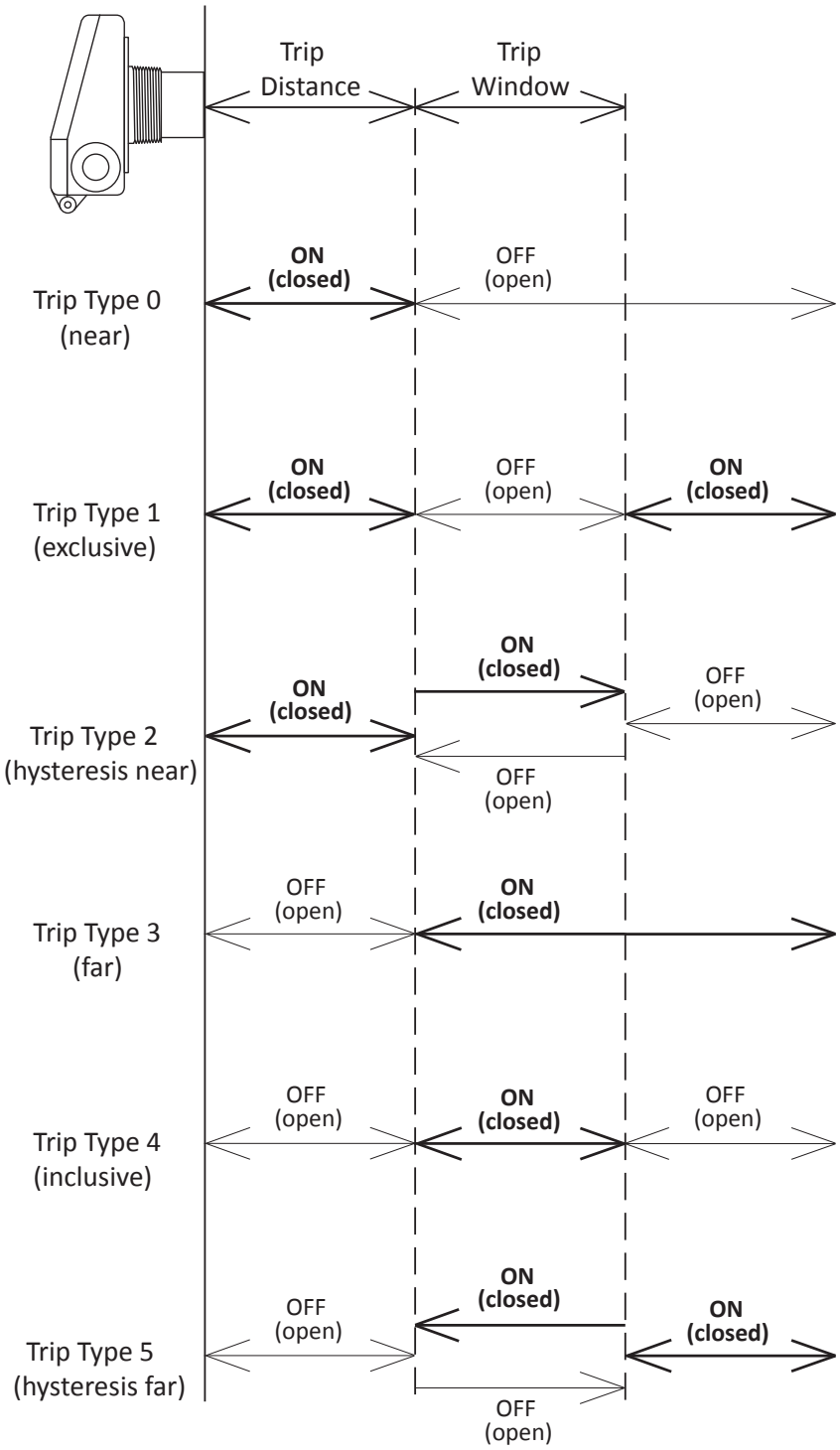
Type 8 (Timed Relay): sets the relay to activate at a specified interval. The Trip Distance parameter sets the time interval between relay activations (in minutes), and the Trip Window determine how long the relay remains active at each interval (in seconds).

Type 9 (Rate of Change): allows the user to define a maximum rate of change (distance over time), which if exceeded will activate the relay. The Trip Distance parameter is used to define the time value, and the Trip Window parameter is used to define the distance value.

Retry Time

Sets the delay between attempts to connect to the Website after a failed connection. The Retry Time is also used to set the delay before reporting trip alarms to the website. Refer to Alarm Filter .

Trip Type Chart



Website Alarms: the LOE's trip relay outputs can be configured to report to the levelandflow.com website whenever an alarm condition is detected, regardless of the sensors fixed call-in interval. An Immediate alarm can then be setup on the website to initiate email and/or text message alerts whenever an alarm is reported (see using the levelandflow website for more information).

NOTE: Immediate website alarms are subject to the Retry Time delay (30 to 180 second) as set in the LOE's Basic Parameters page. Additional delays may occur in establishing a connection to the website, depending on the speed and quality of the local internet connection.

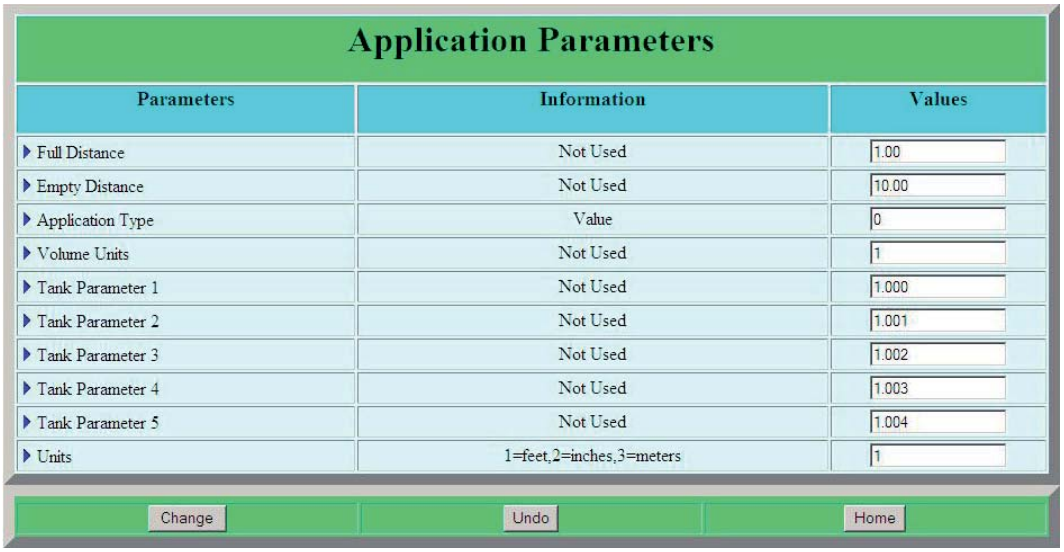
Configuring the LOE for Website Alarms:

Placing a "1" in front of any of the Trip Types designates a closed or active output as an alarm condition. For example; Trip Type 3 would be designated as 13, and would send out an immediate alarm whenever the trip relay is active (closed).

Placing a "2" in front of any of the Trip Types designates an open or inactive output as an alarm condition. For Example; Trip Type 3 would be designated as 23, and would immediately report an alarm whenever the trip relay is inactive (open).

Alarm Filter: (located in the LOE's Network Settings page) enabling the Alarm Filtering option can help prevent nuisance email and/or text message alerts from being sent. If Alarm Filtering is enabled, all alarms conditions that clear before the Retry Time delay expires will not be reported to the website, and no alert messages will be sent. If Alarm Filtering is disabled, all trip alarms will be reported to the website (and alert messages sent), even if the alarm condition has cleared when the Retry Time expires.

Application Parameters



Application Parameters

Parameters	Information	Values
Full Distance	Not Used	1.00
Empty Distance	Not Used	10.00
Application Type	Value	0
Volume Units	Not Used	1
Tank Parameter 1	Not Used	1.000
Tank Parameter 2	Not Used	1.001
Tank Parameter 3	Not Used	1.002
Tank Parameter 4	Not Used	1.003
Tank Parameter 5	Not Used	1.004
Units	1=feet,2=inches,3=meters	1

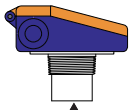
Change Undo Home

Full Distance
Sets the distance (beginning from the sensor face) to the point where the tank is considered full. Typically set to the Blanking Distance (see Basic Parameters).

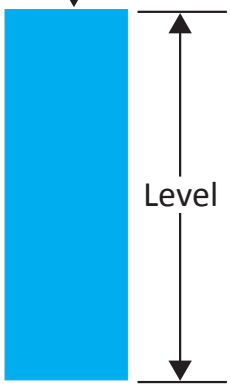
Empty Distance
Sets the distance (beginning from the sensor face) to the point where tank is considered empty. This will typically be the same as the tank depth unless the sensor is mounted on a stand pipe.

Application Type
Determines the type of calculated measurement the sensor will perform. The LOE can measure the distance to the target, the depth of a level, or one of several volumetric calculations (refer to pages 13-21).

0 = Distance (factory default): measures the distance from the face of the sensor to the target surface. Required parameter settings: Units

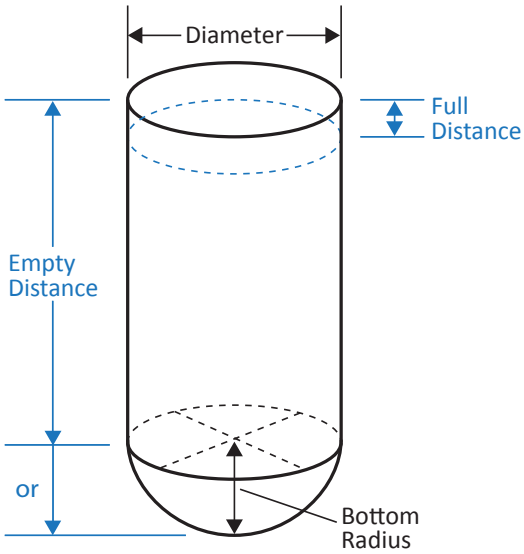


1 = Level: subtracts the measured target distance from the user defined Empty Distance to provide a depth of level measurement. Required parameter settings: Units, Full Distance, Empty Distance.



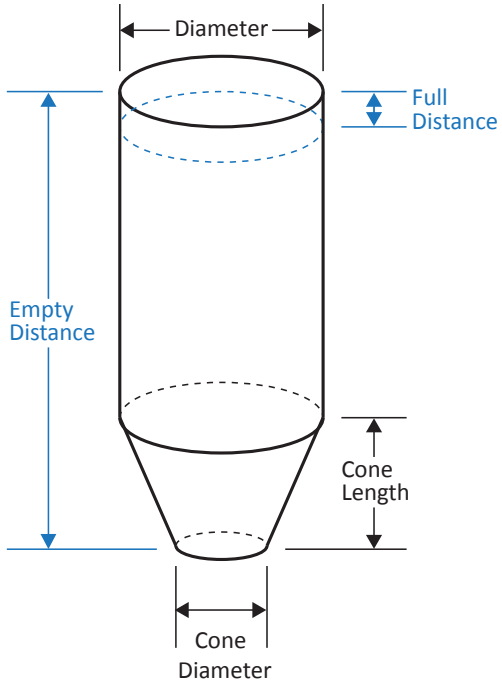
2 = Standing Cylindrical Tank with Hemispherical Bottom

Enter all dimensions shown below into the Tank Parameter fields and select the desired Volume Units.



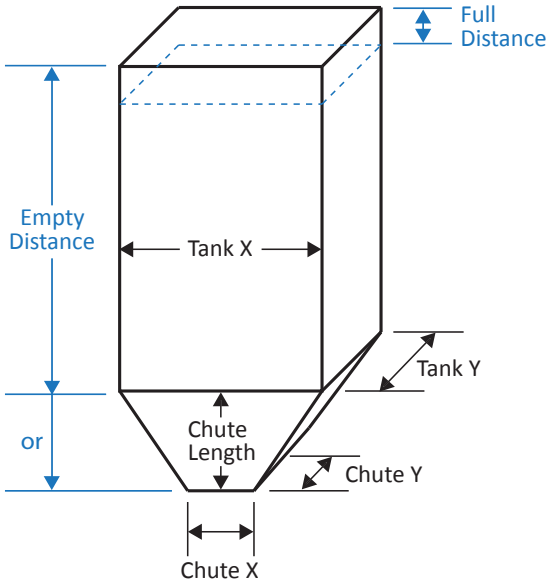
3 = Standing Cylindrical Tank with Conical Bottom

Enter all dimensions shown below into the Tank Parameter fields and select the desired Volume Units.



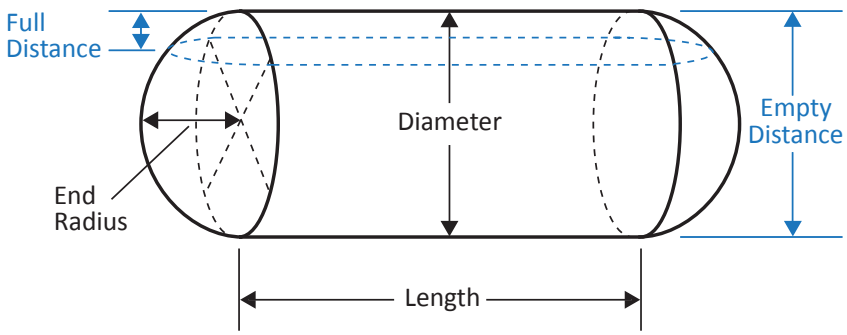
4 = Standing Rectangular Tank with Chute

Enter all dimensions shown below into the Tank Parameter fields and select the desired Volume Units.



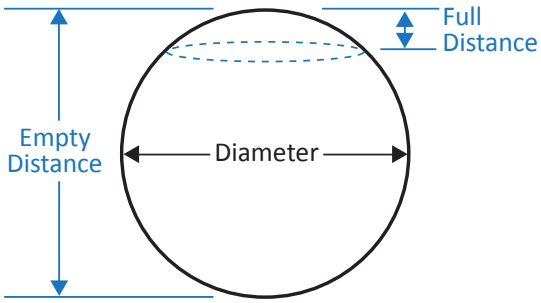
5 = Horizontal Cylindrical Tank with Spherical Ends

Enter all dimensions shown below into the Tank Parameter fields and select the desired Volume Units.



6 = Spherical Tank

Enter all dimensions shown below into the Tank Parameter fields and select the desired Volume Units.

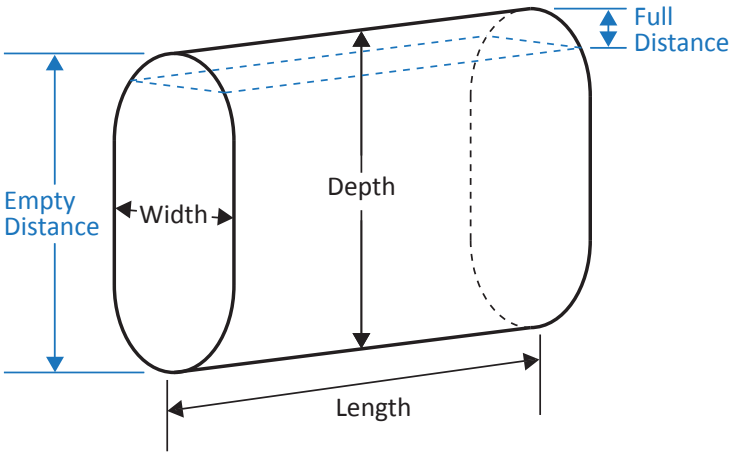


7 = Pounds: allows the user to apply a conversion multiplier to the calculated level reading. The conversion Multiplier is entered in Tank Parameter 1.

Example: suppose the level depth is calculated to be 5.45 feet (based on the Empty Distance setting). If the conversion Multiplier is set to 7.150, the calculated result would be (7.15 x 5.45) 38.968.

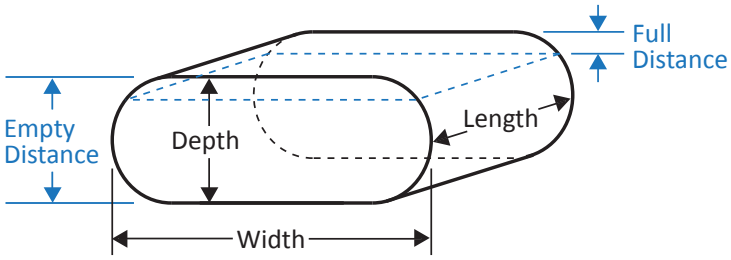
9 = Vertical Oval Tank

Enter all dimensions shown below into the Tank Parameter fields and select the desired Volume Units.



10 = Horizontal Oval Tank

Enter all dimensions shown below into the Tank Parameter fields and select the desired Volume Units.



Volume Units: selects the unit of measure for the volumetric Application Types (types 2-6, 9, 10).

1 = Feet^3
2 = Million feet^3
3 = Gallons
4 = Meters^3
5 = Liters

Tank Parameters: used to enter tank dimensions or the conversion multiplier, depending on the Application Type selected (see Application Types for more information).

NOTE: the Tank Parameter labels will automatically change to reflect the parameters required for the Application Type selected.

Units: selects the Units of measurement for the distance or level Application Type (types 0 or 1), and sets the Units of measure to be used for all parameters requiring dimensional value.

1 = Feet
2 = Inches
3 = Meters

Modbus

The LOE has the capability to interface with up to 10 of APG's Modbus based sensors. The LOE acts as the Master device, querying the Modbus sensors and reporting their readings to the website along with the LOE's own readings.

NOTE: each Modbus sensor will show up on the website as a sub-sensor to it's LOE master. For example, if the LOE's serial number is L00001219, then Modbus sensor 1 would be displayed as L00001219_1 and so forth.

RS-485 Modbus Input 1 & 2

These pages are used to configure the parameters of Modbus sensor currently selected (see "Sensor Number to View" under "RS_485 Network Settings" page). Not all parameters are applicable to every Modbus sensor. Refer to the Modbus sensor's user manual for parameter descriptions.

RS-485 Modbus Holding Registers

This page is available to view the readings of the Modbus sensor that is currently selected.

Modbus TCP/IP

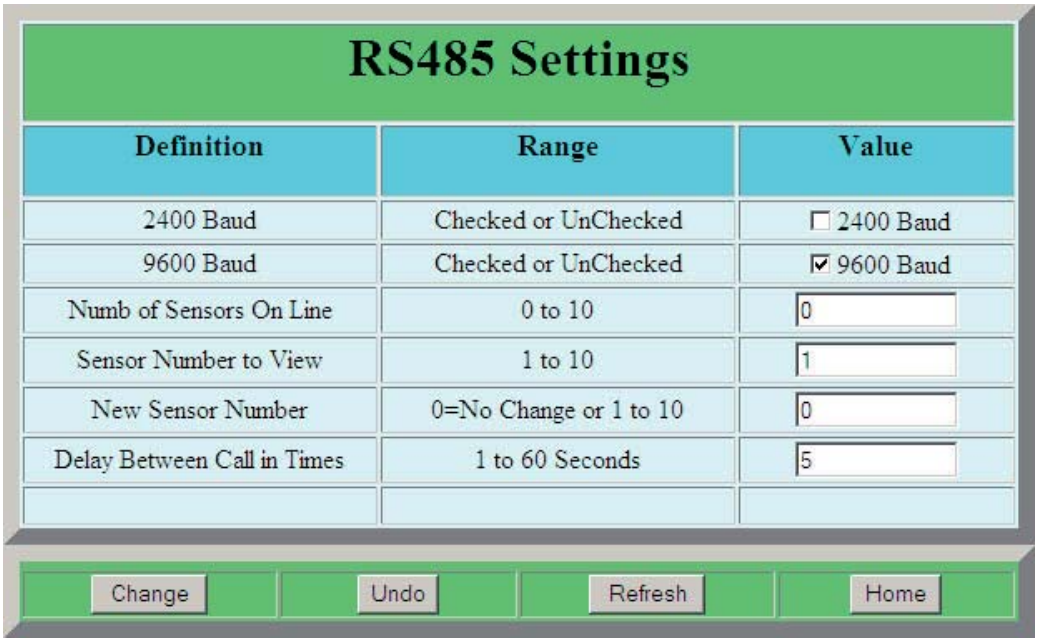
Using the LOE's IP address and port number 502, the LOE's readings can be polled at address number 11 on registers 30303-30304.

Example:

0001: Transaction Identifier
0000: Protocol Identifier
0006: Message Length (6 bytes to follow)
0B: The Unit Identifier (0B hex = 11)
04: The Function Code (read Holding Registers)
012E: The Data Address of the first register requested. (12E hex = 303)
0002: The total number of registers requested. (read 2 registers; 303 to 304)

Byte order (hex values)
00 01 00 00 00 06 0B 04 01 2E 00 02

RS-485 Settings



Baud Settings: selects the communication baud rate between the LOE and the attached Modbus sensors. Refer to the Modbus sensor's documentation for the appropriate setting (typically 9600 Baud).

Number of Sensors On Line: sets the number of Modbus sensors that are connected to the LOE.

Sensor Number to View: used to select the sensor number to be viewed or programmed (also see "New Sensor Number" below). The parameters of the selected sensor will populate the RS-485 Modbus Input pages, and the sensor's readings can be viewed in the RS-485 Holding Register page.

New Sensor Number: used to change the sensor number of the sensor currently being viewed (see "Sensor Number to View" above). Each Modbus sensor connected to the LOE must be assigned a unique sensor number (0 to 10). Duplicate sensor numbers will cause errors in communication.

Delay Between Call-in Times: sets the delay between cycles of querying all attached Modbus sensors.

Using the levelandflow.com website

APG's www.levelandflow.com website provides access to sensor readings, as well as the capability to setup email/text-message alerts and remotely adjust sensor parameters (dependent on assigned user access rights).

General Navigation

Sites Tab: Displays the list of sites assigned to the user.

Click on a site box to view the list of the sensors that are assigned to that site.

Click on an individual sensor to access the readings data as well as to adjust sensor parameters (for those with access rights).

Profile Tab: allows the user to manage their profile.

NOTE: the Latitude, Longitude and Zoom setting are for setting your default view when entering the Google Maps feature. Simply click the Set button, find your location on the map and click on the location to set a marker. Ensure the zoom at the desired level and click the "Set User's Google map start location" button to save the location.

Data Logging and Retrieval

Begin Date and End Date: Used to set the time period for the data to be retrieved.
Chart: Retrieves the data in the form of a line chart.
Excel: Retrieves the data as an Microsoft Excel file.
View Data: Retrieves a list of sensor readings along with the associated time stamp.
Alarm History: displays a list of alarms that have previously occured.
View Parameters: displays a list of all sensor parameters as of the last time the sensor logged into the website.

Sensor Settings

Edit Info: allows the user to assign description tags, set time zone information, and set a sensor location on the Google Maps feature.

Setting the Sensor Google Maps Locations: click on the "Edit Info" button and then click the "Set" button, find the sensor's location on the map and click on it's location to set a marker. Ensure the zoom at the desired level and click the "Set sensors Google map location" button to save the location.

Edit Parameters: allows users (with access rights) to adjustment sensor parameters.

NOTE: parameter changes made from the website will only take effect after the LOE reports to the website at the next scheduled call-in interval.

Edit Alarms: allows users (with access rights) to add alarms to send email or text message alerts whenever an alarm condition occurs and when the alarm condition clears (see website "Setting Website Alarms" section below).

Website Alarms

There are three different types of website alarms: Immediate, Interval, and Heartbeat. Refer to descriptions below.

Immediate Alarms: results from an alarm condition on one of the LOE's solid state relays (Trip 1 & Trip 2). If one of the trip relays enters an alarm condition, the LOE will report the alarm to the website without waiting for the next scheduled call-in interval.

NOTE: in addition to setting an alarm on the website, the LOE's trip relays must also be configured for website alarming. See "Configuring the LOE for Website Alarms" on page **X** for details.

Interval Alarms: alarm condition is based solely on the sensor readings as reported at the scheduled call-in interval. i.e. the alarm is a function of the website and is not generated by the sensor itself.

Heartbeat Alarm: once every 4 hours the website checks the call-in status of all sensors that have been assigned a heartbeat alarm. If the LOE missed the last scheduled login, an alert message would then be sent to notify the user(s) that the sensor is not reported to the website.

Immediate Alarm Settings

NOTE: the trip relay(s) must be configured for website alarming. See "Configuring the LOE for website alarms" on page X for details.

Label: sets the alarm label that will be included in the alert message title.

Message: allows the user to enter a brief message that will be included in the body of the email or text alert message.

Call Type: selects the type of alert message to be sent. If "None" is selected, the alarm condition will show on the website but no message will be sent.

Sent: (view only) shows the status of the Delay count (see Delay below).

Delay: sets the number of times the alarm must activate before an alarm message will be sent. Setting the Delay to 0 will disable the alarm.

Auto Clear: when checked, the Delay count will reset to 0 and begin again at the end of each cycle, resulting in a new alert message each time the Delay count is reached. If Auto Clear is unchecked, the alert message will be sent when the Delay count is reached, but no further messages will be sent unless the alarm condition clears and then reactivates and is processed though the Delay count filter. If the alarm condition clears and Auto Clear is unchecked, an "Alarm Clear" message will be sent to the contact.

Contact: selects the user to receive the alert message (based the email address and/or cell phone number in their user profile).

Interval Alarm Settings

Label: sets the alarm label that will be included in the alert message title.

Message: allows the user to enter a brief message that will be included in the body of the email or text alert message.

Call Type: selects the type of alert message to be sent. If "None" is selected, the alarm condition will show on the website but no message will be sent.

Alarm Point: defines the value (in the unit of measure of the sensor reading) for the alarm condition. If the box below is checked, the alarm condition will occur whenever the sensor reading is greater than the Alarm Point value. If left unchecked, the alarm condition will be whenever the sensor reading is less than the Alarm Point value.

Offset Clear: sets an offset, starting from the Alarm Point and extending away from the alarm zone, that must be reached before the alarm condition will clear. This is to prevent repeated alarm chatter if the target is fluctuating back and forth across the Alarm Point.

Sent: (view only) shows the status of the Delay count (see Delay below).

Delay: sets the number of times the alarm must activate before an alarm message will be sent. Setting the Delay to 0 will disable the alarm.

Auto Clear: when checked, the Delay count will reset to 0 and begin again at the end of each cycle, resulting in a new alert message each time the Delay count is reached. If Auto Clear is unchecked, the alert message will be sent when the Delay count is reached, but no further messages will be sent unless the alarm condition clears and then reactivates and is processed though the Delay count filter. If the alarm condition clears and Auto Clear is unchecked, an "Alarm Clear" message will be sent to the contact.

Contact: selects the user to receive the alert message (based the email address and/or cell phone number in their user profile).

Heartbeat Alarm Settings

Label: sets the alarm label that will be included in the alert message title.

Message: allows the user to enter a brief message that will be included in the body of the email or text alert message.

Call Type: selects the type of alert message to be sent. If "None" is selected, the alarm condition will show on the website but no message will be sent.

Sent: (view only) shows the status of the Delay count (see Delay below).

Delay: sets the number of times the alarm must activate before an alarm message will be sent. Setting the Delay to 0 will disable the alarm.

Auto Clear: when checked, the Delay count will reset to 0 and begin again at the end of each cycle, resulting in a new alert message each time the Delay count is reached. If Auto Clear is unchecked, the alert message will be sent when the Delay count is reached, but no further messages will be sent unless the alarm condition clears and then reactivates and is processed though the Delay count filter. If the alarm condition clears and Auto Clear is unchecked, an "Alarm Clear" message will be sent to the contact.

Contact: selects the user to receive the alert message (based the email address and/or cell phone number in their user profile).

Adding a new contact to an existing alarm

If more than one contact needs to receive an email and/or text message alert, a duplicate alarm must be added and assigned to the new contact. Simply select the alarm you wish to duplicate, click on the "Copy" button, select the new "Contact", and click the "Add" button.

Sensor Reset

Caution! Performing the following procedure will reset all Network settings, including disabling the DHCP. A crossover Ethernet cable will be required to access the LOE's internal webpage and re-enable the DHCP.

Disconnected the sensor from power. Press and hold down the reset button while reapplying power. Continue to hold the button for another 10 seconds after applying power. The LOE is now reset to default parameter values. In order to access the internal webpage, follow the instructions below:

Computer Setup:
1. Click Start, Control Panel, and then open the Network Connections.
2. Right click on the Local Area Connection and click Propeties.
3. In the center box scroll down and select **Internet Protocol (TCP/IP)** and then click the Properties button.
4. Select **Use the following IP address** and enter in the following:

IP Address: 169.254.0.201
Subnet Mask: 255.255.255.0

NOTE: if "**Use the following IP address**" is already checked and network parameters have been assigned, contact your network administrator for assistance.

LOE Setup:
5. Connect the sensor to a computer's Ethernet port using a crossover Ethernet cable.

NOTE: if a POE-injector is being used, the crossover cable will be between the computer and the injector's LAN port. Use a standard Ethernet cable between the injector's LAN+DC port and the LOE.

6. Apply power to the LOE. The sensor should start ticking and the COM LED should flash approximately every 30 seconds.

7. Open the computer's Internet browser and enter the LOE's default IP address 192.254.0.200 into the browser address bar (i.e., http://169.254.0.200). This should bring up the LOE's Internal webpage.

8. Enter the Network Settings page and check the boxes to enable the External webpage Access and the DHCP, then click **"Change"**. The sensor will no longer respond.

9. Disconnect the LOE from the computer and use a standard Ethernet cable to connect the LOE to a connection that provides access to the Internet. After a few seconds, the Com LED should illuminate and remain solid, indicating the LOE has established communication with the website.

10. Go back to step 1-3 and change the computer Ethernet port's Internet Protocal properties back to "Obtain an IP address automatically".

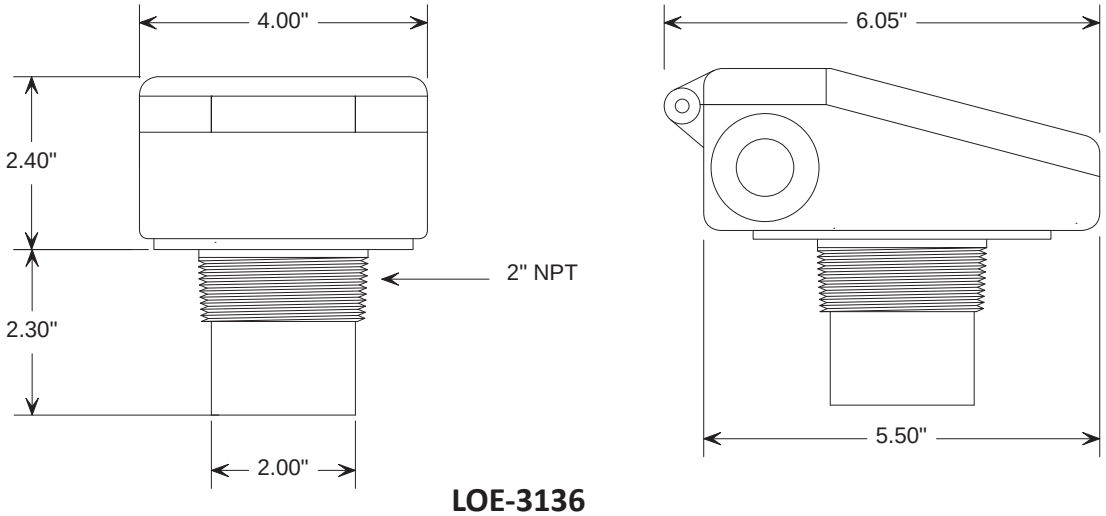
Specifications

Operating Range
- LOE-2126.....1 to 25 feet (305 to 7620 mm)
- LOE-3136.....1.5 to 40 feet (457 to 12192 mm)
- LOE-6126.....6 to 180 inches (152 to 4572 mm)

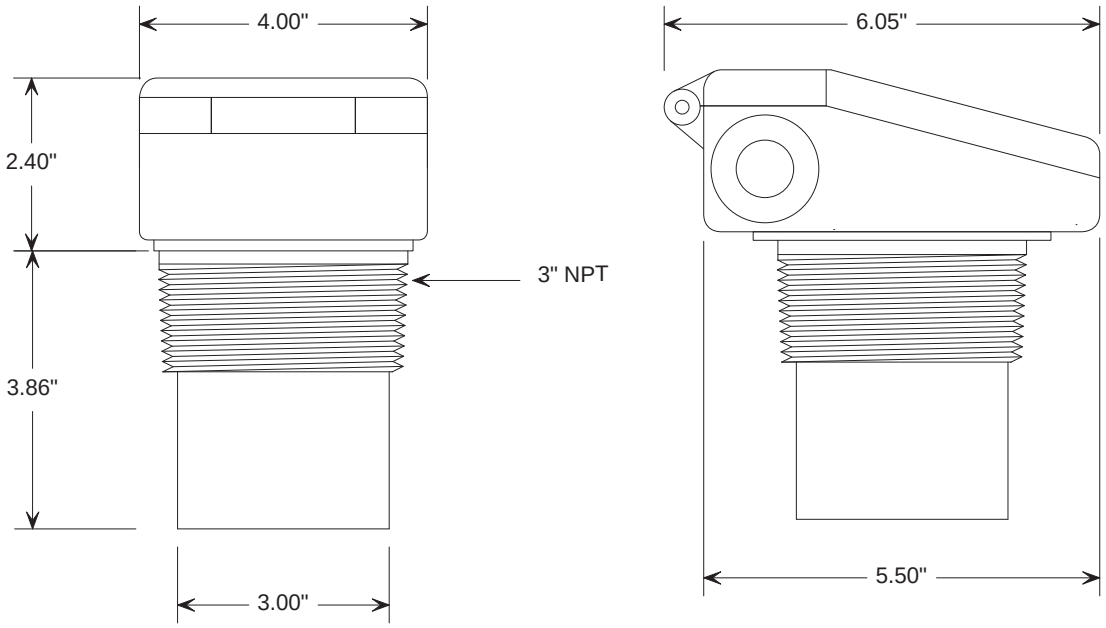
Operating Voltage.....48 VDC Power over Ethernet (POE); requires POE injector or switch
Total Current Draw .....40mA @ 48 VDC
Maximum Power Rating .....2.0 W
Ratings.....IP65
Available Outputs .....Ethernet TCP/IP to internal web page or APG website
Ethernet TCP/IP Modbus
2 - Isolated solid state relays (400 V, 130 mA max.)
Resolution .....0.1 in. (2.54 mm)
Accuracy .....+/- 0.25% of range with no temp gradient
Sensor Adjustments .....Programmable modes via website
Transducer Type .....Flat ceramic sealed PVDF face
Operating Temperature .....-40 to 140°F (-40 to 60°C)
Sample Rate.....1 to 12 Hz
Beam Pattern.....9° off axis
Cable Connection .....RJ-45 + terminal strip for relaysf

Dimensions

LOE-2126 & 6126



LOE-3136



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