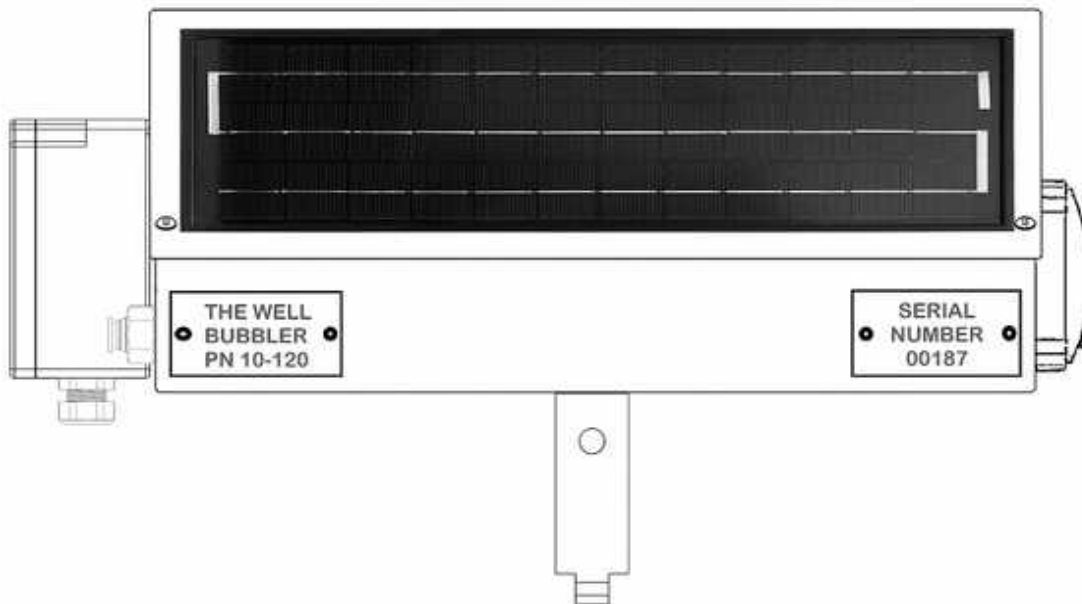


# THE WELL BUBBLER

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## INSTALLATION AND CONFIGURATION MANUAL



**MODEL 10-120**

**MODEL 10-300**

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## INSTALLATION STEP 1

The Well Bubbler 10-120 AND 10-300 are designed for mounting on 1-5/8" channel strut, manufactured by UniStrut and U-Line. Begin the sensor installation by mounting the strut near the well head – either on a tripod as shown below, or on a backboard.

Orient the open face of the strut due South for installations in the Northern Hemisphere, and due North otherwise.



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## INSTALLATION STEP 2

Install the Well Bubbler on the channel strut using the 1/2-13 fasteners included with the unit. Tighten the fastener using a 3/4 wrench; note that the entire weight of the unit is supported by this fastener – torque it appropriately.



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## INSTALLATION STEP 3

Insert the 1/4" OD tubing into the push-to-connect fitting as shown below.  
Depress the green push ring, and pull the tubing, to remove it if necessary.



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## INSTALLATION STEP 4

Install the fuse provided with the Well Bubbler into the fuse holder, as shown below. Push the fuse holder in, and rotate to the right, to engage the fuse. Do not substitute this fuse with any other type, or rating – spare fuses are shipped with the sensor.

The display should now activate; note that the Well Bubbler may begin operating once the fuse is installed. Refer to the following steps for activating, or temporarily deactivating, the unit.

The fuse should be left installed whenever the Well Bubbler is mounted outdoors, allowing the batteries to maintain a charge.





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## DIGITAL DISPLAY

The Well Bubbler includes a digital display used to view well level, flow rate, pump discharge pressure and pump current. The same display is used to start, or stop, automatic measurement and to configure the Well Bubbler. The display includes three buttons: a center round button, the right rectangular button, and the left rectangular button.

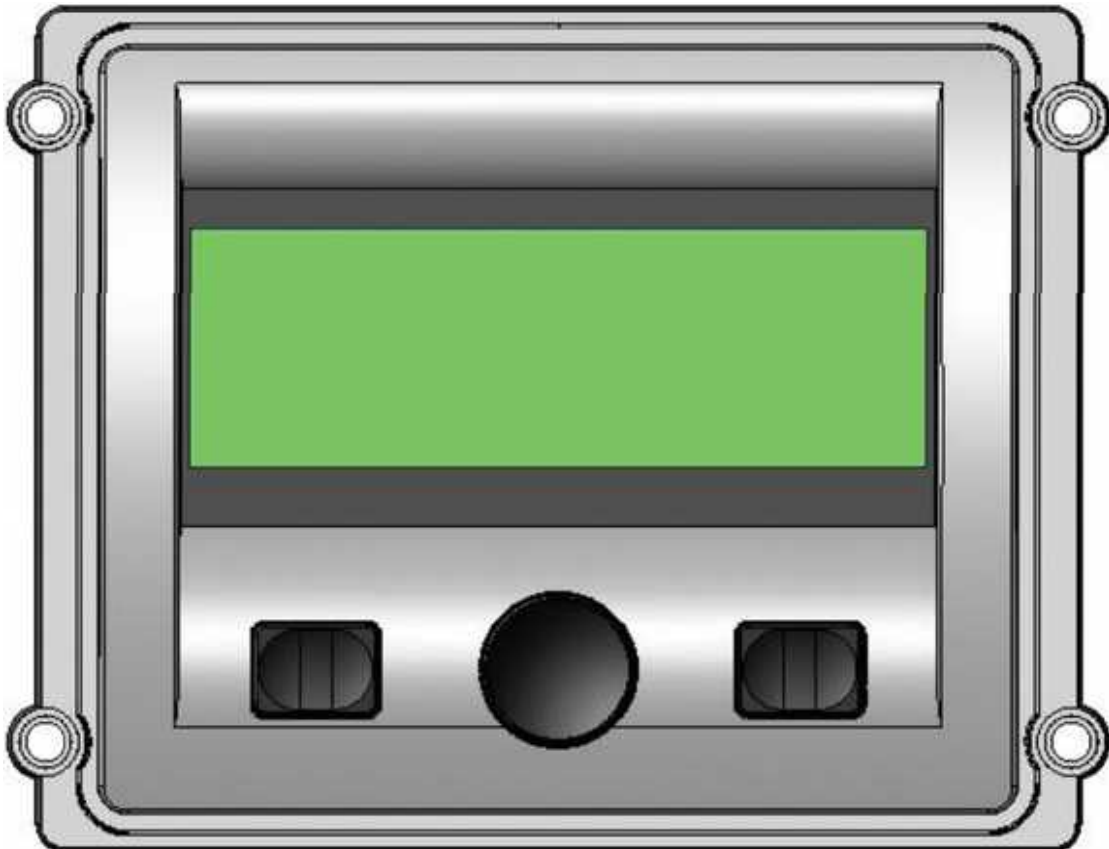
**Center (round) button:** press this button once to turn on the back light; this feature is useful in low light, and will turn off automatically to conserve energy. Press the center button again to move, or toggle, between different menus.

**Right:** press this button to increase a setting, such as the display contrast

**Left:** press this button to decrease, or lower, a setting

Most menu items are used to configure the Well Bubbler, and are accessed through a special button sequence - this prevents unauthorized access to important settings.

**Press, and continue to hold, the center round button, then press and hold the right button. After five seconds, the configuration menus become available temporarily.**



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## DISPLAY: MAIN MENU

The main menu is shown once the fuse is installed; it contains the following items:

**Well level:** the last known value as measured by the unit, with a fully purged airline

**Testing:** the current pressure in the airline, in PSI, and the associated well level

**Stat:** the status indicator shows the operating mode of the unit (Testing, Waiting, etc.)

**t:** the timer showing the duration of the current test, and the period between successive test runs

**Vbat:** The internal battery voltage, nominally between 11.5V and 14.4V

**T:** The internal temperature of the unit, in degrees F; shown for reference only



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## DISPLAY: CONTRAST ADJUSTMENT

The Bubbler adjusts the display contrast automatically, based on the display temperature, to improve visibility in bright sunlight. This menu can be used to override the automatic adjustment.





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## DISPLAY: WELL LEVEL

This menu shows the last measured well level, with a fully purged airline. Note that this measurement is made intermittently – for example, every five or fifteen minutes, and only the last known value is shown on the display.

The displayed value may be slightly different than the actual “current” well level, depending on the well activity and sampling period.



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## DISPLAY: FLOW RATE

This menu shows the last measured flow rate value. A 4-20mA or pulse-type flow meter must be installed, wired to the Well Bubbler, and configured correctly, to measure flow rate.

If a pulse-type flow meter is used, the measurement is an average calculated over several seconds, and updated continuously. This means that the displayed value may be different from the one shown on the flow meter display, especially if the flow rate is variable.

Note also that the displayed value may be different than the one recorded in the data log, or reported on the dashboard – those values are averaged over the entire measurement period of, for example, five or fifteen minutes.

If a 4-20mA flow meter is used, the displayed value is the instantaneous reading taken during the last well level sample, and will not be updated until the next sample is taken – for example, once every five or fifteen minutes. A new, updated flow rate value will be displayed if the center button is pressed repeatedly to reach this menu.



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## DISPLAY: DISCHARGE PRESSURE

This menu shows the last measured discharge pressure value, taken during the last well level sample, once every five or fifteen minutes. A 4-20mA pressure sensor must be installed, wired to the Well Bubbler, and configured correctly, to measure discharge pressure.

This value is not updated continuously, and may be different from the one shown on a mechanical pressure gauge, especially if the discharge pressure is variable.

A new, updated discharge pressure value will be displayed if the center button is pressed repeatedly to reach this menu.



# THE WELL BUBBLER

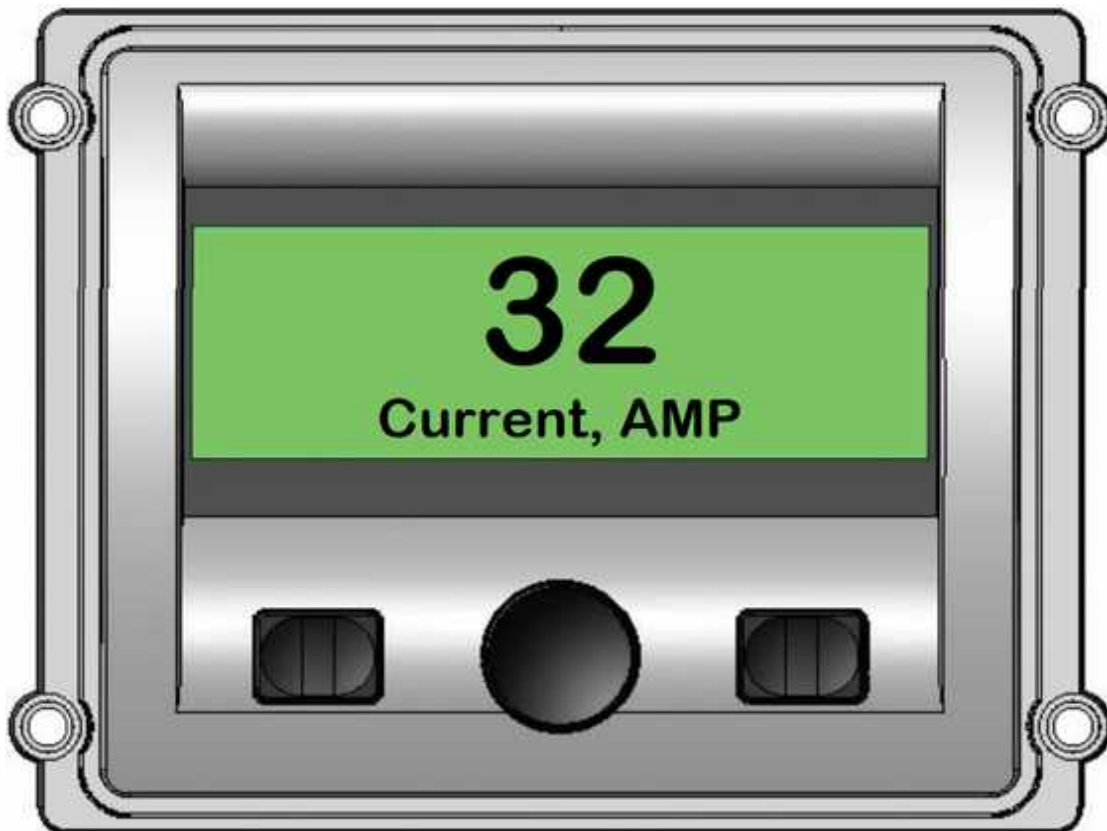
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## DISPLAY: PUMP CURRENT

This menu shows the last measured pump current value, taken during the last well level sample, once every five or fifteen minutes. A 4-20mA current transducer must be installed, wired to the Well Bubbler, and configured correctly, to measure pump current.

This value is not updated continuously, and may be different from the one shown on a clamp meter, especially if the pump current is variable.

A new, updated pump current value will be displayed if the center button is pressed repeatedly to reach this menu.



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## CONFIGURATION: COMPRESSOR POWER

This setting determines the maximum air pressure and flow rate generated by the Well Bubbler. Use the factory setting of 75% for 5/32" OD and 1/4" OD airlines; higher values may be necessary when using 3/8" or larger galvanized sounding tube.

Reduce compressor power to 50%-65% when using the Well Bubbler 10-120 with tanks or shallow wells, to extend compressor and battery life.

This parameter must be set to 100% with all 10-300 Well Bubblers.





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## CONFIGURATION: RUN MANUAL TEST

This menu allows for manual compressor operation. Use it to quickly verify that the compressor is operational, or to manually purge the air line.

The default value of this parameter is OFF; once turned ON, the compressor will run for 10-20 seconds, then automatically turn off.



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## CONFIGURATION: MANUAL PUMP CONTROL

The Well Bubbler is equipped with a pump control relay, which can be used to stop the pump when the water level is low, and to re-start the pump as the water level recovers.

This relay is typically wired to a pump control panel HAND / OFF / AUTO switch. Use the manual pump control menu to manually operate the relay, and verify that the wiring between the Well Bubbler and the pump control is correctly installed.

Selecting “START” will operate the pump; selecting “STOP” will stop it.



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## CONFIGURATION: AUTOMATIC MEASUREMENT

This menu item enables automatic well level measurement. Set this parameter to ON to begin measuring the well level.

Set to OFF if automatic measurement is not needed, and the Well Bubbler has good sunlight exposure or connected to a 24V supply to maintain the battery charge.

Remove the main fuse if the unit will be stored long-term.



# THE WELL BUBBLER

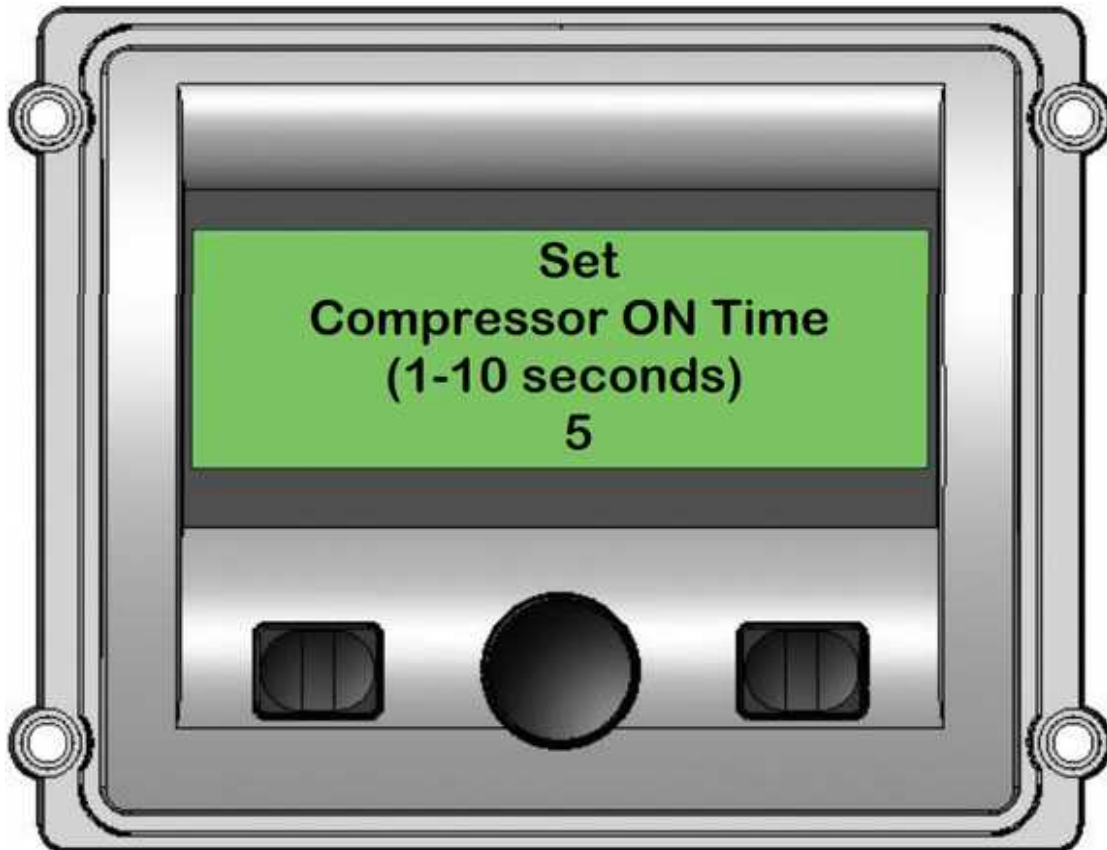
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## CONFIGURATION: COMPRESSOR ON TIME

The Motor ON time should be set to the factory default value of 3-5 seconds when using 5/32" OD or 1/4" OD airline.

A larger value, up to 10 seconds, may be required when using 3/8" or larger galvanized or stainless line.

Values between 1 and 3 seconds can be used when measuring tank level or very shallow wells, to extend compressor life and conserve battery charge.

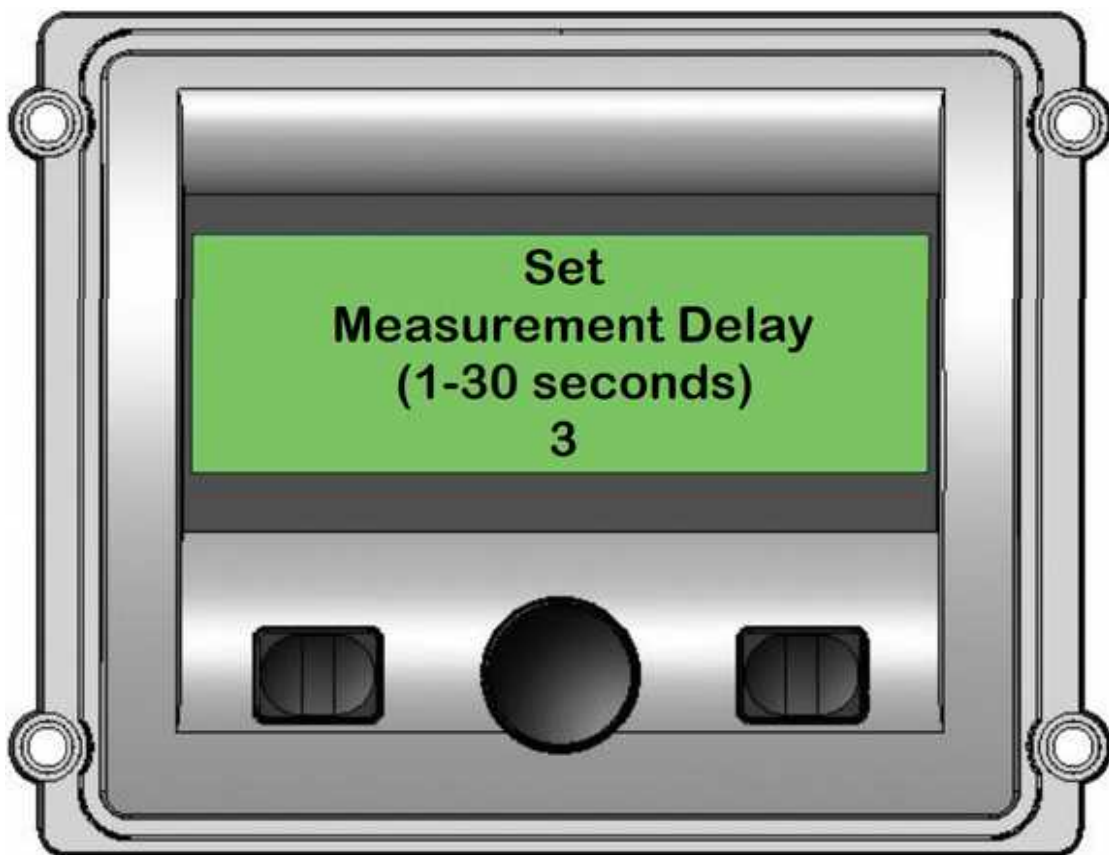


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## CONFIGURATION: MEASUREMENT DELAY

The Measurement Delay time should be set to the factory default value of 3-5 seconds when using 1/4" OD airline. A larger value, up to ten seconds, should be used with 5/32" or smaller diameter tubing.





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## CONFIGURATION: MEASUREMENT PERIOD

The Measurement Period determines how often the Well Bubbler will measure the well level, and auxiliary sensors (flow rate, discharge pressure and pump current).

The lower the measurement period, the more often the Well Bubbler will operate. Typical values for 10-120 models are five or fifteen minutes; 10-300 models can sample between thirty and sixty minutes, when using solar power only.

When powered from an external 24V supply, all models can sample at up to five minutes. Note that a smaller measurement period results in increased wear on the compressor.

Each Well Bubbler will automatically increase its measurement period if the battery is below 12.2V; the unit will stop operating and hibernate at battery voltages below 12.0V, to preserve the battery.



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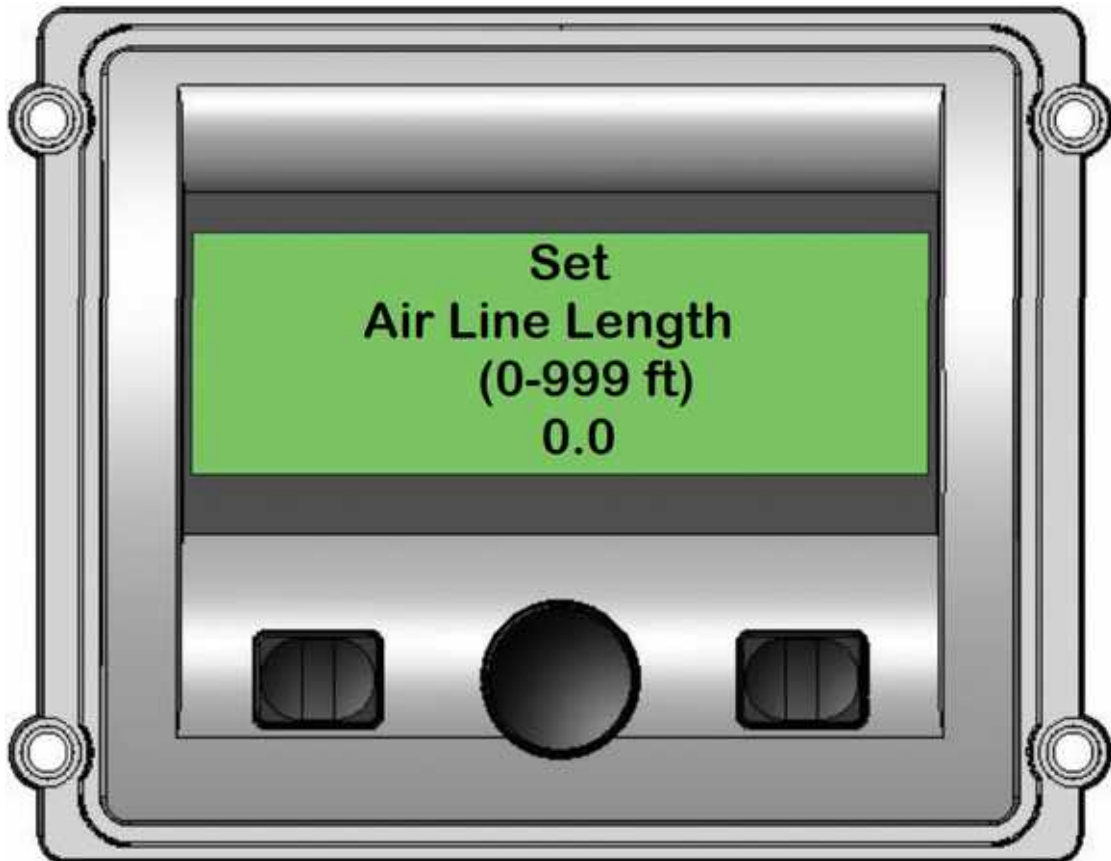
## CONFIGURATION: AIR LINE LENGTH

The air line length is measured from ground level (top of casing, sanitary seal, or motor / gear head base), to the end located in the well, typically just above the pump bowls.

The airline length between the discharge and the Well Bubbler does not matter, and should not be entered here - only the length of air line actually in the well is used to measure well level. The Bubbler itself can be located as far away from the well as necessary, without affecting measurement accuracy.

Enter the actual air line length to report “water below ground” - this is the value provided by a well sounder, and typically shown on pump tests, and well reports.

Enter zero to measure and report “water above the pump” - this option is used when only the water column above the pump is of interest, or the air line length is unknown. This value is also used when measuring tank and reservoir levels.



# THE WELL BUBBLER

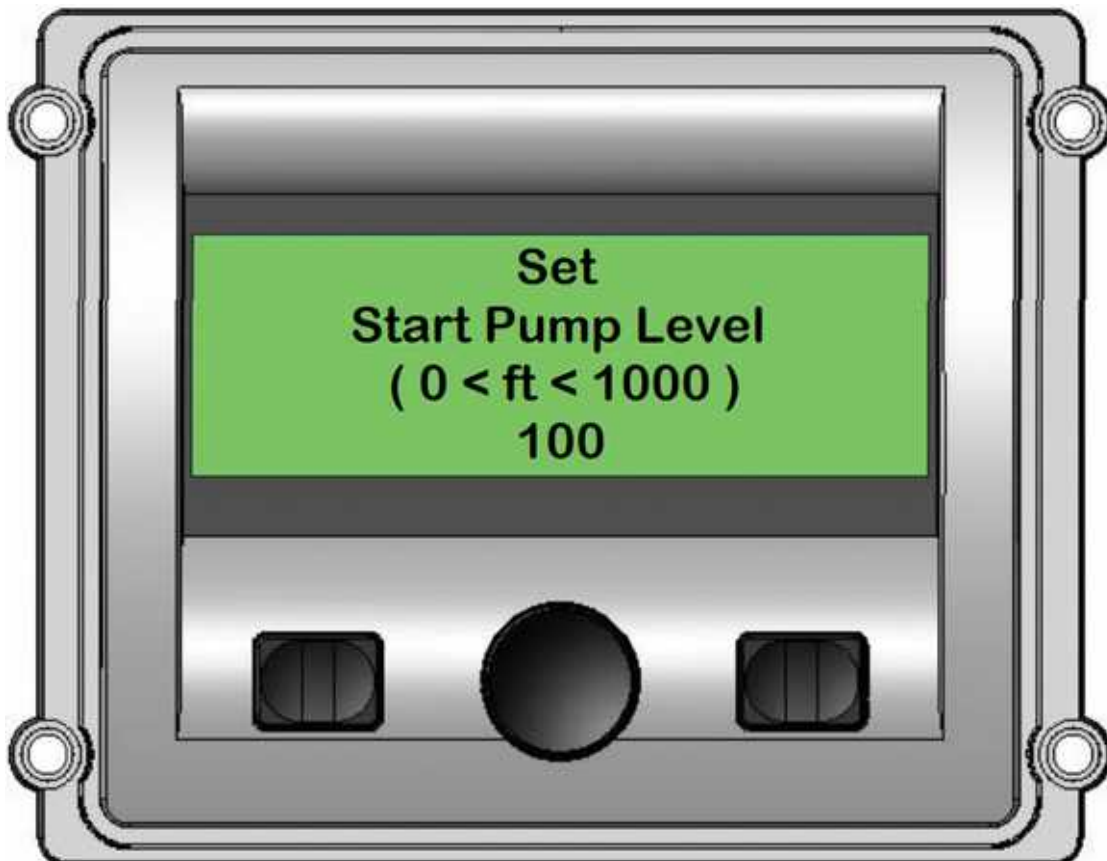
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## CONFIGURATION: START PUMP LEVEL

The Well Bubbler is equipped with a pump control relay, which can be used to stop the pump when the water level is low, and to re-start the pump as the water level recovers. This relay is typically wired to a pump control panel HAND / OFF / AUTO switch.

Set the Start Pump Level to the well level at which the pump should safely start. This value is typically determined by the net positive suction head (NPSH) requirement of the pump itself.

Note that the pump control relay operates based on the instantaneous air line pressure, and will react immediately to protect the pump, without waiting for the scheduled well level sample.



# THE WELL BUBBLER

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## CONFIGURATION: STOP PUMP LEVEL

The Well Bubbler is equipped with a pump control relay, which can be used to stop the pump when the water level is low, and to re-start the pump as the water level recovers. This relay is typically wired to a pump control panel HAND / OFF / AUTO switch.

Set the Stop Pump Level to the well level at which the pump should stop. This value is typically determined by the net positive suction head (NPSH) requirement of the pump.

Note that the pump control relay operates based on the instantaneous air line pressure, and will react immediately to protect the pump, without waiting for the scheduled well level sample.



# THE WELL BUBBLER

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## CONFIGURATION: PUMP RESTART DELAY

The Well Bubbler is equipped with a pump control relay, which can be used to stop the pump when the water level is low, and to re-start the pump as the water level recovers. This relay is typically wired to a pump control panel HAND / OFF / AUTO switch.

Set the Pump Restart Delay to a non-zero value, to avoid cycling the pump frequently. The minimum restart delay is typically specified by the pump manufacturer.





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## CONFIGURATION: TELEMETRY OUTPUT

The Well Bubbler is equipped with two analog outputs, compatible with PLCs, VFDs, SCADA and most telemetry systems.

The analog outputs have a range of 0-5Vdc and 4-20mA. The scaling of those outputs is defined by the value of the Telemetry Output parameter, as follows:

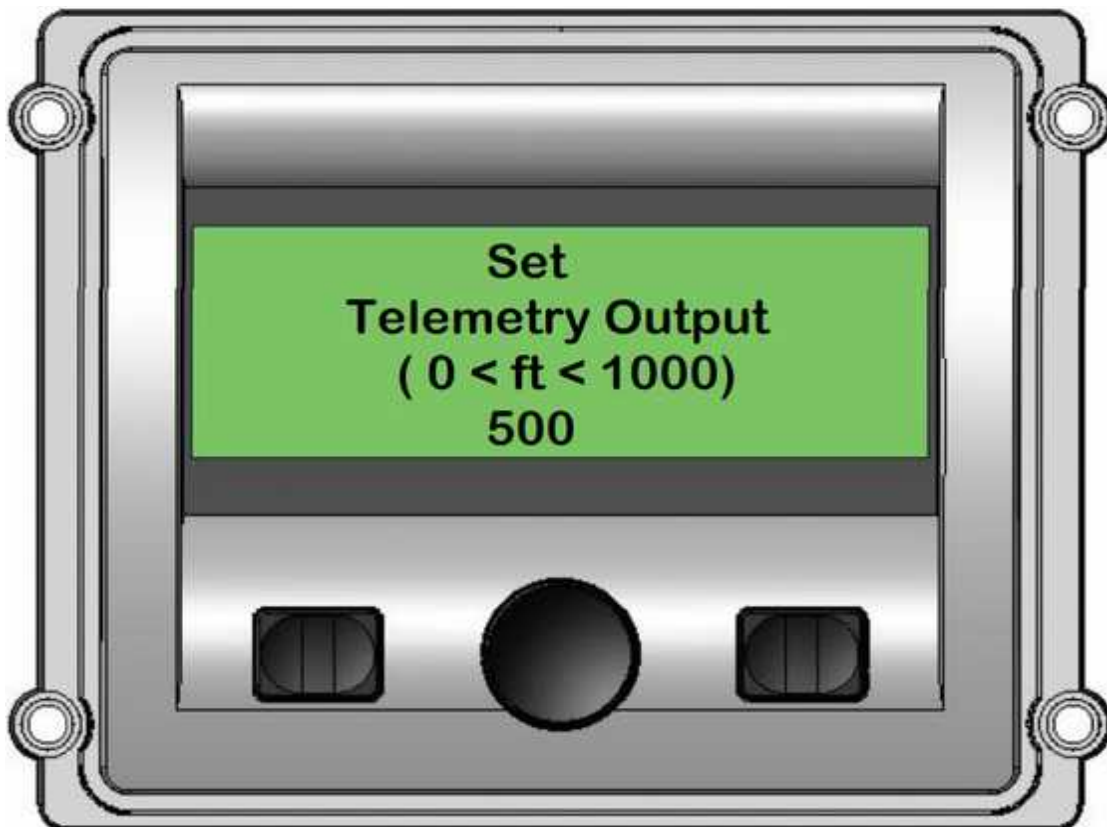
Water Level (feet) = ( Vout / 5.0 ) \* Telemetry Output (feet)

Water Level (feet) = ( mA - 4.0 ) / 16.0 \* Telemetry Output (feet)

Set this parameter to the maximum water level value you expect to measure, or simply to the rating of the Bubbler itself.

For example, setting the Telemetry Output to a value of 500 will result in a 5.0V and 20mA analog output, when the water level reaches 500 feet.

Note that the analog outputs are updated when the Well Bubbler has sampled the well level - once per measurement period. The analog outputs will maintain the last known value between samples.



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## CONFIGURATION: GALLONS PER PULSE

The Well Bubbler is compatible with pulse-type flow meters, and will record and display real-time flow rate. Once the flow meter is correctly installed and wired to the Well Bubbler, set the Gallons Per Pulse to match the output of the flow meter itself.

This parameter must match the pulse output scaling of the flow meter exactly.

Only one flow meter can be wired to a Well Bubbler. If both the pulse-type flow meter scaling, and the 4-20mA flow meter scaling are defined as non-zero values, the flow rate from only the pulse-type unit will be measured and reported.



# THE WELL BUBBLER

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## CONFIGURATION: GALLONS PER MINUTE

The Well Bubbler is compatible with 4-20mA flow meters, and will record and display real-time flow rate. Once the flow meter is correctly installed and wired to the Well Bubbler, set the Gallons Per Minute to match the output of the flow meter itself.

This parameter must match the 4-20mA output scaling of the flow meter exactly. Enter the sensor's rating here, or set the value to zero to disable the feature.

Only one flow meter can be wired to a Well Bubbler. If both the pulse-type flow meter scaling, and the 4-20mA flow meter scaling are defined as non-zero values, the flow rate from only the pulse-type unit will be measured and reported.

If this 4-20mA sensor is configured, and at least 4.0mA is not detected by the Well Bubbler, the unit will display an error, indicating that the sensor cannot be read. Note that some 4-20mA sensors will produce slightly less than 4.0mA at rest (for example, 3.95mA). This will result in an error, until the sensor output exceeds 4.0mA.



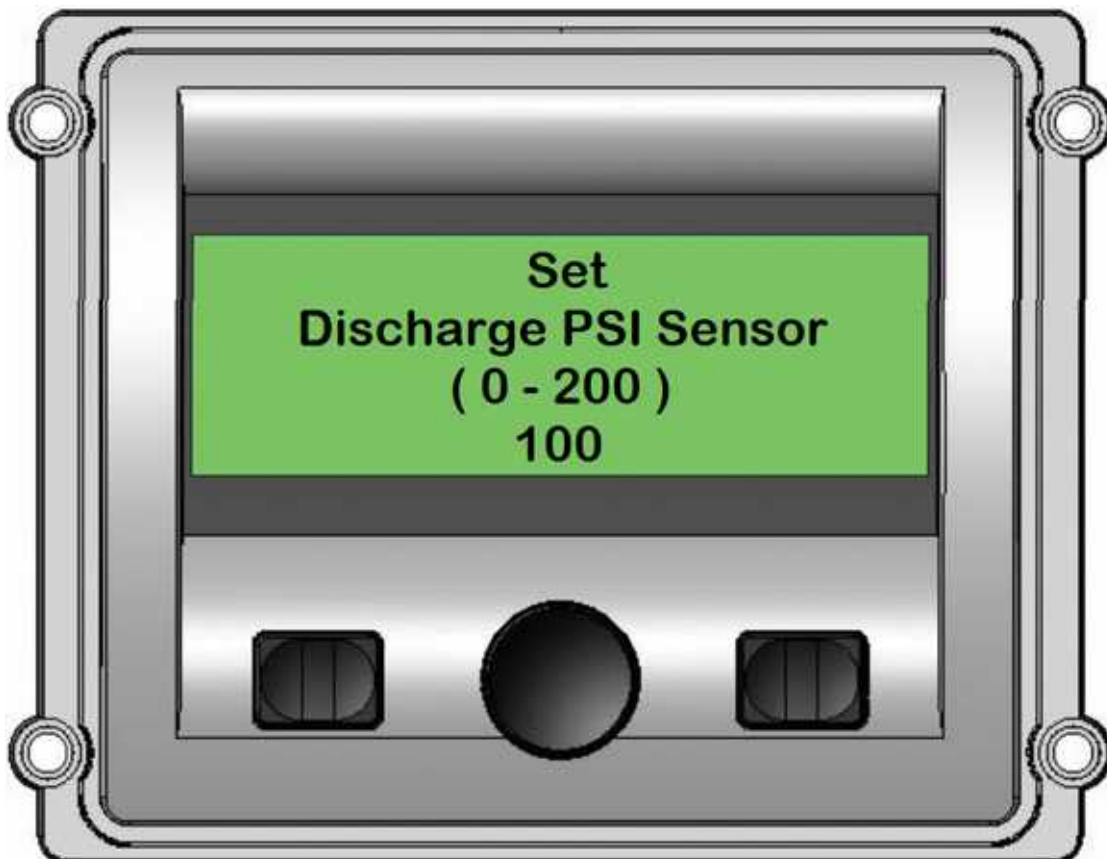
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## CONFIGURATION: DISCHARGE PRESSURE SENSOR

The Well Bubbler can be used to measure and record the pump discharge pressure using a transducer with a 4-20mA output. Enter the sensor's rating here, or set the value to zero to disable the feature.

If this 4-20mA sensor is configured, and at least 4.0mA is not detected by the Well Bubbler, the unit will display an error, indicating that the sensor cannot be read. Note that some 4-20mA sensors will produce slightly less than 4.0mA at rest (for example, 3.95mA). This will result in an error, until the sensor output exceeds 4.0mA.



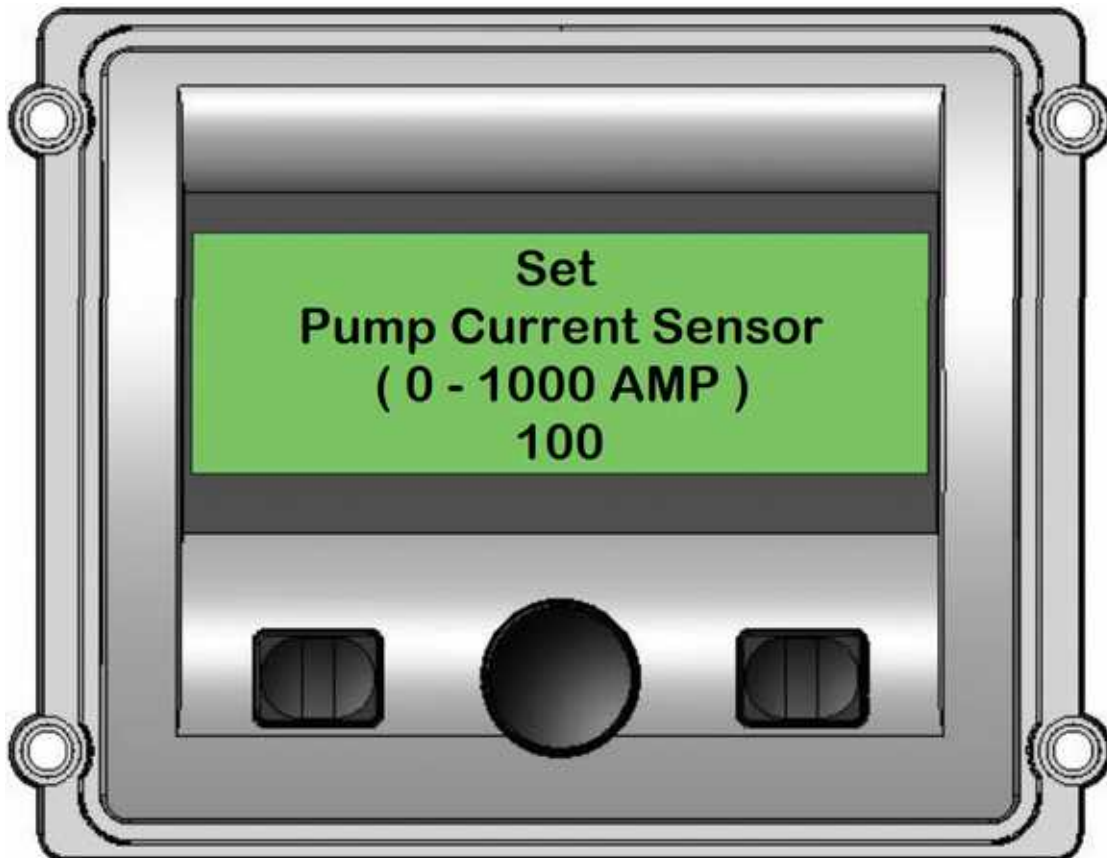
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## CONFIGURATION: PUMP CURRENT SENSOR

The Well Bubbler can be used to measure and record the pump current using a current transducer with a 4-20mA output. Enter the sensor's rating here, or set the parameter to zero to disable this feature.

If this 4-20mA sensor is configured, and at least 4.0mA is not detected by the Well Bubbler, the unit will display an error, indicating that the sensor cannot be read. Note that some 4-20mA sensors will produce slightly less than 4.0mA at rest (for example, 3.95mA). This will result in an error, until the sensor output exceeds 4.0mA.



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## CONFIGURATION: WELL ID

This field is used to identify the well monitored by the Bubbler; the Well ID is recorded with every data point, allowing for convenient use of one Well Bubbler on multiple wells. The Well ID is also reported to the online dashboard.



# THE WELL BUBBLER

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## CONFIGURATION: PUMP CONTROL MODE

The Well Bubbler is equipped with a pump control relay, which can be used to stop the pump when the water level is low, and to re-start the pump as the water level recovers.

When the Well Bubbler relay is used to control a well pump, this field should be set to Empty. If the unit is used to control a pump which fills a tank or reservoir, or a re-injection well, set this parameter to Fill.





# THE WELL BUBBLER

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## CONFIGURATION: FIRMWARE, SPECIFICATIONS

The Firmware Version is displayed for reference only; please include it when contacting Well Bubbler support.

The specific gravity parameter is set at the factory, and can be changed via the Manager software utility, or remotely, for Well Bubblers with cellular monitoring. This value is set to 1.000 by default, for measuring pure water. The Well Bubbler can also be used to measure a variety of liquids, such as acid, fertilizer and sludge, with different densities and specific gravity values.

The rating of a Well Bubbler is set at the factory, and should not be changed afterwards. Well Bubblers with relatively low ratings of 15 psi, 30 psi and 50 psi are available for accurate measurement of tank and reservoir levels, and shallow wells. Pressure ratings of 150 psi, 200 psi and 300 psi are used for monitoring deep wells.



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## HARDWARE INTERFACE, WIRING

Each Well Bubbler is equipped with an 8-pin connector, a 6-pin connector and a USB connector. The connectors are used to wire the sensors and features shown below.

Wiring diagrams for each connector are available in the Downloads section of the Well Bubbler website.

The user manual for the Manager software utility is also available for download, along with the utility itself.



### 8-Pin Connector

- 0-5 Vdc analog output
- 4-20 mA analog output
- 12 Vdc regulated output
- 24 Vdc power input
- Pulse-type flow meter input

### 6-Pin Connector

- Pump discharge pressure sensor, 4-20 mA
- Pump current transducer, 4-20 mA
- Pump control relay

### USB Connector

- Well Bubbler Manager software utility
- Data logger