



WELL BUBBLER 10-120 INSTALLATION INSTRUCTIONS

STEP 1 The Well Bubbler 10-120 is 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 in the ground, or on a backboard, as shown below. Orient the open face of the strut due South for installations in the Northern Hemisphere, and due North otherwise.





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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.



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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STEP 4 Install the fuse provided with the Well Bubbler into the fuse holder, as shown below. 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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USING THE DISPLAY Press the round, center button to toggle between menu items; use the rectangular left and right buttons to set parameter values. 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.

MAIN MENU The main menu is shown once the fuse is installed. Use the round, center button, to toggle between menus. Use the rectangular left, and right, buttons, to change the settings.

The Well Bubbler main menu contains the following items:

Well Level – this is the last known value as measured by the unit

Testing – this is the current pressure in the airline, in PSI

Stat – the status indicator shows the operating mode of the unit – Testing, Waiting, etc.

t – the timer shows the duration of the current test, and the period between successive test runs

Vbat – This is the internal battery voltage, nominally between 11.5V and 14.4V

T – This is the internal temperature of the unit, in Fahrenheit, and is shown for reference only



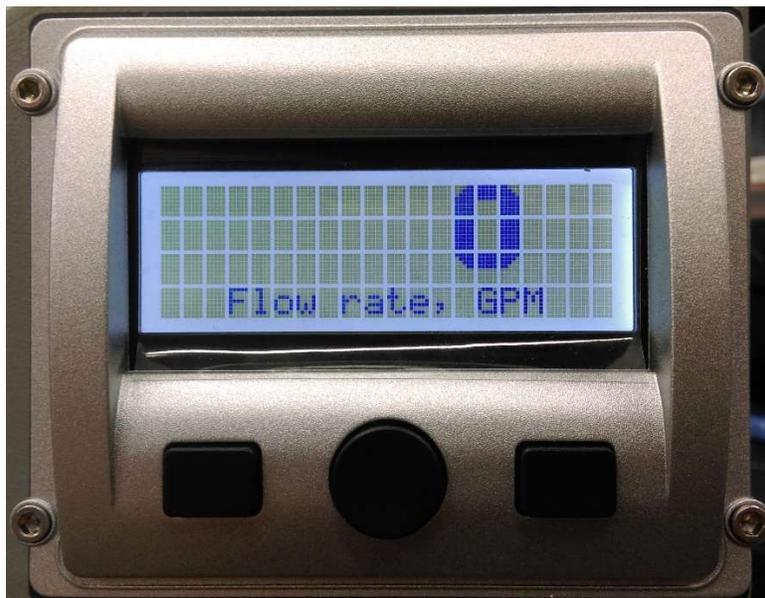


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ADJUST CONTRAST The Bubbler adjusts the display contrast automatically, based on the display temperature, to improve visibility in bright sunlight. This menu can be used to override the automatic adjustment.



FLOW RATE The Bubbler can be configured to read a flow meter with a pulse-type, or 4-20mA type, output. If this feature is enabled, an instantaneous value with a one-second averaging time is displayed here; note that the value stored in the data logger may vary from the displayed value due to longer averaging times.





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MOTOR POWER The Motor Power setting determines the air pressure 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 1/4" or larger galvanized sounding tube.



MANUAL TEST This menu can be used to manually operate the Well Bubbler; this feature can be used to quickly pressurize the air line, or to test compressor operation for diagnostics purposes. Leave the Manual Control in the OFF position for normal operation.





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MANUAL PUMP CONTROL This menu is used to manually open and close the pump control relay for test purposes. The relay is used to control pump, or alarm, operation, based on the measured well level. Leave this menu in the OFF position for normal operation.



ENABLE WELL BUBBLER This menu is used to enable sensor operation; leave this menu in the ON position for normal operation. Leave this menu in the OFF position if the unit is installed in the field, but not connected to an airline.





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MOTOR 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 may be required when using 1/4" or larger galvanized sounding tube.



READ DELAY TIME The Read Delay 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 may be required when using tubing with an ID less than 1/8".





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MEASUREMENT PERIOD The Measurement Period determines how frequently the well level is sampled. A lower value results in more data but requires more power. This parameter should be set to 5 minutes for pump control applications, and 15 minutes for monitoring applications. Increase the period for locations with poor sunlight exposure, or when using air line exceeding 1/4" in diameter. The Well Bubbler will automatically reduce its sampling frequency, then stop operating, if the battery voltage is too low.



AIR LINE LENGTH The Air Line Length is the **single most important parameter** in the Well Bubbler configuration. Set this value to the length of the air line which is installed in the well. Without a correct airline length, the Well Bubbler will display the correct air line pressure, but not the correct well level. The airline length is usually recorded by the company, or individual, responsible for previously testing the well – it is frequently the same as the pump set depth. Alternately, the airline length can be calculated from the standing or pumping water levels shown on a recent pump test.





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PRESSURE LIMIT The Pressure Limit is used to control the maximum allowable air line pressure. The default setting of 150PSI is recommended, unless the air line is prone to pinching, blockage or regular failure.



START PUMP ABOVE Set this parameter to the well depth at which the pump can operate safely, without over-drafting the well or damaging the pump itself. A value of 50-100 feet above the pump set depth is recommended.





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STOP PUMP BELOW Set this parameter to the well depth at which the pump should stop, to prevent over-drafting the well or damaging the pump itself. A value of 30-50 feet above the pump set depth is recommended. Note that this value should be set lower than the START PUMP ABOVE parameter to avoid cycling the well pump frequently and allow the well to recharge.



PUMP RESTART DELAY Set this parameter to control the delay between pump stop and re-start, to avoid frequent cycling of line-driven pumps; a value of 15-30 minutes is recommended.





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SENSOR RATING The Well Bubbler is available with pressure sensor ratings between 5PSI and 150PSI. The standard 10-120 unit uses a sensor with a 150PSI rating; do not modify this parameter unless a custom sensor is installed.



TELEMETRY OUTPUT The Bubbler produces 0-5V and 4-20mA analog outputs for use with telemetry, SCADA and VFDs. The scaling of those outputs is determined by this parameter - set the value to indicate the full-scale output of the unit. The value should equal, or exceed, the air line length; a factory default setting of 500 feet is used.





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GALLONS PER PULSE The Well Bubbler can be used to monitor, and record data from, a pulse-type flow meter. Enter the pulse scaling using this parameter – be sure that it matches the scaling of the flow meter itself. Set the parameter to zero to disable this feature.



GPM FULL SCALE The Well Bubbler can be used to monitor, and record data from, a flow meter with a 4-20mA output. Enter the scaling using this parameter – be sure that it matches the scaling of the flow meter itself. Set the parameter to zero to disable this feature.





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PSI FULL SCALE 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 full-scale output here; a factory default of 100PSI is used. Set the parameter to zero to disable this feature.



AMP FULL SCALE The Well Bubbler can be used to measure and record the pump power using a current transducer with a 4-20mA output. Enter the sensor's full-scale output here; a factory default of 10Aac is used. Set the parameter to zero to disable this feature.





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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.



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





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DISPLAYED VALUES Once configured, the Well Bubbler will display the measured well level, in feet. If the flow meter input is enabled, the GPM value will also be displayed periodically. If the pressure transducer or current transducer inputs are enabled, their sampled values will be displayed whenever the round center button is pressed.



TELEMETRY OUTPUT Telemetry and datalogger output, as well as relay wiring, are accessed via the liquid-tight terminal block mounted on the left side of the unit - **do NOT open** the main Well Bubbler enclosure. Both the 0-5V and 4-20mA channels generate an output proportional to the last measured well level – not just the airline pressure. The outputs are scaled via the Telemetry Output parameter; the following transfer functions should be used to calculate the GSWS:

$$\text{GSWS (ft)} = (V / 5.0) * \text{Telemetry Output (ft)}$$

$$\text{GSWS (ft)} = (\text{mA} - 4.0) / 16.0 * \text{Telemetry Output (ft)}$$

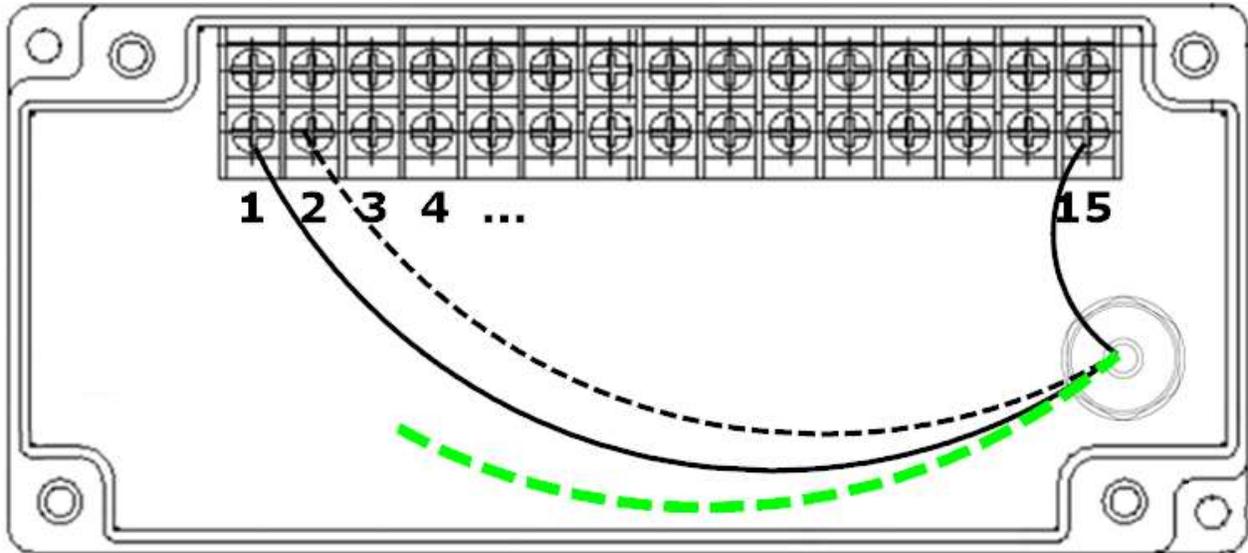
The 0-5V output is active, and does not require external power. The 4-20mA output is passive, and requires a 12V-24V external supply; it is galvanically isolated to 600Vac from the internal supply reference, the chassis, and the 0-5V reference. The relay contact rating is 5A at 120Vac; the relay should be used to operate an external pump control circuit, and not the motor itself.



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TERMINAL BLOCK WIRING The Well Bubbler includes an extensive list of features, wiring for which is accessed via the liquid-tight terminal block. Each of the fifteen wires is numbered, and landed on the appropriate terminal of the terminal block. The wire assignment is shown below, and on the interior of the terminal block cover. Refer to unit specifications prior to interfacing external sensors and telemetry.



MAIN HARNESS WIRING			
Designation	Color	Wire #	Term #
0-5V OUT NEG-	BLACK	1	1
0-5V OUT POS+	BLACK	2	2
4-20mA OUT NEG-	BLACK	3	3
4-20mA OUT POS+	BLACK	4	4
RELAY	BLACK	5	5
RELAY	BLACK	6	6
FLOW PULSE -	BLACK	7	7
FLOW PULSE +	BLACK	8	8
12V OUT NEG-	BLACK	9	9
12V OUT POS+	BLACK	10	10
ALL 4-20mA NEG-	BLACK	11	11
FLOW 4-20mA POS+	BLACK	12	12
PRESSURE 4-20mA POS+	BLACK	13	13
CURRENT 4-20mA POS+	BLACK	14	14
AUX DC INPUT POS+	BLACK	15	15
CHASSIS GND	GRN/YLW	NA	NA