Sentry **WIRELESS** LIQUID LEVEL ALARM MODEL 110
OPERATING MANUAL

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1. SAFETY PRECAUTIONS

The potential for electrical shock exists whenever water is present near conductive electrical equipment. Check for sources of electricity from other nearby devices before working on this equipment. There is no possibility of serious shock from the energy levels used by this alarm. The low direct current (DC) voltages and transformer isolation provide safety when handling or opening the enclosures or the probe. Best practice however, is to disconnect power when working on this equipment.

2. APPLICATIONS

The *Sentry* liquid level alarm continuously monitors a water level, rising or falling, that may cause an alarm condition. Application examples are pump chambers, cisterns, holding tanks, sumps, floor drains, irrigation channels or truck tanks. The battery powered outdoor probe communicates with the indoor alarm display up to 90 m (300 feet) range. The indoor alarm display will flash an LED and sound an audible alarm.

- Green indicates power on and monitoring
- Red flashing and audio pulsing indicates an alarm condition
- Yellow indicates an error in the probe circuit or in the wireless communication

See the State Table in Section 4.1 for the complete detail of the conditions which may be displayed and the self-diagnostics.

Audio can be temporarily silenced with the pushbutton. Audio will reset when the alarm condition is corrected.

2.1. HIGH LEVEL alarm condition will occur when the liquid level rises to partially cover the pins on the bottom of the probe. An example of rising water causing an alarm condition is a septic tank.

2.2. LOW LEVEL alarm condition will occur when the liquid level falls close to the middle of the pins of the probe. An example of falling water level causing an alarm condition is a cistern that requires filling.

3. INSTALLATION

3.1. Mount the *Sentry* indoor alarm display at a convenient viewing location. Select an eye level location that is frequented, near a 120VAC receptacle. Power to the receptacle should be supplied from a circuit separate from any pump that is being monitored by this alarm. Install the supplied screws, 3" apart vertically and projecting ¼" from the wall, to mount the display. Install the AC adapter and plug into the alarm display. The LED will be steady yellow, indicating no wireless communication. See the State Table in Section 4.1 for the complete detail of the conditions which may be displayed and the self-diagnostics.

3.1.1. Channel 1 is factory default. If it is necessary to change to another channel, see section 4.3.

3.2. Mount the *Sentry* outdoor transmitter near the water source to be monitored. Fasten the weatherproof NEMA 4 enclosure to a post or a riser pipe above grade. Radio transmission is improved by mounting the transmitter higher and away from sheet metal or electrical power lines.

3.2.1. The jumper position inside the outdoor transmitter determines the HIGH LEVEL or LOW LEVEL function to suit your application. See FIG 4. Using needle nosed pliers, install the jumper, shorting the two terminals for a HIGH LEVEL function. For a LOW LEVEL function the jumper is installed on one terminal.

3.2.2. Channel 1 is factory default. If it is necessary to change to another channel, see section 4.3.

3.2.3. Install the four AA cell batteries supplied--see FIG 7.

3.3. Suspend the probe at the depth the alarm is required. Use the supplied clip to grip the probe cord. See FIG 1. Use wire that will not corrode, such as insulated building wire, bent into an “S” hook, to suspend the probe from a projection in or off the rim of the neck of the tank. The probes alarm point occurs when the pins are partially covered by water.

FIG 1 PROBE WITH SUSPENSION CLIP

3.4. Test the alarm

3.4.1. For a HIGH ALARM the LED will be green and on steady with the probe out of the liquid. When the probe is lowered into the liquid, the LED will turn flashing red and the audible alarm will pulse. Silence the audible alarm. Raise the probe out of the liquid to stop the red LED flashing and to reset the audible alarm. Repeat this sequence to prove operation. For any other conditions see the State Table in section 4.1.

3.4.2. For a LOW ALARM the LED should be green and on steady with the probe in the liquid. When the probe is raised above the water, the LED will turn flashing red and the audible alarm will pulse. Silence the audible alarm. When the probe is lowered into the liquid the LED will turn steady green indicating alarm is monitoring. Repeat this sequence to prove the operation. For any other conditions see the State Table in section 4.1.

3.4.3. The indoor alarm display will respond within 3 seconds to a change in alarm state after wireless communications have been established. The indoor alarm display should receive an update from the outdoor transmitter every 3.5 minutes when no state change has occurred. See section 4.4 for further details.

FIG 2 INDOOR ALARM DISPLAY
REAR INTERIOR

FIG 3 OUTDOOR TRANSMITTER ENCLOSURE INTERIOR

FIG 4 OUTDOOR TRANSMITTER ENCLOSURE INTERIOR CLOSEUP

3.5. Optional relay output

The relay output may be used to switch an external circuit to operate remote alarms, security systems, auto-dialers or other control applications. The spring clamp terminal block on the indoor display accepts 26-14 gauge solid or stranded wire. See Fig 5 below. Depress the orange lever and insert the stripped wire into the terminal block.

FIG 5 OPTIONAL RELAY OUTPUT

4. OPERATION and TROUBLESHOOTING

4.1 State Table and Troubleshooting - Indoor Alarm Display

LED	AUDIO	HIGH LEVEL (i.e. Septic tank)	LOW LEVEL (i.e. Cistern)	CORRECTIVE ACTION
OFF	OFF	No Power		Check breaker Check Transformer Check plug into display
GREEN STEADY	OFF	PROBE DRY	PROBE WET	OK
RED FLASHING	PULSING	ALARM - PROBE WET	ALARM - PROBE DRY	OK
RED FLASHING	SILENCED	ALARM - PROBE WET	ALARM - PROBE DRY	OK
RED FLASHING	OFF	DISPLAY IN PROGRAMMING MODE		See 4.3
YELLOW FLASHING	PULSING	MANUAL TEST		OK
YELLOW STEADY	CONTINUOUS	NO WIRELESS SIGNAL		Replace batteries (See 5.1) Check for radio interference Change radio frequency Transmitter out of range
GREEN / YELLOW FLASHING	CONTINUOUS	PROBE ERROR		Replace probe
RED STEADY	CONTINUOUS	PROBE SHORT		Replace probe
RED / YELLOW FLASHING	CONTINUOUS	PROBE DISCONNECTED		Connect probe wires (See FIG 4) Check probe wire for damage; make a waterproof repair
As it was	CHIRP	LOW BATTERY		Replace batteries (See 5.1)

4.2 A manual test function is incorporated into the indoor alarm display. Pressing down and holding the Audio button will test the software and hardware and return a yellow flashing LED and a pulsing alarm sound.

4.3 Twelve radio frequencies are available. Changing the frequency may be required if an installation uses multiple alarms within close proximity, or if interference with other radio devices occurs.

Factory preset

Channel #	1	2	1	2	1	2	1	2	1	2	1	2
Group	1		2		3		4		5		6	
Frequency	1	2	3	4	5	6	7	8	9	10	11	12

To change the frequency select the channel and group using the procedure outlined in the following sections. Channel 1, group 2, selects frequency 3, which is the factory preset. The indoor alarm display and the outdoor transmitter must be on the same frequency.

4.3.1 Program the indoor display

- Disconnect power from the indoor alarm display.
- Open the back cover of the display and move the jumper to either channel 1 or 2 position. See FIG 2. Replace the cover.
- Hold the Audio button down while connecting power. The LED will turn on bright red indicating that the programming mode is entered. Release the button and the LED will go out.
- Within 5 seconds, start to press the button from 1 to 6 times to select the group. The LED will turn on bright red each time a contact is made.
- Wait for 5 seconds, and the LED will flash back the same number of times to confirm the group. After another 5 second delay it will flash once or twice confirming the channel setting. The display will then go into normal operation.

4.3.2 Program the outdoor transmitter

- Disconnect the power from the outdoor transmitter by removing a battery and waiting 5 minutes for the capacitance to discharge.
- Move the jumper to either channel 1 or 2 position. See FIG 4.
- Hold a magnet over the reed switch while installing the battery. See FIG 6. The LED will turn on bright red indicating that programming mode is entered. Remove the magnet and the LED will go out.
- Within 5 seconds, place the magnet near the reed switch from 1 to 6 times to select the group. The LED will turn on bright red to indicate reed switch contact.
- Wait for 5 seconds and the LED will flash back the same number of times to confirm the group. After another 5 second delay it will flash once or twice confirming the channel setting. The transmitter will then go into normal operation.
- During normal operation the LED will flash every three seconds while the magnet is held near the reed switch, indicating a transmission.

FIG 6 OUTDOOR TRANSMITTER
REED SWITCH AND LED

4.4 The wireless transmissions are timed to optimize battery life. The indoor alarm display will respond within 3 seconds to a change in alarm state after wireless communications have been established. The indoor alarm display should receive an update from the outdoor transmitter every 3.5 minutes when no state change has occurred. The internal capacitance of the outdoor transmitter will prolong its operation for a few minutes when the batteries are removed. It may take as much as 5 minutes for the indoor alarm display to recognize that no wireless signal has been received after the battery has been removed.

5. MAINTENANCE

5.1. Four AA cell long life alkaline batteries power the outdoor transmitter. See FIG 7. Follow the diagrams on the battery holder for correct battery installation; positive and negative battery ends installed as shown on the battery holder. Replacement batteries must be new, fresh alkaline and replaced as a set of four.

FIG 7 OUTDOOR TRANSMITTER
BATTERIES INSTALLED

6. SPECIFICATIONS

6.1. INDOOR ALARM DISPLAY

Power Supply - 120VAC, 60 Hz input, 9VDC 200 mA output, UL listed, CSA certified, indoor unit, power consumption typically .05 watts, 0.9 watts maximum during alarm condition

Enclosure - flame retardant ABS

High level, Low level function selectable

LED - tricolor

Audible alarm - solid state transducer, 85db @ 10cm

Transceiver - ISM 2.4GHz, 12 channels available, -40^0C to 85^0C rated, IC and FCC 15 approved

6.2. OUTDOOR TRANSMITTER

Power – four AA batteries, battery life 3 years

Enclosure – PVC NEMA 4

High level, Low level function selectable

Transceiver - ISM 2.4GHz, 12 channels available, -40^0C to 85^0C rated, IC and FCC 15 approved

Optional relay output—dry contacts normally open, 2A @ 30 VDC, 0.4A @ 125 VAC rating

Probe – digital RF proximity, stainless steel, type 304 or 316, 22mm diameter x 100mm long, cable - 2 conductor, 18 Ga, SJOOW jacket, 5m (16 feet) or 10m (32 feet)

Suspension clip – HDPE, UV resistant

6.3. IC AND FCC 15 APPROVAL

Contains Model XBEE-PRO Radio, IC: 4214A-XBEEPRO

Contains FCC ID: OUR-XBEE

The enclosed device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

7. WARRANTY

Aquatic Sentry Controls Inc. warrants that this product is free from defects in materials and workmanship under normal use and service for a period of **three years** from the date of purchase by the initial owner. Aquatic Sentry shall be responsible only for actual loss or damage suffered and then only to the extent of Aquatic Sentry's invoiced price. Within the warranty period we shall repair, refurbish or replace, at our option, such products or components, which are returned to us with shipping charges prepaid, and which are determined by us to be defective. This warranty will not apply to any product or part thereof which has been subject to misuse, negligence, or accident; or misapplied; or modified; or repaired by unauthorized persons; or improperly installed. The provisions of the above warranty are our sole obligation and exclude all other remedies or warranties, expressed or implied, including warranties of merchantability and fitness for a particular purpose, whether or not purposes or specifications are described herein. We further disclaim any responsibility whatsoever to the customer, or to any person, for injury to person, damage to, or loss of property or value caused by any product, regardless of whether the defect is warrantable or whether the product has been subjected to misuse, negligence, accident; or modified or repaired by unauthorized persons; or improperly installed.

Under no circumstances shall the company be liable for any incidental, consequential or special damages, loss or expenses arising from the use of this product, or in connection with the use of, or inability to use, our product for any other purpose whatsoever.

Aquatic Sentry products or parts thereof assumed to be defective by the purchaser within the stipulated warranty period should be returned to the seller or local distributor for evaluation and service. If deemed necessary, the seller or distributor shall contact Aquatic Sentry Controls Inc. for a Returned Materials Authorization and then return the item for direct factory evaluation, service or replacement. No material may be returned to Aquatic Sentry Controls Inc. without proper factory authorization.

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