Sentry LIQUID LEVEL GAUGE MODEL 200 or 200C
OWNER 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. The low direct current (DC) voltages and transformer isolation of this instrument pose no danger when handling or opening the enclosures or connecting the sensor. Best practice, however, is to disconnect power when working on this equipment.

2. APPLICATIONS

The *Sentry* liquid level gauge continuously measures the water level in cisterns, holding tanks, pump chambers, sumps, treatment plants, irrigation channels and truck tanks. The indoor level display indicates the depth of water in feet, meters or percent. HIGH and LOW level alarm points and an audible alarm with silence and auto reset can be used to warn of an alarm condition. A yellow LED indicates when the silence is activated.

Four relay outputs on the model 200C can be configured to operate pumps, aerators, remote alarms, security system, auto dialer or other control applications. Four green LEDs on the display indicate the relay status.

The sensor rests, vertically, on the bottom of the tank and is tethered at the top. Sensor cables are terminated in a NEMA 4X junction box, to which customer-supplied cable is terminated. This cable then terminates at the display. (Fig 3.3.1)

3. INSTALLATION

   3.1. Mount the *Sentry* level display in a dry location, at a convenient viewing height within 6 feet of a 110VAC receptacle. Power to the receptacle should be supplied from a circuit separate from any pump or equipment that is being monitored or controlled by this gauge. The supplied screws can be used to mount the

unit. Install screws 3" apart vertically and projecting ¼" from the surface. Install the AC adapter and plug into the level display. The LED display will read `OPEn` indicating that the sensor is not connected.

3.2. Mount the *Sentry* outdoor weatherproof NEMA 4 junction box to a post or a riser pipe above grade within nine feet of the top inside of the tank.

3.3. Install a two or three conductor cable between the junction box and the indoor display. Single sensors eight feet and less in length use two conductor cable. Dual sensors or sensors greater than eight feet require three conductor cable. An 18 gauge cable, preferably stranded conductors, with an FT4 jacket (gray PVC) is recommended for most applications. The sensor power cable(s) are connected to the cable run inside the junction box. See Fig 3.3.1. The screw terminal plug is installed on the display end of the cable and plugged into the display. See Fig 3.6.1
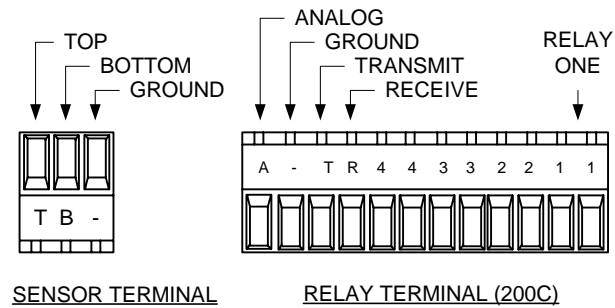

WHITE+
WHITE OR GREEN +
BLACK -

RED +
WHITE +
BLACK -

CABLE BY CUSTOMER

TOP SENSOR (>8')

BOTTOM SENSOR

FIG 3.3.1
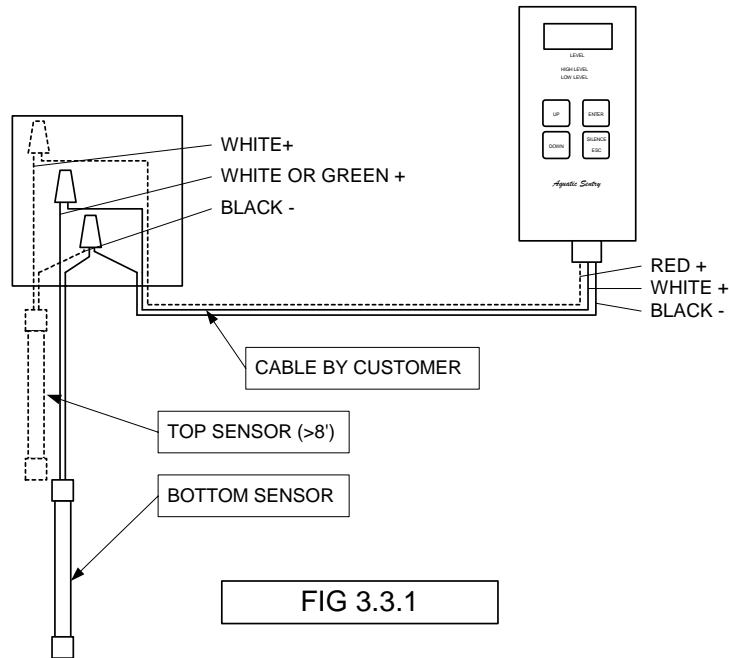
FIG 3.6.1

3.4. It is good practice to test the operation of the gauge at this point. Wrapping your hand around the sensor(s) and moving slowly up will give a reading on the display at the approximate level of your hand. *(The water in your hand acts as the water that will surround the sensor when in operation.)* Setting the sensor into a pail of water is another way to test the operation. The level is displayed in feet, the factory default setting. This step verifies the integrity of the wiring.

3.5. A single sensor length is a maximum of 8 feet. A top sensor is used in addition to the bottom sensor for a total depth of greater than 8 feet up to 16 feet. The top sensor can be incorporated into the same tube up to 10 feet. After that depth dual sensors are used and a support leg is used to ensure the top sensor is in alignment with the bottom sensor. The sensor lengths may be also be mixed; for example a 12 foot sensor may be made out of two 6 foot sensors. Lower the sensor(s) into the water using the tether rope. **DO NOT SUSPEND THE SENSOR FROM THE POWER CABLE.** The sensor is internally weighted and will rest on the bottom of the tank. For dual sensor applications mount the support leg to the top sensor per the enclosed instructions. The tether rope(s) is tied off to hold the sensor vertical.

3.6. (Model 200C) Run the control wiring to the power relays. Conductor size maximum is 16 gauge, preferably stranded. 18 gauge wire is recommended.

The display plug-in screw plug is labeled for relay 1-4 terminals. See Fig 3.6.1.

3.7. Program the display for the required alarm points and control relay settings referring to the following instructions and the programming mode menu supplied separately.

3.7.1. To enter the programming mode hold the ENTER and ESC buttons down for 5 seconds. The display will move through the diagnostic mode $d\ IRG$ and will then display the first item of the menu, the HIGH LEVEL ALARM. $H\ ,\ R$ Scroll through the first level of menu items by using the UP and DOWN buttons. Select the next level of each menu item by pressing the ENTER button. Move back to the previous level of menu items by pressing the ESC button. Pressing ESC will not change any values. Press ENTER to temporarily store each change into memory. The display will verify the temporary $5tor$ status when ENTER is pressed.

3.7.2. Program a HIGH LEVEL ALARM by setting the trip point at the desired depth. As the water level rises up past that depth, the red LED and the audio alarm will activate. Set the release point depth below the trip point to turn the alarm off as the water level falls and returns to normal. A release point set above the trip point will be ignored but the alarm may "hunt". Set the audio alarm on or off. If no HIGH LEVEL ALARM is required, set the trip and release values higher than the sensor length and the audio to off.

3.7.3. Program a LOW LEVEL ALARM by setting the trip point at the desired depth. As the water level falls below that depth the red LED and the audio alarm will activate. Set the release point depth above the trip point to turn the alarm off as the water level rises and returns to normal. A release point set below the trip point will be ignored but

the alarm may "hunt". Set the audio alarm on or off. If no LOW LEVEL ALARM is required, set the trip and release values to zero and the audio to off.

3.7.4. (Model 200C Controller). Program any of the four CONTROL RELAYs by setting the desired action, or polarity, for the relay – normally open or normally closed. Set the trip point at the desired depth. This will activate the relay closed (or open, depending upon polarity). Set the release point which activates the relay open (or closed, depending upon polarity). Setting the release point above the trip point is a PUMP UP configuration. Setting the release point below the trip is a PUMP DOWN configuration. The four relays can be set independently for any span throughout the entire range of the sensor to operate pumps, aerators, low or high level cutouts, remote alarms, security systems, auto dialers or other control applications. The relay status is shown on the front bottom of the display. Relay 1 status is shown by the right LED. The position of the LED corresponds to the positions of the relay wiring terminations on the screw terminal plug below.

3.7.5. Set the brightness of the LED display to 1, 2, 3 or 4 where 4 is the brightest.

3.7.6. If installing another sensor, other than the original factory supplied, program the length of the bottom and top sensor. Lengths are entered in one foot increments up to 8 feet--the maximum length of an individual sensor. When two sensors are used, enter each of their lengths. Example – a 5 ½ foot sensor would be entered as 6 feet.

3.7.7. If a different display than the factory setting of depth in feet and decimals of a foot is desired, set the display units to meters or percent of the sensor length. Volume will be available in the future for specific tank configurations.

When in display mode press ENTER to check which units are being displayed:

FEEt   Foot (decimals)

PErc   Percent of the sensor length

5 I   Meters

The display returns to numeric level when ENTER is released.

3.7.8. Scroll to 9u it and press ENTER to return to the level display. This also reprograms any temporary value changes that were made and stored in memory while in programming mode.

4. OPERATION and TROUBLESHOOTING

4.1. Self calibration

This instrument "learns" the characteristics of the tank it is installed in while it is in use. Readings may be less accurate when the system is first tested. Once the tank is in use and has been filled at least ¼ full the system will be "taught' and give the best accuracy.

4.2. State Table and Troubleshooting

LED DISPLAY	HIGH LEVEL	LOW LEVEL	AUDIO	CORRECTIVE ACTION
boot				Display is loading software upon power up.
OPEn				Display is not reading sensor; check all cable connections to sensor.
SHrt				Check all cable connections to sensor. Check terminals for correct polarity. Sensor damaged; replace sensor.
unknown alphanumeric value				Unplug power supply and plug back in. Display will reboot and return to numeric level display mode. Check programmed values for correctness.
Dim				Check the brightness of the display. See 3.7.5 in this manual.
	LED on unexpected			Check programmed HIGH alarm trip and release points; see 3.6.2
		LED on unexpected		Check programmed LOW alarm trip and release points; see 3.6.2
			Audio on unexpected	Check programmed HIGH and LOW alarm bEEP OFF . Verify that release points are set correctly and the unit is not "hunting". See 3.7.2 & 3.7.3

4.3. Diagnostic mode menu

To enter the diagnostic mode press ENTER and ESC at the same time for 1 second. The display will show d IA6 , indicating it is entering diagnostic mode.
The power level is displayed first. This value is the power level that the sensor is operating at as a percentage of the maximum possible signal strength.

The second value is the length of the sensor in 1 ½"
increments.

5. SPECIFICATIONS

    5.1. LEVEL DISPLAY

Display – rated for dry locations, -30^0F to 100^0F, four digit
LED, and programmable HIGH and LOW level visual and
audible alarms. Four configurable control relays. Audio
transducer 85db min @ 10 cm. Relays rated 5 Amps at
30VDC.

Power supply 120VAC, 60 Hz, UL listed and CSA certified,
adapting to 12 VDC

    5.2. SENSOR

Sensor – Sealed 1 ½" PVC pipe, 3m (9') SJOOW cable, NEMA
4X weatherproof junction box

6.   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 one year 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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