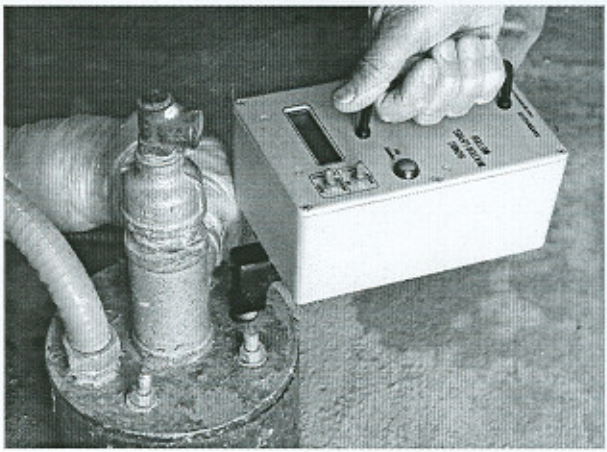
RAVENSGATE CORPORATION

SONIC WATER LEVEL METERS



MODEL 200 USER GUIDE

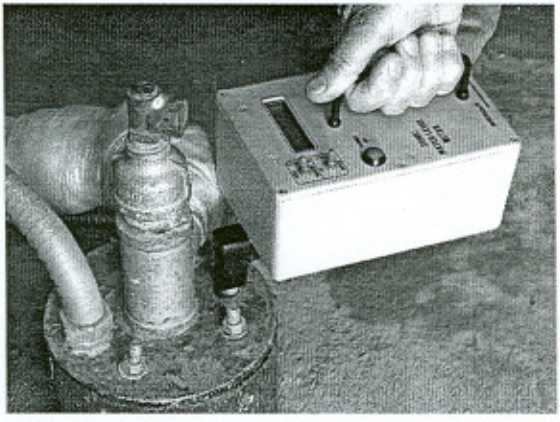
Contents

December 23, 2003

INTRODUCTION

Thank you for purchasing a RAVENSGATE SONIC WATER LEVEL METER, Model 200. You will find that it provides fast, accurate measurements of static water level and draw-down. Furthermore, its small size and light weight make it very convenient to carry to work sites and other locations where measurements are necessary.

Unlike most other water level measurement devices, our Sonic method operates by injecting sound waves into the well casing. The wave reflected from the water surface is then analyzed to determine the level and the result displayed on the front panel. Thus, down-hole probes or instrumentation are not necessary. All that is required is an access port in the well cap 5/8 inches or greater in diameter. Simply insert the measuring duct through the cap, push the power-on button and the measurement is displayed in a few seconds. If the well is uncapped, we supply the meter with an easily fitted cap for diameters up to 6 inches. Larger diameter caps can be fabricated as needed from plastic or sheet metal.



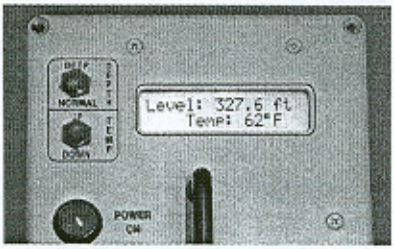
Model 200 shown with the duct properly inserted into the well head.

OPERATING INSTRUCTIONS

Operating the meter requires setting the **DEPTH SWITCH** to either the **NORMAL** or **DEEP** setting. The **NORMAL** setting should be used when the static water level is between 10 feet and 500 feet. If the static water level is outside this range, inaccurate readings may occur. Likewise, in the **DEEP** setting, the static water level

must be deeper than 200 feet to avoid inaccurate readings. However, when applicable, using this setting can reduce the possibility of false readings from obstructions in the upper end of the well casing or from the lower end of the casing in rock wells.

Momentarily pushing the **RED POWER ON** button activates the meter. In the **NORMAL** depth setting it will remain active for five seconds at one "ping" per second. In the **DEEP** setting it will stay active for 15 seconds at one "ping" every 2.75 seconds. Pressing and holding the button continuously will keep the meter active for longer measurement times.



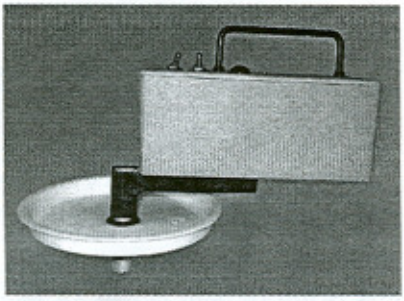
A typical meter reading on the Model 200

At activation, the display comes alive and the temperature setting will appear. If necessary, raise or lower the setting by toggling the temperature switch either forward or backward to the desired value. The temperature setting will be retained when the power is off. For more information see the next section, ***SETTING THE TEMPERATURE.***

Making a measurement is now very simple. Just insert the measuring duct through the access port in the well cap. Make sure that the measuring duct extends all the way through the well cap and seal. Then push the **RED POWER ON** button. The well water level will usually be displayed after the first "ping". It may turn out that the initial **DEPTH** setting was inappropriate. If so, it may be changed at any time, whether the meter is activated or not. If the setting is changed while the unit is running, there may be a delay of a few "pings" before the unit changes modes.

If the well is uncapped and the depth to water is over 100 feet, the cap cover furnished with the meter should be used. Just slide the cover onto the duct and place the meter over the casing. It is not necessary to have a tight seal. However, large gaps due to off-center or tilted placement can reduce the maximum measurable level.

The cover furnished with the unit is for casing diameters up to six inches. For larger diameters, a cover may be easily made from any convenient material such as plastic or sheet metal.



Model 200 with 6 in. cap installed

SETTING THE TEMPERATURE

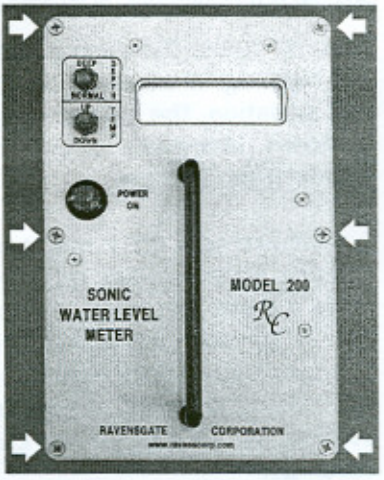
Accurate measurements are best assured when the temperature setting equals the average air temperature in the well casing. The effect of an incorrect setting is approximately one-tenth percent (0.1%) of the depth reading per degree F of error. As an example, if the error is 10 degrees, the measurement will be in error by 1%.

The map and tables furnished with the meter facilitate setting the temperature. For each meter, a map is provided for the state (USA only) where it is to be used. The map is divided into geographical regions. To find the setting temperature, simply locate your region in the left hand column of the **map table.** Then, follow across this row to the month column to find the temperature setting.

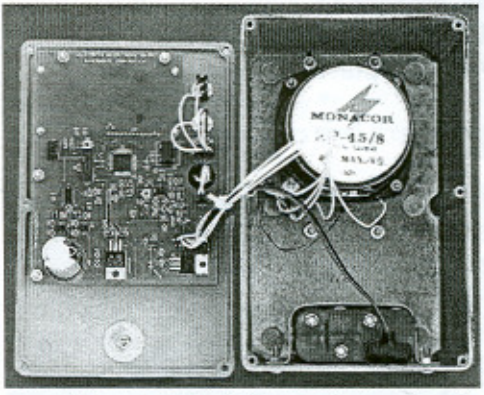
It should be recognized that the **map table** may not be useful in regions of geothermal activity or anomalous subsurface conditions. In this case, for best accuracy, it is necessary to know the well water temperature and the monthly average surface temperature. With this information, the **look-up table** on the back of the map gives the appropriate temperature setting. To use it, first locate the well water temperature in the left hand column. Then, follow across this row to the surface temperature column to find the setting temperature. As an example, if the water temperature is 58 degrees F and the average surface temperature is 85 degrees F, the setting will be 62 degrees F.

BATTERY REPLACEMENT

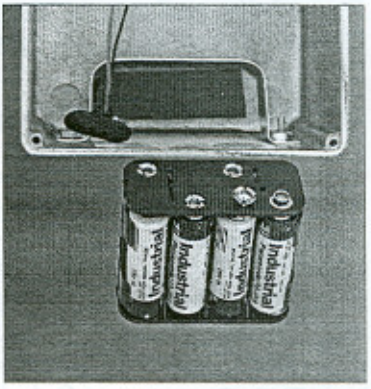
The meter comes provided with eight, AA dry cells. Battery replacement is indicated when the ***LO BAT*** signal on the display consistently stays on during operation. The batteries are located in a slide-out holder located inside of the meter case at the rear. To access the holder remove the six screws on the edge of the of the meter box face. The face should be carefully laid to one side, taking care not to damage or pull on the wires leading to the face. The battery pack connector should be unsnapped next. Then pull the battery pack out from its bracket.



Remove the 6 outside screws to remove the cover



Case opened for battery replacement



Battery pack disconnected and removed

The new batteries are then inserted according to the polarity indications on the holder. For best life the new batteries should be alkaline type. These will provide about 20 hours of continuous running and up to the shelf life of the batteries under more normal intermittent operation. Other types will work, but will have a shorter lifetime. Next, slide the battery pack into the bracket, snap the connector back on the holder, replace the box face being careful not to pinch any wires. Secure with the six cover screws.

MEASUREMENT PROBLEMS

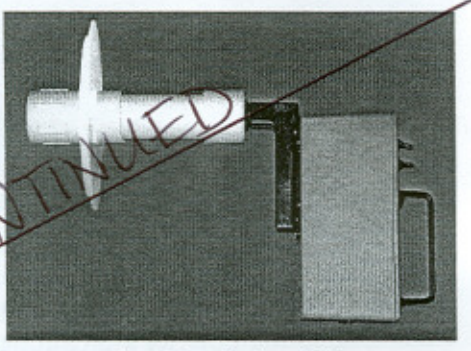
In older wells, the casing may be highly corroded or rough, causing high signal attenuation and unreliable water level readings. In this situation, the higher sensitivity **DEEP** setting will minimize the problem. However, to use this setting, the water level must be greater than 200 feet.

A measurement error might occur if the casing has a discontinuity causing an erroneous reflection. This situation may occur in rock wells if there are voids or fissures in the rock wall. It may also occur in continuously cased wells if the casing diameter abruptly changes somewhere down the well. Likewise, obstructions in the well casing such as torque arresters, wire shields or anything exceeding ½ the area of the casing may also cause erroneous level readings.

In some cases the signal coupling to the well casing may be poor. To avoid this, be sure that the measuring duct goes all the way through the well cap or seal. If the cover plates are used, be sure that there is no large gap between the plate and the well casing.

OPTIONAL DUCT EXTENDER

The DUCT EXTENDER is available as an option. The extender gives access to well casings located six inches or less below a larger diameter casing. The extender slips over the meter duct and mates directly with 2 inch PVC. For larger diameters, a six inch cover is provided that attaches to the end of the extender. Since the extender is six inches long, this amount should be subtracted from the displayed water level.



Duct Extender installed on the Model 200

SPECIFICATIONS

Dimensions:

Length not including duct: 7 inches
Height not including duct: 4 inches
Width: 5 inches

Measuring duct:

Diameter. 5/8 inches
Length. 2 inches

Weight: 3.5 lbs.

Power: 8, AA alkaline batteries

Measurement range:

Normal setting: 10 to 500 feet
Deep setting: 200 to 1200 feet (Under certain conditions this may be less. See *Measurement Problems*.)

Readout accuracy: +/- 0.1 foot

Measurement accuracy *:

(Applies for casing diameters from 2 to 10 inches. Outside this range accuracy may vary.)

+/- 0.2 ft. for water level less than 100 ft,
+/- 0.2% of depth reading for water levels 100 ft. or greater.

Operating temperature range of the meter: 30 to 140 degrees F. The outside or ambient air temperature does not affect the meter operation provided the meter and its components remain within the operating temperature range.

*Under certain conditions, measurement accuracy may exceed this limit. See the previous section, *MEASUREMENT PROBLEMS*.

OPTIONS

Carrying Case
~~Duct Extender~~

WARRANTY

We, The Ravensgate Corporation warrant this product against defects or malfunctions in materials or workmanship for one year from the date of purchase by you, the original purchaser. WE MAKE NO OTHER EXPRESS WARRANTY OR REPRESENTATION OF ANY KIND WHATSOEVER CONCERNING THIS PRODUCT. If any such defect or malfunction occurs within one year of the date of your original purchase, the unit will be repaired or replaced by us without charge.

This warranty does not apply when: (1) the unit has been repaired or modified by anyone other than us. (2) any defect or problem has resulted from accident, misuse, negligence or carelessness.

Return authorization under the warranty or for repair or replacement must be obtained. Contact the Ravensgate Corporation for shipping and packaging instructions.

Ravensgate Corporation is not responsible for loss or damage due to misuse or inappropriate application.

DISCLAIMER:

Ravensgate Corporation will not be responsible or liable for consequential damages caused by instrument failure for any reason whatsoever. Also, Ravensgate Corporation can not be responsible for specifications given by dealers, resellers or others that differ from those given herein.

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Table of Temperature Control Settings
Ts, degrees F

Well Water Temperature, **Tw**, degrees F	Average Daily Surface Temperature, **Tg**, degrees F																			
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
36	31	31	32	33	34	34	35	36	37	37	38	39	40	40	41	42	43	43	44	45
38	32	33	34	35	35	36	37	38	38	39	40	41	41	42	43	44	44	45	46	47
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90	77	77	78	79	80	80	81	82	83	83	84	85	86	86	87	88	89	89	90	91

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