INSTRUCTION MANUAL

WATER LEVEL INDICATOR

Model CPR

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1 APPLICATIONS

The model CPR water level indicator is used to measure the depth of water in boreholes, standpipes and wells.

The model CPR, a light and compact unit, offers an accurate and fast readout of the water depth.

2 PRODUCT

2.1 GENERAL DESCRIPTION

The water level indicator consists in a probe connected to a graduated tape wrapped on a reel.

A control panel is incorporated into the reel. It has the standard full complement of accessories. The indicator light and the buzzer provide a clear signal when the probe contacts water. The On-Off sensitivity switch ensures optimum battery life and allows the operator to compensate for variations in the conductivity of saline or contaminated water.

The probe is specially designed for either static or water well draw-drown measurements. The brass electrode is recessed within a fluted tip to prevent the indicator from sounding prior to contact with the static or pumping water level. A convenient holder is mounted on the reel stand for probe storage. A yellow flat tape, the PCST model, with an extruded transparent polyethylene jacket equipped each water level.

Figure 1: Model CPR water level indicator

2.2 OPERATION PRINCIPLE

The probe is lowered into the borehole. When the probe is in contact with water, a circuit is completed, causing the light to turn on and activating the buzzer on the control panel on the reel. The water level depth is then measured using the graduations on the tape.

3 READING PROCEDURE

3.1 GENERALITIES

Only the model with 14 mm diameter probe assembly (CPR 6) is submersible.

Note: The readout unit on the reel may support light rain, but is not waterproof. Keep it out of rain or wet mud.

For minimizing errors, be sure that the same procedure is used by all technicians.

It is important to take the readings with the same reference, usually the top of the piezometer tube. To get an absolute reading of the water level, use an optical survey method to measure the tube collar elevation.

When the tape inside the borehole is longer than 150m, it is sometime difficult to lower the probe until the water level because of the friction of the tape along the well walls. In order to ease the insertion, a ballast can be fixed to the probe body. Please contact Roctest for more information.

3.2 TAKING MEASUREMENTS

Before taking readings, proceed with the two following operations:

- Check the charge of the battery. Please refer to the maintenance paragraph for more information.
- Check the good functioning of the probe by putting it in contact in a glass of clear water.
- Adjust the sensitivity of the probe using the On/Off switch on the control panel. Sensitivity is set properly if both the buzzer and light turn off immediately when the probe is removed from contact with water. Use a low sensitivity for saline or contaminated water or to reduce false triggering. Increase the sensitivity for less conductive water.

Lower the probe into the borehole until the buzzer sounds. Keep lowering it by a few centimetres in order to check the continuity of the sound. This indicates that the probe is in free water and not only in condensation.

Pull up the probe until the sound stops and move it slowly up and down to accurately determine the water level. Fix the tape and take the readings using the graduations and the top of the piezometer tube.

Be sure to turn off the unit after using the instrument to maximize battery life.

3.3 QUICK VERIFICATION OF MEASUREMENTS

On site, several verifications can be done to prevent a bad measurement.

- Compare readings to previous ones. Are they in the same range? Are they changing slowly or abruptly? Consider external factors that can affect the measurements like construction activities, rain, tide…
- In any case, it is advised to take several readings to confirm the measurement. Then, repeatability can be appreciated and dummy readings erased.

3.4 DATA RECORDING SHEET EXAMPLE

Please refer to Appendix 1 at the end of the instruction manual.

4 MAINTENANCE

4.1 BATTERY CONDITION AND REPLACEMENT

To test the battery condition, turn on the sensitivity button to the maximum clockwise position and push the black button labelled “battery test” on the control panel. If the battery level is correct, when the button is pushed, the buzzer sounds and the red indicator light on the panel turns on.

If the readout battery has to be changed, remove the large slotted head screws located on the control panel. Slowly lift the control panel using caution not to pull any wiring located behind the panel. The battery holder is located on the back side of the control panel. Replace battery with a 9-volt alkaline battery. Be sure the battery connector is securely in place, and the battery is in its holder. Replace control panel.

4.2 CLEANING

It is a good practice to dry probe and tape after each use.

If it is necessary to clean the measuring tape, use a soft cloth and clean water. Rinse off any mud or sand before wiping the cable. The use of chemical cleaners or solvent is not recommended. Excessive cleaning or use of other cleaning methods may damage the plastic protection and the cable markings.

5 TROUBLESHOOTING

Keeping the readout unit with its probe clean and dry as well as a secure storage decreases its chance to fail.

5.1 FUNCTIONNALITY ISSUES

- Check the battery of the readout unit.

- Reduce or increase the sensitivity of the probe.

- Is water in the borehole generally quiet (no bubbling)?

- Turn the readout off and clean the probe in clear water.

- Check the good functioning of the probe into a glass of clear water. If trouble occurs, the readout unit may be suspected and the factory should be consulted. The probe may have been partially damaged also.

- Check the integrity of the measuring tape. Sides of it enclose conductor wires. If cuts or shorts are located, the factory should be consulted.

6 MISCELLANEOUS

6.1 TAPE ELONGATION

In most cases, it is not necessary to estimate the elongation of the measuring tape. However, for huge cable lengths, the calculation details are given below.

The measuring tape is stretched due to the weight of the probe and the centralizer and to its own weight. Submitted to 4.0 kg, the elongation is 1 mm for 4.5m of PCST tape. To be able to estimate the elongation value, the useful weights are indicated in the following table.

Model CPR component	Weight in kg/m
PCST tape	0.021
Probe	0.130

Table 1: Weight of each component of model CPR instrument

Because the main cause of the elongation is the weight of the tape itself, it is necessary to distribute its weight all along it.

Use the following relation to calculate the elongation of the tape:

$$e = kL \cdot \left(\frac{m_t}{2} L + m_p \right)$$

where e = elongation of the tape in millimetres

k = cable elongation in mm/(m.kg)

L = length of the tape in meters

m_t = weight of the tape per length (kg/m)

m_p = weight of the probe in kilograms

Example: (using data above)

With L = 100 m,

We get: $e = 0.056 \times 100 \times \left(\frac{0.021}{2} \times 100 + 0.130 \right) =$ 6.6 mm

6.2 ENVIRONMENTAL FACTORS

Since the purpose of a piezometer installation is to monitor site conditions, factors which may affect these conditions should always be observed and recorded. Seemingly minor effects may have a real influence on the behaviour of the structure being monitored and may give an early indication of potential problems. Some of these factors include, but are not limited to: blasting, rainfall, tidal levels, excavation and fill levels and sequences, traffic, temperature and barometric changes, changes in personnel, nearby construction activities, seasonal changes, etc.

6.3 CONVERSION FACTORS

	To Convert From	To	Multiply By
LENGTH	Microns Millimetres Meters	Inches Inches Feet	3.94E-05 0.0394 3.2808
AREA	Square millimetres Square meters	Square inches Square feet	0.0016 10.7643
VOLUME	Cubic centimetres Cubic meters Litres Litres	Cubic inches Cubic feet U.S. gallon Can–Br gallon	0.06101 35.3357 0.26420 0.21997
MASS	Kilograms Kilograms Kilograms	Pounds Short tons Long tons	2.20459 0.00110 0.00098
FORCE	Newtons Newtons Newtons	Pounds-force Kilograms-force Kips	0.22482 0.10197 0.00023
PRESSURE AND STRESS	Kilopascals Bars Inches head of water* Inches head of Hg Pascal Kilopascals Kilopascals Kilopascals	Psi Psi Psi Psi Newton / square meter Atmospheres Bars Meters head of water*	0.14503 14.4928 0.03606 0.49116 1 0.00987 0.01 0.10197
TEMPERATURE	Temp. in °F = (1.8 x Temp. in °C) + 32 Temp. in °C = (Temp. in °F – 32) / 1.8		

* at 4 °C

E6TabConv-990505

Table 2: Conversion factors

Appendix 1

Example of water level data sheet

Water level datasheet

Site name:______________________________ Probe serial number:____________________
Location:_______________________________ Operator:_______________________________
Borehole name:__________________________ Readings units:_________________________

Initial reading / tube collar:
Date - Time:____________________
Reading:________________________

Elevations:
Tube collar:____________________
Ground:_________________________

Date - Time	Reading from the collar	Reading from the ground	Water level evolution	Comment