



# INSTRUCTION MANUAL

## WATER LEVEL INDICATOR

### Model CPR

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This product should be installed and operated only by qualified personnel. Its misuse is potentially dangerous. The Company makes no warranty as to the information furnished in this manual and assumes no liability for damages resulting from the installation or use of this product. The information herein is subject to change without notification.

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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-down 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.

Two types of flat tape are available:

- a black one: the EVAT model with permanent hot stamped graduations
- a yellow one: the PCST model with an extruded transparent polyethylene jacket



**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

**To prevent damage, do not submerge probe beyond the detection depth.**

Only the model with 11 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 the Roctest Group 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.

**Do not remove the plastic tip from the probe!**

**Removing the probe tip destroys the waterproof integrity of the probe and will cause damage to the electrical connections. Repairs resulting from probe tip removal will not be covered under warranty.**

### 4.3 SPLICING PROCEDURE

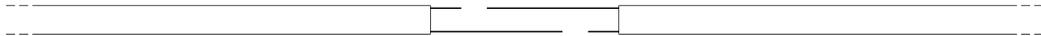
If the graduated tape is damaged or cut, a splicing kit is available (only for EVAT model). Please contact the Roctest Group for more information.

The splicing kit consists of the following parts:

- 1 small shrink tubing (10 cm x 3.2 mm), to be cut in two parts
- 1 medium shrink tubing (10 cm x 6.4 mm)
- 1 large shrink tubing (10 cm x 9.5 mm)
- A length of soldering tin cored silver wire
- 4 pieces of adhesive extruded sealer (2.5 cm)
- A new CPR probe with some tape length

In order to repair the tape, follow the procedure described below.

**Step 1** Strip the extremity of both cables and cut to get one lead approximately 0.7 cm long and the other approximately 3 cm.



**Step 2** Tin the tip of each lead.

**Step 3** Thread the larger shrink tubing on one of the extremities of the cable and the medium one on the other one.

**Step 4** Thread the small shrink tubing on each lead.



**Step 5** Lay the cables as shown on drawing above, and then solder each lead.

**Step 6** Cover each solder joint with a small shrink tubing, and then heat with a heat gun as to get a result similar to the following drawing.



**Step 7** Cover the two wires with the medium shrink tubing and heat it to fix it.

**Step 8** Fill the space around the joint with a length of adhesive extruded sealer.

**Step 9** Cover with the long shrink tubing, and then heat with a heat gun as to get a result similar to the following drawing.



## 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 UNSTABLE READING

- Check the battery of the readout unit.
- Reduce 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.

### 5.2 NO READING

- Check the battery of the readout unit.
- Increase the sensitivity of the probe.
- 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. 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
PCST tape only (200 m)	3.940
Probe	0.065

**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 PCST tape and data above)

With  $L = 100$  m,

$$\text{We get: } e = 0.056 \times 100 \times \left( \frac{0.020}{2} \times 100 + 0.065 \right) = 6.0 \text{ mm}$$

## 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	Inches	3.94E-05
	Millimetres	Inches	0.0394
	Meters	Feet	3.2808
AREA	Square millimetres	Square inches	0.0016
	Square meters	Square feet	10.7643
VOLUME	Cubic centimetres	Cubic inches	0.06101
	Cubic meters	Cubic feet	35.3357
	Litres	U.S. gallon	0.26420
	Litres	Can-Br gallon	0.21997
MASS	Kilograms	Pounds	2.20459
	Kilograms	Short tons	0.00110
	Kilograms	Long tons	0.00098
FORCE	Newtons	Pounds-force	0.22482
	Newtons	Kilograms-force	0.10197
	Newtons	Kips	0.00023
PRESSURE AND STRESS	Kilopascals	Psi	0.14503
	Bars	Psi	14.4928
	Inches head of water*	Psi	0.03606
	Inches head of Hg	Psi	0.49116
	Pascal	Newton / square meter	1
	Kilopascals	Atmospheres	0.00987
	Kilopascals	Bars	0.01
Kilopascals	Meters head of water*	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**

