



Proving Ring Penetrometer

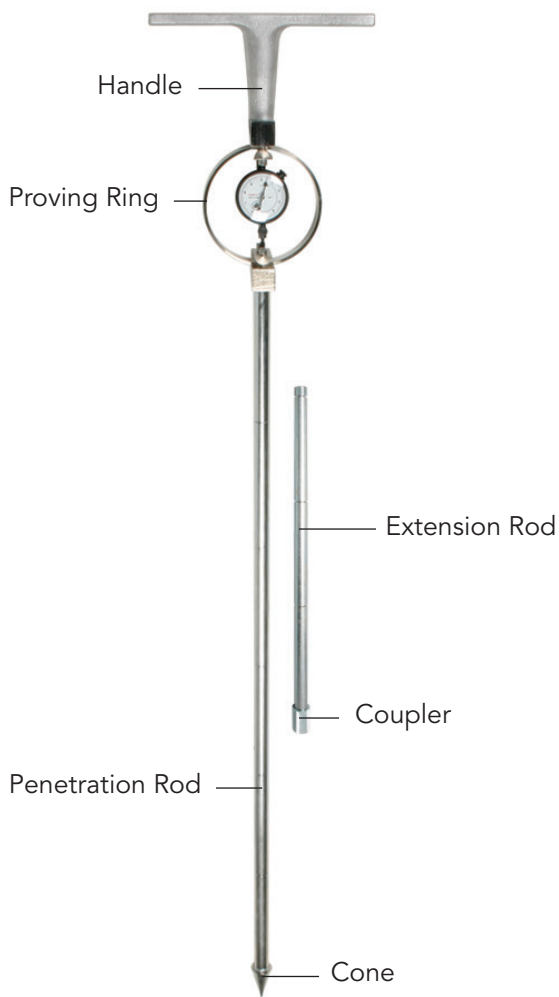


Figure #1

## **General Information**

The Proving Ring Penetrometer is a cone type of penetrometer which can be used in a number of applications. It serves as a rapid means for determining the penetration resistance of soils in shallow exploration work. The reading obtained in this method maybe correlated to standard or modified compaction data for compaction control in the field. Trafficability relationships can be obtained for quick field evaluation of sites.

Correlation with the CBR or bearing capacity tests can be established by the user. In conjunction with the standard laboratory and field test, the H-4204 has proven to be an extremely useful tool for quick field checks and in reducing the possible number of the more time-consuming standard check tests.

The instrument consists of a T-handle, one 36" penetration rod, one 18" extension rod graduated every 6", one proving ring of 220 lb. (99.79 kg) capacity with dial indicator and a removable cone point. The cone point has a base area of 0.983 square inch and a conical area of 1.938 square inch.

The dial indicator furnished with this assembly has a maximum reading feature. A clutch type brake attachment maintains the reading until the brake is manually released.

## **Assembly (See figure 1)**

Attach the handle to the upper block of the proving ring.

Attach the penetration rod with cone attached to the lower block of the proving ring.

If the extension rod is being used, attach it by means of the coupler to the lower block of the proving ring and attach the penetration rod to it.

## **Preliminary Setting**

Inspection: Inspect the instrument before use to make sure that all nuts, bolts and joints are tight and that the dial gauge tip contacts the proving ring bearing block screw.

## **Zeroing the Instrument**

Allow the penetrometer to hang vertically from its handle while zeroing is carried out. After rough adjustment to approximately zero by use of the two lock screws on the mounting lug of the proving ring, fine adjustment maybe accomplished by turning the hexagon head bolt (proving ring bearing block) screwed into the half round of the lower mounting block of the ring. With the bearing point of the dial indicator stem making contact with the head of this screw, any movement of the screw will reflect on the ring.

A second method for zeroing the dial indicator is by adjustment of the dial face itself. Release the knurled screw located on the upper right side of the dial housing. After rotation of the dial face to the zero position, be certain to tighten the knurled screw so as to maintain this position. This adjustment should be made only for small angles since extreme non-symmetry of the dial can cause confusion in reading.

## Rezeroing the Instrument

When reading has changed at any time or if any part is changed in the penetrometer, the instrument should again be zeroed as described in the Zeroing Instrument section above.

## Operation

Be certain that the dial indicator has been set to zero position. Select the site to be tested and clear the test location so that a flat and clean surface is available for testing.

Hold the assembly vertically on the test location. Grasping the handle firmly, push the cone point down into the soil at a steady uniform rate until the top of the cone goes just below the surface.

Determine the dial indicator reading as follows:

Each subdivision has a value of one. The small dial reads from 0 to 10 with one division being equal to one full rotation of the large dial. Each value on the small dial has a value of 100. Thus, one complete rotation of the large dial is 100 and is recorded as 1 on the small dial.

To determine the penetration resistance (bearing capacity) in pounds per square inch, record the dial reading of both the inner and outer dials. Use this number in referring to the Proving Ring Calibration Chart provided to determine the penetration resistance (bearing capacity) in pounds force at the depth being tested.

In order to measure the penetration resistance at 6", 12" or other depths, push the cone point down into the soil until the 6", 12" or other marks on the rod just hit the surface and record the dial indicator reading. Refer to the calibration table to read the pounds force value.

**Note:** An approximate resistance (bearing capacity) is obtained by dividing the penetration load by the cone base area. The cone base area is actually 0.983 square inch. But in order to make correction for the cone soil friction, the base area should be taken as 1 square inch. Hence the penetration load reading in pounds is numerically equal to the penetration resistance or cone index in pounds per square inch.

Return the dial indicator reading to zero position by pressing the release button on the pointer stem housing. Support the release button from behind while pressing.

In soils of very low resistance, it maybe desirable to utilize a deeper penetration. The 6" marks or other marks, which the user may wish to scribe on the extension, may be used as the stopping point rather than the top of the cone. These penetration depths allow correlation with laboratory tests as well as the standard penetration depth.

## **Precautions**

Keep the instrument vertical while taking the measurements.

Do not attempt readings higher than the capacity of the dial since this will overstress the proving ring.

Do not withdraw the instrument by the ring but always by the rod.

## **Care and Adjustment**

### **General Care**

All parts of the penetrometer are plated for resistance to corrosion and should be relatively maintenance free. The penetrometer needs little care beyond keeping the instrument free from dirt & rust, keeping all parts tight and frequently checking and if necessary rezeroing the instrument. Take particular care to see that no grit is caught between the extensometer arm of the dial and the lower mounting block.

### **Dial Indicator**

The dial indicator is a sensitive instrument that should be protected against water and rough usage. Never immersed it in water and wipe it dry as soon as possible after its use in rainy weather. When transported truck, cushion the dial by wrapping it in paper or cloth.

### **Mounting Block Adjustments**

If either or both mounting blocks should become loosened and moved, the entire ring assembly should be returned to the factory for calibration. Merely readjusting and retightening these blocks may or may not return the ring to its initial calibration and a calibration check is necessary in this case.

### **Cone Replacement**

Considerable use of the same cone may result in a rounding of its points. This will not affect the accuracy of the instrument necessarily, but if the base of the cone has had excessive wear or is deformed by hard usage, the cone should be replaced.

### **Proving Ring Recalibration**

If the ring should have need of recalibration, services are available from Humboldt Mfg. Company.

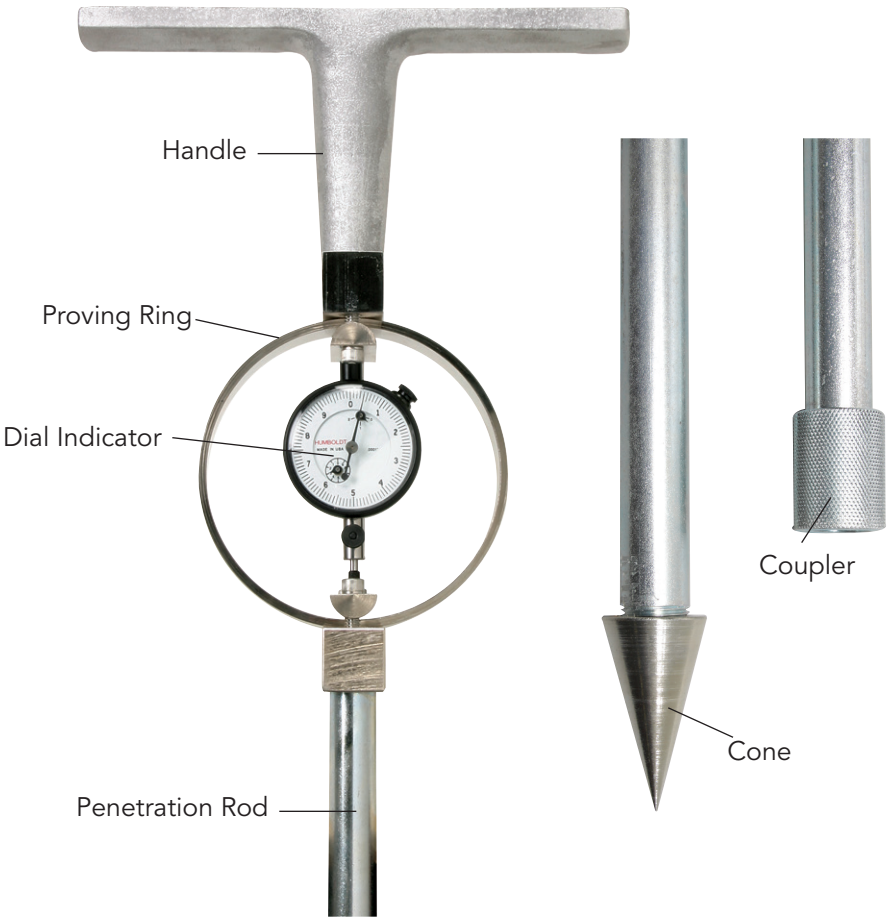
### **Special Note**

In areas where the cone can be driven only through  $1/2$  or  $1/4$  of the cone height (very high penetration resistance) with a force up to 220 pounds (safety limit), the actual penetration resistance can be obtained by multiplying the corresponding load reading by an appropriate factor. For example, if the cone penetration is just  $1/2$  of the cone's height, multiply the corresponding load by 4 to get the actual penetration resistance. (It is not generally recommended to take readings at fractional cone penetrations; do so just when the penetration reaches exactly  $1/4$ ,  $1/2$ , etc., of the cone height).

<b>Cone Height</b>	<b>Factor</b>
1/4	16
1/2	4
3/4	1.77
1	1

### **Specifications**

Proving Ring:	220 lb. (99.79 kg)
Dial Indicator:	With continuous graduations, revolution Counter and brake.
Shaft:	3/4" (19mm) dia. x 18" LG. (457mm); graduated at 6" (152mm) intervals.
Extension Rod:	3/4" (19mm) dia. x 36" LG. (914mm) graduated at 6" (152mm) intervals.
Cone:	30 degree; 1 sq. in.; replaceable
Handle:	Cast Aluminum
Weight:	Net 12 lbs. (5.4 kg)



## Warranty

Humboldt Mfg. Co. warrants its products to be free from defects in material or workmanship. The exclusive remedy for this warranty is Humboldt Mfg. Co., factory replacement of any part or parts of such product, for the warranty of this product please refer to Humboldt Mfg. Co. catalog on Terms and Conditions of Sale. The purchaser is responsible for the transportation charges. Humboldt Mfg. Co. shall not be responsible under this warranty if the goods have been improperly maintained, installed, operated or the goods have been altered or modified so as to adversely affect the operation, use performance or durability or so as to change their intended use. The Humboldt Mfg. Co. liability under the warranty contained in this clause is limited to the repair or replacement of defective goods and making good, defective workmanship.

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