








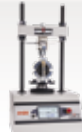




[www.humboldtmfg.com](http://www.humboldtmfg.com)  
1.800.544.7220 • 708.468.6300  
[hmc@humboldtmfg.com](mailto:hmc@humboldtmfg.com)



**WORLDWIDE DEALER LOCATOR:**

Visit our website: and click  
CONTACT at the top of the page.

	About Us	2
	Soil, Field	4
	Aggregate	36
	Soil, Lab	74
	Soil Mechanics	100
	Concrete	150
	Cement	216
	Asphalt	238
	Laboratory	302
	Index	353

# About Us

Humboldt Mfg. Co., located in the United States, is a leading manufacturer and supplier of construction materials testing equipment. Our equipment is used extensively throughout the world for testing soil, concrete, cement, asphalt and aggregate in construction projects. These projects include roads; bridges; dams; earthworks, and buildings. Humboldt is known for manufacturing high-quality, competitively-priced equipment designed to comply with ASTM and AASHTO testing standards, especially our geotechnical testing equipment, our nuclear gauge and the nuclear-free, electrical density gauge.



## Facilities

Humboldt is headquartered in a 70,000 sq. ft. facility in Elgin, IL, as well as a 15,000 sq. ft building located in Raleigh, NC, which houses Humboldt Scientific, our technical center for electronics and software development and location of the manufacture of specific products, such as the nuclear and electrical density gauges. Humboldt's Elgin facility provides extensive production and warehousing capacity, which supports our belief in maintaining a constant stock of products to meet our customers' demands for the quick and efficient supply of testing equipment.

## Dealer Network

Humboldt Mfg. Co. products are available worldwide through our dealer network and directly from our factory. In the United States, our products are sold directly to customers via our website and sales force, as well as a select group of established dealers. Internationally, Humboldt Mfg. Co. sells through an extensive network of experienced and knowledgeable dealers. International customers can request a quote on our website through our Quote Cart system.



## History

Humboldt began operations as a manufacturer of cement testing equipment in the Humboldt Park neighborhood of Chicago, IL — establishing from the beginning, a solid reputation for producing high-quality, scientific products, as well as providing excellent customer service. During World War II, Humboldt expanded its manufacturing operations to meet the demand for general laboratory equipment and began manufacturing a line of top-quality labware, which included Bunsen and high-temperature burners. These products were the beginning of Humboldt's general laboratory equipment line of laboratory burners, stands and clamps. In the past 50 years Humboldt has transformed into the company we are today, focused on the development, manufacturing and distribution of construction materials testing equipment, though the company still manufactures a line of lab burners.

## Quality

Humboldt has always been concerned with the quality of our products and since 2003, we have maintained a quality management system in accordance with ISO standards. This standard comprises the constant monitoring and continuous improvement of the company's processes. Today, Humboldt is certified to ISO 9001: 2015 standards. Our current certification can be viewed on our website.

As Humboldt goes forward, our focus is on the continual improvement of our testing equipment and maintaining diligent customer service. This effort has resulted in the development of our high-quality geotechnical equipment complimented by our advanced testing software modules and the electrical density gauge, a nuclear-free, moisture and density gauge alternative.

# Service

## Calibration and Repair

Humboldt provides dependable and economical calibration and repair services for the following Humboldt or competitors' devices:

- Concrete Air Meters
- Rebound (Schmidt) Hammers
- Load Cells
- Load Rings
- Displacement Transducers
- Pressure Transducers
- Beam Breakers
- Penetrometers
- Speedy Moisture Testers

Each calibration project includes complete inspection and documentation of the device prior to calibration. The device is then disassembled and/or cleaned, inspected, lubed if required, parts are replaced if necessary and then calibrated. All calibrations are performed on certified, NIST-traceable, calibrated devices and we provide the customer with a certificate documenting the calibration. Concrete air meters are cleaned and repaired as necessary before calibration. Calibration of air meters follows the ASTM procedure outlined in ASTM C231.

For calibration and repair information:

**support@humboldtmfg.com • 1.800.544.7220**

### ISO/IEC 17025: 2005 Calibration Facility — 1.800.537.4183

Humboldt also maintains a complete ISO/IEC 17025: 2005 accredited repair and calibration facility at Humboldt Scientific in our Raleigh, North Carolina location. Here we provide repair and calibration services for Humboldt nuclear gauges, as well as those of other manufacturers. This location also performs calibrations on load cells, displacement and pressure transducers.

Cleaning concrete rebound hammer before reassembly and calibration



Calibrating a load ring on a NIST-traceable load frame



Load cell calibration matched to a specific load frame









# SOIL-FIELD

Acidity . . . . .	35
Bearing Capacity . . . . .	16
CBR . . . . .	23
Color . . . . .	35
Compaction Uniformity . . . . .	19-20
DCP . . . . .	25
Density . . . . .	21-22
DMDCP . . . . .	23
Earth Drill. . . . .	32
Electrical Density Gauge . . . . .	13-15
Field CBR. . . . .	26
GeoGauge . . . . .	19-20
Guelph . . . . .	35
Infiltrometer . . . . .	35
Lightweight Deflectometer . . . . .	17-18

Nuclear Density Gauge . . . . .	6-12
Penetrometers, Cone . . . . .	28
Plate Load Testers . . . . .	16
Pocket Penetrometers . . . . .	27
Probes. . . . .	32
Resistivity. . . . .	34
Samplers . . . . .	31
Sampling Auger Kits . . . . .	30
Sampling Augers . . . . .	29,31
Shear Strength . . . . .	23-26
Shear Vane . . . . .	27
Shelby Tubes. . . . .	32-33
Smart DCP . . . . .	24
SMDCP . . . . .	24
Water Level . . . . .	33





HS-5001SD



HS-5001EZ



[www.humboldtscientific.com](http://www.humboldtscientific.com)

All Humboldt nuclear gauges are built rugged for the day-to-day rigors of construction projects. These gauges are built to last using high-quality Noryl® PPO material, which is one of the most dimensionally stable thermoplastics available. This produces a gauge housing that is less brittle than the competition resulting in less breakage. Humboldt also pays strict attention to sealing our gauges against dirt and dust, providing a better design and less electronic problems due to dust.

Humboldt gauges are also "Field Serviceable". If you have a problem with your Humboldt gauge, chances are we can quickly get a part out to you, which you can install on your own, saving you lots of time and money. Other manufacturers require

you to send your gauge back to the factory for calibration. We don't. You can send your gauge back to us or you can allow a third party to calibrate your gauge without incurring any charges from Humboldt.

**With Humboldt, you get:**

- High-quality gauges, built to take a beating
- Truly, field serviceable with parts readily available
- Third-party calibration with no added costs
- Exceptional calibration, leak test and repair service

Humboldt nuclear gauges are available in two models: the SD and EZ Gauges. The SD Gauge, which provides more efficient operation, data collection and processing than any other gauge in its class. Using state-of-the-art technology, the SD gauge brings you a host of features aimed at

making your job easier. Featuring a 4.3" touchscreen, the SD Gauge provides intuitive operation of all gauge operations. It also provides touch pad operation as an alternative control method.

Our EZ gauge is just rugged. It's been used for years in many tough and demanding applications. It has always proven to be easy-to-operate, easy-to-power and easy-to-service. The EZ gauge features a menu-driven control panel with easy-to-use, built-in test routines and auto features, making testing a quick and accurate operation. It also features our innovative trigger release handle that eliminates pinched fingers while providing smooth operation. Unlike some competitors, all Humboldt nuclear gauges are manufactured with 100% new parts — no refurbished gauges sold as new.



## CHOOSE FROM ONE OF FOUR SD OR EZ GAUGE CONFIGURATIONS:



## Fast and EaZy, Full-Service Nuclear Gauge Calibration, Leak Tests and Repairs

To support our customers and their use of our nuclear gauges, Humboldt maintains a complete ISO/IEC 17025: 2005 accredited repair and calibration facility at Humboldt Scientific in Raleigh, North Carolina. Here we provide repair and calibration services for Humboldt gauges, as well as those of other manufacturers. All services are performed by experienced and certified technicians with over 25 years of experience. Our services are built upon providing fast and reliable turn-around of your gauge calibration and repairs while maintaining competitive prices. Humboldt nuclear gauge calibration complies or exceeds ASTM and AASHTO standards by providing five-block calibration for all gauge calibrations. We maintain multiple sets of calibration blocks, which are traceable to master NIST standards.

These blocks are set up in isolated, temperature-controlled bays to reduce interference during

calibration. Documentation and certificates for calibrations conform to NIST procedures and requirements.

We also provide leak test analysis services, gauge rental and disposal services.

### EaZy Shipping Program

And, to make using our services as easy as possible, we have designed our EaZy shipping program. Just go to our website and fill out the calibration/repair form and we'll handle the rest. We will send you the completed shipping papers your gauge will need to have for shipping to us and directions on how to prepare and pack your gauge for shipment. We will contact the shipper and have them pick up your gauge from your designated location and ship it back to you when the calibration is completed.



## Radiation Safety Classes

Humboldt also provides one-day courses in radiation safety and operation for users of portable nuclear moisture density gauges. These courses satisfy the USNRC and Agreement States' requirements for users of all types of nuclear moisture density gauges. A certificate of training will be issued to those who successfully complete the class.

Hazmat Refresher Training is required at least once every 3 years (see 49CFR 172.704). This must include function-specific training in the safe transport of portable nuclear gauges. Humboldt courses satisfy this requirement. See our website for more information and to check the schedule of available courses.



## Radiation Safety and Certification Classes



Learn quickly with these exclusive training courses.

Call 1.800.537.4183

or go to

[www.humboldtscientific.com/classes.html](http://www.humboldtscientific.com/classes.html)



HS-5001SD

## HS-5001SD

Humboldt's NEW HS-5001SD Moisture/Density Gauge provides more efficient operation, data collection and processing than any other gauge in its class. Using state-of-the-art technology, the HS-5001SD brings you a host of new features aimed at making your job easier. Featuring a 4.3" touch-screen, the SD Gauge provides intuitive operation of all gauge operations. It also provides touch pad operation as an alternative control method.

The SD's versatility allows it to measure density through direct transmission and backscatter modes, as well as including thin lift and trench modes, and moisture determinations. The gauge uses an advanced micro-processor-based technology to provide highly-accurate measurements of density and moisture that are automatically computed for direct readouts of wet density, dry density, moisture content, percent of moisture, percent of compaction (Proctor or Marshall), void ratio and air voids. The SD Gauge complies with all pertinent standards: ASTM D6938, D2950, C1040 and AASHTO T310 and is calibrated by the Five-block calibration method.

- Touch Screen Control
- WiFi Enabled
- GPS Equipped

### Touch-Screen or Touch Pad—

You have your choice with the Humboldt HS-5001SD Moisture/Density Gauge. The gauge features a 4.3" touch-screen, which provides complete control or you can also use the menu-driven touch pad.

### Easy to Power—

The SD Touchscreen Gauge is powered by a rechargeable NiMH battery, which provides up to 60 hrs. of runtime. In addition, the gauge can also be powered by six standard AA alkaline batteries. Car charger available.

### GPS—

The SD Gauge is equipped with GPS, which keeps track of the actual location of the measuring device to ensure locations and validity of tests.



NiMH



### WiFi Enabled —

The SD gauge can connect to your PC for downloading test results via wireless technology. No more cables and gauges on your desk. Our wireless function provides a reliable and secure connection up to 30 feet.



### USB Port—

The SD gauge also has a USB slot, which provides a convenient way to capture test data and take it with you, as well as provide an easy way to upgrade the gauge's firmware. Firmware upgrades will be available via the internet from our website.



### Easy Self Repairs—

The SD Gauge's modular design enables it to be serviced in the field by you, if necessary. No need to send the gauge in for repair, we'll send you the necessary components and walk you through many of the repair procedures.





## HS-5001EZ

Humboldt's HS-5001EZ Moisture/Density Gauge is just that — easy. Easy to operate, easy to power and easy to service. The EZ gauge features a menu-driven control panel with easy-to-use, built-in test routines and auto features, making testing a quick and accurate operation. It also features our innovative trigger release handle that eliminates pinched fingers while providing smooth operation.

The EZ's versatility allows it to measure density through direct transmission and backscatter modes, as well as including thin lift and trench modes, as well as moisture determinations. The gauge uses an advanced microprocessor-based technology to provide highly-accurate measurements of density and moisture that are automatically computed for direct readouts of wet density, dry density, moisture content, percent of moisture, percent of compaction (Proctor or Marshall), void ratio and air voids. The EZ Gauge complies with all pertinent standards: ASTM D6938, D2950, C1040 and AASHTO T310 and is calibrated by the Five-block calibration method



- EZ Menu-Driven
- Direct Readouts
- AA batteries (2000hrs)



HS-5001EZ

### Easy to Operate—

Humboldt's HS-5001EZ Moisture/Density Gauge is just that— easy to operate. The EZ gauge features a menu-driven control panel with easy-to-use, built-in test routines and auto features, making testing a quick and accurate operation.



### Easy to Power—

The EZ is powered by six standard AA alkaline batteries, which provide up to 1400 hrs of service. No chargers are needed and you can buy batteries almost anywhere, including the corner convenience store.



### Easy Self Repairs—

The EZ gauge also uses a modular design, which allows it to be serviced in the field, if ever necessary. With this gauge, you don't have to send it back to the factory for repairs, we'll send you the necessary components and walk you through many of the repair procedures.



## SPECIFICATIONS

## Mechanical

Operating Temperature:	14 to 158°F (-10 to 70°C) ambient, 347°F (175°C) Material Surface
Storage Temperature:	-70 to 185°F (-55 to 85°C)
Humidity:	98% without condensation, Rain-Resistant Construction
Vibration:	0.1" (2.5mm) at 12.5 Hz
Materials:	
Shielding:	Tungsten Powder Alloy
Source Rod:	440C Stainless steel, Induction, heat treated to 55 Rockwell C
Gauge Base:	Computer-Machined 6061-T6 Aluminum, Hard-Coated and PTFE Impregnated
Post and Frame:	Computer-Machined 6061-T6 Aluminum, Anodized for Anti-corrosion
Index Rod:	7075 aluminum, Hard Coated and PTFE Impregnated
Top Shell:	Injection-Molded Noryl with Integral Color
Bearing:	Relieved Bronze with Neoprene Seals
Screws/Fittings:	Stainless Steel and Brass

Measurement: Density at 125 pcf (2000 kg/m<sup>3</sup>)

Direct Transmission, 6" (150mm)	15 seconds (Fast)	1 minute (Std.)	4 minutes (Slow)
Precision, pcf (kg/m <sup>3</sup> )	±0.5 (8)	±0.25 (4)	±0.13 (2)
Chemical Error, pcf (kg/m <sup>3</sup> )	±1.0 (16)	±1.0 (16)	±1.0 (16)
Surface Error, pcf (kg/m <sup>3</sup> )	-0.5 (8)	-0.5 (8)	-0.5 (8)
Measurement Depth: 2 to 12" (50 to 300mm)			
Backscatter, 3.5" (88mm)	15 seconds (Fast)	1 minute (Std.)	4 minutes (Slow)
Precision, pcf (kg/m <sup>3</sup> )	±1.0 (16)	±0.5 (8)	±0.25 (4)
Chemical Error, pcf (kg/m <sup>3</sup> )	±2.5 (40)	±2.5 (40)	±2.5 (40)
Surface Error, pcf (kg/m <sup>3</sup> )	-3.0 (48)	-3.0 (48)	-3.0 (48)
Measurement Depth: 3.5" (88mm)			
Moisture at 10pcf (160kg/m <sup>3</sup> )	15 seconds (Fast)	1 minute (Std.)	4 minutes (Slow)
Precision, pcf (kg/m <sup>3</sup> )	±0.5 (8)	±0.25 (4)	±0.13 (2)
Surface Error, pcf (kg/m <sup>3</sup> )	-0.25 (4)	-0.25 (4)	-0.25 (4)
Measurement Depth: 4-8" (100 to 200mm)			

## Dimensions/Weight

Gauge:	
Dimensions (base):	15.75" x 8.66" x 5.5" (400 x 220 x 140mm)
Handle Height:	18" or 21.5" (450 or 550mm)
Weight:	30 lbs (13.6kg)
Reference Standard:	
Dimensions:	13.8" x 7.8" x 3" (350 x 200 x 75mm)
Weight:	10 lbs (4.5kg)
Transit Case:	
Dimensions:	31" x 14" x 19.5" (787 x 356 x 495mm)
Weight:	31 lbs (11.8kg)
Accessory Case (loaded):	
Dimensions:	19.7" x 9.8" x 5" (500 x 250 x 125mm)
Weight:	16 lbs (7.3kg)
Total Shipping Weight:	90 lbs (41kg)



## Radioactive Materials Data Needed for License Application

Radioactive Material	Chemical/Physical Form	Maximum Amount
Cesium-137	Sealed Source Humboldt 2200064	Not to exceed 11 millicuries per source
Americium-241:Be	Sealed Source Humboldt 2200067	Not to exceed 44 millicuries per source

## Electrical

Displays—	
HS-5001SD:	TFT, color LCD with back-light, 16:9, 480 x 272 pixel
HS-5001EZ:	4 lines x 20 alphanumeric w/ backlit liquid crystal display
Timer Stability:	0.01%
Power Supply Stability:	0.10%
Power Source—	
HS-5001SD:	NiMH battery (AA battery optional)
HS-5001EZ:	Six alkaline AA-size batteries
Power Consumption—	
HS-5001SD:	Active—110mA — Battery Life—60 hours runtime
HS-5001EZ:	Active—6.5mA — Battery Life—1400 hours
Power Protection:	Main Batteries—Circuit Breaker Regulated Supplies—Short Circuit Proof
Low Battery Condition:	LOBAT Alarm and Auto Shutoff for low and dead battery conditions
Battery Life	Remaining Battery Life Automatically Estimated at Power-up by activating TEST routine

## Radiological

Gamma Source	
Material, Type and Amount:	Cs-137, 370MBq (10mCi)
Special Form Registration:	USA/0356/S-96 Rev 12
ANSI and ISO Class:	ANSI 77C66535
Neutron Source	
Material, Type and Amount:	Am-241: Be, 1.48GBq (40mCi)
Neutron Yield:	70 Knps ±10%
Special Form Registration:	CZ/1009/S-96 Rev 1
ANSI and ISO Class:	ANSI 77C66545
Source	
Type:	Sealed Source, Special Form
Housing:	Stainless Steel, Double Encapsulated
Surface Dose Rates	18.7 mrem/hr Maximum (Neutron and Gamma)
Transit (shipping) Case	DOT 7A, Type A, Yellow II Label, O.2 TI



Tool Set  
HS-200112

HS-000176



HS-200127

HS-200145



HS-200130



HS-200313



Leak Test kits

HS-200177



HS-000177



HS-200541



HS-200153



HS-001067



HS-200152



HS-001057



HS-000185

## Nuclear Gauge Tool Set

Tool kit includes: rod guide/scrapper plate, drill pin, four-pound hammer, pin extraction tool and zippered accessory case.

**Nuclear Gauge Tool Set** HS-200112  
Ship wt. 16lbs (7.2kg)

## Drill Rod

Drill rod used to create hole for Humboldt nuclear gauges to take reading. Rod measures 0.875" x 20" L.

**Drill Rod** HS-200130  
Ship wt. 4lb (1.8kg)

## Rod Extraction Tool

Tool used to extract drill rod from compacted soil.

**Rod Extraction Tool** HS-200145  
Ship wt. 2lb (0.95kg)

## Scrapper Plate/Rod Guide

Template Plate used as a locator for driving Drill Rod into compacted soil, as well as a guide for Gauge positioning and a Scrapper Plate to level the test site.

**Scrapper Plate/Rod Guide** HS-200127  
Ship wt. 8lbs (3.6kg)

## Hammer, 4 lb., Double-Faced

Hammer used to drive Drill Rod into compacted soil.

**Hammer, 4 lb., Double-Faced** HS-000176  
Ship wt. 5lb (2.2kg)

## Software and Data Cable (infrared RS232)

Cable and software for connecting Humboldt Nuclear Gauge to a computer or printer via RS232 port. For EZ or C models only.

**Software and Data Cable** HS-200313  
Ship wt. 1lb (0.45kg)

## Leak Test Kit

Each leak test kit contains all of the materials necessary for users to perform a leak test on sealed source devices. These test kits include analysis service from Humboldt. Humboldt Scientific, Inc. provides leak test kits and analysis services for both portable and fixed nuclear gauges in accordance with Wipe Test Procedures. Humboldt is licensed by the North Carolina Division of Radiation Protection license # 092-0750-1 to provide sealed-source leak testing on any radioactive material with atomic number 3-105 inclusive; and, has National reciprocity recognition. State-of-the-art leak testing equipment, low cost, and prompt turn-around service ensure accurate and convenient measurement of your samples.

**Leak Test Kit, 10-pack** HS-200177

**Leak Test Kit, 2-pack** HS-200185  
Ship wt. 1lb (0.45kg)

## Replacement Case for Humboldt Nuclear Gauge

Durable case, built to stand up to the rigors of everyday usage. Holds nuclear gauge and all tools and paperwork.

**Replacement Case** HS-200681  
Ship wt. 36lb (16.3kg)

## Padlock

Padlock, which can be keyed so a set uses the same key.

**Padlock** HS-000177  
Ship wt. 1lb (0.07kg)

## Sign, Caution Radioactive Material

8 x 10" metal sign with Radioactive Symbol and Caution.

**Sign, Caution Radioactive Material** HS-001057  
Ship wt. .01lb (0.004kg)

## Transit Label – Yellow II

DOT, Type 7A Radioactive materials transport label required for transporting nuclear density gauges.

**Transit Label – Yellow II** HS-200153  
Ship wt. 0.01lb (0.004kg)

## Cargo Aircraft Only Label

Label that is required when shipping nuclear gauges by aircraft. This label needs to appear on 2 sides of the transport case.

**Cargo Aircraft Only Label** HS-001067  
Ship wt. 0.01lb (0.004kg)

## Type A Label

DOT, Type 7A Radioactive materials transport label required for transporting nuclear density gauges.

**Type A Label** HS-200152  
Ship wt. 0.01lb (0.004kg)

## Security Seal

Security seal for nuclear density gauge transport cases.

**Security Seal** HS-2000185  
Ship wt. 1lb (0.07kg)

## Humboldt S/N Label for HS-5001 Cases

Required serial number plate for gauge case.

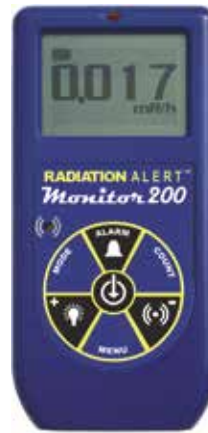
**Humboldt S/N Label** HS-200541  
Ship wt. 1lb (0.07kg)



HS-200800— Containment Boxes include mounting bracket



HS-200820  
(Does not include Case or Padlock)



HS-130508



HS-130512

### Nuclear Gauge Containment System

The NUX safety containment box is an enhanced field security system for nuclear gauges. Constructed of heavy-duty aluminum diamond plate, the NUX can be securely mounted to a host vehicle using the locking hinge pin. The box features a titanium series, high-strength lock assembly, which provides a secure storage enclosure for your gauge in its factory protective container. In addition, the NUX tilting feature makes accessing your gauge an easy operation. Help prevent theft, damage, back injuries, misuse of equipment, improper or unauthorized access to equipment or other misguided actions, which may result in unforeseen costs to your company.

Nux Case for Humboldt Gauges	HS-200800
Nux Case for Troxler Gauges	HS-200802
Nux Case for CPN Gauges	HS-200803

Ship wt. 65lbs (29.4kg)

### NOTES

When the metal transportation box is mounted in a vehicle it effectively becomes part of the vehicle. It is not part of the TYPE A package nor is it an overpack as defined by U.S. DOT. Therefore, the mounted transportation box is not subject to HAZMAT labeling requirements and no radiation warning markings are required on it.

Mounting Bracket for all NUX Boxes	HS-200801
---------------------------------------	-----------

### Security Restraint for Nuclear Gauge

Cable security restraint effectively locks containment box to vehicle or other structure. One-piece cable web drops easily over box and allows user to lock cables directly to containment box closures to prevent opening, as well as securing the complete box to prevent removal. Web is easily moved from

vehicle to vehicle and collapses for easy storage when not in use. Allows for visibility of security labels on case when in use. A minimum of three padlocks are required, but not included.

**Security Restraint for Nuclear Gauge** HS-200820  
Ship wt. 8.4lbs (3.8kg)

### Radiation Alert Monitor 200

The HS-130508 Monitor 200 measures alpha, beta, gamma, and x-rays. Its digital display shows readings in your choice of CPM, CPS,  $\mu\text{Sv/hr}$ , mR/hr, or in accumulated counts. It has a digital display, a red count light, and a beeper that sounds with each count detected. Other features include an adjustable timer, and selectable alert. With the free Observer USB Software Family, you can set computer alarms, calibrate your instrument, and download your collected data from the internal memory for easy reporting. Includes: Carrying Case, Xtreme Boot, Stand, Mini-USB Cable, Observer USB Software Download, Certificate of Conformance.

Operating Range	mR/hr - .001 (1 $\mu\text{R}$ ) to 100 mR/hr; $\mu\text{Sv/hr}$ - .01 to 1000; CPM - 0 to 350,000; CPS - 0 to 5000; Total/Timer - 1 to 9,999,000 cts.
Gamma Sensitivity	1000 CPM/mR/hr referenced to Cs-137
Accuracy	$\pm 10\%$ typical (NIST), $\pm 15\%$ maximum
Energy Sensitivity	Detects alpha down to 2.5 MeV; typical detection efficiency at 3.6 MeV is greater than 80%. Detects beta at 50 keV with typical 35% detection efficiency. Detects beta at 150 keV with typical 75% detection efficiency. Detects gamma and x-rays down to 10 keV typical through the window, 40 keV minimum through the case. Normal background is 5-20 CPM.

Monitor 200 HS-130508  
Monitor 200, NIST Traceable HS-130508C  
Ship wt. 2lbs (0.9kg)

### Radiation Survey Meter, Analog

The HS-130512 survey meter is a compact, general purpose meter capable of detecting alpha, beta, gamma, and x-rays over 3 selectable ranges. A red count light flashes and a beep sounds with each event detected. Uses one 9-volt alkaline battery. Battery life is up to 2,000 hours at normal background radiation levels.

Operating Range	0-.5, 0-5, 0-50 mR/hr; 0-500, 0-5,000, 0-50,000 CPM or 0-500 $\mu\text{Sv/hr}$ 0-50 mR/hr.
Gamma Sensitivity	1000 CPM/mR/hr referenced to Cs-137
Accuracy	$\pm 15\%$ of reading (referenced to Cs-137)
Energy Sensitivity	Detects alpha down to 2.5 MeV; typical detection efficiency at 3.6 MeV is greater than 80%. Detects beta at 50 keV with typical 35% detection efficiency. Detects beta at 150 keV with 75% typical detection efficiency. Detects gamma and x-rays down to 10 keV typical through the window, 40 keV minimum through the sidewall of the detector. Normal background is approximately 10-20 CPM.

Survey Meter, Analog HS-130512  
Survey Meter, Analog, NIST Traceable HS-130512C  
Ship wt. 2lbs (0.9kg)

### NOTES

For Recalibration and NIST-traceable calibration of meters, contact Humboldt Scientific at: 1.800.537.4183





### Electrical Density Gauge

ASTM D7698

The Electrical Density Gauge (EDG) is a nuclear-free alternative for determining the moisture and density of compacted soils used in road beds and foundations. The EDG is a portable, battery-powered instrument capable of being used anywhere without the concerns and regulations associated with nuclear safety. Its user-friendly, step-by-step menu guides the user through each step of the testing procedure and cautions the user when values do not correspond to established curves for the material being tested.

Easy-to-use, the EDG can be used as a construction aid to monitor day-to-day compaction operations by providing performance and measurement results highly comparable to those achieved with

traditional methods, including the nuclear gauge and/or a sand-cone and oven moisture test combination. When conducting a test, the EDG measures and displays the results for wet and dry density, gravimetric moisture content and percent compaction.

#### The advantages of using the EDG are:

- It does not require a highly-trained or licensed technician
- It does not require special handling for shipping or the regulatory compliance for hazardous materials
- It is easy-to-learn and easy-to-use with its step-by-step menu

- Lightweight and easily transportable
- It is accurate and repeatable with results that mirror known testing methods

The EDG Gauge includes: Console/Case; 4-tapered 6" darts; hammer; soil sensor and cables; dart template, temperature probe, battery charger, field verifier.

Electrical Density Gauge

H-4114SD.3F

Ship wt. 35lbs (15.8kg)



## Touch-Screen/Touch Pad—

You have your choice with the new Humboldt H-4114SD EDG. The gauge features a 4.3" touch-screen, which provides complete control or you can also use the menu-driven touch pad.

The EDG measures the electrical dielectric properties and moisture levels of compacted soil using high, radio frequency traveling between darts driven into the soil being tested. The dart's depth of penetration positively determines the depth of measurement. Darts are available in 4", 6", 8", 10" and 12" lengths. In addition, the darts have been designed with a taper, which ensures a continual positive contact with the soil for accurate measurements.

During the testing procedure, four tapered electrodes (darts) are driven into the ground in a cross pattern using the supplied template. Between the two sets of two tapered darts, four point-to-point electrical measurements are made and the electrical characteristics averaged. The dielectric properties that are measured by the unit are compared to a "soil model", which has been developed and programmed into the unit prior to testing. These soil models are required only once for each soil type. The soil model is used as a calibration reference during the testing procedure. It is developed by establishing a curve of measured dielectric properties for different densities and moisture combinations of the actual soil to be tested or a similar material. This soil model is used by the unit through a proprietary correction algorithm to automatically determine the wet and dry density, gravimetric moisture content and percent compaction values for the material being tested. Soil models can be named using the unified soil classifications listed

in the drop-down menu or unique names can be entered using the alpha-numeric keypad. In addition, the temperature probe, which is inserted into the material being tested ensures accurate results by compensating for changes in recorded temperatures. Similar to nuclear gauges, proctor numbers for optimum compaction may be input into the gauge, which would allow for percent compaction to be automatically calculated and displayed at the end of each test. The Proctor numbers would be input into the gauge during the development of the soil model. When determined, this value is entered into the EDG to enable the computation of percent compaction.

Specifications	
Wet Density Range	typical compacted earth sites range
Dry Density Accuracy	within 3% of standard tests
Moisture Content Range	typical compacted earth sites range
Moisture Content Accuracy	within 2% of standard tests
Operating Temperature	0-50°C
Ambient Operating Humidity	5-90%, non-condensing
Power	NiMH battery – 6-pack
Battery Life	approx. 60 hrs. of runtime
Battery Charger	110-240 V 50/60Hz
Dimensions	21" x 17" x 8" (533 mm x 432 mm x 203mm)
GPS	± 3m

## Power—

The EDG is powered by a rechargeable NiMH battery, which provides up to 60 hrs. of runtime. A car charger is available, order H-4114SD.100

NiMH

## GPS—

The EDG is equipped with GPS, which keeps track of the actual location of your measuring device to ensure locations and validity of tests.



## WIFI-Enabled—

The new EDG gauge can connect to your PC for downloading test results via its wireless technology. No more cables and gauges on your desk. Wireless provides a reliable and secure connection up to 30 feet.



## USB Port—

The EDG also has a USB slot, which provides a convenient way to capture test data and take it with you, as well as provide an easy way to upgrade the gauge's firmware. Firmware upgrades will be available via the internet from our website.



# EDG



### EDG Software

EDG Software will allow you to communicate effortlessly with your EDG gauges and only requires minimal setup by the user. EDG Software provides a complete solution for the acquisition, storing, and presentation of Job and Soil Model data. EDG Software works in conjunction with Microsoft Excel to present test data in easy-to-read Excel workbook format files, which can be evaluated directly or sent to any computer using Microsoft Excel. Jobs can be grouped together within projects for organization and reporting.

#### EDG Software Features:

- Communicate with all your EDG gauges.
- Download Job Data.
- Create customized reports from downloaded job data.
- Download Soil Model Data.
- Create reports from downloaded soil model data.
- Upload soil models to any EDG.
- Input proctor data for use in job data or soil model data.
- View maps of test locations, using Google Earth.
- Time/Date, GPS stamps for each test determined, this value is entered into the EDG to enable the computation of percent compaction.

#### Darts for Electrical Density Gauge

Darts are designed in various lengths to correspond to different lift heights. They can be sold individually, and (4) are required.

4" (102mm) Dart	H-4114.4
6" (152mm) Dart	H-4114.6
8" (203mm) Dart	H-4114.8
10" (254mm) Dart	H-4114.10
12" (305mm) Dart	H-4114.12

Shipping wt. 1.5 lbs (.68kg)

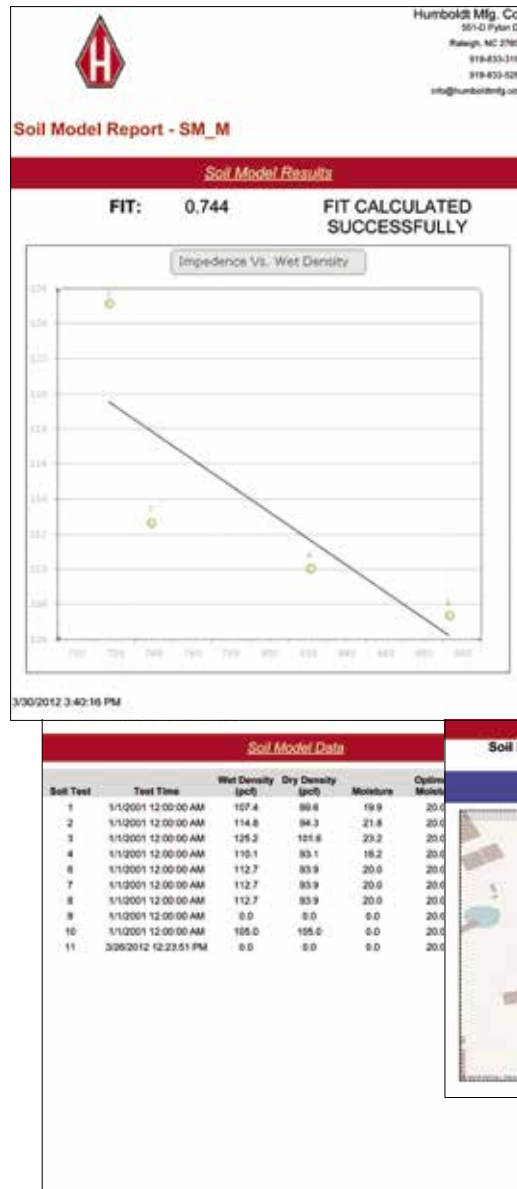
#### Calibration Verifier for EDG

Calibration unit for EDG to carry out verification or calibration of the EDG.

Calibration Verifier for EDG H-4114.MCU

Shipping wt. 4 lbs (1.8kg)

Replacement Parts	Model
Soil sensor with cable	H-4114.250
Temperature sensor	H-4114.900
AC charger	H-4114.600
Cables with clamps (2)	H-4114.700



# EDG

NUCLEAR  
FREE  
DENSITY  
MOISTURE



Darts for EDG



H-4114.MCU





### Humboldt Plate Bearing Tester

ASTM D1195, D1196

The Humboldt Plate Bearing Tester is a field test used for determining the bearing capacity of soil under varying loading conditions. It can also be used to evaluate designs of airport and highway pavements.

This Plate Bearing Tester consists of a hydraulic jack complete with hand pump and rubber; fast-connect hose, large pressure dial gauge; seat plate; (3) precision dial gauges (2.5" dia.-1" x 0.0004 (25 x 0.01mm); 8" (2.4m) complete mounting hardware for gauges, Plate Set (HD-4605) and case for gauges, pump and jack.

The Plate Bearing Tester is available in three (3) capacities: 100kN, 200kN and 500kN.

#### Features:

- Long piston travel to accommodate setup of reaction loading system
- Double-delivery hand pump for fast approach in setup with reaction loading system
- High-precision dial gauges
- Heavy-duty, rigid measuring bridge
- Supplied with calibration and conformity certificates

Plate Bearing Tester, 100kN HD-4600  
 Plate Bearing Tester, 200kN HD-4601  
 Plate Bearing Tester, 500kN HD-4602

Ship wt. 70lbs (31.7kg)

### Plate Bearing Plate Set

ASTM D1195, D1196

ASTM plate set includes: 6", 12", 18" 24" and 30" (152, 305, 457, 610, 762mm) steel plates with eye bolts for transporting and placement of plates with a steel rod.

Plate Bearing Plate Set HD-4605

Ship wt. 65lbs (29.4kg)

### Static, Plate Load Tester

DIN 1834; BS1377

The Static Plate Load Test can be utilized in earthworks and foundation engineering, as well as road construction in order to determine load settlement lines and by this to evaluate the deformability and the load capacity of the soil.

When using the static load tester to evaluate a soil layer, the circular load plate is repeatedly loaded and relieved by means of a load device, a hydraulic pump and pneumatic cylinder. This load is applied to the plate in 6 to 8 equal loading steps. Settlement of the plate is measured by the tester consisting of a carrier frame with a sensing arm and dial gauge. As a counterbalance, a heavy-weight vehicle is used.

The indentation of the load plate into the soil, generated with every load step, is indicated via the dial gauge. The settlement of every load step and the corresponding mean normal stress below the load plate appear as test values. Subsequent to the last load step the relief and a second loading similar to the first loading takes place. For the test evaluation these values are shown in a corresponding diagram as load settlement lines.

The modulus of deformation  $E_v$  is determined from the load settlement line of the first load ( $E_{v1}$ ) and the second load ( $E_{v2}$ ). By comparing the initial deformation from  $E_{v1}$  and the subsequent deformation of  $E_{v2}$  provides an indication of the compaction attained.

The test results and the load settlement lines can be read with the HD-4139.3F Plate Load tester directly on the display and can be printed out immediately at the site via thermal printer or be reviewed later in the office on a PC.

### The HD-4139.3F Plate Load tester features:

- Handy measuring instrument with extra large illuminated display, which is easily viewed in all light conditions and a thermal printer within a aluminum case
- Automatic data transfer, Data-Secure, error-free automatic interpretation
- Intuitive menu navigation with a clearly arranged display
- Evaluation, displaying and printout immediately at the site shows  $E_{v1}$ ,  $E_{v2}$ ,  $E_{v1}/E_{v2}$  and settlement curve
- PC-connection, Software for creation of professional test protocols
- USB interface for easy data transfer, GPS for accurate localization of the measuring point
- Modular design provides flexibility in use

### Static Plate Load Tester

HD-4139.3F

Ship wt. 244lbs (17.4kg)

### Printer Paper

Replacement paper for use with Plate Load Tester and LWD.

### Printer Paper

HD-4129.5

Shipping wt. 2 lbs (0.9kg)

HD-4139.3F shown with transport cases, which are included.





# LIGHTWEIGHT Deflectometer

## Fast, accurate and easy compaction control!

### Areas of application:

- Quality control in road and railway construction
- Quality assurance in earth works and canal construction
- Compaction monitoring in pipe trenches and cable ducts
- Testing of pavement bedding, foundation backfill

### Lightweight Deflectometers

ASTM E2835-11; TP BF-StB B8.3; TB 10102-2004

Lightweight Deflectometers (LWDs) are increasingly being used to determine overall compaction quality of all types of earthworks through their use as a QC/QA field test. LWDs provide a rapid determination of elastic modulus, which is an essential factor in mechanistic design and can be used as an accurate assessment of compaction. An LWD is used for measuring the bearing capacity (deflection) of subgrade/subsoils and unbound base layers, granular layers and backfilling materials, according to ASTM E2835-11. Based on the static plate load test requiring a load vehicle, the LWD provides a simple, fast and repeatable test providing an accurate assessment of compaction parameters. Applications for this non destructive method of testing include bearing capacity and compaction include road construction, pipeline and cable backfill, railway track beds, airport runway/taxiways, dam construction, embankments, foundations and other earthworks.

HD-4129.3F



Humboldt offers two models of Lightweight Deflectometers from HMP—a deluxe model, the HD-4129.3F and a basic unit, the HD-4130.3F.

Both units are the same mechanism and differ only in the controller used with each one.

**The HD-4129.3F features a deluxe controller that includes:**

- A large, 3.5" colorful display
- Light sensor-controlled backlighting that provides the optimum readability even in bright sunlight
- Easy menu navigation

- Integrated GPS
- Integrated WIFI-enabled
- Interface for a thermal printer and USB
- Help function
- Efficient and fast 32-bit processor

The graphic interface of the HD-4129.3F provides an intuitive menu, which guides the user through the testing procedure and provides real-time test results. Measured data is presented in tabular, as well as curve formats with date, time and GPS location clearly depicted.



HD-4130.3F



HD-4129.05A



D-4129.01A

This data can be exported from the control unit via USB or wirelessly directly into the Cloud or to your PC for archiving and further processing. This allows personnel in any office to have access to data while you are still on site testing. It is also possible to print out results to a small portable printer on site. Use of the web-based evaluation software: HMPReport, provides the ability to produce professional reports for each measuring point, which can include your logo and contact details. This software allows you to work with your data from the

Cloud or your PC. The software also enables you to store the data in a database with easy-to-use search and editing options.

#### Units include:

The LWD; magnetic base plate; portable printer (USB); GPS; PC Software and Android App (HD-4129.3F and HD-4159.3F only) Units are 120/220V 50/60Hz

Light Weight Deflectometer, 10kg, Deluxe HD-4129.3F

Light Weight Deflectometer, 10kg, Standard HD-4130.3F

Light Weight Deflectometer, 15kg, Deluxe HD-4159.3F

Light Weight Deflectometer, 15kg, Standard HD-4149.3F

Ship wt. 127lbs (57.6kg)

#### Transport Cart

Cart allows for easy moving of LWD.

#### Transport Cart

HD-4129.01A



Shipping wt. 20 lbs (9kg)

#### Transport Case

Wooden case for storage and transport

#### Transport Case

HD-4129.05A



Shipping wt. 157 lbs (6.8kg)

#### Printer Paper

Replacement paper for use with Plate Load Tester and LWD.

#### Printer Paper

HD-4129.5



Shipping wt. 2 lbs (0.9kg)

Lightweight Deflectometers	HD-4129.3F HD-4159.3F	HD-4130.3F HD-4149.3F
Electronic settlement measuring instrument:		
Settlement measuring range 0.1 bis 2.0 mm $\pm$ 0.02 mm	✓	✓
Measuring range E <sub>vd</sub> < 225 MN/m <sup>2</sup>	✓	✓
Temperature range 0 to 40 °C	✓	✓
Very robust, splash-water proof, connection cable with high-quality LEMO connectors	✓	✓
Graphic display in mm	56 x 73	38 x 68
Colorful, light sensor-controlled and illuminated	✓	
Black/white		✓
Help function	✓	
Fast, efficient 32-bit processor	✓	
WIFI-enabled, USB, thermal printer interface	✓	✓
GPS	✓	✓
Dimensions	210 x 100 x 31mm	211 x 100 x 26mm
Storage capacity, internal in measurement series	1000	500

Lightweight Deflectometers	HD-4129.3F HD-4159.3F	HD-4130.3F HD-4149.3F
Power supply:		
High-performance rechargeable lithium-polymer-battery 3.7 V, 6300 mAh	✓	
(4) R6 Batteries		✓
Menu navigation (18 languages available)	✓	✓
Loading Mechanism		
Total weight: 15kg (HD-4129 & HD-4130)		
Drop weight: 10kg (HD-4129 & HD-4130)		
Total weight: 20kg (HD-4159 & HD-4149)		
Drop weight: 15kg (HD-4159 & HD-4149)		
Max. impact force 7.07 kN	✓	✓
Duration of impact 17.0 $\pm$ 1.5 ms	✓	✓
Material: zinc coated/hard-chrome plated steel	✓	✓
Spring element 17 disk springs	✓	✓
Load plate		
Diameter 300 mm, Plate thickness 20.0 mm	✓	✓
Total weight 15kg Material: zinc coated steel	✓	✓





H-4140 with Case

**GeoGauge**

ASTM D6758

The GeoGauge is a unique, QC/QA field tool that can be used to measure the uniformity of unbound pavement layers by measuring the variability in stiffness throughout a structure. It is an excellent tool for identifying construction anomalies that would otherwise go undetected during construction where only density or percent compaction measurements were used. By measuring stiffness, the GeoGauge can reveal and thus help reduce variabilities in layer properties, which density measurements may miss, thus allowing corrective actions to be taken during construction to ensure that the highest quality base and sub-grade are achieved despite variations in materials used.

The GeoGauge is the perfect companion instrument for density measuring devices such as nuclear gauges and the electrical density gauge. Density measuring devices can be used to ensure that proper compaction is achieved and the GeoGauge can be used to verify that the stiffness/modulus values assumed in the design specifications of new or rehabilitated pavement structures

are met. Compacting and monitoring pavement layers directly to design requirements of structural layer stiffness or material modulus in addition to percent compaction during the construction process establishes the means to effectively control structural uniformity, strength and deflection, as well as enabling the monitoring and control of the construction quality of various materials. This leads to better smoothness and longer lasting pavement surfaces at lower cost.

The GeoGauge works by applying a vibrating force at 25 specific frequencies, which produce small deflections in the material. The resulting displacement is measured by the GeoGauge and displayed as stiffness determined by the ratio of the force to deflection. The GeoGauge produces stress and strain levels common for pavement, bedding and foundation applications. In addition, Young's and shear modulus can be determined from GeoGauge measurements if a Poisson's ratio is assumed. This dynamic technology used by the GeoGauge simulates real in-use conditions. This factor allows the GeoGauge to directly measure in-place engineering properties during the construction process. The GeoGauge supports and

directly links the in-place engineering properties of compacted materials with Mechanistic-Empirical Design for effective QC/QA. Successful control of compaction creates a quality functional structure with the desired engineering properties for the application and life intended.

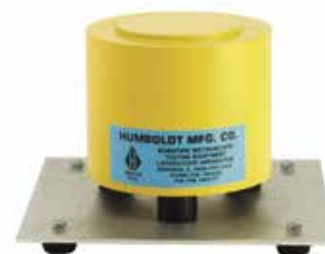
Applications include subgrade, sub-base, base, monitoring the strength gain of lime, cement, fly-ash and polymer stabilized materials, monitoring the re-compaction of underground utility backfills to previous properties matching surrounding undisturbed materials, monitoring the compaction of asphalt and cold in-place recycling to peak properties to prevent wasted effort and damaging over-compaction.

**GeoGauge****H-4140**

Shipping wt. 40 lbs (18.1kg)



H-4140 Face Detail



H-4140.20



H-4140.C

**Features include:**

- Dynamically measures in-place engineering properties using structural layer stiffness, MN/m (klbf/in) and Young's modulus of a material, MPa (kpsi)
- In-place QC/QA links compaction and material performance directly to design requirements while advancing mechanistic-empirical pavement design
- Enables maximum lift stiffness with minimum compactive effort
- Facilitates uniform stress transmission and distribution from pavement to subgrade resulting in longer pavement life, reduced maintenance costs and longer lasting surface smoothness.
- Enables reduced structural variability in construction
- In-place QC/QA of the strength gain of stabilized materials
- Data base development supporting mechanistic-empirical design and performance specifications
- Portable, fast, simple, reliable, non-invasive

- Other compaction applications include: lime, cement, fly-ash and polymer stabilized materials, cement-treated and rehabilitated bases, large particle aggregate bases, as well as underground utility backfills
- Gauge includes simple, easy-to-use software application, which provides download and storage of test data. Application allows printing of data reports, as well as saving information in other formats (.pdf, .csv and rich text) for importing data into other programs

**Specifications**

Layer Stiffness	17 to 400 klbf/in (3 to 70 MN/m)
Young's Modulus (in-place)	4 to 90 kpsi (26 to 610 MPa)
Measuring Depth	9 to 12 inches (230 to 310 mm)
Measuring Duration	75 seconds
Power	six D-cell batteries (1000 to 1500 measurements)
Dimensions	gauge only: 11" dia. x 10.5" high (280 mm x 270 mm) carrying case: 18.5" x 16.5" x 13" (470 x 420 x 330 mm)
Net Weight	gauge only: 22 lbs. (10 kg) with case: 34 lbs. (15.5 kg)

**Verifier Mass**

10kg Mass used to verify calibration of gauge.

**Verifier Mass****H-4140.20**

Shipping wt. 25.7 lbs (11.7kg)

**Calibration Platen**

10kg Platen used to allow gauge to self-calibrate. Gauge is bolted onto platen with a torque wrench, which is included.

**Calibration Platen****H-4140.C**

Shipping wt. 30 lbs (13.6kg)

**Data Cable, Infrared**

Infrared (IR) serial-interface, adapter cable with spreadsheet software template

**Data Cable, Infrared****H-4140.12**

Shipping wt. 2 lbs (0.9kg)

**Sand Cone Apparatus Set, 6.5" (165mm)**

ASTM D1556; AASHTO T191

The sand cone apparatus determines the in-place density of soils having a maximum particle size of up to 2" (51mm) using test hole volumes of approximately 0.1ft<sup>3</sup> (2.8L). The set is comprised of a 1-gal. (3.79L) threaded plastic jar; a COE detachable double cone, which is threaded on one end; and, has a 6.5" (165mm) dia. flanged opening on the other, which fits the opening of the H-4246 sand cone plate. (order separately). The cone has a brass cylindrical valve with a 0.5" (12.7mm) dia. orifice and stops that prevent the valve from rotating past the completely open or completely closed positions.

**Sand Cone Apparatus Set, 1 gal. Jar** H-4245**Sand Cone Apparatus Set, 5L Jar** H-4245M

Shipping wt. 3 lbs (4.5kg)

**Sand Cone Apparatus Set, 4.5" (114mm)**

ASTM D1556; AASHTO T191

The 4.5" sand cone apparatus can be used when it is desired to collect a smaller sample or when gathering a sample is difficult due to extremely hard compacted soil. The cone also determines the in-place density of soils having a maximum particle size of up to 2" (51mm) using test hole volumes of approximately 0.1ft<sup>3</sup> (2.8L). The set is comprised of a 1-gal. (3.79L) threaded plastic jar; a detachable double cone, which is threaded on one end for attaching the threaded plastic jar; and, has a 4.5" (114mm) dia. flanged opening on the other, which fits the opening of the H-4249P sand cone plate.

(order separately). The cone has a brass cylindrical valve with a 0.5" (12.7mm) dia. orifice and stops that prevent the valve from rotating past the completely open or completely closed positions.

**Sand Cone Apparatus Set** H-4249  
Shipping wt. 6 lbs (4.5kg)**Sand Cone Plate**

ASTM D1556; AASHTO T191

Used with sand cone apparatus to simplify removal of soil from test hole and act as template to control hole diameter. Cast aluminum alloy. Both plates have an overall dimension of 12 x 12" (305 x 305 mm). The H-4246 has a 6.5" hole and the H-4249P has a 4.5" hole.

**Sand Cone Plate, 6.5" (165mm) Hole** H-4246**Sand Cone Plate, 4.5" (114mm) Hole** H-4249P

Shipping wt. 4.5 lbs (2.1kg)

**Replacement Jar for Sand Cone**

ASTM D1556; AASHTO T191

1-gal. (3.79L) capacity, threaded-plastic replacement jar is the same as furnished with the H-4245 and H-4249 sand cone apparatus set.

**Replacement Jar for Sand Cone, 1 gal. Jar** H-4238**Replacement Jar for Sand Cone, 5L** H-4238M

Shipping wt. 1.5 lbs (0.5kg)

**Replacement Lid for Plastic Sand Cone Jar**

Replacement lid for use with 1-gal. (3.79L) capacity, threaded-plastic jar.

**Replacement Lid for Sand Cone Jar** H-4238L

Shipping wt. 0.6 lbs (7.3kg)

**Sand Cone, Large, 12" (165mm)**

ASTM D1556; AASHTO T191, COE

For determining in-place density of gravel and coarse soils. Features two identical cones with a

large valve between them and a circular density plate for support on the bottom. A clear plastic cover on the top cone allows for viewing sand flow. The unit also has handles for easier carrying. Flange that fits the lower cone allows apparatus to be used on holes up to 12" (305mm) dia. Complies with U.S. Army Corps of Engineers specifications.

**Sand Cone, Large, 12" (165mm)** H-4248  
Shipping wt. 50 lbs (23kg)**Density Sand**

ASTM D1556; AASHTO T191, COE

Clean, dry, free-flowing uncemented sand has few, if any, particles passing the No. 200 (75mm) or retained on the No. 10 (2.00mm) sieves. The sand's variation in bulk density does not vary greater than 1 percent. Comes in a 50lb. box with a heavy reinforced inner bag.

**Density Sand** H-3821  
Shipping wt. 55 lbs (25kg)**Sand Cone Accessory Kit**

Accessory kit for use with sand density cones and voluverssels. Includes: 100 plastic, 10" x 18" Sample bags and ties, a pocket dial thermometer, a bristle brush, a stainless steel spoon, a steel chisel and a rubber mallet. Does not include sand.

**Sand Cone Accessory Kit** H-4117  
Shipping wt. 9.5 lbs (4.3kg)**Sample Bags and Ties**

100 plastic, 10" x 18" Sample bags and ties.

**Sample Bags and Ties** H-4201  
Shipping wt. 6 lbs (4.5kg)



**Voluvennel**

ASTM D2167; AASHTO T205

Voluvennels determine the in-place density of compacted or firmly-bonded soils using a rubber balloon apparatus viewed through a graduated, direct-reading clear plastic cylinder. Humboldt's voluvennel is designed with a plastic cylinder, which screws into the density plate with the pump assembly mounted on top. Both voluvennels include a pressure-vacuum pump assembly, pressure gauge, quick-coupler valve, double-graduated cylinder, 10 balloons and a density plate. Voluvennels are not suitable for soft soils that deform under a slight pressure or where the volume of the hole cannot be maintained at a constant value. The Voluvennels are individually calibrated before leaving the factory to ensure direct readings on the scale are accurate without the need for calculations. H-4166 is used with max.-sized soil particles of 0.5" (13mm) and H-4167 is used with max.-sized soil particles of 1" (25mm).

Voluvennel, 1/20 ft <sup>3</sup> (1600ml)	H-4166
Voluvennel, 1/13 ft <sup>3</sup> (2230ml)	H-4167
Shipping wt. 15.7 lbs (7.3kg)	

**Voluvennel Saddle Weights**

ASTM D2937

Weights used to ensure uniform and repeatable weight is applied during testing for accurate readings. Can be used with all Voluvennels.

Voluvennel Saddle weights	H-4166S
Shipping wt. 72 lbs (33kg)	

**Balloons, 10pk**

Package of 10 balloons for Voluvennel.

Balloons, 10pk	H-4168
Shipping wt. 0.2 lbs (0.09kg)	

**Pump Assembly, Replacement**

Rubber-bulb, pump assembly for all Voluvennels.

Pump Assembly, all units	H-4166.10
Shipping wt. 0.6 lbs (0.27kg)	

**Voluvennel Base**

ASTM D2167; AASHTO T205

Base for Voluvennels, H-4166 and H-4167. Cast aluminum alloy. Plate has an overall dimension of 12 x 12" (305 x 305 mm). and a 4.5" hole.

Sand Cone Plate, 4.5" (114mm) Hole	H-4249P
Shipping wt. 4.5 lbs (2.1kg)	

**Voluvennel Cylinder Seal Gasket**

Replacement seal gasket for Voluvennels.

Voluvennel Base, H-4166 & H-4167	H-4166.5
Shipping wt. 3 lbs (4.5kg)	

**Voluvennel w/ Metal Guard**

ASTM D2167; AASHTO T205

This Voluvennel features a base-mounted pump and a metal guard for the graduated plastic cylinder which provides an integral metal handle. Each unit includes a double-graduated cylinder, base plate, pressure/vacuum pump assembly with quick-coupler, ten balloons, and an integral gauge for controlling pressure during calibration and testing. The H-4116 Voluvennel is used with max.-sized soil particles of 0.5" (13mm).

Voluvennel, 1/20 ft <sup>3</sup> (1600ml)	H-4116
Shipping wt. 14 lbs (6.8kg)	

**Density Drive Sampler**

ASTM D2937

For determining in-place density of soil by driving a thin-walled tube into the soil mass to obtain a relatively undisturbed sample. Typically used to verify compacted fill placement, or to obtain samples from the bottom of shallow excavations. Zinc-plated, steel drive head and sliding weight hammer used with separately ordered drive tubes. Drive head, 10 lb., has shock reducing spring to guard against fatigue failure.

Density Drive Sampler, 3" (76.2mm)	H-4203.3
Density Drive Sampler, 4" (101.6mm)	H-4203.4
Shipping wt. 20 lbs (11kg)	

**Drive Tubes for Density Drive Sampler**

ASTM D2937

Individual drive tubes for use with the density drive sampler. Tubes are available in two sizes: 3" (76.2mm) x 2.75" (69.9mm) length, (3" x 0.01 ft<sup>3</sup>) for use with the H-4203.3 drive sampler and 4" (101.6mm) x 5" (127mm) length, (4" x 0.033 ft<sup>3</sup>) for use with the H-4203.4 drive sampler.

Density Drive Tube, 3" (76.2mm)	H-4203DT.3
Density Drive Tube, 4" (101.6mm)	H-4203DT.4A
Shipping wt. 0.6 lbs (0.6kg)	



### Dual-Mass Dynamic Cone Penetrometers

ASTM D6951


Developed by the Army Corps of Engineers, Dual-Mass Dynamic Cone Penetrometers (DMDCPs) provide a low-cost, efficient test method for quickly determining in-situ CBR values of pavement base, sub base and sub grades. DMDCPs are primarily used to determine in-place soil shear strength in road construction with CBR values from less than 0.5 to 100% and bearing values ranging from 430 to 10,800 psf. They can readily be used for depths from 30 inches to 6 foot with optional drive rods and extensions. All Humboldt DMDCPs comply with ASTM D6951 specifications and come with a chart to compute CBR values, as well as an Excel spreadsheet template, which automatically charts the test results.

Humboldt's DMDCPs are known for their high quality manufacturing and reliability, and, are available with either threaded connections or a quick-connect design. Both Humboldt DMDCPs feature our exclusive easy-grip hammer that provides a finger grip machined into the back side of the hammer flange, which provides easy, non-slip lifting when performing a test.

Humboldt DMDCPs consist of a drive hammer and steel extension shaft assembly with a 60° hardened cone tip attached at one end. The cone tip is driven into the pavement or sub grade by means of a sliding dual-mass hammer. The diameter at the base of the cone is 20 millimeters, which is 8 millimeters larger than that of the extension shaft. Hammer weight is 17.7 lbs and the hammer drop distance is 22.6" (574mm). Humboldt DMDCPs can also quickly convert to a single-mass unit for use in weaker soils having low CBR values or foundation evaluations by removing the outer sleeve from the dual-mass hammer.

#### Included with the H-4219T DCP:

Description	Model
Dual-Mass DCP Hammer, Threaded Connection	H-4219T.1
Drive Rod, Threaded, 37.75" (959mm)	H-4219T.2
Disposable Cone Adapter	H-4219.5
Hard Cone Tip	H-4219.4
Disposable Cones (pkg of 25)	H-4219.25
Scale, 48"	H-4219.2
Single-User Scale Guide Set	H-4219.17
Wrench Set (Threaded)	H-4219T.7
User Manual	H-4219.MAN
Go, No-Go Gauge	H-4219.3
Pelican Case	H-4219.16

Dual-Mass DCP, Threaded Ends **H-4219T**  
 Ship wt. 66lbs. (29.5kg)

#### Included with the H-4219QC DCP:

Description	Model
Dual-Mass DCP Hammer, Quick-Connect Connection	H-4219QC.1
Drive Rod, Quick-Connect, 37.75" (959mm)	H-4219QC.2
Quick-Connect Pins (2)	H-4219QC.18
Disposable Cone Adapter	H-4219.5
Hard Cone Tip	H-4219.4
Disposable Cones (pkg of 25)	H-4219.25
Scale, 48"	H-4219.2
Single-User Scale Guide Set	H-4219.17
Wrench Set (Quick-Connect)	H-4219QC.7
User Manual	H-4219.MAN
Go, No-Go Gauge	H-4219.3
Pelican Case	H-4219.16

Dual-Mass DCP, Quick-Connect Ends **H-4219QC**  
 Ship wt. 60lbs. (29.5kg)

Accessories	Model
Drive Rod, 12-inch Threaded	H-4219T.12
Drive Rod, 12-inch Quick-Connect	H-4219QC.12
Extension Rod, 24-inch, Threaded (For use with both Quick-Connect and Threaded models)	H-4219.8
Disposable Cones (100 pk.)	H-4219.100





#### Foundation, Single-Mass DCP, Quick-Connect

The H-4220F single-mass (10.1 lbs.), foundation DCP is used to estimate the shear strength of weak soil with a CBR less than 20 and psf less than 4000. It can be used to assess the in-place strength of undisturbed soil and/or compacted materials. It can also be used to estimate the CBR (California bearing ratio), shear strength and thickness of the material. The H-4220F is ideal for horizontal construction applications, such as shallow foundations, footings and pavement shoulders. Typically it is used to assess material properties to a depth of 36 in (914 mm) below the surface. Also, with the use of 24" extensions this depth can be increased to 6 ft (2 m).

The H-4220F comes with a 37.75" drive rod that is marked in 2" increments; a single-mass, 10.1 lb (4.5kg), sliding hammer and a reusable, hardened point. The drive rod and hammer are connected with a quick-connect pin. The Hammer drop is 22.6" (575mm) with a tolerance of 0.039in. (1.0mm). The hardened point has a 60° angle with a tolerance of 1°. The tip base diameter is 0.790" (20mm) with a tolerance of 0.010" (0.25mm).

#### Foundation, Single-Mass DCP

H-4220F

Ship wt. 27lbs. (12kg)

Accessories	Model
Drive Rod, 12-inch Quick-Connect	H-4219QC.12
Extension Rod, 24-inch, Threaded (For use with both Quick-Connect and Threaded models)	H-4219.8

#### Smart DCP for Dual-Mass Dynamic Cone Penetrometers

ASTM D6951

The SmartDCP makes collecting soil data with your Dynamic Cone Penetrometer much easier by automatically counting blows and eliminating the need for tape, pencils, paper and at times a second operator. It also provides vastly improved accuracy and ease of collecting and transferring data from the field to the office.

#### The SmartDCP achieves this by:

- Automatically counting blows;
- Recording the change in depth with each blow
- Tracking the total depth of the probe
- Recording data on Apple iOS and Android smart devices via WIFI
- Eliminating the need for a ruler, pencil, and paper
- Transferring data via e-mail or USB from the smart device

The SmartDCP kit can be mounted to most hand held DCPs on the market and is easily operated by a single person. The investment cost associated with the SmartDCP is quickly realized through the reduction in time spent doing field tests, as well as the increased accuracy and ease of transferring data and creating reports. Users have repeatedly doubled the number of completed tests with increased accuracy when compared to the traditional manual data collection method of using a scale and paper log.

In the field the SmartDCP records data on a smart App. The App is free and available for download at the iOS App store for iPhones or Google Play for Android phones. The SmartDCP App immediately provides real time CBR%, depth change between

blows, as well as total depth of penetration with each data point. Completed tests can be graphed on the smart device in the field for quick analysis or sent via email to the investigation lead to review in the office

A complimentary desktop application for Window's systems is also available. The desktop application can be used to quickly graph your field data and keep your data organized using the application and Windows Explorer. This program can be downloaded from the following link:

<http://www.vertecpcpt.com/dcp-handheld-and-adcp> or via electronic transmittal.

#### SmartDCP Features:

- Touchscreen user interface (Android only)
- Real-time display of test data
- Data transfer to computer via WIFI or USB
- Displays mm per blow; blow counts vs. delta distance per blow (mm)
- Displays depth plot; depth (0-100cm) vs. number of blows
- Displays CBR plot; depth (0-100cm) vs. CBR%
- Fast setup / fast deployment
- Uses wireless WIFI laser depth transducer
- ANDROID OS version 2.2 or higher
- WIFI-enabled ANDROID smart phone or tablet
- SD card

#### The H-4219.30 SmartDCP includes:

carry bag; Leica Disto E7100i Laser Range Finder with batteries; Baseplate with laser mount; laser target; smart device arm band; stamped wrench and 1" combination set, and a manual.

#### SmartDCP

H-4219.30



Ship wt. 27lbs. (12kg)





### Dynamic Cone Penetrometer for Shallow In-situ Tests

The dynamic cone penetrometer (DCP), originally developed by George Sowers, uses a 15 lb steel mass falling 20" to strike an anvil to penetrate a 1.5" diameter 45° (vertex angle) cone that has been seated in the bottom of a hand-augered hole. The DCP can be used effectively in augered holes in nearly all types of soils to depths of 15 to 20 ft. (4.6 to 6.1m). Components are zinc-plated and cones are heat-treated. The cone can be replaced with a Drive Tube Assembly (H-4202.7A) for collection of 3" x 10" (7.6 x 25.4 cm) tube samples from hand-augered holes.

This penetrometer is used to determine a penetration resistance relationship with the standard penetration resistance of virgin soils. As with all field tools used in foundation evaluations, this method should never be used as the sole means for determining foundation conditions. It should be used in conjunction with previously established field and laboratory data, such as the split-spoon standard penetration test, density, shear strength or consolidation data.

The H-4202A set includes; (1) standard hammer assembly (H-4202.1), (1) heat-treated 45° cone penetrometer point with a 1 ft. adapter rod (H-4202.3), (4) 2.5 ft. E drill rod extensions (H-4202.225), (1) auger head (H-4202.6), (1) auger T-handle (H-4202.4), (4) 36" auger extensions (H-4202.5).

The 4202A DCP test set is also available with a H-4202.1A sleeved drive hammer for easier and safer operation.

**Dynamic Cone Penetrometer Test Set** H-4202A  
**DCP Test Set with Sleeved Hammer** H-4202AS  
 Ship wt. 78lbs. (36kg)

### Sleeved Hammer for Dynamic Cone Penetrometer

Alternate hammer for H-4202 DCP test set. Hammer provides a safer and easier alternative to the standard hammer.

**Sleeved Hammer for DCP** H-4202.1A  
 Ship wt. 30.2lbs. (15kg)

### Dynamic Cone Penetrometer Individual Items

Description	Model
Standard drive hammer	H-4202.1
Sleeved drive hammer	H-4202.1A
E drill rod extension 1 ft.	H-4202.21
E drill rod extension 2 ft.	H-4202.22
E drill rod extension 2.5 ft.	H-4202.225
E drill rod extension 5 ft.	H-4202.25
Drive point (45° cone), 1 ft. Rod	H-4202.3
Drive point (45° cone), No Rod	H-4202.3DP
Auger assembly: (Head, (2) pins, T-handle, (1) extension	H-4202.6A
Auger T-handle	H-4202.4
Auger T-handle, SS	H-4202.4SS
Auger extension. 36"	H-4202.5
Auger extension, SS, 36"	H-4202.5SS
Auger head, standard 3.25"	H-4202.6
Auger head, SS, 3.25"	H-4202.6SS
Windowed auger head, 3.25" (heat-treated carbon steel).	H-4202.6W
Windowed auger head, standard (stainless steel) 3.25"	H-4202.6WSS
Shelby Tube Drive Head, 3" E Rod	H-4202.7A
Replacement connector pin.	H-4202.8
Replacement connector pin, SS	H-4202.8SS

E drill rod is 1-15/16" in diameter

### DCP Test Set without Augers

The H-4202X DCP test set without the augers includes; (1) standard hammer assembly (H-4202.1), (1) heat-treated 45° cone penetrometer point with a 1 ft. adapter rod (H-4202.3), (4) 2.5 ft. E drill rod extensions (H-4202.225). This set is also available with the H-4202.1A sleeved hammer.

**DCP Test Set without Augers** H-4202AX  
**Sleeved Hammer for DCP, No Augers** H-4202SX  
 Ship wt. 65lbs. (29.5kg)

### Shelby Tube Drive Head

Drive head for Shelby tubes for use with H-4202.1 or H-4202.1A drive hammers with 3" "E" rod connection. (See page 33 for Shelby tubes.)

**Sleeved Hammer for DCP** H-4202.7A  
 Ship wt. 5.9lbs. (2.7kg)

### Proctor Penetrometer Set

ASTM D1558

Establishes the moisture-penetration resistance relations of fine-grained soils. Includes these interchangeable needles (area in sq. in. or sq. cm): 1" 2 (6.45cm<sup>2</sup>), 3/4" 2 (4.84cm<sup>2</sup>), 1/2" 2 (3.22cm<sup>2</sup>), 1/3" 2 (2.15cm<sup>2</sup>), 1/5 in. 2 (1.29cm<sup>2</sup>), 1/10" 2 (.65cm<sup>2</sup>), 1/20" 2 (0.32cm<sup>2</sup>) 1/30" 2 (0.22cm<sup>2</sup>) and 1/40" 2 (0.16cm<sup>2</sup>). Replacement needles available below.

**Proctor Penetrometer** H-4139  
 Ship wt. 17lbs. (7.7kg)

### Proctor Penetrometer Needles

Description	Model
Resistance Needle Set	H-4143N
1 sq. in. (6.45 cm <sup>2</sup> ) needle	H-4143.1
3/4 sq. in. (4.84 cm <sup>2</sup> ) needle	H-4143.75
1/2 sq. in. (3.22 cm <sup>2</sup> ) needle	H-4143.50
1/3 sq. in. (1.29 cm <sup>2</sup> ) needle	H-4143.33
1/5 sq. in. (2.15 cm <sup>2</sup> ) needle	H-4143.20
1/10 sq. in. (0.65 cm <sup>2</sup> ) needle	H-4143.10
1/20 sq. in. (0.32 cm <sup>2</sup> ) needle	H-4143.05
1/30 sq. in. (0.22 cm <sup>2</sup> ) needle	H-4143.033
1/40 sq. in. (0.16 cm <sup>2</sup> ) needle	H-4143.025

**CBR Field Test Set**

ASTM D4429

The CBR field test set is designed for making CBR determinations in the field and is built around a modified H-4156 load frame. CBR field testing can quickly yield a relative strength determination without having to rely on lab tests. Field tests involve forcing a piston into the soil and comparing the depth of penetration in relation to the load placed on the piston. Typically, the reaction load used for field testing is a heavy piece of equipment, such as a loaded dump truck. Gear box is 2-speed model with a 10,000lbf (45kN) capacity and 3.5 inches of lift. The use of the extension and connector set provides sufficient flexibility for almost any type of height requirement. The CBR field test set includes:

Part #	Description
H-4156J	(1) 2-sp. gear box, handle & platen
H-4156SB	(1) Swivel base
H-4454.020	(1) 2200 lbf load ring
H-4454.050	(1) 5500 lbf load ring
H-4152F.1	(1) CBR extension set
H-4152F.2	(1) CBR connector set
H-4158.1	(1) Dial indicator, 1.000" x 0.001"
H-4152F.8	(1) Steel bridge support
H-4179F.10	(1) Surcharge weight, 10lb, 10"
H-4179	(2) Slotted surcharge weight, 10lb
H-4179F.20	(2) Slotted surcharge weight, 20lb, 8.5"
H-4470	(1) Magnetic indicator mount
H-4178F.4	(1) Penetration piston, 4"

CBR Field Test Set H-4152F

CBR Field Test Set, Metric Indicators H-4152FM

Ship wt. 289 lbs. (131kg)

**Vane Inspection Set**

The Vane Inspection Set provides a rapid check of the stability of foundations, excavations and trenches in clay. The total range is 0 to 260kPa (0 to 2.6 ton/sq. ft.). The scale built into the handle holds the peak value until reset. Accuracy is  $\pm 10\%$ . Four different sized vanes are included with the set (16 x 32, 20 x 40, 25.4 x 50.8mm and 50.8 x 101.6mm). The effective ranges are 0 to 260, 0 to 130, 0 to 65 and 0 to 8kPa. (0 to 2.6, 0 to 1.3, 0 to 0.65 and 0 to 0.08tsf). A "dummy" vane is also included to calibrate the six 0.5 meter long extension rods for effects of soil friction. All items come in a compartmentalized vinyl carrying case with three wrenches.

**Vane Inspection Set**

H-4227

Ship wt. 15.6lb (6kg)

**Vane Inspection Kit Replacement Parts**

Description	Model
Vane: 50.8 x 101.6mm	H-4227.2
Vane: 16 x 32mm	H-4227.3
Vane: 25.4 x 50.7mm	H-4227.4
Vane: 20 x 40mm	H-4227.5
Vane: Calibration	H-4227.7
Vane Inspection T-Handle	H-4227.10
Extension Rod, 0.5 meter	H-4227.1

**Geovane Soil Shear Strength Tester**

The geovane is a hand-held instrument used for determining soil shear strength providing the reading in kPa. The device is simple to use. A 19mm vane blade is screwed into the base of the geovane and the vane is pushed into the soil. Simply rotate the geovane at a rate of 1 revolution per minute and take a reading off the face when the soil fails. The pointer stays in place when failure occurs, allowing you to look up the indicated reading on the supplied calibration chart to get your reading in kPa from zero to 200. Through the use of the optional 33mm vane, readings can be measured between the range of zero to 40 kPa. Extension rods are available to increase the depth measurement capabilities of the unit. The H-4221.4 Adapter is needed to attach extension rods to the geovane. The geovane is supplied complete with a 19mm vane blade, wrenches and a carrying case.

**Geovane Soil Shear Strength Tester**

H-4221

Ship wt. 7lb (3kg)

**Geovane Accessories and Replacement Parts**

Description	Model
Vane Blade (33mm)	H-4221.1
Extension Rod 12" (300mm)	H-4221.2A
Extension Rod 19.7" (500mm)	H-4221.3A
Extension Rod Adapter	H-4221.4



### Pocket Shear Vane, Metal

The Humboldt H-4212MH pocket shear vane Tester provides a quick and efficient method for determining shear strength values of cohesive soils. The pocket shear vane is widely used for taking on-site measurements of excavations, including trenches and test pits. It is also used for taking readings from thin-wall or split core soil samples. It can also be used in the laboratory for evaluations. The device is widely used by safety and OSHA inspectors, back hoe operators, field testing technicians, consulting engineers, etc.

The Humboldt shear vane device comes with three vanes, which are easily attached or removed from the device with the included hex-wrench. We also include a custom, heavy-duty, nylon bag for storage, which can be quickly attached to your belt with its belt clip, as well as a laminated instructions card, so you always have instructions to refer to when doing tests.

The pocket shear vane can be used to gather a large number of readings including those from different failure planes without the need to prepare and trim samples. The device can be used on any reasonably flat surface that is slightly larger than the vane surface being used. The pocket shear vane can be used with fully-saturated, fine-grained soils with an undrained strength independent of normal pressure, including a wide range of clays from soft to stiff consistency. Readings can be made from 0 to 2.5 TSF (1 Kg/cm<sup>2</sup>). The dial on the unit reads in 0.05 TSF (0.05 Kg/cm<sup>2</sup>) increments.

**Pocket Shear Vane, Metal** **H-4212MH**  
 Ship wt. 0.8lb (0.4kg)

### Pocket Shear Vane, Plastic

The H-4212 pocket shear vane tester provides a quick and efficient method for determining shear strength values of cohesive soils. The pocket shear vane is widely used for taking on-site measurements of excavations, including trenches and test pits. It is also used for taking readings from thin-wall or split core soil samples. It can also be used

in the laboratory for evaluations. The device is widely used by safety and OSHA inspectors, back hoe operators, field testing technicians, consulting engineers, etc. This device comes with three vanes, which are easily attached or removed. The torvane shear tester is molded plastic and comes in a plastic molded case.

The pocket shear vane can be used to gather a large number of readings including those from different failure planes without the need to prepare and trim samples. The device can be used on any reasonably flat surface that is slightly larger than the vane surface being used. The pocket shear vane can be used with fully-saturated, fine-grained soils with an undrained strength independent of normal pressure, including a wide range of clays from soft to stiff consistency. Readings can be made from 0 to 2.5 TSF (1 Kg/cm<sup>2</sup>). The dial on the unit reads in 0.05 TSF (0.05 Kg/cm<sup>2</sup>) increments.

**Pocket Shear Vane, Plastic** **H-4212**  
 Ship wt. 1.3lbs (0.6kg)

### Humboldt Soil Penetrometer (Tire-Gauge Design)

For use by field personnel to check visual classification of soils. Verifies whether excavation side walls require shoring, based on OSHA cohesive soils classifications. Indicates consistency, shear strength, and approximate unconfined shear strength. Direct-reading scale—in tons/sq ft, or kg/sq cm—corresponds to equivalent unconfined compressive strength. Range: 0 to 4.5 tons. High quality construction. Includes belt-loop style carrying case and operating instructions. Should not replace laboratory testing or field analysis, or be used to produce foundation design data.

**Humboldt Soil Penetrometer** **H-4200**  
 Ship wt. 0.4lb (0.2kg)

### Soil Penetrometer, Dial-Type

A sophisticated pocket penetrometer offering greater capacity and sensitivity than others. Maximum value is retained on the dial until released via push-button. Inner dial scale 0 to 6.0, with 0.1 divisions in tsf and kg/cm<sup>2</sup>. Outer scale gives load strength over 0 to 11.0 with 0.1 divisions in kg. This reading is used with charts (included)

to estimate safe bearing pressures, depending on plunger used and soil type. Values indicated relate to the standard 0.25" dia. plunger. In addition, readings with four other included plungers (10, 15, 20, 25mm) indicate safe bearing pressures for foundations in consolidated soils over a range of sandy to clay-type soils. The 2.5" (63mm) dia. dial can be easily recalibrated using register plates (included) and any readable scale of 10-15 lbs. capacity. Includes data tables, register plates, instructions, and carrying case.

**Soil Penetrometer, Dial-Type** **H-4205**  
 Ship wt. 1lb (0.5kg)

### Soil Penetrometer, Pocket-Type

For use by field personnel to check visual classification of soils. Verifies whether excavation side walls require shoring, based on OSHA cohesive soils classifications. Indicates consistency, shear strength, and approximate unconfined shear strength. Direct-reading scale—in tons/sq ft, or kg/sq cm—corresponds to equivalent unconfined compressive strength. Indicator sleeve retains reading after piston is released.

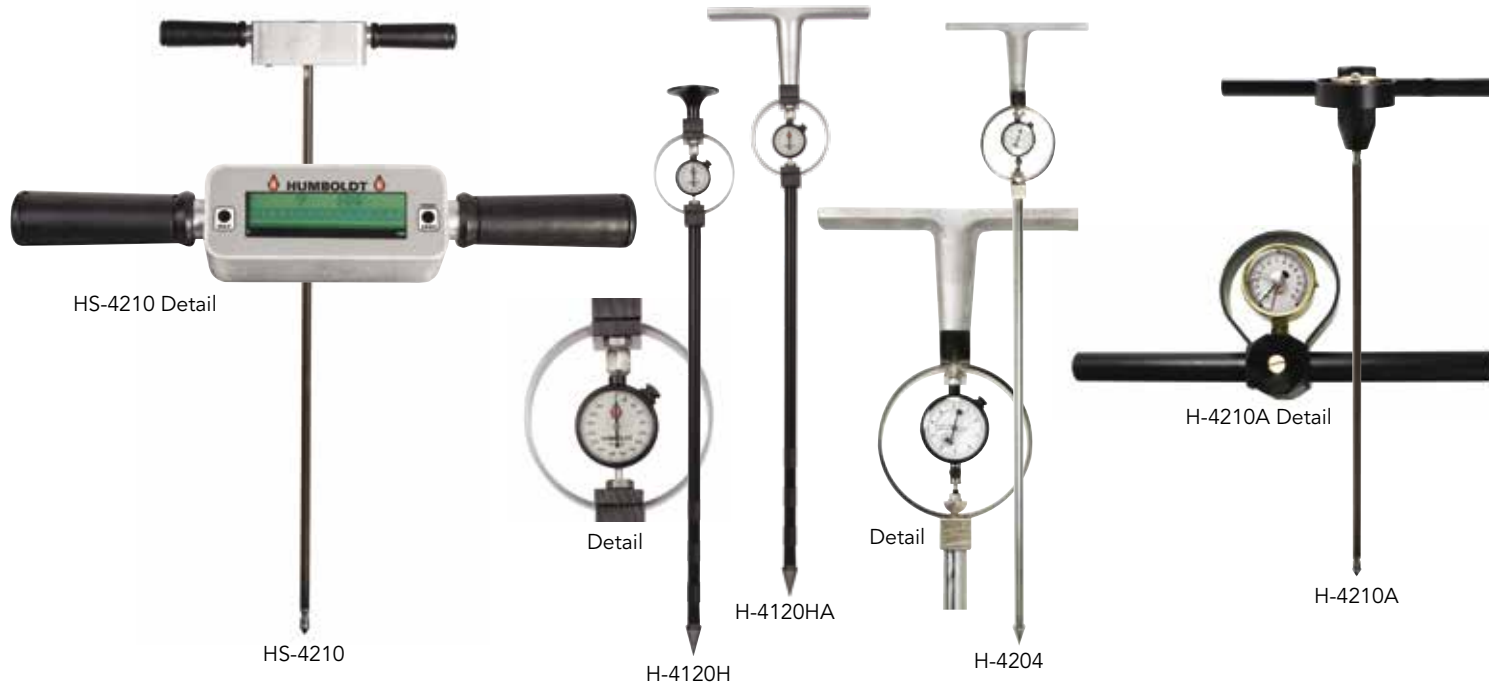
**Soil Penetrometer, Pocket-Type** **H-4195**  
 Ship wt. 0.8lb (0.4kg)

### Penetrometer, Low-Strength Soil Adapter Foot

Adapter foot is recommended when testing extremely low strength cohesive soils. 1" (25mm) dia. foot, compared to the 0.25" (6.35mm) penetrometer piston, increases the effective area measured by 16 times. Divide by 16 to obtain correct unconfined compressive strength when the reading in tons per square foot or kilograms per square centimeter is on the low-load side.

**Adapter Foot for H-4200** **H-4200F**  
**Adapter Foot for H-4195** **H-4195F**  
 Ship wt. 0.4lb (0.2kg)





### Digital Static Cone Penetrometer

The HS-4210 digital, static cone penetrometer (DSCP), with its large, digital readout, makes testing and recording readings easy. The DSCP can be used to evaluate soil consistency by determining the soil's level of compaction and/or the bearing capacity. The DSCP is especially useful in evaluating shallow foundations and pavement sub-grades where fine-grained and soft soils are being used. The DSCP can also be used to aid technicians in quickly selecting sites for testing, as well as correlating with other tests, based on local conditions, such as standard or modified Proctor, CBR or bearing capacity. The DSCP uses a dual-rod design, which eliminates the need to correct for soil friction on the rod as the cone is pushed through the material. Penetration resistance is read directly from the cone tip and registered on the digital display. The unit comes with a 30" starter rod and a 60° cone with a 1.5cm<sup>2</sup> area and reads in lbs., TSF or kg/cm<sup>2</sup>.

**Digital Static Cone Penetrometer** **HS-4210**  
 Ship wt. 9lbs. (4kg)

### HS-4210 Replacement Parts

Description	Model
Extension Rod, 30"	HS-4210.2
Starter Rod, 30"	HS-4210.3
Inside Push Rod, (29.875") For Starter Rod	HS-4210.3.1
60° Cone, 1.5cm <sup>2</sup> max area	H-4210.1
60° Cone, 3cm <sup>2</sup> max area	H-4210.3

### Cone Penetrometer, Corps of Engineers IL DOT 502

Designed to evaluate soil trafficability and manufactured to Corps of Engineers specifications. The factory calibrated dial indicator reads directly in psi. Includes 30 degree cone with 0.5 sq. in. base area; 150 lb capacity proving ring; a dial indicator calibrated direct 0–300psi in 5psi increments; extension rod .625" (15.8mm) dia x 19" (483mm), and the handle.

**Cone Penetrometer, Corps of Engineers** **H-4120H**  
**Cone Penetrometer, COE, T-Handle** **H-4120HA**  
 Ship wt. 4lbs. (1.8kg)

### H-4120H Replacement Parts

Description	Model
30° Cone, 0.5in <sup>2</sup>	H-4120H.4
Penetration Rod, 19" x .625"	H-4120H.3

### Cone Penetrometer, Proving Ring

Used to determine the bearing capacity of sub-grades, or to measure soil compaction. Light and easy to handle in the field. A rapid means of determining the penetration resistance of soil in shallow exploration surveys. Includes: 30°, 1 sq. in. (6.45 sq cm) cone; 250 lb. (1.1kN) capacity proving ring; brake type dial indicator, holds final reading until manually released; 0.75" (19mm) dia shaft, graduated at 6", (152mm) intervals; 0.75" (19mm) dia extension rod, graduated at 6" (152mm) intervals; cast aluminum.

**Cone Penetrometer, Proving Ring** **H-4204**  
 Ship wt. 15.2lbs. (6.8kg)

### H-4204 Replacement Parts

Description	Model
30° Cone, 1in <sup>2</sup> (6.45cm <sup>2</sup> )	H-4204.3
Proving Ring w/ Dial Indicator	H-4204.1
Extension Rod, 37.25"	H-4204.4

### Static Cone Penetrometer

Used in fine-grained, soft soils at shallow foundation and pavement sub-grades to evaluate for soil consistency, level of compaction and bearing capacity. Unmatched for accuracy, reliability and ease of use. Pressure gauge with 0–70kg/cm<sup>2</sup> is scaled for direct reading of cone stress, eliminating proving ring conversions. Dual-rod design eliminates soil friction factor. High strength aluminum and steel construction. Standard model includes a 60° cone with 1.5cm<sup>2</sup> max. area, a 24" (0.6m) starter rod assembly rated at 250 lbf axial force max., and a pressure gauge.

**Static Cone Penetrometer** **H-4210A**  
 Ship wt. 6.3lbs. (2.9kg)

### H-4210 Replacement Parts

Description	Model
60° Cone, 3cm <sup>2</sup> max area	H-4210.3
60° Cone, 1.5cm <sup>2</sup> max area	H-4210.1
Extension rod, 24" (0.6m)	H-4210E.2A
Starter rod, 24" (0.6m)	H-4210.2A
Replacement O-ring	H-4210.9

### NOTES

The use of static cone penetrometers should not replace laboratory testing of field analysis or be used to produce foundation design data.



Augers, Quick-Connect

Augers, Threaded



H-4442QC

H-4442TH



H-4447QC

H-4449QC

H-4447TH

H-4449TH

**Augers, Bucket-Type, Quick-Connect**

Quick-connect, button-and-hex coupling system allows components to connect and disconnect faster and with less hassle than threaded systems. Quick-connect connections, are not compatible with slide hammers. Bucket augers offer outstanding durability and allow access to deeper depths. The regular auger bit is designed for ordinary soil sampling. The sand auger bit is used for dry, sandy soils. Mud auger bits are designed for sampling heavy, wet soil or clay samples; opening facilitates removal of wet samples. Heat treated, high carbon steel bits with tungsten carbide hard-surfaced edges. Bits are welded to a stainless steel cylinder, topped with a carbon steel ball.

Augers, Bucket-Type, Quick-Connect			
Size	Regular	Sand	Mud
2"	H-4410QC	H-4430QC	H-4420QC
2.25"	H-4411QC	H-4431QC	H-4421QC
2.75"	H-4412QC	H-4432QC	H-4422QC
3.25"	H-4413QC	H-4433QC	H-4423QC
4"	H-4414QC	H-4434QC	H-4424QC

Augers, Bucket-Type, Quick-Connect **See Chart**  
 Ship wt. 3lb (1.37kg)

**Augers, Extensions, Quick-Connect**

Extensions for use with the Augers above.

Auger Extensions, Quick-Connect	
Description	Model
2 ft. (610mm), Extension	H-4442QC
3 ft. (914mm), Extension	H-4443QC
4 ft. (1219mm), Extension	H-4444QC
5 ft. (1524mm), Extension	H-4445QC

Auger Extensions, Quick-Connect **See Chart**  
 Ship wt. 3lb (1.3kg)

**Augers, Bucket-Type, Threaded**

Threaded connections use standard, national course, threads. 5/8" connections are the most common and least expensive. Augers, core samplers, probes, slide hammers, hammer-head handles, and kits are available with threaded connections. Bucket augers offer outstanding durability and allow access to deeper depths. The regular auger bit is designed for ordinary soil sampling. The sand auger bit is used for dry, sandy soils. Mud auger bits are designed for sampling heavy, wet soil or clay samples; opening facilitates removal of wet samples. Heat treated, high carbon steel bits with tungsten carbide hard-surfaced edges. Bits are welded to a stainless steel cylinder, topped with a carbon steel ball.

Augers, Bucket-Type, Threaded			
Size	Regular	Sand	Mud
2"	H-4410TH	H-4430TH	H-4420TH
2.25"	H-4411TH	H-4431TH	H-4421TH
2.75"	H-4412TH	H-4432TH	H-4422TH
3.25"	H-4413TH	H-4433TH	H-4423TH
4"	H-4414TH	H-4434TH	H-4424TH

Augers, Bucket-Type, Threaded **See Chart**  
 Ship wt. 3lb (1.3kg)

**Augers, Extensions, Threaded**

Extensions for use with the Augers above.

Auger Extensions, Threaded	
Description	Model
2 ft. (610mm), Extension	H-4442TH
3 ft. (914mm), Extension	H-4443TH
4 ft. (1219mm), Extension	H-4444TH
5 ft. (1524mm), Extension	H-4445TH

Auger Extensions, Threaded **See Chart**  
 Ship wt. 3lb (1.3kg)

**Auger Handles, Quick-Connect**

Cross handles with quick-connect, button-and-hex coupling system connect and disconnect faster and with less hassle than threaded systems.

Auger, Cross-Handle, Padded **H-4447QC**  
 Auger, Cross-Handle, 16" Ratcheting **H-4449QC**  
 Ship wt. 2.6lb (1.3kg)

**Auger Handles, Threaded**

Cross handles with threaded connections use standard, national course, threads. 5/8" connections and are the most common and least expensive handle attachment method.

Auger, Cross-Handle, Padded **H-4447TH**  
 Auger, Cross-Handle, 16" Ratcheting **H-4449TH**  
 Ship wt. 3lb (1.3kg)



H-4418.23



H-4419.23



H-4416.2



H-4449



H-4451



H-4452



H-4208



H-4207



H-4207A

### Basic Soil Sampling Kits, 5/8" Threaded

Basic sampling kits provide everything you'll need to auger to a target depth as deep as 12ft and obtain a relatively undisturbed soil core sample. The kits are used worldwide by construction companies, consultants and engineering firms for site investigations. They are available with 5/8" threaded components with either 2.25" or 3.25" augers. Each kit comes with (1) regular, (1) mud, and (1) sand auger. The kits also include (3) 4' extensions, (1) 18" rubber-coated cross handle, (1) regular slide hammer, (1) core sampler (1.5" x 6" or 2" x 6"), (1) plastic liner, (2) plastic end caps, (1) cleaning brush, (1) universal slip wrench, and (2) adjustable wrenches. All the components fit securely in a foam-lined, poly-reinforced deluxe carrying case with handles and wheels for added portability.

**2.25" Basic Soil Sampling Kit** H-4416.2

**3.25" Basic Soil Sampling Kit** H-4416.3

Ship wt. 56lb (26kg)

### Soil Auger Kits, Threaded

These soil auger kits are complete, compact setups for augering to depths of 12' or 16'. Soil auger kits include (1) regular and (1) mud auger, (4) extensions, an 18" rubber-coated cross handle, and a flexible, poly-canvas carrying case for easy transport and storage. These are supplied with 5/8" threaded connections.

**2.25" Augers with (4) 3' Extensions** H-4419.23

**2.25" Augers with (4) 4' Extensions** H-4419.24

**3.25" Augers with (4) 3' Extensions** H-4419.33

**3.25" Augers with (4) 4' Extensions** H-4419.34

Ship wt. 22lb (8.2kg)

### Soil Auger Kits, Quick-Connect

These soil auger kits are complete, compact setups for augering to depths of 12' or 16'. Soil auger kits include (1) regular and (1) mud auger, (4) extensions, an 18" rubber-coated cross handle, and a flexible, poly-canvas carrying case for easy transport and storage. These are supplied with quick-connect connections.

**2.25" Augers with (4) 3' Extensions** H-4418.23

**2.25" Augers with (4) 4' Extensions** H-4418.24

**3.25" Augers with (4) 3' Extensions** H-4418.33

**3.25" Augers with (4) 4' Extensions** H-4418.34

Ship wt. 21lb (8.6kg)

### Rock Breaker Set

Pair of rock breaking attachments for auger sets. 5/8" threaded-end for attaching to extensions and slide hammers. Used to split or chip rocks and stones found in an augered hole. These rock breakers are alloy-steel, sharp-edged chisels designed for use with slide hammers. Used to break up obstructions in augered holes.

**Rock Breaker** H-4449

Ship wt. 3lb (1.3kg)

### Slide Hammers

Slide hammers are used for easier penetration and extraction of soil samplers and probes. The Hammer consists of steel tubing that slides over a hardened steel rod, which is threaded to 5/8" NC to accommodate drive rods and extensions. Soft, baked-on rubber coating and ball-grip handle reduces shock to operator's hands and increases comfort.

**Regular Slide Hammer, 5/8" Threaded** H-4451

**Compact Slide Hammer, 5/8" Threaded** H-4452

Ship wt. 9lb (4.1kg)

### Universal Slip (Strap) Wrench

Great tool for the field. Can be used to loosen or uncouple auger and penetrometer extensions, as well as any other round or irregular-shaped tools and test apparatus.

**Universal Slip (Strap) Wrench** H-4453

Ship wt. 3lb (1.3kg)

### Sample Bags, Plastic-Lined

Heavy-duty material, plastic-lined sample bag. Bag has draw-cord closure and can be used for various applications involving soils, aggregates, sands and similar materials.

**Sample Bags, 10" x 18" (254 x 457mm)** H-4208

**Sample Bags, 17" x 32" (432 x 813mm)** H-4209

Ship wt. 0.7lbs. (0.31kg)

### Sample Bags

Heavy-duty material, unlined sample bag. Bag has draw-cord closure and can be used for various applications involving soils, aggregates, sands and similar materials.

**Sample Bags, 10" x 18" (254 x 457mm)** H-4206

**Sample Bags, 17" x 32" (432 x 813mm)** H-4207

Ship wt. 0.5lbs. (0.22kg)

### Sample Bags, Economy

Heavy-duty material, unlined sample bag. Bag has draw-cord closure and can be used for various applications involving soils, aggregates, sands and similar materials.

**Sample Bags, 10" x 19" (254 x 483mm)** H-4206A

**Sample Bags, 15" x 29" (381 x 737mm)** H-4207A

Ship wt. 0.25lbs. (0.1kg)



**Soil Sampling Auger, Spiral-Type**

ASTM D1452

For use in sampling soils, auger has 1.5" dia. x 4" long (38mm x 102mm) spiral-type auger bit. Features graduation marks every 6" (152mm). Overall length is 36" (914mm), including handle. Screw-on handle permits attachment of H-4251 extension for sampling beyond 36" depths.

**Soil Sampling Auger, Spiral-Type****H-4250**

Ship wt. 5lbs (2.7kg)

Description	Model
Auger Extension, 36" (914mm)	H-4251

**Auger Set, Quick-release Handle and Bucket**

Set includes a 3.25" windowed, auger head of zinc-plated steel, auger T-handle, 36" (914mm) auger extension and (2) Quick-release connector Pins.

**Auger Set, QR Handle and Bucket****H-4202.6A**

Ship wt. 8lbs (2.2kg)

Description	Model
Auger Extension, 36" (914mm) with Connect Pin for H-4202.6A	H-4202.5
Attachment Pins	H-4202.8

**T-Handle Auger, Iwan-Type**

ASTM D1452

T-handle augers are also known as post-hole, Iwan-type or non-adjustable augers. Feature 36" (914mm) long steel shaft and hardwood cross handle. Available 2" (51mm) to 6" (152mm) diameter. Overall length 48" (1219mm).

Auger, Iwan-Type- 2" Dia. (51mm)	H-4252.2
Auger, Iwan-Type- 3" Dia. (76mm)	H-4252.3
Auger, Iwan-Type- 4" Dia. (102mm)	H-4252.4
Auger, Iwan-Type- 6" Dia. (152mm)	H-4252.6

Ship wt. 8lbs (3.2kg)

Description	Model
Auger Extension, 36" (914mm), includes coupling for H-4252.2	H-4252.2E
Auger Extension, 36" (914mm), includes coupling for H-4252.3, H-4252.4 and H-4252.6	H-4252E

**Soil Sampling Auger Tube Set**

Set contains auger and sampling tube. Components are plated steel to resist abrasive action of soil. Includes 1.25" (25mm) dia. by 12.5" (318mm) long auger, 1" (approx. 25mm) OD by 12.5" (318mm) long sampling tube, two 12" (305mm) extension rods, handle and a fiberboard carrying case.

**Soil Sampling Auger Tube Set****H-4268**

Ship wt. 5.4lbs (3.2kg)

**Soil Sampling Tube Set**

Tube sets are helpful and functional for agricultural and other soil-testing procedures. Sampling tube will produce 15" (381mm) core of soil. Includes 18" (457mm) long, 7/8" (22mm) ID sampling tube, handle and carrying case.

**Soil Sampling Tube Set****H-4269**

Ship wt. 2.7lbs (1.4kg)

**Footstep Soil Sampler**

Footstep Soil Sampler is a 36" one-piece soil sampler with a welded-on footstep. It has a 12" soil tube, which uses replaceable, screw-on soil tips. A 5" handle is welded on to the probe for convenience. The 36" height makes it easy on your back. The sampler provides a 9" x 0.75" sample. The tube is marked in 6" intervals and provides easy unloading of the sample.

**Soil Sampling Tube****H-4261**

Ship wt. 4.2lbs (2.2kg)

**Classic Soil Sampler**

Soil Sampler is a 36" one-piece soil sampler, with an 8" handle. It provides a 9" x 0.75" sample. The tube is marked in 6" intervals and provides easy unloading of the sample. It has a 12" soil tube, which uses replaceable, screw-on soil tips.

**Soil Sampling Tube****H-4362**

Ship wt. 4.2lbs (2.2kg)

**Soil Sampler Replacement Tips**

Soil tips are replaceable and work on the following Sampling Tubes: H-4261, H-4362, H-4268 and H-4269. Buying extra tips for your soil sampling tool can be a convenient and economic way to increase the lifespan of your equipment. Tips are 0.75" in diameter and nickel plated to add extra strength and resist corrosion.

The Regular Soil Tip was specially designed for use in areas with many different soil and moisture types. This is an "all purpose" tip, so if you aren't sure which tip to get, this is a great option.

Dry Soil Tip was specially designed for use in areas with sand or very dry soil.

Wet Soil Tip was designed for use in clay, mud, or very wet soil and moisture types. It has a thicker ridge on the inside to help hold onto the wet soil better.

The Heavy Duty Soil Tip was designed for use in areas with hard soil, gravel or other difficult soil types.

Regular Soil Tip	H-4268.1
Dry Soil Tip	H-4268.2
Wet Soil Tip	H-4268.3
Heavy-Duty Soil Tip	H-4268.4

Ship wt. 1lbs (0.45kg)

**Probe Rod, Steel**

Ideal for locating buried pipes, tanks and utility lines. Zinc-plated steel, 36" (914mm) x 0.5" (12.7mm) shaft.

**Probe Rod, Steel****H-4188**

Ship wt. 8lbs (2.2kg)

**Probe Rod, Fiberglass**

Ideal for locating buried pipes, tanks and utility lines. Light, non-conductive fiberglass 48" (1219mm) x 0.5" (12.7mm) shaft.

**Probe Rod, Fiberglass****H-4188F**

Ship wt. 8lbs (2.2kg)

**Power Mechanical Earth Drill**

For soil sampling, construction and more, earth augers are gasoline powered and portable. Using one operator, they allow fast and easy drilling. They feature snap-on or screw-on augers and extensions. Engine mounted on wheel-base carrier keeps motor noise and fumes away from the operator. Torque tube eliminates counter torque. Features such as the carrier and torque tube offer greater mobility, beneficial in areas inaccessible to large equipment, on slopes and horizontal drilling, various standard sampling methods to obtain material samples. Recoil starter and spring-loaded throttle-in-handle assembly provide fingertip control. Centrifugal clutch, heavy-duty flexible shaft connects to the motor and provides for a smooth operation. Blades and points are tool steel, hard-surfaced and heat treated. Blades are reversible for longer life. Most augers are snap-on design; smaller diameter augers are screw-on. Auger has either 5HP or 8HP, 4-cycle engine with 10:1 gear ratio, complete with wheel kit and torque tube. Order augers and extensions separately. For augers 1.5" to 6" dia., maximum depth is 18' (38 to 152mm, 5.5m deep).

**Power Mechanical Earth Drill, 5hp****H-4050****Power Mechanical Earth Drill, 8hp****H-4051**

Ship wt. 225lb (102 kg)

**42" Snap-On Augers**

Description	Model
1.5" (38mm) Snap-On Auger	H-4052A.1
2" (51mm) Snap-On Auger	H-4052A.2
3" (76mm) Snap-On Auger	H-4052A.3
4" (102mm) Snap-On Auger	H-4052A.4
6" (152mm) Snap-on Extension	H-4052A.6

42" Long augers dig a 36" deep hole.

**36", Full-flighted Snap-On Extensions**

Description	Model
1.5" (38mm) Snap-On Extension	H-4053.1
2" (51mm) Snap-On Extension	H-4053.2
3" (76mm) Snap-On Extension	H-4053.3
4" (102mm) Snap-On Extension	H-4053.4
6" (152mm) Snap-On Extension	H-4053.6

**Tube Extensions**

Description	Model
36" Tube extension for 3 to 6" Augers	H-4053.7
18" Tube extension for 3 to 6" Augers	H-4053.8

**Replacement Points & Blades**

Description	Model
Point, Screw-on, 1.5" (38mm)	H-4055.1
Point, Screw-on, 2" (51mm)	H-4055.2
Point, Screw-on, 3" (76mm)	H-4055.3
Point, For 4" (102mm) and 6" (152mm) Blades	H-4055
Blade, 4" (102mm)	H-4056
Blade, 6" (152mm)	H-4057

**Shelby Tubes**

ASTM D1587

Shelby tube samplers are thin-walled, hollow steel tubes, which are driven into the ground to extract a relatively undisturbed soil sample for use in laboratory tests used to determine density, permeability, compressibility and strength. Each tube has one end that is chamfered to form a cutting edge and the upper end includes holes for securing the tube to a drive head. Shelby tubes are useful for collecting soils that are particularly sensitive to sampling disturbance, including fine cohesive soils and clays. The tubes can also be used to transport samples back to the lab as well. **Note: Size is OD.** All tubes are 16 gauge steel.

Description	Model
2" dia x 30" long, (wt.2.5lbs)	H-4210.230
2" dia x 36" long, (wt.3.2lbs)	H-4210.236
2.5" dia x 30" long, (wt.4.2lbs)	H-4210.253
2.5" dia x 36" long, (wt.5.5lbs)	H-4210.256
*3" dia x 10" long, (wt.1.9lbs)	H-4210.10
*3" dia x 12" long, (wt.1.9lbs)	H-4210.12
*3" dia x 18" long, (wt.3.0lbs)	H-4210.18
*3" dia x 24" long, (wt.3.8lbs)	H-4210.24
*3" dia x 30" long, (wt.5.1lbs)	H-4210.30
*3" dia x 36" long, (wt.6.2lbs)	H-4210.36
3.5" dia x 30" long, (wt.5.5lbs)	H-4210.353
3.5" dia x 36" long, (wt.6.3lbs)	H-4210.356
*5" dia x 24" long, (wt.11.8lbs)	H-4210.524
*5" dia x 30" long, (wt.17.5lbs)	H-4210.530
*5" dia x 36" long, (wt.19.5lbs)	H-4210.536

\* galvanized

**Shelby Tubes**

See Table



Ship wt. See Table



**Caps for Shelby Tubes**

Plastic end caps for protecting tube and sample.

Description	Model
2" Plastic End Cap	H-4210.2C
2.5" Plastic End Cap	H-4210.25C
3" Plastic End Cap	H-4210.3C
3.5" Plastic End Cap	H-4210.35C
5" Plastic End Cap	H-4210.5C

**Caps for Shelby Tubes**

See Table

Ship wt. See Table

**Expansion Packer for Shelby Tubes**

Expanding plugs to seal samples in Shelby tubes for transport.

Description	Model
2" Expansion Packer	H-4210.2P
2.5" Expansion Packer	H-4210.25P
3" Expansion Packer	H-4210.3P
5" Expansion Packer	H-4210.5P

**Expansion Packer for Shelby Tubes**

See Table

Ship wt. See Table

**Sealing Wax**

ASTM D109

Sealing wax to seal ends of shelby tubes for transport. 10 lb. box.

**Sealing Wax**

H-4210W

Ship wt. 11lb (5.4 kg)

**ACCESSORIES**

For Melting Pots, Go to page 179

**Shelby Tube Head, 3" Tubes**

Shelby Tube Head for 3" shelby tubes for use with H-4202.1 or H-4202.1A drive hammers with "E" rod connection (sold separately, see page 25).

**Shelby Tube Head, 3" Tubes**

H-4202.7A

Ship wt. 5.9lb (2.7 kg)

**Shelby Tubes Heads**

Various heads for different sized Shelby tubes.

Description	Model
2" for AW Rod (wt.4lbs)	H-4210.2AW
2" for AWJ Rod (wt.5lbs)	H-4210.2AWJ
2.5" for AW Rod (wt.6lbs)	H-4210.25AW
3" for AW Rod (wt.13lbs)	H-4210.3AW
3" for AWJ Rod (wt.11lbs)	H-4210.3AWJ
3" for NW Rod (wt.9lbs)	H-4210.3NW
5" for NW Rod (wt.28lbs)	H-4210.5NW

**Shelby Tubes Heads**

See Table

Ship wt. See Table

AW= 3 threads per inch

AWJ= 5 threads per inch

**ACCESSORIES**

For Knives, Go to page 347

For Pans, Go to pages 342-343

**Water Level Indicator**

The Water Level Indicator determines water levels in drainage operations, dams, reservoirs, embankments, wells, bore holes, underground cavities, or any hydrological/geological work. Works well with small openings, holes & shafts that are not always straight. Compact, self-contained units feature a jointed design for easy access to difficult openings. Weighted probe is

lowered into the opening via high-strength, flexible cable. Buzzer & light indicate when water level has been reached. Readings taken from marked cable to very tip of probe so less than 1 ml of water is displaced. Probe resists false readings caused by cascading water. Standard models have cables marked in feet, metric models marked in centimeters.

Water Level Indicator, 150ft.	H-4040.150
Water Level Indicator, 300ft.	H-4040.300
Water Level Indicator, 500ft.	H-4040.500
Water Level Indicator, 50m	H-4040.50M
Water Level Indicator, 100m	H-4040.100M
Water Level Indicator, 150m	H-4040.150M

Ship wt. 6 to 12lbs (3 to 5kg)

**Water Level Meter**

The Water Level Meter is designed to measure groundwater levels, especially in small diameter tubes and piezometers, or where a flexible assembly is needed to get past downhole instrumentation. Units include a 3/8" dia. x 2.75" (10 x 70mm) stainless steel probe with 10 stainless steel weights, weighing 6.14oz. (174g). This probe is ideal for the majority of water level measurement applications. The flexible weight assembly allows easy well access and keeps the cable hanging straight in monitoring wells. The coaxial cable used has a durable polyethylene jacket with permanent markings precisely etched on the cable every 1/100ft.

Water Level Indicator, 100ft.	H-4041.100
Water Level Indicator, 200ft.	H-4041.200
Water Level Indicator, 300ft.	H-4041.300
Water Level Indicator, 500ft.	H-4041.500
Water Level Indicator, 30m	H-4041.30M
Water Level Indicator, 60m	H-4041.60M
Water Level Indicator, 100m	H-4041.100M
Water Level Indicator, 150m	H-4041.150M

Ship wt. 6 to 12lbs (3 to 5kg)



**Resistivity Meter, Digital**

ASTM G187, G57; AASHTO T-288

The digital resistivity meter provides soil resistivity readings at the push of a button. It provides a direct read-out of resistance without a need to select ranges or adjust dials. The resistance range is from  $0.01\Omega$  to  $10M\Omega$  (auto-ranging). The meter provides a high-resolution digital display and is housed in a rugged, hard plastic case— safe for use on wet ground. It provides a blue-tooth interface for optional data logging via a blue-tooth-enabled PC. Resistance measurements are unaffected by any stray interference signals, which may be present in the soil during readings, due to the use of narrow band-pass filters centered at 82.2Hz (the unit's operating frequency). Runs on a set of replaceable D-cell alkaline batteries with no need to periodically recharge the unit or to plug it into a power source. Performs 10,000 single readings on a fresh set of batteries. For data logging capabilities, the meter is supplied with an "over-the pipe" soil resistivity survey program, known as "ProCP soil resistivity", based on the 4-Pin Wenner methodology.

**Accuracy:**

$0.01\Omega$  to  $1M\Omega$  range:  $\pm 1.6\%$   $\pm 1$ LS Display Digit  
 $1M\Omega$  to  $10M\Omega$  range:  $\pm 5\%$   $\pm 1$ LS Display Digit

**Resistivity Meter, Digital**

H-4385D

Ship wt. 10.5lbs (5kg)

**Resistivity Meter, Analog**

ASTM G187, G57; AASHTO T-288

The resistivity meter can be easily used to measure resistivity of soil in-situ using the 2, 3, or 4 electrode method or with a soil box to measure resistivity of soil or water in the range of distilled to sea water. Resistance measurement range is from  $0.01\Omega$  to  $1.1M\Omega$  and resistance measurements are unaffected by any stray interference signals that may be present in the earth during measurement, due to use of narrow band-pass filters. It

has a rugged, lightweight weatherproof case with an IP67 rating for dust and water intrusion. The lid can be removed to facilitate use and movement of the meter to new locations without removing test leads. Runs on a set of C-cell alkaline batteries eliminating recharging and plugged-in power sources.

**Resistivity Meter**

H-4385

Ship wt. 10lbs (5kg)

**Soil Box**

The Soil Box can be used with both resistivity meters for a quick and accurate measurement of resistivity of a soil or water sample in the field or laboratory. Construction is clear plastic with stainless steel current plates and brass potential pins. The dimensions are such that the measured resistivity with the Resistivity Meter, when the box is filled level, can be expressed in ohm-centimeter, making calculations unnecessary. The box can also be used with other meters. H-4386: 8.75" x 1.5" x 1.25" (222 x 38 x 32mm) and H-4386SM: 4.375" x 1.125" x 1.5" (111 x 29 x 38mm).

**Soil Box, 280ml Capacity**

H-4386

**Soil Box, 75ml Capacity**

H-4386SM

Ship wt. 1.3lb (0.5kg)

**Soil Cylinder**

ASTM G187; AASHTO T-288

The Soil Cylinder can be used to satisfy either of the 2-electrode methods— ASTM G187 or AASHTO T-288 Standards. The body of the Soil Cylinder is made of clear acrylic with PVC components and the distribution plates (conducting end plates) are stainless steel. Rubber O-rings provide sealing for the two end caps. Accommodates large sample volumes [approximately 2,714 cm<sup>3</sup> (2.714 liters)] and can accommodate crushed-rock samples, as well as regular soils and liquids. Water can be added in-situ for sample saturation (de-ionized water, simulated rain water etc.)

Field-collected samples can be immediately "installed" in the cylinder, as opposed to filling a separate container for transportation. This means that resistance readings taken at a later stage will be representative of the "as-found" sample.

**Soil Cylinder**

H-4385.5

Ship wt. 4.6lbs (2.3kg)

**Resistivity Test Reel with Soil Pins**

Four pin, test reel set for attaining 1-20 ft. depth measurements. Can be used with any 4-terminal meter. Uses 4-electrode Wenner method. Includes 4 separate, color-coded wires of varying lengths from 5 to 65 ft. Jumper leads (2-foot) are supplied for connection to meter.

**Resistivity Test Reel with Soil Pins**

H-4388

Ship wt. 6.7lbs (3.2kg)

**Soil Pins (Electrodes)**

Set of 4 soil pins for use with resistivity meters. Pins measure 1/4" x 20" (1.9 x 51cm).

**Soil Pins (Electrodes)**

H-4388.1

Ship wt. 3.9lbs (1.8kg)

**Soil Box Leads, set of 4**

Set of 4 wire leads for use with resistivity meters to connect to soil boxes. Leads are 4 ft. (122 cm) long.

**Soil Box Leads, set of 4**

H-4387

Ship wt. 0.7lbs (0.3kg)

**Resistivity Meter Test Kit**

ASTM G187, G57; AASHTO T-288

The Soil resistivity test kit is designed to conveniently store and carry all that is necessary to perform the Wenner Four-Pin Method, as outlined in the ASTM G57-06 Standard, as well as the Soil-Box Method. The kit includes: (1) large Soil Box; Soil container test leads set, (1) set of 4-Pin Test Reel leads; 4-Pin soil resistivity test reel, (4) Heavy-duty, stainless steel, 18" long, T-handle, Soil pins and carrying case. **Order Resistivity Meter separately.**

**Resistivity Meter Test Case**

H-4385.1

Ship wt. 10lbs (6kg)



HM-4502



HSM-2100



H-4377



H-4368A

### Double Ring Infiltrometer

ASTM D3385

Ideal for field testing, as well as lab use. The Double-Ring Infiltrometer provides actual field measurements of the rate of infiltration of water or other liquid through soils, especially fine-grained soils. The test provides reliable data for use in environmental and other geotechnical studies, such as liquid waste disposal; leaching; drainage; irrigation requirements, and canal or reservoir leakage.

The Infiltrometer is comprised of two stainless steel rings measuring 12" and 24" dia x 20"H (304.8 and 609.6 dia x 508mm). These rings are driven into the soil in a concentric arrangement using the included driving plate.

The rings are filled with water and the water level is maintained by the use of constant-head Mariotte reservoir cylinders, which provide a constant head of water for the duration of the test. The velocity of liquid passing into the soil from the inner ring is equivalent to the infiltration rate. Water between the two rings promotes one-dimensional vertical flow beneath the inner ring.

A mariotte tube provides a constant head of water for flow tests. Graduations on the side of the tube used to determine flow rate. Sealed adjusting tube raises or lowers the head inside the infiltrometer ring. There is a main flow valve in the base platform and a bleed valve next to the adjusting tube seal. Includes: 0.5" thick (12.7mm) aluminum driving cap with centering pins; two, 6" square (152.4mm) neoprene splash guards; and two mariotte tubes with 3,000 ml and 10,000 ml capacities with support stands, flexible tubing and rubber splash guards.

Double Ring Infiltrometer

HM-4502

Ship wt. 148lbs (72.5kg)

### Guelph Permeameter Kit

ASTM D5126

The Guelph Permeameter is an easy-to-use instrument to quickly and accurately measure in-situ hydraulic conductivity. Accurate evaluation of soil hydraulic conductivity, soil sorptivity, and matrix flux potential can be made in all types of soils.

The equipment can be transported, assembled, and operated easily by one person. Measurements can be made in 10.5 to 2 hours, depending on soil type, and requires only about 2.5 liters of water. Measurements can be made in the range of 15 to 75cm below the soil surface.

The Guelph Permeameter is a complete kit consisting of the permeameter, field tripod, well auger, well preparation and cleanup tools, collapsible water container, and vacuum test hand pump, all packaged in a durable carrying case. Accessory attachments are available for extending the measurement capability of the permeameter. Depth attachments increase the depth of operation by 80cm. The maximum practical operating depth is 315cm. Ring attachments allow ring infiltrometer measurements from 10 and 20cm diameter rings. A tension adapter allows measurements to be made under tensional and very low head conditions. The Guelph Permeameter Kit, consists of: permeameter field tripod, well auger, well preparation and cleanup tools, collapsible water container, and vacuum test hand pump, in a durable carrying case.

Guelph Permeameter Kit

HSM-2100

Ship wt. 33lbs (14.9kg)

### Acidity and Moisture Tester

Provides the ability to make on-the-spot in field or lab tests for soil acidity in moist soil. Measures pH and moisture content (% relative saturation). The Kelway tester operates on the principle of electrical potential between two dissimilar metal plates - without batteries or any external power

source. When inserted into moist soil it registers the degree of acidity on the upper scale. The lower scale shows degree of moisture (% saturation) when the switch button is held in. Tester is supplied with belt-loop case, two 3" x 4" (76 x 102mm) conditioning film sheets and instructions. Not for use with liquids.

Acidity and Moisture Tester

H-4377

Ship wt. 2lbs (1kg)

### Acidity and Moisture Tester Conditioner Film

Conditioning film sheets for Acidity and Moisture Tester. Package of 12.

Conditioner Film (12 pk)

H-4377.1

Ship wt. 1lbs (0.5kg)

### Soil Color Charts

Munsell soil color charts were developed with the U.S. soil conservation service for classifying soil color, but may also be used for rocks, archaeological specimens, and other natural products. Munsell charts are a standard tool for geologists, civil engineers, and soil scientists. The tabbed charts include 10R, 7.5R, 5R, 2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, 5Y and 10Y-5GY color ranges. Charts for tropical and semitropical soils, and for Australia, SE Asia are now included. A two page Gley chart for submerged soils covers weak chromas and neutrals of blue and green hues. A white page is used to describe carbonate, silica, gypsum, soluble salt participates and more. Openings between chips allow easy visual comparison with soil samples. Illustrations of soil grain structures, charts for estimating proportions of mottles and coarse fragments, color name diagrams, and instructions are furnished. Color chips are mounted on neutral gray, 7.25 x 4.25" (184 x 108mm) water resistant pages in an 8 x 6" (203 x 152mm) loose-leaf binder.

Soil Color Charts

H-4368A

Ship wt. 1.5lbs (0.5kg)