Triaxial Testing Equipment

PROMAT

YOUR SOLUTION TO TESTING INSTRUMENTS

ELITE SERIES
Load Frames

Elite Series Load Frames

ASTM D1883, D2850, D2166, D4767 and D1559; AASHTO T193, T296, T297, T208, T245 and T246; BS 1377: Part 4, BS 1377 Part 7, BS 1377 Part 8, BS 598 Part 107

Humboldt's Elite Series Load Frames provide the materials testing lab with a choice of three, highly-versatile and precision-built loading systems covering a range of testing applications. The HM-5030 is the workhorse of the group, capable of handling any testing need up to 50kN or 11,000 lbf. The HM-5020 is a machine designed specifically for triaxial testing and other testing requirements up to 15kN or 3,000 lbf. and, the HM-5040, is a heavy-duty machine capable of handling testing requirements up to 100kN or 22,000 lbf.

These machines provide four (4) integral and independent data acquisition channels, which can be utilized in stand-alone configurations or accessed through a LAN-networked computer using Humboldt's Next Software.

Elite Series load frames are built with durable, high-quality components and feature the use of a stepper motor, precision gears and gear box to ensure smooth and reliable operation, as well as precise results.

In stand-alone mode, these load frames provide a 7" (178mm) touch-screen controller. These new waterproof, touch screens provide colorful, at-a-glance monitoring of testing functions without the use of a computer. Operators can see all the data in several formats at the machine while the test is running. Data can then be downloaded later to a computer in the lab, in the next room or at a different location, while also providing report generation capabilities from within Humboldt's NEXT software or our enhanced test-specific modules.

NOTES

Elite Series load frames are sold as load frames only though shown here with typical triaxial setups

HM-5020 TRIAXIAL LOADER

Load capacity	3000 lbf (15kN)
Speed Range Testing: Fast Approach:	 0.00001 – 2.00000 in/min (0.00001 – 50.80000 mm/min) 2.1 in/min (55.0 mm/min)
Data channels	4
Platen Size / Travel	10" (254mm) / 4" (100mm)
Data storage	1000 tests and up to 3000 readings per test
Clearance, vertical	27" (686mm)
Clearance, horiz.	11" (286mm)
Voltage	110/220V 50/60Hz. 5.0 amps

A small-footprint, triaxial-specific load frame that provides the versatility, precision and durability found throughout Humboldt's Elite Series load frames.

The HM-5020 Triaxial Loader has been specifically designed to handle triaxial testing applications, including: UU, CU and CD triaxial and UC. From educational institutions and consulting firms to high-volume commercial labs and construction projects, the Triaxial Loader can handle any application with ease. Its heavy-duty design and precise stepper-motor control provide a stable platform for years of reliable service allowing the HM-5020 to perform any tests required up to its load capacity of 3000 lbf (15kN).

Like all Elite Series load frames, the HM-5020 is built around Humboldt's integral, 4-channel data logger with touch-screen control, which allows the load frame to be used as a standalone device capable of full test control and data logging. It can also be controlled by a networked computer at any location with access to the network.

Triaxial Loader, 110/220V 50/60 Hz HM-5020.3F

Shipping wt. 300 lb (54kg)

HM-5030 MASTER LOADER

Load capacity	11000 lbf (50kN)
Speed Range Testing: Fast Approach:	 0.00001 – 2.00000 in/min (0.00001 – 50.80000 mm/min) 3.0 in/min (75.0 mm/min)
Data channels	4
Platen Size / Travel	10" (254mm) / 4" (100mm)
Data storage	1000 tests and up to 3000 readings per test
Clearance, vertical	40" (1000mm)
Clearance, horiz.	15" (380mm)
Voltage	110/220V 50/60Hz. 5.0 amps

Designed for applications requiring multi-purpose loading systems, such as road construction projects in either mobile or fixed labs, educational institutions and consulting firms, the HM-5030 Master Loader is ideal for just about any application from road construction to high-volume commercial and educational laboratories.

While the HM-5030 has been specifically designed for soil testing labs conducting multiple testing operations including: UU, CU and CD triaxial, UC, CBR and LBR, it is also perfect for running Marshall, Hveem, TSR and SCB asphalt tests as well. Its heavy-duty design and precise stepper-motor control provide a stable platform for years of reliable service allowing the HM-5030 to perform any tests required up to its load capacity of 11000 lbf (50kN).

Like all Elite Series load frames, the HM-5030 is built around Humboldt's integral, 4-channel data logger with touch-screen control, which allows the load frame to be used as a standalone device capable of full test control and data logging. It can also be controlled by a networked computer at any location with access to the network.

Master Loader, 110/220V 50/60 Hz HM-5030.3F

Shipping wt. 300 lb (136kg)

HM-5040 GRAND LOADER

Load capacity	22000 lbf (100kN)
Speed Range Testing: Fast Approach:	 0.00001 – 0.49999 in/min (0.00001 – 12.50000 mm/min) 0.5 in/min (12.5 mm/min)
Data channels	4
Platen Size / Travel	10" (254mm) / 4" (100mm)
Data storage	1000 tests and up to 3000 readings per test
Clearance, vertical	44" (1100mm)
Clearance, horiz.	21" (540mm)
Voltage	110/220V 50/60Hz. 5.0 amps

The HM-5040 Grand Loader is ideal for just about any application from road construction to high-volume commercial and educational laboratories, which require higher pressure loading capacities up to 22000 lbf (100kN), such as those involving larger sized samples and samples comprised of rock and rock/soil mixtures. It's wider stance and large vertical and horizontal clearances allows it to accommodate much large sample cells.

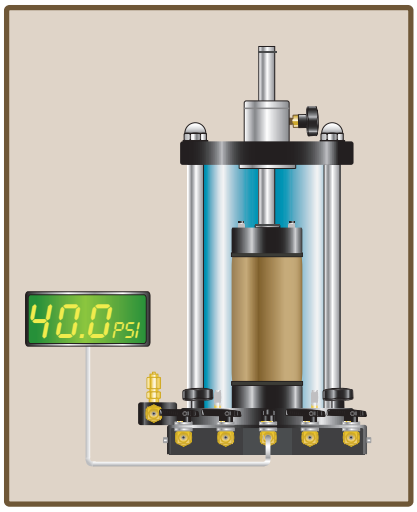
Its heavy-duty design and precise stepper-motor control provide a stable platform for years of reliable service allowing the HM-5040 to perform any tests required up to its load capacity of 22000 lbf (100kN).

Like all Elite Series load frames, the HM-5040 is built around Humboldt's integral, 4-channel data logger with touch-screen control, which allows the load frame to be used as a standalone device capable of full test control and data logging. It can also be controlled by a networked computer HM-5040 includes a storage base with casters.

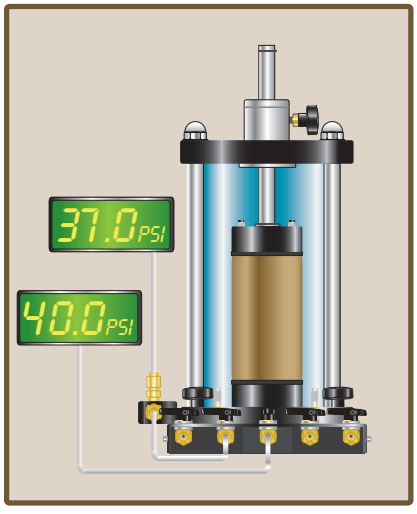
Grand Loader, 110/220V 50/60 Hz HM-5040.3F

Shipping wt. 725 lb (329kg)

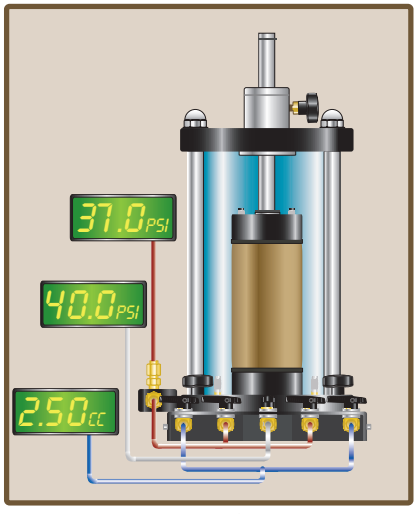
Triaxial Setups



UU-Triaxial Test
Typical Cell Setup



CU-Triaxial Test
Typical Cell Setup



CD-Triaxial Test
Typical Cell Setup

Humboldt Triaxial Testing Systems

Humboldt provides an extensive line of triaxial testing equipment solutions for today's soil labs.

Presented below and on the following pages are three triaxial systems based around our HM-5030 and HM-5020 load frames, our NEXT software with triaxial-specific software modules and three different pressure control solutions.

Automated Pressure Control Triaxial System

Designed for those who want the ultimate in control of their triaxial testing, Humboldt's automated pressure control triaxial system is a computer-controlled system specifically designed for soil testing laboratories conducting UU, CU and CD Triaxial tests, as well as unconfined compression. It is perfect for large, high-volume labs, as well as those who want to utilize technology to increase staff efficiencies and testing accuracy. This system provides complete control of the testing process including data acquisition.

Available in one or three-cell configurations, our automated control panels can handle your testing needs in stride. And, if you want to increase the number of simultaneous tests you can run, Humboldt's NEXT software can easily handle a multitude of tests. All you need to do is add cells and the other appropriate equipment to handle your needs.

Humboldt's automated pressure control triaxial system is built around the HM-5240.3F Stand-alone pressure controller. The HM-5240.3F is a fully-automated pneumatic pressure controller, which is highly accurate up to 150psi (1000kpa) in pressure and 100cc (100ml) in volume. It is designed specifically for geotechnical laboratory triaxial testing (UU, CU and CD) and provides control and monitoring of cell pressure, back pressure, pore water measurement and volume change when used with our Elite Series load frames.

The HM-5240 provides four (4) integral and independent data acquisition channels, which can be utilized in stand-alone configuration or accessed through a LAN-networked computer using Humboldt's NEXT software. The unit is built with durable high-quality components and features the use of two electronic regulators to ensure smooth and reliable operation of pressures, as well as precise results.

In stand-alone mode, this pressure controller provides a 7" (178mm) touch-screen controller. This new waterproof, touch screen provides colorful, at-a-glance monitoring of testing functions without the use of a computer. Operator could see all the data in several formats at the controller while the test is running. Then can be viewed simultaneously or downloaded later to a computer in the lab, in the next room or at a different location, while also providing report generation capabilities from within Humboldt's NEXT software or our enhanced test- specific modules. The system can also be configured for use with our triaxial-specific load frame, the HM-2900. While Humboldt's automated pressure control triaxial system has been designed to work as a complete system, its make-up provides for the ultimate in versatility and expanded possibilities.

See pages 132-133 for a complete component list for the automated pressure control triaxial system

Automated Pressure Control Triaxial System Components

Manual Pressure Control Triaxial System

Humboldt's manual pressure control triaxial system provides a manually-controlled alternative to our automated system. The manual system eliminates the HM-5240.3F pressure controller from the system and replaces its function with a control panel that allows for manual control of the confining and back pressures. The HM-2315 Volume Change Apparatus, which measures the volume change of a soil sample by monitoring the flow of water through the chamber of the unit. The lower assembly contains changeover valves, which when used in conjunction with the upper assembly provides limitless capacity. It is accurate to better than ±0.05 ml and is easily de-aired in seconds

Like the automated system, our manually-controlled system can run UU, CU and CD triaxial tests, as well as unconfined compression. Manual control panels are available in one or three-cell configurations and can be used in multiple configurations. All you need to do is add cells and the other appropriate equipment to handle your needs.

Humboldt's manual pressure control triaxial system is built around our NEXT software and our enhanced test-specific modules, which monitors, controls and reports test data, and, the highly-regarded HM-5030 load frame with its built-in, 4-channel data acquisition controller for stress, strain, pore water pressure and volume change measurement. The system can also be configured for use with our triaxial-specific load frame, the HM-5020. While Humboldt's manual pressure control triaxial system has been designed to work as a complete system, its make-up provides for the ultimate in versatility and expanded possibilities.

See pages 134-135 for a complete component list for the Manual Pressure Control Triaxial System

FlexPanel Pressure Control Triaxial System

Humboldt's FlexPanel pressure control option eliminates the use of the air/water bladder interface concept of pressure control in lieu of its highly-accurate burette system. Humboldt FlexPanels provide an accurate and easy-to-operate solution for controlling compressed air, water, de-aired water and vacuum without the need for air/water bladder interfaces to produce the pressures necessary for triaxial testing. FlexPanels utilize a set of three burettes to control cell, top cap and base pedestal pressures.

This extremely versatile pressure system controls the pressure, water, de-airing tank and vacuum from a single panel. The three burettes allow for the control of the cell pressure and the back pressure for each cell. They can monitor volume change in the sample and can be used to measure the flow of water through the sample for permeability testing.

This is a benefit to using FlexPanels over the air/water bladder system.

Like our other control systems you can run UU, CU and CD triaxial tests, as well as unconfined compression with FlexPanels. They are available in one or three-cell configurations and can be used in multiple configurations. All you need to do is add cells and the other appropriate equipment to handle your needs.

Humboldt's FlexPanel pressure control system also uses our NEXT software and our enhanced test-specific modules, which monitors, controls and reports test data, and, the highly-regarded HM-5030 load frame with its built-in, 4-channel data acquisition controller for stress, strain, pore water pressure and volume change measurement. The system can also be configured for use with our triaxial-specific load frame, the HM-5020

See pages 136-137 for a complete component list for the FlexPanel Pressure Control Triaxial System.

FlexPanel Pressure Control Triaxial System Components

Manual Pressure Control Triaxial System Components

Triaxial Setups

Automatic Pressure Control

Component List for 1 and 3-Cell Triaxial System with Automatic Pressure Control

Automatic Pressure Control System,1-Cell Setup

Components		
Load Frame (choose 1 below)		
50kN (11240 lbf) capacity	HM-5030.3F	1
15kN (3372 lbf) capacity	HM-5020.3F	1
Load/Strain		
Load Cell	HM-2300.020	1
Strain Transducer (LSCT)	HM-2310.20	1
Ball Seat Adapter	HM-200387	1
Strain Transducer Bracket	HM-4178BRT	1
UU Triaxial Software Module	HM-5002SW	1
CU Triaxial Software Module	HM-5003SW	1
CD Triaxial Software Module	HM-5006SW	1
Pressure/Volume Change		
Pressure Distribution Panel	HM-4154	1
Air/Water Bladder	HM-4151A	2
Pressure/Volume Controller	HM-5240.3F	1
De-airing System	HM-4187A.3F	1
Vacuum Pump	H-1763A or H-1763A.4F	1
Silent Air Compressor	HM-4220 or HM.4220.4F	1
Triaxial Cell (choose 1 below)		
3"/ 75mm dia. capacity	HM-4199B	1
4"/ 100mm dia. capacity	HM-4199B-4	1
Top Cap/ Base Pedestal Set (specify specimen size)	HM-4199.XX	1
Installation Kit	HM-4167	1

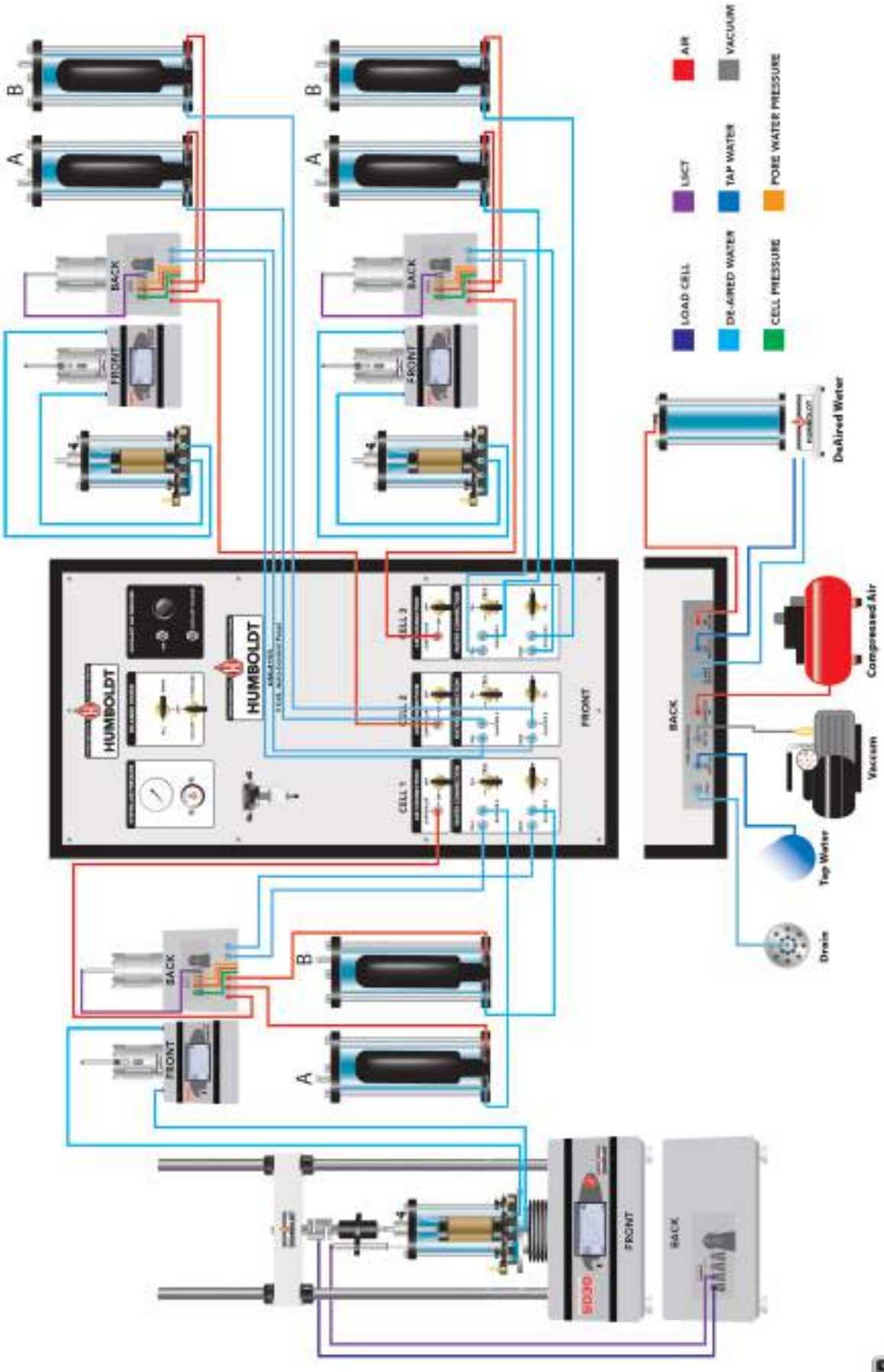
Automatic Pressure Control System, 3-Cell Setup

Components		
Load Frame (choose 1 below)		
50kN(11240 lbf) capacity	HM-5030.3F	1
15kN (3372 lbf) capacity	HM-5020.3F	1
Load/Strain		
Load Cell	HM-2300.020	1
Strain Transducer (LSCT)	HM-2310.20	1
Ball Seat Adapter	HM-200387	1
Strain Transducer Bracket	HM-4178BRT	1
UU Triaxial Software Module	HM-5002SW	1
CU Triaxial Software Module	HM-5003SW	1
CD Triaxial Software Module	HM-5006SW	1
Pressure/Volume Change		
Pressure Distribution Panel	HM-4155	1
Air/Water Bladder	HM-4151A	6
Pressure/Volume Controller	HM-5240.3F	3
De-airing System	HM-4187A.3F	1
Vacuum Pump	H-1763A or H-1763A.4F	1
Silent Air Compressor	HM-4220 or HM.4220.4F	1
Triaxial Cell (choose 1 below)		
3"/ 75mm dia. capacity	HM-4199B	3
4"/ 100mm dia. capacity	HM-4199B-4	3
Top Cap/ Base Pedestal Set (specify specimen size)	HM-4199.XX	3
Installation Kit	HM-4167	1

Triaxial Installation Kit
Kit designed to provide fittings, connectors, tubing and tools to complete a triaxial set up installation. See page 141 for kit contents and other individual set up items.

Standard Triaxial Sample Prep Accessories:
(See page 144 for a complete list and description. Items with .XX require a sample size)

Accessory	Item #	Required	Accessory	Item #	Required
Acrylic Base Disk	HM-4179.XX	2 or 6	2-Part Compaction Mold	HM-3818.XX	1
Membranes	HM-4180.XX	1	2-Part Vacuum Split Mold	HM-3827.XX	1
Membrane Stretcher	HM-4181.XX	1	Split Miter Box	HM-3847.XX	1
O-Rings (12-pack)	HM-4182.XX	1	Filter Paper (100-pack)	HM-4189.XX	1
O-Ring Placing Tool	HM-4183.XX	1	Filter Strips	HM-4189FS	1
Porous Stone	HM-4184.XX	2 or 6	High Vacuum Grease	HM-4198	1
Membrane Tester	HM-4185.XX	1			



Automatic Pressure Control System, 3-Cell Setup

Manual Pressure Control

Component List for 1 and 3-Cell Triaxial System with Manual air/water bladder Pressure Control

Manual Pressure Control System,1-Cell Setup

Components		
Load Frame (choose 1 below)		
50kN (11240 lbf) capacity	HM-5030.3F	1
15kN (3372 lbf) capacity	HM-5020.3F	1
Load/Strain/Pore Pressure		
Load Cell	HM-2300.020	1
Strain Transducer (LSCT)	HM-2310.20	1
Ball Seat Adapter	HM-200387	1
Strain Transducer Bracket	HM-4178BRT	1
UU Triaxial Software Module	HM-5002SW	1
CU Triaxial Software Module	HM-5003SW	1
CD Triaxial Software Module	HM-5006SW	1
Pressure		
Pressure Distribution Panel	HM-4164.3F	1
Air/Water Bladder	HM-4151A	2
De-airing System	HM-4187A.3F	1
Pore Pressure Transducer	HM-4170	1
Silent Air Compressor	HM-4220 or HM.4220.4F	1
Vacuum Pump	H-1763A or H-1763A.4F	1
Volume Change		
Volume Change Apparatus (Required for CU & CD Triaxial)	HM-2315	1
Strain Transducer, 1'' (25mm)	HM-2310.10	1
LSCT/LVDT Mounting Bracket	HM-2310BR	1
Triaxial Cell (choose 1 below)		
3"/ 75mm dia. capacity	HM-4199B	1
4"/ 100mm dia. capacity	HM-4199B-4	1
Top Cap/ Base Pedestal Set (specify specimen size)	HM-4199.XX	1
Installation Kit	HM-4167	1

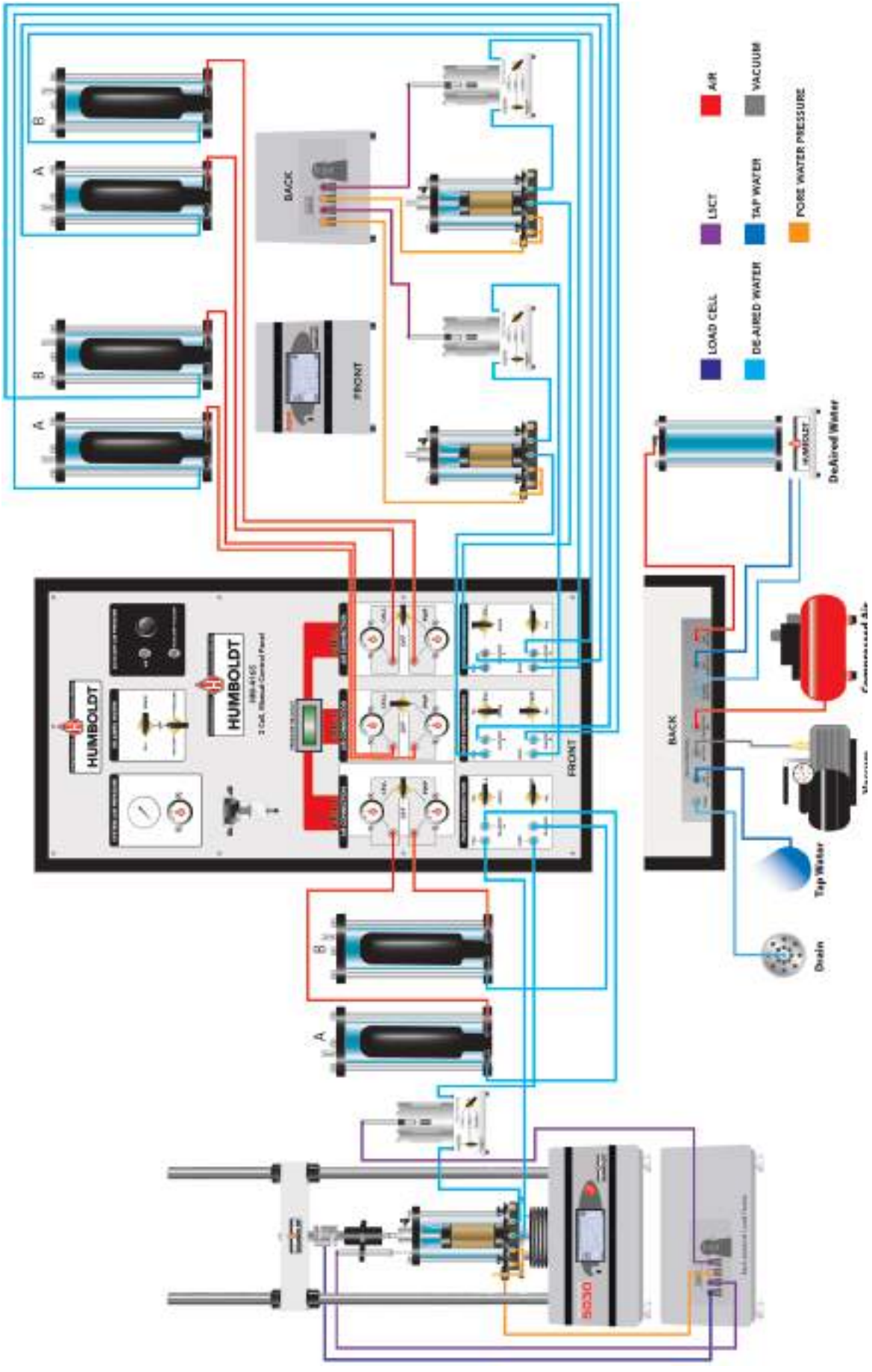
Manual Pressure Control System, 3-Cell Setup

Components		
Load Frame (choose 1 below)		
50kN (11240 lbf) capacity	HM-5030.3F	1
15kN (3372 lbf) capacity	HM-5020.3F	1
Load/Strain/Pore Pressure		
Load Cell	HM-2300.020	1
Strain Transducer (LSCT)	HM-2310.20	1
Ball Seat Adapter	HM-200387	1
Strain Transducer Bracket	HM-4178BRT	1
UU Triaxial Software Module	HM-5002SW	1
CU Triaxial Software Module	HM-5003SW	1
CD Triaxial Software Module	HM-5006SW	1
Humboldt Logger	HM-5320.3F	1
Pressure		
Pressure Distribution Panel	HM-4165.3F	1
Air/Water Bladder	HM-4151A	6
De-airing System	HM-4187A.3F	1
Pore Pressure Transducer	HM-4170	3
Silent Air Compressor	HM-4220 or HM.4220.4F	1
Vacuum Pump	H-1763A or H-1763A.4F	1
Volume Change		
Volume Change Apparatus (Required for CU & CD Triaxial)	HM-2315	3
Strain Transducer, 1'' (25mm)	HM-2310.10	3
LSCT/LVDT Mounting Bracket	HM-2310BR	3
Triaxial Cell (choose 1 below)		
3"/ 75mm dia. capacity	HM-4199B	3
4"/ 100mm dia. capacity	HM-4199B-4	3
Top Cap/ Base Pedestal Set (specify specimen size)	HM-4199.XX	3
Installation Kit	HM-4167	1

Triaxial Installation Kit
Kit designed to provide fittings, connectors, tubing and tools to complete a triaxial set up installation. See page 141 for kit contents and other individual set up items.

Standard Triaxial Sample Prep Accessories:
(See page 144 for a complete list and description. Items with .XX require a sample size)

Accessory	Item #	Required	Accessory	Item #	Required
Acrylic Base Disk	HM-4179.XX	2 or 6	2-Part Compaction Mold	HM-3818.XX	1
Membranes	HM-4180.XX	1	2-Part Vacuum Split Mold	HM-3827.XX	1
Membrane Stretcher	HM-4181.XX	1	Split Miter Box	HM-3847.XX	1
O-Rings (12-pack)	HM-4182.XX	1	Filter Paper (100-pack)	HM-4189.XX	1
O-Ring Placing Tool	HM-4183.XX	1	Filter Strips	HM-4189FS	1
Porous Stone	HM-4184.XX	2 or 6	High Vacuum Grease	HM-4198	1
Membrane Tester	HM-4185.XX	1			



Manual Pressure Control System, 3-Cell Setup

FlexPanels Pressure Control

Component List for 1 and 3-Cell Triaxial/Permeability System with FlexPanel Pressure Control

FlexPanel Pressure Control System,1-Cell Setup

Components		
Load Frame (choose 1 below)		
50kN (11240 lbf) capacity	HM-5030.3F	1
15kN (3372 lbf) capacity	HM-5020.3F	1
Load/Strain/Pore Pressure		
Load Cell	HM-2300.020	1
Strain Transducer (LSCT)	HM-2310.20	1
Pore Pressure Transducer	HM-4170	1
Ball Seat Adapter	HM-200387	1
Strain Transducer Bracket	HM-4178BRT	1
UU Triaxial Software Module	HM-5002SW	1
CU Triaxial Software Module	HM-5003SW	1
CD Triaxial Software Module	HM-5006SW	1
Pressure		
Pressure Distribution Panel	HM-4150.3F	1
De-airing System	HM-4187A.3F	1
Silent Air Compressor	HM-4220 or HM.4220.4F	1
Vacuum Pump	H-1763A or H-1763A.4F	1
Volume Change		
Volume Change Apparatus (Required for CD Triaxial)	HM-2315	1
Strain Transducer, 1'' (25mm)	HM-2310.10	1
LSCT/LVDT Mounting Bracket	HM-2310BR	1
Triaxial Cell (choose 1 below)		
3"/ 75mm dia. capacity	HM-4199B	1
4"/ 100mm dia. capacity	HM-4199B-4	1
Top Cap/ Base Pedestal Set (specify specimen size)	HM-4199.XX	1
Installation Kit	HM-4167	1

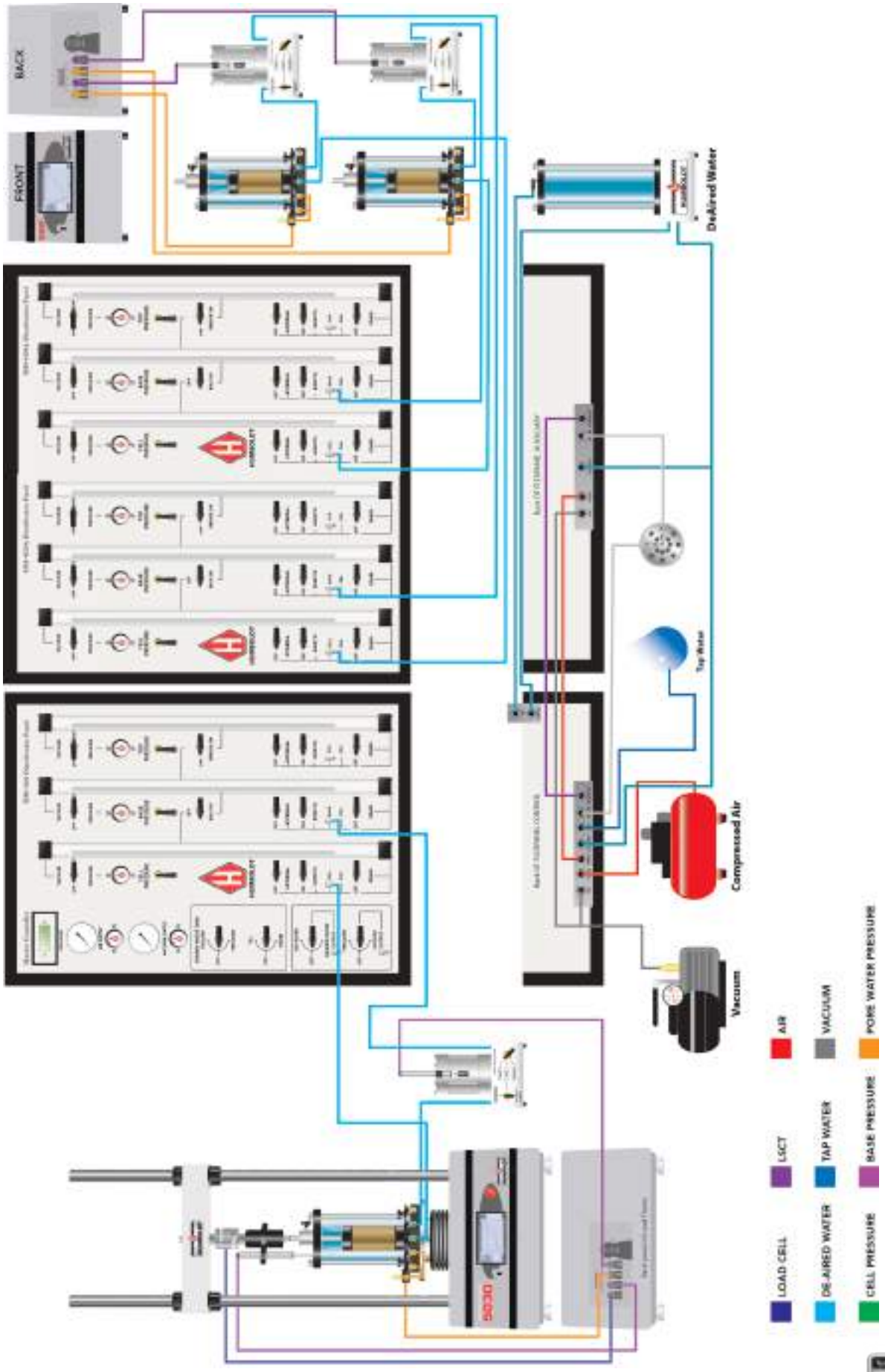
FlexPanel Pressure Control System, 3-Cell Setup

Components		
Load Frame (choose 1 below)		
50kN (11240 lbf) capacity	HM-5030.3F	1
15kN (3372 lbf) capacity	HM-5020.3F	1
Load/Strain/Pore Pressure		
Load Cell	HM-2300.020	1
Strain Transducer (LSCT)	HM-2310.20	1
Pore Pressure Transducer	HM-4170	3
Ball Seat Adapter	HM-200387	1
Strain Transducer Bracket	HM-4178BRT	1
UU Triaxial Software Module	HM-5002SW	1
CU Triaxial Software Module	HM-5003SW	1
CD Triaxial Software Module	HM-5006SW	1
Humboldt Logger	HM-5320.3F	1
Pressure		
Pressure Distribution Panel	HM-4150.3F	1
Pressure Distribution Panel	HM-4160A	1
De-airing System	HM-4187A.3F	1
Silent Air Compressor	HM-4220 or HM.4220.4F	1
Vacuum Pump	H-1763A or H-1763A.4F	1
Volume Change		
Volume Change Apparatus (Required for CD Triaxial)	HM-2315	3
Strain Transducer, 1'' (25mm)	HM-2310.10	3
LSCT/LVDT Mounting Bracket	HM-2310BR	3
Triaxial Cell (choose 1 below)		
3"/ 75mm dia. capacity	HM-4199B	3
4"/ 100mm dia. capacity	HM-4199B-4	3
Top Cap/ Base Pedestal Set (specify specimen size)	HM-4199.XX	3
Installation Kit	HM-4167	1

Triaxial Installation Kit
Kit designed to provide fittings, connectors, tubing and tools to complete a triaxial set up installation. See page 141 for kit contents and other individual set up items.

Standard Triaxial Sample Prep Accessories:
(See page 144 for a complete list and description. Items with .XX require a sample size)

Accessory	Item #	Required	Accessory	Item #	Required
Acrylic Base Disk	HM-4179.XX	2 or 6	2-Part Compaction Mold	HM-3818.XX	1
Membranes	HM-4180.XX	1	2-Part Vacuum Split Mold	HM-3827.XX	1
Membrane Stretcher	HM-4181.XX	1	Split Miter Box	HM-3847.XX	1
O-Rings (12-pack)	HM-4182.XX	1	Filter Paper (100-pack)	HM-4189.XX	1
O-Ring Placing Tool	HM-4183.XX	1	Filter Strips	HM-4189FS	1
Porous Stone	HM-4184.XX	2 or 6	High Vacuum Grease	HM-4198	1
Membrane Tester	HM-4185.XX	1			



FlexPanel Pressure Control System, 3-Cell Setup

Triaxial Cells

HM-4199B

HM-4199B-6

HM-5199B-4

HM-4199.28

Standard Triaxial Cells

Triaxial Cells are available for use with sample sizes from 1.4" (35mm) to 6" (150mm). The clear acrylic chamber has a working pressure of 150 psi (1,000 kPa) and is tested to 250 psi (1,700 kPa). The design features a solid base, which provides an extremely stable test platform making it faster and easier to center the cell on the load frame platen— reducing setup times. HM-4199B cells provide easy access to the test chamber by utilizing a one-piece, chamber unit that is quickly removed through the removal of three easy-turn knobs. These cells also have an integral de-airing block for the pore pressure transducer built into the side. The cells have five no-volume-change valves aligned on one side for maximum convenience. Two valves handle top drainage, two valves handle bottom drainage, and one valve handles filling and drainage, as well as providing confining pressure to the cell. The removable base pedestal accommodates various sample diameters. Top caps and base pedestals are available in a choice of black-anodized aluminum or stainless steel in various sizes (see chart below). Other sizes are available. The cell top and base are precision machined from 6061 T6 aluminum, black anodized for a durable finish. A .625" hardened stainless steel piston runs inside a linear bearing to reduce friction. Choice of brass or stainless steel valve fittings is available (stainless steel for use with hazardous materials). When ordering, specify top cap and base pedestal for desired sample size, see charts below. Order porous stones separately, see page 144.

Standard Triaxial Cell, 2.8" (70mm) **HM-4199B**
15 lb (7kg)

Standard Triaxial Cell, 6" (150mm) **HM-4199B-6**
120 lb (54kg)

Double-wall Triaxial Cell w/ Submersible Load Cell

This Double-wall Triaxial Cell can handle samples up to 4" (100mm) and includes a 2000lb (10kN) Submersible Load Cell (HM-2300.020S) Double-wall Triaxial Cells are typically used when testing unsaturated soill samples.

Double-Wall Triaxial Cell, 4" (100mm) **HM-5199B-4**
28 lb (13kg)

NOTES

When ordering cells, specify top cap and base pedestal for desired sample size. Order porous stones separately, see page144.

Size	Top Cap/ Pedestal Set	
	Aluminum	Stainless Steel
35mm	HM-4199.35	HM-4199.35
1.4"	HM-4199.14	HM-4199.14
38mm	HM-4199.38	HM-4199.38
1.5"	H M-4199.15	H M-4199.15
50mm	HM-4199.50	HM-4199.50
2.0"	HM-4199.20	HM-4199.20
70mm	HM-4199.70	HM-4199.70
2.8"	HM-4199.28	HM-4199.28
100mm	HM-4199.100	HM-4199.100
4.0"	HM-4199.40	HM-4199.40
150mm	HM-4199.150	HM-4199.150
6"	HM-4199.60	HM-4199.60

Size	Top Cap	
	Aluminum	Stainless Steel
35mm	HM-4199.35T	HM-4199.35SST
1.4"	HM-4199.14T	HM-4199.14SST
38mm	HM-4199.38T	HM-4199.38SST
1.5"	H M-4199.15T	H M-4199.15SST
50mm	HM-4199.50T	HM-4199.50SST
2.0"	HM-4199.20T	HM-4199.20SST
70mm	HM-4199.70T	HM-4199.70SST
2.8"	HM-4199.28T	HM-4199.28SST
100mm	HM-4199.100T	HM-4199.100SST
4.0"	HM-4199.40T	HM-4199.40SST
150mm	HM-4199.150T	HM-4199.150SST
6"	HM-4199.60T	HM-4199.60

Size	Pedestal	
	Aluminum	Stainless Steel
35mm	HM-4199.35B	HM-4199.35SSB
1.4"	HM-4199.14B	HM-4199.14SSB
38mm	HM-4199.38B	HM-4199.38SSB
1.5"	H M-4199.15B	H M-4199.15SSB
50mm	HM-4199.50B	HM-4199.50SSB
2.0"	HM-4199.20B	HM-4199.20SSB
70mm	HM-4199.70B	HM-4199.70SSB
2.8"	HM-4199.28B	HM-4199.28SSB
100mm	HM-4199.100B	HM-4199.100SSB
4.0"	HM-4199.40B	HM-4199.40SSB
150mm	HM-4199.150B	HM-4199.150SSB
6"	HM-4199.60B	HM-4199.60SSB


HM-4155


HM-4154


HM-4165.3F


HM-4164.3F

Automated Control Panel

ASTM: D2850, D2166, D4767, and D1559; AASHTO: T193, T296, T297, T208; BS 1377: Part 4: 1990, BS 1377: Part 7: 1990, BS 1377: Part 8: 1990

Used in conjunction with the HM-2450A.3F pressure controller, Humboldt automated control panels provide an accurate and easy-to-operate solution for providing the controls necessary for distributing compressed air, water, de-aired water and vacuum within an air/water bladder-type triaxial testing system. The use of these control panels and the HM-2450A.3F pressure controller allows changes in cell and back pressures required for sample saturation to be done automatically without the need for an operator. This feature reduces the need for continual monitoring of the sample saturation process during a triaxial test.

Specifications			
Pressure gauge	psi	BAR	Mpa
Max. input pressure	200	14	1.4
Max. output pressure	150	10	1
Pressure resolution	0.1	0.01	0.001
Display	LCD		
HM-4164 dimensions (L x W x H)	8 x 8 x 37.5" (203 x 203 x 952mm)		
HM-4165 dimensions (L x W x H)	8 x 19.5 x 37.5" (203 x 495 x 952)		

Humboldt auto control panels feature an analog input pressure gauge and controller, an air/water filter for the input pressure and de-aired water tank input, as well as quick-disconnects for quickly connecting bladders, the pressure controller and triaxial cells.

The HM-4154 provides connections for one triaxial cell, while the HM-4155 provides connections for up to three triaxial cells. For each triaxial cell, one bladder is required for generating the cell pressure and a second bladder is required for back pressure.

Automated Panel, 1 Cell — HM-4154
Shipping wt. 100 lb (45.3kg)

Automated Panel, 3 Cell — HM-4155
Shipping wt. 80lb (36.2kg)

Manual Control Panel

ASTM: D2850, D2166, D4767, and D1559; AASHTO: T193, T296, T297, T208; BS 1377: Part 4: 1990, BS 1377: Part 7: 1990, BS 1377: Part 8: 1990

For those operations that do not require automated control, Humboldt's HM-4164 and HM-4165 manual control panels provide an accurate and easy-to-operate solution for controlling compressed air, water, de-aired water and vacuum within an air/water bladder-type triaxial testing system.

The use of these control panels provides the necessary control for making changes in cell and back pressures required for sample saturation to be done from a central location on the panel. The operator has complete control of system pressure during the triaxial test with three independently-controlled pressure regulators. These control panels have a bias pressure regulator feature, which allows simultaneous control of confining and back pressures, while maintaining a constant differential pressure

Humboldt manual control panels feature an analog input pressure gauge and controller, an air/water filter for the input pressure and de-aired water tank input, a digital pressure readout for each set of cell functions, as well as quick-disconnects for quickly connecting bladders, the pressure controller and triaxial cells.

Specifications			
Pressure gauge	psi	BAR	Mpa
Max. input pressure	200	14	1.4
Max. output pressure	150	10	1
Pressure resolution	0.1	0.01	0.001
HM-4164 dimensions (L x W x H)	8 x 8 x 37.5" (203 x 203 x 952mm)		
HM-4165 dimensions (L x W x H)	8 x 19.5 x 37.5" (203 x 495 x 952)		

The HM-4164 provides connections for one triaxial cell, while the HM-4165 provides connections for up to three triaxial cells. For each triaxial cell, one bladder is required for generating the cell pressure and a second bladder is required for back pressure .

Manual Panel, psi, 1 Cell, 120/220V 50/60Hz — HM-4164.3F
Shipping wt. 100 lb (45.3kg)

Manual Panel, kPa, 1 Cell, 120/220V 50/60Hz — HM-4164M.3F
Shipping wt. 100 lb (45.3kg)

Manual Panel, psi, 3 Cell, 120/220V 50/60Hz — HM-4165.3F
Shipping wt. 76 lb (34.7kg)

Manual Panel kPa, 3 Cell, 120/220V 50/60Hz — HM-4165M.3F
Shipping wt. 100 lb (45.3kg)

Triaxial FlexPanels

HM-4140.3F HM-4150.3F HM-4160.3F HM-4150A HM-4160A

Humboldt FlexPanels

ASTM: D1559, D2850, D2166, D4767, and D5084; AASHTO: T193, T296, T297, T208; BS 1377: Part 4: 1990, BS 1377: Part 6, BS 1377: Part 7: 1990, BS 1377: Part 8: 1990

Humboldt FlexPanels provide an accurate and easy-to-operate solution for controlling compressed air, water, de-aired water and vacuum without the need for air/water bladder interfaces to produce the pressures necessary for triaxial testing. FlexPanels utilize a set of three burettes to control cell, top cap and base pedestal pressures.

This extremely versatile pressure system controls the pressure, water, de-airing tank and vacuum from a single panel. The three burettes allow for the control of the cell pressure and the back pressure for each cell. They can monitor volume change in the sample and can be used to measure the flow of water through the sample for permeability testing. FlexPanels can manually measure volume change or permeability in a triaxial test sample without the use of a volume change apparatus, a distinct benefit when compared to air/water bladder systems. See page 92-93 for more information and specifications for Humboldt's FlexPanels.

Control Panel (psi), 120/220V 50/60Hz **HM-4140.3F**
Shipping wt. 35 lb (16kg)

Control Panel (kPa), 120/220V 50/60Hz **HM-4140M.3F**
Shipping wt. 50 lb (22.6kg)

Control Panel, 1-Cell (psi), 120/220V 50/60Hz **HM-4150.3F**
Shipping wt. 98 lb (44.5kg)

Control Panel, 1-Cell (kPa), 120/220V 50/60Hz **HM-4150M.3F**
Shipping wt. 98 lb (44.5kg)

Control Panel, 2-Cell (kPa), 120/220V 50/60Hz **HM-4160.3F**
Shipping wt. 175 lb (79.3kg)

Control Panel, 2-Cell (kPa), 120/220V 50/60Hz **HM-4160M.3F**
Shipping wt. 125 lb (56kg)

Auxiliary Panel, 1-Cell **HM-4150A**
Shipping wt. 77 lb (34.9kg)

Auxiliary Panel, 2-Cell **HM-4160A**
Shipping wt. 275 lb (124.7kg)

	HM-4140.3F	HM-4140M.3F	HM-4150.3F	HM-4150M.3F	HM-4160.3F	HM-4160M.3F	HM-4150A	HM-4160A
Pressure/ Resolution	2-150 psi (0.1 psi)	14-1000 kPa (1 kPa)	2-150 psi (0.1 psi)	14-1000 kPa (1 kPa)	2-150 psi (0.1 psi)	14-1000 kPa (1 kPa)	Not Applicable	
Vacuum	0-14.7 psi or 30 Hg	(0-100kPa) or 30 Hg	0-14.7 psi or 30 Hg	(0-100kPa) or 30 Hg	0-14.7 psi or 30 Hg	(0-100kPa) or 30 Hg		
Inner Burette								
Cell	Not Applicable		50cc x 0.1 cc (ml) area = 0.305cm^2					
Top	Not Applicable		10cc x 0.02 cc (ml) area = 0.305cm^2					
Base	Not Applicable		10cc x 0.02 cc (ml) area = 0.305cm^2					
Outer Burette								
Cell	Not Applicable		400 cc (ml)					
Top	Not Applicable		460 cc (ml)					
Base	Not Applicable		460 cc (ml)					
Voltage	110/220VAC 50/60Hz						Not Applicable	
Power	6 watts							
Operating Temperature	14 to 158°F (-10 to 70°C)							
Dimensions	8 x 8 x 37.5" (203 x 203 x 952mm)		8 x 25.5 x 37.5" (203 x 648 x 952mm)		8 x 43.5 x 37.5" (203 x 1105 x 952mm)		8 x 19.5 x 37.5" (203 x 495 x 952)	8 x 37.5 x 37.5" (203 x 952 x 952)
Shipping Weight	35lb (16kg)		98lb (44.4kg)		175lb (79.3kg)		77lb (34.9kg)	275lb (124.7kg)

ELITE SERIES
Automated Pressure Controllers

Specifications:	HM-5810	HM-5820
Maximum hydraulic pressure	200-500 psi	
Volumetric capacity	270mL/channel	
Load capacity	N/A	3000 lbf (15kN)
Voltage/Current	110/220V 50/60Hz - 16.0 amps	
Dimensions (L x D x H)	38" x 15" x 20.5" (970 x 385 x 520 mm)	38" x 15" x 45.5" (970 x 385 x 1160 mm)

HM-5820 HM-5810

Automated, Pressure Controller
ASTM D5084

The HM-5810 is an automated pressure controller designed to handle saturation, consolidation and permeation of a triaxial test sample. In this application it can be used solely for permeability testing as well, eliminating the need for distribution panels, etc. The HM-5810 is all you need to successfully do permeability testing for soil.

Cell, head and tail pressure can be set in increments of 0.1 PSI while volume change is measured to 0.0001cc. The flow rate for permeation can be set from 1 cc/sec (60 cc/min) down to less than 0.000002 cc/sec (0.00012 cc/min). There are three data input channels – one for each pressure transducer, or if you are only doing permeability, you will only need one of the channels/pressure transducers.

The HM-5810 provides an accurate and simplified permeability setup, which eliminates the need for seperate distribution panels, and simplifying tubing and control cable setup. By using the integral staging platform, the HM-5810 provides an extremely compact and organized setup.

The HM-5810 is built around Humboldt's integral, data logger with touch-screen control, which allows the HM-5810 to be used as a standalone device capable of full test control and data logging. It can also be controlled by a networked computer at any location with access to the network.

Hydro-Control Pressure Controller HM-5810.3F

Shipping wt. 168 lb (76kg)

Automated, Pressure Controller with Load Frame
ASTM D5084, D2850, D2166, D4767; AASHTO T296, T297, T208

The HM-5820 is an automated pressure controller designed to handle saturation, consolidation and permeation of a triaxial test sample, as well as perform a shear function with the use of its integral HM-5020 Load Frame. This allows the technician to also perform triaxial shear tests without having to purchase an additional unit.

Cell, head and tail pressure can be set in increments of 0.1 PSI while volume change is measured to 0.0001cc. The flow rate for permeation can be set from 1 cc/sec (60 cc/min) down to less than 0.000002 cc/sec (0.00012 cc/min). There are three data input channels – one for each pressure transducer, or if you are only doing permeability, you will only need one of the channels/pressure transducers.

The HM-5820 provides an accurate and compact configuration for performing triaxial tests without the need for seperate distribution panels, and simplifying tubing and control cable setup. By using the integral load frame, the HM-5820 provides an extremely compact and organized setup.

The HM-5820 is built around Humboldt's integral, data logger with touch-screen control, which allows the HM-5810 to be used as a standalone device capable of full test control and data logging. It can also be controlled by a networked computer at any location with access to the network.

Triax-Control Pressure Controller HM-5820.3F

Shipping wt. 168 lb (76kg)

Controller Specifications:	
Display (Resistive Touch)	7" (178mm) VGA (480 x 800)
Real-time test data	Graphic and tabulation
Processor	Dual 32-bit ARM
RAM	64MB
Memory, non-volatile	4GB
Analog to digital converter	24 bit
Logging speed	up to 50 readings per second
Multi-test storage	1000
Points per test	3000
USB port (front)	export data, import/export calibration data, WiFi
USB port (back)	provides external power for wireless access point
Ethernet connection	for network connectivity
24-bit differential analog to digital converter	2
Ambient temperature sensor	1
Firmware Update	Ethernet or flash drive

NOTES

Triaxial cells, sample prep materials and additional load cells, etc. are not included and need to be purchased separately. For more information on Humboldt's NEXT software Modules, see page 104-105.

Triaxial Components

HM-5240.3F

HM-5250.3F

HM-2315
Shown with HM-2310 Transducer and HM-2310BR Bracket

Pneumatic Pressure Controller, 150psi (1000kpa)
The HM-5240.3F is a fully-automated pneumatic pressure controller, which is highly accurate up to 150psi (1000kpa) in pressure and 100cc (100ml) volume in any one direction. It is designed specifically for geotechnical laboratory triaxial testing (UU, CU and CD) and provides control and monitoring of cell pressure, back pressure, pore water measurement and volume change when used with our Elite Series load frames.

The HM-5240 provides four (4) integral and independent data acquisition channels, which can be utilized in stand-alone configuration or accessed through a LAN-networked computer using Humboldt's NEXT software. The unit is built with durable high-quality components and features the use of two electronic regulators to ensure smooth and reliable operation of pressures, as well as precise results.

In stand-alone mode, this pressure controller provides a 7" (178mm) touch-screen controller. This new waterproof, touch screen provides colorful, at-a-glance monitoring of testing functions without the use of a computer. Operator could see all the data in several formats at the controller while the test is running. Then can be viewed simultaneously or downloaded later to a computer in the lab, in the next room or at a different location, while also providing report generation capabilities from within Humboldt's NEXT software or our enhanced test- specific modules.

Specifications	
Maximum Pressure	150psi (1000kpa)
Volume Capacity	100cc (100ml) in any one direction
Voltage	110-220V 50/60Hz - 5.0 amps
Dimension (L x W x H)	13" x 11.5" x 22" (330 x 292 x 559mm)

Pressure Controller, **HM-5240.3F**
Shipping wt. 40 lb (18.1kg)

Hydraulic Pressure Controller, 500psi (3500kpa)
The HM-5250.3F is a fully-automated hydraulic pressure controller, which is highly accurate up to 500psi (3500kpa) in pressure and 200cc (200ml) in volume. It is designed specifically for geotechnical laboratory triaxial testing (UU, CU and CD) and provides control and monitoring of cell pressure, back pressure, pore water measurement and volume change when used with our Elite Series load frames.

The HM-5250 provides four (4) integral and independent data acquisition channels, which can be utilized in stand-alone configuration or accessed through a LAN-networked computer using Humboldt's NEXT software. The unit is built with durable, high-quality components and features the use of stepper motors and precision gears to ensure smooth and reliable operation of pressures, as well as precise results.

In stand-alone mode, this pressure controller provides a 7" (178mm) touch-screen controller. This new waterproof, touch screen provides colorful, at-a-glance monitoring of testing functions without the use of a computer. Operator could see all the data in several formats at the controller while the test is running. Then can be viewed simultaneously or downloaded later to a computer in the lab, in the next room or at a different location, while also providing report generation capabilities from within Humboldt's NEXT software or our enhanced test-specific modules.

Specifications	
Maximum Pressure	500psi (3500kpa)
Volume Capacity	200cc (200ml)
Voltage	110-220V 50/60Hz - 8.0 amps
Dimension (L x W x H)	13" x 11.5" x 22" (330 x 292 x 559mm)

Pressure Controller, **HM-5250.3F**
Shipping wt. 75 lb (34kg)

Volume Change Apparatus, Automatic
The apparatus is used for measuring the volume change of a soil sample by monitoring the flow of water through the chamber of the unit. The lower assembly contains changeover valves, which when used in conjunction with the upper assembly provides limitless capacity. The unit can be used with a linear strain transducer, a digital indicator, or as part of an automated system. It is accurate to better than ±0.05 ml and is easily de-aired in seconds. Includes connectors, valves, and tubing. Order strain transducer or digital indicator separately.

Volume Change Apparatus **HM-2315**
Shipping wt. 22 lb (9.9kg)

Triaxial Setup Accessories


HM-4151A


HM-4187H


HM-2310.10


HM-2310BR

HM-4187A.3F


HM-4170

HM-4221


HM-4222


HM-4223

Air/Water Bladder Cylinder

The Humboldt air/water bladder cylinder is used to deliver pressurized de-aired water to the triaxial cell. The bladder acts as an reservoir and interface between the compressed air, used as the pressure source, and the de-aired water, which is used as the pressurizing medium for the sample. The use of the bladder eliminates the reintroduction of air into the de-aired water, while providing a high-degree of accuracy. The cylinder will operate continuously to a maximum pressure of 150 psi (1000 kPa). It is constructed of anodized aluminum top and bottom plates, acrylic cylinder and a fluoroelastomer bladder.

Bladder Cylinder — HM-4151A
Shipping wt. 11 lb (4.9kg)

Bladder

Replacement bladder for HM-4151A Air/Water Bladder Cylinder.

Bladder — HM-4151.1
Shipping wt. 0.5 lbs (0.22kg)

De-Airing Water System

The HM-4187A.3F produces 8-liter batches of de-aired water without the use of heat. Combined mechanical agitation and vacuum evacuation removes gasses at much higher rate than conventional heat-boiling methods. Will de-air water to less than 0.5 pph dissolved oxygen in 4 minutes. Requires a vacuum pump, (see page 136) 1/55hp motor 110V, 60Hz. 7.5 x 7.5 x 20" (190 x 190 x 508mm).

De-Airing System, 120/220V 50/60Hz — HM-4187A.3F
Shipping wt. 24.5 lb (11.3kg)

De-Airing Water Tank

For use with Triaxial/Permeability Distribution Panels. Requires a Vacuum Pump, (see page 136).

De-Airing Water Tank — HM-4187H
Shipping wt. 17 lb (7.7kg)

Strain Transducer

Strain transducer, 1" (25mm) for use with HM-2315 automatic volume change apparatus.

Strain Transducer — HM-2310.10
Shipping wt. 1 lb (0.45kg)

Transducer Bracket

Bracket to attach strain transducer to HM-2315 automatic volume change apparatus.

Transducer Bracket — HM-2310BR
Shipping wt. 0.1 lb (0.04kg)

Pore Pressure Transducer

Highly accurate, 200 psi (1400 kPa) pore pressure transducer. Designed for geotechnical lab applications with outstanding overload protection and protected from corrosive water. Requires input of 10 V DC, with an output of 100 mV. Supplied with 2 meter cable and 5-pin DIN plug.

Pore Pressure Transducer — HM-4170
Shipping wt. 0.8 lb (0.36kg)

Refrigeration Dryer

Compressed air quality is often overlooked in many labs. Compressed air contains condensate which, when cooled, will turn into water, causing extensive damage to both the compressed air network and testing equipment. Refrigeration dryers actively remove this condensate to achieve near perfectly dry compressed air. The benefits are notable: less system downtime, reduced costs and maintenance, and improved test equipment life. This refrigeration dryer, thanks to its PlusPack heat exchanger and the most compact dimensions on the market, will prove a major asset in your lab. Dryer uses a 1/2" NPT-F pipe size and nominal flow is: 10 SCFM, 17 Nm3/hr and 0.3 Nm3/min. based on an ambient and inlet temperature of 100°F (38°C) and a working pressure of 100 psig (7 bar).

Refrigeration Dryer, 115V 60Hz 1ph — HM-4221
Shipping wt. 20 lb (9.1kg)

Desiccant Dryer

Ideal for drying small volumes of air at the point of use. Convenient in-line mounting saves space. ISO Class 2 dryer. Max. operating pressure is 150 psig. and max operating temperature is 125°F. Total capacity is 4400 ft^3, Female NPT inlet/outlet size is 0.25 NPTF, bowl size is 1.75 lbs, Height 11 Inches, Width 4.625", Includes one charge of desiccant.

Desiccant Dryer — HM-4222
Shipping wt. 5 lb (2.3kg)

Filter/Regulator

One-piece, Filter/Regulator, 0-125 psi (0 - 8.6 bar) with standard filtration of 5 micron. Height is 9.77 and width is 2.36. Bowl material is polycarbonate and includes sight glass and pressure gauge.

Filter/Regulator — HM-4223
Shipping wt. 1.48lb (0.67kg)

Triaxial Sample Prep


HM-4220


HM-4167


HM-4168


H-1763A


HM-4196.25


HM-4196.12


HM-003175


HM-4150.45


HM-4150.22AS


HM-4197.25


HM-4197.12


HM-4150.78


HM-003176


HM-4150.44


HM-4150.72

Compressor

When operating under full load this exceptionally quiet compressor offers a tremendously low noise level of 40 db/A. Each compressor is built with quality in mind, and comes equipped with powder-coated air tank, pressure switch, 1-micron air filter, regulator, and pressure gauges for completely automatic and trouble free operation.

Specifications	
Output	4.2 CFM120 L.Min
Horse Power	1.0Hp
Tank Size	13 Gal50 Lt.
Noise Level	42 db/A
Max Pressure	120 PSI (8 Bar)
Operating Pressure	90-120 PSI6-8 Bar

Compressor, 120V 50/60Hz **HM-4220**
Compressor, 220V 50/60Hz **HM-4220.4F**
Shipping wt. 147 lbs (66kg)

High-Vacuum Pump

Direct-drive two-stage rotary sliding vane high vacuum pump features gas ballast and trap to reduce risk of oil being sucked into the system. Produces free air displacement 85L per minute (3 cu. ft. per minute) and maximum vacuum 29-30". Operating temperature is 30 to 170°F (-1.11 to 76.6°C). Has 0.25" OD intake ports for 0.25" ID tubing. Dimensions: 11.25" x 15.5" x 6.5" (28.6 x 39.4 x 16.5cm).

High-Vacuum Pump, 120V 60Hz **H-1763A**
High-Vacuum Pump 230V 50/60Hz **H-1763A.4F**
Shipping wt. 31 lbs (14kg)

Triaxial Installation Kit

Kit designed to provide fittings, connectors, tubing and tools to complete a triaxial set up installation. Kit includes items in the table below. All items can be purchased individually as well.

Triaxial Kit Components	
.125" Brass Ferrules (10)	HM-4197.12
.25" Brass Ferrules (10)	HM-4197.25
.125" OD Tubing, 10ft.	HM-4196.12
.25" OD Tubing, 100ft.	HM-4196.25
.375" to .25" Reducer Bushing (3)	HM-4150.77
Cutter, Flexible Tubing (1)	HM-000058
Thread Tape, PTFE (1)	HM-000059
Hex wrench, 3/16" (1)	HM-000060
Hex wrench, 7/64" (1)	HM-000061
Hex wrench, 2.5mm (1)	HM-000062
Wrench, 7/16 & 9/16" (1)	HM-000063
Wrench, Adjustable, 6" (1)	HM-000064
Union T Fitting, .25" (5)	HM-4150.45
Quick Valve Coupling, .25" (2)	HM-4150.72
Regulator Elbow, .25" (3)	HM-4150.44
.25" to .125" Reducer Coupling (3)	HM-4150.78
Tube Fitting T, 6mm OD (5)	HM-003175
Push-to-Connect Tube Fitting Coupler, .25" OD (4)	HM-003176
Plug, .25" Nylon (5)	HM-003193
O-ring (Upper Cap), .125" (10)	HM-4150.006
O-ring for Quick-Connect (10)	HM-4196.CXO

Triaxial Installation Kit **HM-4167**
Shipping wt. 4.5 lbs (2.04kg)

Shear & Consolidation Installation Kit

Kit designed to provide fittings, connectors, tubing and tools to complete a triaxial set up installation. Kit includes items in the table below. All items can be purchased individually as well.

Shear & Consolidation Kit Components	
.25" OD Tubing, 100ft.	HM-4196.25
.375" to .25" Reducer Bushing (3)	HM-4150.77
Cutter, Flexible Tubing (1)	HM-000058
Thread Tape, PTFE (1)	HM-000059
Wrench, Adjustable, 6" (1)	HM-000064
Union T Fitting, .25" (5)	HM-4150.45
Quick Valve Coupling, .25" (2)	HM-4150.72
Regulator Elbow, .25" (3)	HM-4150.44
Tube Fitting T, 6mm OD (5)	HM-003175
Push-to-Connect Tube Fitting Coupler, .25" OD (4)	HM-003176

Shear & Consolidation Installation Kit **HM-4168**
Shipping wt. 4.5 lbs (2.04kg)

Replacement Pressure Regulators	
Pressure regulator 2-150 psi w/ fittings	HM-4150.22AS
Positive bias regulator w/ fittings	HM-4150.23AS

HM-3818.28

HM-3701

HM-3820.28

Compaction Mold, Two-Part

Two-part aluminum molds with easy-close band clamp closure. Molds include base plate and pedestal, which provides a stable platform for mold during production. Ratio of sample height to diameter is 2:1.

Sample Size	Mold with Base Plate
1.4"	HM-3818.14
1.5"	HM-3818.15
1.875"	HM-3818.18
2.0"	HM-3818.20
2.36"	HM-3818.23
2.5"	HM-3818.25
2.8"	HM-3818.28
4.0"	HM-3818.40
6.0"	HM-3818.60
35mm	HM-3818.35
38mm	HM-3818.38
50mm	HM-3818.50
70mm	HM-3818.70
100mm	HM-3818.100
150mm	HM-3818.150

Compaction Mold, Two-Part — See Table

Shipping wt. 15 lbs (6.8kg)

Compaction Hammer

Rod with sliding weights on a 2" (51mm) dia foot. Stop allows adjusting height of drop up to 8" (203mm). Includes one .25 lb. (100g) and one 2.25 lb. (1kg) weight.

Compaction Hammer — HM-3701

Shipping wt. 6 lbs (2 .7kg)

Compaction Mold, Three-Part with Hammer

Three-part aluminum molds with easy-close band clamp closure. Molds include base plate and pedestal, which provides a stable platform for mold during production. Ratio of sample height to diameter is 2:1.

Sample Size	Mold with Base Plate
1.4"	HM-3820.14
1.5"	HM-3820.15
1.875"	HM-3820.18
2.0"	HM-3820.20
2.36"	HM-3820.23
2.5"	HM-3820.25
2.8"	HM-3820.28
4.0"	HM-3820.40
6.0"	HM-3820.60
35mm	HM-3820.35
38mm	HM-3820.38
50mm	HM-3820.50
70mm	HM-3820.70
100mm	HM-3820.100
150mm	HM-3820.150

Compaction Mold, Three-Part — See Table

Shipping wt. 18 lbs (8.2kg)

Triaxial Sample Prep

Soil Sample Trimmer

Sample trimmer with alignment bar for cutting samples to precise diameters. The HM-3330 handles samples up to 4" samples by employing easily interchangeable top platens. Stainless steel pins in pedestal & top platen hold sample in position. Top platen bearing assembly is lowered & locked and sample trimmed with wire saw. **Order top platens (below) and saw (next page) separately.**

Soil Sample Trimmer, 1" to 4" — HM-3330

Shipping wt. 7 lb (3.1kg)

Top Platens for Soil Trimmer

Individual, sized, top platens for the soil sample trimmer. Platens are interchangeable.

Size	Model	Size	Model
1.0"	HM-3330.10	4.0"	HM-3330.40
1.4"	HM-3330.14	35mm	HM-3330.35
1.875"	HM-3330.18	38mm	HM-3330.38
2.0"	HM-3330.20	50mm	HM-3330.50
2.5"	HM-3330.25	70mm	HM-3330.70
2.8"	HM-3330.28	100mm	HM-3330.100
3.0"	HM-3330.30		

Top Platens for Soil Trimmer — See Chart

Shipping wt. 1 lb (0.45kg)

Wire Saw

Sample trimming saw with replaceable wire blade.

Wire Saw — HM-3175

Shipping wt. 1 lbs (0.45kg)

Wire Saw Blade

Replacement wire for HM-3175 saw.

Wire Saw Blade — HM-3175.1

Shipping wt. 0.1 lb (0.04kg)

Length Comparator

ASTM D2166, D2850, D4767, BS 1377:8

Length comparator designed to quickly and accurately measure the height of soil samples to within ±0.1% of the total height. Includes a digital indicator accurate to within 0.0001 inches (0.002mm) with 0 to 1" (0 to 25mm) total range. The comparator is comprised of an upright support 14" (356mm) tall attached to a 6" x 6" x 2" (150 x 150 x 50mm) granite base and includes a 6" (152mm) reference bar. Other reference bars such as 4.0", 3.0" and 2.0" for other sample sizes are available. Reference bar includes Calibration Report traceable to the National Institute of Standards and Technology.

Length Comparator — HM-4173

Shipping wt. 20 lb (9.07kg)

Precision Diameter Tape

ASTM D2166, D2850, D4767, BS 1377:8

Diameter tapes provide a fast, reliable method for measuring the diameter of concrete, soil and asphalt cores and cylinders. One reading provides round and out-of-round diameters within an accuracy of .001" (.03mm) by means of special graduations and vernier scale. All tapes are made from a stainless alloy and are precision engraved to ensure accuracy. Inch-scale tape has a diameter range of 0.75 to 7" and the metric-scale tape has a diameter of 28 to 200mm. Includes certificate of calibration. Tapes are calibrated and include a NIST-traceable certification.

Precision Diameter Tape, 0.75 to 7" — HM-4174

Precision Diameter Tape, 28 to 200mm — HM-4174M

Shipping wt. 0.8 lb (0.36kg)

High-Vacuum Grease

Effective means of sealing latex membranes to sides of the top cap.

High-Vacuum Grease — HM-4198

Shipping wt. 0.8 lb (0.36kg)

Filter Paper Strips

Wrapped around sample to accelerate saturation in triaxial testing, 5 x 150mm, Grade 55, 100/pkg.

Filter Paper Strips — HM-4189FS

Shipping wt. 0.5 lb (0.22kg)

Triaxial Sample Prep

Latex Membranes, 0.012"	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4180.14	HM-4180.15	HM-4180.20	HM-4180.28	HM-4180.40	HM-4180.60	HM-4180.14	HM-4180.15	HM-4180.20	HM-4180.28	HM-4180.40	HM-4180.60
Latex Membranes, 0.025"	HM-4180.14T	HM-4180.15T	HM-4180.20T	HM-4180.28T	HM-4180.40T	HM-4180.60T	HM-4180.14T	HM-4180.15T	HM-4180.20T	HM-4180.28T	HM-4180.40T	HM-4180.60T

Made from non-porous latex rubber [max. temp. 220°F (104°C)]. Length varies according to sample diameter. All have sufficient length to enclose full length of sample, both top & base of pedestal, and disc—plus enough surplus to allow doubling over the O-rings. 12/pkg. Membranes are 0.012" or 0.025"in thickness.

Membrane Stretcher	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4181.14	HM-4181.15	HM-4181.20	HM-4181.28	HM-4181.40	HM-4181.60	HM-4181.14	HM-4181.15	HM-4181.20	HM-4181.28	HM-4181.40	HM-4181.60

Simple & effective method of sheathing (encasing) sample with latex membrane without creasing or damaging the sleeve.

O-Rings	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4182.14	HM-4182.15	HM-4182.20	HM-4182.28	HM-4182.40	HM-4182.60	HM-4182.14	HM-4182.15	HM-4182.20	HM-4182.28	HM-4182.40	HM-4182.60

For sealing membranes from confining fluid and sample. Neoprene. 12/pkg.

O-Ring Placing Tool	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4183.14	HM-4183.15	HM-4183.20	HM-4183.28	HM-4183.40	HM-4183.60	HM-4183.14	HM-4183.15	HM-4183.20	HM-4183.28	HM-4183.40	HM-4183.60

Positions rings to seal membrane with minimum disturbance to specimen.

Porous Stones	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4184.35	HM-4184.38	HM-4184.50	HM-4184.70	HM-4184.100	HM-4184.150	HM-4184.14	HM-4184.15	HM-4184.20	HM-4184.28	HM-4184.40	HM-4184.60

Used for permeability and triaxial testing to allow even distribution of water through sample. Two stones required per cell, each 1/4" thick (6mm).

Membrane Tester	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4185.14	HM-4185.15	HM-4185.20	HM-4185.28	HM-4185.40	HM-4185.60	HM-4185.14	HM-4185.15	HM-4185.20	HM-4185.28	HM-4185.40	HM-4185.60

Tester is easy to use for quick visual detection of possible flaws in membranes.

2-Part Split Miter Box	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-3847.35	HM-3847.38	HM-3847.50	HM-3847.70	HM-3847.100	HM-3847.150	HM-3847.14	HM-3847.15	HM-3847.20	HM-3847.28	HM-3847.40	HM-3847.60

For use with undisturbed samples and for sample trimming of cohesive soils. Made from non-ferrous metal.

2-Part Vacuum Split Former	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-3827.35	HM-3827.38	HM-3827.50	HM-3827.70	HM-3827.100	—	HM-3827.14	HM-3827.15	HM-3827.20	HM-3827.28	HM-3827.40	HM-3827.60

For use with non-cohesive soils and disturbed samples. Made from non-ferrous metal. Larger sizes require use of supporting jacks.

Sample Trimmer with Knife	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4186.14	HM-4186.15	HM-4186.20	HM-4186.28	HM-4186.40	HM-3847.60	HM-4186.14	HM-4186.15	HM-4186.20	HM-4186.28	HM-4186.40	HM-3847.60

Used to trim sample ends or cut sample to a specific length.

Filter Paper	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4189.15	HM-4189.15	HM-4189.20	HM-4189.28	HM-4189.40	HM-4189.60	HM-4189.15	HM-4189.15	HM-4189.20	HM-4189.28	HM-4189.40	HM-4189.60

Used to prevent soil from penetrating into porous stones or into a panel. 100/pkg.

Acrylic Disk	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4179.35	HM-4179.38	HM-4179.50	HM-4179.70	HM-4179.100	HM-4179.150	HM-4179.14	HM-4179.15	HM-4179.20	HM-4179.28	HM-4179.40	HM-4179.60

Acrylic disk used in UU triaxial tests.