



Humboldt  
Multi-Speed Load Frame

## **Application**

The HM-2850 Multi-speed Load Frame is designed for those who want a high-quality, but simple, multi-purpose load frame without built-in data acquisition capabilities. The HM-2850 is ideal for applications where the operator is either not concerned with data acquisition; or, already has or is planning to construct their own data acquisition system. With its large 7" color, touchscreen, the HM-2850 provides the operator with the ability to precisely select any speed with four decimal accuracy within the machine's speed range.

The HM-2850 features a quiet, direct drive stepper motor that provides a range of loading speeds from 0.00001 to 2.00000 in/min (0.00001 to 50.80000mm/min.). This speed range is more than adequate for the majority of standard soil tests.

The HM-2850 also incorporates a separate, dedicated control to accommodate 2.00000 in/min (50.80000mm). for use in Marshall and TSR Testing, as well as a rapid travel speed of 2.25 in/min for moving the platen into position quickly. Speeds are controlled through the use of edit keys and the digital display.

## **Product Use**

This product is intended for use only in accordance with the directions and specifications contained in this User Guide. The HM-2800 Multi-speed Load Frame has been designed for testing that complies with ASTM D1883, D2850, D2166, D4767, D5581 and D6927 and AASHTO T193, T296, T297, T208, T245, T246, as well as other applicable International standards.

## **Features include:**

- 8" plated platen provides roomy, stable base for test equipment
- 7" color, touchscreen
- Test speeds adjustable from 0.00001 to 2.00000 in/min (0.00001 to 50.80000mm/min.) via touchscreen
- User selectable unit change from keyboard between U.S. Standard and Metric units.

## Machine Specifications

Specifications	
Load capacity	11000 lbf (50kN)
Speed range	0 - 2.00000 in/min. 0 - 50.80000 mm/min.
Platen Size	8" (203mm)
Platen Travel	4" (100mm)
Clearance, vertical	40" (1000mm) Max
Clearance, horiz.	11" (279mm)
Dimensions (l x w x h).	17 x 22 x 51 inch (432 x 559 x 1295mm)
Voltage	110/220V 50/60Hz. 5.0 amps

Covers: CBR, UU, CU, CD, UC, Marshall and Hveem Tests.  
ASTM: D1883, D2850, D2166, D4767, D5581 and D6927  
AASHTO: T193, T296, T297, T208, T245, and T246;  
BS 1377: Part 4: 1990, BS 1377: Part 7: 1990, BS 1377: Part 8:  
1990, BS 598: Part 107

### General Warnings

#### Safety Warnings

Operators should take care to operate this machine under the maximum load restrictions. The machine is programmed at the factory to provide safety shutdown if the upper or lower maximum travel is exceeded as well as if the upper instrument calibration is exceeded.

#### Electrical Warnings

Typically, there is no reason for the operator to open the machine. However, if the customer's engineers attempt to change settings to the circuit board connected to the back panel, the machine must always be unplugged before this operation. Unplugging the internal connection to the back panel circuit board while the machine is under power will result in permanent damage to the circuit board.

## **IMPORTANT NOTICE**

The information contained herein is supplied without representation or warranty of any kind. Humboldt Mfg. Co. therefore assumes no responsibility and shall have no liability, consequential or otherwise, of any kind arising from the use of the described equipment contained in this manual.

### **Updated products**

The manufacturer reserves the right to change or modify product design or construction without prior notice and without incurring any obligation to make such changes and modifications on products previously or subsequently sold.

### **Fitness for application**

The manufacturer makes no recommendations or claims regarding fitness for applications other than the specific tests as defined in this User Guide.

## **Installation and Set-up**

### **Unpacking**

During your inspection, make certain that the contents of your shipment match the documentation provided by your packing list. Accessories that are part of your order may have been packed with or installed onto the HM-2850, so make sure they are accounted for and match the packing list.

Listed below are those items included with an HM-2850 Multi-Speed Load Frame:

### **Multi-Speed Load Frame— HM-2850.3F**

Includes:

SHH04—3/4-16 Bolt x 3-1/2 inch long

WF04—Washer for SHH04 Bolt

HM-000352—AC Power Cord

### **Electrical Connections**

Place unit on a flat smooth surface and use leveling feet (supplied) and a bubble level to ensure that the unit is level side-to-side and back-to-front.

### **Electrical Connections**

The HM-2850 arrives ready for operation. Attach the supplied IEC electrical cord to the machine and plug into a standard wall receptacle for use in the United States.

### **Power Cord:**

Your Multi-use Test Machine is fitted with a molded vinyl grounding plug. The cord is made of three conductors either

(American color coding).

Green	Ground (Earth)
White	Cold (Neutral)
Black	Hot (Live)

or

(International color coding).

Green/Yellow	Ground (Earth)
Blue	Cold (Neutral)
Brown	Hot (Live)

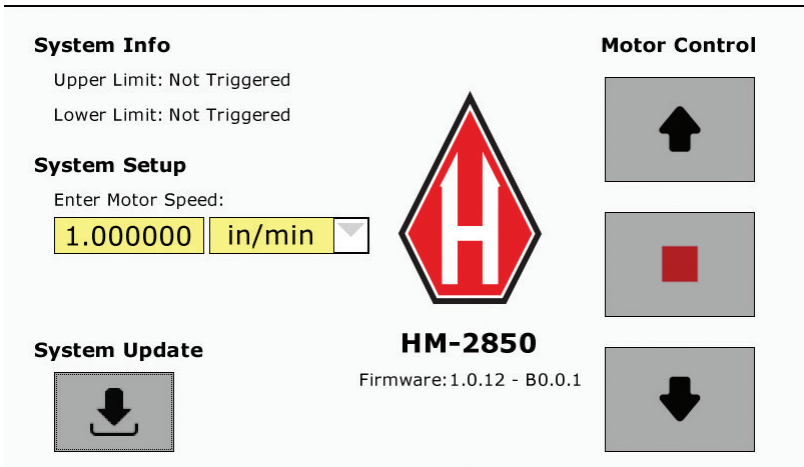
### **Fuses:**

The HM-2850 uses (2) 5x20mm, slo-blow fuses in the IEC power entry module at the right rear of the machine. The replacement part number for these fuses is H-1322.13.

## Operation

### Control Panel

An On-Off rocker switch on the back right side of the machine is the power switch. The control panel is situated on the front left hand side of the machine base. A 7" touch-screen displays the speed and units in either in/min or mm/min. A touch-screen enables setting the speeds and units and control of machine travel.



### Speed Selection

On the control panel, pressing Motor Speed causes the display to display the motor speed keypad where you can enter the desired speed.

### Speed Units Selection

Press the unit to select in/min or mm/min.

### Running a Test

After selecting the desired speed and positioning the sample, initiate a test by pressing the Up Arrow. Upon conclusion of the test press the Stop Test key. See Page 7 for a chart of common tests and test speeds.

### Rapid Travel

Pressing and holding down either the up or down arrows allows travel at slightly over 2.25 in/min in the direction chosen and releasing either key will stop the travel.

## **Maximum Travel**

A redundant limit switch prevents over travel in the up or down directions by stopping the machine automatically. The maximum travel of the platen is 4.00 inches (100mm).

## **Load Ring**

When a load ring is used it can be attached directly to the cross-beam using the 3/4-16 x 3" long bolt.

## **Maximum Load**

This Compression and Testing Machine is rated a 11,000 lbf (50kN).

## **Accuracy of Platen Speeds**

The indicated speeds are based on zero load conditions and will be maintained within +/- 5%. The actual motor speed will be maintained to +/- 1%. These are not closing gap speeds.

The speeds used in the various test are, in fact, the closing gap speed, i.e., the distance between the cross-beam and the platen. These closing gap speeds will be dependent on the stiffness of the sample being tested and the compressibility of any load measuring device (such as the load ring). At high loads, some machine stretch may occur. The test speeds used should, therefore, take into account these factors.

## **Maintenance**

Both the jack unit and the gearbox are packed with grease and do not normally require further attention. The machine can generally be maintained by keeping it clean, and if adjusting the crosshead beam, lightly oiling the exposed threads.

## Common Speeds for Specimen Testing

Test Description	Standards	Speed in/min.	Tolerance	Comments
CBR, 1mm	BS 1377, Clause 7.4.2.2	.039 (1mm/min.)	± 20% ie. .2 mm/min.	
UU Triaxial Unconsolidated Undrained, 1.4"	ASTM D2850 Para. 5.1 & 7.5 AASHTO T208	1% min. plastic, .3% min. brittle	—5% constant rate, strain control	Cohesive soils; no ripples in a glass of water
UU Triaxial Unconsolidated Undrained, 1"	BS 1377, Part 7	.3% min.		
Unconfined Cohesive Soil	ASTM D2166 Para. 7.1	1/2 to 2% min.	Strain Controlled	Clay or Cemented Soils
UC Consolidated Undrained, 1.4"	ASTM D4767 Para. 5.2	.028 or formula in Para. 8.4.2	±1%	Cohesive Plastic Soils
Marshall/TSR	ASTM D6927 & 5581; AASHTO T245	2"	±.15 or 7.5%	
Mold Soil Cement	ASTM D1633	Approx. .05	Continuous	w/o shock
CBR/LBR Hveem & Soil Cement	ASTM D1883, D4429 (field) AASHTO T193	Approx. .05 no pulses	Continuous run at idle	w/o shock
UU Unconsolidated Undrained quick triaxial, 1.4"	ASTM D2850	.008	±5%	Brittle material
UU Unconsolidated Undrained quick triaxial, 2.8"	ASTM D2850	.017	±5%	Brittle material
UC Unconsolidated Undrained triaxial for cohesive soil	ASTM D4767 Para. 5.2	.056 or formula in Para. 8.4.2	±1%	Cohesive soils w/plasticity



## Typical Test Setups for the HM-2850

The charts below list the parts necessary to perform these standard tests.

### CU/UU Triaxial Setup with HM-2850

Components	Item
<b>Load</b>	
50kN (11240 lbf) capacity	HM-2850.3F
<b>Strain</b>	
Load ring 2,200 lbf (10 kN)	H-4454.020
Dial gauge 2.0" travel, 0.001" divisions)	H-4463
Pore pressure transducer	HM-4170
Ball seat adapter	HM-200387
Single channel readout (choose)	HM-2350 HM-2350.4F
NEXT software basic, user defined	included
<b>Pressure</b>	
Pressure distribution panel for CU triaxial (choose)	HM-4150.3F HM-4150M.3F
Pressure distribution panel for UU triaxial (choose)	HM-4140.3F HM-4140M.3F
De-airing system	HM-4187A.3F
Vacuum pump (choose)	H-1763A H-1763A.4F
<b>Triaxial Cell (choose 1 below)</b>	
3" / 75mm dia. capacity	HM-4199B
4" / 100mm dia. capacity	HM-4199B-4
Top Cap/ Base Pedestal Set (specify specimen size)	HM-4199.XX

## Typical Test Setups for the HM-2850 (cont.)

### Unconfined Compression Setup with HM-2850

Components	
Load	
50kN (11240 lbf) capacity	HM-2850.3F
Upper unconfined platen	HM-2002
Displacement indicator platform	HM-3000.10.2
Displacement indicator rod	HM-3000.10.1
Load ring 500 lbf (2.5 kN)	H-4454.005
Dial gauge 2.0" travel 0.001" divisions	H-4463

### Typical Soil Cement Setup

Components	
Load	
50kN (11240 lbf) capacity	HM-2850.3F
Upper swivel platen	HM-2003E
Strain	
Load ring 5,000 lbf (25 kN)	H-4454.050

### Typical Triaxial Sample Prep Items

Components		
Part #	Qty.	Description
HM-4180.XX	1	Membranes, 12/pk
HM-4181.XX	1	Membrane Stretcher
HM-4182.XX	1	O-Rings, 12/pk
HM-4184.XX	2	Porous Stone
HM-4187E	1	De-Airing Tank, 6 Liter, 110V
HM-3847.XX	1	Split Miter Box
HM-4189.XX	1	Filter Paper, 100/pk
HM-4189FS	1	Filter Strips 5 x 150mm 100/pk

**Part Numbers** ending in .XX require a size code to be entered referring to the sample size to be tested. **For Triaxial** samples, sizes are: .14 = 1.4"; .15 = 1.5"; .20 = 2.0"; .25 = 2.5"; .28 = 28"; .30 = 3.0".40 = 4.0"; .35 = 35mm; .38 = 38mm; .50 = 50mm; .70 = 70mm, and .100 = 100mm.



## Warranty

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

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Testing Equipment for



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