



Humboldt
Multi-Speed Load Frame

Introduction

Applications

The HM-2800 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-2800 is ideal for applications where the operator either is not concerned with data acquisition; or, already has or is planning to construct their own data acquisition system. With its digital display, the HM-2800 provides the operator with the ability to precisely select any speed with three decimal accuracy within the machine's speed range.

The HM-2800 features a quiet, direct drive DC motor that provides a range of loading speeds from .008 to 1.999 in/min. This speed range is more than adequate for the majority of standard soil tests. The HM-2800 also incorporates a separate, dedicated control to accommodate 2.00 in/min. 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 a 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:

- 10" nickle-plated platen provides roomy, stable base for test equipment
- Backlit LCD display
- Test speeds adjustable from .008 to 1.999 in/min. via keypad
- User selectable unit change from keyboard between U.S. Standard and Metric units.

Machine Specifications

| Specifications | |
|------------------------|---|
| Dimensions (l x w x h) | 17 x 22 x 51 inch (432 x 559 x 1295mm) |
| Platen Travel | 3 inches (76mm) Max. |
| Net Weight | 206 lbs. (94kg) |
| Shipping Weight | 300 lbs. (660kg) |
| Speed Range | 0 - 1.99 inch/min (0 - 50.5 mm/min) |
| Load Capacity | 11000 lbf (50 kN) |
| Vertical Clearance | 32 inch (812mm) Max. |
| Horizontal Clearance | 11 inch (279mm) |
| Voltage | 120 VAC 50/60HZ 220 VAC 50/60HZ |
| Current | 9 Amps @ 125V 4.5 Amps @250V |

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-2800, so make sure they are accounted for and match the packing list.

Listed below are those items included with an HM-2800 Multi-Speed Load Frame:

Multi-Speed Load Frame— HM-2800

Includes:

SHH04—3/4-16 Bolt x 3-1/2 inch long

WF04—Washer for SHH04 Bolt

????—AC Power Cord

Multi-Speed Load Frame, 220 50/60Hz— HM-2800.4F

Includes:

SHH04—3/4-16 Bolt x 3-1/2 inch long

WF04—Washer for SHH04 Bolt

HM-2000.56— Step-down transformer for electric conversion

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-2800 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.

The 220 50/60Hz variation of the HM-2800, the HM-2800.4F includes a step-down transformer, which allows the HM-2800 to be used with 220 50/60Hz applications. The step-down transformer is an external device, which comes pre-wired with a supplied cable but no plug. The cable can be used to hard-wire the transformer to your 220 50/60Hz source, or you can install an appropriate plug. The transformer can then be plugged into the HM-2800 with the supplied cable.

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 Master Loader 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 front right side on the machine is the power switch and is illuminated when in the On or I position. The control panel is situated on the front left hand side of the machine base. A backlit LCD displays the speed and units in either in/min or mm/min. A membrane key pad enables setting the speeds and units and control of machine travel.

Speed Selection

On the control panel pressing the Enter/Edit key causes the display cursor to blink indicating you are in the edit mode. Select the magnitude of the digit using the up or down arrow key(s). Pressing the Next Digit key moves the cursor to the next position for selection of the digit for that position. When finished, pressing the Enter/Edit key enables return to the operating mode.

Units Selection

From the edit mode press the Rapid Platen Up/Stop key to select inches/min or press the Rapid Platen Down/Stop key to select millimeters/min. Press the Edit key to return to operating mode.

Running a Test

After selecting the desired speed and positioning the sample, initiate a test by either pressing the Run Test key, or if running a Marshall/ TSR test pressing that key. Note, the Marshall/TSR key allows running this test while leaving another preset speed in the display. Upon conclusion of the test press the Stop Test key (or either of the Rapid Platen/Stop keys). See Page 7 for a chart of common tests and test speeds.

Rapid Travel

Pressing either of the Rapid Platen/Stop keys allows travel at slightly over 2 in/min in the direction chosen and re-pressing either key will stop the travel.

Maximum Travel

A redundant limit switch prevents over travel in the down direction by stopping the machine automatically. Maximum travel in the up direction is limited by the jack screw extending beyond its housing preventing further loading. The maximum travel of the platen is 3.50 inches (88mm).

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 10,000 lbf (44kn).

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-2800

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

Typical CU Triaxial, 1-Cell Setup using HM-2800

| Part # | Qty | Description |
|------------|-----|---|
| HM-2800 | 1 | Multi-Speed Load Frame |
| HM-4150 | 1 | FlexPanel I (3-Burette Panel) |
| HM-4199B | 1 | Triaxial Cell, Brass Fittings |
| HM-4199.XX | 1 | Top Cap & Base Pedestal 2.8" |
| H-4454.020 | 1 | Load Ring 2,200 lbf (10 kN) |
| H-4463 | 1 | Dial Gauge 2.0" travel, 0.001" divisions) |
| HM-4170 | 1 | Pore Pressure Transducer, 200 PSI |
| HM-2350 | 1 | Single Channel Readout |
| HM-200387 | 1 | Ball Seat Adapter |

Typical UU Triaxial, 1-Cell Setup using HM-2800

| Part # | Qty | Description |
|------------|-----|---|
| HM-2800 | 1 | Digital MasterLoader 110/220V |
| HM-4140 | 1 | FlexPanel I (3-Burette Panel) |
| HM-4199B | 1 | Triaxial Cell, Brass Fittings |
| HM-4199.XX | 1 | Top Cap & Base |
| H-4454.020 | 1 | Load Ring 2,200 lbf (10 kN) |
| H-4463 | 1 | Dial Gauge 2.0" travel, 0.001" divisions) |
| HM-4179.XX | 2 | Acrylic Base Disk |
| HM-200387 | 1 | Ball Seat Adapter |

Typical Unconfined Compression Setup using HM-2800

| Part # | Qty | Description |
|--------------|-----|---|
| HM-2800 | 1 | Multi-Speed Load Frame |
| HM-2002 | 1 | Unconfined Upper Platen |
| HM-3000.10.2 | 1 | Displacement Indicator Platform |
| HM-3000.10.3 | 1 | Displacement Indicator Rod |
| H-4454.005 | 1 | Load Ring 500 lbf (2.5 kN) |
| H-4158.1 | 1 | Dial Gauge 1.0" travel, 0.001" divisions) |

Typical Test Setups for the HM-2800 (cont.)

Typical Soil Cement Setup using HM-2800

| Part # | Qty | Description |
|-------------|-----|-----------------------------|
| HM-2800 | 1 | Multi-Speed Load Frame |
| HM-2003E | 1 | Upper Swivel Platen |
| HM-4454.050 | 1 | Load Ring 5,000 lbf (25 kN) |

Typical Triaxial Sample Prep Items

| 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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