



HM-2700D.3F

**Direct/Residual Shear, Standard Controller— HM-2700.3F**

**Direct/Residual Shear, Analog Controller— HM-2700A.3F**

**Direct/Residual Shear, Digital Controller— HM-2700D.3F**

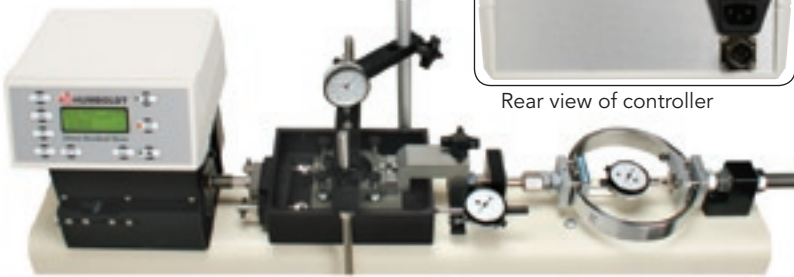
The Humboldt HM-2700 Series Direct/Residual Shear Machines are an economical choice for performing direct/residual shear tests utilizing the deadweight method. The HM-2700s come in three different configurations: a standard controller model; a controller with four analog instrumentation channel inputs, an RS-232 Port and RS-485 Input and Output; and, a controller with four Digital instrumentation channel inputs, an RS-232 Port and RS-485 Input and Output.

All models include the carriage, stand, vertical load hanger and a balanced lever loading arm with a 10:1 ratio that reduces the weight required to perform tests. The microprocessor-based system features a stepper motor drive system, large display, touch-sensitive keypad and forward/reverse travel limit switches.

All models allow for rapid and easy manual adjustment of Shearing force speed rates. The maximum shear force is 2000 lbf (10kN), and, the maximum consolidation force is 2000 lbf (10kN). The carriage accepts shear box squares up to 4.0" (100mm) internal dimension. Forward and reverse measurements permit residual shear testing as standard. A built-in safety feature prevents the overloading of the load measuring system. Meets ASTM D3080, AASHTO T236 and BS1377 standards.

**Model Configurations**

HM-2700.3F



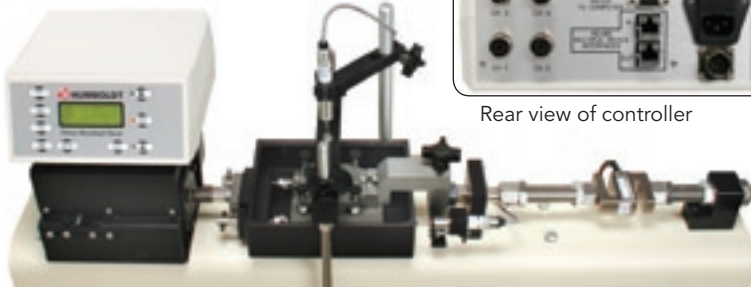
Rear view of controller

HM-2700D.3F



Rear view of controller

HM-2700A.3F



Rear view of controller

**Models A and D Feature:**

- Backlit LCD display
- Nonvolatile test data storage and instrument calibration
- Battery-backed real-time clock
- Auto conversion of instrument calibration between English or Imperial units and SI or metric units
- Test setup and selection via keypad
- Automatic triggering of test logging data
- View logged test data via the LCD display
- Logging rate as fast as 0.1 second/reading
- Four channels with real-time data acquisition
- RS-232 interface for computer or printer.
- Humboldt HMTS, Basic, User-Defined Level software included for data acquisition



**Specifications**

Horizontal Movement:	2" (50.mm) maximum
Horizontal Shear Force:	2,000 lbf (10kN)
Vertical Load:	2,000 lbf (10kN)
Speed Range:	0.00001 - 0.49999 inch/min (0.00001 - 12.9999 mm/min)
Voltage	110/220 VAC 50/60HZ
Current	6.5 Amps
Analog to digital converter	16 Bit
Data storage	4000 Readings
Data collection rate	100 ms
Computer port	RS232
Dimensions:	40 x 10 x 45" (L x D x H) (1016 x 254 x 1143mm)
Shipping Weight:	288 lb (131kg)



**Individual Weights and Sets—**

For use with the HM-2700 Direct/Residual Shear and HM-1000 Dead-weight Consolidation Frame.

**Individual Weights**

TSF Weight	Model No.
0.125 (1/8)	HM-1120.125
0.25 (1/4)	HM-1120.250
0.50 (1/2)	HM-1120.500
1.0	HM-1120.1
2.0	HM-1120.2
4.0	HM-1120.4
KGF Weight	Model No.
0.5 kg	HM-1122.05
1.0 kg	HM-1122.1
2.0 kg	HM-1122.2
4.0 kg	HM-1122.4
5.0 kg	HM-1122.5
8.0 kg	HM-1122.8
10.0 kg	HM-1122.10

**Direct/Residual Shear (Dead Weight) Typical Setups:**

Part #	Qty	Description
<b>Dead Weight with Manual Control</b>		
HM-2700.3F	1	Direct Residual Shear Apparatus 10:1
HM-2701.XX (S/D)	1	Shearbox Assembly
HM-2702.XX (S/D)	1	Shearbox Cutter
HM-2703.XX (S/D)	1	Dolly/Tamper
H-4454.020	1	Load Ring, 2,200 lbf (10.0 kN)
H-4158.1	1	Dial Indicator, 1.000 (25 x 0.001 mm)
H-4471	1	Dial Indicator, 0.5" x .0001" (12.7 x .0025 mm)
HM-1120*	1	Weight Set, 16 TSF
<b>Dead Weight, w/ Analog Transducer Data Acquisition</b>		
HM-2700A.3F	1	Direct Shear w/ Analog Inputs
HM-2701.XX(S/D)	1	Shearbox Assembly
HM-2702.XX(S/D)	1	Shearbox Cutter
HM-2703.XX(S/D)	1	Dolly/Tamper
HM-2300.020	1	S-Type Load Cell 2,000 lbf (10.0 kN)
HM-2310.10	1	Strain Transducer 1" (25mm)
HM-2310.04	1	Strain Transducer 0.4" (10mm)
HM-2310BR	2	Strain Transducer Bracket
HM-1120*	1	Weight Set, 16 TSF
HM-2700SW	1	HMTS Direct Shear Reporting Software
<b>Dead Weight, w/ Digital Dial Gauge Data Acquisition</b>		
HM-2700D.3F	1	Direct Shear w/ Digital Inputs
HM-2701.XX (S/D)	1	Shearbox Assembly
HM-2702.XX (S/D)	1	Shearbox Cutter
HM-2703.XX (S/D)	1	Dolly/Tamper
H-4454.020D	1	Load Ring, Digital 2,200 lbf (10.0 kN)
HM-4469.10	2	Digital Indicator 1" x .0001" (25 x 0.002 mm)
HM-4469C	3	Data Cable for Indicator
HM-1120*	1	Weight Set, 16 TSF
HM-2700SW	1	HMTS Direct Shear Reporting Software

**Part Numbers** ending in .XX require a size code to be entered referring to the sample size to be tested.

**For Direct/Residual Shear** samples, sizes are: .20 = 2.0"; .242 = 2.42"; .25 = 2.5"; .40 = 4.0"; .50 = 50mm; .60 = 60mm, and .100 = 100mm.

**NOTE: For Direct/Residual Shear, also, use "S" for square and "D" for round samples.**

\*For Metric applications, use HM-1122, Weight Set, 32kg.

Weight Set	Model No.	Set Includes
16 TSF Set	HM-1120	includes: (2) .125 TSF, (1) .25 TSF, (1) .50 TSF, (1) 1.0 TSF, (1) 2.0 TSF, (3) 4.0 TSF weights
32 TSF Set	HM-1121	includes: (2) .125 TSF, (1) .25 TSF, (1) .50 TSF, (1) 1.0 TSF, (1) 2.0 TSF, (7) 4.0 TSF weights
32 kgf Set	HM-1122	includes: (4) 1 kg, (3) 4 kg, (2) 8 kg weights
50 kgf Set	HM-1125	includes: (3) 1 kg, (1) 2 kg, (1) 5 kg, (4) 10 kg weights
64 kgf Set	HM-1123	includes: (4) 1 kg, (5) 4 kg, (5) 8 kg weights
88 kgf Set	HM-1124	includes: (4) 1 kg, (5) 4 kg, (8) 8 kg weights



HM-2560A.3F

### Pneumatic Direct/Residual Shear Apparatus, 110/220 VAC 50/60Hz— HM-2560A.3F

The Humboldt HM-2560A Direct/Residual Shear Apparatus utilizes the pneumatic loading concept for applying the vertical load to the sample. In doing so, this self-contained model eliminates the need for cumbersome loading weights used in dead weight-type systems.

The microprocessor-based system features a stepper motor drive system, large display, touch-sensitive keypad and forward/reverse travel limit switches. Through the use of a built-in 4-channel data acquisition system, the operator can preset the logging condition for the test.

Built to last in the harshest laboratory environments, the vertical/horizontal loading mechanism and shear box assembly are mounted on a 1.25" (30mm) thick solid aluminum base and heavy-gage enamel painted steel cabinet. The strain rods are manufactured from stainless steel and the shearbox carriage (water chamber) is constructed of anodized cast aluminum for corrosion resistance and long service life. The shearbox is constructed of anodized aluminum for light weight.

The HM-2560A is supplied complete with a 2,000 lbf (10kN) capacity load cell, 1" (25.4mm) horizontal strain transducer, 0.4" (10.2mm) vertical strain transducer and a built-in 4-channel

analog data acquisition system. Shearbox assemblies and related accessories are not included and must be ordered separately. Complies with ASTM D3080, AASHTO T236 and BS1377 standards.

#### Features include:

- Four channels with real-time data acquisition
- Backlit LCD display
- RS232 interface for computer or printer.
- Nonvolatile test data storage and instrument calibration
- Battery-backed real-time clock
- Auto conversion of instrument calibration between English or Imperial units and SI or metric units
- Test setup and selection via keypad
- Automatic triggering of test logging data
- View logged test data via the LCD display
- Logging rate as fast as 0.1 second/reading
- Humboldt HMTS, Basic, User-Defined Level software included for data acquisition



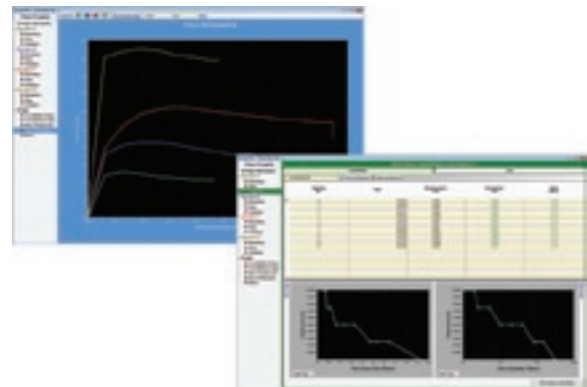
### Specifications

Horiz. Movement	2" (50mm) maximum
Horiz. Shear Force	HM-2560A: 2,000 lbf (10kN) HM-2550: 1,500 lbf (6.7kN)
Vertical Load	HM-2560A: 2,000 lbf (10kN) HM-2550: 1,500 lbf (6.7kN)
Speed Range	HM-2560A: 0.00001 to 0.49999 in/min. 0.00001 to 12.99999 mm/min. HM-2550: 0.0001 to 0.3 in/min. 0.0025 to 7,6200 mm/min.
Voltage	110/220 VAC 50/60HZ
Current	6.5 Amps
Analog to Digital	16 bit
Data Storage	4000 Readings
Data Collection Rate	100 ms
Computer Port	RS232
Dimension (W x D x H)	30 x 15.5 x 22" (L x D x H) (760 x 368 x 558mm))
Weight	140 lb (64 kg)
Shipping Weight	168 lb (76 kg)



### Pneumatic Direct/Residual Shear, Basic Version— HM-2550 220-240V 50/60Hz— HM-2550.4F

Similar in design to the HM-2560, this economical version is perfect for laboratories not requiring data acquisition or reporting functions. The HM-2550 has a 1,500 lbf (6.7kN) vertical load and horizontal shear force capacity, and, has built-in digital readouts for pressure and load. These are used for setting the vertical load and for the measurement of shear forces. Horizontal and vertical shear displacement values are measured by means of two mechanical dial indicators, which are included, as well as a S-Type Load Cell 2,000 lbf (10.0 kN). Shearbox assemblies and related accessories are not included and must be ordered separately. Meets ASTM D3080, AASHTO T236 and BS1377 standards.



### Direct/Residual Shear Typical Setups:

Part #	Qty	Description
<b>Pneumatic, Computer Control w/ Analog Instrumentation</b>		
HM-2560A.3F	1	ShearScan 10, w/ Analog Inputs
HM-2701.XX(S/D)	1	Shearbox Assembly
HM-2702.XX(S/D)	1	Shearbox Cutter
HM-2703.XX(S/D)	1	Dolly/Tamper
HM-2300.020	1	S-Type Load Cell 2,000 lbf (10.0 kN)
HM-2310.10	1	Strain Transducer 1" (25mm)
HM-2310.04	1	Strain Transducer 0.4" (10mm)
HM-2310BR	2	Strain Transducer Bracket
HM-2700SW	1	HMTS Direct Shear Reporting Software
<b>Pneumatic with Manual Control</b>		
HM-2550	1	Pneumatic Direct Shear Set
HM-2701.XX(S/D)	1	Shearbox Assembly
HM-2702.XX(S/D)	1	Shearbox Cutter
HM-2703.XX(S/D)	1	Dolly/Tamper

**Part Numbers** ending in .XX require a size code to be entered referring to the sample size to be tested.

**For Direct/Residual Shear** samples, sizes are: .20 = 2.0"; .242 = 2.42"; .25 = 2.5"; .40 = 4.0"; .50 = 50mm; .60 = 60mm, and .100 = 100mm.

**NOTE: For Direct/Residual Shear, also, use "S" for square and "D" for round samples.**

### HMTS Reporting Software, Direct/Residual Shear Module— HM-2700SW

Humboldt Material Testing Software (HMTS) provides a complete solution for the acquisition, recording and presentation of test data, as well as controlling testing operations when used in conjunction with compatible Humboldt testing equipment. HMTS 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.

The Direct/Residual Shear Module provides a simple, test-specific interface to control Shear test operations and automatically record data while also displaying it in real-time tables and graphs. Technicians can be freed-up for other duties with the assurance that all test data is being collected and saved.

- Test Information is stored, and all calculations are performed automatically
- Live tests and live graphing capabilities (real-time)
- Complete test report including all calculations and graphs required for testing
- Review and export tests using Microsoft Excel

**See page 72 for more information on Humboldt's HMTS software.**

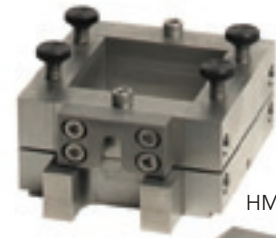


HM-2703.60S



HM-2702.60S

HM-2701.25D



HM-2701.60S



**Accessory**

**Model**

Cutter	HM-2702.XXS/D
Dolly Tamper	HM-2703.XXS/D
Porous Plate	HM-2704.XXS/D

**Part Numbers** ending in .XX require a size code to be entered referring to the sample size to be tested.

**For Direct/Residual Shear** samples, sizes are: .20 = 2.0"; .24 = 2.42"; .25 = 2.5"; .40 = 4.0"; .50 = 50mm; .60 = 60mm, and .100 = 100mm.

**NOTE:** For Direct/Residual Shear, also, use "S" for square and "D" for round samples.

**Round Shearbox Assemblies**

Size	Model
2.0"	HM-2701.20D
2.42"	HM-2701.24D
2.5"	HM-2701.25D
4.0"	HM-2701.40D
50mm	HM-2701.50D
60mm	HM-2701.60D
100mm	HM-2701.100D

**Square Shearbox Assemblies**

Size	Model
2.0"	HM-2701.20S
2.42"	HM-2701.24S
2.5"	HM-2701.25S
4.0"	HM-2701.40S
50mm	HM-2701.50S
60mm	HM-2701.60S
100mm	HM-2701.100S

**Shearbox Assemblies include:** Sample Box, (2) Porous Plates, (1) Loading Pad, and (1) Grid Plate.

**Load Rings w/ Mechanical Dial Gauge**

**Model**

Proving ring w/ mechanical dial gauge, 550 lbf (2.5 kN)	H-4454.005
Proving ring w/ mechanical dial gauge, 1,100 lbf (5.0 kN)	H-4454.010
Proving ring w/ mechanical dial gauge, 2,200 lbf (10 kN).	H-4454.020

**Load Rings w/ Digital Indicators**

Proving ring w/ digital indicator, 550 lbf (2.5 kN).	H-4454.005D
Proving ring w/ digital indicator, 1,100 lbf (5.0 kN)	H-4454.010D
Proving ring with digital indicator, 2,200 lbf (10 kN)	H-4454.020D
Data cable for digital indicator	HM-4469C

**Load Cells**

Load cell, 2,000 lbf (10 kN)	HM-2300.020
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H-4465.12



H-4454.005



H-4454.005D



HM-4469.05

**Displacement Measuring Devices**

**Vertical Devices**

**Model**

Mechanical dial gauge, 0.5 x 0.0001"	H-4471
Mechanical dial gauge, 12 x 0.002mm	H-4465.12
Digital indicator, 0.5 x 0.0001" (12 x 0.002mm)	HM-4469.05
Data cable for digital indicator	HM-4469C
Strain Transducer, 0.4" (10mm)	HM-2310.04

**Horizontal Devices**

Mechanical dial gauge, 1.0 x 0.001"	H-4158.1
Mechanical dial gauge, 25 x 0.01mm	H-4465.25
Digital indicator, 1.0 x 0.0001" (25 x 0.002mm)	HM-4469.10
Data cable for digital indicator	HM-4469C
Strain Transducer, 1.0" (25mm)	HM-2310.10



HM-2310.10

HM-2300.010