

Load Frame for CBR, LBR & Marshall Testing



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1. Introduction

1.1 Applications

The HM-5170A.3F is a fully automatic, dual-speed load frame—(0.05 in/min and 1 mm/min) with a resistive touch screen and built-in unit conversion specific to instrumentation calibration (in-lbf to SI) for high-quality CBR/LBR testing. The screen displays real-time graphic stress versus penetration and tabulation of test data specific to load, penetration, and stress. With multi-test storage up to 1000 tests and 2500 points per test, the HM-5170A.3F is ideal for monitoring test data in real-time and assessing a test's peak value.

1.2 Product Use

This product is intended for use only in accordance with the directions and specifications contained in this User Guide. Your HM-5170A.3F has been configured according to your specifications.

1.3 Key Features

The HM-5170A.3F includes the following key features:

- 7-inch VGA display (480 X 800) with upper and lower travel limit switches.
- Two 32-bit ARM processors, 64 MB of RAM, and 4 GB of Non-Volatile Memory.
- External power for optional Wi-Fi adapter.
- Ethernet connection for network connectivity, as well as data download software for PC.
- Auto upgrade of firmware via Ethernet or USB port.
- High Speed Logging (max 20 readings per second).
- Ambient temperature sensor.
- Emergency stop button and rapid return home at end of test.
- 24 VDC motor drive (direction and motor enable with encoder feedback).
- USB port to export test data and import/export calibration data.
- Multi points (2, 5, or 10) Instrument calibration and auto tare of instrumentation after 10lbf (44N) seating load.
- Two 12-bit differential analog to digital convertors with a max 200,000 samples per second
- Auto recording of the load reading at penetration of 0.025 in. (0.64 mm), 0.050 in. (1.3 mm), 0.075 in. (1.9 mm), 0.100 in. (2.5 mm), 0.125 in. (3.18 mm), 0.150 in. (3.8 mm), 0.175 in. (4.45 mm), 0.200

in. (5.1 mm), 0.300 in. (7.6 mm), 0.400 in. (10 mm) and 0.500 in. (13 mm), or at intervals of penetration of 0.25 mm to a total penetration not exceeding 7.5 mm. And LBR load readings for each 0.010 inch (0.25 mm) penetration up to 0.200 inches (5.08 mm), after which the load reading will be taken at 0.225, 0.250, 0.275, 0.300, 0.325, 0.350, 0.375, 0.400, 0.450, and 0.500 inches (5.72, 6.35, 6.98, 7.62, 8.26, 8.89, 9.52, 10.16, 11.43, and 12.7 millimeters) of penetration.

Note: CBR operation adheres to AASHTO (T193), ASTM (D1883), or BS (1337:4); LBR operation adheres to (FM 5-515).

1.4 Accessories

Description	Part #
CBR/LBR Reporting Software	HM-5001SW
WiFi Intelligent Bridge	HM-000356
Linear Transducer	HM-2305.10
Linear Transducer Bracket	HM-2305BRT
S-Type Load Cell	HM-2300.100
Pancake Load Cell	HM-2300.100P
CBR/LBR Penetration Piston	H-4178

2. General Warnings

2.1 Safety Warnings

Operators should take care to operate this machine under 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.

2.2 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 first be unplugged. 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.

3. Manufacturer's Rights and Responsibilities

3.1 Software Copyright

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3.2 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.

3.3 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.

3.4 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.

4. Startup Scenarios

The HM-5170A.3F has been pre-calibrated. The machine is designed to run a specific test and has been calibrated in the factory.

DO NOT RECALIBRATE!

4.1 Instrument Inputs

This refers to load cell/transducer connections. The HM-5170A.3F has 2 instrumentation inputs located on the back panel to accommodate load cell/transducer connections. This feature allows you to set up and calibrate up to 2 different instruments, which the unit can quickly switch between for those needing to do multiple types of tests.

If you purchased load cells/transducers with your unit, they will either be mounted and calibrated, or in the case of multiple load cells/transducers, calibrated but not mounted. Additional load cells/transducers will be marked to indicate what input channel was used in the calibration. These load cells/transducers should be connected to the indicated channels.

Third-party load cells/transducers, which are compatible, can also be used with the HM-5170A.3F. Compatible units must work with an excitation voltage of 3.3 or 8.25 volts and produce an output of 0-3.3 volts and 0-25 millivolts. Prior to use, all third-party instrumentation must be configured and calibrated. Please refer to the Configuration and Calibration sections of this manual.

If you are using third-party cables for load cells/transducers connections, make sure they are wired to be compatible with the HM-5170A.3F. Consult Figure #1 for a compatible reference wiring diagram. Plugs to connect third-party instrumentation to the Humboldt HM-5170A.3F are available; order part HS-000474.

Note: Input 1 will always be a load cell and Input 2 will always be a displacement transducer.

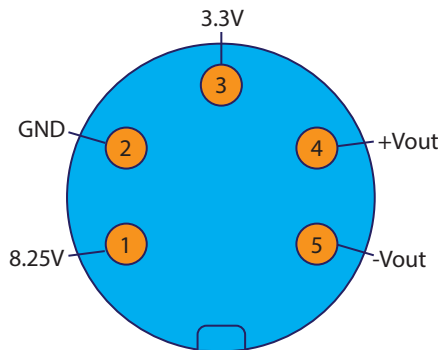


Figure #1 Wiring Diagram

4.2 Mounting Load Cells and Transducers

If you purchased your HM-5170A.3F with instrumentation, one of the load cell/transducer setups should already be mounted see figure 2. If you are using the machine for multiple tests or want to use instrumentation not included, such as third-party instrumentation, the following photos can be used as a guide for load cells/transducers setup.



Figure #2 CBR Instrumentation Setup

4.3 Unpacking

Initial inspection should include checking for physical damage during shipping and obvious external damage to the product.

Package contents are defined by your packing list. Each Loader is configured according to customer specifications. In your inspection, make certain that the contents of your shipment match the documentation provided by your packing list.

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.

4.4 Electrical Connections

The HM-5170A.3F is equipped with an internal, digital, switching power supply, which allows it to be used with most power configurations throughout the world. The unit is supplied with an IEC electrical cord with a standard 110V plug. The HM-5170A.3F 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. For locations other than the U.S., replace the supplied electrical cord with an IEC cord with the correct plug for your application. The supplied cord can also be used by cutting the standard plug from the cord and attaching the correct plug.

4.5 Local Area Network Connection

Plug your machine into the network and refer to Section 6.5 "Network". Use a standard CAT 5 or CAT 6 Ethernet cable. If wireless is required, use the 5 volt power USB port located on the back to power a USB access point HM-000356.

4.6 Power Switch

The Power Switch is located above the electrical cord inlet in the back panel on the rear of the machine. The Fuse Compartment is located between the electrical cord inlet and the Power Switch. The HM-5170A.3F uses a 10 amp fuse. To begin operation, press the Power Switch.

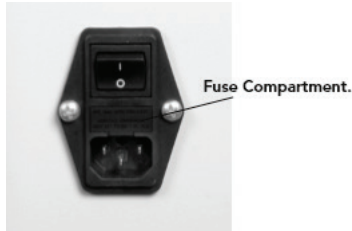


Figure #3 Power Switch

5. Home Screen

This is the screen that appears once your machine is powered on.

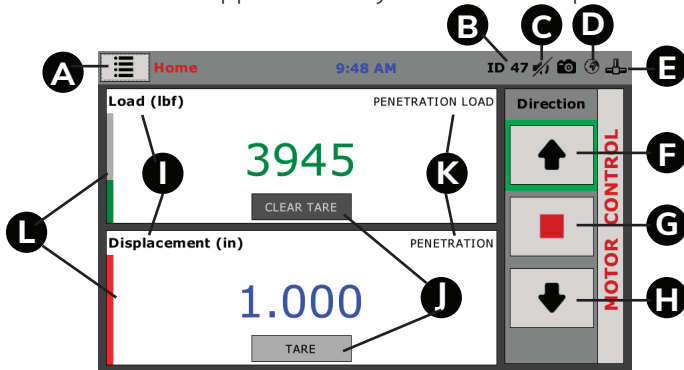


Figure #4 Home Screen

A. Options

Press this button to select “New Test,” “Current Tests,” “Previous Tests,” and “System Settings” options.

B. Unique Logger Identification Number

This displays the number that is specific to each logger connected to the Internet.

Note: Each logger needs a unique identification number.

C. Mute

Indicates that sound is disabled.

D. Internet Connectivity

This indicates if your machine is connected to the Internet. A red icon indicates connection to the Internet; a gray icon indicates no connection to the Internet.

E. Network Connectivity

This indicates if your machine is connected to the network. A red icon indicates connection to the network; a gray icon indicates no connection to the network.

F. Motor Travel Limit Indicator

If a red box appears, you have reached the maximum motor travel limit. The box will otherwise appear green to indicate whether the up or down arrow has been selected for motor movement.

G. Stop

Press the red square to stop motor movement.

H. Direction of Movement

Press either the up or down arrow to control the direction of motor movement.

I. Instrumentation Type

This displays the type of instrumentation connected and the corresponding unit of measurement. T

J. Tare/Clear Tare

This button can be used to tare the input before testing. Once pressed, the “Tare” button will change to a “Clear Tare” button, which will remove the applied tare.

K. Channel

This displays the name of the calibrated channel and can be customized under Setting  Calibration  Calibrate  Name.

L. Calibration Parameters

The level of color indicates calibration parameters. Green indicates within calibration parameters, yellow indicates nearing the end of calibration parameters, and red indicates over calibration parameters.

6. System Settings Screen

This screen is accessed through button A in figure 4 (options), selecting the “System Setting”

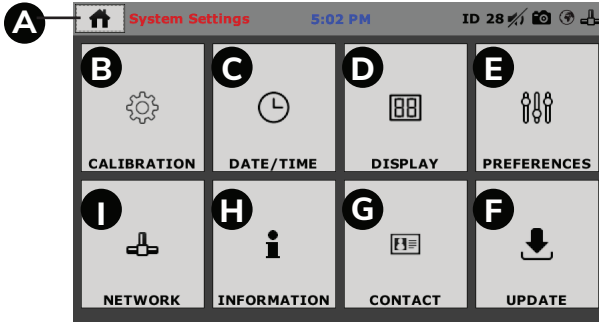


Figure #5 System Settings Screen

A. Home

Press this button to return to the home screen.

B. Calibration

Select this option to turn input limits on/off, view the calibration value and raw input counts, calibrate, and import/export calibration files.

C. Date/Time

Select this option to change the date, time, and clock style.

D. Display

Select this option to change the brightness, display settings, and language.

E. Preferences

Select this option to change the unique logger identification number, update check frequency, enable/disable sound, enable/disable automatic system updates, change the ambient temperature, set desired motor speed units, change the test storage limit, and view recycled tests.

F. Update

Select this option to update from USB, check for updates, and view update details.

G. Contact

Select this option to view Humboldt Manufacturing contact information.

H. Information

Select this option to view the firmware version, IP information, local status, Internet status, and memory usage.

I. Network

Select this option to enable/disable DHCP, view IP information, view local status, and view Internet status.

6.1 Calibration Screen

This screen is accessed through selection of the “Calibration” button B in figure 5.

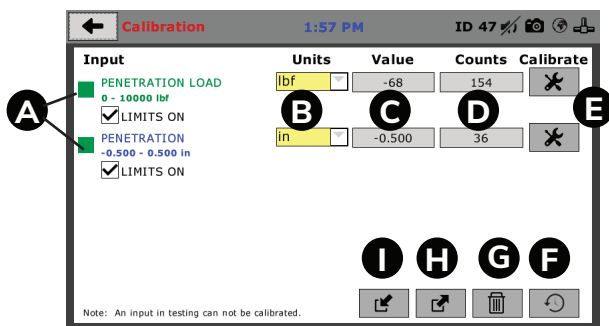


Figure #6 Calibration Screen

A. Input

This is a summary of the calibration of connected channels. A red box indicates current use in testing; a green box indicates no current use in testing. Select “limits on” to keep machine from exceeding sensor limits. If “select limits” is on and limits are exceeded, all tests will stop running and the motor will stop to avoid damaging connected instruments. Note: An input in testing cannot be calibrated.

B. Units

The display units of calibration instrument can be customized. Available options include kN, lbf, and N for load and cm, in, and mm for penetration.

C. Value

This displays the current calibration value. If it is not calibrated, the value will read “N/A.”

D. Counts

This displays current A/D input counts.

E. Calibrate

Select this button to perform or modify calibration. When you click on this button you will be asked for your password.

The screenshot shows the 'Calibration' screen with a status bar at the top displaying '1:56 PM' and 'ID 47'. The main table has columns: Input, Units, Value, Counts, and Calibrate. Two rows are visible: 'PENETRATION LOAD' (Units: lbf, Value: -68, Counts: 154) and 'PENETRATION' (Units: in, Value: 7). Both rows have 'LIMITS ON' checked. A modal dialog titled 'Enter Password' is centered over the table, featuring a numeric keypad (1-9, 0) and a 'Cancel' button. At the bottom, a note states: 'Note: An input in testing can not be calibrated.' and there are icons for save, share, delete, and refresh.

F. Restore Factory Calibration

Select this button to restore factory calibration. You will see a display of the current value with system calibration and the current value with factory calibration. Beside each is the option to select for restoration, and at the bottom of the page is an option to restore all. Press the “restore factory calibration” button to restore the factory calibration.

The screenshot shows the 'Restore Calibration' screen with a status bar at the top displaying '2:03 PM' and 'ID 47'. The main table has columns: Input, Current, Factory, and Restore. Two rows are visible: 'PENETRATION LOAD' (Current: -93, Factory: 0) and 'PENETRATION' (Current: -0.500, Factory: 0). Both rows have 'Restore' checkboxes. At the bottom, there is a 'RESTORE ALL' checkbox and a refresh icon. A note at the bottom states: 'Note: An input in testing can not be calibrated.'

G. Delete Calibration

Press this button to select calibrations to delete.

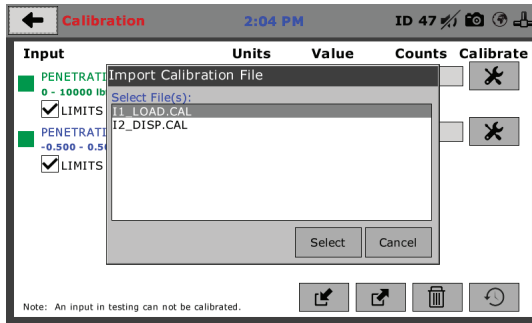
The screenshot shows the 'Calibration' screen with a status bar at the top displaying '2:03 PM' and 'ID 47'. A modal dialog titled 'Delete Calibration' is open, showing a list of calibrations to delete: 'PENETRATION LOAD' and 'PENETRATION'. The dialog has 'Select' and 'Cancel' buttons. The background table shows the same data as in the previous screenshots. A note at the bottom states: 'Note: An input in testing can not be calibrated.'

H. Export Calibration to USB

Press this button to select calibrations to export to USB.

I. Import Calibration from USB

Press this button to select calibrations to import from USB.



6.1.1 Calibration Sensor Details screen

This screen is accessed through selection of the “Calibrate” button E, in figure 6.

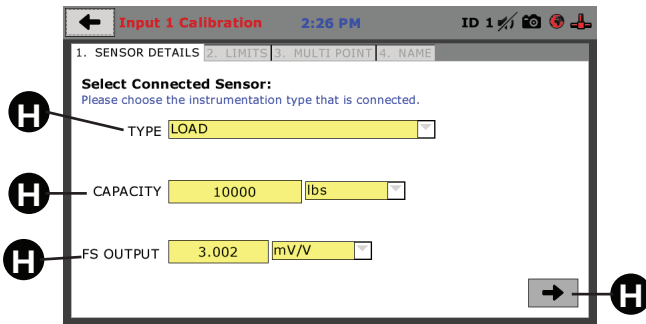


Figure #7 Calibration Screen - Sensor Details

A. Input Type

For a CBR test, the types will always be load and displacement. For other tests, available options include displacement, pressure, and volume.

B. Capacity

This refers to the maximum sensor capacity found on the sensor specifications sheet.

C. Full Scale Output

This can be found on the sensor specifications sheet or, if not known, can be left at 0. If a number other than 0 is entered, your machine will automatically generate a 2 point calibration. If you would like to do a manual calibration, leave the number at 0.

D. Next

Press this button to continue to the next screen, “Limits.”

6.1.2 Calibration Limits Screen

This screen is accessed through selection of the “Calibrate” button E, in figure 6, then after progression through the “Sensor Details” screen.

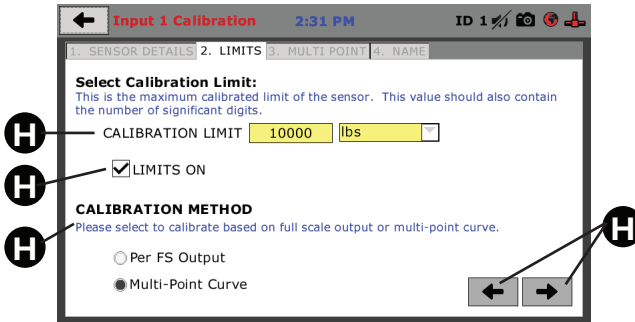
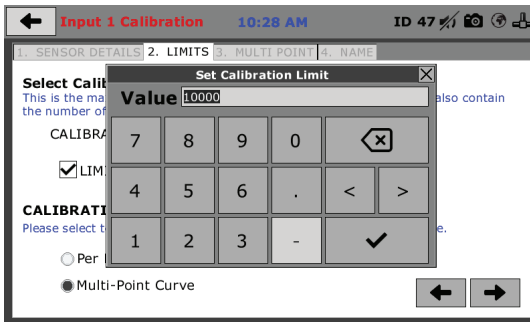


Figure #8 Calibration Screen - Sensor Details

A. Calibration Limits

The calibration limit cannot exceed sensor capacity unless limits are turned off. The number of significant digits (digits after the decimal) is how many digits will be available in calibrated readings.



A window above will open to set the calibration limit.

Use the arrow buttons < > to make corrections, then press the button with the checkmark ✓ when you are done.

Note: Significant digits make readings more precise. A displacement calibration must have at least 3 significant digits for the test to run correctly.

B. Limits On

Select this box to turn limits on/off. If limits are turned off, the calibration limit can exceed sensor capacity.

Note: Accuracy cannot be guaranteed if calibration limit is exceeded.

C. Calibration Method

Select "Per FS Output" to automatically do a 2 point calibration. More information on FS Output can be found under section "Sensor Details" Section 6.1.1 on page 13.

Select "Multi-Point Curve" to do a manual entry for calibration. If your output is at 0 and "Per FS Output" is chosen as the calibration method, your machine will prompt to correct the calibration method. Correct the calibration method by selecting "Multi-Point Curve" or entering a value besides 0.

D. Back or Next

Use the left arrow to return to the previous screen, "Sensor Details." Use the right arrow to continue to the next screen, "Multi Point."

6.1.3 Calibration Multi Point Screen

This screen is accessed through selection of the "Calibrate" button E, in Figure 6, then after progression through the "Sensor Details" and "Limits" screens.

Input 2 Calibration 12:07 PM ID 47

1. SENSOR DETAILS 2. LIMITS 3. MULTI POINT 4. NAME

Create Multi-Point Calibration:
Please note a minimum of 2 points are required for a successful calibration.

POINT	APPLIED	A/D COUNTS
0	0.000	36
1	0.200	842
2	0.400	1710
3	0.600	2727
4	0.800	3306
5	1.000	4021
6		
7		
8		
9		
10		


Entry Method
☒ QUICK CLICK
☐ MANUAL ENTRY

Calibration
 5 Point
 1 Point
 5 Point
 10 Point
 Custom

Navigation arrows: Left arrow (Back), Right arrow (Next)

Figure #9 Calibration Screen - Five Point

- A. Point
- B. Applied
- C. A/D Counts
- D. Entry Method
- E. Calibration
- F. Back or Next

- D. Select “Quick Click” to prompt to capture A/D counts when Set Point  has been pressed.

Select “Manual Entry” to manually enter applied or A/D Counts also allows for entry of negative applied values.

Note: If “Manual Entry” is selected, all appropriate cells of the calibration table must be filled. The number of appropriate cells depends on your calibration type.

E. Calibration Type

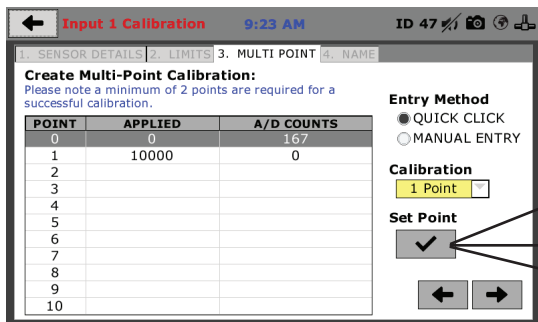
This gives the option for a one point calibration, five point calibration, ten point calibration, or custom calibration. If a point calibration is selected, your machine will automatically fill the applied column in increments corresponding to your set calibration limit. The custom setting allows entry for any number of calibration points between 1 and 10 in addition to a 0 point.

F. Back or Next

Use the left arrow to return to the previous screen, “Limits.” Use the right arrow to continue to the next screen, “Name.”

Below are examples of calibration options:

6.1.3.1 One Point Calibration Method



Input 1 Calibration 9:23 AM ID 47


1. SENSOR DETAILS 2. LIMITS 3. MULTI POINT 4. NAME


Create Multi-Point Calibration:
Please note a minimum of 2 points are required for a successful calibration.

POINT	APPLIED	A/D COUNTS
0	0	167
1	10000	0
2		
3		
4		
5		
6		
7		
8		
9		
10		

Entry Method
☒ QUICK CLICK
☐ MANUAL ENTRY

Calibration
 1 Point

Set Point


Clear Point



Clear All Points


Figure 10: One-Point Calibration

A. Set Point

Pressing this button to capture A/D counts and select the next row down see figure 10.


B. Clear Point

Pressing this button to clear the point see figure 10.

C. Clear All Points

When first enter the "Multi Point" screen, there is an option to clear all

points to reconfigure calibration points see figure 10).

As shown below, the first row will be highlighted to indicate selected input. At this step press the set Point  to capture the A/D counts for Zero Load (see figure 10).

The second row will be highlighted indicating the required load of 10000lbf to be applied to the sensor (see figure 11).

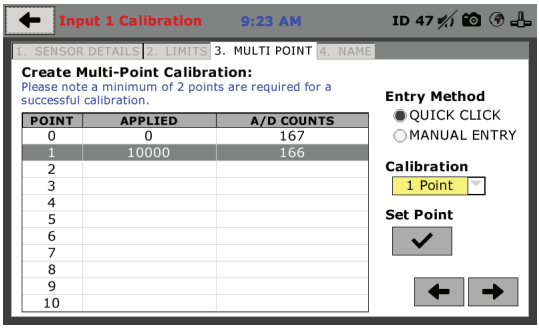



Figure 11: One-Point Calibration

After the 10000 lbf been applied to the sensor press the Set Point  to capture the A/D counts for 10000 lbf Load (see figure 12).

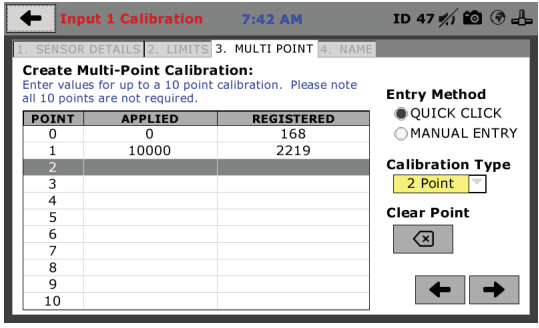


Figure 12: One-Point Calibration

6.1.3.2 Five Point Calibration Method

The display below is an example of a five Point calibration.

Input 2 Calibration 12:14 PM ID 47

1. SENSOR DETAILS 2. LIMITS 3. MULTI POINT 4. NAME

Create Multi-Point Calibration:
Please note a minimum of 2 points are required for a successful calibration.

POINT	APPLIED	A/D COUNTS
0	0.000	36
1	0.200	842
2	0.400	1710
3	0.600	2727
4	0.800	3306
5	1.000	4021
6		
7		
8		
9		
10		

Entry Method
☒ QUICK CLICK
☐ MANUAL ENTRY

Calibration
 5 Point

Clear All Points

← →

6.1.3.3 Point Calibration Method

The display below is an example of a ten Point calibration.

Input 2 Calibration 12:14 PM ID 47

1. SENSOR DETAILS 2. LIMITS 3. MULTI POINT 4. NAME

Create Multi-Point Calibration:
Please note a minimum of 2 points are required for a successful calibration.

POINT	APPLIED	A/D COUNTS
0	0.000	36
1	0.100	0
2	0.200	0
3	0.300	0
4	0.400	0
5	0.500	0
6	0.600	0
7	0.700	0
8	0.800	0
9	0.900	0
10	1.000	0

Entry Method
☒ QUICK CLICK
☐ MANUAL ENTRY

Calibration
 10 Point

Set Point

← →

6.1.3.4 Custom Calibration Method

The displays below are an example of a custom calibration sequence.

Input 2 Calibration 12:25 PM ID 47

1. SENSOR DETAILS 2. LIMITS 3. MULTI POINT 4. NAME

Create Multi-Point Calibration:
Please note a minimum of 2 points are required for a successful calibration.




POINT	APPLIED	A/D COUNTS
0	0	35
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0

Entry Method
☒ QUICK CLICK
☐ MANUAL ENTRY

Calibration
 Custom

Set Point

← →

← **Input 2 Calibration** 12:26 PM ID 47   

1. SENSOR DETAILS 2. LIMITS 3. MULTI POINT 4. NAME

Create Multi-Point Calibration:
Please note a minimum of 2 points are required for a successful calibration.




Enter Point 0 Applied Value

Value: -0.500

POINT	APPLIED	A/D COUNTS
0		
1		
2		
3		
4		
5		
6		
7		
8	0	0
9	0	0
10	0	0

Method: QUICK CLICK
Calibration: Custom
Set Point: ✓

← →

← **Input 2 Calibration** 12:26 PM ID 47   




1. SENSOR DETAILS 2. LIMITS 3. MULTI POINT 4. NAME

Create Multi-Point Calibration:
Please note a minimum of 2 points are required for a successful calibration.

POINT	APPLIED	A/D COUNTS
0	-0.500	4020
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0

Entry Method: ☒ QUICK CLICK ☐ MANUAL ENTRY
Calibration: Custom
Set Point: ✓

← →

← **Input 2 Calibration** 12:29 PM ID 47   

1. SENSOR DETAILS 2. LIMITS 3. MULTI POINT 4. NAME

Create Multi-Point Calibration:
Please note a minimum of 2 points are required for a successful calibration.

POINT	APPLIED	A/D COUNTS
0	-0.500	4018
1	-0.250	3006
2	0	1996
3	0.250	1009
4	0.500	35
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0

Entry Method: ☒ QUICK CLICK ☐ MANUAL ENTRY
Calibration: Custom
Clear Point: ✕

← →

6.1.4 Sensor Name Screen

This screen is accessed through selection of the “Calibrate” button E, in figure 6, after progression through the “Sensor Details,” “Limits,” and “Multi Point” screens.

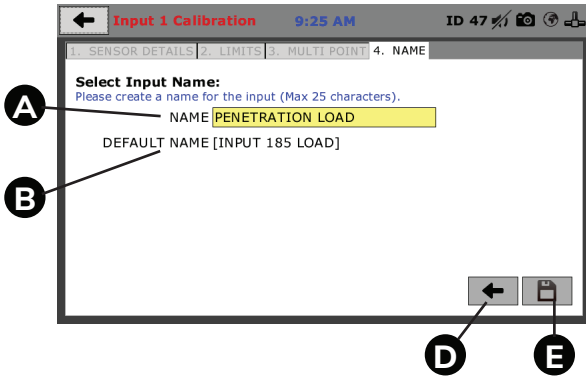
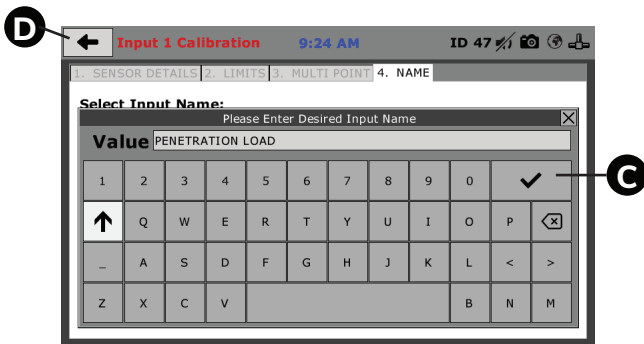


Figure 13: Sensor Naming Screen

A. Input Name

Enter a name for your input. There is a maximum of 25 characters. A window below will open to set the desired Input name. Use the arrow buttons < > to make corrections. Press the button with the checkmark ✓ to save the name when you are done.



B. Default Name

If no name is entered in the space above, a default name will be selected for your input. This default name corresponds to your unique logger identification number and will appear in the brackets.

C. Check ✓

D. Back ⬅

Press back to review the previous screen, "Multi Point."

E. Save 📄

Press "save" to save a summary of your channel information.

6.2 Date/Time

This screen is accessed through selection of the “Date/Time” button C in figure 5.

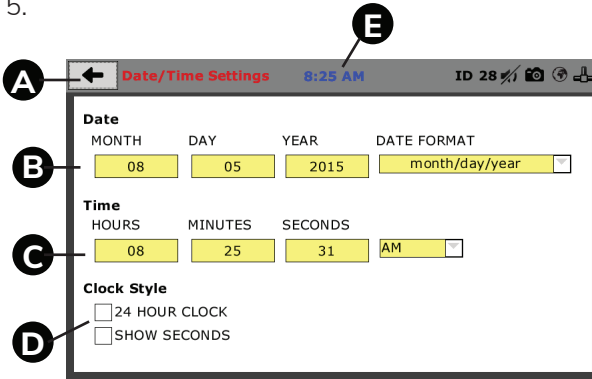


Figure 14: Date / Time Setting Screen

A. Back

Press this button to return to the previous screen.

B. Date

Set the month, day, year, and date display format.

C. Time

Set the hours, minutes, seconds, and am/pm.

D. Clock Style

This includes the option to view a 24 hour clock or a 12 hour clock, as well as the option to show seconds or not show seconds.

E. Clock

The current time is displayed on each screen. Touch the clock for rapid return to this screen for date/time modifications.

6.3 Display

This screen is accessed through selection of the “Display” button D in figure 5.



Figure 15: Display Screen

A. Brightness

Slide the gray bar to the left or right to adjust brightness.

B. Dim Display

The backlight of the display will automatically dim to save power. Click the yellow box to change the number of minutes before the display goes dim. After the time has elapsed, touch the display to deactivate dimming.

C. Turn Display Off

The display will automatically turn off to save power. Click the yellow box to change the number of minutes before the display powers off.

D. Language

Select the yellow box to choose the display language. Available options are English, Español, and Chinese.

6.4 Preferences

6.4.1 General

This screen is accessed through selection of the “Display” button E in figure 5.

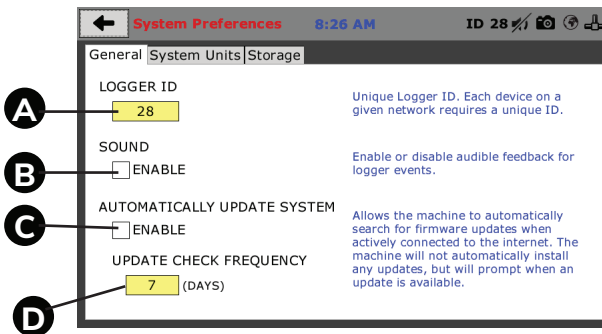


Figure 16: System Preference - General

A. Logger ID

Each logger who is connected to the network needs a unique identification number. This number can be between 1 - 245.

B. Sound

Enable or disable audible feedback for logger events.

C. Automatically Update System

This option allows the machine to automatically search for firmware updates when actively connected to the Internet. The machine will not automatically install any updates, but will prompt when an update is available.

D. Update Check Frequency

This number represents the frequency with which the machine checks for updates.

6.4.2 System Units

This screen is accessed through selection of the “Preferences button,” then “System Units.”

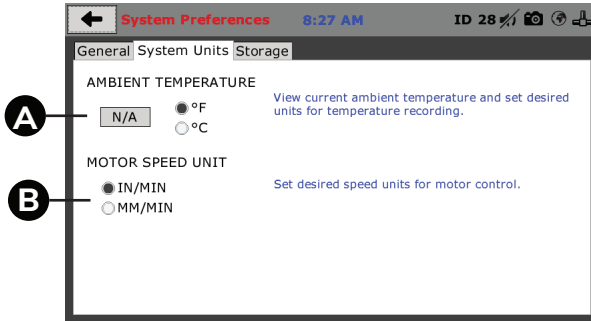


Figure 17: System Preference - Units

A. Ambient Temperature

View current ambient temperature and select desired units (Fahrenheit or Celsius) for temperature recording.

B. Motor Speed Unit

Set desired speed units for motor control (in/min or mm/min).

6.4.3 Storage

This screen is accessed through selection of the “Preferences” button, then “Storage.”

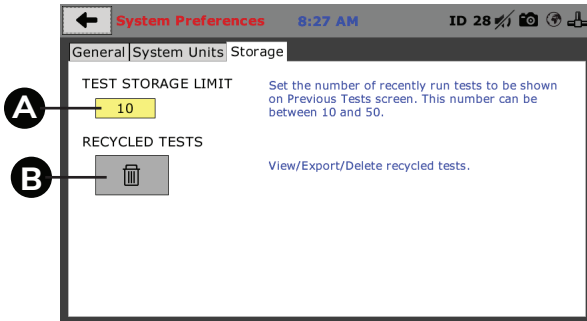


Figure 18: System Preference - Storage

A. Test Storage Limit

Set the number of previously run tests to be available on the “Previous Tests” screen. This number can be between 10-50.

B. Recycled Tests

This refers to previously run tests that are not displayed in the “Previous Tests” window. These tests are not deleted, but are recycled for later use. Select this button to view/export/delete recycled tests.

6.4.3.1 Recycled Tests

This screen is accessed through selection of the “Preferences” button, “Storage”, and “Recycled Tests.”

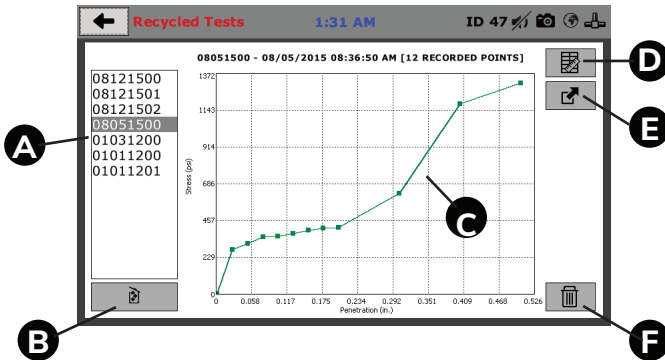


Figure 19: System Preference - Storage - Recycle

A. Previous Tests

The names of previous tests are displayed here.

B. Delete all Tests

Press this button to delete all previous tests. A prompt will ask you to confirm this action.

Note: Tests cannot be taken back from the recycle bin.

C. Data

This is a graphical representation of the data.

D. Tabulation View

Press this button to switch to a tabulation view of the data. Press it again to return to a graphical view.

E. Export Test File

Press this button to export a test file.

F. Delete a Test

Press this button to delete a single test. A prompt will ask you to confirm this action.

6.5 Network

This screen is accessed through selection of the “Network” button.

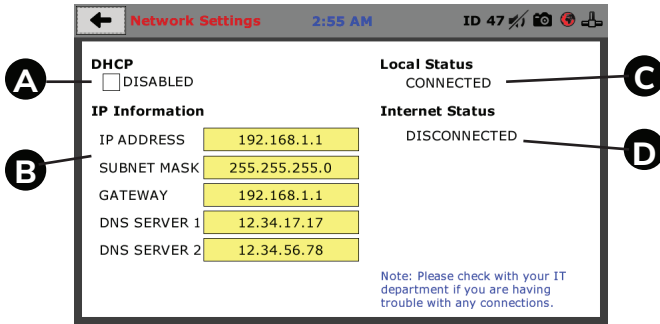


Figure 20: Network

A. DHCP

Select this to enable/disable the Dynamic Host Configuration Protocol. If enabled, your machine will pick up IP information from your router. If disabled, you will need to manually enter the network information.

B. IP Information

The IP address must be unique for each machine.

C. Local Status

This indicates the status of the local network connection.

D. Internet Status

This indicates your machine's ability to connect to the Internet.

Note: If you are experiencing issues with any connections, please contact your IT department for assistance.

6.6 Connection Information

This screen is accessed through selection of the “Information” button.

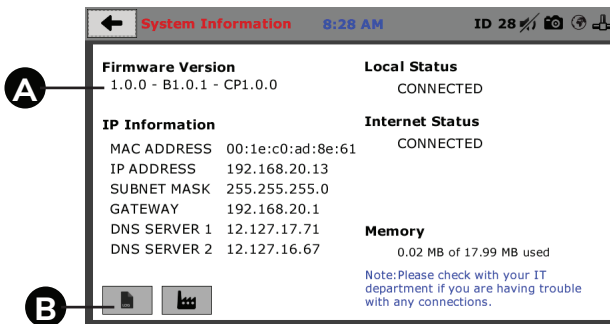


Figure 21: System Information

A. Firmware Version

This is a summary of your machine's connection status and software versions. If you contact Humboldt customer support for assistance, they may ask for this information.

B. Event Log

This opens your machine's event log. If you contact Humboldt customer support for assistance, they may ask for this information.

6.6.1 Password

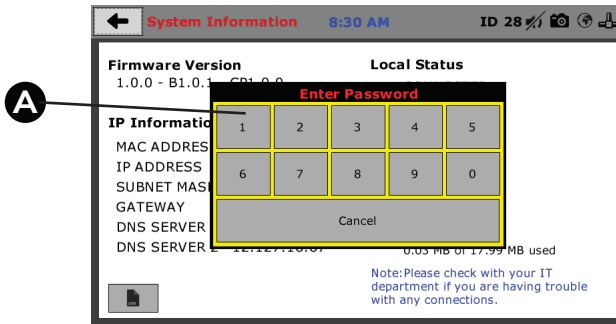


Figure 22: Password

A. A password prompt will open if the "event log" or "factory screen" buttons are pressed. Enter the password or press "cancel" to close the password prompt and return to the information screen.

6.6.2 Event Log

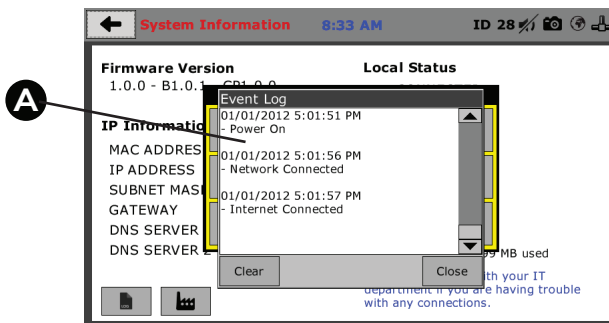


Figure 23: Event Log

A. After the correct password is entered, the event log will be displayed. This shows all system events, including powering on/off, modifications, and test information. Press "clear" to delete event log details or "close" to exit the event log window.

6.7 Contact Information

This screen is accessed through selection of the “Contact” button.

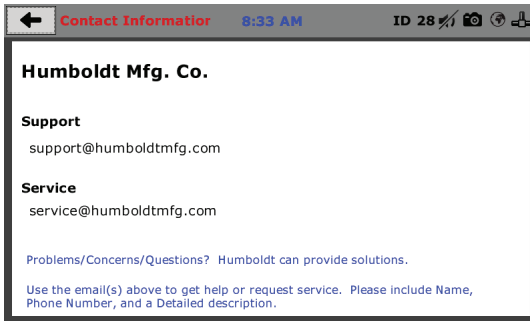


Figure 24: Humboldt Contact Information

If you require assistance, please email Humboldt Support at support@humboldtmfg.com or Humboldt Service at service@humboldtmfg.com. Please include your name, telephone number, and a detailed description of your reason for contact.

6.8 Update

This screen is accessed through selection of the “Updates” button.

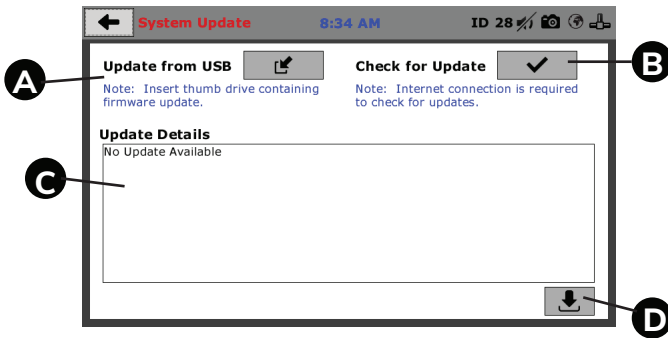


Figure 25: Update Information Screen

A. Update from USB

Software updates for your machine can be downloaded from www.humboldtmfg.com. Insert a thumb drive with these firmware updates and then select this icon. A window will open to select update files. If you would like to close this window and return to the "Updates" screen, press "cancel."

B. Check for Update

If your machine is connected to the Internet, the software will automatically check for updates. How often this occurs can be customized under the "Preferences" button. However, you may select this button to force an immediate check for updates.

C. Update Details

If updates are downloaded from the Internet, this shows the changes that were made.

D. Multi File Update

This refers to the file extension of an update. Any files on USB that are valid for this product will be displayed here. Select this button to run updates.

7. New Test

This screen is accessed through selection of the “New Test” button.

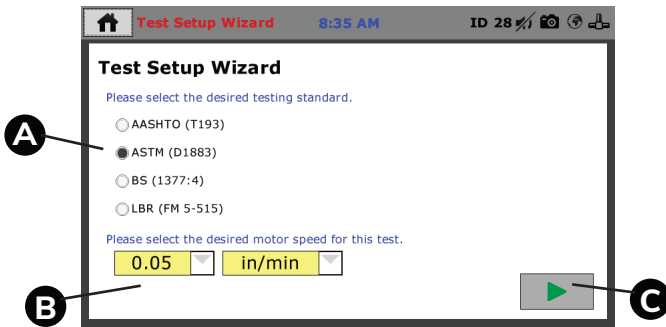


Figure 26: CBR / LBR Test Setup

7.1 Test Setup Wizard

A. Testing Standard

Select a testing standard based on which test you would like to run.

B. Motor Speed

Motor speed options correspond with testing standards.

C. Run Test

Press this button to begin the test. The screen will prompt for an input value, or test name.

7.2 Test File Save As

This screen is accessed through selection of the “New Test” button, then selection of the green arrow to run a test.



Figure 27: Test File Save As

A. Caps Lock

Press this button to activate caps lock for capitalization. Press again to deactivate caps lock.

B. Delete

Press this button to delete a character.

C. Navigation

Press this button to move your cursor so that corrections can be made.

7.3 Start Testing



Figure 28: Test Screen

A. Go Button

Once your value is entered, click the check button to begin the test.

7.4 Motor Running

The motor will run until it apply 10 lbf on the sample, then it will stop and prompt that the seating load has been met.

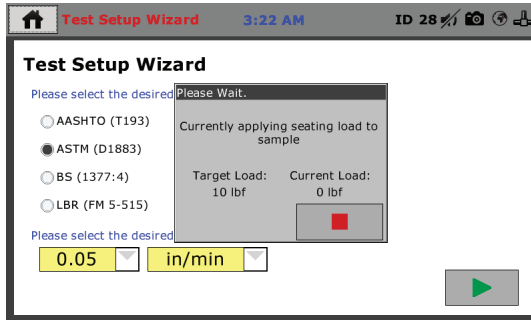


Figure 29: Applying Seating Load

7.5 Surcharge Weights

Place surcharge weights if necessary and press “continue.” The test will then trigger and the first data point will be recorded. As a result, the “Current Tests” screen will be shown.

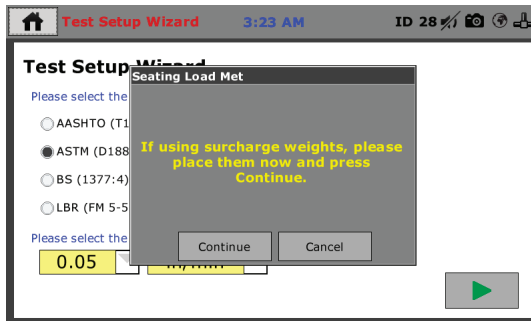


Figure 30: Surcharge Weights Prompt

8. Current Tests

This screen is accessed through selection of the “Current Tests” button or through progression of the “Test Setup Wizard.”

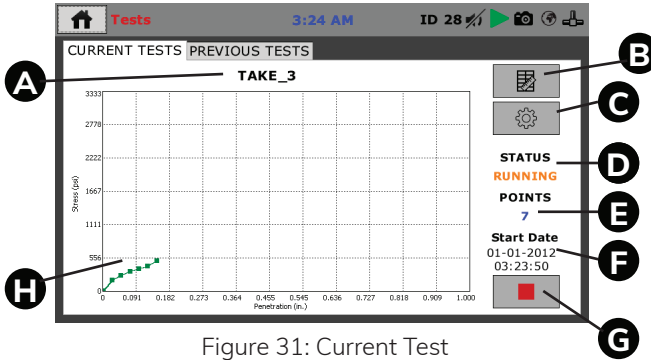


Figure 31: Current Test

A. Test Name

The test name that you entered will be displayed here.

B. Test in Progress

This indicates that a test is currently running.

C. Tabulation View

Press this button to switch to a tabulation view of your data.

D. Status

This indicates if your test is running or not

E. Points

This shows how many total test points have been recorded.

F. Start Date

This shows the date that the current test was triggered.

G. Stop Test

Press this button to stop the test.

H. Data

This is a graphical representation of your test data.

8.1 Tabulation View

This is a tabulation view of the data.

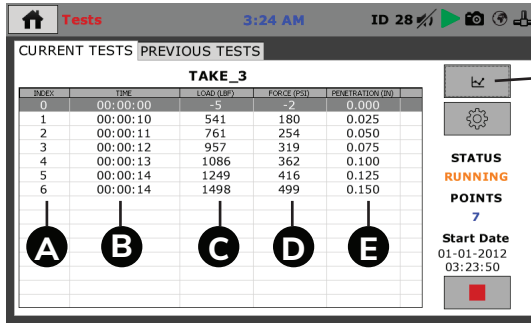


Figure 32: Data Tabulation

A. Index

Displayed here is an index of the recorded test points taken.

B. Time

This records the elapsed time from when the test was triggered to when the point was recorded.

C. Load

This measurement changes based on calibration units.

D. Force

This is load divided by sample area, the penetration plunger area being 3 square inches. If using test method BS (1377:4), the force column will not be visible.

E. Penetration

This is the displacement measurement, or the measurement penetration into the soils.

F. Graph View

Press this button to view a real-time graphical display of your data. An example is shown below.

8.2 Graph View

This is a graphical representation of the data.

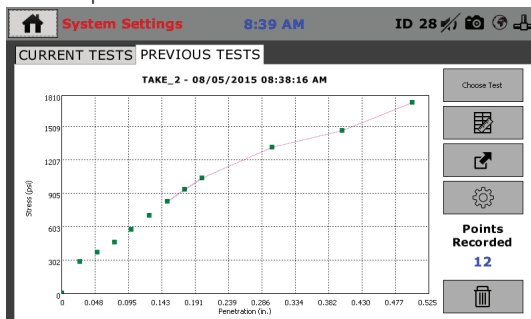


Figure 33: Graph View

9. Previous Tests

Once the test stops or is manually stopped, the screen will move to the “Previous Tests” screen. This screen can also be accessed by selecting the “Previous Tests” button.

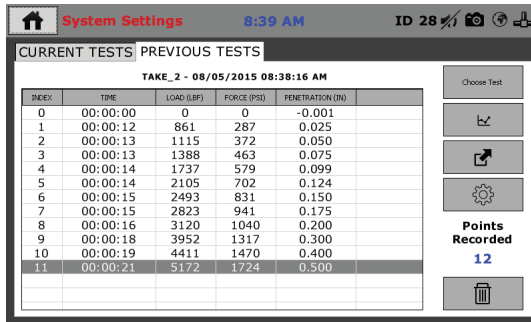


Figure 34: Previous Tests

9.1 Choose Test

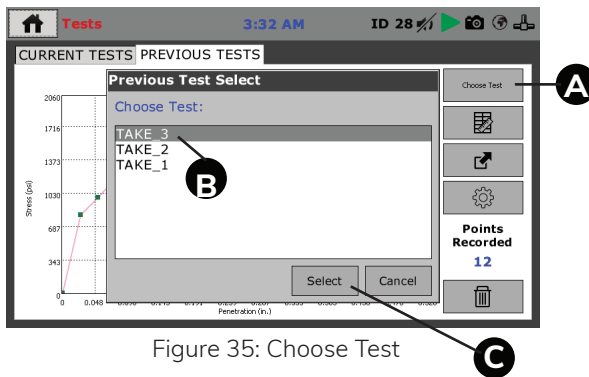


Figure 35: Choose Test

A. Choose Test

Press this button to access a list of previous tests.

B. Previous Tests

Choose a previous test by clicking one of the test names.

C. Select

Press “select” to view the test.

10. System Reset

A reset is available in case of a serious problem in system memory. This will clear all data in memory, including input calibration and configuration of all channels. A reset returns the machine to its original factory state. To proceed with this option and reset, hold the “Reset” button on the back of the machine at startup.

11. Software

Humboldt offers comprehensive CBR/LBR data reporting software. The software can be used to control the HM-5170A.3F, run tests, and collect data in real time. The software also offers detailed reports and interactive graphs. It can be used with the HMTS Next software but will require purchasing the HM-5001SW software module.

A pre-defined reporting software module and template are available for specific tests, such as CBR. This module provides more control over start and stop conditions for specific tests, as well as provides extended reporting capabilities. Contact Humboldt for more information.

12. HM Download Software

This software is designed to download tests that have been run directly on the HM-5170A.3F. It downloads and saves tests directly to a PC. Custom graphs and reports can be generated and exported into multiple formats.

13. Specifications

13.1 Applicable Standards

Covers: CBR Tests ASTM D1883, AASHTO T193, BS 1377:4, and LBR FM 5-515

13.2 Physical Specifications

Net Weight:	206 lbs. (94 kg)
Shipping Weight:	300 lbs. (136 kg)
Overall Height:	39"
Base Dimension (l x w x h):	17 x 22 x 51" (432 x 559 x 1295mm)
Platen Travel:	3 1/2" (88mm)
Load Capacity:	11000 lbs. (50 KN)
Vertical Clearance:	32" (812mm)
Horizontal Clearance:	11" (279mm)

13.3 Electrical/Electronic Specifications

Voltage:	110 /220 VAC 50/60 Hz
Current:	12 Amps
Analogue to Digital Converter:	12 Bit
200,000 samples per second	

Multi test storage up to 1000

Up to 2500 points per test

LAN Communication

The HM-5170A.3F is sold as a CBR-specific set and includes:

(1) HM-5170A.3FX CBR-Specific Load Frame (110 /220 VAC 50/60 HZ, 1 phase)

(1) HM-2300.100 Load Cell 10,000lbf (50kN)

(1) HM-2305.10 Strain Indicator, 1.000" x .001" (25.000mm x .001mm)

(1) H-4178 Penetration Piston with Stud

(1) HM-2305BRT Strain Indicator Bracket

13.4 Accessories

HM-5001SW CBR / LBR Reporting software

HM-000356 Wireless WiFi intelligent bridge

14. Support

Phone support is available for general operating questions and troubleshooting problems between 8am and 5 pm Eastern Time. Please call:

1.800.537.4183

1.919.832.6509 or fax: 1.708.456.0137

hmc@humboldtmfg.com

For sales and sales-related information, such as available accessories, general sales questions, and pricing, please call:

1.800.544.7220

1.708.456.6300 or fax: 1.708.456.0137

hmc@humboldtmfg.com

Warning

Use appropriate PPE while operating device. Keep body parts clear of moving surfaces when operating machine. Ensure all motion has stopped prior to adding or removing testing samples or support equipment.

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

Construction Materials

HUMBOLDT

www.humboldtmfg.com



HUMBOLDT CBR/LBR and Marshall/TSR Loader

HM-5170A.3F

The HM-5170A Loader has been specifically designed to handle CBR and LBR testing applications, but can also do Marshall and TSR testing for labs who are also involved in asphalt mix testing. Its heavy-duty design and precise stepper-motor control provide a stable platform for years of reliable service. From educational institutions and consulting firms to high-volume commercial labs and construction projects, the HM-5170A Loader can handle these applications with ease.

The HM-5170A is built around Humboldt's integral, 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.

In stand-alone mode, the HM-5170A load frame provides 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 transferred to a computer for use with Humboldt's Next Software for report generation.

This machine can also be controlled from a computer using Humboldt's NEXT software. This software provides robust machine control, data acquisition and report generation. Because the HM-5170A is connected to your network, your computer can be placed in the your lab, in the next room or at a different location. Adding the CBR/LBR-specific or Marshall-specific Software Modules allows you to better control your testing by guiding you through the specific process.

The HM-5170A is sold as a Load Frame ONLY, refer to the recommended accessories charts for items needed to perform CBR/LBR and Marshall and TSR testing.



Typical Marshall Testing Setup

Description	Qty	Part #
Load Frame (choose one)	1	HM-5120A.3F HM-5170A.3F
Load Cell, Pancake 11,000 lbf (50kN)	1	HM-2300.100CP
Strain Transducer 1" (25mm)	1	HM-2305.10
Transducer Bracket	1	HM-5000BR
Marshall head, 4"	1	H-1349
Marshall head, 6" (choose one)	1	H-1369
Marshall Software Module	1	HM-5005SW

Typical TSR Testing Setup

Description	Qty	Part #
Load Frame	1	HM-5120A.3F
Load Cell, Pancake 11,000 lbf (50kN)	1	HM-2300.100CP
Lottman head, 4"	1	H-1349
Lottman head, 6" (choose one)	1	H-1369

Specifications	
Load capacity	11000 lbf (50kN)
Speed Setting	2"/min. (50.8mm/min.) [HM-5170A only for CBR 0.05 in/min (1.27 mm/min)]
Data channels	2
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. 5.0amps

CBR/LBR Setup: HM-5150A.3F and HM-5170A.3F	
Description	Part #
(1) Pancake load cell, 11,000lbf (50kN)	HM-2300.100CP
Linear Potentiometer Transducer, 1" (25mm)	HM-2305.10
(1) Penetration piston with stud	H-4178
(1) Displacement transducer bracket	HM-5000BR
(1) NEXT CBR/LBR software module	HM-5001SW

HM-5170A Marshall and TSR Loader

Stand-alone Control

Humboldt's touch-screen controller provides you with full, graphical monitoring of all testing functions in a stand-alone application, while maintaining full computer control when desired.

The seven-inch, waterproof screen provides at-a-glance monitoring of testing functions, in a real-time graphical display, without the use of a computer, building upon Humboldt's dedication to modular, stand-alone data acquisition.

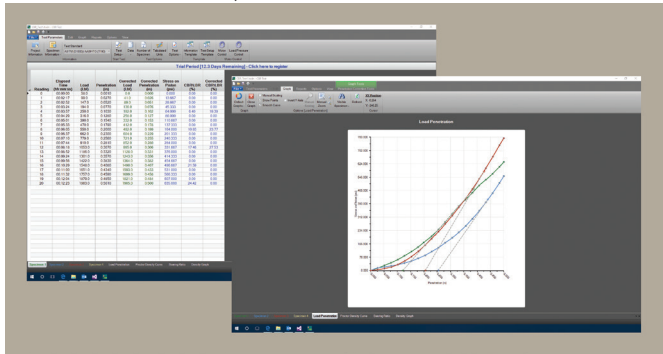
In a stand-alone application, you will be able to run tests and display results while viewing tabulation, basic x-y graphs and instrument readings in real-time during the test, using user-defined, basic data acquisition. Test data is stored in the device and can be downloaded to a USB drive via the machine's FRONT USB port or the data can be transferred to a computer via the LAN port.

A second USB port located on the back of the machine can also be used to power a wireless access point, which can provide a wireless hook-up with a computer, if no LAN is available.

Touch-Screen Controller provides:

- 2-channel data acquisition
- Hi-res, 7" waterproof, touch-screen provides total control and real-time graphical display of tests
- Machine /Test control and data acquisition via touch-screen
- Calibration of channels to load cells, transducers and other suitable instruments
- Real-time graphical chart and numerical display of tests via touch-screen display
- Effective sampling rate of 50 readings per second
- Stores up to 1000 tests with 3000 points per test
- 2 USB ports. One in front for data transfer and the rear port is for powering a wireless access point.
- Automatic determination of specimen failure and correction for stability and flow values.

CBR/LBR Module, HM-5001SW



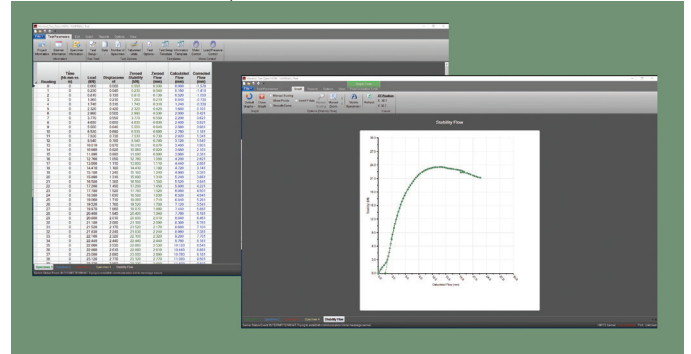
Computer Control

Humboldt's Next software is included with the HM-5170A load frame. This software provides robust machine control, data acquisition and report generation for those using a computer to control load frame operations.

Humboldt's NEXT software and the Marshall-specific module provide you with the following capabilities:

- Test-specific setup that guides you through the process, which includes selecting data collection parameters that best fit the specific test
- Input specific project information for each test, such as project name, client information, etc
- All test-specific initial, intermediate, and final parameters required by ASTM and BS standards are dynamically calculated for you, based on your input of specimen information, such as size, weight, etc
- Tabulated test data, graphs and all test-specific calculations are provided in real time, allowing you to monitor tests in process
- Generate test-specific reports that include all graphs and data presented in a project
- Create and store test-specific test setup templates for rapid setup of future tests
- Produce test-specific graphs, which allow you to draw construction lines to calculate angles and other test-specific parameters
- Automatically recover from a PC shutdown without loss of data
- All unit parameters can be adjusted individually
- Simultaneously run multiple tests on one computer, involving any of the available NEXT software modules and any compatible Humboldt equipment up to 255 device connections, which is up to 1020 inputs
- Access free, downloadable software upgrades for purchased modules

Marshall Module, HM-5005SW



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