product manual 11.18

HM-5040.3F

Grand Loader Load Frame

GEOTECHNICAL TEST EQUIPMENT

HUMBOLDT

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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 Load Frame 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.

Installation and Equipment Setup

Electrical Connections

The HM-5040 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-5040 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 that has 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.

Power Switch

The Power Switch is located on the left side of the back of the machine, above the electrical cord inlet. The Fuse Compartment is located between the electrical cord inlet and the Power Switch. The HM-5040 uses a 10 amp fuse. To begin operation, attach the supplied electrical cord, plug it in and press the Power Switch.

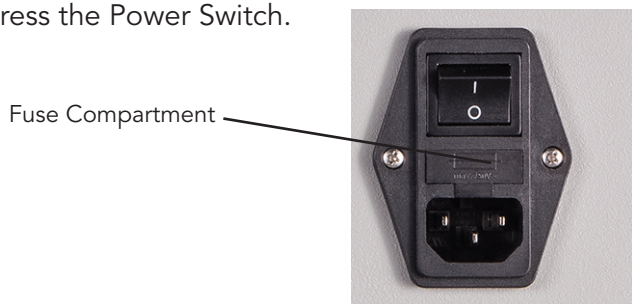
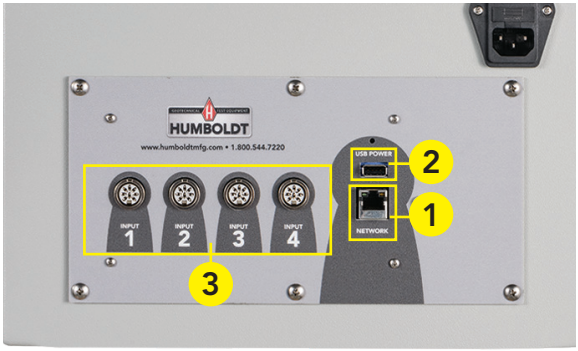


Fig. 1 Power Switch

Instrumentation Connections and Setup

HM-5040 Rear Instrumentation Panel



Above is a photo of the rear instrumentation panel of the HM-5040.

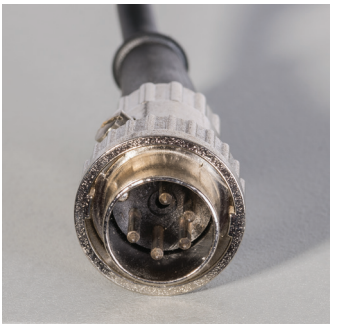
Network (1)
Ethernet input for connecting machine to a local area network (LAN) and/or the internet.

USB Power (2)
The USB Power port is used for powering a wireless access appliance for those who want to use a wireless LAN setup.

Instrument Inputs (3)
The panel features four (4) inputs for connecting instrumentation to the machine. Each input represents a separate channel. If you have purchased instrumentation from Humboldt with your HM-5040, it has been assigned to a specific channel and calibrated. Instrumentation will have a numbered tag attached to it and should be plugged into the corresponding input on the machine.

Below are photos of an instrumentation input and the instrumentation plug. Install the plugs into the inputs by lining up the guide at the bottom of the plug with the slot at the bottom of the input.

Instrumentation Input



Instrumentation Plug

Once you have installed the instrumentation into the correct inputs, your rear panel should look like this if you are using all four inputs.

If you purchased multiple load cells and/or transducers with your machine, they will either be mounted and calibrated, or in the case of more than four (4) load cells/transducers, calibrated and assigned to a specific input, but not mounted.

Additional load cells/transducers will be marked to indicate what input channel was used in their calibration. These load cells/transducers should be connected to the indicated channels when desired for use, however you will have to import the correct calibration information to that input before use. This information can be found on a USB thumbdrive that was

included with your machine. Refer to the Equipment Setup section of this manual, page 25 for additional information and instructions on how to accomplish this.

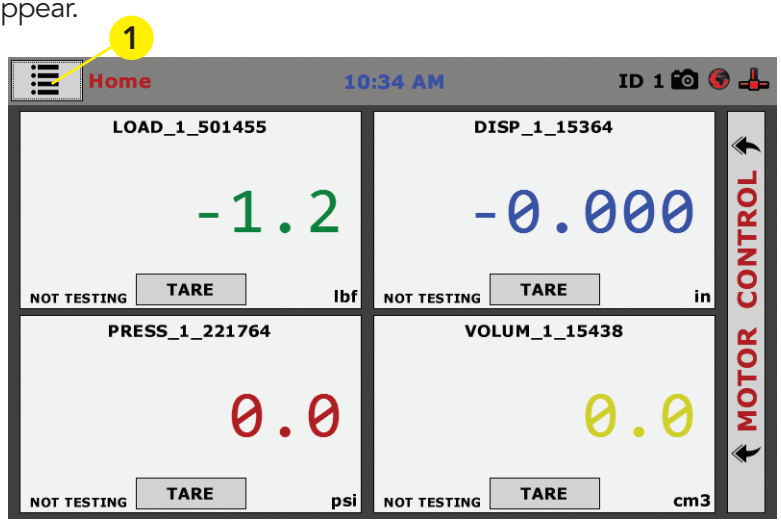
Third-party instrumentation, which is compatible, can also be used with the HM-5040. If you plan to use third-party load cells and/or transducers, please refer to the Equipment Set-up section of this manual, page 30 for instructions.

Initial Set Up

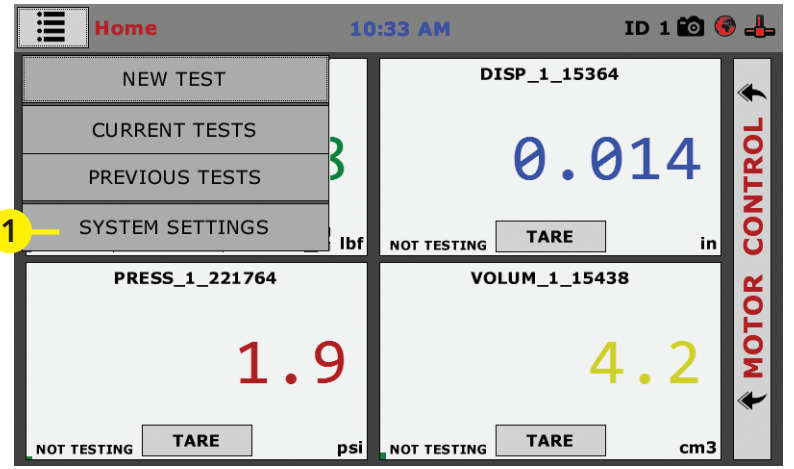
Remember, if you purchased Humboldt instrumentation with your HM-5040, it is already calibrated and assigned to a channel and will not need calibration, however you should confirm that the instrumentation has been set up and calibrated. If you are using 3rd-party instrumentation, go to the Equipment Setup section for calibration instructions.

DO NOT RECALIBRATE!

When your HM-5040 is first turned on, the screen below will appear.

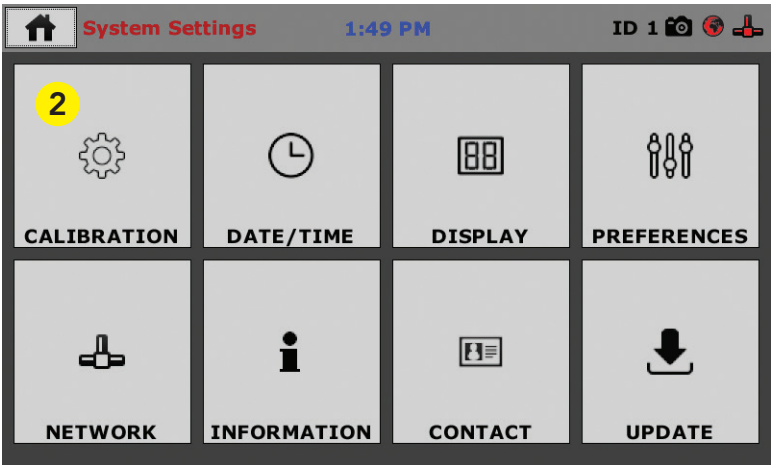


From this screen, to confirm your machine instrumentation has been calibrated, navigate to the Calibration section by clicking the Menu icon in the top left corner of the screen (1). When you click on this button, you will see a drop-down menu appear, see below.

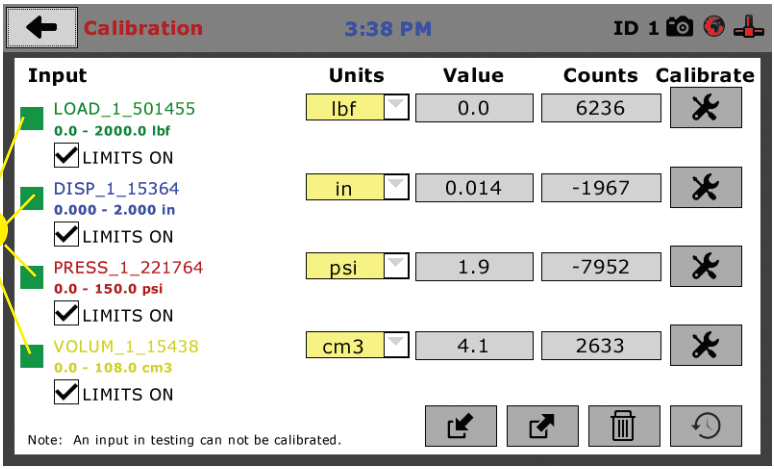


Navigate to the bottom of this drop-down menu and click on System Settings **(1)**. You will see the following screen.

Initial Set Up — Calibration



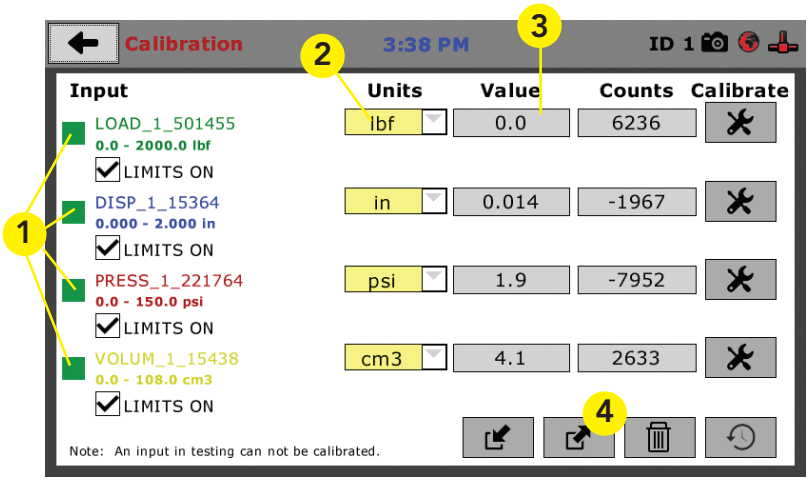
Click on the Calibration tab in the top left corner **(2)**. You will see the following screen.



Calibration Input Screen

The Calibration Input Screen (above) is used to monitor and calibrate instrumentation and assign them to specific channels of the HM-5040. The Calibration Input Screen provides a summary of the calibration status of each channel. At this time, verify the calibration information.

A green box at the left of a channel indicates that the channel has instrumentation assigned to it and that it is calibrated and ready for use **(1).**



Each channel has a “Limits On” check box. Use the Limits On to keep the machine from exceeding the sensor limits of the instrumentation. By selecting this option, before the test can exceed the limits of the sensors, all tests will stop

running and the motor will stop to avoid damaging connected instrumentation.

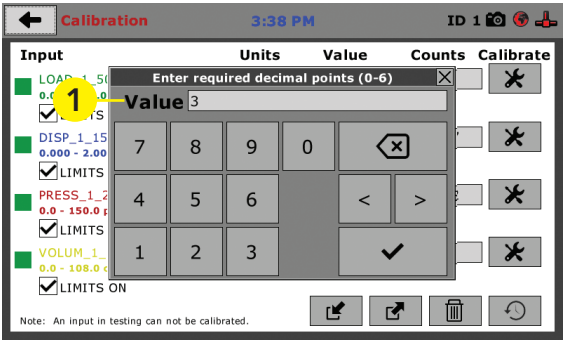
Note: An input cannot be calibrated during testing.

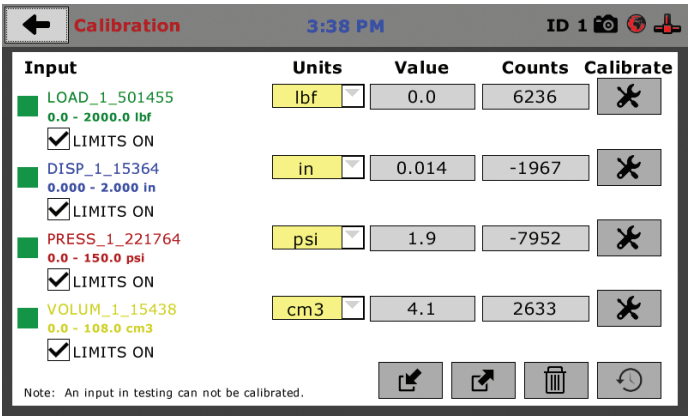
Units (2)

In this field, a calibrated instrument will display the units that were chosen for use at the time of calibration. This field can also be used to automatically toggle conversion of units between lb.-in. and SI units if the need arises.

Value (3)

This field displays the current calibration value. This value should already be set with 3 decimal point accuracy . If the instrument is not calibrated, the unit will read "N/A." To change the numbers of decimels shown, click on the field and the following window will appear. Fill in the number of decimal points desired **(1)**.



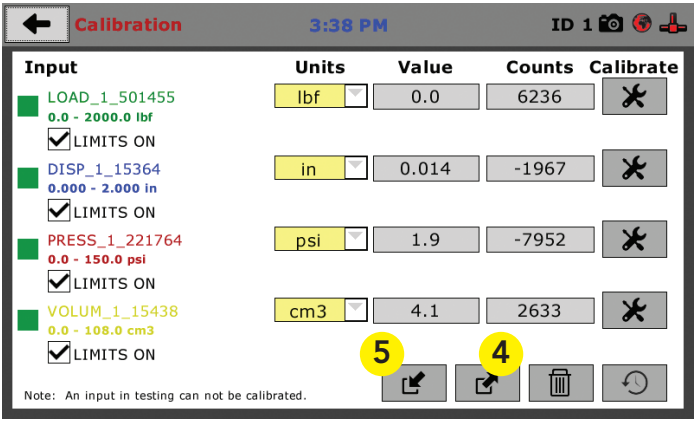


The screen above shows a typical calibration setup. In this example, the HM-5040 has been set up for a standard Consolidated Drained or Undrained Triaxial setup. Input One has been set up for the load cell with a value of 0.000

to 2000.000 lbf. Input Two has been set up for the LSCT with a value of 0.000 to 2.000 inches. Input three has been set up for the pore pressure reading with a value of 0.000 to 150.000 psi. And, Input 4 has been set up for Pressure/volume Controller with a value of 0.000 to 108.000cm^3.

Export Calibration via USB (4)
It is a good practice to export all your calibrations to a thumb drive. In case of a problem this practice allows you to recover your calibration data quickly.

On the screen below, press the Export Calibration button **(4)** to select calibrations to export via USB.

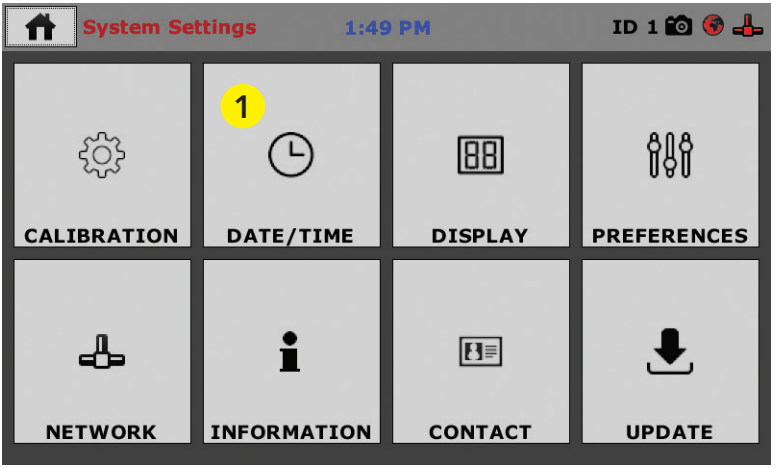


Also, if you purchased more than four instruments for multiple setups, you will find a USB thumbdrive packed with your HM-5040 Load Frame.

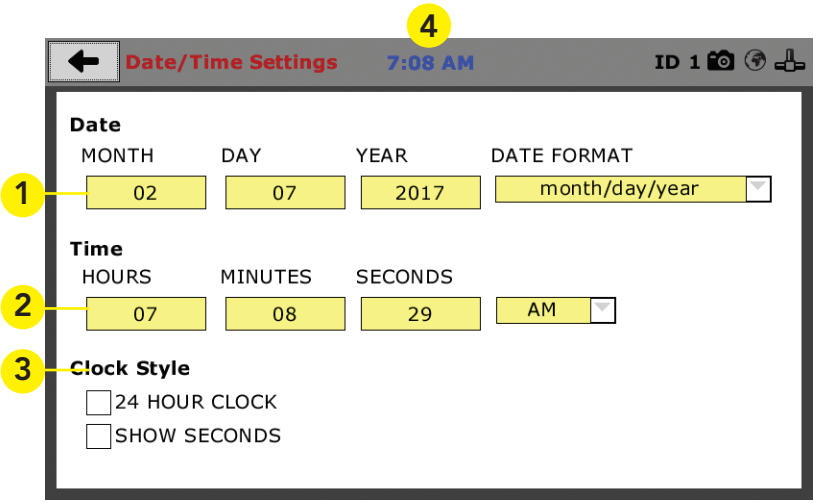
This thumbdrive will contain the calibration data for the extra instrumentation. To use this calibration information, it is recommended to first export all your HM-5040's calibration data to the thumbdrive and then download the additional calibration data you need for your additional test setups **(5)**.

Initial Set Up — Date and Time

To set up Date and Time settings, return to the System Settings screen and click on the Date/Time Panel. **(1)**



Click on the Date/Time tab **(1)**. You will see the following screen.



Date (1)
Set the month, day, year, and date display format.

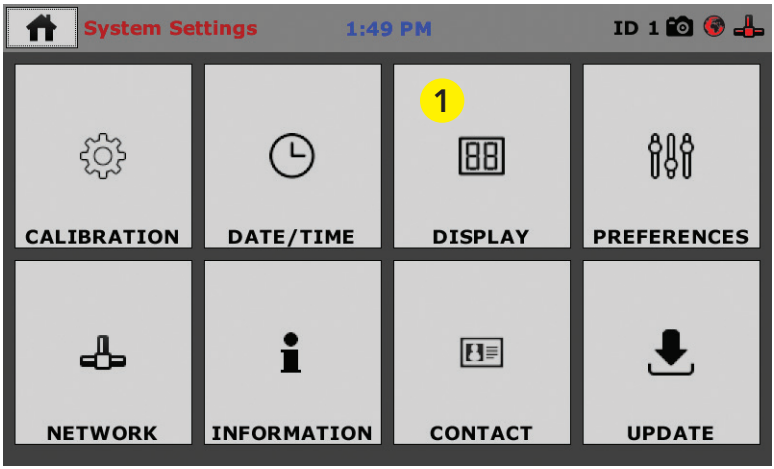
Time (2)
Set the hours, minutes, seconds, and am/pm.

Clock Style (3)
Select a clock view, either a 24-hour or 12-hour clock, as well as the option to show seconds or not.

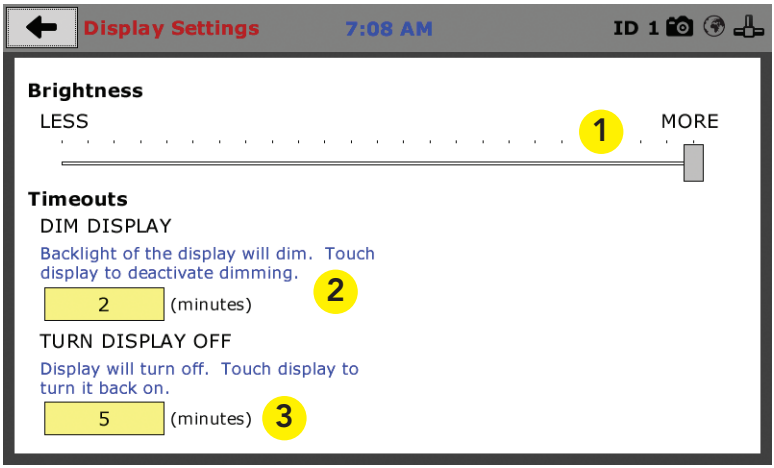
Clock (4)
The current time is displayed is located on every controller screen. Clicking on the time from any screen, you will be taken to the Date/Time Settings Screen.

Initial Set Up — Display

To set up Date and Time settings, return to the System Settings screen and click on the Date/Time Panel. **(1)**



Click on the Display tab **(1)**. You will see the following screen.



Brightness (1)

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

Dim Display (2)

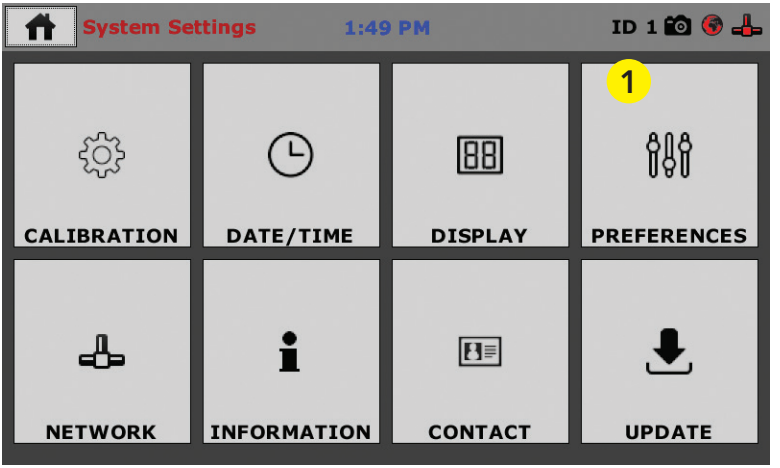
The backlight of the display will automatically dim to save power. Click the yellow box to change the number of minutes before the display goes dim. After the time has elapsed, touch the display to deactivate dimming.

Turn Display Off (3)

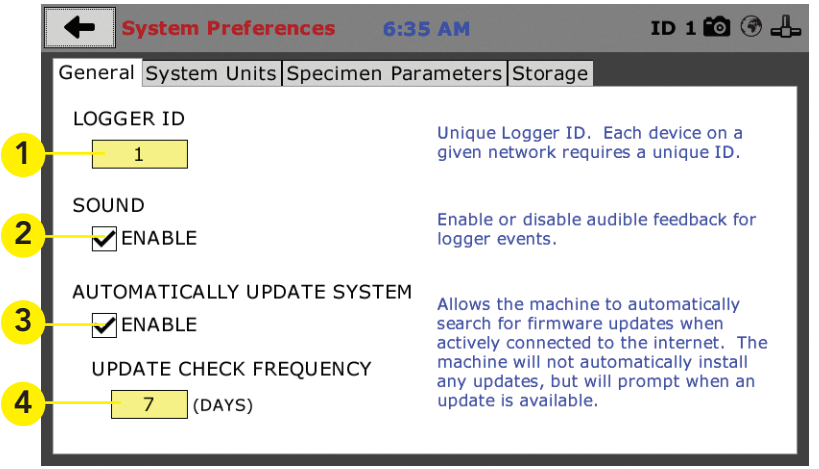
The display will automatically turn off to save power. Click the yellow box to change the number of minutes before the display powers off.

Initial Set Up — Preferences

This screen is accessed by clicking on the "Preferences" button. **(1)**



Click on the Preferences tab **(1)**. You will see the following screen.



Preferences – General Tab

The Preferences panel is comprised of four (4) tabs and defaults to the General tab, see above.

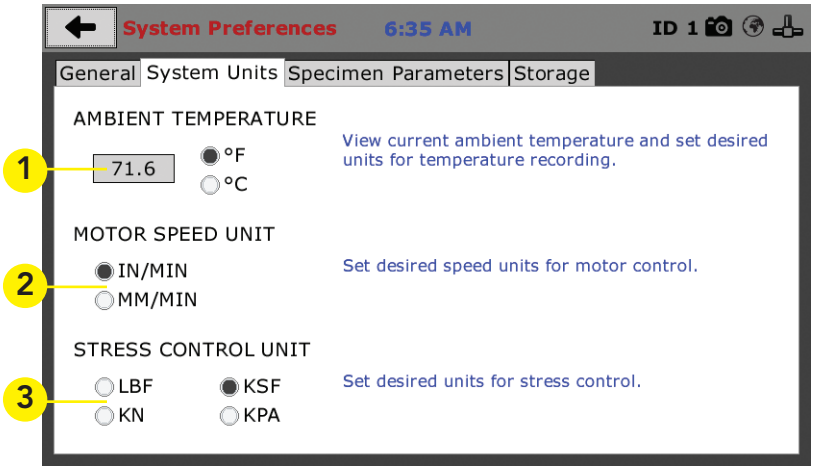
Logger ID (1)
Each machine that is connected to your network requires a unique Logger ID. These numbers can be assigned any number between 1-245. In most cases, if you are setting up a new machine it has been given the Logger ID 1. This would show in the Logger ID field. (1). If this number conflicts with another machine's Logger ID, one of the machines will have to be changed to another Logger ID.

Sound (2)
Checking this box enables or disables audio feedback for logger events.

Automatically Update System (3)
Checking this box allows the machine to automatically search for firmware updates when actively connected to the Internet. The machine will not automatically install updates; it will prompt when an update is available.

Update Check Frequency (4)
The number placed in this box represents the frequency (how many days) the machine checks for updates.

Preferences – System Units Tab
This screen is accessed by clicking on the "System Units" Tab under System Preferences.

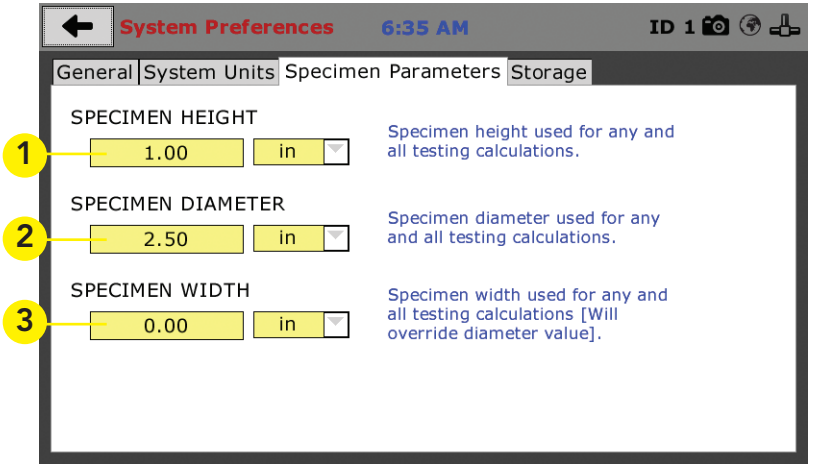


Ambient Temperature (1)
This field displays the current ambient temperature and allows you to select desired units (Fahrenheit or Celsius) for temperature recording.

Motor Speed Unit (2)
Click on the desired units you want to use for motor control (in/min or mm/min).

Stress Control Unit (3)
Click on the desired units you want to use for stress control (LBF, KN, KSF OR KPA).

Preferences – Specimen Parameters Tab
This screen is accessed by clicking on the Specimen Parameters Tab under System Preferences.

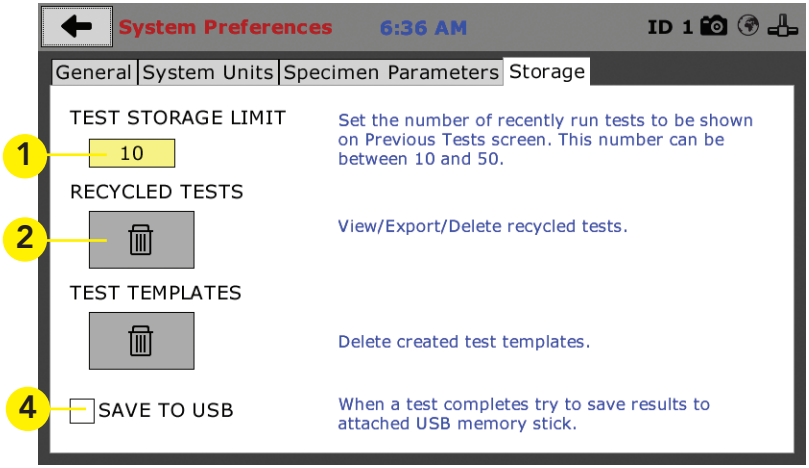


Specimen Height (1)
This field allows you to set the specimen height that will be used for all testing calculations.

Specimen Diameter (2)
This field allows you to set the specimen diameter that will be used for all testing calculations.

Specimen Width (3)
This field allows you to set the specimen width that will be used for all testing calculations.

Preferences – Storage Tab
This screen is accessed by clicking on the Storage Tab under System Preferences.



Test Storage Limit (1)
This field allows you to set the number of previously run tests to be available on the "Previous Tests" screen. This number can be between 10-50.

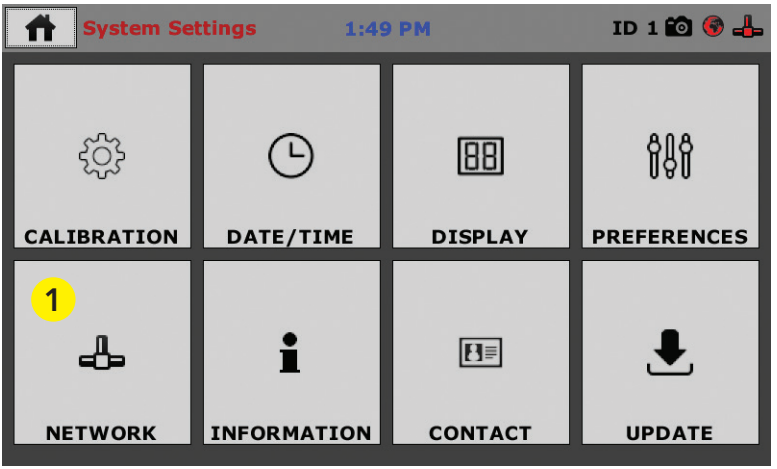
Recycled Tests (2)
This refers to previously run tests that are not displayed in the "Previous Tests" window. These tests are not deleted; they are recycled for later use. Select this button to view/export/delete recycled tests.

Test Templates (3)
Select this button to delete test templates that have been created, but are no longer desired.

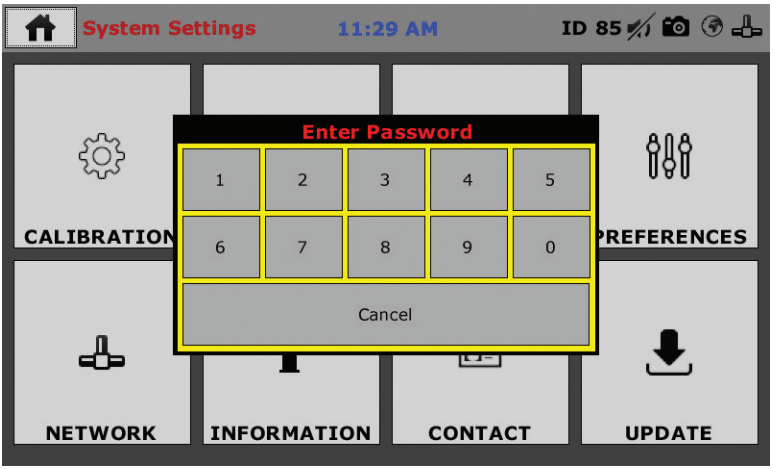
Save to USB Check Box
Checking this Box saves the results of a test to USB thumb drive inserted into the front USB slot on the machine. **(4)**

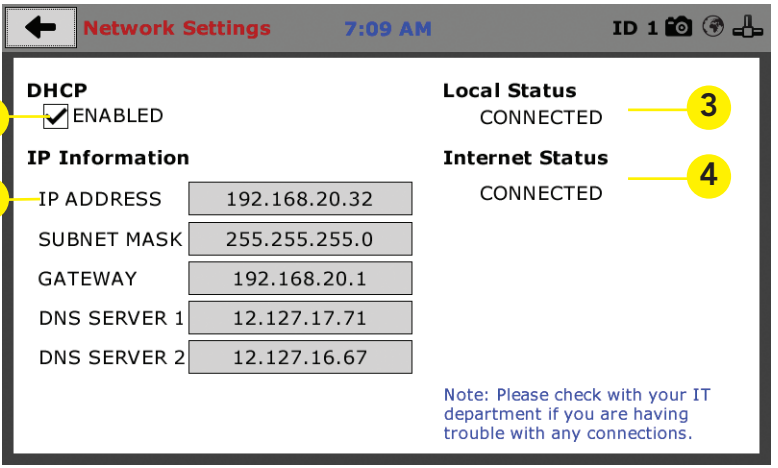
Initial Set Up — Network

To set up Network settings, return to the System Settings screen and click on the Network panel. **(1)**



A password is required to access the Network Settings. That password is: **27604**.





Network Settings Screen
The screen above is the Network Settings screen, it provides information on your IP information and network status.

DHCP (1)
Check this box to enable/disable the Dynamic Host Configuration Protocol (DHCP). If enabled, your machine will pick up IP information from your router. If disabled, you will need to manually enter the network information for a static IP, please consult your network administrator for this.

IP Information (2)
This information will be filled in automatically if the DHCP is checked, otherwise you will have to manually supply this information. The IP address must be unique for each machine.

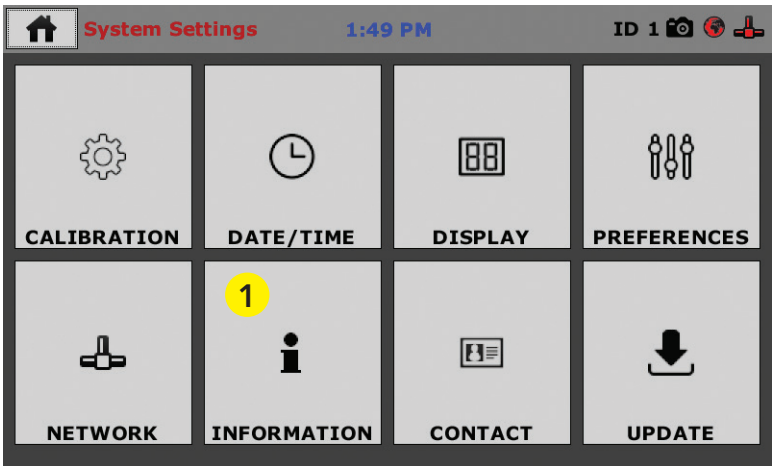
Local Status (3)
This indicates the status of the local network connection, Connected or Disconnected.

Internet Status (4)
This indicates the status of your Internet connection, Connected or Disconnected.

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

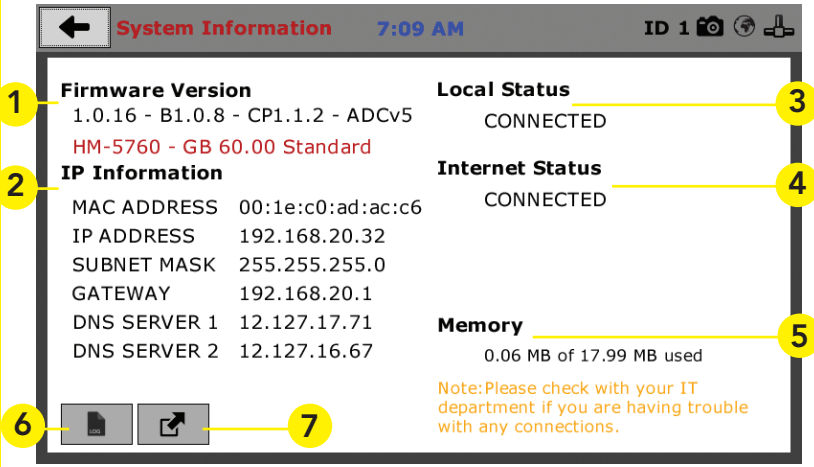
Initial Set Up — Information

Clicking on this panel provides a view of the current status of the machine. **(1)**



System Information

Below is a view of the System Information screen. It provides a current status of the machine.



Firmware Version (1)

The current version of the machine firmware is shown here. If you contact product support, you will need to supply this information.

IP Information (2)

This information will be filled in automatically if DHCP is checked, otherwise you will have to manually supply this information. The IP address must be unique for each machine.

Local Status (3)

This indicates the status of the local network connection, Connected or Disconnected.

Internet Status (4)

This indicates the status of your Internet connection, Connected or Disconnected.

Memory (5)

This indicates the current status of how much available memory is being used by the machine

Factory Screen (6)

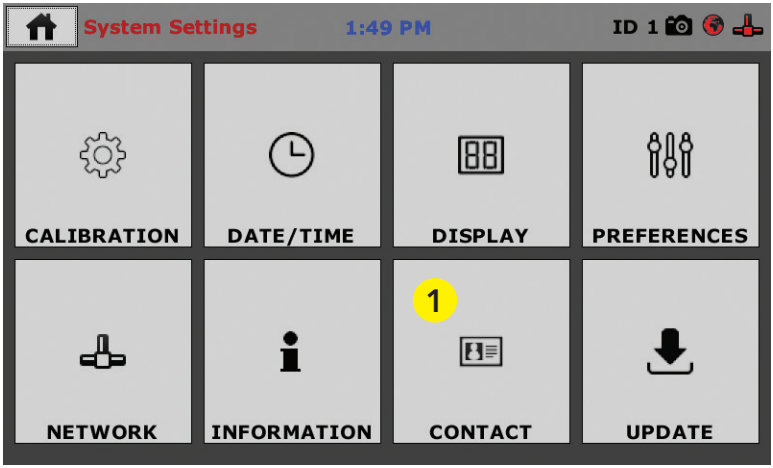
This is for Humboldt use only.

Export Log File (7)

This button exports a log file from the machine to a USB thumb drive. Be sure to insert a thumb drive before exporting the file or you will receive an error. This file can be helpful in trouble shooting by Humboldt Support.

Initial Set Up —Contact

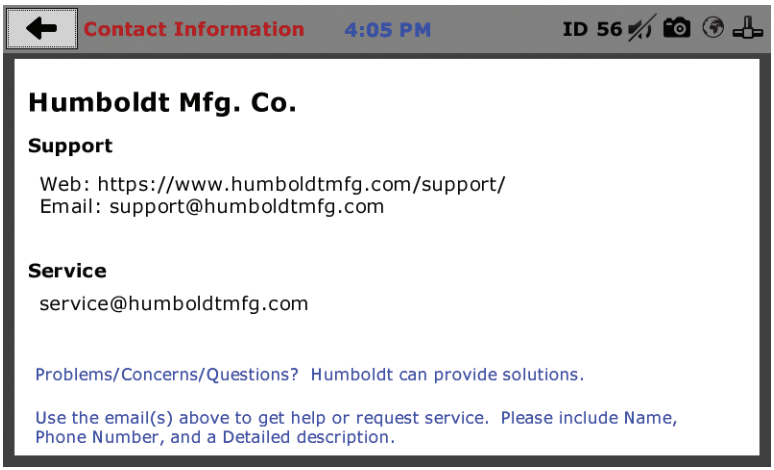
Clicking on this panel provides contact information for Humboldt Support and Service**(1)**



Contact Information

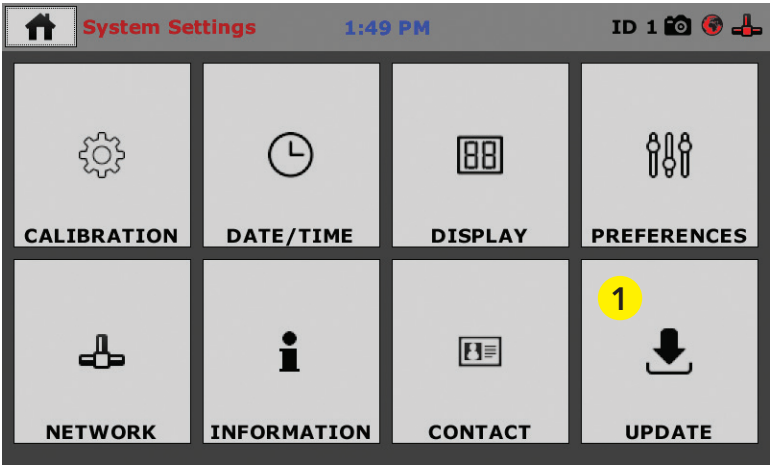
Below is a view of the Contact Information screen showing contact information for Humboldt Support and Service.

For quickest response go to this link on our website: https://www.humboldtmfg.com/support and fill in the support form. This will provide us with the necessary information to assist you and you will be added to the next position in the support cue.
You can also email Humboldt Support at support@humboldtmfg.com or Humboldt Service at service@humboldtmfg.com. Please include contact information and a detailed description of your reason for contact.

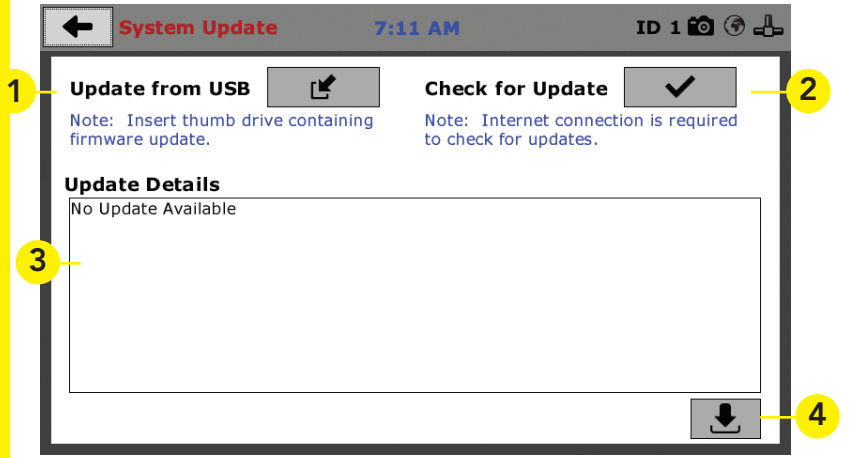


Initial Set Up — Update

Clicking on this panel provides information on checking for Updates, performing updates and an update history for the machine. **(1)**



Clicking on the Update Panel brings up the following screen.



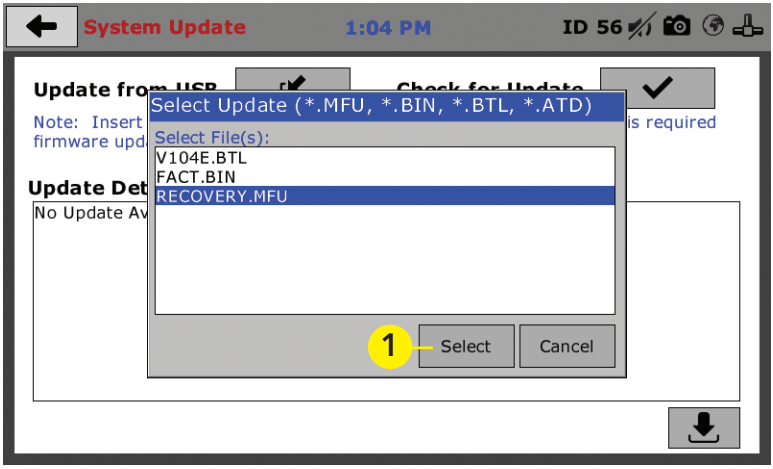
Update from USB (1)

If your HM-5040 is not connected to the internet, Software updates for your machine can be downloaded from the Humboldt website Support Area using a computer. To access the Software Update area, go to: https://www.humboldtmfg.com/support/software.php.

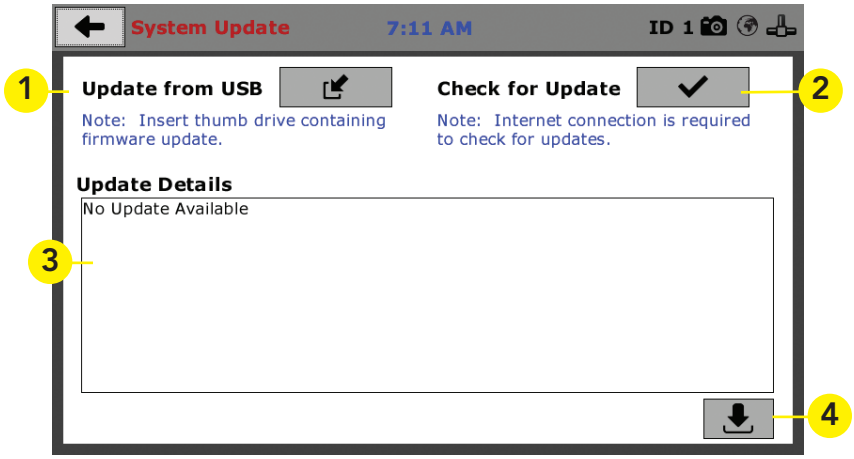
Once on this page, click on the Elite Series Firmware tab. You will see a list of Humboldt Elite Series machines. Click on

the HM-5040 Current Version link and the firmware update will begin to download to your computer. Once the download is complete. Load the file onto a USB thumb drive and insert the thumb drive into the USB port on the front of the HM-5040. With the USB thumb drive inserted into the USB port, click on Update from USB **(1)**.

A window will open and you will see a list of Updates. Select a file to use for your update and click the Select button.



The update process will begin. This may take several minutes. Your HM-5040 may reboot several times during the update, do not turn off or reset machine during this process.



Check for Update (2)

If your HM-5040 is connected to the internet, you can have the machine check automatically for updates, which can be found under System Settings – Preferences button. How often the machine checks for updates can be customized under Preferences. However, you may click on the Check for Update button **(2)** to force an immediate check for updates.

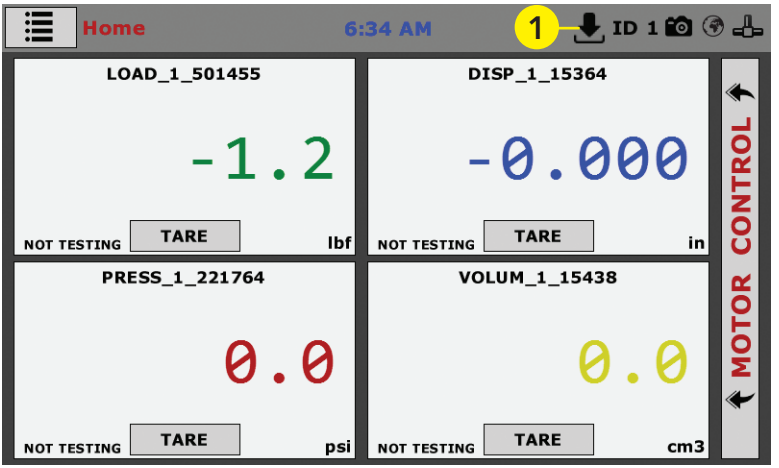
Update Details (3)

If you have chosen to have the HM-5040 check for updates automatically, this box will display a running list of updates currently available for your machine, but, which have not been installed.

Download Updates (4)

Clicking this button will download updates for your machine and automatically install them. To accomplish this, the machine must be connected to the internet. Machine will install, turn-off and restart. Wait until installation is complete and the window indicates: Ready for Testing.

You can tell that there is an update available by the appearance of the following icon in the window header **(1)**.



Operation from a Computer and NEXT Software

This manual covers the setup and operation of the HM-5040.3F Load Frame in Stand-alone Mode only. For information on operating your load frame with Humboldt's NEXT Software and a computer, please refer to the Humboldt NEXT software manual.

Equipment Setup

Installation and Equipment Setup

Electrical Connections

The HM-5040 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-5040 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 that has 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.

Power Switch

The Power Switch is located on the left side of the back of the machine, above the electrical cord inlet. The Fuse Compartment is located between the electrical cord inlet and the Power Switch. The HM-5040 uses a 10 amp fuse. To begin operation, attach the supplied electrical cord, plug it in and press the Power Switch.

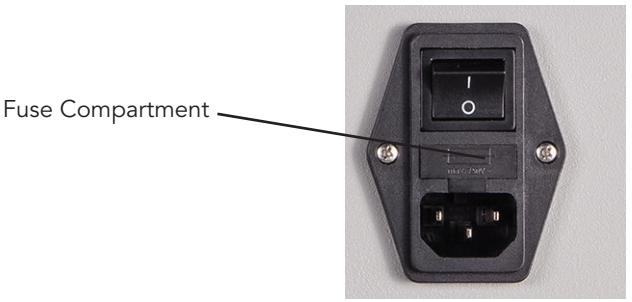
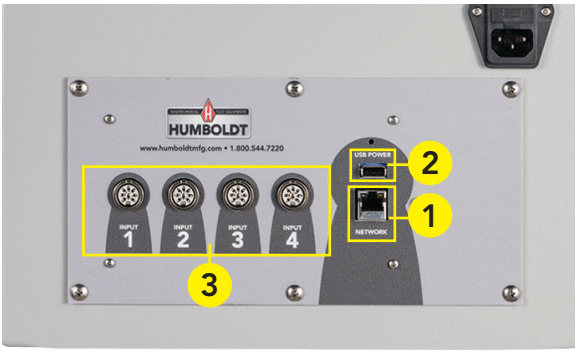


Fig. 1 Power Switch

Instrumentation Connections and Setup

HM-5040 Rear Instrumentation Panel



Above is a photo of the rear instrumentation panel of the HM-5040.

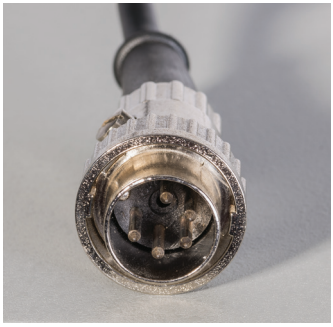
Network (1)
Ethernet input for connecting machine to a local area network (LAN) and/or the internet.

USB Power (2)
The USB Power port is used for powering a wireless access appliance for those who want to use a wireless LAN setup.

Instrument Inputs (3)
The panel features four (4) inputs for connecting instrumentation to the machine. Each input represents a separate channel. If you have purchased instrumentation from Humboldt with your HM-5040, it has been assigned to a specific channel and calibrated. Instrumentation will have a numbered tag attached to it and should be plugged into the corresponding input on the machine.

Below are photos of an instrumentation input and the instrumentation plug. Install the plugs into the inputs by lining up the guide at the bottom of the plug with the slot at the bottom of the input.
Below are photos of an instrumentation input and the instrumentation plug. Install the plugs into the inputs by lining up the guide at the bottom of the plug with the slot at the bottom of the input.

Instrumentation Input


Instrumentation Plug

Once you have installed the instrumentation into the correct inputs, your rear panel should look like this if you are using all four inputs.

If you purchased multiple load cells and/or transducers with your machine, they will either be mounted and calibrated, or in the case of more than four (4) load cells/transducers, calibrated and assigned to a specific input, but not mounted.

Additional load cells/transducers will be marked to indicate what input channel was used in their calibration. These load cells/transducers should be connected to the indicated channels when desired for use, however you will have to import the correct calibration information to that input for correct operation. Calibration information for additional instrumentation can be found on a USB thumbdrive that was shipped with your HM-5040.

For information on calibration, see Page 30 of this manual.

Instrumentation Setup

On the next page are examples of typical instrumentation setups for different tests the HM-5040 is capable of running. When you receive your unit, if you purchased instrumentation from Humboldt, your instrumentation will be attached to the machine for shipping. Please use the photographs on the following page as a guide for setting up the instrumentation for testing.

Typical Setups (setups shown on HM-5030 frame)

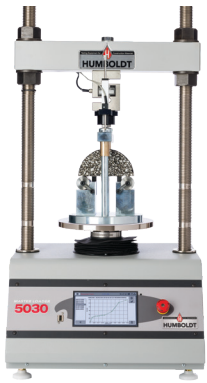
CBR/LBR

Unconfined Compression

Consolidated Drained and Undrained

Unconsolidated Undrained

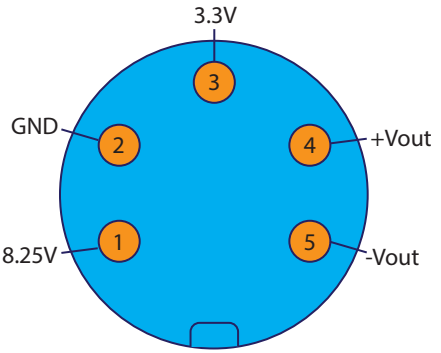
Marshall



Semi-Circular Bending

Third-Party Instrumentation

Third-party load cells/transducers, which are compatible, can also be used with the HM-5040. Compatible units must work with an excitation voltage of 8.25 volts and produce an output of 0-5 volts. Prior to use, all third-party instrumentation must be configured and calibrated. If you are using third-party cables for load cells/transducers connections, make sure they are wired to be compatible with the HM-5040, see illustration below. Plugs to connect third-party instrumentation to the Humboldt HM-5040 are available; order part HS-000474.



Calibration of Instrumentation

All instrumentation included with your HM-5040 has been calibrated and assigned to specific channels for use. These channels are marked on the corresponding instrumentation and the correct calibration information will appear in the channel calibration parameters, once you have installed the instrumentation to the correct inputs.

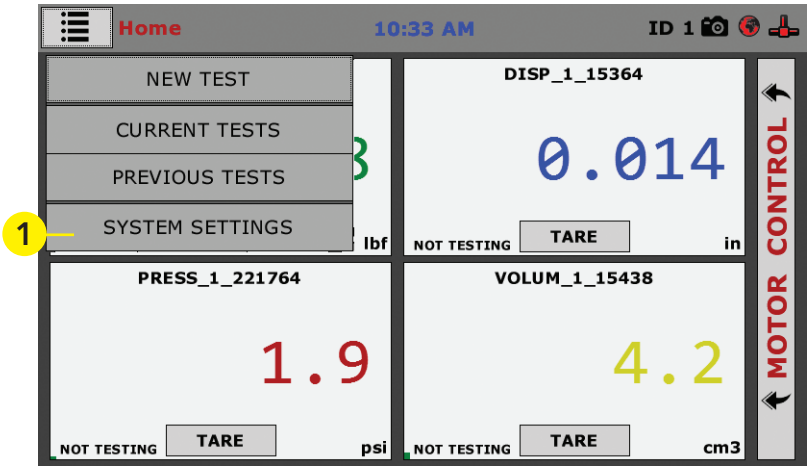
DO NOT RECALIBRATE!

How to Perform a Calibration

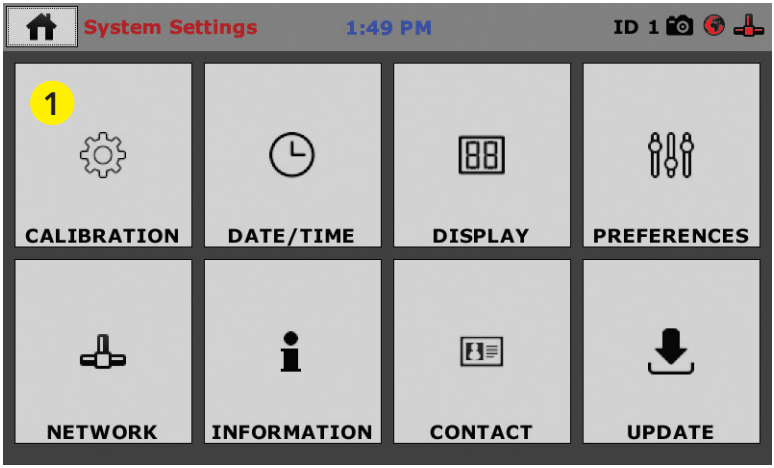
All instrumentation included with this unit has been calibrated and assigned to specific channels for use. Humboldt recommends and standard lab practice dictates that your HM-5040 should be calibrated periodically. For most, this period is usually a year, though other rules may apply to the frequency of calibration.

To perform a calibration, it will be necessary to either hire a calibration service to come in to calibrate your machine or have the necessary calibration equipment to perform this service.

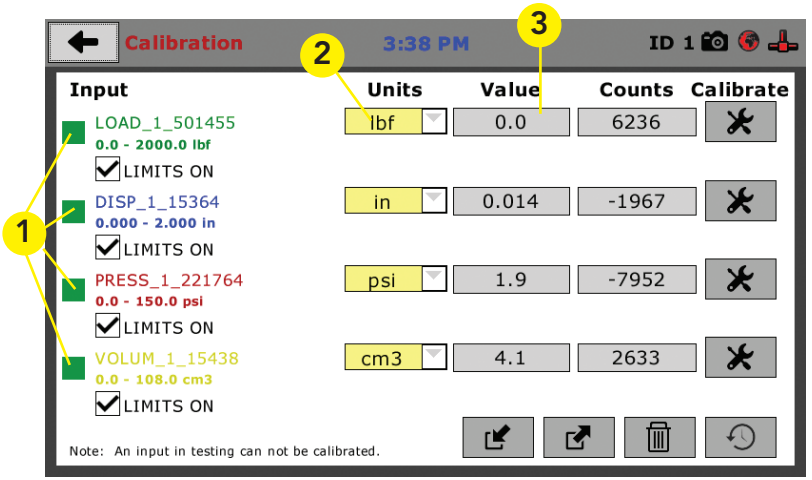
To begin a calibration, navigate to the Calibration section by clicking the Menu icon in the top left corner of the screen (1). When you click on this button, you will see a drop-down menu appear, see below.



Navigate to the bottom of this drop-down menu and click on System Settings **(1)**. You will see the following screen.



Click on the Calibration tab in the top left corner **(1)**. You will see the following screen.



Calibration Input Screen

The Calibration Input Screen (above) is used to monitor and calibrate instrumentation and assign them to specific channels of the HM-5040. The Calibration Input Screen provides a summary of the calibration status of each channel. At this time, verify the calibration information.

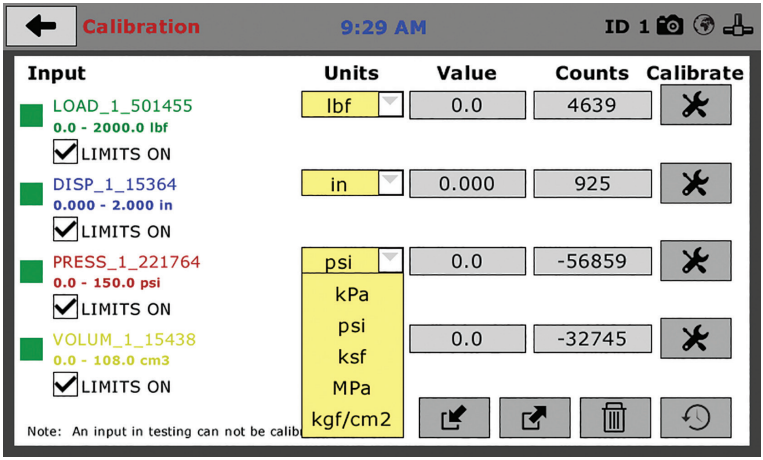
A green box at the left of a channel indicates that the channel has instrumentation assigned to it and that it is calibrated and ready for use **(1).**

Each channel has a "Limits On" check box (1). Use the Limits On to keep the machine from exceeding the sensor limits of the instrumentation. By selecting this option, before the test can exceed the limits of the sensors, all tests will stop running and the motor will stop to avoid damaging connected instrumentation.

Note: An input cannot be calibrated during testing.

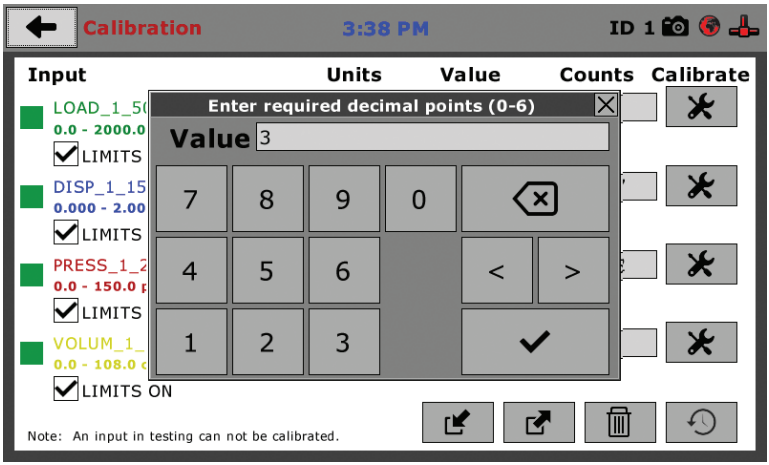
Units (2)

In this field, a calibrated instrument will display the units that were chosen for use at the time of calibration. This field can also be used to automatically toggle conversion of units between lb.-in. and SI units if the need arises. To view choices for types of Units, click on the Units field and the Unit choices will be displayed, see on next page.



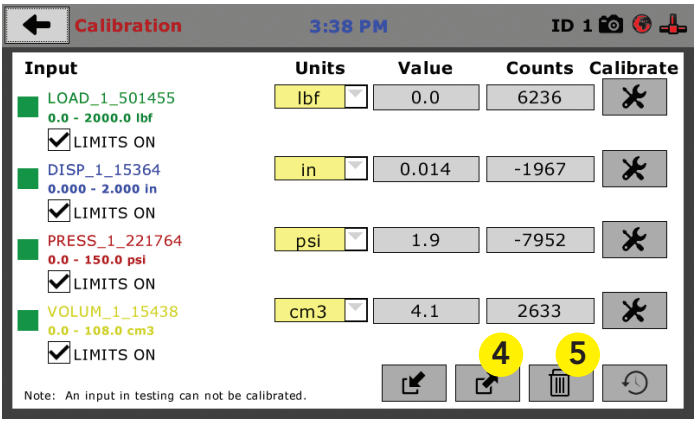
Value (3)

This field displays the current calibration value. This value should already be set with 3 decimal point accuracy . If the instrument is not calibrated, the unit will read "N/A". Clicking on this field will bring up a window where you can enter the required decimal points required for the value.



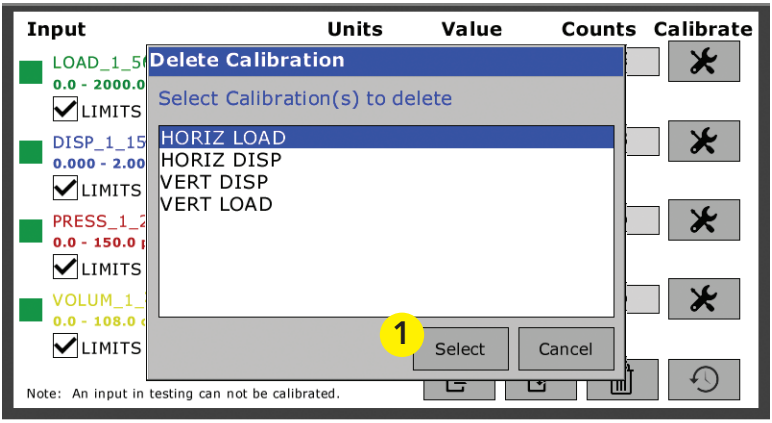
Performing a New Calibration

The first step in calibrating instrumentation to an input is to remove any calibration that is already being used for that input. To do this, Press the Export Calibration Button **(4)** (see next page) to select calibrations to export via USB. It is a good practice to export all your calibrations to a thumb drive. In case of a problem this practice allows you to recover your calibration data quickly.



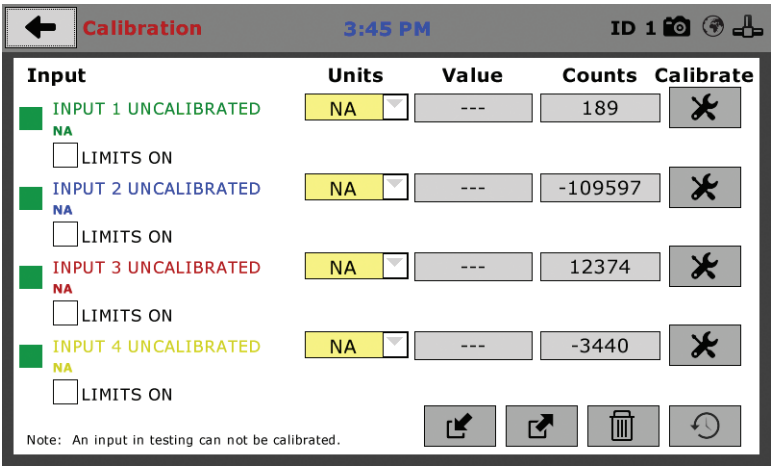
Once your calibrations have been saved, you will see a pop up screen that says: Calibration Export Successful.

To begin to remove existing calibrations, click on the trash can icon **(5)** to begin to erase the Input calibrations you wish to recalibrate. When you press the trash can icon, this screen will appear.



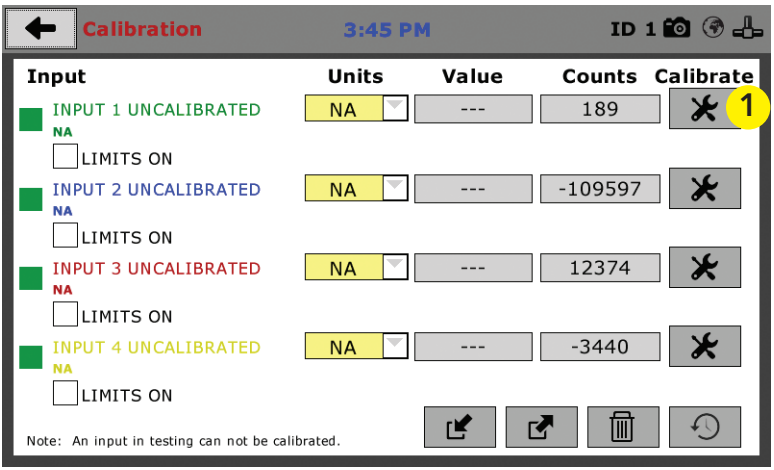
On this screen select an Input calibration to delete, one at a time, and then press the Select button **(1)**. The calibration will be deleted. You can do this for all Inputs you wish to calibrate.

Once all Input calibrations have been cleared, your Calibration window should look like the one below with no Inputs calibrated.

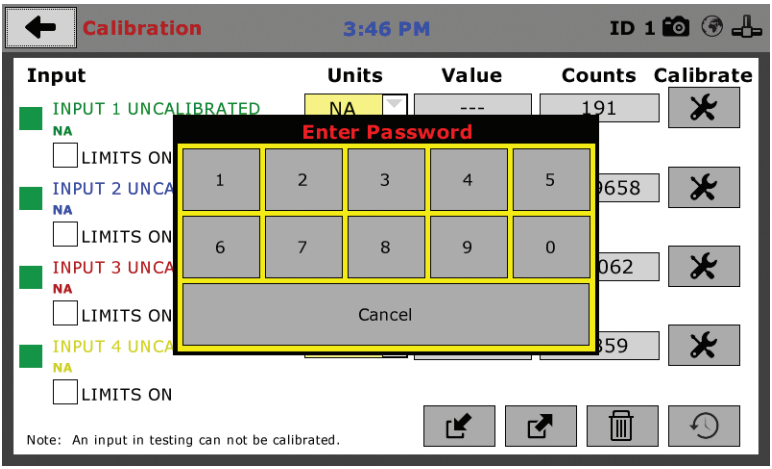


Calibrating your instrumentation to the appropriate Input requires a separate device, which can provide precise and specific loads or displacement, and, which has been certified to be accurate. The calibration process involves plugging the instrumentation into the HM-5040 while placing the instrumentation into the certified calibration device, which provides a specific set load or displacement.

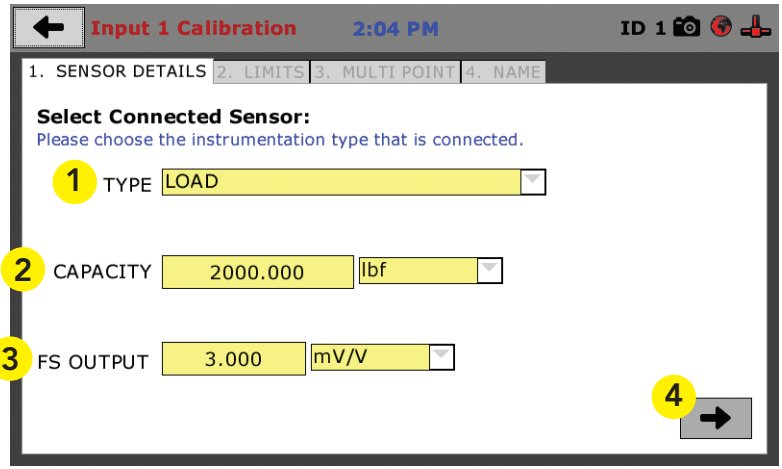
Once this has been done, click the Calibrate button next to the appropriate Input **(1)**.



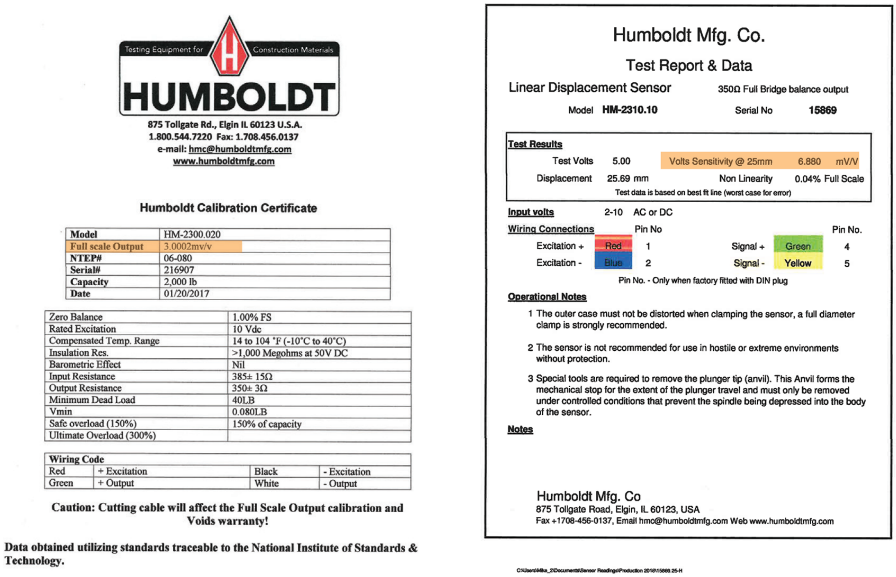
A pop-up window will appear requiring you to enter the password, which is **22234**.



Upon filling in the password, you will see this screen, Tab 1 Sensor Details of the Calibration settings.



On Tab 1, the Sensor Type **(1)** will default to Load. For Capacity **(2)**, fill in the maximum capacity of the sensor and choose either lbf or kN. For FS output **(3)**, refer to the calibration sheet, which came with the instrument your are using and enter it here and then choose mV/V. The next page shows typical calibration sheets with the FS Output information highlighted in orange.



HUMBOLDT

875 Tollgate Rd., Elgin IL 60123 U.S.A.
1.800.544.7220 Fax: 1.708.456.0137
e-mail: hmc@humboldtmfg.com
www.humboldtmfg.com

Humboldt Calibration Certificate

Model	HM-2300.020
Full scale Output	3.0002mV/V
NTEP#	06-080
Serial#	216907
Capacity	2,000 lb
Date	01/20/2017

Zero Balance	1.00% FS
Rated Excitation	10 Vdc
Compensated Temp. Range	14 to 104 °F (-10°C to 40°C)
Insulation Res.	>1,000 Megohms at 50V DC
Barometric Effect	Nil
Input Resistance	385± 15Ω
Output Resistance	350± 3Ω
Minimum Dead Load	40LB
Vmin	0.080LB
Safe overload (150%)	150% of capacity
Ultimate Overload (300%)	

Wiring Code			
Red	+ Excitation	Black	- Excitation
Green	+ Output	White	- Output

Caution: Cutting cable will affect the Full Scale Output calibration and Voids warranty!

Data obtained utilizing standards traceable to the National Institute of Standards & Technology.

Humboldt Mfg. Co.

Test Report & Data

Linear Displacement Sensor — 350Ω Full Bridge balance output

Model **HM-2310.10** — Serial No **15869**

Test Results

Test Volts	5.00	Volts Sensitivity @ 25mm	6.880 mV/V
Displacement	25.69 mm	Non Linearity	0.04% Full Scale

Test data is based on best fit line (worst case for error)

Input volts 2-10 AC or DC

Wiring Connections

		Pin No			Pin No.
Excitation +	Red	1	Signal +	Green	4
Excitation -	Blue	2	Signal -	Yellow	5

Pin No. - Only when factory fitted with DIN plug

Operational Notes

1 The outer case must not be distorted when clamping the sensor, a full diameter clamp is strongly recommended.

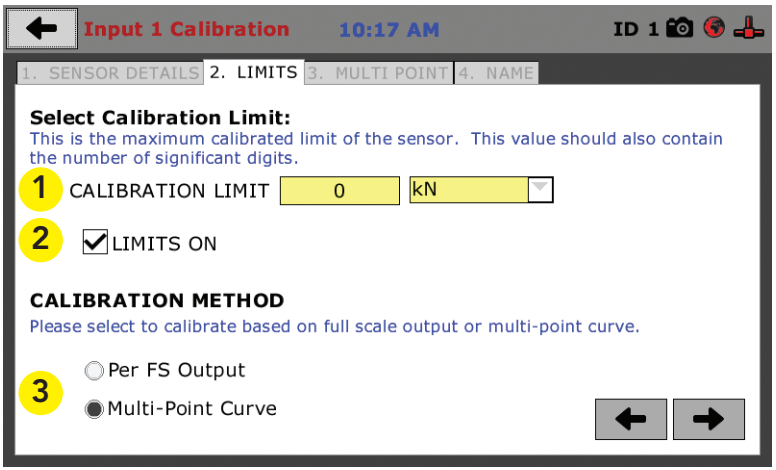
2 The sensor is not recommended for use in hostile or extreme environments without protection.

3 Special tools are required to remove the plunger tip (anvil). This Anvil forms the mechanical stop for the extent of the plunger travel and must only be removed under controlled conditions that prevent the spindle being depressed into the body of the sensor.

Notes

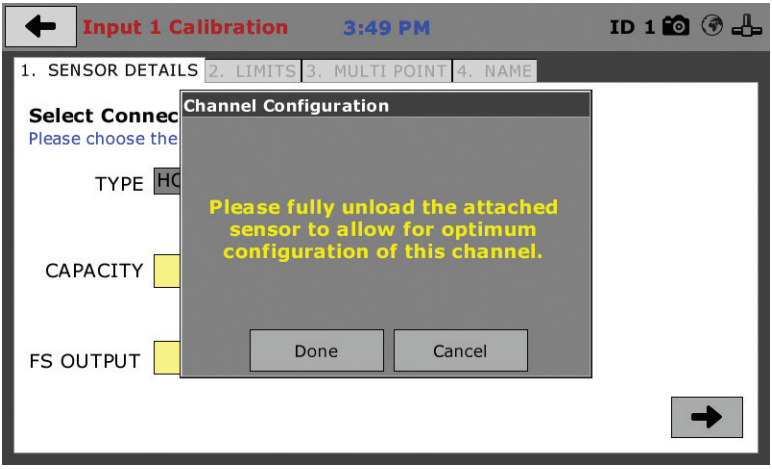
Humboldt Mfg. Co
875 Tollgate Road, Elgin, IL 60123, USA
Fax +1708-456-0137, Email hmc@humboldtmfg.com Web www.humboldtmfg.com

Once this is complete, click on the Right Arrow **(4)**, in the bottom right-hand corner of the screen to save these settings. You will be taken to Tab 2, Limits.

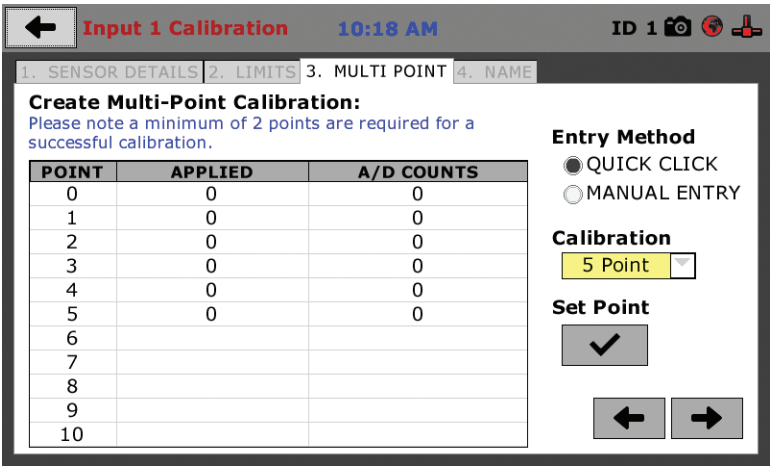


On Tab 2, in the Calibration Limit field **(1)**, enter the maximum calibrated limit of the sensor. This value should contain the number of decimal points you require for degree of accuracy, up to 5 points. Limits On **(2)**, should be checked if you don't want the machine to apply a load greater than the Calibration Limit **(1)**. Calibration Method **(3)** determines whether this calibration will be based only on the maximum load capacity of the sensor or upon a multi-point curve of up to a maximum of 10 points.

If you choose Per FS Output (not a recommended calibration method) it will base your calibration on the maximum load capacity of the sensor vs. zero load capacity of the sensor. If you choose this method and click on the Right Arrow in the bottom right-hand corner of the screen. You will be prompted to remove any load on the sensor and click on Done **(4)** when you have done so.

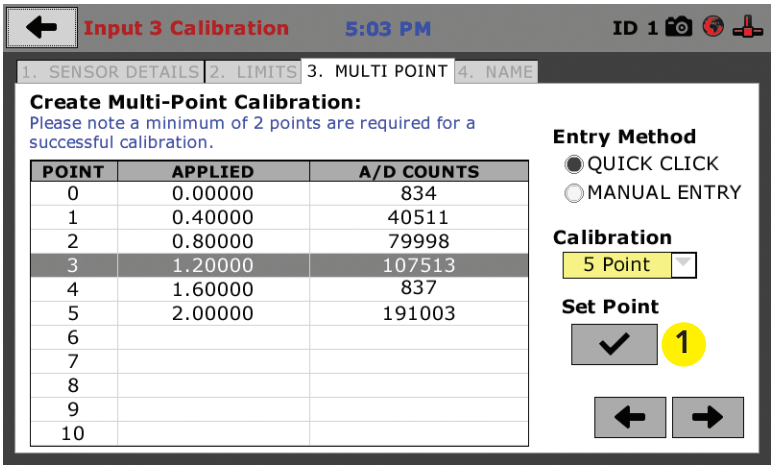


If you choose Multi-Point (Recommended calibration method) Curve and click on the Right Arrow in the bottom right-hand corner of the screen, you will be taken to Tab 3.



On Tab 3 you will be able to set the number of points you want to use for your calibration. You can choose 1-point, 5-point, 10-point or Custom, which allows you to use any number of points up to a total of 10. In the example on the previous screen shot above, a 5-point calibration has been chosen.

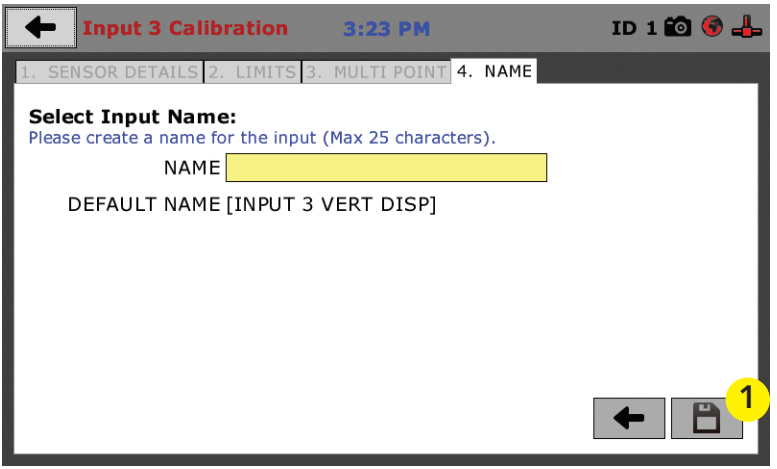
With your instrumentation sensor placed in a calibration frame and the sensor plugged into the an Input on the HM-5040. You will set the "0" point at 0 with no load applied to the sensor. The "5" point will be set with the maximum load capacity of the sensor applied. Points "1" through "4" are usually determined by spacing them out evenly between the no load reading and the maximum load reading. As an example, if you have a sensor with a 1,000 lb maximum force capability, you would set the "0" point at "0" and the "5" point at 1,000. Points "1" through "4" would typically be set at: "1" 200; "2" 400; "3" 600; "4" 800 and "5" 1000. Or, divide the maximum load number by the number of points, in this case 5, which works out to 200 point increments between points. See below.



Each point would be chosen by clicking on the corresponding point row above. The load would be applied to the sensor and an A/D Counts reading would appear. To set the point, click on the Set Point button **(1)**. This would be repeated until all points have been set. In the example above, Point 3 is being calibrated and is ready to have the Set Point button **(1)** clicked. Point 4 still needs to be calibrated.

Once all Points have been calibrated, click on the Right Arrow in the bottom right-hand corner of the screen. You will be taken to Tab 4.

On Tab 4, you will be asked to name the calibrated Input.

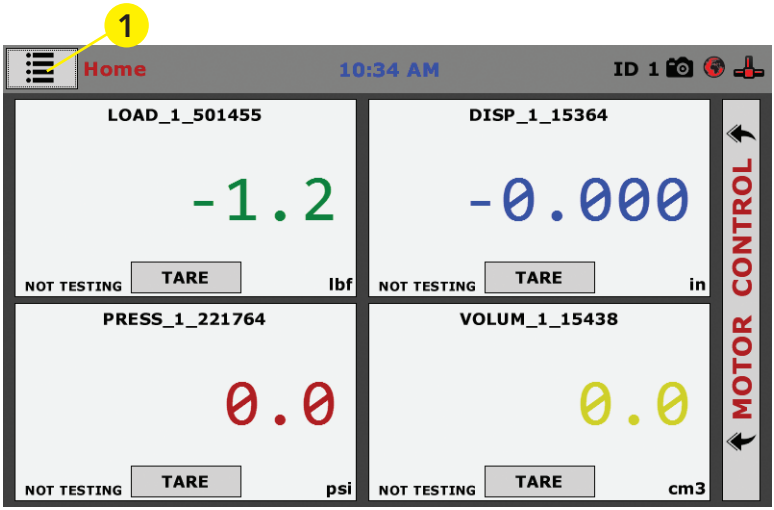


The screen will provide a default name, but you can name the Input anything you'd like. Once you've named the Input, click on the disk icon in the lower, right-hand corner **(1)**. This will save it. Use this method for calibrating any additional Inputs necessary.

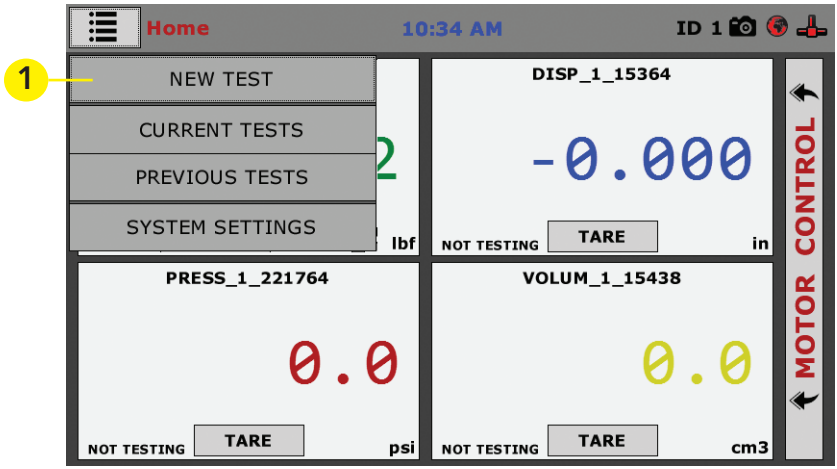
Test Setup

Test Setup

To begin a new test, Click on the Menu icon in the top left corner of the screen **(1)**.

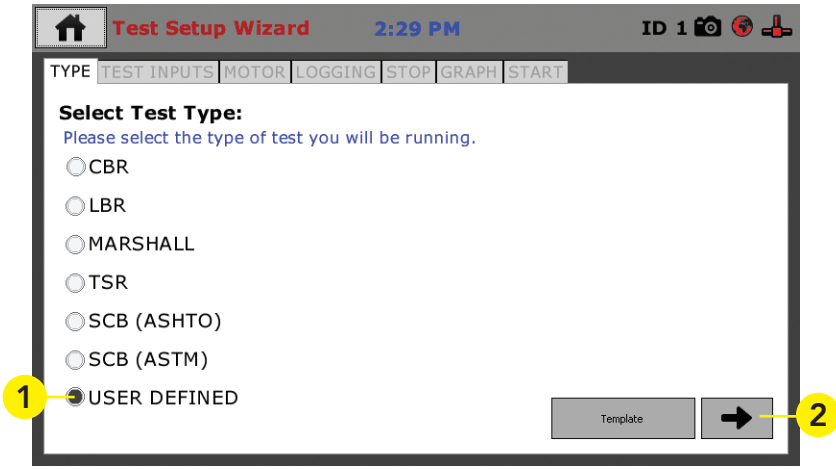


When you click on this button, you will see a drop-down menu appear, see below. Click on NEW TEST (1).



Test Setup Wizard – Select Test Type

Clicking on NEW TEST **(1)** above brings up the Test Setup Wizard (see next page). On the first screen of the Wizard, you can select the type of test you want to perform — CBR; LBR; MARSHALL; TSR; SCB (ASHTO), SCB (ASTM) and USER DEFINED.



Select USER DEFINED **(1)** for all triaxial tests, such as Unconfined Compression, Consolidated Drained and Undrained and Unconsolidated Undrained, as well as any custom tests you would like to set up.

In our example here, we will be setting up a triaxial test, so we would choose USER DEFINED.

Test Setup Wizard – Template

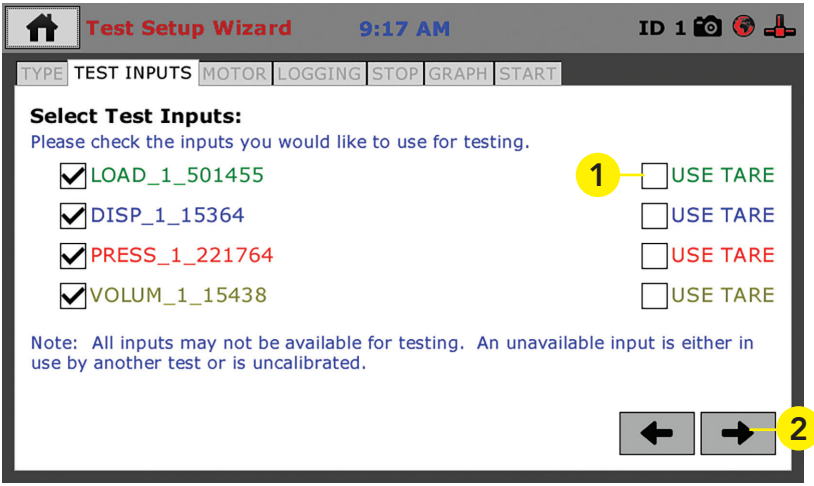
If you are just beginning to use your new machine, there will be no templates, which have been saved, so at this point, clicking on the template button will provide no templates to choose from.

To create templates, you essentially save a completed test as a template. Once you have completed some tests and save them as templates, they will then show up when you press the template button. This will allow you to quickly repeat tests with the same parameters, as well as a fast way to create new tests by choosing a template and then changing some of the parameters.

Test Setup Wizard – Select Test Inputs

Once you have chosen the type of test you'd like to run, for our example we have chosen USER DEFINED, click on the Right Arrow button **(2)** in the bottom right-hand corner. You will see the screen on the following page.

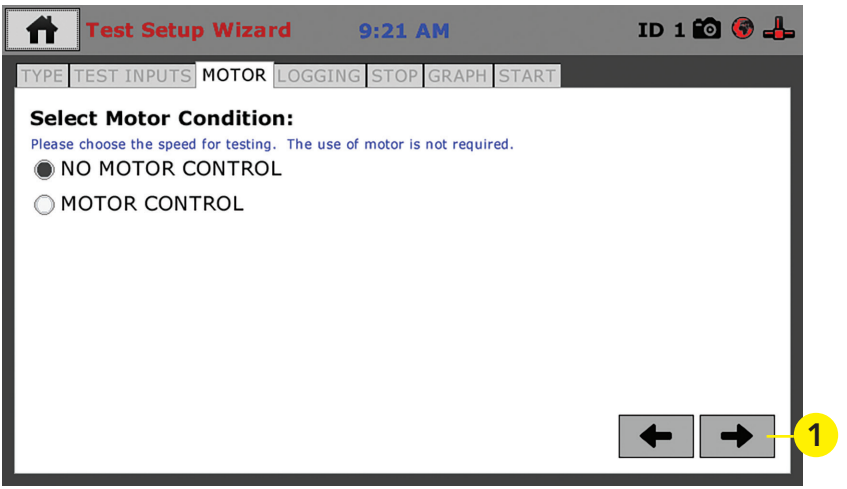
Note: All inputs may not be available for testing. An unavailable input is either all ready in use by another test or the input is uncalibrated.



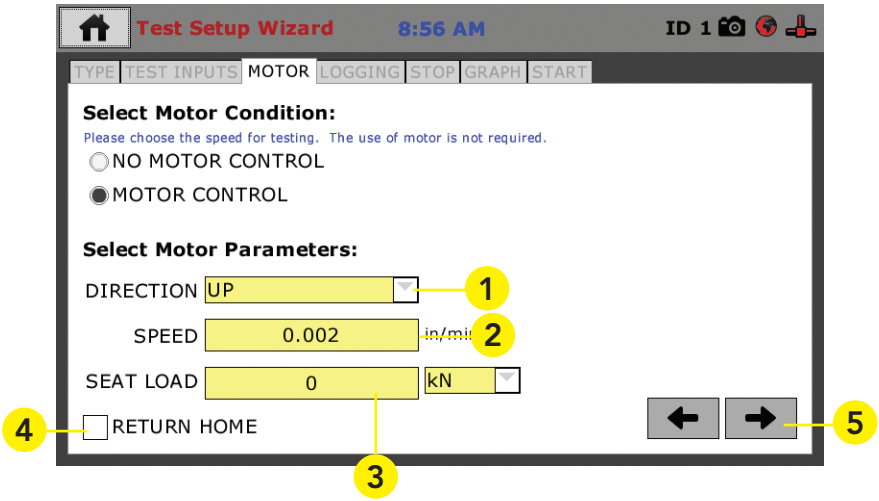
As seen in the screen above, choose the test inputs required for the test you want to run. If an input has not been calibrated or if it is in use by another test, you will not be able to choose that input. If you want the test to begin from a tared value (0), check the box next to USE TARE **(1)**.

Test Setup Wizard – Select Motor Condition

Once you have chosen the test inputs you want to use, click on the Right Arrow button **(2)** in the bottom right-hand corner. You will see the following screen.

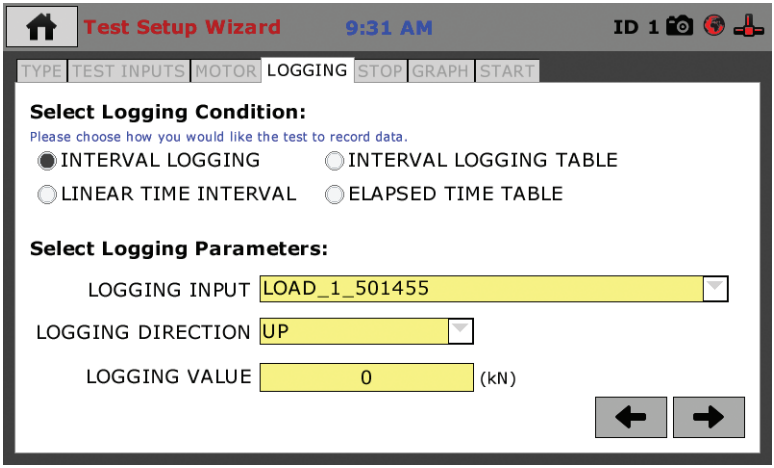


Choose NO MOTOR CONTROL OR MOTOR CONTROL based on the test parameters you are using. If your test requires no sample compression, choose NO MOTOR CONTROL, and click on the right Arrow **(1)** in the lower right-hand corner of the screen to continue.



If your test requires motor control, as in our example here, choose MOTOR CONTROL. When you select MOTOR CONTROL, the screen will change to show the Select Motor Parameters, see above. For DIRECTION, use the field drop-down menu **(1)** to select up or down. In our example we have chosen the direction as Up and we have set the SPEED **(2)** to 0.002 in/min., which would be determined previously in the consolidation stage of the test. In this test example there is no SEAT LOAD **(3)**, unlike a CBR test, which would require one.

Use the Return Home **(4)** check box in the lower left-hand corner if you would like the motor to return to its starting position after the test is complete. If not, the motor will remain where it is when the test is complete. Once you have chosen your test inputs, click on the Right Arrow button **(5)** in the bottom right-hand corner. You will see the following screen.

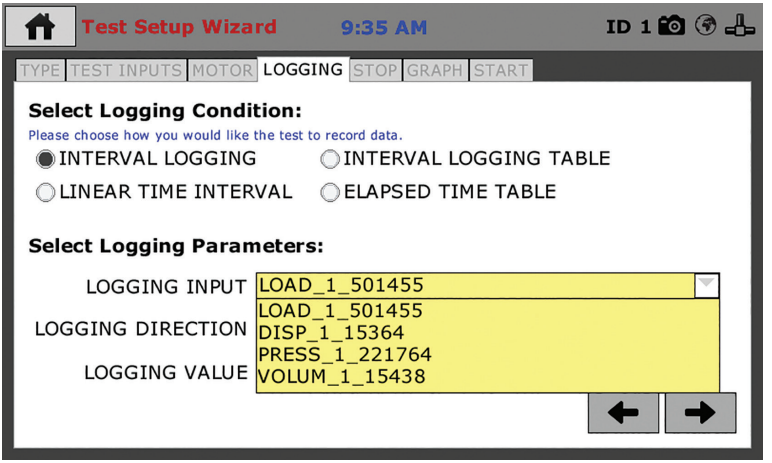


Test Setup Wizard – Logging Condition

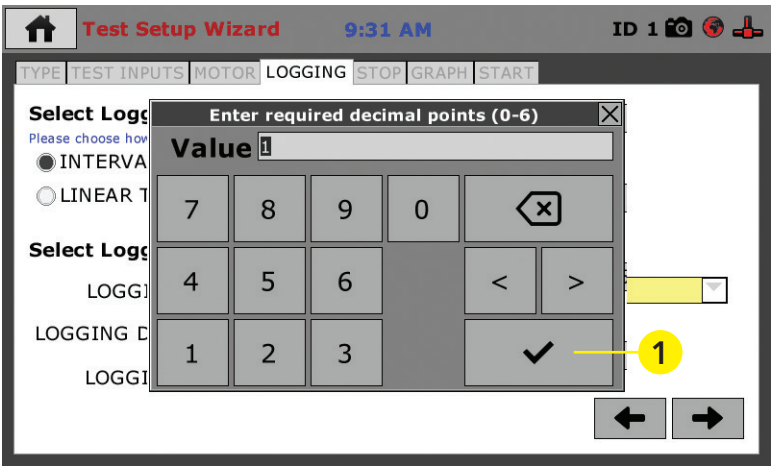
This screen allows you to choose the Logging Condition you wish to use for your test. The available options are "Interval Logging," "Interval Logging Table," "Linear Time Interval," and "Elapsed Time Table." You will choose **ONE** of these conditions:

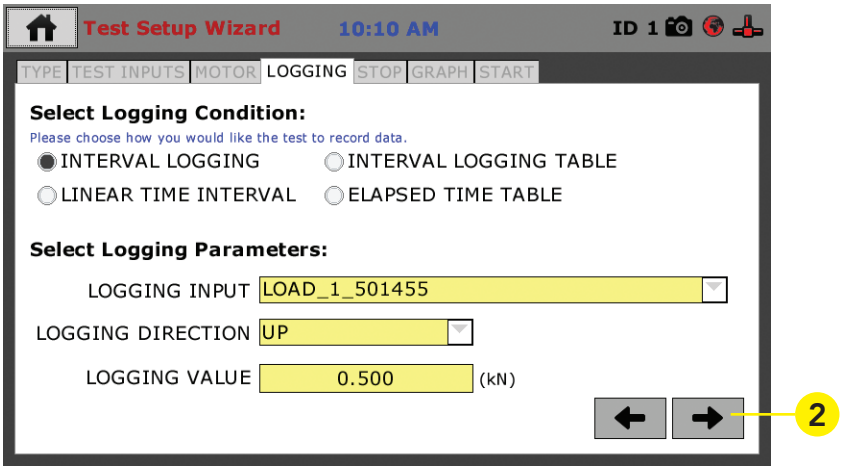
Interval Logging

With INTERVAL LOGGING, selected, click on the LOGGING INPUT field to individually choose each Input in the Pop-up Field and set the desired LOGGING DIRECTION AND LOGGING VALUE for each Input.



To set the LOGGING VALUE, click on the yellow field to the right of LOGGING VALUE and fill in a value from the pop up window that appears, see below. Once you have entered a value, Click the Check Mark **(1)** in the lower right-hand corner to save the value.

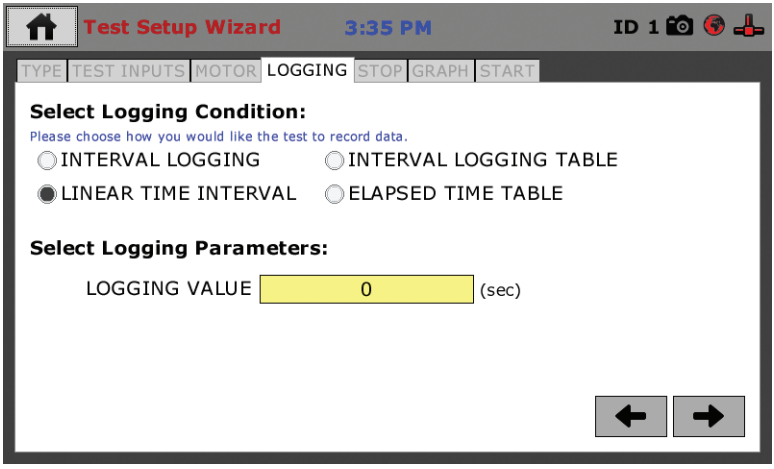




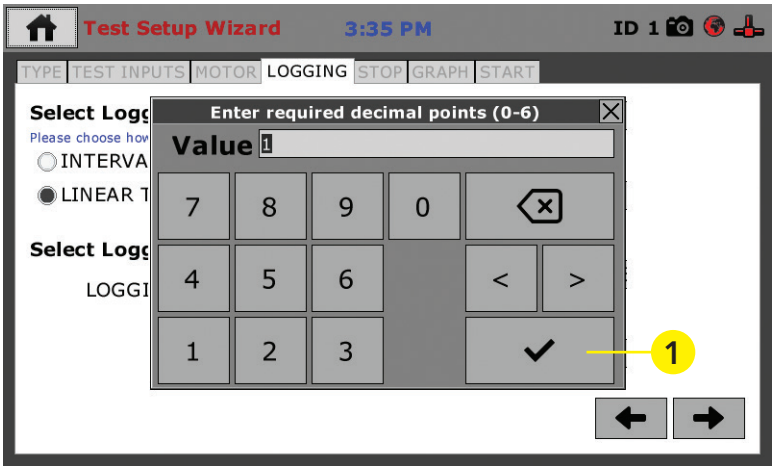
The screen will now look like this. Click the Arrow **(2)** in the lower, right-hand corner of the window to continue the Test Setup process.

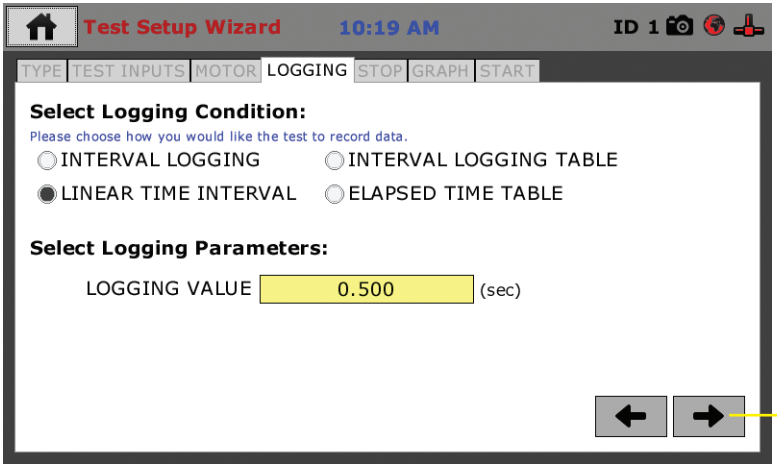
Linear Time Interval

With LINEAR TIME INTERVAL, selected, click on the LOGGING VALUE field to choose an interval of time in seconds, which you want the machine to log data.



To set the LOGGING VALUE, click on the yellow field to the right of LOGGING VALUE and fill in a value from the pop up window that appears, see below. Once you have entered a value, Click the Check Mark **(1)** in the lower right-hand corner to save the value.

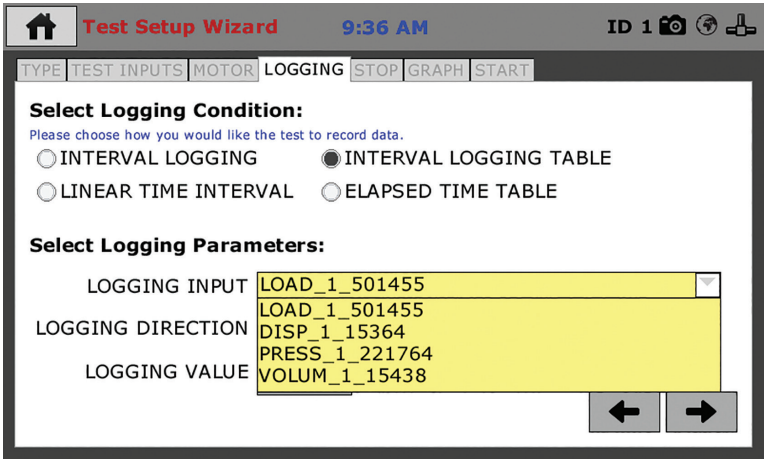




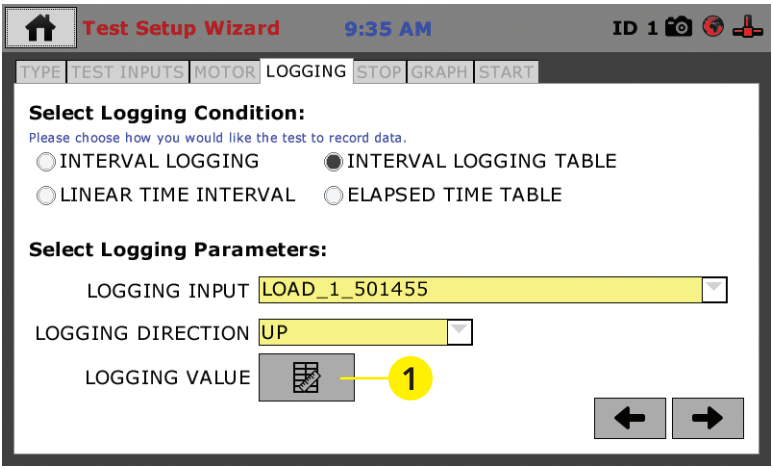
The screen will now look like this. Click the Arrow **(2)** in the lower, right-hand corner of the window to continue the Test Setup process.

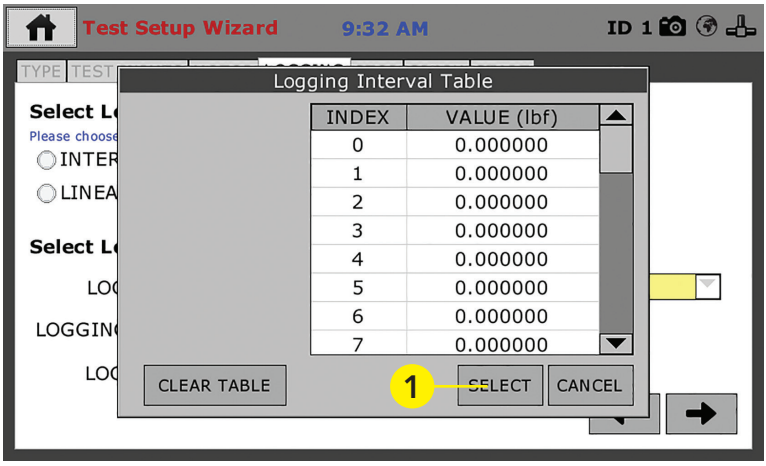
Interval Logging Table

With INTERVAL LOGGING TABLE, selected, click on the LOGGING INPUT field to individually choose each Input in the Pop-up Field and set the desired LOGGING DIRECTION AND LOGGING VALUE for each Input.



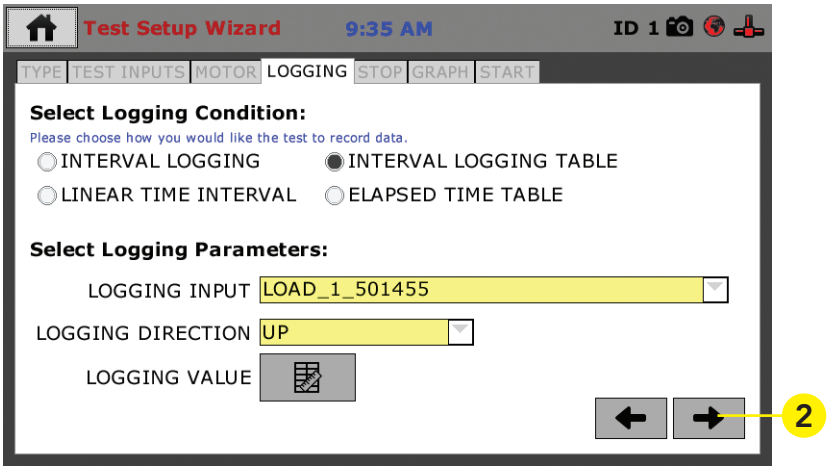
To set the LOGGING VALUE, click on the gray box **(1)** to the right of LOGGING VALUE and fill in the table values in the pop up window that appears, see below.





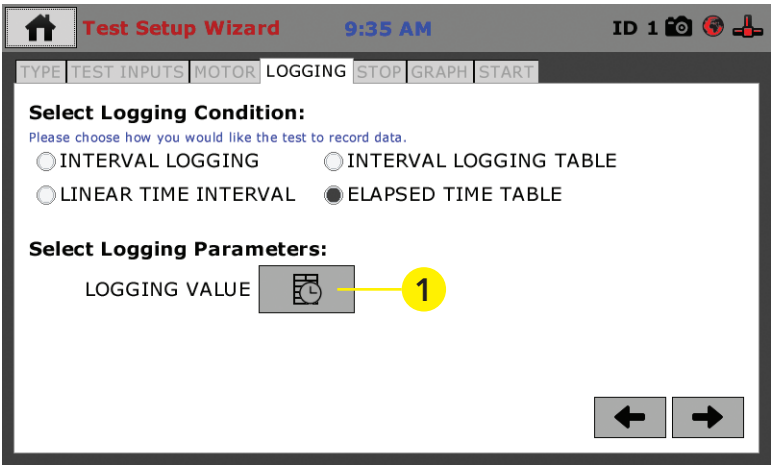
Above is a blank INTERVAL LOGGING TABLE. In order for the logging table to function, you will need to fill in the table with values from either an ASTM standard or your own values. Once you have completed the table for all inputs, Click the SELECT Button **(1)** in the lower right-hand side of the window to save the table.

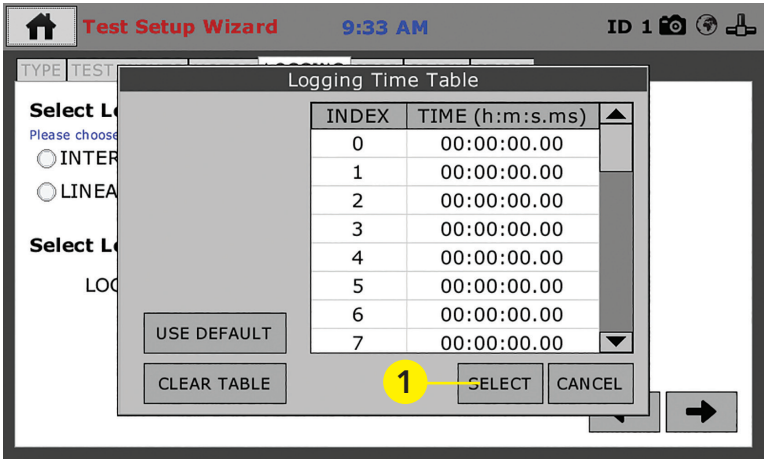
To continue the Test Setup process, click the Arrow **(2)** in the lower, right-hand corner of the window.



Elapsed Time Table

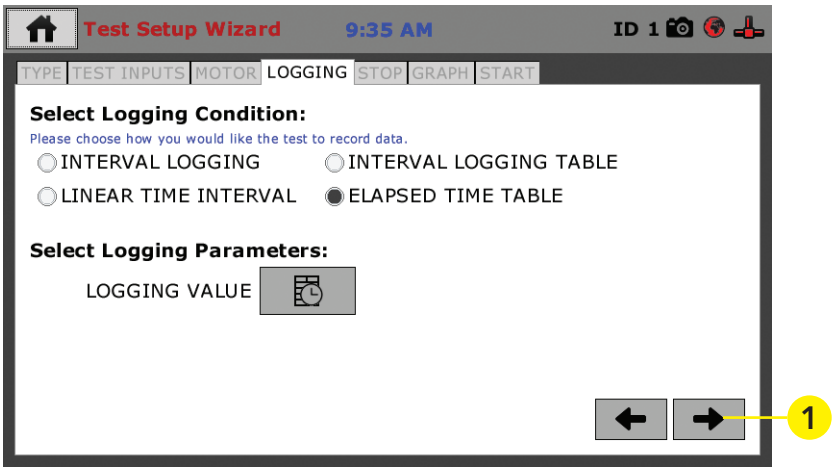
With ELAPSED TIME TABLE, selected, click on the gray box **(1)** to the right of LOGGING VALUE and fill in the table values in the pop up window that appears, see next page.





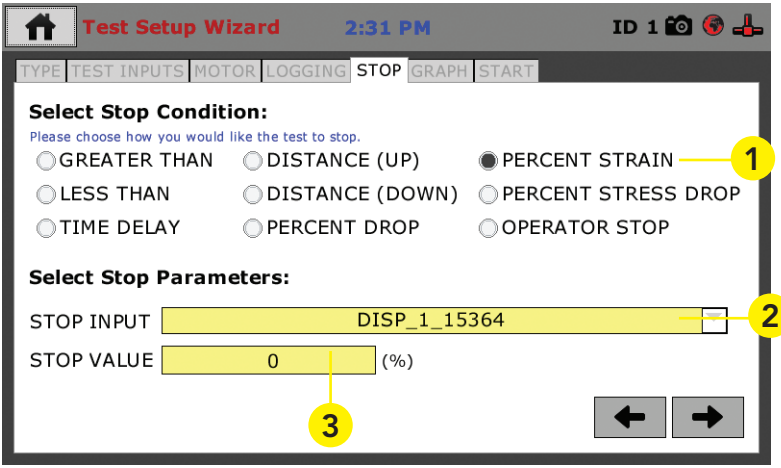
Above is a blank LOGGING TIME TABLE. In order for the logging table to function, you will need to fill in the table with values from either an ASTM standard or your own values. Once you have completed the table for all inputs, Click the SELECT Button **(1)** in the lower right-hand side of the window to save the table.

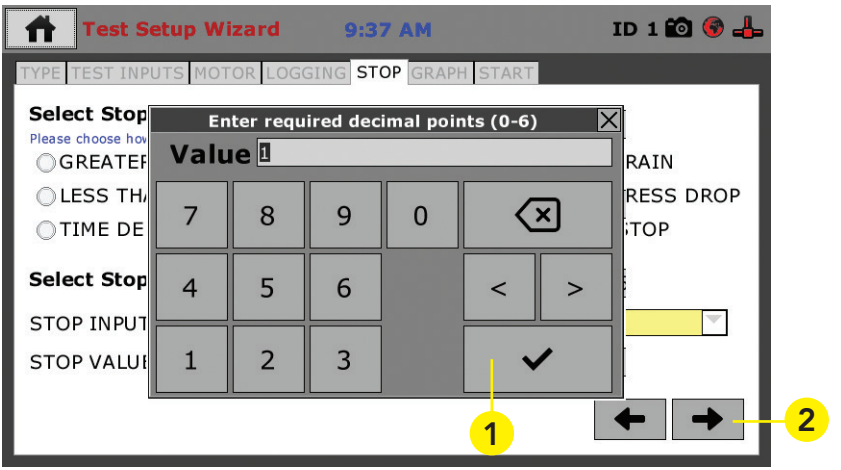
To continue the Test Setup process, click the Arrow **(2)** in the lower, right-hand corner of the window.



Test Setup Wizard – Stop Condition

To set the Stop Condition for the test, select one condition from the list of nine choices, see screen below. PERCENT STRAIN **(1)** has been chosen for our example here. Then choose the appropriate input device to coincide with your choice, in this case DISP, from the Stop Input field **(2)**. Also, add a value in the The Stop Value field **(3)**, by clicking on it and using the pop-up window to enter a value.

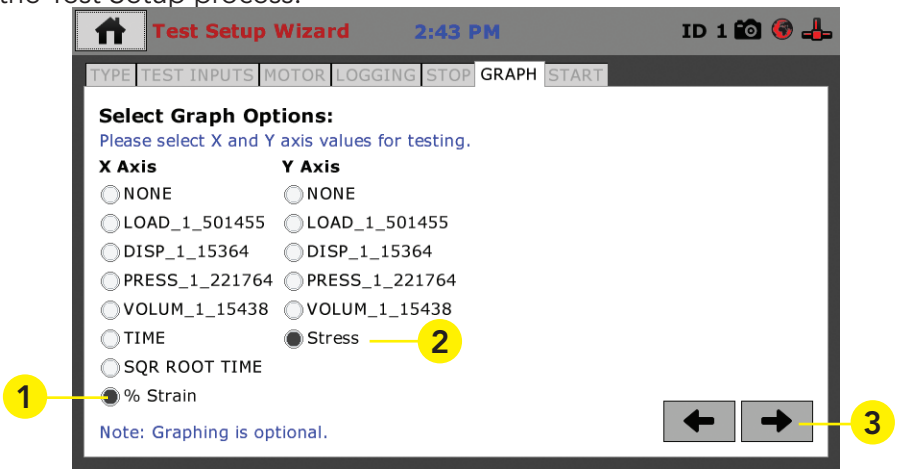




Click the Check Mark **(1)** in the lower right-hand corner to save the value. Click the Arrow **(2)** in the lower, right-hand corner of the window to continue the Test Setup process.

Test Setup Wizard – Graph Options

To set the Graph Options for the test, choose the values for the X and Y axis values you want to use for your test. For this test, we have chosen % Strain for the X Axis **(1)** and Stress for the Y Axis **(2)**. Click the Arrow **(3)** in the lower, right-hand corner of the window to continue the Test Setup process.

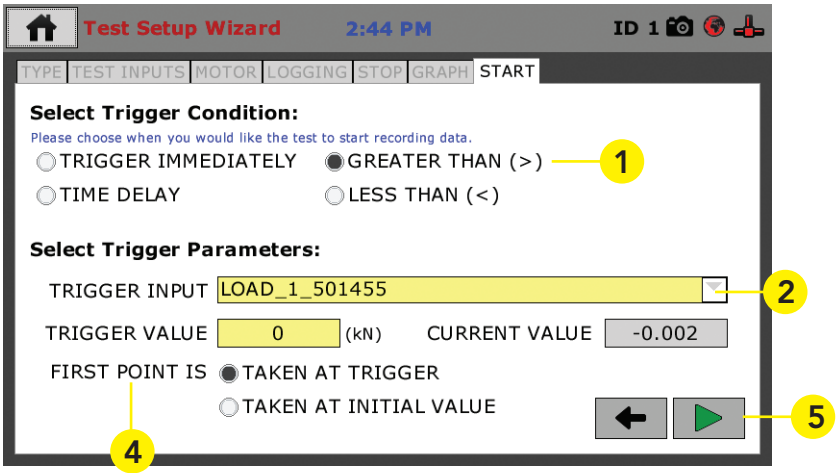


Test Setup Wizard – Start Options

On this next screen you will choose when you would like the test to start recording data. The options include: "Trigger Immediately," "Greater Than," "Time Delay," and "Less Than."

Trigger Immediately— Choose this option if you would like the test to start recording data without delay. You are now setup to run your test. Proceed with your test by pressing the Green Arrow **(5)** in the bottom, right-hand corner of the screen.

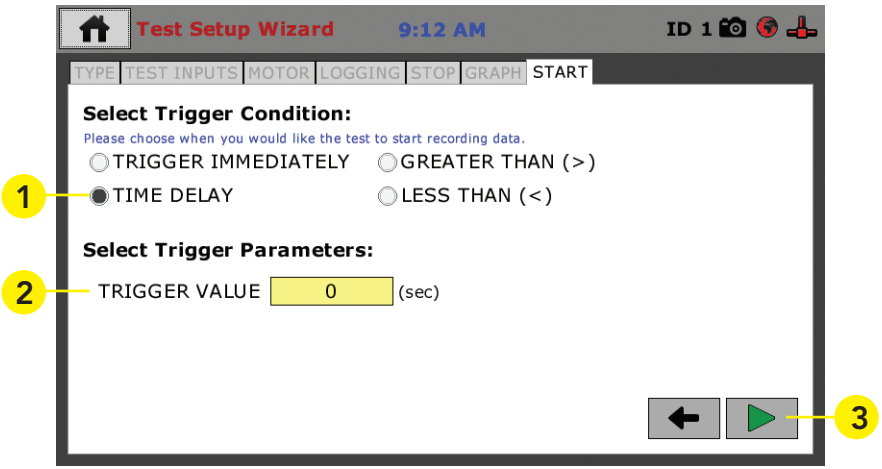
Greater Than (>) (1)— Choose this option if you would like the test to start recording data once you have reached a specified value.



After selecting GREATER THAN (>) **(1)**, select the TRIGGER INPUT **(2)** you'd like to use for this condition, here we have chosen LOAD. Fill in the TRIGGER VALUE you'd like to use, here we have used "0" **(3)**. Now choose whether you want the FIRST POINT to be taken at the TRIGGER or taken at the INITIAL VALUE, here we have chosen TAKEN AT TRIGGER **(4)**.

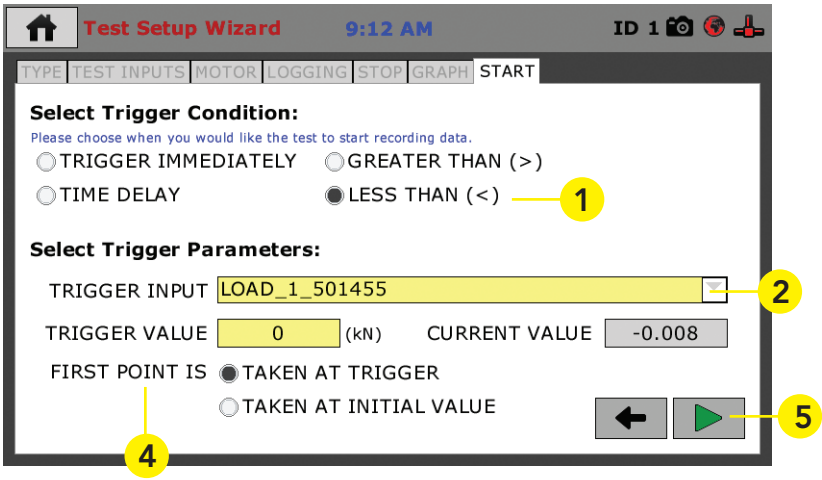
You are now setup to run your test. Proceed with your test by pressing the Green Arrow **(5)** in the bottom, right-hand corner of the screen.

Time Delay (1)— Choose this option if you would like the test to start after a specified amount of time.



After choosing TIME DELAY, Enter the TRIGGER VALUE (delay) **(2)** in seconds after which you would like the test to start recording data. You are now setup to run your test. Proceed with your test by pressing the Green Arrow **(3)** in the bottom, right-hand corner of the screen.

Less Than (<) (1)— Choose this option if you would like the test to start recording data before you have reached a specified value.



After selecting LESS THAN (>) **(1)**, select the TRIGGER INPUT **(2)** you'd like to use for this condition, here we have chosen LOAD. Fill in the TRIGGER VALUE you'd like to use, here we have used "0" **(3)**. Now choose whether you want the FIRST POINT to be taken at the TRIGGER or taken at the INITIAL VALUE, here we have chosen TAKEN AT TRIGGER **(4)**.

You are now setup to run your test. Proceed with your test by pressing the Green Arrow **(5)** in the bottom, right-hand corner of the screen.

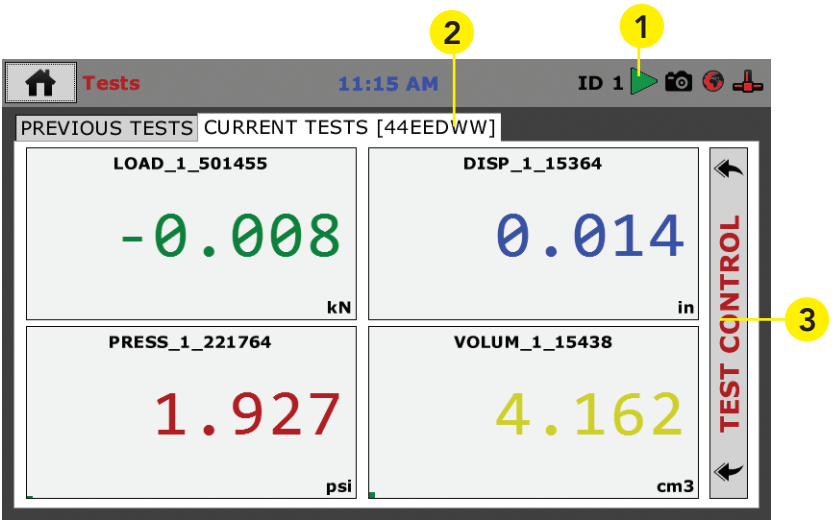
Test Setup Wizard – Start

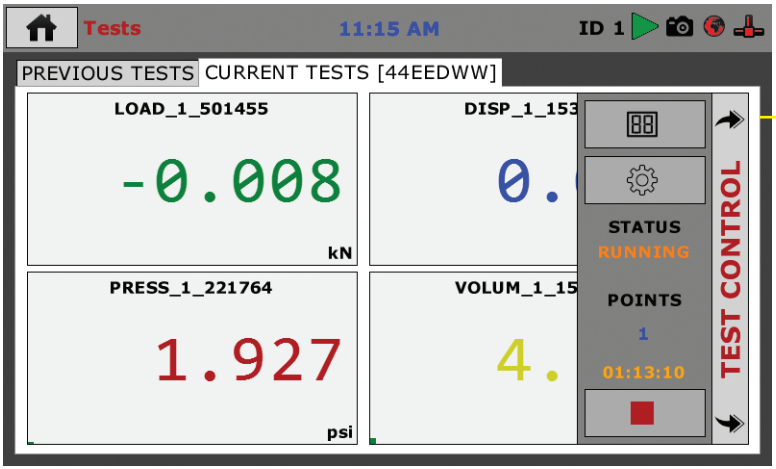
When you press the Green Arrow **(5)** in the bottom, right-hand corner of the screen. You will see the following screen.

In the Value Field **(1)** give your test a name. When finished, click on the check mark key **(2)** to save. Once saved, you will be see the following screen, showing the test you just saved. The test will begin to run automatically, depending upon what you set your Start Parameters to.

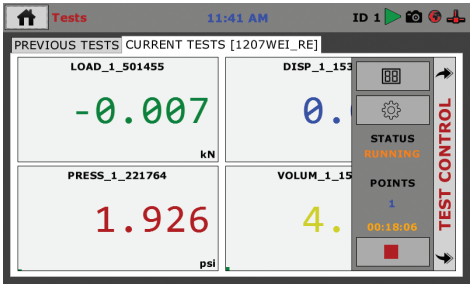
Tests — Current Tests Tab

On the screen below, the Green Arrow **(1)** in the screen header indicates that a test is currently running. The name of the test **(2)** is shown in the current tab. To access different views, control or stop the current test, click on the Test Control tab **(3)** at the right of the screen. Clicking on this tab opens the Test Control panel, see screen below.

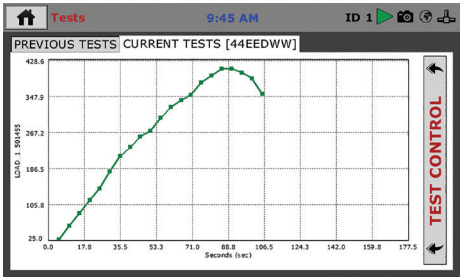




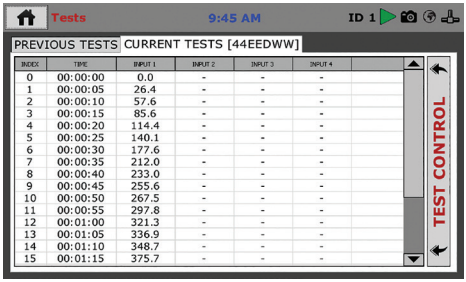
To Toggle through the different available views of your active test, click on the Switch Views button (1). The views that are available are: Live Readouts, Graph or Tabulation. Examples of these screens are below.



Live Readouts



Graph



Tabulation

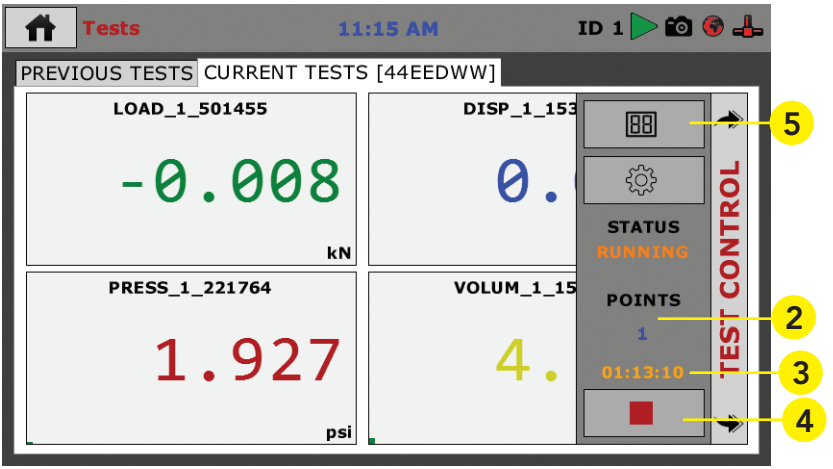
Also available on the Test Control Panel is the:

Status Monitor (1), which indicates whether a test is running or not running.

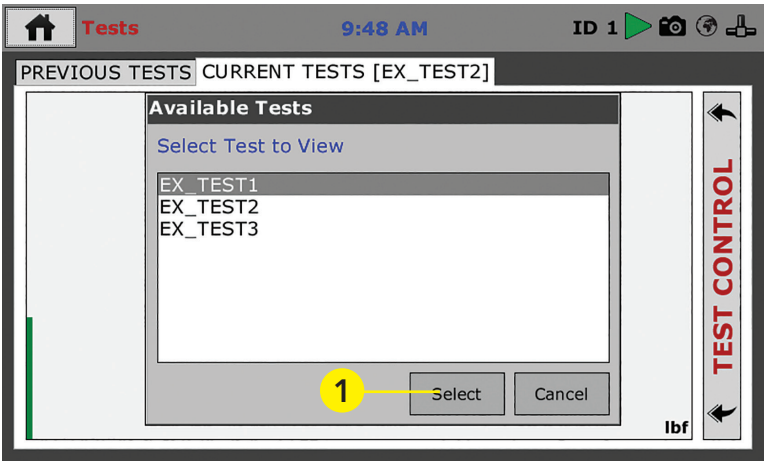
Points (2) indicates how many total test points have been recorded.

Start Time (3) indicates the starting time the current test was triggered. And, the

Stop Test button (4), which will stop the test when clicked.

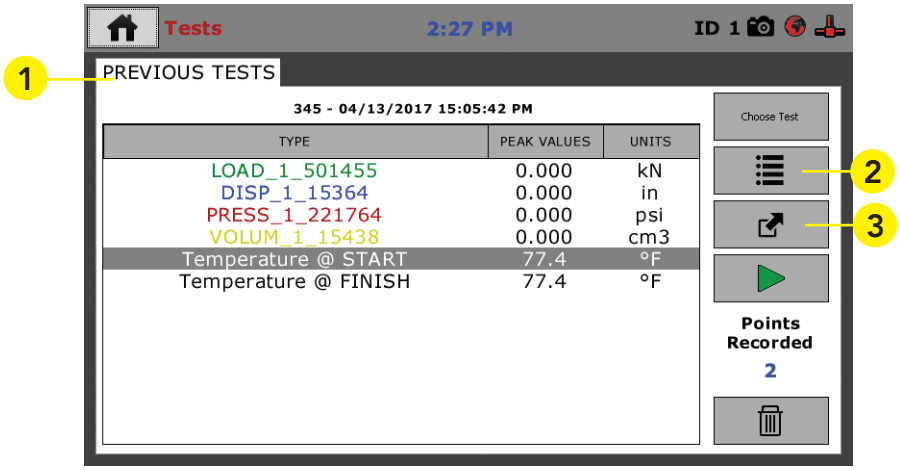


Available Tests (5)
Clicking on the Available Tests icon brings up a screen that lists all currently running tests, see below. By clicking on a test in the list and clicking on the Select Button (1) you can see the current status of that test.



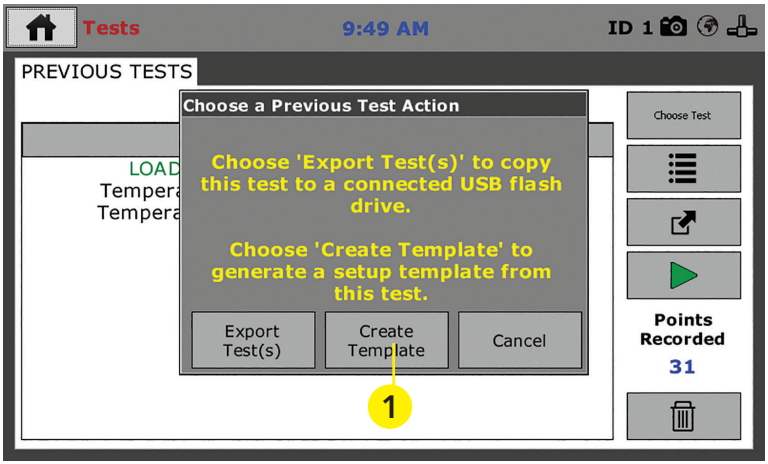
Tests — Previous Tests Tab

Once a test is completed or stopped by the operator, the results of that test immediately appear on the Previous Tests Tab **(1)**.

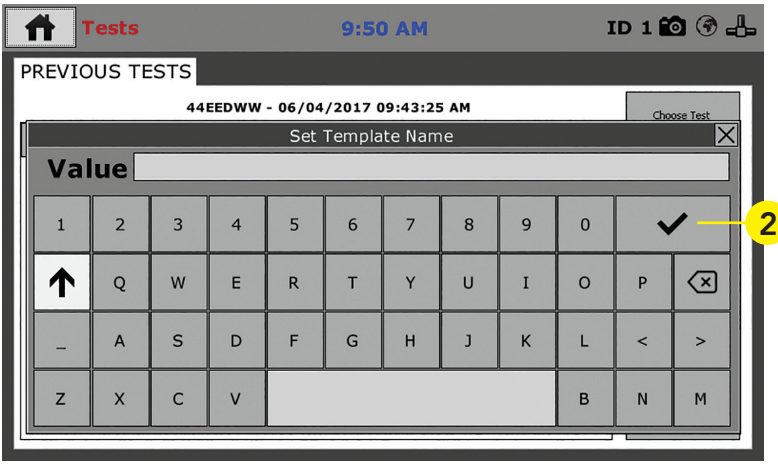


To Toggle through different views of your completed test, click on the Switch Views button **(2)**. The views that are available are: Peak Values, Graph or Tabulation.

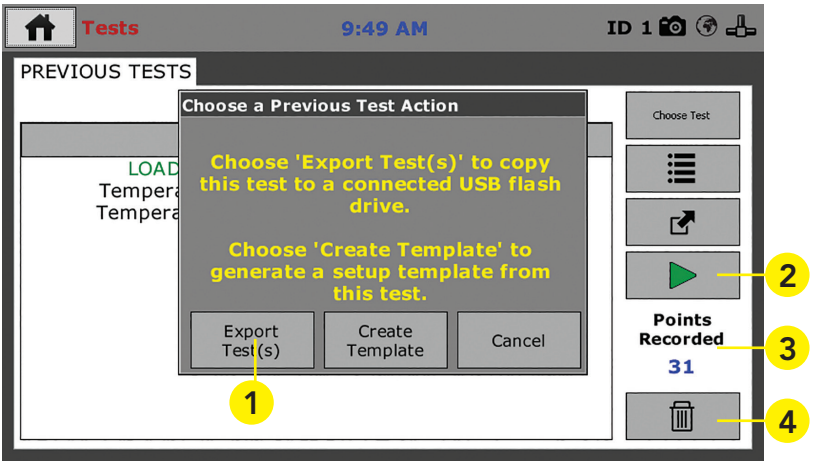
To create a Test Template for this test or to Export the test data to a connected USB flash drive, click on the Test Actions button **(3)** and the following screen will appear.



Click on the Create Template button **(1)** a pop up window will appear asking you to name your template, see next page. Name your template and click on the Check Mark **(2)** to save the template for future use.



To export the test data to a USB Flash Drive, insert a Flash Drive into the USB slot on the machine's front panel. Click on the Export Tests button **(1)**. The machine will transfer your file to the USB Flash Drive and you can take the drive with you.

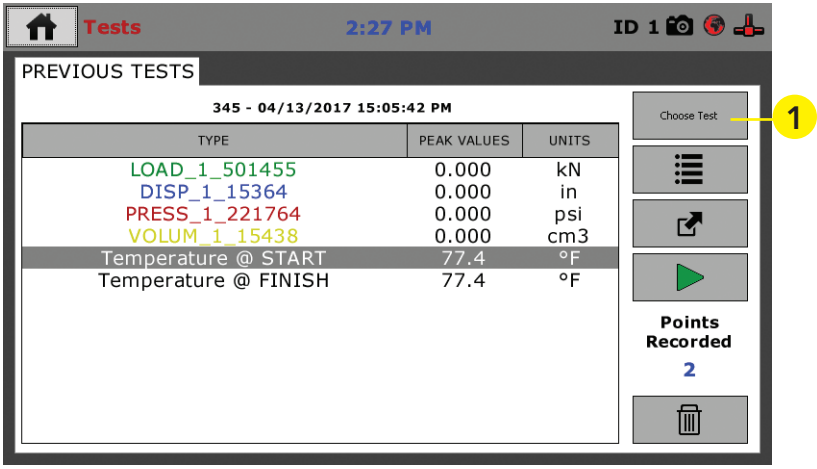


To begin a new Test, click on the Green Arrow key **(2)** and you will be taken to the Test Setup Wizard to create a new Test or to choose a Test Template.

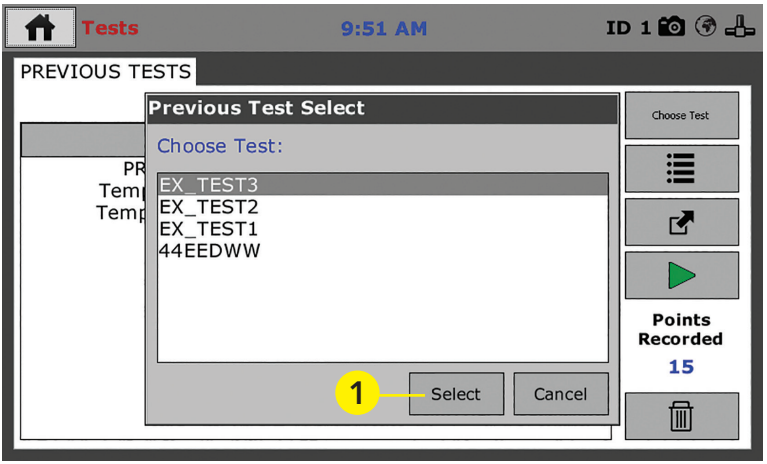
Also on the Previous Tests Tab, on each previous test page you will see how many points were recorded during the test **(3)**.

You can also delete Previous Tests by clicking on the Trash button **(4)**.

On the Previous Tests Tab you can also select any of your previous tests by clicking on the Choose Test button (1), below.



When this button is clicked, a pop up screen will show a number of your previous tests, based on the number you specified in the preferences panel for this feature, see below. By clicking on a test in the list and clicking on the Select Button (1) you can see the current status of that test.



Operation from a Computer and NEXT Software

This manual covers the setup and operation of the HM-5020.3F Load Frame in Stand-alone Mode only. For information on operating your load frame with Humboldt's NEXT Software and a computer, please refer to the Humboldt NEXT software manual.

HM-5040.3F Specifications

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-5040 Master Loader is ideal for just about any application from road construction to high-volume commercial and educational laboratories.

While the HM-5040 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-5040 to perform any tests required up to its load capacity of 11000 lbf (50kN).

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 at any location with access to the network.

Load Frame Specifications:	
Load capacity	22000 lbf (100kN)
Speed range	0 - .4999 in/min. 0 - 12.5000 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" (5400mm)
Voltage	110/220V 50/60Hz. 5.0 amps

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
Data acquisition	4 Channels
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
Emergency stop	Large button
24-bit differential analog to digital converter	4
Ambient temperature sensor	1
Limit switches	2
Firmware Update	Ethernet or flash drive

General Warnings

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.

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.

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.

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.

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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