product manual 07.24

HM-5810.3F

Automated Pressure Controller

GEOTECHNICAL TEST EQUIPMENT

HUMBOLDT

Quick Start Guide **4**
Unpacking
Installation and Equipment Setup **4**
Electrical Connections 4
Power Switch 4
Instrumentation Connections and Setup **5**
HM-58120 Rear Instrumentation Panel 5
Network 5
USB Power 5
Instrument Inputs 5
Initial Set-up **7**
Initial Set-up — Calibration **8**
Calibration Input Screen 9
Units 10
Value 10
Export Calibration via USB 13
Initial Set Up — Date/Time **14**
Date 14
Time 14
Clock Style 14
Clock 14
Initial Set Up — Display **15**
Brightness 15
Dim Display 15
Turn Display Off 16
Initial Set Up — Preferences **16**
Preferences – General Tab 16
Logger ID 17
Sound 17
Automactically Update System 17
Update Check Frequency 17
Preferences – System Units Tab 17
Ambient Temperature 17
Motor Speed Unit 18
Stress Control Unit 18
Preferences – Specimen Parameters Tab 18
Specimen Height 18
Specimen Diameter 18
Preferences – Storage Tab 18
Test Storage Limit 19
Recycled Tests 19
Test Templates 19
Save to USB Check Box 19
Initial Set Up — Network **19**
Network Settings Screen 21
DHCP 21
IP Information 21
Local Status 21
Internet Status 21
Initial Set Up — Information **21**
System Information 22
Firmware Version 22
IP Information 22
Local Status 22
Internet Status 22
Memory 22
Factory Screen 22
Export Log File 22
Initial Set Up — Contact **23**
Contact Information 23
Initial Set Up — Update **24**
Update from USB 24
Check for Update 25
Update Details 25
Operation from a Computer and NEXT 26
Equipment Setup **27**
Installation and Equipment Setup **28**
Electrical Connections 28
Power Switch 28
Instrumentation Connections and Setup **28**
Rear Instrumentation Panel 28
Network 29
USB Power 29
Instrument Inputs 29
Instrumentation Setup **30**
Third-Party Instrumentation 31
Calibration of Instrumentation **31**
How to Perform a Calibration 31
Calibration Input Screen 33
Units 34
Value 34
Performing a New Calibration 35
Test Setup **43**
Test Setup 44
How to Fill Hydraulic Pistons 46
Deairing Line from HM-5810 to Cell 49
Pressurizing 49
Permeability Setup 56
Filling the Triaxial Cell 51
Flushing the Triaxial Cell Water Lines 52
Specifications **60**
General Warnings **61**
Warranty **61**
Manufacturers Rights & Responsibilities **62**

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-5810 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-5810 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-5810 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-5810 Rear Instrumentation Panel

Above is a photo of the rear instrumentation panel of the HM-5810.

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-5810, 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.

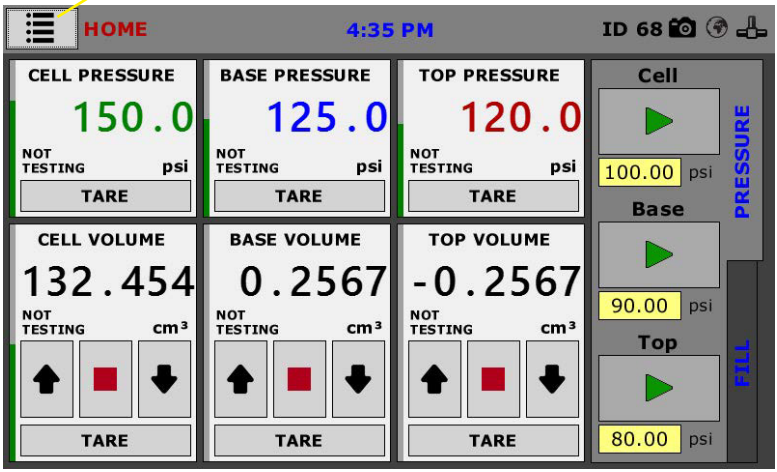
Third-party instrumentation, which is compatible, can also be used with the HM-5810. If you plan to use third-party load cells and/or transducers, please refer to the Equipment Setup section of this manual, page 31 for instructions.

Initial Set Up

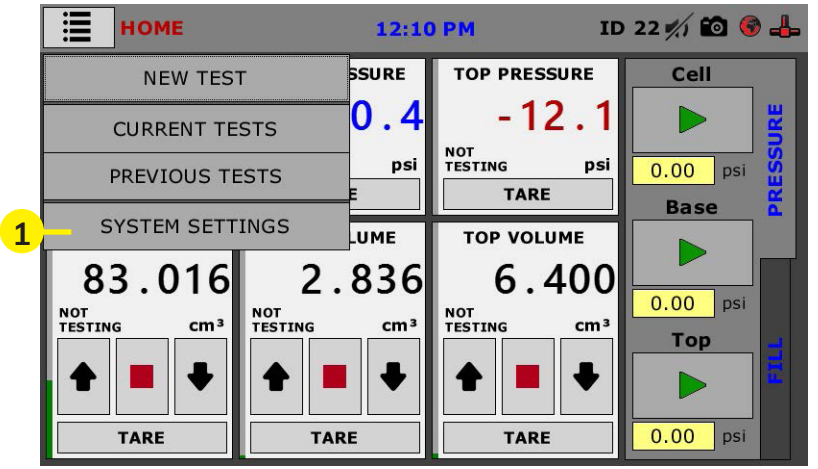
Remember, if you purchased Humboldt instrumentation with your HM-5810, it is already calibrated and assigned to a channel and will not need calibration, however you should confirm that the instrumentation has been set up and calibrated. If you are using 3rd-party instrumentation, go to the Equipment Setup section for calibration instructions.

DO NOT RECALIBRATE!

When your HM-5810 is first turned on, the screen below will appear.

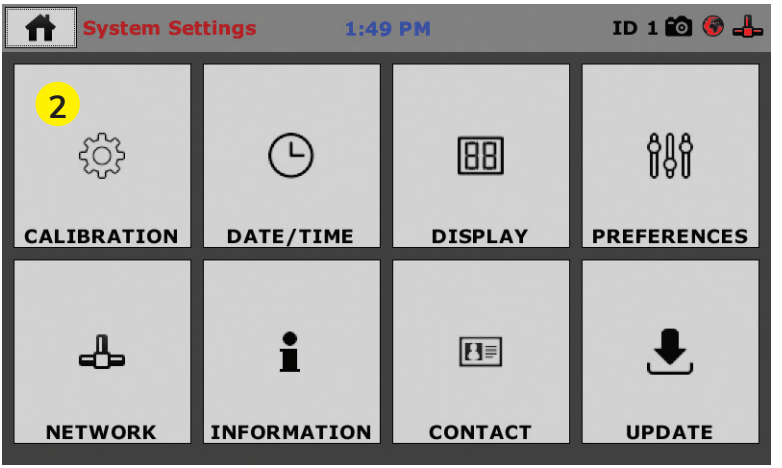


From this screen, to confirm your machine instrumentation has been calibrated, navigate to the Calibration section by clicking the Menu icon in the top left corner of the screen (1). When you click on this button, you will see a drop-down menu appear, see below.

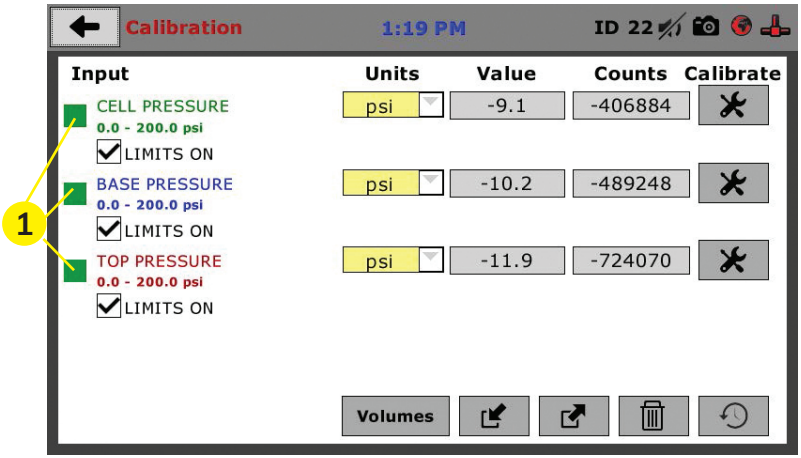


Navigate to the bottom of this drop-down menu and click on System Settings **(1)**. You will see the following screen.

Initial Set Up — Calibration



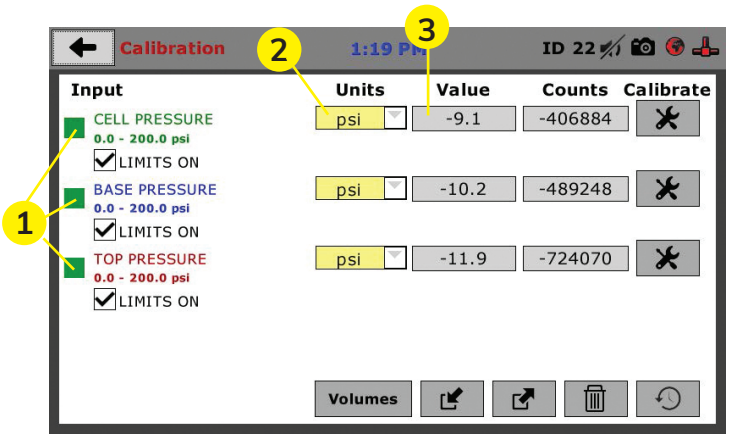
Click on the Calibration tab in the top left corner **(2)**. You will see the following screen.



Calibration Input Screen

The Calibration Input Screen (above) is used to monitor and calibrate instrumentation and assign them to specific channels of the HM-5810. 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).**



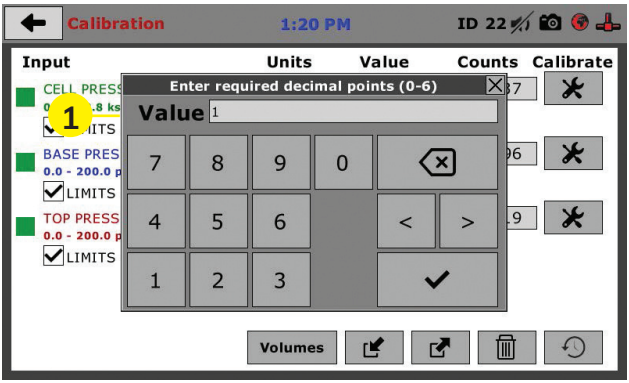
Each channel has a “Limits On” check box (1). Use the Limits On to keep the machine from exceeding the sensor limits of the instrumentation. By selecting this option, before the test can exceed the limits of the sensors, all tests will

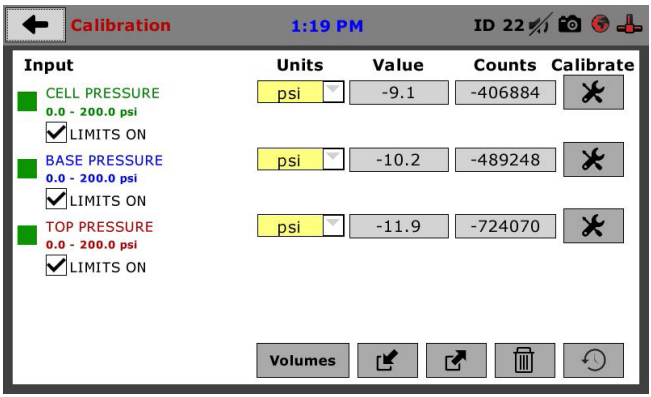
stop running and the motor will stop to avoid damaging connected instrumentation.

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.

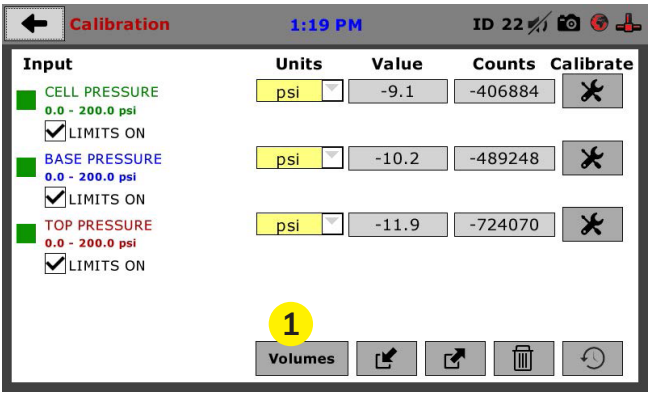
Value (3)
This field displays the current calibration value. This value should already be set with 3 decimal point accuracy . If the instrument is not calibrated, the unit will read “N/A.” To change the numbers of decimals shown, click on the field and the following window will appear. Fill in the number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



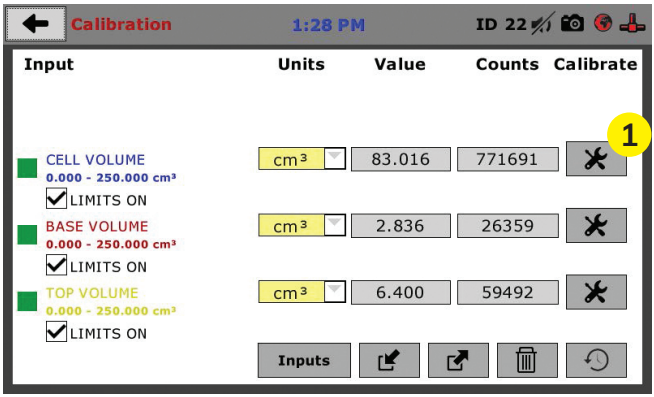


The screen above shows a typical cell pressure calibration setup. In this example, the HM-5810 has been set up for a standard Consolidated Drained or Undrained Triaxial setup. Input 1 is set up to read Cell Pressure of 0.0-200.0 psi; Input

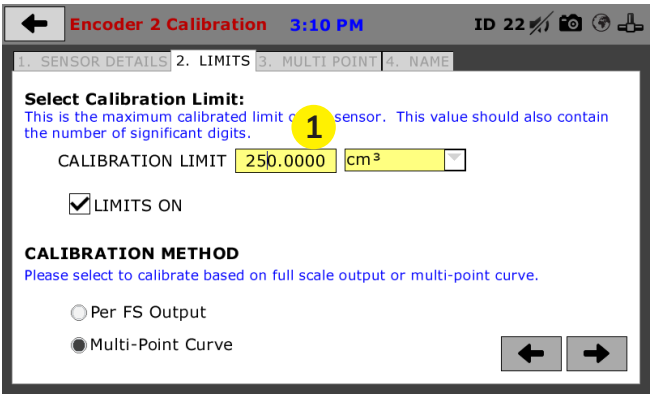
2 is set up to read Base Pressure of 0.0-200.0 psi, and Input 3 is set up to read Top Pressure from 0.0-200.0 psi.`



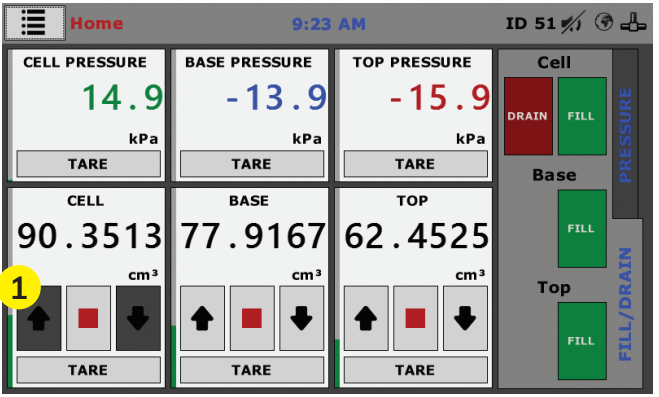
Now, we need to calibrate the Cell Volume. To get to the volumes calibration page you need to push the Volumes button at the bottom of the screen **(1)**. However, calibration for volume on this is a bit different than what we are used to since it is based on a motor count rather than measuring the actual volume. In order to calibrate the volume the following steps have to be followed:



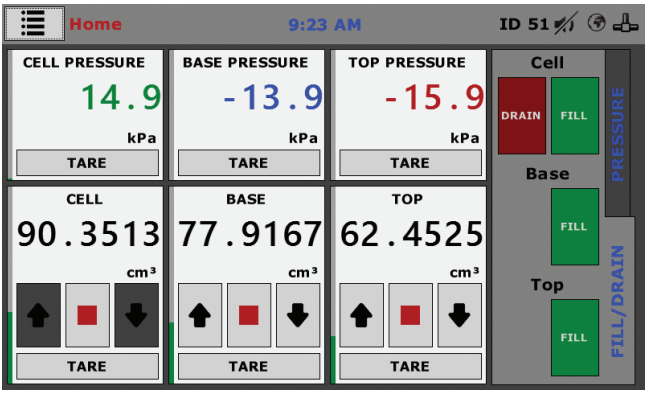
On the screen above, select the cell to be calibrated **(1)**.



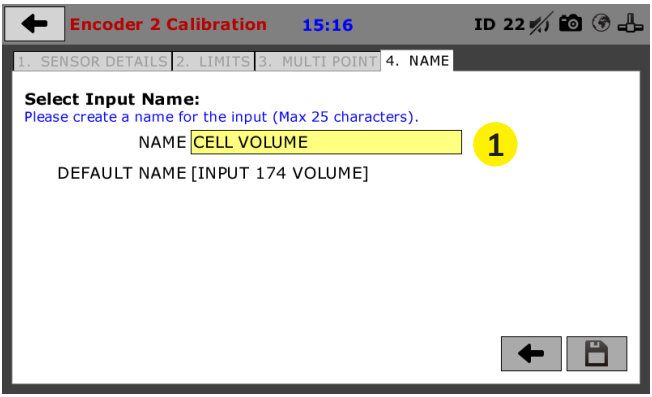
Ensure that the calibration limit is set to 250 cm^3 **(1)**.



Select the Per FS Output radio button **(1)**.



Ensure that the cell piston has been fully moved to the down position, you will then be prompted to reset encoder, select YES **(1)**.



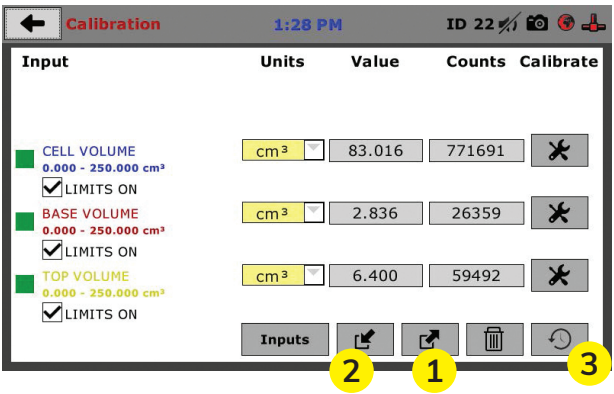
Select an Input Name **(1)**. Then repeat this process for the Base and Top Volumes.

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.

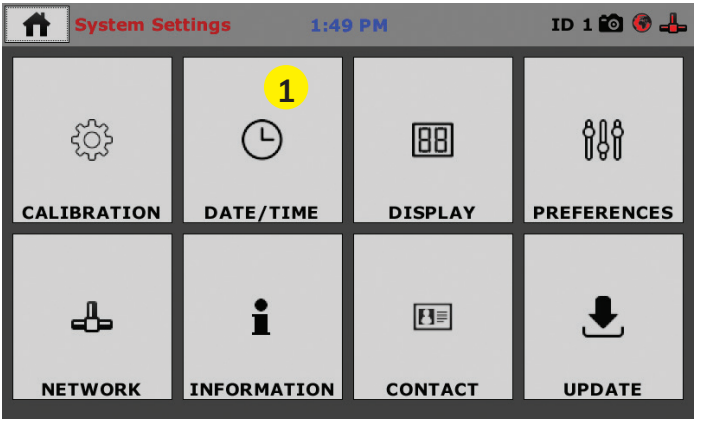
On the screen below, press the Export Calibration button **(1)** to select calibrations to export via USB.

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-5810's calibration data to the thumbdrive and then download the additional calibration data you need for your additional test setups **(2)**.

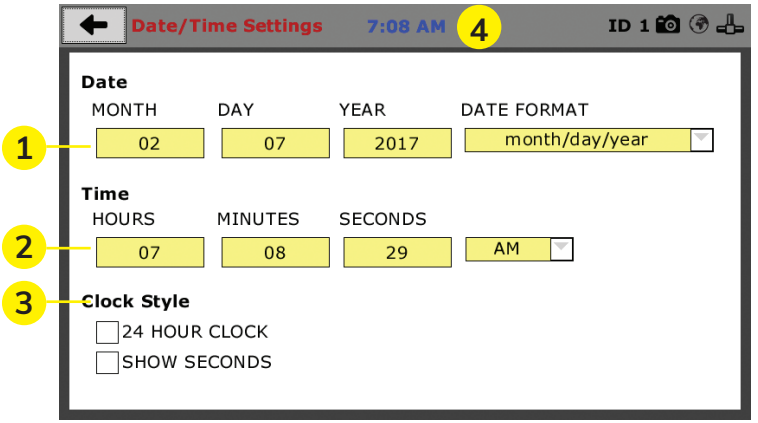
To set up Date and Time settings, return to the System Settings screen and click on the Date/Time Panel. **(3)**



Initial Set Up — Date and Time



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



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

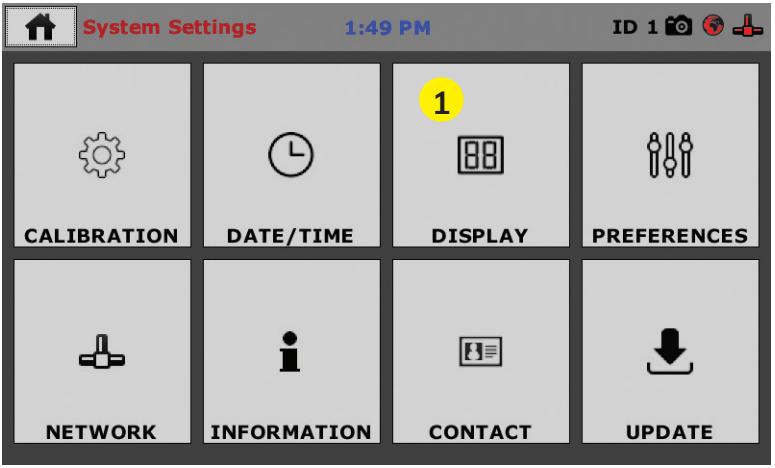
Time (2)
Set the hours, minutes, seconds, and am/pm.

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.

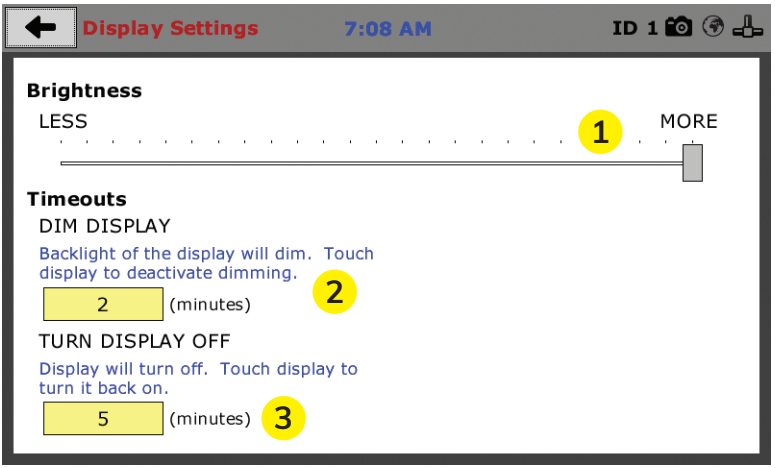
Clock (4)
The current time is displayed is located on every controller screen. Clicking on the time from any screen, you will be taken to the Date/Time Settings Screen.

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)

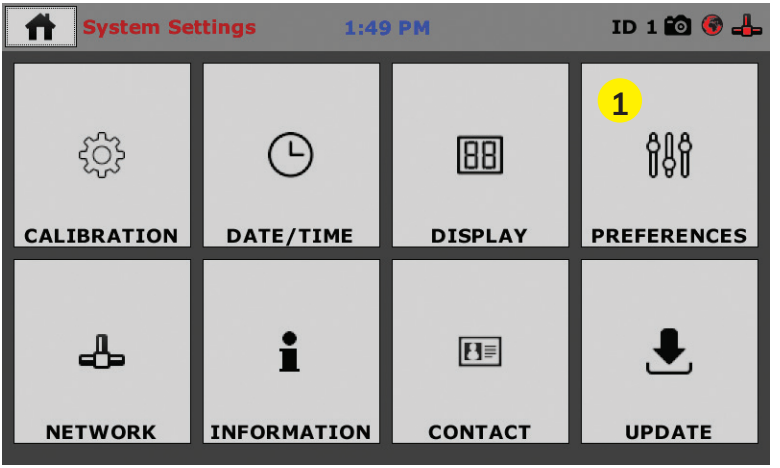
The backlight of the display will automatically dim to save power. Click the yellow box to change the number of minutes before the display goes dim. After the time has elapsed, touch the display to deactivate dimming.

Turn Display Off (3)

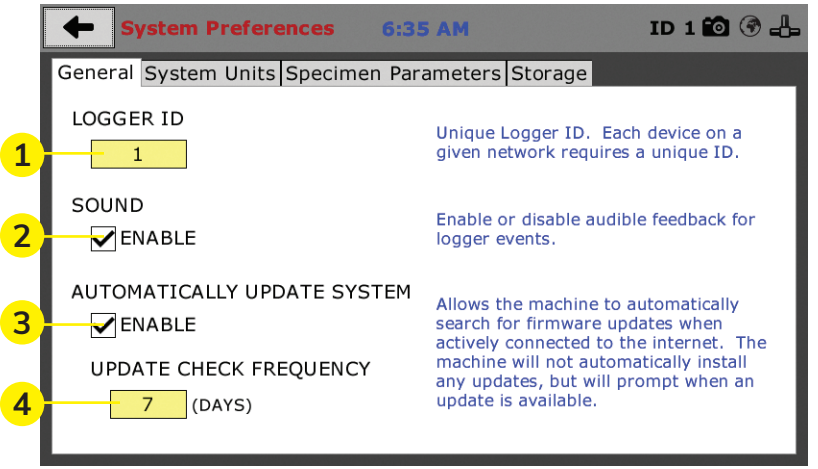
The display will automatically turn off to save power. Click the yellow box to change the number of minutes before the display powers off.

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.

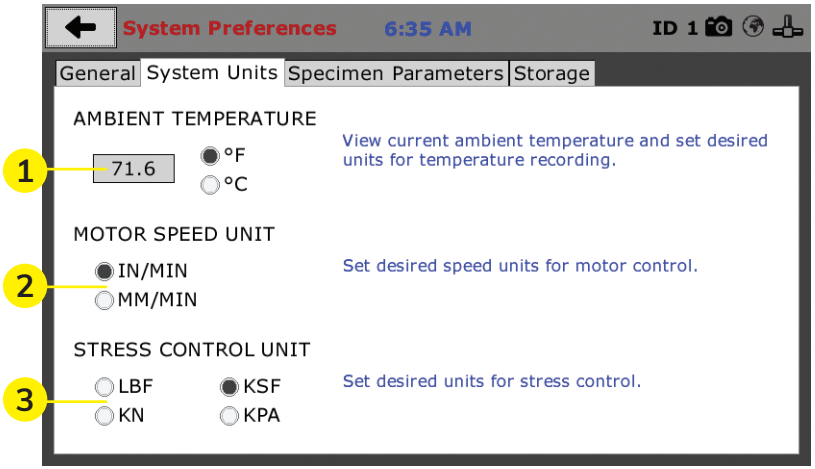
Logger ID (1)
Each machine that is connected to your network requires a unique Logger ID. These numbers can be assigned any number between 1-245. In most cases, if you are setting up a new machine it has been given the Logger ID 1. This would show in the Logger ID field. (1). If this number conflicts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

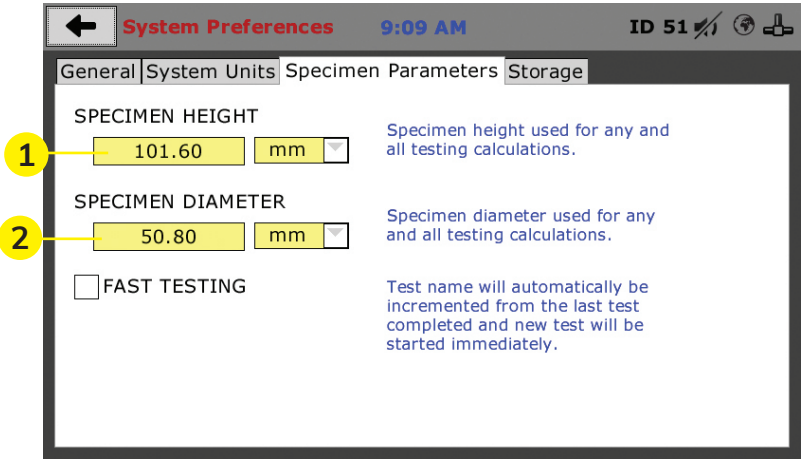


Ambient Temperature (1)
This field displays the current ambient temperature and allows you to select desired units (Fahrenheit or Celsius) for temperature recording.

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).

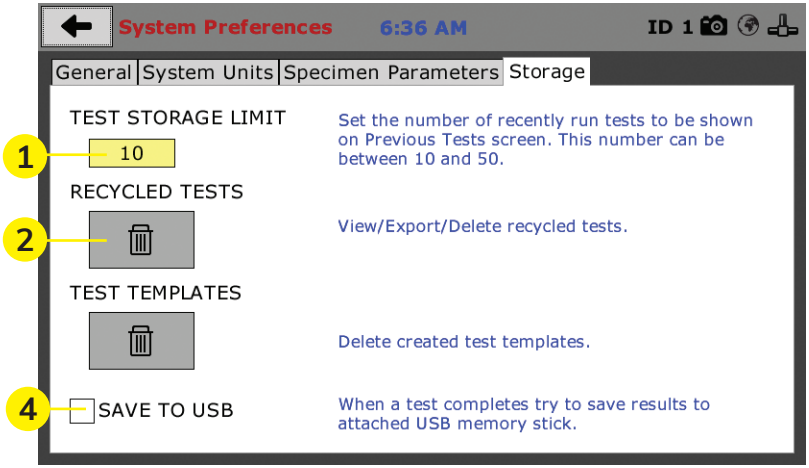
Preferences – Specimen Parameters Tab
This screen is accessed by clicking on the Specimen Parameters Tab under System Preferences.



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.

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.

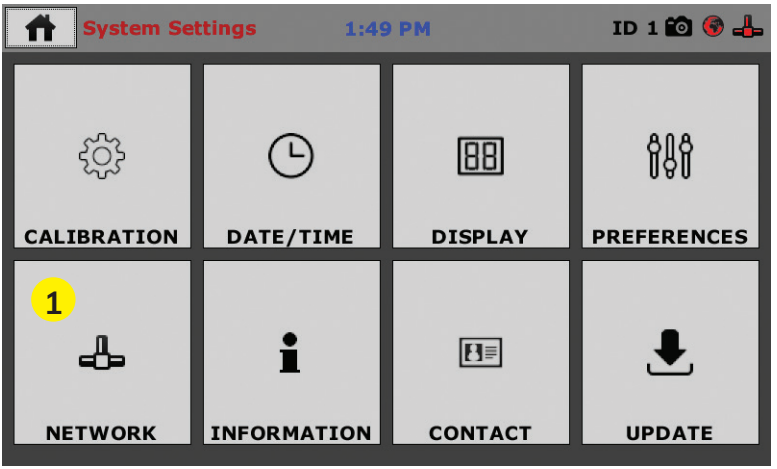
Recycled Tests (2)
This refers to previously run tests that are not displayed in the "Previous Tests" window. These tests are not deleted; they are recycled for later use. Select this button to view/export/delete recycled tests.

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

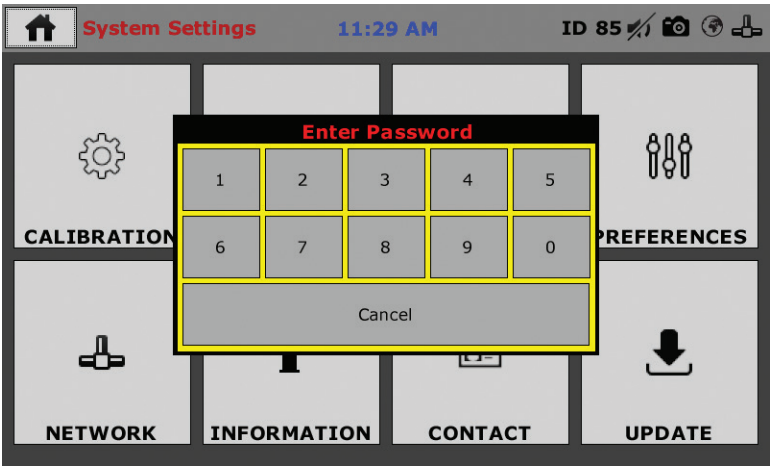
Save to USB Check Box (4)
Checking this Box saves the results of a test to USB thumb drive inserted into the front USB slot on the machine.

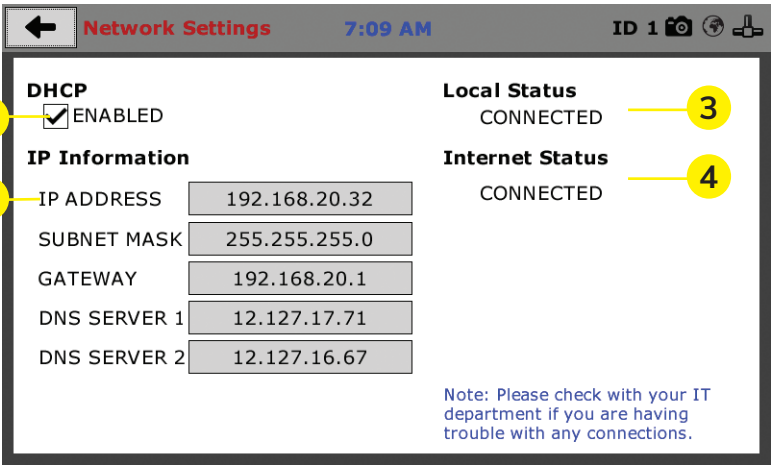
Initial Set Up — Network

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.

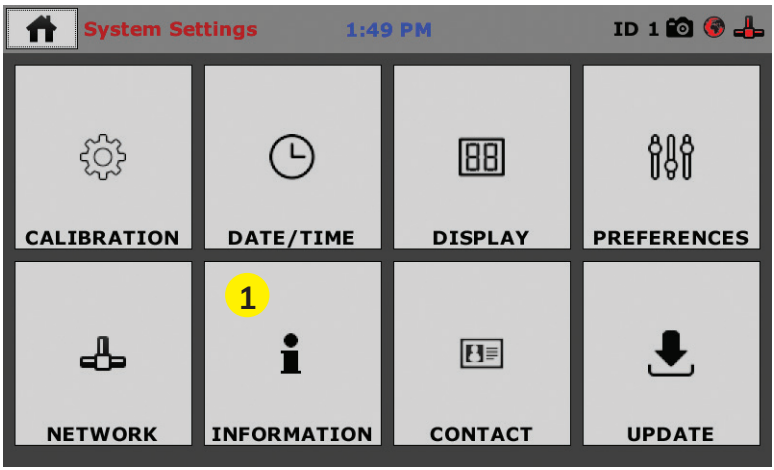
Local Status (3)
This indicates the status of the local network connection, Connected or Disconnected.

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.

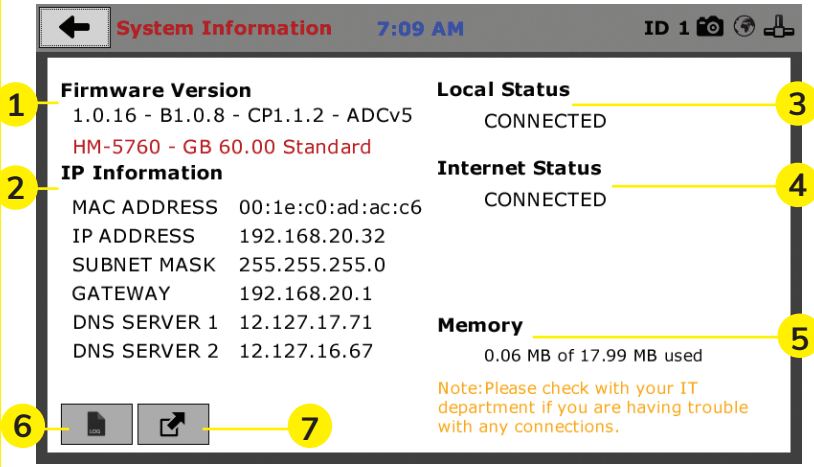
Initial Set Up — Information

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)

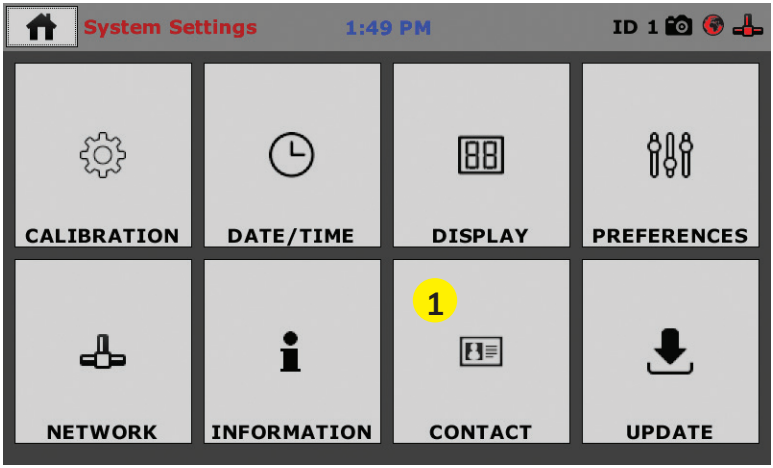
This is for Humboldt use only.

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

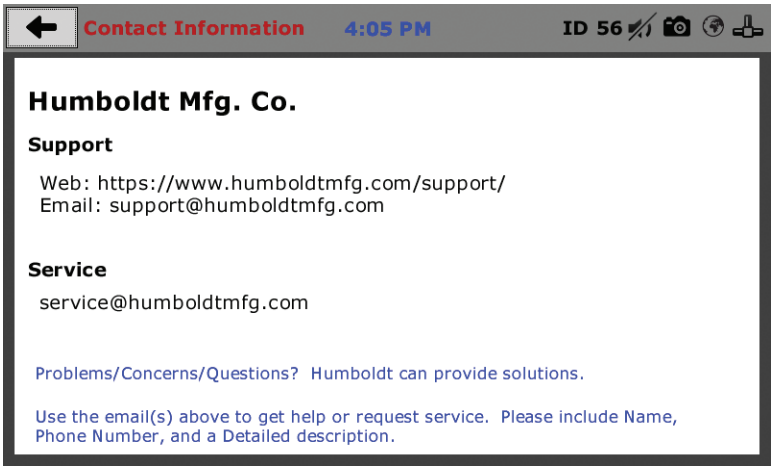
Clicking on this panel provides contact information for Humboldt Support and Service**(1)**



Contact Information

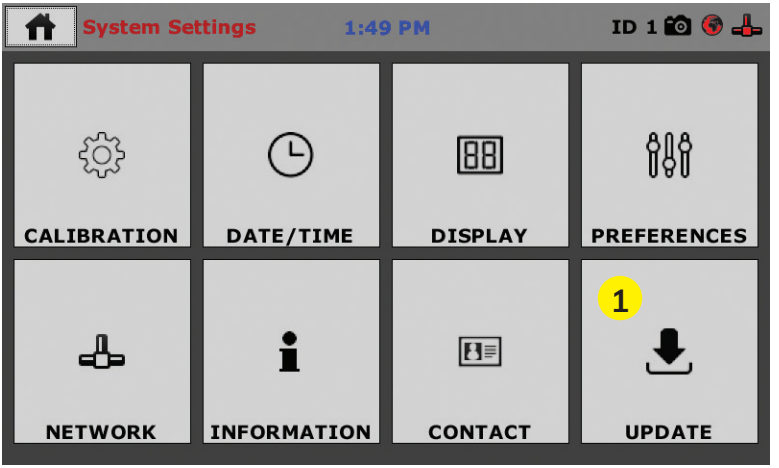
Below is a view of the Contact Information screen showing contact information for Humboldt Support and Service.

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)**



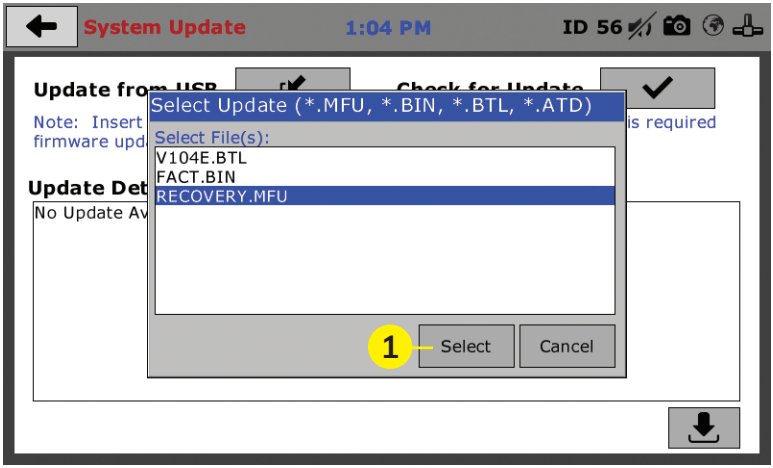
Clicking on the Update Panel brings up the following screen.

Update from USB (1)
Firmware updates can be uploaded to your HM-5810 from a USB drive. Firmware updates are available for download from our website at: https://www.humboldtmfg.com/support/software.php.

Once on the website page, click on the Elite Series Firmware tab. You will see a list of Humboldt Elite Series machines. Click on the HM-5810 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-5810. 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-5810 may reboot several times during the update, do not turn off or reset machine during this process.

Check for Update (2)
If your HM-5810 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-5810 check for updates automatically, this box will display a running list of updates currently available for your machine, but, which have not been installed.

Operation from a Computer and NEXT Software

This manual covers the setup and operation of the HM-5810.3F Controller 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-5810 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-5810 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-5810 uses a 10 amp fuse. To begin operation, attach the supplied electrical cord, plug it in and press the Power Switch.

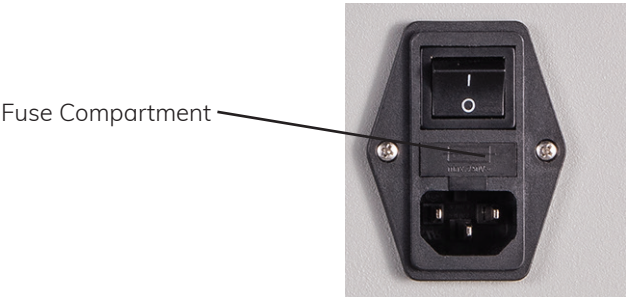


Fig. 1 Power Switch

Instrumentation Connections and Setup

HM-5810 Rear Instrumentation Panel

Above is a photo of the rear instrumentation panel of the HM-5810.

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-5810, 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-5810.

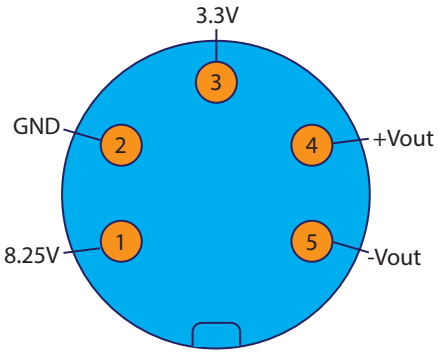
For information on calibration, see Page 31 of this manual.

Instrumentation Setup

On the next page are examples of typical instrumentation setups for different tests the HM-5810 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.

Third-Party Instrumentation

Third-party load cells/transducers, which are compatible, can also be used with the HM-5810. 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-5810, see illustration below. Plugs to connect third-party instrumentation to the Humboldt HM-5810 are available; order part HS-000474.



Calibration of Instrumentation

All instrumentation included with your HM-5810 has been c alibrated 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!

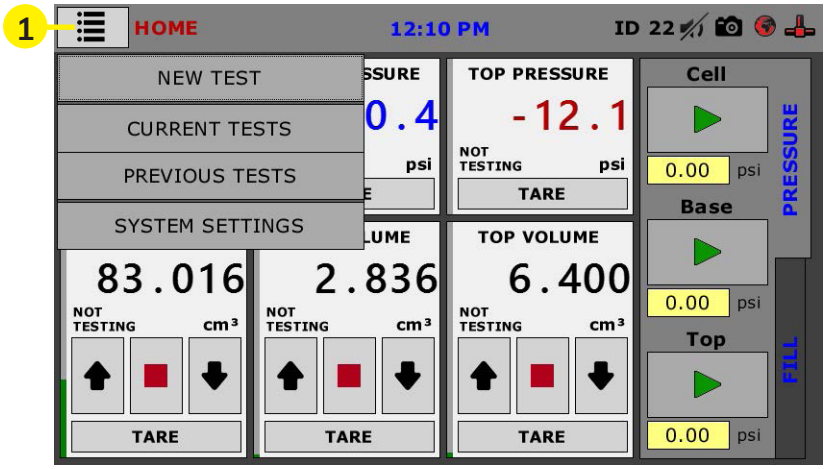
How to Perform a Calibration

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-5810 should be calibrated periodically. For most, this period is usually a year, though other rules may apply to the frequency of calibration.

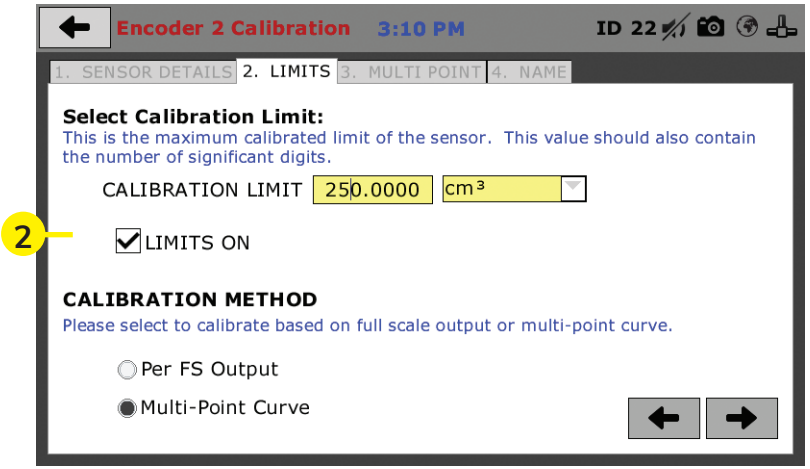
To perform a calibration, it will be necessary to either hire a calibration service to come in to calibrate your machine or have the

necessary calibration equipment to perform this service.

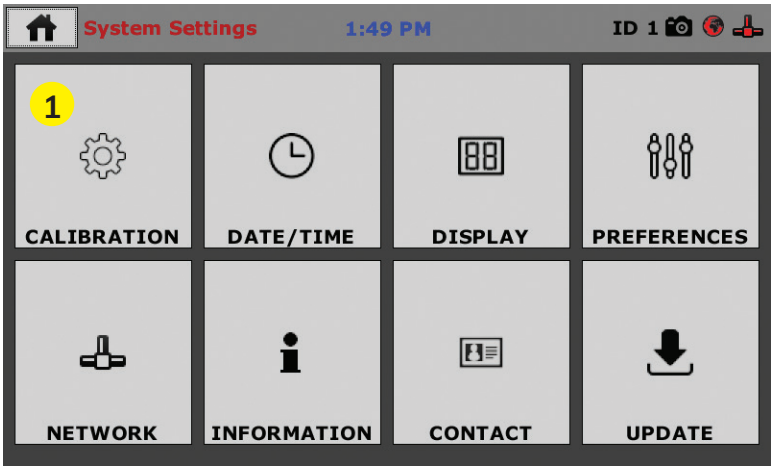
To begin a calibration, navigate to the Calibration section by clicking the Menu icon in the top left corner of the screen (1). When you click on this button, you will see a drop-down menu appear, see below.



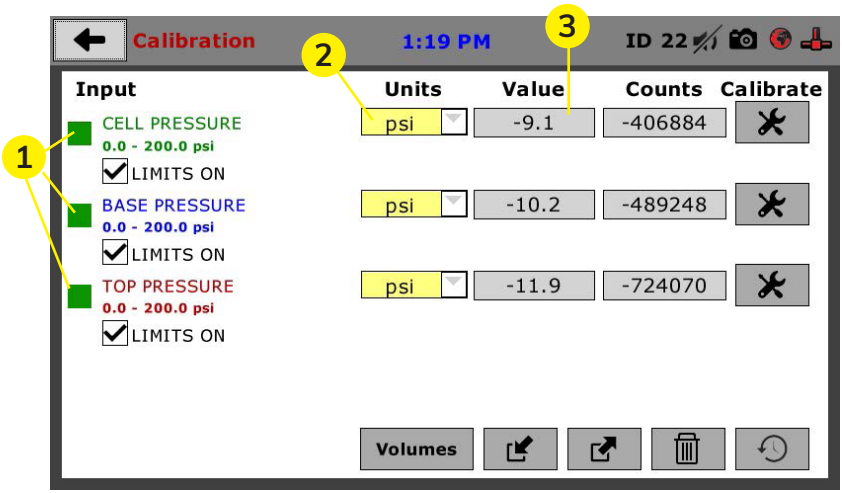
Navigate to the bottom of this drop-down menu and click on System Settings **(2)**. You will see the following screen.



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-5810. 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.

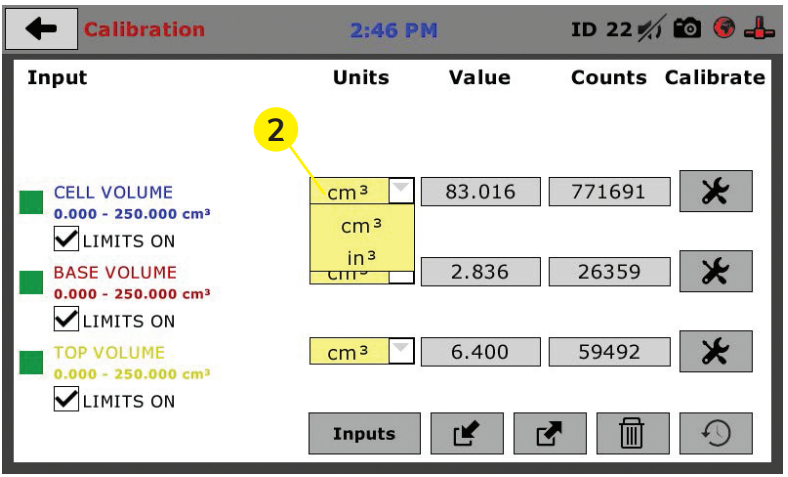
Note: An input cannot be calibrated during testing.

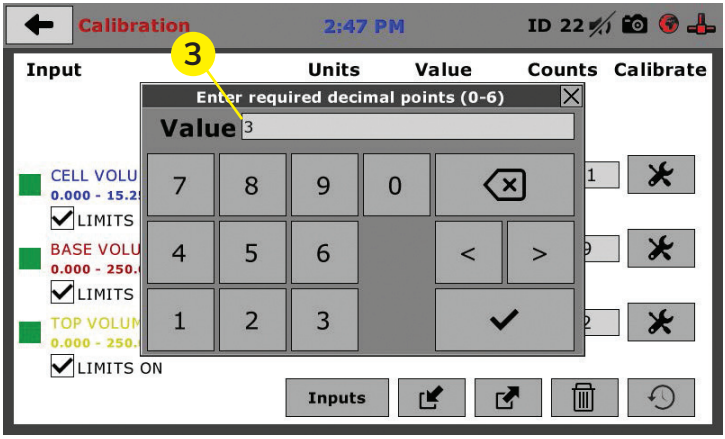
Units (2)

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 image below.

Value (3)

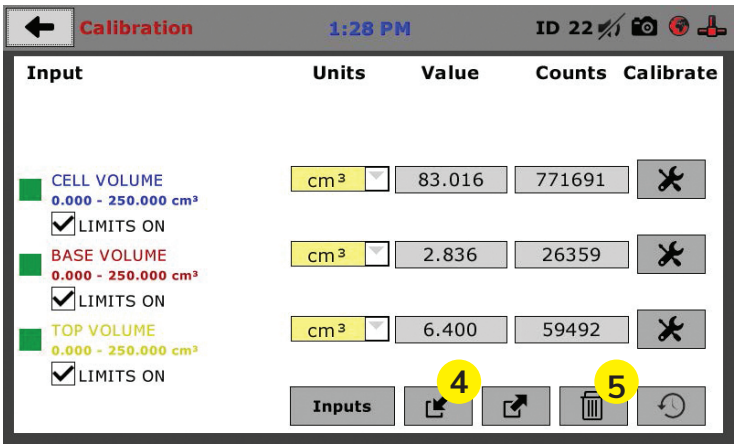
This field displays the current calibration value. This value should already be set with 3 decimal point accuracy . If the instrument is not calibrated, the unit will read “N/A”. Clicking on this field will bring up a window where you can enter the required decimal points required for the value.





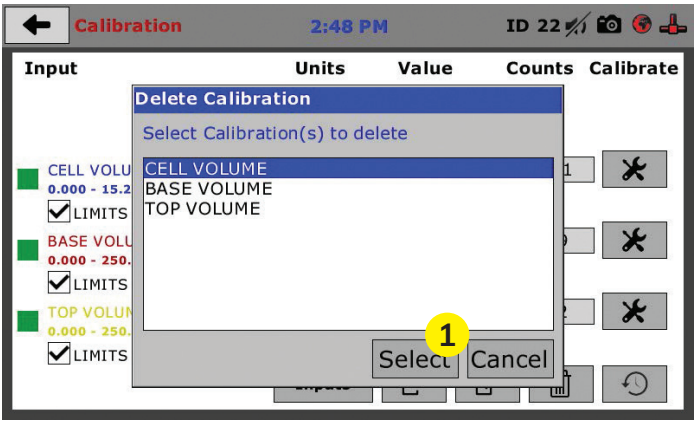
Performing a New Calibration

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.



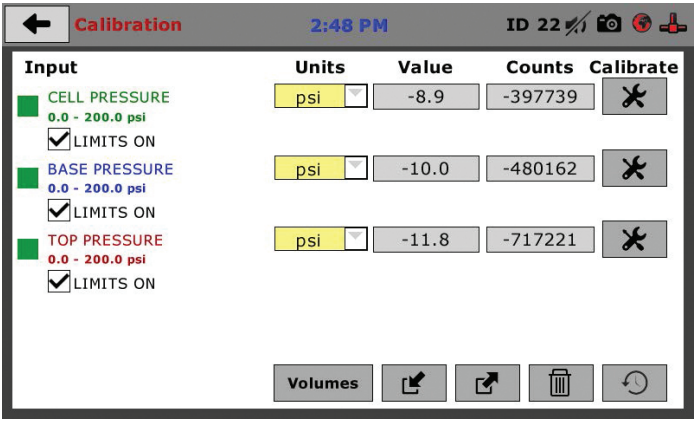
Once your calibrations have been saved, you will see a pop up screen that says: Calibration Export Successful.

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.



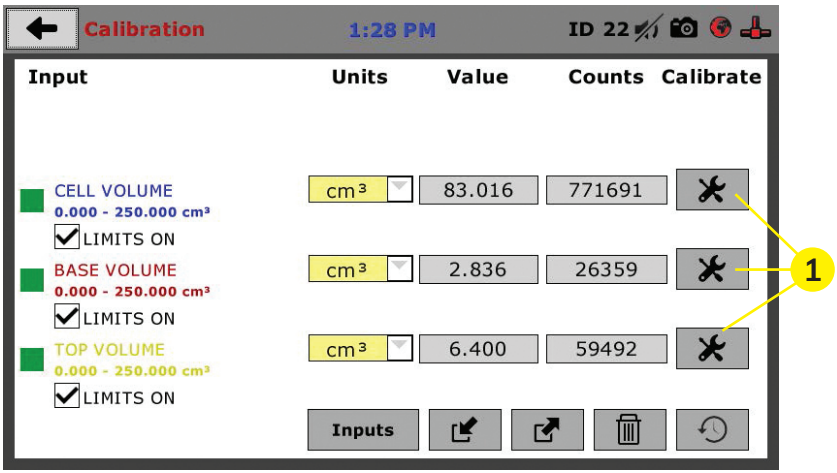
On this screen select an Input calibration to delete, one at a time, and then press the Select button **(1)**. The calibration will be deleted. You can do this for all Inputs you wish to calibrate.

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

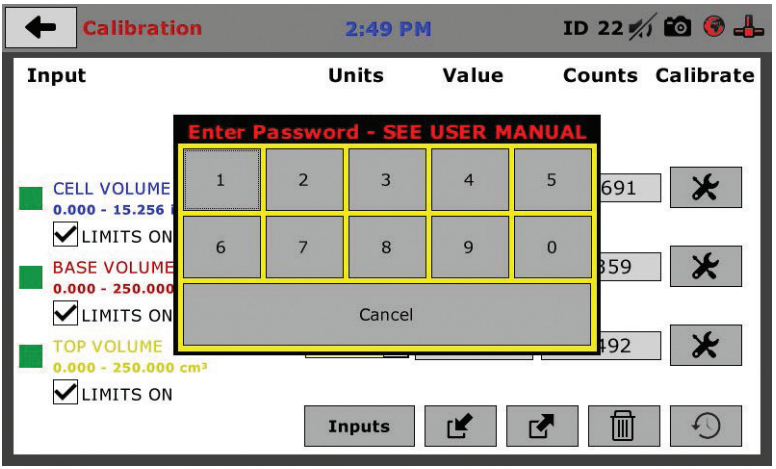


Calibrating your instrumentation to the appropriate Input requires a separate device, which can provide precise and specific loads or displacement, and, which has been certified to be accurate. The calibration process involves plugging the instrumentation into the HM-5810 while placing the instrumentation into the certified calibration device, which provides a specific set load or displacement.

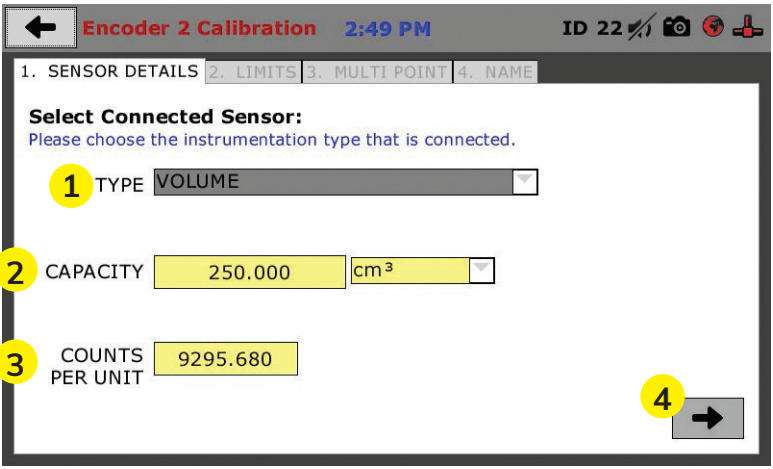
Once this has been done, click the Calibrate button next to the appropriate Input **(1)**.



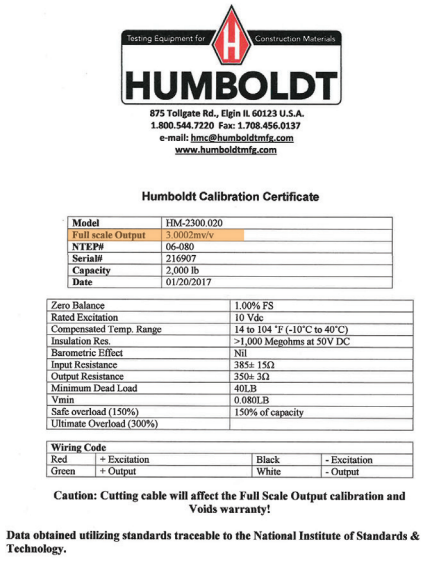
A pop-up window will appear requiring you to enter the password, which is **22234**, see below.



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 Volume. For Capacity **(2)**, fill in the maximum capacity of the sensor and choose either lbf or kN.



Testing Equipment for | Construction Materials

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

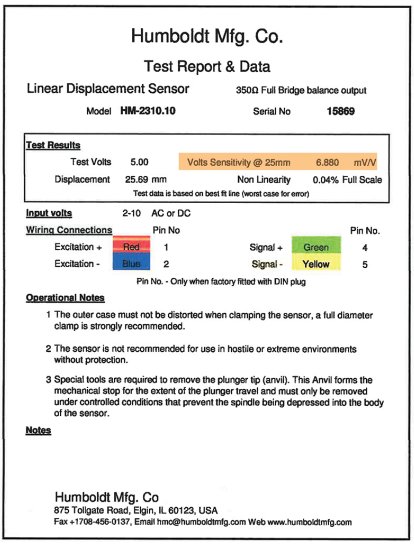
Model	HM-2300.020
Full scale Output	3.0002mv/v
NTEP#	06-080
Serial#	216907
Capacity	2,000 lb
Date	01/20/2017

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.

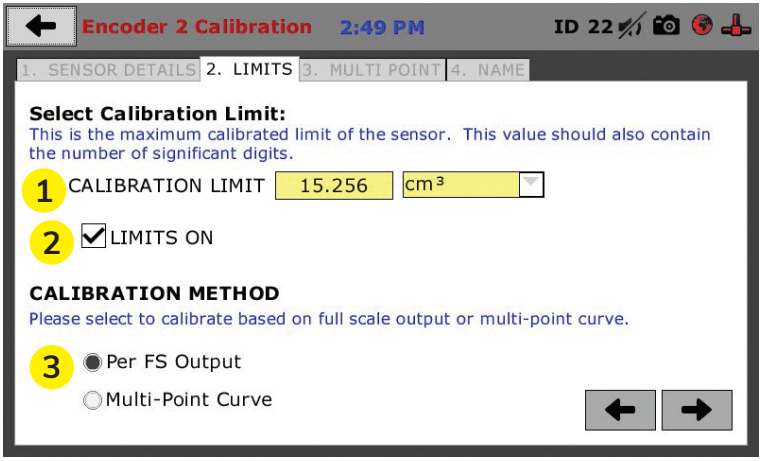
2 The sensor is not recommended for use in hostile or extreme environments without protection.

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

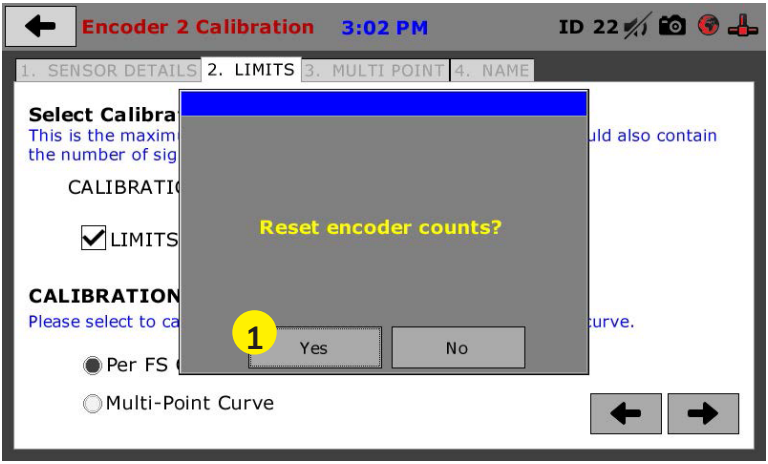
Humboldt Mfg. Co
875 Tollgate Road, Elgin, IL 60123, USA
Fax +1708-456-0137, Email hmc@humboldtmfg.com Web www.humboldtmfg.com

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.

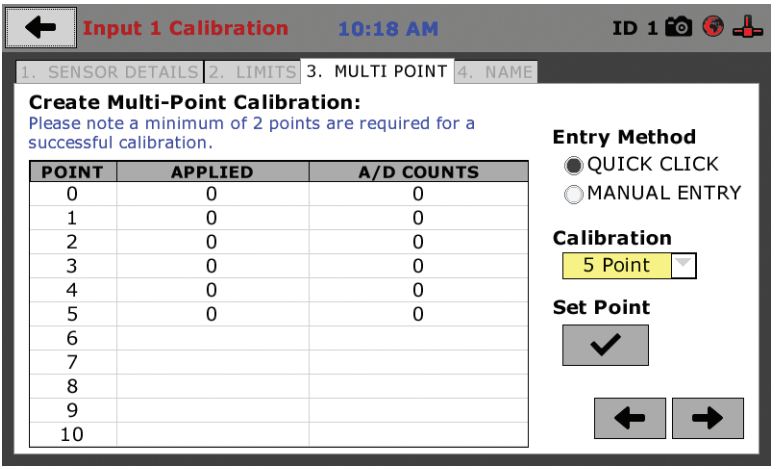


On Tab 2, in the Calibration Limit field **(1)**, enter the maximum calibrated limit of the sensor. This value should contain the number of decimal points you require for degree of accuracy, up to 5 points. Limits On **(2)**, should be checked if you don't want the machine to apply a load greater than 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 meth-od) it will base your calibration on the maximum capacity of the sensor vs. the minimum capacity of the sensor. If you choose this method click on the Right Arrow in the bottom right-hand corner of the screen. A confirmation window will come up asking if you wish to reset the encoder counts; select YES, see next page.



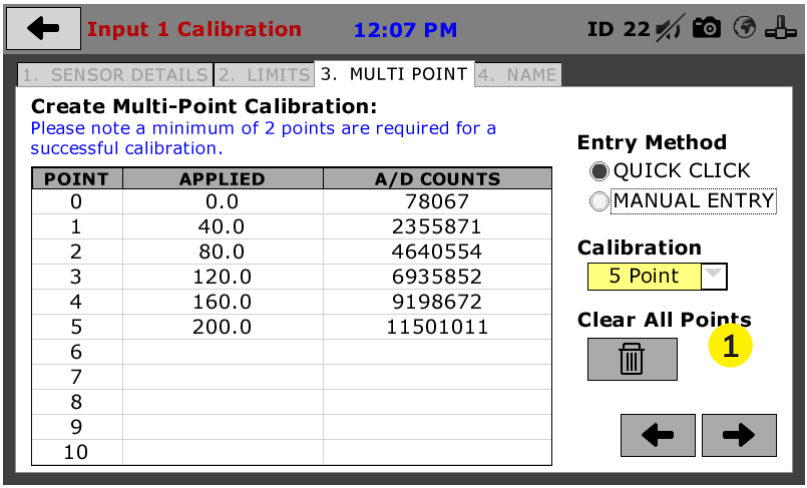
If you choose Multi-Point (Not recommended for encoder counts when calibrating the volume control) Curve and click on the Right Arrow in the bottom right-hand corner of the screen, you will be taken to Tab 3.



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.

Connect the instrumentation sensor connected to a calibrated pressure control device, and connect the instrumentation plug to the appropriate channel Input on the back of the HM-5810. You will set the “0” point at 0 with no pressure applied to the sensor. A “5” point calibration 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 pressure reading and the maximum load reading.

For example, the pressure transducer has a maximum pressure rating of 200 psi. you would set the “0” point at “0” and the “5” point at 200. Points “1” through “4” would typically be set at: “1” 40 psi; “2” 80 psi; “3” 120 psi; “4” 160 psi and “5” 200 psi. Or, divide the maximum load number by the number of points, in this case 5, which works out to 40 point increments between points. See photo below.

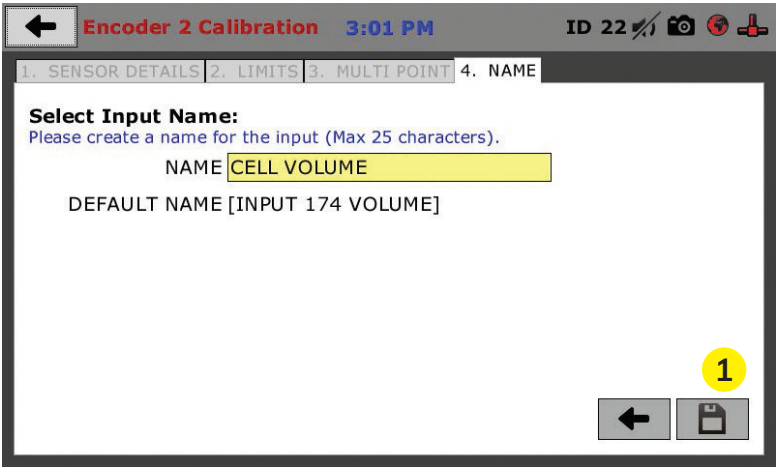


Each point would be chosen by clicking on the corresponding calibration point row. The load would be applied to the sensor and an A/D Counts reading would appear. To set the point, click on the Set Point button (1)

NOTE: this button toggles between **“Clear Point”** and **“Set Point”**.

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. If a user defined name is not chosen the machine will save the calibration using a default name based on the sensor type and channel input number.



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

HYDRO-CONTROL
5810
HUMBOLDT
CELL
BASE
TOP
AIR / WATER
DEAIRING
FILL
OFF
VACUUM
AIR
DRAIN
TAP
AUXILIARY WATER

Test Setup

To begin a new test, first, you will need to fill your deairing tank.
To begin set all knobs into the Off position, see photo below.

Then:

1. In the Deairing Tank section, Turn the top FILL/DRAIN valve to the FILL position **(1)**
2. Then, Turn the bottom VACUUM/PRESSURE valve to the VACUUM position **(2)**

The valves should now be in the position shown in the photo below.

5. When the Deairing Tank is 3/4 full, turn the Deairing Tank FILL/DRAIN valve to the “OFF” position.
6. Leave the VACUUM/PRESSURE valve on VACUUM for 20-30 minutes to remove air out of water in Deairing Tank. The Vacuum should be in the -28” HG. Then...
7. After 30 minutes, turn the VACUUM/PRESSURE valve to the OFF position. The Valves should now be in the position shown in the photo below **(3)**.

8. You can now turn off your Vacuum Pump
9. You can now turn the Lower Deairing Tank valves from Off to Pressure**(4)**.

   You should now have an adequate supply of Deaired Water in the Deairing Tank to initiate a triaxial test.

How to Fill the Hydraulic Pistons on the HM-5810

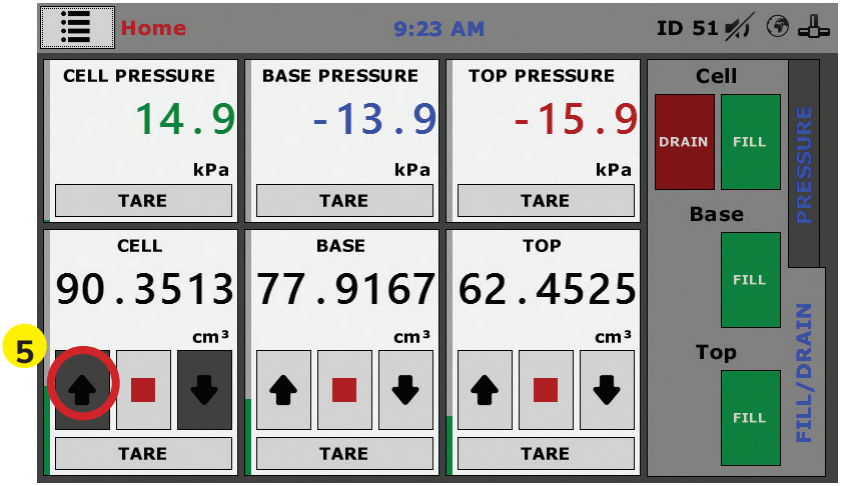
Note: This process will need to be done three times, once for each cylinder (Cell, Base, and Top).

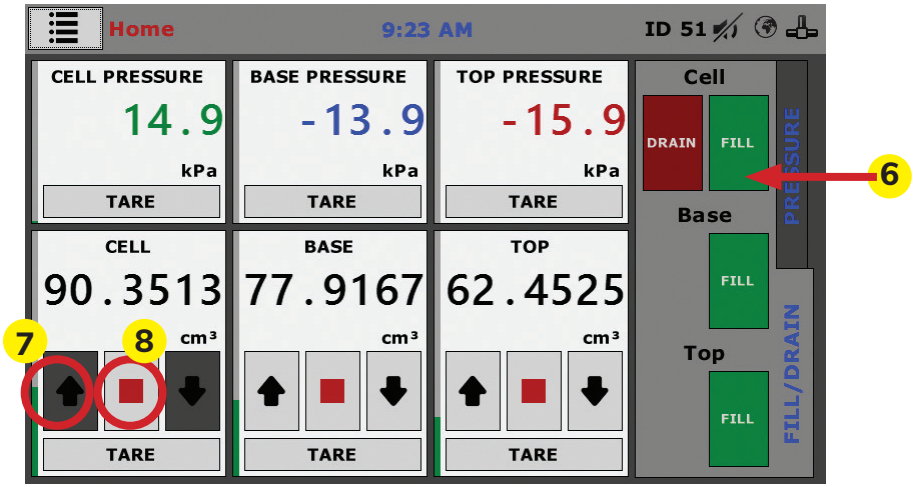
3. Open the Cylinder Bleed valve **(3).**

   NOTE: Make sure the Line Bleed valve is closed **(4).**

4. Press the UP arrow under CELL VOLUME on the touch screen to move the piston to the top of the Cylinder **(5)**.

   Once the piston is all the way to the top of the cylinder, close the bleed valve **(3 above)** select the FILL button on the touch screen, and press the down arrow on the touch screen and the piston will move to the bottom of the cylinder and read: 0.0000. This will allow the piston to move down and fill the cylinder with water.





5. Select the Cell Fill Button **(6)** to allow water to flow from the water source to the Pressure Cylinder. When all air has been removed through the Bleed Valve and only clear water is exiting, close the Bleed Valve.

   Once the cylinder is full (this will be at approximately 260 cc), open the bleed valve to allow any excess air to exit the cylinder and lines.

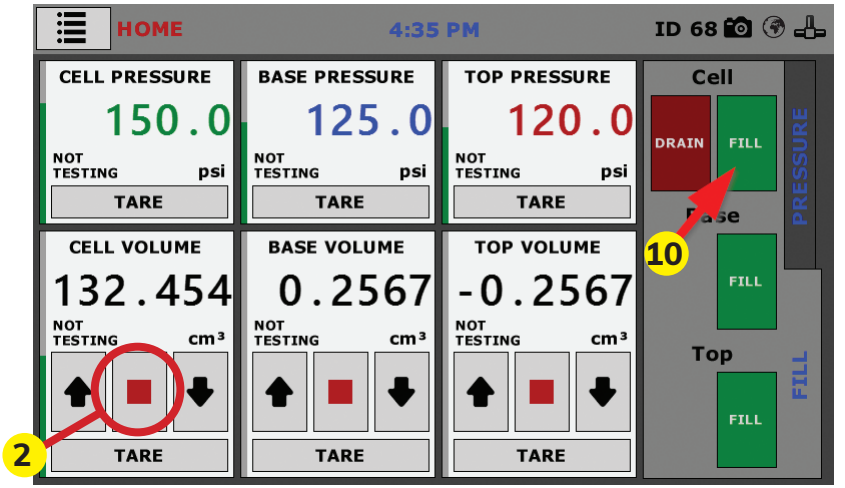
6. Open the Line Bleed valve to allow water to exit the lines and fittings near the pressure cylinder. When all air has been removed through the Line Bleed valve, close the bleed valve. Press the Fill button on the touch screen to close the solenoid valve.

NOTE: This process is typical for filling all three pressure cylinders

8. Repeat this process for the Base and Top Pressure cylinders.

Deairing the Lines from the HM-5810 to the Triaxial Cell

1. Connect a length of tubing to the CELL PORT on the front of the HM-5810 **(2)**, see photo at top of page.
2. Press the FILL BUTTON **(10)** on the touch screen for the CELL
   CHAMBER.
3. Press STOP **(2)** on the touch screen once the air has passed through the tubing press the Fill button **(10)** to stop the flow of water.

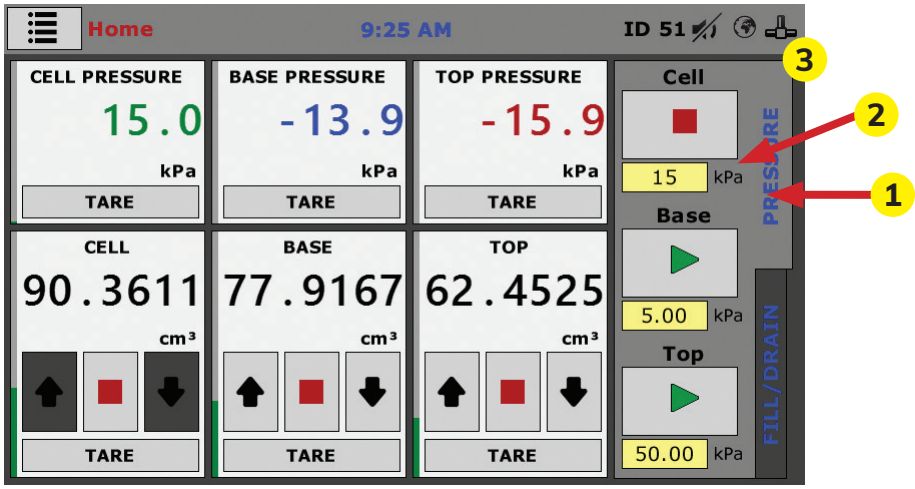


4. Repeat this process for the Base and Top Chambers.

   NOTE: Please ensure you are using the correct Fill Buttons when bleeding the Base and Top lines.

Pressurizing the HM-5810

1. Disconnect the triaxial cell water supply lines from the quick disconnect on the HM-5810
2. Select the PRESSURE TAB **(1)** on the Touch Screen.
3. Enter 50 psi for Cell Pressure in the yellow PSI Field **(2)**, and then, Press the corresponding green Start Button **(3)**, (see photo below).



3. Repeat this process for the Base and Top Chambers.
4. Leave all three chambers set under 50 psi for 24 hours to dissolve any remaining air in the HM-5810 plumbing system.

Filling the Triaxial Cell

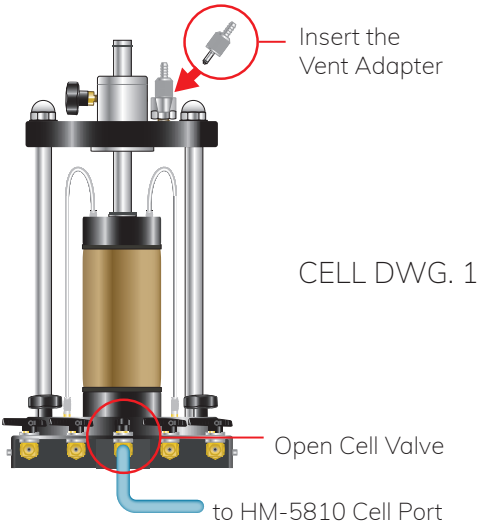
1. In order to fill the Triaxial Cell, Connect tubing between the CELL PORT on the left front of the HM-5810 nd the Cell port on the Triaxial Cell.

   NOTE: Ensure that the pressure in the cylinders on the HM-5810 has been reduced to close to 0 psi, and the pressure control STOP button has been selected on the touch screen to ensure that the HM-5810 will not try to maintain pressure in the system when the Triaxial Cell valve is opened, and the FILL button is selected on the touch screen."

   There is insufficient water contained within the pressurec cylinders to fill the Triaxial cell. Do not try to fill the interior lines or the Triaxial Cell using the water contained within the pressure cylinders.

2. Ensure that the PRESSURE RELIEF VALVE is open on top of Triaxial Cell. NOTE: On Humboldt Triaxial Cells, this is achieved by inserting the Vent Adapter into Vent on top of Triaxial Cell Chamber

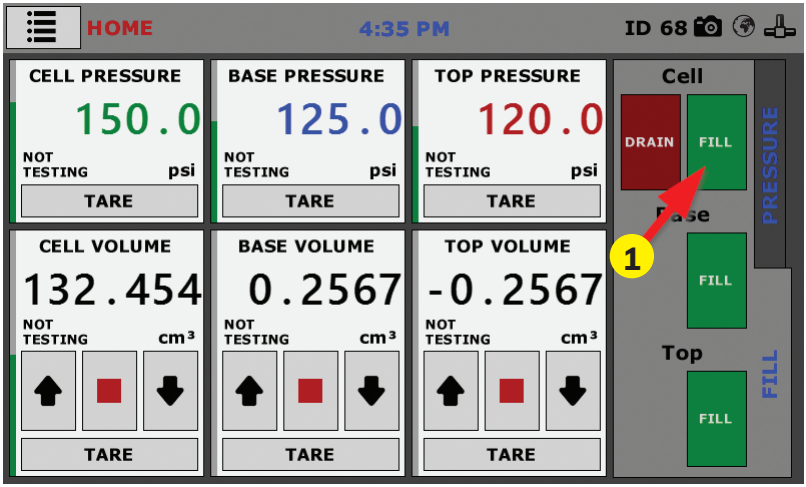
3. Ensure that the CELL VALVE is open on the Triaxial Cell (see Red Circle around the CELL VALVE in CELL DWG. 1 below).



CELL DWG. 1

4. Press the Cell FILL button **(1)** on the FILL TAB on the HM-5810 touchscreen (see below).

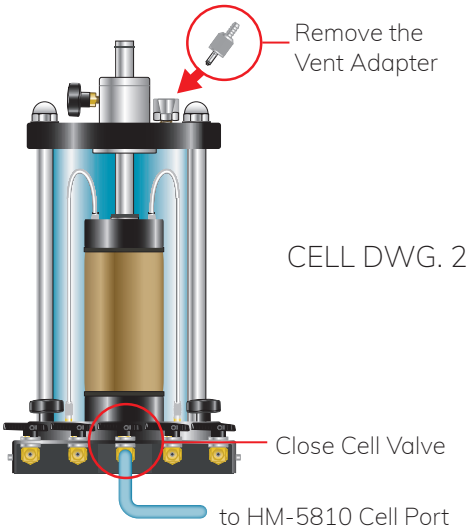
   NOTE: when the Fill Tab is activated water will flow from the external source, through the Pressure Cylinder, and into the Triaxial Cell.



5. Once the Triaxial Cell is filled completely, turn the CELL VALVE on the Triaxial Cell to the OFF position (See CELL DWG. 2 below).

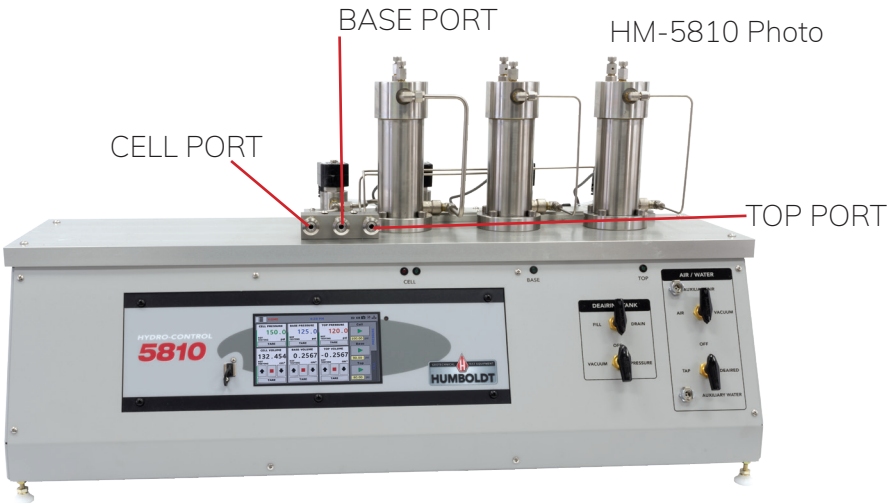
   Press the FILL tab on the touch screen to close the water supply.

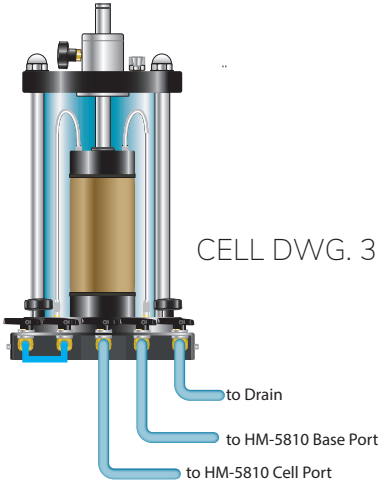
6. Then, Remove the Vent Adapter at the top of the Triaxial Cell (See CELL DWG. 2 below).



Flushing the Triaxial Cell Water Lines

1. Before proceeding, make sure the Triaxial Cell is configured like the drawing above. Make sure all the VALVES on the Triaxial Cell are closed. (see CELL DWG. 2 above).
2. Connect the line from the BASE OUTPUT PORT on the HM-5810 (see HM-5810 Photo) to the BASE VALVE (port to the right of the CELL VALVE) on the Triaxial Cell (see CELL DWG. 3, below).
3. In addition, connect a line between the TOP VALVE and the BASE VALVE on the left side of the Triaxial Cell (see CELL DWG. 3, below).



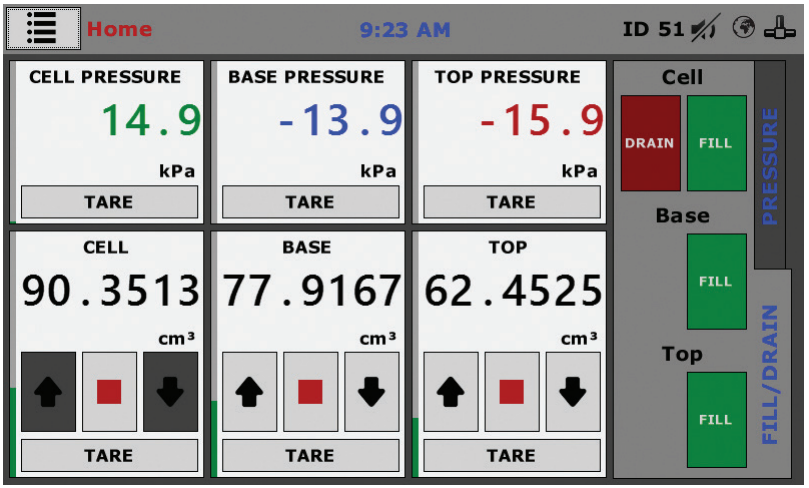


1. Ensure the Cell port on the Triaxial Cell is turned to OPEN.
2. Using the pressure controls on the touch screen on the HM-5810, apply a cell pressure of 3-5 psi to the Triaxial Cell.
3. Disconnect the tube connected to the right TOP port on the Triaxial Cell.
4. Select the Base FILL tab on the HM-5810 touch screen.
5. Open the right Top port on the Triaxial Cell.
6. Open the right Base port on the Triaxial cell
7. Water should start moving from the De-airing tank, through the HM-5810, through the internal lines in the Triaxial Cell, and out through the right Top port to allow the air in the lines to escape.

   Note: For this operation to work properly the De-airing tank must be positioned at least 2-3 feet above the HM-5810 and the Triaxial Cell. Monitor the base pressure on the HM-5810 and ensure that the Base pressure does not exceed the Cell pressure during this operation.

8. When all the air has been bled from the internal lines close the right TOP port on the Triaxial cell.
9. Close the right BASE port on the Triaxial Cell.

10. Press the Base FILL button on the HM-5810 to shut off the water source.
11. Reconnect the water tubing to the right Top port on the Triaxial Cell.

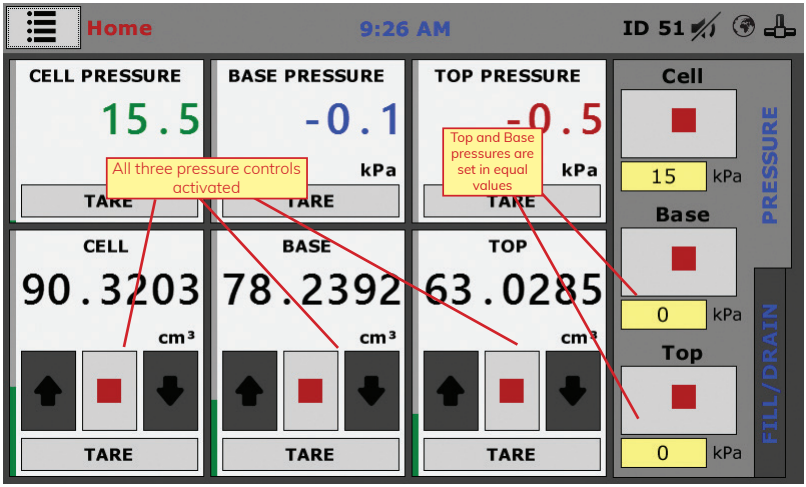


CELL DWG. 4

HM-5810 Permeability Set-up

NOTE: These instructions assume the that both the Saturation and Consolidation phases of the test have been completed to ASTM standards. Failure to do so may result in poor or inaccurate results during the permeability phase of the test.

1. Ensure that the applied Top pressure and Base pressure on the HM-5810 are equalized.

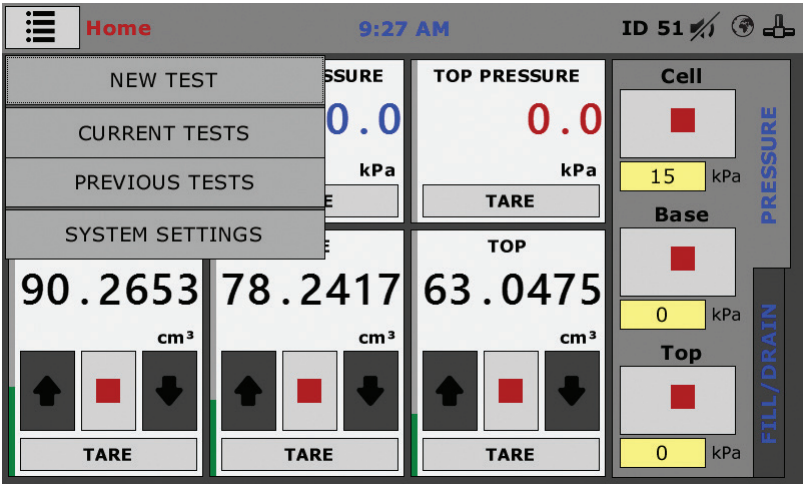


a. **NOTE:** All three pressure controls are actively applying pressure, and that the Base and Top pressure settings are equal in the illustration above.

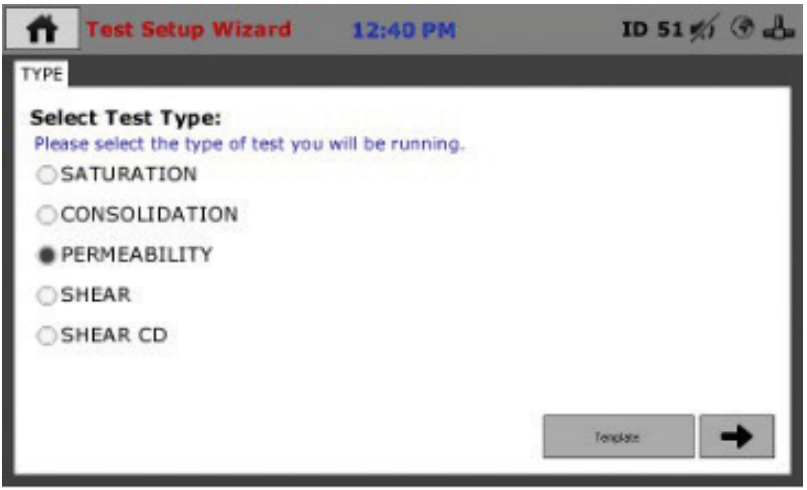
2. Once the Top and Base pressures have been equalized on the HM-5810, ensure that the Top port on the Triaxial cell is in the open position.

NOTE: If the Top port on the Triaxial cell was in the open position during the Saturation and Consolidation phases of the test the only step required is to apply a Top pressure that matches the current Base pressure.

3. From the touch screen, select the HOME button; a pull-down window will appear.
4. Select the New Test button from the pull-down window.



5. Select PERMEABILITY from the Test Type menu.



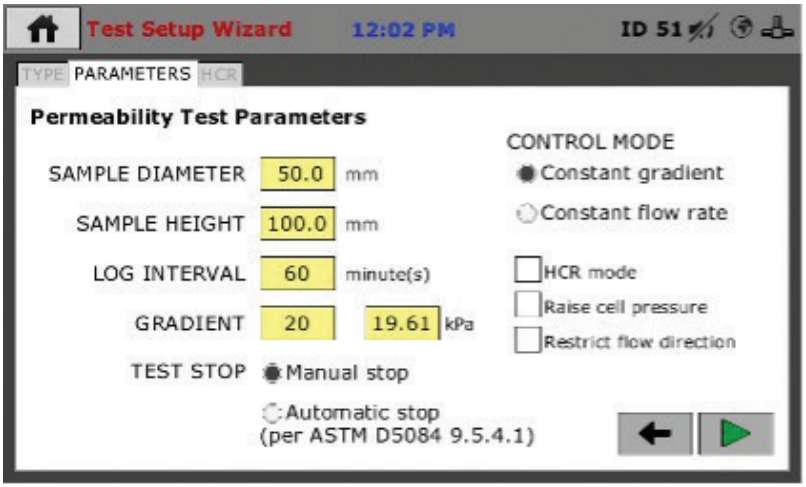
6. Select the Next Tab button

7. Enter the test parameters for the test to be run then select the Test Start button (green arrow in the lower right corner of the screen).

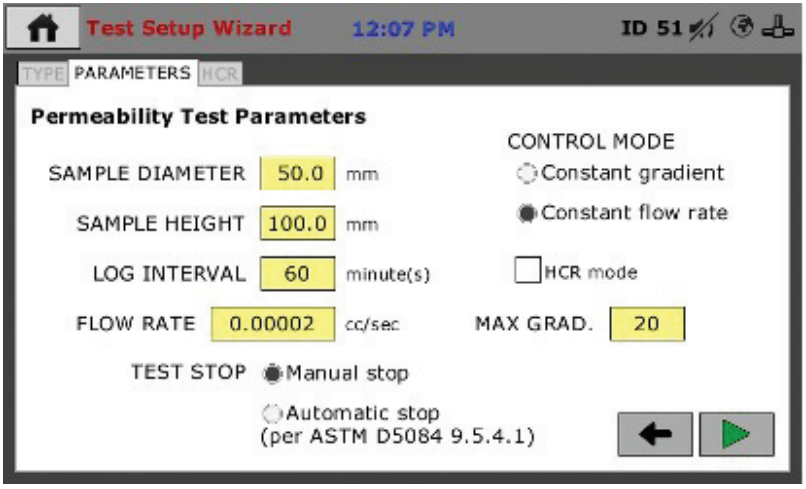
   a. If HCR mode is selected, you will need to enter the Initial Conductivity value on the next screen.

   b. Depending on the Permeability test type (Constant Gradient or Constant Flow) one of the two screens shown below will display.

Constant Gradient



Constant Flow



8. Select the Next Tab button (button with the green arrow).

9. Enter the desired name for the test.

10. Select the Check Mark button.

Once the Check button has been selected the test will automatically initiate.

HM-5810.3F Specifications

Humboldt's HM-5810.3F is a small-footprint, triaxial-specific load frame that provides the versatility, precision and durability found throughout Humboldt's Elite Series load frames.

The HM-5810 Triaxial Loader has been specifically designed to handle triaxial testing applications, including: UU, CU and CD triaxial and UC. From educational institutions and consulting firms to high-volume commercial labs and construction projects, the Triaxial Loader can handle any application with ease. Its heavy-duty design and precise stepper-motor control provide a stable platform for years of reliable service allowing the HM-5810 to perform any tests required up to its load capacity of 3000 lbf (15kN).

The HM-5810 is built around Humboldt's integral, 4-channel data logger with touch-screen control, which allows it 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.

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
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	2
Ambient temperature sensor	1
Firmware Update	Ethernet or flash drive

General Warnings

Ensure auxiliary equipment (Triaxial cell, tubing, etc...) is rated for the capacity of the testing 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. Before disconnecting tubing, ensure applied pressure has been removed.

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. Operators must ensure that Triaxial Cells used with the HM-5820 must be able to meet the same pressure capacity as the HM-5820.

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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