Dependable Products From People You Trust

Automated Curing Chamber

#120-20-A - Single Deep
#120-25-A - Double Deep

Instruction Manual

Updated 2/21/2025
Ver. 2

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Intro

The Curing Chamber is designed to prepare well cement specimens for compressive strength tests. It is necessary to determine the amount of time required for a cement to develop compressive strength so that drilling/production operations can be resumed as quickly as possible. The goal is to design a slurry that can quickly develop compressive strength so that the “waiting on cement” time is minimized. The Curing Chambers provide a means of curing cement specimens under typical downhole temperatures and pressures.

Description

Cement is poured into a special mold that produces specimens measuring 2" × 2" × 2". The mold is placed into the test cell and the pressure is added via an air-driven hydraulic pump. Test temperature and pressure are automatically controlled by the touch screen display. After a predetermined amount of time, the temperature of the test cell is reduced by the cooling system. Specimens are removed and the compressive strength is determined as outlined in API Specification 10.

An optional Expansion Module uses a linear transducer inside the wall of the cell to measure the expansion or shrinkage of the cement while curing.

Components

Components:

#120-25-043	Relief Valve, 5000 psi
#122-001	Thermocouple Assembly
#122-008	Heater Assembly
#122-052	Rupture Disk, 5,500 PSI (38 MPa)
#122-077	Fuse, 10 Amp
#122-083	Mold Assembly, 8 Specimen
#170-27	Allen Wrench, 5/32"

Optional:

#120-20-A-SP Spare Parts Kit

#120-20-019	Set Screw for Cell Cap, 5/8", Qty: 6
#120-25-014-1	Filter Element, 35 Micron, Qty: 4
#120-25-038	Socket, 5/16" × 3/8", Qty: 1
#120-25-043	Relief Valve, 5000 psi, Qty: 1
#120-70-1-056	Check Valve, Qty: 1
#120-89-555	Filter Element, 40 micron, Qty: 2
#122-001	Thermocouple Assembly, Qty: 1
#122-008	Heater, Qty: 2
#122-052	Rupture Disk, ¼", Qty: 2
#122-077	Fuse, 10 Amp, 5 mm × 20 mm, Qty: 10
#122-083-02	Socket Screw, 10-32 × 5/8, Qty: 20
#165-44-2	Anti Seize Compound, Silver, 7g Pouce, Qty: 20
#170-27	Allen Wrench, 5/32", Qty: 1

Specifications

Maximum Temperature	600°F (315.6°C)
Maximum Pressure	5,000 psi (34.5 MPa)
Air Supply	100 - 120 psi (689 - 827 kPa)
Cubes	Single Deep: 8 Double Deep: 16
Cooling Water Supply	40 psi (276 kPa)
Display	Touch Screen
Safety Features	Pressure Relief Valve Safety Head with Rupture Disk
Power Requirements	220 Volts, 50/60 Hz, 30 Amp
Weight	Approximately 450 lb
Dimensions	22.5" × 27.5" × 70"
Shipping Weight	Approximately 750 lb
Shipping Dimensions	26" × 34" × 76"
Industry Standards	API Specification 10 ASTM Standard C-109

Setup

1. Carefully remove the instrument from the wooden crate.

2. Make sure the PRESSURE RELEASE valve is closed (clockwise) and all switches are in the OFF or AUTO position.

3. Connect a compressed air or Nitrogen source to the AIR SUPPLY port on the back of the unit. Also connect a water supply and drain line. All three ports are ¼" NPT.

4. Plug the Curing Chamber into an appropriate electrical outlet.

   A second electrical port on the back of the unit can be used to provide backup power in case of emergency. Plug an Uninterruptable Power Supply (UPS) into this port. In the event of a power interruption, the electronics will remain on while the heaters will shut off. When the power comes back on, all systems will run off of the main power source.

Tip

5. Turn the MAIN POWER switch ON.

6. Prepare the cement molds as outlined on the next page. Note that these procedures are stated within API Specification 10.

Control Panel

- FILL/DRAIN CELL: Select FILL to fill the cell with water before a test. Select DRAIN to drain water from the cell after a test is complete.
- LVDT POWER: Supplies power to the expansion module (optional)
- LVDT PROBE: Extends or Retracts the expansion module probe into the test cell (optional)
- HEAT: Select AUTO to use a Test Profile to control the test temperature (see page 11). Select MANUAL to set the temperature manually on the display. Select OFF to turn off the heaters.
- COOL: Select AUTO to use a Test Profile to control the cooling system after a test (see page 11). Select MANUAL to turn the cooling system on or off with the display. Select OFF to turn off the cooling system.
- PUMP: Select AUTO to use a Test Profile to control the test pressure (see page 11). Select MANUAL to set the pressure manually on the display. Select OFF to turn off the pump.
- MAIN POWER: Supplies power to all electrical systems

Prepare Molds

1. Thinly coat the interior faces of the molds and the contact surfaces of the plates with grease to facilitate the removal of the cement specimens once they have cured.
2. Prepare the cement slurry in accordance with API Specification 10.
3. Pour the slurry into the molds in a layer equal to one-half of the mold depth.
4. After all the mold compartments are filled half full with slurry, puddle each specimen 25 times with a puddling rod.
5. After puddling the first layer, stir the remaining slurry by hand using a puddling rod or spatula to eliminate segregation.
6. Fill each compartment to overflowing and puddle 25 times with a puddling rod.
7. Using a straight edge, strike off the excess slurry even with the top of the mold.
8. Place a greased cover plate on top of the mold.
9. Install the T-handle onto the mold.
10. Clean all excess cement from the outside of the mold assembly before starting a test.

Cement Molds

Operation

Starting a Test

1. Loosen all twelve set screws on the cell cap with a torque wrench.
2. Unscrew the cell cap by turning it counterclockwise.
3. Lift the cell cap off of the cell.
4. Carefully lower the cement mold into the test cell, ensuring that the thermocouple port is centered correctly.
5. Remove the handle from the mold.
6. Lubricate the sealing ring and threads on the cell cap with high temperature grease.
7. Lower the cell cap onto the test cell.
8. Tighten the cell cap completely by hand. Be careful not to damage the seal rings.
9. Tighten all twelve set screws on the cell cap by hand, using a cross pattern.
10. Adjust a torque wrench to 90 inch-pounds and tighten the set screws in a cross pattern. For example, tighten a set screw, then tighten the set screw across from the first until all of the set screws have been tightened.
11. Now adjust the torque wrench to 180 inch-pounds and tighten the set screws in the same cross pattern.

    The cap must be tightened in a consistent and uniform manner to obtain a good seal.
12. Insert the thermocouple into the port in the cell cap. Tighten the threaded gland finger tight and then loosen it ¼ turn. Plug the thermocouple into the thermocouple port on the unit cabinet.
13. Make sure the PRESSURE RELEASE valve is closed (clockwise).
14. Set the FILL/DRAIN CELL switch to FILL.
15. With a ⅝" wrench handy, watch the top of the cell. When water begins to flow from the thermocouple connection, tighten the thermocouple fitting with the wrench.
16. Set the HEAT, COOL, and PUMP switches to AUTO.
17. On the Test Setup screen, enter the parameters of your test. See page 11 for instructions.
18. Touch the Start Test button on the display.

Operation

Ending a Test

1. If the Stop At End option is turned on (see page 13), the unit will automatically turn off the heat and turn on the cooling system when the test is complete. If the Stop At End option is turned off:

   a. Touch the Stop Test button.

   b. Set the HEAT switch to OFF and the COOL switch to ON.

2. When the temperature is below 180°F (80°C), set the PUMP switch to OFF.

3. Slowly open the PRESSURE RELEASE valve (counterclockwise). The pressure should be close to zero.

   Do not release the pressure until the temperature is below 200°F (93°C).

Important

4. Set the FILL/DRAIN CELL switch to DRAIN. This will allow air into the cell to purge the water.

5. Slowly loosen the fitting on the thermocouple and remove it from the test cell.

6. Loosen the set screws on the cell cap.

7. Unscrew the cell cap and lift it off the test cell.

8. Remove the cement specimens and cool them in a water bath as described in API documents.

9. Return the cell cap to the test cell to prevent dust and other matter from entering the test cell.

10. Close the PRESSURE RELEASE valve and set all switches to OFF or AUTO.

Onboard Display

The Curing Chamber features an onboard display. It provides access to test configuration and manual control. The display can be operated either as a touch-screen or with the control wheel.

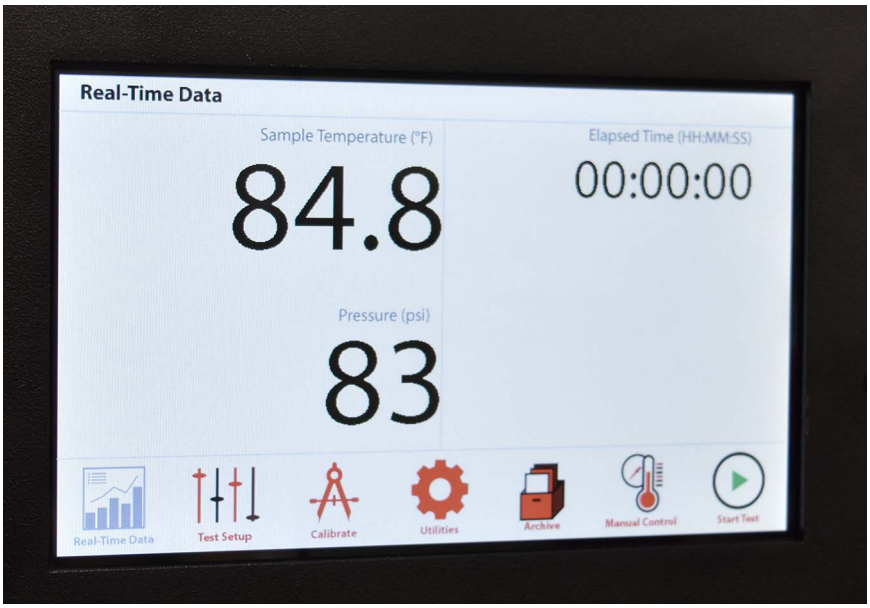
To operate the display with the Control Wheel:

1. Turn the Control Wheel to scroll through the available parameters.
2. Press the Control Wheel to select a parameter.
3. Turn the Control Wheel to scroll through available values for the parameter.
4. Press the Control Wheel to select a value.

Onboard Display

Real-Time Data

The Real-Time Data screen is the default screen. When the display has been idle for more than 2 minutes, it will automatically revert to this screen. Here you can see the current test parameters. This screen does not accept any inputs.



Onboard Display

Test Setup

On the Test Setup screen, you can create a Profile for your test.

1. Choose a Parameter (Temperature or Pressure).

2. Choose a Step Type:

   Ramp: This will increase the temperature or pressure up to the target in a set number of minutes. Enter the ramp time and target temperature or pressure.

   Step: This will increase the temperature or pressure up to the target as fast as possible. Enter the target temperature or pressure.

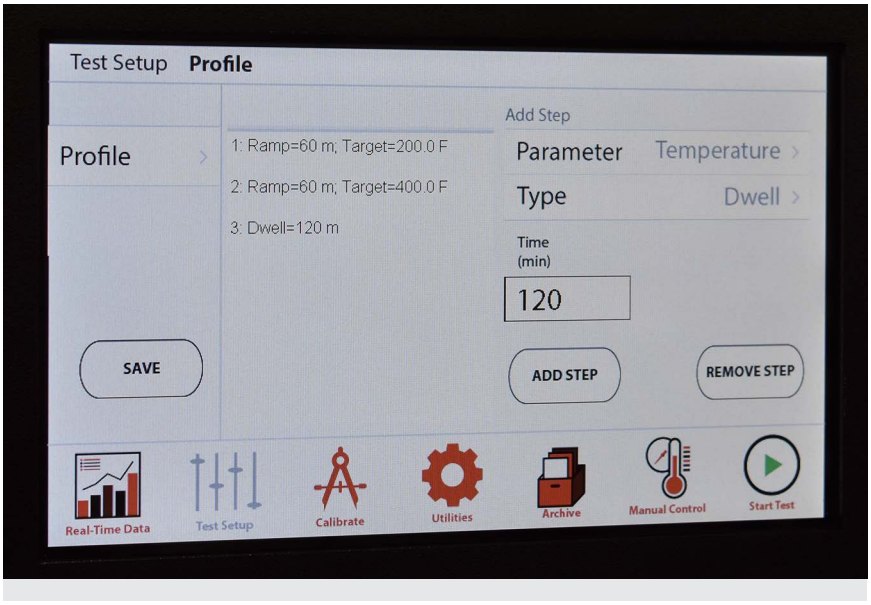
   Dwell: This will hold the current temperature or pressure for a set number of minutes. Enter the time.

3. Enter the parameters for the step (ramp time, target temperature, etc).

4. Select the “ADD STEP” button.

5. To remove a step, select it in the list and select the “REMOVE STEP” button.

6. When you are finished adding steps, select the “SAVE” button.



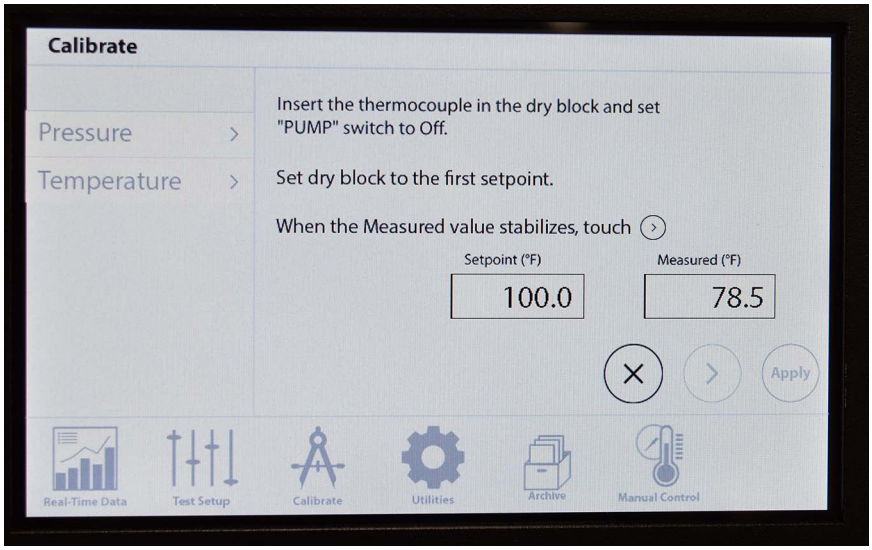
Onboard Display

Calibrate

On the Calibrate screen, the onboard display can calibrate the pressure transducer and thermocouple.

1. Select the system (Pressure or Temperature) to calibrate.

2. Follow the onscreen instructions.



Onboard Display

Utilities

The Utilities screen sets general parameters.

1. Enter the values for each parameter:

   Temperature: Choose either °F (Fahrenheit) or °C (Celsius)

   Pressure: Choose units for cell pressure (psi or MPa).

   Expansion: Turn the Expansion feature on or off. This is an optional feature.

   Stop At End: If this option is turned on, when the test defined on the Test Setup screen finishes, the unit will automatically turn off the heater, turn on the cooling system (as long as the temperature is above 120°F), and reduce the cell pressure (once the temperature is below 120°F). If this option is off, when the test is complete, the Curing Chamber will maintain the temperature and pressure until the user intervenes.

2. Select “Apply” when done.

Onboard Display

Archive

On the Archive screen, saved calibrations and tests can be exported to a USB drive.

1. Place a USB drive in the port on the front of the instrument.

   The port has an indicator light to show the status of the inserted drive:

   a. Green: The drive is inserted and supported.

   b. Amber: The drive is inserted and supported, but low on free space.

   c. Red: The drive is inserted but not supported.

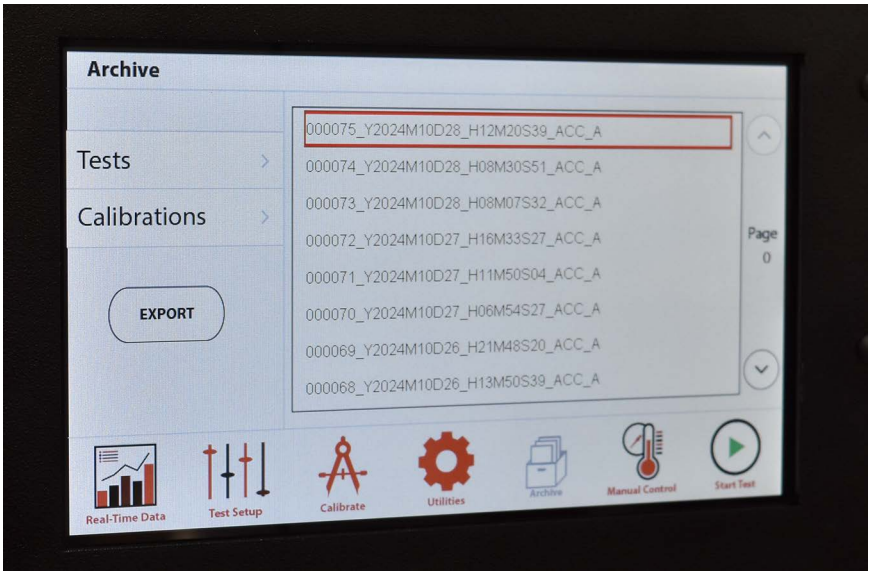
   Make sure the drive is formated in the FAT32 file system.

2. On the left-hand side of the screen, choose either Tests or Calibrations. The list of available tests or calibrations will populate on the right.

3. Choose the item to export.

4. Select “Export”. The file will be saved to the USB drive.

Important

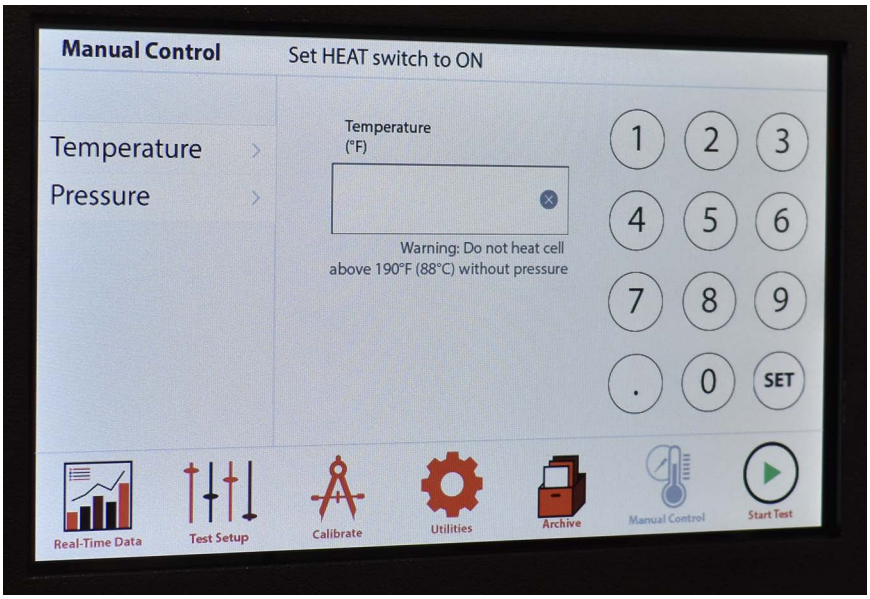


Onboard Display

Manual Control

The Manual Control screen can be used to set the temperature and/or pressure. The relevant switch (HEAT or PUMP) must be set to MANUAL.

1. On the left-hand side of the screen, choose Temperature or Pressure.
2. Enter the setpoint in the box.
3. Select “SET” when done.



Onboard Display

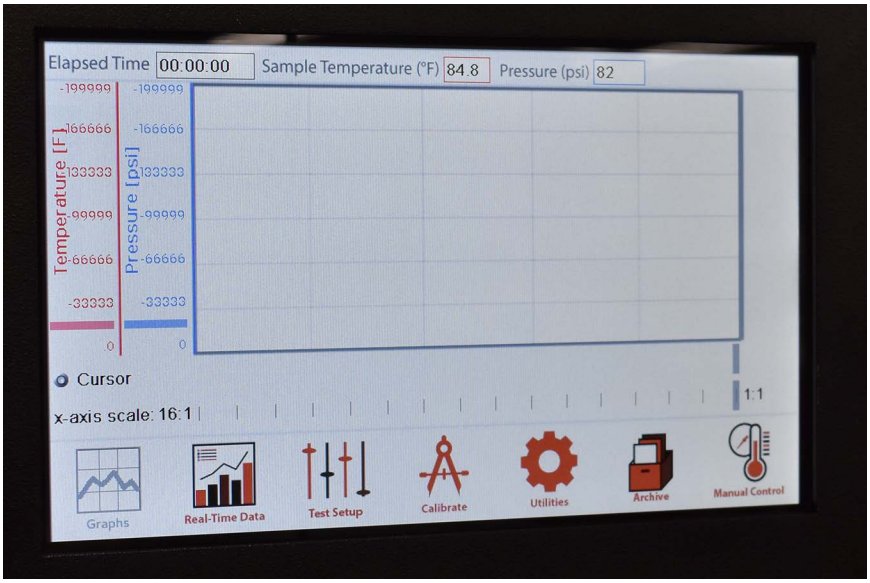
Start Test

The Start Test button starts a test using the parameters that are currently defined on the Test Setup screen. Before pressing the Start Test button, be sure to configure your test parameters (see page 11).

Onboard Display

Graphs

The Graphs screen shows a graph of the temperature and pressure over time.

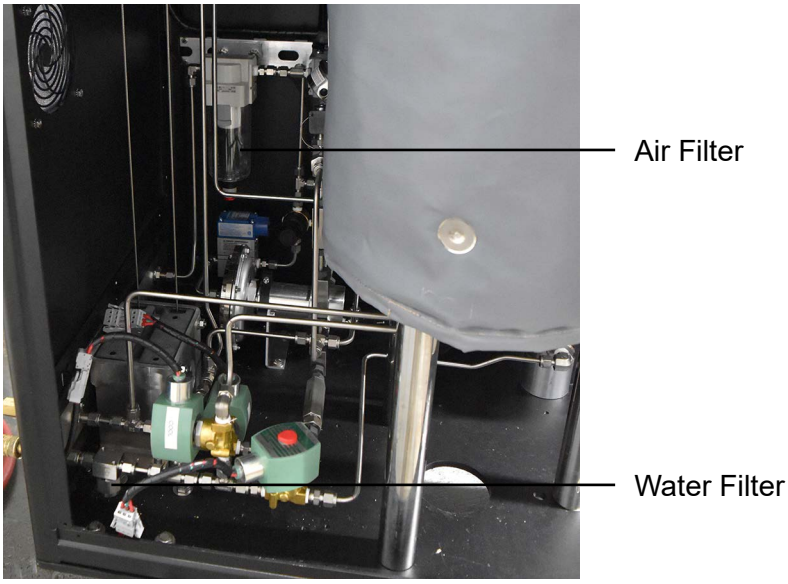


Maintenance

Filters

The water filter cleans the incoming water before it is routed to the various valves and regulators. This filter should be cleaned at least every three months. It may need to be cleaned more, depending on how clean your water source is.

1. Remove the panel on the left-hand side of the Curing Chamber.
2. Locate the water filter.
3. Unscrew and remove the filter housing.
4. Remove the filter element and clean it thoroughly.
5. Place the filter element back into the filter housing.
6. Screw the filter housing back into the filter.

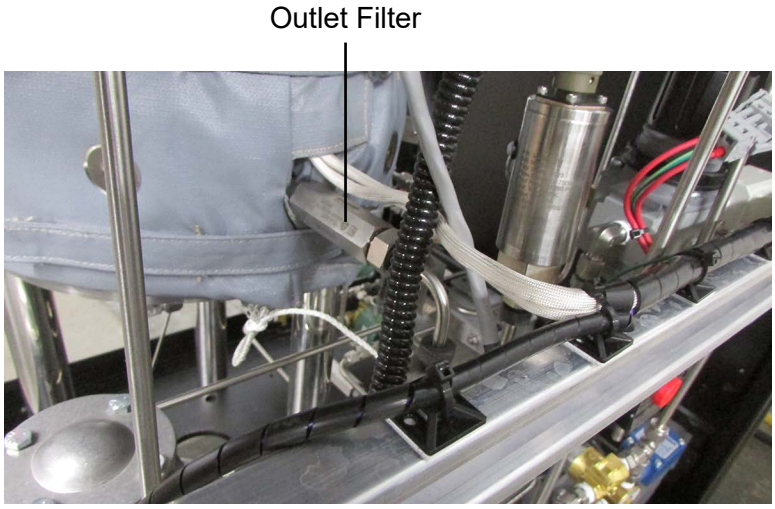


The Curing Chamber uses an air filter to remove moisture from the air source. This filter may need to be emptied periodically.

1. Remove the panel on the right-hand side of the Curing Chamber.
2. Locate the air filter.
3. Unscrew and remove the clear chamber on the bottom of the air filter.
4. Pour out any moisture that has accumulated inside the chamber.
5. Screw the chamber back onto the air filter body.

The outlet filter removes cement residue from the water when it exits the cell. This filter should be cleaned monthly.

1. Remove the panel on the right-hand side of the Curing Chamber.
2. Locate the outlet filter.
3. Note the direction of flow marked on the side of the filter.
4. Unscrew and remove the filter from the cell.
5. Thoroughly clean the filter.
6. Reinstall the filter, making sure the direction of flow is correct.



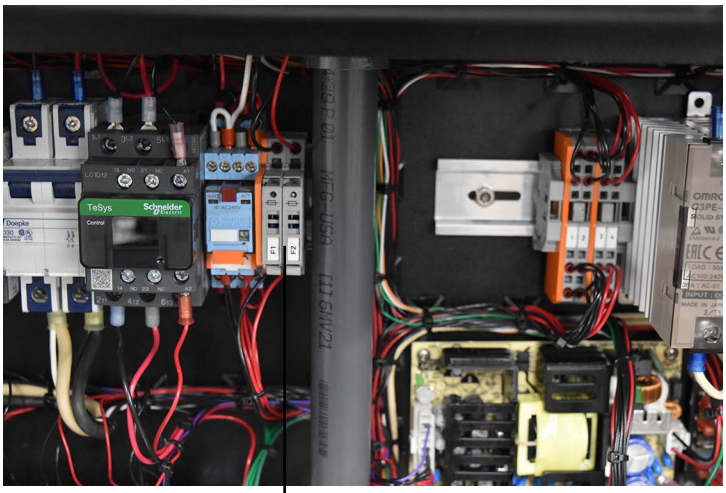
Maintenance

Fuses

The Curing Chamber uses two fuses to protect the electronic components. Remove the panel behind the test cell to access the fuses.

F1: 10 Amps

F2: 10 Amps



Fuses

Maintenance

Check Valve

The Curing Chamber uses a check valve to prevent air and water from leaving through the top of the cell. If this check valve becomes dirty, it will prevent water and air from entering the cell. It may need to be cleaned or replaced.

1. The check valve is connected to the top of the cell.
2. Remove the tool tray that is next to the cell cap.
3. Unscrew and remove the check valve.
4. Remove the spring from inside the valve housing.
5. If the spring is dirty, clean it thoroughly. If it is damaged, the check valve will need to be replaced.
6. Re-install the cleaned or new check valve into the cell.

Check Valve

Maintenance

Regulators

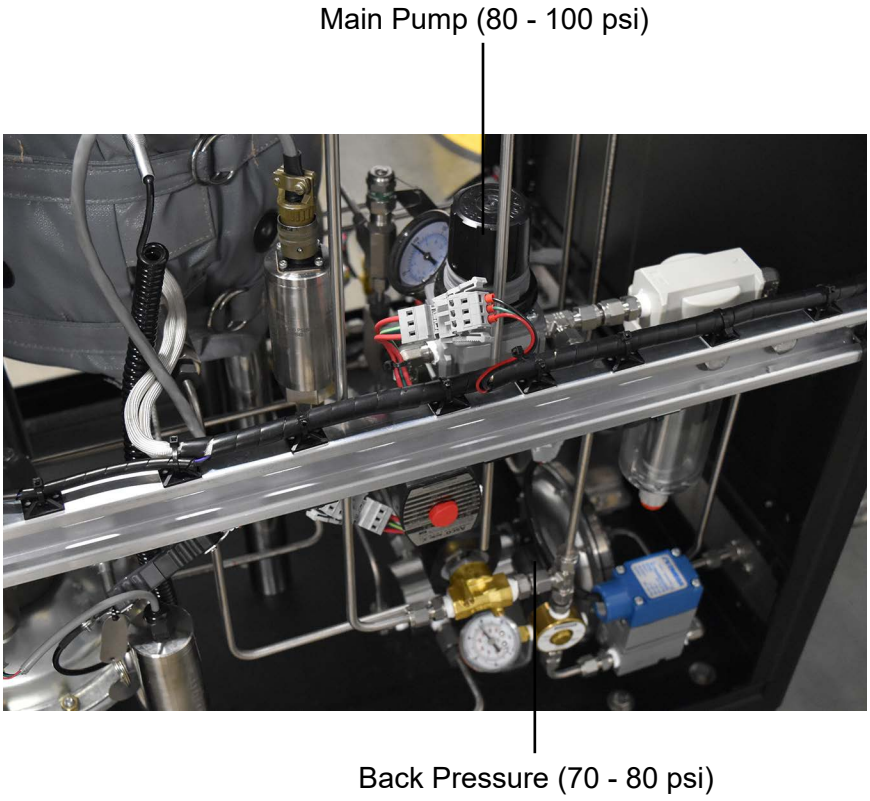
The Curing Chamber has two regulator inside the cabinet that control the flow of air to the main pump and the back pressure regulator. These regulators are set during production and should not need to be adjusted.

1. To access these regulators, remove the panel on the right-hand side of the unit cabinet.

2. The top regulator controls air to the main pump. It should always be set to between 80 and 100 psi.

3. The bottom regulator controls air to the back pressure regulator. It should always be set to between 70 and 80 psi.

4. If either of these regulators is not in the specified range, adjust it until it is.



Maintenance

Troubleshooting

Symptom	Cause	Remedy
Power		
There is no power to the machine	The main power cord is not plugged in. The fuse has blown.	Make sure the main power cord is firmly plugged into the wall. Check the F1 and F2 fuses.
Heating		
The unit is not heating	The HEAT switch is set to OFF. The unit is running on battery backup.	Turn the HEAT switch to AUTO or MANUAL. The heater will not turn on if the unit is running on battery backup.
The unit is overheating	The thermocouple is not plugged in completely. The thermocouple assembly is damaged.	Check the thermocouple and make sure the connections are secure. Replace the thermocouple assembly.
Pressure		
The pressure will not reach the setpoint.	The supply regulator is set too low. The inlet check valve is dirty or damaged.	Adjust the supply regulator to between 80 and 100 psi. See page 21. Remove and clean or replace the inlet check valve. See page 20.
The pressure rises above the setpoint.	The pressure release regulator is set too low. The outlet filter is clogged.	Adjust the pressure release regulator to between 70 and 80 psi. Remove and clean the outlet filter. See page 18.

Warranty and Return Policy

Warranty:

OFI Testing Equipment, Inc. (OFITE) warrants that the products shall be free from liens and defects in title, and shall conform in all respects to the terms of the sales order and the specifications applicable to the products. All products shall be furnished subject to OFITE's standard manufacturing variations and practices. Unless the warranty period is otherwise extended in writing, the following warranty shall apply: if, at any time prior to twelve (12) months from the date of invoice, the products, or any part thereof, do not conform to these warranties or to the specifications applicable thereto, and OFITE is so notified in writing upon discovery, OFITE shall promptly repair or replace the defective products. Notwithstanding the foregoing, OFITE's warranty obligations shall not extend to any use by the buyer of the products in conditions more severe than OFITE's recommendations, nor to any defects which were visually observable by the buyer but which are not promptly brought to OFITE's attention.

In the event that the buyer has purchased installation and commissioning services on applicable products, the above warranty shall extend for an additional period of twelve (12) months from the date of the original warranty expiration for such products.

In the event that OFITE is requested to provide customized research and development for the buyer, OFITE shall use its best efforts but makes no guarantees to the buyer that any products will be provided.

OFITE makes no other warranties or guarantees to the buyer, either express or implied, and the warranties provided in this clause shall be exclusive of any other warranties including ANY IMPLIED OR STATUTORY WARRANTIES OF FITNESS FOR PURPOSE, MERCHANTABILITY, AND OTHER STATUTORY REMEDIES WHICH ARE WAIVED.

This limited warranty does not cover any losses or damages that occur as a result of:

- Improper installation or maintenance of the products
- Misuse
- Neglect
- Adjustment by non-authorized sources
- Improper environment
- Excessive or inadequate heating or air conditioning or electrical power failures, surges, or other irregularities
- Equipment, products, or material not manufactured by OFITE
- Firmware or hardware that have been modified or altered by a third party
- Consumable parts (bearings, accessories, etc.)

Returns and Repairs:

Items being returned must be carefully packaged to prevent damage in shipment and insured against possible damage or loss. OFITE will not be responsible for equipment damaged due to insufficient packaging.

Any non-defective items returned to OFITE within ninety (90) days of invoice are subject to a 15% restocking fee. Items returned must be received by OFITE in original condition for it to be accepted. Reagents and special order items will not be accepted for return or refund.

OFITE employs experienced personnel to service and repair equipment manufactured by us, as well as other companies. To help expedite the repair process, please include a repair form with all equipment sent to OFITE for repair. Be sure to include your name, company name, phone number, email address, detailed description of work to be done, purchase order number, and a shipping address for returning the equipment. All repairs performed as "repair as needed" are subject to the ninety (90) day limited warranty. All "Certified Repairs" are subject to the twelve (12) month limited warranty.

Returns and potential warranty repairs require a Return Material Authorization (RMA) number. An RMA form is available from your sales or service representative.

Please ship all equipment (with the RMA number for returns or warranty repairs) to the following address:

OFI Testing Equipment, Inc.
Attn: Repair Department
11302 Steeplecrest Dr.
Houston, TX 77065
USA

OFITE also offers competitive service contracts for repairing and/or maintaining your lab equipment, including equipment from other manufacturers. For more information about our technical support and repair services, please contact techservice@ofite.com.