Model 4020-SG Automated UCA/SGSM


Part No #120-59

Instruction Manual

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Ver. 3.0

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Introduction

By measuring the change in velocity of an acoustic signal, the Ultrasonic Cement Analyzer provides a continuous non-destructive method of determining compressive strength as a function of time.

SGSM

The Static Gel Strength Measurement (SGSM) device uses a vaned bob to condition a cement slurry inside a pressurized test cell and measure static gel strength at down-hole conditions. By directly measuring the forces required to initiate movement in the sample, the SGSM provides an accurate way of determining the static gel strength.

Description

The cement slurry to be tested is placed in an autoclave unit with temperature and pressure adjusted to simulate down hole conditions. An acoustic signal is then transmitted through the cement sample. As the strength of the cement increases over time, the acoustic signal travels faster through the sample.

In an SGSM test, a vaned bob is submerged in the cement. During the test, the bob turns periodically and measures the static gel strength of the sample.

Features

Main Features
- Programmable temperature and pressure control
- Data transmission via USB for UCA software and RS-232 for SGSM software
- Instant data availability on-screen and automatically converted to CSV format
- Nondestructive comprehensive strength cement test
- Mechanical measurement of static gel strength
- Cement conditioned in the test cell before the gel strength test.
- Rapid cooling system

Safety Features
- High temperature light indicator
- Automated cool down routine
- Over pressure/temperature alarm
- Over pressure/temperature shutdown
- Rupture disc to prevent over pressure situations
- Anti-boil algorithm to prevent slurry from boiling at high temperatures.
Software Features
- Two separate executable software applications for the UCA and SGSM
- Calibration stamp and archive

Max Test Conditions
- Maximum Temperature: 400°F (204.4°C)
- Maximum Pressure: 20,000 PSI (137.9 MPa)

Size:
- 29" × 20" × 14" (73.6 × 50.8 × 35.6 cm)
- 85 lb (39 kg)
- Air Supply: 100 PSI (690 kPa) Recommended, 150 PSI (1,035 kPa) Maximum, ¼" NPT Connector
- Water Supply: 40 – 100 PSI, 40° – 100°F, ¼" NPT Connector
- Water Drain: ¼" NPT Connector
- Coolant Supply: ¼" NPT Connector
- Coolant Drain: ¼" NPT Connector
- Heater: 230 – 240 VAC, 10 Amp, 50 – 60 Hz
  Electronics Power: 230 – 240 VAC, 2 Amp, 50 – 60 Hz
Components

Only use replacement parts that have been supplied by OFITE.

Included:

- #120-50-TR Acoustic Transducer, set of 2
- #120-50-021 Test Cell Assembly
  - #120-50-021A Cell Body
  - #120-50-021B Cell Cap, Bottom
  - #120-50-021C Cell Cap, Top
  - #120-50-027-1 Seal Ring, Qty. 2
  - #120-50-026 Retaining Ring
  - #120-59-081 Handle for Cell Cap, Qty. 2
  - #123-011 O-ring, Qty. 30
- #120-50-023 Upper Transducer Spring Holder
- #120-50-039 Open-End Wrench, ½"x¾"
- #120-50-040 Combination Wrench, ½"
- #120-50-041 Wrench, Strap, 18"
- #120-50-090 Wrench, Cell Cap
- #120-51-047 Transducer Spring, Qty. 2
- #120-52-021 Fill Gauge
- #120-53-25 LPT Cable
- #120-53-81 Wrench, Combination, ¾"
- #120-58-005 Drive Assembly (See diagram on page 87 for parts list)
- #120-58-006 SGSM Cell Assembly (See diagram on page 86 for parts list)
- #120-58-007 Wrench, Allen, ¾"
- #120-58-008 Calibration Stand
- #120-58-016 Wrench, Strap, 5"
- #120-59 Automated UCA/SGSM
- #120-59-355 Fill Tube
- #120-59-520 USB Cable
- #120-75-9 Weight Hanger
- #120-75-10 Weight Set
- #120-209 Thermocouple Assembly
- #123-024 Couplant, High Temperature
- #130-75-27 Wrench, Allen, T-handle, ¾"
- #130-75-71 Monitor
- #130-75-74 Desktop Computer
- #130-79-15 Serial Cable, DB9, M/F
- #141-15 Hose, Qty. 5
- #141-19 Hose Adapter, Qty. 5
- #220-10A-EURO Power Cords, European plugs, Qty. 2
- #220-15A-USA Power Cords, USA plugs, Qty. 2

Instruction Manual
Calibration Certificate
Software
Replacement Parts:
#120-50-027-1 Seal Ring
#120-50-026 Retaining Ring
#120-50-TR Acoustic Transducer, set of 2
#120-50-047 Spring for Transducer
#120-50-053 Heater
#120-53-82 Retaining Ring, SGSM Adaptor, Upper
#120-53-01 SGSM Vane Assembly
#120-53-02 SGSM Drive Magnet
#120-53-041 Bearing, SGSM Drive Head
#120-53-33 Tension Spring
#120-53-34 Load Cell
#120-53-58 Back-Up Ring, SGSM Adaptor, Upper
#120-53-59 Back-Up Ring, SGSM Adaptor, Lower
#120-58-010 SGSM Magnet Shaft Assembly
#120-58-05 Retaining Ring, SGSM Adaptor, Lower
#120-58-23 SGSM Diaphragm
#120-59-355 Fill Tube
#120-59-520 USB Cable
#120-90-033 Air Filter
#120-106-001 High Pressure Filter Elements, Qty. 3
#120-209 Thermocouple Assembly
#120-53-25 LPT Cable
#122-053 Rupture Disk, 22,500 PSI
#130-79-15 Serial Cable
#172-24 Solid State Relay, 240V–25A

Consumables:
#120-106-001 High Pressure Filter Elements
#120-53-31 O-Ring, SGSM Adaptor, Lower
#120-53-32 O-Ring, SGSM Adapter, Upper
#120-53-42 Graphite Bushing
#122-073 Fuse, 2 Amp, 5 mm × 20 mm, Qty. 2,
Fan, Pump/Cooling Solenoid
#122-075-2 Fuse, 6 Amp, 5 mm × 20 mm, Heater
#122-077 Fuse, 10 Amp, 5 mm × 20 mm, Qty. 2, Main Power
#123-011 O-ring
#123-024 Acoustic Couplant
#120-58-SP  Spare Parts Kit for SGSM:
  #120-50-026  Retaining Ring, External, Qty: 2
  #120-50-027-1  Seal Ring, Qty: 2
  #120-53-01  Vane Assembly
  #120-53-041  Bearing
  #120-53-31  O-ring, Qty: 5
  #120-53-32  O-ring, Qty: 5
  #120-53-33  Tension Spring, Qty: 2
  #120-53-42  Graphite Bushing, Qty: 20
  #120-53-58  Backup Ring, Upper, Qty: 2
  #120-53-59  Backup Ring, Lower, Qty: 2
  #120-53-82  Retaining Ring, External, Qty: 2
  #120-58-05  Retainer Ring, External, Qty: 2
  #120-58-23  Diaphragm
  #120-58-38  Retainer Ring, Internal, Qty: 2
  #123-011  O-ring for Test Cell, Qty: 5
## Explanation of Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Caution: Risk of Danger" /></td>
<td>This symbol directs the operator to consult the instruction manual for safety related warnings. (ISO-7000-0434) Whenever this symbol is used on the equipment, the user must consult the manual to determine the nature of the hazard and any actions which have to be taken.</td>
</tr>
<tr>
<td><img src="image" alt="Hot" /></td>
<td>This symbol indicates that a surface may be hot to the touch.</td>
</tr>
<tr>
<td><img src="image" alt="Shock Hazard" /></td>
<td>This symbol indicates a risk of electrical shock.</td>
</tr>
<tr>
<td><img src="image" alt="Note" /></td>
<td>This symbol will indicate important notes and helpful hints for the operation of the equipment.</td>
</tr>
<tr>
<td><img src="image" alt="Tip" /></td>
<td>This symbol is used to identify operational information and best practices to obtain the most reliable data.</td>
</tr>
<tr>
<td><img src="image" alt="Caution: Note" /></td>
<td>This symbol is used to indicate statements in the manual which warn against actions which may cause damage to the equipment during routine service or maintenance.</td>
</tr>
</tbody>
</table>
Quick Start
UCA

1. Set up the software with the desired parameters. See page 17.
2. Prepare the cell caps and cell body.
3. Assemble the bottom cell cap. See page 23.
4. Install the bottom cell cap to the bottom of the cell body. See page 25.
5. Assemble the top cell cap. See page 26.
6. Mix the slurry and fill the cell. See page 28.
7. Install the top cell cap to the cell assembly.
8. Install the test cell to the cabinet. See page 29.
9. Connect water supply line, thermocouple, and transducer to the test cell.
11. Allow test cell to cool down. See page 32.
12. Remove test cell. See page 33.
13. Disassemble the test cell.
14. Remove the cement from the test cell. See page 34.
15. Clean and inspect all of the test cell components.
Quick Start
SGSM

1. Set up the software with the desired parameters (see page 35).
2. Prepare the cell caps and cell body.
3. Assemble the bottom cell cap. See page 44.
4. Install the bottom cell cap to the bottom of the cell body. See page 46.
5. Assemble the top cell cap. See page 47.
6. Assemble the SGSM shaft assembly and install it to the top cell cap. See page 49.
7. Install the top cell cap to the cell assembly.
8. Install the test cell to the cabinet.
9. Connect the SGSM head to the shaft assembly and run a drag check. See page 52.
10. Mix the slurry and fill the cell. See page 53.
11. Connect water supply line, thermocouple, and transducer to the test cell. See page 54.
12. Run the test. See page 55.
13. Allow test cell to cool down. See page 56.
14. Evaluate the test data. See page 57.
15. Remove test cell.
16. Disassemble and clean the cement from the test cell. See page 58.
17. Clean and inspect all of the test cell components.
Setup

1. Carefully remove the instrument from the crate and place it on a flat, stable surface. Make sure to allow for adequate air flow around the unit, especially near the vents on the sides.

   To ensure personal safety, always use proper lifting techniques. Position the unit so that the user can quickly disconnect plugs in case of an emergency.

2. Make sure all switches are off and the pressure relief knob is turned completely counterclockwise.


   Make sure the “Coolant Drain” is suitable for high temperature discharge.

4. Connect the UCA/SGSM -to a PC with the supplied cables (USB for the UCA and RS-232 for the SGSM).

5. Connect the SGSM head to the UCA with the supplied LPT cable.

6. Turn the “Main Power” switch on.

7. Put the “UCA/SGSM” switch to the correlating position of the desired test.
Front View

Rear Panel

Hoses

Electronic Connections
Control Panel

Water On/Fill – Fills the cell with water from an external water source.

Alarm – Sounds an alarm when operating in SGSM mode to indicate when the final gel strength has been reached or gel strength #5 has been reached if not in multiple conditioning mode. See page 43.

Heater – Engages the heat jacket which heats the cell to the target temperature.

Main – Controls the main power to the entire unit.

Pressure Up – Applies pressure from an external air source to the cell.
   a. Manual – Constantly applies pressure until the system is switched to off, auto, or until it reaches 20,000 PSI (Max Pressure).
   b. Off – Stops the pressure application.
   c. Auto – Applies pressure until the unit reaches the target pressure entered in the software setup menu. See page 17.

Cool – Engages the cooling system to the cell.
   a. Manual – Constantly applies water or coolant to the heat jacket.
   b. Off – Stops the application of water or coolant to the heat jacket.
   c. Auto – Automatically allows coolant to flow to the heat jacket once the test is finished and while the temperature is above 100° F. To change the temperature threshold, contact OFITE technical support.

Mode – Switches the test operation modes between UCA and SGSM to facilitate accurate communication between the unit and the computer software.
Both the UCA and SGSM software applications include a Test Profile Builder. Here you can create a custom temperature and pressure profile for your test.

1. Select Utilities → Test Profile Builder.

2. Click "New Test" to build a new test profile. To edit a current test profile select a test from the list on the left-hand side by double clicking on the appropriate test.

3. In the "Profile Name" box, enter a test name.

4. Each test profile has two parameters: temperature and pressure. For each parameter, there is a series of steps. Each step specifies the setpoint and other options for that parameter.

   To add a step, click the Temperature or Pressure tab and then click the "Add" button. As you add steps to the test profile, the graph below will change to reflect the new data.
When building a test at temperatures above 200°F (93.3°C), apply a minimum of 1,000 PSI (6.9 MPa) to prevent the sample from boiling. A pressure of 1,000 PSI (6.9 MPa) is also required to get a good transit time signal.

a. Temperature – There are three types of temperature settings:

   i. Hold – This will hold the current temperature for a set number of minutes. Enter the time into the "Time" Box.

   ii. Ramp – This will increase the temperature up to the target in a set number of minutes. You will be prompted for the ramp time and target temperature.

   iii. Step – This will increase the temperature up to the target as fast as possible. Enter the target temperature in the "Target" box.

The maximum temperature setpoint allowed is 400°F (204.4°C). The units of measure will be the same as entered in the Setup menu. See page 17.

4. To edit an existing step, double click the step in the step list or highlight the existing step and select the "Edit" button. Click OK when done.
5. Click the “OK” button to exit the “Setup” screen. The new Temperature Profile will now appear in the “Temperature Profiles List” in the “UCA Info” tab.

b. Pressure – There are two types of pressure settings:

i. Hold – This will hold the current pressure for a set number of minutes.

ii. Ramp – This will increase the temperature up to the target in a set number of minutes. Enter the time to temperature in the "Time" box. Enter the target temperature in the "Target" box.

iii. Step – This will increase the pressure up to the target as fast as possible. Enter the target temperature in the "Target" box.

The maximum pressure setpoint allowed is 20,000 PSI (138 MPa).

d. Hold Indefinitely (For UCA only):

With this option turned on, the test will run until you click the “Stop Test” button. If this option is not checked, the test will end when all the steps in the Temperature Profile are complete.

In the SGSM Profile Builder, there is no “Hold Indefinitely” option. The test will continue to hold temperature through the final gel strength until the end of the test.
**UCA Software Setup**

Before you begin a UCA test, you must prepare the PC to record the data.

1. Turn on the PC and the UCA.

2. Put the “UCA/SGSM” switch to the UCA position. See page 35.

3. Open the software by double-clicking the Automated UCA icon on the desktop.

4. Click Utilities → Setup.

---

**Note**

The UCA software will only communicate through USB.
“CS Unit” – PSI or MPa

“Temp Unit” – °F or °C

“Archive Path” – Choose a location to save archive files.

“Logo Path” – Select a logo (.JPG format) to print on the graph at the end of the test.

“CS #1”, “CS #2”, “CS #3” – Enter a compressive strength value in each of these fields. When the cement reaches that compressive strength, the software will record the elapsed time and print it on the graph.

“Unit #” – Identifies the unit generating the graph. This field is helpful when multiple units are generating graphs.

“Strength @”, “Strength 2 @”, “Strength 3 @” – Enter a time period in each of these three fields. At the end of the test, the compressive strength at these three times will print on the graph.

“Ultrasonic Transducer”, “Pressure Transducer”, “Thermocouple” – Calibration Frequency: Enter a time period in each of these three fields. The default time period is set at six months but can be edited if needed. The UCA software will prompt a reminder that these components need to be recalibrated at each of these times. This will not affect the test.

“Print to Printer” – When this option is on, a graph of the test results will automatically print to the computer’s default printer when a test is complete.
The software application has a set of tabs that are specific to the test configuration.

The **UCA Info** tab shows the current test configuration and a graph of the temperature and pressure profiles.
The **UCA Chart** tab shows a graph with real-time data.

“**Elapsed Time**” – Time since the test began (HH:MM)

“**Temperature**” – Temperature within the test cell. (°F or °C, depending on the settings in the Setup screen)

“**Pressure**” – Pressure within the test cell. (PSI or MPa, depending on the settings in the Setup screen)

“**Transit Time**” – Time required for the sound wave to travel through the sample (Microseconds)

“**Compressive Strength**” – Calculated compressive strength of the sample (PSI or MPa)

“**Acoustic Impedance**” – Calculated acoustic impedance of the sample.

“**Cursors**” – Plotted points on the graph. Coordinates are displayed in this window as the cursor is moved around the graph.

To turn on the cursors, right-click on the graph → Visible Items → Cursor Legend.
The Y-Axis should have the autoscale default off. The X-Axis should default on. The chart can be manually scaled to show more or less detail. To manually scale a chart:

1. Right-click on the X or Y axis and uncheck “AutoScale X” or “AutoScale Y”.
2. Double-click the minimum value on the axis. Type in a new value.
3. Double-click the maximum value on the axis. Type in a new value.
4. The chart will now only display values between the new minimum and maximum.

The Log Data tab shows the test data for the cell.
Once the temperature and pressure profiles are built, select Utilities → Load Cell Info. Here you can enter all the necessary test information in advance, before preparing the cement sample.

The information in these fields will display in the data file at the end of the test. Select the desired profile before the test.

The following fields are required:

**Test Name** — Each test must have a unique test name. The software uses this field to name the data file.

**Slurry Density** — The software uses this field to calculate the correct compressive strength.

**Cement Density** — The software uses this field to calculate the acoustic impedance.
The cell body and both cell caps were manufactured and pressure tested together. All three pieces are serialized. Before assembling the test cell, make sure all three pieces have the same serial number.

For a complete diagram of the test cell, refer to page 85.

**Bottom Cap Assembly**

1. Inspect the transducer port to make sure that it is clean and free of debris. Dried transducer couplant can accumulate on the sides and bottom of the port. This couplant must be cleaned from the port as well.

2. Tighten the jaws of the vice on the flats of the bottom cell cap with the threads facing up.

3. Apply a thin layer of high-temperature grease to the threads of the bottom cell cap.

4. Remove grease from the center area of the surface with a paper towel.

5. Leave only a thin layer of grease on the top surfaces of the bottom cell cap avoiding the center area that transmits or receives transducer signal. Excess grease will interfere with the transducer signal.

6. Apply high temperature ultrasonic couplant (#123-024) to the internal center of the cell cap where the excess high temperature grease was removed.
7. Install the seal ring (#120-50-027-1) with the narrow side pointed towards the threads and place the o-ring (#123-011) on top of it.

8. Apply more high temperature grease to the seal ring and o-ring.

The o-ring should be inspected for signs of degradation before installing a new o-ring.

The bottom cell cap does not require a retaining ring.
Cell assembly
The test cell is labeled to indicate which end is the top and which is the bottom. The interior of the cell has a taper with the narrow end at the top and the wider end at the bottom to facilitate cement plug removal.

1. Apply a thin layer of high-temperature grease to the surfaces that will be in contact with cement. This will make cleaning easier when the test is complete.

2. Carefully screw the cell body onto the bottom cell cap completely. Then unscrew the cell body ⅛ of a turn. This will facilitate disassembly later.

   The cell body should turn smoothly onto the cell cap. If you encounter resistance, stop turning and unscrew the body slightly. Then continue turning until the cell body is completely tightened.

   Watch the bottom cell cap o-ring from inside the cell body as it screws onto the cell cap. Make sure that the o-ring remains seated. If the o-ring becomes unseated, unscrew the cell body and reset the o-ring to its proper location.

3. Remove the cell body and bottom cell cap from the vise in preparation for the top cell cap assembly.
**Top Cap Assembly**

1. Inspect the transducer, fill, and thermocouple ports and make sure they are clean and free of debris. Dried transducer couplant can accumulate on the sides and bottom of the port. This couplant must be cleaned from the port as well.

   The two ports are interchangeable.

2. Tighten the jaws of the vice on the flats of the top cell cap with the threads facing up.

3. Apply a thin layer of high-temperature grease to the threads of the bottom cell cap.

4. Remove grease from the center area of the surface with a paper towel.

5. Leave only a thin layer of grease on the top surfaces of the bottom cell cap avoiding the center area that transmits or receives transducer signal. Excess grease will interfere with the transducer signal.

6. Apply high temperature ultrasonic couplant (#123-024) to the internal center of the cell cap where the excess high temperature grease was removed.
7. Install the seal ring (#120-50-027-1) with the narrow side pointed towards the threads and place the o-ring (#123-011) on top of it.

   The o-ring should be inspected for signs of degradation before installing a new o-ring.

8. Install the retaining ring (#120-50-026) above the o-ring.

9. Apply more high temperature grease to the seal ring, o-ring, and the retaining ring.

10. Remove the top cell cap from the vise and replace it with the bottom cell cap and cell body. Tighten the jaws of the vice on the flats of the cell cap and cell body.
Filling the Cell
1. Once the slurry has been mixed, place the fill gauge on top of the test cell.

2. Fill the cell until the cement touches the bottom of the fill gauge to the side labeled “UCA”.

3. Carefully screw the top cell cap onto the cell body completely. The cell cap should turn smoothly onto the cell body. If you encounter resistance, stop turning and unscrew the cap slightly. Then continue turning until it tightens completely.

Tip
Unscrew the top cell cap ¼ of a turn. This will facilitate disassembly later.
1. Apply a thin coat of an ultrasonic couplant to the two transducers. One inside the heat jacket and the one that connects to the UCA cabinet. When applying the couplant, apply only the smallest amount necessary to allow for the couplant to be spread out in a thin layer, evenly over the face of the transducer. Applying too much couplant can interfere with the integrity of the signal that is either transmitted or received by the transducers.

2. Carefully place the cell into the heating jacket.

3. Place the top transducer into the hole in the top cell cap. Compress the spring and place the spring holder over it. Tighten the screw with a 3/16" allen wrench to secure the spring holder in place.

4. Connect the water supply tube from the port on the test cell to the cabinet.
   a. Screw the glands on the water supply tube, leaving two threads of each fitting exposed. The longer end goes to the cabinet and the shorter end goes to the cell.
   b. Turn the cell in the heat jacket so the water supply tube is aligned properly to the cell.
   c. Use a 5/8" wrench to tighten the fitting on the cabinet completely.
5. Plug the thermocouple from the cell cap to the port on the cabinet leaving the thermocouple gland slightly loose on the cell cap.

6. Turn the "WATER ON/FILL" switch to the on position until water comes out of the thermocouple gland and ventilation port on the top cell cap.

7. Once the water comes out of the ventilation port, tighten the thermocouple gland completely and turn the Water On/Fill switch to the "OFF" position. This will ensure that all air has been purged from the cell.

8. Clean and dry the top cell cap and cabinet of excess water.

9. Make sure all the cables are connected properly. See page 11 for more information.
UCA
Starting the Test

Use of this equipment in a manner not specified by the manufacturer may impair the protections provided by the equipment.

The following steps are to be done once the cell has been prepared and installed properly:

1. Turn the “Mode” switch to the “UCA” position.

2. In the software, fill out the test information required for the test.

3. Select a temperature profile for the test (see page 14).

4. Make sure the Pressure Release valve is completely closed (clockwise).

5. Turn the “PRESSURE UP” switch to the “Manual” or “Auto” position depending on the user’s test preference. See page 13.

6. Turn the “COOL” switch to the “Manual” or “Auto” position depending on the user’s test preference. See page 13.

7. Turn the “HEAT” switch to the on position.

8. Verify that all of the switches on the control panel are in the proper positions for the test and click the “START TEST” button in the software. Edit information about the test or continue with the test procedure by pressing “OK”. See page 22.

When you click the “OK” button, the test will begin.

Solid particles and air bubbles within the cement slurry can adversely affect the results of your test. The first transit time reading should be at least 10 µs/in. If it is less than 10 µs/in.:

a. Wait a few minutes to see if the problem corrects itself.

b. If the transit time remains below 10 µs/in., restart the test by clicking “Stop Test” and then “Start Test”.

c. If the problem persists, remix the slurry and start the test again. To avoid this problem, carefully follow the mixing procedure in API Specification 10B 2 (ISO Standard 10426-2).
1. When the test is complete, click the “STOP TEST” button in the software. The data file will be automatically saved in the folder specified on the “Setup” screen.

2. Turn the “HEATER” switch to the "OFF" position. If the cooling system is switched to the “Auto” position, the cooling system will cool automatically if the cell temperature is greater than 100°F. To change the temperature threshold, contact OFITE Technical support.

3. Turn the “COOL” switch to the “MANUAL” position and allow the test cell to cool to 100°F.

4. When the cell has cooled, turn the “PRESSURE UP” and “COOL” switches to the "OFF" position. Turn the “WATER ON/FILL” switch to the “OFF” position.

5. Open the pressure release valve by slowly turning it counterclockwise.

   Always open the pressure release valve very slowly to prevent pulling cement into the plumbing.
Disassembling the test cell is a very important part of the procedure. Care must be taken while disassembling the test cell to reduce the risk of damage to all components. Properly cleaning the test cell will also increase the longevity and maintain integrity of internal components.

1. Unscrew and remove the water supply tube from the cell cap and the instrument cabinet.

   **Use caution. If the lines are plugged, the test cell may contain a small amount of trapped pressure.**

2. Unscrew and remove the thermocouple and transducer.

3. Lift the cell out of the heating jacket.

   When removing the test cell, pay special attention to the transducer. Make sure it doesn’t pull off of the end of the transducer cable with the cell.

4. The UCA wrench may be required to remove the end caps. Remove both cell caps from the cell as shown below and proceed with the following instructions:
   a. Remove the top cell cap
   b. Properly dispose of water from the cell.
   c. Remove the bottom cell cap.

5. Remove the backup rings, o-rings, and retainer rings from both cell caps.

6. Clean the backup rings, o-rings, and retainer rings from both cell caps.

7. Inspect the backup rings, o-rings, and retainer rings for damage.

8. Clean the threads of the cell and cell caps of grease and debris.
There are two ways to remove cement from the cell. The first way requires a hydraulic shop press and the cement removal knock out tool (#120-50-074). The second way is to use the knock out tool and a mallet. A hardened cement plug can only be pushed out of the cell from the top to the bottom.

**Hydraulic Shop Press**

a. Secure the cell into the press with the end labeled "TOP" facing up and the end labeled "BOTTOM" facing down.

b. Insert the knock out tool into the cell on top of the cement.

c. Slowly increase pressure in the press until the cement slides out of the cell.

**Knock Out Tool and Mallet**

a. Tighten the jaws of the vice on the flats of the cell body with the end labeled "TOP" facing up and the end labeled "BOTTOM" facing down.

b. Insert the knock out tool into the cell on top of the cement.

c. Hit the top of the knock out tool with the mallet until the cement slides out of the bottom of the cell.

1. Remove and clean the cement and grease from the cell.
2. To reassemble the test cell see pages 23–27.
Before you begin an SGSM test, you must prepare the PC to record the data.

1. Turn on the PC and UCA.

2. Put the UCA/SGSM switch to the SGSM position.

3. Open the software by double-clicking the automated SGSM icon on the desktop.

4. Click Utilities → Setup.

The SGSM software will only communicate through the serial connection.

“COM Port” - The COM port is connected to the device through the RS-232 cable.

“Temp Unit” - °F or °C

“Pressure” - PSI or MPa

“Gel Strength” - Gel strength units (Dyne/cm², lb/100 ft², Pa., lb/ft²)
“Unit #” - Identifies the unit generating the graph. This field is helpful when multiple units are generating graphs.

“Archive Path” - The location to save the data files.

“Logo Path” - Allows you to place a desired product logo on test graphs. Navigate to where logos are saved and select a logo (.JPG format) to print on the graph at the end of the test.

“Bob Height” - The height of the bob in millimeters.

“Bob Diameter” - The diameter of the bob in millimeters.

“Conditioning Speed” - The speed (RPM) for conditioning the cement slurry prior to the SGSM test.

The standard conditioning speed is set at 30 RPM. This speed can be changed based upon your specific needs and/or conditions.

“Conditioning Time” - This is the amount of time the SGSM will condition the cement before it begins measuring gel strength. This value must be at least 2 minutes.

After the Conditioning Time, the SGSM will measure the rate of gel strength development and calculate the gel strength of the slurry based on the variables entered in the setup screen of the software.

“Test Speed” - The speed (RPM) the bob will rotate to measure the gel strength of the cement.

“Test Time” - The amount of time the bob will rotate while measuring the gel strength.

“Wait Time” - The amount of time the bob will pause between gel strength measurement periods.

“Strength #1”, “Strength #2”, ..., “Strength #5” - Enter a gel strength value in each of these fields. When the cement reaches that gel strength, the software will record the elapsed time and print it on the graph.
“Pressure Transducer and Thermocouple” - This is the time between calibration periods. By default, they are set at 6 months.

Enter a time period in each of these fields. The default time period is set at six months but can be edited if needed. The SGSM software will prompt a reminder that these components need to be recalibrated at each of these times. This will not affect the test. When these reminders are prompted, just click OK to clear them.

“Print to Printer” - When this option is on, a graph of the test results will automatically print to the printer when a test is complete.
The software has a set of tabs that are specific to the SGSM test configuration.

The SGSM Info tabs show the current SGSM test configuration and a graph of the temperature and pressure profiles.
The **SGSM Chart** shows a graph for an SGSM test while the test is running.

- **“Elapsed Time”** - Time since the test began (HR:MIN:SEC)
- **“State Time”** - Elapsed time of the current state.
- **“SGSM State”** - The current state of the SGSM test.
  - **Mixing** - The bob is conditioning the cement. The speed is set by the “Conditioning Speed” field in the Setup screen.
  - **Wait** - After conditioning the cement, the motor stops for 6 seconds to allow the fluid to reach a steady state.
  - **Pre Zero** - Before performing the zero operation, the software rotates the bob one full revolution to overcome any initial drag.
  - **Zero** - Before starting the gel strength measurement, the software rotates the bob one full revolution and records the amount of drag in the system. It uses these values to compensate for the drag during a test.
  - **Stop** - The bob is stopped between measurements. The amount of time the bob will be stopped is specified in the “SGSM Wait Time” field on the Setup screen.
  - **Measure** - The bob is rotating and measuring gel strength. The measurement will last for the amount of time specified in “SGSM Test Time” on the Setup screen.
The chart in the SGSM software can be manually scaled to show more or less detail. To manually scale a chart:

1. Right-click on the X or Y axis and uncheck “AutoScale X” or “AutoScale Y”.
2. Double-click the minimum value on the axis. Type in a new value.
3. Double-click the maximum value on the axis. Type in a new value.
4. The chart will now only display values between the new minimum and maximum.
The **Log Data** tab shows the logged data. This data is available at the end of the test.
Once the temperature and pressure profiles are built, select Operate → Load SGSM Info. Here you can enter all the necessary test information in advance, before preparing the cement sample.

The information in these fields will display in the data file at the end of the test. Select the desired profile before the test.

The following fields are required:

**Test Name** - Each test must have a unique test name. The software uses this field to name the data file.

**Slurry Density** - This field displays the range of the density of the cement slurry density.

**Cement Density** - Specifies the density of the cement slurry.
Multiple Conditioning - When this option is turned ON, the software will measure gel strength periodically until the cement reaches the value in the “Strength #5” field entered in the setup screen. Then it will condition the cement for the time period specified in the “Conditioning Time” field on the Main Setup screen. This cycle will continue until the gel strength reaches the value in the “Final Strength” field on the Test Info Setup screen. Once the gel strength reaches the “Final Strength, the alarm will sound and the test will end.

This value is used for all conditioning periods when “Multiple Conditioning” is on. If no value is specified, the default is 30 minutes.

Note

Multiple Conditioning Turned ON

When Multiple Conditioning function is checked OFF, “Strength #5”, will prompt the software to turn on the alarm, and stop the test.

Note

Multiple Conditioning Turned OFF
The cell body and both cell caps were manufactured and pressure tested together. All three pieces are serialized. Before assembling the test cell, make sure all three pieces have the same serial number.

For a complete diagram of the test cell, refer to page 85.

**Bottom Cap Assembly**

1. Inspect the transducer port to make sure that it is clean and free of debris. Dried transducer couplant can accumulate on the sides and bottom of the port. This couplant must be cleaned from the port as well.

2. Tighten the jaws of the vice on the flats of the cell cap with the threads facing up.

3. Apply a thin layer of high-temperature grease to the surface of the bottom cell cap that meets with the cement. Wipe off any excess grease.
4. Install the seal ring (#120-50-027-1) with the narrow side pointed towards the threads and place the o-ring (#123-011) on top of it.

5. Apply more high temperature grease to the seal ring and o-ring.

The o-ring should be inspected for signs of degradation before installing a new o-ring.

The bottom cell cap does not require a retaining ring.
Cell assembly
The test cell is labeled to indicate which end is the top and which is the bottom. The interior of the cell has a taper with the narrow end at the top and the wider end at the bottom to facilitate cement plug removal. Apply a thin layer of high-temperature grease to the surfaces that will be in contact with cement. This will make cleaning easier when the test is complete.

6. Carefully screw the cell body onto the bottom cell cap completely. Then unscrew the cell body ¼ of a turn. This will facilitate disassembly later.

   The cell body should turn smoothly onto the cell cap. If you encounter resistance, stop turning and unscrew the body slightly. Then continue turning until the cell body is completely tightened.

   Watch the bottom cell cap o-ring from inside the cell body as it screws onto the cell cap. Make sure that the o-ring remains seated. If it the o-ring becomes unseated, slightly unscrew the cell body and reset the o-ring to its proper location.

7. Remove the cell body and bottom cell cap from the vise in preparation for the top cell cap assembly.
**Top Cap Assembly**

1. Inspect the transducer and thermocouple ports to make sure that they are clean and free of cement.

2. Install the thermocouple into one of the ports on the top cap of the SGSM test cell. Tighten the thermocouple completely then loosen it ¼ of a turn.

   The two ports are interchangeable.

3. Tighten the jaws of the vice on the flats of the cell cap with the threads faced up.

4. Insert a retaining ring into the lower internal ring groove of the cell cap so the gap clears the thermocouple as shown below.
5. Insert the diaphragm into the cell cap so the gap clears the thermocouple.

Insert the other retaining ring into the groove above the diaphragm so the gap clears the thermocouple as shown below.

6. Place the metal seal ring on the external portion of the cell cap with the narrow end pointed toward the threads. The seal ring should not need to be removed from the top cell cap. If it must be replaced, the metal seal ring must be reinstalled in the same orientation.

7. Place an o-ring on the cell cap above the metal seal ring.

8. Install the retaining ring above the o-ring.

9. Apply high temperature grease to the threads, seal ring, o-ring, and the retainer ring.
10. Install the two bushings. One bushing goes into the hole in the top of the top cell cap. The other goes inside the mounting adapter.

Make sure the bushings sit flush with the metal.

11. Secure the mounting adapter (120-58-04) with the short end facing up.

12. Place the upper backup ring (#120-53-58) around the top of the mounting adapter with the o-ring (#120-53-32) on top of it. The backup ring should be oriented with the taper pointing away from the o-ring.

13. Place a retaining ring (#120-53-82) on the mounting adapter to hold the o-ring in place.

14. Secure the mounting adapter with the longer end of the shaft pointed up. Place the lower backup ring (#120-53-59) around the bottom of the mounting adapter with the o-ring (#120-53-31) on top of it. The backup ring should be oriented with the taper pointing away from the o-ring.

15. Install the retainer ring (#120-58-05) above the o-ring.
16. Install the SGSM base to the mounting adapter as shown below. Screw the threads facing inward and the allen heads on the outside of the base.

17. Insert the magnet shaft assembly (#120-58-010) into the SGSM base, threads first with the magnet facing upward.

18. Lightly grease the threads of the mounting adapter that secure the magnet cover.

19. Place the magnet cover over the magnet and screw it tight.

20. Lightly grease the threads that secure the plug and gland.

21. Install the plug and gland. Completely tighten them, then loosen them ¼ of a turn.

22. Secure the top cell cap in a vise with the threads facing down.

23. Carefully insert the assembled base and bob shaft through the top of the cap, with the threads of the bob shaft going in first.

24. Once the base reaches the top of the cell cap, screw the assembly onto the cell cap.
25. With a set of calipers, measure the diameter of the bob along all three axes of the vane. Measure the height of the bob blades in three places. Record the average diameter and average height and enter them in the Setup screen. Refer to page 35.

The bob should be measured every 3 months for consistency. There should be no need to replace the bob unless it has been damaged in some way.

26. Screw the bob onto the bob shaft. Hold the shaft in place with the supplied \( \frac{3}{16} \)" combination wrench (#120-53-81) while tightening the bob.

The bob screws counterclockwise onto the bob shaft with a left-handed thread.
Before running a gel strength test, it is recommended you perform a drag check in the software. Run the drag check in air.

Always perform a drag check after calibrating the transducer. During the drag check, the SGSM will run at 2 RPM and the total time for the drag check will be 33 sec.

1. Carefully screw the assembled SGSM top cap onto the test cell.
   
   The cell cap should turn smoothly in the test cell threads. If you encounter resistance, stop turning and unscrew the cap slightly. Then continue turning until the cap is completely tightened.

2. Once the cap is completely tightened, unscrew it one quarter turn. This will facilitate disassembly later.

3. Install the SGSM head to the base.

4. Connect the SGSM Head to the UCA with the LPT cable. See page 11.

5. To get to the Drag Check screen in the software click Utilities → Drag Check and select “Run”.

6. Allow the test to run for 33 seconds and select “Save”.

7. Repeat the drag check test to ensure consistency.

   The test must have a peak drag less than 85 grams. If the value jumps wildly from one check to the next, this is an indication that there is a problem with one or more of the components of the system (bushing, shaft, load cell, etc.). You will need to inspect the SGSM assembly for problems. See page 68 for troubleshooting instructions.
SGSM
Preparing the Test Cell

Filling the Cell
1. Once the slurry has been mixed, place the fill gauge on top of the test cell.

2. Fill the cell until the cement touches the bottom of the fill gauge to the side labeled “SGSM”.

3. Carefully screw the top cell cap onto the cell body completely. The cell cap should turn smoothly onto the cell body. If you encounter resistance, stop turning and unscrew the cap slightly. Then continue turning until it tightens completely.

   Unscrew the top cell cap ⅛ of a turn. This will facilitate disassembly later.
NOTE: To minimize wear and tear of the bottom acoustic transducer, remove it from the unit. It must remain paired with the top acoustic transducer.

1. Carefully place the cell into the heating jacket.

2. Align the cell as shown below.

3. Connect the water supply tube from the port on the test cell to the cabinet.
   a. Screw the glands on the water supply tube, leaving two threads of each fitting exposed. The longer end goes to the cabinet and the shorter end goes to the cell.
   b. Turn the cell in the heat jacket so the water supply tube is aligned properly to the cell.
   c. Use a \( \frac{5}{8}'' \) wrench to tighten both glands completely.

4. Plug the thermocouple from the cell cap to the port on the cabinet leaving the thermocouple gland slightly loose on the cell cap.

5. Turn the "WATER ON/FILL" switch to the on position until water comes out of the thermocouple gland and ventilation port on the top cell cap.

6. Once the water comes out of the ventilation port, tighten the thermocouple gland completely and turn the Water On/Fill switch to the "OFF" position. This will ensure that all air has been purged from the cell.

7. Clean and dry the top cell cap and cabinet of excess water.

8. Carefully place the SGSM Drive Assembly on top of the test cell. Make sure all the cables are connected properly. See page 11 for more information.
Use of this equipment in a manner not specified by the manufacturer may impair the protections provided by the equipment.

The following steps are to be done once the cell has been prepared and installed properly:

1. Put the “MODE” switch to the “SGSM” position.

2. In the software, fill out the test information required for the test.

3. Select a temperature profile for the test (see page 14).

4. Make sure the Pressure Release valve is completely closed (clockwise).

5. Set the “PRESSURE UP” switch to the “MANUAL” or “AUTO” position depending on the user’s test preference.

6. Set the “COOL” switch to the “MANUAL” or “AUTO” position depending on the user’s test preference.

7. Turn the “HEAT” switch on.

8. Verify that all of the switches on the control panel are in the proper positions for the test and click the “START TEST” button in the software. Edit information about the test or continue with the test procedure by pressing “OK”. See page 42.
1. The test stops automatically. The alarm needs to be acknowledged and cleared by clicking the SGSM alarm (green button) that appears in the upper right hand corner.

2. Turn the “HEATER” switch the "OFF" position. If the cooling system is switched to the “Auto” position, the cooling system will cool automatically if the cell temperature is greater than 100°F. To change the temperature threshold, contact OFITE Technical support.

3. Turn the “COOL” switch to the “MANUAL” position and allow the test cell to cool to 100°F.

4. When the cell has cooled, turn the “PRESSURE UP” and “COOL” switches to the "OFF" position. Turn the “WATER ON/FILL” switch to the “OFF” position.

   Always open the pressure release valve very slowly to prevent pulling cement into the plumbing.

5. Unscrew and remove the high-pressure line from the cell cap and the instrument cabinet.

   Use caution. The test cell may contain a small amount of air at high temperature and/or pressure.

6. Unplug the thermocouple.

7. Remove the SGSM cap assembly.

8. Remove the thermocouple.

9. Lift the cell out of the heating jacket.
When a test is complete, the software automatically generates a .jpg file of the chart and a data file that can be opened in Excel. Both of these files will be stored in the folder specified in the “Archive Path” field on the Setup screen (see page 35).

The SGSM data file will show the elapsed test time, temperature, pressure, and gel strength at each peak during the test. This differs from the UCA data file, which includes data points at a specific time interval throughout the test.

The SGSM chart shows the temperature, pressure, and gel strength over time. The software also generates a trend line connecting the peaks of the gel strength line.

At the top of the SGSM chart are entries for “Time @ × lb/100ft²”. This shows the calculated time at which the cement reached each gel strength. These values are set in the Options screen (see page 35) as “Strength #1”, “Strength #2”, etc.

The “Transition Time” is the calculated time from “Strength #1” to “Strength #5”. By default, these fields are set to 100 and 500 lb/100ft² respectively.

The measurement time for the static gel strength begins at the end of the conditioning period. These times are interpolated based on the trend line generated from the peaks that are measured at the end of each “SGSM Test Period”.

When Multiple Conditioning is on, the Interpolated Data will only reflect data collected from the first cycle.
SGSM
Disassembling and Cleaning the Test Cell

The test cell must be cleaned immediately after every test. Any cement left in the test cell will harden and could damage the equipment. Clean all surfaces of the test cell with soap and water.

Remove all o-rings, snap rings, and bushing and clean them individually. Carefully inspect them and discard any that show damage or wear.

If the cement sets during an SGSM test, the bob and bob shaft will set with the cement in the test cell. If this happens, it may be possible to remove bob without damaging the equipment.

There are two procedures for removing the SGSM from set cement. The first procedure attempts to save the magnet and shaft. This procedure will only work if the threads on the shaft have been heavily greased. The shaft will need to twist free from the bob and any cement that has set around it.

If the first procedure fails, then the second procedure will remove the magnet and shaft from the cell. However, both the magnet head and the bob shaft will be destroyed and will not be reusable. The bob itself should be reusable for further testing.

To avoid damaging the equipment, make sure all surfaces that will be in contact with the cement are covered in grease before assembling the cell.

Procedure 1:

Tools Needed
- 10” Crescent Wrench
- ¾” Wrench
- ½” Strap Wrench
- Soft Face Hammer
- Cell Cap Wrench
- Heavy Duty Vice
- Small Sledge Hammer
- Rock Chisel
- Knock Out Tool

A hardened cement plug can only be pushed out of the cell from the top to the bottom. Secure the test cell in a heavy duty vice.
1. Tighten the jaws of the vice on the flats of the test cell with the SGSM Drive Assembly facing up.

2. Use a crescent wrench to hold the bob shaft housing in place.

3. Unscrew the black SGSM base collar.

4. Unscrew the magnetic housing on top of the cell.

5. Fit the strap wrench around the magnet on top of the shaft.

6. The bob shaft has a left-handed thread. Using the strap wrench, unscrew the shaft from the bob by rotating the shaft clockwise. The magnet is press fit onto the shaft and should move as one piece. If the magnet turns on the shaft, skip to Procedure 2.

7. When the shaft has disengaged completely from the bob, carefully remove the shaft by grasping the magnet and pulling straight up.

8. Use a ⅝” wrench to loosen the thermocouple connection and pull it straight up to make sure it pulls clear of the set cement.

9. Remove the drive adapter by unscrewing it from the cell cap with a crescent wrench.
10. Use the cell cap wrench to remove the lid of the test cell.

11. Turn the test cell over and secure it in the vice with the end labeled "BOTTOM" will be facing up.

12. Use the cell cap wrench to remove the bottom cell cap.

13. Remove the cell from the vice.

14. Set the cell upright on a counter with the end labeled "TOP" facing up.

15. Using a hammer and the knock out tool and/or a cement press, remove the cement plug from the test cell.

   Be sure to apply force only to the top of the cement plug.

   Take extra precautions as the bob can be damaged during this operation.

16. Note the top and bottom of the cement plug. The top of the plug will have a hole in the top from which the shaft was pulled.

17. Once the cement plug has been removed, set the plug on its side.

18. Using a small chisel, begin chipping at the plug about ½" from the bottom.

   Be careful not to damage the vanes on the bob.
19. Remove the cement from the bottom of the plug in small chunks until you expose one of the vanes on the bob.

20. Set the plug upside down on the counter.

21. Place the chisel next to the exposed vane and begin chipping downward away from the vane.

22. Proceed around the bob by removing the cement from between the vanes.

Procedure 2:

Tools Needed
- 10" Crescent Wrench
- ⅝" Wrench
- Channel Locks
- Soft Face Hammer
- Cell Cap Wrench
- Heavy Duty Vice
- Small Sledge Hammer
- Rock Chisel
- Knock Out Tool

1. Secure the SGSM cell in a heavy duty vice.

2. Use a crescent wrench to hold the bob shaft housing in place.

3. Unscrew the magnetic housing on top of the cell.

4. Remove the magnetic housing.

5. Use a ⅝" wrench to loosen the thermocouple connection and pull it straight up to make sure it pulls clear of the set cement.
6. Expose a section of the bob shaft:
   a. Use a crescent wrench to unscrew the bob shaft housing.
      **Do not remove the housing completely!**
   b. Raise the magnetic housing enough so that you can pull the thermocouple clear.

3. Unscrew the cell cap 2 or 3 turns.

4. Screw the cell cap back down.

5. Screw the bob shaft housing back down.

6. Grip the exposed area of the shaft with a pair of channel locks.

7. The bob shaft has a left-handed thread. Loosen the shaft by turning the channel locks clockwise.

8. When the threads are fully disengaged, carefully remove the shaft.

9. Remove the magnetic housing.
   
   The action of removing the shaft will destroy the upper bushing.

10. Use a cell cap wrench to remove the cell cap.

11. Turn the test cell over and secure it in the vice with the end labeled "BOTTOM" will be facing up.

12. Use the cell cap wrench to remove the bottom cell cap.

13. Remove the cell from the vice.

14. Set the cell upright on a counter with the end labeled "TOP" will be facing up.
15. Using a hammer and the knock out tool and/or a cement press, remove the cement plug from the test cell.

Be sure to apply force only to the top of the cement plug.

Take extra precautions as the bob can be damaged during this operation.

16. Note the top and bottom of the cement plug. The top of the plug will have a hole in the top from which the shaft was pulled.

17. Set the plug on its side.

18. Using a small chisel, begin chipping at the plug about ½" from the bottom.

19. Remove the cement from the bottom of the plug in small chunks until you expose one of the vanes on the bob.

20. Set the plug upside down on the counter.

21. Place the chisel next to the exposed vane and begin chipping downward away from the vane.

22. Proceed around the bob by removing the cement from between the vanes.

Do not use any type of decontamination or cleaning agents as they may cause a hazard as a result of a reaction with parts of the equipment or with material contained with in. If there is any doubt about the compatibility of a decontamination or cleaning agent please contact OFITE Technical Support.
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Schedule</th>
</tr>
</thead>
</table>
| Calibrate Load Transducer     | - After any mechanical components are changed (bob, shaft, bushings, transducer, etc)  
                                | - Monthly                                                                  |
| Replace Bushings              | - If the bushings show signs of damage or wear                             
                                | - When the SGSM Drag Check results are too high (see page 52)              |
| SGSM Drag Check               | - Before every test                                                        
                                | - After transducer calibration                                             |
| Bob Measurements              | - Every 3 Months                                                           |
| O-ring Replacement            | - After 400°F (204.4°C) tests or as needed                                |
| Temperature                   | - Monthly (see page 74)                                                    |
| Pressure                      | - Annually (see page 72)                                                   |
| Fuses                         | - As needed (see page 65)                                                  |
If one of the main systems on the UCA SGSM (main power, fan, heater, pump, and cooling solenoid) is not working, then you may need to check the fuses.

1. Removing the top panel on the UCA SGSM and inspect the terminal block which holds the fuses. They are labeled as follows:

2. If a fuse for a particular system is blown, a red LED light will come on below the blown fuse's housing.

3. Unplug the power cord leading to the UCA SGSM.

4. Depressing the tab on the bottom of the fuse housing should allow you to flip the housing up.

5. Open the door on the side of the fuse housing.

6. Replace the blown fuse.

7. Close the door on the fuse housing and push the housing down back into place.

8. Plug the power cord back into the UCA.

9. Check to ensure the system is working again.

### UCA/SGSM (#120-59)

<table>
<thead>
<tr>
<th>Fuse</th>
<th>System</th>
<th>Fuse Type</th>
<th>Part#</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F1 Main Power</td>
<td>10 Amp</td>
<td>#122-077</td>
</tr>
<tr>
<td>2</td>
<td>F2 Main Power</td>
<td>10 Amp</td>
<td>#122-077</td>
</tr>
<tr>
<td>3</td>
<td>F3 Fan</td>
<td>2 Amp</td>
<td>#122-073</td>
</tr>
<tr>
<td>4</td>
<td>F4 Heater</td>
<td>6 Amp</td>
<td>#122-075-2</td>
</tr>
<tr>
<td>5</td>
<td>F5 Pump and Cooling Solenoid</td>
<td>2 Amp</td>
<td>#122-073</td>
</tr>
</tbody>
</table>
If the pump is running but no pressure is building in the test cell, this may indicate that the rupture disk has blown. To replace the rupture disk:

1. Make sure the “Pressure Release Valve” is completely closed.

2. Make sure the “PRESSURE UP” switch is on “AUTO” if you are using the software or “MANUAL” if you are running a manual test.

3. Make sure the “WATER ON/FILL” switch is set to “ON”.

4. The UCA/SGSM has a rupture disk (#122-053) to prevent damage due to over pressurization. If the pressure inside the cell, at ambient temperature, exceeds 22,500 PSI, the disk will rupture and release the pressure. If this happens, the cell cannot be pressurized until the rupture disk has been replaced.

   The rupture disk is located inside a hexagonal shaped block just up stream from the filter on the inlet side of the pump. To replace the rupture disk, remove this block, discard the ruptured disk, and install a new disk. Then re-install the block into the plumbing line.

The same symptoms may also be due to clogged a High Pressure Air Filter (#120-106). To replace the high pressure air filter:

1. Locate the high-pressure filters (#120-106) inside the cabinet.

2. Before removing a filter, observe the direction arrow on the side. This will be important later when re-installing the filter.

3. Carefully disconnect the pipe from the hex fitting.

4. Remove the hex fittings from both sides of the filter housing.

5. Clean or replace the internal filter making sure the direction of flow is consistent with the original installation.

6. Replace the filter to the hex fitting in the proper direction of flow.

7. Reconnect the filter to the line.
At times moisture can build up throughout the air lines if the air supply into the machine is not dry. The air filter will indicate if moisture is building up throughout the lines. If so, the water should be removed from the air line and the air filter should be drained of excess moisture.

1. Place a paper towel underneath the air filter to prevent water from spraying inside the UCA/SGSM.

2. Use the paper towel to press the pressure release button to remove water in the line.
## Maintenance

### Troubleshooting

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power</strong></td>
<td>There is no power to the machine</td>
<td>The main power cord is not plugged in.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>One of the fuses for the main power supply is blown</td>
</tr>
<tr>
<td><strong>Heating / Cooling</strong></td>
<td>The unit is not heating</td>
<td>The heater switch is not on</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The heater fuse is blown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Temperature overshoot tripped LF Controller</td>
</tr>
<tr>
<td></td>
<td>The unit is overheating</td>
<td>The thermocouple is not plugged in</td>
</tr>
<tr>
<td></td>
<td>The unit is not able to maintain temperature or the temperature is cycling uncontrollably</td>
<td>The coolant water is on</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The thermocouple is not plugged in</td>
</tr>
<tr>
<td><strong>Thermocouple</strong></td>
<td>Thermocouple will not fit into the cell cap</td>
<td>The port is filled with cement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The thermocouple is bent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The hub collar is too low on the thermocouple shaft</td>
</tr>
<tr>
<td>Symptom</td>
<td>Cause</td>
<td>Remedy</td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The unit will not hold pressure</td>
<td>The cell o-rings are worn or not seated properly</td>
<td>Disassemble the cell and inspect all o-rings. Discard any that show signs of damage or wear</td>
</tr>
<tr>
<td></td>
<td>There is a leak at one of the fittings</td>
<td>Tighten the leaking connection</td>
</tr>
<tr>
<td></td>
<td>If there are no visible leaks then there may be an internal leak caused by clogged tubing or a faulty air pressure valve.</td>
<td>Inspect filters as instructed on page 66 and replace if needed. If the tubing is clogged or the air pressure valve has failed, contact OFITE Technical Support.</td>
</tr>
<tr>
<td>The unit will not build pressure</td>
<td>There is a leak at one of the fittings</td>
<td>Tighten the leaking connection</td>
</tr>
<tr>
<td></td>
<td>The pump is broken (not cycling, constantly cycling)</td>
<td>Replace the pump</td>
</tr>
<tr>
<td></td>
<td>The Rupture Disk is blown</td>
<td>Replace the Rupture Disk as instructed on page 66.</td>
</tr>
<tr>
<td></td>
<td>If there are no visible leaks then there may be an internal leak caused by clogged tubing or a faulty air pressure valve.</td>
<td>Inspect filters as instructed on page 66 and replace if needed. If the tubing is clogged or the air pressure valve has failed, contact OFITE Technical Support.</td>
</tr>
<tr>
<td><strong>Symptom</strong></td>
<td><strong>Cause</strong></td>
<td><strong>Remedy</strong></td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Software</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is no transit time</td>
<td>The transducers are dirty</td>
<td>Clean the transducers</td>
</tr>
<tr>
<td></td>
<td>Too much couplant has been applied to the transducers</td>
<td>Wipe off the transducers and apply a smaller amount of couplant to the transmitter surface</td>
</tr>
<tr>
<td></td>
<td>The springs do not provide enough force to keep the transducer in contact with the steel surface</td>
<td>Replace the springs</td>
</tr>
<tr>
<td></td>
<td>The transducer cables have been damaged</td>
<td>Replace the transducer cables</td>
</tr>
<tr>
<td></td>
<td>The transducers have exceeded their useful life</td>
<td>Replace the transducers</td>
</tr>
<tr>
<td>Trace lines are missing from the graph</td>
<td>The boxes for each line are unchecked</td>
<td>Check the appropriate boxes</td>
</tr>
<tr>
<td><strong>Leaks</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water is not flowing to the cell</td>
<td>The filter is plugged</td>
<td>Clean the filter (see photo on page 66)</td>
</tr>
<tr>
<td></td>
<td>The fill tubing is plugged</td>
<td>Check the tubing for obstruction</td>
</tr>
<tr>
<td></td>
<td>The fittings and/or cell cap openings are clogged with cement</td>
<td>Check the openings and clean if necessary</td>
</tr>
<tr>
<td>Water is leaking from the fitting</td>
<td>The threads have been damaged</td>
<td>Replace the fitting</td>
</tr>
<tr>
<td></td>
<td>The collar on the thermocouple connection is too high or too low</td>
<td>Adjust the collar until 2 threads are exposed</td>
</tr>
<tr>
<td></td>
<td>Cement has clogged the inner surface of the port</td>
<td>Clean cement out of the port</td>
</tr>
<tr>
<td>Symptom (Continued)</td>
<td>Cause</td>
<td>Remedy</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>The test cell is leaking cement</td>
<td>The o-ring has been damaged</td>
<td>Replace the o-ring</td>
</tr>
<tr>
<td></td>
<td>The o-ring has come out of the groove</td>
<td>Reseat the o-ring</td>
</tr>
<tr>
<td></td>
<td>The metal seal ring is upside down</td>
<td>Make sure the pointed end of the metal seal ring is installed with the narrow side away from the o-ring (see diagram on page 23)</td>
</tr>
<tr>
<td>Weak or intermittent transit time signal during calibration or test</td>
<td>Dirty transducers or transducer cavity</td>
<td>Remove and clean both the transducers and transducer cavity.</td>
</tr>
<tr>
<td></td>
<td>Worn transducer cables and/or BNC connections</td>
<td>Remove and check the cables for kinks and connections for dirty or worn area. Clean or replace as necessary.</td>
</tr>
<tr>
<td></td>
<td>Excessive transducer couplant used</td>
<td>Clean transducers</td>
</tr>
<tr>
<td></td>
<td>Degraded transducers</td>
<td>Replace transducers</td>
</tr>
<tr>
<td></td>
<td>Couplant used is not rated for the test temperature</td>
<td>Remove and clean the transducers and reapply the proper couplant</td>
</tr>
<tr>
<td>Drag Check (SGSM Only)</td>
<td>Load cell is out of calibration (only for #120-58)</td>
<td>First, calibrate the Load cell (see page 72).</td>
</tr>
<tr>
<td></td>
<td>The Magnet Shaft Assembly (#120-58-010) is bent</td>
<td>Disassemble the SGSM cell cap and make sure the shaft is not bent.</td>
</tr>
<tr>
<td></td>
<td>Bushings may be damaged or worn</td>
<td>Inspect the bushings for damage or wear. Replace any damaged or worn components and run the drag check again.</td>
</tr>
</tbody>
</table>
The pressure should be calibrated on new instruments and whenever the pressure transducer has been replaced. For further assistance, contact OFITE Technical Support.

1. System Preparation
   a. Start the UCA or SGSM software.
   b. Go to Utilities → Calibrate → Pressure Transducer.
   c. Click “Accept” once you are ready to calibrate.
   d. Vent the test cell of all pressure. When the reading on the display stabilizes click “Accept.”
   e. Remove the Fuse Panel on the right side. Push the calibration shunt jumper. Notice the red flaps on the shunt, are no longer visible.

   The alarm will sound since the shunt sets the pressure reading to 24,000 PSI higher than the max allowed rating.

   **Note**
f. Wait for the value to stabilize.

g. Once the value stabilizes, click “Accept.”

![Image](image1.png)

h. The next screen will display the new cell values. Click “Save” to store the new value.

![Image](image2.png)

i. Pull the calibration shunt jumper. Notice the red flaps are visible again.

![Image](image3.png)

The Pressure Transducer is now calibrated.
Calibration requires the use of a calibrated heating device. For further assistance, contact OFITE Technical Support.

1. Start the UCA or SGSM software.

2. Connect the thermocouple to a dry block calibrating device.

3. Set the dry block to 100°F (37.8°C).


A warning prompt will appear to inform the user that all parameters will be erased if the entire calibration process is not completed.

5. Enter “Setpoint 1” at 100°F (37.8°C) and wait until the reading reaches the target temperature.
6. Once the reading on the dry block stabilizes, click accept.

7. Now set the dry block to 200°F.

8. Enter “Setpoint 2” at 200°F (93.3°C) and wait until the reading reaches the target temperature.

9. Once the reading on the dry block stabilizes click accept.

10. Now set the dry block to 400°F.

11. Enter “Setpoint 3” at 400°F (204.4°C) and wait until the reading reaches the target temperature.

12. Once the reading on the dry block stabilizes click accept.
13. The software will display the “Offset” that will be saved on the Eurotherm.

Offset – Is the average of the three differences from the three steps.

14. Click the “Save” button on the software.

15. Test the new setting by conducting a new test.

16. Set the dry block to 300°F.

17. Once the dry block reaches 300°F, note the corresponding temperature reading on the software.

The reading on the software should be within 2°F of the dry block.
The UCA unit should be calibrated initially upon install. It should then be calibrated whenever any part of the test cell, transducers, control card or software are changed.

1. Start the UCA software.
2. Put the “UCA/SGSM” switch to the UCA position.
3. Begin by filling the test cell with distilled water and placing it in the unit as described in the “Connecting the Cell” section on page 29.
4. Wait for the sample temperature to reach 70° ± 2°F (21.1° ± 1.1°C).
   If the sample temperature is outside this range, transit time may be different than expected.
5. Click the “Set Xmitter On” button.
6. The transit time should be 17.0 ± 2.0 µsec (at room temperature). If the transit time is within the acceptable range, click “OK” to save the calibration and continue.
   If the transit time is not within this range, it could be an indication that the transducers are failing or the transducer cables are damaged. Inspect and clean the transducers as well as the transducer cables and connections. If the transit time is still out of range, then you may need to get replacement parts for the transducers or cables. See page 29.
   If the software displays an error message, contact OFITE for support.
7. Click the “Set Xmitter Off” button to turn off the transmitter.
**Calibration**

**SGSM Transducer**

The transducer on the SGSM should be calibrated periodically to ensure accurate readings. The calibration is performed with a dead-weight set.

1. Remove the torque spring from the SGSM and install the calibration pulley.

2. Connect the wire to the torque spring post and thread it over the calibration pulley.

3. Attach the other end of the wire to the hook on the calibration dead-weight holder. Adjust the SGSM so that the weight holder is hanging freely.
4. Start the SGSM software.

5. Put the “UCA/SGSM” switch to the SGSM position.

6. Click Utilities → Calibrate Load Cell.

7. You will be prompted to take a reading with no weight on the transducer. Simply click the “ACCEPT” button.

8. You will now be prompted to add weight to the weight holder. Place the appropriate weight on the holder and click the “ACCEPT” button.

When calibrating the unit for the first time, the software does not provide prompts that indicate which weights to apply to the weight holder.

The correct weights are: 0g, 100g, 200g, and 400g.

9. Continue adding weight according to the prompts and click “ACCEPT” every time.

10. When the calibration is complete, click the “SAVE” button.

11. Remove the calibration pulley assembly and reinstall the tension spring between the base spring post and the torque spring post.
The UCA software stores all calibration data from prior Ultrasonic Transducer, Thermocouple, and Pressure Transducer calibrations. To view data from a previous calibration, select “Calibration Archive” from the “Utilities” menu. Select a calibration archive.

A list of previous calibrations will appear. Click on a calibration record and export to view the data.

Enter a file name and a location and press “OK”. A final prompt will appear to indicate when the file has exported successfully.
The SGSM software stores all calibration data from prior “Load Cell, Thermocouple, and Pressure Transducer” calibrations. To view data from a previous calibration, select them from the “Utilities” menu. A list of previous calibrations will appear in the Calibrations Archive window to the left. Click on a calibration record and export to view the data.
From this screen you can view and export the data to the PC in an Excel document. Select a calibration and click Export. A “Choose or Enter Path of File” window will open. Enter a file name and save it as a “.dat” document. The “.dat” document will create a text file which can be opened in Excel.
Appendix
Multiple Instruments

It is possible to control multiple instruments from a single computer. To setup the software for multiple UCAs, repeat the following procedure for each instrument.

1. Plug each instrument into separate USB ports to the computer.
2. On the computer, navigate to the “C:\Program Files (x86)” folder.
3. Locate the “UCA” or “SGSM” folder and select it.
4. Hold down the CTRL key and then press C. Then hold down the CTRL key and hit V. This will create a duplicate folder.
5. Choose a name to identify the new instrument.
6. Rename the new folder with the name of the instrument.
7. Locate the program file (.exe) inside the folder and rename it with the name of the instrument.

For convenience, create a shortcut to this file on the desktop.
8. Open the software using the new program file.
9. Change the “Archive Path” to a new folder in the Setup Screen. See page 35.

Each instrument must have its own Archive Path.
Appendix
Electrical System
Grounding

Proper grounding protects the equipment operator from the risk of electric shock. The electrical cord provided with this equipment has an equipment grounding conductor and a grounding plug. Observe the following guidelines at all times:

- Always connect the plug to a matching outlet that is properly installed and grounded.

- If an extension cord is necessary, make sure it has three prongs and is compatible with the electrical cord provided with the equipment.

- Do not modify the electrical cord provided with the equipment. If it is not compatible with any available outlets, have a compatible outlet installed by a qualified electrician.

- If the equipment-grounding conductor (solid green or green and yellow) is improperly connected, the operator will be at risk of electrical shock. Never connect it to a live terminal.

- Local codes may require a Ground Fault Circuit Interrupter (GFCI).

- Repair or replace a damaged or worn cord immediately.

- When in doubt, consult a qualified electrician.
Appendix
UCA Cell Assembly Diagram

- Top Cap (#120-59-021C)
- Handles (#120-59-081)
- Back Up Ring (#120-50-027-1)
- O-Ring, Viton (#123-011)
- Retaining Ring (#120-50-026)
- Cell Body (#120-59-021A)
- O-Ring, Viton (#123-011)
- Back Up Ring (#120-50-027-1)
- Base Cap (#120-59-021B)
Appendix

SGSM Cell Assembly Diagram

#120-58-006 - Cell Assembly for High Pressure SGSM

1. 120-51-024 Gland, Medium Pressure
2. 120-51-024-1 Plug, Medium Pressure
3. 120-53-09 Cover for Driven Magnet
4. 120-58-010 Magnet Shaft Assembly
5. 120-53-13 Base Flange
6. 120-53-42 Bushing, Qty: 2
7. 120-53-82 Retainer Ring, External
8. 120-53-32 O-ring
9. 120-53-58 Backup Ring, Upper
10. 120-53-59 Backup Ring, Lower
11. 120-53-31 O-ring
12. 120-58-04 Mounting Adapter
13. 120-58-05 Retaining Ring
14. 120-51-4 Handle, Qty: 2
15. 120-58-03 Cell Cap
16. 120-58-38 Retaining Ring, Internal, Qty: 2
17. 120-58-23 Diaphragm
18. 120-50-027-1 Seal Ring, Qty: 2
19. 120-50-021A Cell Body
20. 120-50-021B Bottom Cap
Appendix

Drive Assembly Diagram

#120-58-005 - SGSM Drive Assembly

<table>
<thead>
<tr>
<th>Number</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>120-53-16</td>
<td>Cap for Drive Cover</td>
</tr>
<tr>
<td>2</td>
<td>120-53-15</td>
<td>Body for Drive Cover</td>
</tr>
<tr>
<td>3</td>
<td>120-53-57</td>
<td>Thumb Screw, #6-32 × .375&quot;L, Qty: 6</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Screw, Pan Head, #10-32 × .75&quot;L, Qty: 4</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Lock Washer, Qty: 4</td>
</tr>
<tr>
<td>6</td>
<td>130-76-28</td>
<td>Motor</td>
</tr>
<tr>
<td>7</td>
<td>120-53-37</td>
<td>Connector, Motor to Board, 10 Position, Qty: 2</td>
</tr>
<tr>
<td>8</td>
<td>120-53-20</td>
<td>Flange for Motor Mount</td>
</tr>
<tr>
<td>9</td>
<td>120-53-33</td>
<td>Spring for Load Cell</td>
</tr>
<tr>
<td>10</td>
<td>120-53-22</td>
<td>Post for Torque Spring, Tall</td>
</tr>
<tr>
<td>11</td>
<td>120-53-21</td>
<td>Post for Torque Spring, Short</td>
</tr>
<tr>
<td>12</td>
<td>120-53-17</td>
<td>Post for Torque Transducer</td>
</tr>
<tr>
<td>13</td>
<td>120-53-60</td>
<td>Retainer Ring, Internal</td>
</tr>
<tr>
<td>14</td>
<td>120-53-041</td>
<td>Bearing</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Nut, #4-40, 3/16&quot;W × 1/16&quot;H</td>
</tr>
<tr>
<td>16</td>
<td>120-58-08</td>
<td>Calibration Stand</td>
</tr>
<tr>
<td>17</td>
<td>120-610</td>
<td>Screw, Phillips, Pan Head, #4-40 × .375&quot;L</td>
</tr>
<tr>
<td>18</td>
<td>120-58-11</td>
<td>Pulley for Calibration Stand</td>
</tr>
<tr>
<td>19</td>
<td>120-58-10</td>
<td>Thumb Screw, #10-32 × 3/16&quot;L</td>
</tr>
<tr>
<td>20</td>
<td>120-53-11</td>
<td>Drive Base</td>
</tr>
<tr>
<td>21</td>
<td>120-53-55</td>
<td>Thumb Screw for Load Cell, #6-32 × 1/2&quot;L</td>
</tr>
<tr>
<td>22</td>
<td>120-53-34</td>
<td>Load Cell</td>
</tr>
<tr>
<td>23</td>
<td>120-53-18</td>
<td>Mount for Torque Transducer</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>Screw, Pan Head, #8-32 × 3/16&quot; LG, Qty: 2</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>Set Screw, Hex, Flat Pt, #8-32 × 3/16&quot;, Qty: 2</td>
</tr>
<tr>
<td>26</td>
<td>120-53-02</td>
<td>Magnet for Driver Assembly</td>
</tr>
<tr>
<td>27</td>
<td>120-58-14</td>
<td>Support for Drive Assembly</td>
</tr>
<tr>
<td>28</td>
<td>120-53-75</td>
<td>A/D Board Assembly</td>
</tr>
<tr>
<td>29</td>
<td>120-53-29</td>
<td>Connector for Load Cell, 5 Pin</td>
</tr>
<tr>
<td>30</td>
<td>120-53-30</td>
<td>Connector for Motor, 6 Pin</td>
</tr>
</tbody>
</table>
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, e-mail 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.