

CAUTION

DO NOT install the SAM-255 inside a fume hood.

To avoid the possibility of a thermal overload, the SAM-255 should not be physically located inside a fume hood. Vapors should be vented into a fume hood by means of the exhaust hose only.

Installation of the SAM-255 inside a fume hood will void any written or implied warranty from the manufacturer.

Operating Precautions

Do not place any type metal container in the microwave.

Do not tamper with the safety interlocks. The SAM-255™ is equipped with three door safety interlock switches which prevent the instrument from producing microwave power if the door is open. Tampering with the safety interlocks may allow microwave production when the door is open, which is very dangerous.

Do not place any object between the front of the microwave cavity and the door or allow soil or cleaner residue to accumulate on sealing surfaces.

Do not operate the instrument if it is damaged. It is particularly important that the instrument door close properly and that there is no damage to the door (bent), hinges or latches (broken or loosened), or door sealing surfaces.

The instrument utilizes high voltages and microwave radiation. It should be adjusted or repaired only by qualified service personnel trained in repair and maintenance of high voltage and microwave power systems.

The possibility of instrument-induced electromagnetic interference (EMI) is minimal if precautions outlined in this manual are followed. However, it is recommended that the user post a sign warning pacemaker wearers that a microwave device is in operation. Also, the instrument should not be placed close to any electrical device susceptible to EMI. If the instrument is suspected of inducing EMI, the door and the front of the cavity should be carefully inspected for damage. A microwave leakage measurement should be performed as outlined in the Maintenance and Service section of this manual. Leakage above the legal limit of 5 mW/cm² should be reported to the CEM Service Department.

To avoid possible electrical shock or exposure to microwave energy, the instrument must be turned off and the power cord removed from the electrical outlet prior to any part replacement.

WARNING

Improper installation or use of the instrument grounding wire and/or plug can result in electrical shock.

The SAM-255 instrument must be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This instrument is equipped with a cord having a grounding wire with a grounding plug. The plug must be plugged into a dedicated outlet that is properly installed and grounded.

If grounding instructions are not completely understood or if doubt exists that the instrument is properly grounded, consult a qualified electrician or service technician. If it is necessary to use an extension cord, use only a 3-wire extension cord with a 3-blade grounding plug that has a 3-slot electrical receptacle. The marked rating of the extension cord shall be equal to or greater than the electrical rating of the instrument.

Warnings, Cautions and Notes

Warnings, cautions and notes are included throughout this manual and should be read thoroughly and strictly followed.

WARNING - A warning is inserted for essential information used to emphasize dangerous or hazardous conditions to the operation, cleaning and maintenance of the instrument which may result in personal injury.

CAUTION - A caution is inserted for essential information used to emphasize procedures which, if not strictly followed, may result in damage or destruction to the instrument or improper instrument operation.

NOTE - A note is inserted for emphasis of procedures or conditions which may otherwise be misinterpreted or overlooked and to clarify possible confusing situations.

To the best of our knowledge, the information contained herein is accurate. However, CEM Corporation cannot accept liability of any kind for the accuracy or completeness of the information contained in this manual. The final determination of the suitability and proper use of the instrument described herein, the accuracy of the information and data obtained from such use, and whether such use infringes any patents or the legal safeguards of others are the sole responsibility of the user.

Table of Contents

Introduction.....	1
Compounds Unsuitable for Microwave Drying	1
Installation	2
Unpacking.....	2
Inspection	4
Instrument Description.....	5
Display.....	5
Keyboard	5
Instrument Startup	5
External Balance Installation	6
External Balance Setup	6
Printer Installation.....	6
Personal Computer Setup	7
Setup Menu	9
External Balance	9
System Options	10
Timers.....	10
Set Clock	10
Screen Saver Time.....	11
Tests	11
Information.....	11
Select Language.....	12
Program Options	12
Printer Setup.....	13
Company Name.....	13
Delete Method	13
Quick Test - No External Balance.....	15
Quick Test - External Balance	16
Edit/Create Method.....	21
Create Method.....	21
Standard	21
Ramping	22
Load Method.....	23
Perform Method.....	25
Standard - No External Balance	25
Standard - External Balance.....	25
Ramping Method - No External Balance	29
Ramping Method - External Balance.....	29
Print Menu	33
Print Method	33
Maintenance, Troubleshooting and Service	35
Routine Maintenance.....	35
Microwave Leakage Measurement.....	36
Microwave Power Measurement	37
Calibration	39
Temperature Calibration	39
Enter Previous Calibration Values	40
Troubleshooting Guide	41
Error Messages	42
Component Removal and/or Replacement	44
Fuses.....	44
Instrument Cover	44
Spare Parts.....	45
Specifications	46
Warranty	47
Customer Support	48

Introduction

The Microwave Drying System, Model SAM-255, is a special purpose microwave system designed for laboratory use in heating/drying a wide range of materials. Its primary purpose is the rapid drying of samples. Optional workstation accessories can be used to determine dry content (loss on drying of samples).

Calculations for the SAM-255 include

- % LOD (Loss on Drying) = $\frac{\text{Initial Weight} - \text{Final Weight (Dried Sample Weight)}}{\text{Initial Weight}} \times 100$

The SAM-255 consists of

- a microwave power system.
- a stainless steel microwave cavity with exhaust fan,
- a programmable digital computer,
- an optional internal infrared temperature control system,
- a flame detection device,
- internal calibration software,
- two (2) RS-232 ports and one (1) parallel printer port, and
- an exhaust hose to vent fumes.

Available accessories for use with the SAM-255 include

- drying sample holders and accessories,
- balances,
- printers, and
- calibration source instrumentation

Compounds Unsuitable for Microwave Drying

WARNING

Drying of certain chemical compounds or types of samples constitutes unreasonable, hazardous misuse of CEM microwave drying systems. The classes of compounds listed below are unsuitable microwave drying. Absence of a particular chemical compound from this list does not imply microwave drying of such a sample is safe under all conditions. CEM will not be responsible for damage to equipment and facilities or personal injuries resulting from microwave drying of such compounds/samples.

- Explosives (TNT, Nitrocellulose, etc.)
- Propellants (Hydrazine, Ammonium Perchlorate, etc.)
- Pyrophoric chemicals
- Hypergolic mixtures (Nitric Acid and Phenol, Nitric Acid and Triethylamine, Nitric Acid and Acetone, etc.)
- Aviation Fuels (JP-1, etc.)
- Acetylides
- Perchlorates (Ammonium, Potassium, etc.)

Installation

The SAM-255 instrument should be installed on a laboratory work bench with access to a fume hood or other means of fume disposal.

To install the SAM-255, choose a location that:

1. provides at least 8 in. (20 cm) space on each side and 6 in. (15 cm) space in the rear for proper ventilation.
2. is free from vibration of large equipment.
3. provides a temperature range of 41°F (5°F) to 104°F (40°C).
4. provides adequate bench space for sample handling and printer placement.
5. permits the instrument to be connected to a dedicated, grounded outlet. The SAM-255 instrument should be operated on a stabilized, constant voltage AC power supply, and the voltage must be within $\pm 10\%$ of the specified level. (Refer to the "Specifications" in this manual.)

Note: Measure line voltage to ensure that it meets system specifications.

CAUTION

Line voltage fluctuations greater than 10% will affect instrument performance.

6. provides access to a fume hood or other means of fume disposal.

CAUTION

Do not install the SAM-255 instrument inside a fume hood. Placing the instrument in a fume hood can cause a thermal overload. Vent the SAM-255 into a fume hood by means of the exhaust hose.

7. The exhaust system is designed to push fumes through the exhaust hose (3" ID) at approximately 125 CFM (unducted). The exhaust system will push fumes through the flexible exhaust hose at approximately 55 - 75 Kmh (40 - 55 mph). The exhaust hose should be a maximum length of 16 feet (maximum 8 feet vertical within 16 feet).

WARNING

To avoid insufficient exhaust, never permit the exhaust flow rate to fall below 50 CFM.

Unpacking

1. Carefully open the shipping cartons, using caution to avoid puncturing or tearing the foam packaging. Remove the foam and cardboard packing material.

NOTE

Retain all packing material for use if returning the instrument to the manufacturer for service.

2. With at least two people for lifting, locate the handles on each side of the lifting carton and lift the instrument from the shipping carton and place it on a laboratory bench. Carefully remove the lifting carton and plastic wrap from the instrument.
3. Open the instrument door and remove the packing from the four studs in the bottom of the instrument cavity.
4. Verify that all accessories (listed and illustrated on next page) are included.

SAM-255 Accessories:

- Exhaust Hose
- Fuses, 120V, 60 Hz - 15 AMP (2), 240V, 50 Hz - 8 AMP (2)
- Power Cord
- Calibration Adapter Cable
- Operation Manual

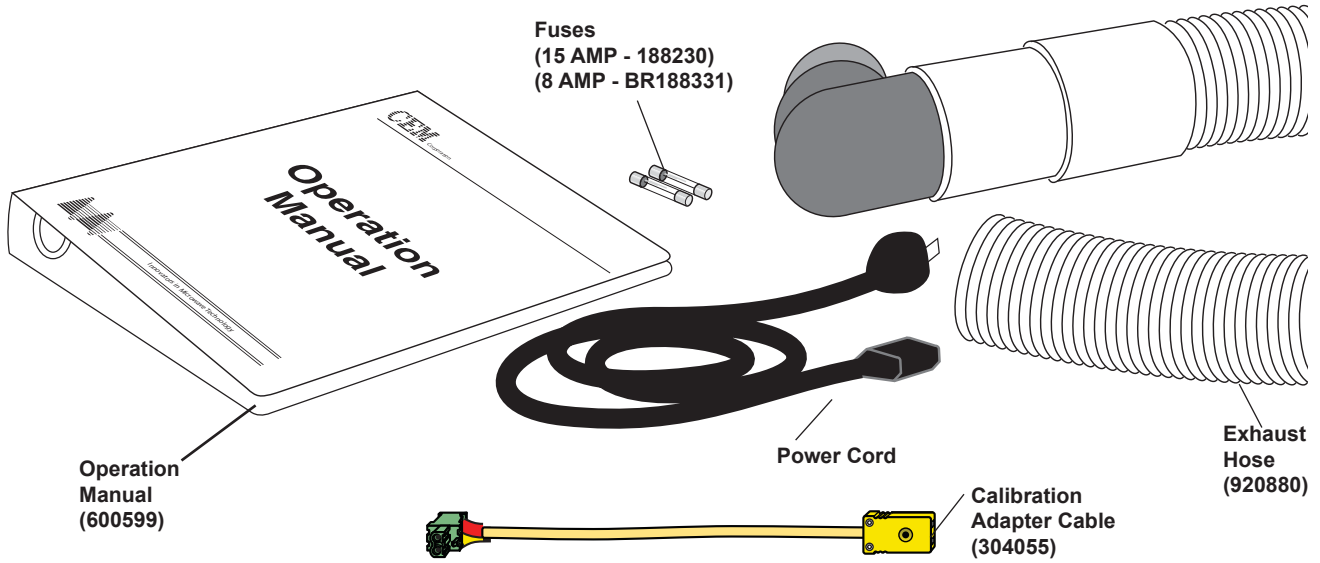


Figure 1. SAM-255 Accessory Kit

Inspection

1. Inspect each part of the instrument for any cracks, dents, or warping.
2. Inspect the door for any damage and for proper alignment. When closed, the door should seat firmly against the front of the microwave cavity.

WARNING

If damage is noted, do not attempt instrument operation.

If the instrument has been damaged in shipping, contact the freight carrier to report damage and to file a damage report. Contact the CEM Service Department or the local subsidiary or distributor to report damage and to request service information.

CEM Corporation
Service Department
P.O. Box 200
3100 Smith Farm Road
Matthews, NC 28106-0200 USA

Within the United States:
(800) 726-5551 or (704) 821-7015
Fax: (704) 821-4369
E-mail: service@cemx.com

Outside the United States:
Telephone: (704) 821-7015
Fax: (704) 821-4369
Web: <http://www.cemx.com>

CEM Microwave Technology Ltd.

2 Middle Slade
Buckingham Industrial Park
Buckingham MK18 1WA
United Kingdom
Telephone: (44) 1-280-822873
Fax: (44) 1-280-822342
email: info.uk@cem.com

CEM GmbH

Carl-Friedrich-Gauss-Str. 9
47475 Kamp-Lintfort
Germany
Telephone: (49) 2842-96440
Fax: (49) 2842-964411
email: info@cem.de
www.cem.de

CEM S.r.l.

Via Dell'Artigianato, 6/8
Italy
Telephone: (39) 35-896224
Fax: (39) 35-891661
email: info.srl@cem.com

CEM μ Wave S.A.S.

Immeuble Ariane
Domaine Technologique de Saclay
4, rue Ren Razel
91892 ORSAY Cedex
France
Telephone: (33-1) 6935-5780
email: info.fr@cem.com

Instrument Description

- **Display** - shows menus, method parameters and instrument status on an 8 line x 40 character vacuum fluorescent display.
- **Keyboard** - allows the operator to enter setup parameters and company names and control operational parameters such as time.



Figure 3a. SAM-255 (Front View with Door Open)

Instrument Startup

1. Connect the exhaust hose to the cavity exhaust outlet by pushing the plastic elbow as far into the exhaust outlet as possible. Orient the plastic elbow so that the exhaust hose extends toward the fume disposal mechanism. Place the open end of the exhaust hose in a fume hood or other fume disposal mechanism.
2. Plug the female end of the power cord into the power cord receptacle on the power panel in the rear of the instrument. Plug the male end of the power cord into a grounded, dedicated electrical outlet.

Note: The SAM-255 is available in 120V, 60 Hz, 12 AMP or 220 - 240V, 50 Hz, 8 AMP instruments only.

3. If applicable, install the printer and/or external balance according to instructions included in this manual.
4. Position the power switch located on the power panel in the rear of the instrument in the "on" position.

External Balance Installation

1. Press the SAM-255 power switch to the “off” position and remove the power cord from the electrical outlet.

CAUTION

Ensure that the SAM-255 power switch is in the “off” position when installing an external balance to avoid damage to the SAM-255 and/or balance.

2. Place the external balance on a sturdy laboratory workbench or table.
3. Plug one connector of the cord shipped with the external balance into the socket on the balance and the other connector into the external balance port of the SAM-255 (figure 2). Plug the balance power cord into a grounded AC electrical outlet. Plug the SAM-255 power cord into a dedicated electrical outlet.
4. Based on the type external balance used, refer to the manufacturer’s manual and/or CEM instructions for specific procedures for setup and configuration of the balance and instrument.

External Balance Setup (Port J1)

Refer to figure 2 of this manual for location of balance, printer and computer ports. Outlined below are serial port configurations for external balances:

	Pin	Function
Denver Instrument:	300 Baud	
	8 Data Bits	2 RX
	1 Stop Bit	3 TX
	No Parity	5 GND
Sartorius:	1200 Baud	
	7 Data Bits	2 TX
	1 Stop Bit	3 RX
	Odd Parity	5 GND
Mettler:	2400 Baud	
	7 Data Bits	2 RX
	1 Stop Bit	3 TX
	Even Parity	5 GND
Sciencetech:	24 Baud	
	Even Parity	2 RX
	7 Data Bits	3 TX
	1 Stop Bit	5 GND

*The SAM-255 defaults to a Sciencetech external balance.

Printer Installation

The SAM-255 supports a variety of different printer standards – IBM, Epson Compatible Graphics, HP LaserJet, and Canon Color. A compatible printer is available from CEM Corporation. This printer is factory set and requires no setup.

To install the printer, follow the procedures outlined below. Refer to the manual shipped with the printer for illustrations and explanation of the terminology used.

1. Press the SAM-255 power switch to the “off” position.

CAUTION

Ensure that the SAM-255 power switch is in the “off” position when installing a printer to avoid damage to the SAM-255 and/or printer.

2. Remove the printer and its accessories from the shipping carton. Place the printer on a vibration-free printer stand or a solid, sturdy laboratory workbench or table. Save all packing material.
3. Plug one connector of the computer cable into the socket on the printer. Plug the other connector into the parallel port of the SAM-255 (figure 2). Plug the printer power cord into a grounded AC electrical outlet.

4. Plug the SAM-255 power cord into an AC power receptacle.
5. Position the power switch of the printer in the “on” position.
6. Position the power switch of the SAM-255 in the “on” position.

Personal Computer Setup (Port J2)

Information transfer to an external computer is accomplished with RS-232C serial compatible signals using 8 data bits, 1 stop bit and null parity. The interface connector (figure 2) is a 9 pin DB9 (male). The information is transmitted in standard ASCII format.

Note to programmer: Parse data on tab.

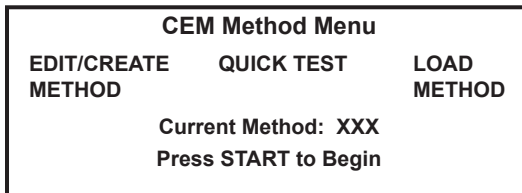
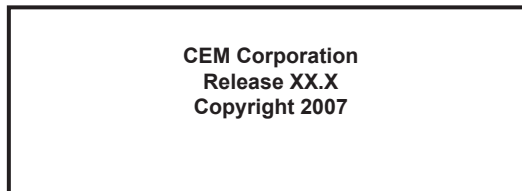
Comm. Port Setup	DB9 Connections	
	Pin	Function
9600 Baud		
8 Data Bits	2	RX
1 Stop Bit	3	TX
No Parity	5	GND

PC software to interface and collect data must be supplied by the user.

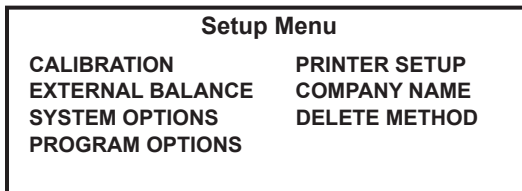
Setup Menu

The Setup Menu permits instrument entry of system variables, printer and communication port setup; access of system information and history; method deletion; and thermocouple and balance calibration.

1. Position the power switch in the “on” position. The following screens will appear in succession, ending with the CEM Method (Main) Menu.

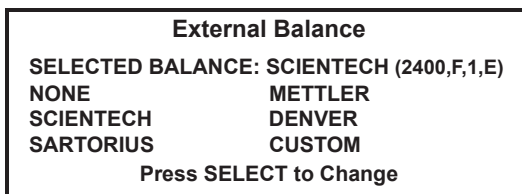


2. With the CEM Method Menu displayed, press the SETUP key.



3. Using the arrow keys, highlight **External Balance**. Press the SELECT key.

External Balance



4. Using the arrow keys, highlight the selected external balance or “None” if no external balance is to be used. Press the SELECT key.

Note: The numbers in parentheses after each balance refer to the baud rate, data bits, stop bits and parity settings for the balances.

Note: For balances not shown, choose “Custom.” Press the SELECT key to choose the appropriate baud rate, data bits, stop bits and parity settings.

5. Press the BACK key to return to the Setup Menu.

Setup Menu	
CALIBRATION	PRINTER SETUP
EXTERNAL BALANCE	COMPANY NAME
SYSTEM OPTIONS	DELETE METHO
PROGRAM OPTIONS	

System Options

6. Using the arrow keys, highlight **System Options**. Press the SELECT key.

System Options	
TIMERS	LANGUAGE
TESTS	
INFORMATION	
CONTROLS	

Timers

7. Using the arrow keys, highlight **Timers**. Press the SELECT key.

Timers	
SET CLOCK	
SCREEN SAVER TIME: XX:XX	

Set Clock

8. Using the arrow keys, highlight **Set Clock**. Press the SELECT key.

Set Clock	
DATE FORMAT: XX/XX/XX	
DATE: XX/XX/XX	
TIME: (24 Hour format): XX:XX	
Press SELECT to Change	

9. Using the arrow keys, highlight **Date Format**. Press the SELECT key to toggle between DD/MM/YYYY (Day/Month/Year) or MM/DD/YYYY (Month/Day/Year).
10. Using the arrow keys, highlight **Date**. Use the numeric keys to enter the appropriate date.
11. Using the arrow keys, highlight **Time**. Use the numeric keys to enter the appropriate time. The time should be entered on a 24-hour basis. For example, 1:00p.m. should be entered as 13:00.
12. Press the BACK or NEXT key to return to the “Timers” screen.

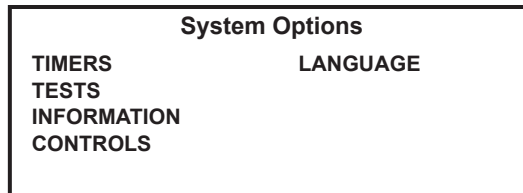
Timers	
SET CLOCK	
SCREEN SAVER TIME: XX:XX	

Screen Saver Time

- Using the arrow keys, highlight **Screen Saver Time**.
- The screen saver time is set to determine the length of time the instrument can be idle prior to the screen saver appearing on the screen. Screen saver time can be set from 5 -90 minutes. Default screen saver time is 15 minutes. Use the numeric keys to enter the desired screen saver time.

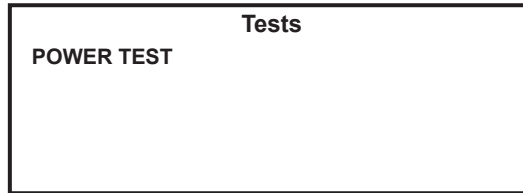
Note: If a screen saver time of fewer than 5 minutes is entered, the instrument software will automatically enter 5 minutes.

- Press the BACK key to return to the “Systems Options” screen.



Tests

- Using the arrow keys, highlight **Tests**. Press the SELECT key.

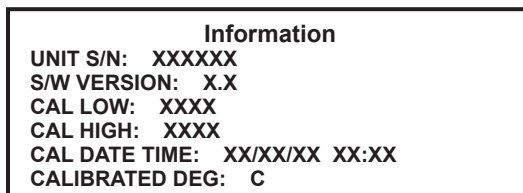


Note: To perform an instrument microwave power test, refer to the maintenance section of this manual.

- Press the BACK key to return to the “System Options” screen.

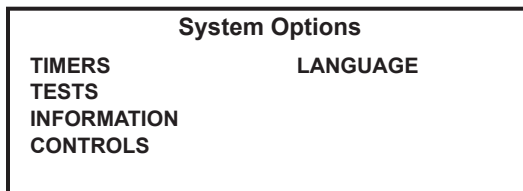
Information

- Using the arrow keys, highlight **Information**. Press the SELECT key.

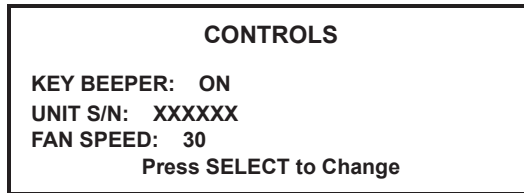


Note: The information screen is for user information only and cannot be revised. Press the PRINT key to print an information report.

- Press the BACK key to return to the “System Options” screen.



- Using the arrow keys, highlight **Controls**. Press the SELECT key.



Note: The key beeper is an audible “beep” after each key stroke and can be turned on and off.

21. Using the arrow keys, highlight **Key Beeper**. Press the SELECT key to toggle between “On” and “Off.”

Note: The unit serial number should never be changed or edited in the instrument software unless it has been lost due to instrument failure, etc.

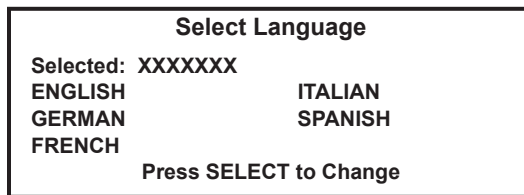
22. Using the arrow keys, highlight **Unit S/N**. If necessary, use the numeric keys to enter the appropriate serial number shown on the instrument serial number label.

23. Press the BACK key to return to the “System Options” screen.

24. Using the arrow keys, highlight Fan Speed. Using the numeric keys, enter the desired fan speed (0 - 100).

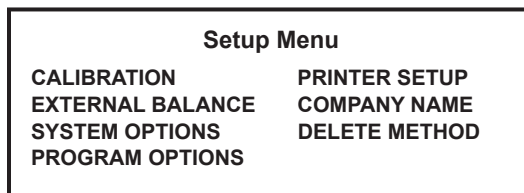
Select Language

25. Using the arrow keys, highlight **Language**. Press the SELECT key.



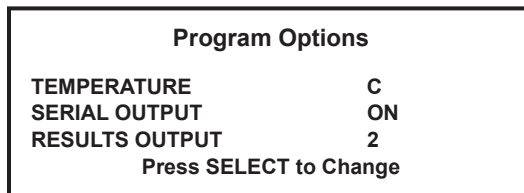
26. Using the arrow keys, highlight the desired language. Press the SELECT key.

27. Press the BACK key two (2) times to return to the **Setup Menu** screen.



Program Options

28. Using the arrow keys, highlight **Program Options**. Press the SELECT key.



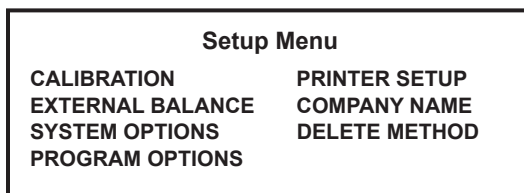
29. Using the arrow keys, highlight **Temperature**. Press the SELECT key to toggle and select degrees C or degrees F.

Note: The serial output permits the temperature and weight to be recorded and displayed by the computer.

30. Using the arrow keys, highlight **Serial Output**. Press the SELECT key to toggle between “On” and “Off.”

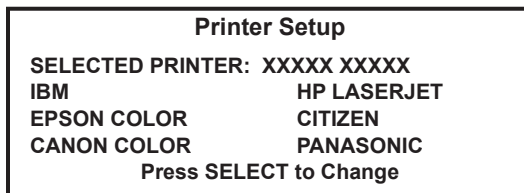
31. Using the arrow keys, highlight **Results Output**. Press the SELECT key to toggle between two (2) and four (4).

32. Press the BACK key to return to the **Setup Menu** screen.



Printer Setup

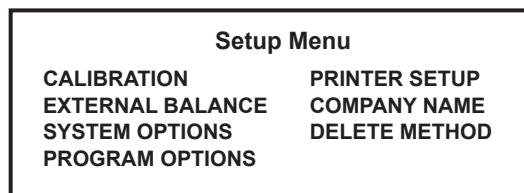
33. Using the arrow keys, highlight **Printer Setup**. Press the SELECT key.



Note: The instrument default is the Epson color printer.

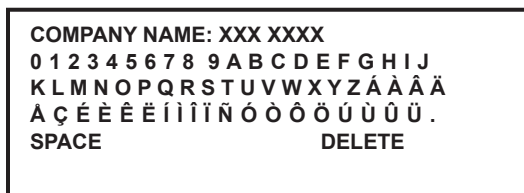
34. Using the arrow keys, highlight the type of printer to be used with the SAM-255 instrument. Press the SELECT key.

35. Press the BACK key to return to the **Setup Menu** screen.



Company Name

36. Using the arrow keys, highlight **Company Name**. Press the SELECT key.

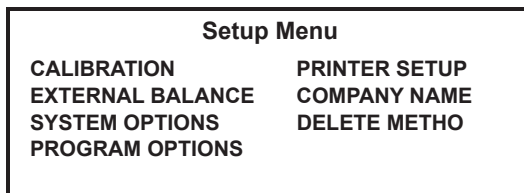


Note: The company name can be entered from this screen for identification and printout purposes.

Note: The company name can be entered from this screen for identification and printout purposes.

37. Using the arrow keys, highlight the first letter or number of the company name. Press the SELECT key. Continue highlighting the letters/numbers (23 maximum) of the name and pressing the SELECT key until the name is displayed on the screen. **Note:** When entering numbers, the numeric keys can be used.

38. Press the BACK key to return to the **Setup Menu** screen.



Delete Method

Note: Methods stored in the system memory can be deleted when they are no longer needed.

39. Using the arrow keys, highlight **Delete Method**. Press the SELECT key.

```
Delete Method
XXXXX
XXXXXXXXX
XXXXXXXXXXXXX
XXXXXX XXXX
XXXXXXXXXXXXX
```

40. Using the arrow keys, highlight the method to be deleted from the method directory. Press the SELECT key.

```
Delete Method
Once method is deleted,
it cannot be recovered.
Press SELECT to delete
Press HOME to cancel
```

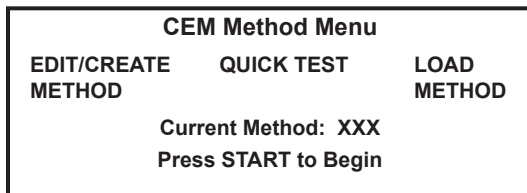
41. To cancel the deletion, press the HOME key two (2) times to return to the CEM Method Menu.

42. To continue with the deletion, press the SELECT key. Press the HOME key to return to the CEM Method Menu.

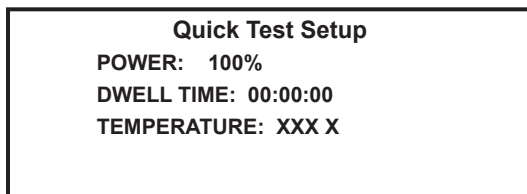
```
CEM Method Menu
EDIT/CREATE   QUICK TEST   LOAD
METHOD       METHOD       METHOD
Current Method: XXX
Press START to Begin
```

Quick Test - No External Balance

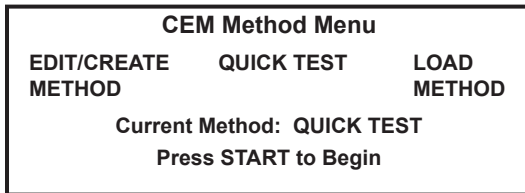
Quick test permits entry of time and temperature parameters for a one-time drying procedure using the standard weighing format. Drying procedures performed with the Quick Test method cannot be saved in the instrument memory. To enter and store a method in the instrument directory, refer to “Edit/Create Method.”



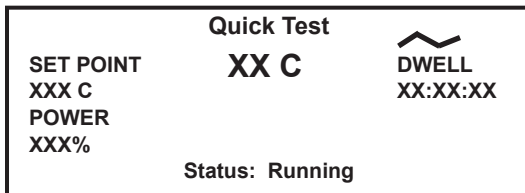
- Using the arrow keys, highlight **Quick Test**. Press the SELECT key.



- Using the arrow keys, highlight **Power**. Use the numeric keys to enter the desired microwave power. Power can be set from 0 to 100%.
- Using the arrow keys, highlight **Dwell Time**. Use the numeric keys to enter the desired method dwell time. Dwell time can be set from 1 second to 99 hours and 59 minutes. (Examples: To enter 5 minutes, press “5, 0, 0;” to enter 1 hour, press “1, 0, 0, 0.”)
- Using the arrow keys, highlight **Temperature**. Use the numeric keys to enter the desired test temperature (0 - 150 °C).
- Press the HOME key to return to the **CEM Method Menu** screen.



- Prepare and place samples in the drying sample holders. Place the sampleholders containing the samples into the instrument. Close the instrument door.
- Press the START key to begin the countdown of the programmed dwell time.



Note: The wavy line in the upper right corner of the screen indicates that microwaves are activated to obtain or maintain the programmed temperature.

Note: The START/STOP key can be used to pause the method during operation.

- When the dwell time is complete, an audible beep will be heard. The “Status” will indicate “Complete.”
- Open the instrument door and remove the drying sample holders containing the samples.
- Press the START key to dry additional samples or the HOME key to return to the **CEM Method Menu**.

Quick Test - External Balance

Quick test permits entry of time and temperature parameters for a one-time drying procedure using the standard weighing format. Drying procedures performed with the Quick Test method cannot be saved in the instrument memory. To enter and store a method in the instrument directory, refer to the “Edit/Create Method” section of this manual.

CEM Method Menu		
EDIT/CREATE METHOD	QUICK TEST	LOAD METHOD
Current Method: XXX Press START to Begin		

- Using the arrow keys, highlight **Quick Test**. Press the SELECT key.

Quick Test Setup		
POWER: 100%		
DWELL TIME: 00:00:00		
TEMPERATURE: XXX X		

- Using the arrow keys, highlight **Power**. Use the numeric keys to enter the desired microwave power. Power can be set from 0 to 100%.
- Using the arrow keys, highlight **Dwell Time**. Use the numeric keys to enter the desired method dwell time. Dwell time can be set from 1 second to 99 hours and 59 minutes. (Examples: To enter 5 minutes, press “5, 0 0;” to enter 1 hour, press “1, 0, 0, 0.”)
- Using the arrow keys, highlight **Temperature**. Use the numeric keys to enter the desired test temperature (0 - 150 °C).
- Press the HOME key to return to the **CEM Method Menu** screen.

CEM Method Menu		
EDIT/CREATE METHOD	QUICK TEST	LOAD METHOD
Current Method: QUICK TEST Press START to Begin		

- Press the START key to begin the countdown of the dwell time.

Quick Test		
SET POINT XXX X POWER XXX%	XX °X	DWELL XX:XX:XX
Status: Complete		

- Press the “balance” key.
- Press “Select.”

Edit Sample ID	
ENTER NEW ID	
FINAL WEIGHT	
ERASE ID	
SELECT ANALYSIS	% LOD

- Using the arrow keys, highlight **Enter New ID**. Press the SELECT key.

SAMPLE ID: XXXX
 0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J
 K L M N O P Q R S T U V W X Y Z Á Â Ã Ä
 Å Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö Ù Ú Û Ü
 SPACE DELETE

- 10. Using the arrow keys, highlight the first letter or number of the sample identification. Press the SELECT key. Continue highlighting the letters/numbers (23 maximum) of the ID and pressing the SELECT key until the proper identification is displayed on the screen. **Note:** When entering numbers, the numeric keys can be used.
- 11. Press the NEXT key.

Start Weight
 Sample ID: XX
 Clear external balance pan
 and press NEXT

- 12. Ensure that the external balance is clear. Press the NEXT key.

TARING BALANCE

- 13. Wait for the instrument to tare the balance.

Start Weight
 Sample ID: XX
 Place empty sample holder on
 balance pan and press NEXT
 Press BACK to Retare

Note: Press the BACK key to retare the balance.

- 14. Place the empty sample holder on the balance pan. Press the NEXT key.

READING BALANCE

- 15. Wait for the instrument to measure the weight of the sample holder. An audible beep will be heard

Start Weight
 Sample ID: XX
 Tare Wt: X.XXXX
 Add sample to sample holder
 and press NEXT
 Press BACK key to Reweigh

Note: Press the BACK key to reweigh the sample holder.

- 16. Place the sample in the sample holder. Press the NEXT key.

READING BALANCE

Final Weight
Sample ID: XX
Tare Wt: X.XXXX
Sample Wt: X.XXXX
Clear external balance pan
and press NEXT

27. Ensure that the external balance is clear. Press the NEXT key.

TARING BALANCE

28. Wait for the instrument to tare the balance.

Final Weight
Sample ID: XX
Tare Wt: X.XXXX
Sample Wt: X.XXXX
Place sample holder and dried sample on
balance pan and press NEXT
Press BACK key to Retare

Note: Press the BACK key to retare the balance.

29. Place the sample holder with the dried sample on the external balance pan.

30. Press the NEXT key.

READING BALANCE

31. Wait for the instrument to determine the final weight and calculate the data results.

Data Results
Sample ID: XX
Program: XX:XX:XX at XX X
Tare Wt: X.XXXX
Start Wt: X.XXXX
Final Wt: X.XXXX
% LOD: XX.XX%

32. Press the PRINT key to print the data results or the “computer” key to send the data to a PC. To continue weighing dried samples, press the NEXT key.

33. To process additional samples using the same heating parameters, press the HNEXTkey.

34. To end the Quick Test method and return to the CEM Method Menu, press the HOME key.

Edit/Create Method

New methods can be created and stored in the SAM-255 instrument. A maximum of 50 methods can be stored in the directory.

Create Method

```
CEM Method Menu
EDIT/CREATE   QUICK TEST   LOAD
METHOD        METHOD        METHOD
Current Method: XXX
Press START to Begin
```

1. Using the arrow keys, highlight **Edit/Create Method**. Press the SELECT key.

```
Edit Method
NEW METHOD
XXXXXXXXXX
XXXXXXXXXXXXX
XXXXXX XXXX
XXXXXXXXXXXXX
```

2. To create a method, use the arrow keys and highlight **New Method**. To edit a method, use the arrow keys and highlight the method to be edited. Press the SELECT key.

```
METHOD NAME:
0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J
K L M N O P Q R S T U V W X Y Z Á Â Ã Ä Å
À Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö Ù Ú Û Ü .
SPACE                                DELETE
```

3. Using the arrow keys, highlight the first letter or number of the method name. Press the SELECT key. Continue highlighting the letters/numbers (16 maximum) of the method name and pressing the SELECT key until the method name is displayed on the screen. **Note:** when entering numbers, the numeric keys can be used.
4. Press the NEXT key. the **Program Options** screen will appear.

```
Program Options
STANDARD
RAMPING
```

5. Using the arrow keys, highlight the desired heating option. Press the SELECT key.

Note: A **Standard** program is for methods having only 1 stage. A **Ramping** program is for methods having multiple stages.

Standard

Note: If **Standard** is selected in step 5, the Method Setup screen will appear. Proceed with step 6. If **Ramping** is selected, the Select Option screen will appear. Proceed to step 10.

```
Method Setup
POWER: XXX%
DWELL TIME: 00:00:00
TEMPERATURE: XXX X
```

6. Using the arrow keys, highlight **Power**. Use the numeric keys to enter the desired microwave power (0 - 100%).
7. Using the arrow keys, highlight **Dwell Time**. Use the numeric keys to enter the desired method dwell time. Dwell time can be set from 1 minute to 99 hours and 99 minutes. (Examples: To enter 5 minutes, press “5;” to enter 1 hour, press “1, 0, 0.”)
8. Using the arrow keys, highlight Operating **Temperature**. Use the numeric keys to enter the desired test temperature (0 - 150 °C).
9. Press the HOME key to return to the **CEM Method Menu** screen.

Ramping

STAGE	TEMP	RAMP	% PWR	DWELL
1	0 C	00:00:00	000	00:00:00
2	0 C	00:00:00	000	00:00:00
3	0 C	00:00:00	000	00:00:00
4	0 C	00:00:00	000	00:00:00
Press ▼ for more stages or press HOME				

Note: % Power specifies the maximum power used during the current stage.

10. Using the arrow keys, the numeric keyboard and the SELECT key, enter the desired method parameters for each stage including temperature, ramp time, % power, and dwell time for the applicable number of stages (8 stages maximum).
11. Press the HOME key to return to the **CEM Method Menu** screen.

Load Method

The selected method for operation must be loaded as the current method prior to operation of the SAM-255.

```
CEM Method Menu
EDIT/CREATE   QUICK TEST   LOAD
METHOD                               METHOD
Current Method: XXX
Press START to Begin
```

1. To load a stored method into the system for performance, use the arrow keys to highlight **Load Method**. Press the SELECT key.

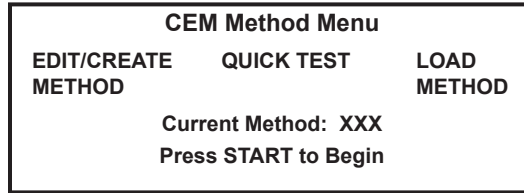
```
Load Method
XXXXXXXXXX
XXXXXXXXXX
XXXXXXXXXXXXX
XXXXXX XXXX
XXXXXXXXXXXXX
```

2. Using the arrow keys, highlight the method to be performed. Press the SELECT key. The loaded method will appear on the CEM Method Menu as the "Current Method".

```
CEM Method Menu
EDIT/CREATE   QUICK TEST   LOAD
METHOD                               METHOD
Current Method: XXX
Press START to Begin
```

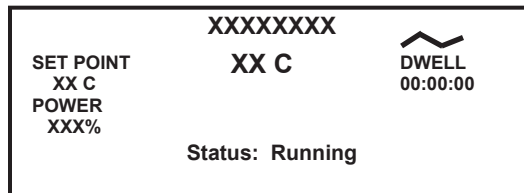

Perform Method

Note: The method to be performed must be loaded as the current method prior to operation of the SAM-255.



Standard Method - No External Balance

1. Prepare and place samples in the drying sample holders. Place the sample holders containing the samples into the instrument.
2. Press the START key.

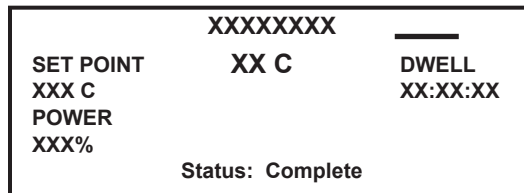


Note: The wavy line in the upper right corner of the screen indicates that microwaves are activated to obtain and maintain the programmed temperature during the dwell time.

3. The instrument will begin the countdown of the dwell time.

Note: The START/STOP key can be used to pause the method during operation.

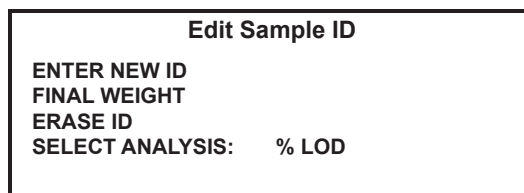
4. When the dwell time is complete, an audible beep will be heard, signaling the end of the drying time.



5. Open the instrument door. Remove the drying sample holders containing the samples from the instrument. Close the instrument door.
6. To dry additional samples using the same method, press the START key.
7. To end the method, press the HOME key.

Standard Method - External Balance

1. Press the "balance" key.



2. Using the arrow keys, highlight **Enter New ID**. Press the SELECT key.

SAMPLE ID: XXXX
0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J
K L M N O P Q R S T U V W X Y Z Á Â Ã Ä
Å Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö Ù Ú Û Ü
SPACE DELETE

- Using the arrow keys, highlight the first letter or number of the sample identification. Press the SELECT key. Continue highlighting the letters/numbers (23 maximum) of the ID and pressing the SELECT key until the proper identification is displayed on the screen. **Note:** When entering numbers, the numeric keys can be used.
- Press the NEXT key.

Start Weight
SAMPLE ID: XXXX
Clear external balance pan
and press NEXT

- Ensure that the external balance is clear. Press the NEXT key.

TARING BALANCE

- Wait for the instrument to tare the balance.

Start Weight
SAMPLE ID: XXXX
Place empty sample holder on
balance pan and press NEXT
Press BACK to Retare

- Place the empty sample holder on the balance pan. Press the NEXT key.

Note: Press the BACK key to retare the balance.

READING BALANCE

- Wait for the instrument to measure the weight of the sample holder.

Start Weight
SAMPLE ID: XXXX
Sample holder WT: X.XXXX
Add sample to sample holder
and press NEXT
Press BACK key to Reweigh

Note: Press the BACK key to reweigh the sample.

- Place the sample in the sample holder. Press the NEXT key.

READING BALANCE

10. Wait for the balance to weigh the sample.

Start Weight

SAMPLE ID: XXXX
SAMPLE WT: X.XXXX

Press NEXT key to weigh next sample,
or press SELECT for run screen

11. Press the SELECT key.

CEM Method Menu

EDIT/CREATE METHOD	QUICK TEST	LOAD METHOD
-----------------------	------------	----------------

Current Method: XXX
Press START to Begin

12. Press the START key to begin the countdown of the programmed dwell time. The instrument will maintain the programmed temperature during the dwell time.

XXXXXXXXX

SET POINT XX C POWER XXX%	XX °C	DWELL 00:00:00
------------------------------------	-------	-------------------

Status: Running

Note: The START/STOP key can be used to pause the method during operation.

13. When the dwell time is complete, an audible beep will be heard, signaling the end of the programmed time.

XXXXXXXXX

SET POINT XXX X POWER XXX%	XX °X	DWELL XX:XX:XX
-------------------------------------	-------	-------------------

Status: Complete

14. Press the “balance” key.

Edit Sample ID

ENTER NEW ID
FINAL WEIGHT
ERASE ID
SELECT ANALYSIS % LOD

15. Using the arrow keys, highlight **Final Weight**. Press the SELECT key.

Select Sample ID

XXXXX
XXX
XXXX
XXXX
XXX

16. Using the arrow keys, highlight the desired sample identification. Press the SELECT key.

FINAL WEIGHT

Sample ID: XXXX
Tare Wt: X.XXXX
Sample Wt: X.XXXX

Clear external balance pan
and press NEXT

17. Ensure that the external balance is clear. Press the NEXT key.

TARING BALANCE

18. Wait for the instrument to tare the balance.

FINAL WEIGHT
Sample ID: XXXX
Tare Wt: X.XXXX
Sample Wt: X.XXXX
Place sample holder and dried sample on
balance pan and press NEXT
Press BACK key to Retare

Note: Press the BACK key to retare the balance.

19. Place the sample holder with the dried sample on the external balance pan.

20. Press the NEXT key.

READING BALANCE

21. Wait for the instrument to determine the final weight and calculate the data results.

Data Results	
Sample ID:	XXXX
Program:	XX:XX at XXX C
Tare Wt:	X.XXXX
Start Wt:	X.XXXX
Final Wt:	X.XXXX
% LOD:	XX.XX%

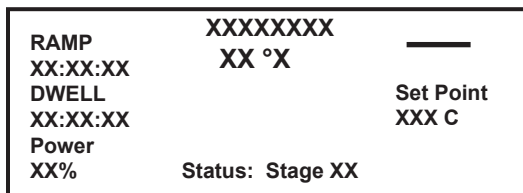
22. Press the PRINT key to print the data results or the “computer” key to send the data to a PC.

23. To process additional samples using the same method, repeat the applicable above steps.

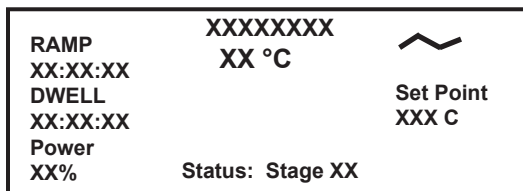
24. To end the method and return to the CEM Method Menu, press the HOME key twice.

Ramping Method - No External Balance

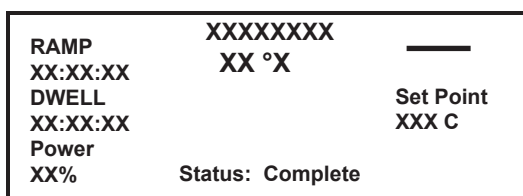
1. Press the START key to begin the method.



2. Open the instrument door.
3. Place the sample holder(s) containing the sample(s) into the instrument.
4. Press the START key to activate microwaves.



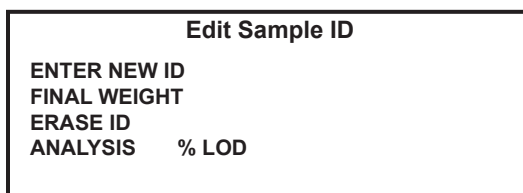
5. The programmed ramp time for Stage 1 begins counting down. When the ramp time is complete, the dwell time for Stage 1 will begin counting down. Ramp time and dwell time will continue through each programmed stage. When the final dwell time is complete, an audible beep will be heard, signaling the end of the method.



6. Open the instrument door and remove the sample holder(s) containing the sample(s).
7. To perform the same method for additional samples, press the START key and repeat the applicable procedures.
8. To end the method, press the HOME key.

Ramping Method - External Balance

1. Press the "Balance" key.



2. Using the arrow keys, highlight **Enter New ID**. Press the SELECT key.



3. Using the arrow keys, highlight the first letter or number of the sample identification. Press the SELECT key. Continue highlighting the letters/numbers (23 maximum) of the ID and pressing the SELECT key until the proper identification is displayed on the screen. **Note:** When entering numbers, the numeric keys can be used.
4. Press the NEXT key.

Start Weight
SAMPLE ID: XXXX
Clear external balance pan
and press NEXT

5. Ensure that the external balance is clear. Press the NEXT key.

TARING BALANCE

6. Wait for the instrument to tare the balance.

Start Weight
SAMPLE ID: XXXX
Place empty sample holder on
balance pan and press NEXT
Press BACK to Retare

7. Place the empty sample holder on the balance pan. Press the NEXT key.

Note: Press the BACK key to retare the balance.

READING BALANCE

8. Wait for the instrument to measure the weight of the sample holder.

Start Weight
Sample ID: XXXX
Tare WT: X.XXXX
Add sample to sample holder
and press NEXT
Press BACK key to Reweigh

Note: Press the BACK key to reweigh the sample.

9. Place the sample in the sample holder. Press the NEXT key.

READING BALANCE

10. Wait for the balance to weigh the sample.

Start Weight
SAMPLE ID: XXXX
SAMPLE WT: X.XXXX
Press NEXT key to weigh next sample,
or press SELECT for run screen

11. Press the SELECT key.


```

CEM Method Menu
EDIT/CREATE    QUICK TEST    LOAD
METHOD        METHOD        METHOD
Current Method: XXX
Press START to Begin

```

12. Press the START key to activate microwaves.


```

RAMP          XXXXXXXX    
XX:XX:XX     XX °X
DWELL
XX:XX:XX     Set Point
Power        XXX C
XX%          Status: Stage 1

```

13. The programmed ramp time for Stage 1 begins counting down. When the ramp time is complete, the dwell time for Stage 1 will begin counting down. Ramp time and dwell time will continue through each programmed stage. When the final dwell time is complete, a series of audible beeps will be heard, signaling the end of the method.

```

RAMP          XXXXXXXX    
XX:XX:XX     XX °X
DWELL          Set Point
XX:XX:XX     XXX C
Power
XX%          Status: Complete

```

14. Press the "Balance" key.

```

Edit Sample ID
ENTER NEW ID
FINAL WEIGHT
ERASE ID
ANALYSIS %LOD

```

15. Using the arrow keys, highlight **Final Weight**. Press the SELECT key.

```

Select Sample ID
XXXXX
XXX
XXXX
XXXX
XXX

```

16. Using the arrow keys, highlight the desired sample identification. Press the SELECT key.

```

FINAL WEIGHT
Sample ID: XXXX
Tare Wt: X.XXXX
Sample Wt: XXXX
Clear external balance pan
and press NEXT

```

17. Ensure that the external balance is clear. Press the NEXT key.

```

TARING BALANCE

```

18. Wait for the instrument to tare the balance.

FINAL WEIGHT
Sample ID: XXXX
Tare Wt: XXXX.X
Sample Wt: XXXX
Place sample holder and dried sample
on balance pan and press NEXT
Press BACK key to Retare

Note: Press the BACK key to retare the balance.

19. Place the sample holder with the dried sample on the external balance pan.
20. Press the NEXT key.

READING BALANCE

21. Wait for the instrument to determine the final weight and calculate the data results.

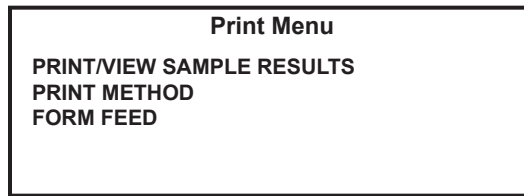
Data Results
Sample ID: XXXX
Program: XXXXXX
Tare Wt: X.XXXX
Start Wt: X.XXXX
Final Wt: X.XXXX
% LOD: XX.XX%

22. Press the PRINT key to print the data results or the "computer" key to send the data to a PC.
23. To process additional samples using the same method, repeat the necessary steps above.
24. To end the method and return to the CEM Method Menu, press the HOME key twice.

Print Menu

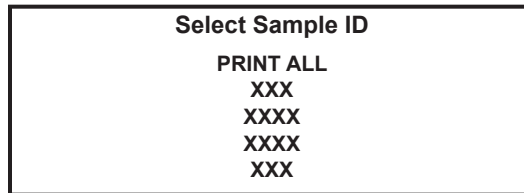
1. With the CEM Method Menu displayed, press the PRINT key.

Print/View Sample Results

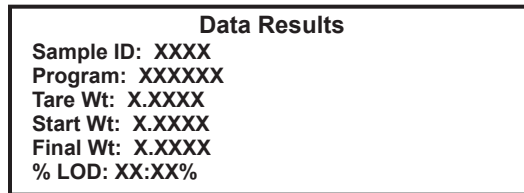


Note: The user can view or print sample results of one or all stored methods, print a method showing method parameters, or choose form feed to ensure a printout beginning at the top of a page, etc.

2. Use the arrow keys to highlight **Print/View Sample Results**. Press the SELECT key.



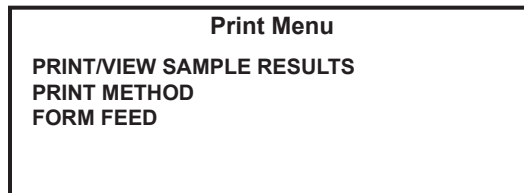
3. Use the arrow keys to highlight either "Print All" or the sample ID for which the results are to be displayed and/or printed.
4. Press the SELECT key.



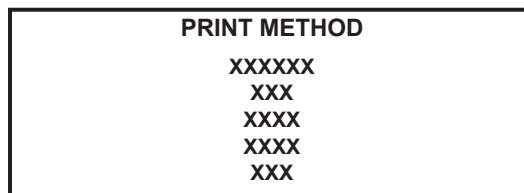
5. Press the PRINT key. The data results of the selected method will be printed.
6. Press the BACK key to return to the Print Menu screen.

Note: Press the HOME key to return to the CEM Method Menu.

Print Method



7. Use the arrow keys to highlight **Print Method**. Press the SELECT key.



8. Use the arrow keys to highlight the method to be printed.
9. Press the SELECT key. The method parameters will be printed.

10. Press the BACK key to return to the Print Menu screen.
11. Press the HOME key to return to the CEM Method Menu.

Maintenance, Troubleshooting and Service

Routine maintenance should be performed on the instrument to prolong the instrument life and minimize downtime. Basic operational troubleshooting procedures should be limited to replacement of defective sub-system components. For detailed instructions concerning service and repair, contact the CEM Service Department or the local subsidiary or distributor.

Routine Maintenance

A monthly routine preventive maintenance program is recommended to ensure optimum performance of the SAM-255.

NOTE

Failure to properly maintain the SAM-255 instrument will nullify the instrument warranty.

Door, Seals and Interlocks – Carefully inspect the door, door seals, and door interlock to verify that they are clean and working properly. Ensure that there is no loosening of or damage to the door hinges or latch. Ensure that the door closes securely.

Cleaning Recommendations – Routine cleaning of the instrument is necessary to prevent buildup which can restrict air flow through the system, and clog exhaust ports. Scheduled (monthly) cleaning of the door seals, cavity interior and exhaust blower are necessary. For applications where buildup is more prevalent, a weekly inspection should be performed to detect the necessity for more frequent cleaning. Inspect and clean the SAM-255 as follows:

1. Unplug the instrument from the electrical outlet.
2. Loosen the exhaust hose clamp and remove the exhaust hose.
3. Using a vacuum or soft bristle brush, clean the cavity exhaust outlet located on the back wall of the instrument cavity. Use a soft cloth and soapy water to clean the outlet. If this will not clean the outlet, use a soft cloth with an organic solvent such as varsol or alcohol.
4. Using a soft bristle brush with a handle long enough to reach all areas of the hose, clean the interior of the exhaust hose. Using a soft cloth, clean the hose with an organic solvent such as varsol or alcohol.
5. Using a vacuum or soft bristle brush, clean the waveguide entry port located in the ceiling of the instrument cavity.
6. Using a vacuum, remove the debris caused by the above cleaning processes from the interior of the cavity.
7. Using a soft cloth and warm soapy water, clean the instrument cavity, door and door seal. Rinse and thoroughly dry the cleaned areas.

Microwave Leakage Measurement

The door and cavity of the SAM-255 are designed for durability and reliable operation under severe laboratory conditions. External radiation checks are performed on the instrument at several points in the manufacturing process to ensure that microwave leakage is only a fraction of that permitted by U.S. law ($5\text{mW}/\text{cm}^2$).

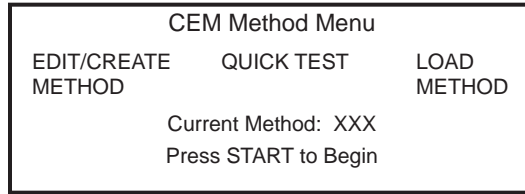
The door of the SAM-255 is equipped with a safety interlock system which stops the generation of microwave energy when the instrument door is ajar. If the interlock system fails, the fusible link to the magnetron will open, rendering the microwave power system inoperable.

To verify that door seals and interlock system are working properly, the SAM-255 should be tested periodically for microwave leakage. Leakage measurements should also be performed at any time that damage to the instrument door has occurred or following replacement of any high voltage component. To test for microwave leakage, program the instrument for a quick test procedure. With the instrument operating in the pre-heat cycle, use a federally approved microwave leakage detector such as the Holaday Model HI-1500 and measure the microwave leakage around the door seal, at the louvers in the cover, and at the fan grills in the cover. Leakage should not exceed $5\text{mW}/\text{cm}^2$. If the instrument shows excessive microwave leakage, do not attempt further operation. Contact the CEM Corporation Service Department or your local distributor.

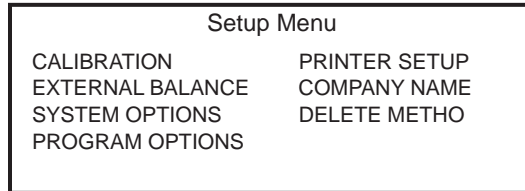
Microwave test meters are available from CEM Corporation. CEM does not recommend use of inexpensive meters available in electronics stores because they lack the necessary sensitivity to properly test an instrument for microwave leakage.

Microwave Power Measurement

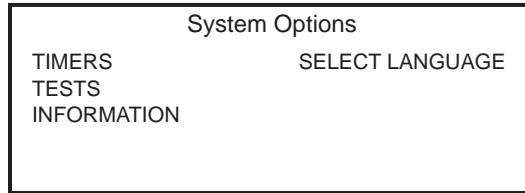
1. Open the instrument door.



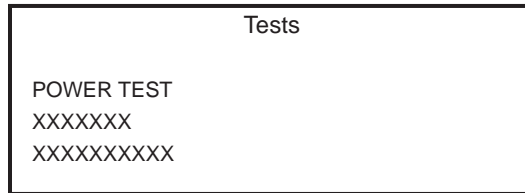
2. With the CEM Method Menu displayed, press the SETUP key.



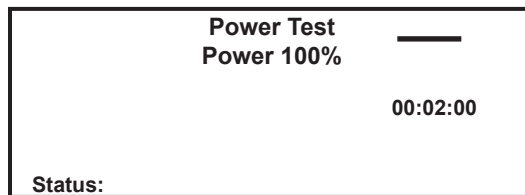
3. Using the arrow keys, highlight **System Options**. Press the SELECT key.



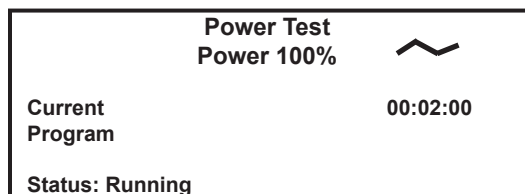
4. Using the arrow keys, highlight **Tests**. Press the SELECT key.



5. Press the SELECT key.

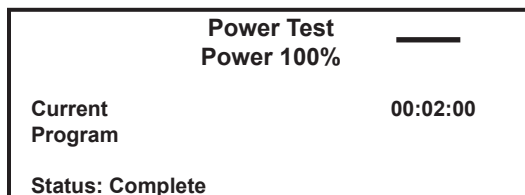


6. Using the CEM Power Test Kit, place 1 liter of ambient temperature (18 - 22 °C) deionized water in a Teflon or polypropylene beaker.
7. Using a thermometer with 0.1 °C gradations, measure and record the initial temperature, T_i . Ensure that the thermometer is immersed to its indicated immersion line prior to reading the temperature.
8. Remove the thermometer from the beaker. Carefully place the beaker in the left front corner of the instrument cavity. Gently close the instrument door to avoid spilling any of the water.
9. Press the START key.



Note: The wavy line in the upper right corner of the screen indicates that microwaves are activated.

10. During the power test, the “status” line of the screen will indicate “Warm Up.”
11. At the end of the programmed time (2 minutes), the “status” line of the screen will indicate “Complete,” and several audible beeps will be heard.

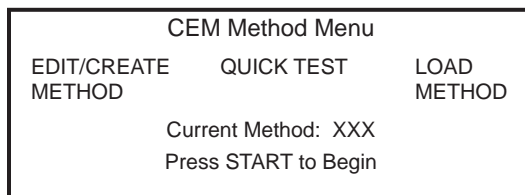


12. Immediately remove the beaker from the instrument cavity. Vigorously stir the water thoroughly for 15 seconds, then measure and record the peak temperature reading. This is the final temperature, T_f .

The microwave power output is calculated as follows:

$$\text{Power in Watts} = 35 (T_f - T_i)$$

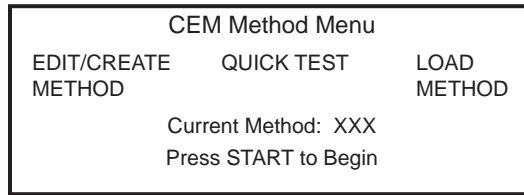
13. If the measured power is below 650 watts, repeat the power measurement. If the power remains below the required wattage, the instrument may not be producing adequate microwave power. However, the instrument may reach the temperature by increasing the method specified time-to-temperature. If the instrument continues to not produce adequate wattage, contact the CEM Service Department.
14. If the instrument is producing inadequate power, refer to the Troubleshooting guide in this manual.
15. Press the HOME key to return to the CEM Method Menu.



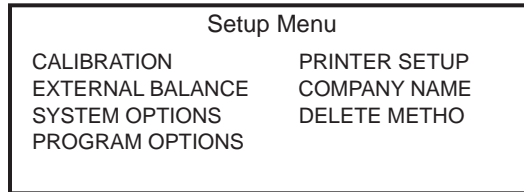
16. Close the instrument door.

Calibration

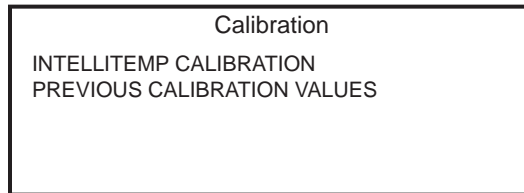
The IR sensor can be calibrated using the software calibration procedures and the CEM calibration instrument (part number 271062). Calibration is required if the instrument software or the IR sensor is replaced. If calibration data is lost for other reasons, the previous calibration parameters can be entered, and calibration will not be required.



1. With the CEM Method Menu displayed, press the SETUP key.



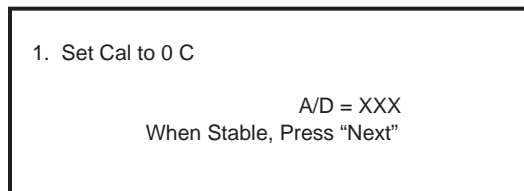
2. Using the arrow keys, highlight **Calibration**. Press the SELECT key.



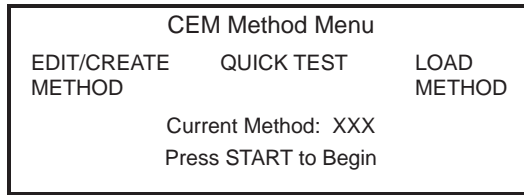
Temperature Calibration

Note: To enter previous calibration values, proceed to step 18.

3. Install the connector of the CEM calibration instrument into the SAM-255 calibration adapter cable.
4. Using the arrow keys, highlight **Intellitemp Calibration**. Press the SELECT key.



5. Turn the calibration instrument on. Position the slide switch of the calibration instrument at the 0 °C setting.
6. Wait approximately three (3) seconds, permitting the calibration instrument output to stabilize.
7. Press the NEXT key.
8. Position the slide switch of the calibration instrument at the 1000 °C position.
9. Wait approximately three (3) seconds, permitting the calibration instrument output to stabilize.
10. Press the NEXT key.
11. Record the new "V Low" and "V High" calibration points.
12. Press the BACK to return to the calibration screen or the HOME key to return to the CEM Method Menu.

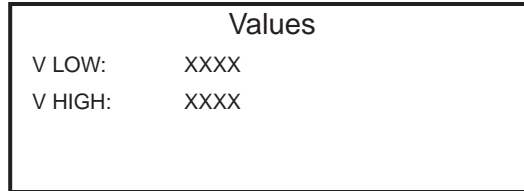


13. Disconnect the calibration instrument from the thermocouple wiring connector.

Enter Previous Calibration Values

18. Using the arrow keys, highlight **Previous Calibration Values**. Press the SELECT key.

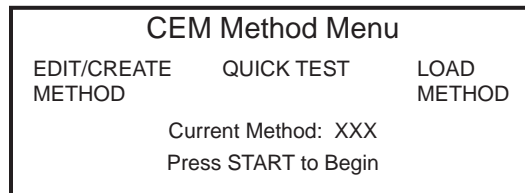
Note: Calibration values are shipped with the instrument.



19. Using the arrow keys, highlight **V Low**. Press the SELECT key. Using the numeric keys, enter the previous calibration value for “V Low.”

20. Using the arrow keys, highlight **V High**. Press the SELECT key. Using the numeric keys, enter the previous calibration value for “V High.”

21. Press the BACK key to return to the calibration screen or the HOME key to return to the CEM Method Menu.



Troubleshooting Guide

Condition	Possible Cause
Instrument Inoperative	Instrument not plugged into electrical outlet Power switch not in "on" position Blown fuse Loose connection to power switch Faulty power switch Faulty DC power supply
Fuse Blows When Door is Opened	Interlock(s) not properly adjusted or faulty
Fuse Blows Repeatedly During Operation	Low line voltage Faulty high voltage component Faulty DC power supply Faulty controller board
No Display	Blown Fuses Loose or broken wiring connections Loose or faulty interface cable Faulty display Faulty controller board
Inoperative Keyboard	Loose or faulty interface cable Faulty keyboard Faulty controller board
Microwave Leakage	Improperly adjusted instrument door Damaged instrument door RF stub not installed properly or loose
Erratic Temperature	Incorrect A/D setting Faulty controller board
Blank Display	Faulty display Instrument in stand-by mode (press any key)
"Door Open" Message	Instrument door not properly closed Interlock system not properly adjusted
Keyboard Inoperative	Loose cable connection to controller board Faulty controller board
IR Error	Faulty connector Faulty IR sensor IR sensor not properly calibrated Faulty controller board
Internal Blower Assembly Inoperative	Faulty blower Improper setting in setup procedures
Excessive Temperature Error	Temperature over 200 °C

Error Messages

The “Magnetron Overload” error message indicates that the magnetron has, for some reason, overheated. The procedure in progress is terminated. The magnetron is turned off and all fans are turned on to cool the instrument. Open the instrument door and permit the instrument to cool down to ambient (room) temperature. Once the instrument is cool, turn the instrument off and contact the CEM Service Department.

**MAGNETRON OVERLOAD
ALLOW UNIT TO COOL DOWN
CONTACT FACTORY**

This “Calibration Error” is displayed if previous calibration values are entered incorrectly. Press the SELECT key to escape the error screen. Enter or re-enter calibration values. The “Run Error” message indicates that, for some reason, the calibration values have been lost. Press any key on the numeric keyboard to escape the error screen. Either enter the previous calibration values or calibrate the IR sensor.

**CALIBRATION ERROR
RECALIBRATE FROM START
PRESS SELECT KEY**

The “Run Error” message indicates that a dwell time has not been programmed. Press the SELECT key to escape the error screen. Either a dwell time for the method.

**RUN ERROR
DWELL TIME = 00:00
TIME MUST BE PROGRAMMED
PRESS SELECT KEY**

The “Calibration Switch S1-5” message indicates that switch S1-5 on the CPU board is in the incorrect position for calibration and is not the same scale as the previous calibration. Contact the CEM Service Department.

**CALIBRATION SWITCH S1-5
DOES NOT MATCH PREVIOUS
CALIBRATION SCALE!
CONTACT FACTORY**

The “Maximum Sample” message indicates that the maximum number of samples (5) has been stored in the instrument software. To store additional sample data, previous sample information must be deleted.

**RUN ERROR
DWELL TIME = 00:00
TIME MUST BE PROGRAMMED
PRESS SELECT KEY**

The “Excessive Temperature” error message indicates that the temperature in the instrument cavity has reached a temperature exceeding 200 °C (normally due to sample ignition). The procedure in progress is terminated. All instrument functions are terminated. Permit the instrument to cool down to ambient (room) temperature. Once the instrument is cool, turn the instrument off. Wait at least 15 seconds prior to turning the instrument back on.

Excessive temperature detected
Allow unit to cool down
CONTACT CEM

XX °C

WARNING

If the instrument cavity or door is damaged, do not attempt instrument operation.

CAUTION

If a small fire occurs in the instrument cavity, thoroughly clean the cavity of any carbon and residue prior to operation. If the turntable is damaged, replace the turntable prior to operation.

Component Removal and/or Replacement

WARNING

SAM-255 instruments utilize high voltages and microwave radiation. Instrument service and repair should be performed only by technicians trained in repair and maintenance of high voltages and microwave power systems.

WARNING

To avoid possible electrical shock or exposure to microwave energy, the instrument must be turned off and the power cord removed from the electrical outlet prior to any part replacement.

Fuse(s)

1. Turn the instrument off and unplug the power cord from the electrical outlet.
2. Using a small flat blade screwdriver, remove the fuse drawer and fuses. Use a VOM (vol/ohm meter) to determine if either fuse is open.
3. Replace the fuse(s) as required.
4. Install a new fuse (15 AMP - 120V or 8 AMP - 240V) into the fuse drawer. Snap the drawer into the instrument.

Instrument Cover

1. Turn the instrument off and unplug the power cord from the electrical outlet.
2. Remove the exhaust hose and elbow from the blower exhaust.
3. Remove the screws located along the sides and back of the cover. Pull back and lift up the cover to remove it from the instrument, using caution to prevent damage to any of the internal components or wiring.
4. During cover installation, carefully place the cover on the instrument to avoid damage to the internal components. Position the cover on the instrument and push the cover toward the front of the instrument until it is properly positioned.
5. Install all cover mounting screws securely.
6. Install the exhaust elbow and tubing.

Spare Parts

A copy of this page can be used as an order form when ordering spare parts. Mail, call or fax the order to CEM Corporation.

CEM Corporation
P.O. Box 200
Matthews, NC 28106-0200

Part No.	Description
149910	Filament Transformer
184948	Blower Assembly (120V)
118320	15 AMP Fuse (US and Canada)
BR188331	8 AMP Fuse (Europe and rest of world)
271062	Calibration Instrument
300500	Microwave Leakage Test Meter
920855	Exhaust Hose
920916	100g External Balance w/Cable (60 Hz Instruments)
910740	Epson Printer
	IR Sensor Assembly (Optional)

Specifications

Temperature Capabilities:	150° C
Electrical Ratings:	120V, 60 Hz, 12 AMP 220 - 240V, 50 Hz, 8 AMP
Magnetron Frequency:	2450 MHz
Microwave Power:	650 watts minimum
Exhaust Capabilities:	120 CFM
Printer Port:	25-Pin Parallel (System compatible with IBM, Epson, Okidata, ASCII, Star NX-1020 and HP Thinkjet printers)
Computer Interface:	RS-232 Serial Interface (PC software to interface and collect data - must be supplied by the user)
Balance Interface:	RS-232, Serial Interface
Overall Instrument Dimensions:	18.17 x 25.75 x 19.60 in. (WxDxH) 46.15 x 65.40 x 49.78 cm (WxDxH)
Unit Weight:	97.5 lbs. 44.226 kg.
IR System:	Infrared device for monitor/control of sample drying
Internal Calibration of Temperature Control:	Calibrated to NIST Traceable Standard
Internal Diagnostic Software:	BITS System (Built-in Test System) Analyzes magnetron hrs., system power on hrs., time spent at various temperatures, number of door openings and closings, calibration time and date, calibration set points, calibration tables and data
Safety Interlock:	Three safety door interlock mechanisms prevent instrument operation and microwave emissions in case of improper door closure or misalignment
Turntable:	10 RPM
Cavity Lighting:	Halogen Lamp

DECLARATION OF CONFORMITY

Application of council directives: 89/336/EEC & 73/23/EEC

Standards to which Conformity is Declared:
to EN 61326-1, & EN 61010-1

Manufacturer's Name: CEM Corporation

Manufacturer's Address: 3100 Smith Farm Road, Matthews, . . .
NC 28105, USA

Importer's Name: _____

Importer's Address: _____

Type of Equipment: Electrical Equipment for Measurement,
Control, and Laboratory Use

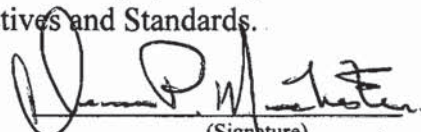
Model Number(s): SAM 255

Test Serial Number: N2330 (NP1055)

Year of Test: 2008

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directives and Standards.

Place: Matthews, NC USA


(Signature)

Date: January 4, 2008

Dennis P. Manchester

Warranty

What Is Covered:

CEM Corporation warrants that the instrument will be free of any defect in parts or workmanship and will, at its option, replace or repair any defective part (excluding consumables) or instrument.

For How Long:

This warranty remains in effect for 365 days from date of delivery to the original purchaser.

What Is Not Covered:

This warranty does not cover parts or workmanship which have been damaged due to:

- Neglect, abuse or misuse,
- Damage caused by or to test samples,
- Damage incurred during instrument relocation,
- Damage caused by or to any attached equipment,
- Use of incorrect line voltages or fuses,
- Fire, flood, "acts of God" or other contingencies beyond the control of CEM Corporation,
- Improper or unauthorized repair, or
- Any other damage caused by purchaser or its agents.

Responsibilities of Purchaser:

To ensure warranty coverage, the purchaser must:

- Use the instrument according to directions,
- Connect the instrument properly to a power supply of proper voltage,
- Replace blown fuses,
- Replace consumables and
- Clean the instrument as required.

How to Get Service:

Purchaser should contact the Service Department of CEM Corporation or the nearest CEM subsidiary or distributor for return authorization and for proper crating and shipping instructions to return instrument, freight prepaid, for service. On-site repairs by an authorized service technician are available through the CEM Service Department. Travel costs will be charged to the purchaser for on-site repairs.

Within the U.S.

CEM Corporation
3100 Smith Farm Rd.
Matthews, NC 28106-5044
(800) 726-5551
Fax: (704) 821-4368

Outside the U.S.

CEM Corporation
3100 Smith Farm Rd.
Matthews, NC 28106-5044
(704) 821-7015
Fax: (704) 821-4368

Warranty Disclaimer:

CEM Corporation hereby excludes and disclaims any warranty of merchantability or fitness or any particular purpose. No warranty, express or implied, extends beyond the face hereof. CEM Corporation shall not be liable for loss of use of instrument or other incidental or consequential costs, expenses or damages incurred by the purchaser or any other user. This warranty is not transferable.

Purchaser's Rights under State Law:

This warranty gives the purchaser specific legal rights, and the purchaser may also have other rights which vary from state to state.

Customer Support

For customer support in the areas of service, applications or sales, call the following toll-free numbers.

Applications Assistance (800) 726-3331

Service Assistance (800) 726-5551

Sales Assistance (800) 726-3331