

SMART VACPREP

INTELLIGENT VACUUM SAMPLE PREPARATION SYSTEM

M I C R O M E R I T I C S



OPERATOR MANUAL

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Dec 2013

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ABOUT THIS MANUAL

The following icons and format may be used throughout this manual to identify notes of importance, warnings, and cautions.



NOTE - Notes contain important information pertinent to the subject matter.



CAUTION - Cautions contain information to help prevent actions that may damage the analyzer or components.



WARNING - Warnings contain information to help prevent actions that may cause personal injury.

For Chemisorption - Indicates the marked item is applicable to chemisorption analyzers only.

For Physisorption - Indicates the marked item is applicable to physisorption analyzers only.

Field Labels and Screen Titles

Labels and Buttons	Description
Buttons (in the application)	Buttons in the application are represented as bold font weight and blue letters. Some examples are: Save , Edit , Replace All , etc.
Buttons (on the equipment)	Buttons on the equipment are represented as bold font and black letters. some examples are: Start or Cancel .
<i>Field Labels</i>	Field Labels are represented as italicized words. Some examples are: <i>Sample</i> , <i>Automatically Collected</i> , <i>Analysis Conditions</i> , etc
Keyboard Commands	Keyboard commands are represented as bold font weight and black letters. Some examples are: F2 , Alt+F4 , etc.
Menu Instructions	Menu instructions are represented as bold and italicized words. Some examples are: <i>File > New Sample</i> <i>Reports > Start Report</i> <i>Unit [n] > Unit Configuration</i>
<i>Screen Tabs</i>	Screen Tabs are represented as italicized words. Some examples are: <i>Sample Description</i> , <i>Degas Conditions</i> , <i>Analysis Conditions</i> , and <i>Report Options</i> .
<i>Screen Titles</i>	Screen Titles are represented as italicized words. Some examples are: <i>Analysis Adsorptive Properties</i> , <i>Free Space</i> , <i>Sample Tube</i> , etc

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1 ABOUT THE SMART VACPREP



The Smart VacPrep is an advanced six-port degassing system that utilizes vacuum to degas samples by heating and evacuation. Each of the ports may be operated independently of one another. Samples may be added or removed from degas ports without disturbing the treatment of other samples undergoing preparation. When starting a new sample, ports already degassing samples are automatically suspended unless they are in the slow evacuation stage. When unrestricted evacuation is attained by the new samples, the previously suspended samples will automatically resume their evacuation. Degassing will automatically terminate when each sample has completed all programmed steps.

The Smart VacPrep remembers the previously selected set of degas conditions and allows them to be reused. However, the option of programming each port with a different set of parameters is available. A record of the sample preparation time and temperature can be recorded as part of the sample data file.

The degas program may be started or terminated by using the analyzer software on the computer attached to the analyzer or with push buttons on the front panel of the Smart VacPrep. The push button control on each port provides the ability to attach the sample tube with heating mantle, and immediately start degassing a sample.

There are two methods of starting the degas process from the analyzer software:

- **Start Degas** menu option. Accessed from the **Smart VacPrep > Unit [n] > Start Degas** menu selection. Provides the option to use degas conditions from selected sample files or a degas conditions files for each Smart VacPrep port. When using the *Start Degas* menu option, the degas process is started using the **Start** button on the *Start Degas* window. This option is more convenient for samples that have specific degas requirements that should be associated with the sample file when it is created.

- **QuickStart** menu option and Smart VacPrep panel buttons. Accessed from the **Smart VacPrep > Unit [n] > QuickStart Degas Conditions** menu selection. Provides the option to enter commonly used degas conditions for each Smart VacPrep port without the need for a sample information file.

This option provides three ways to load information into *QuickStart Degas Conditions*:

1. Load degas conditions from an existing degas conditions file
2. Copy conditions from another Smart VacPrep unit and port
3. Enter degas conditions manually

When using the *QuickStart* menu option, the degas process is started using the **Select** button and **Start** buttons for each port on the Smart VacPrep unit.

Using the *Start Degas* option does not change the degas conditions set up in *QuickStart*. *QuickStart* degas conditions are remembered for the next push button operation.

Sample tubes are attached to the sample ports. Heating mantles are then installed and secured to the sample tube with a metal clip. If using straight wall sample tubes, heating mantles with elastic cords may be purchased separately. The mantle is plugged into the power and thermocouple connectors on the front panel. The degassing process can then be started either by pressing the **Select** and **Start** buttons on the Smart VacPrep unit or by going to **Smart VacPrep > Unit [n] > Degas > Start Degas**.

A Check Seal or TransSeal can be used to transfer air-sensitive samples from the Smart VacPrep to the analyzer's port without atmospheric contamination. To order these parts, reference the Parts and Accessories section for the analyzer. Instructions for using the Check Seal or TranSeal are included with the ordered part.

Smart VacPrep Components Table

Component	Description
Cancel button	Stops the degas process on all ports where the <i>Select</i> indicator is lit.
Ethernet port	Located on the left side panel. Use to connect an Ethernet switch.
Power Switch (not shown)	Located on the back of the unit, turns the unit on or off.
Select buttons	Used to select the ports to be degassed.
Start button	Starts the degas process on all ports where the <i>Select</i> indicator is lit.
Status Indicator	<p>Three lights indicate the current status of the station. The lights flash when the valves are open.</p> <p>Green. Indicates the station is idle and not hot. The setpoint temperature is below 30 °C and the actual temperature is below 50 °C.</p> <p>Red. Indicates when the setpoint temperature is greater than 30 °C and heat is being applied to the station.</p> <p>Yellow. Indicates the station is in use, but not currently being heated. The heating mantle may still be above 50 °C.</p>

SPECIFICATIONS FOR THE SMART VACPREP

The Smart VacPrep degasser has been designed and tested to meet the following specifications:

Specifications for the Smart VacPrep

Specification	Description
Backfill Options	Automatically backfill or wait for user command
Capacity	6 ports
Degas Method	Heat and vacuum
Physical Dimensions	Height: 69 cm (27 in.) Width: 53 cm (20.75 in.) Depth: 44 cm (17 in.) Weight: 32 kg (70 lbs)
Evacuation Period	Determined by selected elapsed time or achievement of selected low pressure target
Evacuation Rate	Selectable evacuation rate from 1.0 to 50.0 mmHg/s
Heating of Samples	Heating mantles
Heating Ramp Rate	Selectable from 0.1 °C per minute to 10 °C per minute
Soak Time	Zero to 999 minutes in one minute increments (Zero = Manual Cancel).
Temperature Accuracy	Deviation less than ± 10 °C at the sensing thermocouple embedded in the heating mantle
Temperature Control	One ramp during evacuation phase, five additional ramps during subsequent phases
Temperature Range	40 to 450 °C in one degree increments
Vacuum Control	Selectable target pressure controls switchover from restricted to unrestricted evacuation.

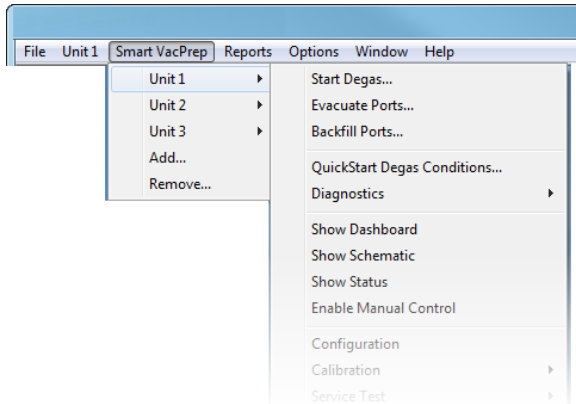
SET THE VOLTAGE FOR THE SMART VACPREP

The Smart VacPrep voltage setting is housed in a compartment adjacent to the power connector on the back of the unit.

1. Use a flat head screwdriver to gently pry open the cover of the compartment.
2. Firmly press down on the voltage indicator and roll the indicator to display the appropriate voltage for your environment. Selections are: 100 Vac, 120 Vac, 230 Vac, and 240 Vac.
3. Firmly press the compartment cover shut. Ensure it closes securely. The selected voltage will appear in the window on the compartment cover.

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2 ABOUT THE SMART VACPREP SOFTWARE



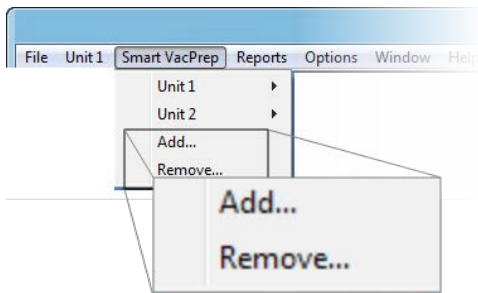
If a software update is required for the analyzer to support the Smart VacPrep, the software can be downloaded from the internet at this location:

<http://www.micromeritics.com/Smart-VacPrep-Software.aspx>

The degasser software is installed as a part of the analyzer installation. During installation, an IP address will be assigned to the unit allowing the unit to connect automatically during startup. Up to three additional degasser units can be installed.

Menu options for the Smart VacPrep are provided on the Smart VacPrep menu.

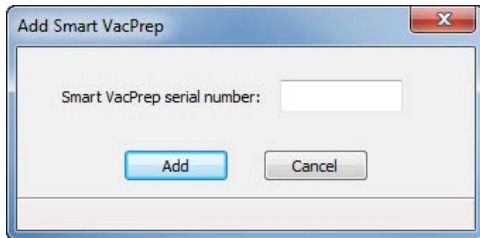
ADD OR REMOVE A SMART VACPREP



A Smart VacPrep unit must be removed from one application before it can be added to another application if they are running on the same subnet.

ADD A SMART VACPREP UNIT

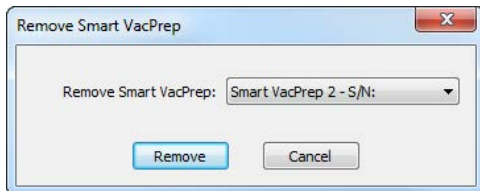
Smart VacPrep > Add



1. When prompted, enter the serial number of the unit being added. Duplicate serial numbers are not allowed.
2. Click **Add**. Initialization begins.

REMOVE A SMART VACPREP UNIT

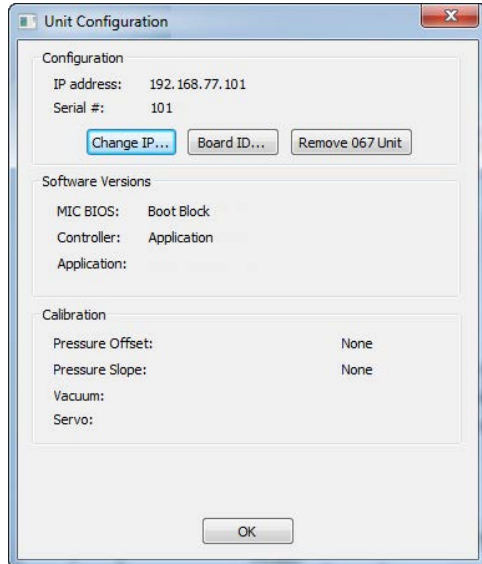
Smart VacPrep > Remove



1. Select the serial number to remove.
2. Click **Remove**.

SMART VACPREP CONFIGURATION

Smart VacPrep > Unit [n] > Configuration



Displays the Smart VacPrep configuration and software versions.

Smart VacPrep Unit Configuration Fields and Buttons Table

Field or Button	Description
Board ID	Click to display the board ID.
Change IP	Click to display the <i>Unit IP Setup</i> window. The IP address and Subnet mask assigned during installation display. Do not edit these fields unless instructed by a Micromeritics service representative.
OK	Saves and closes the active window.
Remove 067 Unit	Click to remove the selected Smart VacPrep unit.

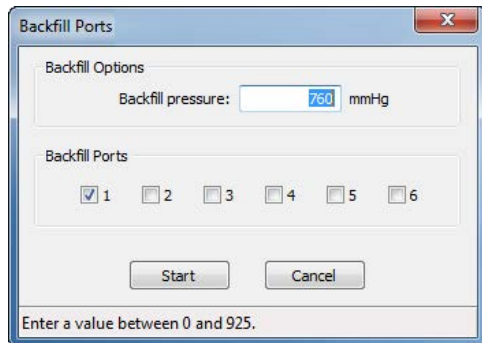
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3 OPERATE THE SMART VACPREP

BACKFILL THE SMART VACPREP PORTS

Smart VacPrep > Unit [n] > Backfill Ports

Use to backfill ports with gas.

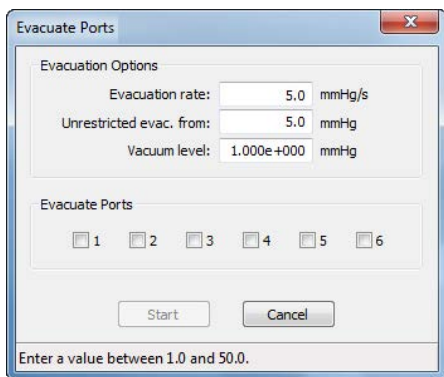


1. Enter the backfill pressure in the Backfill pressure field.
2. Select the ports to be backfilled.
3. Click **Start** to start the process or **Cancel** to stop the process.

EVACUATE THE SMART VACPREP PORTS

Unit [n] > Smart VacPrep > Evacuate Smart VacPrep Ports

Allows manual evacuation of up to six degas ports.



Smart VacPrep Evacuate Ports Fields and Buttons

Field or Button	Description
Cancel	Discards any changes or cancels the current process.
Evacuate Options	<ul style="list-style-type: none"> • Unrestricted evac. pressure. Pressure value at which unrestricted sample evacuation should begin. • Vacuum level. Specify the vacuum level to be achieved before evacuation begins. • Evacuation rate. Rate of evacuation.
Evacuate Port[s]	Select the ports() to evacuate.
Start	Starts the operation.

QUICKSTART DEGAS CONDITIONS

Smart VacPrep > Unit [n] > QuickStart Degas Conditions

The *QuickStart Degas Conditions* option provides the ability to enter commonly used degas conditions for each Smart VacPrep port without the need for a sample information file. Degassing can then be easily started using the front panel buttons on the Smart VacPrep unit.

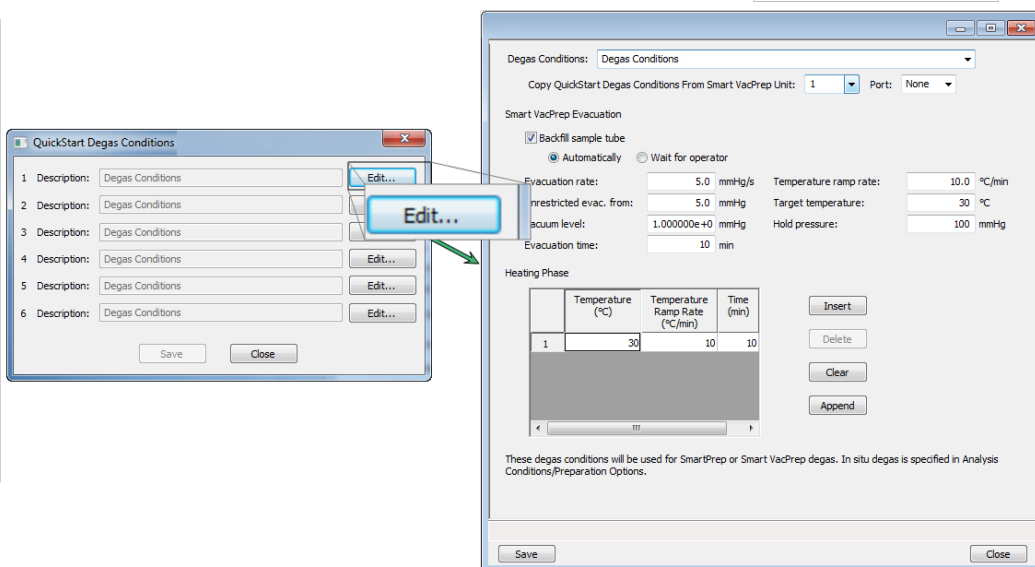
This option provides three ways to load information into *QuickStart Degas Conditions*:

1. Load degas conditions from an existing degas conditions file.
2. Copy conditions from another Smart VacPrep unit and port.
3. Enter degas conditions manually.

Degas conditions can be copied into sample files after degassing for record keeping.

When using the *QuickStart* menu option, the degas process is started using the **Select** button and **Start** buttons for each port on the Smart VacPrep unit.

QuickStart degas conditions are remembered for the next push button operation.



1. Go to **Smart VacPrep > Unit [n] > QuickStart Degas Conditions**.
2. The six ports are represented by row numbers. Ports that are busy are grayed out and disabled. Click **Edit** for the port to be configured.
3. Enter degas conditions using one of the following methods:
 - To select degas conditions from a *Degas Conditions* file, click the dropdown arrow to the right of the *Degas Conditions* field. If the file is not shown, select *Browse*, locate the file, then click **Load**.
 - To copy QuickStart Degas Conditions from another Smart VacPrep unit, select the unit and port number to the right of the *Copy QuickStart Degas Conditions from Smart VacPrep Unit [n] Port [n]* field..
 - To enter degas conditions manually, complete the fields on the window. Reference the *Degas Conditions* section of the analyzer operator manual
4. Click **Save**. Repeat these steps for each port to be configured. If multiple ports will have the same degas conditions parameters, click **Edit** on the port and use the *Copy QuickStart Degas Conditions from Smart VacPrep Unit [n] Port [n]* field to load the settings from the first port.
5. Repeat these steps for each applicable unit and port.
6. If using a Check Seal, verify that the Check Seal opener is installed in the Smart VacPrep port. Follow the instructions included with the Check Seal for instructions on inserting the opener.
7. Load the sample into the sample tube. If using a Check Seal or TranSeal, insert it into the sample tube.
8. Load the sample on the Smart VacPrep sample port.
9. Attach the heating mantle using the metal clip. If a straight wall tube is used, heating mantles with elastic cords are available. Reference the Parts and Accessories section of the analyzer operator manual.

10. Install the safety shield.
11. Press the **Select** button for the port to be degassed. A blue LED is lit.
12. Press the **Start** button on the Smart VacPrep panel to start the degas process for all ports that have a blue LED lit.
13. When degassing is complete and the sample has cooled, the sample can be transferred to an analysis port.

LOAD QUICKSTART DEGAS CONDITIONS INTO A SAMPLE FILE

QuickStart Degas Conditions can be copied into a sample file. Reference the Degas Conditions section of the analyzer operator manual.

Degas Conditions Fields and Buttons Table

Field or Button	Description
Close	Closes the active window.
Degas Conditions	Use to browse for a .DEG file that contains degas condition parameters to be used in the analysis.
Heating Phase	<p>This option is applicable when degassing with either a Smart VacPrep or a SmartPrep.</p> <p>Enter up to five stages of degas conditions.</p> <ul style="list-style-type: none"> • Temperature. Degas temperature. • Temperature Ramp Rate. Rate at which the temperature is to change. • Time. Amount of time to heat the sample. <p>Use to modify the table contents.</p> <ul style="list-style-type: none"> • Insert. Inserts one row above the selected row. • Delete. Deletes the selected row. • Clear. Clears all table entries and displays only one default value. • Append. Inserts one row at the end of the table.

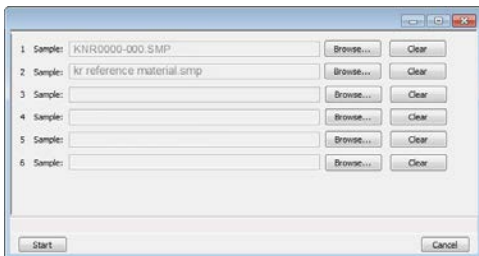
Degas Conditions Fields and Buttons Table (continued)

Field or Button	Description
Save	Saves changes to the active window.
Smart VacPrep Evacuation	<p>This option is applicable only when degassing with a Smart VacPrep.</p> <ul style="list-style-type: none"> • Backfill sample tube. Indicate if the sample tube should be backfilled automatically or wait for operator response. • Evacuation Rate. Rate used for evacuation. • Unrestricted evac. from. Pressure at which the unrestricted evacuation is to begin. • Vacuum level. Pressure for unrestricted evacuation. • Evacuation time. Length of time for preliminary evacuation before proceeding with the <i>Heating Phase</i> temperature schedule. The timer starts when the vacuum level is reached. • Temperature ramp rate. Rate at which the temperature is to change when advancing to the target pressure. • Target temperature. Targeted pressure for evacuation. • Hold pressure. Pressure at which heating will stop and hold the sample temperature approximately constant until the pressure falls below the <i>Hold</i> pressure. This prevents damage to the sample structure due to 'steaming' and /or elutriation due to excessive escaping gas velocity.

START SMART VACPREP DEGAS

Smart VacPrep > Unit [n] > Start Degas

This option allows the degassing of up to six samples simultaneously. A sample can be added to any idle port and a degas operation started. When adding a sample, the degas operation in progress will be suspended until the sample reaches the target pressure, then degassing on all ports will resume. If other samples are still in the initial evacuation phase, the new samples will wait until the fast evacuation is started. Samples can be removed from any of the six ports without disturbing the degas operations already in process. Starting several samples as a batch allows them to perform the initial evacuation at the same time.



Degas conditions remain the same from degas to degas unless the *Degas Conditions* file is changed or replaced by the operator. A manual evacuation can be performed on any idle degas port.

The six ports are represented by row numbers. Ports that are busy are grayed out and disabled.

1. Click **Browse** to search for a sample file or a degas conditions file. Select the file, then click **Open**. Do this for each Smart VacPrep port to be used.
2. If using a Check Seal, verify that the Check Seal opener is installed in the Smart VacPrep port. Follow the instructions included with the Check Seal for instructions on inserting the opener.
3. Load the sample into the sample tube. If using a Check Seal or TranSeal, insert it into the sample tube.
4. Load the sample on the Smart VacPrep sample port.
5. Attach the heating mantle using the metal clip. If a straight wall tube is used, heating mantles with elastic cords are available. . [See "Parts and Accessories for the Smart VacPrep" on page 7 - 1.](#)
6. Install the safety shield.
7. Click **Start** on the *Start Degas* window to begin the degas process for the selected Smart VacPrep ports.
8. Click **Start** to begin the degas process for the selected Smart VacPrep ports.
9. Allow the samples to cool before transferring them to the analysis ports to start the analysis.

Smart VacPrep Start Degas Fields and Buttons Table

Field or Button	Description
Browse	Searches for a file. Select a file from the <i>Name</i> column or from the library, then click Open . Alternatively, double click the file name to open (or import) the file.
Cancel	Discards any changes or cancels the current process.
Clear	Clears the field.
Sample	Displays the path and file name of the selected .SMP file.
Start	Starts the degas operation for the selected ports.



Degas ports can also be canceled using buttons on the Smart VacPrep unit. Press **Select** on the unit to select the port, then press the **Cancel** button.

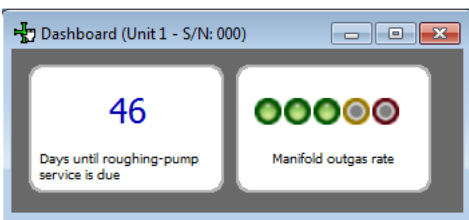
SHOW SMART VACPREP DASHBOARD

Smart VacPrep > Unit [n] > Show Dashboard

The dashboard displays the following:

- Number of days until roughing pump maintenance is due
- Manifold outgas rate

Data for the dashboard comes from the logged diagnostic data. The dashboard is automatically kept current as the relevant diagnostic data items are updated. The gauges will be updated even if the dashboard window is not open.



Red numbers on the dashboard require attention. To reset the dashboard numbers, right click on the dashboard setting, then click [Reset](#).

Smart VacPrep Dashboard Gauges and Descriptions Table

Field or Button	Description
Days until roughing-pump service is due	Annual maintenance is recommended. The number of days until the anniversary of the last pump maintenance is shown. The displayed value is updated at least once per day and when the maintenance time is reset. When the displayed value is 30 or less, the value is displayed in red. Red negative numbers display if maintenance is past due.
Manifold outgas rate	Provides the qualitative indication of the outgas rate in the dosing manifold. LED images constitute a bidirectional bar graph of the outgas rate. The gauge is updated after each outgas rate measurement. <ul style="list-style-type: none"> • Three green LEDs are lit if outgas rate is below 30% of outgas rate limit. • At 30%, the left LED turns off. • At 60%, the center LED turns off. • At 90%, three green LED lights turn off and the center yellow LED is

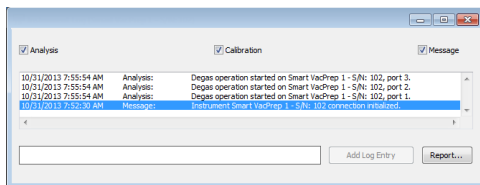
Smart VacPrep Dashboard Gauges and Descriptions Table (continued)

Field or Button	Description
	<p>turned on.</p> <ul style="list-style-type: none"> At 110% and above, only the red LED is lit and attention is required.

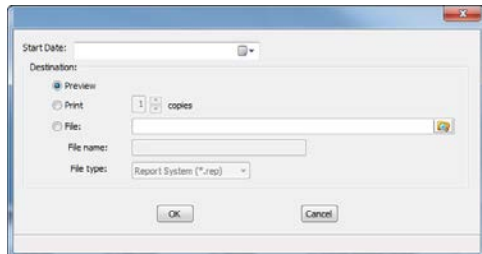
SHOW SMART VACPREP LOG

Smart VacPrep > Unit [n] > Show Log

Use to display a log of recent analyses, calibrations, or messages.



Analyzer Log Fields and Buttons Table

Field	Description
Add Log Entry	Use to enter information to appear in the sample log report that cannot be recorded automatically through the application. Click the button again to enter multiple log entries.
Analysis / Calibration / Message	Select the logs to display.
Report	<p>Click to display the <i>Instrument Log Report Settings</i> window to specify report output options.</p>  <ul style="list-style-type: none"> Start Date. Displays a calendar to select the start date for the report. Preview. Previews the predefined report on the screen. Print. Sends the report to the default printer. Copies. Select the number of copies to print. This field is only enabled when <i>Print</i> is selected.

Analyzer Log Fields and Buttons Table (continued)

Field	Description
	<ul style="list-style-type: none"> File. Select the destination directory. Enter a new file name in the <i>File name</i> field, or accept the default. Select to save the file as a report system (.REP), a spreadsheet (.XLS), a portable document format (.PDF), or an ASCII text (.TXT) file format.

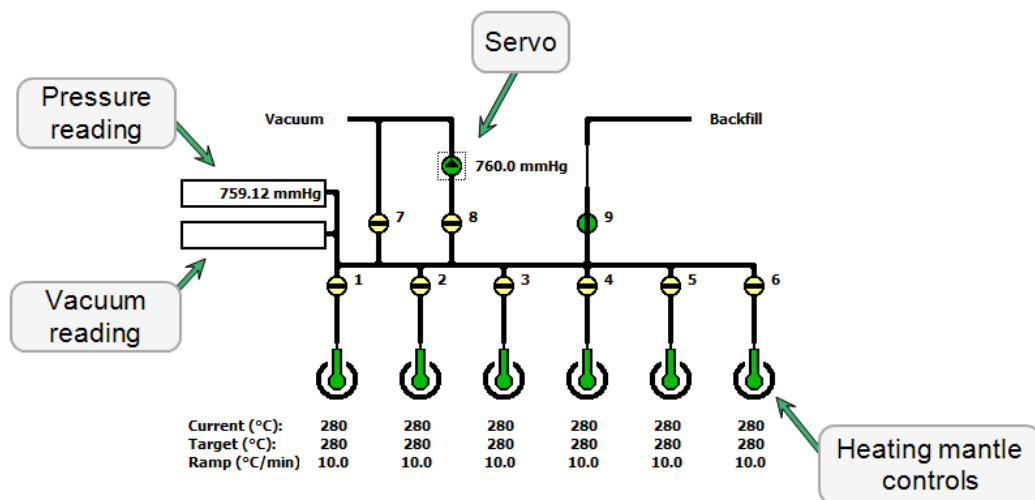
SHOW SMART VACPREP SCHEMATIC

Unit [n] > Show Instrument Schematic

Use to display an analyzer schematic. To operate the valves and elevator from this window, manual control must be enabled (**Smart VacPrep > Unit [n] > Enable Manual Control**).

Smart VacPrep Schematic Components Icon Table

Field or Button	Description
	Open Valve. Green indicates an open valve.
	Closed Valve. Yellow indicates a closed valve.
	Servo Valve. Closed.
	Servo Valve. Open.
	Sample Tube. Cannot be manually controlled.



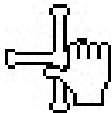
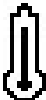
Smart VacPrep Schematic Components Table

Schematic Components	Description
1-6	Sample port valves
7, 8, 9	Vacuum and backfill valves
Heating mantle controls	Sets the ramp rate and target temperature

SMART VACPREP SCHEMATIC SHORTCUT MENUS

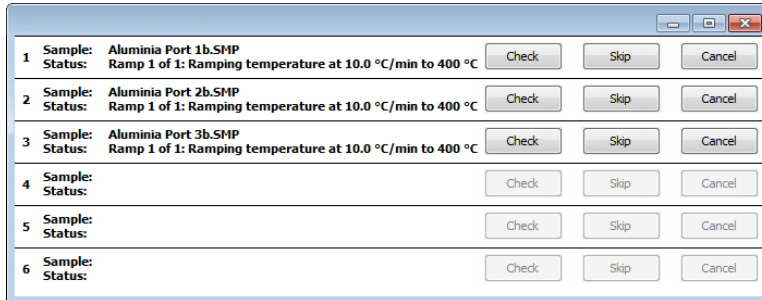
Each manually controlled schematic component has a shortcut menu displaying the operations available for that particular component. To access the shortcut menu, hover the mouse pointer over the component and right click.

Smart VacPrep Schematic Shortcuts Table

Schematic Shortcut Icon	Available Options:
Valve options 	<ul style="list-style-type: none"> • Close - Closes the selected valve. • Open Opens the selected valve. • Set - Use to set the servo valve target pressure and to dose or evacuate.
Temperature control options 	<ul style="list-style-type: none"> • Disable. Select to disable the temperature control options for the selected port. • Set. Select to set the following: <ul style="list-style-type: none"> ◦ Enable or disable temperature control ◦ Control sample temperature ◦ Control furnace temperature ◦ Cool the sample to less than 50 °C ◦ Set heater power percent

SHOW SMART VACPREP STATUS

Smart VacPrep > Unit [n] > Show Status



The *Smart VacPrep Status* window allows the monitoring of degas operations for a manual degas operation.

Smart VacPrep Status Fields and Buttons Table

Field or Button	Description
Cancel	Cancels the current degas operation.
Check	<p>Click to check the outgassing rate of the samples on the selected port. The following process occurs:</p> <ul style="list-style-type: none"> • The current degassing step is suspended. • The vacuum valves are closed and the vacuum level on the selected ports is monitored. • The <i>Status</i> window indicates that the degassing operation is being checked and displays the outgassing rate as it becomes available. <p>During the degas check, the Check button changes to Continue. When Continue is clicked, the valves open and the degassing operation resumes.</p> <p>If the outgassing rate indicated that the sample has been freed of contaminants (minimal pressure increases), click Skip to advance to the next state of the degassing operation. For example, if degassing is checked after the setpoint is attained, Skip advances you to the ramping stage.</p>
Sample	The name of the sample file.
Skip	Skips the current degas operation.
Status	Indicates the current status of the degas.

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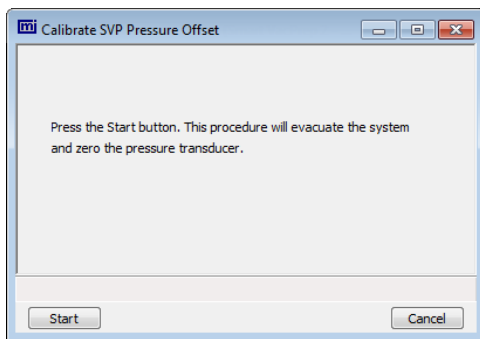
4 SMART VACPREP CALIBRATION

Smart VacPrep > Unit [n] > Calibration

Various calibration procedures and service tests are included in the operating program. These procedures and tests are designed to provide a service representative with instrument readouts, as well as to assist in troubleshooting potential problems.

SMART VACPREP PRESSURE OFFSET

Smart VacPrep > Unit [n] > Calibration > Pressure Offset



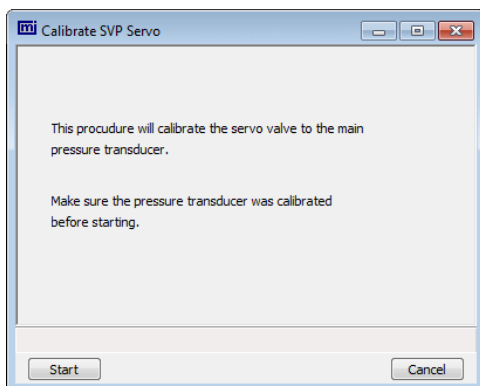
Use to perform system calibration. This option evacuates the system and zeros the pressure transducer.

Disabled calibration options can be accessed only with the assistance of an authorized Micromeritics service representative.

Click **Start** to begin the process.

SMART VACPREP SERVO VALVE CALIBRATION

Smart VacPrep > Unit [n] > Calibration > Servo Valve



Use to calibrate the servo valve to the manifold pressure transducer. The servo valve should always be recalibrated after a pressure calibration has been performed. The pressure transducer should be calibrated before starting this calibration procedure.

1. Go to **Smart VacPrep > Unit [n] > Calibration > Servo Valve**.
2. Click **Start**. The window closes when the calibration is complete. Click **Cancel** to stop the calibration process.

Servo Valve Fields and Buttons Table

Field or Button	Description
Cancel	Discards any changes or cancels the current process.
Start	Starts the operation.

5 SMART VACPREP DIAGNOSTICS

DIAGNOSTIC TEST REPORT FOR SMART VACPREP

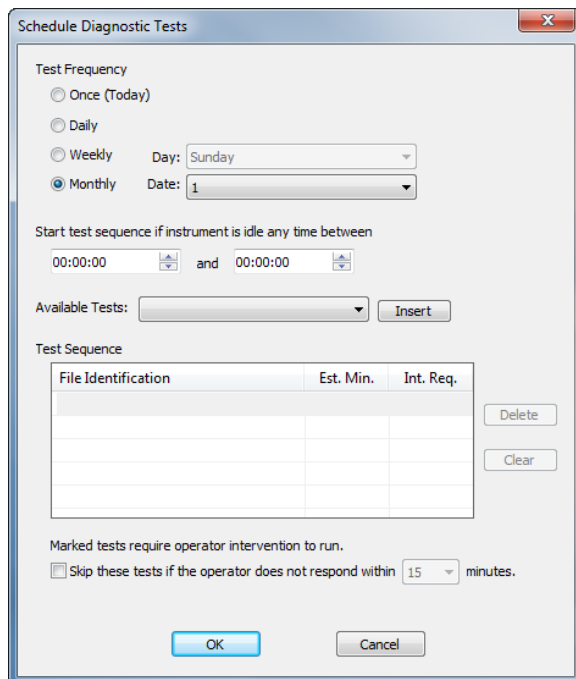
Smart VacPrep > Unit [n] > Diagnostics > Diagnostic Test Report

Displays previously run diagnostic tests. Separate directories store tests run once, daily, weekly, and monthly.

SCHEDULE SMART VACPREP DIAGNOSTIC TEST

Smart VacPrep > Unit [n] > Diagnostics > Schedule Diagnostic Tests

Allows the specification of one-time or periodic running of a sequence of diagnostic tests. A separate list of tests is saved for each of the possible test frequencies. Tests are categorized and flagged as requiring intervention or not. If tests requiring intervention are scheduled, the operator has the option of skipping these tests if the operator does not respond within a specified time after an initial prompt is displayed, before the test is started. Events are logged in the instrument log for all starting, ending, and skipped tests.



Schedule Diagnostic Tests

Test Frequency

Once (Today)
 Daily
 Weekly Day: Sunday
 Monthly Date: 1

Start test sequence if instrument is idle any time between

00:00:00 and 00:00:00

Available Tests: Insert

Test Sequence

File Identification	Est. Min.	Int. Req.

Delete
Clear

Marked tests require operator intervention to run.

Skip these tests if the operator does not respond within 15 minutes.

OK Cancel

Schedule Diagnostics Fields and Buttons Table

Field or Button	Description
Available Tests drop-down list	Select one or more tests to run unattended. Select the test and click the Insert button for the test to display in the Test Sequence box.
Cancel	Discards any changes or cancels the current process.
Intervention Required	Check this option if any test requiring operator intervention should be skipped if the operator does not respond within the specified time.
OK	Saves and closes the active window.
Start Test Sequence if Instrument is Idle Any Time Between	Enter a From and To time for an unattended test to begin if the instrument is idle at any time during the entered time frame.
Test Frequency	Select how often the test is to run unattended.
Test Sequence	Provides the test file identification and estimated run time. A check mark in the Intervention Required column indicates that operator intervention is required. Click Delete to remove the selected test or Clear to clear the entire table of all entries. To add a test to the test sequence, highlight a row in the Test Sequence box, select a test from the Available Tests list and click Insert. The new test will be inserted above the highlighted row. Select a row and click Delete to remove the test from the sequence. Select Clear to remove all entries from the Test Sequence box.

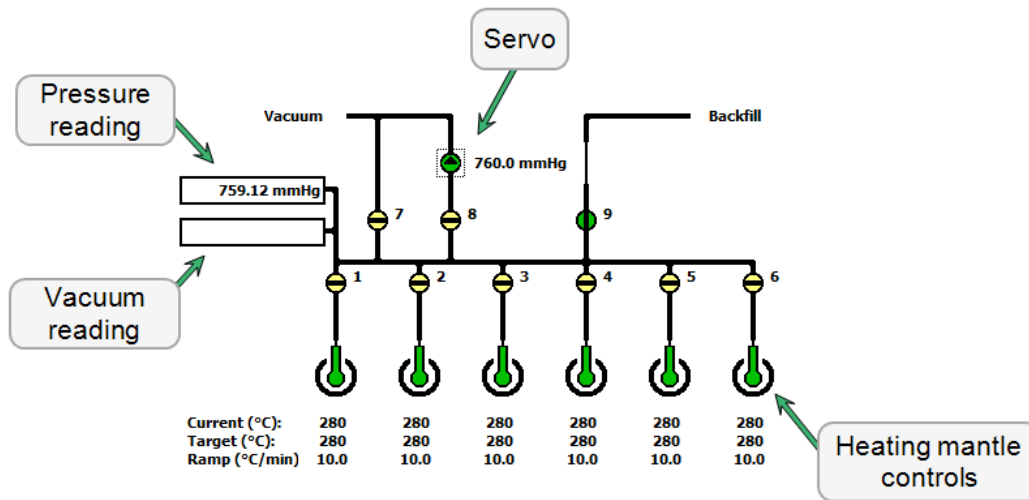
6 MAINTENANCE AND TROUBLESHOOTING

ENABLE MANUAL CONTROL FOR SMART VACPREP

Smart VacPrep > Unit [n] > Enable Manual Control

Use to enable the manual control of certain system valves and elevator components. When this option is enabled, a checkmark appears to the left of **Unit [n] > Enable Manual Control**.

If the schematic is not immediately visible, go to **Unit [n] > Show Instrument Schematic**.





Smart VacPrep Schematic Components Table

Schematic Components	Description
1-6	Sample port valves
7, 8, 9	Vacuum and backfill valves
Heating mantle controls	Sets the ramp rate and target temperature

Smart VacPrep Schematic Components Icon Table

Field or Button	Description
	Open Valve. Green indicates an open valve.
	Closed Valve. Yellow indicates a closed valve.
	Servo Valve. Closed.

Smart VacPrep Schematic Components Icon Table (continued)

Field or Button	Description
	Servo Valve. Open.
	Sample Tube. Cannot be manually controlled.

REPLACE THE SMART VACPREP FUSE

The Smart VacPrep uses two 5 amp fuses located in a compartment adjacent to the power connector on the back of the unit.

1. Use a flat head screwdriver to gently pry open the cover of the compartment.
2. Use the flat head screwdriver to gently pry the fuses out of the holder.
3. Insert a new fuse into each holder, then push the holders back into the slot until snug.
4. Press the compartment cover shut. Ensure it closes securely.

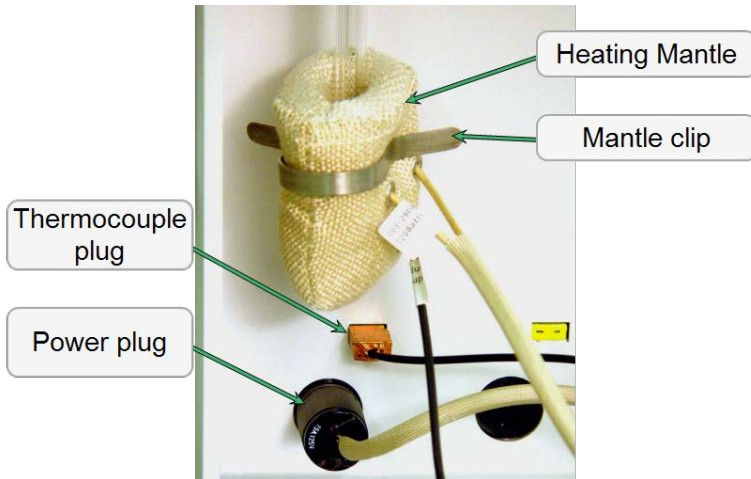
SAMPLE TUBE INSTALLATION ON THE SMART VACPREP

1. While holding the degas port plug, turn the connector nut counterclockwise to loosen. Remove both the plug and the nut.



2. If using a rubber stopper, remove it from the sample tube. If using a Check Seal or TransSeal, do not remove them from the sample tube. Place the port connector nut, ferrule, and O-ring onto the sample tube.

3. If using a Check Seal, verify that the Check Seal opener is installed in the sample port.
4. To attach the sample tube set to the degas port, push the sample tube in to a full stop. Secure the sample tube in place by sliding the connector nut, ferrule, and O-ring up onto the degas port and turning the connector nut clockwise. Tighten the nut securely by hand.
5. Place a heating mantle over the sample tube bulb and secure the mantle in place with a mantle clip.



6. Insert the heating mantle thermocouple plug into the thermocouple connector.
7. Insert the heating mantle power plug into the power connector and twist the power plug to lock securely.
8. After installing the sample tubes, install the safety shield around the sample tubes and heating mantles to minimize the risk of receiving a burn by touching hot components.

OIL BASED VACUUM PUMP

INSPECT AND CHANGE VACUUM PUMP OIL



The equipment shown in this section may differ slightly from yours. However, the process is the same unless otherwise noted.

The oil in the vacuum pump should be changed every three months when the efficiency of the vacuum pump declines (requiring increased time to reach vacuum levels) or if it becomes discolored.

Inspect the Oil

View the vacuum pump oil through the oil-level window. The oil level should be midway between the indicators on the oil-level window when the pump is running. Oil in good condition is clean, clear or light in color and transparent. Change the oil if it has darkened.



Change or Add Oil



Drain the oil while the pump is warm and disconnected from the power source.

Use oil supplied by Micromeritics or refer to the vacuum pump manual for other acceptable oils.

1. Unplug the vacuum pump from the power source.
2. Loosen the wing nut on the clamp at the top of the oil vapor trap. Swing the clamp open and remove the trap from the hose.



3. Grasp the handle on top of the vacuum pump and place the pump on a work surface.
4. Place a waste container under the drain spout.



5. Remove the drain plug and drain the oil into the waste container.
6. Replace the drain plug.
7. Remove the drain plug from the oil-fill port on top of the pump.



8. Slowly add oil to the port until the level is midway between the indicator lines in the oil-level window when the pump is running.



Do not allow oil to rise above the midway position when the pump is running. Doing so may cause oil to splash into the oil filter causing contamination.

9. Check the washer or O-ring used at the oil-filling port and replace if necessary.
10. Insert the oil-fill plug and turn clockwise to tighten.
11. Check the alumina in the oil vapor trap. If most of the pellets are no longer white, replace the alumina before reattaching the vacuum pump. [See "Replace the Alumina in the Oil Vapor Trap" below.](#)
12. Reconnect the vacuum pump hose.
13. Reconnect the power cord to the power source.
14. Turn the vacuum pump on and recheck the oil level.
15. Allow the pump to run a few hours (overnight if possible) to eliminate air and moisture from the fresh fluid and to produce efficient vacuum operations.

REPLACE THE ALUMINA IN THE OIL VAPOR TRAP



The equipment shown in this section may differ slightly from yours. However, the process is the same unless otherwise noted.

The activated alumina in the oil vapor trap becomes saturated during use. The alumina should be inspected periodically and replaced when most of the alumina pellets are no longer white.



Do not perform the following procedure on used alumina. The resultant oil vapors may cause a fire.

1. Disconnect the vacuum pump from the analyzer and place it on a work table.
2. Loosen the wing nut on the clamp at the top of the oil vapor trap. Swing the clamp open and remove the trap from the hose.



3. Loosen the wing nut on the clamp at the bottom of the oil vapor trap. Open the clamp and remove the trap.



4. Remove one end fitting from the trap body and dispose of the used alumina in an appropriate manner.
5. Wash the trap body with a detergent-based soap. Rinse with water, then rinse with isopropyl or ethyl alcohol. Set the trap aside and allow to dry thoroughly.



Exposure of the trap body to oil vapor may cause small cracks on the inside surface of the trap body. Under normal circumstances, these cracks will not cause problems or leaks.

Prepare fresh alumina

1. Preheat the oven to 300 °C.
2. Pour approximately 180 grams of fresh alumina into a glass or metal container (approximately 250 mL if a graduated beaker is used). Place the container in the oven.
3. Bake the alumina for two hours at 300 °C.
4. Remove the baked alumina from the oven and allow to cool until luke warm. A desiccator may be used to speed the cooling process.
5. Use a small spatula to gently pry the O-ring from the end fittings of each end of the trap body.



6. Inspect the O-rings. If dusty, clean with a lint-free tissue. If damaged, replace with a new O-ring.
7. Screw one of the end fittings onto the trap body.
8. Ensure the trap body is dry and the alumina is lukewarm. Pour the alumina pellets into the trap until level with the top of the trap body.
9. Screw the other end fitting back onto the trap and tighten securely by hand.
10. Lightly tap both ends of the trap body on the work surface to remove remaining dust from the pellets.



11. Inspect the centering ring before replacing it onto the intake port. If it appears to be flattened, replace it. A flattened centering ring can cause vacuum leaks. There are two types of centering rings. Use the one with the smaller opening at the intake port.
12. Place the centering ring on the intake port.
13. Place the trap on the centering ring.



14. Open the clamp and place it around the flange of the intake port and the flange of the trap. Swing the clamp fastening screw toward the intake port until it fits into the slot in the other half of the clamp. Tighten the wing nut securely by hand.



15. Reconnect the hose from the analyzer to the oil vapor trap.
 - a. Place the clamp around the vacuum pump hose flange and vapor trap.



16. Plug the pump power cord into the power source. Allow the pump to run a few hours (overnight if possible) to eliminate air and moisture from the fresh oil and to produce efficient vacuum operations.

REPLACE THE VACUUM PUMP EXHAUST FILTER



The equipment shown in this section may differ slightly from yours. However, the process is the same unless otherwise noted.

The gases used by the analyzer are exhausted by the oil-filled vacuum pump. The filter minimizes the release of oil vapor and should be replaced when it becomes so saturated with oil that it is ineffective.



Exhaust filters are used to minimize the release of oil vapors. The gases are diluted substantially upon release from the vacuum pump; however, it may be necessary in some locations to provide a fume hood for protection from hazardous gases and vapors released into the work area.

1. Turn off the power to the pump and disconnect the pump from the power source.
2. Loosen the clamp wing nut at the vacuum pump exhaust port. Swing the clamp away from the exhaust port and remove it.



3. Remove and discard the exhaust filter. Ensure the centering ring remains in place on the exhaust port.
4. Place the new filter on the centering ring.
5. Open the clamp and place it around the exhaust port flange and the exhaust filter flange. Swing the clamp fastening screw toward the exhaust port until it fits into the slot in the other half of the clamp. Tighten the wing nut securely by hand.
6. Turn on the power to the pump.

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7 PARTS AND ACCESSORIES FOR THE SMART VACPREP

Part Number	Item and Description
Cables	
003-63801-01	Cable, Ethernet straight-thru; for connecting instrument to control module (computer)
Gas Cylinder Accessories	
004-25549-00	Reducer, 1/8 in tube × 1/4 in tube
004-33601-00	Expansion kit; adds an additional outlet to the gas regulator
004-33602-00	Pressure relief kit; prevents excessive gas pressure in the event of regulator failure (not to be used with toxic gases)
004-62230-58	Gas regulator, CGA 580 fitting, 30 psig (He, N ₂ , Kr, Ar)
230-02001-00	Gas inlet line, 1/8 in. × 6 ft., copper
Heating Mantle and Accessories	
003-26044-00	Smart VacPrep heating mantle 24V, 120W
067-14701-00	Heating Mantle Shield, (1) replacement shield
067-33002-00	Heating Mantle Shield Option, includes (2) shields, each shield covers (3) heating mantles
230-25808-00	Smart VacPrep heating mantle clip
Operating Supplies	
004-25466-00	O-RING, -010 70 DURO BUNA-N; for use with sample port dust frit
004-27041-00	Sample port dust frit, 20 microns
067-33601-00	Operating supplies, sample tube o-rings (1/2 in. and 12 mm), sample port dust frit , o-rings for sample port dust frit (6-month supply)
067-33602-00	Extended operating supplies, sample tube o-rings (1/2 in. and 12 mm), sample port dust frit , o-rings for sample port dust frit (12 month supply)
Sample Tubes and Accessories	
004-25013-02	O-ring, -013 70 DURO VITON; for use with 12 mm sample tubes (brown)
004-25022-00	O-ring, -012 70 DURO BUNA-N; for use with 3/8 in sample tubes
004-25044-00	O-ring, -013 70 DURO BUNA-N; for use with 1/2 in sample tubes (black)
004-25466-00	O-ring, -010 70 DURO BUNA-N; for use with 1/4 in sample tubes
004-25647-01	O-ring, -904, VITON; for use with 9 mm sample tubes (brown)
067-25840-00	Sample tube ferrule, 12 mm (red)
067-25840-01	Sample tube ferrule, 9 mm (red)
067-33603-00	Option kit, 1/4 in. ferrules and O-rings (6 ferrules and 12 O-rings)

Part Number	Item and Description
067-33604-00	Option kit, 3/8 in. ferrules and O-rings (6 ferrules and 12 O-rings)
067-33605-00	Option kit, 9 mm ferrules and O-rings (6 ferrules and 12 O-rings)
260-25843-00	Sample tube ferrule, 1/2 in
300-25824-00	Sample tube nut
300-25825-00	Sample tube ferrule, 1/4 in
300-25826-00	Sample tube ferrule, 3/8 in
Smart VacPrep Systems	
067-00000-00	Smart VacPrep (no vacuum pump)
067-00000-11	Smart VacPrep with 110/120V oil-sealed vacuum pump system
067-00000-22	Smart VacPrep with 220/240V oil-sealed vacuum pump system
067-00001-00	Smart VacPrep with hybrid turbo vacuum pump system
Vacuum Pump and Accessories	
004-16003-01	Oil, vacuum pump, 1 Liter
004-16830-00	Activated alumina, 500 grams; for oil vapor trap
004-25491-02	Centering ring, NW 40, BUNA-N, AL; for use with hybrid turbo vacuum pump
004-25509-00	Clamp, NW 10/16
004-25626-08	Flex tube, 3/4-in. OD x 48-in. long, NW-16, NW-40
004-25630-00	Centering ring, NW 16
004-25652-00	O-ring, size 217, for oil vapor trap
004-25860-00	Fitting, elbow, NW-16; for connecting to the vacuum inlet
004-27040-00	Filter, for vacuum pump exhaust
004-62023-01	Service kit, for vacuum pump P/N 062-00004-00 (for Edwards and VacuuBrand)
062-00000-11	Vacuum pump with built-in anti-suckback valve, 100/120 VAC, includes hose kit
062-00000-23	Vacuum pump with built-in anti-suckback valve, 220/240 VAC, includes hose kit
062-00004-00	Hybrid turbo vacuum pump assembly
062-33002-00	Activated alumina oil vapor trap, for one oil-based vacuum pump
260-25896-00	Adapter, KF-16 to 7/16 hose

8 ERROR MESSAGES

Program error messages are listed numerically. If the *Action* response indicates to contact a Micromeritics service representative, record the error message, then make backup copies of any files involved in the operation.

4407 Error searching for installed Smart VacPreps. The registry could not be read..

Cause: The application was not installed properly.

Action: Reinstall the application. If the problem persists, contact your Micromeritics service representative.

4408 The %s in %s already has Smart VacPrep S/N %d. The Smart VacPrep must be removed from the %s before it can be added.

Cause: The Smart VacPrep was already installed for another application / unit.

Action: Remove the Smart VacPrep from the installed unit before adding it to the preferred unit.

4409 A free IP address on the same subnet as %s could not be found."

Cause: All IP addresses on the network for the Ethernet card specified during installation are in use by other Micromeritics applications on this computer.

Action: Uninstall unused Micromeritics applications.

Action: Configure a different Ethernet card for use by the application using the application installer.

4410 The .INI file could not be updated with configuration for Smart VacPrep S/N %s."

Cause: The application .INI file is opened by another application and could not be updated.

Action: Close all open applications and add the Smart VacPrep again using the Smart VacPrep menu.

4411 Error dosing.

Cause: The backfill timed out.

Action: Ensure there is gas available and the pressure regulator is set to the appropriate pressure. Also ensure that the gas supply regulator shut-off valve is open.

4412 Error calibrating the servo.

Cause: Calibration results are out of range.

Action: Follow standard calibration procedures and try again. If the problem persists, contact your Micromeritics service representative.

4413 Error overheating on port [0]. Current = [TEMPC0] [TEMPC-U], Target = [TEMPC0] [TEMPC-U], Limit = [TEMPC0] [TEMPC-U].

Cause: The temperature of the indicated mantle exceeded the maximum allowed value.

Action: Ensure the power and thermocouple connectors for the mantle are properly installed. If they are, the mantle may be defective; contact your Micromeritics service representative.

4414 Error thermocouple unplugged on port [0]. Target = [TEMPC0] [TEMPC-U]."

Cause: The thermocouple is unplugged or has malfunctioned.

Action: Ensure the thermocouple is plugged in. If the problem persists, contact your Micromeritics service representative.

4420 Communications error.

Cause: The application failed to connect to the Smart VacPrep.

Action: Ensure the unit is powered and properly connected to the network specified during installation. Check the power cable, power switch, and Ethernet cable, then reconnect to the Smart VacPrep either through the Smart VacPrep menu for this instrument or by restarting the application. If the problem persists, contact your Micromeritics service representative.

4421 Smart VacPrep S/N %s is busy and could not be removed.

Cause: The Smart VacPrep cannot be removed because it is currently performing an operation.

Action: Wait until the Smart VacPrep completes the current operation and try again.

4422 The file %s does not exist.

Cause: The selected file does not exist on the disk drive.

Action: Select an existing file. Ensure that the file has been created before use.

4423 The sample %s is already selected on port %d.

Cause: The selected sample file is already selected for use on a different port.

Action: Select another sample file for this port.

4424 The file %s on port %d could not be opened. Check if the sample file is already in use for editing or analysis.

Cause: The selected sample file is already open by this or another application.

Cause: The selected sample file is damaged.

Action: Select another sample file.

4425 The sample %s on port %d has an invalid status and cannot be used for degassing.

Cause: The status of the file is not consistent with the current operation.

Action: Select a sample file that has not been used for an analysis. Only sample files with a status of No Analysis or Prepared may be selected.

4426 Port %d is currently in use. Operation cannot be started.

Cause: The current operation cannot be completed because the port is already in use.

Action: Wait for port to terminate operation or perform the desired operation on an unused port.

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