

MIC SAS II 5800

SUB-SIEVE AUTOSIZER



micromeritics®

**Effective Solutions for
Material Characterization**

OPERATOR MANUAL

580-42800-01
June 2019
(Rev -)

TRADEMARKS

MIC SAS is a registered trademark of Micromeritics Instrument Corporation.
Micromeritics is a registered trademark of Micromeritics Instrument Corporation.

Copyright

The software described in this manual is furnished under a license agreement and may be used or copied only in accordance with the terms of the agreement.

WARRANTY

MICROMERITICS INSTRUMENT CORPORATION warrants for one year from the date of shipment each instrument it manufactures to be free from defects in material and workmanship impairing its usefulness under normal use and service conditions except as noted herein.

Our liability under this warranty is limited to repair, servicing and adjustment, free of charge at our plant, of any instrument or defective parts when returned prepaid to us and which our examination discloses to have been defective. The purchaser is responsible for all transportation charges involving the shipment of materials for warranty repairs. Failure of any instrument or product due to operator error, improper installation, unauthorized repair or alteration, failure of utilities, or environmental contamination will not constitute a warranty claim. The materials of construction used in MICROMERITICS instruments and other products were chosen after extensive testing and experience for their reliability and durability. However, these materials cannot be totally guaranteed against wear and/or decomposition by chemical action (corrosion) as a result of normal use.

Repair parts are warranted to be free from defects in material and workmanship for 90 days from the date of shipment.

No instrument or product shall be returned to MICROMERITICS prior to notification of alleged defect and authorization to return the instrument or product. All repairs or replacements are made subject to factory inspection of returned parts.

MICROMERITICS shall be released from all obligations under its warranty in the event repairs or modifications are made by persons other than its own authorized service personnel unless such work is authorized in writing by MICROMERITICS.

The obligations of this warranty will be limited under the following conditions:

1. Certain products sold by MICROMERITICS are the products of reputable manufacturers, sold under their respective brand names or trade names. We, therefore, make no express or implied warranty as to such products. We shall use our best efforts to obtain from the manufacturer, in accordance with his customary practice, the repair or replacement of such of his products that may prove defective in workmanship or materials. Service charges made by such manufacturer are the responsibility of the ultimate purchaser. This states our entire liability in respect to such products, except as an authorized person of MICROMERITICS may otherwise agree to in writing.
2. If an instrument or product is found defective during the warranty period, replacement parts may, at the discretion of MICROMERITICS, be sent to be installed by the purchaser, e.g., printed circuit boards, check valves, seals, etc.
3. Expendable items, e.g., sample tubes, detector source lamps, indicator lamps, fuses, valve plugs (rotor) and stems, seals and O-rings, ferrules, etc., are excluded from this warranty except for manufacturing defects. Such items which perform satisfactorily during the first 45 days after the date of shipment are assumed to be free of manufacturing defects.

Purchaser agrees to hold MICROMERITICS harmless from any patent infringement action brought against MICROMERITICS if, at the request of the purchaser, MICROMERITICS modifies a standard product or manufactures a special product to the purchaser's specifications.

MICROMERITICS shall not be liable for consequential or other type damages resulting from the use of any of its products other than the liability stated above. This warranty is in lieu of all other warranties, express or implied, including but not limited to, the implied warranties of merchantability or fitness for use.

CORPORATE PROFILE

Micromeritics Instrument Corporation is a leading global provider of solutions for material characterization with best-in-class instrumentation and application expertise in five core areas: density; surface area and porosity; particle size and shape; powder characterization; and catalyst characterization and process development. Founded in 1962, the company is headquartered in Norcross, Georgia, USA and has more than 300 employees worldwide. With a fully integrated operation that extends from a world class scientific knowledge base through to in-house manufacture, Micromeritics delivers an extensive range of high-performance products for academic research and industrial problem-solving. The implementation of tactical partnerships to incubate and deliver valuable new technologies exemplifies the company's holistic, customer-centric approach which extends to a cost-efficient contract testing laboratory – the Particle Testing Authority (PTA). The strategic acquisitions of Freeman Technology Ltd and Process Integral Development S.L. (PID Eng & Tech) reflect an ongoing commitment to optimized, integrated solutions in the industrially vital areas of powders and catalysis.

Freeman Technology (Tewkesbury, UK) brings market-leading powder characterization technology to Micromeritics' existing portfolio of particle characterization techniques. The result is a suite of products that directly supports efforts to understand and engineer particle properties to meet powder performance targets. With over 15 years of experience in powder testing, Freeman Technology specializes in systems for measuring the flow properties of powders. In combination with detailed application know-how these systems deliver unrivalled insight into powder behavior supporting development, formulation, scale-up, processing and manufacture across a wide range of industrial sectors.

PID Eng & Tech (Madrid, Spain) complements Micromeritics' renowned offering for catalyst characterization with technology for the measurement and optimization of catalytic activity, with a product range that extends to both standard and bespoke pilot scale equipment. Launched in 2003, PID Eng & Tech is a leading provider of automated, modular microreactor systems for the detailed investigation of reaction kinetics and yield. These products are supported by a highly skilled multidisciplinary team of engineers with in-depth expertise in the design, construction and operation of laboratory units and process scale-up.

The Particle Testing Authority (PTA) provides material characterization services for fine powders and solid materials using Micromeritics' instrumentation alongside complementary solutions from other vendors. With the certification and expertise to operate across a wide range of industries the PTA offering runs from single sample analysis to complex method development, method validation, new product assessment, and the analytical support required for large scale manufacturing projects. An experienced, highly trained team of scientists, engineers, and lab technicians works closely with every client to ensure that all analytical requirements are rapidly and responsively addressed.

Micromeritics has a strong global network with offices across the Americas, Asia, and Europe complemented by a dedicated team of distributors in additional locations. This ensures that local, knowledgeable support is available for every customer, in academia or industry. Micromeritics works across a truly diverse range of industries from oil processing, petrochemicals and catalysts, to food and pharmaceuticals, and at the forefront of characterization technology for next generation materials such as graphene, metal-organic-frameworks, nanocatalysts, and zeolites. Engineering solutions that work optimally for every user is a defining characteristic of the company.

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ABOUT THIS MANUAL

Log in to your [customer portal](#) to access the following:

- Calculations
- Error Messages
- MIC SAS II 5800 Operator Manual in PDF format

Parts and accessories can be found online at www.Micromeritics.com.

The following icons may be found in this manual:



NOTE — Notes contain important information applicable to the topic.



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.

EU DECLARATION OF CONFORMITY

To view the full EU Declaration of Conformity document, visit the Micromeritics web page at <https://www.micromeritics.com/About-Us/CE-Declarations-of-Conformity.aspx>.

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Norcross, GA / USA / 30093-2901

Table of Contents

Warranty	<i>i</i>
Corporate Profile	<i>ii</i>
Contact Us	<i>iii</i>
About this Manual	<i>iv</i>
1 About the MIC SAS II	1 - 1
Safety Precautions	1 - 4
Menu Selections	1 - 5
Instrument Status	1 - 5
Remote Browsers	1 - 6
Specifications for the MIC SAS II 5800	1 - 6
2 MIC SAS Menu Selection	2 - 1
Load a Sample	2 - 3
Remove the Brass Sample Plug	2 - 4
3 Records Menu Selection	3 - 1
Reports	3 - 5
Calibration Report	3 - 5
Fisher Number Map Report	3 - 6
Log Report	3 - 8
Control Charts	3 - 9
Print or Export Records	3 - 11
4 SOP Menu Selection	4 - 1
5 Instrument Menu Selection	5 - 1
Home Position	5 - 3
6 Maintenance Menu Selection	6 - 1

Remote Computer Configuration	6 - 5
Printer Installation	6 - 6
Clean the Instrument	6 - 10
Refresh the Browser	6 - 10
Upload Logo	6 - 11
 7 Troubleshooting and Maintenance	 7 - 1
Gas Connections	7 - 3
Guidelines for Connecting Gases	7 - 3
Replace a Gas Cylinder	7 - 4
Connect a Regulator and a Gas Line to a Gas Cylinder	7 - 6
Power Instrument On and Off	7 - 8
Routine Maintenance	7 - 9
 8 Help	 8 - 1
 Index	 Index - 1

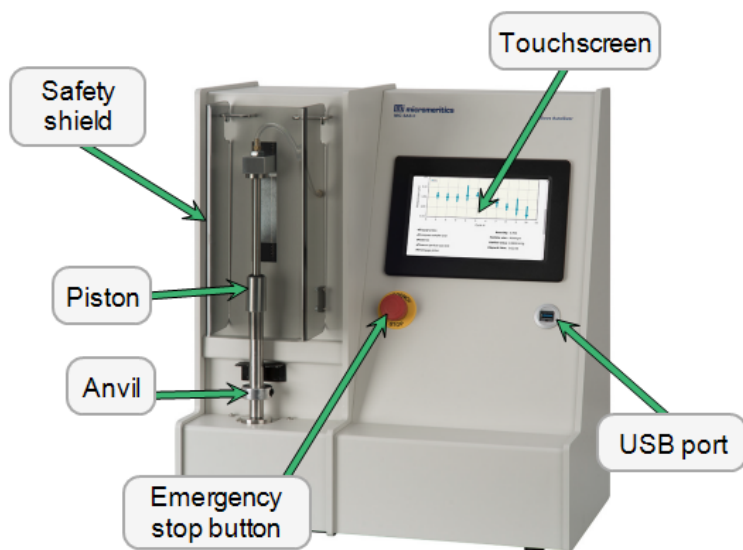
1 ABOUT THE MIC SAS II

The system includes an anvil and piston inside a steel, open-ended sample tube. The piston and anvil have O-ring seals against the inside of the tube. A brass plug covered with filter paper is placed on the anvil, the sample tube is positioned over it, a powdered sample is loaded into the tube, and a second brass plug with filter paper is placed on top of the sample. The piston is driven down by a stepper motor to compress the sample. Constant head pressure is maintained throughout the analysis by controlling the flow rate with a mass flow controller (MFC). After passing through the sample, the gas passes through a flow restrictor to maintain some back pressure. Particle size is calculated from the differential pressure across the sample according to the Kozeny-Carman equation. Ambient temperature is used to calculate air viscosity, which is used in the particle size calculation.

The emergency stop button powers off the stepper motor in case of an emergency.

A safety shield is placed around the piston and anvil area during operation.

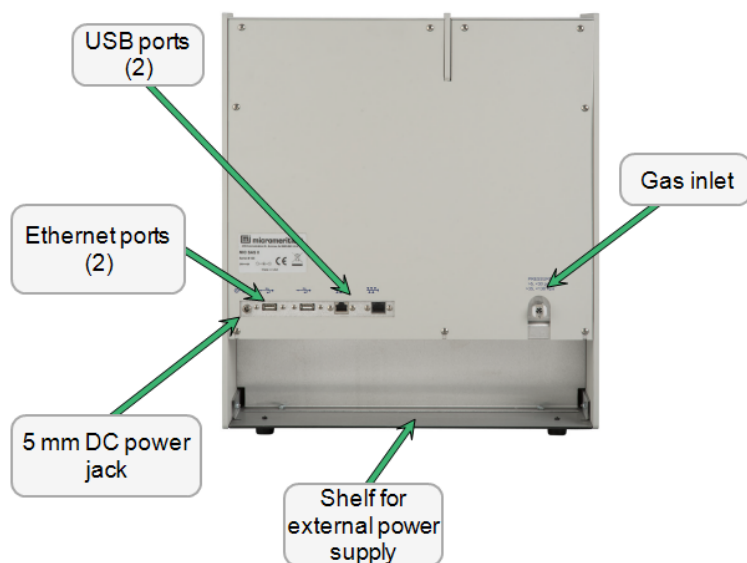
FRONT PANEL



Front Panel Components

Component	Description
Anvil	Supports and seals the bottom of the sample tube.
Emergency stop button	Powers off the stepper motor but leaves the computer and application running. The touchscreen will remain on. Use of this button requires a reset to restore power. To reset the instrument, gently pull the emergency stop button until a click is heard.
Piston	Seals the top of the sample tube.
Safety shield	Covers the exposed moving parts of the piston and anvil.
Touchscreen	Touchscreen to run analyses and review/edit records.
USB port	The USB ports on the front and back of the instrument can be used interchangeably, however, to prevent wires from interfering with the operation of the instrument, use the USB port on the back for devices with cords. The USB ports can be used to connect a printer or keyboard, export and import data, and update software.

BACK PANEL



Back Panel Components

Component	Description
Ethernet ports (2)	<ul style="list-style-type: none"> • Left port. Used to connect the instrument to a network or directly to a computer. • Right port. Used to connect to other devices on the same network or to share an internet connection between devices.
Gas inlet	For attaching the analysis gas.
5 mm DC power jack	For an external power supply.
Shelf for external power supply	For external power supply storage.
USB ports (2)	The USB ports on the front and back of the instrument can be used interchangeably, however, to prevent wires from interfering with the operation of the instrument, use the USB port on the back for devices with cords. The USB ports can be used to connect a printer or keyboard, export and import data, and update software.

SAFETY PRECAUTIONS

SAMPLES

The instrument was designed for nonhazardous samples only. DO NOT attempt to use the instrument to analyze any sample material whose safety has not been verified. During normal operation, fine particles may become airborne or skin contact may occur with the sample.

POWER SUPPLY



Use of a power cord or power supply not provided with the instrument could cause personal injury or damage to the equipment. Do not use a power cord or power supply other than what was supplied with the instrument. If a replacement is needed, contact your Micromeritics Service Representative.

MENU SELECTIONS

Menu Selections

Menu Selection	Description
MIC SAS	Use to run an analysis. See MIC SAS Menu Selection on page 2 - 1 .
Records	Displays a list of reports from completed analyses. See Records Menu Selection on page 3 - 1 .
SOP	Displays a list of saved standard operating procedures used to define analyses. See SOP Menu Selection on page 4 - 1 .
Instrument	Use for manual operation and monitoring the state of the instrument. See Instrument Menu Selection on page 5 - 1 .
Maintenance	Use to perform maintenance functions on the instrument. See Maintenance Menu Selection on page 6 - 1 .
Help	Use to display instrument help. Click the Online Help button, scan the QR code, or go to the specified web page.

INSTRUMENT STATUS

The instrument status is displayed on the touchscreen title bar.

Instrument Status

File Status	Description
Analyzing	An analysis is in progress.
Paused	Displays when the Pause button has been tapped during an analysis.
Power Off	Displays when the emergency stop button has been used.
Ready	No analysis is running.
Readying	Displays at the end of an analysis when the piston is moving towards the disengage position.

REMOTE BROWSERS



See:

[Remote Computer Configuration on page 6 - 5](#)

Remote browser sessions can be used to perform the same functions as the touchscreen on the instrument.

SPECIFICATIONS FOR THE MIC SAS II 5800

Specification	Description
Measurement range	0.5 - 75 μm
Porosity range	0.2 - 0.9%
Compression accuracy	< 0.05 mm
Environment temperature	15 to 35 °C operating 0 to 50 °C non-operating
Repeatability	$\pm 3\%$
Precision	$\pm 3\%$
Power	30 W
Power supply	External power supply: 100 - 240 VAC $\pm 10\%$. Power supplied to the instrument: 12 VDC @5A
Physical	
Height	50 cm (19.5 in.)
Width	44 cm (17 in.)
Depth	27 cm (10.5 in.)
Weight	16 kg (34 lbs.)
<i>In keeping with a policy of ongoing product improvement, specifications are subject to change without notice.</i>	

2 MIC SAS MENU SELECTION

MIC SAS > [SOP Selection]



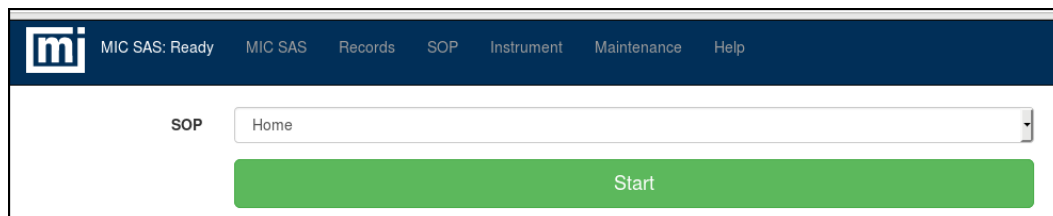
See also:

- [Home Position on page 5 - 3](#)
- [Load a Sample on page 2 - 3](#)
- [Remove the Brass Sample Plug on page 2 - 4](#)
- [SOP Menu Selection on page 4 - 1](#)

Use to start and monitor analyses. The MIC SAS II performs two types of analyses:

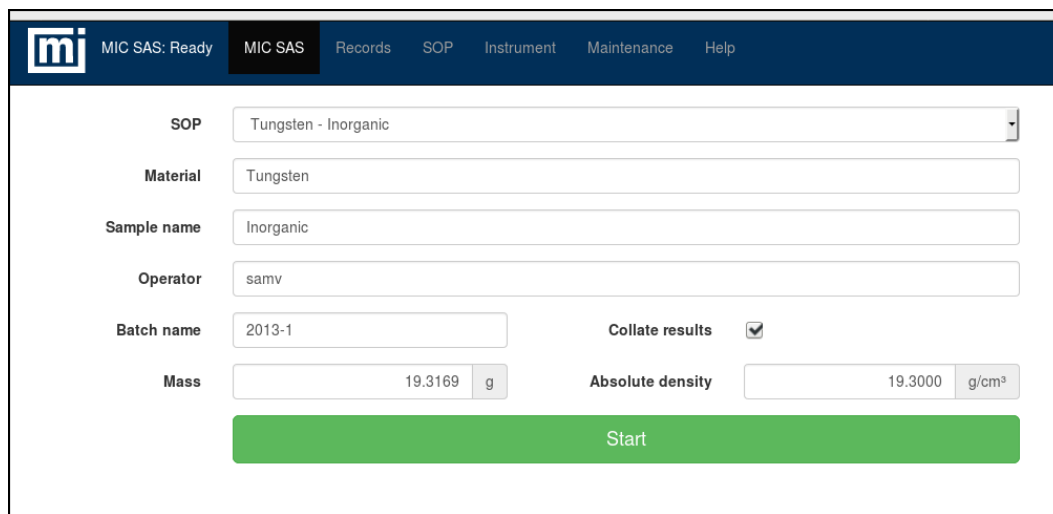
- Organic — mainly pharmaceuticals
- Inorganic — mainly for heavy metal powders such as tungsten

When **START** is tapped, the button changes to **CANCEL**. When **CANCEL** is tapped, the button changes to **START**.



The screenshot shows the MIC SAS menu interface. At the top, there is a navigation bar with the 'mi' logo and menu items: MIC SAS: Ready, MIC SAS, Records, SOP, Instrument, Maintenance, and Help. Below this, the 'SOP' dropdown menu is open, showing 'Home' as the selected option. A large green button labeled 'Start' is positioned below the dropdown.

Select an SOP from the drop-down box to display the SOP details.





The screenshot shows the MIC SAS menu interface with the 'SOP' dropdown set to 'Tungsten - Inorganic'. The 'MIC SAS' menu item is highlighted in the top navigation bar. Below the dropdown, there are several input fields: 'Material' (Tungsten), 'Sample name' (Inorganic), 'Operator' (samv), 'Batch name' (2013-1), 'Collate results' (checked), 'Mass' (19.3169 g), and 'Absolute density' (19.3000 g/cm³). A large green button labeled 'Start' is positioned at the bottom.



Some items listed in the MIC SAS table display only during an analysis.

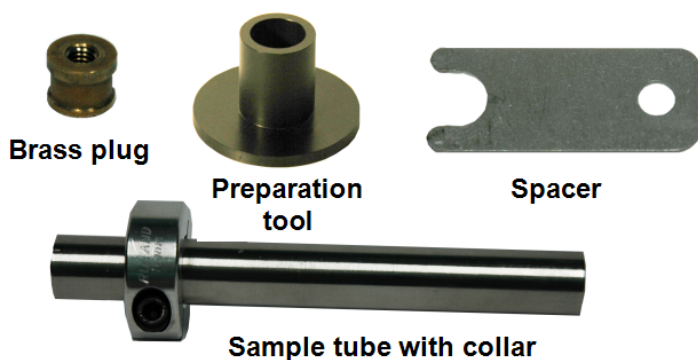
MIC SAS

Field or Button	Description
Absolute density [text box]	The sample density excluding the volume of pores and cavities.
Analysis steps	<div>  Indicates a completed step.  Indicates the step in progress. </div> <div> Inorganic: <ul style="list-style-type: none"> Engage piston Compress sample Stabilize Measure particle size Disengage piston </div> <div> Organic: <ul style="list-style-type: none"> Establish flow Measure particle size Disengage piston </div>
Batch name [text box]	Name of the analysis batch.
Cancel [button]	Cancels the analysis and disengages the piston.
Collate results [check box]	Produces a table in the <i>Summary</i> report. All analyses with the same batch name and the <i>Collate</i> option enabled appear in the <i>Summary</i> report.
Mass [text box]	The sample mass.
Material [text box]	Type of sample material used for analysis.
Operator [text box]	Person running the analysis.
Pause [button]	Pauses the analysis in progress.
Resume [button]	Displays when an analysis is paused. Tap to restart the analysis.
Sample name [text box]	Description of the sample used for analysis.

MIC SAS (continued)

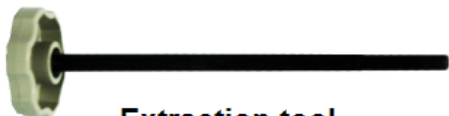
Field or Button	Description
SOP [drop-down box]	Select the SOP to be used to run the analysis. After an SOP is created and saved, it will appear in the SOP drop-down box. See SOP Menu Selection on page 4 - 1 for details.
Start [button]	Starts the analysis. This button is disabled if the safety shield is not in place (a <i>Safety shield is required</i> warning is displayed) or if the emergency stop button is activated (a <i>Motor Off</i> message is displayed).

LOAD A SAMPLE



1. Place the sample preparation tool on a flat surface.
2. Insert a brass sample plug into the sample preparation tool.
3. Place a paper filter on top of the brass sample plug.
4. Insert the sample tube on top of the paper filter and press down until the sample tube is firmly seated around the brass plug.
5. Insert the sample into the sample tube and weigh the sample tube assembly with the sample. Make a note of the mass.
6. Place a paper filter on the open end of the sample tube.
7. Insert a brass plug on top of the paper filter.
8. Firmly press the paper filter and brass plug into the sample tube.
9. For Inorganic analysis only, place the open end of the sample tool spacer onto the anvil. The spacer tool is used for the first compression only.
10. Place the lower end of the sample tube onto the anvil.
11. Install the sample tube collar and adjust the collar when the sample tube is in place.
12. Install the safety shield over the anvil, sample tube, and piston assembly.

REMOVE THE BRASS SAMPLE PLUG



Extraction tool

1. Remove the sample tube from the instrument.
2. Insert the extraction tool into one sample brass plug and screw the extraction tool into the brass plug.
3. Remove the brass plug from the bottom of sample tube.
4. Pour out the sample, or, if necessary, push the sample out by pushing the remaining plug with the extraction tool.

3 RECORDS MENU SELECTION

Displays a list of all records from completed analyses.




- Multiple checkboxes can be selected.
- Columns are sortable by tapping the column header.
- The report is displayed by tapping the record.
- Tapping a link in a table row displays the report. See [View a Record on page 3 - 4](#).

Additional reports are available via links at the bottom of the window.






- [Fisher Number Map Report on page 3 - 6](#)
- [Calibration Report on page 3 - 5](#)
- [Log Report on page 3 - 8](#)

MIC SAS: Ready MIC SAS Records SOP Instrument Maintenance Help						
MIC SAS: Ready MIC SAS Records SOP Instrument Maintenance Help						
	Material	Sample Name	Batch Name	Particle Size (µm)	Surface Area (cm²/g)	Last Modified
<input type="checkbox"/>	Lactose	Lactose Run #2	Lactose	14.562	2679	May 14, 2019, 8:59 a.m.
<input type="checkbox"/>	Lactose	Lactose Run #1	Lactose	13.690	2850	May 13, 2019, 3:30 p.m.
<input type="checkbox"/>	New SOP	Tungsten Reference...	2013-1	1.007	3088	May 2, 2019, 8:09 p.m.
<input type="checkbox"/>	New SOP	Tungsten Reference...	2013-1	1.002	3103	May 1, 2019, 2:46 a.m.
Default Fisher Number Map						May 16, 2019, 5 p.m.
Calibration Report						
Log Report						

Records

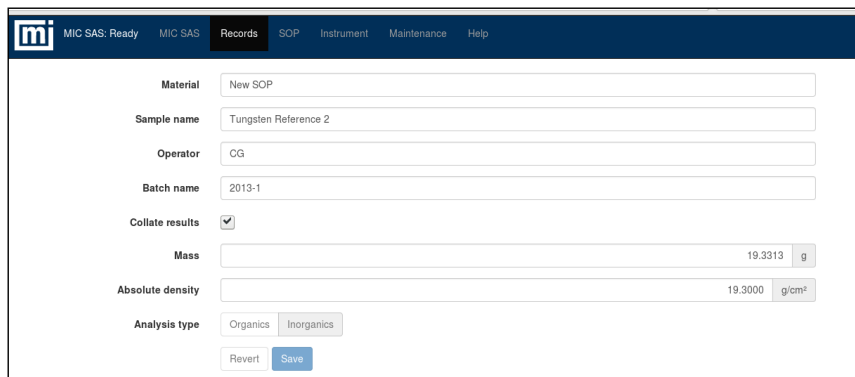
Field or Button	Description
Batch Name	Name of the analysis batch.
Control icons	<div>  Use to select or deselect record. </div> <div>  Opens a record for editing. Tap Save to save changes. See Edit a Record on page 3 - 3. </div> <div>  Tap to run an analysis with this record's conditions. Tapping it switches to the MIC SAS view and uses the record's conditions as the SOP. </div>

Records (continued)

Field or Button	Description
Last Modified	The date and time the record was last modified.
Material	Type of sample material used for analysis.
Particle Size (μm)	Particle size of the analysis sample.
Sample Name	Description of the sample used for analysis.
Surface Area (cm^3/g)	Surface area of the analysis sample.
Toolbar	 Deletes the selected records.
	 Prints the selected record.
	 Downloads the selected record(s) as a ZIP file (file format is <i>MICSAS.YYYY-MM-DD.zip</i> where <i>YYYY-MM-DD</i> is the download date) to a USB device. If using a remote browser, a directory selector is opened for exporting the selected record(s) in a ZIP file.
	 Select and upload a single record as an XML file or multiple records in a ZIP file. After uploading, a popup window displays the number of records added and/or rejected.
	 Displays the <i>Size Control Chart</i> report or the <i>Surface Area Control Chart</i> for the selected records. There may be multiple selections.

EDIT A RECORD

Tap the edit icon to the left of the record. Sample mass, absolute density, and text fields can be edited. Analysis parameters are shown but cannot be changed.

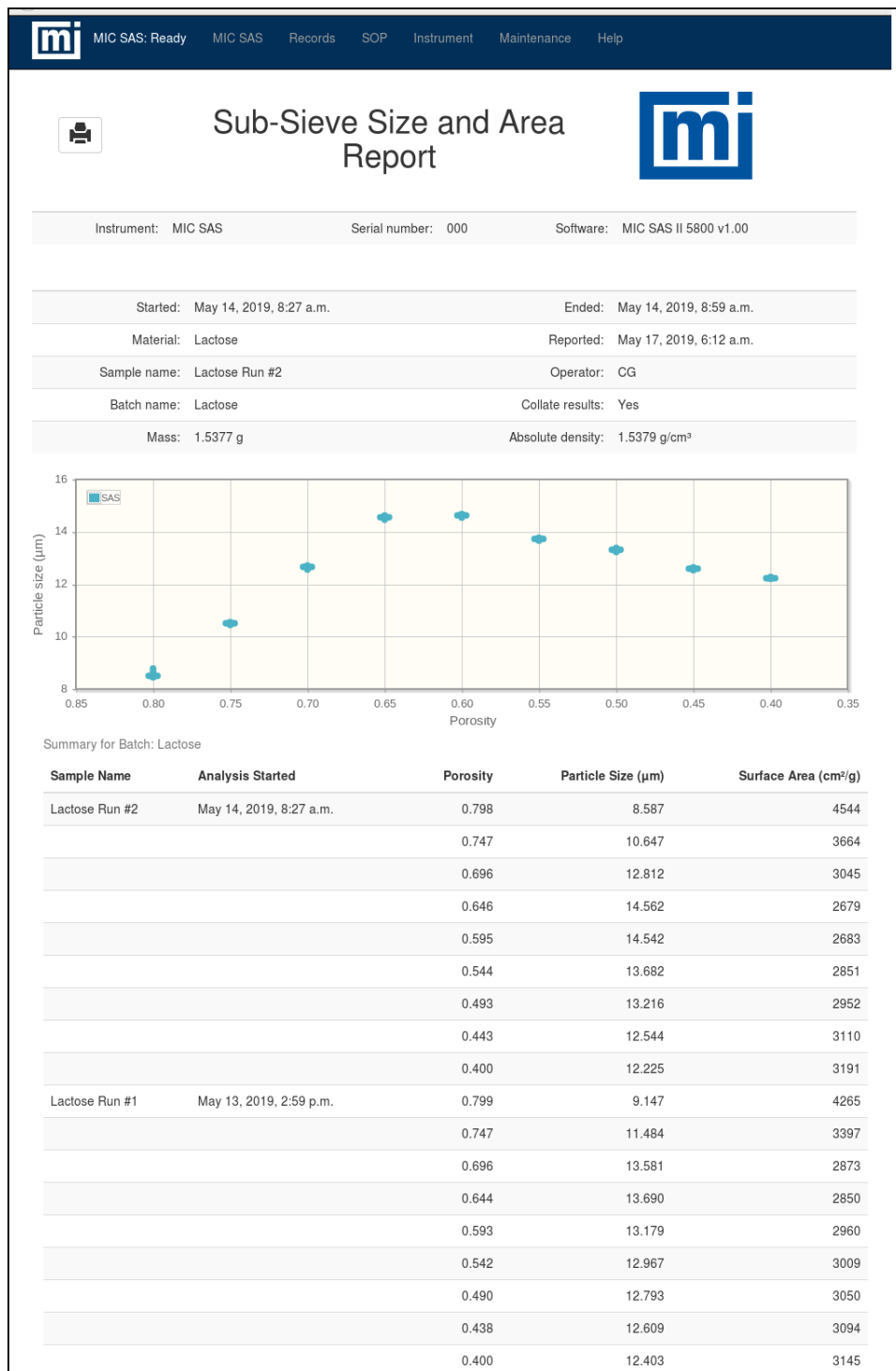


Records

Field or Button	Description
Absolute density [text box]	The sample density excluding the volume of pores and cavities.
Batch name [text box]	Name of the analysis batch.
Collate results [check box]	Produces a table in the <i>Summary</i> report. All analyses with the same batch name and the <i>Collate</i> option enabled appear in the <i>Summary</i> report.
Mass [text box]	The sample mass.
Material [text box]	Type of sample material used for analysis.
Operator [text box]	Person running the analysis.
Revert [button]	Returns fields to the currently saved values.
Sample name [text box]	Description of the sample used for analysis.
Save [button]	Saves screen changes.

VIEW A RECORD

Tap a blue link on the *Records* list to view a record.



REPORTS




CALIBRATION REPORT

To run the *Calibration Report*, scroll to the bottom of the *Records* window and tap *Calibration Report*.

The *Calibration Report* lists:

- Temperature offset
- Pin slope
- Pin offset
- Pdiff slope
- Motor current percent
- Disengage position
- Engage position


The date and time are shown for each entry.


<div>  MIC SAS: Ready MIC SAS Records SOP Instrument Maintenance Help </div>			
<div>  <div>Calibration Report</div>  </div>			
Temperature offset	0.00 °C		May 16, 2019, 8:59 p.m.
Pin slope	0.002610 cm H ₂ O/count		May 16, 2019, 8:59 p.m.
Pin offset	2900 counts		May 16, 2019, 8:59 p.m.
Pdiff slope	0.002610 cm H ₂ O/count		May 16, 2019, 8:59 p.m.
Pdiff offset	2900 counts		May 16, 2019, 8:59 p.m.
Motor current %	40 %		May 16, 2019, 8:59 p.m.
Disengage position	25250 steps		May 16, 2019, 8:59 p.m.
Engage position	18625 steps		May 16, 2019, 8:59 p.m.

FISHER NUMBER MAP REPORT


To run the *Fisher Number Map Report*, scroll to the bottom of the *Records* window and tap *Fisher Number Map*.

A Fisher number map is a polynomial that relates SAS particle size to Fisher number for a particular material. The Fisher particle size shown in reports is the Fisher number displayed with units of μm .


MIC SAS: Ready MIC SAS Records SOP Instrument Maintenance Help



Fisher Number Map



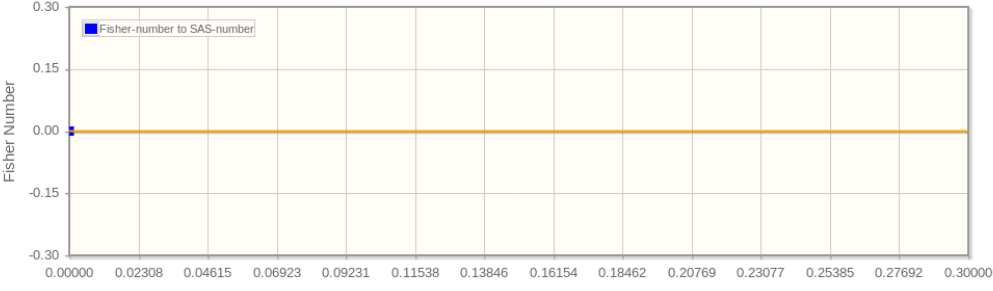
Instrument: MIC SAS Serial number: 000 Software: MIC SAS II 5800 v1.00

Reported: May 17, 2019, 6:27 a.m.

Material

Coefficients

0	1	2	3	4	R ²
0.0000	0.0000				0.0000



☒ Include origin Degree: 1st 2nd 3rd 4th

Include	SAS Particle Size (μm)	Fisher Number
	0.000	0.000
<input type="checkbox"/>	0.000	0.000
<input type="checkbox"/>	0.000	0.000
<input type="checkbox"/>	0.000	0.000
<input type="checkbox"/>	0.000	0.000

Cancel Save

Fisher Number Map




Field or Button	Description
Cancel [button]	Discards any changes.
Coefficients	The coefficients used in the equation.
Degree [button]	The coefficients give the n^{th} order term from a polynomial fit. Coefficients higher than the degree of the polynomial are not displayed. Zero is shown for coefficients that are not determined because of an insufficient number of included points. R^2 is the usual R-squared statistic.
Fisher Number [column]	The Fisher number from an analysis run on an instrument that uses Fisher number.
Include [check box]	<p>Select to include in the fit. Errors are indicated for SAS particle sizes in enabled rows that are not greater than zero and strictly increasing. The graph is not updated, and Save is disabled when any fields have errors.</p> <p>Selecting a row or focusing the Fisher number field highlights the corresponding point in the graph. Changing the selections or the Fisher number for a selected point updates the coefficients, R^2, and the graph.</p>
Include origin [check box]	If selected, a point at 0, 0 is included in the line fit.
Material [drop-down box]	Comes from the SOPs, records, and other maps. This map will be used to determine the Fisher number for all records with the selected material.
SAS Particle Size (μm) [column]	Enter the particle size from the analysis run on the MIC SAS II.
Save [button]	Saves changes.
x-axis y-axis	The x-axis is <i>SAS Particle Size (μm)</i> and the y-axis is <i>Fisher Number</i> . The lower axis limits are zero; the upper limits are autoscaled. The fit is shown as a smooth curve without points in orange. A legend identifies the two data sets.

LOG REPORT


To run the *Log Report*, scroll to the bottom of the *Records* window and tap *Log Report*.

The *Log Report* lists :

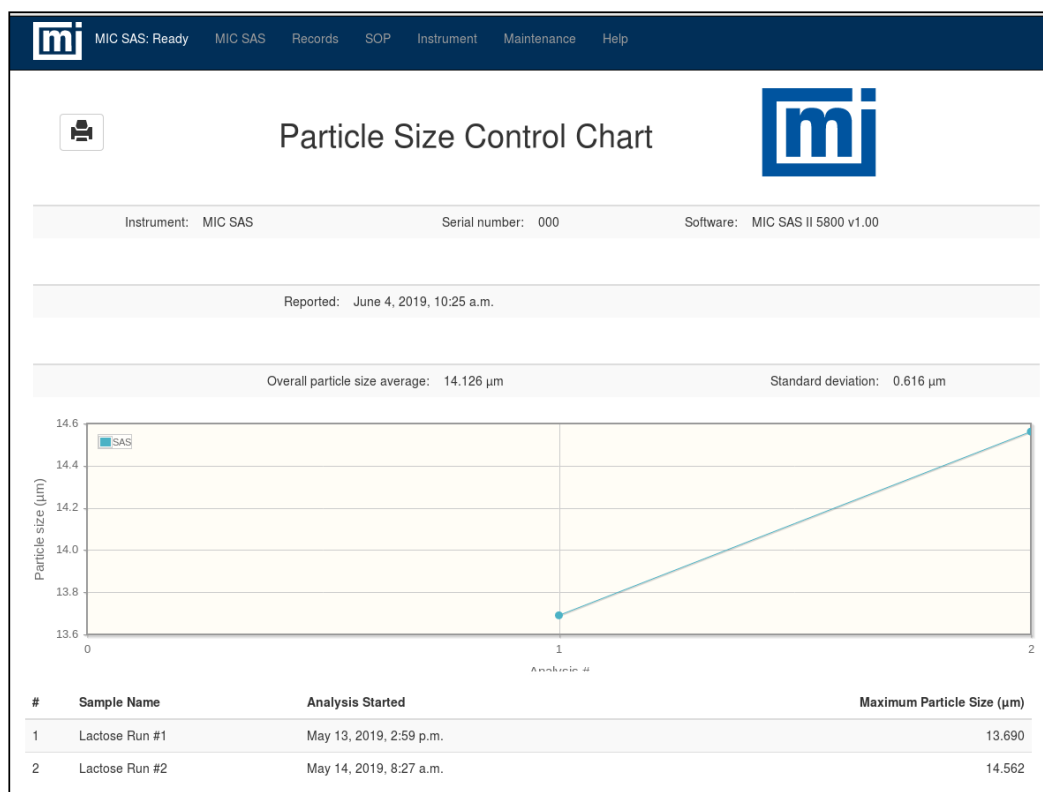
- Start and end of analysis and home operation. Home end entry shows the new home position.
- Analysis started with mass not within $\pm 5\%$ of density
- Pause, resume, and cancel
- Shield placement and removal during analysis
- Emergency stop and reset
- Temperature calibration
- Pressure gauge tare
- Pressure calibration
- Motor current set (including number of cycles)

 MIC SAS: Ready MIC SAS Records SOP Instrument Maintenance Help			
<div>  <div>Instrument Log Report</div>  </div>			
Date	Type	Description	
March 14, 2019, 7:53 a.m.	Maintenance	Deleted all fisher map	
March 14, 2019, 7:53 a.m.	Maintenance	Deleted 2 records	
March 14, 2019, 7:53 a.m.	Maintenance	Deleted 1 SOPs	
March 14, 2019, 7:25 a.m.	Inorganics	Inorganics analysis ended.	
March 14, 2019, 7:24 a.m.	Inorganics	Inorganics analysis started.	
March 14, 2019, 6:46 a.m.	Inorganics	Inorganics analysis ended.	
March 14, 2019, 6:45 a.m.	Inorganics	Inorganics analysis started.	
March 14, 2019, 6:36 a.m.	Inorganics	Inorganics analysis ended.	
March 14, 2019, 6:35 a.m.	Inorganics	Inorganics analysis started.	
March 12, 2019, 10:29 a.m.	Instrument	Taring pressure gauges	
March 8, 2019, 4:18 p.m.	Inorganics	Inorganics analysis ended.	

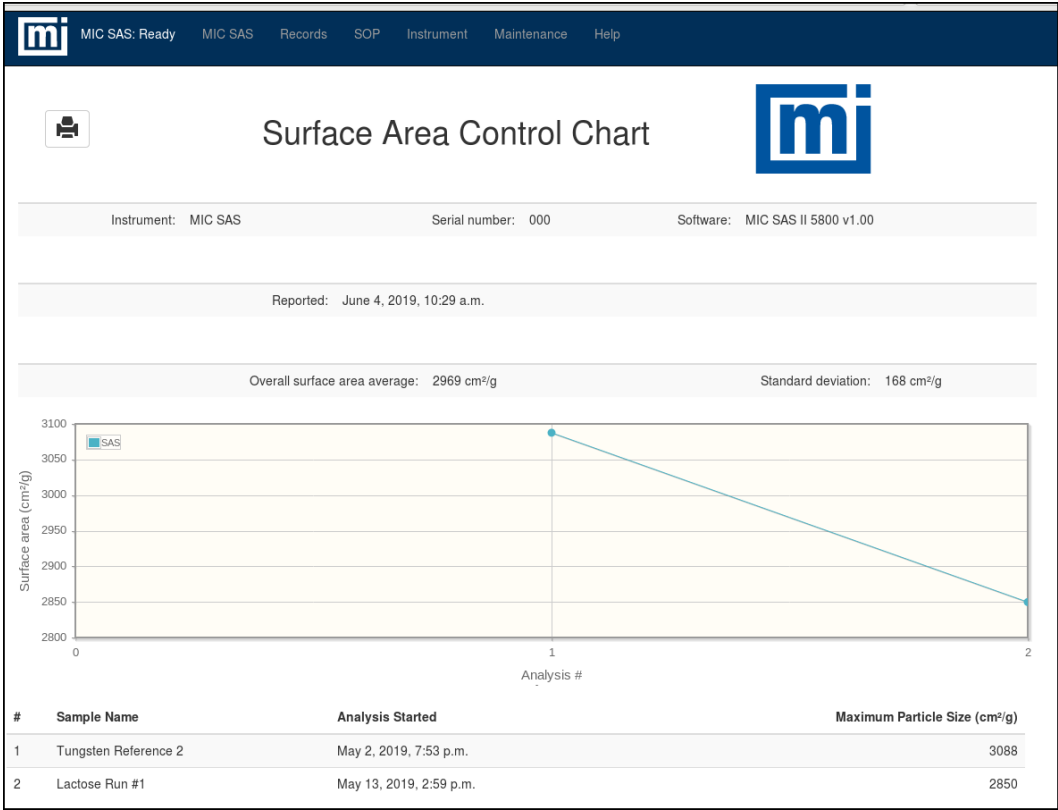
CONTROL CHARTS

1. On the *Records* menu, select one or more records, then tap the Report icon ().
2. Select either *Size Control Chart* or *Surface Area Control Chart*.

Size Control Chart



Surface Area Control Chart



PRINT OR EXPORT RECORDS

PRINT RECORDS



The printer must be attached to the instrument. See [Printer Installation on page 6 - 6](#)

USE A PRINTER ATTACHED TO THE INSTRUMENT:

- Tap the *Records* menu item.
- Select one or more records to print.
- Tap the printer icon. A single record will be generated for all selected records. Tap the printer icon at the top of the page to send the report to an attached printer.

USE A REMOTE COMPUTER:

- Click the *Records* menu item.
- Select one or more records to print.
- Click the printer icon. A single import will be generated for all selected records. Click the printer icon at the top of the page to send the report to an attached printer.

EXPORT RECORDS



If performed locally, plug a USB stick into a USB port.

1. Insert the USB stick into a USB port of the instrument.
2. Tap the *Records* menu item.
3. Select one or more records to export.
4. Tap the download icon. A success message displays upon successful download:

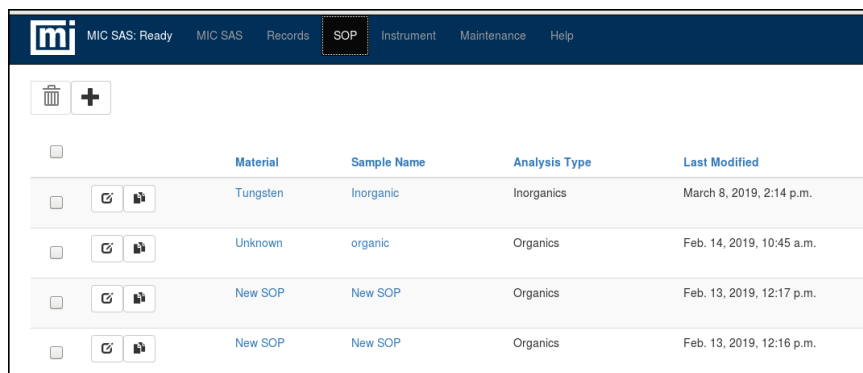
Successfully saved to <USB-location>.zip. Please remove USB.

Blank Page

4 SOP MENU SELECTION

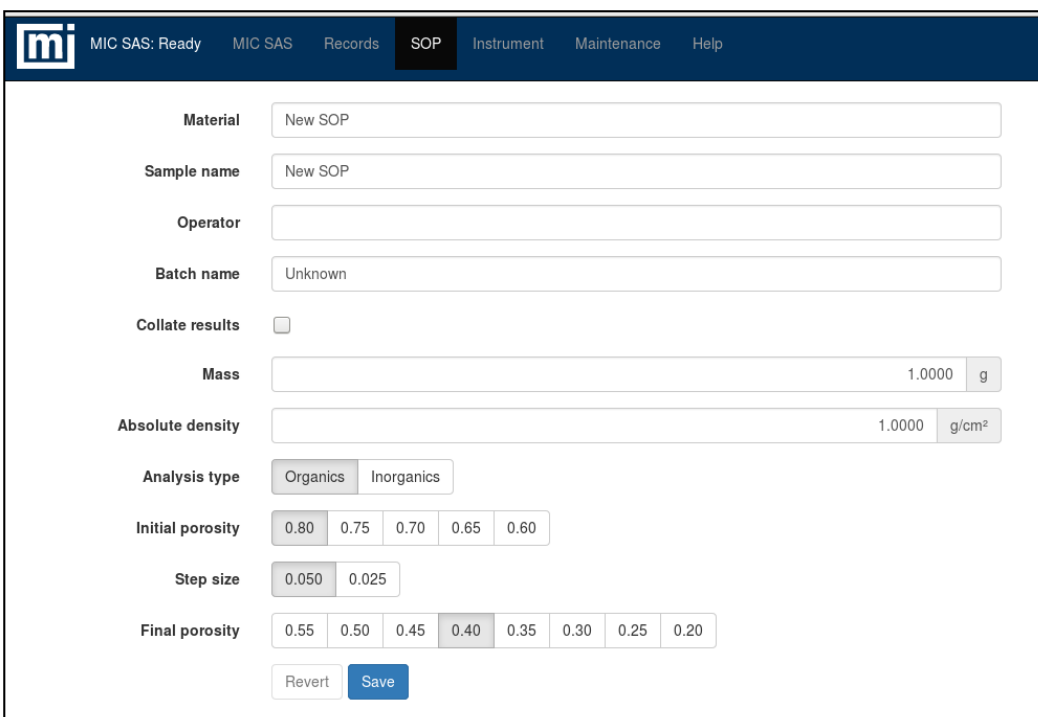
Use to define analysis conditions.

- Multiple checkboxes can be selected.
- Columns are sortable by tapping the column header.
- Tapping a link in a table row displays the SOP.



	Material	Sample Name	Analysis Type	Last Modified
<input type="checkbox"/>	Tungsten	Inorganic	Inorganics	March 8, 2019, 2:14 p.m.
<input type="checkbox"/>	Unknown	organic	Organics	Feb. 14, 2019, 10:45 a.m.
<input type="checkbox"/>	New SOP	New SOP	Organics	Feb. 13, 2019, 12:17 p.m.
<input type="checkbox"/>	New SOP	New SOP	Organics	Feb. 13, 2019, 12:16 p.m.

Tap a blue link in the SOP list to view or edit SOP details. Tap the plus icon on the toolbar to create a new SOP.



Material: New SOP

Sample name: New SOP

Operator:

Batch name: Unknown

Collate results: ☐

Mass: 1.0000 g

Absolute density: 1.0000 g/cm²

Analysis type: Organics Inorganics

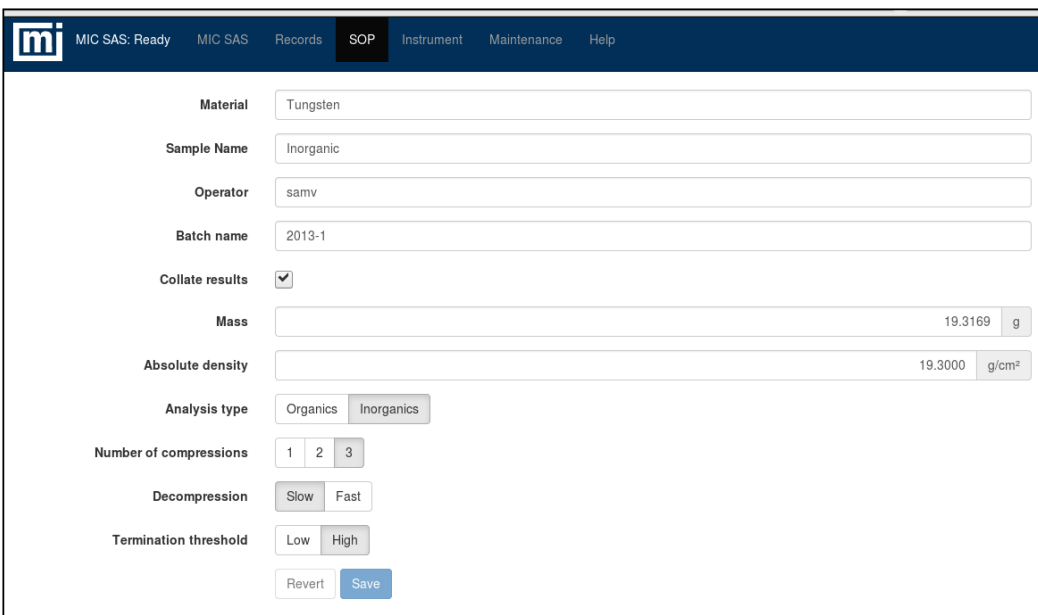
Initial porosity: 0.80 0.75 0.70 0.65 0.60

Step size: 0.050 0.025

Final porosity: 0.55 0.50 0.45 0.40 0.35 0.30 0.25 0.20

Revert Save

Organics SOP



The screenshot shows the MIC SAS II 5800 Operator Manual interface. The top navigation bar includes 'MIC SAS: Ready', 'MIC SAS', 'Records', 'SOP' (selected), 'Instrument', 'Maintenance', and 'Help'. The main form contains the following fields and controls:




- Material:** Text box with 'Tungsten'.
- Sample Name:** Text box with 'Inorganic'.
- Operator:** Text box with 'samv'.
- Batch name:** Text box with '2013-1'.
- Collate results:** Checkmark button (checked).
- Mass:** Text box with '19.3169' and a unit dropdown set to 'g'.
- Absolute density:** Text box with '19.3000' and a unit dropdown set to 'g/cm³'.
- Analysis type:** Two buttons: 'Organics' and 'Inorganics' (selected).
- Number of compressions:** Three buttons: '1', '2', and '3' (selected).
- Decompression:** Two buttons: 'Slow' and 'Fast' (selected).
- Termination threshold:** Two buttons: 'Low' and 'High' (selected).
- Buttons:** 'Revert' and 'Save' at the bottom.

Inorganics SOP



SOP

Field or Button	Description
Absolute density [text box]	The sample density excluding the volume of pores and cavities.
Analysis Type [button]	The type of analysis. <ul style="list-style-type: none"> • Organics — mainly pharmaceuticals • Inorganics — mainly for heavy metal powders such as tungsten
Batch name [text box]	Name of the analysis batch.

SOP (continued)

Field or Button	Description
Collate results [check box]	Produces a table in the <i>Summary</i> report. All analyses with the same batch name and the <i>Collate</i> option enabled appear in the <i>Summary</i> report.
Control icons	 Tap to select or deselect an SOP. When selected, a check appears in the box.
	 Tap to edit the selected SOP.
	 Creates a duplicate of the SOP and opens it for editing.
Decompression [button]	[Inorganics]. Select the decompression speed. <ul style="list-style-type: none"> • Slow. The piston is retracted in 0.005 cm increments. • Fast. The piston is retracted in 0.01 cm increments.
Final Porosity [button]	[Organics]. Select the final porosity for the analysis.
Initial Porosity [button]	[Organics]. Select the initial porosity for the analysis.
Last Modified	The date and time the record was last modified.
Mass [text box]	The sample mass.
Material [text box]	Type of sample material used for analysis.
Number of compressions [button]	[Inorganics]. Select the number of compressions to perform before data collection.
Operator [text box]	Person running the analysis.
Revert [button]	Returns fields to the currently saved values.
Sample name [text box]	Description of the sample used for analysis.
Save [button]	Saves changes.
Step Size	[Organics]. Select the step size.
Termination threshold [button]	[Inorganics]. Analysis terminates after: <ul style="list-style-type: none"> • Low. 3 decreasing particle sizes or 25 cycles • High. 5 decreasing particle sizes or 40 cycles

SOP (continued)

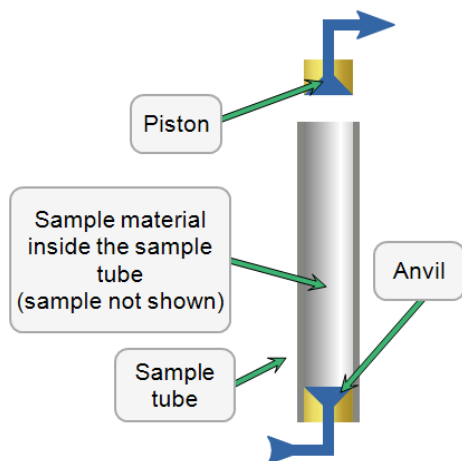
Field or Button	Description
Toolbar	 Deletes the selected SOPs from the list. Tap the box to the left of the record to select it, then tap the Delete icon to delete the selected SOPs.
	 Tap to create a new SOP.

5 INSTRUMENT MENU SELECTION

Use for manual operation and monitoring the state of the instrument.

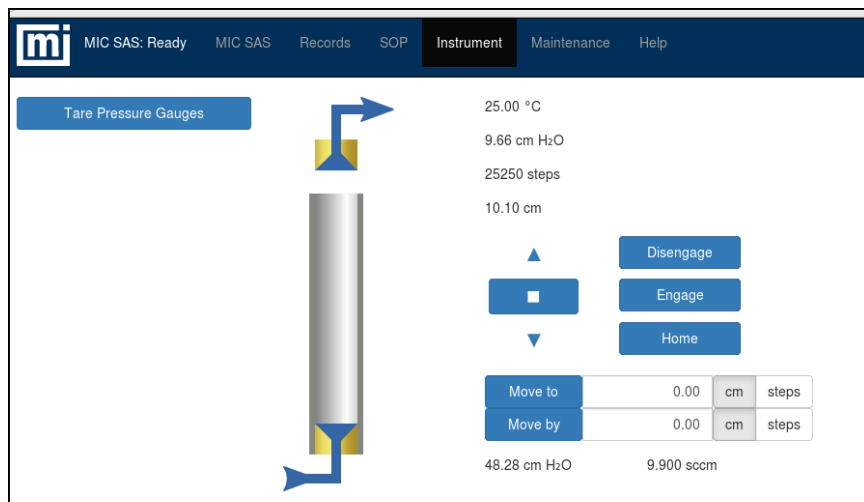


Additional controls are present when *Allow calibration* is selected in the **Maintenance > Advanced** view. Changing calibrations can affect the performance of the instrument. Make changes only under the direction of a Micromeritics Service Representative.

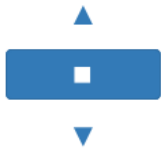


Instrument Schematic

Component	Description
Anvil	Anvil with O-ring inside sample tube. A brass plug with filter paper is placed between the sample material and the anvil.
Piston	Piston with O-ring inside sample tube. A brass plug with filter paper is placed between the sample material and the piston.
Sample tube	Steel, open-ended sample tube.



Piston Controls

Field or Button	Description
Disengage [button]	Tap to raise the piston head above the sample tube.
Engage [button]	Tap to lower the piston head to inside the sample tube.
Home [button]	Tap to lower the piston to the home position. Home position is where there is no gap between the plugs. See Home Position on the facing page .
Move to [button] and [text box] Move by [button] and [text box]	Select units of steps or cm. Enter a position or increment. The piston moves when the Move to or Move by button is tapped.
Power Off	On-screen message that displays when power to the stepper motor has been powered off.
Shield Off	On-screen message that displays when the safety shield is not in place. All buttons are disabled until the safety shield is in place.
Tare Pressure Gauges [button]	Use if either pressure reading is not close to zero when a sample tube is not installed and no gas is flowing. Tap to adjust the pressure offset. This button is disabled if gas is being flowed or the piston is not in the disengage position.
	Up arrow. Tap to move the piston up in increments. Stop button. Tap to stop the piston movement. Down arrow. Tap to move the piston down in increments.

HOME POSITION

Instrument > Home [button]

The Home position is where there is no gap between the plugs.

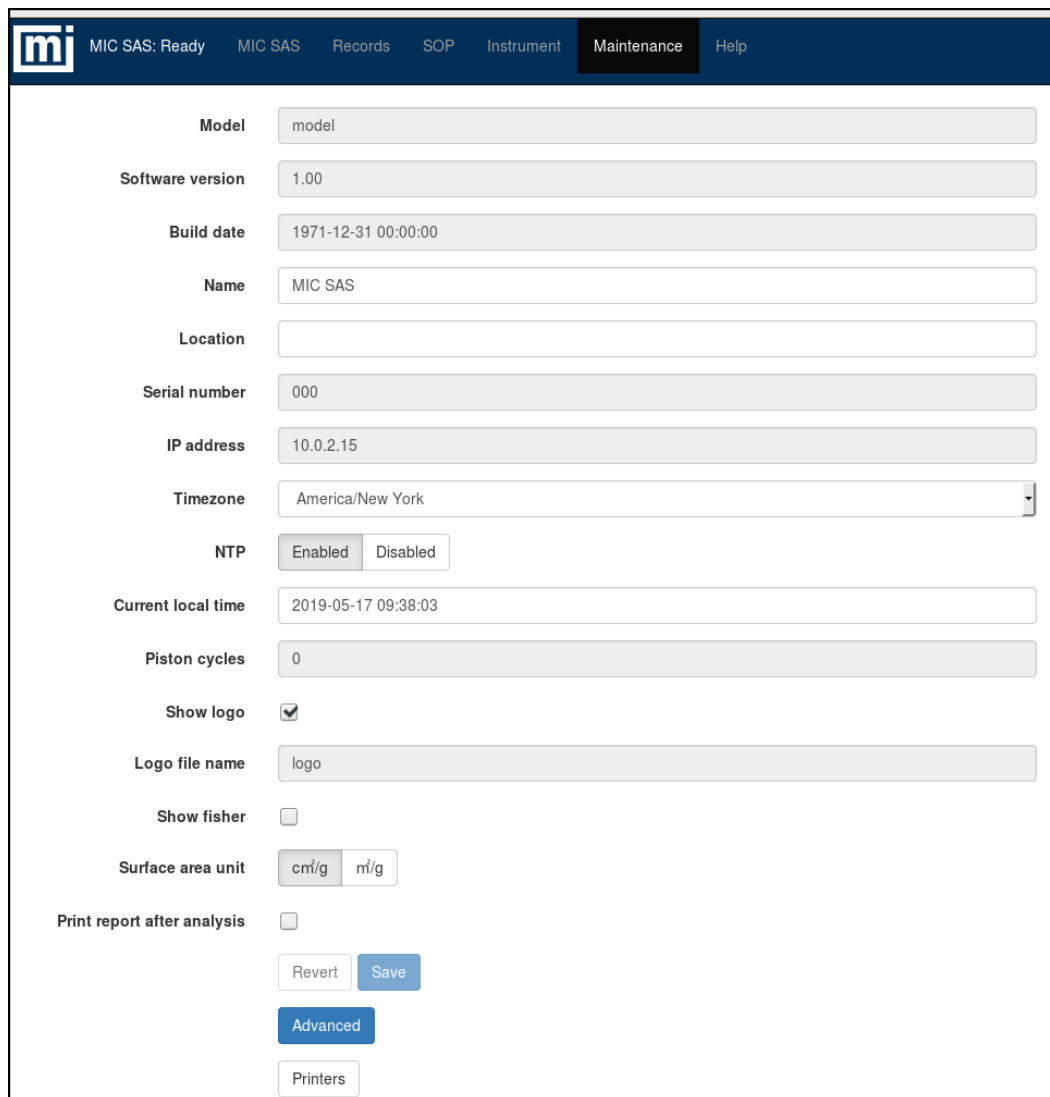
RETURN THE PISTON TO THE HOME POSITION

1. Tap *Instrument* on the menu.
2. Tap **Home**. The piston lowers to the home position.

Blank Page

6 MAINTENANCE MENU SELECTION

Shows setup information about the instrument.



The screenshot shows the 'Maintenance' menu in the MIC SAS interface. The menu is titled 'Maintenance' and contains various configuration fields and buttons. The fields are as follows:

- Model:** model
- Software version:** 1.00
- Build date:** 1971-12-31 00:00:00
- Name:** MIC SAS
- Location:**
- Serial number:** 000
- IP address:** 10.0.2.15
- Timezone:** America/New York
- NTP:** Enabled (selected), Disabled
- Current local time:** 2019-05-17 09:38:03
- Piston cycles:** 0
- Show logo:** ☒
- Logo file name:** logo
- Show fisher:** ☐
- Surface area unit:** cm²/g (selected), m²/g
- Print report after analysis:** ☐

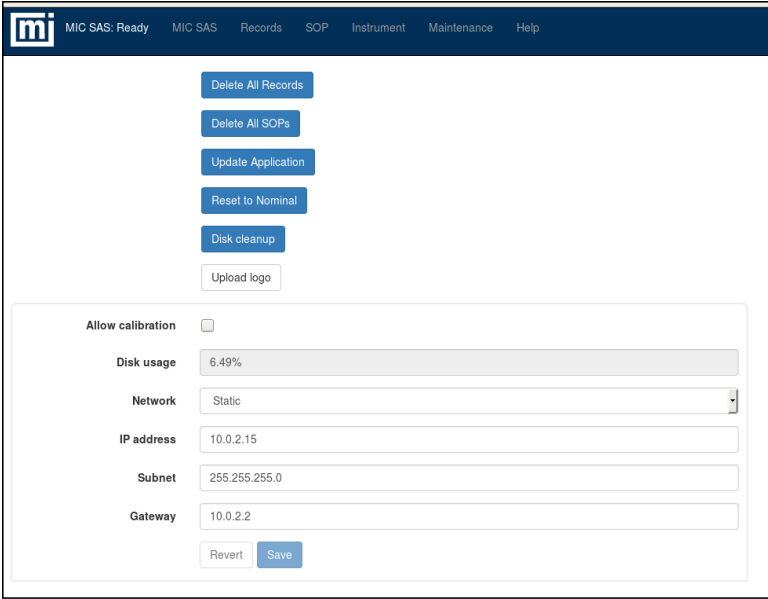
Buttons at the bottom of the menu:

- Revert
- Save
- Advanced
- Printers

Maintenance

Field or Button	Description
Advanced [button]	Administrator level configuration options — enabled only when the instrument is in the <i>Idle</i> state.

Maintenance (continued)

Field or Button	Description
	 <ul style="list-style-type: none"> • Delete all records [button]. Tap to delete all records from the <i>Records</i> screen. • Delete all SOPs [button]. Tap to delete all SOPs from the <i>SOP</i> screen. • Update application [button]. Tap to perform a software update. • Reset to Nominal [button]. Tap to reset the calibrations of the pressure transducers to the nominal values. Make changes only under the direction of a Micromeritics Service Representative. • Disk cleanup [button]. Tap to clear the log file, and remove temporary and cached files from the disk. • Upload logo [button]. Tap to select a logo to display on reports. See Upload Logo on page 6 - 11. • Allow calibration [checkbox]. Enable to allow users to calibrate the instrument. These settings affect the instrument operation. Make changes only under the direction of a Micromeritics Service Representative. • Disk usage . * Displays the percentage of disk space used . • Network [drop-down box]. <p>DHCP. Select to have the instrument's network settings configured automatically. The instrument must be connected to a network with a DHCP server.</p>

Maintenance (continued)

Field or Button	Description
	<p>Static. Select to assign specific network settings. Network configuration is required for remote operation through a web browser, but not necessary for operating the instrument with the touchscreen. See Remote Computer Configuration on page 6 - 5.</p> <ul style="list-style-type: none"> • <i>IP address</i> * [text box]. Use to change the IP address of the instrument. • <i>Subnet</i> * [text box]. Use to change the Subnet setting of the instrument. • <i>Gateway</i> * [text box]. Use to change the Gateway setting of the instrument.
Build date **	Displays the software build date.
Current local time [text box]	Set the instrument's clock by entering the current local date and time.
IP address ***	IP address of the instrument.
Location [text box]	Location of the instrument.
Logo file name **	The file name of the uploaded logo.
Model **	Instrument model.
Name [text box]	The name of the instrument (ie., lab number, etc.).
NTP [button]	Enable to use Network Time Protocol for setting the instrument's clock. The instrument must be attached to a network with NTP servers. If NTP is disabled, the instrument will keep time on a battery-backed internal clock.
Piston cycles **	Indicates the number of times the piston has gone to the disengage position after home or analysis. The number is set to zero when a force calibration is performed. The number before the reset is logged in the force calibration message.
Print report after analysis [check box]	Enable to print a report after each analysis.
Printers [button]	Click to configure a printer attached to the instrument. See Printer Installation on page 6 - 6 .
Revert [button]	Returns fields to the currently saved values.
Save [button]	Saves screen changes.
Serial Number **	Serial number of the instrument.

Maintenance (continued)

Field or Button	Description
Show fisher [check box]	Indicates if Fisher sizes and areas should be displayed and reported.
Show logo [check box]	Enable to display a logo on reports. This feature requires the upload of a PNG or BMP image. If this option is enabled, the image is displayed and printed to the right of the report title for all reports. To upload a logo, tap Advanced on the <i>Maintenance</i> window.
Software version **	Version of the installed software application.
Surface area unit [button]	Select whether surface areas are expressed as cm ² /g or m ² /g.
Timezone [drop-down box]	Select the local timezone. When the timezone is changed, the times displayed for records are changed to local times for the new timezone.

* Applicable to *Static* networks only.

** Field cannot be edited.

*** Field can be edited on the *Advanced* view only.

REMOTE COMPUTER CONFIGURATION

The remote computer and the instrument must be on the same network. The following is the recommended configuration:

- The IP addresses on both devices must have the same first three sets of 0-255 numbers (octets) and differ in their last octets.
- The subnet masks on both devices should be 255.255.255.0.
- The gateways on both devices must be the same, but must differ from the IP addresses in their last octets (optional).

Configuration Settings Examples

	Instrument Setting	Remote Computer
IP Address	192.168.77.101	192.168.77.100
Subnet Mask	255.255.255.0	255.255.255.0
Gateway	192.168.77.10	192.168.77.10



If the remote computer has multiple Network Interface Cards (NICs), only change the settings of the NIC that is connected to the instrument. Refer to the computer's operating system manual or the internet for instructions on how to change the network settings of the NIC in use.

Bridged instruments must have different IP addresses.

1. In the instrument application, tap the *Maintenance* menu, then tap **Advanced**.
2. In the *Network* field, tap *Static* and enter the details from the *MIC SAS* column in the table [Configuration Settings Examples above](#).



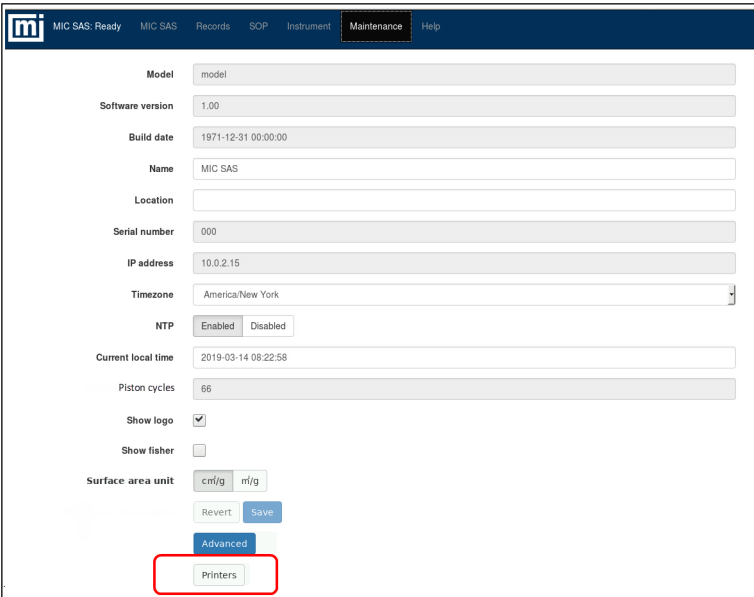
If an error occurs regarding IP conflicts, contact your IT department to release IP addresses on the same subnet.

To access the instrument from the remote computer, enter the IP address of the instrument in a web browser on the remote computer. Firefox and Chrome are the recommended browsers.

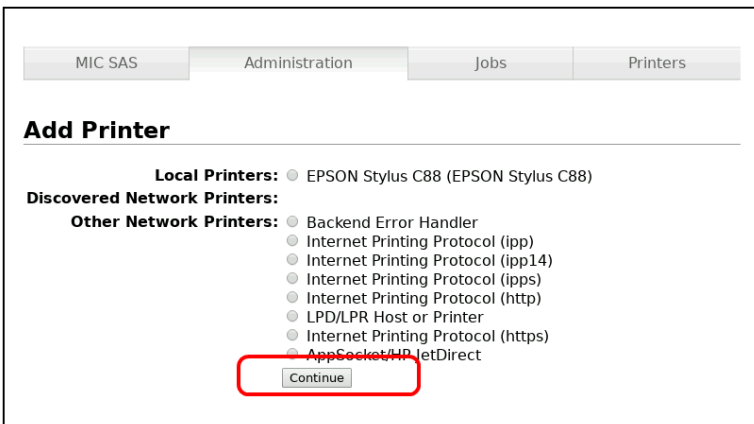
PRINTER INSTALLATION

These instructions are for configuring a printer attached to the instrument. When configuration is complete, use the *Jobs* tab to view queued print jobs.

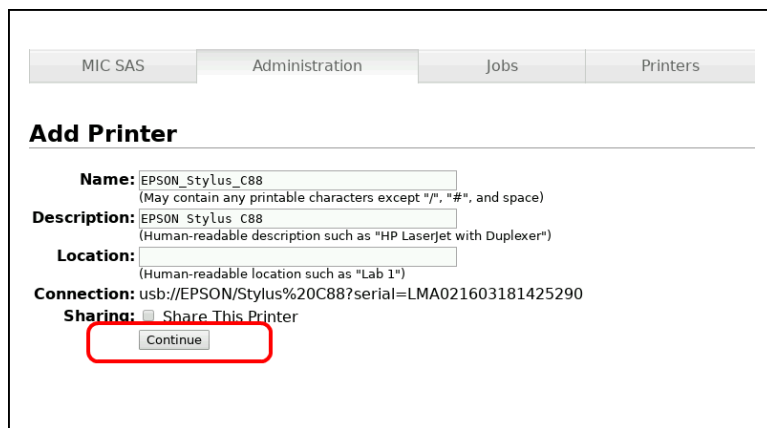
1. Tap the *Maintenance* tab.
2. Tap **Printers** at the bottom of the window.



3. On the *Administration* tab, select the attached printer, then tap **Continue**.



4. On the *Add Printer* window, complete the fields to identify the attached printer. If the printer will be shared with other devices, select the *Share This Printer* option. Tap **Continue** when done.



MIC SAS Administration Jobs Printers

Add Printer

Name: EPSON_Stylus_C88
(May contain any printable characters except "/", "#", and space)

Description: EPSON Stylus C88
(Human-readable description such as "HP Laserjet with Duplexer")

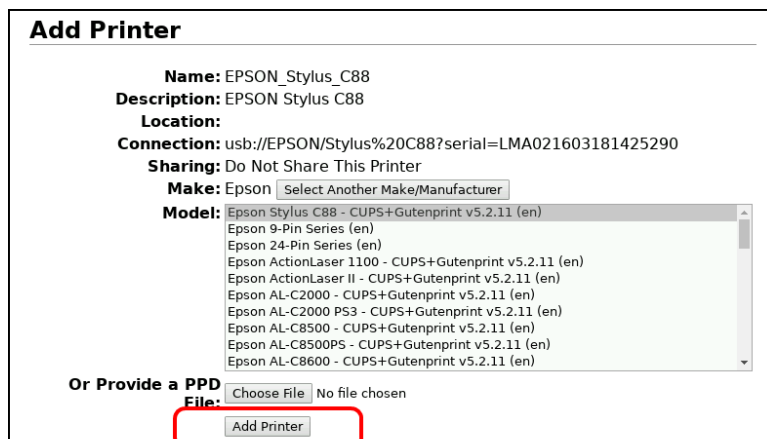
Location:
(Human-readable location such as "Lab 1")

Connection: usb://EPSON/Stylus%20C88?serial=LMA021603181425290

Sharing: ☒ Share This Printer

Continue

5. Select the printer model from the *Model* drop-down list then tap **Add Printer**.



Add Printer

Name: EPSON_Stylus_C88

Description: EPSON Stylus C88

Location:

Connection: usb://EPSON/Stylus%20C88?serial=LMA021603181425290

Sharing: ☐ Do Not Share This Printer

Make: Epson Select Another Make/Manufacturer

Model: Epson Stylus C88 - CUPS+Gutenprint v5.2.11 (en)
Epson 9-Pin Series (en)
Epson 24-Pin Series (en)
Epson ActionLaser 1100 - CUPS+Gutenprint v5.2.11 (en)
Epson ActionLaser II - CUPS+Gutenprint v5.2.11 (en)
Epson AL-C2000 - CUPS+Gutenprint v5.2.11 (en)
Epson AL-C2000 PS3 - CUPS+Gutenprint v5.2.11 (en)
Epson AL-C8500 - CUPS+Gutenprint v5.2.11 (en)
Epson AL-C8500PS - CUPS+Gutenprint v5.2.11 (en)
Epson AL-C8600 - CUPS+Gutenprint v5.2.11 (en)

Or Provide a PPD File: No file chosen

Add Printer

6. Select printer settings from the drop-down lists then tap **Set Default Options**.

Set Default Options for EPSON_Stylus_C88

[General](#) [Printer Features Extra 3](#) [Common](#) [Printer Features Extra 2](#)
[Printer Features Extra 4](#) [Output Control Common](#) [Printer Features Extra 4](#) [Output Control Extra 1](#) [Output Control Extra 2](#)
[Output Control Extra 4](#) [Output Control Extra 5](#) [Banners](#) [Policies](#)

General

Media Size: A4
Color Model: RGB Color
Color Precision: Normal
Media Type: Plain Paper
Print Quality: Standard
Resolution: Automatic
Output Order: Reverse
Shrink Page If Necessary to Fit Borders: Shrink (print the whole page)

Set Default Options

7. Tap the *Printers* tab. The installed printer displays.

[MIC SAS](#) [Administration](#) [Jobs](#) **[Printers](#)**

EPSON_Stylus_C88 (Idle, Accepting Jobs, Not Shared)

[Maintenance](#) [Administration](#)

Description: EPSON Stylus C88

Location:

Driver: Epson Stylus C88 - CUPS+Gutenprint v5.2.11 (color)

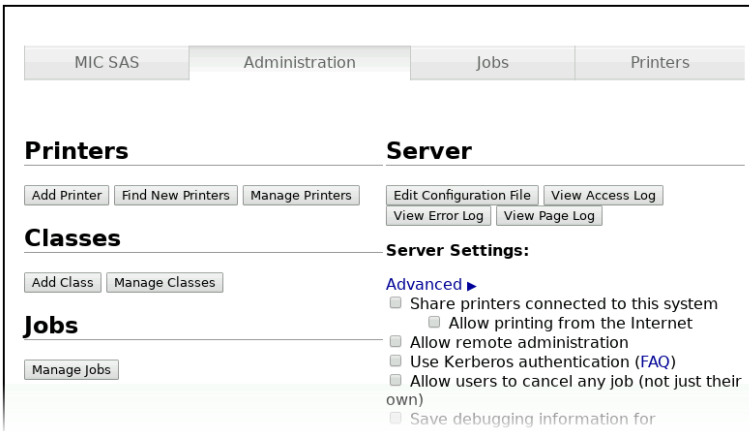
Connection: usb://EPSON/Stylus%20C88?serial=LMA021603181425290

Defaults: job-sheets=none, none media=iso_a4_210x297mm sides=one-sided

Jobs

Search in EPSON_Stylus_C88:

8. Tap the *Administration* drop-down list and tap *Set as default printer*.
9. To specify additional printer options, tap the *Administration* drop-down list.



10. Tap *MIC SAS* to return to the application.

CLEAN THE INSTRUMENT

The exterior casing of the instrument may be cleaned using a clean cloth dampened with isopropyl alcohol (IPA), a mild detergent, or a 3% hydrogen peroxide solution. Do not use any type of abrasive cleaner.



Do not allow liquid to penetrate the casing of the instrument. Doing so could result in damage to the unit.

REFRESH THE BROWSER

If a keyboard is attached or removed from the instrument, the browser will need to be refreshed.



One method to refresh the browser is to power the instrument OFF, attach or remove the keyboard, then power the -back ON. See [Power Instrument On and Off on page 7 - 8](#) Alternatively, use the following instructions.

Attach a keyboard and refresh the browser:

1. With the browser open, attach the keyboard.
2. Press **F5** or **Ctrl+R** on the attached keyboard. When the browser completes the refresh process, the virtual keyboard will be disabled and the attached keyboard can be used.

Remove the keyboard and refresh the browser:

1. With the browser open, press **Ctrl+W** on the attached keyboard.
2. Remove the keyboard before the browser refresh process completes. When the browser completes the refresh process, the virtual keyboard can be used.

UPLOAD LOGO



Administrator level access is required.

UPLOAD A LOGO FROM THE INSTRUMENT

1. Insert the USB device containing the logo file into a USB port of the instrument. Ensure the file name is either *MICSAS.PNG* or *MICSAS.BMP*. No other file names or file extensions are supported.
2. Tap the *Maintenance* menu, then tap **Advanced**.
3. Tap **Upload Logo**.
4. On the *Confirm Action* window, tap **Yes** to restart the application immediately or tap **No** to cancel the operation.

Confirm Action

This requires an application restart. Any unsaved changes will be lost. Are you sure you want to continue?

Yes

No

UPLOAD A LOGO FROM A REMOTE COMPUTER



See:

[Remote Computer Configuration on page 6 - 5](#)

1. Go to the *Maintenance* menu, then click **Advanced**.
2. Click **Upload Logo** and access the logo file. Ensure the file extension is either .PNG or .BMP. No other file extensions are supported.
3. Select the file in the list, then click **Upload**.



A file selection dialog box titled "Select a file" with a close button (X) in the top right corner. Below the title bar, there are two buttons: "Select file" and "Upload". Below these buttons, the file "MICSAS.png" is listed.

4. On the *Confirm Action* window, click **Yes** to restart the application immediately or click **No** to cancel the operation.



A "Confirm Action" dialog box with a close button (X) in the top right corner. The text inside reads: "This requires an application restart. Any unsaved changes will be lost. Are you sure you want to continue?". At the bottom right, there are two buttons: "Yes" and "No".

7 TROUBLESHOOTING AND MAINTENANCE

**See also:**

- [Clean the Instrument on page 6 - 10](#)
- [Instrument Status on page 1 - 5](#)
- [Maintenance Menu Selection on page 6 - 1](#)
- [Power Instrument On and Off on page 7 - 8](#)
- [Routine Maintenance on page 7 - 9](#)
- [Replace a Gas Cylinder on page 7 - 4](#)
- [Printer Installation on page 6 - 6](#)

Log in to your [customer portal](#) to access error messages.

Sample tube rises when piston engages.

Cause: The retaining sample tube collar is missing or too loose.

Action: Fit the retaining collar tightly on the sample tube just below the bracket.

Unexpected test results.

Cause: No sample, or incorrect sample in the tube.

Action: Check that the correct sample has been loaded and the correct mass and density have been entered.

Cause: The top brass sample plug and filter paper are not in place.

Action: Install top brass sample plug and filter paper.

Cause: Sample has escaped the tube during the test.

Action: Repeat the test using two filter papers on each plug.

Cause: Inappropriate Fisher number mapping being applied

Action: Check that the Fisher number map for the material is correct.

Sample escapes top of sample tube when piston first engages.

Cause: The top O-ring is worn.

Action: Check the integrity of the O-rings. See [O-rings on page 7 - 9](#).

Cause: The sample material contains very fine particles.

Action: The loss of a very small amount of sample may not require any action. A second filter paper on the top brass plug may reduce the amount of sample lost.

One or both pressures read close to zero during analysis.

Cause: No air supply.

Action: Ensure that the air cylinder valve, and any shutoff valves are open. Check that the regulator is set properly. Check that the air line is connected.

Cause: There is a leak or blockage in the system.

Action: Ensure the piston is engaged in the tube. Ensure the air outlet tube on the top of the moving piston mount is connected. Check the integrity of the O-rings. See [O-rings on page 7 - 9](#).

Piston does not move.

Cause: The piston may be stationary for minutes at a time during analyses, and some piston motions are barely large enough to see, but if analysis does not progress for a long time, it's possible that the piston motor has become overloaded.

Action: Go to the *Instrument* view and tap the stop icon (white square in a blue rectangle). If the piston is still unresponsive, cycle power on the instrument.

Cause: The emergency stop button was pressed.

Action: Reset the emergency stop. The button shuts off power to the motor, so a home operation must be performed.

Pressures are not steady during analysis.

Cause: O-rings are worn.

Action: Check the integrity of the O-rings. See [O-rings on page 7 - 9](#).

Sample mass cannot be made equal to its absolute density.

Cause: A limited amount of sample is available, or the sample has a very low bulk density and very high absolute density.

Action: Some standards require mass and density to be equal, however accurate measurements may be possible with less sample. Be sure to enter the actual mass and density. A warning that mass and density differ by more than 5% is shown, but the analysis can still be started.

GAS CONNECTIONS

GUIDELINES FOR CONNECTING GASES

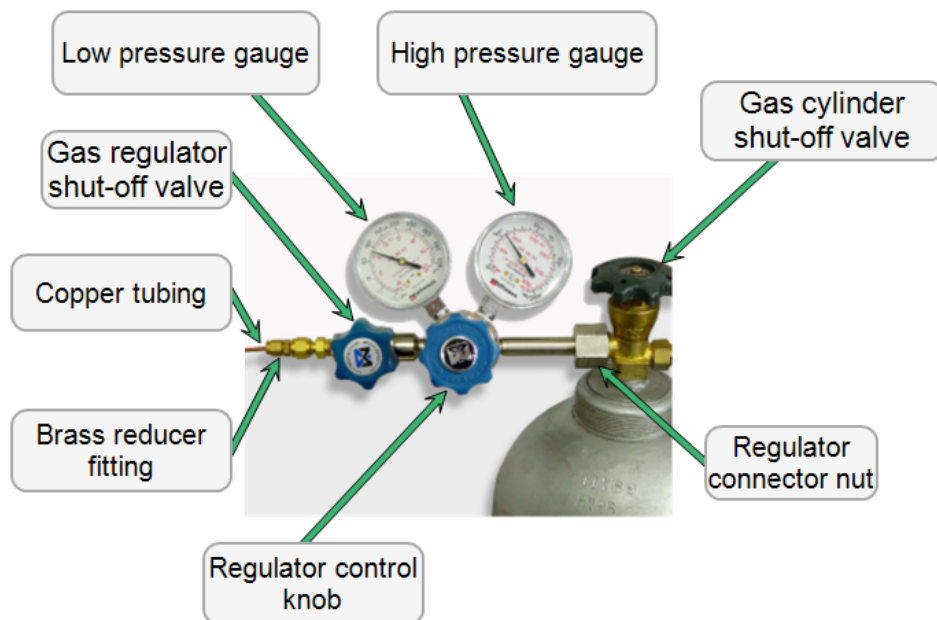
- Place gas cylinders within 6 feet (2 m) of the gas inlets of the analyzer. Using gas line extenders on gas cylinders located in remote areas may degrade gas quality and reduce pressure. Gas lines are typically five to six feet long. Place the cylinders close enough to allow for proper connection at the analyzer inlet.
- Use a retaining strap (or other appropriate tether) to secure the gas cylinder.
- Always use the gas lines provided with the analyzer. It is very important that proper gas lines are used with the analyzer.
 - **Do not use** polymer tubing for the gas line.
 - **Do not use** flexible gas lines. Some flexible lines may appear to be appropriate, such as those with a herringbone covering, but the line may be coated internally with a polymer.
- Long gas lines, such as those used with gas cylinders placed in remote areas, must be evacuated for an extended period of time to remove ambient gases. When possible, avoid placing gas cylinders in remote locations. It is always best to have gas cylinders located near the analyzer.
- Carefully route the gas lines from the cylinder to the analyzer avoiding overlapping or entangling gas lines. This will help avoid confusion when maintenance is required.
- Label the gas line at the analyzer inlet for proper identification and maintenance.
- Replace gas cylinders before gas is depleted. It is best to replace a gas cylinder when the pressure reads approximately 500 psi (3500 kPa) on the high pressure gauge. Contaminants absorbed to the walls of the cylinder will desorb as the pressure decreases.
- Ensure the gas cylinder is closed before connecting to the analyzer.

REPLACE A GAS CYLINDER



See also:

- [Connect a Regulator and a Gas Line to a Gas Cylinder on page 7 - 6](#)



Disconnect a Depleted Gas Cylinder

1. Close the regulator shut-off valve and gas cylinder shut-off valve by turning the knobs clockwise.
2. Disconnect the gas line from the regulator. Gas will be vented from the line. It is not necessary to disconnect the gas line from the analyzer inlet if the cylinder will be replaced immediately with one of the same type.
3. Open the gas regulator shut-off valve by turning the knob counter-clockwise. Gas will be vented from the regulator.
4. Turn the regulator control knob clockwise to open and vent any remaining gas. Both gauges should read at or near zero. If not, make sure the gas regulator shut-off valve is open.
5. Close the regulator by turning the control knob counter-clockwise.
6. Use an appropriate wrench to loosen the nut at the regulator connector nut then remove the regulator from the cylinder.
7. Replace the protective cap on the depleted cylinder. Disconnect the retaining strap and move the cylinder to an appropriate location.

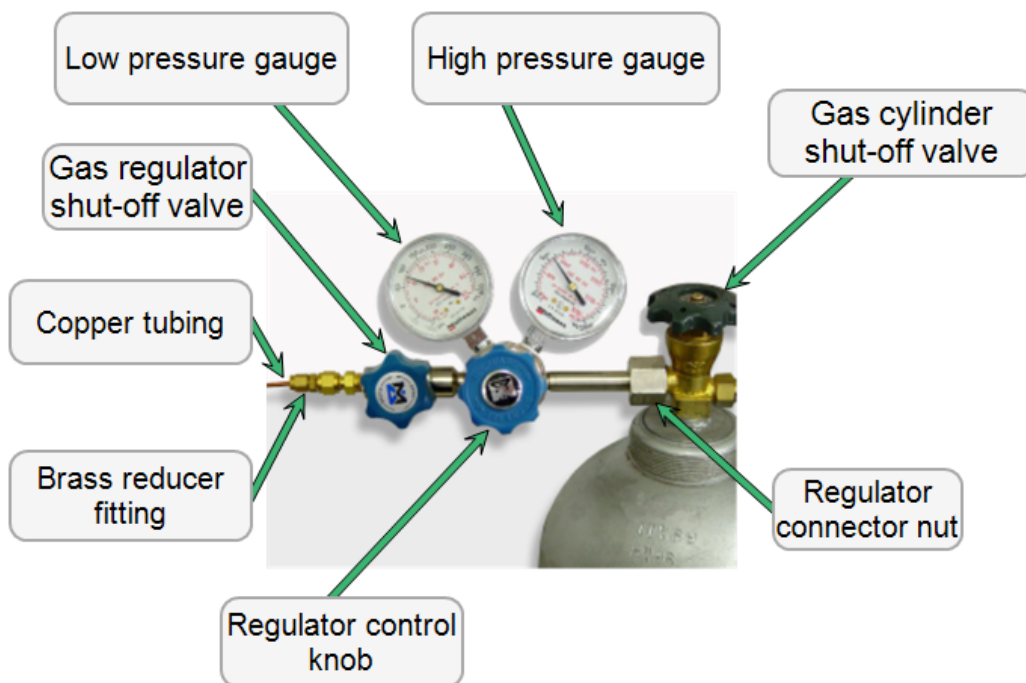
Connect a Gas Cylinder

Regulator Pressure Settings

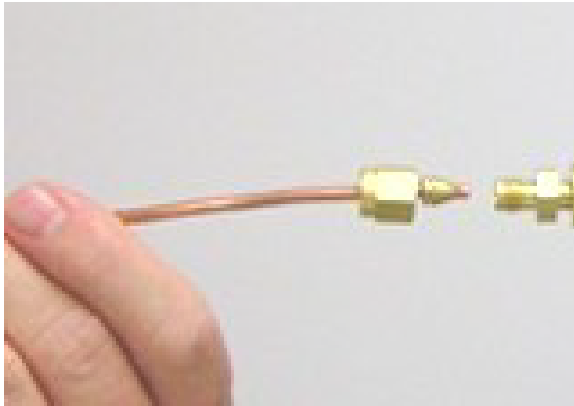
Analyzer Series	Gauge should indicate
3Flex	15 psig (103 kPag)
AccuPyc	25 psig (172 kPag)
ASAP	15 psig (103 kPag)
AutoChem	15-18 psig (103 - 124 kPag)
AutoPore	50-60psig (345 - 404 kPag)
Gemini	15-18 psig (103 - 124 kPag)
MIC SAS II	15-20 psig (103-138 kPag)
TriStar	15-18 psig (103 - 124 kPag)



Exceeding the maximum recommended air pressure could cause personal injury or damage the instrument.

CONNECT A REGULATOR AND A GAS LINE TO A GAS CYLINDER

1. Move the gas cylinder close to the analyzer.
2. Secure the cylinder in place using straps or chains connected to a wall bracket or other fixed surface, or use a cylinder stand.
3. Use an appropriate cylinder wrench to remove the protective cap from the cylinder by turning the protective cap counterclockwise.
4. Attach the gas regulator to the connector on the gas cylinder. Hand tighten the nut, then use an appropriate wrench to tighten an additional 3/4 turn.
5. Check for leaks at the high pressure side of the regulator and in the connector.
 - a. Turn the regulator control knob fully counterclockwise.
 - b. Slowly open the gas cylinder shutoff valve, then close it.
 - c. Observe the pressure on the high pressure gauge.
 - d. If pressure drops, repair the leak.
6. Connect the gas line to the regulator.
 - a. Connect the gas line to the regulator connector.



- b. Use two 7/16 in. (11 mm) wrenches to tighten the gas line connection — one to hold the fitting steady and one to tighten the connector nut.



7. Purge the air from the gas line.
 - a. Open the regulator shutoff valve.
 - b. Open the gas cylinder shutoff valve and flow gas for 10 to 30 seconds.
 - c. Close the gas cylinder shutoff valve and allow regulator pressure to go to zero.

POWER INSTRUMENT ON AND OFF



To power off the instrument, disconnect the power cable.

It is recommended that the instrument remain powered on. When the main power is disconnected, the piston loses the home position and will need to be reset. See [Home Position on page 5 - 3](#).

Power ON the equipment in the following order:

1. Plug in the instrument. (There is no **ON/OFF** power switch.)
2. Allow the instrument to run for approximately 60 minutes.

Power OFF the equipment in the following order:

1. Ensure the instrument status is *Idle*.
2. Disconnect the power plug from the instrument. (There is no **ON/OFF** power switch.)

ROUTINE MAINTENANCE

The instrument should be serviced approximately once per year.

O-RINGS

O-rings on the piston and anvil are essential to the accurate operation of the instrument and should be checked regularly for signs of wear or damage. The O-rings will wear, especially on the piston, and hence should be replaced regularly.

To check for O-ring leaks:

1. Tap the *Maintenance* view, then tap **Advanced**.
2. Select *Allow calibration* and tap **Save**.
3. Tap the *Instrument* view.



Changing calibrations will affect the performance of the instrument. The following steps do not change any calibrations. Pressing other buttons on the left side of the display may change calibrations.

4. Install an empty sample tube.
5. Enter a flow rate of 10 sccm and tap **Set Flow Rate**.
6. When pressure stabilizes, try to move the tube by hand. The O-rings should be replaced if the tube moves freely or the inlet or differential pressure vary by more than a few tenths of a cm H₂O.
7. Tap **Stop Flow**.
8. Tap the *Maintenance* view, then tap **Advanced**.
9. Deselect *Allow calibration* and tap **Save**.

AIR SUPPLY

Check that the cylinder has adequate pressure. Replace the cylinder when it is low. See [Replace a Gas Cylinder on page 7 - 4](#).

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8 *HELP*

Tap **Online Help** to access the online help files. Internet connection is required for online help. If internet connection is not available on the instrument, go to <http://bit.ly/2PCKB7B> on a device with internet access, or scan the QR code.



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INDEX

A

about the MIC SAS II 1 - 1
about this manual *iv*

B

browser, refresh 6 - 10

C

calibration report 3 - 5
components, instrument 1 - 1
contact us *iii*
control chart report 3 - 9
corporate profile *ii*

E

EU Declaration of Conformity *iv*
export records 3 - 11

F

Fisher Number Map report 3 - 6

G

gas
 connect gas cylinder 7 - 5
 disconnect gas cylinder 7 - 4
 guidelines for connecting 7 - 3
 replacement cylinder 7 - 4
gas connections 7 - 3
gas line, connect to gas cylinder 7 - 6

H

Help 8 - 1
home position 5 - 3

I

instrument components 1 - 1
instrument exterior, clean 6 - 10
Instrument menu selection 5 - 1
instrument, status 1 - 5

L

log report 3 - 8
logo, upload 6 - 11

M

maintenance 7 - 1
 clean instrument exterior 6 - 10
 connect gas cylinder 7 - 5
 disconnect gas cylinder 7 - 4
 guidelines for connecting gases 7 - 3
 replacement cylinder 7 - 4
 routine 7 - 9
Maintenance menu selection 6 - 1
manual, about this *iv*
menu selection
 Instrument 5 - 1
 Maintenance 6 - 1
 MIC SAS 2 - 1
 Records 3 - 1
 SOP 4 - 1
menu selections 1 - 5
MIC SAS II, about 1 - 1
MIC SAS menu selection 2 - 1

P

power analyzer on and off 7 - 8
print records 3 - 11

printer installation 6 - 6

R

records

- export 3 - 11

- print 3 - 11

Records menu selection 3 - 1

records;export 3 - 11

regulator, connect to gas cylinder 7 - 6

remote browsers 1 - 6

remote computer configuration 6 - 5

reports

- calibration 3 - 5

- control chart 3 - 5, 3 - 9

- Fisher number map 3 - 6

- log 3 - 8

S

safety precautions 1 - 4

sample

- load 2 - 3

- remove brass sample plug 2 - 4

SOP menu selection 4 - 1

specifications 1 - 6

status

- instrument 1 - 5

T

troubleshooting 7 - 1

W

warranty *i*