AccuSizer A7000 AD Particle Sizer

Field service manual

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NOTICES

MANUAL PART NUMBER

998-009

EDITION

(Software Version 2.1.1.15+) Manual Version – 01
(PSS purchased by Entegris)
(Software Version 2.5.4.3+) Manual Version – 02
(Software Version 2.6.3.1) Manual Version – 03
(Software Version 3.1.6.0) Manual Version – 04

WARRANTY

Entegris makes every effort to ensure that this document is correct. However, due to Entegris policy of continual product development we are unable to guarantee the accuracy of this, or any other document after the date of publication. We therefore disclaim all liability for any changes, errors or omissions after the date of publication. No production or transmission of any part of this publication is allowed without express written permission of Entegris.

TECHNOLOGY LICENSES

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

SIGNAL WORD DEFINITIONS

The following symbology is used throughout this user manual next to hazard information.

WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices or those that may damage the instrument.

NOTE: Indicates a statement of policy directly or indirectly related to personnel safety or property protection. It may also be used to highlight important instrument settings or features.

DOCUMENT CHANGE HISTORY

DATE	DESCRIPTION OF DOCUMENT REVISION OF REVIEW	NEW RELEASE NUMBER
10/06/2017	(Software Version 2.1.1.15+) Manual Version	- 01
	(Software Version 2.5.4.3+) Manual Version	- 02
12/03/2018	(Software Version 2.6.3.1) Manual Version Reformat of Installation Guide into Field Service Manual	- 03
	Addition of the following information: • General Information • Health and Safety • Unpacking and Installation • System Performance • Features of Fluidics • Maintenance Procedure • Troubleshooting	
11/24/2025	(Software Version 3.1.6.0) Manual Version	- 04
	Addition of the following information: • Brand and logo update • Filter bleed update • Liquid connections update	

GENERAL INFORMATION

SUPPORT

If you need technical assistance, contact Entegris based on the type of support needed.

Technical Support

Entegris, Inc.
7225 W Oakland Street
Chandler, AZ 85226

T: (727) 846-0866

Expedited Instrumentation Technical Assistance | Entegris

USER MANUAL

The AccuSizer™ Software User Manual (Manual Part Number 998-002) is accessible from the software and a hard copy is provided with the instrument upon delivery. Additional hard copies of the user manual may be obtained from Entegris Company upon request.

SUPPLEMENTAL READING

More details on the operation of the instrument can be found in the following manuals:

Title	Part number
AccuSizer™ Theory	998-001
AccuSizer™ AD Calibration using AccuSizer	992-017

SAFETY RELATED POLICY

Entegris will provide end user information about any safety related upgrades or newly identified hazards with the AccuSizer SIS should it become necessary. Service should only be performed by Entegris personnel or sales/support partners that have been trained by Entegris.

The end user and their subcontractors who work with the AccuSizer SIS must ensure that their respective employees are provided with material safety data sheets from their Environmental Health and Safety (EHS) department for all chemicals that pass through the AccuSizer SIS. The end-user is responsible for checking that the instrument components of the AccuSizer SIS are compatible with their process before use; see the Appendix for more information on instrument specifications.

It is imperative that when working on any piece of equipment, the service technician follows all policies, practices, and procedures established by the end users' EHS group.

DECONTAMINATION AND DISPOSAL

To clean the AccuSizer SIS fluidics system, flush DI water through each flow path using software controls or manually. If hazardous chemicals were used in the system, use proper decontamination procedures.

Do not dispose of the AccuSizer SIS or its components in the trash. Properly dispose of the unit with an electronics waste management system according to local policies. Before disposing the unit, contact Entegris for instructions on disabling the unit from being powered on again.

SAMPLE HANDLING WARNINGS

Always handle all substances in accordance with the COSHH regulations (UK) or any local regulations concerning sample handling safety. The Material Safety Data Sheets (MSDS) must be obtained for all substances used in the system and safety precautions and control measures used accordingly.

Use the instrument in a well-ventilated room if noxious samples or dispersants are to be analyzed.

Wear a protective respiratory mask if noxious samples or dispersants are being handled, particularly in their dry state during sample preparation.

Wear protective gloves when handling hazardous materials, or those that cause skin infections or irritations. Chemical protection gloves are suitable, which are tested according to EN 374. At least 4 mil thick. Type of material PVC: polyvinyl chloride, PE: polyethylene, NR: natural rubber, latex, CR: chloroprene (chlorobutadiene) rubber, NBR: acrylonitrile-butadiene rubber, IIR: isobutene-isoprene (butyl) rubber, FKM: fluoro-elastomer, PVA: polyvinyl alcohol, Nitrile. Gloves should be used in accordance with the instructions provided by the PPE supplier, except where additional instructions by the equipment supplier are required.

Always test a sample for chemical compatibility before using in the instrument.

After measuring a hazardous sample scrupulously clean the instrument to remove any contaminants before making another measurement.

Always label samples for analysis using industry standard labeling, particularly if they are handled by a number of staff or stored for long periods. Clearly mark any operator hazard and associated safety precautions that are required for the handling of dangerous materials.

Always adopt responsible procedures for the disposal of waste samples. Many chemicals are forbidden by law to be disposed of in such a manner as to allow their entry into the water system. The user is advised to seek local advice as to the means available for disposal of chemical wastes in the area of use. Recommendations can be found in the Safety Data Sheets.

The surfaces of the instrument may be permanently damaged if samples are spilt onto them. If a spill occurs, then the instrument should be disconnected from the power supply before cleaning.

Reagents Used

The user is responsible for the chemicals put through the system that come from their own process. Entegris may supply a polystyrene latex (PSL) standard with the system for verifying particle size accuracy performance:

Thermo Scienific Polymer Microsphere Suspension which is defined as non-hazardous based on its SDS. It contains the following chemistries:

a. Polystyrene 1% (CAS no. 9003-53-6) or Polystyrene divinylbenzene 1% (CAS no. 9003-70-7)

b. Sodium azide <0.09% (CAS no. 26628-22-8)

INTRODUCTION

This Field Service Manual is designed to enable the user to set up the system and perform initial operational checks. In addition, routine maintenance procedures are described and all the physical features of the instrument are identified and explained.

WARNING: This instrument or the samples to be measured may be hazardous if misused. You must read the Health and Safety section of this manual before operating the system.

INSTRUMENTATION

This manual addresses the following AccuSizer™ instruments:

Instrument name	Model number
AccuSizer™ Autodiluter (AD) includes:	
AccuSizer AD Fluidics module	AccuSizer A7000 AD
AccuSizer Counter	AccuSizer A7000 CTR
LE Sensor (SPOS)	LE Series sensor

ASSUMED INFORMATION

This manual will assume that you are installing and using an AccuSizer Autodiluter (AD) Particle Size analyzer. If there are any operational procedures that differ for any of the other instruments in the range then alternative information will be provided.

This manual will refer to the above instruments as either the “AccuSizer AD” or the “Instrument”.

SECTION DESCRIPTIONS

The following is a list of the contents and objectives of the sections within this manual.

Health and Safety

Essential information that should be read to ensure the safe operation of the instrument.

Unpacking and Installation

The method of unpacking and installing the instrument is covered. It should be noted that installation of the instrument MUST be done by Entegris personnel. Damage could be caused to the instrument if initial installation is undertaken by the user. This section should be used as a source of reference in the event that the instrument location is changed.

System Performance

Once installed, it is useful for the user to ensure that the instrument is functioning at its optimum performance.

Features of the Fluidics

This will aid the user in becoming familiar with the features of the instrument fluidics.

Maintenance Procedure

The instrument will function at optimum performance when maintained on a regular basis. This section outlines the maintenance procedures that the operator and supervisor of the instrument are expected to perform.

Troubleshooting

This will aid the user in troubleshooting the instrument on their own. If these remedies do not work, Entegris should be contacted.

HEALTH AND SAFETY

Following are the safety guidelines that apply to the AccuSizer Autodiluter (AD) instrument. The guidelines are part statutory and part advisory. They should not be used as a replacement for common sense by the user.

This instrument contains no user serviceable parts except the fluidics which encompasses all tubing, syringes and laser light sensors. Repairs should be left to a qualified Entegris’ representative. The maintenance section of this manual describes all the operations that are required for correct routine operation.

WARNING: If this equipment is used in a manner not specified within this manual, the protection provided by the equipment may be impaired.

INSTRUMENT ACCESS

Within this manual reference is made to the various people that will have access to the instrument. Below is a list of these people and their responsibility:

Entegris Employees

Entegris personnel (service engineers, representatives etc.) have full access to the instrument and are authorized to perform all service procedures that may be required.

Supervisor

The supervisor is the person responsible for the management/safety of the instrument and of its operation. The supervisor is responsible for the training of the operators. The supervisor can perform all user maintenance routines identified at the end of this manual, including changing the fuses.

Operator

An operator is a person trained in the use of the instrument. The operator can perform all user maintenance routines identified at the end of this manual, except changing the fuses.

SITE REQUIREMENTS

Specific site requirements must be met to ensure the safe operation of the AccuSizer Autodiluter (AD) instrument. Information about the site requirements can be found in the Environmental conditions section of this manual.

WARNING: If the instrument is used in an environment not conforming to the site requirements, safety and/or performance may be compromised.

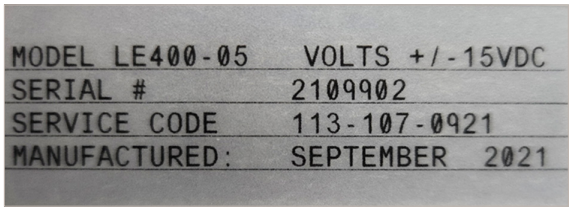
ACCUSIZER SENSOR LASER SAFETY PRECAUTIONS

WARNING: Laser radiation can be harmful to the body and can cause permanent eye damage. Read this section of the manual carefully before operating the equipment.

WARNING: Performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

The AccuSizer™ Model LE400-05 sensor is certified to conform to the applicable requirements of 21 CFR Subchapter J, 1040.10 and 1040.11 (Radiation Control for Health and Safety Act of 1968, 42 U.S.C. 263f) and IEC 60825-1 and IEC 61010-1.

As presently constructed, each of these sensors is designated by the Center for Devices and Radiological Health (CDRH) as a Class I product, resulting in exposure to negligible levels of Laser Radiation during normal operation. The two labels shown below are affixed to the sides of the LE400-05 Sensor. They attest to the above Safety Certification and also establish the place and date of manufacture of each sensor.

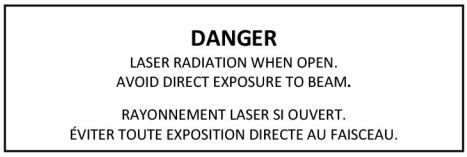


WARNING: Read carefully before attempting to operate any AccuSizer System, including, but not limited to, the AccuSizer Autodiluter (AD).

No Laser Radiation is accessible anywhere in the immediate outside vicinity of any sensor listed above whenever power is delivered to the sensor (typically from an AccuSizer system). Each sensor is sealed at the factory and must remain sealed when in possession of the operator, whether it is in operation or not. The black-anodized aluminum outer housing of the sensor constitutes a Protective Housing, which prevents the operator's access to laser radiation as long as the top cover and main body of the sensor are securely attached to each other.

CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

During operation the Top Cover of the sensor Must Remain Attached to the Main Body – i.e., the Sensor Must Remain Sealed -- by means of the 4 screws secured at the factory. The DANGER label on the cover, reproduced below, warns of the user's possible exposure to the laser beam (25 milliwatts, 785 nm wavelength) if the Top Cover and Main Body of the sensor are detached for any reason while power is applied to the unit.



WARNING: Separation of the top cover and main body of the sensor while power is applied to the sensor may result in possible Direct Exposure to Dangerous Laser Radiation and is prohibited.

ELECTRICAL SAFETY WARNINGS

- The AccuSizer is Mains powered and its input power cables should be treated accordingly.
- The metal parts of the instrument are earthed via a protective earth connection. Never run the equipment without a protective earth connection.
- Do not obscure any electrical sockets - ensure that all electrical plugs can be disconnected in an emergency.
- Route electrical cables away from areas where liquids may be spilt.
- Be careful when measuring samples to avoid liquid or powder spillages over the equipment. Conducting materials or liquids can break down the insulation and cause hazardous conditions within the instrument. Should such spillages occur, disconnect the power and clean immediately.

SAMPLE HANDLING WARNINGS

- Always handle all substances in accordance with the COSHH regulations (UK) or any local regulations concerning sample handling safety. The Material Safety Data Sheets (MSDS) must be obtained for all substances used in the system and safety precautions and control measures used accordingly.
- Use the instrument in a well ventilated room if noxious samples or dispersants are to be analyzed.
- Wear a protective respiratory mask if noxious samples or dispersants are being handled, particularly in their dry state during sample preparation.
- Do not smoke during measurement procedures, particularly where inflammable or toxic samples or dispersants are used or stored.
- Do not eat during measurement procedures, particularly where poisonous samples or dispersants are used or stored.
- Wear protective gloves when handling hazardous materials, or those that cause skin infections or irritations.
- Take care when handling glass. Hazardous materials may enter a wound caused by broken glass.
- Always test a sample for chemical compatibility before using in the instrument. Refer to Appendix A at the end of this manual that lists all substances that are compatible with the AccuSizer AD Fluidics and LE Sensor.
- After measuring a hazardous sample scrupulously clean the instrument to remove any contaminants before making another measurement.
- Always label samples for analysis using industry standard labeling, particularly if they are handled by a number of staff or stored for long periods. Clearly mark any operator hazard and associated safety precautions that are required for the handling of dangerous materials.

NOTE: It is important to keep a record of all hazardous substances used in the instrument for the protection of Service and Maintenance personnel.

- Always adopt responsible procedures for the disposal of waste samples. Many chemicals are forbidden by law to be disposed of in such a manner as to allow their entry into the water system. The user is advised to seek local advice as to the means available for disposal of chemical wastes in the area of use. Recommendations can be found in the Safety Data Sheets.
- The surfaces of the instrument may be permanently damaged if samples are spilt onto them. If a spill occurs then the instrument should be disconnected from the power supply before cleaning.

MOVING THE INSTRUMENT

If it is necessary to move the instrument the following guidelines should be followed:

- Drain the AccuSizer AD fluidics of all liquids.
- Disconnect the AccuSizer Counter from the power source.
- Disconnect the AccuSizer AD fluidics and Sensor from the AccuSizer Counter.
- Disconnect the AccuSizer Counter from the computer.
- Disconnect the computer from the power source.

It is recommended that at least two people are used to carry the instrument. Always adopt proper lifting techniques to avoid back injury. Please refer to the Lifting and Carrying instructions found in the Unpacking and Installation section of this manual.

If the instrument is to be moved large distances, it is recommended that it is repackaged in its original packaging. This also applies to all accessories. Repackaging is the reverse of the unpacking procedure described in the Unpacking and Installation section of this manual.

NOTE: If the instrument is to be returned for any type of service, health and safety information should be enclosed for all samples that were measured on the instrument.

DISPOSING OF THE ACCUSIZER FLUIDICS AND ACCUSIZER COUNTER

When the need eventually arises to dispose of the instrument, it should be done in a responsible manner. The following are guidelines that should be followed:

- Before disposal of the instrument, it should be disabled in such a manner as to make it impossible for it to be powered up. Seek advice from your local Entegris representative for details.
- The instrument should be decontaminated if hazardous materials have been used in it.
- Refer to any local regulations on disposal of instrument.

⚠ **WARNING: Do not dispose of the instrument in the trash.**

UNPACKING AND INSTALLATION

The AccuSizer Autodiluter (AD) instrument is only to be installed by Entegris personnel or its representative. However, the following information is aimed at providing guidance in unpacking the instrument, selecting the appropriate site and connecting the instrument. If, in the future, the instrument is to be moved, refer back to these directions.

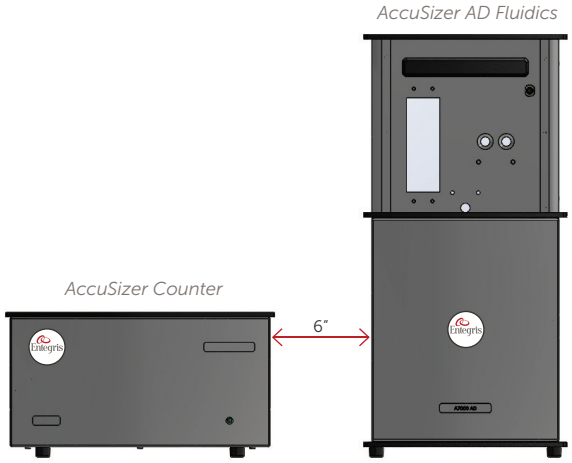
The AccuSizer Autodiluter (AD) instrument is delivered in two boxes; one containing the AccuSizer AD Fluidics, along with documentation and accessories and the second containing the AccuSizer Counter along with the LE Sensor, and cables.

ENVIRONMENTAL CONDITIONS

The selection and preparation of a suitable site prior to unpacking will help to ensure trouble free operation and will be reflected in the quality of the results. The equipment is designed and intended for use within a normal laboratory environment with the following conditions recommended:

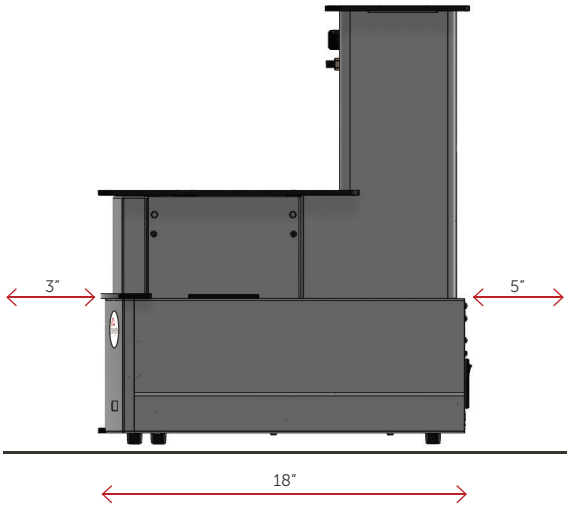
- Humidity <50%.
- Temperature, between 5 and 30 degrees Celsius.
- Power requirements, 120/240 VAC; 50/60 Hz; 750 VA
- The AccuSizer AD Fluidics and Counter need to be mounted on a horizontal workbench for optimum operation.
- The workbench must be able to support a minimum of 40 lbs. for the AccuSizer AD fluidics module with sensor and the AccuSizer Counter. The addition of the weight of the computer and accessories should also be taken into account.
- The workbench should be clear of sheets of paper or other objects which could block the flow of air to the fan mounted, internally, to the back of the AccuSizer Counter.
- Power sockets should not be obscured so that they can be disconnected in an emergency.
- Route all electrical cables away from areas where liquids can be spilt.
- Power sockets will be required for; the AccuSizer Counter, computer, printer and other accessories.

- The room must be well ventilated if noxious samples or dispersants are used.
- 0.2 µm Filtered, distilled water
- Space requirements are illustrated in the diagram below:



Place the AccuSizer Counter to either the right or left side of the AccuSizer AD Fluidics. The space between the AccuSizer Counter and AD Fluidics should be no less than 6" apart.

WARNING: DO NOT STACK the AccuSizer AD Fluidics on top of the AccuSizer Counter.



UNPACKING THE ACCUSIZER AD FLUIDICS

Unpacking of the instrument is very straight forward. The tape must be removed from the top of the cardboard shipping carton exposing the second set of box flaps. Continue by lifting the second set of flaps open. The AccuSizer AD Fluidics along with the documentation and accessories are nestled into the specialty formed foam inserts. The documentation and accessories can be removed and placed to the side.

Prior to lifting the AccuSizer AD fluidics module, ensure the workbench where the instrument is to be placed is clear.

WARNING: The AccuSizer AD Fluidics module weighs approximately 23 lbs. Assistance in lifting and positioning the instrument is recommended.

CAUTION: The AccuSizer AD Fluidics module contains transit securing parts. These parts MUST be removed by a Entegris representative prior to powering up the unit. Damage will be caused if the transit securing parts are not removed.

UNPACKING THE ACCUSIZER COUNTER

Unpacking of the AccuSizer Counter by first removing the tape from the top of the cardboard shipping carton exposing the second set of box flaps. Continue by lifting the second set of flaps open. The AccuSizer Counter along with the AccuSizer sensor and cables are nestled into the specialty formed foam inserts. The AccuSizer sensor and cables can be removed and placed to the side.

Prior to lifting the AccuSizer counter, ensure the workbench where the instrument is to be placed is clear.

WARNING: The AccuSizer Counter weighs approximately 18 lbs. Assistance in lifting and positioning the instrument is recommended.

LIFTING INSTRUCTIONS

Do not attempt to lift by bending forward. Bend your hips and knees to lower down to the item you are attempting to lift, extend your arms and place around item. Once the item is secure in your arms, keep it somewhat close to your body, and straighten your legs to lift. Never lift a heavy object above shoulder level. Avoid turning or twisting your body while lifting or holding a heavy object.

CARRYING INSTRUCTIONS

Do not attempt to carry the AccuSizer Fluidics module or AccuSizer Counter. If the instrument is to be moved use a cart where both modules can be placed on a clean, horizontal surface.

SHIPPING CARTON STORAGE

Once the shipping cartons are emptied, they should be stored in the event that the instrument needs to be transported to a different location. Care should be taken when relocating the instrument as the transit securing parts will not be fitted. Relocation by commercial operators or international shippers is not recommended.

CHECK LIST OF ITEMS DELIVERED

Major Components

AccuSizer Counter Module (A7000 – CTR)
AccuSizer AD Fluidics Module
Sensor Module (LE400-05)

Cables

USB Cable (Computer controller)
Control Port Cable (14 Pin LEMO Connector)
LE Sensor Cable - 10 Pin LEMO connector cable (for LE Sensor)
AccuSizer Power Cable

Accessories
Dilution Vessel, Tubing, Stir Bars and Syringes and Filters

50 mL Dilution Vessel Side Port
Dilution Vessel Strap
Dilution Cap Gasket
Red Cap for Dilution Vessel
Inlet Tubing (¼ 28 fitting or Luer tip on one end)
Drain Tubing, 2 legs (¼ 28 with fittings)
Extra Tubing
Stir Bars
Fuses (Fuse 5A Slo Blo)
Ferrule Kit
Disposable Syringes (5 and 10 mL)
Hex Key 9⁄64" Looped T-Handl

Test Standard

Micro Measurement Lab Standard
Certificate of Analysis

Software

AccuSizer System Software
AccuSizer User Manual (Hard copy and/or digital)

Sensor Cleaning Kit

Floss
Micor-90 Certified Cleaning Solution
1 - 10cc syringe
Calibration Curve for LE sensor (Hard copy and digital)

Certificates

Certificate of Validation (Certificate to be completed by validator)
Certificate of Functional Performance (Certificate to be completed by a representative of Entegris.)

The AccuSizer AD Fluidics, AccuSizer Counter, Sensor, documentation, accessories and cables have been carefully packed to avoid damage in transit, however, should any damage have occurred, contact your local Entegris representative immediately to inform them of any damage or shortages.

After checking that all the parts of the AccuSizer Autodiluter have been correctly delivered, the different modules can be connected together. A Entegris representative will coordinate the installation of the instrument with the user initially. If in the instrument is to be relocated it is recommended that the Unpacking and Installation section of this manual be used to correctly disconnect and reconnect all of the connections. Consult the manual provided with your PC for details on disconnecting and connecting the computer.

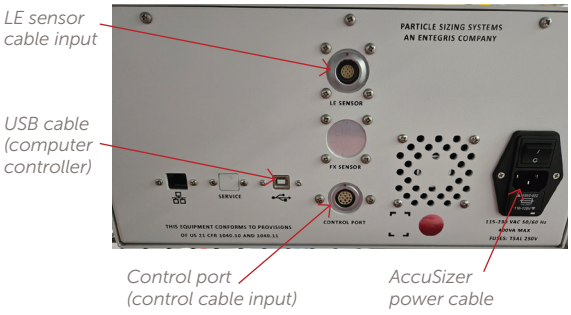
ACCUSIZER COUNTER INSTALLATION

Materials needed:

Flat-head screwdriver
Adjustable wrench
Hex Key 9⁄64" Looped T-Handl

1. The AccuSizer Counter and AccuSizer AD Fluidics modules should be placed immediately next to each other, along with the controlling computer, on a sturdy, level surface.
2. Connect the 3 prong AC power cable to the AccuSizer Counter to the receptacle directly under the ON/OFF switch. Do not plug into power supply.

⚠ **CAUTION: Before attaching the unit to AC power, the POWER ON/OFF switch must be OFF.**



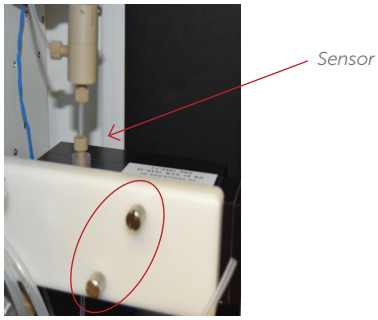
3. Connect the USB cable between the computer controller and the AccuSizer Counter.
4. Insert one end of the controller cable (larger diameter gray LEMO cable) into the socket labeled Control Port on the back of the AccuSizer Counter. Line up the red dots and push in firmly until you feel a click.
5. Insert one end of the LE Sensor cable (smaller diameter gray LEMO cable) into the socket labeled LE Sensor on the back of the AccuSizer Counter. Line up the red dots on the connector and the socket and push firmly.
6. Leave power OFF.

SENSOR MODULE INSTALLATION

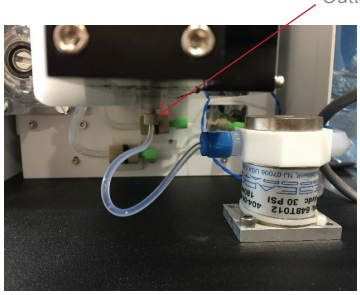
Material needed:

Flat-head screwdriver

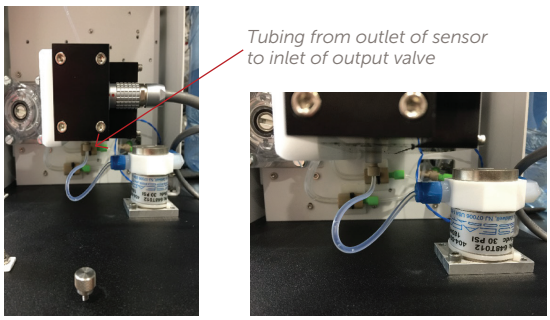
1. Remove the front and two side shipping panels from the AccuSizer AD fluidics module.
2. Using the two thumb screws located on the white Delrin mounting bracket, align the screw holes on the side of the sensor and screw in the sensor to the bracket.



3. Attach the available tubing to inlet and outlet of the sensor.



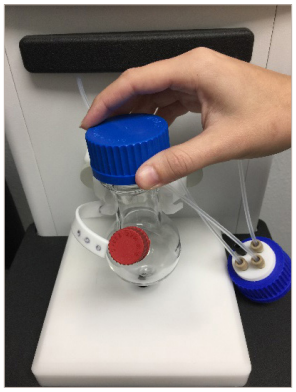
4. Connect outlet tubing from the sensor to the pump by screwing in the fittings located at the end of the outlet tubing to the output valve.



5. Now that the sensor is installed, install one side panel of the AD Fluidics module followed by the front panel and then the remaining side panel.

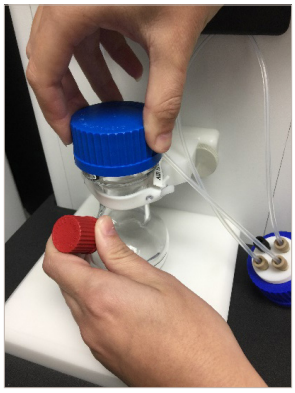
DILUTION CHAMBER INSTALLATION

1. Hold the Dilution Vessel securely by hand and place the Luer tip of the Dilution Vessel in to the Sensor tube.



2. Place the Vessel Strap around the Dilution Vessel and secure to the white Delrin holder.

3. Remove the Vessel Cap without the tube connections.



4. Replace with the Vessel Cap with the sample inlet tube and diluent input tube.

5. Screw the Vessel cap with the sample inlet tube and diluent input tube.

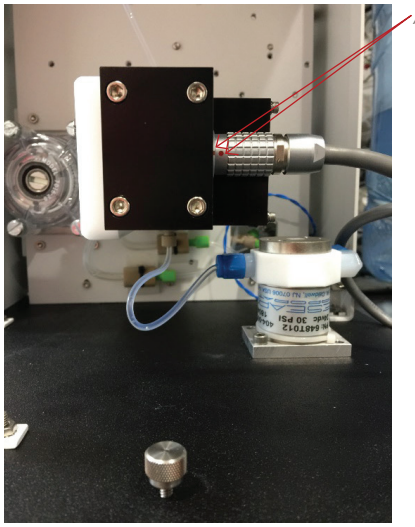
CONNECTIONS

Materials needed:

Adjustable wrench
Hex Key 9⁄64" Looped T-Handl

1. Connect the gray sensor cable with the 10 pin LEMO connectors on both ends between the LE Sensor and the connector marked Sensor on the AccuSizer Counter Module.

2. Make sure that the red dots on the cable are aligned with the red dot found on the sensor.



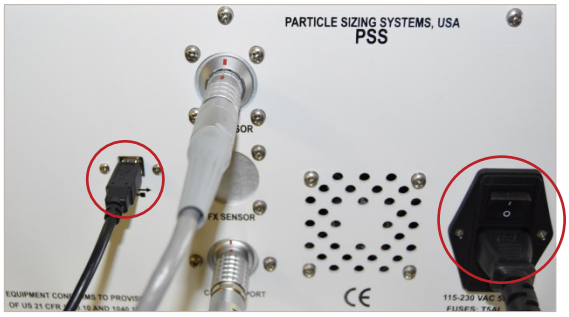
3. Attach the gray cable with 14 pin LEMO connectors on both ends between the AccuSizer Counter module port marked Control Port and the Accu-Sizer AD Fluidics module port marked Control Cable.

4. Connect inlet tubing to the bulkhead connector labeled INLET located on the back of the AccuSizer AD. Insert the loose end of the tubing into the diluent source. The fresh diluent is used for autodiluting the sample.

5. Connect tubing to Sample Drain connector labeled DRAIN on back of the AccuSizer AD Fluidics module and place free end of tubing into a drain bucket. It is important that the drain bucket be placed lower than the height of the system.
6. Connect the power cable between the power source and the AccuSizer A7000 Counter module. Please refer to the Environmental conditions section of this manual for power requirements.

⚠ **CAUTION: Only use power cables supplied by Entegris to ensure proper operation.**

7. Connect the USB cable between the computer Serial port and the USB connector on the AccuSizer A7000 Counter module.



SOFTWARE INSTALLATION

If a computer controller was purchased from Entegris, the software will already be installed. If however, the computer controller was not purchased insert the USB memory stick containing the software and run the AccuSizer Setup executable.

PREREQUISITES

Before installing the software, make sure that the operating system is updated with the latest service packs and security patches. The software requires the Microsoft .NET Framework 4.5. The software installer will automatically attempt to install it for you, but this requires an internet connection. You will also need Windows 7 SP1 as a minimum to operate the software. Since the installation time of the Framework can take a considerable amount of time, it is recommended to preinstall it before installing the software.

Installing the software requires administrative rights on the local PC.

INSTALLATION

The installation of the AccuSizer software is done through the standard setup procedure.

Using Windows Explorer, open the folder where the setup files are stored, then double click on the setup icon. The installation wizard will appear.

The installer will automatically detect if there is any prerequisite missing and will attempt to install them if an internet connection is available. Otherwise it will prompt you to install the requested software first.

UPGRADING

The installer will automatically detect previous releases of the software up to version 2.0.0 and upgrade them silently.

Data files are not fully compatible with software versions older than 2.0.0. Upgrading older software versions is not supported and must not be attempted.

SOFTWARE INSTALLATION AND 21 CFR PART 11 ACTIVATION

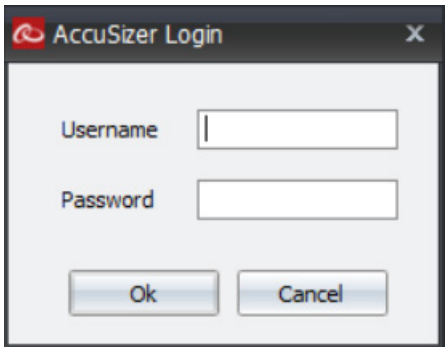
Install AccuSizer System Controller Software.

Load the software installation files onto the PC.

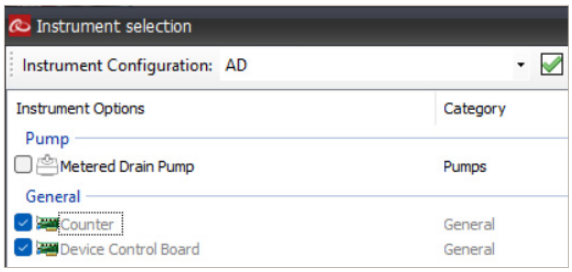
Run AccuSizer Setup.EXE.

1. Confirm that the AccuSizer icon displays on the desktop.

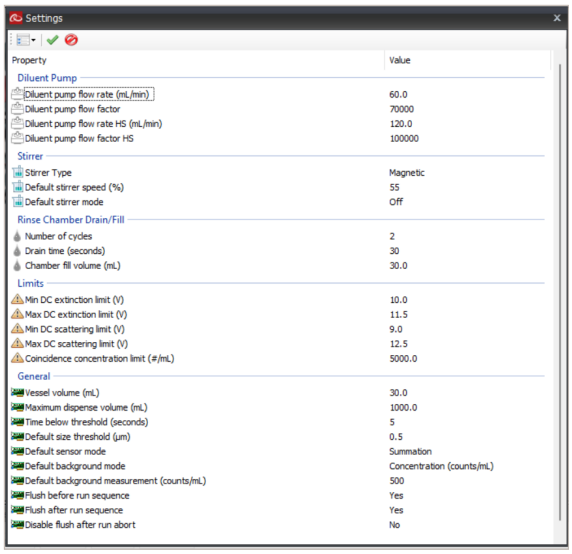
2. Log-in using the following information:
   Username: admin
   Password: admin



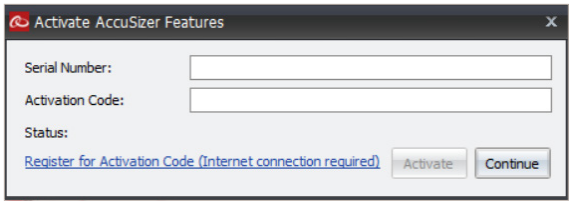
3. Click Instrument, Select Instrument, select AD in the Instrument Configuration window, and click on the green check icon.



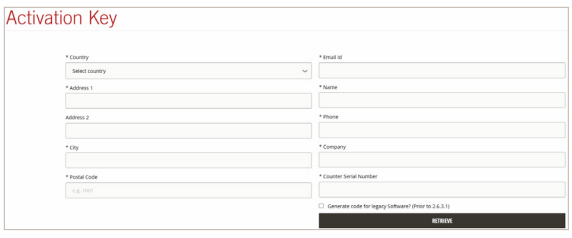
4. Click Instrument, Instrument Settings and enter the diluent pump flow factor displayed on the dilution fluidics. Other settings can be also be adjusted here. Click the green check icon.



5. To activate the 21 CFR part 11 software click on Help, Activate Features. The Activate AccuSizer Features window displays. The codes that are needed to enter into the following fields can be obtained by clicking on the http address provided.



6. The AccuSizer Activation Code Retrieval window displays. Complete all fields followed by clicking on Retrieve.



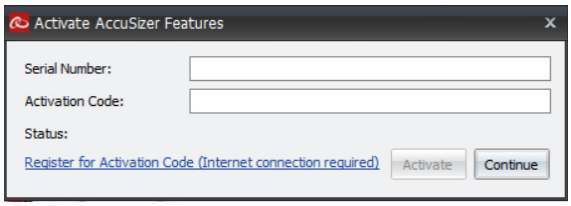
7. Once the form has been submitted, access your e-mail account and look for an e-mail from Entegris with the Subject line: Your AccuSizer activation code. The contents of the e-mail will appear as seen in the window located below.

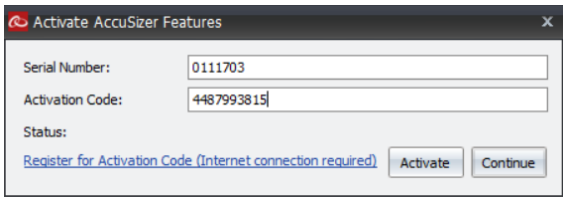
> Your CFR part 11 activation code for AccuSizer is:
>
> XXXXXXXXXX
>
> You have requested a copy of your code **1** times.

8. Only the codes for your instrument configuration will be provided. If you did not purchase the 21 CFR Part 11 compliant software package then the code will not be provided. If you wish to purchase these packages, contact Entegris. Once the upgrades are purchased activation codes will be provided.

   NOTE: The codes shown in the above e-mail are only examples.

9. Enter the Serial Number and CFR Code and then click on Activate.

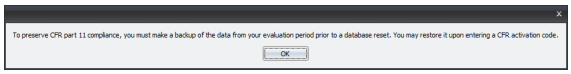




The status will change to:

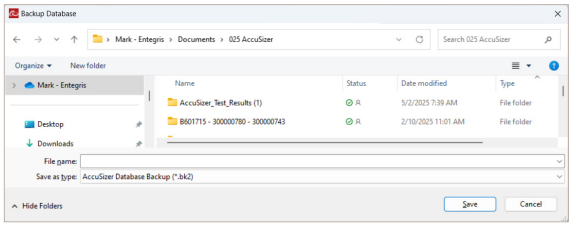
21 CFR Part 11 has been successfully activated.

10. Once the codes are entered click on Activate, you will be asked to create a database backup file.

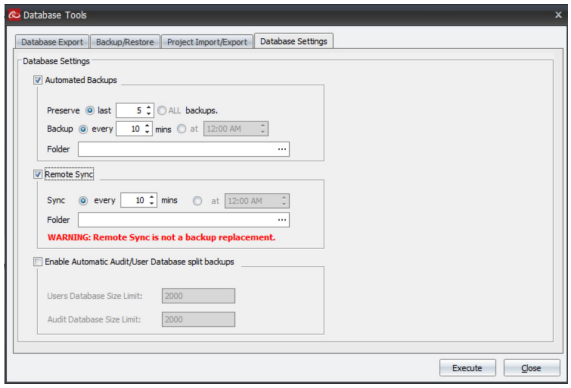


11. Click on OK to continue.

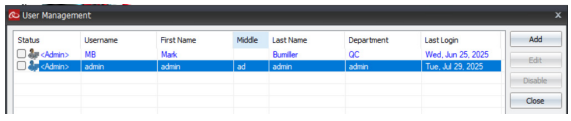
The backup database window displays prompting for a directory name of where the database backup is to be stored and then continues to prompt for a file-name under which the data will be stored.



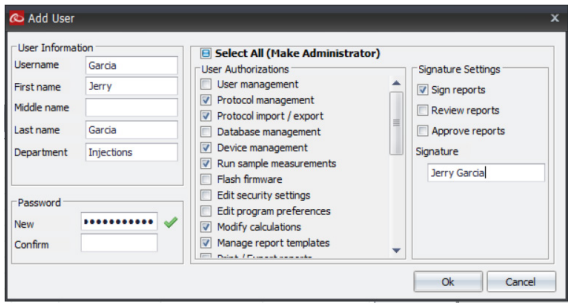
12. Once this information is entered, click on Save.
13. Select Database Tools from the File pull down menu.



14. Click on the Backup/Restore tab to load the database.
15. Click either Restore empty default data base if you want a new database or click on Restore backup. In either case, you will automatically be logged out of the software.
16. Access User Management from the Options pull down menu.



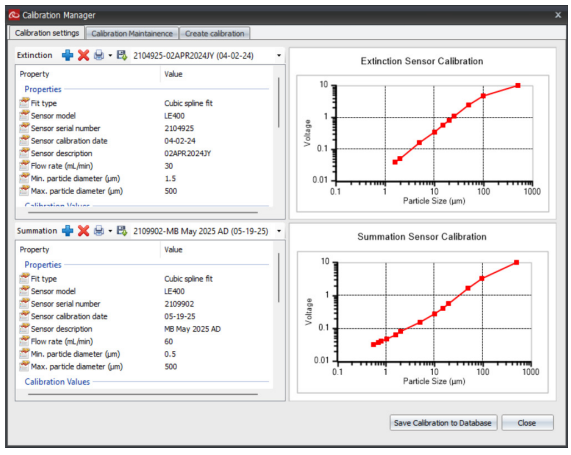
17. Select Add.



18. Create a new User Login ID assigning all permissions. This will serve as the Administrator of the software.
19. When finished, click on Ok.
20. Log out and re-login using the new username and password.
21. Be sure to keep track of the username and password. This information cannot not be recovered.

During the installation of the software a prompt to install the Extinction and Summation calibration curves will display. If it did not display, follow these steps to install both calibrations:

1. Click on Calibration icon.
2. Click on displayed to the right of Extinction. From the window that displays, select the calibration file to be loaded. (Calibration File format: *.sns)

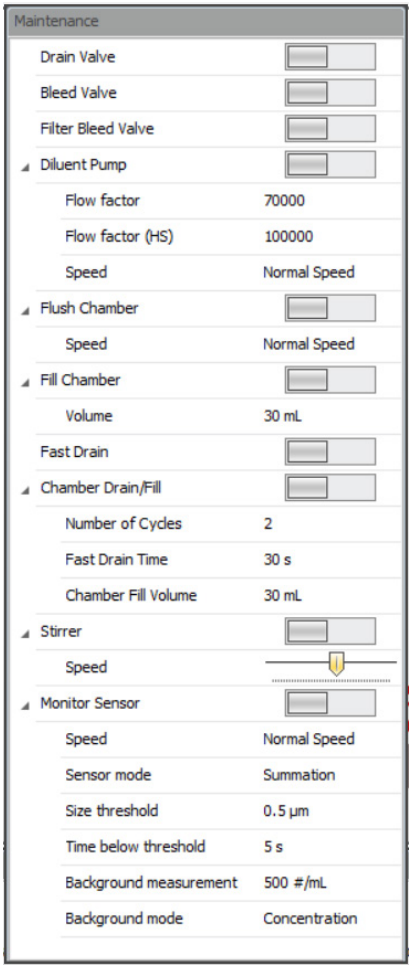


3. Repeat prior step to load the Summation File. Click on Close.

FLUSHING THE SYSTEM

It is good practice to prepare the instrument for a sample run by flushing the chamber so that there is no chance that any residual from a previous sample run is left behind. Follow these steps to flush the instrument and review the count rates to ensure cleanliness of the system:

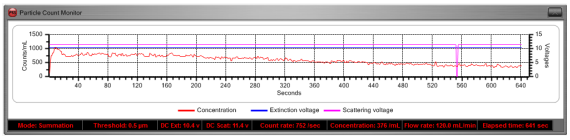
1. Click on the icon or click on the Maintenance tab.



2. Locate Flush Chamber and slide the switch to the right (On position).
3. Select Normal Speed from the pull down menu. The Particle Count Monitor window displays. Observe the counts. Keep flushing until the counts fall below about 500 counts/mL.
4. Bleed air out of the diluent filter:
   - Place a beaker under the metal tube bleed port in the front of the diluter
   - Open the Maintenance window
   - Turn on Filter Bleed Valve and Diluent Pump
   - Turn off Filter Bleed Valve and Diluent Pump once water starts to come through the bleed port in front of the diluter
5. Locate the Monitor Sensor section and enter the following parameters:

Speed	Normal Speed
Sensor mode	Summation
Size threshold	0.56 µm
Time below threshold	1 sec
Background measurement	100 #/mL
Background mode	Concentration

6. Slide the Monitor Sensor switch to the right (On position).
7. The Particle Count Monitor window displays. Observe the Sensor voltages located on the bottom portion of the screen. Make sure that there are within acceptable ranges.



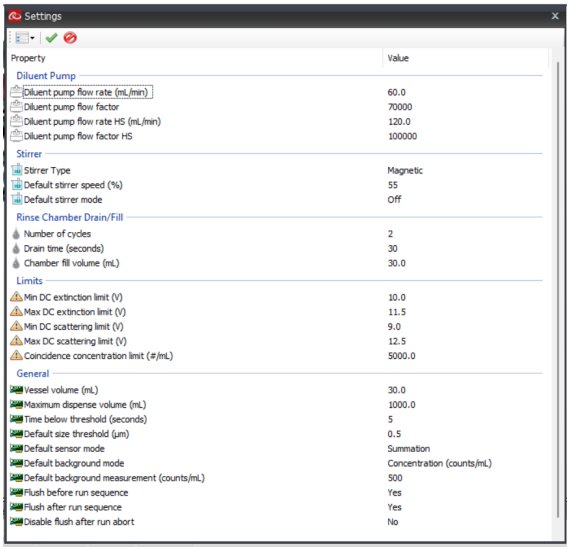
The sensor monitor will end automatically once the background level of 100 particles/mL is reached.

8. Click on the center of the main software window to Close when finished.

RUNNING A SAMPLE

SAMPLE SETUP USING INSTRUMENT SETTINGS AND DEFINING A PROTOCOL

1. Click on the Instrument Settings icon. The AD Settings window displays.



2. Enter the following information into the appropriate fields:

Diluent Pump	
Diluent pump flow rate (mL/min)	60.0
Diluent flow pump factor	Refer to label on Autodiluter for pump speeds.
Diluent pump flow rate HS (mL/min)	120
Diluent flow pump factor HS (mL/min)	Refer to label on Autodiluter for pump speeds.
Stirrer	
Default stirrer speed (%)	50
Default stirrer mode	On
Rinse Chamber Drain/Fill	
Number of cycles	2
Drain time (seconds)	30
Chamber fill volume (mL)	30.0
Limits (See NOTE below.)	
Min DC extinction limit (V)	
Max DC extinction limit (V)	
Min DC scattering limit (V)	
Max DC scattering limit (V)	
Coincidence concentration limit (#/mL)	
General	
Vessel volume (mL)	30.0
Maximum dispense volume (mL)	1000
Time below threshold (sec)	1
Default size threshold (µm)	0.56
Default sensor mode	Summation
Default background mode	Concentration (counts/mL)
Default background measurement (counts/mL)	100
Flush before run sequence	No
Flush after run sequence	No
Disable flush after run abort	No

NOTE: To obtain these limits, look at the label that is applied to the side of the sensor. Locate the Service Code. The first 3 digits indicate the scattering voltage. The second 3 digits indicates the extinction voltage and the last 4 digits indicates the month and year that the sensor was manufactured.

Example:

LE Sensor

Service Code: 115-107-0317
115 indicates that the scattering voltage for this sensor is 11.5
107 indicates that that extinction voltage for this sensor is 10.7
0317 indicates that the sensor was manufactured in March of 2017

Calculate Min/Max:

Remember these are the recommended tolerances for the sensor
To calculate the Min/Max for the extinction senor, +/- 0.5 volts.
To calculate the Min/Max for the scattering sensor, + 0.8 volts.
The coincidence concentration limit is set to 3500-4000 particles/mL.

3. Click Save and then Close to save the parameters set.

INSTRUMENT FEATURES

Using the instructions of the previous sections, the system is now connected. Take some time to familiarize with the features of the instrument.

This section provides a guide to identify the features of the system. A description of the theory of operation of the system is given in the AccuSizer Theory Manual (Part Number 998-001). An AccuSizer User Manual, that accompanies the instrument, provides a description of the software (Part Number 998-002). The AccuSizer User Manual is also accessible from the AccuSizer Software.

All AccuSizer systems consist of a Fluidics module (to transport the sample through the sensor), Counter module (pulse height analyzer) and Sensor (to count and size the particles). A computer is used to run the AccuSizer software that analyzes the raw data to provide the results as particles flow through the sensor they scatter and obscure the incident laser beam. This light interaction creates pulses that are proportion to the size of the particle. The counter converts these pulses to particle size and counts.

SENSOR

The LE Sensor features a collimated beam of light and two detectors for scattered and obscurated light to determine particle sizes over the range of 0.5-400 µm.

ACCUSIZER AUTOMATIC PARTICLE SIZER (AD) INSTRUMENT

The AccuSizer AD has the ability to detect low levels of particle aggregates several standard deviations away from the mean of the distribution. Often these aggregates are the difference between a good and bad sample.

The diagram below shows a typical system with the AccuSizer AD Fluidics and AccuSizer Counter.

A computer is used to run the AccuSizer software that analyzes the raw data to provide the results.

ACCUSIZER COUNTER (A7000 - CTR)

The AccuSizer Counter (pulse height analyzer) contains the electronics that control the AccuSizer AD Fluidics module and collects the raw data in 1024 size channels.

ACCUSIZER AD FLUIDICS

The AccuSizer AD Fluidics module is used to transport sample through the LE Sensor either with our without dilution and then analyze the sample using the Sensor that is mounted inside of the unit.

MAINTENANCE PROCEDURES

ACCUSIZER PREVENTATIVE MAINTENANCE

The main parts of the AccuSizer AD instrument that require routine maintenance are the AccuSizer AD Fluidics which houses the Sensor and tubing.

DAILY MAINTENANCE

Preventive maintenance for the AccuSizer AD can, and should be, performed on a daily basis.

- Always flush the system adequately to achieve the same background counts (#/mL) as was present before the particle size analysis. Verify low background counts. Observe the counts per second and the counts per ml on the status bar at the bottom of the window.
- The external tubing should be visually checked for deterioration, signs of wear, deposits, bacteria, etc. If any parts of the tubing are cracked or show signs of excessive wear they should be replaced.
- The Summation Voltage as reported in the Sensor Status Screen should read >10 Volts.
- Bleed the diluent filter.
  - Place a beaker under the metal tube bleed port in the front of the diluter
  - Open the Maintenance window
  - Turn on Filter Bleed Valve and Diluent Pump
  - Turn off Filter Bleed Valve and Diluent Pump once water starts to come through the bleed port in front of the diluter
- Observe the stir bar for rotation.
- Verify the dilution chamber volume. Observe the primary dilution chamber and note if there are any bubbles present along the top of the chamber. If bubbles are present, perform a Flush to force the air from the chamber. Tap the side of the chamber to aid in dislodging the bubbles.
- Visually inspect the AccuSizer AD Fluidics module for signs of diluent or sample leakage. Finger-tighten all tubing connections if liquid is leaking.

WEEKLY MAINTENANCE

Preventive maintenance for the AccuSizer AD can, and should be, performed on a weekly basis.

- Clean sensor. (Please refer to the Sensor Removal and Cleaning section of this manual.)
- Verify that the syringe is seated tightly. Turn the syringe by hand counter-clockwise until seated tightly. Do not overturn the syringe; the fittings will strip.
- Flush out incoming sample lines and loop.
- If the setup allows, disconnect the sample inlet line from the process and affix a large syringe filled with deionized water (DI) water or attach a pressurized water source to the sample tubing then flush with water.
- Flush the Loop by using the Loop Flush option found in the Maintenance window.
- After flushing the Loop continue on to flush the Chamber by selecting Flush Chamber from the Maintenance window. Lastly, flush the static mixer and sensor by selecting Monitor Sensor. Allow the water to flow for 2 minutes then stop the Flush process.

MONTHLY MAINTENANCE

The sensor calibration should be checked once every month with a single point standard reference material that is used in the calibration of the system.

- Verify that all tubing fittings are finger tight.
- Visually inspect all tubing in and out of the fluidics. Nuts can be over tightened with time and the ferrules can pinch the tubing. Tubing can swell over time when left in the diluent. Simply cut a portion of the tubing off or replace the entire length of the faulty tubing. If replacing the tubing, do not cut tubing straight across, cut the tubing on an angle to prevent the tubing end from suctioning to the diluent source container.

BI-YEARLY MAINTENANCE

- Replace the diluent filter. (Please see the Filter Assembly Replacement section of this manual.)

YEARLY MAINTENANCE

The sensor should be re-calibrated once every year depending on operating conditions and according to the sensor calibration procedure outlined in the, AccuSizer AD Calibration using AccuSizer Software (Manual Part Number 992-017). Calibration of a sensor can also be performed for a Service fee by a Entegris Representative.

SENSOR CALIBRATION

The accuracy of the AccuSizer AD instrument is dependent on the correct calibration curve of the sensor installed. A yearly calibration is recommended and should be carried out in accordance with the document entitled, AccuSizer AD Calibration using AccuSizer Software (Manual Part Number 992-017).

The following procedures are performed:

- Cleaning of Sensor and System Flushing
- Sensor Calibration Procedure - Summation Mode
- Sensor Calibration Procedure - Extinction Mode
- Calibration Verification

REPLACING FUSES

Periodically the fuses found in the power socket of the AccuSizer Counter will need to be replaced. Use the following steps for successful replacement:

Materials needed:

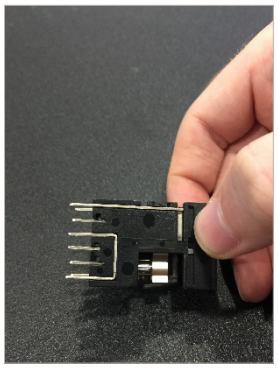
Flat head screwdriver
Fuses supplied

1. Ensure that the power is set to the off (0) position on the AccuSizer Counter.

2. Disconnect the counter from the power source and unplug power cable from power socket located on the back of the counter.

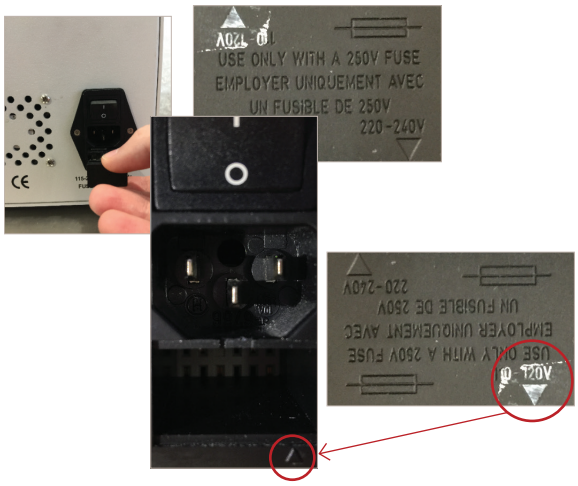
3. Position the flat head screwdriver at the top of the fuse box.

4. Gently pitch the screwdriver inward and then out to release the fuse box.
5. Slide the fuse box out. One fuse is located on each side of the fuse box.



6. Replace each fuse with a new one. New fuses are included in the accessories pouch packed with the instrument.

7. Once the fuses are replaced, slide the fuse box in its correct orientation back into the power socket until the outer cover is mesh with the rest of the socket. Take note of the direction in which the fuse box is replaced. If the AccuSizer Counter is working with 110-120 volts be sure to flip the fuse holder so that the arrow located below the 110-120V label aligns with the arrow on the frame of the fuse holder. If the AccuSizer Counter is working with 110-120 volts be sure to flip the fuse holder so that the arrow located below the 220-240V label aligns with the arrow on the frame of the fuse holder.



8. Plug the power cable from power socket located on the back of the counter and connect to the power source.

SENSOR REMOVAL AND CLEANING

Materials included in Sensor Cleaning kit:

Micro 90®Certified Cleaning Solution
Clean Super floss
30 mL bottle – empty
10 cc syringe
water

Materials needed:

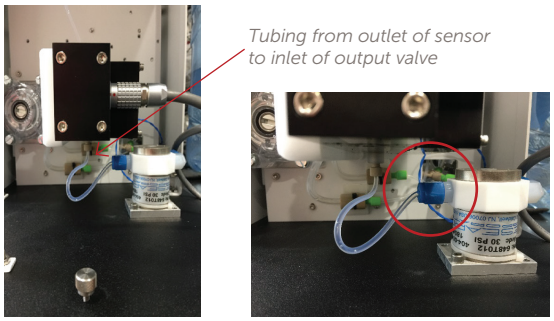
1 can pressurized air

NOTE: Do not replace Super floss with waxed dental floss. This will lead to the coating of the cell wall of the sensor.

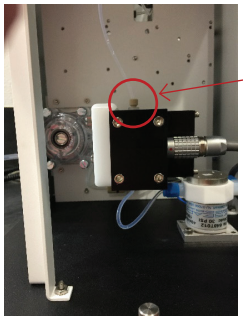
1. Drain all tubing leading to the LE Sensor.
2. Exit the AccuSizer software.
3. Power down the instrument which includes the computer and the AccuSizer Counter.

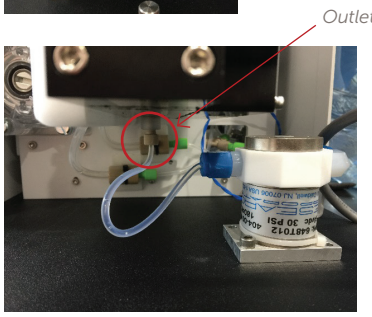
⚠ **WARNING: The sensor must be disconnected from the power source. Under no circumstance should the seal of the black anodized casing of the sensor be broken to gain access to the internal parts of the sensor while power is applied to the sensor. Doing so can lead to bodily harm. If the seal is broken, the warranty is null and void.**

4. Disconnect outlet tubing from the sensor to the valve by screwing in the fittings located at the end of the outlet tubing to the output valve.

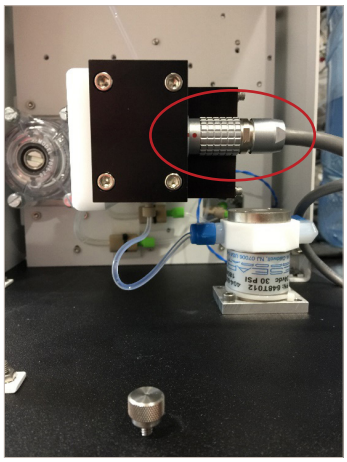


5. Disconnect tubing to the inlet and outlet of the sensor.





6. Disconnect the LEMO connector from the LE Sensor.



7. Holding the sensor with one hand, loosen the two thumb screws located on the white Delrin mounting bracket until the sensor is free with the other hand.

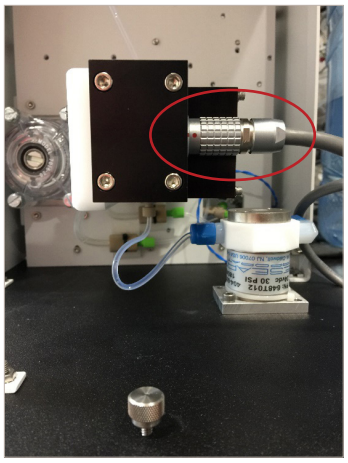
8. The sensor is now free.

⚠ **WARNING: Breaking the seal of the sensor while power is applied, will expose the sensor classifying it as Class 3B. Exposure can lead to bodily damage. If the seal is broken, the warranty is null and void.**

9. If needed, using a can of pressurized clean air, back flush the sensor by spraying from the bottom of the sensor up. This will dislodge any particles that may be clogging the sensor.

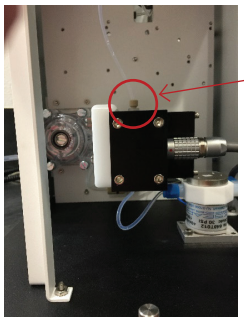
NOTE: Do not use common house air. It contains oil contaminants that can coat the sensor windows.

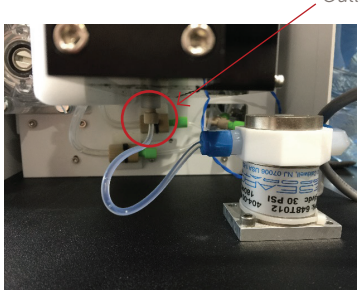
10. Using water dilute a small amount of Micro 90® into the empty bottle supplied. Store the remainder.
11. Thread the long, white end of a single strand of the Super floss provided into the orifice of the sensor until the thick part of the floss is in contact with the Delrin fitting.
12. Using the Micro 90® provided soak the thick part of the floss. Be sure that the thick part of the floss is wet.
13. Gently pull the thick end of the floss back and forth four or five times through the sensor to scrub all four sides of the sensor flow channel.
14. Remove the floss from the sensor without pulling the blue wax end through the sensor.
15. Flush the sensor using a clean 10cc syringe and particle free distilled water.
16. Back flush the sensor by spraying pressurized air from the bottom of the sensor up.
17. Through visual inspection, hold the sensor up to the light to see if the optical path is free of any blockage.



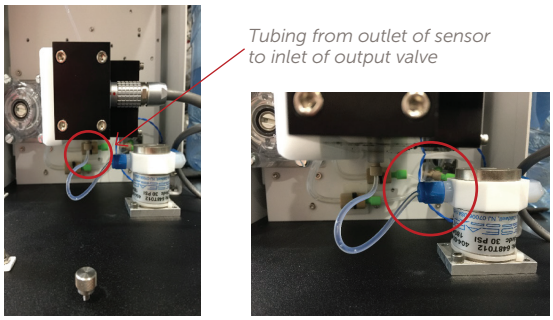
18. The sensor is now clean.

19. Connect the LEMO connector from the LE Sensor.

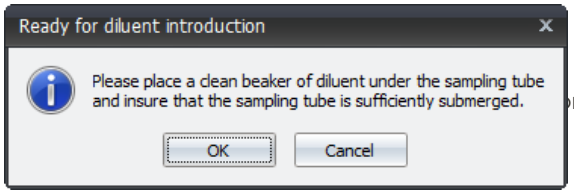




20. Using the two thumb screws located on the white Delrin mounting bracket, align the screw holes on the side of the sensor and screw in the sensor to the bracket.



21. Attach the available tubing to inlet and outlet of the sensor.
22. Connect outlet tubing from the sensor to the pump by screwing in the fittings located at the end of the outlet tubing to the output valve.
23. Now that the sensor is installed, install one side panel of the AD Fluidics module followed by the front panel and then the remaining side panel.
24. Power up the instrument which includes the computer and the AccuSizer counter.
25. Access the AccuSizer software.
26. Be sure that fresh diluent is being introduced into the AccuSizer AD Fluidics.



29. Observe the count rate and the sensor voltages. This is indicative that there is flow through the sensor confirming that it is no longer blocked or dirty.

TROUBLESHOOTING

DRY SENSOR

Do not allow the sensor to run dry. The residue from the sample will build up a film on the cell of the sensor that will affect the baseline noise level and particle sizing capabilities of the sensor.

CLEAN BASELINE

Always flush the system after every run and make sure that it returns to a clean baseline. Leaving chemicals in the cell can deteriorate the optical surface.

SOLVENT COMPATIBILITY

Whenever using a solvent always check to make sure it is compatible with all of the tubing and components inside the system. If any doubt exists concerning how the solvent will affect the tubing check by submerging a small piece of tubing in the solvent and monitor its physical properties for any change. Also refer to Appendix B: Filter and Tubing Compatibility of the AccuSizer User Manual (Part Number 998-002).

After using a solvent, always clean and flush the system with proper materials to return to an aqueous based system.

DILUENT GRADE

Always use the cleanest grades of diluents available when performing particle size analysis. There is no concrete number when it comes to background counts but if the maximum count rate of the sensor is 10,000 particles per ml and the background is hovering around 1000 counts per ml then your signal to noise ratio is 10 to 1 or 10%. This may be fine for some applications but if the analysis calls for identifying small amounts of material on the tail of a distribution this background level will not be acceptable. It is always true that cleaner is better but one has to weigh the benefits versus the time needed to further clean the diluent when making an analysis. In most cases backgrounds below 100 particles per ml are acceptable.

SEAL DETERIORATION

Avoid running the pump dry. Running the pump dry for extensive periods will ruin the seals inside.

HIGH BACKGROUND COUNTS

System background does not come down. This is usually an indication that the system's tubing and sensor are dirty OR the glassware used to introduce the diluent is dirty.

Possible Causes:

- Dirty glassware
- Particulate trapped in the tubing between the chamber and the sensor
- Water source is dirty
- Water Filter has reached maximum load and is shedding
- Water filter is too new
- Aerated Diluent
- Air in the Fluidics

Remedies:

- Flush the system with a solution of 5% micro cleaner in water.
- Removal of the sensor may be required to clean the optical path. This is not a difficult task, however care must be taken to prevent against dropping the sensor.

⚠ **CAUTION: Particle Sizing System accepts no liability in case of sensor damage during cleaning.**

- Clean and rinse dilution chamber thoroughly.

⚠ **CAUTION: Do not use any paper products to clean the inside of the dilution chamber. Commonly used hand towels shed a tremendous number of particles when applied to surfaces.**

- Remove and clean or replace the tubing.
- Let diluent sit over night before using it to allow small air bubbles to percolate out.
- Examine all tubing for bubbles. One can remove bubbles by tapping on the tubing while the system is flushing to release the bubbles from the sides of the tubing.

NO COUNTS

No signal in the Monitor Sensor window. By clicking on Monitor Sensor, the sensor health can be determined by looking at Sensor Voltages and viewing the electronic pulses that are being generated by the sensor.

Possible Causes:

- Sensor is dirty.
- Sensor cable is not connected properly to the AccuSizer counter and LE Sensor.
- Serial cable is not connected properly to the AccuSizer counter and computer.
- Power not applied to the AccuSizer counter or computer.

Remedies:

- Make sure that the sensor cable is plugged into the AccuSizer Counter and the Sensor, and that the serial cable between the counter and the computer is in place with a good connection.
- Make sure that the instrument is monitoring the correct serial port.
- Make sure power is applied to the AccuSizer Counter and computer.
- Verify diluent flow.
- Verify sensor voltages are operating within specification.

COUNTS ARE TOO LOW (0 #/ML)

Possible Causes:

- Flow rate of diluent is too fast
- Out of diluent
- Water filter is air locked
- Impeded diluent flow path
- Sensor voltages are low
- Sensor calibration is off
- Operator/Pipette error

Remedies:

- Calibrate flow rate of unit using a graduated cylinder and a stop watch to monitor the rate of diluent flow from the drain line while the unit is in flush mode.
- Replace diluent source and be sure to bleed the air filter.
- While system is in flush mode, bleed the water filter in the rear of the unit using the top twist valve.
- Check flow rate as in (1) and if more than 50% out of spec (60 ml/min) start at the diluent inlet line and systematically check all tubing for kinks or blockage. A syringe can be used to push water through each section of tubing once removed from the unit.
- Clean the sensor.
- Check the system with a single point latex standard to ensure the size is reported correctly.
- Calibrate pipette, always do the measurement three times to ensure there is in fact a problem and/or have another operator perform the measurement.

COUNTS ARE TOO HIGH

Possible Causes:

- Sensor calibration is off
- Flow rate of diluent is too slow
- Air bubbles from the fluidics
- Air bubbles from the sample
- System was not clean before sample analysis

Remedies:

- Calibrate flow rate of unit using a graduated cylinder and a stop watch to monitor the rate of diluent flow from the drain line while the unit is in flush mode.
- Run an analysis of the clean diluent. Air bubbles often show as a peak above 200um.
- Introduction of the sample can cause an increase in counts.
- See High Background Counts.

INSTRUMENT VOLTAGE

There is a flat black line across the screen at either 1 or 10 volts when using the Monitor Sensor and viewing the Instrument Voltage. This is usually an indication that the sensor is blocked by something and that the signal is not reaching baseline. This can be a partial block that even may allow fluid to flow through the sensor.

Remedy:

- Remove and clean the sensor as well as all of the tubing before the sensor in the instrument flow path. Refer to the Sensor Cleaning section of this manual.

BUBBLES IN DILUENT

There are air bubbles in the diluent (water supply). In some water filtration systems the water is pressurized through various stages of filters and during this process air is pressurized into the water. When the aerated water is placed in the glassware the pressure is reduced and the air starts to degas out of the liquid. This causes the instrument to count the air bubbles as though they are particles that can have a major effect on the particle size distribution.

Remedies:

- Sonicate and heat the liquid to de-gas.
- Draw a vacuum on the liquid to de-gas.
- Allow the diluent to sit for several hours before use will often remedy the situation.

PUMP IS ON AND THE DILUTION CHAMBER DOES NOT FILL

Possible Causes:

- Diluent reservoir is empty
- Air trapped in the filter (occurs commonly when the system runs dry and the diluent tank has to be refilled)
- Pump is not pulling fluid

Remedies:

- Open the finger tight bleed valve at the top (outlet side) of the filter and choose Fill Chamber from the Maintenance window of the AccuSizer software.
- The micro pump being used in the AccuSizer ADFluidics is not designed to have significant suction power it is designed to pump a consistent accurate flow of liquid. It does not work well when it is not primed and it has to pull diluent that is located at a much lower point. Once the pump is primed it can achieve tremendous pressures at very consistent flow rates. You can also initiate the priming by initiating high flow. This increases the suction power of the pump enabling it to pull liquid easier.

CHAMBER EMPTIES DURING AUTODILUTION

Possible Causes:

- The air line is not sealed and the gravity drain is pulling the diluent out faster than the pump is pushing it into the dilution chamber.
- The dilution chamber cap is not sealing properly.
- Injection port cap is not sealed.
- Dilution chamber to sensor tubing is not sealed.

Remedies:

- Make sure the airline is sealed by checking the fittings. Test the ability of the air valve to open and close (seal) on command. The user can push air through the disconnected air line and actuate the air valve to test.
- Inspect the O-rings on the dilution chamber cap for excessive wear or absence. Refit the cap into the dilution chamber.
- Inspect the cap and threads on the glass dilution chamber for cracks. Ensure the rubber in the cap is present. Tighten the cap to finger tight.
- Check all tubing and fittings for seal.

WATER COMES OUT OF AIR LINE AT THE BOTTOM OF THE UNIT

Possible Cause:

- Operator fills dilution chamber and forgets that the system is filling.

Remedy:

- When filling the system be sure not to overfill the dilution chamber. Doing so will result in diluent exiting out of the air line and out of the bottom of the fluidics. If this occurs, drain the air line by removing the top cap opening up the air valve and letting the line gravity drain. Then replace the top cap and close the air valve the system will be ready to operate. A can of pressurized air may also be used.

SYSTEM WILL NOT DRAIN

Possible Causes:

- The system drains by a gravity feed.
- There is air in the drain line.
- Drain line or air line is blocked.
- The system or sensor may be clogged by a large particle.
- The valve is faulty.

Remedies:

- The end of the drain line must to be placed at least 2 feet below the dilution chamber to provide enough gravity potential to drain the system. Also it is important to make sure that the drain line does not become submerged below the water level in the drain tank. This can cause significant back pressure not allowing the system to drain.
- This causes a block in the drain line that the gravity suction alone cannot overcome. This problem occurs after draining the system completely and then filling the dilution chamber. To solve, activate the flush cycle for at least 1 minute after every drain cycle to ensure that all the tubing is filled with diluent and proper gravity pressures can be maintained.

- Open the dilution chamber to air (remove top cap or injection port cap) and open the drain valve by manually activating the drain. If the system drains in this mode then that means the air line is either pinched shut or that the air valve is malfunctioning. Check the function of the air valve using a source of pressurized air and actuating the valve. If the free flow of diluent from the drain line is impeded in any way the system may not drain. The Drain Valve may also be faulty and can be checked with pressurized air and actuating the valve.
- Fill a large syringe with clean diluent, attach it to the drain line, open the air line and back-flush the sensor until the particle in the flow path dislodges back into the autodilution chamber. Replace the dilution chamber with a clean one. Remove and clean the sensor as per Sensor Removal and Cleaning section of this manual.

SENSOR VOLTAGES ARE TOO LOW

Possible Causes:

- Sensor is not connected to counter.
- AccuSizer Fluidics may be dirty.
- Air is trapped in sensor.
- Sensor is dirty.

Remedies:

- Check electrical connection between counter and sensor.
- Flush system repeatedly.
- Start a flush and tap the tubing above and below the sensor to release air bubbles.

SENSOR VOLTAGES ARE TOO HIGH

Possible Cause:

- Sensor dirty.

Remedy:

- Clean Sensor – Refer to the Sensor Removal and Cleaning section of this manual. If still high, i.e. > 12.5V, Contact Entegris.

TOP CAP POPS OFF

Possible Causes:

- Excess pressure exists in the dilution chamber.
- The drain may be clogged and the fluid may not be able to exit the system.

Remedies:

- It can occur when pumping diluent into the chamber and not opening the air valve, a clog in the air line or drain line during the flush cycle. The top cap pops off at very low pressures ensuring that the system will not build up pressure and crack the glass.

⚠ **CAUTION: The top cap is not to be forced on to the glass with a great deal of pressure. It should be placed into the ground glass joint and secured with slight pressure forming an air tight seal.**

The drain may be clogged and the fluid may not be able to exit the system. By continuing to pump diluent into the dilution chamber during a flush or autodilution run cycle the pressure in the dilution chamber builds up and the top cap pops off.

APPENDIX A: CHEMICAL COMPATIBILITY

The identification of chemicals and the sensor configurations required for operation.

CHEMICAL	GLASS
Acetone	Compatible
Ammonium Hydroxide	Compatible
BOE (Buffered Oxide Etch)	Compatible
Developers	Compatible
Dimethyl Formamide	Compatible
Ethylene Glycol Monethyl Ether Acetate	Compatible
H_3PO_4/HNO_3/Acetic Acid	Compatible
Hydrochloric Acid (< 37% concentration)	Compatible (Liquid)
Hydrofluoric Acid	
Hydrogen Peroxide	Compatible
Isopropyl Alcohol (IPA)	Compatible
n-Butyl Acetate	Compatible
n-mothyl Pyrilidone (NMP)	Compatible
Nitric Acid	Compatible
Phosphoric Acid	Compatible (All Temps.)
Potassium Hydroxide	Compatible
Propyl Glycol Monethyl Ether Acetate	Compatible
Sodium Hydroxide	Compatible
Sulfuric Acid	Compatible
Tetramethylammonium Hydroxide	Compatible
Xylene	Compatible

If questions arise concerning the chemical compatibility of a chemical or a chemical blend, contact Entegris prior to performing sample analysis.

APPENDIX B: TECHNICAL SPECIFICATIONS

ACCUSIZER AD SPECIFICATIONS

Specifications	AccuSizer AD Instrument
Samples/Applications	Water, Injectables, Clean Chemicals
Sensor	LE400-05; 0.5-400 µm, light extinction and scattering, summation calibration, particle sensitivity to 10 PPT, concentration limit ~ 9000 particles/mL, size accuracy 2%, count accuracy 15%, recommended flow rate = 30 mL/min, but can be calibrated at other flow rates depending on configuration.
	Physical Size: 6.5"w x 2⅜"d x 2"h, 1.6 lbs.
Wet or Dry	Aqueous or Organic
Dimensions	AccuSizer Counter: 12"w x 18"d x 7" h, 18.6 lbs.
	AccuSizer AD Fluidics: 10" w x 18"d x 22" h
Wetted Surfaces	Glass, Teflon, Kel-F, Viton (optional Kalrez replacement)
Requirements	Waste reservoir
Software Options	AccuSizer Software
	AccuSizer 21 CFR Part 11 compliant software
Computer Requirements	Basic computer or laptop with USB port. Windows 7 operating system or better. Suggested 4 GB of RAM and 200 GB hard drive storage.

LIMITED WARRANTY

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