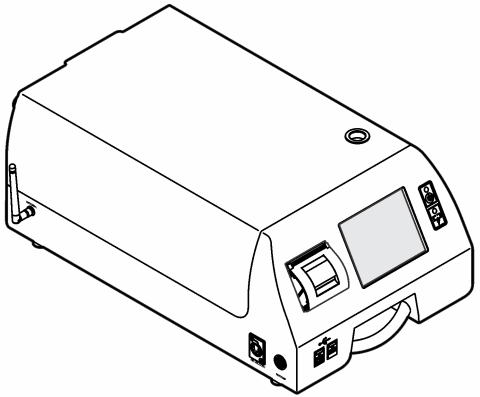
DOC026.53.80359

MET ONE 3411

08/2013, Edition 1, Firmware version 4.08.XX

User Manual



Specifications

Specifications are subject to change without notice.

Instrument specifications

Specification	Detail
Power requirement	100–240 VAC, 3.4 A maximum, 50–60 Hz to the AC-to-DC power supply; 24 VDC and 75 W to the instrument
Installation category	I
Protection class	III
Pollution degree	2
Altitude	2000 m (6562 ft)
Light source	Helium-neon laser, Class 3R Laser (IEC/EN), Class 3A Laser (CDRH), 5 mW maximum at 632.8 nm
Pump type	Air vacuum, rated for continuous use
Count display	Color ¼ VGA TFT touch screen
Interface	Windows CE®-based
Maximum count shown	9,999,999
Delay time	00:00:06 to 23:59:59
Sample and hold times	00:00:01 to 23:59:59
Count alarms	1 to 9,999,999 counts
Data storage	50 to 5000 samples, scrollable on Historical Data review screen 3000 is the default value
Count cycles	Up to 100 while in automatic mode
Locations	Up to 999
Exhaust port	3/8-in. NPT thread

Specification	Detail
Outputs	Ethernet–10Base-T/100Base-TX
	RS485 Serial
	RS232 Serial
	Optional wireless–802.11 b/g compatible
	USB Client (Version 1.1)
	USB Host (Version 1.1)
	Auxiliary (alarm and scan probe)
Manifold	Supports A3432, 32-port manifold system (available on 1 CFM units only)
Communication protocols	Modbus TCP, Modbus RTU, Serial FX
Inputs	Air velocity probe, relative humidity/temperature probe
Auto CDA purge	Purge solenoid activated by connection to CDA
Enclosure material	Stainless steel (passivated)
Weight without battery	15.9 kg (35 lb)
Size (W x D x H)	33 x 56 x 23 cm (13 x 22 x 9 in.) including protrusions, handles and feet
Environment, operation	0 to 40 °C (32 to 104 °F); 10 to 90% relative humidity, non-condensing
Environment, storage	–40 to 50 °C (–40 to 122 °F); 0 to 98% relative humidity, non-condensing
Certifications	CE, C-Tick, KC, FCC, IC, CDRH laser accession no. 9020917-023

Sample measurement specifications

Sampling	
Particle size ranges and standard channels	0.1, 0.2, 0.3, 0.5, 1.0, 5.0 µm
Flow rate	28.3 L/min (1.00 cfm) ± 5% (default factory setting)
Zero count	Conforms to ISO 21501-4 and JIS B9921. 1 count or less in 5 minutes, 95% confidence level
Coincidence loss	5% at 1,765,000 particles/m^3 (50,000 particles/ft^3) per ISO 21501-4 method
Count efficiency	50% for 0.1 µm; 100% for 0.15 µm. Fully complies with ISO 21501-4 and JIS B 9921.

Battery specifications

Specification	Detail
Battery type	Lithium ion smart battery; can be charged, ejected and changed without disruption to the system.
Battery life during operation	3 hours minimum[1]
Battery recharge time	6.75 hours minimum, 10 hours maximum
Power	14.4 VDC, 6.6 Ah (2x)
Battery weight	0.66 kg (1.45 lb)

[1] With two fully-charged batteries in a 1.0 CFM unit sampling for 20 minutes (1 m^3 sample), print record, a 5-minute hold time (simulating a move to new location), then repeating this cycle. The backlight time-out set to 2 minutes.

General information

In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website.

Safety information

NOTICE

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

Use of hazard information

⚠ DANGER

Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

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

⚠ CAUTION

Indicates a potentially hazardous situation that may result in minor or moderate injury.

NOTICE

Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol on the instrument is referenced in the manual with a precautionary statement.

	This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.
	This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and/or electrocution exists.
	Delicate internal electronic components can be damaged by static electricity, resulting in degraded performance or eventual failure.
	This symbol indicates a laser device is used in the equipment.
	This symbol identifies the location of a fuse or current limiting device.
	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August of 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of-life equipment to the Producer for disposal at no charge to the user. ***Note:*** *For return for recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment, producer-supplied electrical accessories, and all auxillary items for proper disposal.*

Compliance

CLASS 1 LASER PRODUCT	This symbol indicates that the instrument is a Class 1 LASER product.

This product complies with IEC/EN 60825-1:2007 and 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007. FDA accession number: 8721904-033.

This product is also CE compliant. Contact the manufacturer for complete compliance details.

Certification

Canadian Radio Interference-Causing Equipment Regulation, IECS-003, Class A:

Supporting test records reside with the manufacturer.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de classe A répond à toutes les exigences de la réglementation canadienne sur les équipements provoquant des interférences.

FCC Part 15, Class "A" Limits

Supporting test records reside with the manufacturer. The device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. The equipment may not cause harmful interference.
2. The equipment must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their expense. The following techniques can be used to reduce interference problems:

1. Disconnect the equipment from its power source to verify that it is or is not the source of the interference.
2. If the equipment is connected to the same outlet as the device experiencing interference, connect the equipment to a different outlet.
3. Move the equipment away from the device receiving the interference.
4. Reposition the receiving antenna for the device receiving the interference.
5. Try combinations of the above.

Wi-Fi devices

NOTICE

Network and access point security is the responsibility of the customer that uses the wireless instrument. The manufacturer will not be liable for any indirect, special, incidental or consequential damages caused by a breach in network security.

Country-specific approval for Wi-Fi devices

⚠ CAUTION

Electromagnetic radiation hazard. Make sure that the antenna is kept at a minimum distance of 20 cm (7.9 in.) from all personnel in normal use. The antenna cannot be co-located or operated in conjunction with any other antenna or transmitters.

Products with the wireless option contain a modular RF Wi-Fi device that operates in the 2.4 GHz range.

- United States FCC ID: R68WIPORTG
- Canada IC ID: 3867A-WIPORTG

Country	ISO31662 letter code	Country	ISO31662 letter code
Austria	AT	Poland	PL
Belgium	BA	Portugal	PT
Denmark	DK	Spain	ES
Finland	FI	Sweden	SE
France	FR	United Kingdom	GB
Germany	DE	Iceland	IS
Greece	GR	Norway	NO
Hungary	HU	Switzerland	CH
Ireland	IE	Turkey	TR
Italy	IT	Netherlands	NL
Mexico	MX	—	—

Regulatory RF device approvals

- FCC: Approved as a Modular Device under a TCB Grant of Authorization. FCC ID: R68WIPORTG
- IC: Approved as a Modular Device under Certificat D'Acceptabilite' Technique C-REL ID : 3867A-WIPORTG

Opinion: Compliant under the R&TTE Directive 1999/5/EC to the essentials requirements of Article 3.2 according to the assessment procedures in Article 10(5) and Annex IV for (class-2 equipment) and marked as CE1177.

Certification

The device complies with Part 15 of the FCC Rules and Industry Canada license-exempt RSS standard(s). Operation is subject to the following conditions:

1. The equipment may not cause harmful interference.
2. The equipment must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this wireless communication equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Any change to the equipment will void the Industry Canada certification and FCC grant.

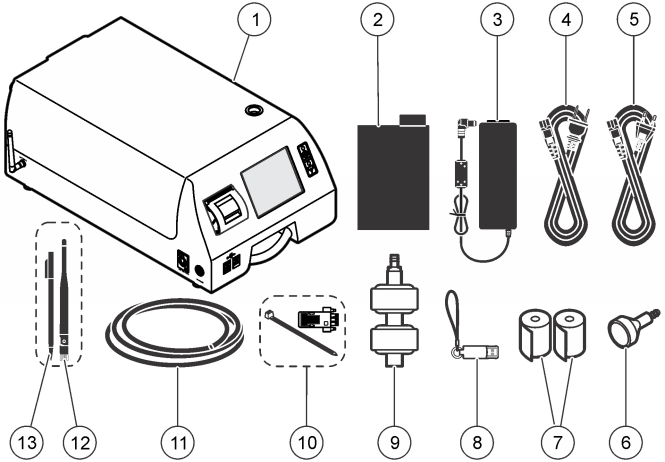
Product overview

This instrument counts and measures the size of airborne particles in cleanroom environments. Refer to Sample measurement specifications on page 8 for the particle sizes ranges.

Product components

Make sure that all components have been received. Refer to Figure 1. If any items are missing or damaged, contact the manufacturer or a sales representative immediately.

Figure 1 Product components



1 3411 particle counter	**8** USB Flash drive
2 Rechargeable battery (2x) (280-120-2024)	**9** Zero count filter
3 AC-to-DC power supply (230-300-7052)	**10** RS485 connector assembly
4 Power cord (US)	**11** Extension tube for isokinetic probe
5 Power cord (EU)	**12** Wireless antenna for Wi-Fi
6 Isokinetic probe	**13** Stylus for touchscreen interface
7 Thermal paper rolls for printer (2x)	

Installation

⚠WARNING

Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

Wiring safety information

⚠WARNING

Electrocution hazard. Make sure that there is easy access to the local power disconnect.

NOTICE

Always disconnect power to the instrument before electrical connections are made.

Obey all safety statements while connections are made to the instrument.

Electrostatic discharge (ESD) considerations

NOTICE

Potential Instrument Damage. Delicate internal electronic components can be damaged by static electricity, resulting in degraded performance or eventual failure.

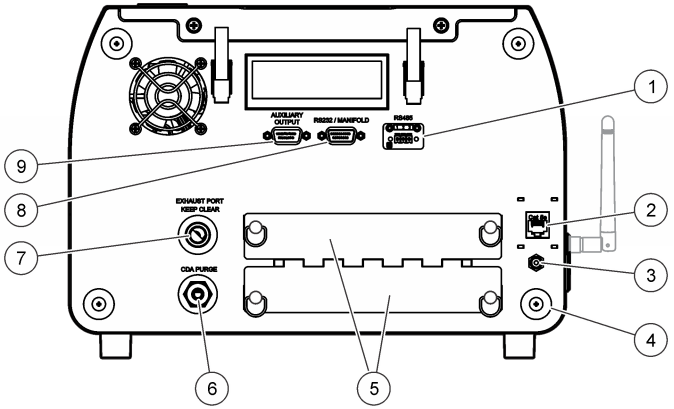
Refer to the steps in this procedure to prevent ESD damage to the instrument:

- Touch an earth-grounded metal surface such as the chassis of an instrument, a metal conduit or pipe to discharge static electricity from the body.
- Avoid excessive movement. Transport static-sensitive components in anti-static containers or packages.
- Wear a wrist strap connected by a wire to earth ground.
- Work in a static-safe area with anti-static floor pads and work bench pads.

Electrical connections

Connect probes, external power, cables and USB devices as shown in Figure 2 and Figure 3.

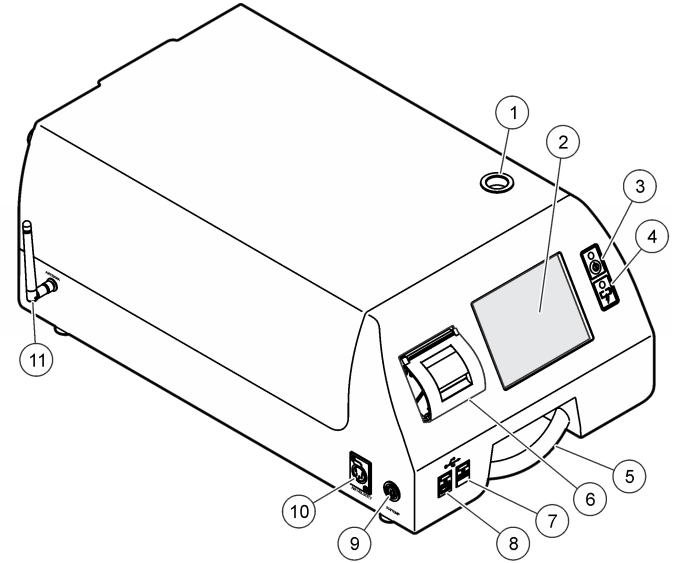
Figure 2 Back view



1	Serial communications RS485 connector	**6**	CDA (clean dry air) purge connector
2	Ethernet connector	**7**	Exhaust port[1]
3	Power connector	**8**	Manifold controller connector or standard RS232 port
4	Supplemental feet	**9**	Auxiliary I/O port for the filter scan probe
5	Battery ports		

[1] The exhaust port has a 3/8-in. NPT thread that can be connected to a 3/8-in. NPT to 3/8-in. hose barb adapter (580854).

Figure 3 Front and side view



1 Sample intake nozzle	**7** USB host connector
2 Touchscreen	**8** USB client connector
3 Power button	**9** Relative humidity and temperature probe connector
4 Battery status light	**10** Air velocity probe connector
5 Handle	**11** Wireless antenna
6 Printer	

Note: *For best results, use USB flash drives supplied by the manufacturer.*

Lithium battery safety

⚠ WARNING

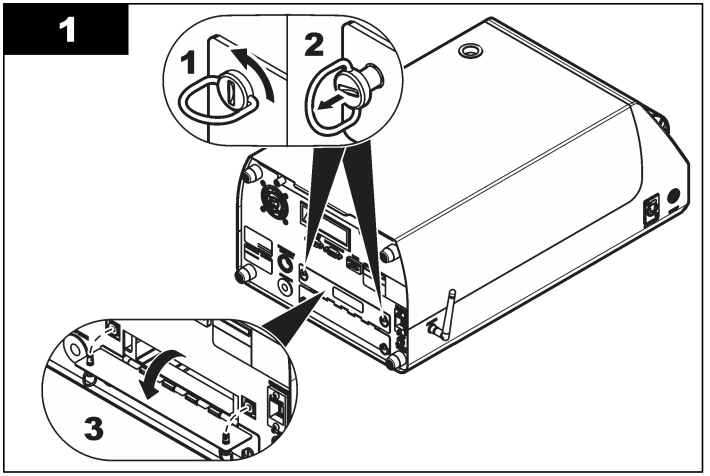
Fire and explosion hazard. Lithium batteries may get hot, explode or ignite and cause serious injury if exposed to abuse conditions.

- Do not use the battery if there is visible damage.
- Do not use the battery after strong shock or vibration occurs.
- Do not expose the battery to fire.
- Keep the battery at temperatures less than 60 ºC (140 ºF).
- Keep the battery dry and away from water.
- Prevent contact between the positive and negative battery terminals.
- Do not let unauthorized persons touch the battery.

Install the batteries

⚠ WARNING

Explosion hazard. To avoid fire and/or explosion, use only the battery type and power supply/charger specified by the manufacturer. For part numbers, refer to Figure 1 on page 11.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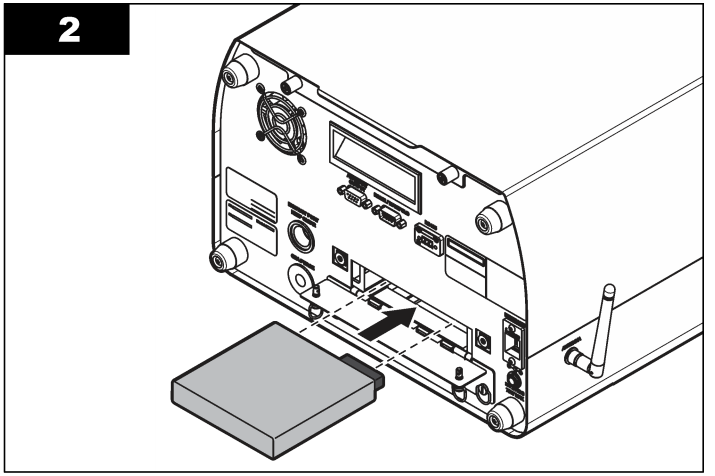
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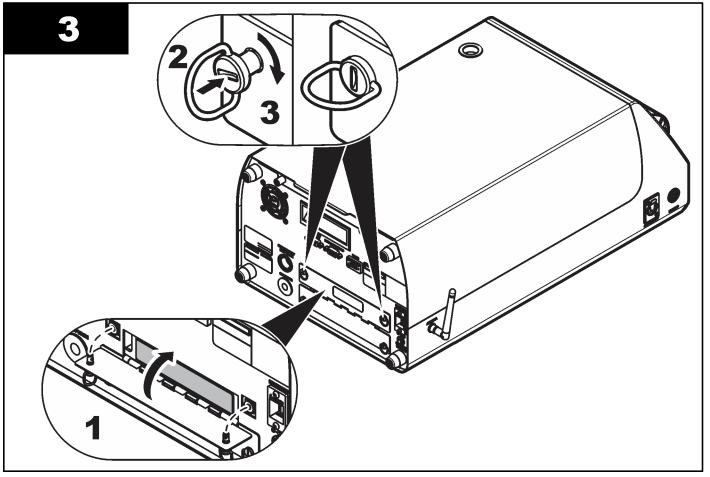
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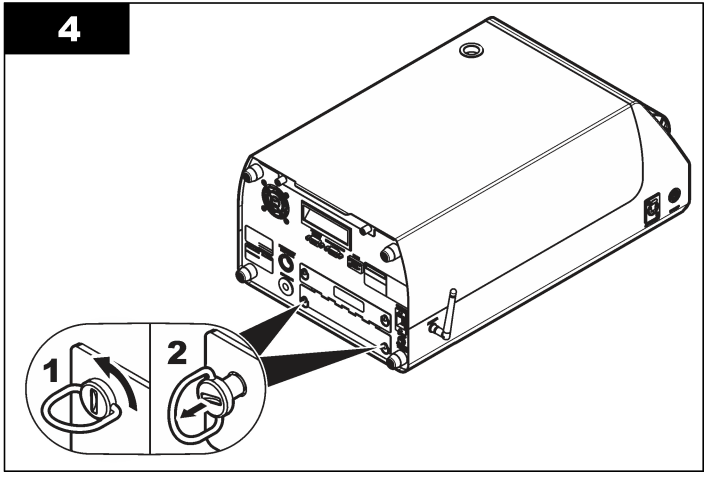
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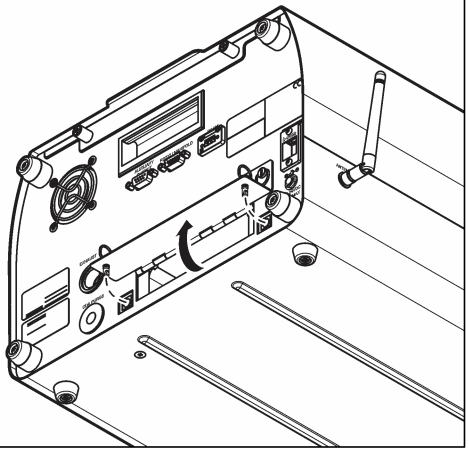

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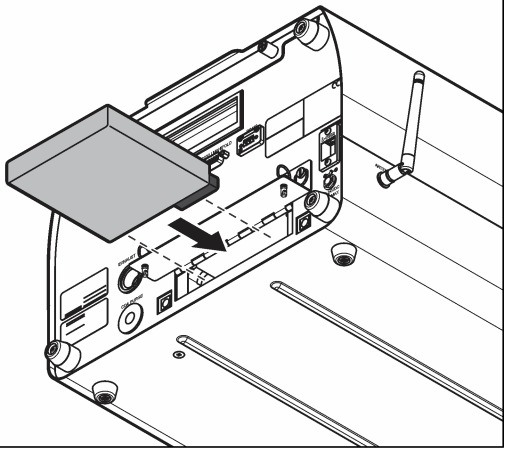
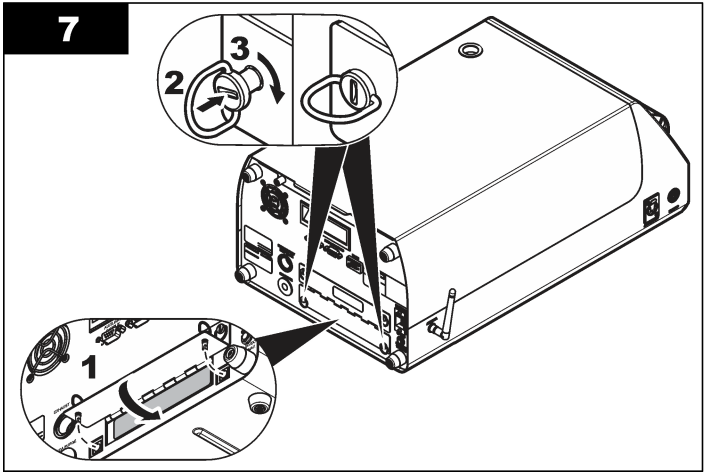
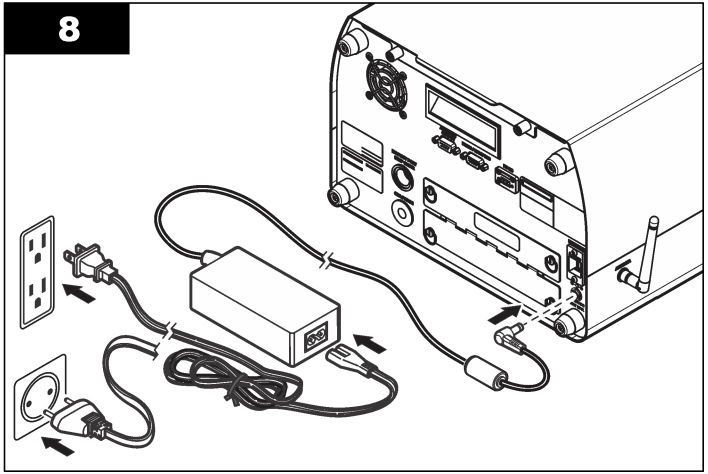


7



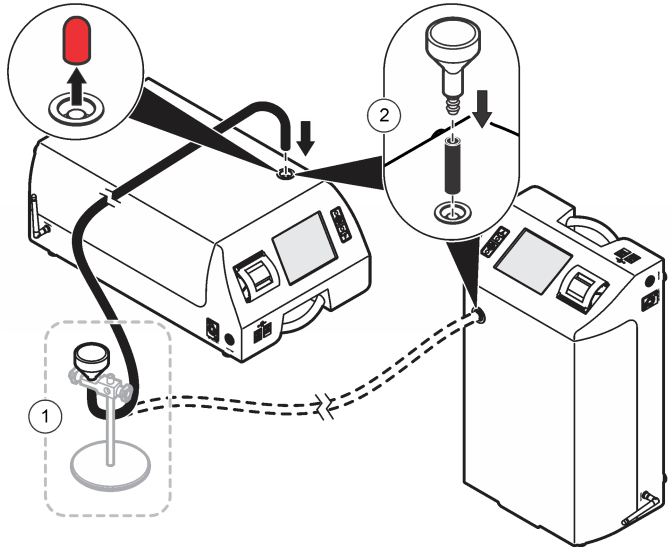
8



Assemble the particle counter system

Figure 4 shows how to assemble the particle counter system.

Figure 4 Particle counter assembly



1	Remote installation of the probe [1]	**2**	Local installation of the probe

[1] Shown with the optional isokinetic probe stand. Refer to 3411 parts on page 41 for ordering information.

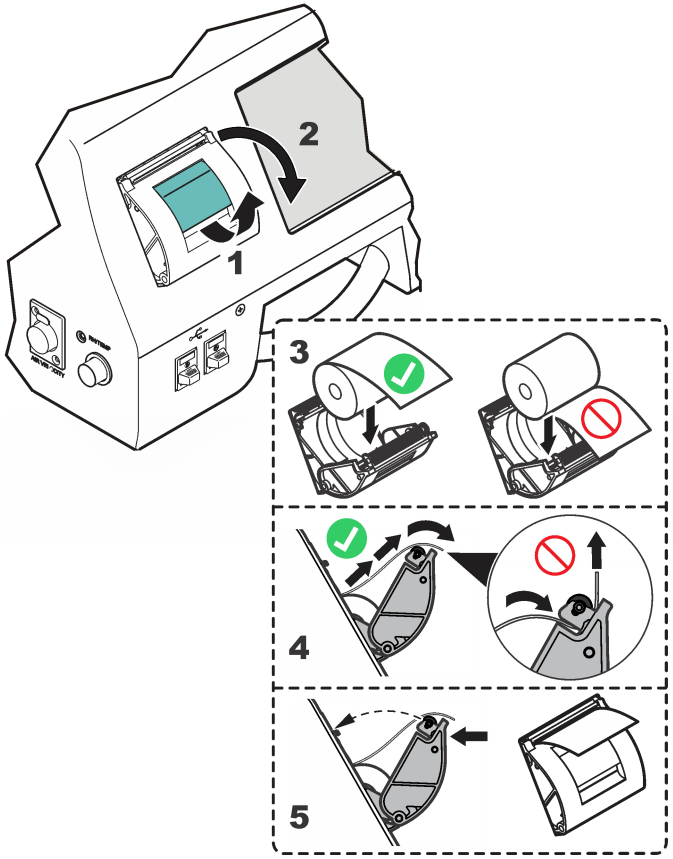
Install the printer paper

NOTICE

To avoid damage to the printer, do not operate the printer without paper. Use only the recommended thermal paper. If the particle counter must be used without paper, be sure to set the print mode to "None".

Refer to the illustrated steps in Figure 5 to install printer paper.

Figure 5 Printer paper installation



Connect to clean dry air (optional)

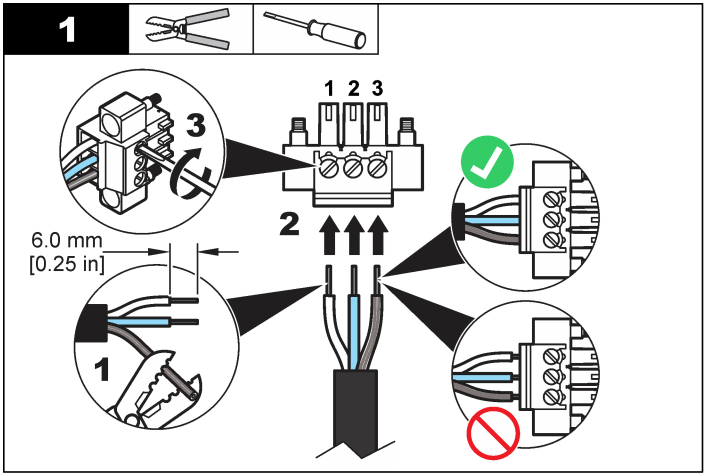
Make sure that all the components installed before the particle counter, including interconnecting lines, are pressure rated for higher than 150 psi.

Use a clean dry air (CDA) purge in high vapor areas to minimize contamination of the sensor. The CDA purge typically consists of a pressure source (40–120 psi, 100 psi nominal), a desiccator and an absolute 0.1 µm filter. The CDA will use approximately 0.1 CFM at atmospheric pressure.

1. Connect the purge air line to the CDA purge connector on the particle counter. Refer to Figure 2 on page 12. Use the supplied $^{1}/_{8}$-inch NPT fitting.
2. Switch on the particle counter.
3. Switch on the purge air.

Connect RS485 communication (optional)

To connect for RS485 communication, refer to the illustrated steps that follow.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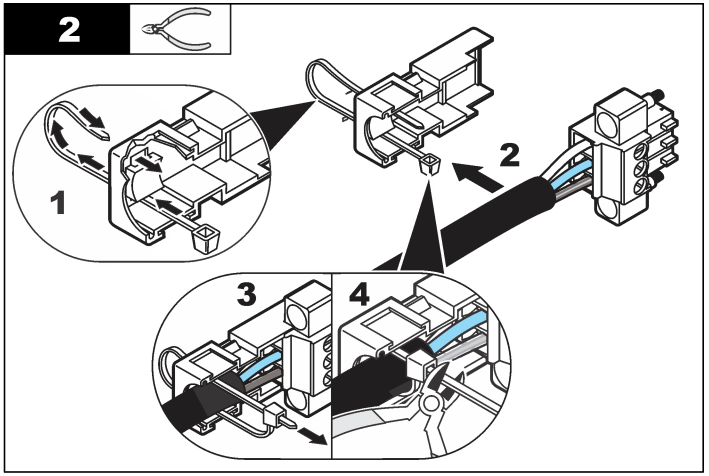
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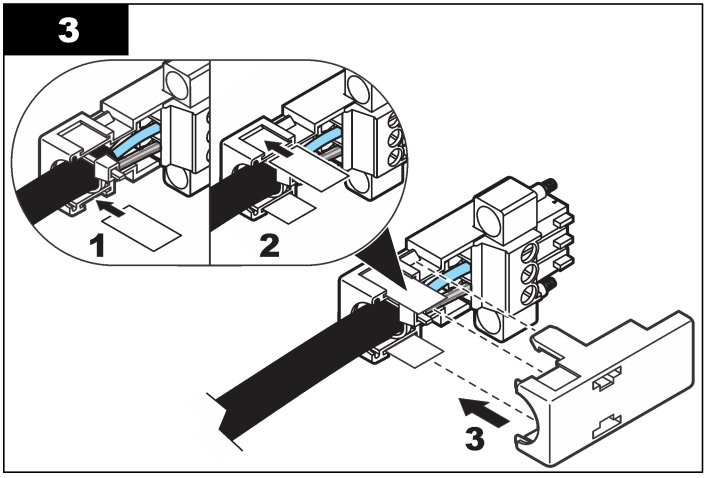
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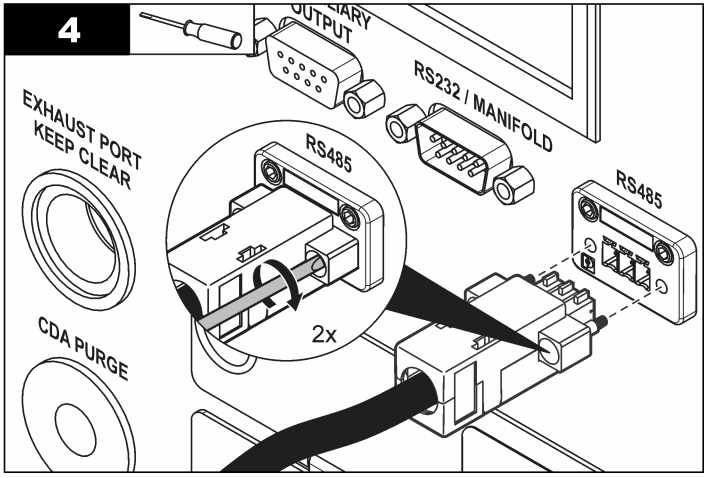

4
OUTPUT
RS232 / MANIFOLD
EXHAUST PORT
KEEP CLEAR
RS485
RS485
2x
CDA PURGE

Particle counter navigation

The functions of the particle counter are accessed from the Counter Navigation screen. Table 1 shows the functions that are accessible through the navigation screen.

Table 2 shows the functions of the other icons.

Table 1 Icons - Counter Navigation screen

Icon	Function	Description
	Sample	Measure particle counts. Refer to Measure particle counts on page 32.
	Historical	Review measurement results in the buffer; print, export or filter data. Refer to Review historical buffer data on page 36.
	Export	Output file as PDF, comma separated value (CSV), tab separated, XML or PortAll files. Refer to Export data on page 36.
	Printer	Print sample data as hard-copy. Refer to How to use the Print Center on page 34.
	Test wizard	Test and report wizard for ISO, EU-GMP, FS or BS classification compliance. Refer to Set up the Test and Report Wizard on page 33.
	Locations	Add/edit/remove areas; copy location settings, edit locations settings; edit alarms for specific locations. Refer to Location management on page 26.
	Group	Load/add/edit a group; delete a group. Refer to Group management on page 28.

Table 1 Icons - Counter Navigation screen (continued)

Icon	Function	Description
	System	Time/Date; Sleep time/backlight timeout; set logon requirements; set sounds for alarms; manage users; set the units for flow rates; manage the data buffer. Refer to Configure the system on page 22.
	Diagnostics	View diagnostic information for troubleshooting. Refer to Diagnostics and Troubleshooting on page 40.
	Network	Configure the network and communication settings. Refer to About network and communications setup on page 20.
	Factory	View the factory information including the calibration date. Refer to Factory settings on page 40.

Table 2 Icons – general

Icon	Function	Description
	Logout	Log out the current user
	Go back	Go to the previous screen
	Run	Start sampling
	Stop	Stop sampling

Table 2 Icons – general (continued)

Icon	Function	Description
	Copy the location settings	Makes a copy of the location settings
	Paste the location settings	Saves the copied location settings over the currently selected location
	Help	Show help information
	Laser	For service use only
	Printer settings	Configure the printer settings
	Alarms	Configure the alarm settings for individual locations or groups
	Filter	Start the filter probe test or configure the historical data filter settings
	Settings	Configure the sample settings for groups
	Upload	Send data to the attached PC

Network and communications

NOTICE

Only qualified personnel should perform the tasks described in this section.

About network and communications setup

 This section shows the setup for:

- Serial communications
- Ethernet network communication
- Wireless (Wi-Fi) communication
- Wireless security

Setup for serial communication

NOTICE

RS232 communication and manifold support cannot be used together because they use the same serial port.

1. On the Counter Navigation screen, push **NETWORK**.
2. Select the Serial tab.
3. Configure these options:
   - Select FX or Modbus RTU.
   - Set the ID for FX or Modbus.
   - Set the Baud rate.
   - Select RS232 or RS485.
   - Activate Manifold Support as needed (RS485 only).
   - Activate Auto Increment Port as needed

Setup for Ethernet communication

1. On the Counter Navigation screen, push **NETWORK**.
2. Select the Ethernet tab.
3. Configure these options:

   - Select FX or Modbus protocol.
   - Enter the Modbus port number.
   - Enter the Configuration port number.
   - Enter the IP address or select DHCP to let the network assign the IP address.
   - Enter the subnet mask address.
   - Enter the gateway address.

Setup for wireless communication

1. On the Counter Navigation screen, push **NETWORK**.
2. Select the Wi-Fi Configuration tab.
3. Configure these options:

   - Enter the Network name.
   - Select the data rate.
   - Select the network type: Ad hoc or infrastructure.
   - Enable auto fallback as needed.
   - Select the channel (Ad Hoc mode only).
   - Check Enable Radio if needed.
   - Select the country.

Set wireless security

1. On the Counter Navigation screen, push **NETWORK**.
2. Select the Wi-Fi Security tab.
3. Configure these options:

   - Select the security type.
   - Select the encryption type.
   - Select the authentication type.
   - Select the key type: Hex or Passphrase.
   - Enter the key in the Key field and in the Retype Key field.

Configuration

About configuration

This section describes tasks that are usually done at the initial commissioning stage. Other tasks are done as updates to the particle counter are needed.
Note: *If user passwords are set, the user must be logged in as an administrator to configure the particle counter.*

About Basic and Advanced operation

At startup, the user can set the operation mode to Basic or Advanced settings.
Use the Basic mode to:

- Do all particle measurement functions
- Save run data in the buffer

Use the Advanced mode to:

- Export dialogs
- Measure air velocity
- Set analog alarms
- Set standards wizards and reports
- Backup, restore and restart
- Copy a configuration
- Set the network protocol (serial, Ethernet, Wi-Fi)
- Manage areas and locations
- Manage user counts and security
- Set user-configurable particle sizes
- Filter data

Set the operation mode at initial startup

To set the operation mode:

1. Power on the instrument.
2. While the operation mode selection screen shows, do one of the actions that follow:
   - Select **BASIC** or **ADVANCED**.
   - Wait 10 seconds. The instrument will start in the selected operation mode.

Change the operation mode

Only permissions in the Advance Operation mode allow a user to change the operation mode. To change operation mode from Advanced to Basic mode:

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Custom** tab.
3. Select **BASIC MODE**.
4. Push **RETURN** to restart the instrument.

Configure the system

System settings control how data is measured and stored, user permissions and other system-wide parameters. System settings can be configured as part of instrument commission, or changed later for different applications.

Set the time and date

Time and date will need to be set at initial commissioning.

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Basic** tab.
3. Select the Time field. Use the numeric keypad to enter the current time in the HH:MM:SS format, then confirm.
4. Select the Date field. Use the numeric keypad to enter the current date in the YYYY-MM-DD format, then confirm.

Set the sleep mode and backlight timeout

Sleep mode and backlight time are active during battery use. When the instrument is connected to AC power, sleep mode and backlight are not active.

During sleep mode the instrument goes into hibernation after a period of inactivity to conserve power. All subsystems are shut down. The time value for sleep mode is in minutes.

The backlight setting turns off the LCD backlight after a period of inactivity to conserve power. The time value for the backlight setting is in seconds.

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Basic** tab.
3. Select the Sleep Time field. Enter the length of idle time before sleep mode begins, then confirm. The range is 1 to 30 minutes.

   Note: *Enter **0** to disable sleep mode.*
4. On the **Basic** tab, select the Backlight Timeout field. Enter the length of idle time before the user interface backlight turns off, then confirm. The range is 5 to 300 seconds.

   Note: *Enter a value of less than 5 seconds to disable backlight timeout.*

   To bring the instrument out of backlight timeout, use a finger or a stylus to make the user interface touchscreen active.

Set the Alarm Reasons option

To capture data about why alarms occur, the Alarm Reason option is set as Required or Optional. In both Required and Optional mode, the user is prompted to select from preset alarm reasons for the alarm event. All users can enter alarm reasons. Only administrators, factory-level users or users with System Settings permissions can disable or change the Alarm Reasons option.
To enable or disable Alarm reasons:

1. On the Counter Navigation screen, push **SYSTEM**.
2. On the **Units and Alarms** tab, push 🔔.

3. On the Alarm Reasons screen, select **REQUIRED**, **OPTIONAL** or **DISABLED**. Refer to Table 3 for more information.

   Note: *The Alarm Reasons option is set to Disabled by default.*

Table 3 Alarm Reasons options

Option	Description
Required	After doing a user-initiated sample cycle, the user is required to enter information about all alarms that happen during the cycle. Alarm reasons must be defined in the Alarm Reasons screen. The user cannot exit the Alarm History screen until a reason has been entered for all alarms.
Optional	After doing a user-initiated sample cycle, the user is prompted to enter information about all alarms that happen during the cycle. Alarm reasons must be defined in the Alarm Reasons screen.
Disabled	The user is not prompted to enter information about alarms.

Set the Sample Comments option

To record user comments made during routine sampling, change the Sample Comments setting. Only administrators, factory-level users or users with System Settings permissions can change the Sample Comments setting.

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select **Sample Comments**.
3. Select an option in the field at the bottom of the screen.

Option	Description
Required	After each user-initiated sample cycle, the user must select one of the preset sample comments from the sample comment list or enter a new comment.
Required on Alarm	After each user-initiated sample cycle, the user must select one of the preset sample comments from the sample comment list or enter a new comment if an alarm(s) occurred during the sample cycle.
Optional	After each user-initiated sample cycle, the user is asked if they would like to enter a comment for the sample. The user can then select one of the preset sample comments from the sample comment list or enter a new comment.
Disabled (default)	The user is not asked if they would like to enter a comment for the sample after each user-initiated sample cycle.

4. To add comments to the comment list so they can be quickly selected:
   a. Select **Add**.
   b. Use the keypad to enter a comment about a sample run.
   c. Push **Enter**.

Set the user interface language

The user interface language can be changed at any time. A language change will require a system restart.

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Options and Accessories** tab.
3. Select the Language field to show language options.
4. Select a language. Push ⏎ then **OK** to restart the instrument.

Manage units and alarms

Units and alarms are controlled on the **Units and Alarms** tab. Units are set for temperature, air velocity, relative humidity and flow rate. The high and low parameter for the flow rate alarm are also enabled and set in this screen. The instrument can be set to work with the Vaisala HMP probe. Preset alarm reasons are accessible from this screen.

Manage audible alarm settings

The **Sounds** tab lets the user select the sound and volume to confirm user interface actions. Sounds that are used for other alarms (stop errors, limit alarms and warnings) are selected in this tab.

1. On the Counter Navigation Screen, push **SYSTEM**.
2. Select the **Sounds** tab.

3. Select the User Feedback field.
4. Select a sound from the list of available notification sounds.
5. Select sounds for stop error, alarm limit and warnings from the list of available notification sounds.
6. Use the slider to set the volume.

Set the measurement units

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Units and Alarms** tab.
3. Select the Temperature field. Select **DEG C** (Celsius) or **DEG F** (Fahrenheit).
4. Select the Air Velocity Field. Select **MM/SEC** or **FT/MIN**.
5. Select the Flow Rate field. Select **LPM** or **CPM**.

Set the flow rate alarm values

Contact technical support before the flow rate alarm is changed.

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Units and Alarms** tab.
3. Select **ENABLED**.
4. Select the High field. Enter a value between 5 and 20.
5. Select the Low field. Enter a value between 5 and 20.

Add an alarm reason

Alarm Reasons describe what conditions have caused an alarm. If a needed Alarm Reason is not available in the list, it can be added and then applied to future data records.

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Units and Alarms** tab.
3. Push 🔔.
4. Push **ADD**. Enter a reason (up to 29 characters).
5. Push **ENTER** to confirm.

Edit an alarm reason

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Units and Alarms** tab.
3. Push 🔔.
4. Select a reason from the list.
5. Push **EDIT**. Change the text string as needed.
6. Push **ENTER** to confirm.

Delete an alarm reason

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Units and Alarms** tab.
3. Push 🔔.
4. Select a reason from the list.
5. Push **REMOVE**.
6. Push **ENTER** to confirm.

Apply an alarm reason to a data record

Prerequisites:

- Alarm reasons must be set to ENABLED or OPTIONAL. Refer to Set the Alarm Reasons option on page 22 for more information.
- Alarm reasons must be entered in the alarm reasons list before they can be applied to a data record. Refer to Add an alarm reason on page 24 for more information.

An alarm reason can be applied to any data record that has an alarm. Alarm reasons show in the Historical data screen and on printouts. Alarm reasons are also included in FTP transfers and all USB flash drive exports.

1. On the Counter Navigation screen, push **HISTORICAL**.
2. Select the Data Buffer field. Enter the number of the record with the alarm, or go to the record with **+** and **–** keys.

3. Select the yellow text below Counts to show the Alarm Reasons list.

   Note: *The yellow text shows the type of alarm that has been recorded.*

4. Select an alarm reason from the list. Push **ENTER**.

Set the inert gas and altitude values
After factory calibration, an inert gas can be selected. The particle counter applies a correction factor to the flow rate basked on the inert gas selection.

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Custom** tab.
3. Select the Gas field, then select the gas to be tested.

   Note: *Only the gases that the instrument has been calibrated with will show in the list.*

4. Select the Altitude field.
5. Select the altitude of the measurement location. The altitude values are shown in feet.

Set the particle count alert (beep function)
The instrument can be set to play a sound when an interval value is counted on a specified channel. For example, when the interval value is 100, the counter will beep each time it counts 100 particles.

1. On the Counter Navigation screen, push **SAMPLE**.
2. Select the **Settings** tab on the right side of the screen.
3. Select Quick Settings.
4. Push **YES** to edit settings for the default group.
5. Select the Run Mode field, then select **BEEP**.

Change the relative humidity and temperature probe

The standard relative humidity and temperature probe is used in most applications. If an HMP probe is needed, it can be selected on the **Units and Alarms** tab.
The scale of the standard probe and the HMP probe are different. When measurements are different than expected, make sure that the HMP probe is selected or deselected as needed.

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Units and Alarms** tab.
3. Select the **HMP RH/T** check box to activate or deactivate the HMP probe.

Manage backup and restore settings

Users with administrator or System Settings permissions can make a backup of configurable settings, and restore the backup settings as needed.

Make a backup of configurable settings

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Options and Accessories** tab.
3. Push **BACK-UP**.

   An electronic copy of the current configuration is stored in instrument memory. This version can be restored with the Restore function.

Restore settings from backup
Use the Restore function when settings become corrupt, incorrectly modified or when the software performs abnormally.

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Options and Accessories** tab.
3. Push **RESTORE**.
4. Push **RESTART**.

Configurations

Specific configurations can be saved as a backup and/or copied as necessary between particle counters.

Copy a configuration
To copy a configuration:

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Configuration** tab.

3. Insert a USB drive into the USB host connector. Refer to Electrical connections on page 12.
4. Push **COPY CONFIGURATION TO USB**.
5. A confirmation message will show. Push **OK**.
6. Remove the USB drive.

Install a configuration

To install a configuration from a USB drive:

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Configuration** tab.
3. Insert the USB drive with the configuration data into the USB host connector. Refer to Electrical connections on page 12.
4. Push **READ CONFIGURATION FROM USB**.
5. A confirmation message will show.
6. Remove the USB drive.
7. Push **OK** to restart the instrument and load the new configuration.

Locations, areas and groups

A **location** defines a space, such as a work bench, that is identified for sample testing. To add, change or remove a location, refer to Location management on page 26.

An **area** is a group of defined locations that are geographically co-located. For example, Cleanroom A is an area. The work benches inside Cleanroom A may be defined as locations. To add, change or remove an area, refer to Area management on page 28.

Groups are locations that have common sampling attributes. For example, all locations that are tested every month may form one group. Locations in a group do not have to be co-located. To add, change or remove a group, refer to Group management on page 28.

Location management

Add a location

1. On the Counter Navigation screen, push **LOCATIONS**.
2. On the Area/Location Setup screen, select an existing area, or if needed, create a new area and then select it. Push **ADD LOCATION**.
3. In the Add Sample Location screen:
   - Select the Location Name field. Enter the location name. Push **ENTER** to confirm.
   - Select the Location ID field to specify a numerical ID for the location. The numerical ID is unique for each location and must be in the range of 000 – 999.

   Note: *Use the **ALT** key to access special characters.*

Edit a location

1. On the Counter Navigation screen, push **LOCATIONS**.
2. On the Area/Location Setup screen, select an existing area.
3. Select **Edit Location**.
4. In the Add Sample Location screen:
   - Select the Location Name field. Enter the location name. Push **ENTER** to confirm.
   - Select the Location ID field to specify a numerical ID for the location.

   Note: *Use the **ALT** key to access special characters.*

Configure new settings for the location

1. On the Counter Navigation screen, push **LOCATIONS**.
2. On the Area/Location Setup screen, select an area.

3. Select a location within the area.
   - Push **ADD LOCATION** to configure a new location.
   - Push **EDIT LOCATION** to change the configuration of a current location.
4. In the Add Sample Location screen, push **SETTINGS**.
5. Select the **General** tab.
   - Set the count cycles and the count mode.
   - Select the run mode.
   - Set the count display option.
6. Select the **Timing** tab.
   - Set the duration for each sample.
   - Set the sample hold time between count cycles.
   - Set the sample delay time to allow delay before the sample test begins.
7. Push **RETURN** to go back to the Add Sample Location screen.

Copy settings from another location

1. On the Counter Navigation screen, push **LOCATIONS**.
2. On the Area/Location Setup screen, select the area that includes the destination location.
3. Select the location where the copied settings should go. Push .
4. Push **YES** to confirm or push **NO** to cancel.

Set location alarms
The particle counter allows different alarm settings for individual locations.
Note: *Use this feature when the Use Location Settings is selected in Group Settings.*

1. On the Counter Navigation screen, push **LOCATIONS**.
2. On the Area/Location Setup screen, select an area.
3. Select a location within the area. Push **ADD LOCATION** or **EDIT LOCATION** as needed.
4. In the Sample Location Setup screen, push **ALARMS**. The Alarm Settings screen has two tabs to configure.
5. In the **Count** tab:
   - Edit the particle size
   - Edit particle concentration limits
6. In the **Environment** tab:
   - Enable the temperature alarm and set temperature limits.
   - Enable the relative humidity alarm and set relative humidity limits.
   - Enable the air velocity alarm and set air velocity limits.

   Note: *These settings are only valid with the specific environmental probe attached to the instrument.*
7. Push **RETURN** to confirm and go back to the Add Sample Location screen.

Remove a location

1. On the Counter Navigation screen, push **LOCATIONS**.
2. On the Area/Location Setup screen, select an area.
3. Select a location. Push **REMOVE LOCATION**.
4. Push **YES** to delete the location or push **NO** to cancel.

Change the order of locations
Change the listed order of locations to change the sample order during testing.

1. On the Counter Navigation screen, push **LOCATIONS**.
2. On the Area/Location Setup screen, select an area.
3. Select a location. Push the **UP** or **DOWN** arrow to change the position of the location in the list.
4. Continue to select and move locations to create the needed order for samples.

   Note: *Arrow keys can also be used to move a location to a different area.*

Area management

Add a new area
Use up to 15 alphanumeric characters to name an area.

1. On the Counter Navigation screen, push **LOCATIONS**.
2. On the Area/Location Setup screen, push **ADD AREA**.
3. Enter the area name and confirm.
   Note: *Use the **ALT** key to access special characters.*

Edit an area

1. On the Counter Navigation screen, push **LOCATIONS**.
2. On the Area/Location Setup screen, select an existing area.
3. Select **EDIT AREA**. Confirm.
   Note: *Use the **ALT** key to access special characters.*

Remove an area

1. On the Counter Navigation screen, push **LOCATIONS**.
2. On the Area/Location Setup screen, select an area.
3. Push **REMOVE AREA**.
4. Push **YES** to delete the area or push **NO** to cancel.

Change the order of areas
Change the listed order of areas for ease of selection. Area order does not affect sample order.

1. On the Counter Navigation screen, push **LOCATIONS**.
2. On the Area/Location Setup screen, select an area.
3. Push the **UP** or **DOWN** arrow to change the position of the area in the list.
4. Continue to select and move areas to create the needed order.

Group management

A group is a collection of sample parameters and settings that can include locations. The locations in a group do not need to be geographically co-located.

Push the **±** button on the sample screen to go to the next location in the active group.

Add a group

1. On the Counter Navigation screen, push **GROUP**.
2. In the Group Settings Management window, select **<NEW>**. Enter the name of the group and confirm.
   Note: *Use the **ALT** key to access special characters.*
3. Push **SAVE**.

Install a group
To enable a group, use the Load Group function.

1. On the Counter Navigation screen, push **GROUP**.
2. In the Group Settings Management window, select a group.
3. Push **LOAD**.

Delete a group

1. On the Counter Navigation screen, push **GROUP**.
2. In the Group Settings Management window, select a group.
3. Push **DELETE**.

Add a location to a group

1. On the Counter Navigation screen, push **GROUP**.
2. In the Group Settings Management window, select a group.
3. Push **SETTINGS**.
4. Push **ADD LOCATION**.

5. Navigate to the needed location and select it, then push **OK**.

   Note: *Push the **UP** or **DOWN** arrow to change the order of locations in the Group Settings screen. Refer to* Change the order of locations *on page 27 for more information.*

Data management

Store partial data

Data can be collected from sample measurements that have been stopped by a user or by a flow error.

1. On the Counter Navigation screen, push **SYSTEM.**
2. Select the **Custom** tab.
3. Select the **STORE PARTIAL DATA** checkbox.

Manage the data buffer

The data buffer allows the data to be preserved or overwritten. In addition, the size of the buffer can be changed and data can be cleared from the buffer.

Set the data buffer to rotate data

The default buffer setting is fixed. In this setting, no new data can be added to the buffer when it is full. When the buffer is set to rotate, new data can be added to a full buffer, while the oldest data record is deleted.

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Custom** tab.
3. Select **ROTATING BUFFER**.

Set the data buffer size

A change to the buffer size causes all current buffer data to be lost and unrecoverable.

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Options and Accessories** tab.
3. Select the Data Buffer Size field. Enter a value between 50 and 5000.
4. Push **ENTER** to confirm.
5. Push **YES** to clear the data buffer.

Real-time PDF/CSV option

Use this option to send the count data to a PDF file and if necessary to a CSV file. Secure PDF files are generated in real time or when sample data is selected from the instrument data buffer using the Export function.

Turn on the PDF option

1. Push **SYSTEM**.
2. Select the **PDF** tab.
3. Enter the unlock code and push **ENTER**.
4. Select the options:

Option	Description
PDF on USB Detect	Automatically saves the real-time count data to a PDF file when the particle counter finds a USB memory stick in the USB port.
New Document On	Sets the criteria to start a new PDF file. New PDFs are made when an area or location changes or when the date changes.
Export Averages	Includes the average count of a set number of runs and the count data for each run to a PDF file.
Export to Excel	When a PDF file is made, the count data is also transmitted in .csv (comma separated value) spreadsheet format.
Warn when USB drive is X% full	Sets a notification that the USB memory stick is 50–95% full.

Save the count data to a folder

Count data can be saved to a file with a filename that includes the date and time the file is created, or a unique identifier.

1. At the particle counter, make a folder to hold the count data. Select Date or enter a name for the folder.
2. Select **Configure File Name**.
3. Use up to seven criteria options to make a file name. Options include: area, date, time, location, user name, serial number or text. When the file name is configured, the PDF is automatically saved to the folder.
4. Select **<None>** to remove a previous entry.

Manage users and permissions


Passwords allow the system administrator to restrict access to the instrument settings. When passwords are enabled, there are two levels of access:

- Administrator—Access to all settings on the instrument except for service (factory) access
- Operator—Access to review historical data and read current measurement values in the Diagnostics section. Operator access can also print historical or diagnostics data.

If password protection is not enabled, all users can access all functional settings of the instrument.
Note: *Factory settings are never accessible without a password.*

Enable the user logon function

To enable user and password login:

1. Push **SYSTEM**.
2. Select the **Basic** Tab.
3. Select **User Logon Required**.

Log on as administrator

1. On the Counter Navigation or Sample screen, push  to log off.
2. Select the User Name field. Enter "Admin". Push **ENTER**.
3. Select the Password field. Enter the default password "123456". Push **ENTER**.
4. Push **OK**.

   Note: *To maintain system security, change the default administrator password. Refer to* Change the password *on page 30.*

Change the password

The password can be changed at the logon screen.

1. From the Counter Navigation screen, push Factory.
2. Push **CHANGE PASSWORD**.
3. Enter the username and push **ENTER**.
4. Enter the old password and push **ENTER**.
5. Select the New Password field. Enter a new password and push **ENTER**.
6. Select the Confirm Password field. Enter the new password again. Push **ENTER**.
7. Push **OK**.

   Note: *To replace a forgotten password, contact the manufacturer with:*

   - *The counter serial number*
   - *The current date setting in the format MMDDYYYY.*

Replace a forgotten password

If the System Administrator password is forgotten, contact technical support to get a new password. Technical support requires the information that follows to supply a new password:

- Instrument serial number
- Current date setting in the format MMDDYYYY, where MM is the two digit month, DD is the two digit day, and YYYY is the four digit year

Add a user

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Users** tab.
3. Push **ADD**.

4. Select the User Name field and enter a user name.
5. Select the Password field and enter a password.
6. Select the Confirm Password field and enter the same password.
7. Select the access level (Admin or Operator).

Assign groups to a user

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Users** tab.
3. Select a user from the list.
4. Push **EDIT**.
5. Select the **Groups** tab.
6. Push **ADD**.
7. In the Select Group screen, select a group from the list.
8. Push **OK**.

Assign user access rights

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Users** tab.
3. Push **EDIT**.
4. Select the **Access Rights** tab.
5. Select or deselect access rights as necessary.

Option	Description
Sampling	The user can start a new count cycle.
Report Wizard	The user can access the report wizard to do sample protocols based on ISO 14644-1, Federal Standard 209E, British Standard 5295, EU Annex I or based on averages.
Historical	The user can search existing data records in the buffer.
Export	The user can export data to the USB stick based on the contents of the buffer or the filtered contents.
Printer	The user can use the different printer functions.
Group Settings	The user can set up or modify group settings.
Area/Location	The user can set up or modify area and/or location settings.
Group Select	The user can select the active group.
Group Admin	The user can add, edit or remove groups and can select the active group.
System Admin	The user can add or remove users, set date/time or any other function found under the System Settings menus.
Diagnostics	The user can see and print current diagnostic information.
Network	The user can access, see and change the network settings.
User Upload	The user can manually trigger the electronic transfer of count records through Ethernet (wired or wireless).

6. Push **OK**.

Operation

Log on to the particle counter

Prerequisites

- Start the system.
- Enable password protection. Refer to Enable the user logon function on page 30.

1. Activate the backlight with a finger or stylus if needed.
2. Push the icon to log out a previous user. Push again to see the logon screen.
3. Enter the user name and password. Confirm.

   Note: *Push the **ALT** key to access special characters.*

Measure particle counts

After a complete particle count measurement, the number of particles measured will show on the screen and be stored as data. Other configured parameters, such as relative humidity, temperature and air velocity will be shown and stored in data.

1. Remove the protective cap from the inlet tube on the counter.
2. On the Counter Navigation screen, push **SAMPLE**.
3. To start the particle count, push ⓐ. The ⓐ icon will change to a ⓧ button while the count is measured.

   Note: *Push ⓧ to end the test before the count is complete. Incomplete particle count data will not be stored or printed unless the Save Partial Data option is selected in System Settings. Refer to* Store partial data *on page 29.*
4. When the count measurement is complete, the test will stop automatically.

Change the particle count location

There are two methods to change the location for a particle count.

- On the Sample screen, push the location name. Select the new location name and confirm.
- On the Sample screen, push the **PLUS** button to increment the location, or push the **MINUS** button to decrement the location.

See settings during the particle count

Location and group settings can be seen at any time during the particle count cycle.

- On the Sample screen, select the Settings tab on the right side of the screen.

See historical data during the particle count

Historical sample data can be seen at any time during the particle count cycle.

1. On the Sample screen, select the **ARROW** button.
2. Select the **HISTORICAL** icon to see the data.

Use the filter scan probe

NOTICE

The filter scan probe function applies to 1 CFM units only.

1. On the Counter Navigation screen, push **SAMPLE**.
2. In the Test screen, push ⇩.
3. To start the test, push **START FILTER PROBE TEST**.
4. To end the test, push **STOP FILTER PROBE TEST**.
5. Push 🖶 to generate a brief report of the last completed test.

Manage sample batch identification

Batch IDs are used to label different test runs. Labels can be text or numbers. The Batch ID is shown:

- On the main sample screen in the settings
- In the System Messages of the Historical screen
- In printed reports, FTP exports and all USB exports

Enter or change a Batch ID

To enter or change a Batch ID:

1. On the Counter Navigation screen, push **SAMPLE**.
2. Select the **Settings** tab.
3. Select **BATCH ID**.
4. Enter the Batch ID as a text, numerical or alphanumerical string. The Batch ID can use up to 29 characters.
5. Push **ENTER**.

Disable a Batch ID

Disable the Batch ID to stop it from showing in data reports.

1. On the Counter Navigation screen, push **SAMPLE**.
2. Select the **Settings** tab.

3. Select **BATCH ID**.
4. Delete the Batch ID text.
5. Push **ENTER**. The default Batch ID value will show, but will not be reported.

Set or clear the Batch ID
At the start of a sample test push **BATCH ID**. The user can select:

- Continue—Keep the Batch ID the same.
- Clear ID—No Batch ID is recorded with the sample cycle.
- Edit ID—Change the Batch ID for the current sample cycle.

The Batch ID can also be cleared when the sample cycle is complete.

How to use the Test and Report Wizard

About standard sampling protocols

Use the Test and Report Wizard for groups, areas and locations that require sample measurements and reports based on specific standards and regulatory guidelines. The particle counter includes sample strategies based on common international protocols such as ISO 14644-1, FS 209E, BS 5295 and EU GMP Annex 1.

The wizard steps through seven data entry points:

- Selection of the type of standard or regulatory guideline: EU GMP, ISO 14644-1, FS209E, BS5295 or Averages (user-defined test protocols)
- Selection of the targeted class for the qualification of the room
- Occupancy state: As built, at rest, in operation
- Particle size or sizes to sample
- Unidirectional or non-directional air flow (for FS209E)
- Area of the room in square meters (m^2)
- Samples per location. A minimum value is set based on room size and standard. This value can be increased as needed.

About reports

ISO 14644-1, FS 209E and BS 5295 specify calculations for airborne particle counter count data. These documents establish the definitions for level of cleanliness in cleanrooms and clean zones based on specified concentrations of airborne particles. The printed reports provide the data to determine the cleanliness level for which that cleanroom qualifies.

Set up the Test and Report Wizard

1. On the Counter Navigation screen, push **TEST WIZARD**.
2. In the Test and Report Wizard screen, complete the fields listed in this step. Select the applicable listed options.

Option	Description
Standard	Shows the list of applicable standards
Grade/Class	Shows a list of room classification
Occupancy	Shows a list of room states

3. Select the Sizes field.
   a. Highlight a particle size.
   b. Push **ADD** to add the size to the Considered Sizes list.
   c. Add as many particle sizes as needed. To remove a particle size, select the size from the Considered Sizes list and push **REMOVE**.
4. Go to the next screen in the wizard.
   a. Enter the room area in m^2. Push **ENTER** to confirm.
   b. Enter the number of samples per location. Push **ENTER** to confirm.
5. Go to the next screen in the wizard.
   a. Push **ADD AREA**, **ADD GROUP** or **ADD LOCATION**. Individual locations will show in the Locations list when the group, area or location is added.

b. Highlight a location. Use the **UP** or **DOWN** arrows to change the order of locations as needed. The order of the list will be the order of the test.

6. Go to the next screen. A confirmation of the selections will show.

Start sample measurement with the Wizard

1. Push **BEGIN SAMPLING**.
2. Obey the prompt and go to the first sample location. Push **OK**.
3. Put the isokinetic probe in position for the test. Push **RUN**.
4. Continue to obey the prompts and move to each location for the test. When all tests are complete, the counter will return to the wizard to configure the report.

Use existing data

The Test and Report Wizard can include existing date for the selected standard and location.

1. Select the Use Existing Data checkbox.
2. Enter the date range for the existing data.
3. Push **BEGIN SAMPLING**.

Report test results

- Push to send the selected data to a USB drive. Refer to Export data on page 36.
- Push to print the selected data. Refer to How to use the Print Center on page 34.

How to use the Print Center

About the Print Center

NOTICE

To avoid damage to the printer, do not operate the printer without paper. If the particle counter must be used without paper, be sure to set the Sample Print Mode field to "None".

The particle counter has a built-in printer. The Print Center screen is accessible from the:

- Counter Navigation screen
- Historical screen
- System Diagnostics screen
- Test/Report Wizard screen
- Area/Location Setup screen

On the Print Center screen, the user can:

- Set automatic print functions
- Print buffer records or count averages

Note: *Filtered data is printed from the Historical screen.*

Set automatic print functions

Note: *If the sample period is very brief and the hold time is zero, the sending of some sample data to the printer may be skipped. However, the data is always obtained and saved. To avoid a printout failure, set the total time of the Sample period and the Hold period combined to more than 12 seconds.*

1. On the Counter Navigation screen, push **PRINTER**.
2. On the Print Center screen, select the Sample Print Mode field. Select an option for automatic printing.

Option	Description
None	No data will print automatically
Alarms	Prints results at the end of the sample when a count alarm is exceeded
Cycles	Prints the results of multiples of the programmed count cycle. The range is 1–99.
All	Prints results after each count cycle is finished

3. Set the Cycle Print Order. Options: 10–1 (oldest printed first) or 1–10 (newest printed first).

4. To show the average of the values in the printout when the samples are taken and the data is printed, select **Print Averages**.

   Note: *The fourth value in the printout is the average of the three previous values.*

5. To round values to the nearest whole number, select **Round Averages**.
6. To repeat the header data on all samples, select **Repeat Sample Headers**. When not selected, the headers print only with the first sample of a series when the cycles are set to > 1.
7. Push **ENTER** to confirm.

Print records manually

The buffer holds 5000 records maximum. The Print Center can print the entire buffer or the average of count cycles obtained at each sample point. To print records manually:

1. On the counter Navigation screen, push **PRINTER**.
2. On the Print Center screen, select the print option for the data. In the Print Report field, select the regulatory reports that will be printed.
   - Push **AVERAGE** to print the average of each size channel for the last sample measurement. Refer to Figure 6.
   - Push **BUFFER** to print all of the records in the buffer. Refer to Figure 7.
3. The data will begin to print.
   - To cancel the print job, push **CANCEL PRINT**.
   - To return to Counter Navigation, push **RETURN**.

Figure 6 Averages report

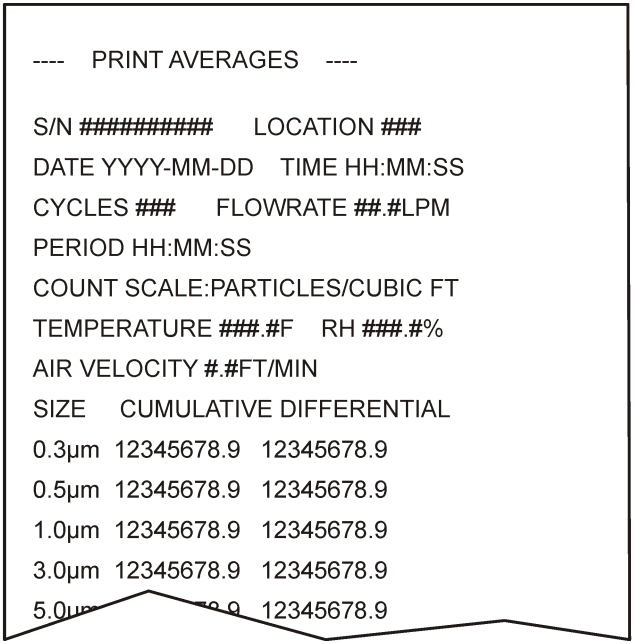
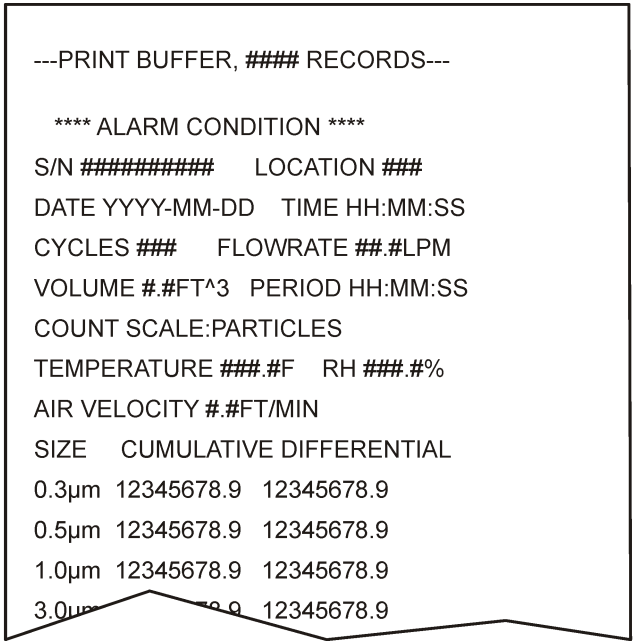


Figure 7 Buffer report (all buffer records)



Review historical buffer data

Records stored in the buffer are known as Historical data. These records can be accessed individually or sorted by location, date or time. The buffer can also be configured to collect partial data for aborted samples.

Set the data filter

The data filter can be set up to sort by location, date and time, either as individual parameters or in combination. To set the data filter, go to the Data Filter Setup screen.

1. Push to go to the Data Filter Setup screen.
2. Select a filter option.

Option	Description
Filter by location	Check all of the locations to be included in the results. Push **ALL** to select all locations, or push **NONE** to deselect all locations.
Filter by date	Enter dates in the DATE FROM and DATE TO fields. Dates are in YYYY-MM-DD format.
Filter by time	Enter the needed times in the TIME FROM and TIME TO fields. Time is in HH:MM:SS format.

Clear the data buffer

Data that has been exported or is not needed can be deleted from the buffer.

1. On the Counter Navigation screen, push **SYSTEM**.
2. Select the **Options and Accessories** tab.
3. To erase all the data in the buffer, push **CLEAR BUFFER**.

Export data

Export data to maintain an electronic record for analysis and reporting.

1. On the Counter Navigation screen, push **EXPORT**.
2. Select **USB Flash Drive** or **Network server**.

   Note: *To export data to a network server, configure and enable the FTP function. Refer to* Configure and enable the FTP function *on page 38*.

3. Select PDF, Comma Separated File, Tab Separated File, XML or PortAll.

   Note: *The PDF option shows only after the PDF option has been set to on. Refer to* Turn on the PDF option *on page 29*.

4. If PDF was selected and the settings on the PDF tab under System Settings should be used, select the box to enable PDF Page and File Break Rules.
5. If needed, change the default file name and confirm.
6. If USB Flash Drive was selected, insert the USB drive into the USB host on the front of the instrument. If the USB Flash Drive is not inserted, a warning will show on the screen. The warning will change to a confirmation after the USB Flash Drive is inserted.
7. Push **EXPORT**. The status bar will show the progress.

   Note: *To stop the export, push* ⏎.

About status values in exported data

The status value represents several elements of unit status. Environmental, count and concentration alarms can be indicated in the status value.

To determine the alarm conditions present in the report, subtract the largest possible value that represents a bit from the Status value in the exported data. Refer to Table 4.

Table 4 Sample status bit mask definitions

Bit	Value	Definition	Bit	Value	Definition
0	1	Calibration	16	65536	Channel 3 concentration alarm
1	2	Flow	17	131072	Channel 4 concentration alarm
2	4	Temperature	18	262144	Channel 5 concentration alarm
3	8	Relative humidity	19	524288	Channel 6 concentration alarm
4	16	Air velocity	20	1048576	Channel 7 concentration alarm
5	32	System alarm	21	2097152	Channel 8 concentration alarm
6	64	Count alarm	22	4194304	Channel 9 concentration alarm
7	128	Concentration alarm	23	8388608	Channel 10 concentration alarm
8	256	Channel 1 count alarm	24	16777216	Channel 11 concentration alarm
9	512	Channel 2 count alarm	25	33554432	Channel 12 concentration alarm
10	1024	Channel 3 count alarm	26	67108864	Channel 7 count alarm
11	2048	Channel 4 count alarm	27	134217728	Channel 8 count alarm
12	4096	Channel 5 count alarm	28	268435456	Channel 9 count alarm
13	8192	Channel 6 count alarm	29	536870912	Channel 10 count alarm
14	16384	Channel 1 concentration alarm	30	1073741824	Channel 11 count alarm
15	32768	Channel 2 concentration alarm	31	2147483648	Channel 12 count alarm

Configure and enable the FTP function

With firmware V4.08, the particle counter can be configured to transmit data via Ethernet (wired or wireless when the wireless option is installed) to an FTP server. This particle counter can connect to servers that use FTP or FTPS (Explicit TLS/SSL).

1. For the user account that will be used in the particle counter, give *file* access on the FTP server: Read, Write and Delete.
2. For the user account that will be used in the particle counter, give *directory* access on the FTP server: Create, Delete, List and Add Subdirectories.

   Note: *The Create, Delete and Add Subdirectories rights are only necessary if the particle counter will be configured to make subdirectories. These rights are not necessary when the particle counter is configured to use the existing directories.*
3. On the Counter Navigation screen, push **EXPORT**.
4. Select **Configure FTP**.
5. Select **Network Server Enabled**.
6. In the Host/IP Addr field, enter the host name or the IP address of the computer where the FTP server is installed.
7. In the Port field, enter the port number on which the FTP server listens.
8. In the Protocol field, select the protocol the FTP server uses (FTP or FTPS (TLS/SSL)).
9. Optional: In the Initial Folder field, enter the initial folder where files will be kept. Leave blank to save files to the root.
10. Select the **Logon** tab.
11. In the Authentication field, select Anonymous or Normal.
12. If Normal was selected, enter a user name and password to use for authentication with the FTP server.
13. Push **Test Connection**. When the connection is successful, "Test Connection Succeeded" shows.

    Note: *If the connection was not successful, an error message shows with the reason.*

Data transfer to the OPC server

Only administrators, factory service personnel and operators with User Upload permission can initiate data upload to the OPC server.

There are three settings that control the data transfer to the OPC server: User initiated upload, user-initiated download and automatic download.

User-initiated data upload

Use this option to control when data is sent to the server.

1. Go to the Network screen.
2. Push ⏏ to initiate the data transfer.

User-initiated data download

User-initiated download is done from the OPC server. Use this option to verify the server connection and start the data download.

To start the data download, push **DOWNLOAD NOW**. All other actions are done by the server.

Automatic data download

Automatic download is configured on the OPC server. For applications that require alarm reasons, automatic download must be disabled.

Calibration

The instrument cannot be calibrated by the user. Contact the manufacturer for instrument calibration.

Maintenance

⚠ WARNING

Multiple hazards. Do not disassemble the instrument for maintenance. If the internal components must be cleaned or repaired, contact the manufacturer.

⚠ CAUTION

Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

Clean the instrument exterior

The instrument exterior can be cleaned as needed. To avoid human exposure to potentially dangerous chemicals, make sure to clean the touchscreen immediately after contact with chemicals.

NOTICE

To prevent damage, do not use an aerosol cleaner or glass cleaner on the touchscreen. Do not leave visible moisture on the instrument or touchscreen. Moisture can penetrate the touchscreen and damage the electronics inside.

1. Put the cap on the sample air intake nozzle to keep contamination out.
2. Spray a mild cleaning solution on a soft cloth. Wipe the outside of the instrument carefully.
3. Use a soft, dry cloth to wipe the touchscreen surface. If needed, moisten the soft cloth with a mild cleaning solution.

Set the count to zero

Do this procedure after unexpectedly high particle counts. This procedure will verify that the particle counter works correctly and will remove residual particles.

1. Put the zero-count filter on the intake tube.
2. Turn on the unit and log in if needed.
3. Push **SAMPLE**.
4. Push **RUN**.
5. Repeat the process until the particle counts return to zero.

Update the instrument software

NOTICE

Do this procedure with only manufacturer-supplied files and directions.

1. Download the self-extracting *.zip file from the location provided by the manufacturer.
2. Extract the files to a compatible USB drive. Use only manufacturer-supplied USB drives for best results.
3. Remove AC power. Remove the batteries.
4. Plug the USB drive into the USB port.
5. Apply AC power to the instrument.
6. Select **Yes** to start the update. When the update is complete, the instrument will continue startup.
7. To verify the version number of the update, push **DIAGNOSTICS**. The version will show on the Diagnostics screen.

Charge the batteries in the particle counter

Batteries in the particle counter will begin to charge when the AC power adapter is connected. A complete charge in the instrument takes approximately 10 hours. The battery is considered to be fully charged when the battery status light on the front of the instrument shows a charge between 95% and 100%.
Prerequisite: Install the batteries in the instrument. Refer to Install the batteries on page 13.

NOTICE

Discard the used batteries according to local regulations or contact the manufacturer. Do not put exhausted batteries in the domestic waste.

1. Attach the power supply to the unit.
2. Connect the unit power supply to the external power through the AC power adapter.

   The battery status light will show the level of power in the battery. Refer to Table 5.

Table 5 Battery LED color indications

LED state	LED color	Battery status	Charge status
Flashing	Orange	Low power	Not charging
Flashing	Green	Low power	Charging
Solid	Green	Charged	Charging

Battery recharge intervals

Table 6 shows the charge frequency that will increase battery life and increase the interval between battery calibrations.

Table 6 Suggested battery recharge interval

Frequency of use	Hours of sampling			
	0.5	1	2	6
Daily	Charge weekly	Charge weekly	Charge daily	Charge daily
Weekly	Charge monthly	Charge weekly	Charge weekly	Charge weekly
Monthly	Store on charge	Store on charge	Store on charge	Store on charge

When the particle counter is not is use, batteries will slowly discharge because of background processes on the instrument.

Calibrate the battery

The lithium ion Smart Battery will tolerate frequent partial discharges. After many partial discharges, the accuracy of the battery gauge is decreased.

To calibrate the battery charge gauge, set the Smart Charger to calibration mode during discharge.

Diagnostics and Troubleshooting

The Diagnostics screen shows information that may be needed for troubleshooting. Table 7 shows an example of a failure notification on the Diagnostics screen.

Table 7 System Diagnostics screen example - Clock battery failure

Signal	Value	Status
Calibration	0.00 VDC	OFF
Flow	0.00 VDC	OFF
Clock battery	0.00 VDC	FAIL
Battery 1 (bottom)	16.42 VDC	PASS
Battery 2 (top)	16.44 VDC	PASS
Laser current	N/A	– –

For troubleshooting that involves technical support from the manufacturer, the user may need to send a fax of the system status printout to technical support.

1. On the Counter Navigation screen, push **DIAGNOSTICS**. Information about the system, such as serial number and software version, shows.
2. On the Diagnostics screen, push  .

The printout will show the serial number, date and time and other data about the system.

Factory settings

For troubleshooting that involves technical support from the manufacturer, the user may need to send a copy of the factory settings to technical support.

Note: *Factory settings cannot be changed by the user.*

To view the factory information including the calibration date:

1. Log on as an administrator.
2. On the Counter Navigation screen, push **FACTORY**. The factory settings show (e.g., calibration date, calibration due date and nominal flow).
3. Push to print the factory settings.

Parts and accessories

⚠ WARNING

Personal injury hazard. Use of non-approved parts may cause personal injury, damage to the instrument or equipment malfunction. The replacement parts in this section are approved by the manufacturer.

Note: *Product and Article numbers may vary for some selling regions. Contact the appropriate distributor or refer to the company website for contact information.*

Parts for the 28.3 LPM counter

Description	Quantity	Item number
Probe, isokinetic, aluminum, for 28.3 LPM	1	2087966-01
Probe, isokinetic, stainless steel, for 28.3 LPM	1	2087966-02
Filter, Zero Count for 28.3 LPM	1	2087939-01
Tubing, Hytrel®, 0.953 cm (0.375 in.) ID, 1.27 cm (0.5 in) OD	10 ft	960380

3411 parts

Description	Quantity	Item number
Battery, Lilon Smart	1	280-120-2024
Smart battery charger	1	280-300-5000

3411 parts (continued)

Description	Quantity	Item number
Brush, intake nozzle cleaning	1	995240
Paper, thermal, roll	1	460519
Power cord, 110 VAC	1	VP623501
Power cord, 220 VAC	1	VP6233500
Power supply, external, 100–240 VAC input, +24 VDC output	1	230-300-7052
WiFi antenna (for wireless versions only)	1	490-200-0001
Software, PortAll, (kit: CD, manual, serial adapter)	1	2084045-02
Software, PortAll, license	1	700011-21
Software, PortAll, license 21CFR	1	700011-22
Document, PortAll Software IQ/OQ	1	701169-01
Stylus for touchscreen interface	1	210-400-5171
Isoprobe, adapter	1	2088035-01
Isokinetic probe stand (optional) (compatible with all Iso-kinetic probes), stainless steel	1	2089406-01
USB flash memory drive kit[1]	1	210-400-0128
Probe, air velocity, 0–200 fpm	1	826172
Probe, RH/T	1	2088928
Probe with beeper, filter scanning	1	2088000-01
Probe without beeper, filter scanning	1	2088000-02
Transportation case with foam inserts and wheels	1	710-200-0002
Low pressure diffuser, 15–49 PSI, 1 CFM only	1	2088616-01

3411 parts (continued)

Description	Quantity	Item number
High pressure diffuser, 28.3 L/min (1.0 CFM), 3/8-in. barb	1	2080732-13
USB 2.0 high speed, 1 m (3.3 ft) cable	1	460-400-4798
USB to RS-232 adapter, DB-9 null modem	1	2088012-02
USB to RS-485 adapter	1	2088012-01

[1] Use only the manufacturer-supplied USB flash drives.

Spare parts kit (2087919-01)

Description	Quantity	Item number
Battery, Lilon Smart Battery	1	280-120-2024
Charger, external battery	1	280-300-5000
Thermal paper, roll	1	460519

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