

# Remote Airborne Particle Counter | Remote APC

Model A530BS A530B A530

## User Manual

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Designed & Manufactured by **MICRONVIEW**

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## Foreword

PMT's Remote APC (continuous particle monitoring) system is widely used in pharmaceutical, food, electronics or other industries that need to maintain a stable environment in cleanrooms or other zones to perform environmental monitoring and early warning functions. These systems are applied in critical zones of aseptic processes or in various cleanrooms or clean zones where environmental cleanliness must be maintained. The most common application is integration within various barrier systems, as outlined below:

1. Weighing and Dosing Systems (Restricted Access Barrier Systems - RABS or isolators)
2. Aseptic Process Systems (RABS or isolators), including but not limited to the following aseptic processes:  
lyophilization, cartridge filling, cell culture or purification, etc. It is also used in pre-filled syringes and ready-to-use stoppers processes.
3. Blow-Fill-Seal Technology (open-type parison processes, etc.)
4. Aseptic Inspection Systems (isolators), etc.

The Rules Governing Medicinal Products in the European Union Volume 4EU Guidelines for Good Manufacturing Practice for Medicinal Products for Human and Veterinary Use

Annex 1: Manufacture of Sterile Medicinal Products:

9.17 The grade A zone should be monitored continuously (for particles  $\geq 0.5$  and  $\geq 5 \mu\text{m}$ ) and with a suitable sample flow rate (at least 28 liters ( $1\text{ft}^3$  per minute) so that all interventions, transient events and any system deterioration is captured. The system should frequently correlate each individual sample result with alert levels and action limits at such a frequency that any potential excursion can be identified and responded to in a timely manner. Alarms should be triggered if alert levels are exceeded.

9.24 Continuous viable air monitoring in grade A (e.g. air sampling or settle plates) should be undertaken for the full duration of critical processing, including equipment (aseptic set-up) assembly and critical processing. A similar approach should be considered for grade B cleanrooms based on the risk of impact on the aseptic processing. An effective environmental monitoring system can reflect the true level of particles and microorganisms in the clean zone, confirm whether the environment meets the requirements of regulations, and give effective feedback on contamination control measures to identify potential sources of contamination for the purpose of continuous improvement. PMT's Remote APC system are developed, manufactured and applied through the principles of risk and lifecycle management to meet global quality compliance.

PMT's Remote APC (continuous particle monitoring) system provide environmental monitoring consisting of a Remote APC and pre-installed operating system software. It supports multi-size particle detection, high precision, fast response, real-time data viewing, and offers a clear interface with easy operation and quick

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setup. Additionally, it includes an automatic data transfer feature upon reconnection to prevent data loss, with the ability to store up to default cache for 15,000 records, expandable up to 5 million records. The pre-installed operating system software is designed for risk-based environmental contamination control. It offers comprehensive management of equipment, facilities, tasks, real-time information, and data, covering a wide range of functions such as monitoring object setup, zone management, monitoring plans, process management, device management, material management, task management, data management, alarm management, personnel management, and knowledge management. Using trend analysis to evaluate the performance indicators of control elements over a specific period, it helps to promptly identify potential contamination risks and enables comprehensive contamination control with a holistic approach.

## **Disclaimer**

1. This device should be operated by trained personnel only.
2. In case of any abnormalities, please power off and shut down the device.
3. Before installing or operating this device, operators are required to carefully read this document.
4. This confidential document contains proprietary information owned by PMT, with all rights reserved.
5. No part of this document may be copied, distributed, or transmitted in any form without prior written permission from PMT.
6. The information contained in this document is subject to modify without notice.
7. Any system failures or consequences regarding safety and effectiveness resulting from violating the above statements are the sole responsibility of the user.

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This document introduces the **Remote Airborne Particle Counter** (Remote APC) to users.

## Chapter 1 Safety Instructions

This device complies with relevant local laws and safety regulations. The following safety precautions must be strictly followed. The user assumes responsibility for any accidents caused by non-compliance.

### 1.1 Installation

Caution
Do not use the device near ethyl alcohol, paint thinners or any other flammable materials. If flammable materials come into the device and contact with electrical components inside the devices, it could be a fire hazard.
Do not place any containers with water or liquid on the device. Shut down the device immediately when any liquid falls into or splashes into the device. In addition, if the power cord or any cables are connected, disconnect immediately. Unplug the power code entirely.
Do not place the device on an unstable location (such as an unstable platform or sloped surface). Do not place the device where is vulnerable to severe vibration. Any of these conditions can result in damage to the device or personal injury for those nearby.
Do not place the device in the following location, or it could be a fire hazard. <ul style="list-style-type: none"><li>· Locations susceptible to high temperatures.</li><li>· Close to any open flame.</li></ul>

### 1.2 Power Supply

Caution
Do not disassemble or modify the cable.
Do not place any heavy objects on the cable. Keep the cable away from heat sources. Otherwise, the cord's insulating layer may melt and could create an electric shock hazard or a fire hazard.
Do not stretch the cable, or it may become loose, overheat and create a fire hazard.
The cable may be damaged if it is placed under strain. Using a damaged cable may create a fire hazard or electric shock hazard.
Do not handle the power cord or cable with wet hands, or it could be an electric shock hazard.
Do not place any items on the AC adapter. It could cause overheating and result in fire or electric shock.
Do not use an AC adapter that is not supplied by PMT, or it could be a fire hazard.
Do not use the supply voltage out of range of AC adapter, or it could be a fire hazard or an electric shock hazard.
To unplug, always grasp the power cord. Do not stretch the cable, as it may expose the core of the cable or damage the insulation. It may result in electric leakage, and it could be a fire hazard or an electric shock hazard.

### 1.3 Operation

Caution
Do not disassemble or modify the device.
If abnormal noise, smoke, overheating or strange odors are detected, shut down the device and disconnect any attached cords or cables immediately. Contact the local distributor. If continue to use, it may result in fire.
Do not use any flammable sprays near the device. If the flammable materials contact the electrical components,

it may create a fire hazard or electric shock hazard.

This device must be properly disposed of by authorized personnel at the end of its service life.

#### 1.4 Maintenance and Inspection

##### Caution

Before performing any maintenance, shut down the device and disconnect the attaching plug to avoid an electric shock hazard.

Wet the clean wiper with 70-80% ethyl alcohol or isopropyl alcohol and clean the device surface. Do not allow the ethyl alcohol or isopropyl alcohol to contact with the electrical components inside the device, or it may result in malfunction.

## Chapter 2 General Information

### 2.1 Introduction

The Remote Airborne Particle Counter (Remote APC) is an airborne particle detector based on laser optical sensor, that can accurately detect, count, and measure airborne particulate. It is commonly used to monitor airborne particulates in environments requiring stable conditions, such as cleanrooms or other controlled environments.

#### Main Features

- Available in versions with built-in blower (A530B, A530BS) and central air supply version (A530).
- Supports both immediate and customized monitoring tasks.
- Real-time data transmission to EMC system or other management systems.
- Optional stainless steel protective shells are available to enhance functionality, as listed in the optional parts list.

#### Performance Features:

- Constant flow sampling with higher precision.
- Continuous monitoring, real-time data, automatic recording.
- The enclosure material is 316L stainless steel or anodized aluminum, resistant to common disinfectants used in cleanrooms.
- Long-life laser with a temperature control system.
- Easily integrate with user-owned systems as a comprehensive monitoring and management platform for facilities or buildings.
- Laser failure light alarm, and count/flow exceeding light alarms.
- Compliant with ISO 21501-4: 2018 standards.

#### Data Integrity:

- Clear interface and easy operation.
- Date transmission, archiving, backup, etc. are all safe and reliable.
- Default cache for 15,000 records, expandable up to 5 million records.
- Automatic data transfer after reconnection to prevent data loss.
- Audit trail

### 2.2 Technical Specification

Parameter	Remote APC Models		
	A530BS	A530B	A530
Model Differences	with blower and screen	with blower, without screen	without blower or screen
Flow Rate	28.3LPM ± 5%		

Parameter	Remote APC Models				
	A530BS	A530B	A530		
Size Range	From 0.3μm to 25μm				
Size Channel	0.3μm, 0.5μm, 5.0μm				
Size Resolution	<15% @ 0.5μm (ISO 21501-4)				
Count Efficiency	50% ±20% at 0.3μm, 100% ±10% for particles >0.45μm (ISO 21501-4 and JIS B9921)				
Concentration Limit	450,000 particles/ft³ at 10% coincidence loss				
Zero Count	<1count/5min				
Exhaust	Internal HEPA filter (>99.999%@0.3μm)	N/A			
Flow Rate Control	Built-in mass flow sensor, closed-loop auto control.	Fixed flow orifice			
Laser Source	Long-life laser				
Communication	RJ45, USB, SENSER-HUB, WIFI				
Data Storage	4GB, default cache for 15,000 records, expandable up to 5 million records				
Alarm	Audible built-in alarm, external sound and light alarm				
Display	4"LCD capacitive touch screen	status indicators			
Language	Chinese, English	N/A			
Blower	Built-in blower		N/A		
Calibration Frequency	Recommended once a year				
Calibration Standard	Meets ISO 21501-4				
Dimensions (H×W×D)	163×153×125 mm/ 6.42×6.02×4.92 in	162×148×110 mm/ 6.37×5.81×4.33 in	182×144×90 mm/ 7.17×5.67×3.54 in		
Weight	1.95 kg/ 4.30 lbs	1.85 kg/ 4.08 lbs	1.60 kg/ 3.53 lbs		
Enclosure	Aluminum or 316L stainless steel		316L stainless steel		
Power	100-240V, 50Hz/60Hz AC to 24V DC input, plug compatible with standard interface types				
Max Power Consumption	AC 90W				
Operating Conditions	Operating temperature: 5 °C-35 °C (41°F-95°F); Relative humidity: 5%-90%, non-condensing.				
Storage Conditions	Storage temperature: 0°C-40°C (32°F-104°F); Relative humidity: 5%-95%, non-condensing.				

Parameter	Remote APC Models		
	A530BS	A530B	A530
Safety	EN 61010-1:2010, EN 61326-1:2013, EN IEC 61326-1:2021		
Warranty	24 months (calculated from the date of product activation or six months after the date of manufacture, whichever comes first). 10 years for laser.		

The appearance of different models of the Remote APC is shown below:



Chart 2-1 A530BS



Chart 2-2 A530B



Chart 2-3 A530

**2.3 Optional Parts List**

Part Name	Part No.	Figures
AC adapter	E1.G901	
Power cord	E1.CN01	
	E1.EU01	
	E1.UK01	
	E1.US01	
Isokinetic probe	S1.0281	
Sample tubing	T1.B381	
Sample tubing (pressure resistant)	T1.H081	
Wireless adapter	E3.0002	
HEPA filter	F1.0002	
Adapter for filter	F2.0004	

Part Name	Part No.	Figures
Remote sensor protective enclosure	U2.S001	
	U2.0001	

## Chapter 3 Installation Environment

The installation environment for the Remote APC depends on user's requirements. Users should consider the specific characteristics of their products and manufacturing processes to confirm a suitable installation environment to avoid any adverse impact on the installation and use of this device, while ensuring that the production operations are not affected and no quality risks are introduced.

In general, the following environmental conditions are suitable for installing the Remote APC:

Table 3-1 Remote APC installation environment requirement

Maximum Operating Altitude	6,652 ft (2000m)
Installation Requirements	<p>Indoor use only.</p> <p>Contact your local regulatory authority to determine pre-installation restrictions and requirements regarding the use of cables.</p> <p>Ensure that there is no electromagnetic field noise interference around the site. If there is a strong magnetic field or a large microwave transmitter station around the site, shielding measures should be taken.</p> <p>The power supply system must be well grounded.</p> <p>If there are dangerous factors such as water and fire in the environment where the equipment is installed, appropriate waterproof and fire prevention measures should be taken.</p> <p>Operating Temperature: 5°C-35°C (41°F -95°F ); Relative humidity: 5%-90%, non-condensing.</p>
Water Resistance	IP65
Laser Classification	Class 1 US 21 CFR 1040.10, EN60825-1

## Chapter 4 Unpacking and Installation

Unpacking and installation should be carried out by authorized personnel.

### 4.1 Unpacking

Carefully open the packaging of the Remote APC, take the device out of the box, and check the contents according to the packing list below. If any components are missing or damaged, please contact PMT immediately. Retain the packaging for possible future return shipping.

Table 4-1 Packing List

Product Name	Part No.	Reference Figure	Quantity
Remote APC	MACHA530BS		1
	MACHA530B		
	MACHA530		
USB flash drive (include Operation Manual)	E3.0001		1
Calibration certificate	N/A		1

Note: If additional accessories were purchased, they will be included with the above items.

### 4.2 Installation

If the installation zone undergoes routine cleaning and disinfection, it is recommended to install the Remote APC outside the room, with only the sampling head and air inlet tube inside the cleanroom. As an alternative, the Remote APC can be placed inside a remote sensor protective enclosure (optional accessory). The enclosure connects to all piping and cables. The enclosure is made of 316L stainless steel, thus resisting common disinfectants used in cleanrooms.

#### 4.2.1 Indicator Lights & Touch Screen

The front of the Remote APC has 4 LED indicator lights, which provide operational status indicators (the A530BS model does not have indicator lights), as shown below:

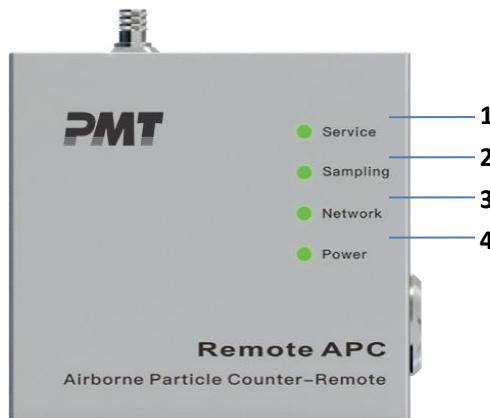


Chart 4-1 Indicator lights

No.	Indicator	Status	Function
1	Service	Red flashing	Flow or laser alarm
		Green flashing	Device is operating normally
2	Sampling	Off	No sampling
		Green flashing	Device is sampling
3	Network	Off	No network connection
		Red	Network failure
		Green	Network operating normally
4	Power	Off	Device is powered off
		Green	Device is powered on and running

The A530BS model has a touch screen on the front panel with no indicator lights. The touch screen displays alarm information and operational status and allows device operation. See below for the functions displayed on the touch screen:



Chart 4-2 The touch screen of A530BS

No.	Icon	Function
1		Start Sampling

No.	Icon	Function	
2		Stop Sampling	
3		Network Status	
4	$\mu\text{m}$ 0.3 0.5 5.0	$\Sigma/\text{m}^3$ 0.0 0.0 0.0	Sampling Data Display
5		Modify Account Password	
6		Enter the Network Configuration Interface	

#### 4.2.2 Electrical Interface

The Remote APC supports various communication and electrical connection options. The electrical interface is located on the side of the device, and the interface types and functions are the same across all models. Below is a brief description of each electrical port:

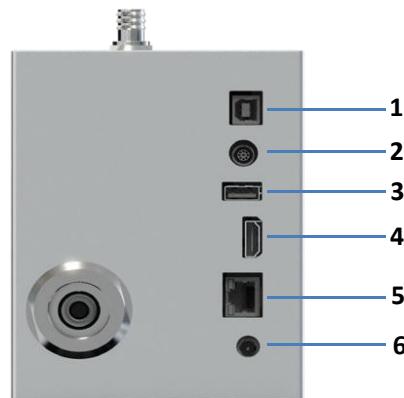


Chart 4-3 Communication and electrical ports

No.	Name	Function
1	Calibration Port	Connect to the calibration controller or PC for device calibration using dedicated software of PMT.
2	Multifunction Port	Connect to indicator lights of the remote sensor protective enclosure. Power and control external indicator lights.
3	USB Port	Power the remote sensor protective enclosure screen and provide touch control functionality, can also connect to a WiFi card for wireless network capabilities.
4	HDMI Port	Supports HDMI display for data communication. Insert both USB and HDMI cables into the corresponding ports on the

No.	Name	Function
		touch screen before powering on for normal operation.
5	Network Port	Standard RJ45 port for data transmission, device interconnection, network management, and remote control.
6	Power Port	Requires a 24V DC power adapter provided by PMT or approved by PMT engineers.

#### 4.2.3 Airflow Connection

The sampling air inlet at the top of the device uses a Pagoda Fitting for sampling or connecting a sampling tube, as shown in chart 4-4.



Chart 4-4 Sampling air inlet connection diagram

The exhaust outlet of A530 model uses a quick connector for attaching a pressure-resistant sampling tube, as shown in chart 4-5. It should be connected to a vacuum pump or a central vacuum source capable of providing 15 inches of mercury (38 cm Hg).

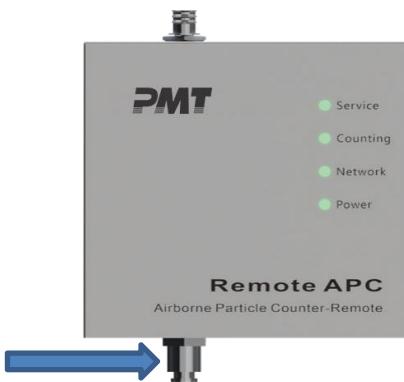


Chart 4-5 A530 exhaust outlet quick connector

The A530BS and A530B models have built-in blowers, so they do not require connection to an external vacuum pump or central vacuum source. The exhaust outlet should simply be connected to a HEPA filter.



Chart 4-6 A530B exhaust outlet HEPA filter connection

#### 4.2.4 Device Installation

##### 4.2.4.1 Determining the Installation Location

The installation and sampling locations of the Remote APC should be determined based on the principles of quality risk management and lifecycle management. It is recommended to establish an environmental monitoring scheme on the basis of a formal risk assessment report, including sampling location, sampling method and sampling frequency. Sampling locations should not introduce contamination into the production process.

The risk assessment needs to establish the location of sampling locations, monitoring frequency and sampling methods in the environmental monitoring program based on the criticality of the production process and final product, facility, equipment, specific processes and critical degree of process steps, the operations involved, the routine monitoring data, the data at the time of the Environmental Monitoring Performance Qualification (EMPQ), the information on the typical microbial flora isolated in the environment, and the study of the airflow pattern. Quality risk management methods and tools can be found in "Quality Risk Management" (ICH Q9 (R1)). The commonly used risk assessment tools for environmental monitoring risk assessment include Failure Mode Effect and Criticality Analysis (FMECA), Hazard Analysis and Critical Control Points (HACCP) methods, etc.

The choice of installation location should be considered in order to find the most valuable sampling location and thus obtain representative data to evaluate the distribution of airborne particulate and microorganisms in the measured environment.

For Grade A zones, Remote APC system should provide continuous monitoring throughout the entire production process. In particular, during critical operations, including equipment assembly, Remote APC system should be used to monitor airborne particulates and microorganisms in the Grade A clean zone. The frequency and number of samples for monitoring Grade A zones should be sufficient to detect any human interventions, incidental events, and any impact of the system on environmental quality. The selection of the continuous monitoring system should also consider any risks posed by the materials used in production, such

as the presence of viable organisms or radioactive substances.

For Grade B areas, which serve as background areas for Grade A, a dedicated particle counter should be used. If an integrated Remote APC system is employed, careful consideration should be given to the sampling interval, ideally no less than 10 minutes (as a guideline). The number of samples must provide a statistically significant data set, especially for static conditions, and should also consider particle counts above 5 micrometers.

The PMT Remote APC monitoring system, owing to its no need for manual intervention, is integrated with aseptic technologies (such as isolators, blow/fill/seal systems, open or closed RABS) and installed within the facility, achieving the goal of reducing personnel contamination risks. With its pre-installed embedded operating system, the monitoring system allows for remote control and data access. Additionally, it includes customizable statistical and trend analysis modules based on user requirements, enabling efficient monitoring and timely alerts.

#### 4.2.4.2 Device Installation

The bottom of the Remote APC features a mount that can be used to attach the device to various stands or installation setups. PMT provides an optional mounting bracket (Part No. H1.0006), allowing the Remote APC to be easily mounted and detached from surfaces (see Figure 4-7).

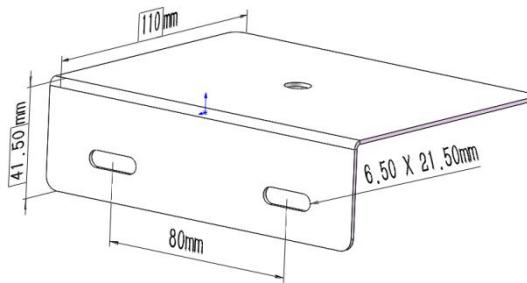


Chart 4-7 Bracket

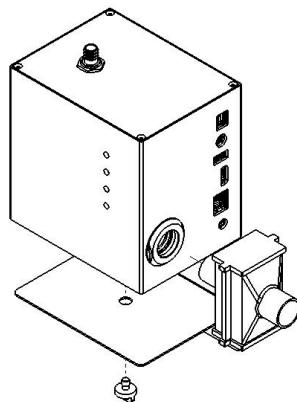


Chart 4-8 Installation

**Bracket Installation Method:**

- a. The bracket includes two holes with diameters of 0.169 inches (4.30 mm), suitable for #6 or M4 screws. Use appropriate screws to fix the bracket to the mounting surface.
- b. Place the Remote APC onto the upper part of the bracket, align the mount screw hole with the circular hole on the top of the bracket, and tighten the mount screw into the particle counter's mount hole, as shown in chart 4-8.

**4.2.5 Protective Enclosure Installation**

When using the Remote APC in environments that undergo frequent disinfection procedures, the use of a remote sensor protective enclosure can prolong the life of the device.

Secure the remote sensor protective enclosure to the mounting surface using four M4 collision screws, as shown in chart 4-9.

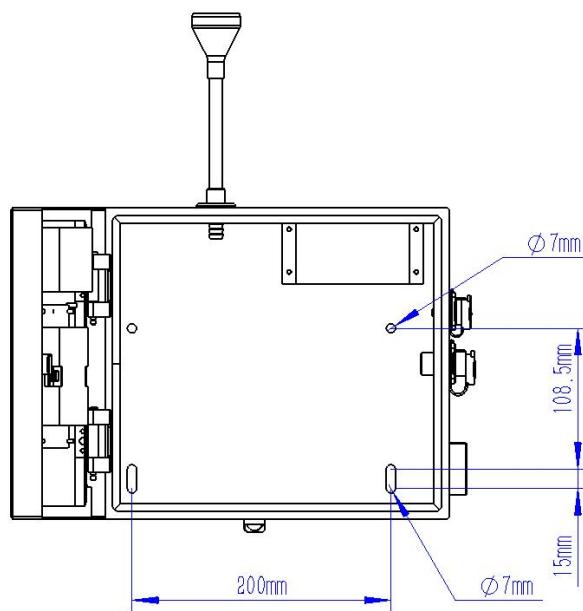


Chart 4-9 Mounting hole of the remote sensor protective enclosure

Place the Remote APC inside the protective enclosure, pass the mount screw through the pre-drilled hole at the bottom of the protective enclosure, and tighten it into the bottom mount hole of Remote APC, as shown in chart 4-10.

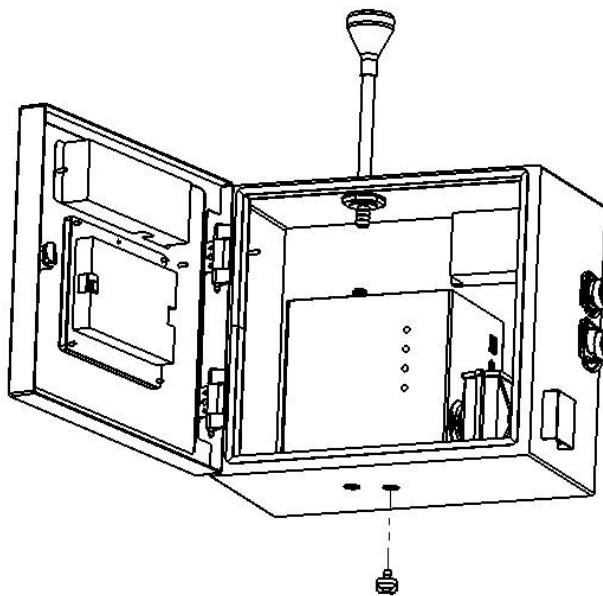


Chart 4-10 Install Remote APC inside protective enclosure

Connect the sampling tube to the Remote APC and the sampling head. Connect the multifunction cable, USB cable, and HDMI cable to the indicator panel and screen, as shown in chart 4-11. When using the screenless version of the remote sensor protective enclosure, only the multifunction cable is required to connect the indicator panel.

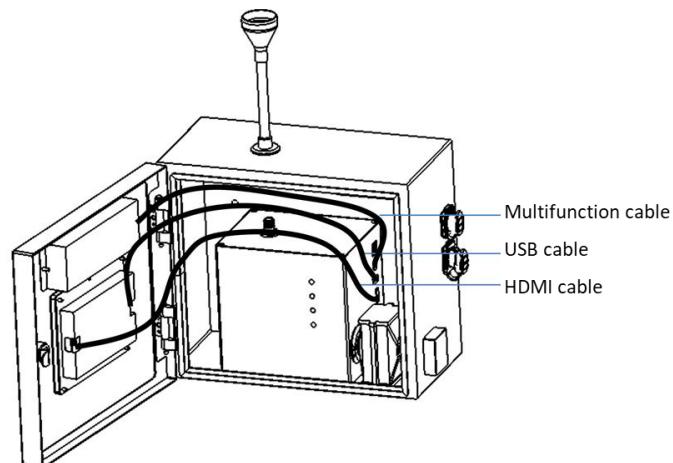


Chart 4-11 Wiring diagram inside the remote sensor protective enclosure

#### 4.2.6 Wiring Preparation

For the Remote APC to function properly, RJ45 data cable and power cable must be connected. These cables need to be prepared on-site after the device position is secured.

- An industrial RJ45 connector is required to connect the Remote APC to the network. The cable pinout should follow the ANSI/TIA/EIA-568-B.1 standard for commercial building wiring.
- Requires a 24V DC power adapter provided by PMT or approved by PMT engineers.
- If using a remote sensor protective enclosure, a waterproof quick-connect plug must be prepared for the power cable and RJ45 data cable.

##### 4.2.6.1 RJ45 Data Cable Preparation

Tools and Materials: Crimping tool, RJ45 connectors, wire tester.

1. Strip the Outer Jacket: Use the crimping tool to strip the outer jacket of the cable, exposing about 1.5-2 cm of the internal wires.
2. Arrange the Wires: Arrange the 8 wires according to the T568B standard (white-orange, orange, white-green, blue, white-blue, green, white-brown, brown).
3. Cut the Wires: Use the crimping tool to cut the wires to the correct length (about 1.4 cm).
4. Insert the Wires into the RJ45 Connector: Insert the arranged wires into the RJ45 connector, ensuring the correct sequence.
5. Crimp the Connector: Use the crimping tool to securely crimp the connector, ensuring proper contact between the wires and the connector.
6. Test the Cable: Use the wire tester to check the continuity of the cable and ensure all wires are properly connected.

##### 4.2.6.2 Waterproof Quick-Connect Power Cable Preparation

Feed the 3-core power cable through the seal and quick connector, connecting it to the power plug. Ensure the neutral, live, and ground wires are correctly identified. Use a wire stripper to remove 3-5 mm of insulation from the copper wires. Using a soldering iron and solder, connect the neutral, live, and ground wires to the appropriate terminals on the plug. See chart 4-12.



Chart 4-12 Waterproof quick-connect power cable preparation

#### 4.2.6.3 Waterproof Quick-Connect RJ45 Data Cable Preparation

Feed the 8-core RJ45 data cable through the seal. Follow the procedure for RJ45 cable preparation, then place the prepared RJ45 connector into the quick connector, as shown in chart 4-13.



Chart 4-13 waterproof quick-connect RJ45 data cable preparation

#### 4.2.7 Wiring Safety Guidelines

When connecting any wiring to the instrument, follow the warnings and precautions below. Make sure to follow all safety guidelines outlined in this installation section. For additional safety information, please refer to Chapter 1.

**Important:** Before making any electrical connections, the device power supply must be disconnected.

**Anti-Static Precautions:** To minimize static discharge hazards and avoid static buildup, power off the device during maintenance. Internal electronic components can be damaged by static electricity, which may lead to decreased instrument performance or failure. To prevent static electricity from damaging the equipment, follow these steps.

1. Discharge any static from your body by touching a grounded metal surface (such as the device chassis or metal piping) before handling electronic components.
2. Minimize static buildup by avoiding excessive movement. Use anti-static containers or packaging for static-sensitive components.
3. Wear a grounded wrist strap to prevent static buildup on your body.
4. Handle all static-sensitive components in a designated anti-static zone, and, if possible, use anti-static floor and workbench mats.

## Chapter 5 Communication Configuration and Remote Operation

The Remote APC supports Ethernet communication, with options for automatic or manual network address configuration. When no external DHCP server is available to automatically assign a network address, the default IP address for the device is: 192.168.19.100.

When setting up the network configuration for Remote APC, ensure that all devices are configured with the planned network addresses. Incorrect network addresses may cause conflicts or prevent communication with the management software server.

Remote APC models with touch screens (model: A530BS) support both device-side and remote network configuration. Models without touch screens (models: A530B & A530) must be configured remotely. The configuration methods are as follows:

- Device-side Configuration:** Click the network settings icon to enter the network configuration page, where automatic or manual connection methods can be selected, as shown in chart 5-1.

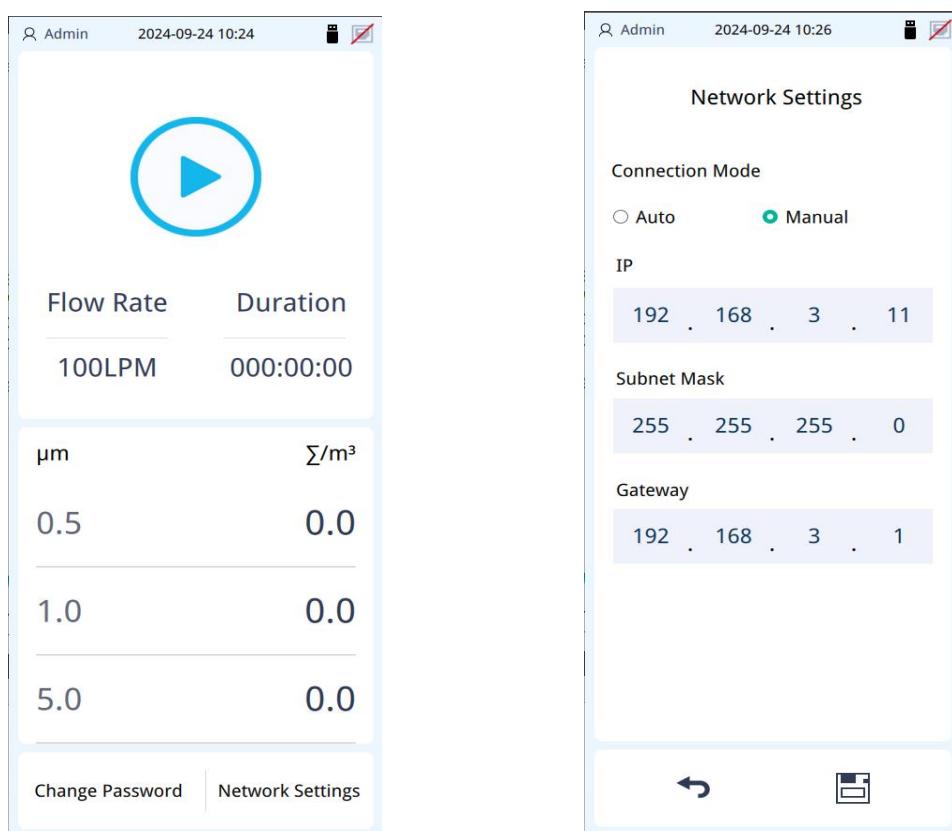


Chart 5-1 A530BS network configuration on device-side

- Remote Configuration:** Use the MODBUS configuration protocol to configure the network address remotely via the EMC system or another compatible system (detailed in Appendix A: Modbus Protocol).

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For instructions on adding, viewing, and configuring devices, refer to the "**EMC System For Remote Devices User Manual**" section **2.5, Device Management**. If the Remote APC cannot be detected by the system, check the following settings:

- a. The Remote APC is operating correctly by checking the operation and network indicator lights.
- b. The network configuration of the Remote APC is correct. Once the physical network connection is confirmed, use the server-side ping function to check for network address errors.

## Chapter 6 Maintenance and Performance Inspection

The Remote APC has no user-serviceable components. However, you can clean the device enclosure, repair or replace cables and connectors if needed.

### 6.1 Cleaning the Enclosure

The Remote APC can be installed as a standalone unit or within a protective enclosure. The device is designed for long-term, trouble-free operation. Regularly wipe the enclosure surface using a lint-free cloth moistened with 70-80% ethanol or isopropanol to extend operational lifespan of the device.

### 6.2 Cable Connectors

Cable connectors can sometimes be damaged due to accidents. Ethernet connections, in particular, are prone to damage. If a connector is damaged, do not forcibly insert it into the port. Instead, repair or replace the damaged connector.

### 6.3 Performance Inspection

Regular performance checks should be conducted to verify that the Remote APC is functioning properly.

#### 6.3.1 Gas Flow Rate Inspection

The flow rate control in the A530 model is managed using a fixed flow orifice, which is non-adjustable. If the flow decreases by 15%, there may be a blockage in the flow control or inlet port.

The A530 and A530BS models regulate flow rate using a built-in flow meter that adjusts the blower speed. If the flow rate deviation exceeds  $\pm 5\%$ , the flow meter or blower may be malfunctioning.

##### Steps to Check Air Flow:

- a. Disconnect all sampling tubes and probes.
- b. Attach a portable flow meter to the inlet port.
- c. Perform a sampling operation and monitor the flow meter reading. Verify that the flow deviation is within  $\pm 5\%$ .

#### 6.3.2 Background Noise Count Check

This check should be performed during installation or when contamination or noise counts are suspected of causing inaccurate data.

Background noise counts may be caused by power line transients, cosmic ray particles, RFI, or EMI. To verify external induced counts, this procedure should be followed. A zeroing HEPA filter is required to perform this test.

##### Steps for Background Noise Count Check:

1. Install the Remote APC in its operating position.

2. Remove the isokinetic sampling head.
3. Attach the HEPA filter to the inlet port.
4. Run three consecutive 5-minute sampling cycles.
5. Verify that all three 5-minute samples return a reading of zero when using the HEPA filter.
6. Remove the HEPA filter to resume normal operation.

## Chapter 7 Troubleshooting and Maintenance

### 7.1 Common Issues and Solutions

Table 8-1-1 Common Issues and Solutions

No.	Common Problem	Possible Cause	Solution
1	Device screen does not light up	System malfunction	Power off and restart the device.
		Internal damage to the device	Return for repair or send to the distributor.
2	Device fail to power on	Internal short circuit	Check the power adapter indicator light; if off, return for repair; if on, the internal short circuit is unlikely.
		Power adapter malfunction	Reconnect the power adapter; if the issue persists, replace the power adapter.
		Device internal malfunction	Return for repair or send to the distributor.
		Button malfunction	Return for repair or send to the distributor.
		Battery is low	Connect the power adapter and restart the device.
		Battery is damaged	Replace the battery.
3	Power cuts out during operation	Power adapter failure	Replace the power adapter; if the issue persists, return for repair.
4	Abnormal flow during sampling	Device not operating under the specified conditions	Ensure the device is used under the specified conditions.
		Clogged air inlet and outlet/bent lines for remote sampling.	Check the air inlet and outlet for obstructions, if none, return for repair or send to the distributor.
		Internal airflow malfunction	Return for repair or send to the distributor.
		Sensor malfunction	Return for repair or send to the distributor.
5	Device enclosure overheats	Internal component malfunction	Power off the device, let it cool, and restart; if the issue persists, return for repair.
6	Touchscreen malfunction or unresponsive	Touchscreen partially malfunctioning	Restart the device; if the issue persists, return for repair or send to the distributor.
		Touchscreen damaged	Return for repair or send to the distributor.
7	Display splash screen while	System malfunction	Power off and restart the device; if

No.	Common Problem	Possible Cause	Solution
	the device is working		the issue persists, return for repair.
		Display screen loose or damaged	Return for repair or send to the distributor.

## 7.2 Routine Maintenance

Maintenance	Frequency	Procedure
Surface Cleaning	As needed or based on operating environment	Use a lint-free cloth moistened with 70-80% ethanol or isopropanol to wipe the surface.
Calibration	Recommended once per year	Send the device to the manufacturer or a certified calibration facility.

## 7.3 Return for Repair

If the device encounters a malfunction and needs to be returned for repair, please contact PMT.

## Chapter 8 Warranty

We provide a 24-month warranty for the Remote APC (hardware and software), starting from the date of product activation or 6 months after shipment (whichever comes first). The product is considered activated after 10 sampling operations or 40 cumulative minutes of sampling. For repair services or replacement parts, we offer a 6-month warranty from the date of shipment.

The warranty will be void under the following conditions:

- a. If the device is repaired or disassembled by a company or individual not authorized by PMT, the after-sales agreement will be voided immediately.
- b. Any damage caused by improper handling or abnormal operation will not be covered under warranty.

If an upgrade is needed during product usage life, we offer lifetime remote upgrade services free of charge.

The Remote APC is a precision device and must be operated by trained personnel.

## Annex A: Modbus Protocol

### 1. Sampling Control

**Method:** Write Coil 0x05

**Address:** 2

**Values:** 0x0000 to stop sampling

0xFF00 to start sampling

### 2. Set Sample Volume

**Method:** Write Multiple Holding Registers 0x10

**Address:** 40015

**Value:** Sample volume in milliliters (mL)

### 3. Read Device Status (Flow Rate, Power, Battery, Blower, Laser, etc.)

**30214** 0: normal >1:abnormal

### 4. Read Sampling Status

**30164** 0: not sampling 1: sampling 2: self-check

### 5. Set Device Flow Rate

**Method:** Write Multiple Holding Registers 0x10

**Addresses:** 40018, 40019

**Value:** Flow rate in milliliters per minute (mLPM)

### 6. Read Sampling Data (6 channels + timestamp, reserved for 20 groups)

Register	Data Type	Description
30187	ushort	Particle Channel 1 (high)
30188	ushort	Particle Channel 1 (low)
30189	ushort	Particle Channel 2 (high)
30190	ushortf	Particle Channel 2 (low)
30191	ushort	Particle Channel 3 (high)
30192	ushort	Particle Channel 3 (low)
30193	ushort	Particle Channel 4 (high)
30194	ushort	Particle Channel 4 (low)

30195	ushort	Particle Channel 5 (high)
30196	ushort	Particle Channel 5 (low)
30197	ushort	Particle Channel 6 (high)
30198	ushort	Particle Channel 6 (low)
30179	ushort	Time Stamp (high)
30180	ushort	Time Stamp (low)
30310	ushort	Time Stamp (high)
30311	ushort	Time Stamp (low)
30312	ushort	Particle Channel 1 (high)
30313	ushort	Particle Channel 1 (low)
30314	ushort	Particle Channel 2 (high)
30315	ushort	Particle Channel 2 (low)
30316	ushort	Particle Channel 3 (high)
30317	ushort	Particle Channel 3 (low)
30318	ushort	Particle Channel 4 (high)
30319	ushort	Particle Channel 4 (low)
30320	ushort	Particle Channel 5 (high)
30321	ushort	Particle Channel 5 (low)
30322	ushort	Particle Channel 6 (high)
30323	ushort	Particle Channel 6 (low)

## 7. Read Device Flow

Register	Data Type	Description	Flow unit	Comment
30022	ushort	Flow Rate (high)	mLPM	Sent in milliliters to avoid decimals
30023	ushort	Flow Rate (low)	mLPM	

## 8. Historical Data Query

### 1. Set the timestamp to query, default is to read 10 groups of data at a time.

Register	Data Type	Description	Comment
40021	ushort	Time Stamp (high)	second
40022	ushort	Time Stamp (low)	

### 2. Addresses for 10 groups of data:

Register	Data Type	Description	Comment
31130	ushort	Time Stamp (high)	Time of first data set
31131	ushort	Time Stamp (low)	second
31132	ushort	Particle Channel 1 (high)	Caching data in an array
31133	ushort	Particle Channel 1 (low)	
31134	ushort	Particle Channel 2 (high)	
31135	ushort	Particle Channel 2 (low)	
31136	ushort	Particle Channel 3 (high)	
31137	ushort	Particle Channel 3 (low)	
31138	ushort	Particle Channel 4 (high)	
31139	ushort	Particle Channel 4 (low)	
31140	ushort	Particle Channel 5 (high)	
31141	ushort	Particle Channel 5 (low)	
31142	ushort	Particle Channel 6 (high)	
31143	ushort	Particle Channel 6 (low)	
31144	ushort	Time Stamp (high)	Time of second set of data
31145	ushort	Time Stamp (low)	second
31146	ushort	Particle Channel 1 (high)	Caching data in an array
31147	ushort	Particle Channel 1 (low)	
31148	ushort	Particle Channel 2 (high)	
31149	ushort	Particle Channel 2 (low)	
31150	ushort	Particle Channel 3 (high)	
31151	ushort	Particle Channel 3 (low)	
31152	ushort	Particle Channel 4 (high)	
31153	ushort	Particle Channel 4 (low)	
31154	ushort	Particle Channel 5 (high)	
31155	ushort	Particle Channel 5 (low)	
31156	ushort	Particle Channel 6 (high)	
31157	ushort	Particle Channel 6 (low)	

## **Annex B: Remote APC CE Certification**

## Remote APC CE Certification -EMC



## Remote APC CE Certification -LVD



### Verification of Conformity

According to Low Voltage Directive 2014/35/EU

Certificate Number IN-QD-5805-240235-3-S1

Licence Holder Micron View Ltd.

Address 1st Floor, 41 Chalton Street, London England NW1 1JD

Machinery Description Airborne Particle Counter-Remote

Model/Type A530B, A510, A520, A530, A510B, A520B

Technical File No. IN-QD-5805-TF240235-3-S

Applicable Standards EN 61010:2010+A1:2019

Date of Issue April 26, 2024

Declaration: In the Opinion of SGS the Submitted Technical File IN-QD-5805-TF240235-3-S and Sample Satisfies the Requirements of the Low Voltage Directive 2014/35/EU.

#### Conclusion

Based upon review of the Technical Construction File and assessment of Sample, the apparatus is deemed to meet the requirements of the above standards and hence fulfills the requirements of:

#### Low Voltage Directive 2014/35/EU

Note: This certificate is only valid for the equipment and configuration described and in conjunction with the technical data detailed above.

This certificate is valid until unless the directive or standards in question has been amended or superseded.

The CE mark can be used under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives.

FOR AND IN BEHALF OF SGS-CSTC  
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## Annex C: Remote APC UKCA Certification

### Remote APC UKCA Certification -EMC

#### Verification of Conformity



According to Electromagnetic Compatibility Regulations 2016

Certificate Number	IN-QD-5805-240235-3-E2
Licence Holder	Micron View Ltd.
Address	1st Floor, 41 Chalton Street, London England NW1 1JD
Machinery Description	Airborne Particle Counter-Remote
Type Identification	A510, A520, A530, A510B, A520B, A530B
Technical File No.	IN-QD-5805-TF240235-3-E
Applicable Standards	EN 61326-1:2013, EN IEC 61326-1:2021
Date of Issue	April 23, 2024

Declaration: In the Opinion of SGS the Submitted Technical File IN-QD-5805-TF240235-3-E and Sample Satisfies the Requirements of the Electromagnetic Compatibility Regulations 2016.

#### Conclusion

Based upon a review of the Technical Construction File and assessment of Sample, the apparatus is deemed to meet the requirements of the above standards and hence fulfills the requirements of:

#### Electromagnetic Compatibility Regulations 2016

##### Note:

This certificate is only valid for the equipment and configuration described and in conjunction with the technical file detailed above.

This certificate is valid until unless the regulations or standards in question has been amended or superseded.

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## Remote APC UKCA Certification - Electrical Equipment (Safety)



### Verification of Conformity

According to Electrical Equipment (Safety) Regulations 2016

Certificate Number	IN-QD-5805-240235-3-S2
Licence Holder	Micron View Ltd.
Address	1st Floor, 41 Chalton Street, London England NW1 1JD
Machinery Description	Airborne Particle Counter-Remote
Model/Type	A530B, A510, A520, A530, A510B, A520B
Technical File No.	IN-QD-5805-TF240235-3-S
Applicable Standards	EN 61010:2010+A1:2019
Date of Issue	April 26, 2024

Declaration: In the Opinion of SGS the Submitted Technical File IN-QD-5805-TF240235-3-S and Sample Satisfies the Requirements of the Electrical Equipment (Safety) Regulations 2016.

#### Conclusion

Based upon a review of the Technical Construction File and assessment of Sample, the apparatus is deemed to meet the requirements of the above standards and hence fulfills the requirements of:

#### Electrical Equipment (Safety) Regulations 2016

Note: This certificate is only valid for the equipment and configuration described and in conjunction with the technical file detailed above.  
This certificate is valid until unless the directive or standards in question has been amended or superseded.

The UKCA mark can be used under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives.

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