Auburn
A Nederman Company

Current Source

PM Pulse

Operating Manual

Auburn FilterSense, LLC.
800 Cummings Center, Suite 350V, Beverly, MA 01915, USA

Phone: +1 978.927.4304 | **Email:** info@auburnfs.com | **Website: www.auburnfs.com**

Table of Contents

1. Technical Support Contact

Auburn (A Nederman Company) provides industry-leading Engineering and technical support for all product lines. The technical support department is staffed with a team of engineering professionals. Areas of assistance provided by the Technical Support department include:

- Pre-Installation Site Analysis
- Product Installation
- General Operation
- Application Specific Review
- Routine Calibration
- EPA Compliance
- Performance Upgrades and Add-On Features

To assure the best and most efficient technical support please be prepared with the following information prior to contacting Auburn (A Nederman Company). If it is determined that the component must be returned for evaluation/repair, a Return Material Authorization (RMA) number will be issued. You must include the RMA number on the packing slip and mark the outside of the shipping container.

- Company Name _____
- Product Model Number _____
- Product Serial Number _____
- Date of Installation _____
- Reason for Return _____

Auburn (A Nederman Company) Technical Support may be reached by:

Phone: (978) 927-4304

Fax: (978) 927-4329

E-Mail: info@auburnfiltersense.com

Hours of Operation: 8AM – 5PM U.S. Eastern Standard Time

- Any control unit or particulate sensor that was exposed to hazardous materials in a process must be properly cleaned in accordance with OSHA standards and a Material Safety Data Sheet (MSDS) must be completed before it is returned to the factory.
- All shipments returned to the factory must be sent by prepaid transportation.
- All shipments will be returned F.O.B. factory.

- Returns will not be accepted without an RMA number.

2. Notifications

2.1. Disclaimer

This document contains important information necessary for proper operation of the product. It is strongly urged that all users of the product read this manual in its entirety. All instructions should be followed properly and any questions that arise should be discussed with Auburn (A Nederman Company).

Any use or distribution of this document without the express consent of Auburn (A Nederman Company) is strictly prohibited. Any reproduction is prohibited without written permission.

In no event will Auburn (A Nederman Company) be liable for any mistake, including lost profits, lost savings, environmental compliance costs or other incidental or consequential damages or injury arising out of the use or inability to use this manual, even if advised of the possibility of such damages, or any claim by any other party. Terms and conditions supplied with each order contain additional liability limitations related to this product.

2.2. Symbols and Conventions

WARNING 	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Warning statements help you to: • Identify a hazard • Avoid a hazard • Recognize the consequences
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
	Identifies information, sections or statements in this manual that apply to approved hazardous area systems, regulations or installation.

3. Parts List

- 1 – PM Pulse current source
- 1 – PM Pulse calibration sheet
- 2 – Paleblue Rechargeable 9V batteries already installed in the PM Pulse current source
- 1 – Paleblue Battery case with USB connector for charging
- 1 – Grounding tube (optional)
- 1 – 5 ft SMA to SMA coaxial cable for MICS Dynacharge and EM 30/70 (optional)
- 1 – 5 ft SMA to SMB coaxial cable for PM1 PRO (optional)
- 1 – 5 ft SMA to BNC coaxial cable for grounding tube, U3600QAL1 and U3600 (optional)

4. General Description

The PM Pulse is a current source that can be used to verify the pA reading on Auburn particulate monitors. The unit is shipped with a variety of cables to make it possible to connect to various input connectors used on the different monitors. The unit uses two Paleblue rechargeable 9V batteries included and preinstalled from the factory. Refer to the Paleblue manual included for safety and the proper charging procedure.

The PM Pulse current source can source current up to 1million pA (picoamperes) making it ideal to verify readings on all Auburn particulate monitors. The PM Pulse also has a power saving mode which will automatically turn the device off after 5-6 minutes of use and a low battery indicator which will turn on

to alert the user that the batteries are low and need to be recharged. The batteries should be recharged as soon as the low battery indicator comes on as weak battery can affect the output signal.

5. Technical Specifications

Nominal voltage	18V	2 x 9V Rechargeable batteries
Maximum current consumption	25mA	Current output is on
Battery life	20 hours	Current output is on
pA output accuracy at 20°C	±3% of range	The reading on the monitor being tested will have its own percent error added to the PM Pulse thus increasing the range of the expected signal
pA output accuracy over temperature	±4% of range	
Range knob accuracy	±2% of range	
Operating temperature	-10°C to 60°C	

6. Connections

The PM Pulse has a standard SMA connector as its main output and is shipped with SMA to BNC and SMA to SMB connectors to make appropriate connections depending on the device being tested. Connect the included coaxial cable to the PM Pulse then to the unit being tested using the additional cables as needed. Also, connect the tested unit to a good earth ground.

7. Grounding Tube

7.1. General Description

The grounding tube is a mobile test chamber that creates a noise isolated environment for particulate sensor testing. The device is designed to accommodate various mounting options with the ability to swap out different heads. The tube utilizes a telescope design and can be accessible for sensors starting at 3” going up to 48” length. The grounding tube has 2 plastic clips that allow users to connect a messenger strap for ease of carrying and the locations can be adjusted to accommodate different carrying methods.

Grounding Tube with 1.5” Quick Clamp Mount

7.2. Functionality

The grounding tube has two external connections allowing it to be hooked up with the PM Pulse as well as a grounding screw. When a probe is inserted into the tube, the sensor rod comes into contact with aluminum compression bands and a small aluminum pin. The band will adjust to the size of the rod being inserted to allow a larger surface area of coverage for testing. The Tester is designed to accommodate all rod types provided from AFS.

Grounding Tube Internal connection

7.3. Parts List

- Probe tester grounding tube
- 2 Clips and 1 carrying strap
- Mounting head (Multiple mounting options available)
- BNC / SMB Connection port
- Pelican case (Stores both PM Pulse and Grounding Tube)

8. Controls

8.1. Selecting Output

- Use the “Mode” switch to select the family of the device you are connecting to. This will put the PM Pulse in the appropriate mode to output the signal accordingly:
  - Mode 1: U3600QAL1, U3600, EM 30, EM 70, and other products
  - Mode 2: MICS Dynacharge
  - Mode 3: PM1 PRO and PM1
- Use the “pA range” switch to select the desired pA output you would like the PM Pulse to output.
- Verify the % of range knob is pointing to 100% to keep the output stable at the selected pA range
- For mode 1, verify the polarity switch is in the desired position for testing: + for forward current, - for reverse current. For modes 2 and 3, the polarity switch does not apply as the current signal alternates automatically.

8.2. Turning On Output

After the device is connected and appropriate selections are made, apply power to the unit using the ON/OFF switch on the right-hand side of the unit. Note, the unit will be in power save mode by default and will not be outputting any current at the initial power on stage.

8.3. Making Measurements

Once the PM Pulse is powered on, measurements can be made by pressing the “Current On” button on the front of the PM Pulse. The LED (yellow) will activate indicating the PM Pulse is outputting the current selected by the selector switches. You can then adjust the output signal by using the % of range knob to increase or decrease the signal as needed. The % of range knob is based on the pA range selection and will cause the output signal to be a percentage of the pA range selection.

For example:

> If the pA range is set to 100pA output, rotating the % of range knob to 50% will lower the output signal by 50%. In this case the output will be 50 pA. Rotating the knob again to 25% will lower the output to 25pA. If the knob is set to 100% and the selector switch is changed to 1K pA, the

output signal will be 1,000 pA. Rotating the knob to 50% will give an output signal of 500pA. Rotating the knob again to 25% will give an output signal of 250pA.

After approx. 5 minutes of outputting the signal, the PM Pulse will automatically go into power save mode and the “Current On” light will turn off indicating the PM Pulse is not outputting any current. If you are not finished making measurements, pressing the “Current On” button again will activate the current source for 5 more minutes. Pressing this button at any time while the PM Pulse is outputting current will reset the timer to 5 minutes however, pressing the button multiple times will not increment the timer to 10 minutes or 15 minutes. It only resets the timer to 5 minutes from when pressed. Holding the button down will keep the output on indefinitely.

9. Operation

WARNING

EQUIPMENT MAINTENANCE

- Only appropriately licensed professionals should perform maintenance using this product.
- WARNING – To prevent ignition of flammable or combustible atmospheres and for operator safety, always disconnect power before servicing.

9.1. Zero Check

9.1.1. PM1 PRO and PM1

- Insert sensor into the grounding tube
- Connect unit or tube to a good ground
- For 5k or 10k units, verify that the pA reading drops and maintains below +/-0.2pA (up to 36” length probes) or +/-0.5pA (longer than 36” length probes).
- For 100k units, verify that the pA reading drops and maintains below +/- 2pA (up to 36” length probes) or +/- 5pA (longer than 36” length probes).
- Remove sensor from grounding tube

9.1.2. MICS Dynacharge

- Insert sensor into the grounding tube
- Connect unit or tube to a good ground
- On the MICS controller, navigate to the live trends screen where the particulate corresponding to the module you are testing is configured.
- For 5k or 10k units, verify that the pA reading drops and maintains below +/-0.2pA (up to 36” length probes) or +/-0.5pA (longer than 36” length probes).
- For 100k units, verify that the pA reading drops and maintains below +/- 2pA (up to 36” length probes) or +/- 5pA (longer than 36” length probes).
- Remove sensor from grounding tube

9.1.3. U3600QAL1/U3600

- Insert sensor into the grounding tube
- Connect unit or tube to a good ground
- On the U3600, verify the pA reading is within +/-1.8 pA.
- Remove sensor from grounding tube

9.1.4. EM 30/70

- Insert sensor into the grounding tube
- Connect unit or tube to a good ground
- On the EM 30/70, verify the pA reading reading drops and maintains below +/-0.2pA (up to 36" length probes) or +/-0.5pA (longer than 36" length probes).
- Remove sensor from grounding tube

9.2. Range Check

9.2.1. PM1 PRO and PM1

- For direct connection to PM1 PRO (PM1 does not support direct connection):
  - Connect the included SMA-SMB adapter cable to the SMA input jack on the PM Pulse
  - Connect the other end to the PM1 PRO SMB input jack located on the front of the module.
- For connection through grounding tube:
  - Insert sensor into the tube
  - Connect unit or tube to a good ground
  - Connect the included SMA-BNC adapter to the SMA input jack on the PM Pulse
  - Connect the other end to the tube BNC input jack.
- Change the "Mode" selector knob to "3"
- Change the "range" selector knob to the desired range such as "100pA"
- Change the "% of range" knob to "100%"
- Change the "polarity" switch to "+"
- Turn on the PM Pulse using the On/Off switch on the right side of the unit
- Press the "Current On" button on the PM Pulse and verify the yellow LED is illuminated
- On the PM1, navigate to the process screen and verify the pA reading fluctuates between 80% and 120% of input, 80pA to 120pA for a 100pA input (direct connection or bare rod only).

  Notes:
  - Using the PM Pulse in this mode is an alternating current signal. You should expect to see fluctuations in the signal due to the nature of alternating current.
  - Increasing the "Real-Time Smoothing" on the PM1 will decrease the range of fluctuation and the reading will be closer to the value on the PM Pulse selector switch. However, increasing the averaging time will also increase the time it takes for the reading to reach the expected value.
  - To increase the "Real-Time Smoothing", login as engineer on the PM1. Go to Setup -> Measurement -> Real-Time Smoothing.

  - For most stable results, change “Real-Time Smoothing” to 60 seconds. **Ensure Averaging time is changed back to original value after test is complete.**
- Use the “% of range knob” on the PM Pulse to lower the output. For example, rotate the knob to “50%” for a 50pA output.
- Verify the pA reading on the PM1 fluctuates between 80% and 120% of input, 40pA to 60pA for a 50pA input (direct connection or bare rod only).
- Rotate the “% of range knob” back to “100%” and change the “range” selector switch to test other ranges as necessary.
- Turn off the PM Pulse by using the On/Off switch on the right side of the unit
- Remove connections to the PM1 PRO or grounding tube

9.2.2. MICS Dynacharge

- For direct connection to MICS Dynacharge:
  - Connect the included SMA cable to the SMA input jack on the PM Pulse
  - Connect the other end to the Dynacharge SMA input jack.
- For connection through grounding tube:
  - Insert sensor into the tube
  - Connect unit or tube to a good ground
  - Connect the included SMA-BNC adapter to the SMA input jack on the PM Pulse
  - Connect the other end to the tube BNC input jack
- Change the “Mode” selector knob to “2”
- Change the “range” selector knob to the desired range such as “100pA”
- Change the “% of range” knob to “100%”
- Change the “polarity” switch to “+”
- Turn on the PM Pulse using the On/Off switch on the right side of the unit
- Press the “Current On” button on the PM Pulse and verify the yellow LED is illuminated
- On the MICS controller, navigate to the live trends screen where the particulate corresponding to the module you are testing is configured.
- Verify the particulate reading on the live trends screen fluctuates between 80% and 120% of input, 80pA to 120pA for a 100pA input (direct connection or bare rod only)

  Notes:
  - Using the PM Pulse in this mode is an alternating current signal. You should expect to see fluctuations in the signal due to the nature of alternating current.
  - Increasing the “Averaging Time” on the MICS Dynacharge will decrease the range of fluctuation and the reading will be closer to the value on the PM Pulse selector switch. However, increasing the averaging time will also increase the time it takes for the reading to reach the expected value.
  - To increase the “Averaging Time”, login as engineer on the MICS controller. Go to info->io modules -> ID of the Dynacharge module -> Averaging Time
  - For most stable results, change “Averaging Time” to 60 seconds. **Ensure Averaging time is changed back to original value after test is complete.**

- Use the “% of range knob” on the PM Pulse to lower the output. For example, rotate the knob to “50%” for a 50pA output.
- Verify the pA reading on the live trends screen fluctuates between 80% and 120% of input, 40pA to 60pA for a 50pA input (direct connection or bare rod only).
- Rotate the “% of range knob” back to “100%” and change the “range” selector switch to test other ranges as necessary.
- Turn off the PM Pulse by using the On/Off switch on the right side of the unit
- Remove connections to the MICS Dynacharge or grounding tube

9.2.3. U3600QAL1/U3600

- For direct connection to U3600:
  - Connect the included SMA-BNC adapter cable to the SMA input jack on the PM Pulse
  - Connect the other end to the U3600 BNC input jack.
- For connection through grounding tube:
  - Insert sensor into the tube
  - Connect unit or tube to a good ground
  - Connect the included SMA-BNC adapter to the SMA input jack on the PM Pulse
  - Connect the other end to the tube BNC input jack.
- Change the “Mode” selector knob to “1”.
- Change the “range” selector knob to the desired range such as “100pA”.
- Change the “% of range” knob to “100%”
- The “polarity” selection does not matter for the test
- Turn on the PM Pulse using the On/Off switch on the right side of the unit
- Press the “Current On” button on the PM Pulse and verify the yellow LED is illuminated
- On the U3600, verify the pA reading is 100pA +/-6% (direct connection or bare rod only). Note that the reading will deviate by up to 6% from nominal value due to accumulated deviations from PM Pulse, tested unit and percent range switch
- Use the “% of range knob” on the PM Pulse to lower the output. For example, rotate the knob to “50%” for a 50pA output.
- Verify the pA reading on the U3600 is 50pA +/-6% (direct connection or bare rod only).
- Rotate the “% of range knob” back to “100%” and change the “range” selector switch to test other ranges as necessary.
- Turn off the PM Pulse by using the On/Off switch on the right side of the unit
- Remove connections to the U3600 or grounding tube

9.2.4. EM 30/70

- Follow same steps as U3600QAL1/U3600 but use SMA-SMA adapter cable for direct connection.

10. Calibration

The PM Pulse current source requires yearly calibration and should be sent back to the factory, before the date on the calibration sticker, to verify calibration.

11. Troubleshooting

- No reading on devices
  - Verify current on LED on PM Pulse is illuminated when making measurements. Verify power switch is in on position and push current on button. If LED is still off, try replacing or recharging the batteries.
  - Verify proper mode is selected on PM Pulse for device connected
  - Verify % of range switch is not set at 0%.
  - Verify connectors are firmly attached to maintain a reliable connection
  - Verify integrity of cable and adapters. Try using a different cable adapter.
- Reading is not accurate on device
  - Verify device has proper earth ground.
  - Verify calibration dates of PM Pulse. Send in for calibration if past deadline.
  - Consider the % error of the device and add it to the PM Pulse % error.
  - Verify no high voltage wire or strong magnetic fields are in the area. Test device inside if possible.
  - Verify low battery indicator on PM Pulse is not on
  - Ensure temperature is not exceeding limits of PM Pulse.
- Unexpected or fluctuating reading
  - Ensure measurements are performed away from high power equipment, RF equipment, high voltage wires or noise generating devices
  - Ensure no strong magnetic fields
  - Ensure unit is kept clean and dry

12. Spare Parts

- PM Pulse current source
- Paleblue Rechargeable 9V batteries or standard 9V batteries
- Grounding tube
- 1 – 5 ft SMA to SMA coaxial cable for MICS Dynacharge and EM 30/70
- 1 – 5 ft SMA to SMB coaxial cable for PM1 PRO
- 1 – 5 ft SMA to BNC coaxial cable for grounding tube, U3600QAL1 and U3600