



# ERT

## USER MANUAL FOR DUSTTRAKS AND VIPER

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## CONFIGURING THE DUSTTRAK FOR VIPER

### Overview



The DustTrak DRX8533 and DRX 8534 can work with Viper using several connection configurations. The following guide addresses those configurations and the parts needed for implementation.



### Special Note – DustTrak II

Although the DustTrak Meter App wasn't specifically designed for use with a DustTrak II, initial testing shows it may be possible to use a DustTrak II with Viper. Using a DustTrak II will have Deployment Manager considerations which are discussed in the DustTrak II section of this guide. ERT's initial test was with a DustTrak II Model 8530.



## CONNECTING TO A LINC (DATA ONLY)

### Hardware Needed

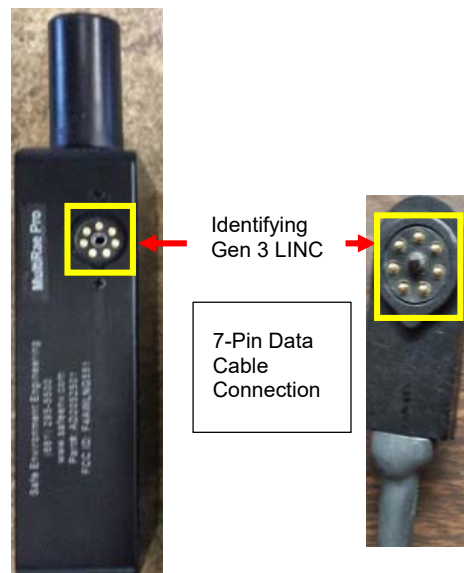
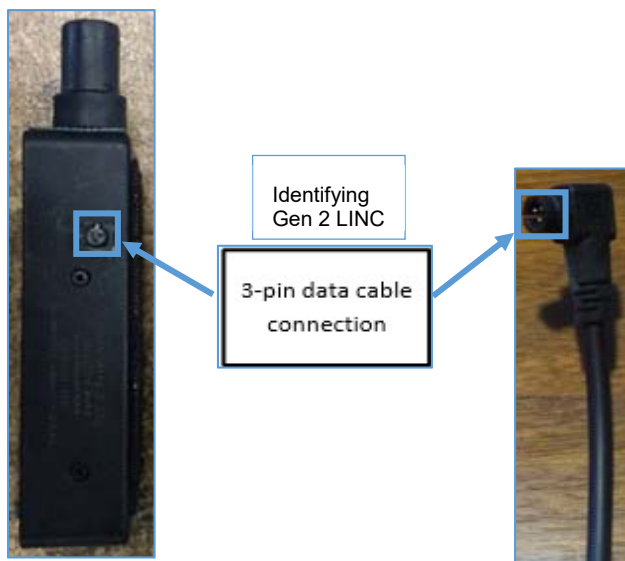
To connect the DustTrak to a LINC (Gen 2 or Gen 3), the following part is necessary:

➤ **USB to SERIAL Adapter (USB to DB9 RS232)**

**NOTE:** Although there may be many USB to Serial Adapters on the market, ERT has tested the **CHIP-X USB** to Serial (USB to DB9 RS232) with the DustTrak setup.



USB to Serial Adapter

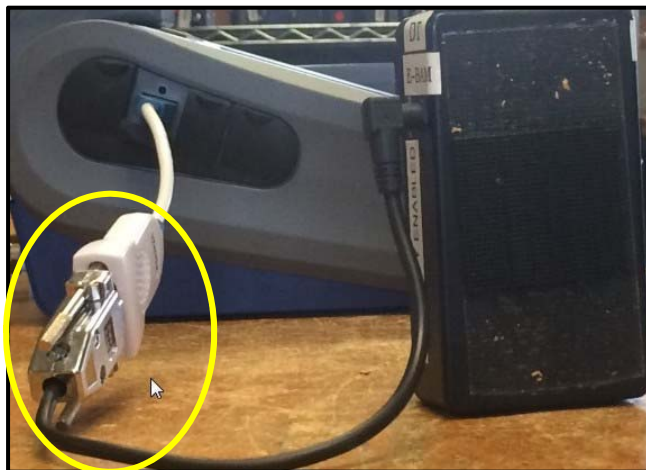




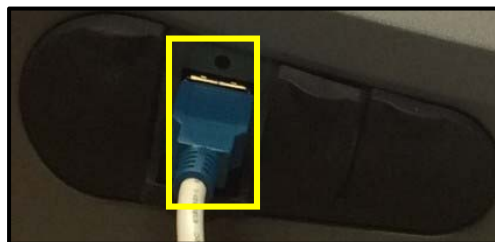
## Hardware Connections

1. Connect the LINC Cable to the *USB to Serial Adapter (USB to DB9 RS232)*.

*Note: LINC cables labeled DustTrak or DataRam will work with a DustTrak. LINC Cables labeled as Ludlum will not work with a DustTrak.*



2. Plug the USB Serial Adapter into the USB port on the left side of the Instrument, behind the rubber protective plug-- second (2<sup>nd</sup>) port.



USB Connection 2<sup>nd</sup> port on DustTrak



Setup without Power to LINC



## CONNECTING TO A LINC (DATA & POWER)

### Hardware Needed

#### THE FOLLOWING CONFIGURATION APPLIES ONLY TO A GEN 3 LINC

The DustTrak USB Port can both supply power to the Gen 3 LINC and output data to the LINC. The LINC can be powered via the mini-USB port on the bottom of the LINC.

This configuration will require the same USB TO SERIAL ADAPTER as shown in the section above. However, the following *additional* parts are necessary to provide both power and data to a Gen3 LINC.

➤ **USB A to USB Mini 5 Pin Cable**

**Note:** ERT has tested cables from [www.firefold.com](http://www.firefold.com), 3ft USB to USB Mini Cable – 5 pin.



USB A to USB Mini 5 Pin Cable

➤ **USB A to USB A multiport splitter Hub.**

**Note:** ERT has tested the **Sabrent SA HB-UMLS 4-port hub with individual switches** (available from [www.bhphotovideo.com](http://www.bhphotovideo.com)).



USB A to USB A Multiport Splitter

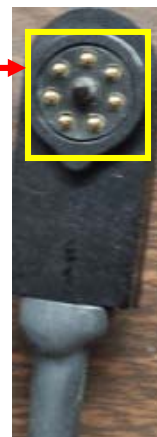


5V USB charging port on the bottom of the Gen 3 LINC



Identifying Gen 3 LINC

7-Pin Data Cable Connection



Example: Gen 3 LINC – 5V USB charging port on the Gen 3 LINC with 7-Pin Data Cable Connection

## Hardware Connections

1. Connect the *4-port USB Multiport Splitter (Hub)* to the USB Port (2<sup>nd</sup> Port) on the DustTrak.







2. Connect the *USB A to USB mini-5 Pin Cable* from the Gen 3 LINC (mini USB) to the USB Port Splitter (Hub). This provides power to the Gen 3 LINC.



3. Connect the LINC Cable (7-Pin) to the USB to Serial Connector and plug into the USB Port Splitter. This acquires data from the instrument.







Configuration with Power to the LINC



# CONNECTING TO A SMART GATEWAY (No LINC)

## Overview

The DustTrak can directly connect to the Smart Gateway (without a LINC) in one of two ways:

1. A connection can be made to the **USB Port** on the Smart Gateway Using an *FTDI Compliant USB to USB **Null Modem** Cable*
2. A connection can be made to the **7-pin COM Port** on the back of the Smart Gateway using a *USB to Serial Adapter* with a *Gen 3 DustTrak LINC Cable*

## Smart Gateway USB Port

### Hardware Needed

➤ **USB A to USB A **Null Modem** Cable:**

**Note:** ERT has tested the FTDI Chip, Null Modem Cable USB - USB NMC-2.5M. This cable can be purchased from <https://americas.rsdelivers.com/>



**Alternate USB Configuration:**

An alternate USB Cable configuration consists of two *USB to Serial Adapters* with a *Null Modem Cable* between them as shown here

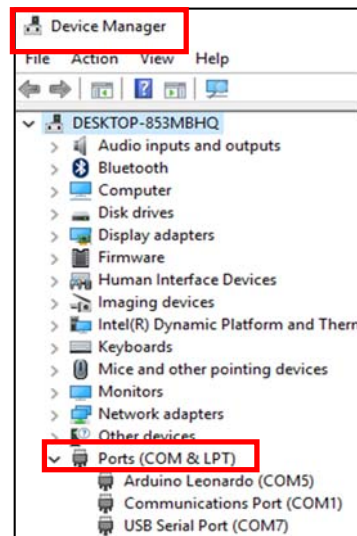




## Hardware Connection

When directly connecting the instrument to the USB port on the Smart Gateway, the laptop inside the smart gateway will assign a new COM port number to the connection. As such, **BEFORE** plugging the USB cable into the Smart Gateway, it is important to first login to the Smart Gateway Laptop and open “Device Manager” in Windows.

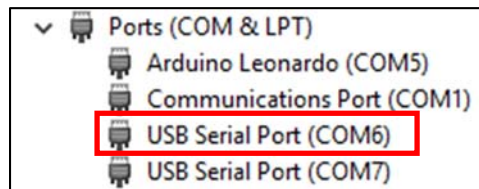
1. Login to the Smart Gateway Laptop
2. Using the Search feature in the taskbar, type “device manager”
3. Open device manager and expand the “Ports (COM & LPT)” section
4. Make note of the current COM Port Numbers and keep Device Manager open



5. Power Up the DustTrak
6. Insert one end of the USB Cable into the USB port on the left side of the Instrument, behind the rubber protective plug
7. Insert the other end of the USB Cable into one of the USB Ports on the back of the Smart Gateway



8. Check Device Manager and make note of the NEW COM Port number assigned to the DustTrak *This COM Port number will be added to the MeterApp after a run is started in Survey Controller on the Smart Gateway.*



9. For detailed instructions for starting a run in Survey Controller and configuring the MeterApp to communicate via a COM Port, please refer to the Smart Gateway Guide – Section 1.



## Smart Gateway 7-Pin COM Port

### ***Hardware Needed***

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➤ **USB to SERIAL Adapter (USB to DB9 RS232)**

**NOTE:** Although there may be many USB to Serial Adapters on the market, ERT has tested the **CHIP-1-X USB** to Serial (USB to DB9 RS232) with the DustTrak setup.



➤ **Gen 3 DustTrak LINC Cable (7-Pin Data Cable)**



➤ **Connected Gen 3 DustTrak LINC Cable (7-Pin Data Cable) to USB to Serial Adapter (USB to DB9 RS232).**



USB to SERIAL Adapter (USB to DB9 RS232) To GEN 3 DustTrak Cable



## Hardware Connection

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1. Plug the USB Serial Adapter into the USB port on the left side of the Instrument, behind the rubber protective plug--second (2<sup>nd</sup>) port.
2. Connect the LINC Cable (7-Pin) to the 7-Pin COM Port labeled on the back of the Smart Gateway
3. For detailed instructions for starting a run in Survey Controller and configuring the MeterApp to communicate via a COM Port, please refer to the Smart Gateway Guide – Section 1.





## DUSTTRAK II

Although the DustTrak Meter App wasn't specifically designed for use with a DustTrak II, initial testing shows it may be possible to use a DustTrak II with Viper. ERT's initial test was with a DustTrak II Model 8530. Using a DustTrak II will have Data Collection and Deployment Manager considerations which are discussed below.

A DustTrak II is a single-channel instrument that is configurable for one sensor (i.e., PM1, PM2.5, PM10, etc). Regardless of how the DustTrak II is configured, the MeterApp will always record the reading in the PM1 position and when data is sent to Deployment Manager, it will be displayed as PM1.

In Deployment Manager, ERT Support can create a new sensor to represent the true particle fraction for which the instrument is configured. This new sensor is considered a "correction factor" sensor. ERT Support can also hide the remaining sensors from view so only the Meter App PM1 sensor and the new "correction factor" sensor are displayed.

### ***Best Practices – Survey Controller & Deployment Manager***

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1. Add a "DustTrak II" Instrument Type to the MeterApp Inventory in Survey Controller and use that instrument type when creating your run.
  - a. Use the traditional DustTrak MeterApp with the "DustTrak II" Instrument Type

Adding a DustTrak II Instrument Type to Survey Controller will assist with the visual recognition of why data is uniquely displayed in Deployment Manager. In addition, the Instrument Type carries through to data exports which will again serve as a reminder of why the data export contains both PM1 and the "correction factor" sensor for the actual particle size configured on the instrument.
2. In the Run Description, include a note about the particle fraction for which the instrument has been configured. The run description is also included in Data Exports and will serve as additional documentation of the instrument configuration.
3. Contact ERT Support
  - a. Request a Correction Factor Sensor be created with the name of the configured particle fraction. The correction factor will be a multiplier of 1. ERT Support will name the sensor with an underscore so it doesn't conflict with other sensor names in the Meter App (i.e., PM\_10, PM\_2.5, etc).
  - b. Request all sensors other than the PM1 and "correction factor" sensor be removed from visibility and charting in Deployment Manager.





Below is an example of how the DustTrak II can look on Survey Controller with the best practices above implemented:

DustTrak II(s):						
~	Instrument ID	Connection	Location	PM1	PM_2.5	Received
	(.102) DustTrak II Northern Perimeter Fenceline	 OK	 39.9362720, -74.1949050	0.025 mg/m3	0.025000 mg/m3	1/15/2021 11:38 AM

- The correct instrument name is displayed (DustTrak II) because it was added to the Survey Controller MeterApp Inventory as a new Instrument Type.
- The new “correction factor” sensor appears as a separate sensor.
- All other sensors are removed from display. PM1 cannot be removed from display because the correction factor is based off of that sensor.

### ***DustTrak II Data Export***

When data is exported from Deployment Manager for the DustTrak II, separate columns will be included with the Correction Name, Value and Units. Also, the instrument name carried through from Survey Controller which serves as an explanation of why there appears to be both PM1 and PM\_2.5 readings. (reminder – all DustTrak II readings will appear as PM1). The view below is also filtered for PM1. All MeterApp sensor types will be included in the export.

Message Sender	Instrument	MeterApp_Config	Received_UTC	Received_Local	Sensor Name	Sensor Reading	Sensor Units	CORRECTION NAME	CORRECTED VALUE	CORRECTED UNITS
epaert251	DustTrak II	DustTrak II LINC 102	1/15/2021 16:32:43	1/15/2021 11:32:43	PM1	0.021	mg/m3	PM_2.5	0.021	mg/m3
epaert251	DustTrak II	DustTrak II LINC 102	1/15/2021 16:32:48	1/15/2021 11:32:48	PM1	0.021	mg/m3	PM_2.5	0.021	mg/m3
epaert251	DustTrak II	DustTrak II LINC 102	1/15/2021 16:32:50	1/15/2021 11:32:50	PM1	0.022	mg/m3	PM_2.5	0.022	mg/m3
epaert251	DustTrak II	DustTrak II LINC 102	1/15/2021 16:32:55	1/15/2021 11:32:55	PM1	0.022	mg/m3	PM_2.5	0.022	mg/m3
epaert251	DustTrak II	DustTrak II LINC 102	1/15/2021 16:32:57	1/15/2021 11:32:57	PM1	0.022	mg/m3	PM_2.5	0.022	mg/m3





## HELPFUL TIPS

### General Tips

- The LINC Baud rate must be set to 9600.
- Only Gen 3 LINC's can be powered through the mini USB port on the bottom.
- If Survey Controller turns green and then immediately greys out, there is a problem with one of the cables (either LINC Cable or the USB A to USB Mini 5 pin cable).
- By default, the DustTrak MeterApp will not launch full screen. To have the MeterApp launch full screen automatically, unlock the MeterApp. On the Data Input Settings tab, put a checkmark in the 'Popup on Connect'. The MeterApp will launch full screen on the next run.
- If everything is connected correctly and operating as expected but the MeterApp does not turn green, try powering the DustTrak off and back on.

The screenshot shows the 'Data Input Settings' tab of the DustTrak MeterApp. The 'Data Input Settings' tab is highlighted with a red box. The 'Popup On Connect' checkbox is also highlighted with a red box.

**File Edit Run Admin Help**

**RESP PM10 Total Data Input Settings Meter Settings Training Log InterOperability**

**LINC Settings**

**Meter's IP Address** 192.168.Insert.Insert **Port** 8023 **No Data Timer** 30 ☐ Wait NDT **Poll Rate (ms)** 2000 **Stagger CMDs (ms)** 0 **Group Identification**

**Separate LINC IP** **Bat Port** 23 **Bat Timeout** 30 ☐ ChkBatVolt **License** 28D24465E4A0 **CompMac** 28D24465E4A0 ☐ SourceFile Identification

**GPS. Default TCP. Optional UDP Serial or MCListen**

**IP** **Port:** ☐ UDP ☐ Connected

☐ Get GPS ☐ Log GPS **GPS Retry** 60 ☐ Use MCListener ☐ DMS Fmt **Stale GPS** 60

☐ Serial com1 4800 N,8,1

**Visibility (Task Bar Icon)**

☐ Hide (run as task icon) **HideNow**

**End of rec** **EoR Switch** ☒ **Popup On Connect**

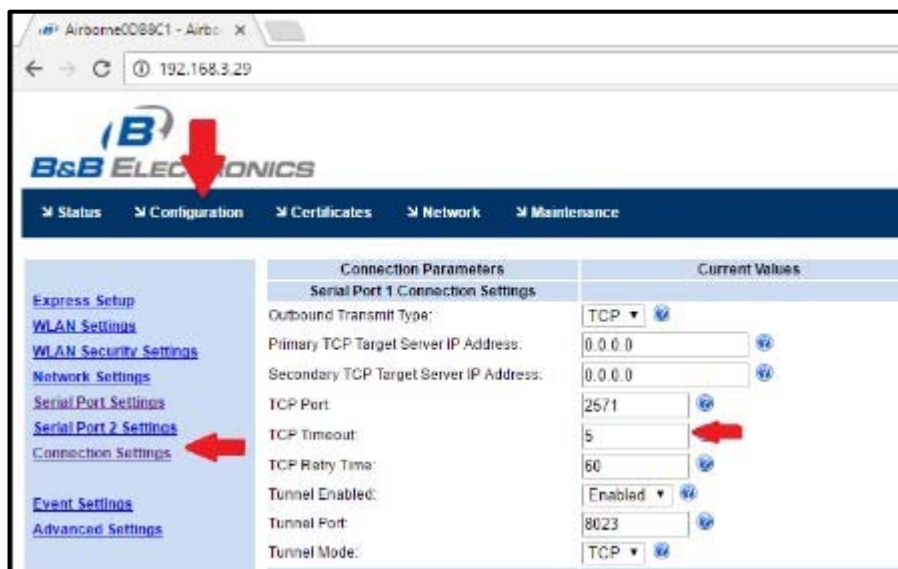
**Tail File**

**Tail File Name** ☒ Unicode **Browse**



## LINC Configuration Tips

- To help maintain better connectivity, we suggest that the TCP Timeout timer for the LINC's connected to the DustTraks be changed from 5 seconds to 0 (zero). The TCP Timeout setting for Serial Port 1 can be found under the Configuration Tab in the Connection Settings option. Please see below.



## Deployment Manager Tips

- The DustTrak instruments display numerous sensors in Deployment Manager. Sensors that do not need to be displayed (i.e., SN, Firm, Model, etc.) can be turned off in Deployment Manager. Below are example screen shots showing all sensors being displayed vs certain sensors not displayed. Please call 1-800-999-6990 or email [ertsupport@epa.gov](mailto:ertsupport@epa.gov) to modify how your sensors are displayed in Deployment Manager.

DustTrak(s):		Instrument ID	Connection	Location	bat	filter	laser	flow	stel	SN	Firm	Model	total TWA	PM10 TWA	RESP TWA	PM2 TWA	PM1 TWA	Total	PM10	RESP	PM2	PM1	Received
		113 DustTrak *	Down	41.6187403, -87.4488109	0	False	False	False	False	8533153914	3.4	8533EP	0.009 twa	0.009 twa	0.009 twa	0.009 twa	0.009 twa	0.022 mg/m3	0.022 mg/m3	0.022 mg/m3	0.022 mg/m3	0.022 mg/m3	12/5/2016 9:12 AM
		127 DustTrak *	Down	41.6186125, -87.4497683	0	False	False	False	False	8533153916	3.4	8533EP	0.004 twa	0.004 twa	0.003 twa	0.003 twa	0.003 twa	0.009 mg/m3	0.009 mg/m3	0.009 mg/m3	0.009 mg/m3	0.009 mg/m3	12/5/2016 9:12 AM

Example: All Sensors Displayed in Deployment Manager

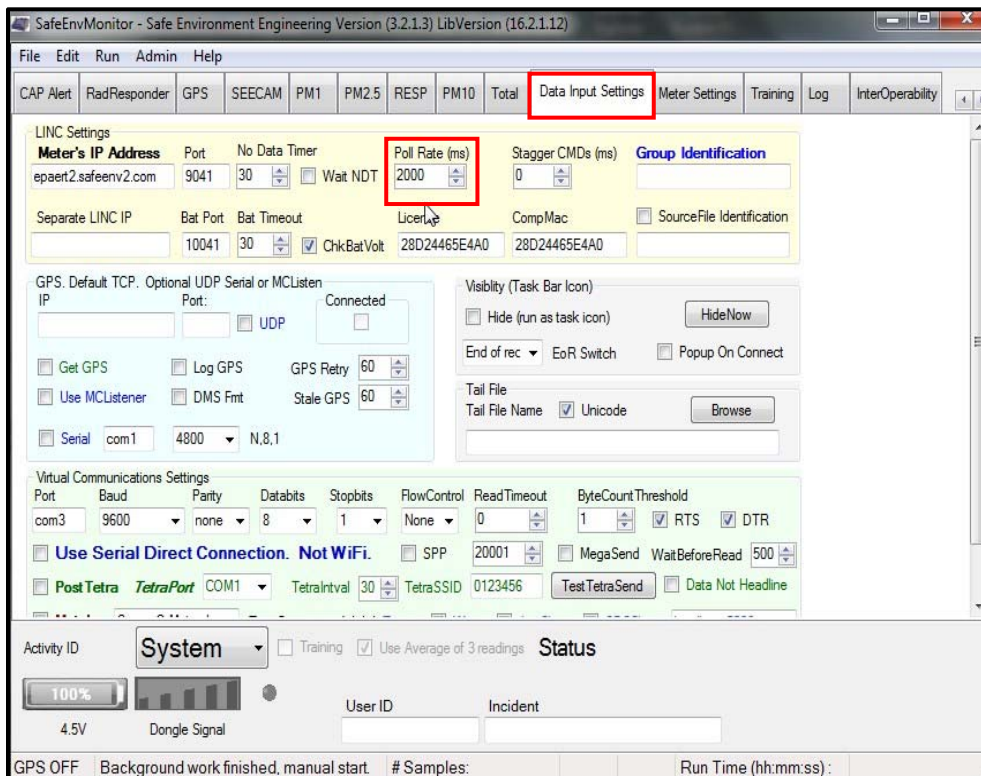
DustTrak(s):		Instrument ID	Connection	Location	total TWA	PM10 TWA	RESP TWA	PM2 TWA	PM1 TWA	Total	PM10	RESP	PM2	PM1	Received
		113 DustTrak *	Down	41.6187403, -87.4488109	0.009 twa	0.009 twa	0.009 twa	0.009 twa	0.009 twa	0.022 mg/m3	0.022 mg/m3	0.022 mg/m3	0.022 mg/m3	0.022 mg/m3	12/5/2016 9:12 AM
		127 DustTrak *	Down	41.6186125, -87.4497683	0.004 twa	0.004 twa	0.003 twa	0.003 twa	0.003 twa	0.009 mg/m3	0.009 mg/m3	0.009 mg/m3	0.009 mg/m3	0.009 mg/m3	12/5/2016 9:12 AM

Example: Some sensors not Displayed in Deployment Manager



## MeterApp Tips for a Serial I/O Configuration

- Recommend running the MeterApp at a 2 second polling rate. Running it at a 1 second polling rate does not allow the TSI's com port buffer to completely empty before asking for another reading. To change the polling rate, unlock the MeterApp. Under the Data Input Settings, change the Poll Rate (ms) to 2000 as the default. **NOTE: This is only an issue with the serial I/O (900 MHz) not using IP packet Lincs.**



## Instrument Configuration Tips

- Sometimes the display screen of the DustTrak will come up and the unit (i.e. 0.003mg/m<sup>3</sup>) will be flashing. This can result in bad readings and sometimes results in readings of 0 on the MeterApp. This typically happens when the DustTrak shuts down (power loss or is turned off) while it is on Run/Survey mode, and the run on the unit itself isn't stopped and/or put on standby. If the unit powers up and starts running without initiating the START button, you will see the readings flashing. To correct this, you must STOP the run, shut the instrument down (just as a precaution for a few minutes), power the instrument back on, then press START on the instrument. It should clear the flashing. The unit will not run successfully without initially being on the standby mode at power-up.