

# Serial Data Acquisition with the TSI® DUSTTRAK™ Aerosol Monitor Model 8520

Application Note ITI-044

## Introduction

The DUSTTRAK™ Aerosol Monitor Model 8520 offers several methods for reading aerosol mass concentration:

1. The front panel displays aerosol concentration in real time.
2. The data logging feature allows users to record and view historical data about aerosol concentration using a computer and TRAKPRO™ Data Analysis Software.
3. Remote serial data acquisition and control via the DUSTTRAK™ monitor's RS-232 serial port.
4. Remote analog data acquisition via 0 to 5 VDC analog output feature built into all DUSTTRAK™ monitor's with serial numbers 22499 and higher. Most older units can have this feature added.

This application note concerns remote serial data acquisition and control (item 3) only. For information on the other methods listed above, refer to the DUSTTRAK™ Operation and Service Manual and/or [Application Note ITI-073 Analog Output for the TSI DUSTTRAK™ Aerosol Monitor Model 8520](#).

The RS-232 serial data acquisition and control option has been incorporated into all DUSTTRAK™ Model 8520 Aerosol Monitors manufactured on or after October 31, 1996. You can find the date of manufacture listed on the serial number tag. For DUSTTRAK™ monitor users with instruments which pre-date this enhancement, the firmware will be automatically upgraded when the unit is returned to TSI or a TSI authorized service center for servicing and calibration. If the date on the white calibration tag is November 1996 or later, the unit has already been upgraded.

The firmware which operates the DUSTTRAK™ monitor includes serial data output capabilities. Users are able to configure the DUSTTRAK™ monitor to automatically transmit the aerosol mass concentration values through the serial interface cable using simple ASCII commands. The DUSTTRAK™ monitor can be set to automatically transmit a reading once per user-defined interval (from 0 to 60 seconds) or to output a single concentration reading. This allows DUSTTRAK™ monitor users to monitor aerosol fluctuations in real time using a data-logger or personal computer. The information may be used for closed-loop control and/or monitoring applications.

## Technical Specifications

The DUSTTRAK™ monitor already includes the cable necessary to do serial data acquisition. The connector required for the RS-232 port is an eight pin, RJ-45 modular connector. The DUSTTRAK™ monitor transmits serial data as ASCII character codes. The specifications for serial communication are shown in the following table. The data string is terminated with carriage return/line feed (0D/0A hexadecimal).

Baud Rate:	1200
Data Bits:	8
Stop Bits:	1
Hardware Control:	None

## Serial Commands

Command (Upper Case)	Returned Value	Description
<b>ASRVCK</b>	sssssss	Returns a seven character string corresponding to any service conditions which may be present. See below for detailed description.
<b>ASPOLL</b>	±vvv.vvv	Returns the seven character string displayed on the DUSTTRAK™ LCD in mg/m <sup>3</sup> . (three digits and a decimal point followed by three more digits)
<b>ASDATAxx</b>	±vvv.vvv	Returns a reading every xx seconds averaged over that time interval, where xx can range from 01 seconds to 60 seconds. The seven character string is in mg/m <sup>3</sup> (format is the same as "ASPOLL"). <b>NOTE: THE ASDATA FUNCTION DOES NOT WORK PROPERLY FOR DUSTTRAK™ MONITORS WITH FIRMWARE REVISIONS BELOW v1.9.</b>
<b>AQDATA</b>	none	Terminates the "ASDATAxx" output stream.

### ASRVCK

The DUSTTRAK™ monitor can be polled for any service conditions which may be present using the command "ASRVCK". This command can be issued to the DUSTTRAK™ monitor to clear any service condition which may be present during startup, as well as any time during normal operation. The DUSTTRAK™ monitor will return a seven character string which corresponds to the seven service conditions which may arise. For example a returned string of "0000000" corresponds to no service conditions (normal operation), a string of "0000001" corresponds to a service condition 1, while a string of "7000300" corresponds to a service condition 7 and a service condition 3. The returned string may contain any combination of the seven service codes when they are present.

Service Code	Service Code Description
1	Memory has been cleared due to temporary loss of power from internal backup battery.
2	Calibration memory error. Internal calibration data corrupted.
3	Backup battery low.
4	The sample inlet nozzle is due for cleaning.
5	Internal filters are due for replacement.
6	The internal pump is failing or has failed.
7	Laser failure.

## ASPOLL

The DUSTTRAK™ monitor can be polled for the current aerosol concentration, averaged over the time constant being used by the DUSTTRAK™ monitor, with the command "ASPOLL". The returned seven character string (three digits, a decimal point and three more digits) represents the average mass sum in mg/m<sup>3</sup>. If the average mass is negative, then the seven character string will be preceded by a minus sign.

## ASDATAxx, AQDATA

The DUSTTRAK™ monitor will output continuous data averaged over a user-defined time interval using the command "ASDATAxx", where xx is a two digit value from 01-60, and represents time in seconds. The data is averaged over the user defined time interval and is output every xx seconds. The returned seven character string (three digits, a decimal point and three more digits) represents the average aerosol reading in mg/m<sup>3</sup>. The data output will continue until the command "AQDATA" is received by the DUSTTRAK™ monitor.

### NOTE

**THE ASDATA FUNCTION DOES NOT WORK PROPERLY FOR  
DUSTTRAK™ MONITORS WITH FIRMWARE REVISIONS BELOW v1.9.**

## Serial Interface Connections

With the instrument lying flat on a table face up with the data port facing you, pin 1 is on the right side and pin 8 is on the left.

### Data Port Pin Assignments

Pin Number	Function	Direction
1	Not used	
2	Not used	
3	Receive data (Rx)	To DUSTTRAK™ monitor
4	Data Set Ready (DSR)	From DUSTTRAK™ monitor
5	Transmit data (Tx)	From DUSTTRAK™ monitor
6	Not used	
7	Signal Ground (G)	
8	Data Terminal Ready (DTR)	To DUSTTRAK™ monitor

### Cable Wiring for Communications with IBM-PC compatible Computer Using 25-Pin, or 9-Pin RS-232 Port

Instrument Data Port Pin	Computer 25-Pin Connector (Use TSI 800560 Cable)	Computer 9-Pin Connector (Use TSI 800563 Cable)
1	8	1
2	5	8
3	2	3
4	6	6
5	3	2
6	22	9
7	7	5
8	20	4

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