



TX8001

Air XD Real-time Dust Monitor



TROLEX <<

User Manual

AIR XD Contents

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1. Product Overview

The AIR XD dust monitor allows you to instantly detect the precise concentration or PM size composition of airbourne dust, so that you can take appropriate action to stay safe and ensure your personnel are fully protected from dust related health hazards.



1.1 Operating Features

- Real time continuous measurement of atmospheric dust concentration
- Advanced optical particulate counter giving high operating stability in varying atmospheric conditions
- Quantification of particle size categories to customer requirements
- Choice of display modes: DIRECT readout or configurable averages
- Two adjustable set point output contacts for remote alarms and control functions
- Standard 4 to 20mA analogue output signal of measured dust concentration
- RS 485 data output with MODBUS protocol
- High visibility alarm warning indicators
- SD storage card for data collection
- Activity monitor

Optical Particle Counting Like No Other

Conventional particle counters react to laser light scattered by individual dust particles carried in a pump assisted air stream. Measurements are tabulated of particle size and concentration, supported by a system of replaceable filters which require additional periodic, time consuming and expensive laboratory analysis.

The AIR XD system eliminates both the air pump and replaceable filter thereby transforming the principles of dust monitoring. An innovative elliptical mirror combined with a dual element photo detector, creates a 'virtual sensing zone' at a fine point in free space at the centre of an open scattering chamber - not just a broad generalisation of particle density, but a tightly controlled measuring point.

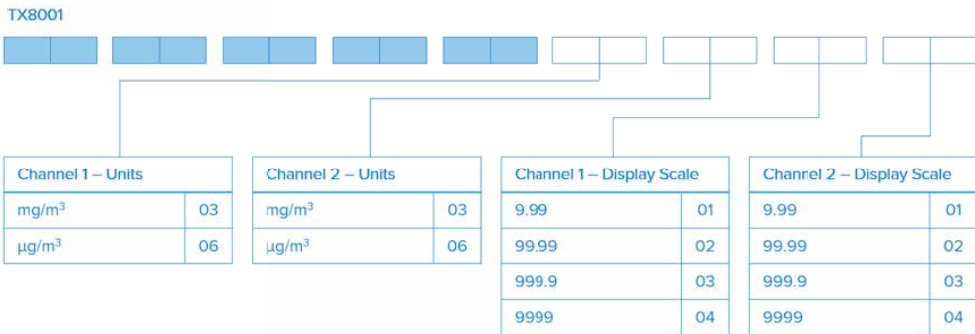
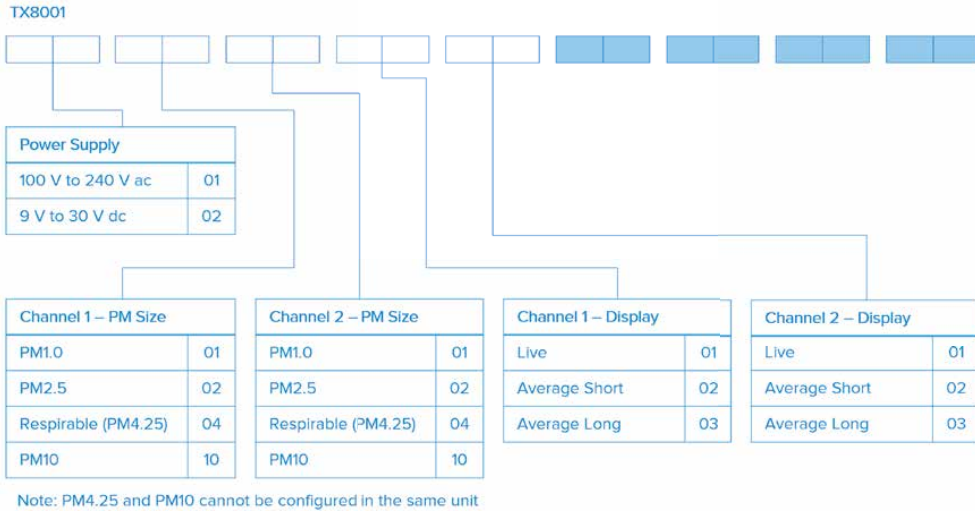
The size of each particle is instantaneously measured and classified at up to 10,000 samples every second within a range of 0.38 μ m and 17.5 μ m. The resulting magnitude histogram is evaluated over a sampling period of several seconds to give a high accuracy average value of dust concentration.

External factors such as ventilation fan speed or wind direction will influence the response of traditional dust measuring systems. AIR XD however, is equipped with dynamic flow compensation to ensure stable accuracy.

1.2 Application

- General purpose workplace airbourne PM measurement
- Real time ambient environmental fine particulates monitoring
- Dust size PM profiling
- Initiate alarm warning systems and dust suppression process control
- Compliance with EH40 legislation requirements
- Applications such as mining, tunneling, roadside/site-wide monitoring, personnel protection, site boundary (in combination with other Trolex products) waste transfer stations, demolition and construction sites.

1.3 Product Options



Advanced configuration:

Average Long h m s

Average Short h m s

Alarm Ch.1 µg or mg/m³

Alarm Ch.2 µg or mg/m³

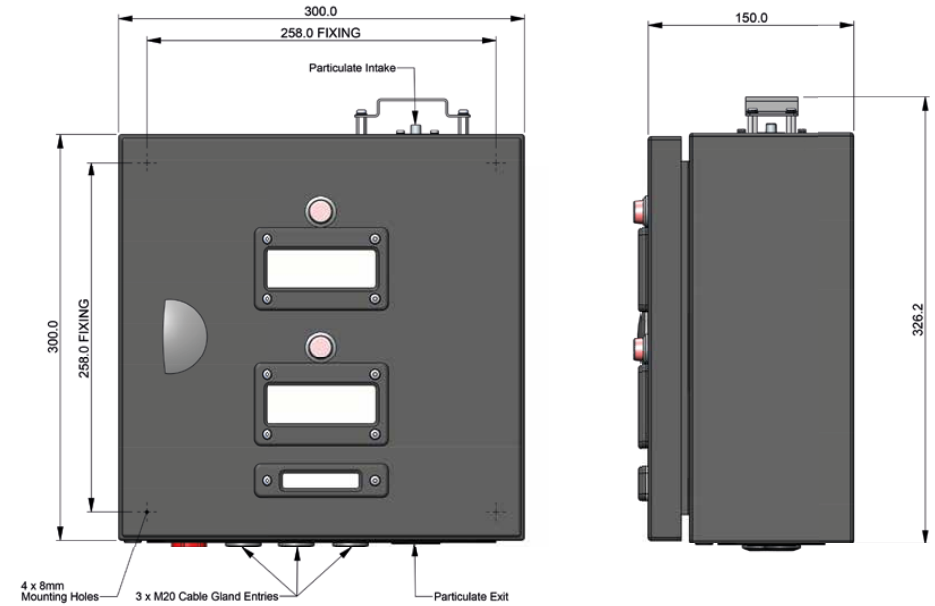
4-20mA Scale Ch.1 µg or mg/m³

4-20mA Scale Ch.2 µg or mg/m³

Particle Density . g/ml

Time Zone : UTC +/-

1.4 Dimensions



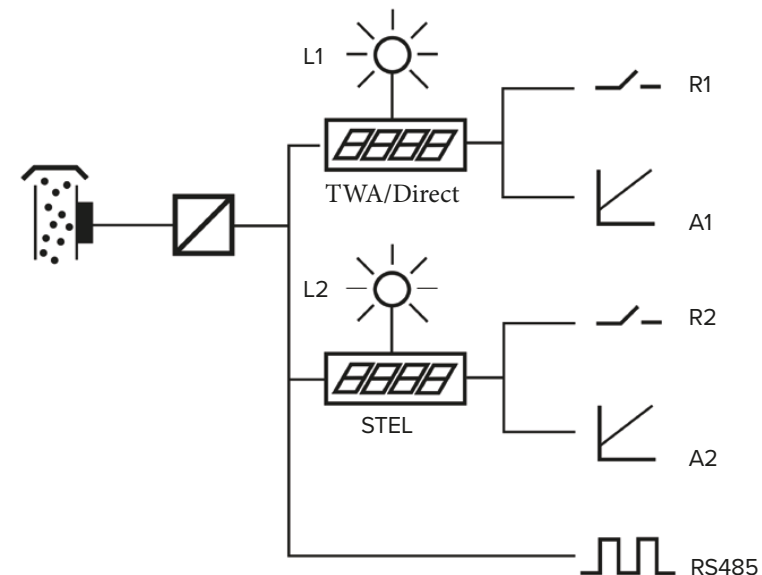
1.5 Technical information

Ambient temperature limits:	-20°C to +40°C
Ambient pressure:	800 to 1100 mbar
Humidity:	95% (Non condensing)
Protection classification:	Dust and waterproof to IP54
Housing material:	Polymer coated sheet steel
Net weight:	4.5 kg
Cable entries:	3 x M20 with removable plugs
Connections:	Screw clamp terminals with plug-in facility
Display 1:	Four digit, seven segment LED numerical readout Configurable
Display 2:	Four digit, seven segment LED numerical readout Configurable
Average LONG calculation:	Calculates an average over a configurable period Default: 8hr period Default set-point (R1 and L1): 1.0 mg/m3 or to specification
Average SHORT calculation:	Calculates an average over a configurable period Default: 15min period Default set-point (R2 and L2): 1.0 mg/m3 or to specification
Visual alarms:	Two independent high brightness LED alarm indicators L1 ON when the channel 1 set-point is exceeded L2 ON when the channel 2 set-point is exceeded
Measuring range:	0.0001 mg/m3 - 1500 mg/m3
Particle size range:	0.38µm to 17.5µm over 16 bins (incl. PM1.0, PM2.5, PM4.25, PM10)
Sampling interval:	10 seconds
Maximum sampling rate:	10,000 particles/second
Total flow rate:	1.2 l/min
Accuracy:	+/- 5%

1.6 Electrical details



Supply voltage:	Universal 100V to 240V ac
Supply current:	45mA nominal
Output contacts:	Two independent alarm contacts, R1 and R2 with adjustable set-points. Contact rating: 5 Amps at 240V ac R1 assigned to channel 1 (DISPLAY 1) R2 assigned to channel 2 (DISPLAY 2)
Analogue output:	Two independent standard 4 to 20 mA current loop outputs A1 and A2 A1 proportional to the value of DISPLAY 1 A2 proportional to the value of DISPLAY 2
Digital output:	RS485 supported by MODBUS protocol
Data storage:	8GB SD card 12 months typical storage capacity

[Section 3.7 >>](#)

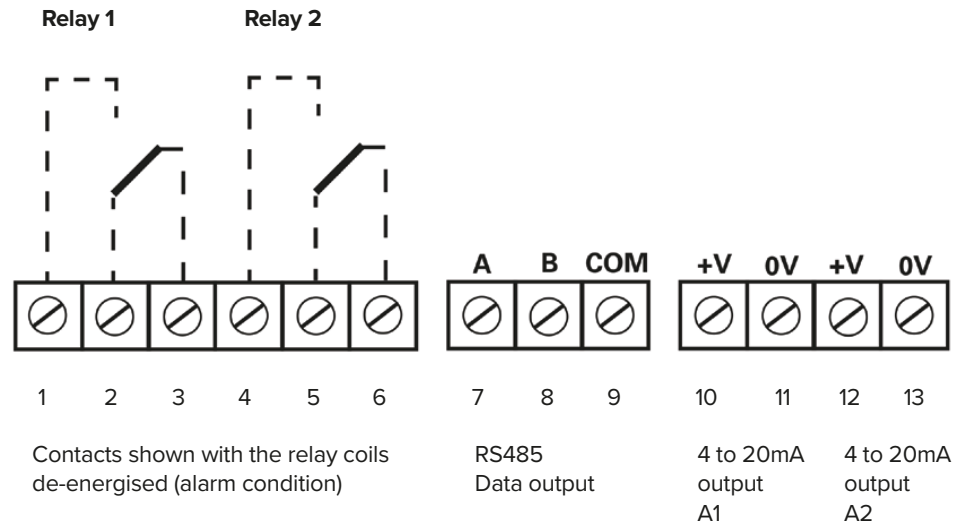


2. Installation

2.1 Safety precautions

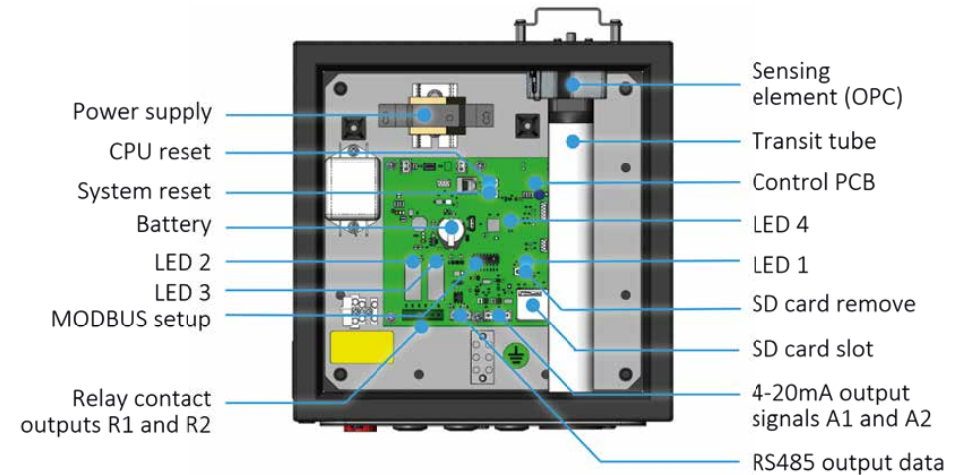
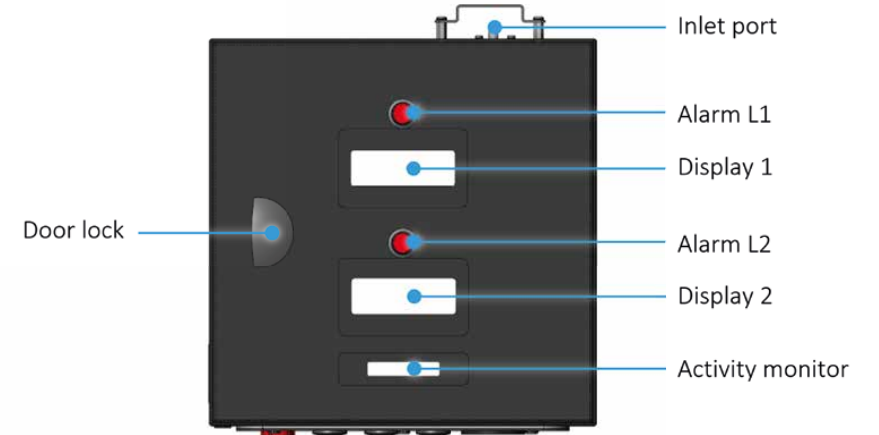
- Ensure that the housing is mounted vertically
Section 1.4 >>
- Ensure that the supply voltage available is compatible with the instrument
Section 1.5 >>
- Ensure that the power is isolated before making electrical connections to the instrument
- Do not remove the outer cover of the dust sensing element
Danger of class 3D laser 
- The device is not certified for use in hazardous areas.
Danger of gas ignition 

2.2 Connections



3. Setup

3.1 Controls and indicators



3.2 Initial Commissioning

1. The displays will flash briefly when the main power is applied and will remain off for approx 30 seconds during the processor self-check routine
2. When the check is complete the displays will energise, and LED 1 & LED 4 will be flashing
3. Leave the power on for 5 minutes to allow the sensor to stabilise
4. Briefly switch OFF and ON again
5. Leave the instrument ON for 5 minutes
6. Switch the power OFF and remove the SD Card [Section 3.7 >>](#)
7. Insert the SD card into a PC and ensure that the a TRX file is present with the correct date and time values. Use the Trolex AIR X software to verify that data is being recorded across TRX files
8. Clear all data from the SD card and replace it into the card slot of AIR XD
9. Switch the power back ON, ready for duty when the self-test routine is completed

3.3 Subsequent Switch On

Please follow section 3.2, steps 1-3

3.4 Activity Monitor

The activity monitor on the AIR XD, is showing live readings via a coloured bar chart representation and is scaled for total particulates 0 to 10 mg/m³. The scale can be configured during production if required.

3.5 System Reset Push Button

The system reset push button will reset all interval counters and storage registers to zero

3.6 CPU Reset Push Button

Reset the central processor when required

3.7 SD card

- All measured data is recorded onto the SD card in Trolex (TRX) file format at intervals of 10 seconds with a corresponding date stamp
- A new TRX file is produced every 24 hour period starting at 24:00 hrs or every time the mains power is returned to the unit
- Logged data can be viewed by inserting the SD card into a PC and opening the TRX files using the AIR X software

SD Card Removal and Replacement

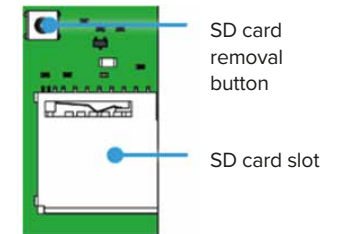
It is important to ensure the current data accumulated in the firmware is transferred into the SD card prior to the removal

SD card removal:

1. Press the button marked 'SD Remove' to transfer the data
2. Press until LED 1 flashes continuously
3. Remove the SD card

SD card replacement:

1. Insert the SD card into the SD card slot
2. Press the button marked 'SD Remove' to update the data
3. Hold until LED 1 flashes continuously



3.8 Calibration and technical support

The instrument is calibrated during manufacture and will not require any further field calibration.

Our technical services team are available to provide expert ongoing technical assistance and we can provide technical support packages tailored to your specific requirements.

Please contact our technical services team:

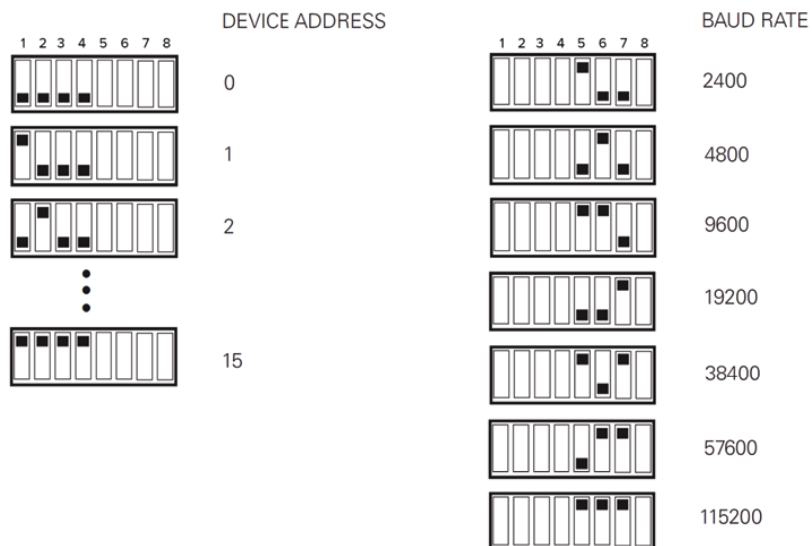
Tel: (0)161 483 1435

Email: Service@trolex.com

3.9 MODBUS Configuration

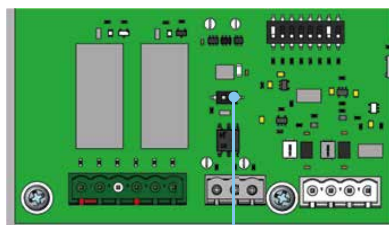
DEVICE ADDRESS and BAUD RATE

An eight-way selector switch is provided on the main PCB to setup the preferred configuration of the MODBUS interface:



Line Terminations

Some network installation may require a line termination resistor to be connected across RS485 lines A & B. A 120R resistor is available with SW 4 set to 1 (0 = no termination resistor):



SW4

MODBUS addresses

Registers: Input Register (16 bit)

Function code: 4

Register Address	Function
1	Firmware version
2	Average LONG ($\mu\text{g}/\text{m}^3 \times 100$)
3	Average SHORT ($\mu\text{g}/\text{m}^3 \times 100$)
4	TSP
5	Sample Flow Rate
6	Bin0 count
7	Bin1 count
8	Bin2 count
9	Bin3 count
10	Bin4 count
11	Bin5 count
12	Bin6 count
13	Bin7 count
14	Bin8 count
15	Bin9 count
16	Bin10 count
17	Bin11 count
18	Bin12 count
19	Bin13 count
20	Bin14 count
21	Bin15 count
22	Mean Time of Flight for Bin1 ($\mu\text{s} \times 3$)
23	Mean Time of Flight for Bin3 ($\mu\text{s} \times 3$)
24	Mean Time of Flight for Bin5 ($\mu\text{s} \times 3$)
25	Mean Time of Flight for Bin7 ($\mu\text{s} \times 3$)
26	Sampling period
27	PM 1 ($\mu\text{g}/\text{m}^3$)
28	PM 2 ($\mu\text{g}/\text{m}^3$)
29	PM 4.25 / PM 10 ($\mu\text{g}/\text{m}^3$)
30	Particle density ($\times 100$)
31	PM Live ($\mu\text{g}/\text{m}^3$)

Registers: Single coils

Function code: 1 – Read single coils

Function code: 5 – Write single coils

Register Address	Function
1	Average LONG Alarm Status
2	Average SHORT Alarm Status
3	Average LONG Relay Enabled
4	Average SHORT Relay Enabled
5	OPC polling enabled
6	System Reset
7	Save To NVR

Registers: Holding register

Function code: 3 – Read holding register

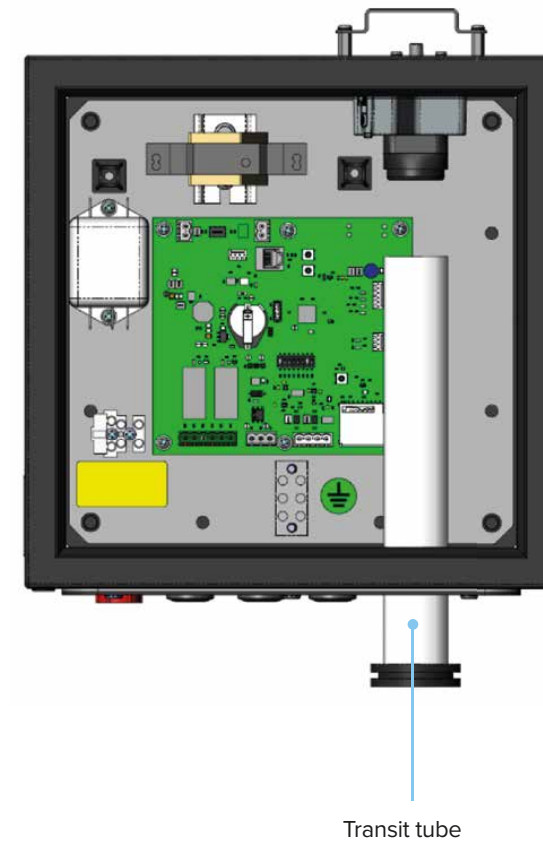
Function code: 6 – Write holding register

Register Address	Function
1	Average LONG AlarmThresh
2	Average SHORT AlarmThresh
3	Average LONG FullScale
4	Average SHORT FullScale
5	DateTime_YY
6	DateTime_MM
7	DateTime_DD
8	DateTime_hh
9	DateTime_mm
10	DateTime_ss
13	Live AlarmThresh
14	Live FullScale
15	Average LONG Time (sec)
16	Average SHORT Time (sec)

4. Maintenance

Every six months it is good practice to carry out a visual inspection of the transit tube and the OPC fan and remove any particulate build up.

- Switch off the power
- Unscrew the gland plate
- Slide the transit tube downwards to reveal the inside of the tube and the underside of the fan
- Clean with the soft brush provided
- Replace the transit tube and fasten the gland plate to the chassis



Disclaimers

The information provided in this document contains general descriptions and technical characteristics of the performance of the product. It is not intended as a substitute for and is not to be used for determining suitability or reliability of this product for specific user applications. It is the duty of any user or installer to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use. Trolex shall not be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments, or find errors in this publication, please notify us at marketing@trolex.com.

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When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Trademarks

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