Turnkey Instruments Ltd

Tel: +44 (0)1606 330020 www.turnkey.tel



Topas & Osiris

Environmental Monitor
Training Manual

1-2 Dalby Court, Gadbrook Business Centre, Northwich, Cheshire. CW9 7TN
Tel: +44 (0)1606 330020 Fax: +44 (0)1606 331526 Website: www.turnkey.tel

CONTENTS

1. Introduction to Turnkey's environmental monitor technology

2. Monitor Illustrations

2.1 Osiris
2.2 Topas

3. Using Turnkey's monitors

4. Setting up of a Monitor

4.1 Display Screen and keys
4.2 Setting Up The Monitor
4.3 Setting up alarm trigger level
4.4 Starting & Stopping Sampling & Deleting Memory via The Keypad
4.5 Reviewing Your Results via The Keypad

5. Using Turnkey's Monitors via AirQ Software

5.1 AirQ Welcome Screen
5.2 AirQ Comms Window
5.3 AirQ Config Window

6. Training Exercise

7. Turnkey's Lamp Post Box & The Osiris

7.1 Inlet Assembly
7.2 Osiris Assembly
7.3 Lamp Post Box Installation
7.4 Removing & Repositioning Osiris After Calibration
7.5 Osiris & Lamp Post Box Illustration

8. Monitor Installations

9. Minor Maintenance

10. Contact details and Website

1. INTRODUCTION IN TO TURNKEY'S ENVIRONMENTAL MONITOR TECHNOLOGY

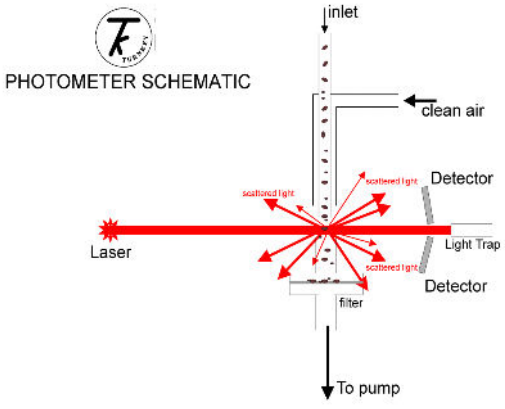
Turnkey's range of continuously recording dust and particle measuring instruments employ our own unique light scattering technique which is based on over 20 years of in-house experience at the forefront of this technology.

The photometer used in our **Topas, Osiris** and **Dustmate** instruments gives a continuous and simultaneous indication of the PM1, PM2.5, PM10 and TSP mass fractions.

The light scattered by airborne particles can be thought of as consisting of three components. Light *reflected* from the surface of the particle, light *refracted* through the particle and light which is *diffracted* from its original path by the presence of the particle. The intensity of the light scattered by reflection or refraction strongly depends on the type of particle. Thus a white limestone particle will reflect much more light than a black diesel fume particle of the same size. On the other hand the diffracted component depends only on the size of the particle and is independent of its material composition.

For irregularly shaped particles, light which is reflected and refracted tends to be scattered over all possible directions. The diffracted component, however, tends to be scattered only through very small angles. For example, for a 5 micron diameter particle, 90% of the diffracted light is scattered by less than 10 degrees from the original direction of the light beam.

Turnkey's photometers analyse only the light scattered through 10 degrees or less. That is they respond only to the diffracted component and have a virtually constant response whether the particles are black or white. Other commercially available photometers detect light scattered through much wider angles or even at 90 degrees to the light beam.



2. MONITOR ILLUSTRATIONS

2.1 OSIRIS



1. Grub screw
2. Air inlet
3. PC Link input
4. Meteorological input
5. Power & Telemetry input
6. Display
7. Key pad

2.2 TOPAS



1. Air Inlet
2. Display
3. Key Pad
4. PC Link Input
5. Filter Holder
6. Blue filter Silencer
7. Pump

3. USING TURNKEY'S MONITORS

All Turnkey's products are made with the user in mind, each product has a similar software application with on screen prompts that helps the user to decide what to press next, with the option of settings being chosen by Yes / No screen prompts, all setting choices can be made with confidence.

Questions:

4. SETTING UP THE MONITOR

4.1 Display Screen and keys: Press **RESET** to turn the monitor on, wait for the display to read Topas or Osiris Ready. If at any time you are unsure what is displayed on the screen or lose a sequence of a flow chart press the **RESET** button until you revert back to Topas or Osiris Ready and proceed again.

4.2 Setting up the monitor (Editing Mode): Each monitor can be set-up via the keypad, you can also start or stop the monitor sampling via the keypad. To set up the editing mode the display must read Topas or Osiris Ready, press **EDIT / ENTER**, press the **[➔]** button, the display will read Operator ID, there is no requirement to enter an operator ID, press the **[➔]** button, the display will read Location, press **ENTER**, you can now enter a 16 digit location.

Firstly if there is any text present pressing the **START/STOP** key will remove it. Using the **[↑]** & **[↓]** buttons you can rotate through the full alphabet and 1 – 9, once you have chosen the correct digit press the **[➔]** button to move onto the next digit, to create a space press the **[➔]** button again, if an incorrect digit has been inserted press the **[←]** or **[➔]** buttons to edit the error. Once the location has been entered press **ENTER.**

Display should now read **Topas** or **Osiris Settings.**
Press **ENTER**, use the **[↑]** & **[↓]** buttons to choose Yes or No and then Enter to move onto the next setting.

Typical settings are as follows:

Difference Mode:	NO	(only available with empty memory)
Workplace Modes:	NO	(only available with empty memory)
Telemetry Mode:	NO	(power down after changing)
Total Particles:	YES	
Measure in ug/m3:	YES	
PM10 Particles:	YES	
Measure in ug/m3:	YES	
PM2.5 Particles:	YES	
Measure in ug/m3:	YES	
PM1 Particles:	YES	
Measure in ug/m3:	YES	
Store In Seconds:	NO	
Wind Speed Input:	YES / NO	
Wind Heading:	YES / NO	
Ext. Temperature:	YES / NO	
Rel. Humidity:	YES / NO	
Password Protect:	NO	
Auto Restart:	YES	
New Sample Daily:	YES	
Inlet Heating On:	YES	
Alarms Enabled:	NO	

Press **RESET**.

The display should now read Mass Calibration, these are the factory calibration settings, these are preset to 1, please do not alter these unless asked or consulted with technical support, press the **[➔]** button.

The display should now read Storage Interval, this is the averaging period in minutes that the monitor records, a usual setting is 15 minutes, to alter press **ENTER** and then use the **[↑]** & **[↓]** buttons, press **ENTER** to exit.

The display should now read Autostop Counter, this can be used to set periodic samples, i.e. If the average setting was 1 minute and the auto stop counter setting was 10, each sample would finish after 10 minutes, if auto restart is set to yes and your auto start key is fitted a new sample would start every 10 minutes.
Press the **[➔]** button.

The display should now read Adjust the Clock, the clock can be adjusted by pressing **ENTER** and using the **[↑]** & **[↓]** buttons to first alter the minutes, press **ENTER** to move onto the hours, press **ENTER** to exit. Note you will have to alter for summer and winter times.

The display should now read Filter & Autoflow, press the **[➔]** button. Note you will have to alter for summer and winter times.

The display should now read Display Refresh, this determines how often the display will be updated, the factory setting is 1 second, please leave this setting to the factory setting. Press the **[➔]** button.

The display should now read Results Display, press **ENTER**, the following settings are to be set as below:
Press **ENTER** after each setting.

LCD Backlight	YES (if using batteries turn to No)
Display Cycling	YES
Latest Dust	YES
Average Dust	YES

If you have set wind direction, speed, relative humidity and external temperature to yes in the editing mode, the two below settings can also been seen in Results Display.

Display wind	YES
Display T & RH	YES

Calibrate gauges relates to the external metrological devises.
(Wind ms/p = 01.00) this is the default setting that should be used when connecting the Davies anemometer, (invert wind gauge) should also be switch to YES.
The following factory settings should be entered when using the Vaisalia relative temperature and humidity sensor.

Scaling Factors

SIGNAL	5 VOLT FSD READING	SCALE FACTOR
Temperature	160.00 deg C	40.00 deg C/V
Humidity	200.00 % RH	40.00 % RH

4.3 Set dust alarm: To set the alarm trigger level enter the value, i.e. Alarm% = 10.00 should be set if a value of 100ug/m3 is required as the trigger level. Press **RESET**.

The display should now read Zero Interval, again this is factory set to 1 hour, please leave this as the factory setting. Press the **[➔]** button.

Press **RESET** twice, the display should now read Topas or Osiris Ready.

Questions:

4.4 Starting & Stopping Sampling & Deleting Memory via The Keypad:

To start a sample via the keypad press **RESET** to turn the monitor on, wait for the display to read Topas or Osiris Ready. Press the **START / STOP** button, the display will read Reset Memory?, if you would like to delete the memory press the **[↑]** button so that the display reads Yes, then **ENTER**, the display will now read Are You Sure? This is a double prompt to remind you if you select Yes again all memory in the monitor will be lost forever! If you do not want to delete the memory press **ENTER** at each of the Reset Memory or Are You Sure prompts.

The display should now read Start Sample # Press the **[↑]** button to Yes then press **ENTER**, the display will now read auto zeroing for about 20 seconds (if this exceeds 20 seconds consult technical support), then the display will start to report data. The display is updated every 1 second, the average data will also be shown once the averaging time in storage interval has been exceeded.

To stop a sample press **START / STOP** the display will read Stop Sampling # Press the **[↑]** button so the display reads Yes then **ENTER**, the display should now read Topas or Osiris Ready.

Questions:

4.5 Reviewing Your Results via The Keypad: You can review the results recorded by the monitor via the display, you cannot do this while the monitor is sampling.

With the display on Topas or Osiris Ready press the **START / STOP** button, with Reset Memory on the display press the **[←]** or **[→]** buttons until the display reads Review Results, press the **[↑]** button to Yes then **ENTER**, you can now rotate through the results by pressing the **[←]** or **[→]** buttons, each sample result will rotate through all the sample data recorded and the start and stop times.

Press **RESET** to return to Topas or Osiris Ready.

Questions:

5. USING TURNKEY'S MONITORS VIA AIRQ SOFTWARE

This section gives a brief explanation of basic communications between AirQ software and Turnkey's range of dust monitoring equipment. Following this section will enable you to communicate remotely with your monitor and carry out simple procedures, such as starting and stopping a sample, uploading data and altering configurations.

Adding a serial number to AirQ

Launch the AirQ software, then click the **+ Add** button.



Enter your 16 digit registration code into the provided box then click **Add**, AirQ will ask you to confirm your serial number is correct click **YES** if the information is correct.



There are three types of methods of communicating with your dust monitors to the AirQ software, they are as follows:-

- Direct connection via a PC link
- GSM modem connection
- Webserver connection

Full version of AirQ software can be downloaded:-
http://www.turnkey-instruments.com/images/software/AirQ-1_2_3-Update.exe

Up-dates can be found:-
http://www.turnkey-instruments.com/AirQ-Setup.exe

Ensure your dust monitor is switched on to communicate with AirQ.

Connecting via Pc Link



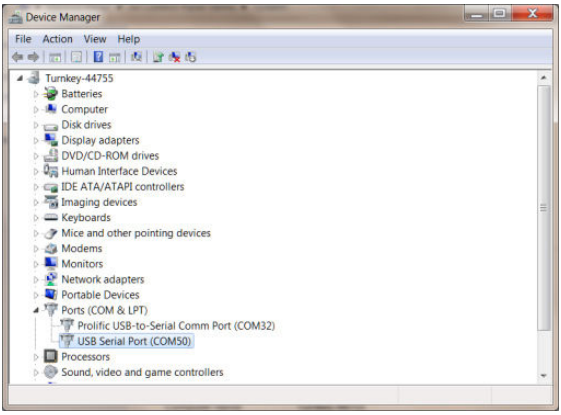
When making a direct connection via a usb link the FTDI driver file should be installed automatically once the lead is connected to your PC.

If you are using an older (Turnkey) PC link the following driver installation guide should be followed:- (Note, Turnkey branded PC links are not compatible with Window 7).

http://www.turnkey-instruments.com/images/documents/USB-Driver-Install.pdf

Once the drivers have been successfully installed the com port that the usb link lead has been assigned to should be determined. Hold the windows key and pause key simultaneously, this will then display “system properties” click the “hardware tab” then “device manager tab”, then double click “ports (COM & LPT)”.

If the drivers have been successfully installed the usb serial port(com #) should be seen i.e. if for example the usb lead has been installed to com6, this number should match the set up screen in AirQ.



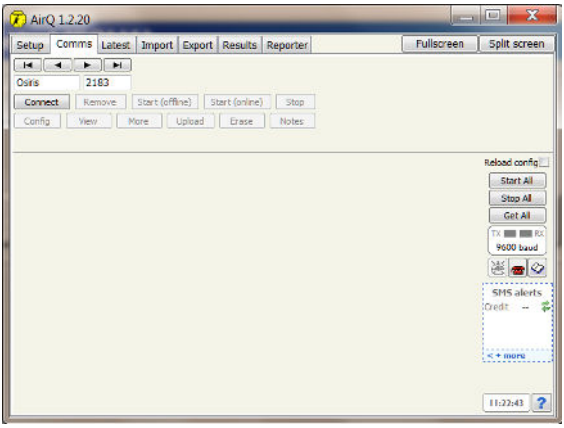
5.1 AirQ Set up screen: With your PC link connected to the local interface, launch AirQ, this will automatically detect the correct communication port and show the serial number of your dust monitor. Select the serial number i.e. TNO2183 in this case.



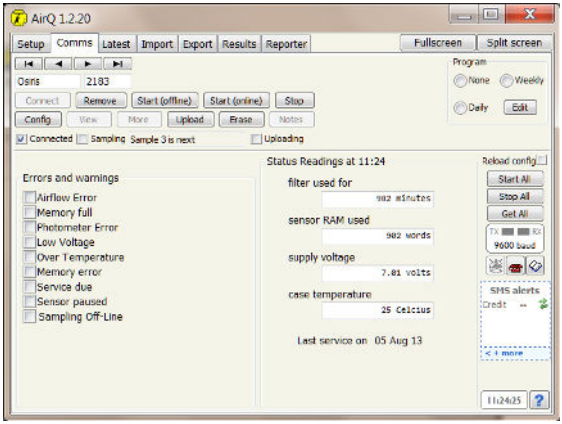
AirQ will display Comms open in green.



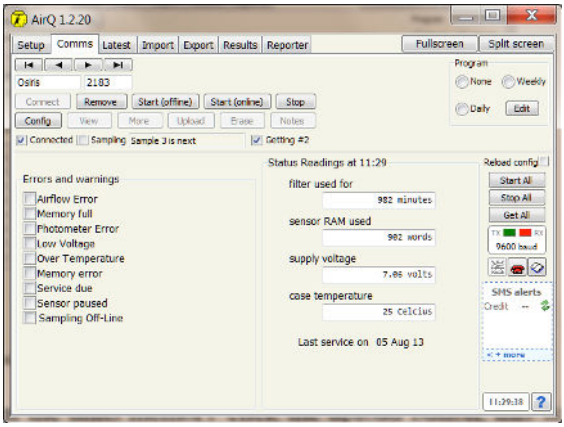
5.2 AirQ Comms Window



Click **CONNECT**, the following screen will be displayed.



To up-load any result from the units memory click the upload button, AirQ will display getting sample #n and count down until all samples have been uploaded.



Connecting via GSM modem

Firstly install the dial out modem, the recommended modems is the US robotics 56K faxmodem, however other modems can be used.



U.S.Robotics modem- PC end.

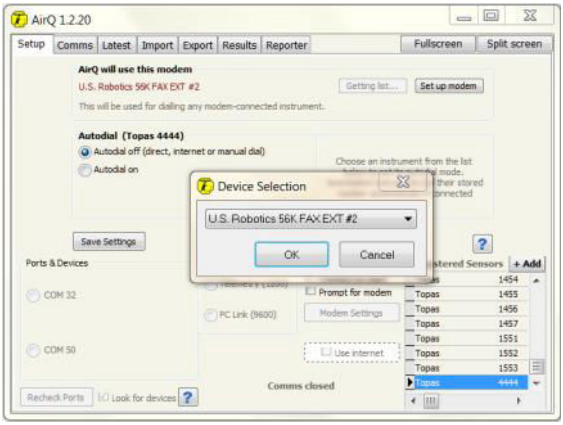


Remote GSM modem – Dust monitor end.

Once this has been successfully installed, click the **MODEM SETTINGS** button.



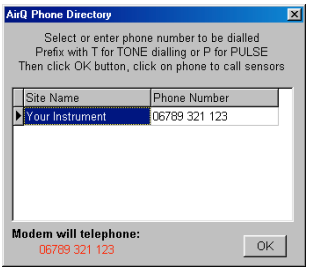
Click the **SELECT** modem button from the drop down menu choose the dial out modem to be used then click **SAVE SETTINGS**.



Select the respected Comm port and PC link, AirQ will display Comms open in green.



Click the  button to enter the phone book shown on the right.

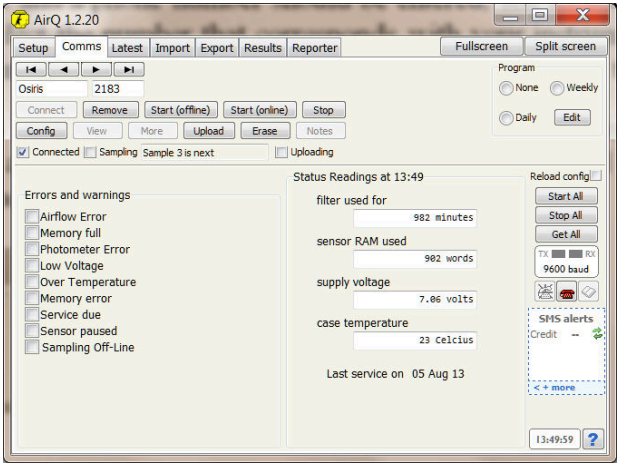


Upon first use a site name and a phone number should be entered, left mouse clicking in the relevant box does this. Select the number that corresponds with your instruments serial number, this will appear in blue at the bottom then click **OK**, this reverts to the comms window.

The next step is to click on the now active  button to dial the instrument. The screen below will appear and count up to about 45 seconds when the modem will begin to connect.



Use the arrows to move to the serial number and click **CONNECT** this will now begin communications with the instrument. The Rx and Tx lights should flash alternately resulting in a screen similar to below. Please wait for **GETTING CONFIGURATION** to disappear in red before proceeding any further.



Webserver connection

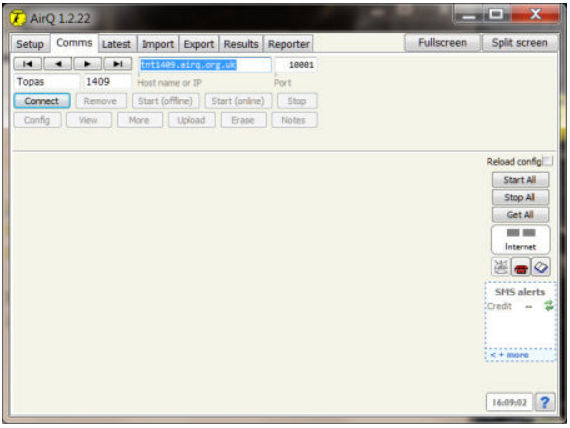


Launch AirQ, check the Use internet box, Comms open in green should be displayed.

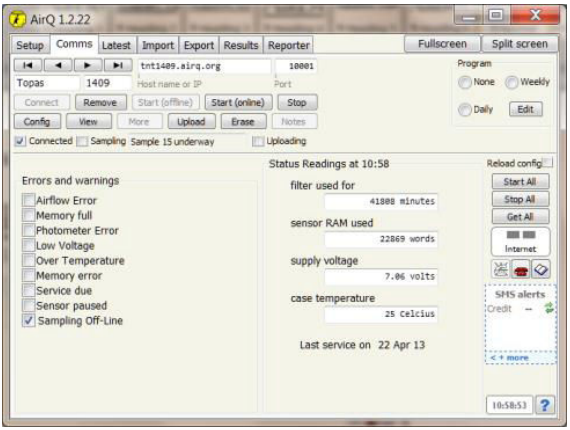


Click the Comms tab, use the ► to scroll to your serial number of your dust monitor.

Enter the host name or IP address this is the serial number of your monitor followed by (.airq.org.uk) i.e. *******.airq.org.uk



Clicking **CONNECT** will automatically enter the default port number 10001.



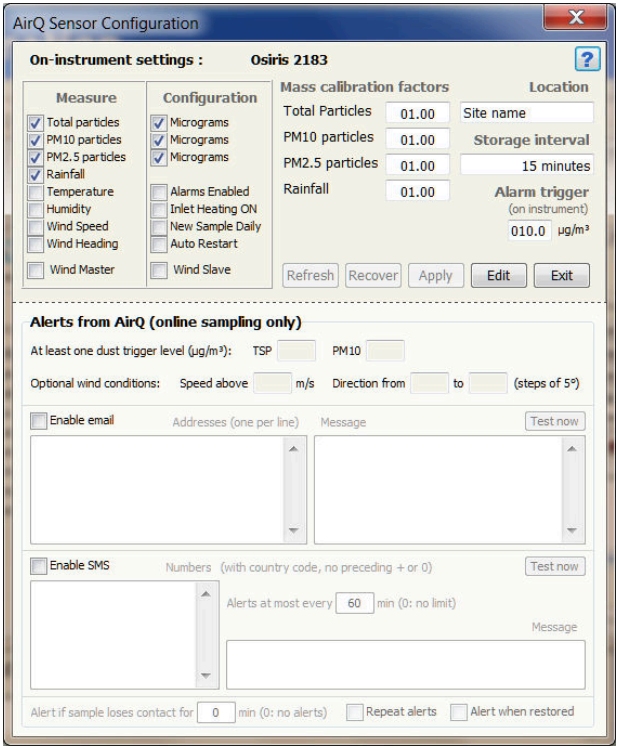
If the Sampling Off-line box is unchecked, pressing the Start (offline) button encapsulated within Off line box will begin a new sample, where data is stored within the monitors internal memory. The start (online) button will begin a sample where data is reported from the monitor back to the PC, requiring a permanent connection between the two. The monitor will cease taking either type of sample if you press **STOP**. Pressing **UPLOAD** will now retrieve any data stored within the instrument. Pressing **ERASE** will now erase all uploaded data, a second confirmation box will appear click **YES**.

Once the upload is complete and the memory has been erased, press **REMOVE** to disconnect the instrument, then if you are used telecommunications press  in order to drop the phone line.

5.3 AirQ Config Window

The monitors configuration can be altered by selecting **CONFIG** from the Comms window launches the window shown below. Please stop sampling if changing any configuration.

Most instrument settings can be changed within the window, the example to the right is the most typical of setups.



Pressing **EDIT** enables changes to be made, but only if the monitor is not sampling. It is not recommended that the Calibration levels are altered unless under specific instruction from Turnkey. Changes to the Location or Integration time (storage interval) can be made by clicking in the relevant box. The Measure section selects the channels to be sampled and the configuration section chooses particle size. Please ensure Auto Restart is selected and in order to have a separate sample per day, new sample daily. To confirm any changes made click the **APPLY** button, this reverts you back to the Comms window.

To confirm changes click again on **CONFIG**, if OK click **EXIT**.

Press **REMOVE** to disconnect the instrument once finished in the COMMS window.

Questions:

6. TRAINING EXERCISE

A good training exercise before site installation is to run the Topas or Osiris in an office or laboratory, a preferable period is a week. On downloading data and creating real time graphs movements in the room can be mapped, sampling while the monitor is close can also be advantageous for ensuring the correct functionality of all settings.

Questions:

7. TURNKEY'S LAMP POST BOX & THE OSIRIS

7.1 Inlet Assembly: Insert the heated inlet pipe into the metal inlet shroud from inside the LPB.

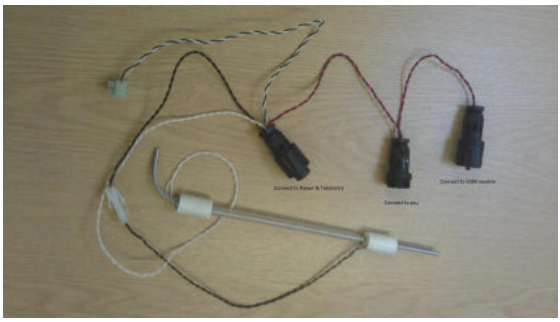
The inlet pipe will self-locate to intrude into the gauze head, you can remove this head if it makes it easier.

7.2 Osiris Assembly: Looking at the Osiris the correct way up you will find silver allen key grub screws in each top corner (shown left), **TWO GRUB SCREWS** are in each hole, remove these using the allen key supplied in the yellow Turnkey case (keep safe).



Inside the LPB at the top, a mounting bracket can be found with two black threaded knobs, these are located in the holes which they belong to by two nuts, remove the two nuts (keep safe, these are only used for holding these knobs when the Osiris is not being used), position the Osiris vertically in the LPB locating the two holes in the LPB with the two holes in the Osiris where the grub screws used to be, screw the two knobs into the Osiris so that it is held firmly within the LPB. The Osiris should not swing once in the box, this could damage the Osiris!!

The image below shows how to connect the heated inlet to an Osiris and GSM modem.



7.3 Lamp Post Box Installation: The LPB is designed to be strapped to any post, preferably using a banding tool and straps, if using straps please remove the inlet pipe while banding box. Please read instructions provided with the banding tool. You can also bolt or screw the LPB to a wall or wooden post.

The LPB measures just 225 x 380 x 210 mm.

7.4 Removing & Repositioning Osiris after calibration: When removing the Osiris from the LPB, first stop the monitor from sampling then disconnect the connectors to the Osiris, please note sequence. Turn the monitor off by pressing the **START / STOP** and the **[←]** buttons together.

Please be aware the inlet will be hot.

Once the inlet has cooled down carefully remove the inlet from the Osiris air inlet (on the face of the unit), this could be very tight, sometimes twisting the air inlet frees the two.

The air inlet does detach from the Osiris, this is a good time to check the air inlet for blockages.

Remove the Osiris by unscrewing each torque knob a bit at a time. Holding the Osiris while removing the knobs helps slightly.

Repositioning the Osiris

Once you have repositioned the Osiris please check all connectors are replaced correctly and the inlet is secure into the air inlet on the Osiris.

Please complete the following checks:
With display on Osiris Ready or sampling press and hold the **RESET** button, the display should indicate a voltage of 6.9 – 7.1 volts, this means you have connected correctly, if the display shows a reading of around 6.5 volts or less, you have not connected correctly, please consult Turnkey.

If not already done so start the monitor sampling, wait for 5 minutes and check inlet heater is warming.

If using a GSM modem you can phone the modem via a mobile phone, if you get a message saying modem is not switched on you have not re-connected correctly, if your phone goes through to call/digital sound you have connected correctly. You can also phone technical support to test the line.

PLEASE CHECK ALL YOUR OSIRIS SETTINGS ARE CORRECT.

Note: (Telemetry mode should be set to **"NO"** on all the above connections).

Questions:

7.5 Osiris & Lamp Post Box



8. MONITOR INSTALLATIONS

We recommend that a Turnkey engineer, using only specified Turnkey parts, install all Turnkey's products.

The Osiris can be installed on street light columns; the Topas and Osiris can be installed on buildings or stands.

9. MINOR MAINTENANCE



Turnkey's monitors require a flow and filter check every 3 months (later models have an inbuilt flow stabiliser, consult technical support if unsure). This is a simple procedure, which can be easily carried out following the Turnkey filter change flow chart.

Please carryout flow checks as a first principle, when going through the flow check the monitor will indicate the weight of particles (dust) that has been deposited on the filter, if the monitor has indicated 4.5 mg or more, complete the flow check then complete a full filter change and flow check as per the flow chart.

The flow of the monitor requires to be at 600 ml per minute, this is indicated on the flow meter by the number 6 and a black line or if using the meter supplied with the service kit the top of the spindle requires to be set to the correct increment, when checking the flow please make sure the flow meter is held vertically and the pipe is not kinked. The maintenance book asks you to detail if the flow is up or down of the indication mark, if using the service kit flow meter please indicate the actual level, if the flow can't be adjusted to the indication line please return your monitor to Turnkey for repair or contact technical support for any further advice.

Filters can be replaced in the holder either way up, please make sure only one filter is relocated into the holder.

Minor servicing.

If there is a suspected blockage it is possible the blockage could be either in the small silver nozzle or the heated inlet:-



- To remove pull and twist the nozzle and check for any ingress/blockages.

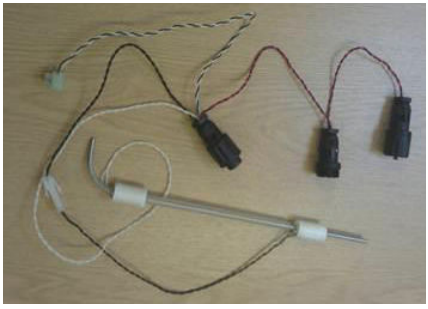


- Once the nozzle is clear refit the nozzle by carefully pushing and twisting the nozzle until it is pushed fully home.

- Now remove the filter base from the rear of the Osiris and replace the old contaminated GFA filter for a new one and refit.

- Start the unit sampling and observe the latest readings on screen.

- Remove the heated inlet and using a can of compressed air blow the inlet tube through to clear any build-up of deposits.

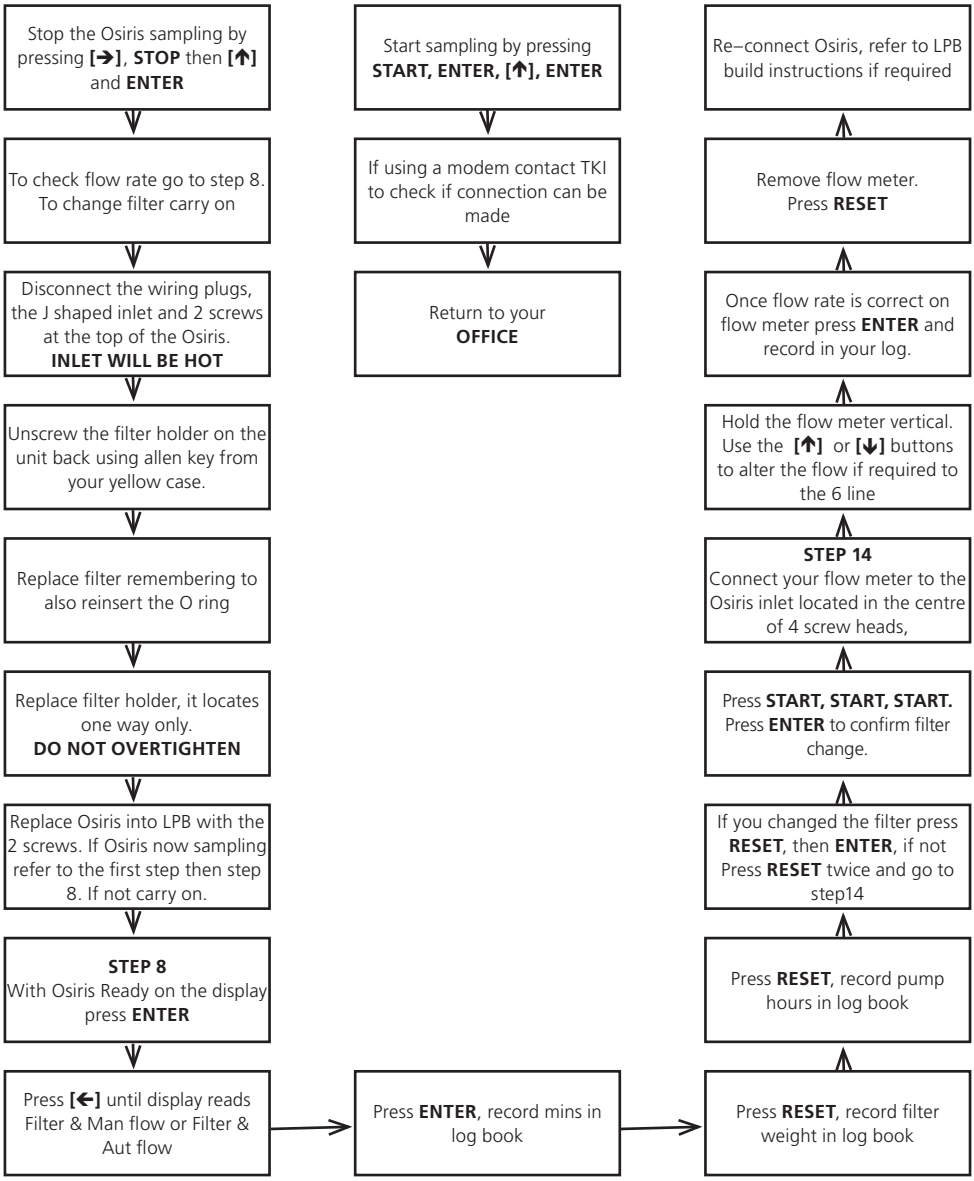


This should have now cleared any potential blockages that may have been causing problems.

Connect your flow meter to the silver nozzle and observe the flow which should be 600cc/min.

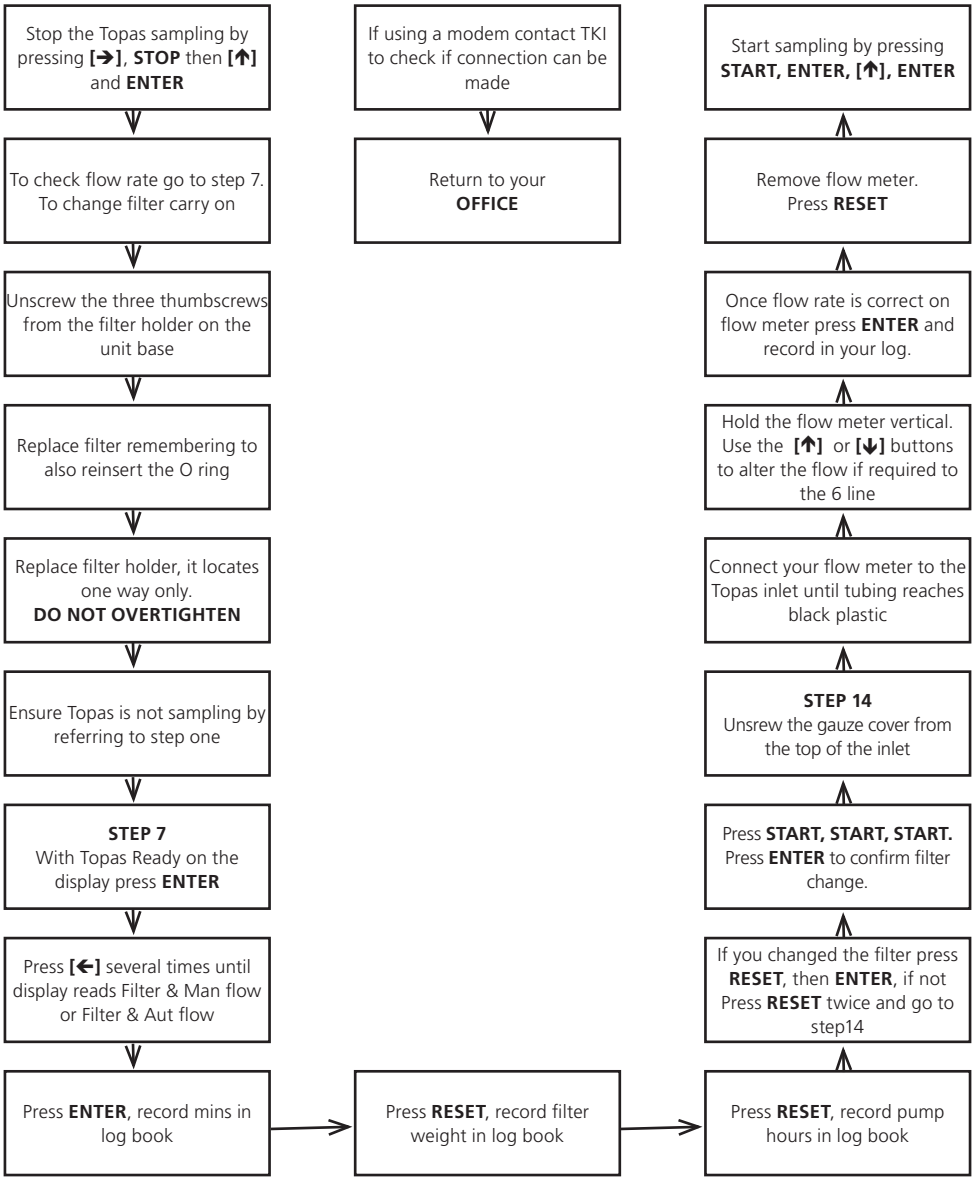
TURNKEY'S OSIRIS FILTER CHANGE FLOW CHART

Following the chart from the top left corner, follow arrows to the next command.



TURNKEY'S TOPAS FILTER CHANGE FLOW CHART

Following the chart from the top left corner, follow arrows to the next command.



10. CONTACT DETAILS AND WEBSITE

If you have any questions or require additional information to this manual you can contact Turnkey by any of the following ways:

Technical support: 01606 812666
Main switch board: 01606 330020
Direct Fax: 01606 331526
Freephone(UK only): 0800 1958887

E mail: techsupport@turnkey-instruments.com
Website: www.turnkey-instruments.com

Return Address:
Turnkey Instruments Ltd
1 & 2 Dalby Court Gadbrook Business Centre
Northwich, Cheshire
CW9 7TN

NOTES



Turnkey Instruments Ltd
Tel: +44 (0)1606 330020 www.turnkey.tel



1-2 Dalby Court, Gadbrook Business Centre, Northwich, Cheshire. CW9 7TN
Tel: +44 (0)1606 330020 Fax: +44 (0)1606 331526 Website: www.turnkey.tel