SWAN TECHNICAL SERVICES

EXPERT SOLUTIONS

Continuous Ambient Air Quality Monitoring System

OUR GLOBAL PARTNERS

acoem · CHROMATOTEC · LUMEX · SWAN · QUEST · Honeywell RAE SYSTEMS · GASERA

Continuous Ambient Air Quality Monitoring System (CAAQMS)

Overview

On-Line Continuous Ambient Air Monitoring System / Station for the measurement of SO_2, NO_x, CO, CO_2, O_3, PM_{10}, $PM_{2.5}$ etc. in the ambient environment.

- Analyzers approved by various International Agencies like US EPA, TUV, EN, and in line with norms as defined by Central Pollution Control Board (CPCB) including online calibration from remotely located servers like CPCB and State PCB servers.
- Uploading of data to CPCB, SPCBs, PCC and company corporate servers. Cloud server facility.
- Remote calibration facility.

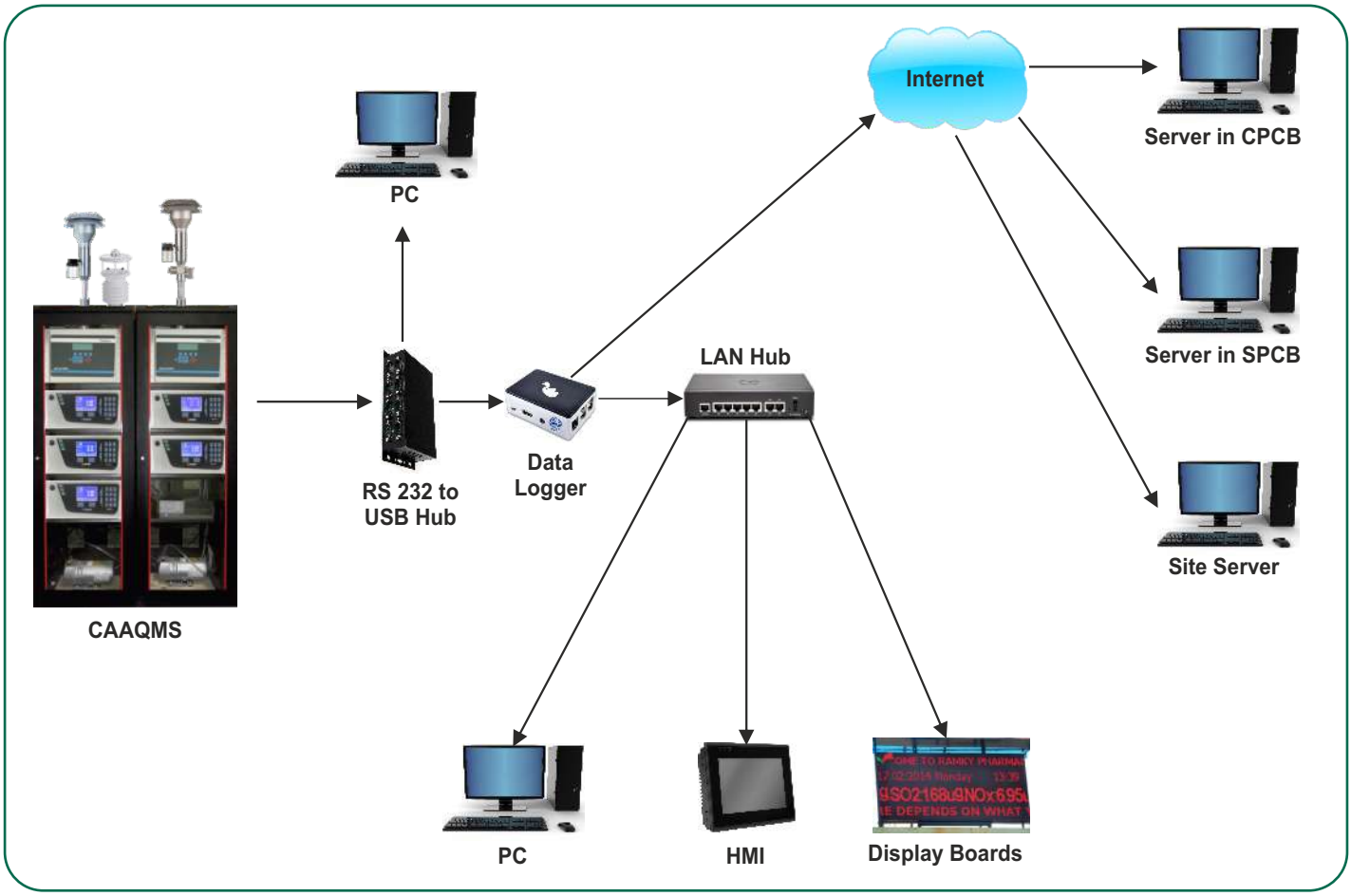
Turnkey Solutions

- SWAN offers turnkey solutions for CAAQMS that span from design and detailed engineering, system integration, supply to installations, commissioning and uploading of data to PCB and company corporate servers.
- SWAN offers entire range of associated products as part of CAAQMS solution that include prefabricated shelter, UPS, PC, display boards, networking components, Wi-Fi units, gateways, A/D converters etc.
- Requirements are thoroughly studied to identify the items needed and engineering carried out to bring out the most economical and sustaining customized solutions.
- Dedicated trained and experienced service team for after sales support across India.

Features

- An electronic adaptive filter for continuously optimized response time and measurement stability is used for the gas analyzers.
- Gas filter correlation technology is for gas analyzers.
- Removable 4GB data storage is available and capable of storing more than 8 years of 5-minute averages.
- A Dual filter design is used for the gas analyzers to minimize maintenance.
- Gas analyzers have Bluetooth connectivity and a suitable Android App is available for direct communication.
- Gas analyzers have comprehensive data logging and remote viewing of over 200 operational parameters.
- All User selectable units are available i.e mg/m^3, $\mu g/m^3$, ng/m^3, ppm, ppb or ppt.
- All analyzers have USEPA, TUV (QAL1), and MCERTS approvals.
- RS232, RS485, USB Ports, and TCP/IP Network Ports are available.

Schematic Diagram



* The CAAQMS data can be uploaded to remote servers by broadband (2 MBPS speed) or by GSM/GPRS

Shelter

- Porta Cabin
- Rack Cabinet for Analyzers
- Three 40W LED Lights.
- Two Indoor Air Conditioning Units.
- Electrical Accessories
- UPS
- Automatic Fire-Fighting System (Optional).
- One Telephone Socket.
- One Ethernet Socket.
- Video Surveillance System (Optional).
- Guard-rail on Roof (Optional).
- Lightning Protection System (Optional).
- 2-Meter Stepladder (4 meter after opening).
- Water-proof Structure
- Furniture
- High Purity Zero Gas Generator
- High Purity Hydrogen Gas Generator (Optional)
- Sampling Tube
- Standard Gas Cylinder
- Display Board

CAAQMS Station

CAAQMS in Mobile Van

Porta Cabin

- Main Shell: The main fabrication of the structural frame work shall be integral & all welded type to comprise of the bottom frame, overall frame work, internal, external cladding with insulation and other peripherals. Sloping self-draining roof and desired door-window, A/C openings etc.
- Base Frame: The main bottom (Base) frame is fabricated and welded MS 2mm thick bending profiles, and all the inter connecting cross members shall also be of steel box duly welded length wise & breadth wise and conveniently equi-spaced.
- Flooring: Bottom flooring with MS Box sections 60 x 40 framing, 600 x 600 grid and on top 16 mm thick cement boards with 1.5mm thick vinyl floor mat.
- Side Walls: 50mm thick PUF panels.
- Roof Framing: Roof sloping self drain with suitable pipes using 40 x 80, 50 x 25 etc..
- Roof: 2mm Thick Plain GI Sheets
- Inner Roof: PVC Profile false ceiling with suitable insulation.
- Door: 30 mm thick PUF panel shutter.
- Window: Aluminum Sliding Windows with MS Grills.
- Painting: One Coat Epoxy primer and one coat Epoxy Finish Paint.

Rack Cabinet

- Single / Dual racks can be supplied as per the number of analyzers required for the CAAQMS System.
- Can fit 19" analyzers, pumps etc.
- Mesh design for air cirulation to keep the system cool.
- Fitted with door for easy ergonomics.

Three 40W LED Lights

- Three 40W LED lights are installed for Lighting.

Two Indoor Air Conditioning Units

- Two Indoor Air Conditioning Units are kept to maintain a stable ambient environment for the station.

Electrical Accessories

- Specifically, there are 3 one-phase regulated sockets (for instruments), 3 one-phase unregulated sockets (for sampling pump and temporary electricity), and 1 one phase socket for air conditioning.

UPS

- It is used for uninterrupted power supply during power outages so that the analyzers can work continuously.

Automatic Fire-Fighting System (Optional)

- A Suspended pressure storage automatic fire-fighting system is installed for the monitoring station.
- When a fire occurs in the protection area, the thermal line quickly transmits the fire signal, activates the fire extinguishing device, and automatically sprays fire extinguishing agent to extinguish the fire.

- Also when a fire occurs in the protection area, the ambient temperature rises to the nominal operating temperature set by the fire extinguishing device, and regardless of whether the thermal line is action, the fire extinguishing device automatically starts to spray fire extinguishing agent to extinguish the fire.
- Alarm is also sounded for alerting the engineer.

Telephone Socket

- One telephone socket for connection with the telephone line is installed.

Ethernet Socket

- One Ethernet socket for connection with the network line is installed.

Video Surveillance System (Optional)

- The video monitoring system uses high definition cameras with 360 degree rotation mounted on a pole.
- The pole has a lightning protection grounding system.
- The video storage time is not less than 1 month.

Guard-rail (Optional)

- Two layered stainless steel guardrail pipe is installed on the roof.
- The pipe is connected and fixed at the top.
- The safety and convenience of the engineer are fully considered.

Lightning Protection System (Optional)

- The external direct lightning protection facilities will meet the protection radius of the protected object.
- Three level lightning protection for power supply and lightning protection for telephone signal are also facilitated.
- In order to prevent damage caused by the potential difference between the equipment, a reliable and effective equipotential connection between the main equipment is to be maintained.
- Lightning protection test report issued by a professional testing organization can also be obtained.

Step-ladder

- Equipped with a 2-meter stepladder (4-meter after opening), which fully considers the safety and convenience for the engineer.

Water-proof Structure

- The waterproof structure is adopted to completely prevent rain from leaking and avoid the drawbacks of leak-proof sealant.
- The roof is sloped from the front to the back (the front is high and the back is low).
- After the construction of the monitoring station is completed, leak-proof sealant is applied on the joint of the two sandwich panels.
- Light steel keel waterproof buckle grooves are installed at the joint of the two color steel plates on the roof.
- The joints between the steel plate and the beam, the buckle groove and the roof of the station are all sealed with weather-resistant silicone to completely prevent rain and avoid the drawbacks of sealing glue.
- It is also equipped with drainage eaves to prevent rainwater accumulation and protect the walls.

Furniture

Furniture is also supplied as part of CAAQMS system accessories and utilities for organizing the items and facilitate comfort to the engineer. Local make below items will be supplied:

- Table - 1 No.
- Chair - 1 No.
- OH Cupboard - 1 No.

High Purity Zero Gas Generator

- Zero Air Generator produces a continuous flow of high purity Zero Air at selected pressure.
- It consists of Compressor, Moisture Trap, Activated Charcoal and Oxitrap.
- Compressor provides oil free air from atmosphere. It has buffer storage tank and moisture formed is automatically drained by drain solenoid valve. The air is then passed through pressure regulator which is used to set output pressure.
- Then air is passed through Moisture trap where any moisture content in air is trapped.
- Then air is passed through activated charcoal and Oxitrap where O_2, CO, CO_2, THC and other unwanted components in the air are adsorbed, leaving Zero Air Gas of required purity.

High Purity Hydrogen Gas Generator (Optional)

- It is easy to operate, safe and reliable, adding alkali at one time.
- Add distilled water, and power on to produce hydrogen.
- Electrolytic polishing, Ultrasonic cleaning, over-voltage protection and two-stage purification.
- With unique anti-liquid return device
- Electrolysis material is made of imported special precious metals, which effectively improves the electrolysis efficiency and keeps the cell temperature constant,
- Stable output flow, automatic tracking, purity does not decay, and can be used continuously

Sampling Tube

- Sampling device: vertical laminar flow sampling manifold.
- Sampling head: Prevent rainwater and coarse particles from falling into the main pipe, and at the same time prevent birds, small animals and large insects from entering the main pipe. The design of the sampling head ensures that the sampling airflow is not affected by the wind direction and enters the main pipe stably.
- Sampling main pipe: Airflow in the sampling main pipe maintains laminar flow. The residence time of the sampling gas in the main pipe is less than 20s, and the distance between branch pipe joints is greater than 8cm.
- The outer wall of the pipeline is equipped with an insulation jacket or heater, and the heating temperature is controlled at 30°C~100°C.

Standard Gas Cylinder

- It is used for calibration of the analyzers.
- Standard gases will be supplied.

Display Board

- It is used for displaying the parameters and measured values continuously on realtime basis.

System Configuration

- SO_2 Analyzer
- NO_x Analyzer
- CO Analyzer
- O_3 Analyzer
- NH_3 Analyzer
- PM_{10} Analyzer
- $PM_{2.5}$ Analyzer
- BTEX Analyzer
- Mercury Monitor
- NMTHC Analyzer
- HCl Analyzer
- HF Analyzer
- H_2S Analyzer
- Dynamic Dilution Calibrator
- Data Acquisition System
- Software

SO_2 Analyzer

- It uses proven pulsed UV fluorescent radiation technology to measure SO_2 in ambient air.
- Range: 0 to 20 ppm.
- LDL: < 0.3 ppb.
- US EPA & EN TUV/MCERTS approved.
- Delivers precise and reliable performance at excellent value.
- Comprehensive data logging and remote viewing.
- Superior remote control, diagnostic viewing and calibration.
- RS232, USB, Bluetooth, analog and digital I/O. Optional TCP/IP
- Intuitive menu, advanced GUI and a large alphanumeric keypad
- Instant status indication. Built-in digital display. Removable flash memory. Rack slide design. Low power demand.

NO_x Analyzer

- It uses proven chemiluminescence technology to measure NO, NO_2 and NO_x in ambient air
- Range 0 to 20 ppm.
- LDL < 0.4 ppb.
- US EPA & EN TUV/MCERTS approved.
- Delivers precise and reliable performance at excellent value.
- Comprehensive data logging and remote viewing.
- Superior remote control, diagnostic viewing and calibration.
- RS232, USB, Bluetooth, analog and digital I/O. Optional TCP/IP
- Intuitive menu, advanced GUI and a large alphanumeric keypad
- Instant status indication. Built-in digital display. Removable flash memory. Rack slide design. Low power demand.

NH_3 Analyzer

- It uses proven chemiluminescence technology and an external thermal catalytic converter to measure NO, NO_2, NO_x and NH_3 in ambient air.
- Range: 0 to 20 ppm (NO, NO_2, NO_x) / 0 to 0 to 2 ppm (ppm)
- LDL: < 0.4 ppb.
- US EPA approved.
- Delivers precise and reliable performance at excellent value.
- Comprehensive data logging and remote viewing.
- Superior remote control, diagnostic viewing and calibration.
- RS232, USB, Bluetooth, analog and digital I/O. Optional TCP/IP
- Intuitive menu, advanced GUI and a large alphanumeric keypad
- Instant status indication. Built-in digital display. Removable flash memory. Rack slide design. Low power demand.

BTEX Analyzer

- A GC/PID for automatic monitoring of BTEX in air, water and soils
- Range : 0.45 to 45 µg/m^3 = 0.1 to 14.5 ppb.
- Min. detection level as low as 10 ppt for application Benzene or 1,3-Butadiene in ambient air.
- Approved and installed by US EPA. MCERTS certified analyzer for benzene measurement following EN 14662-3 norms
- Miniature, sensitive, mobile and flexible.
- Self-cleaning of the lamp ensures high stability.
- Bi-directional RS-232 C to transfer data & results to PC.

CO Analyzer

- It uses proven NDIR gas filter correlation technology to measure CO in ambient air.
- Range 0 to 200 ppm.
- LDL < 40 ppb.
- US EPA & EN TUV/MCERTS approved.
- Delivers precise and reliable performance at excellent value.
- Comprehensive data logging and remote viewing.
- Superior remote control, diagnostic viewing and calibration.
- RS232, USB, Bluetooth, analog and digital I/O. Optional TCP/IP
- Intuitive menu, advanced GUI and a large alphanumeric keypad
- Instant status indication. Built-in digital display. Removable flash memory. Rack slide design. Low power demand.

O_3 Analyzer

- It uses proven non-dispersive ultraviolet (UV) absorption technology to measure O_3 in ambient air.
- Range 0 to 20 ppm.
- LDL < 0.5 ppb.
- US EPA & EN TUV/MCERTS approved.
- Delivers precise and reliable performance at excellent value.
- Comprehensive data logging and remote viewing.
- Superior remote control, diagnostic viewing and calibration.
- RS232, USB, Bluetooth, analog and digital I/O. Optional TCP/IP
- Intuitive menu, advanced GUI and a large alphanumeric keypad
- Instant status indication. Built-in digital display. Removable flash memory. Rack slide design. Low power demand.

PM_{10} Analyzer

- It uses the beta ray attenuation method. The equipment includes a PM_{10} inlet.
- Range: 0 to 10,000µg/m^3
- LDL: <3.6µg/m^3
- Designated by the US EPA as Federal Equivalent Method for PM10 monitoring.
- Highly accurate, reliable, and mechanically simple flow system
- Advanced Smart Heater technology precisely controls sample relative humidity.
- Automatic hourly span checks
- Integrated datalogger, Fast field audits.
- Hourly filter advances minimise effects on volatile compounds

$PM_{2.5}$ Analyzer

- It uses the beta ray attenuation method. The equipment includes a PM_{10} inlet and $PM_{2.5}$ WINS Impactor.
- Range: 0 to 10,000µg/m^3
- LDL: <3.6µg/m^3
- Designated by the US EPA as Federal Equivalent Method for PM2.5 monitoring.
- Highly accurate, reliable, and mechanically simple flow system
- Advanced Smart Heater technology precisely controls sample relative humidity.
- Automatic hourly span checks
- Integrated datalogger, Fast field audits.
- Hourly filter advances minimise effects on volatile compounds

Continuous Mercury Monitor

- Ultra-sensitive measurements of background Mercury (Hg) concentrations.
- EN 15852 Compliant.
- Requires no argon cylinders for operation and no consumables.
- RS232, Modbus, analogue outputs
- Low detection limit and wide range of measurement
- Stable calibration
- Automatic zero drift and span drift correction
- Automatic recalculation to standard conditions
- Auto control and preventive maintenance functions

NMTHC Analyzer

- Based on GC-FID technology.
- Each time after completing sampling, the analyzer purges sample loop and back blows column automatically, to shorten analysis cycle time efficiently.
- Use Silcosteel® processing gas lines to greatly reduce the adsorption and residual of the sample gas within the tube wall.
- FID detector has automatic ignition and alarm function after flameout, effective security management and control of the hydrogen flame gas path.
- LCD Touch Screen. TCP / IP network remote control
- Flameproof enclosure (Optional)

HCl Analyzer

- Based on TDLAS and multiple reflection long optical path technology.
- ppm to ppb range.
- Strong anti-interference capability, high precision, small drift.
- Low detection limit, high sensitivity, Excellent adaptability.
- Compact structure, easy integration, 19" chassis, modular.

Continuous HF Monitor

- Based on combining ultra sensitive cantilever enhanced photoacoustic detection technology with a TDLAS source operating at a fundamental spectral absorption line of hydrogen fluoride (HF).
- High dynamic range and stable operation, 0.5 ppb detection limit, Low sample volume (few ml).
- No consumables. Built-in gas exchange system, Configurable response time : from 15 seconds to few minutes.

Continuous H_2S Monitor

- It uses proven UV fluorescent radiation technology and an internal thermal catalytic converter.
- Range: 0-2 ppm. LDL: < 0.3 ppb
- US EPA approved.
- Delivers precise and reliable performance at excellent value.
- Comprehensive data logging and remote viewing.
- Superior remote control, diagnostic viewing and calibration.
- RS232, USB, Bluetooth, analog and digital I/O. Optional TCP/IP
- Intuitive menu, advanced GUI and a large alphanumeric keypad
- Instant status indication. Built-in digital display. Removable flash memory. Rack slide design. Low power demand.

Dynamic Dilution Calibrator

- High precise mass flow controller
- Large dilution ratio and fast response
- Quartz GPT chamber, multi interfaces for calibration gas
- Continuous self-checking with alarm function
- Colorful display and touch screen operation
- Large memory and history data saved automatically
- Ozone generator and ozone photometer are optional
- Bidirection RS232 port for remote control
- USB and Ethernet interface

Data Acquisition System

- It is used to monitor the execution of tasks such as work control, data acquisition, zero gas and standard gas supply timing, data communication and other tasks of all online analytical instruments and calibration equipment in the monitoring station.
- The control function meets all the requirements of data collection, control and communication.
- Data acquisition industrial computer: CPU frequency ≥3GHz, memory size ≥2GB, hard disk capacity ≥500GB, RS 232 Serial port ≥6. Equipped with keyboard, mouse, 17" monitor.

Software

- SED-9S is the next generation Real Time Data Acquisition and Analytics Software for Continuous Online Emission, Ambient and Effluent Monitoring.
- The platform connects to any analyzer, sensor or device in a plug and play model acquiring data in real time.
- SED-9S comes with pre-built analytics, alerts and reports for real time monitoring and decision making for both industries and regulators.
- With our unique technology solution to remotely calibrate and configure analyzers, SED-9S is the outcome of our dream to make world class products in India for a greener tomorrow.
- Central server consolidates and analyses data from individual stations and provide real time analytics on the data. Hosted in CPCB & SPCB
- Industry and Regulators uses the insights to actionize effective pollution control measures
- Rest based open protocol for multi client deployments
- Secured, high integrity data transfer with digital signature
- Real Time alerts & alarms with SMS and Email Integration
- Integrated data quality codes as per ISO 7168
- Live consolidated industry dashboards
- Remote calibration & configuration of analyzers
- Integrated analytics & predictive models for effective pollution control
- Real Time Event Stream processing triggering real time actions

Other Continuous Ambient Air Monitoring Solutions

Real Time Noise Level Monitoring System

- Real Time Noise Monitoring
- Complies with IEC 61672-1:2013, ANSI S1.4-1983 and ANSI S1.43-1997
- 1/1 & 1/3 Octave in accordance with IEC 61260-1:2014 and ANSI S1.11-2004
- Linearity range: 25dBA~136dBA
- Frequency weighting: A/B/C/Z.
- Time weighting: Fast/Slow/Impulse
- Profile calculation in parallel with different frequency / time weighting.
- Calculate SPL, LEQ, Max, Min, Peak

Mini Ambient Air Quality Monitoring System (Mini AAQMS)

- Monitors the quality of inhaled air in Smart Homes & Offices, Smart cities on Smart Phones.
- Measures SO_2, NO_2, CO, CO_2, O_3, $PM_{2.5}$, PM_{10}, Temperature., Relative Humidity, Noise, Light, UV, Pressure.
- Housed inside a shell and can be pole-mount.
- 8 GB internal memory.
- Communicates to cloud via Wi-Fi / GSM(3G/4G).
- Real Time hot spot analytics. Advance Analytics & Trends. Mobile & Email Alerts.
- Solar powered battery.

Portable Beta Attenuation Mass Monitor

- E-BAM is a Portable, Real-Time Beta Gauge for $PM_{2.5}$ and PM_{10} Particulate measurements.
- Provides truly accurate, precise, real time measurement of fine particulate matter automatically.
- Rugged, portable, battery operated, and deployable in 15 minutes.
- Ambient sampling provides accurate measurement of semi-volatile nitrates and organic compounds.
- Accuracy and precision consistent with U.S.EPA

Continuous VOC Monitor

- Ranges: 0.01 to 100 / 0.1 to 1000 / 1 to 1000 ppm
- Pre-programmed correction factors for more than 200 compounds
- Graphic display and LED status indicator for fault and alarm conditions
- Configurable low, high, and fault relays can trigger alarms or process controls
- Humidity compensation. Explosion-proof enclosure.
- Digital PID module can be easily removed in hazardous locations for calibration or maintenance.

Environmental Particulate Monitor

- Simultaneously measure size-segregated mass fraction concentrations corresponding to PM_1, $PM_{2.5}$ Respirable, PM_{10} and Total PM size fractions. MCERTS certified
- Minimal set-up, New tri-pod mount capability
- Custom alarm settings for alerts anytime.
- Aerosol concentration range 0.001-150 mg/m^3
- Environmentally protected, tamper-proof enclosure
- Cloud Data Management System

Continuous Black Carbon Analyzer

- Based on optical attenuation and absorption principles
- In both infrared and ultraviolet spectral regions. (at 10 different wavelengths simultaneously)
- Improved traceability through its unique factory calibration process and EPA-style sampling inlets.
- Simple, reliable, cost effective, high time resolution.
- No flow splitting, employs a single mass flow controller and is well matched for use with filter media
- Flow checks, audits and trouble-shooting are simple to perform.

Remote Dust Monitor / eSampler

- Remote Dust Monitor / eSampler provides real time particle concentration measurements in both indoor and outdoor environments.
- Measures particulate concentration using a highly sensitive forward scatter laser nephelometer,
- Measurement range : 0 to 100 mg/m^3
- Has flexible serial ports and analog outputs to support various data collection systems.
- Purge Air System keeps the optical components clean to operate in adverse environments without performance degradation.
- Automatic Zero Calibration reduces long term measurement drift by automatically adjusting the zero value each hour.

Weather Station

- Measurable Parameters: Wind speed, Wind Direction, Temp., Relative Humidity, Rainfall, Pressure, Solar Radiation.
- Parameter combination as per requirement.
- Easy to use, integrate and install.
- No moving parts achieve maintenance-free
- Integrated heater that can be switched on if there is danger of freeze.
- Low power consumption. Works with Solar panels also.
- USB interface output & Analog output options are available .
- Configuration Tool for PC.
- Built-in data pre-processing

Contact SWAN TECHNICAL SERVICES PVT. LTD.

Plot No: 922 & 935, Swami Ayyappa Co-op Society, Madhapur, Hyderabad, TS - 500081

(040) 40216184/85

info@swanenviron.com

www.swanenviron.com