

**TCTECORA®**  
POLLUTION CHECK

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# ZmoG

CAQMU

CONTINUOUS AIR QUALITY MONITORING UNIT



Made in Italy



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OUTDOOR  
AIR QUALITY



Air quality management systems must integrate ambient air monitoring plans and respond to different considerations:

- Measure air pollution data in real time and define citizens' health protection strategies;
  - Carry out an assessment on the impact of pollution;
  - The control of emissions and the strategy to reduce their impact based on models and continuous real data thanks to a capillary monitoring network;
  - Implementation of air quality objectives or standards;
  - Management of urban and traffic activities;
- Support research (e.g. long-term studies on the health effects of air pollution).

Business Unit



OUTDOOR  
AIR QUALITY



ZmoG Sampling in the Extreme conditions

In particular, **TCR Tecora®** together with the **Mario Negri Institute for Pharmacological Research** carries out research and experimentation activities aimed at improving the understanding of pollutants in the atmosphere.

The positioning of the monitoring stations depends on many factors; the primary need of the monitoring plans is the protection of human health and therefore the positioning is better established

The locations of the monitoring stations depend on the purpose of the monitoring. Most air quality monitoring networks are designed to support human health goals, and monitoring stations are established in built-up areas. They can be located near busy roads, in city centers or in places of particular interest (e.g. a school, a hospital, particular sources of emissions). Monitoring stations can also be set up to determine background pollution levels, away from urban areas and sources of emissions.

## Product Model

Name	Application	Parameters
Zmog Lite	General Purpose	PM <sub>2.5</sub> , PM <sub>10</sub> , CO <sub>2</sub> , CO, Noise, Light, UV-Radiation, Temperature, Humidity
Zmog Smart	Extensive	PM <sub>2.5</sub> , PM <sub>10</sub> , CO <sub>2</sub> , CO, SO <sub>2</sub> , NO, NO <sub>2</sub> , O <sub>3</sub> , Noise, Light, UV-Radiation, Temperature, Humidity
Zmog Pro	Critical	PM <sub>1</sub> , PM <sub>2.5</sub> , PM <sub>10</sub> , PM <sub>100</sub> (TSP), CO <sub>2</sub> , CO, SO <sub>2</sub> , NO, NO <sub>2</sub> , O <sub>3</sub> , H <sub>2</sub> S, Noise, Light, UV-Radiation, Temperature, Humidity
External Modules	Optional	Wind Speed & Direction, Rainfall, Flood (integrable with all the 3 variants)





# ZmoG

## CAQMU

## Continuous Air Quality Monitoring Unit

### Product Features



#### Registered technology for air sampling

X-Air-Sampling low pressure control system is able to guarantee long term period of sampling gases in worst conditions. Vibration suction element with very low maintenance.



#### Power Supply

Low consumption and remote power activation of low energy. Solar panel with BMS (battery management system) configuration for different Area / Sun irradiation.



#### Maintenance

users can perform a sensor calibration or replacement on site and control raw and calibrated data.



#### Dimensions

ZmoG is a light compact system and can be installed in many configuration, on pole, metal structure, wall (with installation kit).



#### High Tech Materials

Design, concept, engineering... nature are made for every application - Mine extract application, gallery, on cranes, on trains, on bus for control of environmental condition or indoor air quality.



#### Tracked system

GPS system (option) allows a tracking of device in mobile configuration - Research project - on ship, on environmental mobile station or for geo-localization of data to manage a model of the area under control together with others ZmoG units or EPA data (integration with reference data available).



#### IP Protection Grade

IP 67 Protection Grade with Military chassis option for very extreme condition (optional).

IP 66 Protection Grade with certification - Alloy/mold chassis.



#### Theft Protection

Any attempted theft is subject to remote control. Local and remote alarm. Video control with camera (option).



#### Remote service control

Users can control from remote every single unit and perform service operation from remote.



#### Real time communication data

Multi configuration available by ZmoG-Management Software. High capacity 32gb (exp 128gb) memory on board and data transfer by automatic data synchronization. This technology allows data measuring in area not covered by connection.



#### Connection Interfaces Available

USB • Ethernet • WiFi • Bluetooth • GSM • UMTS • LoRa • NBloT • Modbus.

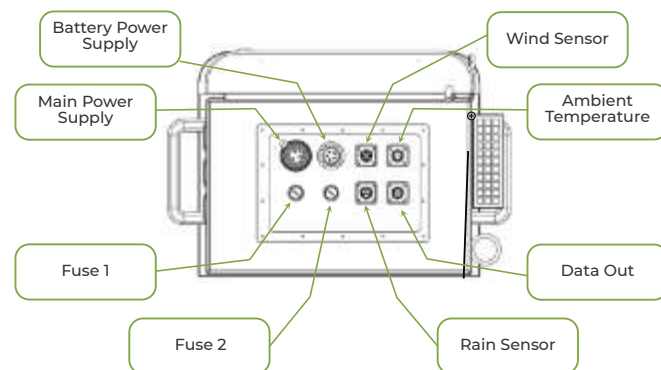


#### Calibration on site

A new concept of calibration control is available like user calibration or factory calibration. Users can calibrate ZmoG on site with reference gas or using a diluitor.

### General Specifications

Size	340mm(W) x 210mm(D) x 370mm(H) (Standard version) 455mm(W) x 347mm D) x 544mm(H) (Military version)
Weight	10.0 Kg (Standard version) 12.4 Kg (Military version)
Material	Alloy Anodized with high protection rate (Coating anod.), Stainless Steel, ABS
Certifications	CE for Europe Market - PTCRB for devices installed for remote control



### Technical Specification

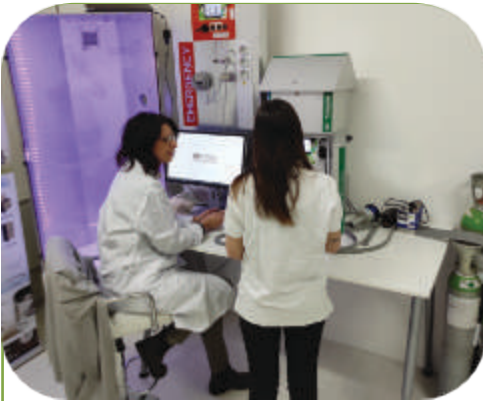
Processor	ARM Cortex quad-core
Memory	8 GB eMMC ROM (ext. 12gb opt) 2 GB RAM
Device Interface	On board multiports or remote API
Operating Temperature	-20°C to 60°C (-40°C military version)
Operating Humidity	0 to 95% RH







## Levels of Calibration



### Lab Calibration

Every factory calibration are made by reference **EN17025** gases. **ZmoG** are calibrated with high quality procedure and strictly field monitoring compaign against reference air quality network.

- > Zero: Nitrogen, Zero air calibration
- > Span: Multipoint calibration with standard gases and diluitor with EN17025 reference
- > Cross sensivity correction
- > Drift life time correction
- > Cross-interference correction on multi gases

### Factory Calibration

**ZmoG** sensors are designed with on board calibration curve. On site calibration with the gases for single or multi-point calibration. Always availbale from remote control for **TCR Tecora®** support (annual service contract with help desk).

## CPU and electronic specification

Processor	ARM Cortex quad-core
Memory	8GB eMMC ROM (ext 12GB opt) 2GB RAM
Device Interface	Onboard multiports or remote API
Operating Temperature	-20°C to 60°C (-40°C military version)
Operating Humidity	0 to 95% RH

## Connectivity

### Cabled Features



**Ethernet** | (Static IP address or DHCP)  
**Modbus** | RS485 RTU or over TCP  
**Relay Output** | 2 Channel

### Wireless Features



**GSM** | 2G | 3G | 4G  
**LORA** | 868 MHz | 915 MHz  
**LTE** | CAT-M1  
**Bluetooth** | 2.0 to 5.0 iot (optional)  
**NB-Iot** | CAT-NB1  
**Sigfox** | 868 to 869 MHz, 902 to 928 MHz  
**Wi-Fi** | AP Mode and Station Mode







### Transmission Data

Log time frequency	1 to 15 minutes (2 gas sensor mode) or 2 to 30 minutes configuration by software
Protocol TX data-push	HTTP request towards server (host)
Protocol RX data-pull	HTTP request from IP units
Software manager and firmware maintenance	Tool for remote SW-FW update

### Power

Avg. Power Consumption	4,8 Watt (2 gas sensor mode) to 10 Watt (heating not considered based on installation are)
Solar Panel (Optional) 	External 110 - 230Vac 50-60Hz, 40 Watt Monocrystalline Solar Panel Inverter or 24 vdc
Power supply module	Switching 24V 50 Watt UL-62368 & CAN/CSA C22.2 Certified
Batteries backup period	12 hours (24 hours Military version)
Batteries 	LiFePO4 12.8 Vdc -12 Ah (24 Ah Military version) Docking station available for battery pack recharge

### Sensors Features

	Parameter	Technology	Range	Resolution	Min. Detection	Log Time	Error / Drift	Sample Rate	Expected Sensor Life
CO <sub>2</sub>	Carbon Dioxide	Non Dispersive Infrared Ray NDIR	Up to 5000 ppm (ext) <sup>1</sup>	1 ppm	20 ppm	2 minutes	< ±5 ppm / year	325 mL / S (sample)	3 years
CO	Carbon Monoxide	Electrochemical Raw mA-nA	0-1000 ppm (ext) <sup>1</sup>	10 ppb	100 ppb	2 minutes	< ±100 ppb / year	325 mL / S (sample)	2 years
SO <sub>2</sub>	Sulfur dioxide	Electrochemical Raw mA-nA	0-20 ppm (ext) <sup>1</sup>	1 ppb	10 ppb	2 minutes	< ±20 ppb / year	325 mL / S (sample)	2 years
NO	Nitric Oxide	Electrochemical Raw mA-nA	0-20 ppm (ext) <sup>1</sup>	1 ppb	10 ppb	2 minutes	< ±50 ppb / year	325 mL / S (sample)	2 years
NO <sub>2</sub>	Nitrogen Dioxide	Electrochemical Raw mA-nA	0-20 ppm (ext) <sup>1</sup>	1 ppb	10 ppb	2 minutes	< ±20 ppb / year	325 mL / S (sample)	2 years
O <sub>3</sub>	Ozone	Electrochemical Raw mA-nA	0-20 ppm (ext) <sup>1</sup>	1 ppb	10 ppb	2 minutes	< ±20 ppb / year	325 mL / S (sample)	2 years
H <sub>2</sub> S	Hydrogen Sulfide	Electrochemical Raw mA-nA	0-100 ppm (ext) <sup>1</sup>	1 ppb	10 ppb	2 minutes	< ±100 ppb / year	325 mL / S (sample)	2 years
NH <sub>3</sub> - CH <sub>4</sub>	On development	Electrochemical Raw mA-nA	TBC	TBC	TBC	2 minutes	TBC	TBC	TBC
Noise	Ambient Noise	C-Low Capacitance Electronic	Upto 140 dB	1dB	30 dB	2 minutes	2% / Year	N.A.	3 years
Li	Light Intensity	Light Photo Conductivity Sensors	Up to 1,00,000 Lux	1 Lux	1 Lux	2 minutes	N.A.	N.A.	3 years
UV	UV Radiation (0-12 UVI)	Light Photo Conductivity Sensors	0.1-100,000 uW/cm2	0.1 uW/cm2	0.1 uW/cm2	2 minutes	N.A.	N.A.	3 years
LV	Visible Light Intensity	Light Photo Conductivity Sensors	Up to 5000 Lux	0.1 Lux	0.1 Lux	2 minutes	N.A.	N.A.	3 years
Temp	Temperature	SSSC - Solid state semi conductor sensing	-40 to 125 °C	0.01°C	-40°C	2 minutes	N.A.	N.A.	3 years
RH - Hum	Humidity	SSSC - Solid state semi conductor sensing	Up to 100% Rh	0.1%	0.1%	2 minutes	N.A.	N.A.	3 years
Atp - Bmp	Barometric Pressire	SSSC - Solid state semi conductor sensing	300-1100 hPa	0.18Pa	300 hPa	2 minutes	±1.0 hPa / year	N.A.	3 years
PM <sub>2.5</sub>	Suspended Particulate Matters with size less than 2.5µ	Laser Scattering - Optical Particle Counter	Upto 5000 Σg/m <sup>3</sup>	0.1 Σg/m <sup>3</sup>	1 Σg/m <sup>3</sup>	2 minutes	Upto ±10 %	1 L/min	12 months
PM <sub>10</sub>	Suspended Particulate Matters with size less than 10µ	Laser Scattering - Optical Particle Counter	Upto 5000 Σg/m <sup>3</sup>	0.1 Σg/m <sup>3</sup>	1 Σg/m <sup>3</sup>	2 minutes	Upto ±10 %	1 L/min	12 months
PM <sub>1</sub>	Ultra Fine Particulate Matters with size less than 1µ	Laser Scattering - Optical Particle Counter	Upto 5000 Σg/m <sup>3</sup>	0.1 Σg/m <sup>3</sup>	1 Σg/m <sup>3</sup>	2 minutes	Upto ±10 %	1 L/min	12 months
PM <sub>100</sub>	Total Suspended Particulates (TSP)	Laser Scattering - Optical Particle Counter	Upto 30000 Σg/m <sup>3</sup>	0.1 Σg/m <sup>3</sup>	1 Σg/m <sup>3</sup>	2 minutes	Upto ±10 %	1 L/min	12 months

<sup>1</sup>Extendable Range Request





### Weather station (Optional)

#### Rain Sensor



- > Relays reed electronic;
- > Information available mm / inch.

#### Wind Sensor



- > Ultrasonic sensor 360°, 0-42 m/s

### Accessories (Optional)

#### Camera - Alarm



- > Tamper segnalation and camera

#### Flood Sensor



- > Ultrasonic sensor Up to 800 cm

### Chassis with Military Insulation

Alloy anodize chassis and stainless steel cover protect Zmog from external weather conditions. An insulation panel done with Aerogel isolates the internal electronic and chamber from external conditions.

### Drying System

To avoid any condensation through the sample, a dryer can work in case of high humidity data. Condensation can retain gases and (like Ozone) and change the validity of measures. Standard dryer is made of a cartridge of silica gel (maintenance by user) or as option with a nafion tube.



### Monitoring Sampling Line

X-AIR-SAMPLING technology allows a constant flow sampling. A sampling head TSP (total suspended particles) is installed on the top of the sampling line in order to cover 360° of sampling in any direction. TSP head is designed also not to suffer in case of windy conditions, maintaining a constant flow through the chamber. Sampling line has a thermostatic control for low temperature.

### Thermostatic Fan

Internal ventilation is made by a double centrifugal fan, able to maintain a constant recirculation of inside air and avoid any contamination by residual gases.

### Monitoring Sampler Chamber

TCR TECORA® developed a gas chamber with a geometric size developed following EPA environmental cabinet.

X-AIR-SAMPLING technology allows a continuous sampling of air towards gas chamber.

A temperature controlled sampling line with special insulation done by Aerogel and a defined path from external conditions are important features to have a correct measured data.

### Installation Kit

Standard Installation kit composed by AISI flange and adaptors for multipurpose applications. Many applications are in urban area, and the units could be installed at traffic lights, light lamp pole.

Tripod for easy relocation available (optional).

Wall Installation kit has a AISI tube with flange in order to locate it 0,5 mt far from the application wall.

Solar Panel Installation kit is configured according to installation site. Panel dimension can have a flag effect to a pole and need to be evaluated in every installation according to altitude from the ground.

It is possible to install **ZmoG** in indoor application using mobile configuration or tripod or located on a desk.

For outdoor application, using installation kit, it is possible to install it at different altitude up to 5 meters from ground.

For research project, we evaluated different altitude and configuration.







# Headquarter

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better future!*

