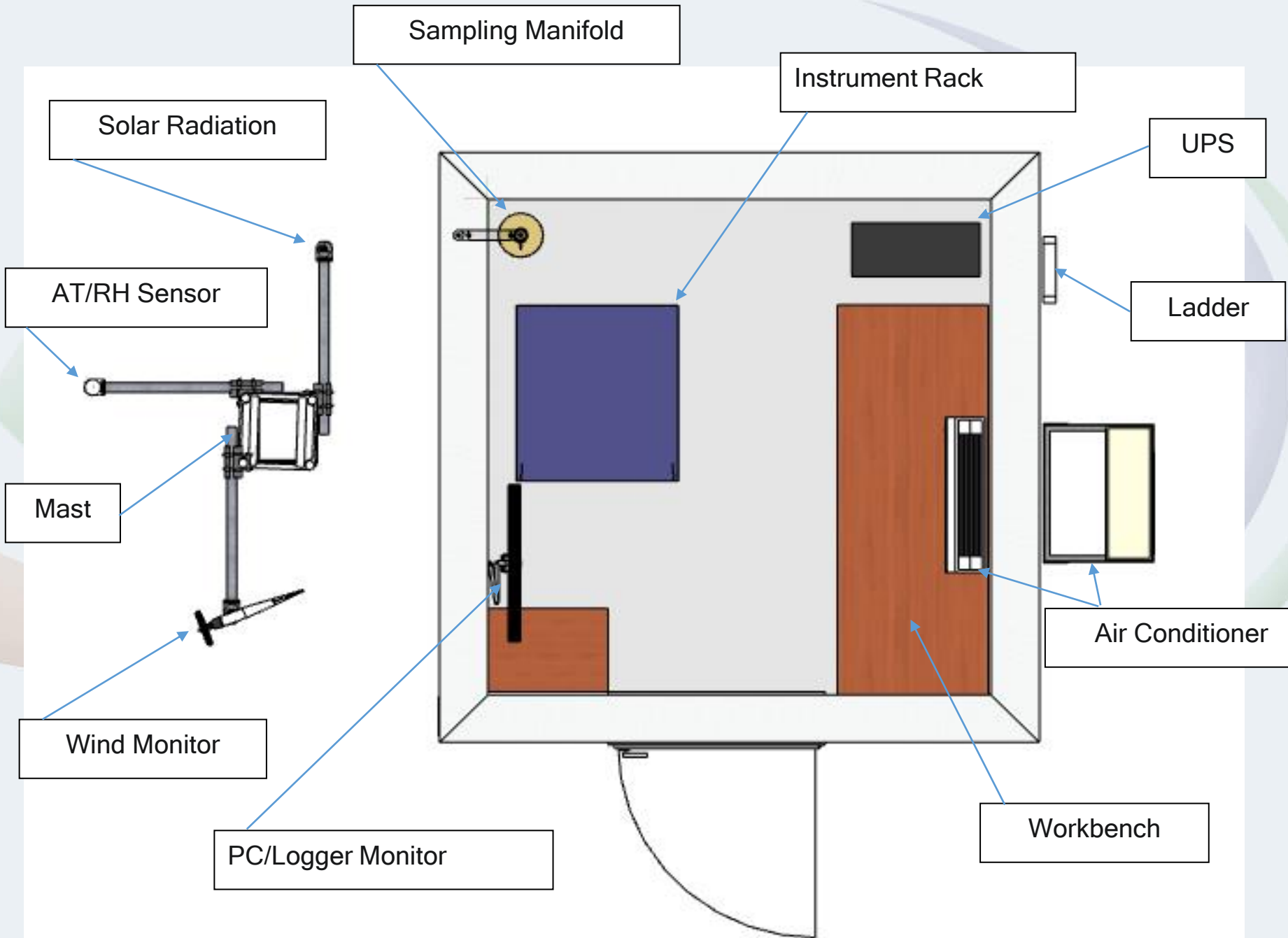


# MODULE 2

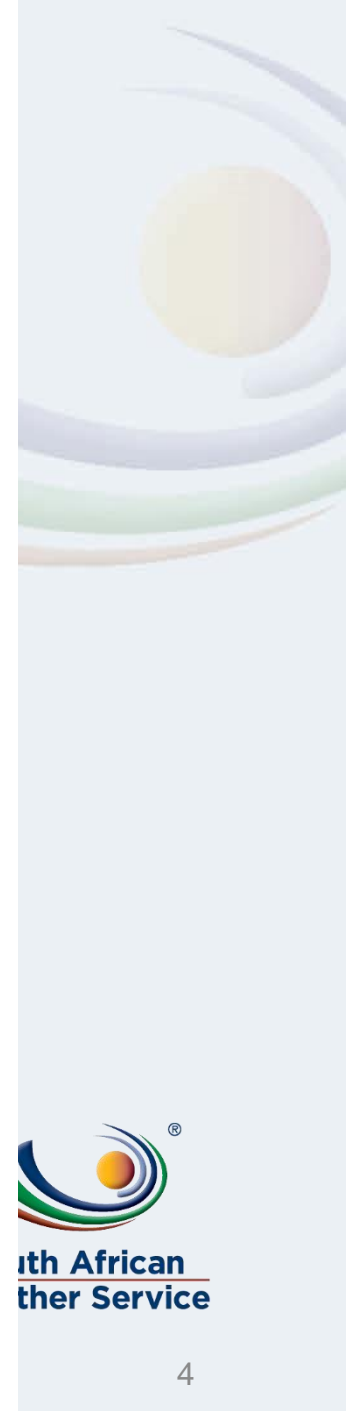
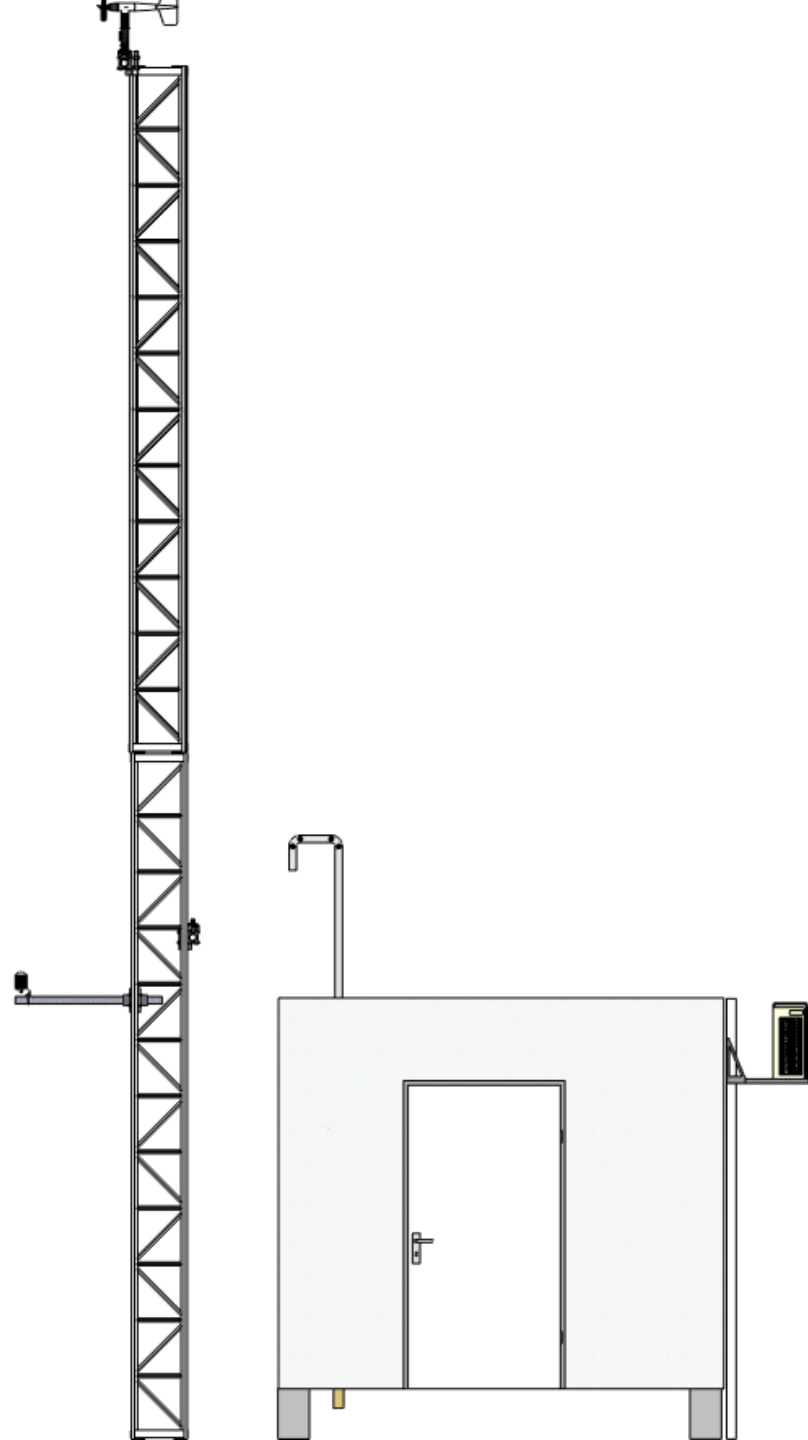
## Introduction to Ambient Air Quality Monitoring Stations







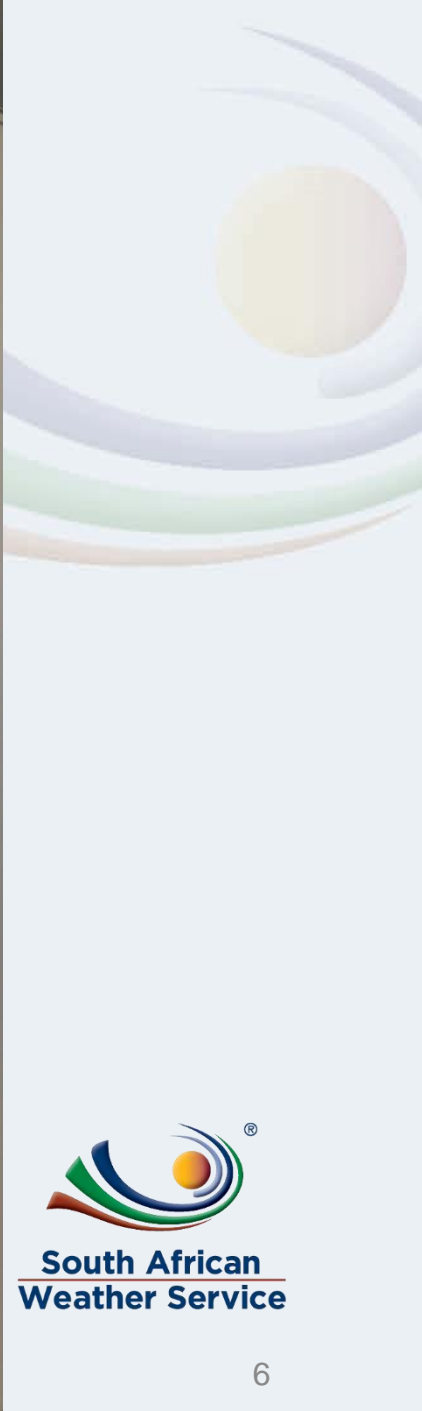
2021/11/05



# Instrument Rack

- Typically how your monitoring instruments will be installed
- This prevents the transfer of vibrations from external sources to the instruments





# Manifold

- Outside air is continuously drawn into the analysers via the glass air inlet manifold.
- The PM analyser consists of a heated air intake manifold to ensure that outside air delivered to the analyser remains free of condensation.



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# Air-Conditioner

- Used to regulate the temperature in the shelter.
- This instrument operated 24/7, thus must be serviced every 6 months.





# Internal temperature meter

- Measures the temperature inside the station.
- The temperature must always be in the range of 20 °C and 30 °C.



# UPS

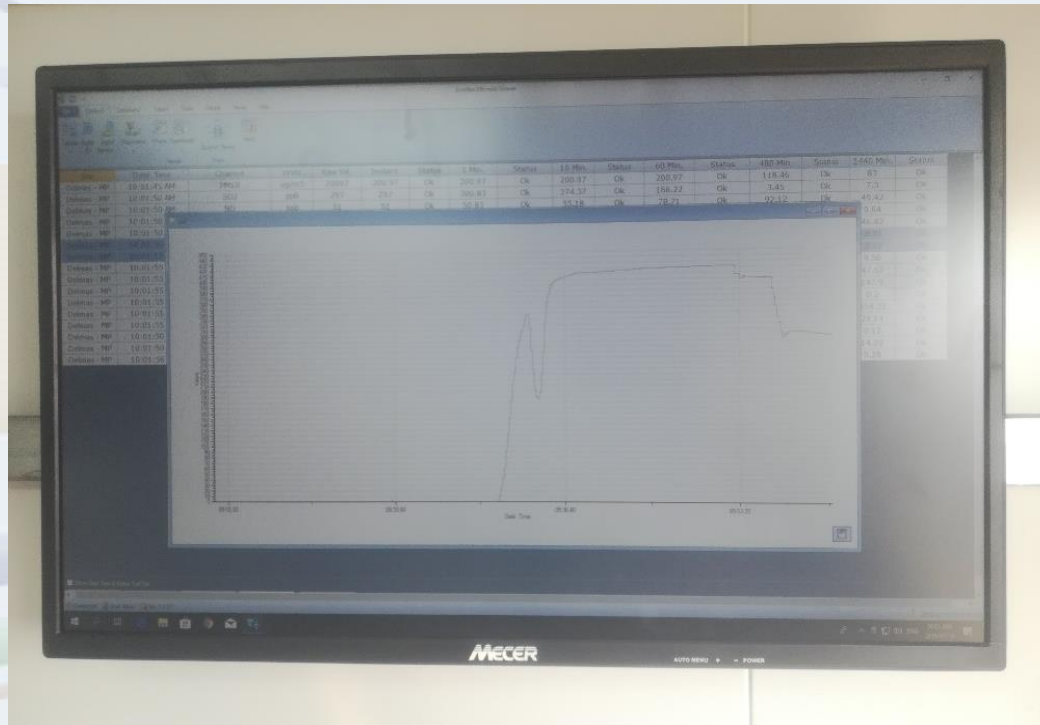
## Uninterruptable Power Supply

- Most stations are located in areas with unreliable power.
- A UPS is used to prevent the station from going offline during times of power outages.
- Typically you will have a 3KVA UPS with additional batteries.



# Computer/Logging System

- All the data from the different instruments are displayed on the computer screen
- The graphs are also displayed here



# Gas bottles

- NO, CO and SO<sub>2</sub> gas bottles
  - NO: 3 % relative analytical tolerance (RAT)
  - CO: 2 % RAT
  - SO<sub>2</sub>: 3.1 % RAT
- Used for multi-point calibrations, span and zero checks



**AIR LIQUIDE**

CERTIFICATE OF ANALYSIS

3 OLD VEREENIGINGSDIJK ALRODE 1401

CUSTOMER: South African Weather Service  
Centurion

ORDER NO: 18000135

CERTIFICATE NO: 3024211

COMPONENTS	REQUIRED	ANALYSED	RELATIVE ANALYTICAL TOLERANCE
CO	1400µmol/mol	1403.5µmol/mol	2%RAT
N <sub>2</sub>	Balance	N/Q	

**AIR LIQUIDE**

CERTIFICATE OF ANALYSIS

3 OLD VEREENIGINGSDIJK ALRODE 1401

CUSTOMER: South African Weather Service  
Centurion

ORDER NO: 18000135

CERTIFICATE NO: 3024213

COMPONENTS	REQUIRED	ANALYSED	RELATIVE ANALYTICAL TOLERANCE
NO	70µmol/mol	79.5µmol/mol	3%RAT
N <sub>2</sub>	Balance	N/Q	

**sanas** CERTIFICATE OF ANALYSIS

3 OLD VEREENIGINGSDIJK ALRODE 1401

CUSTOMER: South African Weather Service  
01 Ecopark Drive

ORDER NO: 18000135

CERTIFICATE NO: 3024212

COMPONENTS	REQUIRED	ANALYSED	TOLERANCE %RAT
SO <sub>2</sub>	70µmol/mol	72.8µmol/mol	3.1%RAT
N <sub>2</sub>	Balance	N/Q	

# Handheld meteorological instrument

- Allows you to carry out all the measurements that are necessary to check and adjust ventilation and air conditioning systems
- Makes it easier to assess the quality of the indoor air
- Measures different variables
  - Wind speed
  - Temperature
  - Barometric pressure
  - Dew point
  - Relative humidity



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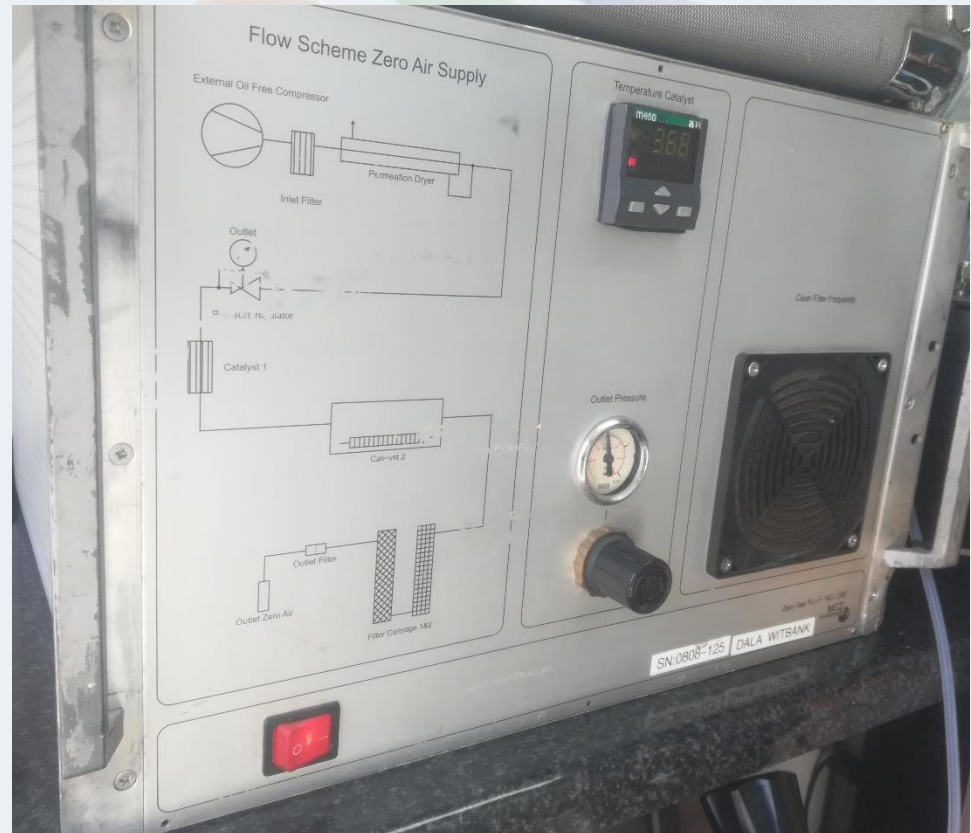
# Dilution calibrator

- Dilutes high gas concentrations to lower concentrations to verify the monitoring instruments.
- Used for calibrations, span and zero checks.



# Zero air supply

- Supplies pollutant-free (zero air) from ambient air
- Allows proper zeroing
- Provides clean diluent air for spanning ambient air analysers



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# Particulate matter instrument

- Most common instrument is the gravimetric method.
- Draws a sample onto a filter and constantly weighs the filter.
- The analyser consists of a heated air intake manifold to ensure that outside air delivered to the analyser remains free of condensation.





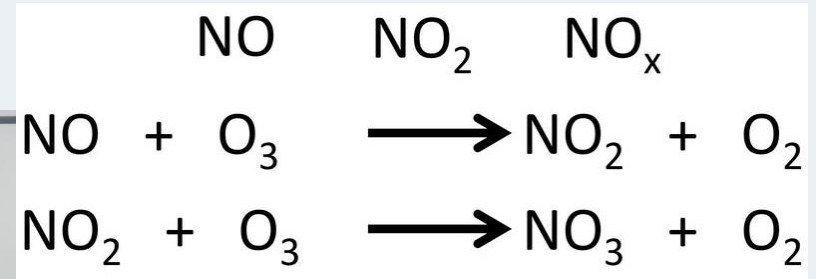
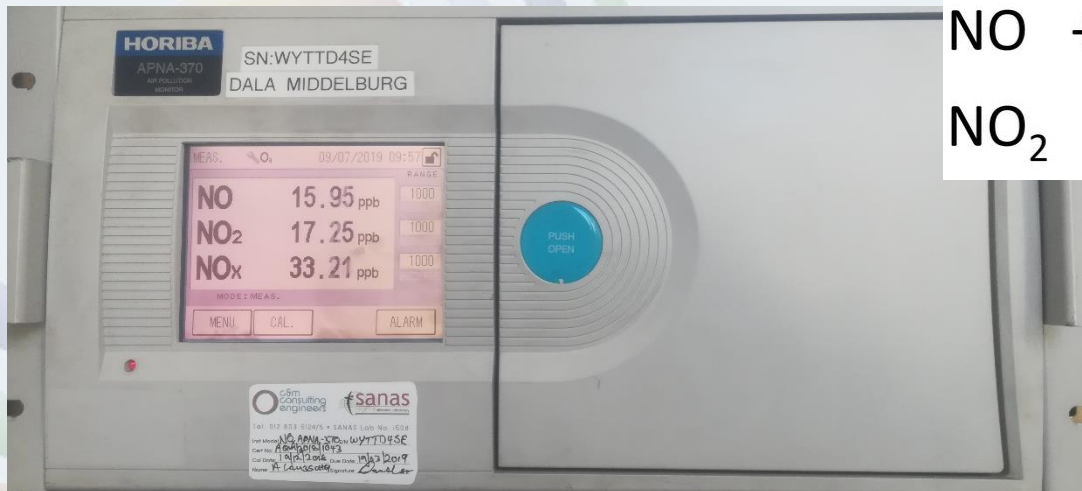
# Sulphur dioxide instrument

- The measurement of SO<sub>2</sub> is based on the Fluorescence Spectroscopy principles.
- Fluorescence Spectroscopy is the analysis of UV light that excites the electrons in molecules of certain compounds causing them to emit light.
- Check or calibrate the analyser against a known SO<sub>2</sub> (in N<sub>2</sub>) concentration diluted with zero air.



# Oxides of Nitrogen instrument

- ▶ The measurement of NO<sub>x</sub> is performed by gas phase Chemiluminescence.
- ▶ Chemiluminescence is the production of light from a chemical reaction.
- ▶ The analyser is checked or calibrated against the known NO (in N<sub>2</sub>) concentration diluted with zero air.



# Carbon monoxide instrument

- The measurement of CO is based on Infrared radiation (IR) absorption.
- CO absorbs IR at a wavelength near 4.7 microns. The strength of signal received is proportional to the amount of CO in the sample.
- Calibrate the analyser against a known CO (in N<sub>2</sub>) concentration diluted with zero air.



# Ozone instrument

- O<sub>3</sub> uses an ultraviolet source. The UV light lights up the sample.
- O<sub>3</sub> is absorbed and the detector will then determine how much ozone is present.
- Due to its reactivity, ozone has to be generated from inside the instrument for calibration purposes.
- Calibrate the analyser against known O<sub>3</sub> concentrations generated with zero air.

