



EMIRAK 2 Continuous Emissions Monitoring System

- Single user interface
- Ease of configuration and operation with on-line help screens
- Choice of numerical and trend displays
- Full system and analyser diagnostics with clear text messages
- Alarms and exceedances calculated on line
- Integral logger and report generator
- Easy communication with other computers

Application

EMIRAK 2 is an extractive multigas analyser system for continuous emissions monitoring. It is normally used to measure the concentration of oxides of nitrogen (NOx), sulphur dioxide (SO₂), carbon monoxide and dioxide (CO, CO₂) and oxygen (O₂) in the flue gas of large combustion processes, incinerators and other processes when it is required by legislation.

EMIRAK applies Signal's Modular Analyser Technology (MAT) to continuous emissions monitoring (CEM). Based on the principle of distributed control, MAT consists of a set of intelligent modules communicating, via an internal data highway and a bus master, with a centralised control computer. There are three different types of modules: analyser, sampling control and interface modules, each controlled by a dedicated microcontroller. These microcontrollers collect data every second and prepare one minute files consisting of averaged measurements, diagnostics and mode of operation. These files are gathered with rigorous time-keeping, by the bus master which acts as a buffer between the control computer and the individual microcontrollers. The bus master holds this data for a complete hour, giving the control computer the flexibility to gather and log the data as well as attend the other supervisory control facilities without affecting the integrity of the collection of time-critical data. The microcontrollers are co-ordinated by the system control computer, equipped with *Emilog*, a complete software package providing centralised supervisory control via a mouse or a keyboard, as well as data logging and reporting facilities (See *Emilog* data sheet).

Plant interface modules enable other external instruments to be incorporated in the EMIRAK system to take advantage of the data processing display, logging and reporting facilities.

With EMIRAK 2, the flue gas is sampled using an extraction package controlled by the sampling control module and maintained at 180°C. This package comprises probe, heated filter and heated line. The sample gas is then carried through a dual pass chiller kept at 3°C, where the water and acids are removed as they form by dedicated peristaltic drain pumps, hence providing clean, dry sample gas to the analyser modules. As the sample pump is located prior to the chiller second pass, it pressurises the sample to 1.33 atmospheres giving it a water dew point at 3°C equivalent to the dew point at 0°C and atmospheric pressure. Removal of water to meet legislative requirements is therefore achieved without "icing" problems. A condensate sensor interlocked with the sampling pump and a filter coalescer are also provided to ensure that no particulates, aerosols or water reach the dry analyser under any circumstances.

The main gases analysed in a dry/cold state are:

CO, CO₂: measured by infrared absorption, they must be analysed in a dry state since infrared measurements are prone to water vapour interference.

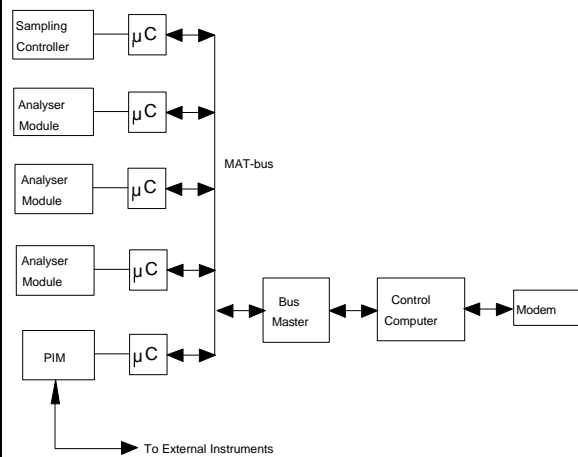
SO₂: Also measured by infrared absorption, SO₂ is slightly soluble in water, therefore a rapid sample chilling and immediate removal of condensate is performed, to ensure that the sample integrity is maintained.

NO_x: Measured by cold chemiluminescence in cases when NO

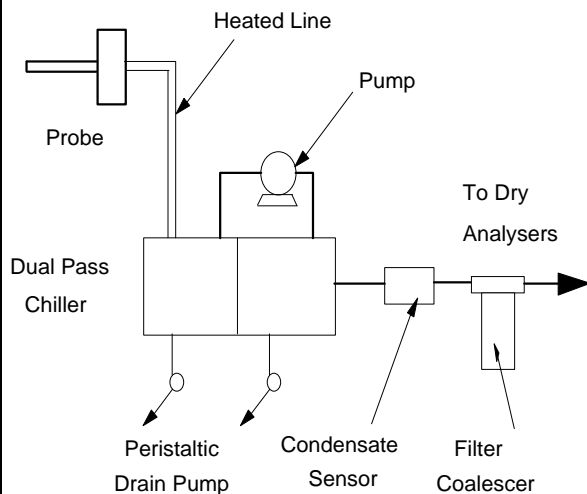
only is required, or when the content of NO₂ in the total NO_x is negligible. Otherwise it is best measured in a wet/hot state, using EMIRAK 1 or EMIRAK 3 methods.

O₂: Measured dry by an accurate zirconia or paramagnetic sensor to enable reporting of emissions data to reference oxygen conditions.

Dimensions(maximum)



MAT Architecture



Emirak 2 Flow Schematic

Analysers Modules

(Other ranges are available on request. A composite data sheet is available with performance figures for all modules)

Gas	Dual Range	Technique	Analysis state
NOx	0-100ppm, 0-1,000ppm	Chemiluminescence	Dry
SO ₂	0-100ppm, 0-1,000ppm 0-500ppm, 0-5,000ppm	Dual Beam NDIR	Dry
CO	0-500ppm, 0-1,000ppm 0-100ppm, 0-500ppm	Single Beam NDIR Dual Beam NDIR	Dry Dry
CO & CO ₂	0-500ppm CO 0-20% CO ₂	Single Beam NDIR (Dual Gas)	Dry
CO ₂	0-10%. 0-20%	Single Beam NDIR	Dry
O ₂	0-25%	Zirconia or Paramagnetic Sensor	Dry

Depth x width x height: 19" single bay rack: 800mm x 600mm x 2100mm
Access at front and back is needed for maintenance -recommended clearance: 800mm

Weight(maximum)

19" single bay rack: 250Kg

Power Supply:

Distribution: via 30mA trip RCD's and MCB's
Voltage: 110V or 230V 50Hz, or 110V 60Hz. All -10% +6%

Maximum consumption:

Probe: 700W
Heated line: 80 to 100W per meter (25A max). Other power available as option.
Rack: up to 3000W

Environmental conditions:

Emirak in its basic form, is designed to work in an indoor clean environment (IP40) within the following conditions:
Temperature: min 10°C, max 25°C (storage 0-40°C)
Humidity: max 90% RH non condensing
If the conditions are outside these parameters, a range of optional additional enclosures are available.

Optional enclosures

For indoor applications
Glass door fitted racks, with or without locking system
For outdoor applications
Cubicles for single bay *EMIRAKS* with air conditioning (IP65)

Walk-in cabins with air conditioning (IP65)
Purged enclosure for hazardous applications are also available

Calibration gases

Calibration gases are not normally part of Signal Ambitech's supply as the hiring and replacement of cylinders is best made by the user. For recommendation about the composition and concentration of the various calibration gases, see the *Emirak* analyser module data sheet.

Customer connection

Electrical power:
Through gland plate, top or bottom, into distribution unit equipped with RCD
Remote communications:
Standard:
1 serial port: RS232 or RS485
analogue outputs: 0-10V and 4-20mA, negative ground

Options:

0-1V analogue output (with this option, 4-20mA is not available)
4-20mA isolated outputs
Plant interface for external analysers/transducers
4 sets of configurable volt free contacts for status
Isolated digital inputs for remote sampling control
For more information, see TN0007 and TN0008
Pipe connections:
Calibration gas and support air: 1/4" OD compression fittings*
Gas Vent: 3/4" UPVC BSPF*
Liquid drain: 3/4" UPVC BSPF**
Heated line: 1/4" OD compression fittings*
* through top panel
** through side panel at low level