



EMIRAK 1 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

EMIRAK1 is an extractive multigas analyser system for continuous emission monitoring. It is normally used to measure the concentration of oxides of nitrogen (NOx), wet oxygen (O₂) and the hydrocarbons (HCs) in the flue gas of large combustion processes, incinerators and other processes when it is required by legislation.

Principle of operation

EMIRAK applies Signal's Modular Analyser Technology (MAT) to continuous emissions monitoring (CEM). Based on the principle of distribution 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 act 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 1 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, heated line and heated pump, and provides a clean hot sample gas to those analyser modules requiring the sample to be maintained above water, hydrocarbon, and acid dewpoints.

EMIRAK 1 is only used when all gases require wet/hot analysis.

Wet/hot analysis:

The main gases in this category are:

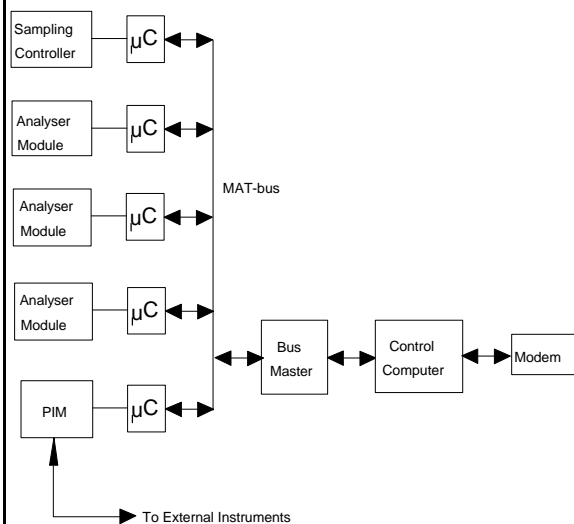
Hydrocarbons: In order to overcome the potential problems of condensation associated with hydrocarbons, and to achieve accurate measurement, the sample gas must be maintained above its dewpoint at all time i.e. during its extraction, transport and analysis.

NOx: NO₂ is highly soluble in water. If water is removed prior to analysis, a significant proportion of the NO₂ present is lost. Therefore, if the quantity of NO₂ is greater than 10% of the total concentration of NOx, it is recommended that the sample be analysed by heated chemiluminescence.

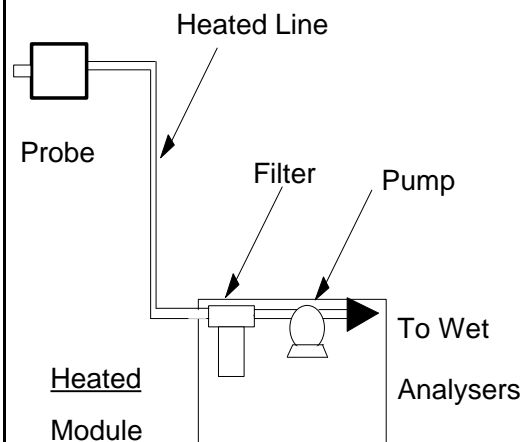
O₂: measured wet by an accurate zirconia sensor located in the heated module. If moisture measurement is required, EMIRAK 3

must be used.

Dimensions (maximum) depth x width x height



MAT Architecture



Emirak 1 Flow Schematic

Analyser 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
Hydrocarbons*	0-100ppm, 0-500ppm	FID	Wet
NOx	0-100ppm, 0-1,000ppm	Chemiluminescence	Wet
O2	0-25%	Zirconia Sensor	Wet

*Option: air clean up module for use as a burner air and zero air generator

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 RCDs and MCBs
 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 enclosures 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 modules data sheet.

Customer connections:
 Electrical power:
 Through gland plate, top or bottom into distribution unit equipped with RCD
 Remote communications:
 Standard:
 1 serial port: R232 or RS485
 Analog outputs: 0-10V and 4-20mA, negative ground

Options:
 0-1V analog output (with this option, 4-20mA not available)
 4-20mA isolated outputs
 Volt free contacts for status
 Isolated digital inputs for remote sampling control
 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