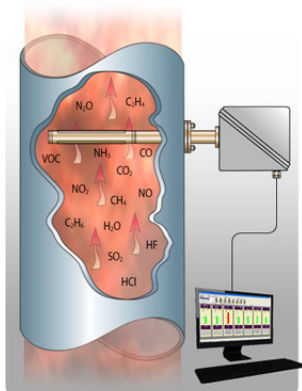


## BASE HygroP Analysis of Water Vapor in Emission Gases (Infrared Spectrometry based)



The BASE HygroP is a rugged analyzer dedicated to the continuous, real time in-situ measurement of Water vapour in flue emissions. It is available with ATEX approval for use in Hazardous Areas.

The instrument is placed directly within the stack (please refer to the figure).

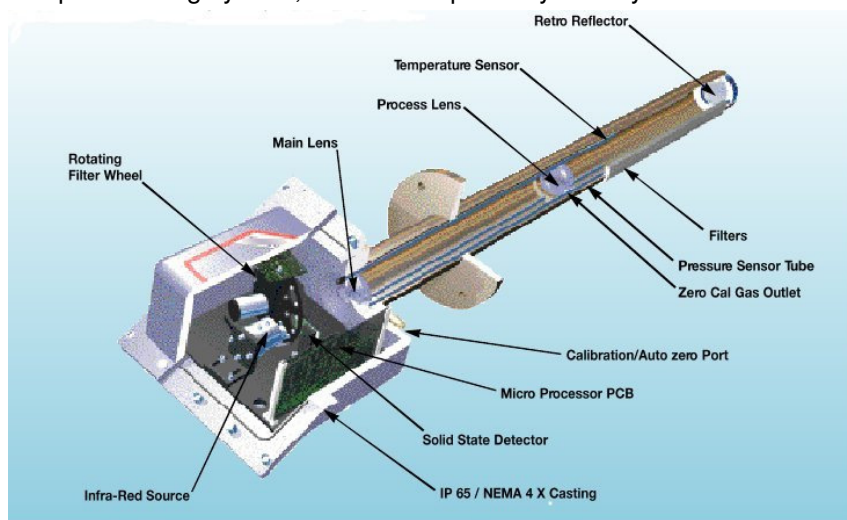
This arrangement avoids the inconveniences of a hot extractive sampling system, where not only the line has to be heated, but also the solenoid valves, filters, pump heads and measurement cell have to be operated at elevated temperature.

The measuring principle relies on InfraRed (IR) spectrophotometry. Water vapour features a strong electromagnetic radiation absorption at 1950 and 1450 nanometers wavelength, in the IR band.

An InfraRed source element (see the figure below) sends a specific wavelength pulse (where the absorption by water vapour is maximal) through the sample cell of the stack mounted analyzer. The IR source sends also a reference pulse at a different

wavelength. The “measure” pulse is partially absorbed by the water vapour to be measured while the “reference” pulse is relatively unaffected. A mirror, at the end of the cell, reflects the remaining radiation back to a detector in the instrument head. Finally an embedded microprocessor calculates the ratio of the two reflected waves and determines the concentration of H<sub>2</sub>O. The cell incorporates temperature and pressure sensors enabling automatic compensation for fluctuations of these parameters. The Filter Wheel allows generating additional wave lengths, in order to analyze the presence of other compounds in the IR band (up to six gases).

As already pointed out, this in-situ (inside the stack) sample cell avoids the use of costly and high maintenance sample handling system, but more importantly it analyses an unmodified truly representative gas sample.



Sintered stainless steel filter panels fitted to the sides of the in-stack cell allow the permeation of the stack gas while preventing the ingress of dust and particulates. The envelope formed by the sintered panels allows the introduction of zero and span gases. An inlet, underside the instrument head, is used to fill the probe with zero gas (typically clean, dry instrument air) for a zero check of the system. In the same way, the probe is filled with certified span gas for a span check. All the above verifications are carried on by the external Control Unit, connected to the probe head by a serial data link.

The figure shows that the collimated IR beam passes down the length of the sample cell and is returned by the Retro Reflector to the Detector via the process and main lenses. This “enveloped folded beam principle” means that the detector is always aligned, there is no performance loss due to stack movement and access is required to one side of the stack only.

As a separate option, a portable water vapour generator is available for connection to the calibration port of the analyzer.

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The HygroP is complemented by the centralized BASE Control Unit (BCU).

The **BCU** controls and processes the raw data from up to six probes and generates, displays and transmits concentration readings in customer specified units. It can also collect data from third party instruments and use them in calculations. It generates trend reports (configurable period and averaging) and calibration status reports (Zero and Cal reports). The data are archived in a 140GB storage (OPC & ODBC ready). The BCU monitors and displays all the status and maintenance data: sample pressure and temperature, analyzer temperature. The interface with the operator is made by a touch screen. Optionally, the Control Unit is available in ATEX certified versions for Zone 1 and Zone 2 areas. The figure shows the BCU contained within a Stainless Steel 316L enclosure provided with a protective air purge system. Magnetic push buttons allow controlling the system without opening the cabinet.



As an alternative, **BACWn** is a stand-alone software package (running on a Windows™ computer) which provides all the display requirements of the analyzers including the incorporation of third party data. The software is OPC and ODBC ready and is therefore able to provide data to client programs running on the same network, such as SCADA software.

Probe Specifications	
<b>Principle of operation</b>	Infrared absorption with multiple wavelength selection
<b>Spectral range</b>	Specific application dependent wavelengths between 2 – 12 µm
<b>Infrared source/detector</b>	Nichrome filament/solid state pyroelectric element
<b>H<sub>2</sub>O concentration</b>	0 – 2000 ppm
<b>Sample path length</b>	1 metre (enveloped folded beam)
<b>Sample temperature</b>	Up to 350 °C / 660 °F (higher temperatures on application))
<b>Accuracy</b>	Typically ±2% of full scale concentration
<b>Response time</b>	Typically 120 seconds to T90
<b>Power</b>	24 Vdc (can be provided by the BCU)
<b>Materials in contact with sample</b>	Calcium fluoride, Glass, 316 Stainless Steel, Graphite
<b>Enclosure</b>	Aluminium alloy casting with high protection finish, protected to IP65 (NEMA 4X)
<b>Operating environment</b>	-10 °C to +45 °C (+14 °F to 113 °F) optional cooler/heater for extended range
<b>Dimensions/Weight</b>	- 1294mm L x 244mm D x 169mm H (51.00" L x 9.6" D x 6.5" H) - Weight: 21 Kg (46.3 lb)
<b>ATEX certification</b>	ATEX marking II 2 G Ex d IIB T6
Control Unit Specifications	
<b>External input/output</b>	- Print function: USB and Parallel printer port - Data dump facility: USB memory stick - Modbus: four wire RS485 full duplex, standard Modbus Slave - LAN: Ethernet two ports 10/100/1000 Mbps - Up to 32 current loop output/inputs: 0 – 20 mA / 4 – 20 mA each galvanically isolated from ground and from each other - Up to 32 relay outputs Volt-free 28Vdc IA: normally close or normally open selectable - Up to 16 digital inputs 24V / 20mA: logic or contact closure detection, link selectable
<b>Power</b>	90-264 Vac, 47-63 Hz; 70W typical 160W maximum (depending on options)
<b>Operating environment</b>	From -10°C to +45°C (from +14°F to +113°F)
<b>Enclosure (not hazardous area)</b>	Polyester powder mild coated steel, stainless steel panel PC bezel. Sealed to IP 65/NEMA 4X
<b>ATEX certification (optional)</b>	II 2 G Ex px II T6 II 3 G Ex pz II T6
<b>Dimensions/Weight</b>	- Wall Mount: 510mm H x 480mm W x 184mm D (20" H x 19" W x 7.2" D) - Weight: 23 Kg (50 lb)

All the specifications subject to change without notice

For specific requirements, please contact the e-mail address:  
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