

**Excellence in Analysis**

# PRODUCT CATALOG

Dycor  
Proline  
ProMaxion  
Process Instruments  
Thermox  
Trace Analytical  
ASOMA  
LAND  
Chandler Engineering  
Western Research

# Overview of AMETEK PROCESS INSTRUMENTS

**AMETEK Process Instruments is a worldwide manufacturer of process analyzers and instrumentation. The markets we serve are ever expanding. They include:**

- Power generation
- Refining and petrochemicals
- Natural gas
- Combustion control for boilers and process heaters
- Metals refining and production
- Pharmaceutical research and manufacturing
- Semiconductor chip manufacturing
- Air separation and industrial gas production
- Glass manufacturing
- Thermal oxidizer control
- Pulp and paper production
- Environmental and pollution monitoring
- Fuel cell research
- And many others

Our engineering and manufacturing activities take place in several North American facilities. We have direct sales and service offices scattered around the globe, as well as a wide network of factory-trained manufacturer's representatives, distributors and service technicians. A Business Unit of the Process & Analytical Instruments division of AMETEK, Inc., we are part of a multinational corporation with over \$3 billion (U.S.) in annual revenue.

## Our Core Competencies



At AMETEK Process Instruments, we focus our experience on designing new, innovative analyzers that help our customers achieve higher levels of productivity and quality. We do this by seeking out ways to overcome the limitations of current methods of process monitoring, control and quality assurance.

It is through this focus that we have created some of the most unique and capable technologies in the world.

Our primary focus in analyzer design is reliability. We understand that you must have confidence that the analyzer will provide the correct information when you need it. It is a documented fact that many of our analyzers have been in service for well over 20 years.

**Our core competencies include widely varying applications and industries such as:**

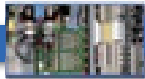
- Sulfur recovery processes
- Coal fired power generation
- Combustion / process heating
- Pharmaceutical solvent drying processes
- Pollution / emissions monitoring
- Monitoring of mammalian cell cultures and fermentation
- Natural gas processing and transmission
- Refining and petrochemical processes
- Heat treating atmosphere monitoring / control
- Vacuum analysis / residual gas analysis
- Analysis of moisture in hydrocarbon gases and high purity gases
- Contamination monitoring of high and ultra high purity gases
- Quality monitoring of gas and liquid feed-stocks and products
- Reaction monitoring
- Chemical composition analysis of gases and liquids

### **Our product technologies currently include:**

- UV, VIS and IR process analyzers
- Tunable Diode Laser Absorption
- Process moisture analyzers based upon electrolytic and quartz-crystal technologies
- Residual gas analyzers
- Process mass spectrometers
- Manual and on-line chilled-mirror dew point analyzers
- Gas chromatographs
- Zirconia oxygen analyzers for combustion control, furnace atmosphere control, air/fuel mixing control and trace oxygen analysis
- Gas gravitometers
- Liquid densitometers
- ED-XRF

We maintain our knowledgeable positions in these markets because we strive to know, understand and meet each customer's needs. We manufacture over a dozen, application-specific analyzers for the sulfur recovery industry alone. We provide technical training seminars and publish technical information in support of our customers' efforts to understand and improve the operations of their facilities.

### **Custom Designs/Unique Solutions**



At AMETEK Process Instruments, we understand that no single solution is applicable to all applications or processes. We maintain the capability to understand and evaluate your unique needs and applications. If a pre-engineered solution does not meet your needs, we will custom-design a solution for you based upon one of our unique technologies. We pride ourselves on our ability, and willingness, to produce unique analyzers and solutions for our customers.

We routinely design and manufacture sample handling and conditioning systems for use with our analyzers. In addition, we design cabinets and shelters to meet any environmental concerns or considerations. We have done it all from a simple instrument to a million dollar, multi-analyzer shelter for use in hazardous locations.

### **Our Long-Term Commitment... Service**

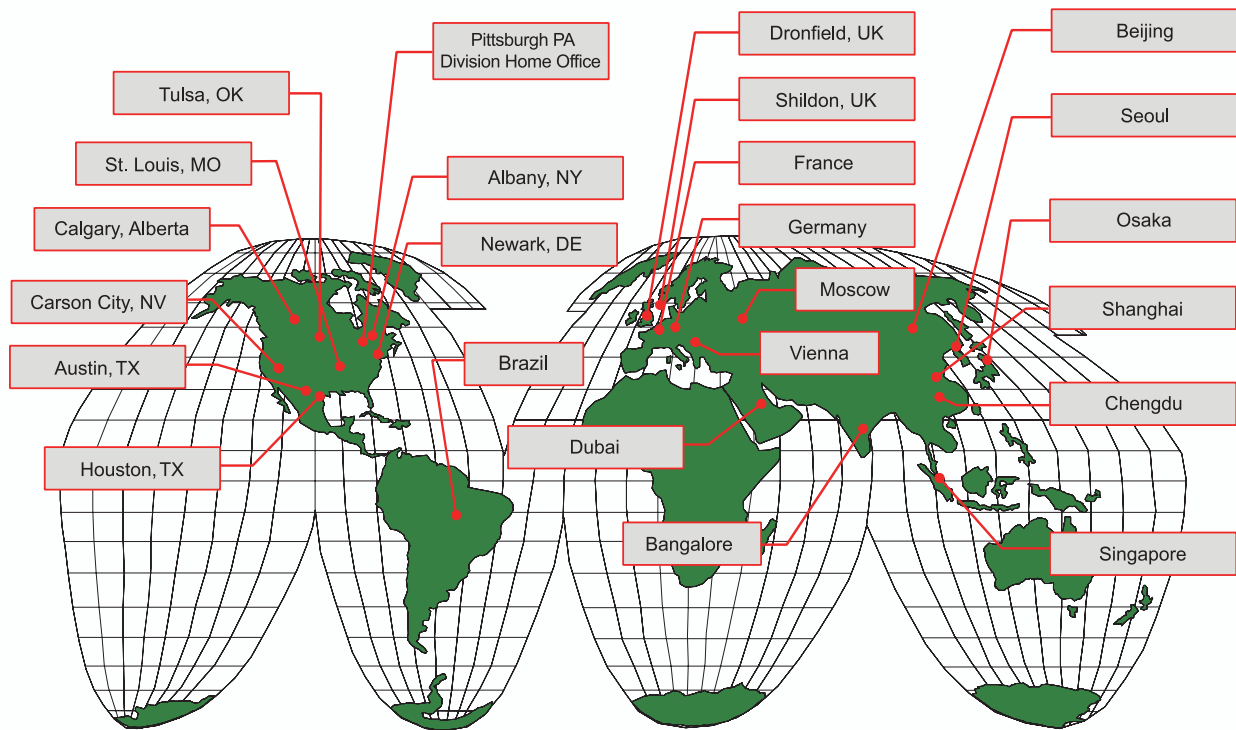


Our customer commitment continues well beyond start-up and commissioning of the analyzers. AMETEK Process Instruments has over 100 factory-trained service technicians worldwide to support our customers' needs. Moreover, we offer a wide variety of service plans to meet their needs. We have the commitment and the resources necessary to support our customers anywhere in the world.

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## Process & Analytical Instruments – Global Presence





AMETEK Western Research UV – VIS photometric analyzers are the most recognized in the world. We are one of the largest suppliers of UV analyzers worldwide, and we are the undisputed world leader for sulfur recovery analyzers. We also produce a number of other analyzers used to monitor a tremendous variety of chemical concentrations and properties.

### Sulfur Recovery Plant Analyzers

Sulfur has been known since 2000 B.C., when it was used for bleaching linen. Element Sulfur exists in coal and refinery crude oil. Another big source of Sulfur is the  $H_2S$  associated with the natural gas. To improve the product quality and decrease the  $SO_2$  emission after the fuel combustion, Sulfur needs to be separated, always in the form of  $H_2S$ . Then,  $H_2S$  is processed to recover elemental Sulfur by Claus and modified Claus process.



With over 18 analyzers dedicated to the Sulfur recovery process, AMETEK can fulfill your analysis needs in gas sweetening, acid gas analysis, tail gas analysis, pit gas monitoring, tail gas treating processes and emissions monitoring.

### Emission Monitors

Perform dry- or wet-basis analysis using one of AMETEK's complete line of emission monitors. Monitor just  $SO_2$  or up to five gases simultaneously including  $SO_2$ ,  $NO$ ,  $NO_2$ ,  $NO_x$ ,  $H_2S$  or  $NH_3$ . Mass flow and optional oxygen measurements are also available. Whether you need a 19" rack-mount analyzer designed for stand-alone use or for integration into a CEM system or a complete hot/wet extractive stack monitoring system, AMETEK can provide a solution.

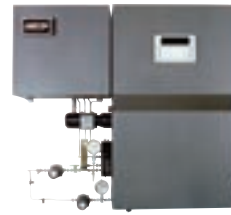
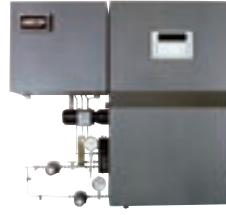
### Natural Gas Processing

AMETEK manufactures a number of analyzers for use in natural gas quality monitoring and control. Whether you monitor  $H_2S$  in sour gas,  $H_2S/COS/MeSH$  in sweet gas, or hydrocarbon dew point, we have an analyzer to suit your needs.

**For detailed information of each model, please refer to the product specification sheets.**

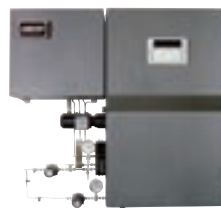
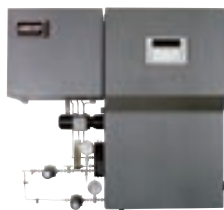


Model	880	881
Analyzer	Tail gas analyzer	H <sub>2</sub> S in sulfur pit analyzer
Principle	Single source multi-wavelength Non-dispersive ultraviolet	Single source multi-wavelength Non-dispersive ultraviolet
Components	H <sub>2</sub> S, SO <sub>2</sub> , Sv	H <sub>2</sub> S, SO <sub>2</sub>
Range	H <sub>2</sub> S: 0-2%, SO <sub>2</sub> : 0-1% Excess H <sub>2</sub> S: -1%-1%; (H <sub>2</sub> S: 0-4%, SO <sub>2</sub> : 0-2% option)	H <sub>2</sub> S: 0-5%, SO <sub>2</sub> : 0-1% Other ranges on request
Response time	T90<15 Seconds	T90<15 Seconds
Precision	±2% Full Scale	±2% Full Scale
Repeatability	±1% Full Scale	±1% Full Scale
Calibration	Optical filter	Optical filter
Linearity	±0.6% of Span	±0.6% of Span
Noise	±0.5% Full Scale	±0.5% Full Scale
Flow rate	2 L/Minute	2 L/Minute
Sampling	No sample line, with aspirator	No sample line, with aspirator
Temperature and pressure compensation	With	With
Analog output	(3~4) 4-20mA	(3~4) 4-20mA
Communication	RS-232/RS-485	RS-232/RS-485
Alarm	Digital	Digital
Power	115/230 VAC 50/60 Hz	115/230 VAC 50/60 Hz
Power consumption	720W	690W
Instrument air	490-700 kPa	490-700 kPa
Others	Steam: 515~690 kPa (steam jacket for ball valve); 210~345 kPa (blow back)	Steam: 515~690 kPa (steam jacket for ball valve)
Explosion proof area	Class I, Division 2, Group A, B, C, D; Zone 1, EExp II C T3	Class I, Division 2, Group A, B, C, D; Zone 1, EExp II C T3
Enclosure	NEMA 4	NEMA 4
Operation temperature	-20°C~50°C	-20°C~50°C
Dimension H×W×D (mm)	1037 × 950 × 305	1161 × 914 × 305
Weight	115 kg	115 kg
Installation	Mounts directly on the process pipe	Mounts directly on sulfur pit lid
Main applications	Tail gas for Sulfur Recovery Unit	Sulfur pit
Features	<ul style="list-style-type: none"> <li>• No sample line is needed;</li> <li>• Long lamp life (5 years)</li> </ul>	<ul style="list-style-type: none"> <li>• No sample line is needed;</li> <li>• Long lamp life (5 years)</li> </ul>



Model	900	909	910
Analyzer	Air demand analyzer (Tail Gas)	Hot/wet single gas mass flow CEM	Hot/wet multi-gas CEM
Principle	Dual sources, multi-wavelength, high resolution, nondispersive UV	Dual beam, high resolution, nondispersive UV	Dual beam, Multi-wavelength, high resolution, nondispersive UV
Components	H <sub>2</sub> S, SO <sub>2</sub> , CS <sub>2</sub> , COS, Sv	SO <sub>2</sub> , NO, NO <sub>2</sub> , H <sub>2</sub> S, NH <sub>3</sub> , Cl <sub>2</sub> , O <sub>2</sub> (Optional ZrO <sub>2</sub> detector)	SO <sub>2</sub> , NO, NO <sub>2</sub> , H <sub>2</sub> S, NH <sub>3</sub> , Cl <sub>2</sub> , O <sub>2</sub> (Optional ZrO <sub>2</sub> detector)
Range	H <sub>2</sub> S: 0-5000ppm-100%; SO <sub>2</sub> : 0-2500ppm-100%; CS <sub>2</sub> : 0-5000ppm-100%; COS: 0-5000ppm-100%; Sv: 0-50ppm-500ppm	SO <sub>2</sub> : 0-250ppm-100%; NO: 0-300ppm-100%; NO <sub>2</sub> : 0-300ppm-100%; H <sub>2</sub> S: 0-125ppm-100%; NH <sub>3</sub> : 0-125ppm-100%; Cl <sub>2</sub> : 0-500ppm-100%	SO <sub>2</sub> : 0-250ppm-100%; NO: 0-300ppm-100%; NO <sub>2</sub> : 0-300ppm-100%; NOx: 0-300ppm-100%; H <sub>2</sub> S: 0-125ppm-100%; NH <sub>3</sub> : 0-125ppm-100%
Response time	T90<30 Seconds	T90<30 Seconds	T90<30 Seconds
Precision	H <sub>2</sub> S, SO <sub>2</sub> : ±1% Full Scale	±1% Full Scale; O <sub>2</sub> : ±0.1%	±1% Full Scale; O <sub>2</sub> : ±0.1%
Repeatability	H <sub>2</sub> S, SO <sub>2</sub> : <0.5% Full Scale	<±0.5% Full Scale	<±0.5% Full Scale
Calibration	Manual or automatic	Manual or automatic	Manual or automatic
Linearity	H <sub>2</sub> S, SO <sub>2</sub> : 1% Full Scale	<±1% Reading	SO <sub>2</sub> : ±1% Reading; NOx, H <sub>2</sub> S, NH <sub>3</sub> : <±1.5% Reading
Noise	H <sub>2</sub> S, SO <sub>2</sub> : 0.2% Full Scale	<0.2% Full Scale	<0.2% Full Scale
Flow rate	3-5 L/Minute	3-5 L/Minute	3-5 L/Minute
Sampling	Aspirator	Aspirator	Aspirator
Temperature and pressure compensation	With	With	With
Analog output	Four 4-20mA (self or loop powered)	Four 4-20mA (self or loop powered)	Four 4-20mA (self or loop powered)
Communication	One RS-422 Serial port (supports Modicon Modbus® RTU), One RS-232 Serial port (typically reserved for configurator software). Optional ports are RS-485 (supports Modicon Modbus® RTU) or RJ-45 Ethernet port (supports Modicon Modbus® TCP/IP)		
Alarm	3 Independent sets of SPDT relays alarm	3 Independent sets of SPDT relays alarm	3 Independent sets of SPDT relays alarm
Power	120/240 VAC ±10%, 47~63 Hz	120/240 VAC ±10%, 47~63 Hz	120/240 VAC ±10%, 47~63 Hz
Power consumption	600 W (for analyzer)	600 W	600 W
Instrument air	>413.6 kPa, 120 L/Minute	>413.6 kPa, 120 L/Minute	>413.6 kPa, 120 L/Minute
Explosion proof area	Class I, Division 2, Group C & D; ATEX II 2 G EEx pd II B T3	Class I, Division 2, Group C & D; ATEX II 2 G EEx pd II B T3	Class I, Division 2, Group C & D; ATEX II 2 G EEx pd II B T3
Enclosure	NEMA 4*	NEMA 4*	NEMA 4*
Operation temperature	5~50°C	5~50°C	5~50°C
Dimension H×W×D (mm)	1554 × 1118 × 306	1554 × 1118 × 306	1554 × 1118 × 306
Weight	160 kg	About 160 kg	About 160 kg
Installation	Back panel	Back panel	Back panel
Main applications	<ul style="list-style-type: none"> <li>Tail gas pipeline for Sulfur Recovery Unit</li> </ul>	<ul style="list-style-type: none"> <li>CEM for Sulfur plant</li> <li>Smelters</li> <li>Sulfuric Acid, Nitric Acid (high acid dew point) process and effluent streams</li> <li>Wet scrubber (high water dew point) effluent streams</li> </ul>	<ul style="list-style-type: none"> <li>CEM for Sulfur plant</li> <li>Smelters</li> <li>Sulfuric Acid, Nitric Acid (high acid dew point) process and effluent streams</li> <li>Wet scrubber (high water dew point) effluent streams</li> </ul>
Features	High precision, resolution and repeatability	Hot/wet measurement; High precision, resolution and repeatability; Optional flow meter	Hot/wet measurement; High precision, resolution and repeatability; Optional flow meter

\* To be installed in analyzer house



Model	919	920	930
Analyzer	Hot/wet single gas analyzer	Hot/wet Multi-gas analyzer	H <sub>2</sub> S in sulfur pit analyzer
Principle	Dual beam, dual wavelength, high resolution, nondispersive UV	Dual beam, multiple wavelength, high resolution, nondispersive UV	Dual beam, multiple wavelength, high resolution, nondispersive UV
Components	SO <sub>2</sub> , NO, NO <sub>2</sub> , H <sub>2</sub> S, NH <sub>3</sub> , CL <sub>2</sub> , O <sub>2</sub> (Optional ZrO <sub>2</sub> detector)	SO <sub>2</sub> , NO, NO <sub>x</sub> , H <sub>2</sub> S, NH <sub>3</sub> , CL <sub>2</sub> , COS, CS <sub>2</sub> , O <sub>2</sub> (Optional ZrO <sub>2</sub> detector)	H <sub>2</sub> S, SO <sub>2</sub>
Range	SO <sub>2</sub> : 0-250ppm-100%; NO: 0-300ppm-100%; NO <sub>2</sub> : 0-300ppm-100%; H <sub>2</sub> S: 0-125ppm-100%; NH <sub>3</sub> : 0-125ppm-100%; CL <sub>2</sub> : 0-500ppm-100%	SO <sub>2</sub> : 0-250ppm-100%; NO: 0-300ppm-100%; NO <sub>2</sub> : 0-300ppm-100%; NO <sub>x</sub> : 0-300ppm-100%; H <sub>2</sub> S: 0-125ppm-100%; NH <sub>3</sub> : 0-125ppm-100%; CL <sub>2</sub> : 0-500ppm-100%; COS: 0-500ppm-100%; CS <sub>2</sub> : 0-500ppm-100%	H <sub>2</sub> S: 0-4%; SO <sub>2</sub> : 0-2%
Response time	T90<30 Seconds	T90<30 Seconds	T90<30 Seconds
Precision	±1% Full Scale; O <sub>2</sub> : ±0.1%	±1% Full Scale; O <sub>2</sub> : ±0.1%	±1% Full Scale
Repeatability	<±0.5% Full Scale	<±0.5% Full Scale	<±0.5% Full Scale
Calibration	Manual or automatic	Manual or automatic	Manual or automatic
Linearity	±1% Reading	SO <sub>2</sub> : <±1% Reading; NO <sub>x</sub> : <±1.5% Reading	<±1% Reading
Noise	<0.2% Full Scale	<0.2% Full Scale	<0.2% Full Scale
Flow rate	3-5 L/Minute	3-5 L/Minute	3-5 L/Minute
Sampling	Aspirator	Aspirator	Aspirator
Temperature and pressure compensation	With	With	With
Analog output	Four 4 - 20mA (self or loop powered)	Four 4 - 20mA (self or loop powered)	Four 4 - 20mA (self or loop powered)
Communication	One RS-422 Serial port (supports Modicon Modbus® RTU), One RS-232 Serial port (typically reserved for configurator software). Optional ports are RS-485 (supports Modicon Modbus® RTU) or RJ-45 Ethernet port (supports Modicon Modbus® TCP/IP)		
Alarm	3 Independent sets of SPDT relays alarm	3 Independent sets of SPDT relays alarm	3 Independent sets of SPDT relays alarm
Power	120/240 VAC ±10%, 47~63 Hz	120/240 VAC ±10%, 47~63 Hz	120/240 VAC ±10%, 47~63 Hz
Power consumption	600 W	600W	600 W
Instrument air	>413.6 kPa, 120 L/Minute	>413.6 kPa, 120 L/Minute	>413.6 kPa, 120 L/Minute
Explosion proof area	Class I, Division 2, Group C & D; ATEX II 2 G EEx pd II B T3	Class I, Division 2, Group C & D; ATEX II 2 G EEx pd II B T3	Class I, Division 2, Group C & D; ATEX II 2 G EEx pd II B T3
Enclosure	NEMA 4*	NEMA 4*	
Operation temperature	5~50°C	5~50°C	5~50°C
Dimension H×W×D (mm)	1554 × 1118 × 306	1554 × 1118 × 306	1554 × 1118 × 306
Weight	About 160 kg (350 lbs)	About 160 kg (350 lbs)	160 kg (350 lbs)
Installation	Back panel	Back panel	Back panel
Main applications	<ul style="list-style-type: none"> <li>• CEM for Sulfur plant</li> <li>• Smelters</li> <li>• Sulfuric Acid, Nitric Acid (high acid dew point) process and effluent streams</li> <li>• Wet scrubber (high water dew point) effluent streams</li> <li>• Multi component process streams</li> </ul>	<ul style="list-style-type: none"> <li>• CEM for Sulfur plant</li> <li>• Smelters</li> <li>• Sulfuric Acid, Nitric Acid (high acid dew point) process and effluent streams</li> <li>• Wet scrubber (high water dew point) effluent streams</li> <li>• Multi component process streams</li> </ul>	<ul style="list-style-type: none"> <li>• Sulfur recovery</li> <li>• Sulfur storage</li> <li>• Sulfur de-gassing</li> </ul>
Features	Hot/wet measurement; High precision, resolution and repeatability	Hot/wet measurement; High precision, resolution and repeatability	High precision, resolution and repeatability

\* To be installed in analyzer house



Model	931	932	933
Analyzer	H <sub>2</sub> S analyzer (Acid Gas, TGTU)	Multi-gas analyzer	Low concentration H <sub>2</sub> S (COS, MeSH) analyzer
Principle	Dual beam, dual wavelength, highresolution, nondispersive UV	Dual beam, multiple wavelength, high resolution, nondispersive UV/VIS	Proprietary frontal elution; Dual beam, multiple wavelength, high resolution, nondispersive UV
Components	H <sub>2</sub> S (Optional CO <sub>2</sub> , H <sub>2</sub> )	SO <sub>2</sub> , NO, NO <sub>x</sub> , H <sub>2</sub> S, NH <sub>3</sub> , CL <sub>2</sub> , COS, CS <sub>2</sub> (Optional CO <sub>2</sub> , H <sub>2</sub> )	H <sub>2</sub> S, COS, MeSH (Optional CO <sub>2</sub> )
Range	H <sub>2</sub> S: 0-4000ppm-100%	SO <sub>2</sub> : 0-250ppm-100%; NO: 0-300ppm-100%; NO <sub>2</sub> : 0-300ppm-100%; NO <sub>x</sub> : 0-300ppm-100%; H <sub>2</sub> S: 0-125ppm-100%; NH <sub>3</sub> : 0-125ppm-100%; CL <sub>2</sub> : 0-500ppm-100%; COS: 0-500ppm-100%; CS <sub>2</sub> : 0-500ppm-100%	Standard range: H <sub>2</sub> S: 0-25-100ppm; COS: 0-100-500ppm; MeSH: 0-50-250ppm; Low range: H <sub>2</sub> S: 0-5ppm
Response time	T90<30 Seconds	T90<30 Seconds	H <sub>2</sub> S: T90<30 Seconds; COS: T90<60 Seconds; MeSH: T90<180 Seconds
Precision	±1% Full Scale; H <sub>2</sub> : ±5% Full Scale	±1% Full Scale; H <sub>2</sub> : 5% Full Scale	±2% Standard range; ±5% Low range
Repeatability	<±0.5% Full Scale	<±0.5% Full Scale	±2% Standard range
Calibration	Manual or automatic	Manual or automatic	Auto zero
Linearity	<±1% Reading	<±1% Reading	±2% Reading
Noise	<0.2% Full Scale	<0.2% Full Scale	1.0% Standard range
Flow rate	2.5 L/Minute	2.5 L/Minute	2.5 L/Minute
Sampling	Depends on application	Depends on application	Sample gas: 830 kPag-13790 kPag
Temperature and pressure compensation	Constant temperature, Optional pressure compensation	Constant temperature, Optional pressure compensation	Constant temperature, Optional pressure compensation
Analog output	Four 4-20 mA, 30 VDC Max; Four 1-5 VDC	Four 4-20 mA, 30 VDC Max; Four 1-5 VDC;	Four 4-20 mA, 30 VDC Max; Four 1-5 VDC
Communication	One RS-232 Serial port (reserved for local use of configurator software), one RS-485 serial port (supports Modicon Modbus® RTU), one RS-485 serial port (reserved for remote use of configurator software), optional RJ-45 Ethernet port (supports Modicon Modbus® TCP/IP)		
Alarm	5 Independent sets of SPDT, Form C, potential-free relay contacts, 2A at 250 VAC	5 Independent sets of SPDT, Form C, potential-free relay contacts, 2A at 250 VAC	5 Independent sets of SPDT, Form C, potential-free relay contacts, 2A at 250 VAC
Power	120/240 VAC ±10%, 47~63 Hz	120/240 VAC ±10%, 47~63 Hz	120/240 VAC ±10%, 47~63 Hz
Power consumption	500W	500W	500 W
Instrument air	30 psig above the process pressure, 30 L/Minute (for Division 2)	30 psig above the process pressure, 30 L/Minute (for Division 2)	—
Explosion proof area	Optional Class I, Division 2, Group A, B, C & D	Optional Class I, Division 2, Group A, B, C & D	Optional Class I, Division 2, Group A, B, C & D
Enclosure			
Operation temperature	0~50°C	0~50°C	0~50°C
Dimension H×W×D (mm)	1185 × 780 × 254	1185 × 780 × 254	1185 × 780 × 254
Weight	145 kg	145 kg	145 kg
Installation	Back panel	Back panel	Back panel
Main applications	<ul style="list-style-type: none"> <li>• SRU feed gas</li> <li>• Acid gas</li> <li>• Well head gas</li> <li>• Sour gas pipeline</li> <li>• Amine-based tail gas treating contactor overhead</li> </ul>	<ul style="list-style-type: none"> <li>• SRU feed gas</li> <li>• Sulfuric acid production</li> <li>• Amine-based tail gas treating</li> <li>• Chemical reaction monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Gas sweetening</li> <li>• Pipeline quality/custody transfer</li> <li>• Synthetic natural gas (SNG)</li> <li>• Blending stations</li> </ul>
Features	High precision, resolution and repeatability	High precision, resolution and repeatability	Patented frontal elution technique; High resolution; Short response time



Model	914CEM	9000 RM	241
Analyzer	Continuous Emission Monitor	Single or Multiple gas analyzer	Hydrocarbon dew point analyzer
Principle	UV, IR, Zirconium oxide, Paramagnetic	Dual beam, multiple wavelength, high resolution, nondispersive UV/ VIS	Automated chilled mirror
Components	According to end user requirements	SO <sub>2</sub> , H <sub>2</sub> S, NO, NO <sub>2</sub> , NO <sub>x</sub> , O <sub>2</sub> (Optional integral paramagnetic sensor)	Hydrocarbon dew point
Range		SO <sub>2</sub> : 0-25ppm-100%; H <sub>2</sub> S: 0-50ppm-100%; NO: 0-50ppm-100%; NO <sub>2</sub> : 0-100ppm-100%	Typically 60°C below the temperature at the analyzer installation
Response time		T90<30 Seconds	Application dependent
Precision		±1% Full Scale; O <sub>2</sub> : ±0.1%	±1°C
Repeatability		<±0.5% Full Scale; O <sub>2</sub> : ±0.1%	±0.4°C
Calibration	Manual or automatic	Manual or automatic	
Linearity		SO <sub>2</sub> : <±1% Reading; NO, NO <sub>2</sub> , NO <sub>x</sub> , H <sub>2</sub> S: <±1.5% Reading; O <sub>2</sub> : ±0.1%	
Flow rate	0.94-4.7 L/Minute	0.25-5 L/Minute	1-5 L/Minute typically
Analog output		2-6 isolated analog outputs, 0-20mA/4-20mA/0-5VDC	4-20mA
Communication		Modbus RTU RS-485 / Modbus TCP/Ethernet	One RS-422/RS-485 Serial port (supports Modicon Modbus® RTU), One RS-232 Serial port (reserved for configurator software). Optional RJ-45 Ethernet port (supports Modicon Modbus® TCP/IP)
Alarm		4 (expandable to 6) relay contacts	6 Status relay contacts
Power	110/220/240 VAC 50-60 Hz	120/240 VAC ±10%, 47~63 Hz	240 VAC ±10%, 50 Hz, 120 VAC ±10%, 60 Hz
Power consumption		300 W	<275 W
Explosion proof area	General purpose; Class I, Division 2	General purpose; Class I, Division 2, Group A, B, C, D	Class 1, Division 1, Group C & D; ATEX II 2 G EExd II B T4
Enclosure	NEMA 4*	—	NEMA 4*
Operation temperature	7~49°C	-20~50°C	10~40°C
Dimension H×W×D (mm)		180 × 480 × 600	840 × 575 × 300
Weight		18.2 kg	60 kg
Installation	Back panel	19" Rack mount	Back panel
Main applications	• Stack gas	• Research • Direct measure, single digit SO <sub>2</sub> CEMs	• Pipeline quality and custody transfer • Specification monitoring • Gas turbine feed gas monitoring
Features	Customized	High precision, resolution and repeatability	Accurate monitoring of hydrocarbon dew points at pipeline or fixed pressure; Electricity is the only consumable

\* To be installed in analyzer house

*THE RIGHT ANALYZER FOR YOUR APPLICATION*

The Thermox product line offers the greatest selection of flue gas analyzers in the industry for measuring oxygen, combustibles, methane and fuel-rich atmospheres. Our commitment is to provide the right analyzer for every application to ensure the highest levels of reliability and efficiency, cost savings and safety for our customers.

**NOx Reduction and Flue Gas Measurement**

Modern combustion burner systems redistribute primary air to secondary air registers for the purpose of staging combustion to reduce thermal NOx generation. The mechanical redistribution of excess air drives combustion closer to stoichiometric conditions resulting in a reduction in excess air, associated heat loss and an increase in background combustibles levels.

Thermox improves your modern combustion process by providing oxygen, or a combined oxygen and combustibles, or oxygen, combustibles and methane measurement that facilitates safety in combustion control and efficiency strategies. Once background combustibles levels are determined, additional reductions in excess air can be safely achieved to minimize NOx generation and increase combustion efficiency.

**2000 Series and IQ Links**

*FLEXIBILITY TO SUIT YOUR NEEDS*



The Series 2000 Control Unit is offered in several packaging options. For many flue gas applications, the control unit is located outdoors or in an area that can be exposed to water. For these environments, the weatherproof NEMA 4 or weatherproof stainless steel NEMA 4X option is available. Both are of a rugged, welded construction designed for long life in heavy industrial service, and can be either wall- or panel-mounted. Hazardous area enclosures are also available, including ATEX and NEC approved versions.

Handheld or dedicated wall mount IQ Link terminals are also available. The IQ Link provides a local interface using RS-232 communications to set up and display system parameters, initiate calibrations, system tests and troubleshooting.

**Insitu Flue Gas Analyzer**

The Insitu model is a direct insertion-type oxygen probe where the zirconium oxide cell is directly in the stream of the products of combustion. The patented Insitu model is designed for applications where the flue gas temperature does not exceed 677°C (1250°F) and where combustibles measurements are not required.

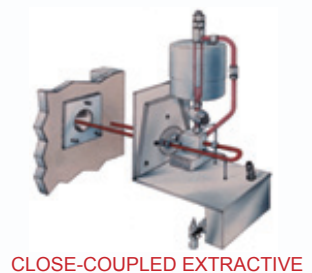
*SIMPLIFIED CONSTRUCTION FOR EASY SERVICE*

With the unique design of the Insitu oxygen probe, field replacement of all components is easily performed. While the outer protection tube remains in the process, the inner probe, housing the oxygen cell and heater/thermocouple assembly, can be removed easily. With no need to return the probe to the factory, extensive down time and expensive repairs on your oxygen insitu probe are avoided.

**WDG-IV, WDG-IVC and WDG-IVCM**

*CLOSE-COUPLED EXTRACTIVE FLUE GAS ANALYZERS*

Designed for fast response in a wide range of flue gas applications, this analyzer mounts directly on the combustion process to provide continuous measurement of oxygen (WDG-IV) or oxygen and combustibles (WDG-IVC). It is suitable for gas streams up to 704°C (1300°F) with standard 316 SS probes. Flue gas temperatures up to 1648°C (3000°F) can be measured using optional high temperature probes. For corrosive gas streams, sample wetted parts in Hastelloy® or Inconel® are available. The analyzer is provided in a range of mounting styles. For hazardous area locations, purged or explosion-proof versions are available.



**CLOSE-COUPLED EXTRACTIVE**

The WDG-IVCM analyzer measures oxygen, combustibles and methane in natural gas-fired applications. It is ideal for gas-fired power boilers or for those using natural gas during start-up and shutdown. With this analyzer, you can monitor oxygen and combustibles for maximum fuel efficiency. In addition, the methane detector can be used for purge and lightoff cycles during start-up and shutdown.

### **WDG-HPII and WDG-HPIIC**

#### *CONVECTIVE FLUE GAS ANALYZERS*

Designed for applications with high particulate levels in the gas stream, the analyzer mounts directly on the combustion process to provide continuous measurement of oxygen (WDG-HPII) or oxygen and combustibles (WDG-HPIIC). This analyzer is suitable for gas streams up to 704°C (1300°F) using the standard 316SS probe/filter assembly. Flue gas temperatures up to 1537°C (2800°F) can be measured using optional high temperature probes. For corrosive gas streams, sample wetted parts in Hastelloy® or Inconel® are available. The analyzers can be provided in a range of mounting styles. For hazardous area locations, purged or explosion proof versions are available.

### **Trace Oxygen Analyzers**

For nitrogen purity and other industrial applications, Thermox TM2000 and CG1000 series industrial gas oxygen analyzers provide a quick response time to process changes, and operate from 100% to 0.1 ppm O<sub>2</sub>.

### **Pre-Mix Gas Analyzers**

The Thermox PreMix 2000 and CMFA-P2000 (portable) analyzers accurately and continuously measure the proportions of oxygen and fuel in pre-mix gases. They are used wherever efficient control is required for an open flame combustion process such as in glass and fiber glass manufacturing, or in flame treating applications.

**For detailed information of each model, please refer to the product specification sheets.**



Model	WDG-Insitu/2000	WDG 1200/INSITU	WDG 1210/INSITU
Installation/Sampling	In-situ	In-situ	In-situ
Components	O <sub>2</sub>	O <sub>2</sub>	O <sub>2</sub>
Output range	O <sub>2</sub> : 0-1% to 0-100%	O <sub>2</sub> : 0-1% to 0-100%	O <sub>2</sub> : 0-1% to 0-100%
Precision	O <sub>2</sub> : ±1% measured value or ±0.05% O <sub>2</sub>	O <sub>2</sub> : ±1% measured value or ±0.05% O <sub>2</sub>	O <sub>2</sub> : ±1% measured value or ±0.05% O <sub>2</sub>
Response time	T63<20 Seconds	T63<20 Seconds	T63<20 Seconds
Max. Flue gas temperature, probe material/length	677°C, 310SS/9", 18", 36", 72", 108"	677°C, 310SS/9", 18", 36", 72", 108"	677°C, 310SS/9", 18", 36", 72", 108"
Analog output	Two 4-20mA	4-20mA	4-20mA
Communication	RS-485	RS-485 Modbus	RS-485 Modbus
Sensor	Enclosure	NEMA 4X	NEMA 4X
	Ambient temperature	-20~71°C	-20~71°C
	Explosion proof area	General purpose; Class 1, Division 2, Group A, B, C, D	General purpose
Power	Sensor: 115/230 VAC ±10%, 47-63 Hz, 150 VA; Control unit: 75 VA	85-264 VAC, 48-62 Hz, 250 VA	85-264 VAC, 48-62 Hz, 250 VA
Control unit	2000	2000	2000
Sensor dimension H×W (mm)	160 × 160	153 × 152	153 × 152
Main applications	<ul style="list-style-type: none"> <li>• Power generation</li> <li>• Boiler</li> <li>• Petrochemicals</li> </ul>	<ul style="list-style-type: none"> <li>• Power generation</li> <li>• Boiler</li> <li>• Process industry</li> </ul>	<ul style="list-style-type: none"> <li>• Power generation</li> <li>• Boiler</li> <li>• Process industry</li> </ul>
Features	Simple installation and operation	Simple installation and operation; Sensor and controller are integrated	Simple installation and operation

\* Above ambient temperature listed is for sensor. For 2000 control unit, ambient temperature is -10~50°C, Enclosure is NEMA 4, and 2000 control unit is UL Listed for NEC Class I, Division 2 areas.



Model	WDG-HPII	WDG-HPIIC	WDG-HPIICM	
Installation/Sampling	Close-coupled, convective	Close-coupled, convective	Close-coupled, convective	
Components	O <sub>2</sub>	O <sub>2</sub> , Combustibles (CO+H <sub>2</sub> )	O <sub>2</sub> , Combustibles (CO+H <sub>2</sub> ), CH <sub>4</sub>	
Display range	O <sub>2</sub> : 0-100%	O <sub>2</sub> : 0-100%; Combustibles: 0-10000ppm or 0-5%	O <sub>2</sub> : 0-100%; Combustibles: 0-10000ppm or 0-5%; CH <sub>4</sub> : 0-5%	
Output range	O <sub>2</sub> : 0-1% to 0-100%	O <sub>2</sub> : 0-1% to 0-100% Combustibles: 0-2,000ppm to 0-10000ppm or 0-1% to 0-5%	O <sub>2</sub> : 0-1% to 0-100% Combustibles: 0-2000ppm to 0-10000ppm or 0-1% to 0-5% CH <sub>4</sub> : 0-2% to 0-5%	
Precision	O <sub>2</sub> : ±0.75% measured value or ±0.05% O <sub>2</sub>	O <sub>2</sub> : ±0.75% measured value or ±0.05% O <sub>2</sub> ; Combustibles: ±2% Full range	O <sub>2</sub> : ±0.75% measured value or ±0.05% O <sub>2</sub> ; Combustibles: ±2% Full range; CH <sub>4</sub> : ±5% Full range	
Response time	T63<16 Seconds	T63<16 Seconds	T63<16 Seconds	
Max. Flue gas temperature, probe material/length	704°C, 316SS/24",36",48" 1024°C, 310SS/24",36",48" 1537°C, ceramic/24",36",48"	704°C, 316SS/24",36",48" 1024°C, 310SS/24",36",48" 1537°C, ceramic/24",36",48"	704°C, 316SS/24",36",48" 1024°C, 310SS/24",36",48" 1537°C, ceramic/24",36",48"	
Analog output	Two 0/4-20mA	Three 0/4-20mA	Three 0/4-20mA	
Communication	RS-485, RS-232 & HART® optional (IQ Links)	RS-485, RS-232 & HART® optional (IQ Links)	RS-485, RS-232 & HART® optional (IQ Links)	
Sensor	Enclosure	NEMA 4	NEMA 4	
	Ambient temperature	-20~71°C	-20~71°C	-20~65°C
	Explosion proof area	General purpose; Class 1, Division 2, Group A, B, C, D; Class 1, Division 1 Group B & D	General purpose; Class 1, Division 2, Group A, B, C, D; Class 1, Division 1 Group B & D	General purpose; Class 1, Division 2, Group A, B, C, D
Power	Sensor: 115 VAC ±10%, 47-63 Hz, Max. 600 VA (650 VA floor mount); 230 VAC ±10%, 47-63 Hz, Max. 1850 VA (1900 VA floor mount); 2000 control unit: 95-230 VAC ±10%, 47-63 Hz, Max. 75 VA			
Control unit	2000 or IQ type	2000 or IQ type	IQ type	
Sensor dimension H×W×D (mm)	685 × 260 × 254	685 × 260 × 254	685 × 260 × 254	
Main applications	<ul style="list-style-type: none"> <li>• Waste incineration</li> <li>• Kilns/furnaces</li> <li>• Paper and pulp</li> <li>• Wet stream scrubber</li> <li>• Other high dust application</li> </ul>	<ul style="list-style-type: none"> <li>• Waste incineration</li> <li>• Kilns/furnaces</li> <li>• Paper and pulp</li> <li>• Other high dust application</li> </ul>	<ul style="list-style-type: none"> <li>• Waste incineration</li> <li>• Kilns/furnaces</li> <li>• Paper and pulp</li> <li>• Other high dust application</li> </ul>	
Features	Suitable for high dust application	Suitable for high dust application	Suitable for high dust application	

\* Above ambient temperature listed is for sensor. For 2000 control unit, ambient temperature is -10~50°C, Enclosure is NEMA 4, and 2000 control unit is UL Listed for NEC Class I, Division 2 areas.



Model	WDG-IV	WDG-IVC	WDG-IVCM	WDG-IV UOP/RP
Installation/Sampling	Close-coupled, extractive	Close-coupled, extractive	Close-coupled, extractive	Close-coupled, extractive
Components	O <sub>2</sub>	O <sub>2</sub> , Combustibles (CO+H <sub>2</sub> )	O <sub>2</sub> , Combustibles (CO+H <sub>2</sub> ), CH <sub>4</sub>	O <sub>2</sub>
Display range	O <sub>2</sub> : 0-100%	O <sub>2</sub> : 0-100%; Combustibles: 0-10000ppm or 0-5%	O <sub>2</sub> : 0-100%; Combustibles: 0-10000ppm or 0-5%; CH <sub>4</sub> : 0-5%	0-100%
Output range	O <sub>2</sub> : 0-1% to 0-100%	O <sub>2</sub> : 0-1% to 0-100% Combustibles: 0-2000ppm to 0-10000ppm or 0-1% to 0-5%	O <sub>2</sub> : 0-1% to 0-100% Combustibles: 0-2000ppm to 0-10,000ppm or 0-1% to 0-5%; CH <sub>4</sub> : 0-2% to 0-5%	0-1% to 0-100%
Precision	O <sub>2</sub> : ±0.75% measured value or ±0.05% O <sub>2</sub>	O <sub>2</sub> : ±0.75% measured value or ±0.05% O <sub>2</sub> ; Combustibles: ±2% Full range	O <sub>2</sub> : ±0.75% measured value or ±0.05% O <sub>2</sub> ; Combustibles: ±2% Full range; CH <sub>4</sub> : ±5% Full range	O <sub>2</sub> : ±0.75% measured value or ±0.05% O <sub>2</sub>
Response time	O <sub>2</sub> : T90<6 Seconds	O <sub>2</sub> : T90<13 Seconds	O <sub>2</sub> : T90<30 Seconds	O <sub>2</sub> : T90<6 Seconds
Max. Flue gas temperature, probe material/length	704°C, 316SS/24"-108" 1024°C, 310SS/24"-108" 1649°C, Hexoloy™/24"-72"	704°C, 316SS/24"-108" 1024°C, 310SS/24"-108" 1649°C, Hexoloy™/24"-72"	704°C, 316SS/24"-108" 1024°C, 310SS/24"-108" 1649°C, Hexoloy™/24"-72"	900°C, Hastelloy C
Analog output	Two 0/4-20mA	Two 0/4-20mA	Three 0/4-20mA	Two 0/4-20mA
Communication	RS-485, RS-232 & HART® optional (IQ Links)	RS-485, RS-232 & HART® optional (IQ Links)	RS-485, RS-232 & HART® optional (IQ Links)	RS-485
Sensor	Enclosure	NEMA 4	NEMA 4	NEMA 4
	Ambient temperature	-20~71°C	-20~71°C	-20~60°C
	Explosion proof area	General purpose; Class 1, Division 2, Group A, B, C, D; Exd II C T3	General purpose; Class 1, Division 2, Group A, B, C, D; Exd II C T3	General purpose; Class 1, Division 2, Group A, B, C, D
Power	Sensor: 115 VAC ±10%, 47-63 Hz, Max. 600 VA (650 VA floor mount); 230 VAC ±10%, 47-63 Hz, Max. 1850 VA (1900 VA floor mount); 2000 control unit: 95-230 VAC ±10%, 47-63 Hz, Max. 75 VA			
Control unit	2000 or IQ type	2000 or IQ type	2000 or IQ type	2000
Sensor dimension H×W×D (mm)	660 × 260 × 254	660 × 260 × 254	660 × 260 × 254	495 × 515 × 230
Main applications	<ul style="list-style-type: none"> <li>Petrochemicals</li> <li>Chemicals</li> <li>Process furnaces</li> </ul>	<ul style="list-style-type: none"> <li>Petrochemicals</li> <li>Chemicals</li> <li>Process furnaces</li> </ul>	<ul style="list-style-type: none"> <li>Petrochemicals</li> <li>Chemicals</li> <li>Process furnaces</li> </ul>	<ul style="list-style-type: none"> <li>CCR process</li> <li>Corrosive or high pressure processes</li> </ul>
Features	High precision and quick response	High precision and quick response	High precision and quick response	Specifically developed for CCR application

\* Above ambient temperature listed is for sensor. For 2000 control unit, ambient temperature is -10~50°C, Enclosure is NEMA 4, and 2000 control unit is UL Listed for NEC Class I, Division 2 areas.



Model	CEM/O <sub>2</sub>	SA/F IQ Air Demand Analyzer	PreMix 2000 Air/Fuel Ratio Analyzer	CMFA-P2000
Installation/Sampling	Extractive	Extractive, optional pump	Stationary, inside pump/ aspirator	Portable, inside pump/ aspirator
Components	O <sub>2</sub>	O <sub>2</sub> , A/F ratio, Wobbe	O <sub>2</sub> , excess fuel, oxides/ fuels or fuels/oxides ratio	O <sub>2</sub> , excess fuel, oxides/ fuels or fuels/oxides ratio
Display range	O <sub>2</sub> : 0-100%	O <sub>2</sub> : 0-100%	O <sub>2</sub> : 0-100%; Excess Fuel: 0-1 to 0-5%	O <sub>2</sub> : 0-100%; Excess Fuel: 0-1 to 0-5%
Output range	O <sub>2</sub> : 0-1% to 0-100%	O <sub>2</sub> : 0-1% to 0-100%	O <sub>2</sub> : 0-1% to 0-100%; Excess Fuel: 0-1% to 0-5%; 5% Excess Oxygen to 5% Excess Fuel	O <sub>2</sub> : 0-1% to 0-100%; Excess Fuel: 0-1% to 0-5%; 5% Excess Oxygen to 5% Excess Fuel
Precision	O <sub>2</sub> : ±0.75% measured value or ±0.05% O <sub>2</sub>	O <sub>2</sub> : ±0.75% measured value or ±0.05% O <sub>2</sub>	O <sub>2</sub> : ±2% measured value or ±0.1% O <sub>2</sub> ; Excess Fuel: ±5% value or ±0.25% Excess Fuel	O <sub>2</sub> : ±2% measured value or ±0.1% O <sub>2</sub> ; Excess Fuel: ±5% measured value or ±0.25% Excess Fuel
Response time	T90<4 Seconds (0.94 L/Minute)	T90: 25-35 Seconds (10:1 bypass flow)	O <sub>2</sub> : T63<18 Seconds; Excess Fuel: T63<17 Seconds	O <sub>2</sub> : T63<18 Seconds; Excess Fuel: T63<17 Seconds
Inlet pressure/flow rate	Flow rate: 0.94-9.4L/ Minute	Inlet pressure: 34.5-689 kPa	Max. inlet pressure: 68.95 kPa; Flow rate: 1 L/Minute; Bypass: 50 L/Minute	Max. inlet pressure: 68.95 kPa; Flow rate: 1 L/Minute
Analog output	Two 0/4-20mA	Three 0/4-20mA	Two 0/4-20mA	Two 0/4-20mA
Communication	RS-485, RS-232 & HART® optional (IQ Links)	RS-485, RS-232 & HART® optional (IQ Links)	RS-485	RS-485
Sensor	Enclosure	Indoor	Indoor	NEMA 3R
	Ambient temperature	-18~50°C	-20~40°C	-20~70°C
Power	115/230 VAC ±10%, 47-63 Hz, 1670 VA (sensor); 75 VA (control unit)	115/230 VAC ±10%, 47-63 Hz	Sensor: 115 VAC ±10%, 50/60 Hz 1200 VA; 230 VAC ±10%, 50/60 Hz, 2400 VA; Control unit: 75 VA	115 VAC ±10%, 50-60 Hz, 747 VA Max; 230 VAC ±10%, 50-60 Hz, 2222 VA Max.
Control unit	2000 or IQ type	IQ type	2000	2000
Sensor dimension H×W×D (mm)	325 × 305 × 155	610 × 610 × 230	445 × 305 × 235	273 × 457 × 407
Main applications	• CEM system	• Burners using variable composition fuel gas	• Glass forehearth • Air/fuel mixtures • Glass fiber apparatus • Open flame brazing and soldering • Tempering furnaces • Gas generators • Metals and metal forming	• Glass melting tanks • Mix station tuning on forehearths • Furnace atmosphere control • Flame treating applications
Features	Excess Fuel Software Option	Better process control from a direct measurement based upon a duplication of the combustion process	Measure air/fuel ratio in openflame applications where flue gas measurements are not practical	Two analyzers in one. Acts as a flue gas oxygen analyzer or a premix gas analyzer

\* Above ambient temperature listed is for sensor. For 2000 control unit, ambient temperature is -10~50°C, Enclosure is NEMA 4, and 2000 control unit is UL Listed for NEC Class I, Division 2 areas.



Model	TM2000	CG1000	CG1000-RTP
Output range	O <sub>2</sub> : 0.1ppm~100%	O <sub>2</sub> : 0.1ppm~100%	O <sub>2</sub> : 0.1 ppm~100%
Precision	ppm O <sub>2</sub> content: 2% reading or 0.5 ppm O <sub>2</sub>	ppm O <sub>2</sub> content: ±2% reading or 0.5 ppm O <sub>2</sub>	±2% reading or 0.05% O <sub>2</sub> (for ppm content, 0.5 ppm O <sub>2</sub> ), whichever is greater
Response time	<5 Seconds (0.6 L/Minute)/decade	<5 Seconds (150 mL/Minute)/decade	<5 Seconds (150 mL/Minute)/decade
Sample gas pressure	1.5-20 psig	8.7-1035 Torr gauge, with pump	600-810 Torr, with vacuum system/aspirator
Flow rate	0.1-1 L/Minute	150 mL/Minute	150 mL/Minute
Flow measurement	N/A	Electronic flow sensor	Electronic flow sensor
Operation temperature	-18~50°C	5~40°C	5~40°C
Power	115/230 VAC ±10%, 50/60 Hz, 288 VA	115/230 VAC ±10%, 50/60 Hz, 150 VA	115/230 VAC ±10%, 50/60 Hz, 80 VA
Calibration	Calibration gas: 0.6 L/Minute; Zero gas: 1ppm-10% O <sub>2</sub> /N <sub>2</sub> ; Span gas: At least one decade above zero gas	Calibration gas: 150 mL/Minute; Zero gas: 1ppm-10% O <sub>2</sub> /N <sub>2</sub> ; Span gas: At least one decade above zero gas	Calibration gas: 150 mL/Minute; Zero gas: 1ppm-10% O <sub>2</sub> /N <sub>2</sub> ; Span gas: At least one decade above zero gas
Display	4-line × 20-characters vacuum fluorescent display	4-line × 20-characters vacuum fluorescent display	4-line × 20-characters vacuum fluorescent display
Communication	RS-485	RS-485	RS-232, RS-485 (optional)
Options	Sample gas bypass	Built in pump	SS sampling system, vacuum system/aspirator, inert seal, leakage test 3×10 <sup>-8</sup> atm-cc/sec
Dimension H×W×D (mm)	445 × 305 × 235	273 × 202 × 406	273 × 202 × 406
Weight	13.6 kg	8.6 kg	11.8 kg
Main applications	<ul style="list-style-type: none"> <li>• Cryogenic gas generating systems</li> <li>• Nitrogen purity systems</li> <li>• Blanket gas analysis</li> <li>• Inert gas purity</li> <li>• Welding atmospheres</li> <li>• Air separation</li> <li>• Atmospheric oven control</li> <li>• Glove box applications</li> </ul>	<ul style="list-style-type: none"> <li>• Cryogenic gas generating systems</li> <li>• Nitrogen purity systems</li> <li>• Blanket gas analysis</li> <li>• Inert gas purity</li> <li>• Welding applications</li> <li>• Air separation</li> <li>• Atmospheric oven control</li> <li>• Glove box applications</li> <li>• Semiconductor manufacturing</li> <li>• Oxidation/anneal thermal process furnaces</li> </ul>	<ul style="list-style-type: none"> <li>• Rapid Thermal Processing (RTP)</li> <li>• Fast ramp mini-batch furnaces</li> </ul>
Features	Quickly responds to process change; Can detect excess combustibles process upsets with very low ppm oxygen readings	Portable, Quickly responds to net oxygen changes from 0.1 ppm to 100% O <sub>2</sub>	Fast response over a wide operating range; Specifically developed for RTP process



Model	CG1100	CG1100-RTP	CG1100-GS
Output range	O <sub>2</sub> : 0.1 ppm-100%	O <sub>2</sub> : 0.1 ppm-100%	O <sub>2</sub> : 0.1 ppm-100%
Precision	±2% of reading or 0.05% O <sub>2</sub> absolute (0.5 ppm O <sub>2</sub> absolute for ppm range), whichever is greater	±2% of reading or 0.05% O <sub>2</sub> absolute (0.5 ppm O <sub>2</sub> absolute for ppm range), whichever is greater	±2% of reading or 0.05% O <sub>2</sub> absolute (0.5 ppm O <sub>2</sub> absolute for ppm range), whichever is greater
Response time	<5 Seconds (150 mL/Minute)	<5 Seconds (150 mL/Minute)	<5 Seconds (150 mL/Minute)
Sample gas pressure	600~1795 Torr	600~1034 Torr	5~10 psig 25~120 psig
Flow rate	150 mL/Minute	50~200 mL/Minute, (calibration flow rate 100 mL/Minute)	Controlled at 150 mL/Minute
Flow measurement	Electronic flowmeter	Electronic flowmeter	Mechanical flowmeter
Operation temperature	0~40°C	0~40°C	0~40°C
Power	100-250 VAC, 47-63 Hz, 60 VA	100-250 VAC, 47-63 Hz, 60 VA	100-250 VAC, 47-63 Hz, 60 VA
Calibration gas	Calibration gas: 150 mL/Minute; Zero gas: 1ppm~10% O <sub>2</sub> /N <sub>2</sub> ; Span gas: At least one decade above zero gas	Calibration gas: 150 mL/Minute; Zero gas: 1ppm~10% O <sub>2</sub> /N <sub>2</sub> ; Span gas: At least one decade above zero gas	Calibration gas: 150 mL/Minute; Zero gas: 1ppm~10% O <sub>2</sub> /N <sub>2</sub> ; Span gas: At least one decade above zero gas
Communication	RS-232, 2 × RS-485	RS-232, 2 × RS-485	RS-232, 2 × RS-485
Others	Options: Vacuum generator (aspirator), 2000 system software	Features: SS sampling system, Inert seal for measuring cell, leakage test 3×10 <sup>-8</sup> atm-cc/sec, inlet and outlet shut off valves, Optional 2000 system software	Options: Remote calibration unit, 2000 system software
Dimension H×W×D (mm)	203 × 203 × 203	203 × 203 × 203	203 × 203 × 203
Weight	3.7 kg	5.0 kg	3.7 kg
Main applications	<ul style="list-style-type: none"> <li>• Oven/Furnace Atmospheres</li> <li>• Blanket/Purge Gases</li> <li>• Welding Gases</li> <li>• Food Packaging</li> <li>• Component Aging Chambers</li> <li>• Carbon Dioxide Purity</li> <li>• Nitrogen Purity</li> </ul>	<ul style="list-style-type: none"> <li>• Rapid Thermal Processing (RTP)</li> <li>• Fast ramp mini-batch furnaces</li> </ul>	<ul style="list-style-type: none"> <li>• Air Separation</li> <li>• Blanket /Purge Gases</li> <li>• Welding Atmospheres</li> <li>• Food Packaging</li> <li>• Glove Box Applications</li> <li>• Inert Gas Purity</li> <li>• Nitrogen Purity</li> <li>• Oven/Furnace atmospheres</li> </ul>
Features	Fast response over a wide operating range: O <sub>2</sub> 0.1ppm-100%	Fast response over a wide operating range: Specifically developed for RTP process	Fast response over a wide operating range: O <sub>2</sub> 0.1ppm-100%

## Process Spectrophotometer

AMETEK's Model 4000 Photometric Analyzer can be configured to monitor 1000's of chemicals, traits and characteristics in either gas or liquid streams of any temperature or pressure.

The updated model IPS-4 Integrated Process Spectrophotometer is another solution to your special components measurement. AMETEK's IPS-4 is a huge step forward in capability and reliability for process spectrophotometers. Using the most modern electronics and diode array technology, the IPS-4 UV is engineered to perform a wide variety of liquid and gas analyses. Up to eight components of interest can be measured simultaneously through the combination of a modern, diode array-based optical system with our proprietary process-ready electronics, while reporting the results of five. The IPS-4 IR is a very robust single beam/multiwavelength technique which uses sample and reference filters to measure multiple components. The IR and UV benches may now be integrated on one analyzer, the IPS-4 Full Spectrum – greatly extending the measurement possibilities. And with integrated customized sample handling and conditioning system, the IPS-4 is engineered to be a fully integrated, turn-key solution to your specific process analysis need.

## Tunable Diode Laser Absorption Spectroscopy

Model 5100 multi gas analyzer based on Tunable Diode Laser Absorption Spectroscopy (TDLAS), is widely used in natural gas, chemical and combustion processes to measure H<sub>2</sub>O, CH<sub>4</sub>, CO<sub>2</sub>, H<sub>2</sub>S and O<sub>2</sub>. As TDLAS is a non-contact technique, there are no sensor ageing nor degradation issues, thus it is better suited to “dirty” streams than direct contact sensor based systems. While our competitors use all analog electronics in their WMS (Wavelength Modulation Spectroscopy) implementation, in the 5100 the processing is digital, which provides more accurate and precise results. Model 5100 comes standard with laser line lock and internal moisture verification features. Digital signal processing, web browser based interface, advanced diagnostic functions and an extremely low cost of ownership make the Model 5100 the best performing and most reliable in its class.

## Moisture Analyzer

Moisture content is of particular concern for many processes and gases. For natural gas, Moisture can cause freezing where rapid expansion occurs due to the Joule-Thompson effect and high levels of moisture can lower the net heating value or BTU content of the gas. For chemical reactions, trace moisture in some reactant gases may cause whole process failure. High moisture levels of UHP gases have been linked to reduced yields and variable device characteristics in most semiconductor technologies, and for most geometries.

Compressed industrial gas suppliers need accuracy to certify compressed gas quality. Many industrial applications use desiccant dryers to remove moisture from process gases. Used as the gases, dryer or process monitor, accurate and reliable moisture analyzer is needed.

Most moisture analyzers of AMETEK measure trace levels of moisture in a gas through the use of a quartz-crystal oscillator sample cell. AMETEK is the leader in quartz-crystal technology, which for thirty years has offered significant advantages over other measurement techniques:

- It is the most accurate trace moisture measurement technology available
- It responds far faster to both increasing and decreasing moisture levels
- It is specific to moisture in most applications
- It provides a much more rugged sensor



Because of these advantages, the quartz-crystal oscillator has become the industry standard for applications ranging from ultrahigh purity semiconductor gases to natural gas streams containing 30% H<sub>2</sub>S.

### Real Moisture Measurement

These moisture analyzers measure moisture concentration directly, in parts per million by volume, parts per million by weight, or mass of water per standard volume.

## **The Quartz-Crystal Oscillator**

The heart of these analyzers is a quartz-crystal microbalance (QCM) sensor and sampling system developed by AMETEK specifically for highly accurate moisture measurements. The sensor consists of a pair of electrodes which support the QCM sensor. When voltage is applied to the sensor a very stable oscillation occurs. The faces of the oscillator are covered with a hygroscopic polymer. As the amount of moisture sorbed onto the polymer varies, the mass of the QCM changes, producing a corresponding change in the frequency of oscillation.

## **Unique Sampling System**

The sampling system in most of the QCM moisture analyzers provides three operating modes: gas saver, sensor saver and high speed.

Under normal conditions, the analyzer operates in the HIGH SPEED mode. Process gas and dry reference gas alternately pass through the sensor for short, equal intervals of time. In this mode, the analyzer delivers a speed of response that's far superior to other analyzers.

In some processes, the sample gas is very valuable, in which case the sample gas consumption can be reduced by activating GAS SAVER mode.

In process applications where the sample contains liquid contaminants such as glycol, compressor oils or high boiling point hydrocarbons, the moisture analyzer should be operated in its SENSOR SAVER mode.

The unique AMETEK sampling system in the Model QCM analyzers provides superior accuracy, repeatability and speed of response compared to other moisture analyzers.

## **Sophisticated System Diagnostics and Inherently Better Accuracy That You Can Verify Right In Your Process**

The performance of every analyzer is influenced by a number of parameters like drift. However every AMETEK QCM analyzer is equipped with an internal moisture standard. This NIST traceable verification unit eliminates drift and allows the user at any moment to check the analyzer's responsiveness and accuracy. And the analyzer's On-Line Verification capability gives you data you can count on while completely eliminating the need for periodic recalibration of probes. With its internal moisture source, the QCM analyzer gives you data you can have confidence in. On a programmed schedule, or whenever you feel it's necessary, you can route your process gas through the analyzer's internal moisture source, giving you a calibration standard based on the actual process gas.

You can also use AMETEK QCM analyzer to verify the performance of sensors that previously had to be returned to the manufacturer for recalibration.

This analyzer also monitors the baseline performance of the QCM sensor. If contaminants begin to foul the sensor, the analyzer will automatically change its operating mode to the sensor saver mode and provide an alarm. This self-preservation capability enables the QCM analyzer to continue to deliver accurate moisture measurements while extending cell life.

## **Fast Response**

The QCM analyzers employ "non-equilibrium" sensing technology, pioneered and refined in over thirty years of practical applications. The fundamental difference between the QCM and other technologies is that the QCM does not need to measure the absolute value of moisture. So, there's no need to wait for equilibrium between the sensor and process. When a rapid change in moisture concentration occurs, the QCM moisture analyzers can respond quickly to alert you the problem.

Besides QCM analyzers, AMETEK can also provide analyzers with  $P_2O_5$  electrolytic principle.

AMETEK provides highly accurate, reliable QCM based moisture analyzers for all your moisture measurement needs.

**For detailed information of each model, please refer to the product specification sheets.**

# PROCESS INSTRUMENTS

## Process Spectrophotometer



Model	IPS-4 UV/IR	IPS-4 UV/IR Full Spectrum
Analyzer	Integrated process spectrophotometer	
Principle	UV or IR or Both	UV or IR or Both
Components	CO, CO <sub>2</sub> , H <sub>2</sub> O, NH <sub>3</sub> , Cl <sub>2</sub> , SO <sub>2</sub> , HCl, halogen and halide, hydrocarbon	
Range	ppm to 100%, depends on application	ppm to 100%, depends on application
Response time	Photometer <2 Seconds, Total system response depends upon sample system	
Precision	Typically 1% Full Scale	Typically 1% Full Scale
Repeatability	<1% Full Scale, depends on application	<1% Full Scale, depends on application
Calibration	Zero and Span – Manual or Automatic	Zero and Span – Manual or Automatic
Linearity	<1% Full Scale	<1% Full Scale
Noise	0.5% Full Scale	0.5% Full Scale
Flow rate	Depends on application, Typically between 1 and 10 L/Minute	
Sampling	Instrument air driven aspirator	Instrument air driven aspirator
Analog output	Two 0/4-20mA, vacuum fluorescent display, Fast Ethernet	Four 0/4-20mA, vacuum fluorescent display, Fast Ethernet
Communication	RS-232/RS-485 supports Modbus RTU	RS-232/RS-485 supports Modbus RTU
Alarm	8 dry relay contacts	8 dry relay contacts
Power	120/240 VAC, ±10%, 47~63 Hz	120/240 VAC, ±10%, 47~63 Hz
Power consumption	700 W when oven is heated	700 W when oven is heated
Instrument air	490-700 kPag	490-700 kPag
Explosion proof area	General purpose; Class 1, Division 1; Class 1, Division 2	
Enclosure	IP65, NEMA 4	IP65, NEMA 4
Operation temperature	-20~50°C	-20~50°C
Dimension H×W×D (mm)	530 × 780 × 254	660 × 950 × 300
Weight	66 kg	80 kg
Installation	Cabinet	Cabinet
Typical applications	<ul style="list-style-type: none"> <li>• Ethylene Glycol purity monitoring</li> <li>• Titanium oxide production</li> <li>• SRU feed gas</li> <li>• Acetic acid production</li> <li>• Natural gas</li> <li>• Waste water treatment</li> <li>• Chemical and petrochemical processes</li> <li>• Halogen and Halide plants</li> </ul>	<ul style="list-style-type: none"> <li>• Ethylene Glycol purity monitoring</li> <li>• Titanium oxide production</li> <li>• SRU feed gas</li> <li>• Acetic acid production</li> <li>• Natural gas</li> <li>• Waste water treatment</li> <li>• Chemical and petrochemical processes</li> <li>• Halogen and Halide plants</li> </ul>
Features	Integrated sample system in oven. Fast Ethernet and Modbus communications. Integrated IR and UV measurement capability.	

# PROCESS INSTRUMENTS

## Process Spectrophotometer



Model	4000	4600	4610
Analyzer	Photometric analyzer	Stack gas analyzer	NOx Photometric analyzer
Principle	UV	Non-dispersive ultraviolet	Non-dispersive ultraviolet
Components	Aniline, Benzene, Bisphenol A, CS <sub>2</sub> , Cl <sub>2</sub> , ClO <sub>2</sub> , Color, DMAC, F <sub>2</sub> , H <sub>2</sub> S, Hydroquinone, Invert Sugar, I <sub>2</sub> , Lignin, MEHQ, Mercury, NCl <sub>3</sub> , NOx, Phenol, ClCO, SO <sub>2</sub> , Uranium Hexafluoride, Uranyl Nitrate, Vanadium	SO <sub>2</sub> , (O <sub>2</sub> , Optional mass emissions, Optional moisture correction)	NOx, O <sub>2</sub>
Range	Customized	SO <sub>2</sub> : 0-100ppm-5000ppm, Other ranges available O <sub>2</sub> :0-25% (Option)	NOx: 0-200ppm-100%; O <sub>2</sub> : 2-25% (wet base)
Response time	Optical system <1 Second; System response time relates to preconditioning system	T90<60 Seconds (typical, including sample system)	T90<60 Seconds
Precision	±1% Full Scale	±2%	Photometer: ±1%; System: 2-5%
Repeatability	Depends on application	0.25%	—
Calibration	Filter or calibration gas	Optical filter	Optical filter
Linearity		0.60%	—
Noise	<±0.5%		
Flow rate	Gas: 2.5 L/Minute; Liquid: 100 mL/Minute	3-5 L/Minute	3 L/Minute
Sampling	Depends on application	Instrument air driven eductor	Aspirator
Analog output	Two 4-20mA	Two 4-20mA	Two 4-20mA
Communication	RS-485	RS-485	RS-485
Alarm	Four relays	Digital	Digital
Power	120/240 VAC ±10%, 47~63 Hz	120/240 VAC, ±10%, 50/60 Hz	120/240 VAC, ±10%, 50/60 Hz
Power consumption	600W	2000W	Field unit: 1275W; Controller: 75W
Instrument air	350-700 kPa	400-700 kPa	300-600 kPa
Explosion proof area	Class 1, Division 1, Group C, D; Class I, Division 2, Group A, B, C, D, T4; Zone 1, II C T3	General purpose; Class I, Division 2, Group A, B, C, D; Zone 1 EExp II C, T3	Field: Class I, Division 1, Group C, D T6; Controller: Class I, Division 2, Group A, B, C, D T4
Enclosure	NEMA 4X	NEMA 3 RCV, NEMA 4X	NEMA 3 RCV, NEMA 4X
Operation temperature	-7~52°C	-20~50°C	-2~50°C (Field unit); 0~50°C (Controller)
Dimension H×W×D (mm)		1829 × 1219 × 305	1830 × 1220 × 310 (Field unit)
Weight		409 kg	500 kg (Field unit)
Installation	Cabinet	Back panel or Cabinet	Cabinet
Main applications	<ul style="list-style-type: none"> <li>• Chlorine purity</li> <li>• Fluorination process</li> <li>• Phosgenation Processes</li> <li>• Pulp &amp; Paper Bleaching</li> <li>• Turbidity</li> </ul>	<ul style="list-style-type: none"> <li>• Sulfur recovery units</li> <li>• Sulfuric acid plants</li> <li>• Nitric acid plants</li> <li>• Power generation plants</li> <li>• Cement kilns</li> <li>• Smelters &amp; Pulp mills</li> <li>• Fluid catalytic cracker stacks</li> </ul>	<ul style="list-style-type: none"> <li>• Sulfuric acid plants</li> <li>• Nitric acid plants</li> <li>• Power generation plants</li> <li>• Cement kilns</li> <li>• Smelters</li> <li>• Pulp mills</li> </ul>

# PROCESS INSTRUMENTS

## Process Spectrophotometer



Model	4650	4660	4670	4700
Analyzer	H <sub>2</sub> S in lean amine analyzer	Low H <sub>2</sub> S analyzer	H <sub>2</sub> S in rich amine analyzer	High H <sub>2</sub> S analyzer
Principle	Non-dispersive ultraviolet	Non-dispersive ultraviolet	Non-dispersive ultraviolet	Non-dispersive ultraviolet
Components	H <sub>2</sub> S	H <sub>2</sub> S	H <sub>2</sub> S	H <sub>2</sub> S
Range	0-1g/L	0-10ppm (sales gas); 0-300ppm (fuel gas); Other ranges available	0-0.5mol H <sub>2</sub> S/mol amine, Other ranges available	0-100%
Response time	T90<60 Seconds	T90<60 Seconds	T90<60 Seconds	Less than 30 Seconds
Precision	±4%	±3%	±2%	±2%
Repeatability	±1%	±1%	±0.5%	0.25%
Calibration	Optical filter	Optical filter	Optical filter	Optical filter
Linearity	—	±1%	—	0.60%
Noise		<±0.3% Full Scale		
Flow rate	—	2 L/Minute	—	3-5 L/Minute
Sampling	Depends on application	Sample inlet pressure: 35-350 kPag; Pump for low pressure	—	
Analog output	Two 4-20mA	Two 4-20mA	Two 4-20mA	Two 4-20mA
Communication	RS-485	RS-485	RS-485	RS-485
Alarm	Digital	Digital	Digital	Digital
Power	120/240 VAC ±10%, 47~63 Hz	120/240 VAC ±10%, 47~63 Hz	120/240 VAC, 50/60 Hz	120/240 VAC, 50/60 Hz
Power consumption	2000W	200W	500W	1000W
Instrument air	70-700 kPa	70-700 kPa	140-700 kPa	
Explosion proof area	Class I, Division 2, Group A, B, C, D, T6-T4; Class I, Division 1, Group C, D; ATEX II 2 G II C T3	Class 1, Division 2, Group B, C, D Zone 1 EExd II C T4	Class I, Division 2, Group A, B, C, D, T6-T4; Class I, Division 1, Group C, D; ATEX II 2 G II C T3	Class 1, Division 2, Group C, D; Zone 1 EExd II C T4 (the power supply and controller must be mounted in a safe area at a remote location.)
Others	Clean water: 70~350 kPa greater than sample return pressure at 60 L/Hour	Steam condensate: 35-350 kpa, 50 mL/Minute; Ammonia: Commercial grade (Liquid gas) bottle lasts about 3 years	Clean water: 70~350 kPa greater than sample return pressure at 60 L/Hour	
Enclosure	NEMA 3 RCV, NEMA 4X	NEMA 3 RCV, NEMA 4X	NEMA 3 RCV, NEMA 4X	NEMA 3 RCV, NEMA 4X
Operation temperature	-7~50°C	5~50°C	-7~50°C	-20~50°C
Dimension H×W×D (mm)	1829 × 1219 × 305 (Field unit)	1829 × 1219 × 305 (Field unit)	1829 × 1219 × 305 (Field unit)	1829 × 1219 × 305 (Field unit)
Weight	409 kg	409 kg	409 kg	409 kg
Installation	Cabinet	Cabinet	Cabinet	Cabinet
Main applications	• Amine regeneration	• Sales (natural) gas • Refinery fuel gas • Absorber overhead gas • Hydrogen recycle gas • Other process streams	• Amine regeneration	• Acid gas • Sour gas • Well head gas • Flare gas
Features	High precision and stability	Convert H <sub>2</sub> S to (NH <sub>4</sub> ) <sub>2</sub> S; High precision; Decrease interferences from aromatic or unsaturated hydrocarbon	High precision and stability	Suitable for high H <sub>2</sub> S application

# PROCESS INSTRUMENTS

## Tunable Diode Laser Absorption Spectrophotometer



Model	5100	5100 HD	5100 HD ATEX	5100 (Portable)
Principle	Tunable Diode Laser Absorption Spectroscopy (TDLAS)			
Flow cell	Vertical cell, Single cell	Horizontal cell, Single or dual cell in oven which may be heated to 100°C as standard, higher temperature options available		Application specific gas cells with a wide range of path lengths available
Components	Single analyte	Single or multiple analyte	Single or multiple analyte	H <sub>2</sub> O
	H <sub>2</sub> O, H <sub>2</sub> S, CO <sub>2</sub> , CH <sub>4</sub> , CO, O <sub>2</sub>			
Typical ranges	H <sub>2</sub> O: 0-10ppm/5-2500ppm (varies with application); CH <sub>4</sub> & CO: ppm to percentage levels; CO <sub>2</sub> : 0-100ppm to percentage levels; O <sub>2</sub> : 0-2%			H <sub>2</sub> O: 5-2500ppm
Accuracy	H <sub>2</sub> O: ±2% reading or ±4ppm; CH <sub>4</sub> : ±3% reading; CO <sub>2</sub> : ±2% reading			±2% reading
Response time	Photometric response: <1 second; Whole system response time depends on sampling system			T90<15 seconds
Analog output	0/4-20mA, 4 lines			
Communication	RS-485 (Modbus RTU protocol), Fast Ethernet			USB 2.0 interface
Alarm	Dry relay contacts			
Sample gas temperature	0-100°C			
Sample gas pressure	<70 kPag			
Flow rate	1-10 L/Minute			
Operation temperature	-20~50°C			-20~50°C
Explosion proof area	GP/Division 2, Division 1, ATEX Zone 1	ATEX Zone 2 and Zone 1	ATEX Zone 2 and Zone 1	Division 2
Enclosure	IP65, NEMA 4			
Weight	25 kg	59 kg	113 kg	5 kg
Dimension H×W×D (mm)	869 × 434 × 212	642 × 830 × 295	648 × 114 × 435	250 × 150 × 80
Power	120/240 VAC ±10%, 47-63Hz, 25W, 130W with cell heater	120/240 VAC ±10%, 47-63Hz, 25W, 430W with oven	120/240 VAC ±10%, 47-63Hz, 25W, 430W with oven	Battery, approximately 8 hours under normal use
Installation	Outdoor, stationary			Portable
Heated sample cell compartment	No	Yes	Yes	No
Typical applications	<ul style="list-style-type: none"> <li>• Natural gas</li> <li>• Petrochemical and chemical processes</li> <li>• LNG</li> <li>• Refinery</li> <li>• Combustion application</li> </ul>			<ul style="list-style-type: none"> <li>• Spot checking the performance of plant equipment</li> </ul>
Features	All digital signal processing; Fully intergrated sample handing; Web based interface; Noncontact measurement; Reference cell for span validation & peak locking			Excellent wavelength stability; Advanced digital signal processing; Reference cell for span validation & peak locking

# PROCESS INSTRUMENTS

## Moisture Analyzer



Model	303B	304MCA
Principle	P <sub>2</sub> O <sub>5</sub> electrolytic	P <sub>2</sub> O <sub>5</sub> electrolytic
Medium	Non corrosive gas	Cl <sub>2</sub>
Range	0-1000ppm, 0-2000ppm (with reduced sample flow)	0-1000ppm, 0-2000ppm (with reduced sample flow)
Precision	±0.5ppm or ±5% reading, whichever is greater	±2ppm or ±20% reading, whichever is greater
Sensitivity	0.1ppm	1ppm
Repeatability	±1% reading	±1% reading
Low detection limit	0.1ppm	0.1ppm
System response time	T63<30 Seconds	T63<30 Seconds
Analog output	4-20mA	4-20mA
Communication	—	—
Alarm	Rated for 1A, 24 VDC, normally open and normally closed contacts	Rated for 1A, 24 VDC, normally open and normally closed contacts
Sample gas pressure	69-690 kPa	70-2758 kPa
Flow rate	100 mL/Minute; 500 mL/Minute (Bypass)	100 mL/Minute; 100 mL/Minute (Bypass)
Operation temperature	0°C~52°C	0°C~40°C
Explosion proof area	Class 1, Division 2, Group A, B, C, D, T4	Class 1, Division 2, Group A, B, C, D, T4
Enclosure	NEMA 3R	NEMA 4X
Power	100-130 VAC, 47-63 Hz, 20W; 200-260 VAC, 47-63 Hz, 20W	100-130 VAC, 47-63 Hz, 10W; 200-260 VAC, 47-63 Hz, 10W
Installation	Portable	Stationary
Weight	6.4 kg	14.7 kg
Dimension H×W×D (mm)	127 × 235 × 343	318 × 610 × 159
Main applications	• Non corrosive gas	• Moisture in Cl <sub>2</sub>
Features	Portable; Fast response and high precision	Specifically developed for Cl <sub>2</sub> measurement

# PROCESS INSTRUMENTS

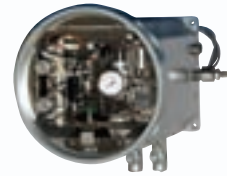
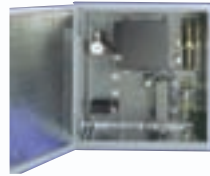
## Moisture Analyzer



Model	2850	3050-AM	3050-RM
Principle	Quartz-crystal microbalance	Quartz-crystal microbalance	Quartz-crystal microbalance
Medium	Non corrosive gas	Non corrosive gas	Non corrosive gas
Range	0.1-1000ppm (1-100ppm with trend indication outside this range)	0.1-100ppm, (Indicates trend to 1000 ppmv)	0.1-2500ppm
Precision	±0.05ppm or ±5% reading, whichever is greater	±10% reading	±0.1ppm or ±10% reading
Sensitivity	20 ppbv or 0.5 percent of instrument range, whichever is greater	—	0.1ppm or 1% reading
Repeatability	±5% reading	—	±5% reading
Low detection limit	0.1ppm	0.1ppm	0.1ppm
System response time	T63<5 Minutes	T63<5 Minutes	T63<5 Minutes
Analog output	4-20 mA	4-20 mA	4-20 mA
Communication	RS-485	RS-485/RS-232	RS-485/RS-232
Alarm	Three pairs, 30 VAC/DC, 1A	Three contact, 30 VAC/60 VDC, 50 VA/1A	Three contact closures; system, data valid and concentration alarms
Moisture generator	0.8ppm / 3ppm	—	50ppm
Sample gas pressure	103-700 kPa	42-345 kPa	138-345 kPa
Flow rate	200 mL/Minute	150 mL/Minute	150 mL/Minute
Operation temperature	4°C~40°C	5°C~50°C	5°C~50°C
Explosion proof area	Class 1, Division 2, Group B, C, D	Non-hazardous	Class 1, Division 2, Group A, B, C, D, T4
Power	85-265 VAC, 47-63 Hz, 185 W	85-265 VAC, 47-63 Hz, 185 W	85-265 VAC, 47-63 Hz, 185 W
Installation	Stand-alone or 19-inch rack installation	19-inch rack/bench-top installation	19-inch rack mount
Weight	17 kg	9.8 kg	11.4 kg
Dimension H×W×D (mm)	132 × 432 × 381	133 × 483 × 419	133 × 483 × 419
Main applications	<ul style="list-style-type: none"> <li>Industrial gas production and quality assurance</li> <li>Cryogenic air separation</li> <li>Process dryers</li> </ul>	<ul style="list-style-type: none"> <li>Industrial gas production and quality assurance</li> <li>Cryogenic air separation</li> <li>Semiconductor grade gas</li> </ul>	<ul style="list-style-type: none"> <li>Industrial gas</li> </ul>
Features	Fast response; Wide range; High precision; On line verification	Fast response; Wide range; High precision; On line zero gas verification	Fast response; Wide range; High precision; On line verification

# PROCESS INSTRUMENTS

## Moisture Analyzer



Model	3050-OLV	3050-DO	3050-SLR
Principle	Quartz-crystal microbalance	Quartz-crystal microbalance	Quartz-crystal microbalance
Medium	Non corrosive gas	Non corrosive gas	Non corrosive gas
Range	0.1-2500ppm	0.02-2500ppm	0.1-2500ppm
Precision	±10% reading	±20ppb or ±10% reading	±0.03ppm or ±10% reading
Sensitivity	0.1ppm or 1% reading	10ppb or 1% reading	10ppb or 1% reading
Repeatability	±5% reading	±5% reading	15ppb or ±5% reading
Low detection limit	0.1ppm	0.02ppm	0.1ppm
System response time	T63<5 Minutes	T63<5 Minutes	T63<5 Minutes
Analog output	4-20 mA	4-20 mA	4-20 mA
Communication	RS-485/RS-232	RS-485/RS-232	RS-485/RS-232; Modbus protocol
Alarm	Three contact closures; system, data valid and concentration alarms	Two contact closures	Two contact closures: system and data valid alarms
Moisture generator	50ppm	1ppm	1ppm
Sample gas pressure	138-345 kPa	138- 345 kPa	138-345 kPa
Flow rate	150 mL/Minute	150 mL/Minute	150 mL/Minute
Operation temperature	-20°C~50°C	-20°C~45°C	-20°C~45°C
Explosion proof area	Class 1, Division 2, Group A, B, C, D, T4; Class 1, Division 1, Group B, C, D, T5; EExd II C T6	Class 1, Division 2, Group A, B, C, D, T4	Class 1, Division 1, Group B, C, D, T6; EExd II C T6
Enclosure	NEMA 4X	NEMA 4X	—
Power	120 ±10% VAC, 50/60 Hz, 150 W 230 ±10% VAC, 50/60 Hz, 150 W	120/240 VAC, 50/60 Hz, 150 W	120/240 VAC, 50/60 Hz, 150 W
Weight	—	82 kg	—
Dimension H×W×D (mm)	612 × 681 × 347	672 × 671 × 339	432 × 502 × 295
Main applications	• Natural gas • Industrial gas application	• Dryer Outlet Monitoring	• Super low range moisture application
Features	Fast response; Wide range; High precision; On line verification	Fast response; Wide range; High precision; On line verification	Fast response; Wide range; High precision; On line verification

# PROCESS INSTRUMENTS

## Moisture Analyzer



Model	3050-TE	5000	561 Sample Preconditioning System
Principle	Quartz-crystal microbalance	Quartz-crystal microbalance	
Medium	Non corrosive gas	Non corrosive gas	Non corrosive gas
Range	0.01-100ppm	0.1-1000ppm	Number of streams: 1 to 4
Precision	±0.01ppm or ±10% reading	±1ppm or ±5% reading	
Sensitivity	5ppb or 1% reading	0.1ppm or 0.5% reading	
Repeatability	±5ppb or ±5% reading	0.2ppm or 1% reading	
Low detection limit	0.01ppm	0.1ppm	
System response time	T63<5 Minutes	T63<5 Minutes	Stream switching time is from 2 minutes to many minutes per stream
Analog output	4-20 mA	4-20 mA	
Communication	RS-485/RS-232	RS-485/RS-232	
Alarm	Two contact closures: system and data valid alarms	System Alarm; Concentration Alert; Range or Calibration Alert	
Moisture generator	1ppm	3ppm, 20ppm	
Sample gas pressure	138-345 kPa	207-690 kPa	30-100psi, up to 200psi with optional pressure reducer
Flow rate	150 mL/Minute	250 mL/Minute	1500 mL/Minute
Operation temperature	-40°C~60°C	-20°C~50°C (field unit), -10°C~50°C (controller)	-20°C~50°C, -40°C~50°C with electronic heat
Explosion proof area	Class 1, Division 1, Group B, C, D, T6; EExd II C T6	Class 1, Division 1, Group B, C, D, T6; EExd II C T6	Class 1, Division 2, Group B, C & D; EExd II C T6
Enclosure	NEMA 3R	NEMA 4X	—
Power	120/230 ±10% VAC, 50/60 Hz, 150W	230 VAC ±10%, 50/60 Hz, 175W (field unit); 75W (controller)	220V, 50/60 Hz, 190W
Weight	153.3 kg	—	Max. 350 kg
Dimension H×W×D (mm)	1219 × 700 × 532	432 × 370 × 380	Single stream: 1530 × 770 × 460; Multi stream: 1680 × 920 × 460
Main applications	<ul style="list-style-type: none"> <li>• Cryo-recovery plant</li> <li>• Sub-0.1 ppmv industrial moisture analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Petroleum Refining</li> <li>• Natural gas &amp; Acid gas</li> <li>• Petrochemicals &amp; Chemicals</li> <li>• Enhanced Oil Recovery</li> <li>• Electronics &amp; Metals</li> </ul>	<ul style="list-style-type: none"> <li>• Preconditioning system for 2850, 5800, 5812, 5000. Options include pressure reducer, electric heater, vortex cooler, gas/liquid separator, enclosure, fast loop, etc.</li> </ul>
Features	Fast response; High precision; On line verification; Suitable for sub-0.1 ppmv industrial moisture analysis	Fast response; Wide range; High precision; On line verification	

# PROCESS INSTRUMENTS

## Moisture Analyzer



Model	5800	5812	5830
Principle	Quartz-crystal microbalance	Quartz-crystal microbalance	Quartz-crystal microbalance
Medium	Non corrosive gas	Natural gas	Non corrosive, clean gas
Range	0.02-100ppm,trend indication to 1000 ppm	1-1000ppm	0-100ppm, trend indication to 1000 ppmv
Precision	±20ppb or ±5% reading	±1ppm or ±5% reading	±20ppb or ±10% reading
Sensitivity	5ppb or 0.5% reading	0.02ppm or 0.5% reading	5ppb or 0.5% reading
Low detection limit	20ppb	0.1ppm	20ppb
System response time	T63<5 Minutes	T63<5 Minutes	T63<5 Minutes
Analog output	4-20 mA	4-20 mA	4-20 mA
Communication	RS-485	RS-485	RS-485/RS-232
Alarm	Three independent contact closures, 32 VDC maximum, 1A noninductive load, for system alarm, range alert	Three independent contact closures, 30 VDC maximum, 1A resistive load for system alarm, range alert	Three dry contact closures, 32 VDC maximum, 1A noninductive load (moisture, data valid and system alarm)
Moisture generator	0.8ppm/3ppm	3ppm	0.8ppm
Sample gas pressure	100-689 kPa	100-1000 kPa	138-345 kPa
Flow rate	200 mL/Minute	200 mL/Minute	150 mL/Minute; 1 L/Minute (for bypass)
Operation temperature	4°C~40°C	4°C~40°C	5°C~50°C
Explosion proof area	Class 1, Division 2, Group A, B, C, D	Class 1, Division 2, Group A, B, C, D, T3C	—
Power	85-265 VAC, 47-63 Hz, 185W	85-265 VAC, 47-63 Hz	85-265 VAC, 47-63 Hz, 180W
Installation	Stand-alone or 19-inch rack installation	Stand-alone or 19-inch rack installation	19-inch rack/bench-top installation
Weight	16.8 kg	8.2 kg	12.7 kg
Dimension H×W×D (mm)	132 × 432 × 381	132 × 432 × 381	133 × 483 × 419
Main applications	<ul style="list-style-type: none"> <li>• High purity gas production</li> <li>• Olefin production, storage and transmission</li> <li>• Semiconductor gases</li> </ul>	<ul style="list-style-type: none"> <li>• Natural gas</li> </ul>	<ul style="list-style-type: none"> <li>• High purity gas production</li> <li>• Semiconductor gases</li> </ul>
Features	Fast response; Exceptional accuracy; On line verification	Fast response; Exceptional accuracy; Long sensor life; On line verification	Fast response; Exceptional accuracy; On line verification

# PROCESS INSTRUMENTS

## Moisture Analyzer



Model	5910	5920
Principle	Quartz-crystal microbalance	Quartz-crystal microbalance
Medium	UHP gases	UHP gases
Range	0-150ppb, Trend indication to 1000 ppbv	0-150ppb, Trend indication to 1000 ppbv
Precision	±100 pptv or ±10% reading	±1ppb or ±10% reading
Sensitivity		Better than 1 ppb
Low detection limit	150ppt	1ppb
System response time	T80 (25ppb step change)<10 Minutes	T80 (25ppb step change)<10 Minutes
Analog output	4-20 mA	4-20 mA
Communication	RS-485/RS-232	RS-485/RS-232
Alarm	System alarm, concentration alarm and data valid 30 VAC or 60 VDC max, 50 VA or 1A max, resistive	System alarm, concentration alarm and data valid 30 VAC or 60 VDC max, 50 VA or 1A max, resistive
Sample gas pressure	138-345 kPa	138-1035 kPa
Flow rate	<3 L/Minute	<0.5 L/Minute
Operation temperature	10°C~30°C	10°C~30°C
Explosion proof area	Class 1, Division 2, Group A, B, C, D, T4	—
Power	100-132 VAC / 230 VAC ±10%, 47-63 Hz, 185W	100-132 VAC / 230 VAC ±10%, 47-63 Hz, 185W
Installation	19-inch rack mount	19-inch rack mount
Weight	15.9 kg	15.9 kg
Dimension H×W×D (mm)	177 × 480 × 509	177 × 480 × 509
Main applications	<ul style="list-style-type: none"> <li>• Continuous monitoring</li> <li>• Spot monitoring</li> <li>• Cylinder gases</li> </ul>	<ul style="list-style-type: none"> <li>• Continuous monitoring</li> <li>• Spot monitoring</li> <li>• Cylinder gases</li> </ul>
Features	Fast response;  Exceptional accuracy;  On line verification;  ppt moisture analysis for UHP gas	Fast response;  Exceptional accuracy;  On-line zero-gas verification

Trace Analytical was founded in 1984. It has been a market leader since 1993. The business became part of AMETEK in 2004.

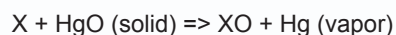
Trace Analytical chromatographs are capable of detecting ppb concentrations of contaminants in sample gas matrices. Not only familiar with the industry's advanced analytical technology, Trace Analytical developed it!

Trace Analytical analyzers have two types of detectors: Reduction Gas Detector (RGD) and Flame Ionization Detector (FID). ta3000R/5000R/7000R and ta3000F/5000F/7000F are specially designed to detect ppb level of H<sub>2</sub>, CO, CO<sub>2</sub>, CH<sub>4</sub> and NMHC impurities in bulk gases.

### **Reduction Gas Detection**

The ta3000R/5000R/7000R consists of a microprocessor controlled gas chromatograph utilizing the Unique Reduction Gas Detector (RGD) designed by Trace.

Species eluting from the RGD column set pass immediately into the heated bed of mercuric oxide (HgO) and the photometric detector. Within the HgO bed, the general reaction occurs:



Where X is any appropriate reducing gas. The resulting mercury vapor is quantified by means of an ultraviolet photometer located immediately downstream of the mercuric oxide bed. The relative ease of measuring mercury vapor at low concentrations lends the technique its inherent sensitivity.

### **Flame Ionization Detection**

The ta3000F/5000F/7000F consists of a microprocessor controlled gas chromatograph utilizing the Flame Ionization Detector (FID).

Flame Ionization Detection Species eluting from the FID column set pass immediately into the heated bed of ruthenium oxide (Ru<sub>3</sub>O<sub>4</sub>) and the flame detector. Within the ruthenium oxide bed the general reaction occurs:



Where CO<sub>x</sub> is an appropriate carbon – oxygen compound gas. For carbon dioxide the equilibrium reaction is:



The resulting methane is quantitatively determined by means of flame ionization immediately downstream of the ruthenium oxide bed. Methane and other simple hydrocarbons pass through the methanizer unaffected.

Trace Analytical analyzers have been widely used in semiconductor industry to monitor ppb level contaminants in UHP gases and widely used in petrochemical industry to measure ppb level CO in ethylene/propene. And have good reputation to help the research in research institute and university.

**For detailed information of each model, please refer to the product specification sheets.**



Model	ta3000R	ta5000R	ta7000R
Detector	Reduction Gas Detector (RGD)		
Components	H <sub>2</sub> , CO		
Range	0-3ppm (Higher range is available as an option)		0-199.9ppb
Precision	H <sub>2</sub> : ±10ppb CO: ±5ppb or ±10% reading	H <sub>2</sub> : ±10ppb CO: ±5ppb or ±10% reading	H <sub>2</sub> : ±10ppb CO: ±5ppb or ±10% reading
Low detection limit	10ppb	3-5ppb (varies with application)	<0.5ppb
Analysis time	2-10 Minutes (varies with application)	6 Minutes (varies with application)	6 Minutes (varies with application)
Display resolution	0.1ppb		
Communication ports resolution	0.01ppb		
Carrier gas	N <sub>2</sub>	N <sub>2</sub>	N <sub>2</sub> or Sample gas after internal purification
Flow rate	Min. 20 mL/Minute; Bypass 50 mL/Minute	Min. 20 mL/Minute; Bypass 50 mL/Minute	300 mL/Minute
Purity	99.99999% (external purifier may be required)	99.999999% (external purifier may be required)	N/A
Pressure	70-90 psig		
Pressure stability	±2%		
Vent pressure	Vent to atmosphere, Max. 0.5 psig		
Temperature	16-38°C, optimum when maintained ±2°C		
Sample gas Pressure	N/A	N/A	70-90 psig
Flow rate	20-100 mL/Minute	20-100 mL/Minute	50 mL/Minute
Connection	1/16" VICI compression	1/16", 1/8" VICI compression	1/16", 1/8", 1/4" VICI compression
Calibration gas production	External MGB1000 gas blender	External MGB1000 gas blender	Internal gas blender
Operation temperature	16~32°C		
Power	220 VAC, 50 Hz		
Dimension H×W×D (mm)	180 × 430 × 670		
Weight	15.9 kg		
Main applications	<ul style="list-style-type: none"> <li>• Dissolved H<sub>2</sub> in water headspace</li> <li>• CO in air</li> <li>• Ethylene or ethyleneoxide in air</li> <li>• CO in ethylene/propylene</li> <li>• CO and H<sub>2</sub> in CH<sub>4</sub></li> <li>• H<sub>2</sub> and CO in bulk gas: O<sub>2</sub>, inerts and air</li> </ul>	<ul style="list-style-type: none"> <li>• CO, H<sub>2</sub> in N<sub>2</sub>, Ar, He, O<sub>2</sub></li> </ul>	<ul style="list-style-type: none"> <li>• High purity gas</li> </ul>



Model	ta3000F	ta5000F	ta7000F	
Detector	Flame Ionization Detector (FID)			
Components	CO <sub>2</sub> , CH <sub>4</sub> , NMHC			
Range	0-5ppm (Higher range is available as an option)		0-199.9ppb	
Precision	±1×LDL or ±2% reading, which is greater		CH <sub>4</sub> : ±0.25ppb CO <sub>2</sub> : ±0.5ppb; NMHC: ±1ppb, or ±10% reading	
Low detection limit	10-25ppb (varies with application)	3-10ppb (varies with application)	0.5-2ppb (varies with application)	
Analysis time	2-10 Minutes (varies with application)	10 Minutes (varies with application)	10 Minutes (varies with application)	
Display resolution	0.1ppb			
Communication ports resolution	0.01ppb			
Carrier gas	N <sub>2</sub>	N <sub>2</sub>	N <sub>2</sub> or Sample gas after internal purification	
Flow rate	Min. 50 mL/Minute; Bypass 50 mL/Minute	Min. 50 mL/Minute; Bypass 50 mL/Minute	300 mL/Minute	
Purity	99.99999% (external purifier may be required)	99.999999% (external purifier may be required)	99.9999% N <sub>2</sub> for H <sub>2</sub> and O <sub>2</sub> Models	
Pressure	70-90 psig			
Pressure stability	±2%			
Vent pressure	Vent to atmosphere, Max. 0.5psig			
Temperature	16~38°C, optimum when maintained ±2°C			
FID Air	Pressure	20 psig	20 psig	50-60 psig
	Pressure stability	±2%	±2%	±2%
	Flow rate	230 mL/Minute	230 mL/Minute	250 mL/Minute
	Purity	Hydrocarbons <1ppm; Dew point: <-65°C		
FID H <sub>2</sub>	Pressure	30 psig	30 psig	50-60 psig
	Flow rate	30 mL/Minute	30 mL/Minute	35 mL/Minute
	Purity	Hydrocarbons, water, CO, CO <sub>2</sub> <1ppm		
Sample gas	Pressure	N/A	N/A	70-90 psig
	Flow rate	20-100 mL/Minute	20-100 mL/Minute	50 mL/Minute
Connection	1/16", 1/8" VICI compression		1/16", 1/8" VICI compression	1/16", 1/8", 1/4" VICI compression
Calibration gas production	External MGB1000 gas blender		External MGB1000 gas blender	Internal gas blender
Operation temperature	16~32°C			
Power	220 VAC, 50 Hz			
Dimension H×W×D (mm)	180 × 430 × 670			
Weight	15.9 kg			
Main applications	• CO <sub>2</sub> , CH <sub>4</sub> , NMHC in N <sub>2</sub> , Air, H <sub>2</sub> or inert gas • H <sub>2</sub> in CO	• CO <sub>2</sub> , CH <sub>4</sub> , NMHC in N <sub>2</sub> , Ar, He, O <sub>2</sub> and H <sub>2</sub>	• High purity gas	

Founded in 1947 by Tom Land and based in Dronfield, United Kingdom, LAND specializes in Infrared temperature measurement and Combustion gas and environmental emissions monitoring. LAND has been the innovator in the combustion and environment monitoring industry – first Carbon monoxide monitor for combustion monitoring, first fully-integrated oxygen analyzer and first dual sensor emissions analyzer.

## **Lancom 4**

### *THE WORLD'S MOST VERSATILE PORTABLE FLUE GAS ANALYZER*

*Building on the success of the Lancom III, the Lancom 4 represents the next generation of portable gas analyzer technology. It is the most accurate, robust and flexible portable flue gas analyzer currently available.*

#### **Features**

- Monitoring of up to 17 measurement parameters
- Up to 9 simultaneous gas measurements in a single instrument (CO, NO, NO<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub>, O<sub>2</sub>, CO<sub>2</sub>, H<sub>2</sub>S, C<sub>x</sub>H<sub>y</sub>)
- Weighs only 6 kg (13 lbs)
- Robust, industrial design
- Wake and Sleep, semi-continuous operation mode for periodic unattended operation
- Range of user selectable options
- Data acquisition and analysis software for capture, manipulate and report data on your PC
- Simple field upgrade
- Meets ASTM D-6522 with Dry Sampler probe
- Supports USB memory sticks
- Multi languages support including Chinese
- A colored display

## **Lancom 200**

### *PORTABLE SULFURIC ACID DEWPOINT TEMPERATURE MONITOR*

The new Lancom 200 is the latest acid dewpoint monitor from LAND – an unrivalled history which now extends over 40 years of design and manufacture of portable sulfuric acid dewpoint temperature instruments.

#### **Features**

- Measure Sulfuric Acid Dewpoint Temperature – A unique but vital measurement
- Key process parameters measured and calculated – Essential operator information including SO<sub>3</sub>
- Easy to use precise control – Obtain a reading in minutes
- Weighs only 10kg (22lb) – Easily carried around plant
- Robust, industrial design – For daily use in the harshest plant environments
- Data logging – Capture and store over 10,000 readings
- Simple field maintenance – Easy-fit measurement cell – Replace in minutes
- Traceable Calibration – To national standards in our own UKAS approved lab

## **Genesis Flue Gas Oxygen Analyzer**

Genesis is a range of flue gas analyzers for measuring Oxygen within boilers and furnaces. The wide range of products available have the measurement capability, performance and quality to meet most industrial applications.

## **Series 9000**

### *HIGH ACCURACY, CARBON MONOXIDE MONITOR*

The Model 9100 Carbon Monoxide Monitor breaks new ground in accuracy, performance and ease-of-use. Built upon the success of the original Series 9000 this new model has the flexibility to meet all user requirements.

### *COMBUSTION EFFICIENCY*

Incomplete combustion of carbon based fuels, including coal and oil will always result in the formation of Carbon Monoxide (CO). Increased CO concentration equates to insufficient or inefficient combustion. It is not uncommon to have varying boiler loads and fuel quality. The greater the variation the most advantage can be gained by controlling with continuous monitoring of the levels of CO.

### *REDUCING NO<sub>x</sub> USING CO MEASUREMENT*

NO<sub>x</sub> emission levels can be optimized by controlling the levels of excess air in the combustion process through continuous CO measurement. Maintaining low levels of CO minimizes NO<sub>x</sub> emission levels. Close control of excess air levels through CO measurement is vital, as NO<sub>x</sub> level increases are non-linear.

## **Opacity and Dust Compliance Monitoring**

LAND is a world leader in opacity monitor design and manufacture, with a commitment to continuous product improvement.

The Model 4500 MkIII meets the latest and most demanding standards for Continuous Opacity Monitoring Systems. Well known for its stability and reliability, Model 4200 is the ideal particulate monitoring tool for multi-process plants with common stacks.

### *PATENTED TECHNOLOGY*

The Model 4500 MkIII uses a patented highly homogeneous “advanced LED light source” together with a patented “Flood LED”, to achieve the highest levels of stability and accuracy. The “no moving parts” optical system gives the dust emissions monitor exceptional reliability. The patented dual LED technology of the Model 4200 has proven itself worldwide as stable, reliable and trouble free. The lightweight and compact design makes it ideal for a wide range of applications.

## **FGA 9xx Series**

### *CONTINUOUS EMISSIONS & COMBUSTION EFFICIENCY MONITORING*

The FGA 9xx Series range of analyzers use dual sensor technology to measure the levels of Nitrogen Oxides, Carbon Monoxide and Oxygen in flue gas. For stand-alone use or as part of a fully-integrated system to meet the demands of modern environmental legislation.

### **Features and Benefits**

- Fully integrated system in a single compact box – no additional components required
- Suitable for a wide range of applications – up to 3 gases in a single analyzer
- Low maintenance – straightforward servicing without specialist skills
- Proven high performance – dual sensor measurement technique, MCerts approved/Certified to US EPA standards
- True measured Total NO<sub>x</sub> – separate NO + NO<sub>2</sub> sensors for true NO<sub>x</sub> monitoring, no converters necessary
- Simple installation – locate the analyzer anywhere, including outside locations
- Automatic calibration option – for continuous unattended operation in compliance monitoring applications
- Combustion Efficiency measurement option – for optimizing process efficiency where conditions are changing

## **FGA II**

Advanced CEM technology for accurate measurement and high reliability to meet today's regulatory requirements and ready for future legislation. The FGA II continuous emissions monitor uses Advanced Dual Sensor Technology (ADST) to measure specific flue gas components in low-sulfur processes. Note: The FGA II is not recommended for processes where the average SO<sub>2</sub> concentration is >50 ppm.

### **Features & Benefits**

- Fully integrated system – Up to 7 gases in a single compact analyzer
- Wide measurement range – from 0 - 10 ppm up to 0 - 5,000 ppm
- Remote diagnostics capability – Built-in hardware and software for remote diagnostics and system configuration
- Widely accepted, certified performance – complies with the latest monitoring standards
- Simple installation and maintenance – requires no specialist skills or training, all maintenance carried out on-site
- Highest measurement performance – ADST ultra-low drift measurement technology
- Measured Total NO<sub>x</sub> (NO + NO<sub>2</sub>) – separate sensors for true NO<sub>x</sub> monitoring
- Record and store vital emissions data – Internal data logging function

## **Coal Fire Detection**

### *ADVANCE WARNING OF THE ONSET OF COAL MILL AND SILO FIRES THROUGH THE BUILD-UP OF CARBON MONOXIDE*

This unique detection system is specifically designed to detect rapid build-up of carbon monoxide inside pulverizing coal mills and silos. It continuously monitors the atmosphere, and responds very quickly to any significant increase in the levels of CO, created by the onset of a fire. This provides the operator with advance warning to enable preventative action to be taken before damage to the plant, or injury to personnel occurs.

**The savings in cost of repairs following a mill fire would pay for the system many times over.**

### **Features and Benefits**

- Advanced fire detection system – Protect expensive mill equipment and prevent downtime
- Specifically designed for fire detection on coal mills and silos – Robust, low maintenance system
- Continuous self-checking of measurement integrity – High level of reading confidence
- Tailored to each application – Easily set, site-specific alarm thresholds
- Easy connection to plant control equipment – Standard analog and discreet contact outputs.

### *WHY CARBON MONOXIDE (CO)?*

Monitoring of CO, as opposed to temperature sensing, provides much earlier detection of combustion and subsequent prevention of a mill fire. The system will detect changes significantly faster – in time to prevent damage.

### *HOW IT WORKS?*

It extracts sample gases from the mill (often the mill outlet) or silo and continuously monitors the levels of carbon monoxide (CO). Dual sensors continuously monitor CO, with self-checking and auto-calibration to maintain integrity.

### *ALARMS*

Alarm threshold levels can be set to best suit the plant operating conditions. These settings can also compensate for externally introduced CO, where mills are using recycled combustion air for coal feed heating.

### *OPTIONAL O<sub>2</sub> MEASUREMENT*

Measurement of oxygen is an option in the single stream instrument. Oxygen-limited silos will benefit from this additional measurement as an additional fire prevention precaution.

**For detailed information of each model, please refer to the product specification sheets.**



Analyzer type	Portable flue gas monitor	Sulfuric acid dewpoint temperature monitor																											
Model	Lancom 4	Lancom 200 (Portable)																											
Components	CO, NO, NO <sub>2</sub> , NO <sub>x</sub> , H <sub>2</sub> S, SO <sub>2</sub> , CO <sub>2</sub> , C <sub>x</sub> H <sub>y</sub> , O <sub>2</sub>	Acid dewpoint, SO <sub>3</sub>																											
Principle	Electrochemical, IR (CO <sub>2</sub> ), catalytic (C <sub>x</sub> H <sub>y</sub> )	Conductive cell																											
Range	<table border="0"> <tr> <td>O<sub>2</sub></td> <td>0 to 25% v/v</td> <td>0 to 30% v/v</td> </tr> <tr> <td>CO (low)</td> <td>0 to 100 ppm</td> <td>0 to 6000 ppm</td> </tr> <tr> <td>CO (high)</td> <td>0 to 4000 ppm</td> <td>0 to 10%</td> </tr> <tr> <td>SO<sub>2</sub></td> <td>0 to 100 ppm</td> <td>0 to 4000 ppm</td> </tr> <tr> <td>NO<sub>2</sub></td> <td>0 to 100 ppm</td> <td>0 to 5000 ppm</td> </tr> <tr> <td>NO</td> <td>0 to 100 ppm</td> <td>0 to 1000 ppm</td> </tr> <tr> <td>H<sub>2</sub>S</td> <td>0 to 200 ppm</td> <td>0 to 1000 ppm</td> </tr> <tr> <td>CO<sub>2</sub></td> <td>0 to 25% v/v</td> <td></td> </tr> <tr> <td>Hydrocarbons (C H)</td> <td>0 to 4% v/v (Calibrated as methane)</td> <td></td> </tr> </table>	O <sub>2</sub>	0 to 25% v/v	0 to 30% v/v	CO (low)	0 to 100 ppm	0 to 6000 ppm	CO (high)	0 to 4000 ppm	0 to 10%	SO <sub>2</sub>	0 to 100 ppm	0 to 4000 ppm	NO <sub>2</sub>	0 to 100 ppm	0 to 5000 ppm	NO	0 to 100 ppm	0 to 1000 ppm	H <sub>2</sub> S	0 to 200 ppm	0 to 1000 ppm	CO <sub>2</sub>	0 to 25% v/v		Hydrocarbons (C H)	0 to 4% v/v (Calibrated as methane)		Acid dewpoint: 125~200°C
O <sub>2</sub>	0 to 25% v/v	0 to 30% v/v																											
CO (low)	0 to 100 ppm	0 to 6000 ppm																											
CO (high)	0 to 4000 ppm	0 to 10%																											
SO <sub>2</sub>	0 to 100 ppm	0 to 4000 ppm																											
NO <sub>2</sub>	0 to 100 ppm	0 to 5000 ppm																											
NO	0 to 100 ppm	0 to 1000 ppm																											
H <sub>2</sub> S	0 to 200 ppm	0 to 1000 ppm																											
CO <sub>2</sub>	0 to 25% v/v																												
Hydrocarbons (C H)	0 to 4% v/v (Calibrated as methane)																												
Precision		±0.5°C																											
Response time		3-15 Minutes, depends on application																											
Max.Flue gas temperature	0~600°C, Max. 1400°C (high temperature probe)	450°C																											
Analog output	Option: 8 independent 4-20mA signals																												
Communication	USB, RS-232, RS-485	Thermal printer; RS-232/RS-485 Modbus protocol; USB port																											
Operation temperature	-5~45°C	-20~+50°C																											
Power	95-265 VAC ±10%, 50-60 Hz, 30 W Battery, rechargeable lead-acid (internal). Typical 8 hour operation	95-265 VAC 10%, 50-60 Hz, 30W; Rechargeable battery 2×6V 4 Amp. Hours. Typical 8 hour operation																											
Instrument air		Clean, dry, oil-free air: 420-1050 kPa, 1-150 L/Minute																											
Enclosure	Medium density blended polyethylene	IP42 (instrument in bag); IP65 (probe)																											
Weight	6 kg	9.8 kg (including bag and hoses)																											
Dimension H×W×D (mm)	245 × 453 × 120	500 × 300 × 225																											
Main applications	• Flue gas	<ul style="list-style-type: none"> <li>• Cold-end Corrosion</li> <li>• Combustion Efficiency</li> <li>• Fuel Additive Optimization</li> <li>• ESP Efficiency</li> <li>• Acid Smut &amp; Aerosol Emissions</li> <li>• Toxic Release Inventory</li> </ul>																											



Analyzer type	Oxygen in flue gas monitoring		CO monitoring
Model	Genesis 1200 WDG	Genesis 1210 WDG	9100
Components	O <sub>2</sub>	O <sub>2</sub>	CO
Principle	Zirconium oxide	Zirconium oxide	IR
Range	0-1%, 0-25%	0-1%, 0-25%	CO: 0-10000 ppm; Pathlength: 0.5-10m
Precision	±1% measured value or ±0.2% O <sub>2</sub>	±1% measured value or ±0.2% O <sub>2</sub>	±3%
Response time	T63<20 Seconds	T63<20 Seconds	2-250 Seconds, adjustable
Max.Flue gas temperature	677°C	677°C	370°C
Analog output	4-20mA	4-20mA	4-20mA
Communication	RS-485 Modbus	RS-485 Modbus	RS-232/RS-485, Optional Modbus
Operation temperature	-20~+70°C	-20~+70°C	-30~+55°C
Power	85-264 VAC, 48-62 Hz, 250 VA	85-264 VAC, 48-62 Hz, 250 VA	85-132/170-264 VAC, 50/60 Hz, 200W
Instrument air	—	—	Air mover or blower
Enclosure	IP65	IP65	IP65, NEMA 4
Weight	8.8~15.1 kg	9.5~15.8 kg	Transmitter: 10.1 kg; Receiver: 9.4 kg
Dimension H×W×D (mm)	153 × 152 (H × W)	153 × 152 (H × W)	264 × 212 × 475
Main applications	• Flue gas	• Flue gas	• Boiler Combustion Efficiency • Low NOx Burner Performance • Burner Performance Monitoring • Process Control • Precipitator Protection • Explosion Prevention



Analyzer type	Dust monitoring	
Model	4200	4500 MkIII
Principle	Optical	Optical
Source	Red LED	Green LED
Compliance standard	N/A	ASTM D6216
Range*	Opacity: 0-20%/0-100%; Dust density: 0-100/0-999mg/m <sup>3</sup>	Opacity: 0-10%/0-100%; Dust density: 0-100/0-10000mg/m <sup>3</sup> ; Optical density: 0-0.1/0-3.0
Optical pathlength	0.3-10m	0.5-10m
Precision	±2% Opacity	±1% Opacity
Response time	T90<10 Seconds	T90<10 Seconds
Analog output	4-20mA	4-20mA
Communication	—	RS-485 Modbus, Ethernet
Operation temperature	-20~+55°C	-40~+55°C
Power	90-260 VAC, 50/60 Hz, 10W	90-260 VAC, 50/60 Hz, 75W
Enclosure	IP65, NEMA 4	IP65, NEMA 4
Weight	Transceiver: 5 kg; Retro-reflector: 2 kg	Transceiver: 7 kg; Retro-reflector: 3.2 kg
Dimension H×W×D (mm)	Transceiver: 127 × 157 × 404; Retro-reflector: 127 × 127 × 200	Transceiver: 201 × 191 × 413; Retro-reflector: 201 × 191 × 237
Main applications	<ul style="list-style-type: none"> <li>• Particulate Removal System Efficiency Monitoring</li> <li>• Combustion Efficiency Monitoring</li> <li>• Evaluation of Control Processes</li> <li>• Precipitator Power Optimisation</li> <li>• Baghouse Performance Monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Particulate Removal System Efficiency Monitoring</li> <li>• Combustion Efficiency Monitoring</li> <li>• Evaluation of Control Processes</li> <li>• Precipitator Power Optimisation</li> <li>• Baghouse Performance Monitoring</li> </ul>

\* Dust density range is related to optical pathlength.



Analyzer type	FGA900 series flue gas monitoring*						Continuous emissions monitoring	Coal fire detection
Model	900	930	940	942	945	950	FGA II	MILL/SILO WATCH
Components	CO	CO, O <sub>2</sub>	O <sub>2</sub> , NO, NOx	O <sub>2</sub> , NO, NO <sub>2</sub> , NOx	NO, NO <sub>2</sub> , NOx	CO, O <sub>2</sub> , NO, NOx	NO, NO <sub>2</sub> , NOx, SO <sub>2</sub> , CO, CO <sub>2</sub> , O <sub>2</sub>	CO
Principle	Electrochemical						Electrochemical	Electrochemical
Range	CO: 0-20ppm/0-4000 ppm; NO: 0-20ppm/0-2000 ppm; NO <sub>2</sub> : 0-20ppm/0-500 ppm; O <sub>2</sub> : 0-5%/0-25%						CO: 0-10ppm/0-4%; NO: 0-10ppm/0-5%; NO <sub>2</sub> : 0-10ppm/0-0.1%; SO <sub>2</sub> : 0-10ppm/0-1%; CO <sub>2</sub> : 0-3%/0-100%; O <sub>2</sub> : 0-5%/0-25%	CO: 0-100ppm/0-4000ppm; 0-100mg/m <sup>3</sup> /0-5000mg/m <sup>3</sup>
Precision	2ppm or 2% reading; O <sub>2</sub> : 1% of range						2ppm or 2% of reading; CO <sub>2</sub> /O <sub>2</sub> : 1% of range	2ppm or 2% of reading
Response time	Depends on application						Depends on application	T90<30 Seconds (exclude sampling system)
Max.Flue gas temperature	1700°C						1700°C	200°C
Analog output	4-20mA						4-20mA	4-20mA
Communication	RS-232 (for service)						RS-232/RS-485 Modbus	
Operation temperature	0~+35°C (with optional heater or cooler: -40~+55°C)						-40~+50°C	0~+45°C (with heater or air conditioner: -20~+50°C)
Power	110/230 VAC ±20%, 50-60 Hz, 300W (air conditioner or heater will increase the power consumption)						200-240 VAC, 50/60 Hz, 600W (analyzer)	83-132 VAC, 165-264 VAC, 50/60 Hz, 300W
Instrument air	Clean, dry, oil-free air: zero calibration: 210 kPa, 5 L/Minute; Cooling: 210-1050 kPa, 90 L/Minute						Clean, dry, oil-free air zero calibration: 420 kPa, 10 L/Minute;	Clean, dry, oil-free air zero calibration: 210 kPa, 5 L/Minute; Cooling: 210-1050 kPa, 90 L/Minute
Enclosure	IP65, NEMA 4						IP65, NEMA 4X	IP65, NEMA 4
Weight	53.6 kg						50 kg	53 kg
Dimension H×W×D (mm)	600 × 600 × 350						600 × 600 × 420	600 × 600 × 350
Main applications	<ul style="list-style-type: none"> <li>• Power Utilities</li> <li>• Refineries &amp; Chemical Plants</li> <li>• District Heating Plants</li> <li>• Waste Incinerators</li> <li>• Cement Plants</li> <li>• Process Industries</li> <li>• Pulp &amp; Paper Manufacture</li> </ul>						<ul style="list-style-type: none"> <li>• Power Utilities</li> <li>• Refinery &amp; Chemical plant</li> <li>• District Heating Plants</li> <li>• Waste Incinerators</li> <li>• Cement Plants</li> <li>• Process Industries</li> <li>• Pulp &amp; Paper Manufacture</li> </ul>	<ul style="list-style-type: none"> <li>• Mill</li> <li>• Silo</li> </ul>

\* For FGA900E series, two more functions are added based on FGA900 series: Efficiency measurement and automatic calibration.

### **On-Line Natural Gas Chromatograph**

The Chandler Model 2920 Gas Analyzer System is a stand-alone gas chromatograph designed to measure the heating value of up to six natural gas streams. Its modular design makes it easy to install, operate and maintain in the field, and an optional software package is available for remote communications, diagnostics and control. Built to withstand harsh environmental conditions, the Model 2920 delivers the repeatability and accuracy of a laboratory gas chromatograph. It uses field-proven technologies and industry-standard gas chromatographic techniques.

### **Model 292B Portable Natural Gas Chromatograph**

The production and custody transfer of natural gas requires accurate measurement of the composition of the gas. Many contractual requirements define the desired composition, heating value and relative density of the gas being sold or transported. Portable gas analysis of the critical components in natural gas ensures reliable results when installation of stationary analyzers is impractical or costly.

The AMETEK Model 292B natural gas chromatograph is designed as a truly 'portable' analyzer. An integrated sample inlet manifold allows for single connections of sample and drive (carrier) gases, allowing for flexible installation either as a stand-alone analyzer, or integrated into a mobile platform such as a truck or other vehicle.

### **Chandler Dew Point Testers**

#### *BUREAU OF MINES-TYPE DEW POINT TESTER FROM AMETEK*

The Chandler Bureau of Mines Dew Point Tester is a primary instrument used to measure the dew point temperature of any gas. It is rugged, portable and can provide very repeatable results. Because of its primary nature, the standard dew point tester requires no calibration. Consequently, it is frequently used to verify results of electronic instruments.

The Chandler Dew Point Tester, which meets ASTM D1142 and traceable to NIST, is a chilled mirror device that operates by achieving the conditions required by the definition of dew point. When a gas is cooled out of contact with liquid water, the humidity or water content remains constant, but the percentage of saturation increases until it reaches 100% and moisture begins to condense. The temperature at this point is known as the dew point or frost point.

### **Chandler Moisture Chek 2000™**

The Moisture Check 2000 is a rugged, microprocessor-based, easy-to-use moisture analyzer specifically designed for the Natural Gas industry. It uses phosphorous pentoxide (P<sub>2</sub>O<sub>5</sub>) sensor technology (Ultra Cell™) coupled with microprocessor-based electronics to provide accurate, reliable moisture measurements. The Ultra Cell Sensor can easily be reconditioned in the field eliminating the need for spare sensors. The Moisture Chek is available in a Class I, Division 2 portable, and both Class I, Division 1 and Class I, Division 2 stationary models. Whether in the field or on-line, the Moisture Chek 2000 is easy to use and delivers accurate readings.

### **Ranarex™ Gas Gravimeters**

Ranarex Gravimeters measure the specific gravity of gases as compared to air. For many industrial process gases there is a definite connection between the analysis of the gas mixture and its specific gravity. When the specific gravity is involved in the analysis of the total mixture, or when the instruments are used with orifice metering in gas volume, they are graduated in specific gravity. When the gravimetric principle can be applied, Ranarex gravimeters excel over more complex and costly analyzers in total performance.

### **Chandler UGC Vibrating Densitometer**

For more than 30 years, the Chandler Densitometer has been used by major pipelines and other industries. It was developed primarily for extremely accurate fluid metering (custody transfer), plus many other applications, such as pipeline interface detection, blending, process control, etc. The frequency output of the Chandler Vibrating Densitometer is compatible with most flow computers.

**For detailed information of each model, please refer to the product specification sheets.**



Model	2920 On-line Natural Gas Chromatograph	292B Portable Natural Gas Chromatograph	13 Dew Point Tester
Principle	TCD	TCD	Chilled mirror
Components	C1~C5, C6+	C1~C5, C6+	Moisture
Range	0-3000 BTU/scf	0-2000 BTU/scf	-129°C~ambient temperature
Precision	±0.05%	±0.05%	±0.1°C~±1°C (depend on ranges)
Sensitivity	±0.05%	±0.05%	0.1°C
Repeatability	±0.05% or 0.5BTU/1000BTU	±0.05% or 0.5BTU/1000BTU	—
Limit of detection	C2/C3/C4: 0.025%, varies with different component	C2/C3/C4: 0.025%, varies with different component	-129°C (depends on cooling medium)
Measuring cycle	12 Minutes	12 Minutes	Depends on final dew point and cooling rate
Analog output	0-10 VDC, 4-20mA (option)	0-10 VDC, 4-20mA (option)	—
Communication	RS-232C Modbus	RS-232C Modbus	PDA
Sample gas pressure	49-420 kPa	49 kPa-24.1 mPa	0-34.6 mPa
Flow rate	100-1300 mL/Minute	100-1300 mL/Minute	2.36 L/Minute
Power	115/230 VAC ±10%, 50/60 Hz	115/230 VAC ±10%, 50/60 Hz	Battery-powered with 115 VAC or 230 VAC charger (optional)
Operation temperature	-25~45°C	-25~55°C	-20~50°C
Explosion proof area	Class 1, Division 2, Group C & D	Class 1, Division 2, Group C & D	—
Enclosure	NEMA 4	NEMA 4	NEMA 4
Installation	Fixed	Portable	Portable
Weight	35 kg (depends on sample streams)	17 kg	11 kg
Dimension H×W×D (mm)	546 × 374 × 630	280 × 267 × 457	200 × 355 × 178 (Portable case)
Main applications	<ul style="list-style-type: none"> <li>Natural gas</li> </ul>	<ul style="list-style-type: none"> <li>Natural gas</li> </ul>	<ul style="list-style-type: none"> <li>Natural gas</li> <li>Sour gas</li> <li>Industrial gases</li> <li>Heat Treating Furnaces</li> </ul>
Features	On line installation; Up to six natural gas streams; Compliance with industry standards: GPA, ASTM, ISO, AGA; Column can be used more than 10 years	Portable; Compliance with industry standards: GPA, ATMS, ISO, AGA; Column can be used more than 10 years	Portable; Meets ASTM D1142; RTD traceable to NIST; Easy to maintain and use



Model	Moisture Chek 2000	Ranarex Gas Gravitometer	UGC Vibrating Densitometer
Principle	Electrolytic (P <sub>2</sub> O <sub>5</sub> ) sensor technology	Torque created by gases in opposite direction	Vibrating densitometer
Components	Moisture in gas	Gas gravitometer	Liquid density
Range	10-1050ppm; Dew point: -68~-22°C; Optional higher range 300-6000ppm	Stationary: 0.07-2.5; Portable: 0.52-1.03/0.97-1.90	0.3 - 1.6 g/mL
Precision	±2% reading	±0.5% of real value	±0.0002 g/mL (0.3~0.5 g/mL), depends on ranges
Sensitivity	0.1ppm	—	—
Repeatability	±1% reading	—	±0.00001 g/mL (0.3~1.0 g/mL), depends on ranges
Limit of detection	10ppm	0.07	0.3 g/mL
Measuring cycle	T63<30 Seconds	—	—
Analog output	4-20mA	Optional 4-20mA	Frequency: 1kHz~2kHz
Communication	RS-232	—	—
Sample gas pressure	350-690 kPa	<140 kPag	<22.4 mPa
Flow rate	500 mL/Minute (75 mL/Minute to sensor)	4.7-9.5 L/Minute	5.7 L/Minute
Power	110/220 VAC, 50/60 Hz, or battery	115 VAC, 60 Hz or 230 VAC, 50 Hz	24 VDC ±8 VDC @ 35mA
Operation temperature	-18~+54°C	-18~54°C	-40~85°C
Explosion proof area	Class 1, Division 2, Group D; Class 1, Division 1, Group D (stationary)	Optional Class 1, Division 1, Group B & D (stationary model)	Class 1, Division 1, Group C & D
Enclosure	NEMA 4, NEMA 4X, IP66	Optional NEMA 4X	NEMA 4, Optional NEMA 4X
Weight	8 kg	Portable: 23 kg; Stationary: 4 kg	11 kg
Dimension H×W×D (mm)	317 × 124 × 267	535 × 375 × 267	—
Main applications	<ul style="list-style-type: none"> <li>Natural gas</li> <li>Other non-corrosive gases</li> </ul>	<ul style="list-style-type: none"> <li>Oil Refining</li> <li>Natural Gas Measurement</li> <li>Gas Utilities</li> <li>Chemical Processing</li> <li>Heat Treating Metals</li> <li>Combustion Analysis</li> <li>Sewage Treatment</li> </ul>	<ul style="list-style-type: none"> <li>Pipeline interface detection</li> <li>Blending</li> <li>Process control</li> </ul>
Features	Ultra cell™ sensor design, more resistant to contamination; Output can be dew point temperature; Be calibrated with 2000C moisture calibration unit	Portable, stationary; Accurate, Sensitive, Fast Response; Durable, corrosion-resistant materials. Outer case protects against dust, humidity and shock.	Continuous on-line density measurement; Provides input for mass flow calculations; Excellent repeatability and long-term stability; Model 278 CSA approved

The mass spectrometer is a versatile tool for many applications. It can be operated over a wide range of pressures (high vacuum to 20 psig) and can detect any component that falls within the mass range of the instrument. Our current offering includes basic RGA instruments up to hazardous location, self-contained process mass spectrometers. Typical applications include: fermentation off gas, pharmaceutical dryer end-point detection, steel manufacturing off-gas, biofuels analysis, TPD/TPR/TPO, thin film etc.

### **Fermentation**

Fermentation is the process by which living organisms are cultured or grown to produce a specific product. The products can be as simple as baker's yeast and alcohols, or as complex as therapeutic proteins, antibiotics, enzymes, biofuels and genetically engineered materials. Regardless of the end product, fermentation reactions must be carefully monitored to gauge the health of the culture and to determine when the culture can be harvested or the required product has been produced. Since these are living organisms, the levels of oxygen and carbon dioxide in the off gases can be used to follow the process of fermentation. The ratio of carbon dioxide to oxygen is called respiratory quotient and is the prime indicator of culture health. While these measurements can be made by several techniques, the most accurate RQ determination requires complete knowledge of all of the gases found in the reactor. The use of the mass spectrometer provides a highly refined control signal to maximize culture health and productivity.

### **Dryer End Point Detection**

For pharmaceutical drying processes, common NIR and GC systems measure only final LOD with little detail about internal processes. By contrast, the AMETEK process mass spectrometer gives you all of the data you need to confirm dryness at the endpoint in detail, so you can improve efficiency and shorten cycle times significantly. Not only are the data available almost immediately, they are so detailed you can even identify dryer paddle rotations. That means the instrument can help you to determine precisely when all potential drying work has been accomplished at each process step which helps identify ineffective drying steps and excessive durations. The data can even help you recognize the presence of feedstock variations and anomalies and flag deviations from production procedures in previous production steps.

### **Steel Off Gas**

The conversion of iron containing between 4 and 4.5% carbon to steel containing less than 0.2% carbon is one of the most important industrial processes. The process of converting iron to steel is based on the removal of carbon in the form of carbon monoxide and carbon dioxide. Analysis of carbon oxides in the furnace off gas is a vital part of the process control strategy for the converter. As well as carbon oxides, steel process gas contains nitrogen, argon, oxygen, hydrogen and water. Fast, accurate, multi-component gas analysis is required for optimized process control – all features of the AMETEK process mass spectrometer.

### **BTEX and Other VOCs In Ambient Air**

Industries involved in the production of or using hazardous substances in their manufacturing process are required to monitor the environment in and around the plant to ensure that the concentrations of known pollutants remain below harmful exposure limits. The BTEX chemicals are produced on a large scale as solvents or intermediates and occur together in gasoline as well as other petroleum products. They all have some acute and long-term toxic effects to human health with benzene being the most commonly monitored component. Their volatility allows them to easily be dispersed into the atmosphere where membrane interface mass spectrometry can be used for their detection deep into the ppb levels. High analysis speed and multiple sample points allows for a much faster analysis time than conventional techniques.

**For detailed information of each model, please refer to the product specification sheets.**



Model	Dymaxion/LC/LC-D RGA	BENCH TOP	PROLINE	PROMAXION
Mass range	1-100AMU (optional 1-200AMU/1-300AMU)			
Sampling system	N/A	Capillary/aperture	8/16/24/32 ports	8/16/24/32/40 ports
Sampling pressure	<1E-4 Torr	<5 psig	500 Torr-20 psig	3 Torr-30 psig
Detection limit	Faraday cup: $5 \times 1E-12$ Torr; Multiplier: $5 \times 1E-14$ Torr	1 ppm to 100% (ppb is possible for some circumstances)		
Communication	RS-485, RS-232, Ethernet	RS-485, RS-232, Ethernet, Modbus, OPC, Wireless net, Optic fiber, Optional analog/digital input or output		
Power	230 VAC, 50 Hz			
PC requirement	Windows operation system			
Applications	MBE, Ion injection, Leak detection under vacuum, Residual gas analysis	PVD, PECVD, Magnetic Sputtering, Catalysis, TPD/TPR/TPO	Reforming, Fuel cell, Fermentation, Solvent drying, Steel, environmental, reaction end point	

ASOMA Instruments was established in Austin, Texas, in 1979 as one of the first companies to offer low-cost benchtop ED-XRF instrumentation. Throughout the next decade and a half, ASOMA became established as an industry leader with the development and release of the Models 100, 200 and 200T-series of XRF analyzers, as well as on-line instrumentation for measuring total sulfur in liquid hydrocarbon streams.

## PHOENIX II DE

### *BENCHTOP ED-XRF ANALYZER*

The PHOENIX II DE is an Energy Dispersive X-Ray Fluorescent (ED-XRF) benchtop analyzer that offers extreme simplicity of operation in a low-cost compact design. It is ideal for elemental analysis of liquids, solids, pastes, slurries and powders for various elements qualitatively and quantitatively. This ED-XRF spectrometer has been designed for use in the rugged environment of production process and quality control, but is also well suited for the laboratory. An onboard PC makes use of Windows™ operating system along with a simple, intuitive touch screen display, making analysis easy for nontechnical operators, but advanced enough for even the more experienced user as well.

#### **Typical Applications Include:**

- Diesel, gasoline, crude oil, bunker fuel, other petroleum distillates
- TiO<sub>2</sub> in various matrices
- Zn Stearate in plastics
- Fe in Silica Sand
- Fe in Cocoa
- Many other applications possible

## PHOENIX II IE

### *BENCHTOP ED-XRF ANALYZER, USING POLARIZATION*

The PHOENIX II IE is a polarized Energy Dispersive X-Ray Fluorescent (ED-XRF) benchtop analyzer that offers extreme simplicity of operation in a low-cost compact design.

Besides the features of PHOENIX II DE, PHONENIX II IE using polarization combines polarized source X-rays and a movable secondary target, giving the PHOENIX II IE improved performance for the measurement of low atomic number elements such as, Al and Si as well as S and Cl.

#### **Typical Applications Include:**

- Diesel, gasoline, crude oil, bunker fuel, other petroleum distillates
- Silicone coating on paper and film
- Conversion coatings
- Ti, Fe, Zn, Se, Al, Si, Cl, Zr in cosmetics and body care products
- Zn, Ti, Ca, Fe, Sb, Br, P in plastics
- Many other applications possible

## Model 682T-HP

### *ON-LINE HIGH PRESSURE SULFUR ANALYZER*

The Model 682T-HP is designed for analysis of sulfur in highly viscous hydrocarbons. This system is ideal for processes where sample pressures are high and in situations where fouling of flow cell windows with paraffin or similar substances can occur.

The Model 682T-HP system is a fast, sensitive and compact system and provides continuous, reliable detection of sulfur at pressures up to 800 psi. It can operate either as a stand-alone analyzer or can be tied in to plant-wide automation systems to provide real-time strategic measurements.

#### **Features and Benefits**

- Ideal for analysis of crude and other highly viscous hydrocarbons, pipelines, terminals, blending
- Sample stream temperatures up to 200°C (392°F) standard (Consult AMETEK for higher temperatures)
- Proprietary window in flow cell can withstand pressures in excess of 800 psig/55 bar standard (Consult AMETEK for higher temperatures)
- Certified to industry standards
- Large flow cell diameter (5 cm/2 inches) reduces interferences
- Analysis range for sulfur of 0.02-6.0%

**For detailed information of each model, please refer to the product specification sheets.**



Model	PHOENIX II DE	PHOENIX II IE	682T-HP
Principle	ED-XRF	ED-XRF with Polarization	X-Ray Transmission
Excitation	X-ray tube (30kV, 9W)	X-ray tube (48kV, 50W), HOPG, moveable secondary target (optional)	X-ray tube
Detector	Gas-filled proportional counter detector		
Sample	Solid, liquid, film, paste, powder, coating, sheet, slurry		Crude oil, heavy oil, etc
Elements	Al~U	Al~U	S
Range	ppm-100%	ppm-100%	0.02-6%
Precision	Varies with application	Varies with application	±30ppm @ 3.2% S; ±50ppm @ 0.1% S
Analysis time	100 Seconds, Varies with application	100 Seconds, Varies with application	100 Seconds
Output	Internal PC and thermal printer, VGA, USB and Ethernet connections	Internal PC and thermal printer, VGA, USB and Ethernet connections	4-20mA, dry contact for alarm, RS-485; Options: Profibus, Modbus, Ethernet
Operation temperature	15~30°C	15~30°C	15~30°C
Power	60W, 120/230 VAC	60W, 120/230 VAC	115/230 VAC ±10%, 50/60 Hz, 80W, Max. 300W
Explosion proof	—	—	Class 1 Division 1 Group A-D; Class 1 Division 2 Group A-D; ATEX Zone 1
Enclosure	—	—	NEMA 4X, IP65
Weight	18 kg	18 kg	125 kg (not including densitometer)
Dimension H×W×D (mm)	310 × 380 × 460	310 × 380 × 460	1513 × 1000 × 382
Main applications	<ul style="list-style-type: none"> <li>• Diesel, gasoline, crude oil, bunker fuel, other petroleum distillates</li> <li>• TiO<sub>2</sub> in various matrices</li> <li>• Zn Stearate in plastics</li> <li>• Fe in Silica Sand</li> <li>• Fe in Cocoa</li> <li>• Many other applications possible</li> </ul>	<ul style="list-style-type: none"> <li>• Diesel, gasoline, crude oil, bunker fuel, other petroleum distillates</li> <li>• Silicone coating on paper and film</li> <li>• Conversion coatings</li> <li>• Ti, Fe, Zn, Se, Al, Si, Cl, Zr in cosmetics and body care products</li> <li>• Zn, Ti, Ca, Fe, Sb, Br, P in plastics</li> <li>• Many other applications possible</li> </ul>	<ul style="list-style-type: none"> <li>• Crude oil</li> <li>• Heavy hydrocarbon</li> <li>• Vessel fuel</li> <li>• Blending</li> </ul>

# PERIODIC TABLE

Periodic Table of the Elements

IA	IIA	IIIA	IVA	VA	VIA	VIIA	VIIIA												
1 <b>H</b> Hydrogen 1.008	2 <b>He</b> Helium 4.003	5 <b>B</b> Boron 10.811	6 <b>C</b> Carbon 12.011	7 <b>N</b> Nitrogen 14.007	8 <b>O</b> Oxygen 15.999	9 <b>F</b> Fluorine 18.998	10 <b>Ne</b> Neon 20.180												
3 <b>Li</b> Lithium 6.941	4 <b>Be</b> Beryllium 9.012	13 <b>Al</b> Aluminum 26.982	14 <b>Si</b> Silicon 28.086	15 <b>P</b> Phosphorus 30.974	16 <b>S</b> Sulfur 32.066	17 <b>Cl</b> Chlorine 35.453	18 <b>Ar</b> Argon 39.948												
11 <b>Na</b> Sodium 22.990	12 <b>Mg</b> Magnesium 24.305	13 <b>Al</b> Aluminum 26.982	14 <b>Si</b> Silicon 28.086	15 <b>P</b> Phosphorus 30.974	16 <b>S</b> Sulfur 32.066	17 <b>Cl</b> Chlorine 35.453	18 <b>Ar</b> Argon 39.948												
19 <b>K</b> Potassium 39.098	20 <b>Ca</b> Calcium 40.08	31 <b>Ga</b> Gallium 69.72	32 <b>Ge</b> Germanium 72.61	33 <b>As</b> Arsenic 74.922	34 <b>Se</b> Selenium 78.96	35 <b>Br</b> Bromine 79.904	36 <b>Kr</b> Krypton 83.80												
37 <b>Rb</b> Rubidium 85.468	38 <b>Sr</b> Strontium 87.62	49 <b>In</b> Indium 114.82	50 <b>Sn</b> Tin 118.71	51 <b>Sb</b> Antimony 121.76	52 <b>Te</b> Tellurium 127.60	53 <b>I</b> Iodine 126.905	54 <b>Xe</b> Xenon 131.29												
55 <b>Cs</b> Cesium 132.905	56 <b>Ba</b> Barium 137.33	81 <b>Tl</b> Thallium 204.38	82 <b>Pb</b> Lead 207.2	83 <b>Bi</b> Bismuth 208.980	84 <b>Po</b> Polonium 209	85 <b>At</b> Astatine 210	86 <b>Rn</b> Radon 222												
87 <b>Fr</b> Francium (223)	88 <b>Ra</b> Radium 226.025	113																	
		IB	IIB	IIIB	IVB	VB	VIB	VII	VIII	IX	X	XI	XII						
		29 <b>Cu</b> Copper 63.546	30 <b>Zn</b> Zinc 65.39	39 <b>K</b> Potassium 39.098	40 <b>Ca</b> Calcium 40.08	41 <b>Sc</b> Scandium 44.956	42 <b>Ti</b> Titanium 47.88	43 <b>V</b> Vanadium 50.942	44 <b>Cr</b> Chromium 51.996	45 <b>Mn</b> Manganese 54.938	46 <b>Fe</b> Iron 55.847	47 <b>Co</b> Cobalt 58.933	48 <b>Ni</b> Nickel 58.70	49 <b>Cu</b> Copper 63.546					
		79 <b>Au</b> Gold 196.967	80 <b>Hg</b> Mercury 200.59	71 <b>La</b> Lanthanum 138.905	72 <b>Ce</b> Cerium 140.908	73 <b>Pr</b> Praseodymium 140.908	74 <b>Nd</b> Neodymium 144.24	75 <b>Pm</b> Promethium 144.9126	76 <b>Sm</b> Samarium 150.36	77 <b>Eu</b> Europium 151.964	78 <b>Gd</b> Gadolinium 157.25	79 <b>Tb</b> Terbium 158.925	80 <b>Dy</b> Dysprosium 162.50	81 <b>Ho</b> Holmium 164.930	82 <b>Er</b> Erbium 167.26	83 <b>Tm</b> Thulium 168.934	84 <b>Yb</b> Ytterbium 173.04	85 <b>Lu</b> Lutetium 174.967	
		101 <b>Ag</b> Silver 107.868	102 <b>Cd</b> Cadmium 112.41	89 <b>Y</b> Yttrium 88.906	90 <b>Zr</b> Zirconium 91.22	91 <b>Nb</b> Niobium 92.906	92 <b>Mo</b> Molybdenum 95.94	93 <b>Tc</b> Technetium (98)	94 <b>Ru</b> Ruthenium 101.07	95 <b>Rh</b> Rhodium 102.906	96 <b>Pd</b> Palladium 106.42	97 <b>Au</b> Gold 196.967	98 <b>Hg</b> Mercury 200.59	99 <b>Tl</b> Thallium 204.38	100 <b>Pb</b> Lead 207.2	101 <b>Bi</b> Bismuth 208.980	102 <b>Po</b> Polonium 209	103 <b>At</b> Astatine 210	104 <b>Rn</b> Radon 222
		111 <b>Rg</b> Roentgenium	112	103 <b>La</b> Lanthanum 138.905	104 <b>Ce</b> Cerium 140.908	105 <b>Pr</b> Praseodymium 140.908	106 <b>Nd</b> Neodymium 144.24	107 <b>Pm</b> Promethium 144.9126	108 <b>Sm</b> Samarium 150.36	109 <b>Eu</b> Europium 151.964	110 <b>Gd</b> Gadolinium 157.25	111 <b>Tb</b> Terbium 158.925	112 <b>Dy</b> Dysprosium 162.50	113 <b>Ho</b> Holmium 164.930	114 <b>Er</b> Erbium 167.26	115 <b>Tm</b> Thulium 168.934	116 <b>Yb</b> Ytterbium 173.04	117 <b>Lu</b> Lutetium 174.967	118 <b>Uuo</b> Ununoctium 289
		119	120	109 <b>La</b> Lanthanum 138.905	110 <b>Ce</b> Cerium 140.908	111 <b>Pr</b> Praseodymium 140.908	112 <b>Nd</b> Neodymium 144.24	113 <b>Pm</b> Promethium 144.9126	114 <b>Sm</b> Samarium 150.36	115 <b>Eu</b> Europium 151.964	116 <b>Gd</b> Gadolinium 157.25	117 <b>Tb</b> Terbium 158.925	118 <b>Dy</b> Dysprosium 162.50	119 <b>Ho</b> Holmium 164.930	120 <b>Er</b> Erbium 167.26	121 <b>Tm</b> Thulium 168.934	122 <b>Yb</b> Ytterbium 173.04	123 <b>Lu</b> Lutetium 174.967	124 <b>Uuq</b> Ununquadium 289
		121	122	110 <b>La</b> Lanthanum 138.905	111 <b>Ce</b> Cerium 140.908	112 <b>Pr</b> Praseodymium 140.908	113 <b>Nd</b> Neodymium 144.24	114 <b>Pm</b> Promethium 144.9126	115 <b>Sm</b> Samarium 150.36	116 <b>Eu</b> Europium 151.964	117 <b>Gd</b> Gadolinium 157.25	118 <b>Tb</b> Terbium 158.925	119 <b>Dy</b> Dysprosium 162.50	120 <b>Ho</b> Holmium 164.930	121 <b>Er</b> Erbium 167.26	122 <b>Tm</b> Thulium 168.934	123 <b>Yb</b> Ytterbium 173.04	124 <b>Lu</b> Lutetium 174.967	125 <b>Uur</b> Ununpentium 289
		123	124	111 <b>La</b> Lanthanum 138.905	112 <b>Ce</b> Cerium 140.908	113 <b>Pr</b> Praseodymium 140.908	114 <b>Nd</b> Neodymium 144.24	115 <b>Pm</b> Promethium 144.9126	116 <b>Sm</b> Samarium 150.36	117 <b>Eu</b> Europium 151.964	118 <b>Gd</b> Gadolinium 157.25	119 <b>Tb</b> Terbium 158.925	120 <b>Dy</b> Dysprosium 162.50	121 <b>Ho</b> Holmium 164.930	122 <b>Er</b> Erbium 167.26	123 <b>Tm</b> Thulium 168.934	124 <b>Yb</b> Ytterbium 173.04	125 <b>Lu</b> Lutetium 174.967	126 <b>Uus</b> Ununseptium 289
		125	126	112 <b>La</b> Lanthanum 138.905	113 <b>Ce</b> Cerium 140.908	114 <b>Pr</b> Praseodymium 140.908	115 <b>Nd</b> Neodymium 144.24	116 <b>Pm</b> Promethium 144.9126	117 <b>Sm</b> Samarium 150.36	118 <b>Eu</b> Europium 151.964	119 <b>Gd</b> Gadolinium 157.25	120 <b>Tb</b> Terbium 158.925	121 <b>Dy</b> Dysprosium 162.50	122 <b>Ho</b> Holmium 164.930	123 <b>Er</b> Erbium 167.26	124 <b>Tm</b> Thulium 168.934	125 <b>Yb</b> Ytterbium 173.04	126 <b>Lu</b> Lutetium 174.967	127 <b>Uuh</b> Ununheptium 289
		127	128	113 <b>La</b> Lanthanum 138.905	114 <b>Ce</b> Cerium 140.908	115 <b>Pr</b> Praseodymium 140.908	116 <b>Nd</b> Neodymium 144.24	117 <b>Pm</b> Promethium 144.9126	118 <b>Sm</b> Samarium 150.36	119 <b>Eu</b> Europium 151.964	120 <b>Gd</b> Gadolinium 157.25	121 <b>Tb</b> Terbium 158.925	122 <b>Dy</b> Dysprosium 162.50	123 <b>Ho</b> Holmium 164.930	124 <b>Er</b> Erbium 167.26	125 <b>Tm</b> Thulium 168.934	126 <b>Yb</b> Ytterbium 173.04	127 <b>Lu</b> Lutetium 174.967	128 <b>Uuq</b> Ununquadium 289
		129	130	114 <b>La</b> Lanthanum 138.905	115 <b>Ce</b> Cerium 140.908	116 <b>Pr</b> Praseodymium 140.908	117 <b>Nd</b> Neodymium 144.24	118 <b>Pm</b> Promethium 144.9126	119 <b>Sm</b> Samarium 150.36	120 <b>Eu</b> Europium 151.964	121 <b>Gd</b> Gadolinium 157.25	122 <b>Tb</b> Terbium 158.925	123 <b>Dy</b> Dysprosium 162.50	124 <b>Ho</b> Holmium 164.930	125 <b>Er</b> Erbium 167.26	126 <b>Tm</b> Thulium 168.934	127 <b>Yb</b> Ytterbium 173.04	128 <b>Lu</b> Lutetium 174.967	129 <b>Uur</b> Ununpentium 289
		131	132	115 <b>La</b> Lanthanum 138.905	116 <b>Ce</b> Cerium 140.908	117 <b>Pr</b> Praseodymium 140.908	118 <b>Nd</b> Neodymium 144.24	119 <b>Pm</b> Promethium 144.9126	120 <b>Sm</b> Samarium 150.36	121 <b>Eu</b> Europium 151.964	122 <b>Gd</b> Gadolinium 157.25	123 <b>Tb</b> Terbium 158.925	124 <b>Dy</b> Dysprosium 162.50	125 <b>Ho</b> Holmium 164.930	126 <b>Er</b> Erbium 167.26	127 <b>Tm</b> Thulium 168.934	128 <b>Yb</b> Ytterbium 173.04	129 <b>Lu</b> Lutetium 174.967	130 <b>Uus</b> Ununseptium 289
		133	134	116 <b>La</b> Lanthanum 138.905	117 <b>Ce</b> Cerium 140.908	118 <b>Pr</b> Praseodymium 140.908	119 <b>Nd</b> Neodymium 144.24	120 <b>Pm</b> Promethium 144.9126	121 <b>Sm</b> Samarium 150.36	122 <b>Eu</b> Europium 151.964	123 <b>Gd</b> Gadolinium 157.25	124 <b>Tb</b> Terbium 158.925	125 <b>Dy</b> Dysprosium 162.50	126 <b>Ho</b> Holmium 164.930	127 <b>Er</b> Erbium 167.26	128 <b>Tm</b> Thulium 168.934	129 <b>Yb</b> Ytterbium 173.04	130 <b>Lu</b> Lutetium 174.967	131 <b>Uuh</b> Ununheptium 289
		135	136	117 <b>La</b> Lanthanum 138.905	118 <b>Ce</b> Cerium 140.908	119 <b>Pr</b> Praseodymium 140.908	120 <b>Nd</b> Neodymium 144.24	121 <b>Pm</b> Promethium 144.9126	122 <b>Sm</b> Samarium 150.36	123 <b>Eu</b> Europium 151.964	124 <b>Gd</b> Gadolinium 157.25	125 <b>Tb</b> Terbium 158.925	126 <b>Dy</b> Dysprosium 162.50	127 <b>Ho</b> Holmium 164.930	128 <b>Er</b> Erbium 167.26	129 <b>Tm</b> Thulium 168.934	130 <b>Yb</b> Ytterbium 173.04	131 <b>Lu</b> Lutetium 174.967	132 <b>Uuq</b> Ununquadium 289
		137	138	118 <b>La</b> Lanthanum 138.905	119 <b>Ce</b> Cerium 140.908	120 <b>Pr</b> Praseodymium 140.908	121 <b>Nd</b> Neodymium 144.24	122 <b>Pm</b> Promethium 144.9126	123 <b>Sm</b> Samarium 150.36	124 <b>Eu</b> Europium 151.964	125 <b>Gd</b> Gadolinium 157.25	126 <b>Tb</b> Terbium 158.925	127 <b>Dy</b> Dysprosium 162.50	128 <b>Ho</b> Holmium 164.930	129 <b>Er</b> Erbium 167.26	130 <b>Tm</b> Thulium 168.934	131 <b>Yb</b> Ytterbium 173.04	132 <b>Lu</b> Lutetium 174.967	133 <b>Uur</b> Ununpentium 289
		139	140	119 <b>La</b> Lanthanum 138.905	120 <b>Ce</b> Cerium 140.908	121 <b>Pr</b> Praseodymium 140.908	122 <b>Nd</b> Neodymium 144.24	123 <b>Pm</b> Promethium 144.9126	124 <b>Sm</b> Samarium 150.36	125 <b>Eu</b> Europium 151.964	126 <b>Gd</b> Gadolinium 157.25	127 <b>Tb</b> Terbium 158.925	128 <b>Dy</b> Dysprosium 162.50	129 <b>Ho</b> Holmium 164.930	130 <b>Er</b> Erbium 167.26	131 <b>Tm</b> Thulium 168.934	132 <b>Yb</b> Ytterbium 173.04	133 <b>Lu</b> Lutetium 174.967	134 <b>Uus</b> Ununseptium 289
		141	142	120 <b>La</b> Lanthanum 138.905	121 <b>Ce</b> Cerium 140.908	122 <b>Pr</b> Praseodymium 140.908	123 <b>Nd</b> Neodymium 144.24	124 <b>Pm</b> Promethium 144.9126	125 <b>Sm</b> Samarium 150.36	126 <b>Eu</b> Europium 151.964	127 <b>Gd</b> Gadolinium 157.25	128 <b>Tb</b> Terbium 158.925	129 <b>Dy</b> Dysprosium 162.50	130 <b>Ho</b> Holmium 164.930	131 <b>Er</b> Erbium 167.26	132 <b>Tm</b> Thulium 168.934	133 <b>Yb</b> Ytterbium 173.04	134 <b>Lu</b> Lutetium 174.967	135 <b>Uuh</b> Ununheptium 289
		143	144	121 <b>La</b> Lanthanum 138.905	122 <b>Ce</b> Cerium 140.908	123 <b>Pr</b> Praseodymium 140.908	124 <b>Nd</b> Neodymium 144.24	125 <b>Pm</b> Promethium 144.9126	126 <b>Sm</b> Samarium 150.36	127 <b>Eu</b> Europium 151.964	128 <b>Gd</b> Gadolinium 157.25	129 <b>Tb</b> Terbium 158.925	130 <b>Dy</b> Dysprosium 162.50	131 <b>Ho</b> Holmium 164.930	132 <b>Er</b> Erbium 167.26	133 <b>Tm</b> Thulium 168.934	134 <b>Yb</b> Ytterbium 173.04	135 <b>Lu</b> Lutetium 174.967	136 <b>Uuq</b> Ununquadium 289
		145	146	122 <b>La</b> Lanthanum 138.905	123 <b>Ce</b> Cerium 140.908	124 <b>Pr</b> Praseodymium 140.908	125 <b>Nd</b> Neodymium 144.24	126 <b>Pm</b> Promethium 144.9126	127 <b>Sm</b> Samarium 150.36	128 <b>Eu</b> Europium 151.964	129 <b>Gd</b> Gadolinium 157.25	130 <b>Tb</b> Terbium 158.925	131 <b>Dy</b> Dysprosium 162.50	132 <b>Ho</b> Holmium 164.930	133 <b>Er</b> Erbium 167.26	134 <b>Tm</b> Thulium 168.934	135 <b>Yb</b> Ytterbium 173.04	136 <b>Lu</b> Lutetium 174.967	137 <b>Uur</b> Ununpentium 289
		147	148	123 <b>La</b> Lanthanum 138.905	124 <b>Ce</b> Cerium 140.908	125 <b>Pr</b> Praseodymium 140.908	126 <b>Nd</b> Neodymium 144.24	127 <b>Pm</b> Promethium 144.9126	128 <b>Sm</b> Samarium 150.36	129 <b>Eu</b> Europium 151.964	130 <b>Gd</b> Gadolinium 157.25	131 <b>Tb</b> Terbium 158.925	132 <b>Dy</b> Dysprosium 162.50	133 <b>Ho</b> Holmium 164.930	134 <b>Er</b> Erbium 167.26	135 <b>Tm</b> Thulium 168.934	136 <b>Yb</b> Ytterbium 173.04	137 <b>Lu</b> Lutetium 174.967	138 <b>Uus</b> Ununseptium 289
		149	150	124 <b>La</b> Lanthanum 138.905	125 <b>Ce</b> Cerium 140.908	126 <b>Pr</b> Praseodymium 140.908	127 <b>Nd</b> Neodymium 144.24	128 <b>Pm</b> Promethium 144.9126	129 <b>Sm</b> Samarium 150.36	130 <b>Eu</b> Europium 151.964	131 <b>Gd</b> Gadolinium 157.25	132 <b>Tb</b> Terbium 158.925	133 <b>Dy</b> Dysprosium 162.50	134 <b>Ho</b> Holmium 164.930	135 <b>Er</b> Erbium 167.26	136 <b>Tm</b> Thulium 168.934	137 <b>Yb</b> Ytterbium 173.04	138 <b>Lu</b> Lutetium 174.967	139 <b>Uuh</b> Ununheptium 289
		151	152	125 <b>La</b> Lanthanum 138.905	126 <b>Ce</b> Cerium 140.908	127 <b>Pr</b> Praseodymium 140.908	128 <b>Nd</b> Neodymium 144.24	129 <b>Pm</b> Promethium 144.9126	130 <b>Sm</b>										

# APPLICATION DATA SHEET

## AMETEK

### PROCESS ANALYZER APPLICATION DATA

Instructions Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

Customer: \_\_\_\_\_  
 Plant: \_\_\_\_\_  
 Process Component to be analyzed: \_\_\_\_\_  
 Process/Licenser: \_\_\_\_\_  
 Analyzer range: \_\_\_\_\_ to \_\_\_\_\_  
 \_\_\_\_\_ to \_\_\_\_\_  
 \_\_\_\_\_ to \_\_\_\_\_  
 PPM  %  by Weight  by Volume  Other: \_\_\_\_\_

#### Concentration ranges of all components in stream (list all known, even if in ppm range):

By weight	By volume		
_____ % to _____ %	_____ % to _____ %	_____ % to _____ %	_____ % to _____ %
_____ % to _____ %	_____ % to _____ %	_____ % to _____ %	_____ % to _____ %
_____ % to _____ %	_____ % to _____ %	_____ % to _____ %	_____ % to _____ %
_____ % to _____ %	_____ % to _____ %	_____ % to _____ %	_____ % to _____ %

#### Process conditions at sample tap:

Process connection: \_\_\_\_\_  
 Piping orientation for mounting of probe  Vertical  Horizontal  
 Temperature: Normal: \_\_\_\_\_ Min: \_\_\_\_\_ Max: \_\_\_\_\_ Units: \_\_\_\_\_  
 Pressure: Normal: \_\_\_\_\_ Min: \_\_\_\_\_ Max: \_\_\_\_\_ Units: \_\_\_\_\_  
 Phase(s) (gas, liquid)  
 Other data (viscosity, unusual surges, contaminants): \_\_\_\_\_  
 If vapor phase, dew point \_\_\_\_\_ Pressure: \_\_\_\_\_  
 Sample boiling point \_\_\_\_\_ at atm pressure  
 Are there likely to be any particulates, mists, etc., in the sample? If so, describe: \_\_\_\_\_

#### Conditions at analyzer discharge point:

Process connection:  To atmosphere or waste stream at atmospheric pressure  
 Return to process at: \_\_\_\_\_  
 Vent/scrubber (by customer): \_\_\_\_\_  
 Pressure: \_\_\_\_\_ at \_\_\_\_\_ temp \_\_\_\_\_ Range: \_\_\_\_\_  
 Units: \_\_\_\_\_ Pressure: \_\_\_\_\_ Range: \_\_\_\_\_ Units: \_\_\_\_\_

#### Materials of construction which may be used in contact with sample:

Metals: \_\_\_\_\_  
 Plastics: \_\_\_\_\_  
 Can you furnish spectrophotometric scans of your sample? (Please attach if available.)  YES  NO  
 Lab analysis method: \_\_\_\_\_

#### Environment at probable analyzer site (control station assumed to be in a protected area):

Analyzer will be:  Indoors  Outdoors  
 Temperature range: \_\_\_\_\_ to \_\_\_\_\_  
 Average barometric pressure: \_\_\_\_\_ Solar radiation temperature: \_\_\_\_\_  
 Shelter to be provided by:  AMETEK  Others  
 Conditions analyzer will be exposed to (corrosive or explosive; excessive moisture, dust): \_\_\_\_\_

#### Hazardous area electrical classification:

At analyzer, field unit location:  
 General purpose  
 Hazardous  
 Class: \_\_\_\_\_ Group: \_\_\_\_\_ Div/Zone: \_\_\_\_\_ T Class: \_\_\_\_\_  
 At analyzer, control station location:  
 General purpose  
 Hazardous  
 Class: \_\_\_\_\_ Group: \_\_\_\_\_ Div/Zone: \_\_\_\_\_ T Class: \_\_\_\_\_

#### Utilities available:

120 V 60 HZ  110 V 50 HZ  Steam pressure: \_\_\_\_\_  Nitrogen pressure: \_\_\_\_\_  
 240 V 60 HZ  220 V 50 HZ  Instrument Air pressure: \_\_\_\_\_  Clear Water pressure: \_\_\_\_\_  
 UPS Available  Instrument Air temperature: \_\_\_\_\_  
 Other. Please specify: \_\_\_\_\_

#### Sample system to be supplied by AMETEK?

Yes. Specify distance from sample tap to probable analyzer site: \_\_\_\_\_  
 any Height: \_\_\_\_\_ Width: \_\_\_\_\_ fluid: \_\_\_\_\_ Depth: \_\_\_\_\_  
 No Specify sample conditions available at analyzer. Inlet pressure: \_\_\_\_\_ Temperature: \_\_\_\_\_  
 Outlet pressure: \_\_\_\_\_ Temperature: \_\_\_\_\_

#### Analyzer output desired and quantity:

4 to 20 mA  Held signal required  Alarms required  Relays  
 Other: \_\_\_\_\_  
 Type of relay contacts:  AC  DC  
 Computation required for desired outputs (LB/MMBTU, etc.): \_\_\_\_\_

#### Sample lines:

Length: \_\_\_\_\_  
 Length: \_\_\_\_\_  
 Length: \_\_\_\_\_  
 Length: \_\_\_\_\_

#### Quotation to be sent to (if different from above):

Name: \_\_\_\_\_  
 Title: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 City/State/Zip: \_\_\_\_\_  
 Phone: \_\_\_\_\_  
 Date quote required: \_\_\_\_\_  
 Fax: \_\_\_\_\_







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