

The people for Process Analytics

MZD Analytik GmbH is located in Dresden, Europe's Silicon Valley, the capital of Saxony, Germany. It has set itself the goal of offering modern measuring and automation technology in process analytics. The leading employees of **MZD** have a Doctorate or Master's degree in technical discipline and, thanks to many years of experience, are able to competently solve the problems of measurement and automation technology that are pending in the industry. We place great value on certified quality standards for the products we developed and produced. **MZD** has a well-developed network in Europe and Asia (China) in order to be able to respond competently to all questions of our industrial customers.

Our engineers work in partnership with OEM/ODM's (and customers) from the initial design stage through post-production to ensure customer satisfaction throughout all phases of product development.

MZD offers for you both in Europe and Asia

- Project planning, construction and commissioning of measuring equipment, which we plan and act according to your task
- Coordination of all services, including our cooperation partners in some more complex tasks (general contractor)
- Calibration and adjustment of our measuring instruments



The people for Process Analytics

MZD Analytik GmbH supply products as follows:

Moisture in Gas	0~1~500ppm(Max.2,500ppm)	Dewpoint	-100 ~ -20°C
H2S Gas Analyzer	0~100ppm up to 1%	Cl2 Gas Analyzer	0~100ppm up to 30%
HCl Gas Analyzer	0~10ppm up to 100ppm	NH3 Gas Analyzer	0~10ppm up to 100ppm
O2 Gas Analyzer	0~10ppm up to 100%	O3 Gas Analyzer	0~1ppm up to 5000ppm
H2 Gas Analyzer	0~100%	CH4 Gas Analyzer	0~100ppm up to 100%
C2H2 Gas Analyzer	0~100ppm up to 10%	CmHn Gas Analyzer	0~1000ppm up to 100%
CO Gas Analyzer	0~500ppm up to 100%	CO2 Gas Analyzer	0~50ppm up to 100%
SO2 Gas Analyzer	0~10ppm up to 10%	NOx Gas Analyzer	0~10ppm up to 5000ppm
He/Ne/Kr/D2/SF6/R125 Gas	0~100%		
Thermal Conductivity analyzer	two-component gas (%)		
Infrared photometry analyzer	CO,CO2,CmHn,N2O,SO2,CF4,SF6,H2O		
Ultraviolet photometry analyzer	SO2,NO,NO2,O3,Cl2,ClO2,CS2,H2S		
Laser analyzer	NH3,H2O,CO,CH2O...		
Medical Oxygen Analyzer	H2O,O2,CO,CO2		
Mutigas Analyzer	Up to six gases components		
Bulk Moisture	0~100%		
Water quality analyzer			
Fouling Monitoring	0~1000µm	Turbidity	0~4000NTU/FNU
Dissolved Oxygen	0~20mg/L or 200ppm or 200%SAT	PH	-2~16pH
ORP	-2000~2000mv	Conductivity	0~700ms/cm
Salinity	0~133000ppm	Total dissolved solids	0~78g/Kg
SS/MLSS	0~50g/L	Chlorine/Dioxide Chlorine	0~2/5/10ppm
COD	0~50mg/L or 1300mg/L	BOD	0~15mg/L or 350mg/L
TOC	0~20mg/L or 500mg/L		

If you have any demand for different measuring applications, please contact us. We can develop and customize the measuring system to fit your applications and wishes, for your private labeled products!

The basis of our work is the mutual trust between the partners in a long-term successful cooperation. Our service goal is to uncompromisingly achieve the satisfaction of our customers and to be the most important partner

Moisture Analyzer

Continuous Measurement of trace moisture in Corrosive Gases

Overview

Electrolysis principle for trace moisture measurement in gas was successfully tested and applied to trace moisture measurement by Keide in 1959. This method provides a continuous industrial measurement solution for trace moisture in non-alkaline gases, which can continuously, online and real-time monitor the trace moisture in various industrial processes.

Principle

The sensor are plated with parallel platinum layers or wound parallel platinum wires, the platinum wires are coated with a hydrated phosphorus pentoxide film. When the gas passes through the electrolytic cell, all of the water is absorbed and generates phosphoric acid. At the same time, the DC voltage between the platinum wires causes the phosphoric acid to produce an electrolytic reaction to decompose oxygen, hydrogen and phosphorus pentoxide. When the absorption and electrolysis reach a balance, the water entering the electrolytic cell is all absorbed by the phosphorus pentoxide film and then electrolyzed completely. According to Faraday's law of electrolysis and the gas law, the absolute value of moisture in a gas sample can be directly measured according to the electrolysis current.

Application

- Chemicals (Especially for technologies with aggressive gases , PVC / Chlor-Alkali / Fluorine / Polysilicon / Silicone)
- Oil and gas
- Energy/Power Plant
- Air Separation Unit
- Microelectronics(OLED/capacitor/HID)
- Lithium battery
- University and research
- Glove Boxes



Trace Moisture Analyzer



Sensor features

Zirconia ceramic or glass material is optional. The movable construction of electrolytic cell is easy to disassemble and do maintenance.

Installation

▲ Corrosive gas: PVDF electrolytic cell, Non-corrosive gas: PVDF or SS stainless steel electrolytic cell

▲ The sample gas pressure can reach 3Bar(PVDF)/10Bar(SS)

▲ Stable sample gas flow rate 20NI/h or 100NI/h

▲ Three-way valve and four-way valve operation, convenient for sensor maintenance and recoating

▲ Slight positive pressure protection of compressed air in the sampling unit

▲ Filter can be used for unclean gases

▲ Electric heating regulator can be used for liquid chlorine evaporation

▲ Vacuum pump can be used for the vacuum sample gas

▲ The sample gas outlet is recommended to be discharged into the exhaust gas treatment equipment

Some application case

▲ Trace moisture measurement in chlorine at the inlet of the chlorine compressor for protection.

▲ Trace moisture measurement in chlorine at the outlet and the final outlet of the chlorine compressor for protection.

▲ Monitor the leakage of the precooler to protect the chlorine compressor.

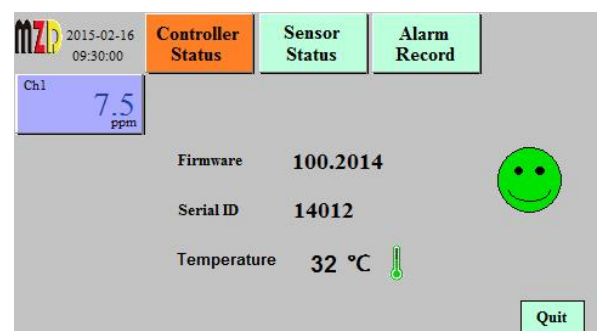
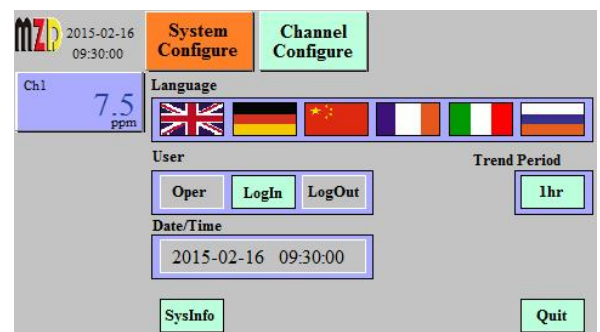
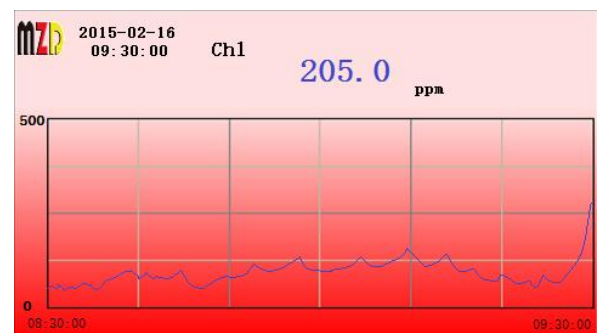
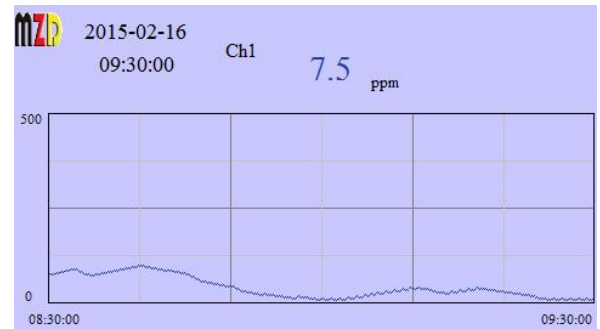
▲ Monitor the accuracy of the dew point analyzer at the outlet of the freezer.

Moisture Analyzer

Continuous Measurement of trace moisture in Corrosive Gases

Features

- ❖ **Quick and convenient**
The navigation menu contains 6 languages, which can be operated easily.
- ❖ **Process safety**
4.3" or 7" large size color LCD touch screen, convenient and safe touch operation and debugging
Large size screen with red flashing alarm, clearly visible from long distances and in dark areas
Alarm immediately, safe the process
- ❖ **Alarm event record**
Real-time data curve display
Record function for up to 6,000 alarms
- ❖ **Expert calibration function**
Multi-point calibration function up to 9 point
- ❖ **Powerful self-diagnosis function**
Built-in flow monitoring
Built-in heartbeat monitoring function and watchdog
Monitor the status of analyzer and sensors, and promptly remind customers to take necessary maintenance
High-standard hardware and software security and password protection
- ❖ **Powerful control function**
High(low) limit control function
Optional: Timer control(automatic cleaning) function
Optional: analog PID control function
Optional: PWM control function
- ❖ **Flexible fieldbus communication functions for IOT4.0**
Optional fieldbus MODBUS, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, etc.



Trace Moisture Analyzer

Parameters

Sensor Material	Glass pillar with platinum wires or Platinum coated ceramic plate (Al ₂ O ₃)			
Measuring Cell Material	PVDF or Stainless Steel			
Display	4.3" or 7" industrial color touch screen			
Language	Multi-Language (English, German, Chinese, French, Italian, Russian or Customized)			
Range	0~1 to 500ppm (*Maximum 2500ppm, free setting)			
Sensitivity	1ppb			
Accuracy	0.4ppm or 5% of measuring value(0~2,000ppm)			
	0.4ppm or 2% of measuring value(0~500ppm)			
	10% of measuring value(0~20,000ppb)			
Sensitivity	1ppb			
Response Time	Less than 1 s			
Action time T90 (up)	Less than 5 s			
Action time T90 (down)	Less than 15 min			
Diagnosis function	Flow monitoring, Sensor and controller self-diagnosis,Heartbeat monitoring			
Event Logger	Internal Flash,up to 6,000 alarm records			
Analog Output(Galvanic)	4~20mA, maximum load 500Ω			
Relay Output(Galvanic)	Relay(2A, 230V AC freely set alarm), System alarm			
Control function	Optional Timer controller,PID analog controller,PWM controller			
Calibration	Expert calibration function,Multi-point calibration function up to 9 point			
Communication	RS485 MODBUS RTU, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, MODBUS TCP/IP, etc			
Power	80~264V AC,1A or 19~28V DC,3A			
Electrical protection	EMI / RFI CEI-EN55011 – 05/99			
Ambient Temperature	-15 ~ 60℃			
Storage and transport temperature	-25 ~ 70℃			
Gas Flow	20NI/h or 100NI/h			
Process Pressure(Max.)	3Bar(PVDF) or 10Bar(Stainless Steel)			
Sample gas temperature	5~65℃			
Process Connection	1/4"NPT thread or KF40 flange			
Diameter of connecting pipe	6mm			
Leakage Level	< 5x10 ⁻⁸ mbar x l / s ⁻¹			
Wire Connections	5Pin			
Sensor Cable	3 ~ 150 meters			
Explosion-proof	Sensor Intrinsic Safety Ex ia optional, Exd IICT4 Controller optional			
Wall-mounted(1~2Channels)	4.3" color touchscreen	ABS,Gray RAL7045	213x185x84mm	IP65
	1.8" color LCD	Aluminum,Gray	180x160x135mm	IP65, Exd IICT4
Laboratory Desktop(1~2Channels)	7" color touchscreen	Aluminum,Black	250x144x184mm	IP40
Portable(1~2Channels)	7" color touchscreen	ABS,Yellow	420x325x180mm	IP67
19" Rack(1~6Channels)	7" color touchscreen	Aluminu,natural-coloured	483x133x238mm	IP40

Moisture Analyzer

Continuous Measurement of trace moisture in Corrosive Gases

Overview

Trace moisture analyzer is cost-effective and suitable for stable and continuous measurement of trace moisture of most gases.

Application

- Microelectronics(OLED/capacitor/HID)
- Lithium battery
- University and research
- Glove Boxes
- Metal heat treatment/welding
- Chemicals/Pharmaceuticals
- Air Separation Unit



Sensor Material	Platinum coated ceramic plate (Al ₂ O ₃)
Display	1.8" color LCD, 160*128Pixel, English Menu, Status LED (NAMUR NE107)
Operation	Magnetic button
Range	0~1 to 500ppm (*Maximum 2500ppm, free setting) Or -100 ~ -20℃ (Dew point)
Accuracy	2% of measuring value or 0.4ppm (0~500ppm range) 10% of measuring value (0~1ppm range)
Sensitivity	1ppb
Lowest detection limit	1ppb
Response Time	Less than 1s
Action time T90 (up)	Less than 5s
Action time T90 (down)	Less than 30 min
Diagnosis function	Self-diagnosis, heart beat monitoring
Analog Output	4~20mA, Maximum load 500 ohms
Relay Output	2 Relays (2A, 230V AC/DC freely set alarm), 1 Relay (System alarm)
Communication	RS485 MODBUS RTU Slave
Power	19 ~ 28V DC, 0.5A
Ambient Temperature	5 ~ 65℃
Process Pressure (Max.)	20Bar
Gas Flow	20NI/h (Recommend)
Process connection	NPT1/2" screw or KF40 flange
Housing Material	Aluminum alloy, Stainless steel
Size	Φ110*240*107 mm
Weight	1.5Kg
Explosion-proof	Ex d IICT4 optional

Moisture Sensor and Analyzer

Overview

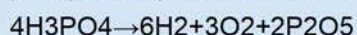
Electrolysis principle for trace moisture measurement in gas was successfully tested and applied to trace moisture measurement by Keide in 1959. This method provides a continuous industrial measurement solution for trace moisture in non-alkaline gases, which can continuously, online and real-time monitor the trace moisture in various industrial processes.

Principle

The sensor pillar is plated with parallel spiral platinum layer as the electrode, and the hydrated phosphorus pentoxide film is coated between the platinum layer. Phosphorus pentoxide has a strong water absorption, when chlorine gas flows steadily through the sensor flow cell, where the water is absorbed to generate phosphoric acid, the reaction formula is as follows:



At the same time, between the two platinum layers to plus DC voltage, that has the electrolysis reaction, phosphoric acid is reductively decomposed into oxygen, chlorine, phosphorus pentoxide. The reaction formula is as follows:



When the absorption and electrolysis reach a balance, the water entering the electrolytic cell is absorbed by the phosphorus pentoxide film and electrolyzed. According to Faraday's law of electrolysis and gas law, it can be deduced that the electrolysis current of water is proportional to the water content of the gas sample. The specific calculation relationship is as follows:

$$I = QPT_0FU \times 10^{-4} / 3P_0TV_0$$

I -- electrolysis current of water, μA ;

U -- water content of the gas sample $\mu\text{L/L}$ (volume ratio);

Q -- gas sample flow mL/min ;

P -- environmental pressure, Pa ;

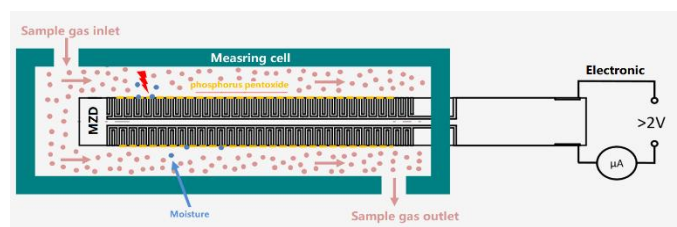
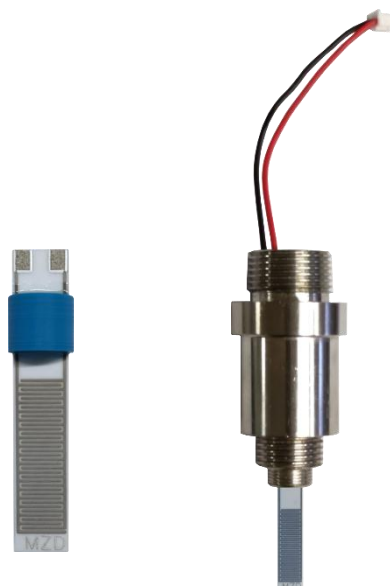
$T_0 = 273.15\text{K}$;

$F = 96485\text{C}$;

$P_0 = 101325\text{ Pa}$;

T -- the absolute temperature of the environment, K ;

$V_0 = 22.4\text{L/mol}$.



Advantage

- Anticorrosive
- Quick response, $T_{90}(\text{up}) < 5\text{s}$
- High accuracy and repeatability
- $0 \sim 10\text{ppm}/2000\text{ppm}$
- No calibration required*
- Rugged and durable design
- Easy installation
- Long-life

*Recoating sensor regularly

Moisture Sensor and Analyzer

The electrolysis moisture analyzer is an absolute measurement method, which is stable and does not drift. It can be used for acid gas such as chlorine, hydrogen chloride, hydrogen sulfide, hydrogen fluoride, sulfur dioxide, sulfur trioxide, or used for air, nitrogen, hydrogen, oxygen, argon, helium, neon, carbon monoxide, carbon dioxide, sulfur hexafluoride, Methane, ethane, propane, butane, natural gas and other neutral gases, but not suitable for alkaline gases that react with P₂O₅, such as ammonia.

The phosphorous pentoxide coating needs to be regenerated regularly, and the maintenance cost is very low, usually using phosphoric acid regeneration every 3 to 6 months. When used in high-humidity situations, the life of the phosphorus pentoxide coating will be shortened, and the regeneration cycle needs to be shortened.

Features

- **Ceramic pillar sensor:** Based on the glass sensor, MZD have developed a ceramic sensor that can realize standardized and automation production. Positive and negative platinum layers are plated on ceramic cylinders or flat plates. The contact area between the platinum layer and the sample gas is larger, the reaction is faster, and the measurement is more stable and reliable.
- **No calibration required***
- Range: 0 ~ 1 to 500ppm*
- Quick response: T₉₀(up) < 5s
- High accuracy and repeatability: Accuracy <2%FS, Repeatability <±0.5%FS
- Flow: 20l/h
- Rugged and durable design
- Long-life ceramic sensor

*Recoating sensor regularly

Main applications

- Lithium battery
- Vacuum drying oven manufacturer
- Vacuum glove box manufacturer
- Metal heat treatment/welding
- OLED/capacitor/HID lamp and electronics
- Fine Chemicals/Pharmaceuticals
- Vacuum drying box/glove box moisture meter and OEM
- Universities and scientific research institutions (nuclear industry/new energy materials)



Moisture Sensor and Analyzer

Parameters

Measuring principle	Electrolysis (P2O5 sensor)
Sensor Material	Platinum coated ceramic plate
Ambient Temperature	5 ~ 65℃
Process Pressure(Max.)	20Bar
Gas Flow	20NI/h
Process connection	NPT1/2" screw or KF40 flange
Display	1.8" industrial color LCD, 160*128Pixel
LED Light	Status LED(Complies with NAMUR NE107)
Language	English Menu
Operation	Magnetic button
Range	0~1 to 500ppm(*Maximum 2500ppm, free setting)
Accuracy	0.4ppm or 2% of measuring value(0~500ppm) 10% of measuring value(0~1ppm)
Sensitivity	1ppb
Lowest detection limit	1ppb
Response Time	Less than 1 s
Action time T90 (up)	Less than 5 s
Action time T90 (down)	Less than 30 min
Diagnosis function	Self-diagnosis, Heartbeat monitoring
Calibration	Expert calibration function: Multi-point calibration function up to 9 point
Power	19 ~ 28V DC,0.5A
Analog Output	4~20mA
Relay Output	Relay(2A, 230V AC/DC freely set alarm), System alarm
Communication	RS485 MODBUS RTU
Electrical protection	EMI / RFI CEI-EN55011 – 05/99
Housing Material	Aluminum alloy, Stainless steel
Size	Φ110*240*107 mm
Weight	1.5Kg
Explosion-proof	Exd IICT4 optional

Hydrogen Analyzer—Better solution for Green Hydrogen!

Overview

Thermal conductivity gas transmitter (analyzer) has ***built-in temperature and humidity measurement and compensation***, is cost-effective and suitable for stable and continuous measurement of the content of hydrogen (H₂).

Application

- Water electrolysis to produce hydrogen
- Hydrogenation unit
- Hydrogen-cooled generator
- University and research
- Metal heat treatment/welding
- Chemicals/Pharmaceuticals
- Air Separation Unit



Parameters

Measuring principle	Thermal conductivity (TCD)
Display	1.8" industrial color LCD, 160*128Pixel
LED Light	Status LED Light(NAMUR NE107)
Linearity	< 1% F.S.
Repeatability	< 1% F.S.
Sensitivity	0.02% F.S.
T90-time	<1sec at flow rate higher 60l/h
Power	19 ~ 28V DC Power
Analog Output	4~20mA
Relay Output	3 Relays, NO, 5A 250VAC/30VDC
Communication	RS485, MODBUS RTU
Electrical protection	EMI / RFI CEI-EN55011 – 05/99
Flow rate	40l/h to 150l/h; 60l/h -80l/h recommended
Process Pressure(Max.)	10Bar
Temperature Range	-40 ~ 85°C
Humidity Range	0~95%RH (non-condensing)
Process Connection	G3/8 screw or 6mm tube
Ambient Temperature	-15 ~ 60°C
Housing Material	Aluminum and Stainless steel
Explosion-proof	Exd IICT4 Controller optional

Thermal Conductivity Analyzer

Overview

Thermal conductivity gas analyzer is an effective method to measure one of two components in a gas mixture (the thermal conductivities differ a lot). Mainly used to measure the content of hydrogen (H₂), carbon dioxide (CO₂), argon (Ar), etc.

Principle

When the sample gas enters the thermal conductivity cell which is heated at a constant temperature of 63°C, and a thermistor is used above the film to maintain a constant temperature of 135°C. In this way, a small cavity is formed below and above the membrane. The measurement gas can diffuse into it. Hence, the heat loss caused by the thermal conductivity of the sample gas is compensated by heating, and the voltage required to maintain a constant temperature of the membrane is a measurement of the thermal conductivity of the measured gas.

Application

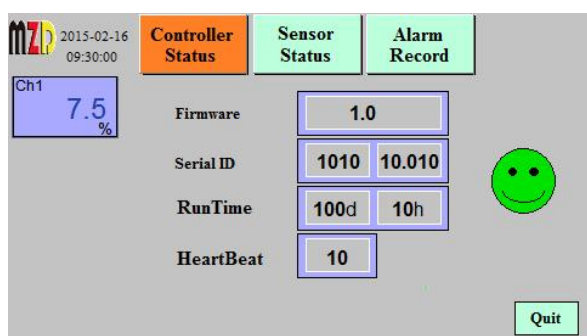
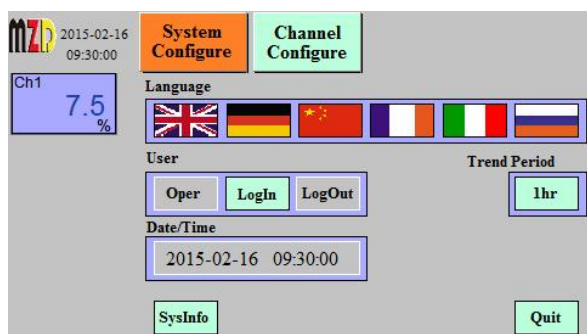
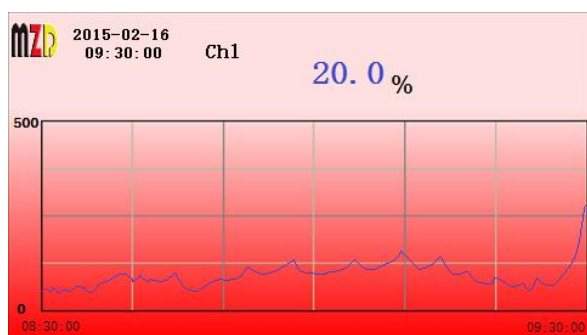
- Measurement of hydrogen (H₂) content in synthesis gas of ammonia plant
- Purity measurement of hydrogen (H₂) in hydrogenation unit
- Measurement of oxygen (O₂) in pure hydrogen (H₂) and hydrogen (H₂) in pure oxygen (O₂) in the process of producing hydrogen by electrolysis of water and oxygen
- Hydrogen (H₂) content measurement in hydrocarbon gas
- Monitoring of hydrogen (H₂) and carbon dioxide (CO₂) content in hydrogen-cooled generator sets
- Measurement of hydrogen (H₂) in chlorine (Cl₂) in the chlorine production process
- Measurement of chlorine (Cl₂) in the chlorine production process
- Measurement of carbon dioxide (CO₂) content in flue gas of furnace combustion
- Argon (Ar) content measurement in air separation plant
- Monitoring in the production of pure gases, such as helium (He) in nitrogen (N₂) and argon (Ar) in oxygen (O₂)
- Sulfur dioxide (SO₂) content measurement in the production process of sulfuric acid and phosphate fertilizer



Features

- ❖ **Corrosion protection**
Sensor surface is coated with Polymer layer(4μm) which will not affect the excellent measurement performance of the sensor unit.
- ❖ **Condensation and dust protection**
The sintered glass with μm-sized holes is used to protect the sensor so that gas molecules can pass through, but liquid water molecules are not permeable.
- ❖ **Multiple gas measurement modes**
The analyzer has 16 built-in binary mixed gas measurement modes and calibration curve.
- ❖ **High corrosion resistance Optional**
Sensor is made from Al₂O₃, glass and SiO₂ coated Pt filaments, and Gas connections in PTFE, PFA
- ❖ **High temperature Optional**
Sensor is be used at higher temperatures up to 180°C

Thermal Conductivity Analyzer



Features

❖ Quick and convenient

The navigation menu contains 6 languages, which can be operated easily.

❖ Process safety

4.3" or 7" large size color LCD touch screen, convenient and safe touch operation and debugging

Large size screen with red flashing alarm, clearly visible from long distances and in dark areas

Alarm immediately, save the process

❖ Alarm event record

Real-time data curve display

Record function for up to 6,000 alarms

❖ Expert calibration function

Multi-point calibration function up to 9 point

❖ Powerful self-diagnosis function

Built-in heartbeat monitoring function and watchdog

Monitor the status of analyzer and sensors, and promptly remind customers to take necessary maintenance

High-standard hardware and software security and password protection

❖ Powerful control function

High(low) limit control function

Optional: Timer control(automatic cleaning) function

Optional: analog PID control function

Optional: PWM control function

❖ Flexible fieldbus communication functions for IOT4.0

Optional fieldbus MODBUS, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, etc.



Thermal Conductivity Analyzer

Measurement components and ranges

Measuring Gas	Carrier Gas	Basis Range	Smallest Range	Smallest Suppressed Zero Range
Hydrogen (H ₂)	Nitrogen (N ₂) or Air	0% – 100%	0% – 0.5%	98% – 100%
Oxygen (O ₂)	Nitrogen (N ₂)	0% – 100%	0% – 15%	85% – 100%
Helium (He)	Nitrogen (N ₂) or Air	0% – 100%	0% – 0.8%	97% – 100%
Carbon dioxide (CO ₂)	Nitrogen (N ₂) or Air	0% – 100%	0% – 3%	96% – 100%
Nitrogen (N ₂)	Argon (Ar)	0% – 100%	0% – 3%	97% – 100%
Oxygen (O ₂)	Argon (Ar)	0% – 100%	0% – 2%	97% – 100%
Hydrogen (H ₂)	Argon (Ar)	0% – 100%	0% – 0.4%	99% – 100%
Helium (He)	Argon (Ar)	0% – 100%	0% – 0.5%	98% – 100%
Carbon dioxide (CO ₂)	Argon (Ar)	0% – 60%	0% – 10%	—
Argon (Ar)	Carbon dioxide (CO ₂)	40% – 100%	—	80% – 100%
Methane (CH ₄)	Nitrogen (N ₂) or Air	0% – 100%	0% – 2%	96% – 100%
Methane (CH ₄)	Argon (Ar)	0% – 100%	0% – 1.5%	97% – 100%
Argon (Ar)	Oxygen (O ₂)	0% – 100%	0% – 3%	96% – 100%
Nitrogen (N ₂)	Hydrogen (H ₂)	0% – 100%	0% – 2%	99.5% – 100%
Oxygen (O ₂)	Carbon dioxide (CO ₂)	0% – 100%	0% – 3%	96% – 100%
Hydrogen (H ₂)	Helium (He)	20% – 100%	20% – 40%	85% – 100%
Hydrogen (H ₂)	Methane (CH ₄)	0% – 100%	0% – 0.5%	98% – 100%
Hydrogen (H ₂)	Carbon dioxide (CO ₂)	0% – 100%	0% – 0.5%	98% – 100%
Sulfur hexafluoride (SF ₆)	Nitrogen (N ₂) or Air	0% – 100%	0% – 2%	96% – 100%
Nitrogen dioxide (NO ₂)	Nitrogen (N ₂) or Air	0% – 100%	0% – 5%	96% – 100%
Hydrogen (H ₂)	Oxygen (O ₂)	0% – 100%	0% – 0.8%	97% – 100%
Argon (Ar)	Xenon (Xe)	0% – 100%	0% – 3%	99% – 100%
Neon (Ne)	Argon (Ar)	0% – 100%	0% – 1.5%	99% – 100%
Krypton (Kr)	Argon (Ar)	0% – 100%	0% – 2%	96% – 100%
Extinguishing gas (R125)	Nitrogen (N ₂) or Air	0% – 100%	0% – 5%	98% – 100%
Deuterium (D ₂)	Nitrogen (N ₂) or Air	0% – 100%	0% – 0.7%	96% – 100%
Deuterium (D ₂)	Helium (He)	0% – 100%	0% – 5%	70% – 100%

Thermal Conductivity Analyzer

Parameters

Measuring principle	Thermal conductivity (TCD)		
Display	4.3" or 7" industrial color touch screen		
Language	Multi-Language (English, German, Chinese, French, Italian, Russian or Customized)		
Linearity	< 1% of range		
Repeatability	< 1% of range		
Warm up time	About 30min; 1h for small ranges		
Sensitivity	0.01%		
Response Time	Less than 1 s (depending on flow rate)		
T90-time	< 1 sec at flow rate higher 60l/h		
Noise	< 1% of smallest range		
Drift at zero point per week	< 2% of smallest range		
Flow rate	40l/h to 150l/h; 60l/h - 80l/h recommended		
Flow influence between 60l/h and 90l/h per 10l/h	< 1% of smallest range		
Measuring error with ambient temperature change per 10°K	< 1% of smallest range		
Gas pressure	Max. 2MPa (20bar)		
Fault with measurement gas change (Pabs > 800 hPa) per 10 hPa	< 1% of smallest range		
Analog Output (Galvanic)	4~20mA, maximum load 500Ω		
Relay Output (Galvanic)	Relay (2A, 230V AC freely set alarm), System alarm		
Diagnosis function	Flow monitoring, Sensor and analyzer self-diagnosis, Heartbeat monitoring		
Event Logger	Internal Flash, up to 6,000 alarm records		
Control function	Optional Timer control function, PID, PWM		
Calibration	Expert calibration function, Multi-point calibration function up to 9 point		
Communication	RS485 MODBUS RTU, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, MODBUS TCP/IP, etc		
Power	80~264V AC, 1A or 19~28V DC, 3A		
Electrical protection	EMI / RFI CEI-EN55011 – 05/99		
Ambient Temperature	-15 ~ 50°C		
Storage and transport temperature	-25 ~ 70°C		
Process Connection	6mm Pipe		
Wall-mounted (1~2 Channels)	ABS, Gray RAL7045	213x185x84mm	IP65
	Aluminum, Gray	230x200x157mm	IP65, Exd IICT4
Laboratory Desktop (1~2 Channels)	Aluminum, Black	250x144x184mm	IP40
Portable (1~2 Channels)	ABS, Yellow	420x325x180mm	IP67
19" Rack (1~6 Channels)	Aluminum, natural-coloured	483x133x238mm	IP40

Hydrogen Analyzer—Better solution for Green Hydrogen!

Overview

Thermal conductivity gas transmitter (analyzer) has ***built-in temperature and humidity measurement and compensation***, is cost-effective and suitable for stable and continuous measurement of the content of hydrogen (H₂).

Application

- Water electrolysis to produce hydrogen
- Hydrogenation unit
- Hydrogen-cooled generator
- University and research
- Metal heat treatment/welding
- Chemicals/Pharmaceuticals
- Air Separation Unit



Parameters

Measuring principle	Thermal conductivity (TCD)
Display	1.8" industrial color LCD, 160*128Pixel
LED Light	Status LED Light(NAMUR NE107)
Linearity	< 1% F.S.
Repeatability	< 1% F.S.
Sensitivity	0.02% F.S.
T90-time	<1sec at flow rate higher 60l/h
Power	19 ~ 28V DC Power
Analog Output	4~20mA
Relay Output	3 Relays, NO, 5A 250VAC/30VDC
Communication	RS485, MODBUS RTU
Electrical protection	EMI / RFI CEI-EN55011 – 05/99
Flow rate	40l/h to 150l/h; 60l/h -80l/h recommended
Process Pressure(Max.)	10Bar
Temperature Range	-40 ~ 85°C
Humidity Range	0~95%RH (non-condensing)
Process Connection	G3/8 screw or 6mm tube
Ambient Temperature	-15 ~ 60°C
Housing Material	Aluminum and Stainless steel
Explosion-proof	Exd IICT4 Controller optional

Thermal Conductivity Sensor and Analyzer

Overview

Thermal conductivity gas sensor has built-in temperature and humidity measurement and compensation, is cost-effective and suitable for stable and continuous measurement of the content of hydrogen (H₂).

The material thermal conductivity of each gas differs, and its thermal conductivity (or thermal conductivity) is related to its molar mass and temperature and has little effect on the gas pressure. When gases with different thermal conductivities are mixed, the thermal conductivity of the mixture depends on the concentration of its components. So the proportion of each component gas can be determined.

The principle of thermal conductivity measurement is particularly applicable when the gases to be measured have significantly different thermal conductivities and one of the following three conditions is fulfilled.

1. the gas mixture contains only two components. For example, the carbon dioxide content in nitrogen or the hydrogen content in nitrogen.
2. the gas mixture contains more than two components, but the concentration of only two components changes.
3. A gas mixture contains more than two components and the background gas contains two or more components but with similar thermal conductivity, which corresponds to two components mixture. For example, when measuring hydrogen or helium in oxygen/nitrogen.

Principle

The sensor chip consists of a silicon frame with 2 silicon-nitride membrane². Each membrane has a micromechanical heating element at its center, and the chip uses a heating resistor to control heating of the center of the membrane to about 40°C above ambient temperature. The resulting temperature increase of the center is measured by the thermopile.



Advantage

- Built-in temperature measurement and compensation
- Built-in humidity measurement and compensation
- Quick response, T₉₀<1s
- High accuracy and repeatability
- 0 ~ 100%
- No drift, maintenance-free, no calibration required
- Rugged and durable design
- Easy installation
- Long-life

Percent Hydrogen Sensor and Analyzer

The actual temperature increase depends upon the effective thermal resistance between membrane center and ambient, this is influenced by the thermal resistance of the gas surrounding the sensor. For each binary gas mixture the ratio of temperature increase to heating power is dependent on the mix ratio. The chip determines the thermal conductance between the ambient and the center of the membrane by measuring the temperature elevation of heater, measures the gas composition. For improve accuracy, temperature and humidity sensors are built in for compensation.

Features

- **High accuracy and repeatability:** Accuracy <1%FS, Repeatability <1%FS
- T90-time: <1sec at flow rate higher 60l/h
- Gas pressure: <10bar
- Flow: 40l/h to 150l/h; 60l/h -80l/h recommended
- Warm up time: 5minute
- Rugged and durable design

Main applications

- Measurement of hydrogen (H₂) content in synthesis gas of ammonia plant
- Purity measurement of hydrogen (H₂) in hydrogenation unit
- Measurement of hydrogen (H₂) in pure oxygen (O₂) in the process of producing hydrogen by electrolysis of water and oxygen
- Hydrogen (H₂) content measurement in hydrocarbon gas
- Monitoring of hydrogen (H₂) content in hydrogen-cooled generator sets
- Measurement of hydrogen (H₂) in chlorine (Cl₂) in the chlorine production process

Applications Industry

- Water electrolysis to produce hydrogen
- Hydrogenation unit
- Hydrogen-cooled generator
- University and research
- Metal heat treatment/welding
- Chemicals/Pharmaceuticals
- Air Separation Unit



Thermal Conductivity Sensor and Analyzer

Parameters

Measuring principle	Thermal conductivity (TCD)
Display	1.8" industrial color LCD, 160*128Pixel
Language	English Menu
LED Light	Status LED Light(NAMUR NE107)
Keypad	Magnetic keypad
Range	0~100%
Linearity	< 1% F.S.
Repeatability	< 1% F.S.
Sensitivity	0.02% F.S.
Response Time	<1s
T90-time	<1sec at flow rate higher 60l/h
Warm up time	5minute
Diagnosis function	Self-diagnosis, heart beat monitoring
Analog Output	4~20mA
Relay Output	3 Relays, NO, 5A 250VAC/30VDC
Communication	RS485, MODBUS RTU
Power	19 ~ 28V DC Power, 0.5A
Flow rate	40l/h to 150l/h; 60l/h -80l/h recommended
Process Pressure(Max.)	10Bar
Temperature Range	-40 ~ 85°C
Humidity Range	0~95%RH (non-condensing)
Process Connection	G3/8 screw or 6mm tube
Ambient Temperature	-15 ~ 60°C
Electrical protection	EMI / RFI CEI-EN55011 – 05/99
Housing Material	Aluminum and Stainless steel
Explosion-proof	Exd IICT4 Controller optional



Ultraviolet photometry analyzer

Overview

Ultraviolet photometry analyzer has 2 measuring ranges as ppm or Vol.-%, and can also realize high-precision up to ppb range. It can measure 2 gas components simultaneously by using 2 UV-LEDs. Nitrogen oxides (NO+NO₂), aromatic hydrocarbons, hydrogen sulphide, ozone, sulphur dioxide and chlorine can be measured.

Principle

UV-LED radiation is divided into measurement and reference paths by a beam splitter. The reference beam directly reaches the detector, which converts it into a reference voltage value. Using this reference signal, the aging effect of UV-LED can be almost completely compensated. The measuring beam enters the sample cell, and the gas in the sample cell is absorbed by the radiation in it. The absorption behavior is recorded by the measuring detector and used to calculate the gas concentration in the measuring cuvette.

Application

- Environmental and Process Measurement Technology (CEM)
- Engine development
- Elemental analysis
- Industrial gas analysis
- Natural gas/biogas analysis
- Process measurement technology
- Biogas research

Measurement components and ranges

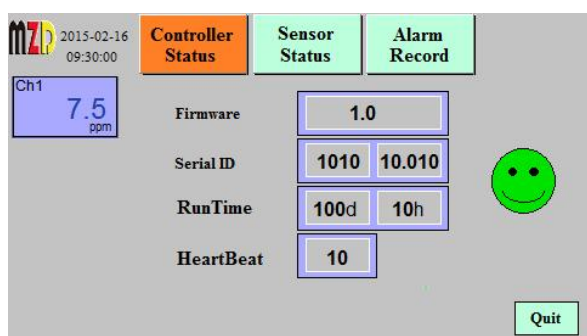
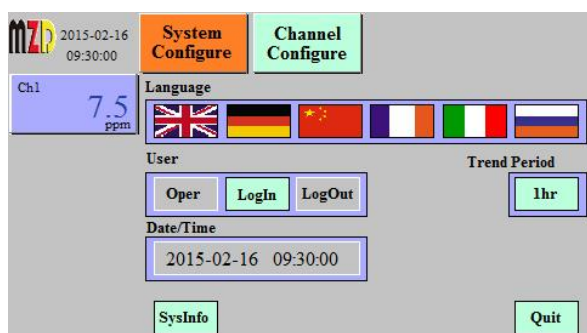
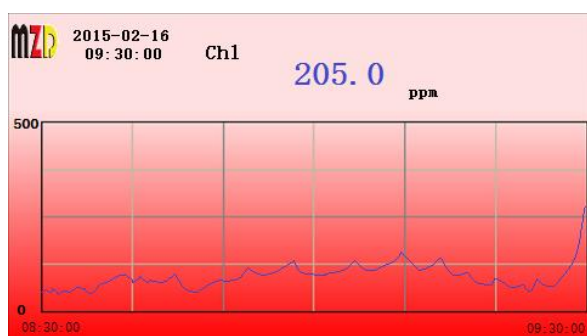
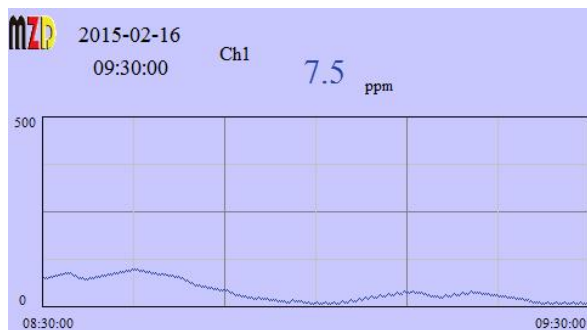
- ❖ SO₂: 0~10ppm up to 10% (Vol)
- ❖ NO: 0~300ppm up to 5,000ppm
- ❖ NO₂: 0~10ppm up to 5,000ppm
- ❖ O₃: 0~1ppm up to 5,000ppm
- ❖ Cl₂: 0~100ppm up to 30% (Vol)
- ❖ H₂S: 0~100ppm up to 1%



Features

- ❖ Linearity error: $\pm 0.5\%$ FS or 1 % F.S
- ❖ Sensor sample cell: stainless steel with inert coating (inside and outside)
- ❖ PEEK cell for corrosive gases (H₂S, chlorine) on request
- ❖ High dynamic range, 1:100
- ❖ Fast response time, $t_{90} < 1$ s possible
- ❖ No water vapour cross sensitivity different to NDIR gas sensors

Ultraviolet photometry analyzer



Features

❖ Quick and convenient

The navigation menu contains 6 languages, which can be operated easily.

❖ Process safety

4.3" or 7" large size color LCD touch screen, convenient and safe touch operation and debugging

Large size screen with red flashing alarm, clearly visible from long distances and in dark areas

Alarm immediately, save the process

❖ Alarm event record

Real-time data curve display

Record function for up to 6,000 alarms

❖ Expert calibration function

Multi-point calibration function up to 9 point

❖ Powerful self-diagnosis function

Built-in heartbeat monitoring function and watchdog

Monitor the status of analyzer and sensors, and promptly remind customers to take necessary maintenance

High-standard hardware and software security and password protection

❖ Powerful control function

High(low) limit control function

Optional: Timer control(automatic cleaning) function

Optional: analog PID control function

Optional: PWM control function

❖ Flexible fieldbus communication functions for IOT4.0

Optional fieldbus MODBUS, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, etc.



Ultraviolet photometry analyzer

Parameters

Measuring principle	NDUV(Non-dispersive UV method) or UVRAS(Ultraviolet Resonance Absorption Spectrometer)		
Display	4.3" or 7" industrial color touch screen		
Language	Multi-Language (English, German, Chinese, French, Italian, Russian or Customized)		
Linearity error	< 0.5%FS or 1%F.S		
Sensitivity	0.1ppm or 0.01%		
Warmup time	1-30 Minutes		
Response Time	Less than 1 s		
Zero point stability	2% of span		
T90-time	<1sec at flow rate higher 60l/h		
Detection limit (4·STDW)	< 1% of span		
Lifetime of the UV Radiation source	> 20 000h		
Gas pressure	800-1200 hPa (mbar)		
max. Pressure	4bar		
Analog Output(Galvanic)	4~20mA, maximum load 500Ω		
Relay Output(Galvanic)	Relay(2A, 230V AC freely set alarm), System alarm		
Diagnosis function	Flow monitoring, Sensor and analyzer self-diagnosis, Heartbeat monitoring		
Event Logger	Internal Flash, up to 6,000 alarm records		
Control function	Optional Timer control function, PID, PWM		
Calibration	Expert calibration function, Multi-point calibration function up to 9 point		
Communication	RS485 MODBUS RTU, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, MODBUS TCP/IP, etc		
Power	80~264V AC, 1A or 19~28V DC, 3A		
Electrical protection	EMI / RFI CEI-EN55011 – 05/99		
Ambient Temperature	5 ~ 50℃		
Storage and transport temperature	-20 ~ 70℃		
Process Connection	6mm Pipe		
Wall-mounted(1~2Channels)	ABS, Gray RAL7045	213x185x84mm	IP65
	Aluminum, Gray	230x200x157mm	IP65, Exd IICT4
Laboratory Desktop(1~2Channels)	Aluminum, Black	250x144x184mm	IP40
Portable(1~2Channels)	ABS, Yellow	420x325x180mm	IP67
19" Rack(1~6Channels)	Aluminum, natural-coloured	483x133x238mm	IP40

Zirconia Oxygen Analyzer

Overview

SMART-OXZ Oxygen Analyzer uses a unique reference built-in zirconia technology, has higher accuracy and repeatability for oxygen measurement, with no need to provide standard air or calibration.

Principle

The zirconia sensor is tubular, separated by a zirconia material in the middle, and porous metal layer are sintered on the two parts of the zirconia as electrodes (usually use platinum Pt as the electrode material). At a certain temperature ($600^{\circ}\text{C}\sim 1400^{\circ}\text{C}$), oxygen molecules with higher oxygen content are adsorbed on the electrode, making this side electrode positively charged, which is the positive electrode or anode of the oxygen concentration battery. Under the catalysis of platinum, a reduction reaction takes place, get electrons to form oxygen ions. Oxygen ions migrate through a large amount of zirconia crystals to the other side where the oxygen content is low, making the electrode negatively charged, which is the negative electrode or cathode of the oxygen concentration battery. Lose electrons on the platinum electrode, forming oxygen molecules. In this way, a certain potential is formed on the two electrodes due to the accumulation of positive and negative charges. This potential is related to the difference in oxygen concentration between the two measured gases of zirconia. It conforms to the Nernst equation and then the oxygen partial pressure (P_1) in the gas can be calculated, and the oxygen concentration in the gas to be measured is obtained.

Application

- ASU(Air separation unit)
- Chemical, Pharmaceutical Industry
- Petroleum and Petrochemical Industry
- Metallurgical Industry
- Glass manufacturing
- Semiconductor Industry
- Food and beverage Industry
- Flare monitoring
- Nuclear, heat treatment, welding protection
- Environmental area monitoring
- Anesthesia, breathing and prenatal care

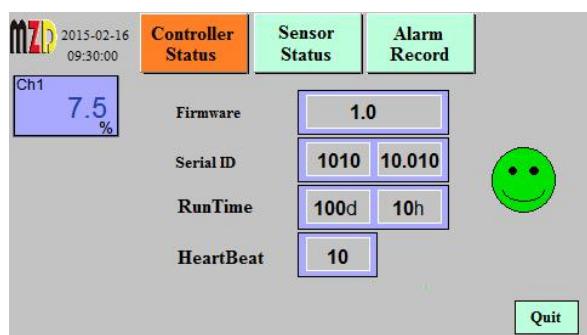
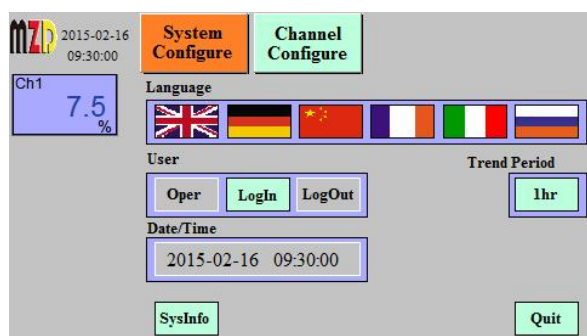
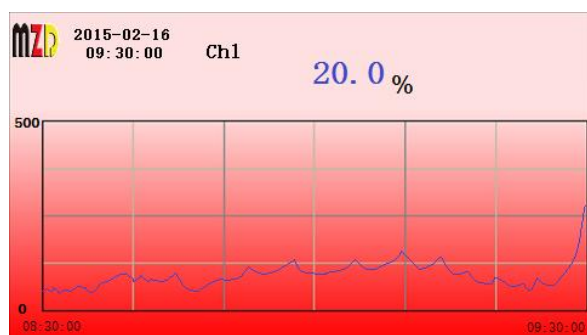
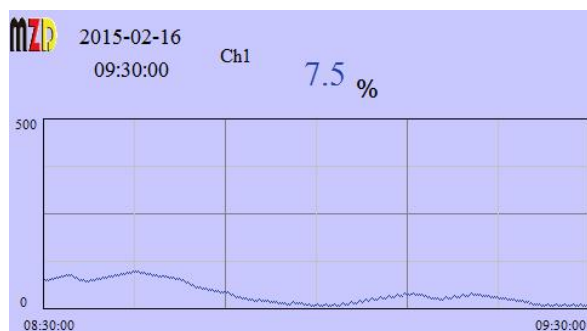


Advantage

- Quick response
- High accuracy and repeatability
- No drift, maintenance-free, no calibration required*
- Rugged and durable design
- Easy installation
- Comfortable and friendly operation
- Long-life zirconia sensor

*For vacuum application, need calibration

Trace/Percent Oxygen Analyzer



Features

❖ Quick and convenient

The navigation menu contains 6 languages, which can be operated easily.

❖ Process safety

4.3" or 7" large size color LCD touch screen, convenient and safe touch operation and debugging

Large size screen with red flashing alarm, clearly visible from long distances and in dark areas

Alarm immediately, safe the process

❖ Alarm event record

Real-time data curve display

Record function for up to 6,000 alarms

❖ Expert calibration function

Multi-point calibration function up to 9 point

❖ Powerful self-diagnosis function

Built-in heartbeat monitoring function and watchdog

Monitor the status of analyzer and sensors, and promptly remind customers to take necessary maintenance

High-standard hardware and software security and password protection

❖ Powerful control function

High(low) limit control function

Optional: Timer control(automatic cleaning) function

Optional: analog PID control function

Optional: PWM control function

❖ Flexible fieldbus communication functions for IOT4.0

Optional fieldbus MODBUS, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, etc.



Zirconia Oxygen Analyzer

Parameters

Measuring principle	Zirconia		
Display	4.3" or 7" industrial color touch screen		
Language	Multi-Language (English, German, Chinese, French, Italian, Russian or Customized)		
Range	0 ~ 10/100/1000ppm or 0 ~ 1%/10%/30%		
Linearity	<3% of measuring value		
Sensitivity	0.1ppm or 0.01%		
Sample gas temperature	<300°C		
Working temperature	700°C		
Gas pressure	<2bar(Available for vacuum)		
Gas Flow	5~10NI/h, Max.10m/s		
Warm up time	5mintue		
Analog Output(Galvanic)	4~20mA, maximum load 500Ω		
Relay Output(Galvanic)	Relay(2A, 230V AC freely set alarm), System alarm		
Diagnosis function	Flow monitoring, Sensor and analyzer self-diagnosis, Heartbeat monitoring		
Event Logger	Internal Flash, up to 6,000 alarm records		
Control function	Optional Timer control function, PID, PWM		
Calibration	Expert calibration function, Multi-point calibration function up to 9 point		
Communication	RS485 MODBUS RTU, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, MODBUS TCP/IP, etc		
Power	80~264V AC, 1A or 19~28V DC, 3A		
Electrical protection	EMI / RFI CEI-EN55011 – 05/99		
Ambient Temperature	-20~50°C		
Storage and transport temperature	-25~70°C		
Ambient Humidity	0~80%RH		
Diameter of connecting pipe	6mm		
Wall-mounted(1~2Channels)	ABS, Gray RAL7045	213x185x84mm	IP65
	Aluminum, Gray	230x200x157mm	IP65, Exd IICT4
Laboratory Desktop(1~2Channels)	Aluminum, Black	250x144x184mm	IP40
Portable(1~2Channels)	ABS, Yellow	420x325x180mm	IP67
19" Rack(1~6Channels)	Aluminu, natural-coloured	483x133x238mm	IP40



Trace/Percent Oxygen Analyzer



Measuring principle	Zirconia
Display	1.8" industrial color LCD, 160*128Pixel
Language	English Menu
LED Light	Status LED Light(NAMUR NE107)
Keypad	Magnetic keypad
Range	0~1~1000ppm, 0~100% O ₂
Accuracy	< 2% F.S.
Repeatability	< 0.1% F.S.
Sensitivity	1ppb or 0.01%
Response Time	<1s
T90-time	<2 sec at flow rate 10l/h
Warm up time	5minute
Diagnosis function	Self-diagnosis, heart beat monitoring
Analog Output	4~20mA
Relay Output	3 Relays, NO, 5A 250VAC/30VDC
Communication	RS485, MODBUS RTU
Power	19 ~ 28V DC Power,1A
Flow rate	5l/h to 10l/h, Max.10m/s
Process Pressure(Max.)	2Bar (Available for vacuum)
Process Gas Temperature	<300°C(Optional,700~1400°C)
Working temperature	700°C
Process Connection	NPT1/2" thread or KF40 flange
Ambient Temperature	-20 ~ 50°C
Ambient Humidity	0~80%RH
Electrical protection	EMI / RFI CEI-EN55011 – 05/99
Housing Material	Aluminum and Stainless steel
Explosion-proof	Exd IICT4 Controller optional

Zirconia Oxygen Sensor and Analyzer

Overview

SMART-OXZ Oxygen sensor uses a unique reference built-in zirconia technology, has higher accuracy and repeatability for oxygen measurement, with no need to provide standard air or calibration.

Principle

Zirconia (ZrO_2) is a ceramic, doped with a certain percentage of low-valent metal oxides as stabilizers, such as calcium oxide (CaO), magnesium oxide (MgO), and yttrium oxide (Y_2O_3), it has high-temperature conductivity, a conductor with ionic conductive properties, and becomes a zirconia solid electrolyte. At a certain temperature, when the oxygen content in the gas on both sides of the zirconia tube is different, a typical oxygen concentration difference cell is formed.

The zirconia tube as a whole is tubular, separated by zirconia material, and a porous layer of metal is sintered on each side of the zirconia as an electrode (usually Pt is used as the electrode material). At a certain temperature ($600^\circ\text{C} \sim 1400^\circ\text{C}$), oxygen molecules on the side with higher oxygen content are adsorbed on the electrode, making the electrode on that side positively charged and the positive or anode of the oxygen concentration difference battery. Under the catalytic action of platinum, a reduction reaction occurs and electrons are obtained to form oxygen ions. The oxygen ions migrate through the holes in the zirconia crystal to the other side where the oxygen content is lower, making that electrode negatively charged and the negative or cathode of the oxygen concentration cell. At the platinum electrode electrons are lost and oxygen molecules are formed. This creates a certain potential at the two electrodes due to the buildup of positive and negative charges, which is related to the difference in oxygen content concentration in the two measured gases of zirconia, in accordance with **Nernst equation**:

$$E = (RT/4F) \cdot \ln(P_0/P)$$

E -- oxygen concentration difference potential (mV)

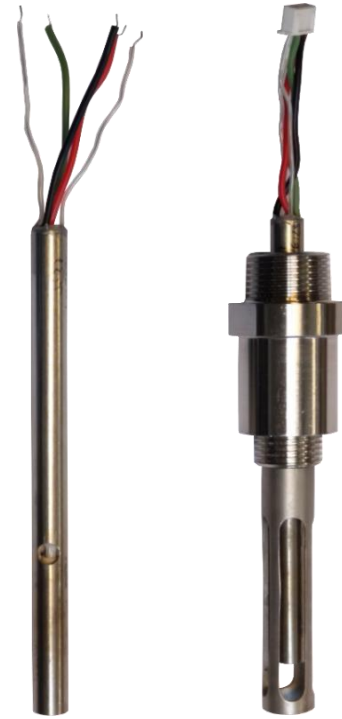
R -- gas constant 8.3145 J/mol-K

T -- zirconia probe operating temperature (K, absolute temperature) = $273.15 + t (^{\circ}\text{C})$

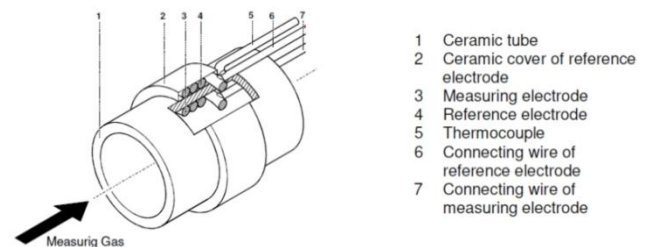
F -- Faraday constant, 96485.3365 (C/mol)

P_0 -- partial pressure of oxygen in the reference gas

P -- Oxygen partial pressure in the sample gas



Construction principle of the solid electrolyte sensor



Composition of the solid electrolyte sensor

Advantage

- Quick response, $T_{90} < 0.5\text{s}$
- High accuracy and repeatability
- 0 ~ 10ppm/30%(up to 100 vol% on request)
- No drift, maintenance-free, no calibration required*
- Rugged and durable design
- Easy installation
- Long-life

*For vacuum application, need calibration

Trace/Percent Oxygen Sensor and Analyzer

The oxygen partial pressure (P) in the gas to be measured can be calculated by measuring the concentration cell potential E and the absolute temperature of the zirconia probe, and thus the oxygen concentration in the gas to be measured.

The zirconia method has high sensitivity, fast response time, wide linear range, good reproducibility and stability. The internal structure is simple and almost independent of external environmental conditions such as temperature, vibration, etc., and requires little maintenance. However, the zirconia method is not suitable for measuring oxygen concentration in reducing gases or gas samples with high reducing gas content because the oxygen concentration is affected by the reducing gas in the gas to be measured, resulting in low measurement results. The sensor life is typically 5 years or more and is typically used for oxygen content measurements at ppm, air concentration (20.64%). Our sensors have been delivered to more than 2,000 customers in industrial facilities and research institutions in 73 countries so far. And we can offer the catalytically inactive potentiometric oxygen measuring cell, which has a worldwide unique position, combines the advantages of classic high-temperature solid electrolyte sensors with those of cold electrochemical oxygen sensors (Clark cells).

Features

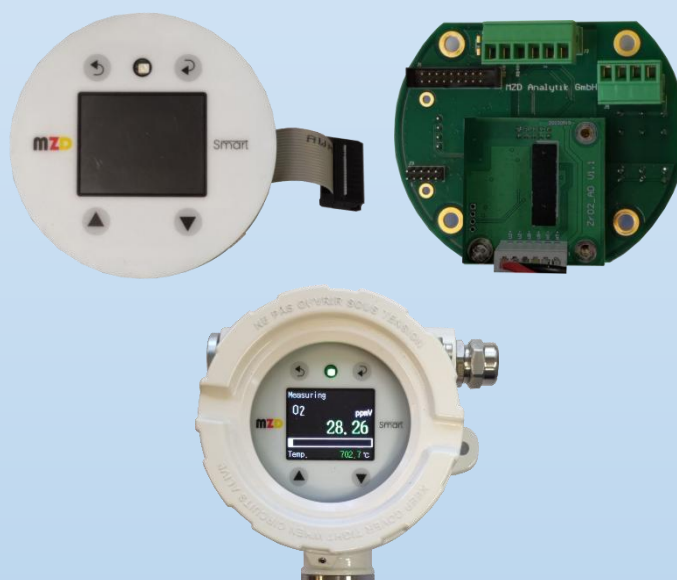
- **High accuracy and repeatability:** Accuracy <2%FS, Repeatability <±0.1%FS
- Sample gas temperature: <300°C(Optional, 700~1400°C)
- Working temperature: 700~800°C
- Gas pressure: <2bar(Available for vacuum)
- Flow: 5~10l/h, Max.10m/s
- Warm up time: 5minute
- Rugged and durable design

Main applications

- Inert gas measurement of trace oxygen content, electronic semiconductor industry, air separation, steel metallurgy, chemical fertilizer, chemical industry, welding protection, etc.
- Flue gas measurement of percent oxygen content, power plants, petrochemical refining, chemical industry, iron and steel metallurgy, cement and building materials, boilers, etc.

Applications Industry

- ASU(Air separation unit)
- Chemical, Pharmaceutical Industry
- Petroleum and Petrochemical Industry
- Metallurgical Industry
- Glass manufacturing
- Semiconductor Industry
- Food and beverage Industry
- Flare monitoring
- Nuclear, heat treatment, welding protection
- Environmental area monitoring
- Anesthesia, breathing and prenatal care



Zirconia Oxygen Sensor and Analyzer

Parameters

Measuring principle	Zirconia
Display	1.8" industrial color LCD, 160*128Pixel
Language	English Menu
LED Light	Status LED Light(NAMUR NE107)
Keypad	Magnetic keypad
Range	0~1~1000ppm, 0~100% O ₂
Accuracy	< 2% F.S.
Repeatability	< 0.1% F.S.
Sensitivity	1ppb or 0.01%
Response Time	<1s
T90-time	<2 sec at flow rate 10l/h
Warm up time	5minute
Diagnosis function	Self-diagnosis, heart beat monitoring
Analog Output	4~20mA
Relay Output	3 Relays, NO, 5A 250VAC/30VDC
Communication	RS485, MODBUS RTU
Power	19 ~ 28V DC Power, 1A
Flow rate	5l/h to 10l/h, Max.10m/s
Process Pressure(Max.)	2Bar (Available for vacuum)
Process Gas Temperature	<300°C (Optional, 700~1400°C)
Working temperature	700°C
Process Connection	NPT1/2" thread or KF40 flange
Ambient Temperature	-20 ~ 50°C
Ambient Humidity	0~80%RH
Electrical protection	EMI / RFI CEI-EN55011 – 05/99
Housing Material	Aluminum and Stainless steel
Explosion-proof	Exd IICT4 Controller optional



Infrared photometry analyzer

Overview

Infrared photometry analyzer uses high-performance light emitting diodes (IR-LED) and thermal micro radiators which are suitable to gas measurement technology. It has high stability and a low detection limit. In the spectral range from 2 μm to 12 μm , carbon dioxide, carbon monoxide, hydrocarbons and nitrous oxide can be measured.

Principle

Infrared photometry analyzer uses broadband radiation sources (thermal emitters). This radiation immediately reaches the measuring cuvette. There, specific spectral ranges are absorbed from the broadband spectrum of the radiation source. The measuring detector which contains at least 2 separate channels, is located at the end of the measuring cuvette. In the simplest case the measuring channel has an interference filter placed in front of the detector. The reference detector also has an interference filter in front of the detector, but with a spectral transmission range (approx. 4 μm) where no absorption takes place. Afterwards a detector measures the specific radiation absorption. The evaluation electronics use the two signals to calculate the gas concentration in the measuring cuvette. Alternatively, a detector with several measuring channels can be placed at the end of the measuring cuvette, so that 3 components can be recorded simultaneously.

Application

- Environmental and Process Measurement Technology (CEM)
- Engine development
- Elemental analysis
- Industrial gas analysis
- Natural gas/biogas analysis
- Process measurement technology
- Biogas research



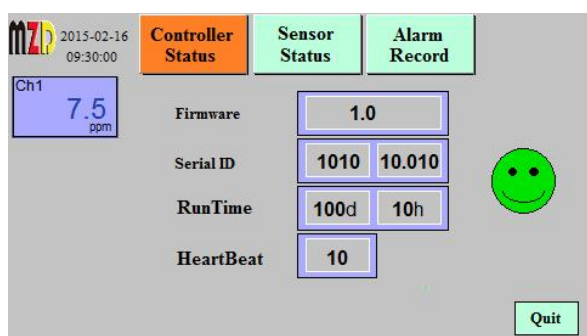
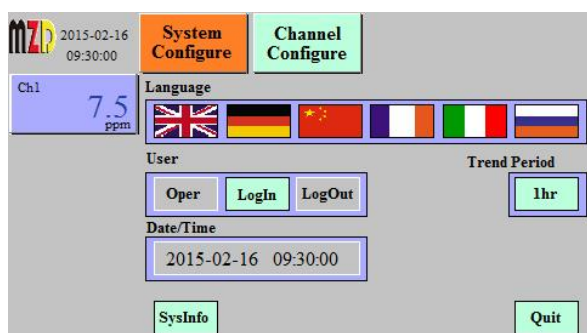
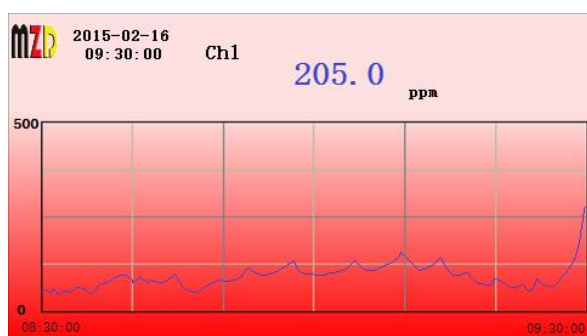
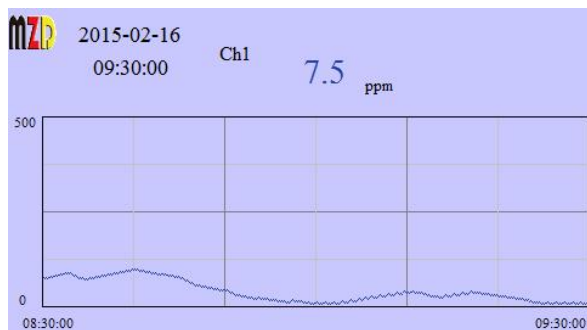
Features

- ❖ Linearity error: $\pm 0.5\%$ FS or 1 % F.S
- ❖ Sensor sample cell: aluminium/gold
- ❖ High dynamic range, 1:100
- ❖ Fast response time, t_{90} is about 3 s

Measurement components and ranges

- ❖ CO: 0 ~ 500ppm up to 100%(Vol)
- ❖ CO₂: 0 ~ 50ppm up to 100%(Vol)
- ❖ HCs: 0 ~ 1000ppm up to 100%(Vol)
- ❖ CH₄: 0 ~ 1000ppm up to 100%(Vol)
- ❖ N₂O: 0 ~ 100ppm up to 100%(Vol)
- ❖ SF₆: 0 ~ 50ppm up to 100%(Vol)
- ❖ CF₄: 0 ~ 100%(Vol)

Infrared photometry analyzer



Features

❖ Quick and convenient

The navigation menu contains 6 languages, which can be operated easily.

❖ Process safety

4.3" or 7" large size color LCD touch screen, convenient and safe touch operation and debugging

Large size screen with red flashing alarm, clearly visible from long distances and in dark areas

Alarm immediately, save the process

❖ Alarm event record

Real-time data curve display

Record function for up to 6,000 alarms

❖ Expert calibration function

Multi-point calibration function up to 9 point

❖ Powerful self-diagnosis function

Built-in heartbeat monitoring function and watchdog

Monitor the status of analyzer and sensors, and promptly remind customers to take necessary maintenance

High-standard hardware and software security and password protection

❖ Powerful control function

High(low) limit control function

Optional: Timer control(automatic cleaning) function

Optional: analog PID control function

Optional: PWM control function

❖ Flexible fieldbus communication functions for IOT4.0

Optional fieldbus MODBUS, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, etc.



Infrared photometry analyzer

Parameters

Measuring principle	NDIR(Non-dispersive IR method)		
Display	4.3" or 7" industrial color touch screen		
Language	Multi-Language (English, German, Chinese, French,Italian, Russian or Customized)		
Linearity error	< 0.5%FS or 1%F.S		
Sensitivity	0.1ppm or 0.01%		
Warmup time	1-30 Minutes		
Response Time	Less than 1 s		
Zero point stability	2% of span		
T90-time	<1sec at flow rate higher 60l/h		
Detection limit (4·STDW)	< 1% of span		
Lifetime of the UV Radiation source	> 20,000h		
Gas pressure	800-1200 hPa (mbar)		
max. Pressure	4bar		
Analog Output(Galvanic)	4~20mA, maximum load 500Ω		
Relay Output(Galvanic)	Relay(2A, 230V AC freely set alarm), System alarm		
Diagnosis function	Flow monitoring, Sensor and analyzer self-diagnosis,Heartbeat monitoring		
Event Logger	Internal Flash,up to 6,000 alarm records		
Control function	Optional Timer control function,PID,PWM		
Calibration	Expert calibration function,Multi-point calibration function up to 9 point		
Communication	RS485 MODBUS RTU, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, MODBUS TCP/IP, etc		
Power	80~264V AC,1A or 19~28V DC,3A		
Electrical protection	EMI / RFI CEI-EN55011 – 05/99		
Ambient Temperature	5 ~ 50℃		
Storage and transport temperature	-20 ~ 70℃		
Process Connection	6mm Pipe		
Wall-mounted(1~2Channels)	ABS,Gray RAL7045	213x185x84mm	IP65
	Aluminum,Gray	230x200x157mm	IP65, Exd IICT4
Laboratory Desktop(1~2Channels)	Aluminum,Black	250x144x184mm	IP40
Portable(1~2Channels)	ABS,Yellow	420x325x180mm	IP67
19" Rack(1~6Channels)	Aluminu,natural-coloured	483x133x238mm	IP40

Laser Spectrum Analyzer

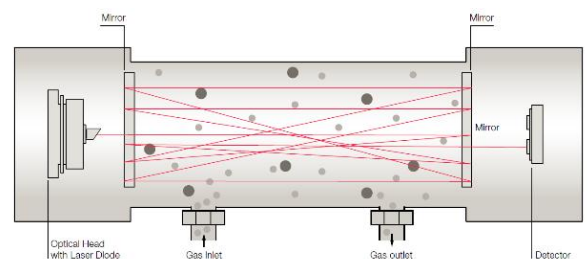
Overview

The measurement principle of the high-precision laser absorption spectrometer is based on the detection of the absorption of molecules passing through the light of a specific wavelength. As light sources, we use laser diodes with wavelengths ranging from the visible to the mid-infrared range, depending on the gas. By evaluating the intensity of the transmitted light (I) and incident light (I_0) of the detector (Lambert-Beer law), the current gas concentration in the measurement chamber can be determined.

The measured spectra were compared with theoretical spectra based on the HITRAN database, which contains information about gas absorption lines. The deviation between these two spectra (which we call "spectral correlation") is continuously analyzed and verified.

Features

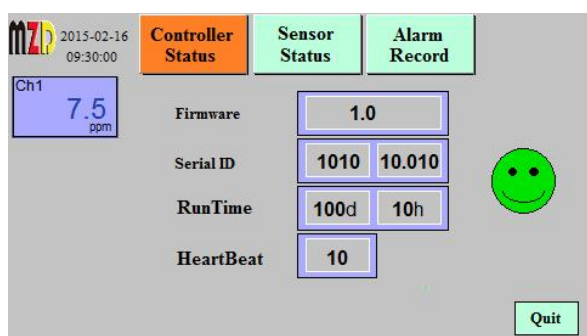
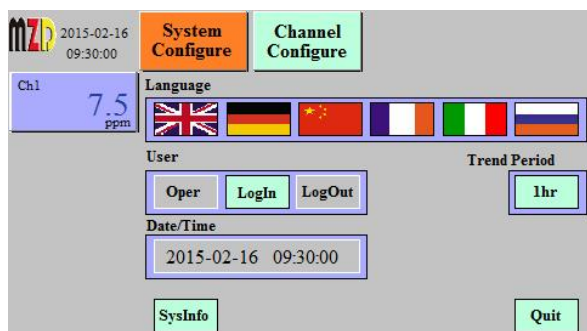
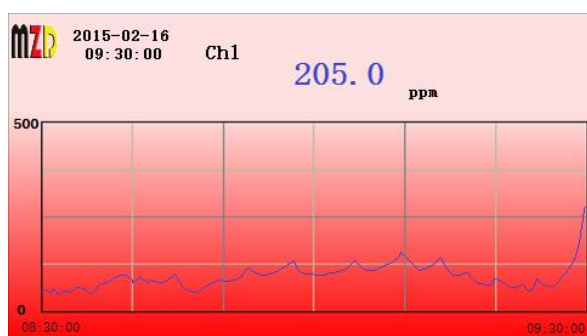
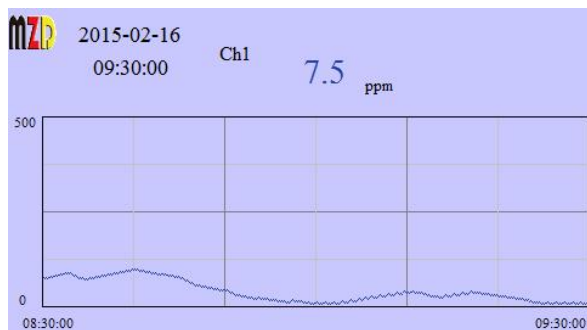
- ❖ Direct physical measurement
Selective and continuous measurement from visible to MID-IR spectral range.
- ❖ No cross sensitivity
The narrow-band tunable laser source ensures the highest selectivity for the measured gas. By choosing the ideal absorption line, other gases will not affect the measurement
- ❖ No condensation, fast response time, low adsorption effect
Due to the pressure- and temperature-stabilized measuring chamber operating under vacuum, (due to the correspondingly lowered dew point) the formation of condensation is prevented. High (adjustable) flow rates and vacuum allow faster response times and minimize adsorption and delay effects.
- ❖ No consumables required
No chemicals or replacement of service parts required.
Lowest operating cost.



Measurement components and ranges

- ❖ NH₃: 0~10 up to 100ppm
- ❖ HCl: 0~10 up to 100ppm
- ❖ H₂O: 0~30%
- ❖ CH₄: 0~100ppm up to 4%
- ❖ C₂H₂: 0~100ppm up to 10%

Laser Spectrum Analyzer



Features

❖ Quick and convenient

The navigation menu contains 6 languages, which can be operated easily.

❖ Process safety

4.3" or 7" large size color LCD touch screen, convenient and safe touch operation and debugging

Large size screen with red flashing alarm, clearly visible from long distances and in dark areas

Alarm immediately, save the process

❖ Alarm event record

Real-time data curve display

Record function for up to 6,000 alarms

❖ Expert calibration function

Multi-point calibration function up to 9 point

❖ Powerful self-diagnosis function

Built-in heartbeat monitoring function and watchdog

Monitor the status of analyzer and sensors, and promptly remind customers to take necessary maintenance

High-standard hardware and software security and password protection

❖ Powerful control function

High(low) limit control function

Optional: Timer control(automatic cleaning) function

Optional: analog PID control function

Optional: PWM control function

❖ Flexible fieldbus communication functions for IOT4.0

Optional fieldbus MODBUS, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, etc.



Laser Spectrum Analyzer

Parameters

Measuring principle	TDLAS (Tunable Diode Laser Absorption Spectroscopy)		
Display	4.3" or 7" industrial color touch screen		
Language	Multi-Language (English, German, Chinese, French,Italian, Russian or Customized)		
Linearity error	<0.5ppm/1ppm(0~1000ppm range) or 1% of the measured value		
Sensitivity	10ppb		
Warmup time	1-30 Minutes		
Response Time	Less than 1 s		
Zero point stability	$\leq \pm 50$ or 100ppb (8 hours)		
T90-time	<1sec at flow rate higher 60l/h		
Detection limit (4·STDW)	≤ 25 ppb (2σ); < 5 ppb (2σ) under specified conditions, constant ambient temperature, flow, and inlet pressure		
Lifetime of the UV Radiation source	> 20,000h		
Gas pressure	200-1000 hPa (mbar)		
max. Pressure	2bar		
Analog Output(Galvanic)	4~20mA, maximum load 500 Ω		
Relay Output(Galvanic)	Relay(2A, 230V AC freely set alarm), System alarm		
Diagnosis function	Mass flow monitoring or controller, Sensor and analyzer self-diagnosis,Heartbeat monitoring		
Event Logger	Internal Flash,up to 6,000 alarm records		
Control function	Optional Timer control function,PID,PWM		
Calibration	Expert calibration function,Multi-point calibration function up to 9 point		
Communication	RS485 MODBUS RTU, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, MODBUS TCP/IP, etc		
Power	80~264V AC,1A or 19~28V DC,3A		
Electrical protection	EMI / RFI CEI-EN55011 – 05/99		
Ambient Temperature	10 ~ 35°C		
Storage and transport temperature	-25 ~ 70°C		
Process Connection	6mm Pipe		
Wall-mounted(1~2Channels)	ABS,Gray RAL7045	213x185x84mm	IP65
	Aluminum,Gray	230x200x157mm	IP65, Exd IICT4
Laboratory Desktop(1~2Channels)	Aluminum,Black	250x144x184mm	IP40
Portable(1~2Channels)	ABS,Yellow	420x325x180mm	IP67
19" Rack(1~6Channels)	Aluminu,natural-coloured	483x133x238mm	IP40

Optical Oxygen Analyzer

Overview

The Optical oxygen analyzer based on luminescence quenching of a sensor dye. The dye is excited with red light, and the properties of the resulting luminescence are measured in the near infrared. The presence of molecular oxygen quenches the luminescence, changing its intensity and lifetime fully reversibly.

This principle is very robust. It shows virtually no interferences to other gases (except Cl₂ and NO₂), has a very low drift, and the sensor is fully solid-state. It does not deplete over time, unlike galvanic oxygen sensors with their limited shelf life. Optics and electronics are hermetically sealed from the measured gas. For typical indoor environmental conditions, a 10-year operating life is expected.

The Optical oxygen analyzer comes with a factory calibration. If required, the user can perform a simple 1-point calibration at ambient air. The Optical oxygen analyzer features build in temperature compensation. No additional signal conditioning is necessary. A mounting thread allow easy installation.



Features

- High-accuracy measurement
- Low drift
- Factory calibrated
- Long life
- Fast response ($t_{63} < 2s$)
- Temperature compensation
- Stainless steel sintered filtration (membrane filtration optional)

Potential Applications

- Inert gas processing chambers (glove boxes)
- Exhaust gas measurement
- Inert gas monitoring
- Monitoring fruit ripening and transport
- Oxygen concentrators
- Incubators
- Portable equipment

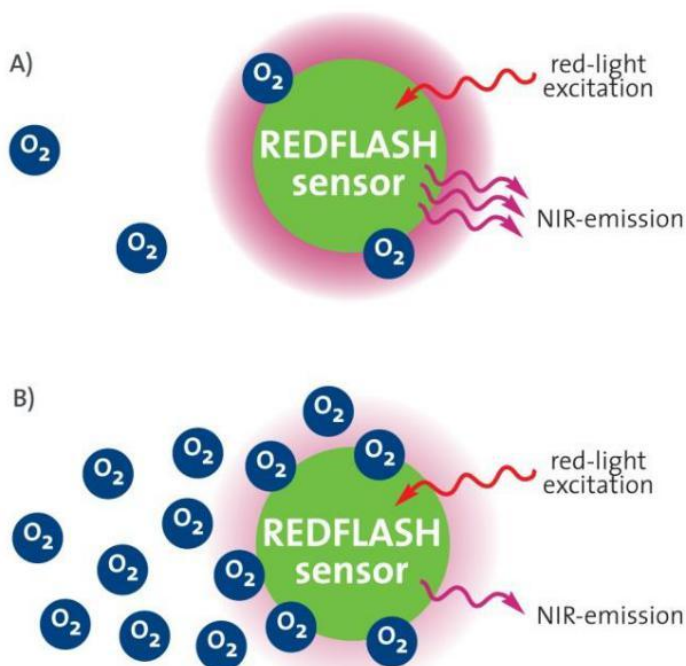
Optical Oxygen Analyzer

Oxygen Measuring Principle

The new Optical technology is based on the unique oxygen-sensitive REDFLASH indicator showing excellent brightness. The measuring principle is based on the quenching of the REDFLASH indicator luminescence caused by collision between oxygen molecules and the REDFLASH indicator immobilized on the sensor tip or surface. The REDFLASH indicators are excitable with red light (more precisely: orange-red at a wavelength of 610-630 nm) and show an oxygen-dependent luminescence in the near infrared (NIR, 760-790 nm).

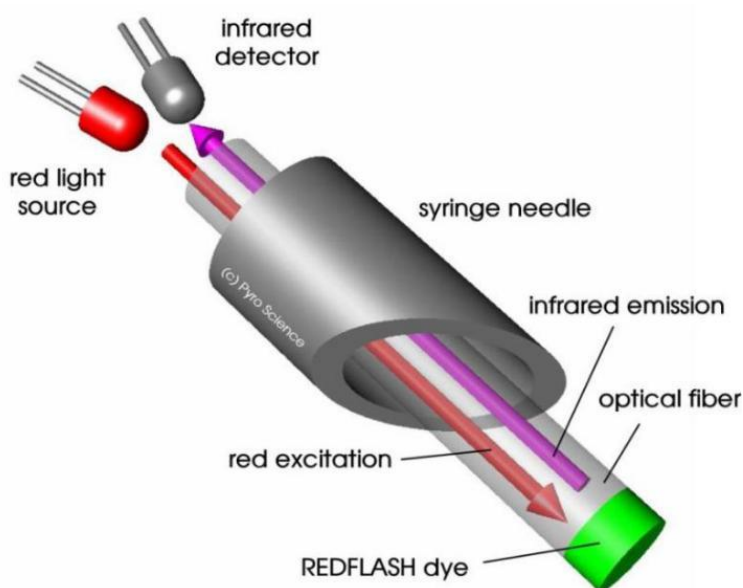
The Optical technology impresses by its high precision, high reliability, low power consumption, low cross-sensitivity, and fast response times. The red-light excitation significantly reduces interferences caused by autofluorescence and reduces stress in biological systems. The REDFLASH indicators show much higher luminescence brightness than competing products working with blue light excitation. Therefore, the duration of the red flash for a single oxygen measurement could be decreased from typically 100 ms to now typically 10 ms, significantly decreasing the light dose exposed to the measuring setup. Further, due to the excellent luminescence brightness of the REDFLASH indicator, the actual sensor matrix can be now prepared much thinner, leading to fast response times of the oxygen sensors.

The measuring principle is based on a sinusoidally modulated red excitation light. This results in a phase-shifted sinusoidally modulated emission in the NIR. Optical oxygen sensor measures this phase shift (termed "dphi" in the software). The phase shift is then converted into oxygen units based on the Stern-Vollmer-Theory.



Principle: red light excited REDFLASH indicators show luminescence in the near infrared (NIR), which decreases with increasing oxygen (quenching effect).

A) high NIR emission at low oxygen and B) low NIR at high oxygen



Optical Oxygen Analyzer

Features

❖ Quick and convenient

The navigation menu contains 6 languages, which can be operated easily.

❖ Process safety

4.3" or 7" large size color LCD touch screen, convenient and safe touch operation and debugging

Large size screen with red flashing alarm, clearly visible from long distances and in dark areas

Alarm immediately, save the process

❖ Alarm event record

Real-time data curve display

Record function for up to 6,000 alarms

❖ Expert calibration function

Multi-point calibration function up to 9 point

❖ Powerful self-diagnosis function

Built-in flow monitoring

Built-in heartbeat monitoring function and watchdog

Monitor the status of analyzer and sensors, and promptly remind customers to take necessary maintenance

High-standard hardware and software security and password protection

❖ Powerful control function

High(low) limit control function

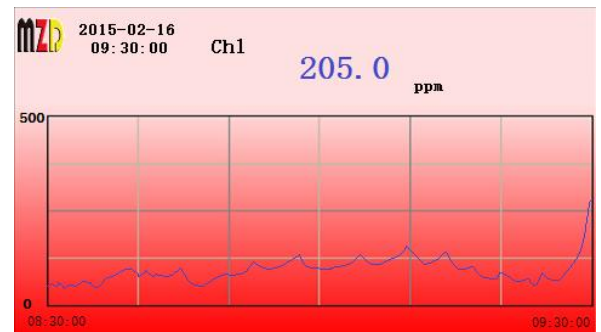
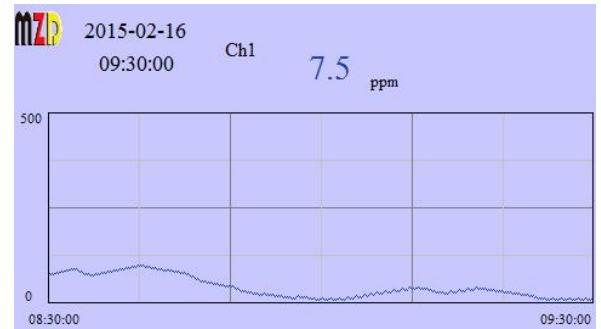
Optional: Timer control(automatic cleaning) function

Optional: analog PID control function

Optional: PWM control function

❖ Flexible fieldbus communication functions for IOT4.0

Optional fieldbus MODBUS, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, etc.



Optical Oxygen Analyzer

Parameters

Measuring principle	Optical			
Display	4.3" or 7" industrial color touch screen 1.8" color LCD, 160*128 pixel, English menu, Status LED Light (NAMUR NE107), magnetic keypad			
Language	Multi-Language (English, German, Chinese, French, Italian, Russian or Customized)			
Range	0~100% O ₂			
Accuracy*	2.5% MV			
Resolution*	0.01%			
Detection limit	0.01% O ₂ (100ppm)			
Response time (t ₆₃)	<2 sec.			
Drift	typ. <1% O ₂ /year **			
Sample gas temperature	10 ~ 40°C			
Process pressure(Max.)	3Bar			
Sample gas flow	30NI/h (recommend)			
Max. number of measurements	>500 million ***			
Lifetime	typ. >5 years ***			
Warm-up time	3 min (reduced accuracy during warm-up)			
Analog Output(Galvanic)	4~20mA, maximum load 500Ω			
Relay Output(Galvanic)	Relay(2A, 230V AC freely set alarm), System alarm			
Diagnosis function	Flow monitoring, Sensor and analyzer self-diagnosis, Heartbeat monitoring			
Event Logger	Internal Flash, up to 6,000 alarm records			
Control function	Optional Timer control function, PID, PWM			
Calibration	Expert calibration function, Multi-point calibration function up to 9 point			
Communication	RS485 MODBUS RTU, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, MODBUS TCP/IP, etc			
Power	80~264V AC, 1A or 19~28V DC, 3A			
Electrical protection	EMI/RFI CEI-EN55011-05/99			
Ambient Temperature	10~40°C			
Storage and transport temperature	-10~60°C			
Ambient Humidity	0~90%RH			
Diameter of connecting pipe	6mm			
Wall-mounted(1~2Channels)	4.3" color touchscreen	ABS, Gray RAL7045	213x185x84mm	IP65
	1.8" color LCD	Aluminum, Gray	230x200x157mm	IP65, Exd IICT4
Laboratory Desktop (1~2Channels)	7" color touchscreen	Aluminum, Black	250x144x184mm	IP40
Portable(1~2Channels)	7" color touchscreen	ABS, Yellow	420x325x180mm	IP67
19" Rack(1~6Channels)	7" color touchscreen	Aluminum, natural-coloured	483x133x238mm	IP40

* given for factory calibration. Units of %O₂ given for 1013 mbar ambient air pressure.

** at 21% O₂, 25° C, 1013 mbar ambient gas pressure, protected from direct sunlight. The drift can be significantly increased after the exposure to elevated temperature >60° C or to specific chemicals (refer to section 3).

*** at 21% O₂, 25° C, 1013 mbar ambient gas pressure, protected from direct sunlight.

Optical Oxygen Analyzer

Overview

The Optical oxygen analyzer is cost-effective and suitable for stable and continuous measurement of the percentage oxygen content of most gases.

Application

- Microelectronics(OLED/capacitor/HID)
- Lithium battery
- University and research
- Glove Boxes
- Metal heat treatment/welding
- Chemicals/Pharmaceuticals
- Air Separation Unit



Measuring principle	Optical
Display	1.8"color LCD,160*128 pixel, English menu, Status LED Light(NAMUR NE107)
Keypad	Magnetic keypad
Range	0~100% O ₂
Accuracy*	2.5% MV.(10℃~40℃) or 5% MV.(-10℃~60℃, <1% O ₂ 为 10%MV.)
Resolution*	0.01%
Detection limit	0.01% O ₂ (100ppm)
Response time (t63)	<2 sec.
Drift	typ. <1% O ₂ /year **
Max. number of measurements	>500 million ***
Lifetime	typ. >5 years ***
Warm-up time	3 min (reduced accuracy during warm-up)
Analog Output(Galvanic)	4~20mA, maximum load 500Ω
Relay Output(Galvanic)	2 Relay(2A, 230V AC/DC freely set), 1 Relay(System alarm)
Communication	RS485 (MODBUS RTU Slave)
Power	19 ~ 28V DC Power, 0.5A
Ambient Temperature	-10~60℃(recommend 10℃~40℃)
Process pressure(Max.)	3Bar
Sample gas flow	30NI/h (recommend)
Process Connection	NPT1/2" thread or KF40 flange
Housing Material	Aluminium alloy, Stainless steel
Size	Φ110*240*107 mm
Weight	1.5Kg
Explosion-proof	Ex d IICT4 optional

Optical Oxygen Analyzer

CROSS-SENSITIVITY AND CHEMICAL

The following table shows the compatibility and possible cross sensitivities to some important chemical substances at a given concentration range. An "X" under "OK" indicates compatibility. "Cross-Sensitivity" indicates that the oxygen measurement is influenced by this substance. "Damage" indicates that this substance might physically damage the Optical oxygen analyzer (marked in red).

Substance	Concentration	OK	Cross-Sensitivity	Damage	Comment
Moisture	0~100%	X			
CH ₄	<20%	X			
Cl ₂			X	X	
CO	<20%	X			
CO ₂	<20%	X			
H ₂ S	<1%	X			
NO	<1%	X			1.
NO ₂			X	X	2.
N ₂ O	<1%	X			
Inorganic acid/sbases	<1%	X			
Methanol, Ethanol, Isopropanol, formic Acid, Acetic Acid	<0.1%v	X			3.
Methanol, Ethanol, Isopropanol, Formic Acid, Acetic Acid	>0.1%v		X		4.
Ethylene oxide			X		5.
Other volatile organic compounds			(X)	(X)	6.

Comments:

1. NO may form NO₂ in presence of oxygen.
2. Ca. 5-10 times more sensitive to NO₂ than to oxygen. Slow degradation over time.
3. 0.1%v in gas corresponds approximately to the vapor pressure above a 0.5-1% solution in water at 25°C.
4. Recalibration after conditioning at constant substance levels might be possible.
5. Exposure to EtO (e.g. for sterilization) will cause increased drift. Recalibration after exposure is possible.
6. Can result in erroneous oxygen readings and significantly enhanced drift. Interference depends on the compound. Substances with high vapor pressure or high reactivity are expected to be more problematic.

Note:

MZD reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. MZD does not accept responsibility for potential errors or possible lack of information in this document.

Optical Oxygen Sensor and Analyzer

Overview

The Optical oxygen analyzer based on luminescence quenching of a sensor dye. The dye is excited with red light, and the properties of the resulting luminescence are measured in the near infrared. The presence of molecular oxygen quenches the luminescence, changing its intensity and lifetime fully reversibly.

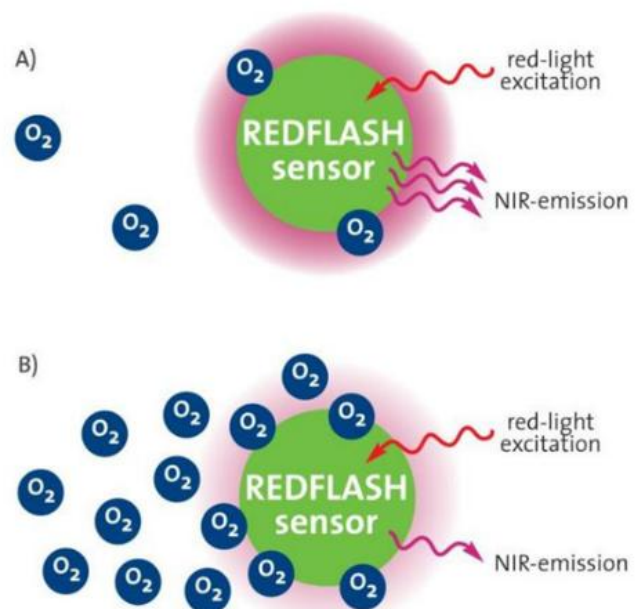
This principle is very robust. It shows virtually no interferences to other gases (except Cl_2 and NO_2), has a very low drift, and the sensor is fully solid-state. It does not deplete over time, unlike galvanic oxygen sensors with their limited shelf life. Optics and electronics are hermetically sealed from the measured gas. For typical indoor environmental conditions, a 10-year operating life is expected.

The Optical oxygen analyzer comes with a factory calibration. If required, the user can perform a simple 1-point calibration at ambient air. The Optical oxygen analyzer features build in temperature compensation. No additional signal conditioning is necessary. A mounting thread allow easy installation.

Principle

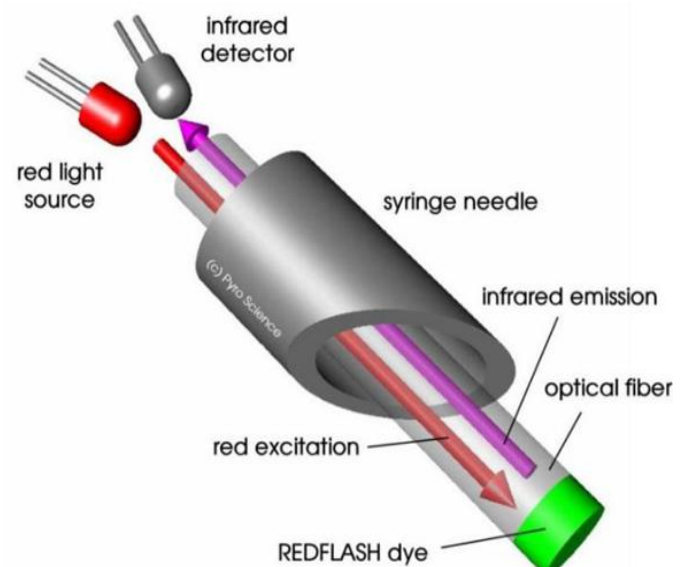
The new Optical technology is based on the unique oxygen-sensitive REDFLASH indicator showing excellent brightness. The measuring principle is based on the quenching of the REDFLASH indicator luminescence caused by collision between oxygen molecules and the REDFLASH indicator immobilized on the sensor tip or surface. The REDFLASH indicators are excitable with red light (more precisely: orange-red at a wavelength of 610-630 nm) and show an oxygen-dependent luminescence in the near infrared (NIR, 760-790 nm).

The Optical technology impresses by its high precision, high reliability, low power consumption, low cross-sensitivity, and fast response times. The red-light excitation significantly reduces interferences caused by autofluorescence and reduces stress in biological systems. The REDFLASH indicators show much higher luminescence brightness than competing products working with blue light excitation. Therefore, the duration of the red flash for a single oxygen measurement could be decreased from typically 100 ms to now typically 10 ms, significantly decreasing the light dose exposed to the measuring setup. Further, due to the excellent luminescence brightness of the REDFLASH indicator, the actual sensor matrix can be now prepared much thinner, leading to fast response times of the oxygen sensors.



Principle: red light excited REDFLASH indicators show luminescence in the near infrared (NIR), which decreases with increasing oxygen (quenching effect).

A) high NIR emission at low oxygen and B) low NIR at high oxygen



Percent Oxygen Sensor and Analyzer

The measuring principle is based on a sinusoidally modulated red excitation light. This results in a phase-shifted sinusoidally modulated emission in the NIR. Optical oxygen sensor measures this phase shift (termed "dphi" in the software). The phase shift is then converted into oxygen units based on the Stern-Vollmer-Theory.

Advantage

- Quick response, $T_{63} < 2s$
- High accuracy and repeatability
- 0 ~ 100% O₂
- Maintenance-free, no calibration required
- Rugged and durable design
- Easy installation
- Long-life

Features

- **High accuracy and repeatability:** Accuracy* 2.5% MV(10°C~40°C) or 5% MV(-10°C~60°C)
- Detection limit: 0.01% O₂ (100ppm)
- T₆₃-time: <2sec
- Drift: typ. <1% O₂/year **
- Max. number of measurements: >500 million ***
- Lifetime: typ. >5 years ***
- Gas pressure: <3bar
- Flow: 30NI/h (recommend)
- Warm up time: 3 min (reduced accuracy during warm-up)

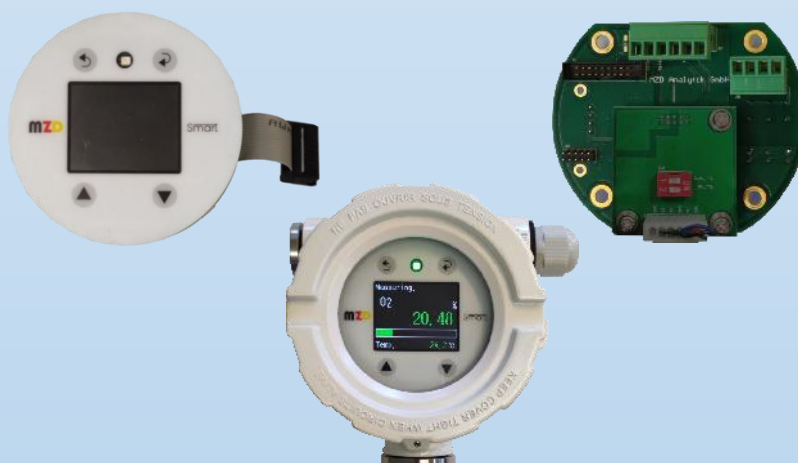
* given for factory calibration. Units of %O₂ given for 1013 mbar ambient air pressure.

** at 21% O₂, 25°C, 1013 mbar ambient gas pressure, protected from direct sunlight. The drift can be significantly increased after the exposure to elevated temperature >60°C or to specific chemicals (refer to section 3).

*** at 21% O₂, 25°C, 1013 mbar ambient gas pressure, protected from direct sunlight.

Applications Industry

- Microelectronics(OLED/capacitor/HID)
- Lithium battery
- University and research
- Glove Boxes
- Metal heat treatment/welding
- Chemicals/Pharmaceuticals
- Air Separation Unit



Optical Oxygen Sensor and Analyzer

Parameters

Measuring principle	Optical
Display	1.8" industrial color LCD, 160*128Pixel
Language	English Menu
LED Light	Status LED Light(NAMUR NE107)
Keypad	Magnetic keypad
Range	0~100% O ₂
Accuracy*	2.5% MV(10°C~40°C) or 5% MV(-10°C~60°C)
Resolution*	0.01%
Detection limit	0.01% O ₂ (100ppm)
Response time (t ₆₃)	<2 sec
Drift	typ. <1% O ₂ /year **
Max. number of measurements	>500 million ***
Lifetime	typ. >5 years ***
Warm-up time	3 min (reduced accuracy during warm-up)
Analog Output	4~20mA, maximum load 500Ω
Relay Output	2 Relay(2A, 230V AC/DC freely set), 1 Relay(System alarm)
Communication	RS485 (MODBUS RTU Slave)
Power	19 ~ 28V DC Power, 0.5A
Process pressure(Max.)	3Bar
Sample gas flow	30NI/h (recommend)
Process Connection	NPT1/2" thread or KF40 flange
Ambient Temperature	-10°C~60°C(recommend 10°C~40°C)
Electrical protection	EMI / RFI CEI-EN55011 – 05/99
Housing Material	Aluminium alloy, Stainless steel
Size	Φ110*240*107 mm
Weight	1.5Kg
Explosion-proof	Ex d IICT4 optional



Paramagnetic Oxygen Analyzer

Overview

SMART-OXM Paramagnetic Oxygen Analyzer uses high-stability paramagnetic oxygen technology to achieve high-precision and high-repeatability oxygen measurement. Optional in 98%~100% high purity oxygen measure range.

Principle

Oxygen is a paramagnetic substance and the volume magnetic susceptibility of other gases is much smaller than that of oxygen (except NO). The oxygen sensor is a pair of quartz glass dumbbell balls filled with nitrogen. The dumbbell balls are wrapped with platinum wires to form an electric feedback loop. The dumbbell balls are suspended in a magnetic field. When oxygen molecules are around the dumbbell balls, the oxygen molecules migrate under the action of the magnetic field, pushing the dumbbell sphere to deflect. The higher the oxygen concentration, the greater the deflection angle. This deflection will generate an electrical signal, which will be amplified by the amplifier and then form a loop through the feedback circuit. Under the action of the magnetic field, the dumbbell will be pushed back to the main equilibrium position. The current in this loop is proportional to the oxygen content. The oxygen content in the sample can be obtained by measuring the current value.

Application

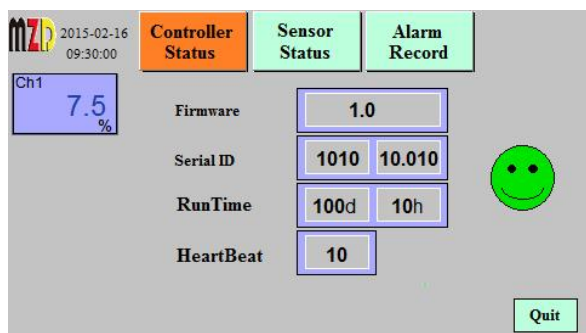
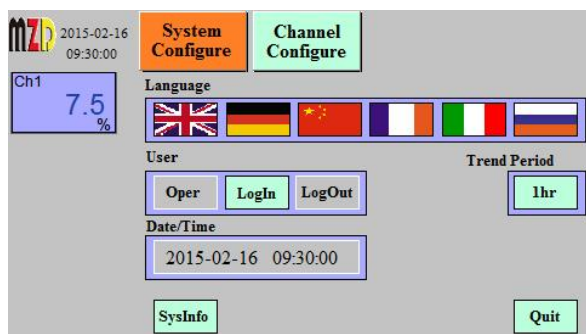
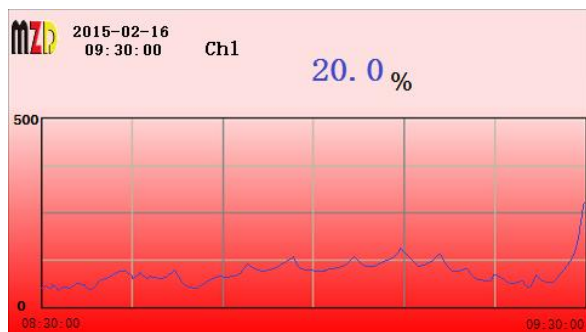
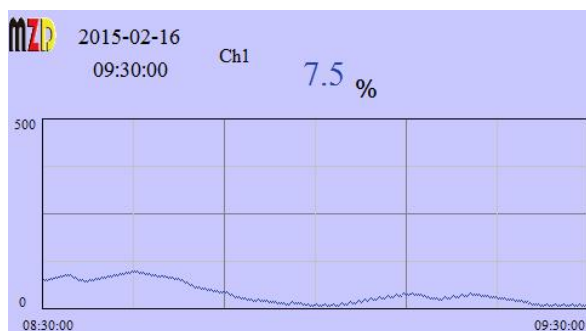
- ASU(Air separation unit)
- Chemical, Pharmaceutical Industry
- Petroleum and Petrochemical Industry
- Metallurgical Industry
- Glass manufacturing
- Semiconductor Industry
- Food and beverage Industry
- Flare monitoring
- Nuclear, heat treatment, welding protection
- Environmental area monitoring
- Anesthesia, breathing and prenatal care



Advantage

- Quick response
- High accuracy and repeatability
- Almost no cross-sensitivity to other gases
- Rugged and durable design
- Easy installation
- Comfortable and friendly operation
- Long-life paramagnetic sensor

Paramagnetic Oxygen Analyzer



Features

❖ Quick and convenient

The navigation menu contains 6 languages, which can be operated easily.

❖ Process safety

4.3" or 7" large size color LCD touch screen, convenient and safe touch operation and debugging

Large size screen with red flashing alarm, clearly visible from long distances and in dark areas

Alarm immediately, safe the process

❖ Alarm event record

Real-time data curve display

Record function for up to 6,000 alarms

❖ Expert calibration function

Multi-point calibration function up to 9 point

❖ Powerful self-diagnosis function

Built-in heartbeat monitoring function and watchdog

Monitor the status of analyzer and sensors, and promptly remind customers to take necessary maintenance

High-standard hardware and software security and password protection

❖ Powerful control function

High(low) limit control function

Optional: Timer control(automatic cleaning) function

Optional: analog PID control function

Optional: PWM control function

❖ Flexible fieldbus communication functions for IOT4.0

Optional fieldbus MODBUS, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, etc.



Paramagnetic Oxygen Analyzer

Parameters

Measuring principle	Paramagnetic Oxygen Analyzer		
Display	4.3" or 7" industrial color touch screen		
Language	Multi-Language (English, German, Chinese, French, Italian, Russian or Customized)		
Range	0~100%		
Linearity	<1%FS		
Sensitivity	<±0.03%		
Zero point drift	<±0.1%/week		
Sample gas temperature	5 ~ 45°C		
Working temperature	55°C		
Temperature influence at zero	<±0.05%/°C		
Temperature influence span	<±0.2%*measure value/°C		
Pressure influence on zero	None		
Pressure influence span	<1%* measure value/1%pressure change		
Flow	10-90 l/h		
Flow error	< 0.1 % with in-build fix bypass (option)		
Tilt	Zero change <= 0,02 Vol.-% O ₂ / 1° deviation from the horizontal position		
T90 Response time	< 3 s with 150 ml/min flow and gas change from nitrogen to air		
Warm up time	45mintue		
Analog Output(Galvanic)	4~20mA, maximum load 500Ω		
Relay Output(Galvanic)	Relay(2A, 230V AC freely set alarm), System alarm		
Diagnosis function	Flow monitoring, Sensor and analyzer self-diagnosis, Heartbeat monitoring		
Event Logger	Internal Flash, up to 6,000 alarm records		
Control function	Optional Timer control function, PID, PWM		
Calibration	Expert calibration function, Multi-point calibration function up to 9 point		
Communication	RS485 MODBUS RTU, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, MODBUS TCP/IP, etc		
Power	80~264V AC, 1A or 19~28V DC, 3A		
Electrical protection	EMI/RFI CEI-EN55011-05/99		
Ambient Temperature	-15~50°C		
Storage and transport	-25~70°C		
Ambient Humidity	0~90%RH		
Diameter of connecting pipe	6mm		
Wall-mounted(1~2Channels)	ABS, Gray RAL7045	213x185x84mm	IP65
	Aluminum, Gray	230x200x157mm	IP65, Exd IIC T4
Laboratory	Aluminum, Black	250x144x184mm	IP40
Portable(1~2Channels)	ABS, Yellow	420x325x180mm	IP67
19" Rack(1~6Channels)	Aluminum, natural-coloured	483x133x238mm	IP40

Gas Concentration/Density Analyzer

Overview

Measure the density or concentration of a gas directly in the gas line or in the gas tank.

Principle

At the heart of the sensor is a microelectromechanical system (MEMS) with an oscillator in the form of a tuning fork. The natural frequency of the oscillator varies depending on the density of the gas surrounding it.

Application

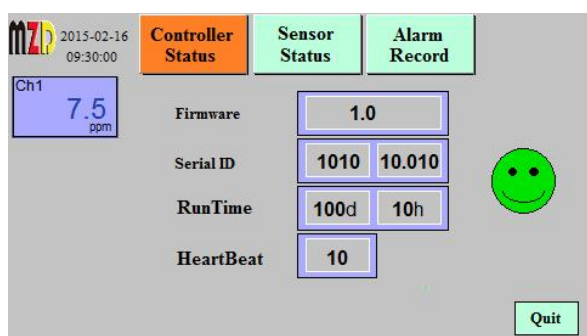
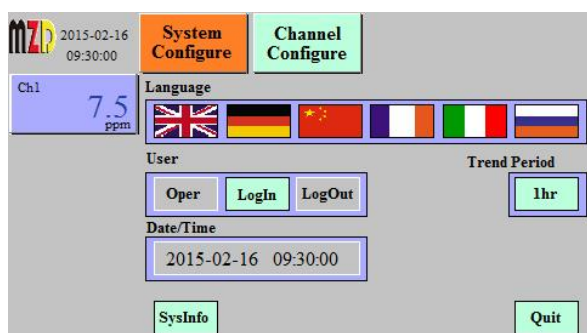
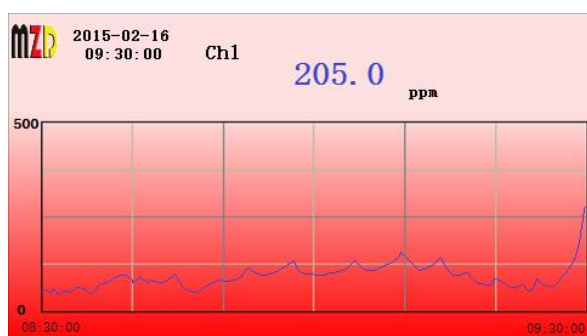
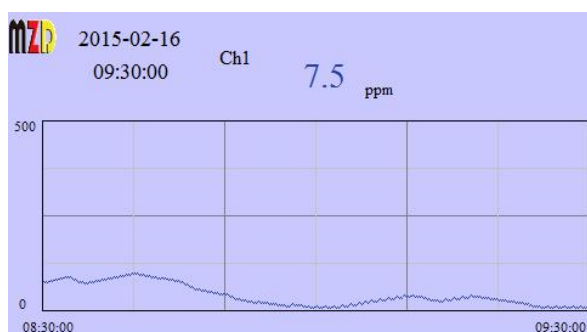
- Monitoring of welding gas mixtures.
- Monitoring of gas mixtures for food packages.
- Monitoring of clean gas.
- Concentration of binary gas mixtures, ideal volume percentages (=molar percentages) in % standard density.
- Permitted gases or mixtures of such gases:
 - Nitrogen (N₂)
 - Oxygen (O₂)
 - Air
 - Carbon dioxide (CO₂)
 - Neon (Ne)
 - Argon (Ar)
 - Krypton (Kr)
 - Xenon (Xe)
 - Hydrogen (H₂)
 - Methane (CH₄)
 - Natural gas (maximum permitted helium concentration: 50 ppm)
 - Ethyne (acetylene)(C₂H₂)
 - Ethene(C₂H₄)
 - Ethane (C₂H₆)
 - Propene (C₃H₆)
 - Propane (C₃H₈)
 - Butane (C₄H₁₀)
 - LPG (supplied as gas)
 - Other media may be used after individual clarification



Features

- ❖ **Built-in Multi-parameter measurement**
Measured variable:
Density in kg/m³
Temperature in °C
Pressure in bar absolute
- ❖ **Performance**
Accuracy of measurement:
Density: <0.1 kg/m³
Temperature: <0.8 °C
Pressure: <0.04 bar
With field calibration density: <0.05 kg/m³
Repeatability:
Density: <0.015 kg/m³
Temperature: <0.06 °C
Pressure: <0.005 bar
- ❖ **Optional mass flow measurement and controller**

Gas Concentration/Density Analyzer



Features

❖ Quick and convenient

The navigation menu contains 6 languages, which can be operated easily.

❖ Process safety

4.3" or 7" large size color LCD touch screen, convenient and safe touch operation and debugging

Large size screen with red flashing alarm, clearly visible from long distances and in dark areas

Alarm immediately, save the process

❖ Alarm event record

Real-time data curve display

Record function for up to 6,000 alarms

❖ Expert calibration function

Multi-point calibration function up to 9 point

❖ Powerful self-diagnosis function

Built-in heartbeat monitoring function and watchdog

Monitor the status of analyzer and sensors, and promptly remind customers to take necessary maintenance

High-standard hardware and software security and password protection

❖ Powerful control function

High(low) limit control function

Optional: Timer control(automatic cleaning) function

Optional: analog PID control function

Optional: PWM control function

❖ Flexible fieldbus communication functions for IOT4.0

Optional fieldbus MODBUS, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, etc.



Gas Concentration/Density Analyzer

Parameters

Measuring principle	Coriolis force		
Display	4.3" or 7" industrial color touch screen		
Language	Multi-Language (English, German, Chinese, French, Italian, Russian or Customized)		
Range	0~19Kg/m ³		
Linearity	Density: <0.1 kg/m ³ , Temperature: <0.8 °C, Pressure: <0.04 bar With field calibration density: <0.05 kg/m ³		
Repeatability	Density: <0.015 kg/m ³ , Temperature: <0.06 °C, Pressure: <0.005 bar		
Sensitivity	Density: <0.001 kg/m ³		
Response Time	<1sec		
T90-time	<1sec (at flow rate 20l/h)		
Gas pressure	0~9 bar		
Sample gas temperature	-20 ~ 60°C		
Built-in filter	Copper sintered filter 50 µm		
Analog Output(Galvanic)	4~20mA, maximum load 500Ω		
Relay Output(Galvanic)	Relay(2A, 230V AC freely set alarm), System alarm		
Diagnosis function	Flow monitoring, Sensor and analyzer self-diagnosis, Heartbeat monitoring		
Event Logger	Internal Flash, up to 6,000 alarm records		
Control function	Optional Timer control function, PID, PWM		
Calibration	Expert calibration function, Multi-point calibration function up to 9 point		
Communication	RS485 MODBUS RTU, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, MODBUS TCP/IP, etc		
Power	80~264V AC, 1A or 19~28V DC, 3A		
Electrical protection	EMI / RFI CEI-EN55011 – 05/99		
Ambient Temperature	-15 ~ 50°C		
Storage and transport temperature	-25 ~ 70°C		
Process Connection	6mm Pipe		
Wall-mounted(1~2Channels)	ABS, Gray RAL7045	213x185x84mm	IP65
	Aluminum, Gray	230x200x157mm	IP65, Exd IICT4
Laboratory Desktop(1~2Channels)	Aluminum, Black	250x144x184mm	IP40
Portable(1~2Channels)	ABS, Yellow	420x325x180mm	IP67
19" Rack(1~6Channels)	Aluminum, natural-coloured	483x133x238mm	IP40

Gas Concentration/Density Analyzer

Overview

Gas concentration/density analyzer is cost-effective and suitable for stable and continuous measurement of the density or concentration of a gas directly in the gas line or in the gas tank.

Application

- Microelectronics(OLED/capacitor/HID)
- Lithium battery
- University and research
- Glove Boxes
- Metal heat treatment/welding
- Chemicals/Pharmaceuticals
- Air Separation Unit



Parameters

Measuring principle	Coriolis force
Display	1.8" industrial color LCD, 160*128Pixel
Language	English Menu
LED Light	Status LED Light(NAMUR NE107)
Keypad	Magnetic keypad
Range	0~19Kg/m3
Linearity	Density: <0.1 kg/m3, Temperature: <0.8 °C, Pressure: <0.04 bar With field calibration density: <0.05 kg/m3
Repeatability	Density: <0.015 kg/m3, Temperature: <0.06 °C, Pressure:<0.005 bar
Sensitivity	Density: <0.001 kg/m3
Response Time	<1sec
T90-time	<1sec (at flow rate 20l/h)
Diagnosis function	Self-diagnosis, heart beat monitoring
Analog Output	4~20mA
Relay Output	3 Relays, NO, 5A 250VAC/30VDC
Communication	RS485, MODBUS RTU
Power	19 ~ 28V DC Power,1A
Built-in filter	Copper sintered filter 50 µm
Gas pressure	0~9 bar
Sample gas temperature	-20 ~ 60°C
Process Connection	NPT1/2" thread or KF40 flange
Ambient Temperature	-15 ~ 50°C
Ambient Humidity	0~80%RH
Electrical protection	EMI / RFI CEI-EN55011 – 05/99
Housing Material	Aluminum and Stainless steel
Explosion-proof	Exd IICT4 Controller optional

Multigas Analyzer

Overview

SMART multigas analyzer is based on the modular design, for continuous measurement of gases in gas compounds, offers eight different type sensors for measurement depending on the requirements, and can measure up to six gases components.

Sensors are based on the Electrolysis(P2O5), capacitive, paramagnetic, zirconium oxide, electrochemical, Thermal Conductivity Detector, Infrared photometry, Ultraviolet photometry measuring principle.

Application

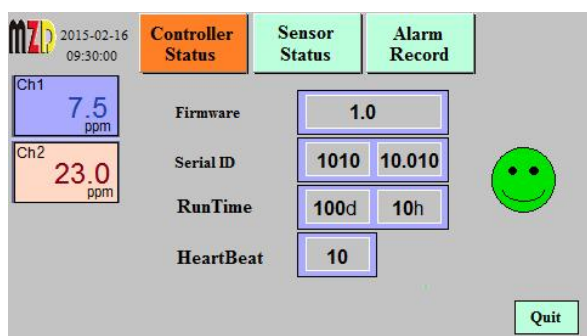
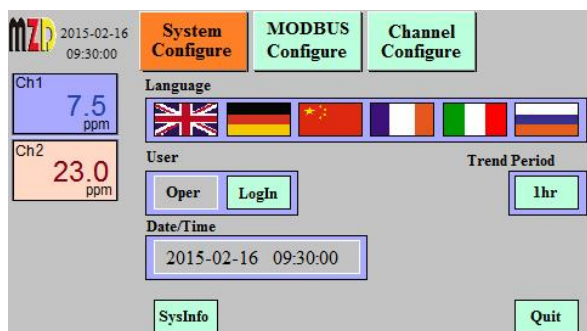
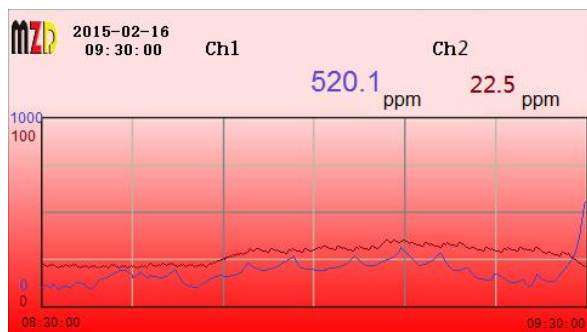
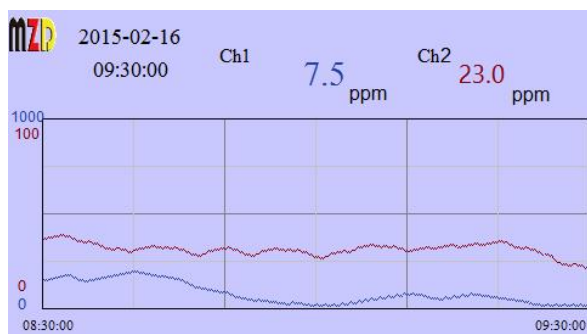
- ASU(Air Separation Unit)
- Chemical, Pharmaceutical industry
- Petroleum and Petrochemical industry
- Metallurgical Industry
- Glass manufacturing
- Semiconductor industry
- Food and beverage industry
- Flare monitoring
- Nuclear,heat treatment, welding protection
- Environmental area monitoring
- Anesthesia, breathing and prenatal care
- Environmental and Process Measurement Technology (CEM)
- Engine development



Measurement components and ranges

- ❖ H₂O: 0% ~ 20,000ppb up to 2000ppm
- ❖ O₂: 0% ~ 10ppm up to 100%
- ❖ H₂: 0% ~ 0.5 up to 100%
- ❖ He: 0% ~ 0.8 up to 100%
- ❖ CO₂: 0% ~ 3 up to 100%
- ❖ N₂: 0% ~ 3 up to 100%
- ❖ Ar: 0% ~ 3 up to 100%
- ❖ SF₆: 0% ~ 2 up to 100%
- ❖ Ne: 0% ~ 1.5 up to 100%
- ❖ Kr: 0% ~ 2 up to 100%
- ❖ D₂: 0% ~ 0.7 up to 100%
- ❖ CO: 0 ~ 200ppm up to 100%
- ❖ CO₂: 0 ~ 50ppm up to 100%
- ❖ CH₄: 0 ~ 500ppm up to 100%
- ❖ C_nH_m: 0 ~ 500ppm up to 100%
- ❖ N₂O: 0 ~ 500ppm up to 100%
- ❖ SO₂: 0 ~ 50ppm up to 10%
- ❖ NO: 0~ 300ppm up to 5,000ppm
- ❖ NO₂: 0 ~ 50ppm up to 5,000ppm
0% ~ 5 up to 100%
- ❖ O₃: 0 ~ 10ppm up to 5,000ppm
- ❖ Cl₂: 0 ~ 500ppm up to 30%
- ❖ H₂S: 0 ~ 100ppm up to 5,000ppm
- ❖ Extinguishing gas (R125): 0% ~ 5 up to 100%
- ❖ Other gases: on requirement

Multigas Analyzer



Features

❖ Quick and convenient

The navigation menu contains 6 languages, which can be operated easily.

❖ Process safety

4.3" or 7" large size color LCD touch screen, convenient and safe touch operation and debugging

Large size screen with red flashing alarm, clearly visible from long distances and in dark areas

Alarm immediately, safe the process

❖ Alarm event record

Real-time data curve display

Record function for up to 6,000 alarms

❖ Expert calibration function

Multi-point calibration function up to 9 point

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❖ Powerful control function

High(low) limit control function

Optional: Timer control(automatic cleaning) function

Optional: analog PID control function

Optional: PWM control function

❖ Flexible fieldbus communication functions for IOT4.0

Optional fieldbus MODBUS, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, etc.



Multigas Analyzer

Parameters

Measuring principle	Electrolysis(P2O5), Capacitive, Paramagnetic, Zirconium oxide, Electrochemical, Thermal Conductivity Detector, Infrared photometry, Ultraviolet photometry		
Display	4.3" or 7" industrial color touch screen		
Language	Multi-Language (English, German, Chinese, French, Italian, Russian or Customized)		
Analog Output(Galvanic)	4~20mA, maximum load 500Ω		
Relay Output(Galvanic)	Relay(2A, 230V AC freely set alarm), System alarm		
Diagnosis function	Flow monitoring, Sensor and analyzer self-diagnosis, Heartbeat monitoring		
Event Logger	Internal Flash, up to 6,000 alarm records		
Control function	Optional Timer control function, PID, PWM		
Calibration	Expert calibration function, Multi-point calibration function up to 9 point		
Communication	RS485 MODBUS RTU, HART, Foundation Fieldbus FF, PROFIBUS PA, PROFIBUS DP, MODBUS TCP/IP, etc		
Power	80~264V AC, 1A or 19~28V DC, 3A		
Electrical protection	EMI/RFI CEI-EN55011-05/99		
Ambient Temperature	-15~50°C		
Storage and transport	-25~70°C		
Ambient Humidity	0~90%RH		
Diameter of connecting pipe	6mm		
Wall-mounted(1~2Channels)	ABS, Gray RAL7045	213x185x84mm	IP65
	Aluminum, Gray	230x200x157mm	IP65, Exd IICT4
Laboratory	Aluminum, Black	250x144x184mm	IP40
Portable(1~2Channels)	ABS, Yellow	420x325x180mm	IP67
19" Rack(1~6Channels)	Aluminum, natural-coloured	483x133x238mm	IP40

