

# LD8001 MULTIGAS



## TRACE NITROGEN, OXYGEN, MOISTURE, HYDROCARBONS ALL IN ONE UNIT



The LD8001MG is an online gas analyzer that can combine multiple sensors and technologies all in one unit to allow multiple impurities detection within a wide range of analysis.



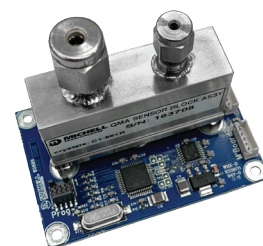
▲ PlasmaDetek



▲ SenzTx



▲ Easidew



▲ QMA

The unit is a rackmount 3U enclosure. The configuration depends on the sensors and options selected. Multiple configurations are available through a modular platform philosophy.

### FEATURES:

- Compact rackmount enclosure (3U) to cover up to four measurements (N<sub>2</sub>, O<sub>2</sub>, H<sub>2</sub>O, C<sub>n</sub>H<sub>m</sub>)
- Bootloader integrated for software update via Ethernet
- Ultra high purity electronic flow controllers for sample flow control
- Large measurement scale
- Touchscreen 7" HDMI TFT Display
- 4-20 mA output per impurity
- Range Identification & alarm status & calibration contacts
- Alarm historic
- LAN/Web control
- Low sample consumption

### APPLICATIONS:

- Industrial gas applications
- Inert and bulk gases
- Air separation unit
- Helium cryogenic installation
- Cryogenic truck loading station
- Process control
- Helium liquification plants
- Steel industry
- Chemical plants
- Gas generation
- Additive manufacturing
- Glove box purge and leak detection
- Research centers and laboratories

# PROVEN SENSORS TECHNOLOGIES

## **PLASMADETEK (for more technical information, refer to our design report on LD8000MultiGas series)**

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The measurement of the trace impurities N<sub>2</sub>-O<sub>2</sub>-H<sub>2</sub>O-CnHm in a helium or argon matrix can be carried out with a PED type detector (PlasmaDetek2) US patent 9,310,308 B2 integrated into an instrument of the LD8001-Multigas type. This technology is based on cold microplasma excited at high voltage / frequency in a helium atmosphere and allowing the selective measurement of each component at a precise optical wavelength. The optical circuit is composed of photodiodes and interference filters combined with an amplification system for converting the measured photons into voltage. All signal processing is then redirected to a microcontroller.

Compared to previous art, the LD8001MG with PED sensor offers an interference free measurement. By the combination of selective bandpass optical filter with a nitrogen doping system and a network of adsorbents & permeation devices, each impurity is accurately measured without being affected by other impurities presence in the sample gas.

Several variants and options on this device are possible depending on the needs of the customer.

### **Low maintenance and cost of ownership**

Using a non depleting PED sensor, the unit can be used for long term operation (over 10 years) without having to change it. This is also due to the network of protection adsorbent, and the detector shut off system during upset conditions. The traps used in the unit are also protected by an isolation valve shut off in case of upset conditions. This is to ensure the durability of the traps and detectors inside the unit. All these factors combined together make our solution robust and minimize the maintenance on the unit.

### **Fast response time**

The unit design allows to keep a minimal sample flow consumption and ensure a quick response time (T<sub>90</sub> at 10sec) using 1/16"OD coated stainless steel lines. The flow controllers are mounted in bypass mode to minimize the gas volume and dead legs upfront of the PEDs.

## **SENZTX**

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With a choice of either zirconia or electrochemical sensor technology the SenzTx module offers reliability, accuracy and flexibility. Both technologies have a broad measurement capability allowing the user to measure from selected ranges from 1ppm to 96% oxygen.

### **Zirconia sensor**

The Ntron zirconia oxygen sensor is a nondepleting, zirconia solid electrolyte sensor. A small capillary on the sensor controls the diffusion of oxygen into the sensor. When heated to over 400°C oxygen is electronically reduced causing current flow through the zirconia electrolyte. Zirconiumoxide allows the movement of oxygen ions through the substrate from a high to a low concentration. The measurement of oxygen is determined by the current flowing through the electrodes. The zirconia sensor has an unlimited shelf life without the loss of calibration and has an expected life in excess of 5 years. The zirconia sensor is not position sensitive and has low cross sensitivity to other gases and does not dry out.

### **Low maintenance and cost of ownership**

Due to the highly stable nature of the sensor, a calibration interval of once per year is required, allowing for significant cost savings. The construction of our zirconia oxygen sensor means that only 100 mL/min of sample gas is required, providing application flexibility and further potential cost savings.

### **Fast response time**

Zirconia oxygen sensors respond very quickly to oxygen concentrations in both directions with a T<sub>90</sub> of less than 10 seconds within a set range.

### **Electrochemical sensor**

The key elements of the electrochemical sensors are a membrane, cathode, anode, electrolyte and measurement circuit. The sensing membrane (covering the cathode) is made of PTFE and is mounted over a metal perforated electrode. The space between the membrane and the electrode is filled either with an aqueous alkaline or an acid electrolyte. In normal operation, all portions of the anode and cathode are immersed in the electrolyte. As oxygen diffuses through the membrane into the electrolyte it causes a reaction between the cathode and anode generating an EMF. This current is proportional to the amount of oxygen present in the sample gas. In the absence of oxygen there is no output from the electrochemical sensor, meaning only one calibration is required.

## EASIDEW

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The Easidew transmitter has a wide measurement range from -110 to +20 °Cdp (-166 to +68 °Fdp) and one stocked product can be used across all class 1 to class 6 industrial dryer applications. The Easidew family of industrial transmitters incorporates the latest Michell advanced ceramic technology providing stable, reliable and repeatable moisture measurements for all dew point applications.

### Ease of Installation

Flexible product design ensures the unit can be quickly and economically installed. • Mini DIN 43650 form C or M12 5 pin electrical connectors • 5/8" UNF, 3/4" UNF, G1/2" BSP process connections • 316 stainless steel transmitter sample blocks.

### Measurement Performance

The transmitter uses Michell's market leading ceramic measurement technology coupled with the latest generation, sophisticated microcontroller electronics to provide accurate and stable measurement across the transmitter's product life.

## QMA (for more technical information, refer to our design report for trace moisture analysis integrated inside the MultiDetek2 GC)

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The Advanced Quartz Crystal Microbalance sensor from Michell Instruments is now integrated inside the LD8001MG to provide reliable, fast and accurate measurement of trace moisture content in a variety of applications where keeping moisture to a minimum is of critical importance. The analyzer provides consistently accurate measurements of trace moisture. This consistency is achieved using a self-calibration system, which adjusts the sensor with reference to an internal moisture generator.

Having such module inside the LD8001 multigas series allows to combine multiple impurities analysis with trace moisture inside the same instrument.

### Quartz crystal microbalance sensor

A quartz crystal is sensitised with a thin film of hygroscopic material. Water molecules are adsorbed into the hygroscopic layer deposited on the surface. The change in mass modifies, in a very precise and repeatable manner, the oscillation frequency. The moisture concentration is measured as a change in the oscillation.

### Quartz crystal sensor principle

The change in the oscillation is evaluated by switching the gas inside the sensor and by measuring the response delta. For sampling response, the sensor is balanced between a dry gas source and the sample source. The difference is then calculated. The same principle is applied for the span gas calibration. However, this time the comparison is between a dry gas and a source of wet gas. A cycling time of 30 seconds on each gas is used to compare the response delta.

### Quartz crystal module principle

The dry gas comes from a reference gas source. The sensor is supplied by a known Helium or Argon or Nitrogen grade 5.0 carrier source going through a heated gas purifier model LDP1000 series. This combination generates a gas purity of 8N. By using this technique, the dry gas source contains less than 10ppb H<sub>2</sub>O what is ideal as zero gas reference.

The wet gas comes from a certified water filled permeation tube heated at a controlled temperature of 45 Celsius. It generates a stable amount of moisture used for span calibration. The moisture generator is made of coated stainless steel to reduce the surface absorption of water molecules and then keep the moisture rate very stable and accurate. The flow inside the module is controlled and maintained by a network of calibrated orifices. All flow passageways upfront the sensor are less than 0.030"ID, all coated with an inert coating to accelerate the response/purge time and improve the performances of the system.

## SPECIFICATIONS:

SENSOR MODEL	PLASMADETEK	PLASMADETEK	PLASMADETEK	PLASMADETEK	SENZTX	SENZTX	EASIDEW	QMA
<b>MEASUREMENT TECHNOLOGY</b>	PED	PED	PED	PED	Zirconia (ZR)	Electrochemical (EC)	Ceramic sensor	Quartz crystal
<b>SENSOR MANUFACTURER</b>	LDetek	LDetek	LDetek	LDetek	NTRON	NTRON	Michell Instruments	Michell Instruments
<b>IMPURITY DETECTED</b>	N2	O2	H2O	CnHm	O2	O2	H2O	H2O
<b>SAMPLE GAS</b>	Ar-He	Ar-He	Ar-He	Ar-He	multiple gases	multiple gases	multiple gases	multiple gases
<b>RANGES* (DEFAULT)</b>	0-1ppm (resolution 10ppb)	0-3ppm (resolution 10ppb)	0-3ppm (resolution 10ppb)	0-3ppm (resolution 10ppb)	0-10ppm (resolution 0.5ppm)	0-10ppm (resolution 0.1ppm)	0-10ppm (resolution 0.5ppm)	0-10ppm (resolution 100ppb)
	0-10ppm (resolution 100ppb)	0-30ppm (resolution 100ppb)	0-30ppm (resolution 100ppb)	0-30ppm (resolution 100ppb)	0-100ppm (resolution 1ppm)	0-100ppm (resolution 1ppm)	0-100ppm (resolution 1ppm)	0-100ppm (resolution 1ppm)
	0-100ppm (resolution 1ppm) up to 5000ppm available	0-50ppm (resolution 1ppm) up to 50ppm available	0-100ppm (resolution 1ppm) up to 100ppm available	up to 30ppm available	0-1000ppm (resolution 1ppm) up to 96% available	0-1000ppm (resolution 1ppm) up to 25% available	0-1000ppm (resolution 1ppm) up to 3000ppm available	0-1000ppm (resolution 1ppm) up to 2000ppm available
<b>LIMIT OF DETECTION (LDL)</b>	10ppb	50ppb	50ppb	50ppb	1ppm	0.5ppm	0.5ppm	20ppb
<b>ACCURACY</b>	<+/- 1% of scale	<+/- 1% of scale	<+/- 1% of scale	<+/- 1% of scale	<+/- 1% of scale	<+/- 1% of scale	<+/- 1% of scale	<+/- 1% of scale
<b>RESPONSE TIME (T90)</b>	<10 sec	<10 sec	<10 sec	<10 sec	<10 sec	<10 sec	<5 min	<5 min
<b>SENSOR LIFE EXPECTATION</b>	10 years	10 years	10 years	10 years	3-5 years	1 year	3-5 years	3-5 years
<b>OPERATING TEMPERATURE RANGE</b>	5-45 Celsius							
<b>SAMPLE GAS TEMPERATURE</b>	0-100 Celsius							
<b>SAMPLE FLOW REQUIREMENT</b>	25-200ml /min	25-200ml /min	25-200ml /min	25-200ml /min	100-200ml /min	100-200ml /min	1-5 L /min	300-500ml /min
<b>OPERATING SAMPLE PRESSURE RANGE</b>	3-30psig (for lower sample pressure requirement, an additional high purity pump is used)							
<b>OUTLET PRESSURE</b>	Atmospheric							
<b>INLET FITTINGS</b>	1/8" or 1/4" Swagelok compression or VCR							
<b>OUTLET FITTINGS</b>	1/8" or 1/4" Swagelok compression or VCR							
<b>DOPING GAS REQUIREMENT</b>	N/A	Nitrogen grade 5.0**	Nitrogen grade 5.0**	Nitrogen grade 5.0**	N/A	N/A	N/A	Nitrogen grade 5.0***
<b>STANDARD FEATURES</b>	Manual or autoranging, MCU embeded system, touchscreen 7" HDMI TFT, 4-20mA outputs, alarm historic, digital outputs for status, 3 ranges, calibration in progress							
<b>OPTIONS</b>	Internal sampling system for zero/span/sample, serial communication RS232-RS485-Modbus-Profibus, 2 level alarms, zero gas free calibration system							
<b>SUPPLY</b>	110VAC 50-60Hz / 220VAC 50-60Hz							
<b>POWER CONSUMPTION</b>	100-250 watts depending of the combination of sensors and options mounted in the unit							
<b>ENCLOSURE TYPE</b>	3U rackmount							
<b>INGRESS PROTECTION</b>	IP20 in accordance with IEC 60529							
<b>ENCLOSURE FINISH</b>	RAL7030 powder coat							
<b>WEIGHT</b>	25-40 lbs (11-18kg) depending of the combination of sensors and options mounted in the unit							
<b>CERTIFICATION</b>	In compliance with EMC directives : IEC 61000-4-3: 2020, IEC 61000-4-6: 2013, IEC 61000-4-2: 2008, IEC 61000-4-4: 2012, IEC 61000-4-5: 2014 A1: 2017, IEC 61000-4-8: 2009, IEC 61000-4-11: 2020 for immunity & CISPR 32: 2015 A1: 2019, FCC Part 15, Subpart B: 2021, CISPR 32: 2015 A1: 2019, FCC Part 15, Subpart B: 2021 for emissions.							

\* Ranges can be factory set to other values. \*\* Refer to LD8000MG design report for more details \*\*\* Zero & Span gas dry gas source



## ORDERING INFORMATION:

### Product Parent Code : LD8001MG

LD8001 MultiGas (ppm) Impurity N<sub>2</sub>, O<sub>2</sub>, H<sub>2</sub>O or CnHm,  
Detector PED, EC, Zr, ED

PRODUCT ORDERING CODE		
{Feature A} + {Feature B} + {Feature C} + {Feature D} + ... + {Feature F}		
Feature	Item	Description
FEATURE {A}	<b>BASE MODEL</b>	
	LD8001MG	Trace N <sub>2</sub> , O <sub>2</sub> , H <sub>2</sub> O and/or CnHm analyser with plasma emission detector, Electrochemical, Zirconium, Ceramic/and or Quartz Crystal, electronic flow control
FEATURE {B}	<b>SAMPLE GAS (CAN ORDER UP TO 4 GASES)</b>	
	B1	N <sub>2</sub> (PED)
	B2	O <sub>2</sub> (EC)
	B3	O <sub>2</sub> (Zr)
	B4	H <sub>2</sub> O (EC)
	B5	H <sub>2</sub> O (QC)
FEATURE {C}	<b>OPERATING VOLTAGE</b>	
	C1	120V
FEATURE {D}	<b>OUTPUT</b>	
	D0	No output
	D1	4-20 mA Outputs
FEATURE {E}	<b>SERIAL COMMUNICATION</b>	
	E0	No Serial Interface
	E1	Serial Interface - Modbus RS232
	E2	Serial Interface - Modbus RS-485
	E3	Serial Interface - Modbus Ethernet
FEATURE {F}	<b>PURGE OPTION</b>	
	F0	No purged valve and flowmeter
	F1	P (Purged valve and flowmeter)

## DIMENSIONS:

### 3U RACKMOUNT ENCLOSURE:

