

LDMOX

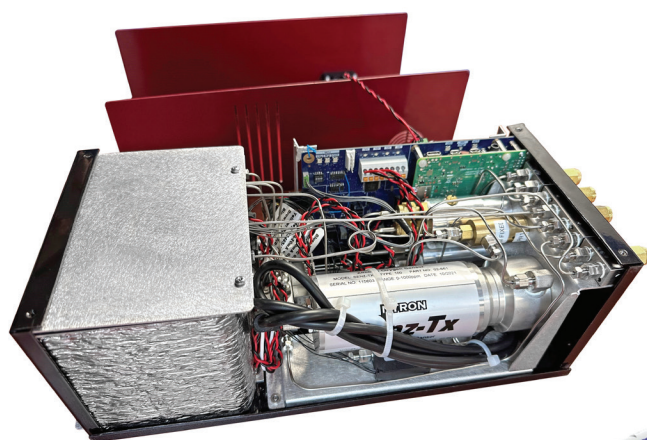


TRACE MOISTURE AND OXYGEN ANALYSER

The LDMOX is our most compact moisture and oxygen analyser using the well proven Quartz Crystal sensor or the Ceramic sensor (Easidew series) from Michell Instruments for H₂O and the Senz-Tx (electrochemical/zirconia) series from NTRON for O₂. Combining both trace oxygen and moisture in the same instrument makes it ideal for any of your applications. A combination of two sensors maximum is possible. The unit includes a built in pressure regulator and a flow sensor to ensure the stability of the reading and the flow measurement indication.

APPLICATIONS

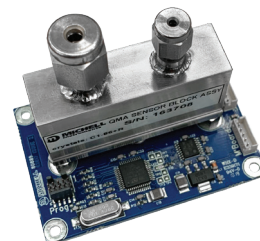
- Industrial
- Medical
- Laboratory



▲ SenzTx



▲ Easidew



▲ QMA



SPECIFICATIONS:

SENSOR MODEL	SENZ-TX	SENZ-TX	QMA	EASIDEW
MEASUREMENT TECHNOLOGY	Zirconia (ZR)	Electrochemical (EC)	Quartz crystal ¹	Ceramic sensor
SENSOR MANUFACTURER	NTRON	NTRON	Michell Instruments	Michell Instruments
IMPURITY DETECTED	O2	O2	H2O	H2O
SAMPLE GAS	multiple gases	multiple gases	multiple gases	multiple gases
RANGES* (DEFAULT)	0-10ppm	0-10ppm	0-10ppm	0-10ppm
	0-100ppm	0-100ppm	0-100ppm	0-100ppm
	0-1000ppm	0-1000ppm	0-1000ppm	0-1000ppm
	up to 96% available	up to 25% available	up to 2000ppm available	up to 3000ppm available
LIMIT OF DETECTION (LDL)	1ppm	0.5ppm	20ppb (with Heated LDP1000 gas purifier and pneumatic diaphragm valve) 100ppb (with moisture trap and electric solenoid valve)	1ppm
ACCURACY	<+/- 1% of scale	<+/- 1% of scale	<+/- 1% of scale	<+/- 1% of scale
RESPONSE TIME (T90)	<10 sec	<10 sec	<5 min	<10 sec
SENSOR LIFE EXPECTATION	3-5 years	1 year	3-5 years	3-5 years
OPERATING TEMPERATURE RANGE	5-45 Celsius			
SAMPLE GAS TEMPERATURE	0-100 Celsius			
SAMPLE FLOW REQUIREMENT	100ml/min per sensor installed			1-5 L /min
OPERATING SAMPLE PRESSURE RANGE	5-30psig (for lower sample pressure requirement, an additional high purity pump is used)			
OUTLET PRESSURE	Atmospheric			
INLET FITTINGS	1/8" or 1/4" Swagelok compression or VCR			
OUTLET FITTINGS	1/8" or 1/4" Swagelok compression or VCR			
STANDARD FEATURES	Modbus, Web interface(admin)			
OPTIONS	4-20mA outputs, Dry contact outputs			
SUPPLY	24VDC (Power supply included for 85VAC/240VAC)			
WEIGHT	10lbs (4.5Kg)			

NOTE #1

Refer to the quartz crystal sensor description to select the proper mode between :

- Pneumatic diaphragm valve versus electric solenoid valve
- LDP1000 heated gas purifier versus moisture trap

TECHNOLOGY

Senz-TX oxygen sensor

With a choice of either zirconia or electrochemical sensor technology the SenzTx 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 T90 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.

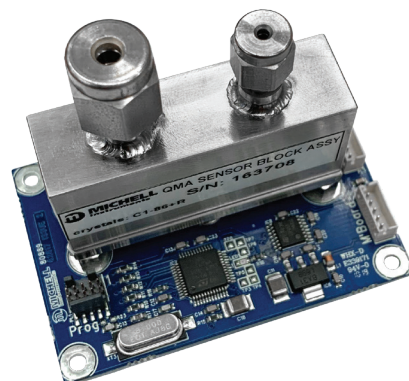
Quartz Crystal moisture sensor

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 H₂O what is ideal as zero gas reference. The wet gas comes from a certified water filled permeation tube heated at a controlled temperature of 55 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.

Pneumatic valve versus electric valve

The pneumatic diaphragm valve is used to get the ldl at 20ppb while the electric solenoid valve is used when 100ppb ldl is sufficient. The pneumatic diaphragm valve required an actuation gas having its pressure set at 65psig while the electric valve doesn't require pneumatic actuation.

Heated gas purifier versus moisture trap

The use of the LDP1000 series heated gas purifier allows to have a better ldl at 20ppb while the use of a moisture trap keep the ldl at 100ppb. The LDP1000 series is available for Argon, Helium, Neon, Nitrogen, Hydrogen, Carbon Dioxide and Oxygen.

Easidew

The Easidew transmitter has a wide measurement range from -110 to $+20^{\circ}\text{Cdp}$ (-166 to $+68^{\circ}\text{Fdp}$) 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

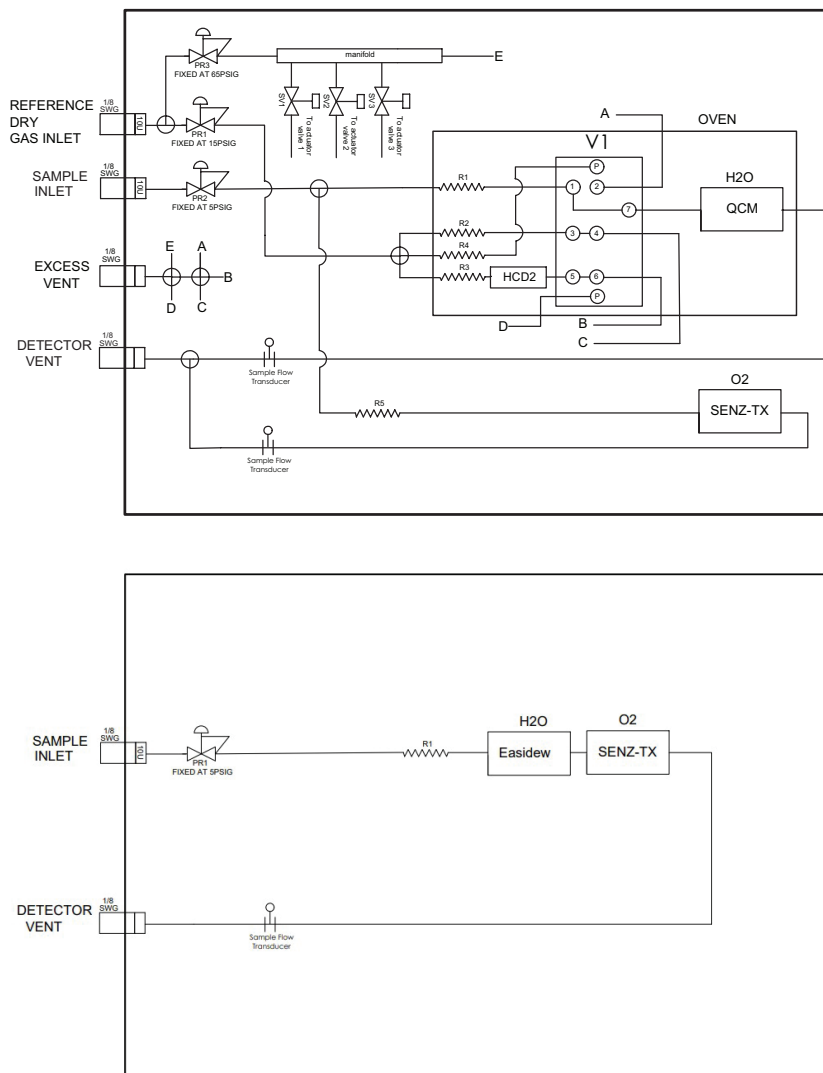
Flexible product design ensures the unit can be quickly and economically installed. • Mini DIN 43650 form C or M12 5 pin electrical connectors • $5/8"$ UNF, $3/4"$ UNF, $G1/2"$ BSP process connections • 316 stainless steel transmitter sample blocks.



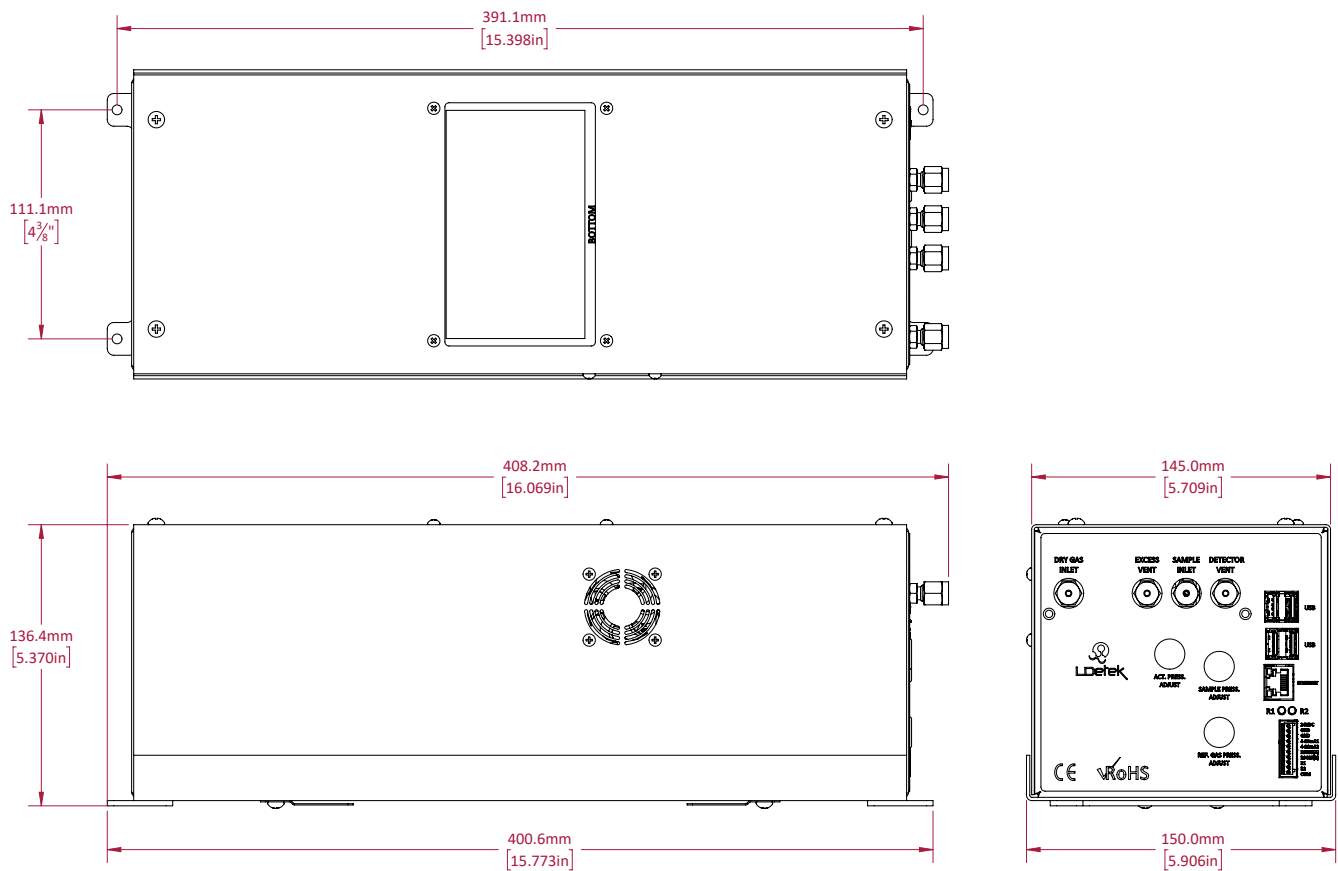
Measurement Performance

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.

INTERNAL FUNCTIONAL DIAGRAM



DIMENSIONS:



ORDERING INFORMATION:

LDMOX	-XX	-XX	-XX	-XX	-XX (for QC sensor only)	-XX (for QC sensor only)
	QC: H2O Quartz crystal CS: Easidew H2O Ceramic sensor	EC: O2 electrochemical ZI: O2 zirconia	2S: 1/8" Compression 4S: 1/4" Compression 2FS: 1/8" face seal (VCR) 4FS: 1/4" face seal (VCR)	mA: 4-20mA	DV: Diaphragm valve EV: Electric valve	HP: Heated purifier MT: Moisture trap



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