



# LDSENZ

## USER'S MANUAL

MOST COMPACT TRACE NITROGEN AND OXYGEN ANALYSER



***LDSenz***

Trace impurity analyzer

**USER'S MANUAL**  
V1.3



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# 1. Forewarning

This manual is required to be read by any user wanted to use the LDSenz Trace Impurity analyzer. It contains important information to successfully operate the instrument. LDetek assumes that all operators have taken the time to read this information before install, operate and troubleshoot the analyzer.

If any error is suspected by the reader, please contact LDetek. LDetek reserves the right to make changes to subsequent editions of this document without prior notice to holders of this edition.

In no event shall LDetek be liable for any damages arising out of or related to this document or the information contained in it.

We would like to thank you for choosing LDetek as your gas analyzer supplier.

## **2.Warranty and Service Policies**

Goods and part(s) (excluding consumable) manufactured by the seller are warranted to be free from defects in workmanship and material under normal use and service for **twelve (12)** months after installation and start-up and not exceeding **eighteen (18)** months from shipment date. Consumable, chemical trap, O-rings, etc., are warranted to be free from defects in workmanship and material under normal use and service for ninety (90) days from the date of shipment by the seller. Goods, part(s) proven by the seller to be defective in workmanship and/or material shall be replaced or repaired, free of charge, F.O.B. Seller's factory provided that the goods, part(s) are returned to Seller's designated factory, transportation charges prepaid, within the twelve (12) months after installation and start-up and not exceeding 18 months from shipment date. In the case of consumable, within the ninety (90) days period of warranty, a defect in goods, part(s) and consumable of the commercial unit shall not operate to condemn such commercial unit when such goods, part(s) and consumable are capable of being renewed, repaired or replaced.

The Seller shall not be liable to the Buyer, or any other person, for the loss or damage directly or indirectly, arising from the use of the equipment of goods, from breach of any warranty, or any other cause.

**ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED ARE HEREBY EXCLUDED.**

IN CONSIDERATION OF THE HEREIN STATED PURCHASE PRICE OF THE GOODS, SELLER GRANTS ONLY THE ABOVE STATED EXPRESS WARRANTY. NO OTHER WARRANTIES ARE GRANTED INCLUDING, BUT NOT LIMITED TO, EXPRESS AND IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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**Limitations of Remedy.** SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE. THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF WARRANTY SHALL BE LIMITED TO REPAIR OR REPLACEMENT UNDER THE STANDARD WARRANTY CLAUSE. IN NO CASE, REGARDLESS OF THE FORM OF THE CAUSE OF ACTION, SHALL SELLER'S LIABILITY EXCEEDS THE PRICE TO BUYER OF THE SPECIFIC GOODS MANUFACTURED BY SELLER GIVING RISE TO THE CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY EXTEND TO INCLUDE INCIDENTAL OR CONSEQUENTIAL DAMAGES. CONSEQUENTIAL DAMAGES SHALL INCLUDE BUT ARE NOT LIMITED TO, LOSS OF ANTICIPATED PROFITS, LOSS OF USE, LOSS OF REVENUE, COST OF CAPITAL AND DAMAGE OR LOSS OF OTHER PROPERTY OR EQUIPMENT. IN NO EVENT SHALL SELLER BE

LIABLE FOR PROPERTY DAMAGE AND/OR THIRD-PARTY CLAIMS COVERED BY UMBRELLA INSURANCE AND/OR INDEMNITY COVERAGE PROVIDED TO BUYER, ITS ASSIGNS, AND EACH SUCCESSOR INTEREST TO THE GOODS PROVIDED HERE UNDER.

**Major force.** The seller is not liable for failure to perform due to labour strikes or acts beyond the seller's direct control.

## **SERVICE POLICY**

1. If a product should fail during the warranty period, it will be repaired free of charge. For out-of-warranty repairs, the customer will be invoiced for repair charges at current standard labour and materials rates.
2. Customers who return products for repairs, within the warranty period, and the product is found to be free of defect, may be liable for the minimum current repair charge.
3. For parts replacement, the original part must be returned with the serial and model numbers of the analyzer. **NO PART WILL BE SHIPPED IF THE ORIGINAL IS NOT SENT BACK TO LDETEK INC.**

## **RETURNING A PRODUCT FOR REPAIR**

Upon determining that repair services are required, the customer must:

1. Obtain an RMA (Return Material Authorization) number.
2. Supply a purchase order number or other acceptable information.
3. Include a list of problems encountered along with the name, address telephone, and RMA number.
4. **Ship the analyzer in its original crating or equivalent. Failure to properly package the analyzer will automatically void the warranty.**
5. **Every gas connection must be capped with appropriate metal caps. Failure to do so will automatically void the warranty.**
6. Write the RMA number on the outside of the box.
7. Use an LDetek approved carrier. Also, the delivery must be sent to LDetek facilities. LDetek will not accept airport to airport delivery.
8. LDetek will not cover the transportation fees.

Other conditions and limitations may apply to international shipments.

## **PROPRIETARY RIGHTS**

Buyer agrees that any LDetek's software, firmware and hardware products ordered or included in the goods ordered are proprietary of LDetek. No change, modification, defacement, alteration, reverse engineering, neither software decompilations nor reproduction of such software or hardware products, or disclosures of programming content to other parties is authorized without the express written consent of LDetek.

To maintain LDetek's trade secret and other proprietary protection of such software and firmware, such items are not sold hereunder but are licensed to the buyer.

LDetek Inc. reserves the right to interrupt all business relationships and warranty or services if there is any tentative from any customers to reverse engineering any of LDetek products or to tamper with any sealed module.

Trademarks and product identification as LDSENZ are the property of LDetek Inc. and shall be used only in connection with LDetek's products. No third party could remove or deface any model number or marks.

## 3.Cautions & Warnings

Improper installation, operation or service of this analyzer may cause damage to the analyzer and void the manufacturer's warranty.

### ***3.1 Electrical shock hazard***

**Do not operate unless the cabinet is securely closed. Servicing this instrument implies possible exposure to shock hazard level voltages which can cause death or serious injury.**

For both safety and proper performance, this instrument **must** be connected to a properly grounded three-wire source of electrical power.

Both alarm switching relay contacts and digital output contacts wired to a separate power source must be disconnected before servicing.

Tampering or unauthorized substitution of components may adversely affect the safety of this product. Use only factory-approved components for repair.

### ***3.2 Possible explosion hazard***

**Never introduce other gases than argon or helium in this analyzer. If explosive, flammable or corrosive gases or mixtures are allowed to flow in the analyzer, fire or explosion may result. This analyzer is not designed to be used in hazardous areas.**

This analyzer must be installed in laboratory environments: moisture- and vibration-free, with stable temperatures.



## **4.Declaration of conformity**

Contact factory for the latest version available.

## 5.Specifications

Sensor model	Senz-Tx	Senz-Tx	PED
Measurement technology	Zirconia (ZR)	Electrochemical (EC)	Plasma emission detector
Sensor manufacturer	NTRON	NTRON	LDetek
Impurity detected	O2	O2	N2
Sample gas	multiple gases	multiple gases	Argon/Helium
Ranges* (default)	0-10ppm (resolution 0.5ppm)	0-10ppm (resolution 0.1ppm)	0-10ppm (resolution 100ppb)
	0-100ppm (resolution 1ppm)	0-100ppm (resolution 1ppm)	0-100ppm (resolution 1ppm)
	0-1000ppm (resolution 1ppm)	0-1000ppm (resolution 1ppm)	0-1000ppm (resolution 1ppm)
	up to 96% available	up to 25% available	up to 5000ppm available
Limit of detection (LDL)	1ppm	0.5ppm	10ppb
Accuracy	<+/- 1% of scale	<+/- 1% of scale	<+/- 1% of scale
Response time (T90)	<10 sec	<10 sec	<10 sec
Sensor life expectation	3-5 years	1 year	>10 years
Operating temperature range	5-45 Celsius		
Sample gas temperature	0-100 Celsius		
Sample flow requirement	100ml/min per sensor installed		
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		

\*One range available per sensor. Other ranges available on request.

## 6. Installation

### 6.1 Installation

Some simple steps are required to make a successful installation.

Unpack the instrument from the box carefully without damaging the gas connections. Inspect the instrument to be sure it is in good condition and hasn't been damaged during shipping.



Remove all plugs from the gas connections on the rear panel. **Don't forget to remove the plug on the detector vent connection and make sure to never pressurize the instrument.** It will damage the detector. This instrument is made to work at atmospheric pressure.

Any backpressure to the detector vent connection will cause damage and replacement of the plasma detector module.

Make sure to purge the gas line with pure argon or helium depending on the application (using UHP grade 5.0 or better) before connecting gas to the sample inlet connection.

Connect the sample gas to the sample inlet of the instrument.

**WARNING: BEFORE CONNECTING A SAMPLE INLET GAS, BE SURE THE DETECTOR VENT CONNECTION IS AT ATMOSPHERIC PRESSURE.**

Turn on the LDSenz unit and connect the Ethernet cable to your computer to communicate with the unit.

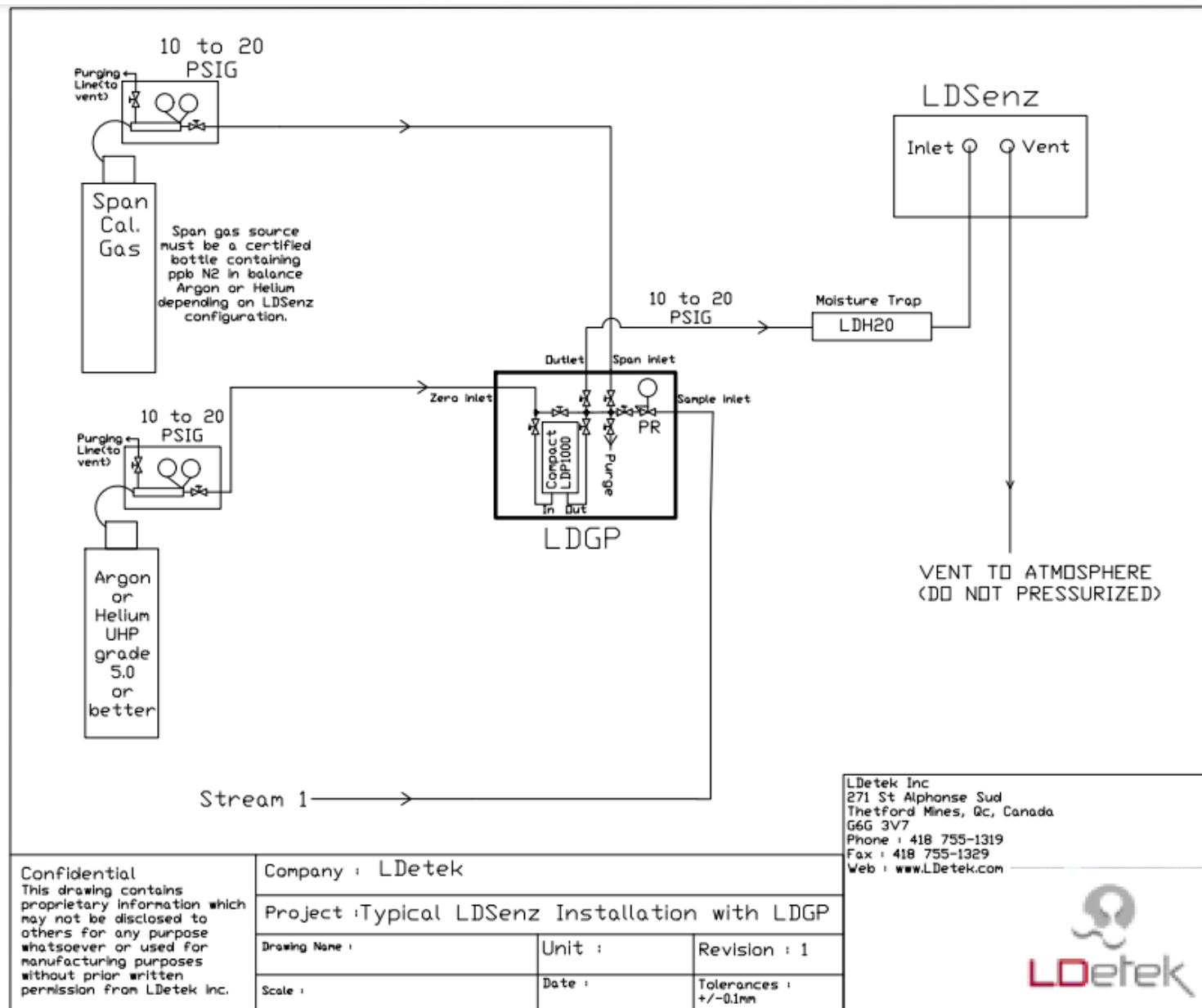
Be sure the operating parameters are configured the same way it appears on the Operating Parameter sheet included with the instrument.

The detector should turn on by itself after few minutes and start showing ppm reading.

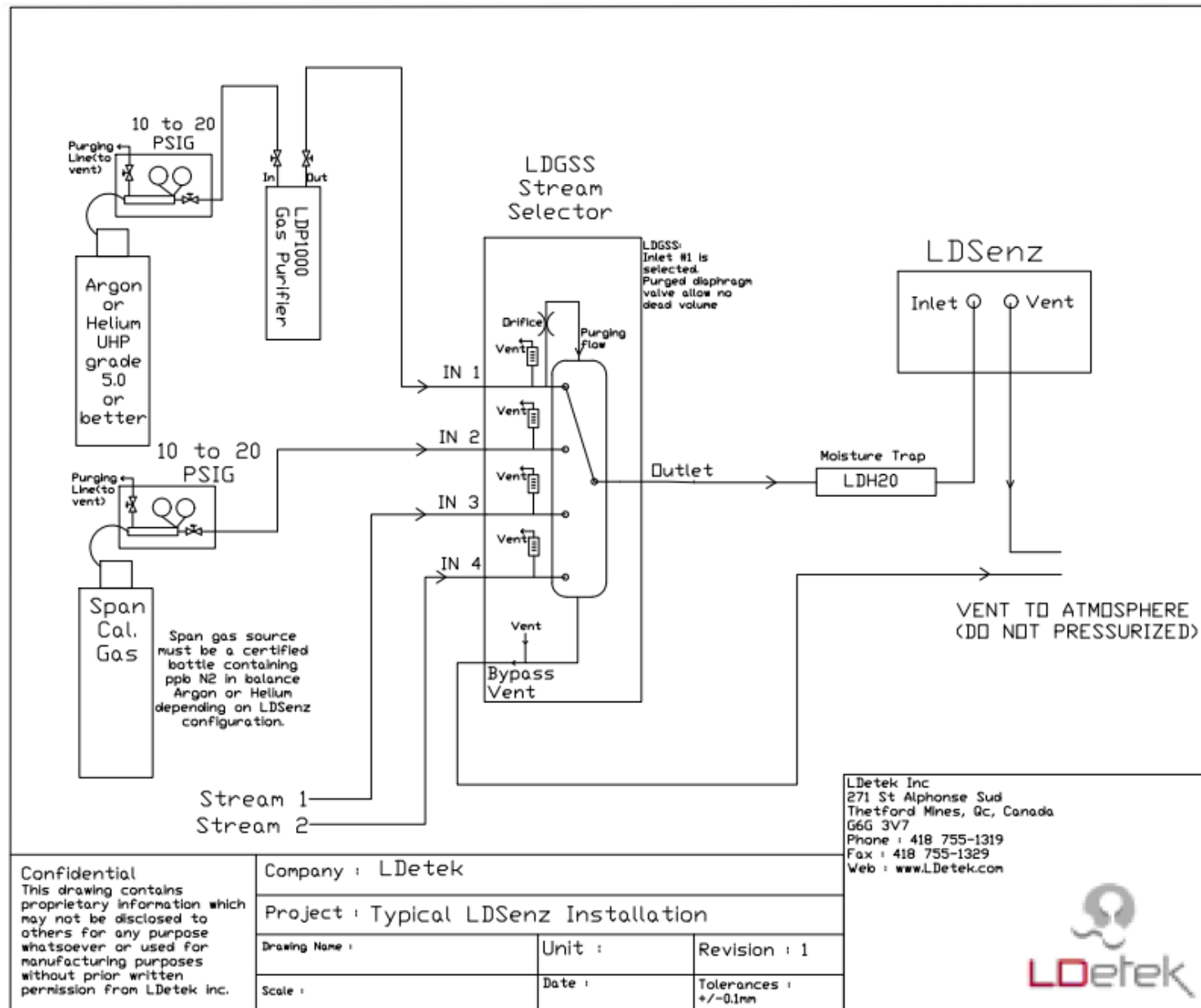
**NOTE: FOR A GOOD INSTALLATION, PLEASE REFER TO LDSENZ TYPICAL INSTALLATION SCHEMATIC.**

Allow at least 24 hours of purging before using the instrument. A calibration must be run after the purging process. Always refer to the calibration sheet included with the instrument to compare the zero and span counts with the calibration counts obtained by LDetek before shipping.

# Typical installation using "LDGP" gas manifold panel for Zero/Span/Sample



# Typical installation using "LDGSS" gas multi-stream selector for Zero/Span/Samples



## 7. Hardware Description & Maintenance

The LDSENZ has major components included in the chassis. This section will describe each component that can be replaced for maintenance or upgrade.

### 7.1 Detector modules for trace N<sub>2</sub> and O<sub>2</sub>

#### Plasma emission detector for trace N<sub>2</sub>



**Plasma emission detector** It is used to trace nitrogen in Argon or Helium to offer fully stable/repeatable/linear and accurate response to nitrogen.

**Plasma emission detector principle** The PED uses Helium or Argon as discharge gas in a sealed quartz chamber dedicated for measuring trace nitrogen at its specific wavelength. Nitrogen impurity is measured continuously through a quartz window that allows the light generated by the passage of nitrogen in the quartz chamber to be measured with its proper optical design.

**Plasma emission module principle** The module is calibrated using a zero reference and a span reference. Generally, the zero comes from a grade 99.999% Argon or Helium that goes in our LDP1000 purifier series to generate grade 99.999999%. Going that way, it ensures the zero gas is well referenced to avoid negative reading. A second source of gas named span gas is used for the nitrogen span reference of the sensor. In this case, a certified gas containing about 10ppm N<sub>2</sub> in a balance Argon or Helium is then required. The module is then calibrated, accurate and linear within its operating range.

**Fast response time** Plasma emission detector responds very quickly to nitrogen concentrations with a T<sub>90</sub> of less than 10 seconds within a set range.



Since the cell is made of thin quartz, this analyzer must be used at **atmospheric pressure to avoid any cell cracking.**

Any backpressure to the detector vent connection will cause damage and replacement of the plasma detector module.

## Senz-TX oxygen sensor for trace O<sub>2</sub>



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 more than 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.

## 7.2 Motherboard and MCU

This electronic board controls all components inside the analyzer: flow readings, detector signals, alarms and 4-20mA and all other options available. This board must be replaced only if you had the confirmation from LDetek.



When replacing this motherboard be sure to avoid any electrostatic contact.

### ***7.3 Sample flow regulator***

An internal mini pressure regulator is mounted to maintain the pressure inlet stable at 4psig to ensure proper flow rate of 100ml/min goes to each of the N2 and O2 sensors. The flow rate is maintained using a fix flow orifice calibrated for respectively 100ml/min at a pressure of 4psig.

### ***7.4 Sample flow sensors***

A flow sensor for each detector outlet N2 and O2 are mounted to measure the flow going into each sensor. The reading can be read by connecting to the device interface.



## 8.Operation

The LDSENZ web interface is available through the Ethernet port.

Refer to the tag on the front of the device to get the proper web link associated to your instrument.

e.g.: <http://ldsenz>

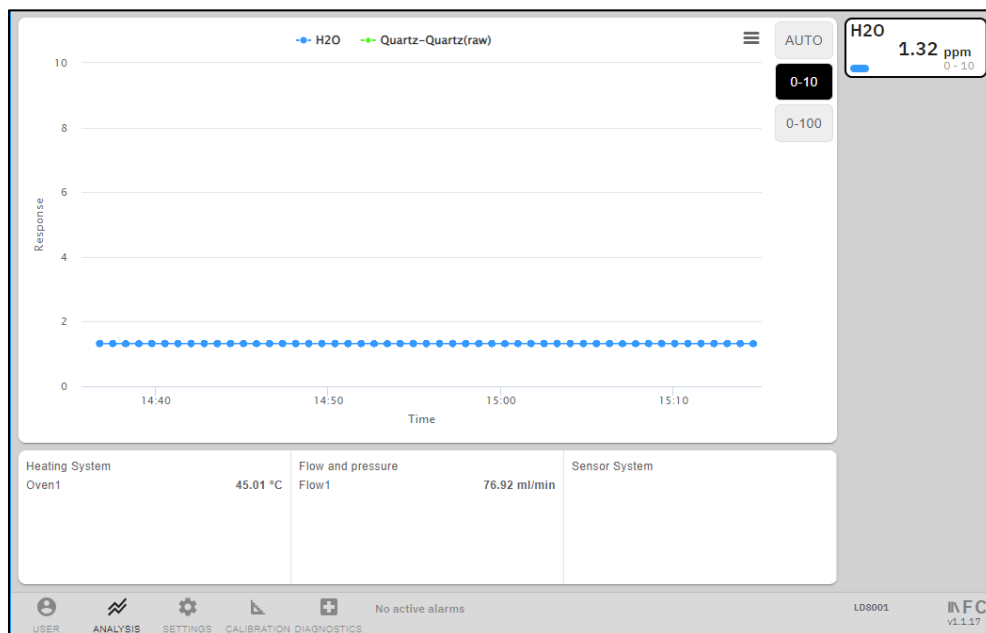
### 8.1 Analysis menu

This is the main menu of the instrument and the menu where the analyzer must stay for normal operations. On the right of the screen, the real-time data of the measured impurities is shown.

- Value in ppb, ppm or %
- Selected range
- Raw signal from the detector in mV
- Flow in milliliter/minute
- Software Version (at the right bottom)

The middle section of the screen gives a real-time trending.

The bottom section gives the choice of the different menus to navigate through the calibration menu, more settings parameters and diagnostic tools menu used for troubleshooting.



## 8.2 Calibration menu

This menu is used to calibrate the instrument.

**REZERO:** Will calibrate the zero with the zero-value entered

**RESPAN:** Will calibrate the span with the span value entered

Click APPLY after REZERO or RESPAN to apply the new calibration

Historic button is available to access previous calibrations.

Enter text in the “Calibration note” text box to add comments if you want.

The screenshot shows the 'Calibration - Oxygen' menu. At the top, there is a navigation bar with a back arrow and the text 'Calibration > Oxygen'. Below this, the title 'Calibration - Oxygen' is displayed next to 'CANCEL' and 'APPLY' buttons. A 'Calibration note' text box is present. A 'Historic' button with a right arrow is also visible. The 'Oxygen Last calibration' is shown as '2023-10-12 14:39:44 [H2O]'. Under 'Impurities to calibrate', 'H2O' is selected and highlighted in blue. Below this, 'H2O last calibration' is '2023-10-12 14:39:44'. The 'Real time concentration' is '1.32 ppm' and the 'Real time unit' is '16.21 MHz'. The 'ReZero' section has a value of '0' MHz or '1.25' ppm, with a 'COPY REAL TIME UNIT' button. The 'ReSpan' section has a value of '2000' MHz or '10' ppm, also with a 'COPY REAL TIME UNIT' button. At the bottom, there is a status bar with icons for USER, ANALYSIS, SETTINGS, CALIBRATION, and DIAGNOSTICS. It also shows 'No active alarms', the ID 'LD8001', and the 'NFC v1.1.17' logo.

← Calibration > Oxygen

Calibration - Oxygen CANCEL APPLY

Calibration note

Historic >

Oxygen Last calibration : 2023-10-12 14:39:44 [H2O]

Impurities to calibrate

H2O

H2O last calibration : 2023-10-12 14:39:44

Real time concentration : 1.32 ppm Real time unit : 16.21 MHz

ReZero 0 MHz or COPY REAL TIME UNIT in 0 min.  
1.25 ppm

ReSpan 2000 MHz or COPY REAL TIME UNIT in 0 min.  
10 ppm

USER ANALYSIS SETTINGS CALIBRATION DIAGNOSTICS No active alarms LD8001 NFC v1.1.17

## 8.2 Settings menu

This menu is used to configure many parameters of the analyzer. This menu is accessible to any user.

**General:** Any general settings for the application display (Language, units, chart duration...)

**Methods:** Method settings and parameters for each method (One method is generally used for a specific sample gas)

**Plasma:** Plasma parameters

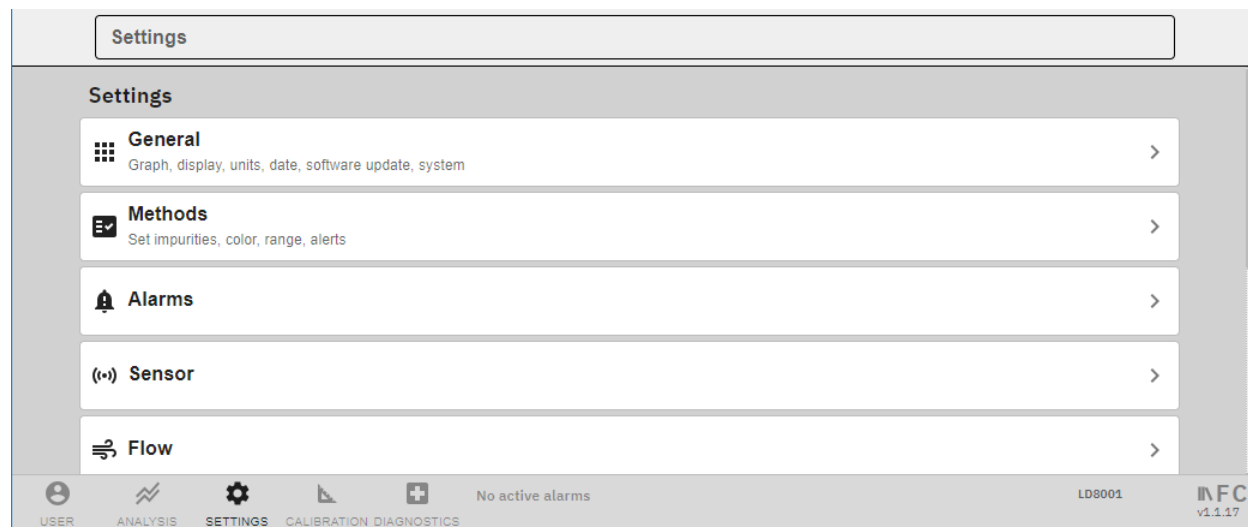
**Sensor:** Sensor parameters for analysis menu

**Flow:** Flow parameters to configure the flow sensor and reading

**Valve:** Valve settings parameters

**Relay:** Relays can be used with alarms

**4-20mA:** Used to calibrate the 4-20mA analog output. You must force at 4mA and measure with an external amperemeter and enter the real current value. Same apply to 20mA value.



## 8.3 Diagnostic menu

This menu is only used for troubleshooting and diagnostic. It is not required for standard operations.

**Analog input:** Give diagnostic and real-time values of flows and sensors

**Digital Output:** Use to force a relay/valve to be activated for testing.

**Analog Output:** Use to force an analog output for testing.

Diagnostic

Diagnostics

MASTER/SLAVE

<b>Flow1</b> Analog Input	Filtered value 1111.61 mV	
	Unit value 76.45 ml/min	
<b>Valve1</b> Digital Output	<div>FORCE ON</div> <div>FORCE OFF</div>	ON
<b>4-20mA2</b> Analog Output	Value 0.00 mA <div>▼ 0 ▲</div> <div>FORCE VALUE</div>	
	Ratio 0.00 % <div>▼ 0 ▲</div> <div>FORCE RATIO</div>	

USER

ANALYSIS

SETTINGS

CALIBRATION

DIAGNOSTICS

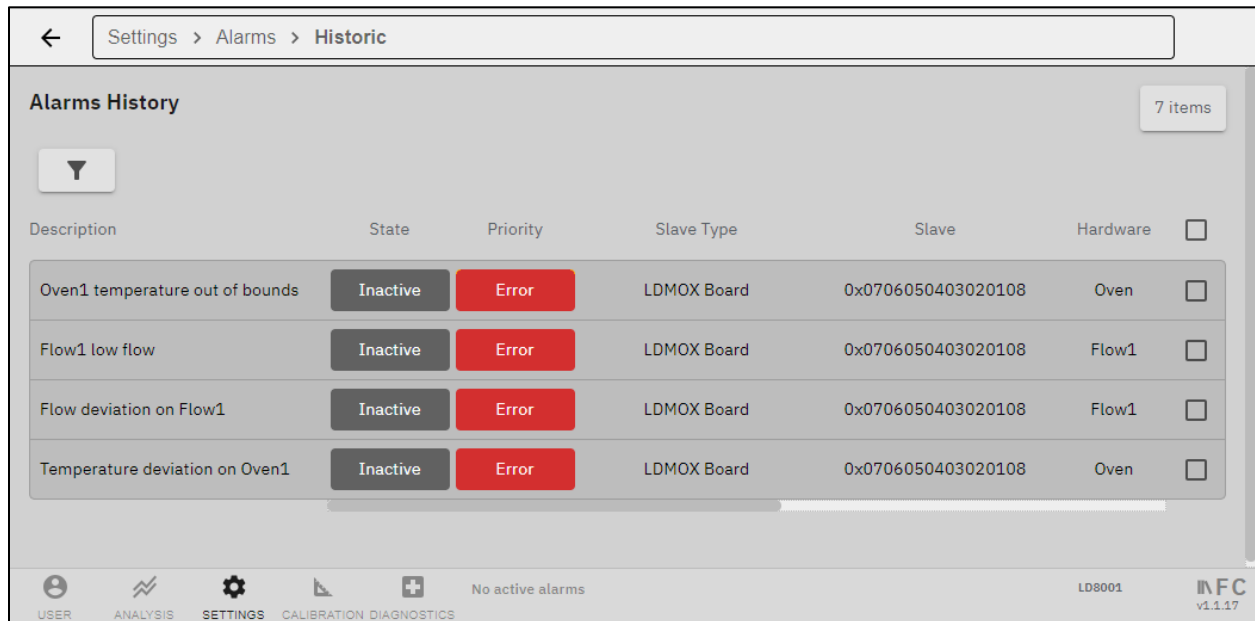
No active alarms

LD8001

v1.1.17

## 8.4 Alarms menu

The alarm menu is available at the bottom of the screen by a double click on the “active alarm”. It then pop up the active or non-active alarm historic.



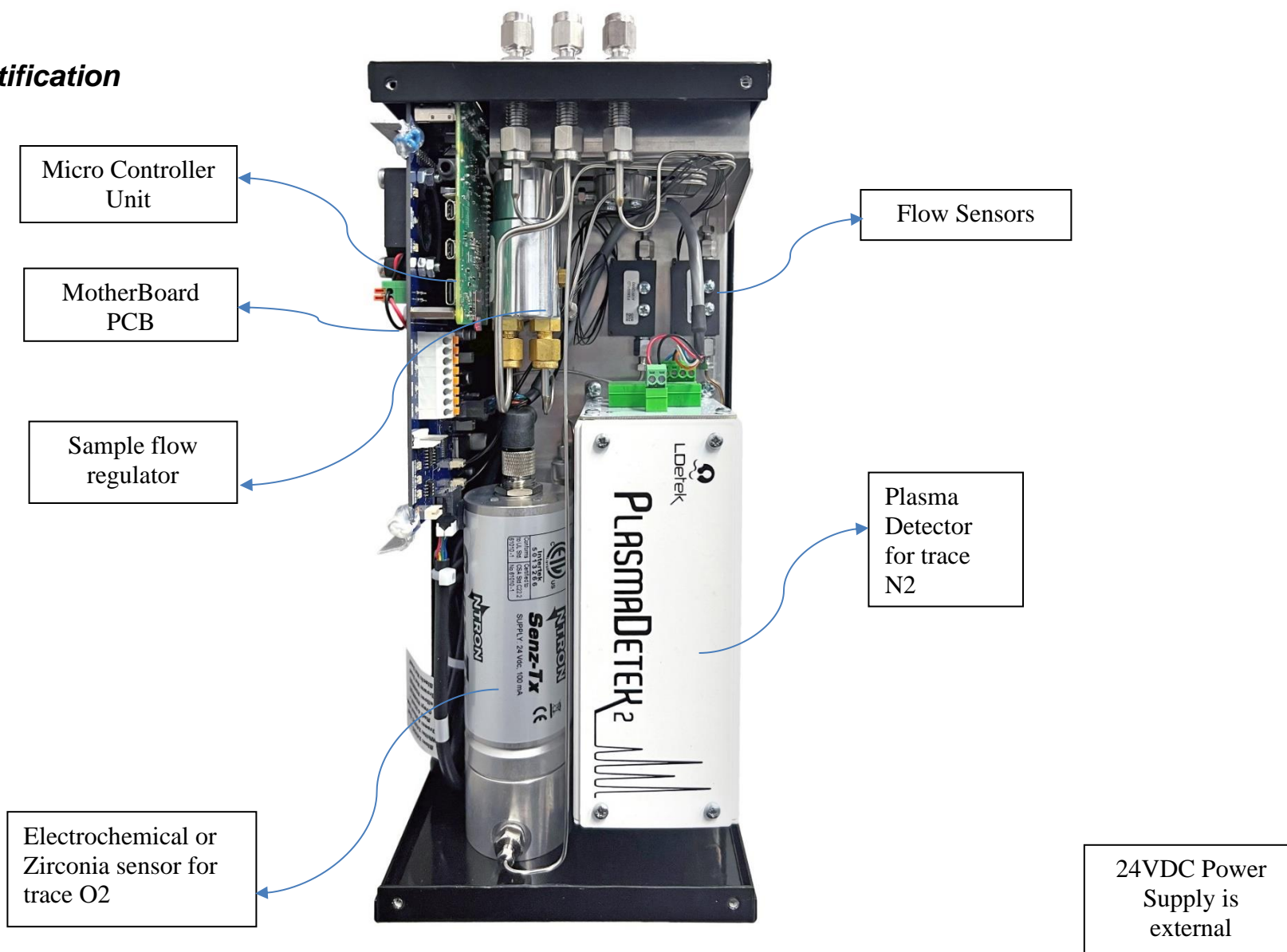
The screenshot shows the 'Alarms History' screen. At the top, a breadcrumb trail reads 'Settings > Alarms > Historic'. Below this, the title 'Alarms History' is displayed next to a '7 items' count. A filter icon is visible. The main content is a table with the following columns: Description, State, Priority, Slave Type, Slave, Hardware, and an unchecked checkbox. The table lists four historical alarms, all with an 'Inactive' state and 'Error' priority.

Description	State	Priority	Slave Type	Slave	Hardware	<input type="checkbox"/>
Oven1 temperature out of bounds	Inactive	Error	LDMOX Board	0x0706050403020108	Oven	<input type="checkbox"/>
Flow1 low flow	Inactive	Error	LDMOX Board	0x0706050403020108	Flow1	<input type="checkbox"/>
Flow deviation on Flow1	Inactive	Error	LDMOX Board	0x0706050403020108	Flow1	<input type="checkbox"/>
Temperature deviation on Oven1	Inactive	Error	LDMOX Board	0x0706050403020108	Oven	<input type="checkbox"/>

At the bottom of the screen, a navigation bar contains icons for USER, ANALYSIS, SETTINGS (which is highlighted), CALIBRATION, and DIAGNOSTICS. To the right of these icons, it says 'No active alarms'. Further right, the identifier 'LD8001' is shown. In the bottom right corner, the 'INFC v1.1.17' logo is present.

## 9. Drawings & Schematics

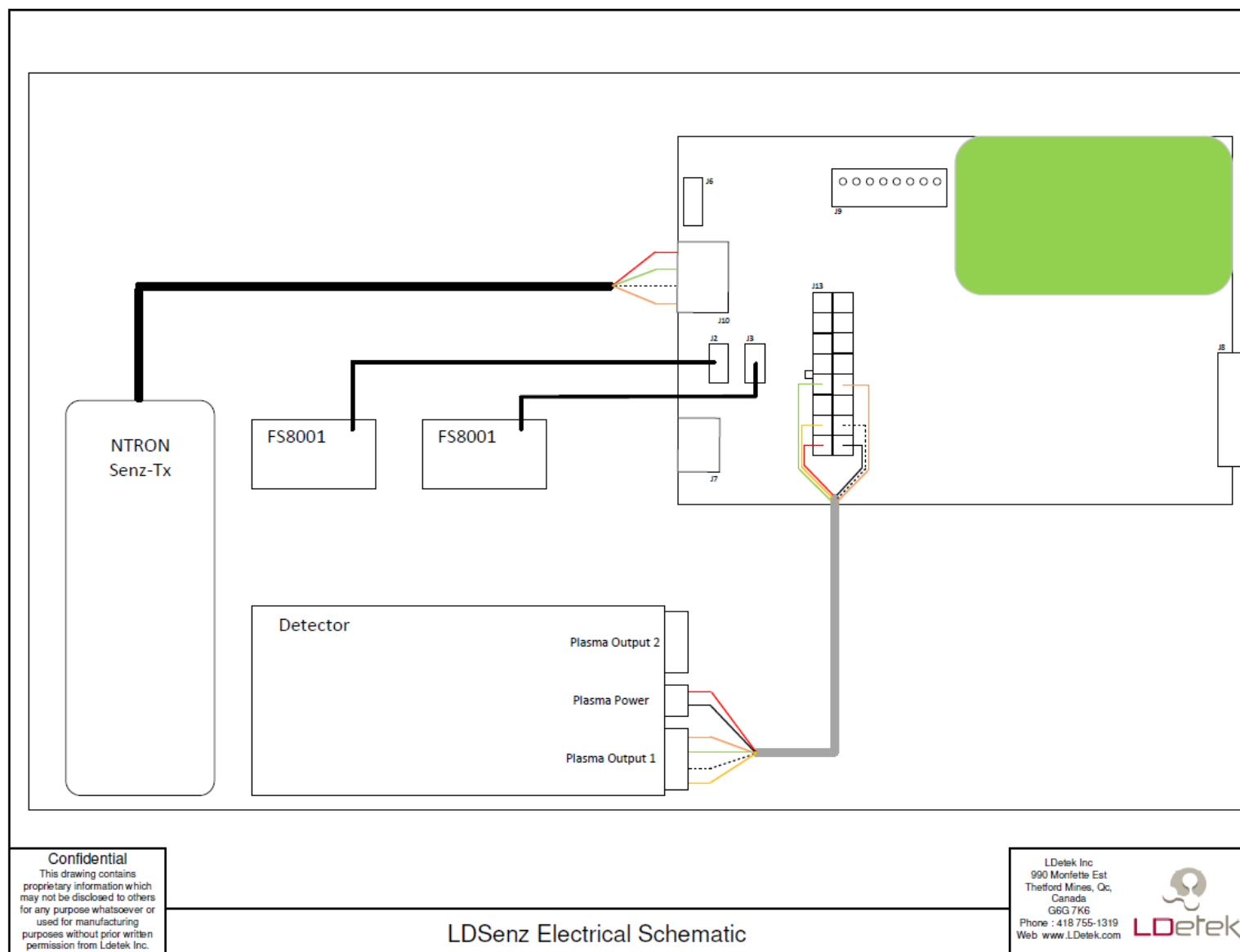
### 9.1 Parts Identification



## 9.2 Back Panel Identification

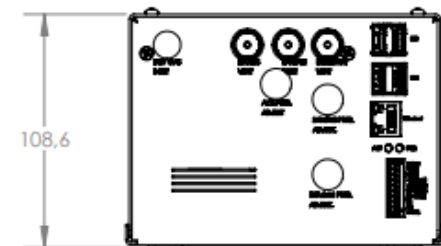
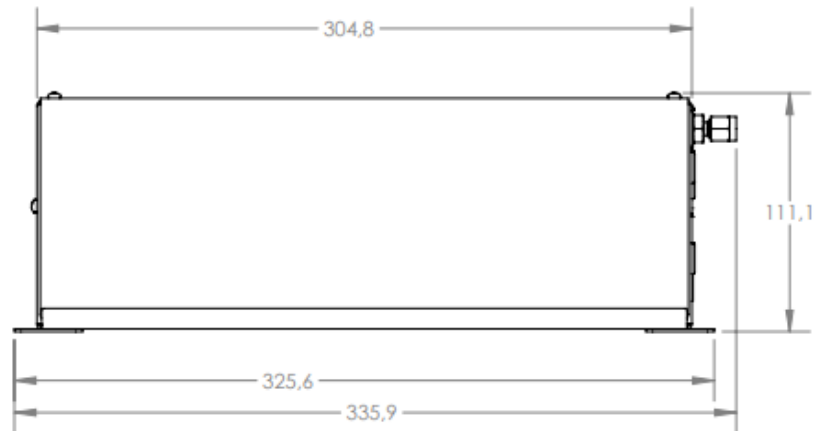
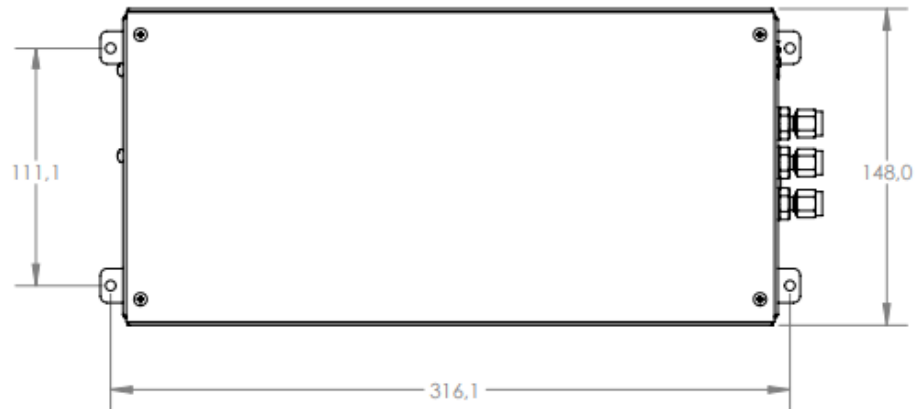


## 9.4 Electrical Schematic LDSENZ





## 9.5 Enclosure Dimensions



## 10. Ordering Information and spare parts

### Ordering information:

<b>LDSENZ</b>	<b>-XXX</b> PED: N2 plasma emission	<b>-XX</b> EC: O2 electrochemical ZI: O2 zirconia	<b>-XX</b> 2S: 1/8" Compression 4S : 1/4" Compression 2FS : 1/8" face seal (VCR) 4FS: 1/4" face seal (VCR)	<b>-XX</b> mA:4-20mA
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### Spare part list:

Description	Part Number
Moisture trap	LD-H2O-T
LDSENZ fuse kit	FK-LDSENZ
Sample Flow controller	Svalve-LDSENZ
Complete Mother Board PCB assembly	MB-LDSENZ
Sample Flow Sensor	FT-LDSENZ
Micro Controller Unit	MCU-LDSENZ
Rear Panel assembly	BP-LDSENZ
24VDC Power Supply	PS-24V-LDSENZ
Entire LD-8000 frame with top and bottom cover	Frame-LDSENZ

This image shows a full page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, typical of notebook paper. There are no margins, text, or other markings on the page.

[illegible]

Thank you for using LDetek Products





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Where **innovation** leads to **success**

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