

# LD2000



## TRACE TOTAL HYDROCARBONS ANALYZER

# DESIGN REPORT



Measuring total hydrocarbons is required in the air separation industry for quality control of the gas produced. The series LD2000 is an online analyzer using a flame ionization detector especially designed for this application. This document will demonstrate the performances of the unit.

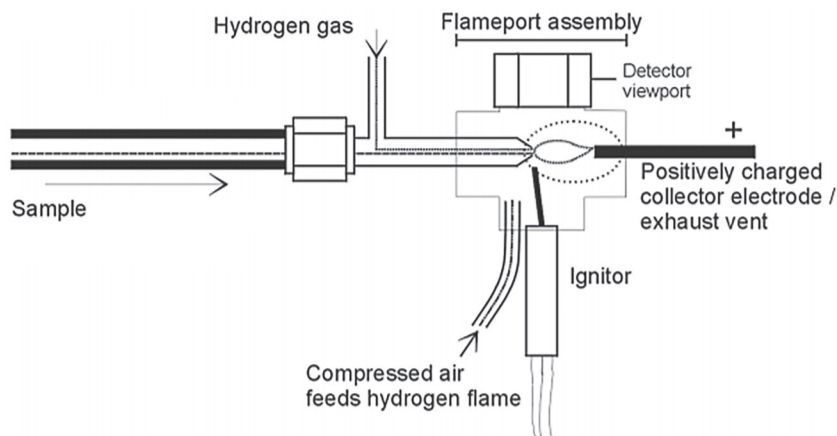
# ANALYZER COMPONENTS

## FLAME IONIZATION DETECTOR (FID)

### DETECTION PRINCIPLE

---

It is well known that due to its relatively good sensitivity to most organic compounds, the FID is a good detector for measuring the level of THC in different sample gases. The principle is based on the creation of carbon atoms (ions) formed during the combustion of the organic compounds burned by a hydrogen flame.



### AMPLIFIER

---

The signal on the collector is amplified with our multi-stage amplifier which has been designed to satisfy the different ranges required. Different sample rates are adjustable to optimize the sensitivity of the signal.

### FLOW CONTROL

---

The sample flow is controlled with the LDetek electronic proportional valve to ensure stability. Concerning air and fuel, the flow control is adjusted with a stainless-steel mini pressure regulator. A safety shutoff valve is installed on the hydrogen gas line to close the fuel when the flame goes off.

### FEATURES

---

The unit offers all the industrial communication protocols with alarms for data/results collection.

### MAINTENANCE

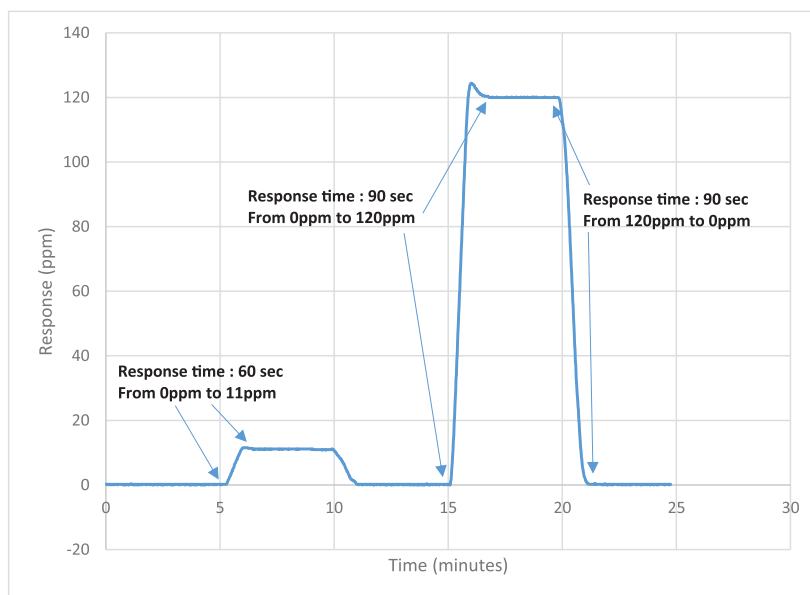
---

It is recommended to replace the hydrocarbon traps for air/fuel once a year to ensure integrity of the flame by avoiding any trace of hydrocarbons coming from the feeding gases. Depending on the carbon level, the FID collector and ignitor are to be replaced every 2 to 3 years to avoid any lack of sensitivity.

# ANALYSER PERFORMANCES

## RESPONSE TIME

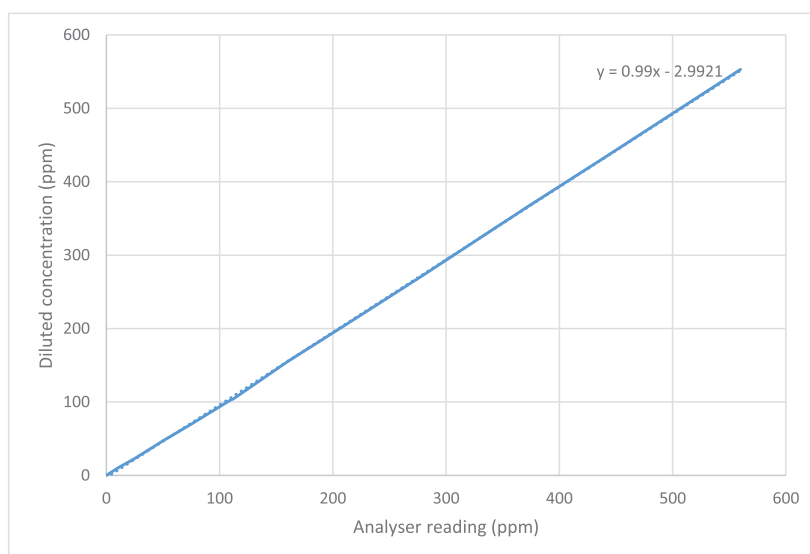
The response time of the unit is demonstrated on the figure 1. Upfront and down front time is of 60-90 seconds depending on the concentration and also the sampling system design. Such response time satisfies the requirements.



**Figure 1**

## LINEARITY/ACCURACY/REPEATABILITY

The linearity curve of the analyser (figure 2) is 0.99 and has been performed using 13 points diluted at different concentrations between 0-560ppm. The same span bottle has been used for the dilution and the calibration to avoid concentration shifting due to different bottle certifications.



**Figure 2**

The accuracy error is +/-1% of full scale. The figure 3 shows the % error for 13 points diluted at different concentrations between 0-560ppm and measured on a 1000ppm scale.

The repeatability error is +/-1% of full scale in a stable environment.

Diluted concentrations *(ppm)	Analyser reading (ppm)	Accuracy (% of scale)
0	0	0
10	10	0
25	23	0.2
50	47	0.3
75	70	0.5
110	103	0.7
112	104	0.8
160	155	0.5
210	204	0.6
280	273	0.7
373	367	0.6
444	437	0.7
560	553	0.7

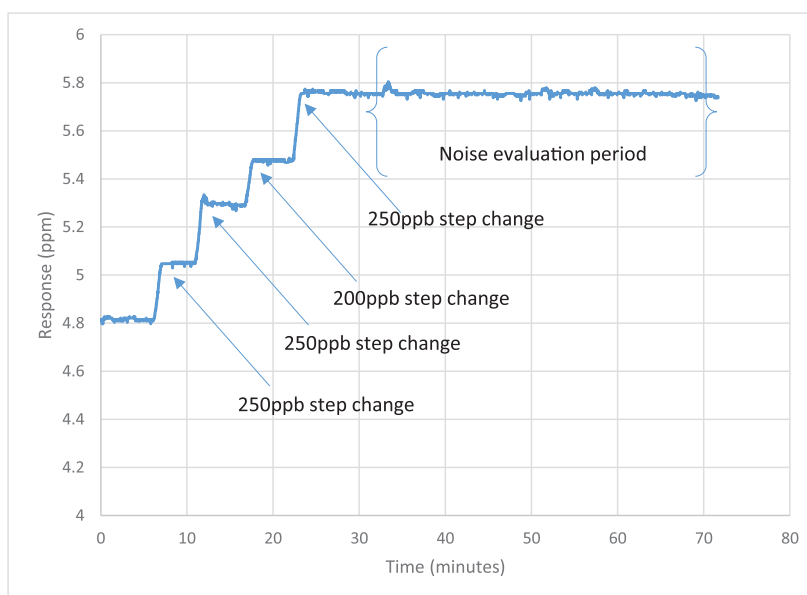
**Figure 3**

\*The dilution system and the certified bottle combined together may give an additional source of error of +/- 1% depending on the conditions.

## DETECTION LIMIT (LDL) AND NOISE

Referring to the figure 4, the peak to peak noise level is 50ppb based on the 40 minutes period. A factor of 2 times the noise level is applied to give an LDL of 100ppb.

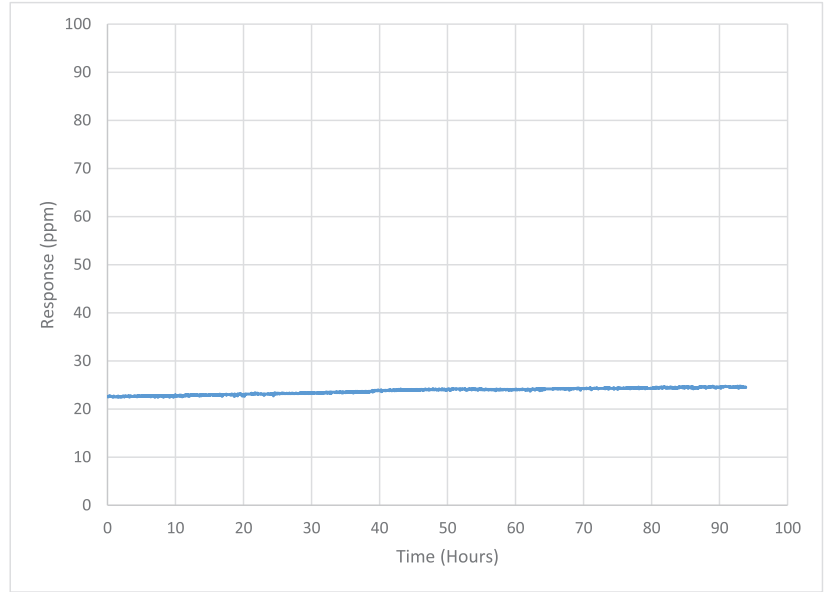
To demonstrate the response limit, some concentration step changes of 200-250ppb have been done. The figure 4 well shows the performances of the unit on its 10ppm range.



**Figure 4**

## STABILITY/DRIFT

Running on a 4 days period at a concentration of 22ppm on a scale of 100ppm in a stable environment, the instrument reading delta shows 1.9ppm which is in the specification of  $\pm 2\%$  of full scale for a one-week period in stable conditions.



**Figure 5**



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

990 Monfette Est, Thetford Mines, (Qc), Canada, G6G 7K6

Phone: 418 755-1319 • Fax: 418 755-1329

info@ldetek.com • www.ldetek.com