

DrägerSensor® DUAL IR Ex/CO<sub>2</sub>

Order no. 68 11 960

Used in	Plug & Play	Replaceable	Guaranty	Expected sensor life	Selective filter
Dräger X-am 5600	–	yes	5 years	> 5 years	–

MARKET SEGMENTS

Telecommunications, shipping, sewage, gas supply companies, refineries, chemical industry, mining, landfills, biogas plants, tunneling.

TECHNICAL SPECIFICATIONS

Detection limit:	1% LEL/0.2 Vol.-% for IR Ex 0.01 Vol.-% CO <sub>2</sub> for IR CO <sub>2</sub>
Resolution:	1% LEL/0.1 Vol.-% for IR Ex (dependent on measuring range) 0.01 Vol.-% CO <sub>2</sub> or 50 ppm CO <sub>2</sub> for IR CO <sub>2</sub> (dependent on measuring range)
Measurement range:	0 to 100% LEL/0–100 Vol.-% CH <sub>4</sub> 0 to 5 Vol.-% CO <sub>2</sub>
Ambient conditions	
Temperature:	(–20 to 50)°C (–4 to 120)°F
Humidity:	(10 to 95)% RH
Pressure:	(700 to 1,300) hPa
Warm-up time:	≤ 5 minutes

FOR THE MEASUREMENT RANGE 0 TO 100% LEL OR 0 TO 4.4 VOL.-% CH<sub>4</sub>  
WHEN CALIBRATED WITH METHANE IN AIR:

Response time:	Diffusion mode ≤ 10 seconds (T <sub>50</sub> ) Diffusion mode ≤ 20 seconds (T <sub>90</sub> ) Pump mode ≤ 10 seconds (T <sub>50</sub> ) Pump mode ≤ 15 seconds (T <sub>90</sub> )
Measurement accuracy	
Sensitivity:	≤ ± 1.5% LEL methane at 50% LEL
Linearity error, typical:	≤ ± 3.5% of measured value or ≤ ± 1.5% of the highest figure in the set measuring range (whichever is higher)
Long-term drift	
Zero point:	≤ ± 1% LEL methane/month
Sensitivity:	≤ ± 3% LEL methane/month at 50% LEL
Influence of temperature	
Zero point:	≤ ± 0.02% LEL methane/K at (–20 to 50)°C (–4 to 120)°F
Sensitivity:	≤ ± 0.1% LEL methane/K at 50% LEL and (–20 to 50)°C (–4 to 120)°F
Effect of humidity, at 40°C (104 °F) (0 to 95% RH, non-condensing)	
Zero point:	≤ ± 0.01% LEL methane/% RH

## FOR THE MEASUREMENT RANGE 0 TO 100% LEL OR 0 TO 1.7 VOL.-% C<sub>3</sub>H<sub>8</sub> WHEN CALIBRATED WITH PROPANE IN AIR

<b>Response time:</b>	Diffusion mode ≤ 12 seconds (T <sub>50</sub> ) Diffusion mode ≤ 40 seconds (T <sub>90</sub> ) Pump mode ≤ 15 seconds (T <sub>50</sub> ) Pump mode ≤ 20 seconds (T <sub>90</sub> )
<b>Measurement accuracy</b>	
Sensitivity:	≤ ± 1.25% LEL propane at 50% LEL
<b>Linearity error, typical:</b>	≤ ± 3.0% of measured value or ≤ ± 1.0% of highest measuring range figure (whichever is higher)
<b>Long-term drift</b>	
Zero point:	≤ ± 3.0% LEL propane/month
Sensitivity:	≤ ± 4.0% LEL propane/month at 50% LEL
<b>Influence of temperature</b>	
Zero point:	≤ ± 0.06% LEL propane/K
Sensitivity:	≤ ± 0.13% LEL propane/K at 50% LEL
<b>Effect of humidity, at 40°C (104 °F) (0 to 95% RH, non-condensing)</b>	
Zero point:	≤ ± 0.01% LEL propane/% RH

## FOR THE MEASUREMENT RANGE 0 TO 5 VOL.-% CO<sub>2</sub>

<b>Response time:</b>	Diffusion mode ≤ 15 seconds (T <sub>50</sub> ) Diffusion mode ≤ 31 seconds (T <sub>90</sub> ) Pump mode ≤ 10 seconds (T <sub>50</sub> ) Pump mode ≤ 15 seconds (T <sub>90</sub> )
<b>Measurement accuracy</b>	
Sensitivity:	≤ ± 0.08 Vol.-% CO <sub>2</sub> at 2.5 Vol.-%
<b>Linearity error, typical:</b>	≤ ± 10% of measured value or ≤ ± 1.5% of highest measuring range figure (whichever is higher)
<b>Long-term drift</b>	
Zero point:	≤ ± 0.005 Vol.-% CO <sub>2</sub> /month
Sensitivity:	≤ ± 0.1 Vol.-% CO <sub>2</sub> /6 months at 2.5% CO <sub>2</sub>
<b>Influence of temperature</b>	
Zero point:	≤ ± 0.0002 Vol.-% CO <sub>2</sub> /K at (-20 to 50)°C (-4 to 120)°F
Sensitivity:	≤ ± 0.0015% Vol.-% CO <sub>2</sub> /K at 2.5 Vol.-% and (-20 to 50)°C (-4 to 120)°F
<b>Effect of humidity, at 40°C (104 °F) (0 to 95% RH, non-condensing)</b>	
Zero point:	≤ ± 0.0001 Vol.-% CO <sub>2</sub> /RH
<b>Test gas:</b>	2 Vol.-% CH <sub>4</sub> or 50 Vol.-% CH <sub>4</sub> 2.5 Vol.-% CO <sub>2</sub>

SPECIAL CHARACTERISTICS

This sensor enables flammable gases and carbon dioxide to be measured simultaneously with just one sensor. As with all other IR sensors, it requires little maintenance, has a high level of long-term stability, and is highly resistant to poisoning.

COMPATIBLE GASES AND MEASURING RANGES:

Gas	Data set name	Measurement range
Ethene	c2h4	0 to 100% LEL <sup>2)</sup>
ETHENE	C <sub>2</sub> H <sub>4</sub>	0 to 100 Vol.-%
Ethanol	EtOH	0 to 100% LEL <sup>2)</sup>
Ex	Ex	0 to 100% LEL
JetFuel	JetF	0 to 100% LEL <sup>2)</sup>
Methane	ch4	0 to 100% LEL <sup>2)</sup>
METHANE	CH <sub>4</sub>	0 to 100 Vol.-%
n-butane	buta	0 to 100% LEL <sup>2)</sup>
n-BUTANE	BUTA	0 to 100 Vol.-%
n-nonane	Nona	0 to 100% LEL <sup>2)</sup>
n-pentane	Pent	0 to 100% LEL <sup>2)</sup>
Propane	c3h4	0 to 100% LEL <sup>2)</sup>
PROPANE	C <sub>3</sub> H <sub>8</sub>	0 to 100 Vol.-%
Toluene	Tolu	0 to 100% LEL <sup>2)</sup>

DETECTION OF OTHER GASES AND VAPORS FOR THE MEASUREMENT RANGE  
0 TO 100% LEL:

Through the use of cross sensitivities when calibrated with propane (C<sub>3</sub>H<sub>8</sub>, 100% LEL = 1.7 Vol.-%). The sensor can be used to detect the gases and vapors listed in the following table. The sensor must be configured to “Ex” measurement gas in the instrument. The sensor may also be sensitive to other gases.

DETECTION OF OTHER GASES AND VAPORS FOR THE MEASURING RANGE  
0 TO 100% LEL

Gas/vapor gas	Chemical symbol	Test gas concentration in Vol.-%	Reading displayed in % LEL (if calibrated to 0.85 Vol.-% propane)	Cross-sensitivity factor
Acetone	C <sub>3</sub> H <sub>6</sub> O	1.25	18	2.78
Acetylene	C <sub>2</sub> H <sub>2</sub>	–	not possible	–
Benzene	C <sub>6</sub> H <sub>6</sub>	0.6	20	2.50
Butadiene -1,3	C <sub>4</sub> H <sub>6</sub>	0.7	20	2.50
i-Butane	(CH <sub>3</sub> ) <sub>3</sub> CH	0.75	41	1.22
n-Butane	C <sub>4</sub> H <sub>10</sub>	0.7	42	1.19
i-Butene	(CH <sub>3</sub> ) <sub>2</sub> C=CH <sub>2</sub>	0.8	31	1.61

<sup>2)</sup> LEL figures depend on country-specific standards.

## DETECTION OF OTHER GASES AND VAPORS FOR THE MEASURING RANGE 0 TO 100% LEL

Gas/vapor gas	Chemical symbol	Test gas concentration in Vol.-%	Reading displayed in % LEL (if calibrated to 0.85 Vol.-% propane)	Cross-sensitivity factor
n-Butanol	$C_4H_{10}O$	0.85	25	2.0
2-Butanone (MEK)	$C_4H_8O$	0.75	22	2.27
Butyl Acetate	$C_6H_{12}O_2$	0.60	20	2.5
Cyclohexane	$C_6H_{12}$	0.50	15	3.33
Cyclopentane	$C_5H_{10}$	0.7	47	1.06
Dimethyl Aether	$C_2H_6O$	1.35	51	0.98
Diethylamine	$C_4H_{11}N$	0.85	44	1.14
Diethyl Aether	$(C_2H_5)_2O$	0.85	46	1.09
Ethane	$C_2H_6$	1.2	65	0.77
Ethylalcohol	$C_2H_6O$	1.55	41	1.22
Ethene	$C_2H_4$	1.2	15	3.33
Ethylacetate	$C_4H_8O_2$	1.0	35	1.43
Ethyl acetate	$C_5H_8O_2$	0.85	26	1.92
n-Heptane	$C_7H_{16}$	0.55	36	1.39
n-Hexane	$C_6H_{14}$	0.5	34	1.47
Methane	$CH_4$	2.2	37	1.35
Methanol	$CH_4O$	3.0	92	0,54
n-Methoxy-2-Propanol	$C_4H_{10}O_2$	0.9	26	1.92
Methyl-tert-butyl aether	$C_5H_{12}O$	0.80	59	0.85
Methyl chloride	$CH_3Cl$	3.8	47	1.06
Methylen chlorid	$CH_2Cl_2$	6.5	on request	–
Methyl ethyl ketone	$C_4H_8O$	0.75	22	2.27
n-Nonane	$C_9H_{20}$	0.35	on request	–
n-Octane	$C_8H_{18}$	0.40	20	2.50
n-Pentane	$C_5H_{12}$	0.55	36	1.39
Propane	$C_3H_8$	0.85	50	1.00
n-Propylalcohol	$C_3H_7OH$	1.05	40	1.25
Propene	$C_3H_6$	0.90	31	1.61
Propylene oxide	$C_3H_6O$	0.95	49	1.02
Toluene	$C_6H_5CH_3$	0.50	19	2.63
o-Xylene	$C_6H_4(CH_3)_2$	0.5	11	4.55



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