

**DrägerSensor® Dual IR Ex/CO<sub>2</sub> HC**

Order no. 68 00 276

Used in	Plug & Play	Replaceable	Guaranty	Expected sensor life
Dräger X-am 8000	no	yes	5 years	> 5 years

**MARKET SEGMENTS**

Mining, landfills, biogas plants

**TECHNICAL SPECIFICATIONS**

<b>Detection limit:</b>	1 % LEL for IR Ex (when calibrated with CH <sub>4</sub> ) 0.2 Vol.-% CO <sub>2</sub> for IR CO <sub>2</sub>
<b>Resolution:</b>	1 % UEG for Ex 0.1 Vol.-% CO <sub>2</sub>
<b>Measurement range:</b>	0 to 100 % UEG/ 0 to 100 Vol.-% (depending on the respective target gas) 0 to 100 Vol.-% CO <sub>2</sub>
<b>Ambient conditions</b>	
Temperature:	(-20 to 50 °C (-4 to 122 °F))
Humidity:	0 to 90 % RH
Pressure:	(800 to 1100) hPa (in potentially explosive atmospheres) (700 to 1300) hPa
<b>Warm-up time:</b>	≤ 3 minutes

**TYPICAL MEASURING PROPERTIES FOR THE MEASUREMENT RANGE 0 TO 100 % LEL OR 0 TO 4.4 VOL.-% CH<sub>4</sub> WHEN CALIBRATED WITH 2.5 VOL.-% METHANE IN AIR:**

<b>Response time:</b>	Diffusion mode (t <sub>50</sub> ) ≤ 10 seconds Diffusion mode (t <sub>90</sub> ) ≤ 21 seconds Pump mode (t <sub>50</sub> ) ≤ 9 seconds Pump mode (t <sub>90</sub> ) ≤ 11 seconds
<b>Precision</b>	
Zero point:	≤ ± 1.0 % LEL
Sensitivity:	≤ ± 2 % LEL at 50 % LEL
<b>Linearity error:</b>	≤ ± 4 % of measured value or ≤ ± 1.5 % of the end of measurement range (the larger value applies in each case)
<b>Influence of temperature (-20 to 50 °C)</b>	
Zero point:	≤ ± 0.02 % LEL/K
Sensitivity:	≤ ± 0.1 % LEL/K at 50 % LEL
<b>Influence of humidity, at 40 °C (104 °F) (0 to 95 % RH, non-condensing)</b>	
Zero point:	≤ ± 0.01 % LEL/% RH
<b>Influence of pressure of the respective measured value/hPa</b>	
Zero point:	≤ ± 0.06 % (compensated)
<b>Long-term drift</b>	
Zero point:	≤ ± 1 % LEL/month
Sensitivity:	≤ ± 3 % LEL/month at 50 % LEL

**TYPICAL MEASURING PROPERTIES 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 0.9 VOL.% PROPANE IN AIR:**

<b>Response time:</b>	Diffusion mode (t <sub>50</sub> )	≤ 14 seconds
	Diffusion mode (t <sub>90</sub> )	≤ 57 seconds
	Pump mode (t <sub>50</sub> )	≤ 10 seconds
	Pump mode (t <sub>90</sub> )	≤ 15 seconds
<b>Precision</b>		
Zero point:	≤ ± 1.0 % LEL	
Sensitivity:	≤ ± 2 % LEL at 50 % LEL	
<b>Linearity error:</b>	≤ ± 3.0 % of measured value or	
	≤ ± 1.0 % of the end of measurement range	
	(the larger value applies in each case)	
<b>Influence of temperature (-20 to 50 °C)</b>		
Zero point:	≤ ± 0.06 % LEL/K	
Sensitivity:	≤ ± 0.13 % LEL/K at 50 % LEL	
<b>Influence of humidity, at 40 °C (104 °F) (0 to 95 % RH, non-condensing)</b>		
Zero point:	≤ ± 0.01 % LEL/% RH	
<b>Influence of pressure of the respective measured value/hPa</b>		
Zero point:	≤ ± 0.06 % (compensated)	
<b>Long-term drift</b>		
Zero point:	≤ ± 3 % LEL/month	
Sensitivity:	≤ ± 4 % LEL/month at 50 % LEL	

**TYPICAL MEASURING PROPERTIES FOR THE MEASUREMENT RANGE 0 TO 100 VOL.-%  
CO<sub>2</sub> WHEN CALIBRATED WITH 50 VOL.-% CARBON DIOXIDE IN NITROGEN:**

<b>Response time:</b>	Diffusion mode (t <sub>50</sub> )	≤ 15 seconds
	Diffusion mode (t <sub>90</sub> )	≤ 55 seconds
	Pump mode (t <sub>50</sub> )	≤ 13 seconds
	Pump mode (t <sub>90</sub> )	≤ 20 seconds
<b>Precision</b>		
Zero point:	≤ ± 0.05 Vol.-%	
Sensitivity:	≤ ± 0.5 Vol.-% at 50 Vol.-%	
Linearity error:	≤ ± 1.0 Vol.-% or ≤ ± 5 % of the end of measurement range (the larger value applies in each case)	
<b>Influence of temperature (-20 to 50 °C)</b>		
Zero point:	≤ ± 0.008 Vol.-%/K	
Sensitivity:	≤ ± 0.4 % Vol.-%/K at 50 Vol.-%	
<b>Influence of humidity, at 40 °C (104 °F) (0 to 95 % RH, non-condensing)</b>		
Zero point:	≤ ± 0.001 Vol.-%/ % RH	
<b>Influence of pressure of the respective measured value/hPa</b>		
Zero point:	≤ ± 0.09 % (compensated)	
<b>Long-term drift</b>		
Zero point:	≤ ± 0.05 Vol.-%/month	
Sensitivity:	≤ ± 2 Vol.-%/month at 50 Vol.-%	

Test gases	2.5 Vol.-% CH <sub>4</sub> for measurement range up to 100 %LEL 50 Vol.-% CH <sub>4</sub> for measurement range up to Vol.-% CH <sub>4</sub> 0.9 Vol.-% C <sub>3</sub> H <sub>8</sub> for measurement range up to 100 %LEL 50 Vol.-% CO <sub>2</sub> for measurement range up to 100 Vol.-% CO <sub>2</sub> Biogas 60 Vol.-% CH <sub>4</sub> /40 Vol.-% CO <sub>2</sub>
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SPECIAL CHARACTERISTICS

This sensor allows a measurement of hydrocarbons (gases and vapors) and carbon dioxide 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. CO<sub>2</sub> concentrations of up to 100% by volume can be reliably detected with this 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.

Gas	Data set name	Measurement range **
n-Butane	buta	0 to 100 % LEL <sup>1)</sup>
n-BUTANE	BUTA	0 to 100 Vol.-%
Ethene	c2h4	0 to 100 % LEL <sup>1)</sup>
ETHENE	C2H4	0 to 100 Vol.-%
Ethanol	EtOH	0 to 100 % LEL <sup>1)</sup>
Ex	Ex	0 to 100 % LEL
JetFuel	JetF	0 to 100 % LEL <sup>1)</sup>
Liquid Petroleum Gas ***	LPG	0 to 100 Vol.-%
Methane	ch4	0 to 100 % LEL <sup>1)</sup>
METHANE	CH4	0 to 100 Vol.-%
n-Nonane	Nona	0 to 100 % LEL <sup>1)</sup>
n-Pentane	Pent	0 to 100 % LEL <sup>1)</sup>
Propane	c3h8	0 to 100 % LEL <sup>1)</sup>
PROPANE	C3H8	0 to 100 Vol.-%
Toluene	Tolu	0 to 100 % LEL <sup>1)</sup>

\*\* The LEL information is dependent on the applicable country-specific standards.

\*\*\* The values in the table are based on 50% propane and 50% butane. In practice, the composition of LPG can fluctuate, which may lead to increased measuring errors.

DETECTING OTHER GASES AND VAPORS

Detection of other gases and vapors for the measuring range 0% to 100% LEL with the DrägerSensor Dual IR Ex/CO<sub>2</sub> HC via cross-sensitivities used for technical measurements when calibrated with propane (C<sub>3</sub>H<sub>8</sub>, 100 % LEL = 1.7 Vol.%. Always observe these values for this application). The sensor can be used to detect the gases and vapors mentioned in the table. For this purpose, the sensor in the device must be configured to the target gas „Ex“. The specified values apply to 20 °C and may vary by ± 30 %. Calibration to the gas or the vapor can cause increased linearity errors.

## RELEVANT CROSS-SENSITIVITIES

Gas/vapor	Chemical symbol	CAS No.	Test gas concentration in Vol.-%	Reading displayed in % LEL (if calibrated to 0.85 Vol% = 50 % LEL propane)	Cross-sensitivity factor f
Acetone	C <sub>3</sub> H <sub>6</sub> O	67-64-1	1.25	18	2.78
Acetylene	C <sub>2</sub> H <sub>2</sub>	74-86-2	–	not possible	–
Benzene	C <sub>6</sub> H <sub>6</sub>	71-43-2	0.60	20	2.50
Butadiene -1,3	C <sub>4</sub> H <sub>6</sub>	106-99-0	0.70	20	2.50
i-Butane	(CH <sub>3</sub> ) <sub>3</sub> CH	75-28-5	0.75	41	1.22
n-Butane	C <sub>4</sub> H <sub>10</sub>	106-97-8	0.70	42	1.19
n-Butanol	C <sub>4</sub> H <sub>10</sub> O	71-36-3	0.85	25	2.00
2-Butanol (MEK)	C <sub>4</sub> H <sub>8</sub> O	78-93-3	0.75	22	2.27
i-Butene	C <sub>4</sub> H <sub>8</sub>	115-11-7	0.80	31	1.61
n-Butyl acetate	C <sub>6</sub> H <sub>12</sub> O <sub>2</sub>	123-86-4	0.60	20	2.50
Cyclohexane	C <sub>6</sub> H <sub>12</sub>	110-82-7	0.50	15	3.33
Cyclopentane	C <sub>5</sub> H <sub>10</sub>	287-92-3	0.70	47	1.06
Diethylamine	C <sub>4</sub> H <sub>11</sub> N	109-89-7	0.85	44	1.14
Diethyl ether	(C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> O	60-29-7	0.85	46	1.09
Dimethyl ether	C <sub>2</sub> H <sub>6</sub> O	115-10-6	1.35	51	0.98
Ethane	C <sub>2</sub> H <sub>6</sub>	74-84-0	1.20	65	0.77
Ethanol	C <sub>2</sub> H <sub>6</sub> O	64-17-5	1.55	41	1.22
Ethene	C <sub>2</sub> H <sub>4</sub>	74-85-1	1.20	15	3.33
Ethyl acetate	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	141-78-6	1.00	35	1.43
Ethyl acrylate	C <sub>5</sub> H <sub>8</sub> O <sub>2</sub>	140-88-5	0.85	26	1.92
n-Heptane	C <sub>7</sub> H <sub>16</sub>	142-82-5	0.55	36	1.39
n-Hexane	C <sub>6</sub> H <sub>14</sub>	110-54-3	0.50	34	1.47
Methane	CH <sub>4</sub>	74-82-8	2.20	37	1.35
Methanol	CH <sub>4</sub> O	67-56-1	3.00	92	0.54
n-Methoxy-2-Propanol	C <sub>4</sub> H <sub>10</sub> O <sub>2</sub>	107-98-2	0.90	26	1.92
Methyl chloride	CH <sub>3</sub> Cl	74-87-3	3.80	47	1.06
Methylene chloride	CH <sub>2</sub> Cl <sub>2</sub>	75-09-2	6.50	20	2.50
Methyl tert-butyl ether (MTBE)	C <sub>5</sub> H <sub>12</sub> O	1634-04-4	0.80	59	0.85
n-Nonane	C <sub>9</sub> H <sub>20</sub>	111-84-2	0.35	on request	–
n-Octane	C <sub>8</sub> H <sub>18</sub>	111-65-9	0.40	20	2.50
n-Pentane	C <sub>5</sub> H <sub>12</sub>	109-66-0	0.55	36	1.39
Propane	C <sub>3</sub> H <sub>8</sub>	74-98-6	0.85	50	1.00
n-Propanol	C <sub>3</sub> H <sub>8</sub> O	71-23-8	1.05	40	1.25
Propene	C <sub>3</sub> H <sub>6</sub>	115-07-1	0.90	31	1.61
Propylene oxide	C <sub>3</sub> H <sub>6</sub> O	75-56-9	0.95	49	1.02
Toluene	C <sub>7</sub> H <sub>8</sub>	108-88-3	0.50	19	2.63
o-Xylene	C <sub>8</sub> H <sub>10</sub>	95-47-6	0.50	11	4.55

f = Specifications relate to the respective test gas concentration and the corresponding LEL.

The table does not claim to be complete. The sensor may also be sensitive to other gases and vapors.