

DrägerSensor® Dual IR Ex/CO₂ ES

Order no. 68 51 880

Used in	Plug & Play	Replaceable	Guaranty	Expected sensor life
Dräger X-am 5600	no	yes	5 years	> 5 years
Dräger X-am 8000	no	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 for IR Ex (when calibrated with CH ₄) 0.01 Vol.-% CO ₂ for IR CO ₂
Resolution:	1 % LEL for IR Ex 0.01 Vol.-% CO ₂ or 50 ppm CO ₂ (depending on set unit)
Measurement range:	0 to 100 % LEL/ 0 to 100 Vol.-% (depending on the respective target gas) 0 to 5 Vol.-% CO ₂
Ambient conditions	
Temperature:	(-20 to 50) °C (-4 to 122) °F
Humidity:	(0 to 95) % RH
Pressure:	(800 to 1100) hPa (in potentially explosive atmospheres) (700 to 1300) hPa
Warm-up time:	≤ 3 minutes

TYPICAL MEASURING PROPERTIES FOR THE MEASUREMENT RANGE 0 TO 100 % LEL OR 0 TO 4.4 VOL.% CH₄ WHEN CALIBRATED WITH 2.5 VOL.% METHANE IN AIR*:

Response time:	X-am 5600	X-am 8000
Diffusion mode (t ₅₀)	≤ 10 seconds	≤ 10 seconds
Diffusion mode (t ₉₀)	≤ 15 seconds	≤ 21 seconds
Pump mode (t ₅₀)	≤ 7 seconds	≤ 9 seconds
Pump mode (t ₉₀)	≤ 10 seconds	≤ 11 seconds
Precision		
Zero point:	≤ ± 1.0 % LEL	
Sensitivity:	≤ ± 2 % LEL at 50 % LEL	
Linearity error:	≤ ± 4 % of measured value or ≤ ± 1.5 % of the end of measurement range (the larger value applies in each case)	
Influence of temperature (-20 to 50 °C)		
Zero point:	≤ ± 0.02 % LEL/K	
Sensitivity:	≤ ± 0.1 % LEL/K at 50 % LEL	
Influence of humidity, at 40 °C (104 °F) (0 to 95 % RH, non-condensing)		
Zero point:	≤ ± 0.01 % LEL/% RH	
Influence of pressure of the respective measured value/hPa		
	X-am 5600	X-am 8000
Zero point:	≤ ± 0.16 % (uncompensated)	≤ ± 0.06 % (compensated)
Long-term drift		
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.% C₃H₈ WHEN CALIBRATED WITH 0.9 VOL.% PROPANE IN AIR*:

Response time:	X-am 5600	X-am 8000
Diffusion mode (t ₅₀)	≤ 12 seconds	≤ 14 seconds
Diffusion mode (t ₉₀)	≤ 40 seconds	≤ 57 seconds
Pump mode (t ₅₀)	≤ 8 seconds	≤ 10 seconds
Pump mode (t ₉₀)	≤ 13 seconds	≤ 15 seconds
Precision		
Zero point:	≤ ± 1.0 % LEL	
Sensitivity:	≤ ± 2 % LEL at 50 % LEL	
Linearity error:	≤ ± 3.0 % of measured value or ≤ ± 1.0 % of the end of measurement range (the larger value applies in each case)	
Influence of temperature (-20 to 50 °C)		
Zero point:	≤ ± 0.06 % LEL/K	
Sensitivity:	≤ ± 0.13 % LEL/K at 50 % LEL	
Influence of humidity, at 40 °C (104 °F) (0 to 95 % RH, non-condensing)		
Zero point:	≤ ± 0.01 % LEL/% RH	
Influence of pressure of the respective measured value/hPa	X-am 5600	X-am 8000
Zero point:	≤ ± 0.16 % (uncompensated)	≤ ± 0.06 % (compensated)
Long-term drift		
Zero point:	≤ ± 3 % LEL/month	
Sensitivity:	≤ ± 4 % LEL/month at 50 % LEL	

TYPICAL MEASURING PROPERTIES FOR THE MEASUREMENT RANGE 0 TO 5 VOL.-% CO₂ WHEN CALIBRATED WITH 2.0 VOL.-% CARBON DIOXIDE IN AIR*:

Response time:	X-am 5600	X-am 8000
Diffusion mode (t ₅₀)	≤ 15 seconds	≤ 14 seconds
Diffusion mode (t ₉₀)	≤ 31 seconds	≤ 48 seconds
Pump mode (t ₅₀)	≤ 8 seconds	≤ 10 seconds
Pump mode (t ₉₀)	≤ 11 seconds	≤ 14 seconds
Precision		
Zero point:	≤ ± 0.01 Vol.-%	
Sensitivity:	≤ ± 0.08 Vol.-% at 2.5 Vol.-%	
Linearity error:	≤ ± 10 % of measured value or ≤ ± 1.5 % of the end of measurement range (the larger value applies in each case)	
Influence of temperature (-20 to 50 °C)		
Zero point:	≤ ± 0.0002 Vol.-%/K	
Sensitivity:	≤ ± 0.015 % Vol.-%/K at 2.5 Vol.-%	
Influence of humidity, at 40 °C (104 °F) (0 to 95 % RH, non-condensing)		
Zero point:	≤ ± 0.0001 Vol.-% / % RH	
Influence of pressure of the respective measured value/hPa	X-am 5600	X-am 8000
Zero point:	≤ ± 0.15 % (uncompensated)	≤ ± 0.09 % (compensated)

Long-term drift	
Zero point:	± 0.005 Vol.-%/month
Sensitivity:	± 0.1 Vol.-%/6 months at 2.5 Vol.-%

* s. a. Notes on Approval 9033890 (X-am 5600), 9033655 (X-am 8000)

Test gases	2.5 Vol.-% CH ₄ for measurement range up to 100 %LEL
	50 Vol.-% CH ₄ for measurement range up to 100 Vol.-% CH ₄
	0.9 Vol.-% C ₃ H ₈ for measurement range up to 100 %LEL
	2 Vol.-% CO ₂ for measurement range up to 5 Vol.-% CO ₂

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.

COMPATIBLE GASES AND MEASUREING RANGES

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

** 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/CO₂ ES or DrägerSensor IR Ex ES via cross-sensitivities used for technical measurements when calibrated with propane (C₃H₈, 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 ₃ H ₆ O	67-64-1	1.25	18	2.78
Acetylene	C ₂ H ₂	74-86-2	–	not possible	–
Benzene	C ₆ H ₆	71-43-2	0.60	20	2.50
Butadiene -1,3	C ₄ H ₆	106-99-0	0.70	20	2.50
i-Butane	(CH ₃) ₃ CH	75-28-5	0.75	41	1.22
n-Butane	C ₄ H ₁₀	106-97-8	0.70	42	1.19
n-Butanol	C ₄ H ₁₀ O	71-36-3	0.85	25	2.00
2-Butanol (MEK)	C ₄ H ₈ O	78-93-3	0.75	22	2.27
i-Butene	C ₄ H ₈	115-11-7	0.80	31	1.61
n-Butyl acetate	C ₆ H ₁₂ O ₂	123-86-4	0.60	20	2.50
Cyclohexane	C ₆ H ₁₂	110-82-7	0.50	15	3.33
Cyclopentane	C ₅ H ₁₀	287-92-3	0.70	51	1.06
Diethylamine	C ₄ H ₁₁ N	109-89-7	0.85	44	1.14
Diethyl ether	(C ₂ H ₅) ₂ O	60-29-7	0.85	46	1.09
Dimethyl ether	C ₂ H ₆ O	115-10-6	1.35	47	0.98
Ethane	C ₂ H ₆	74-84-0	1.20	65	0.77
Ethanol	C ₂ H ₆ O	64-17-5	1.55	41	1.22
Ethene	C ₂ H ₄	74-85-1	1.20	15	3.33
Ethyl acetate	C ₄ H ₈ O ₂	141-78-6	1.00	35	1.43
Ethyl acrylate	C ₅ H ₈ O ₂	140-88-5	0.85	26	1.92
n-Heptane	C ₇ H ₁₆	142-82-5	0.55	36	1.39
n-Hexane	C ₆ H ₁₄	110-54-3	0.50	34	1.47
Methane	CH ₄	74-82-8	2.20	37	1.35
Methanol	CH ₄ O	67-56-1	3.00	92	0.54
n-Methoxy-2-Propanol	C ₄ H ₁₀ O ₂	107-98-2	0.90	26	1.92
Methyl chloride	CH ₃ Cl	74-87-3	3.80	47	1.06
Methylene chloride	CH ₂ Cl ₂	75-09-2	6.50	20	2.50
Methyl tert-butyl ether (MTBE)	C ₅ H ₁₂ O	1634-04-4	0.80	59	0.85
n-Nonane	C ₉ H ₂₀	111-84-2	0.35	on request	–
n-Octane	C ₈ H ₁₈	111-65-9	0.40	20	2.50
n-Pentane	C ₅ H ₁₂	109-66-0	0.55	36	1.39
Propane	C ₃ H ₈	74-98-6	0.85	50	1.00
n-Propanol	C ₃ H ₈ O	71-23-8	1.05	40	1.25
Propene	C ₃ H ₆	115-07-1	0.90	31	1.61
Propylene oxide	C ₃ H ₆ O	75-56-9	0.95	49	1.02
Toluene	C ₇ H ₈	108-88-3	0.50	19	2.63
o-Xylene	C ₈ H ₁₀	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.