

DrägerSensor® Smart IR Ex

Order no. 68 10 460

Used in	Plug & Play	Replaceable	Guaranty	Expected sensor life	Selective filter
Dräger X-am 7000	yes	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:	3% LEL/0.1 Vol.-%
Resolution:	0.5% LEL
Measurement range:	0 to 100% LEL/0 to 100 Vol.-% depending on the gas being measured
Ambient conditions	
Temperature:	(–20 to 60)°C (–4 to 140)°F
Humidity:	(10 to 95)% RH
Pressure:	(700 to 1,300) hPa
Warm-up time:	≤ 4 minutes

FOR THE MEASUREMENT RANGE 0 TO 100% LEL OR 0 TO 4.4 VOL.-% CH₄ WHEN CALIBRATED WITH METHANE IN AIR:

Response time:	Diffusion mode ≤ 20 seconds (t ₅₀) Diffusion mode ≤ 50 seconds (t ₉₀) Pump mode ≤ 20 seconds (t ₅₀) Pump mode ≤ 41 seconds (t ₉₀)
Precision:	≤ ± 2.0% LEL methane at 50% LEL
Linearity error, typical:	≤ ± 5% of measured value
Long-term drift	
Zero point:	≤ ± 2.5% LEL methane/month
Precision:	≤ ± 2.5% LEL methane/month at 50% LEL
Influence of temperature	
Zero point:	≤ ± 0.05% LEL methane/K at (–20 to 60)°C (–4 to 140)°F
Precision:	≤ ± 0.15% LEL methane/K at 50% LEL and (–20 to 60)°C (–4 to 140)°F
Effect of humidity, at 40°C (104 °F) (0 to 95% RH, non-condensing)	
Zero point:	≤ ± 0.05% LEL methane/% RH

FOR THE MEASUREMENT RANGE 0 TO 100% LEL OR 0 TO 1.7 VOL.-% C₃H₈ WHEN CALIBRATED WITH PROPANE IN AIR:

Precision:	≤ ± 1.0% LEL propane at 50% LEL
Linearity error, typical:	≤ ± 4.0% of measured value
Long-term drift	
Zero point:	≤ ± 1.0% LEL propane/month
Sensitivity	≤ ± 2.0% LEL propane/month at 50% LEL
Influence of temperature	
Zero point:	≤ ± 0.03% LEL propane/K
Sensitivity	≤ ± 0.08% LEL propane/K
Effect of humidity, at 40°C (104 °F) (0 to 95% RH, non-condensing)	
Zero point:	≤ ± 0.03% LEL propane/% RH
Test gas:	2 Vol.-% CH ₄
	0.9 Vol.-% C ₃ H ₈

SPECIAL CHARACTERISTICS

This sensor can be used for LEL monitoring and Vol.-% monitoring for some gases. The sensor's database can contain up to 50 different gases. It is also the ideal sensor for measuring hydrocarbons in an inert atmosphere, since its measuring method does not depend on the presence of oxygen. This sensor also has a very long life time, and there is no risk of poisoning from sulfurous or silicone compounds.

COMPATIBLE GASES AND MEASUREMENT RANGES:

Sensor precalibration

The sensor can be delivered with all the necessary calibration data available. The sensor's database can contain up to 50 different gases. The zero point and sensitivity are precalibrated in the sensor for methane (0 to 100% LEL) and propane (0 to 100% LEL). The Vol.-% and % LEL readings are differentiated by displaying the measured gas in upper- and lower-case letters (e.g. ch₄ for 0 to 100% LEL and CH₄ for 0 to 100 Vol.-%).

Gas	Data set name	Measurement range
n-butane	buta	0 to 100% LEL ²⁾
n-BUTANE	BUTA	0 to 100 Vol.-%
Ethene	c ₂ h ₄	0 to 100% LEL ²⁾
ETHENE	C ₂ H ₄	0 to 100 Vol.-%
Ethanol	EtOH	0 to 100% LEL ²⁾
Ex	Ex	0 to 100% LEL
Liquid petroleum gas	LPG (50% propane + 50% butane) ³⁾	0 to 100% LEL ²⁾ / 0 to 100 Vol.-%
JetFuel	JetF	0 to 100% LEL ²⁾
Methane	ch ₄	0 to 100% LEL ²⁾
METHANE	CH ₄	0 to 100 Vol.-%
n-nonane	Nona	0 to 100% LEL ²⁾
n-pentane	Pent	0 to 100% LEL ²⁾
Propane	c ₃ h ₈	0 to 100% LEL ²⁾
PROPANE	C ₃ H ₈	0 to 100 Vol.-%
Toluene	Tolu	0 to 100% LEL ²⁾

²⁾ LEL figures depend on country-specific standards.

³⁾ The figures in the table assume a composition of 50% propane and 50% butane.

In practice, the composition of LPG fluctuates, which can lead to increased measurement errors.

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

Through the use of cross sensitivities when calibrated with propane (C₃H₈, 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. For example: if the instrument is subjected to 1.25 Vol.-% acetone (50% LEL), the instrument will show a reading of 19% LEL if configured to "Ex" measurement gas (calibration using 50% LEL / 0.85 Vol.-% propane). Calibration using the target gas is preferable to calibration using a replacement gas.

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	CH ₃ COCH ₃	1.25	19	2.63
Acetylene	C ₂ H ₂	–	not possible	–
Benzene	C ₆ H ₆	0.6	11	4.44
Butadiene -1,3	CH ₂ CHCHCH ₂	0.7	13	3.85
Cyclohexane	C ₆ H ₁₂	–	on request	–
Cyclopentane	C ₅ H ₁₀	0.7	52	0.96
Dimethyl ether	(C ₂ H ₅) ₂ O	1.35	62	0.81
Ethane	C ₂ H ₆	1.35	76	0.66
Ethanol	C ₂ H ₅ OH	1.75	64	0.78
Ethene	C ₂ H ₄	1.15	9	5.56
Ethyl acetate	CH ₃ COOC ₂ H ₅	1.05	35	1.43
Ethyl acrylate	C ₅ H ₈ O ₂	0.85	23	2.17
i-butane	C ₄ H ₁₀	0.9	49	1.02
i-butene	C ₄ H ₈	0.8	32	1.56
Methanol	CH ₄ O	2.75	93	0.54
Methyl chloride	CH ₃ Cl	3.8	42	1.19
Methylene chloride	CH ₂ Cl ₂	6.5	13	3.85
Methyl ethyl ketone	C ₄ H ₈ O	0.9	28	1.79
n-heptane	C ₇ H ₁₆	0.55	45	1.11
n-hexane	C ₆ H ₁₄	0.5	42	1.19
n-nonane	C ₉ H ₂₀	–	on request	–
n-octane	C ₈ H ₁₈	0.4	32	1.56
n-pentane	C ₅ H ₁₂	0.7	54	0.93
Propane	C ₃ H ₈	0.85	50	1.00
n-propanol	C ₃ H ₇ OH	0.6	40	1.25
o-xylene	C ₆ H ₄ (CH ₃) ₂	0.5	13	3.85
Toluene	C ₆ H ₅ CH ₃	0.6	19	2.63

The specified values may deviate by up to ±30 %.

Calibration for a gas or vapor may result in increased linearity errors. The specified test-gas concentration corresponds to approximately 50 % of the lower explosion limit for the test gas in question. (Source: E. Brandes, W. Möller: Sicherheitstechnische Kenngrößen, PTB, ISBN 3-89701-745-8, Edition 2003)