



EX-TEC[®]

HS 680/660/650/610

Series

Type/model	• HS 680: 064 01 • HS 660: 064 11 • HS 650: 064 21 • HS 610: 064 31
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Certificates

Certificate	TÜV 07 ATEX 553353 X • II 2G Ex db eb ib IIB T4 Gb basic device without leather bag for: ◦ CH₄, C₃H₈, C₄H₁₀, C₉H₂₀, H₂S, CO • II 2G Ex db eb ib IIC T4 Gb basic device with leather bag for: ◦ CH₄, C₃H₈, C₄H₁₀, C₉H₂₀, H₂S, CO, H₂ BVS 09 ATEX G 001 X, PFG 08 G 002 X • applies to Warning %LEL and Warning ExTox applications for CH₄, C₃H₈, CO₂, O₂, CO, H₂S
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Device data

Dimensions (W × D × H)	approx. 148 × 57 × 205 mm (5.83 × 2.24 × 8.07 in) approx. 148 × 57 × 253 mm (5.83 × 2.24 × 9.96 in) with supporting bracket
Weight	approx. 1000 g (35 oz), depending on equipment

Features

Display	monochrome, 320 x 240 pixel
Buzzer	• frequency: 2.4 kHz • volume: 80 dB (A) / 1 m (3.28 ft)
Signal light	red
Pump	• vacuum: > 250 mbar • volume flow: typically 50 l/h ±20 l/h ◦ inspection above ground, measuring in bar holes, gas measuring, plants applications: approx. 50 l/h ◦ structure, warning applications: approx. 30 l/h ◦ application ethane analysis when sampling: approx. 50 l/h • pump error (F100) depending on volume flow: ◦ ≤ 20 l/h F100 certain ◦ > 20 l/h – ≤ 35 l/h F100 possible
Interface	USB
Memory	8 MB
Control	• ON/OFF key • 3 function keys • Jog dial
Sensor	HS 680 • IR and SC for flammable gases (CH₄, C₃H₈, C₄H₁₀) • IR for CO₂ optional: • EC for O₂, H₂S, CO HS 660 • IR and SC for flammable gases (CH₄, C₃H₈, C₄H₁₀) • IR for CO₂ optional: • EC for O₂, CO HS 650 • IR for flammable gases (CH₄, C₃H₈, C₄H₁₀) • IR for CO₂ optional: • EC for O₂, H₂S, CO HS 610 • IR for flammable gases (CH₄, C₃H₈, C₄H₁₀) • IR for CO₂ optional: • EC for O₂

Operating conditions*

Operating temperature	-20 – 40 °C (-4 – 104 °F)
Humidity	5 – 90% r.h., non-condensing
Atmospheric pressure	900 – 1100 hPa
Pressure at gas inlet	max. 100 mbar
Protection rating	IP54
Position of use	any

*Optional sensors can affect the operating conditions of the device.

Storage conditions

Storage temperature	-25 – 60 °C (-13 – 140 °F) temperatures above 40 °C (104 °F) reduce the service life of the sensors
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Power supply

Power supply	4 cells, type Mignon AA, optionally: • rechargeable batteries: NiMH • disposable batteries: Alkaline
Operating time, typical	at least 8 h
Charging time	approx. 3 h (complete charge), depending on capacity
Charging temperature	0 – 35 °C (32 – 95 °F)
Charging voltage	12 V DC (max. 1 A)

Data transmission

Communication	USB
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Gas types

Default	CH ₄
Optional	C ₃ H ₈ • HS 680/660/650/610: % vol. • HS 680/660: ppm • HS 680/650: % LEL C ₄ H ₁₀ • HS 680/660: ppm • HS 680/650: % LEL

Sensors

Note:

probes increase the stated response times.

Methane CH₄, propane C₃H₈, butane C₄H₁₀ (Warning %LEL and Warning ExTox applications)

Type	infrared sensor		
Use	HS 680/650		
Measuring range	0 – 100% LEL		
Resolution	• CH ₄ :	0.05% vol.	
	• C ₃ H ₈ , C ₄ H ₁₀ :	0.02% vol.	
Response times	• CH ₄ :	t ₅₀ < 8 s	t ₉₀ < 14 s
	• C ₃ H ₈ , C ₄ H ₁₀ :	t ₅₀ < 9 s	t ₉₀ < 17 s
Warm-up time	< 30 s		
Temperature range	-20 – 40 °C (-4 – 104 °F)		
Measuring error	according to EN 60079-29-1 • CH ₄ : ±1% LEL (short-term stability) ±4% LEL (long-term stability) • C ₃ H ₈ : ±1% LEL (short-term stability) ±1% LEL (long-term stability)		
Interference, known	all hydrocarbons C _x H _y		
Lifetime, expected	5 years		
Adjustment	test gas concentration: • zero point: hydrocarbon-free, clean air • CH ₄ : 2.20% vol., utilisable 1.00 – 4.00% vol. • C ₃ H ₈ : 1.00% vol., utilisable 0.85 – 1.50% vol. • C ₄ H ₁₀ : 1.00% vol., utilisable 0.50 – 1.30% vol.		

Methane CH₄, propane C₃H₈ (Gas measuring application)

Type	infrared sensor		
Use	HS 680/660/650/610		
Measuring range	0 – 100% vol.		
Resolution	• 0.1% vol. (0 – 9.9% vol.) • 1% vol. (10 – 100% vol.)		
Response times	• CH₄: t₅₀ < 9 s • C₃H₈: t₅₀ < 11 s	- t₉₀ < 17 s - t₉₀ < 22 s	
Warm-up time	< 30 s		
Temperature range	-20 – 40 °C (-4 – 104 °F)		
Measuring error	±3% vol. (according to EN 60079-29-1)		
Interference, known	all hydrocarbons C _x H _y		
Lifetime, expected	5 years		
Adjustment	test gas concentration: • zero point:: hydrocarbon-free, clean air • CH₄: 100% vol., utilisable 20 – 100% vol. • C₃H₈: 100% vol., utilisable 20 – 100% vol.		

Carbon dioxide CO₂ (Warning ExTox application)

Type	infrared sensor		
Use	HS 680/650		
Measuring range	0 – 5% vol. • lower limit: 0.02% vol.		
Resolution	0.02% vol.		
Response times	t ₉₀ < 20 s		
Decay times	t ₁₀ < 14 s		
Warm-up time	< 30 s		
Temperature range	-20 – 40 °C (-4 – 104 °F)		
Measuring error	as per EN 45544: ±0.04% vol. (long-term stability)		
Zero point deviation	0.04% vol.		
Interference, known	none		
Humidity	5 – 90% r.h., non-condensing • short term: 0% r.h.		
Lifetime, expected	5 years		
Adjustment	test gas concentration: • zero point: carbon dioxide-free, clean air • CO₂: 2.00% vol., utilisable 2.00 – 5.00% vol.		

Carbon dioxide CO₂ (Measuring in bar holes application)

Type	infrared sensor
Use	HS 680/660/650/610
Measuring range	0 – 30% vol.
Resolution	1% vol.
Response times	t ₉₀ < 20 s
Warm-up time	< 30 s
Temperature range	-20 – 40 °C (-4 – 104 °F)
Measuring error	±1% vol.
Interference, known	none
Humidity	5 – 90% r.h., non-condensing • short term: 0% r.h.
Lifetime, expected	5 years
Adjustment	test gas concentration: • zero point: carbon dioxide-free, clean air • CO ₂ : 20% vol., utilisable 10 – 30% vol.

Oxygen O₂

Type	electrochemical sensor
Use	HS 680/660/650/610
Measuring range	0 – 25% vol.
Resolution	0.1% vol.
Response times	t ₉₀ < 15 s
Warm-up time	up to 90 s
Temperature range	-20 – 40 °C (-4 – 104 °F)
Measuring error	±3 %, minimum ±0.3 % vol. (±3 digit)
Drift	< 2% within 3 months
Interference, known	none
Humidity	5 – 90% r.h., non-condensing • short term: 0% r.h.
Lifetime, expected	3 years
Adjustment	test gas concentration: • zero point: ◦ oxygen-free air ◦ 100% vol. N ₂ ◦ 100% vol. CH ₄ • O ₂ : 20.9% vol., e.g. clean air

Carbon monoxide CO

Type	electrochemical sensor	
Use	HS 680/650	
Measuring range	0 – 500 ppm • lower limit: ◦ 0 – 100 ppm: 4 ppm ◦ > 100 ppm: 11 ppm	
Resolution	1 ppm	
Response times	t ₉₀ < 30 s	
Decay times	t ₁₀ ≤ 25 s	
Warm-up time	up to 90 s	
Temperature range	-20 – 40 °C (-4 – 104 °F)	
Measuring error	• ±3 %, minimum ±3 ppm (±3 digit) • Long-term stability as per EN 45544 ◦ test gas: ≤ 4% of measured value ◦ zero point (fresh air): ≤ 1 ppm	
Drift	< 10% within 6 months	
Zero point deviation	• 0 – 100 ppm: 3 ppm • > 100 ppm: 13 ppm	
Interference, known	at 20 °C (68 °F) • C ₂ H ₂ 100 ppm: approx. 90 ppm CO • C ₂ H ₄ 100 ppm: approx. 96 ppm CO • Cl ₂ 15 ppm: approx. 1 ppm CO • H ₂ 200 ppm: approx. 30 ppm CO • H ₂ S 50 ppm: approx. 1 ppm CO • NH ₃ 50 ppm: approx. 0 ppm CO • NO 50 ppm: approx. 15 ppm CO • SO ₂ 20 ppm: approx. 0 ppm CO	
Humidity	15 – 90% r.h., non-condensing • short term: 0% r.h.	
Lifetime, expected	3 years	
Adjustment	test gas concentration: • zero point: clean air • CO: 40 ppm, utilisable 10 – 150 ppm	

Hydrogen sulphide H₂S

Type	electrochemical sensor
Use	HS 680/650
Measuring range	0 – 100 ppm • lower limit: 1 ppm
Resolution	1 ppm
Response times	t ₉₀ < 30 s
Decay times	t ₁₀ < 27 s
Warm-up time	up to 120 s
Temperature range	-20 – 40 °C (-4 – 104 °F)
Measuring error	• ±3 %, minimum ±3 ppm (±3 digit) • long-term stability as per EN 45544 ◦ test gas: ≤ 12% of measured value ◦ zero point (fresh air): ≤ 1 ppm
Drift	< 10% within 6 months
Zero point deviation	2 ppm
Interference, known	at 20 °C (68 °F) • CO 200 ppm: approx. 5 ppm H₂S • H₂ 100 ppm: approx. -2 ppm H₂S • NO 50 ppm: approx. 10 ppm H₂S • NO₂ 200 ppm: approx. -3 ppm H₂S • SO₂ 20 ppm: approx. 3 ppm H₂S
Humidity	15 – 90% r.h., non-condensing • short term: 0% r.h.
Lifetime, expected	> 3 years
Adjustment	test gas concentration: • zero point: clean air • H₂S: 40 ppm, utilisable 10 – 100 ppm

Methane CH₄, propane C₃H₈

Type	gas-sensitive semiconductor	
Use	HS 680/660	
Measuring range	0 – 1% vol.	
Indication range	0 – 1.5% vol.	
Resolution	• 0 – 10 ppm: 1 ppm • 10 – 100 ppm: 2 ppm • 100 – 999 ppm: 20 ppm • 0.10 – 1.0% vol.: 0.02% vol. (200 ppm)	
Response times	CH ₄ : t ₉₀ < 7 s	
Warm-up time	approx. 1 min	
Measuring error	±30%	
Interference, known	all flammable gases	
Lifetime, expected	5 years	
Adjustment	test gas concentration: • zero point: hydrocarbon-free, clean air • CH₄: ◦ 10 ppm ◦ 100 ppm ◦ 1000 ppm ◦ 1.0% vol. • C₃H₈: ◦ 10 ppm ◦ 100 ppm ◦ 1000 ppm ◦ 1.0% vol.	

Ethane-detector

Type	gas chromatograph	
Use	HS 680/660	
Gases, separable	CH ₄ , C ₂ H ₆ , C ₃ H ₈	
Sensor, used	gas-sensitive semiconductor	
Measuring range	0 – 12000 ppm	
Separating capacity	25 ppm	
Resolution	1 ppm	
Measurement time	4 min	
Warm-up time	approx. 1 min	
Measuring error	±30%	
Lifetime, expected	5 years	
Test gases	gas mixture:	1% vol. CH ₄ / 100 ppm C ₂ H ₆ in synth. air