



VARIOTEC[®]

480/460/450/400 EX

Series

Type/model	• VARIOTEC 480 EX: 065 01 • VARIOTEC 460 EX: 065 11 • VARIOTEC 450 EX: 065 31 • VARIOTEC 400 EX: 065 21
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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, CO • II 2G Ex db eb ib IIC T4 Gb basic device with leather bag for: ◦ CH₄, C₃H₈, C₄H₁₀, C₉H₂₀, CO, H₂ VARIOTEC 480/450 EX additionally: BVS 09 ATEX G 001 X, PFG 08 G 002 X • applies to Warning LEL and Warning ExTox applications for CH₄, C₃H₈, O₂, CO
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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 • 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
Controls	• ON/OFF key • 3 function keys • jog dial
Sensors	VARIOTEC 480 EX • SC for flammable gases (CH₄, C₃H₈, C₄H₁₀) • CC for flammable gases (CH₄, C₃H₈, C₄H₁₀) • TC for all gases optional: • EC for O₂, CO VARIOTEC 460 EX • SC for flammable gases (CH₄, C₃H₈, C₄H₁₀) • TC for all gases optional: • EC for O₂, CO VARIOTEC 450 EX • CC for flammable gases (CH₄, C₃H₈, C₄H₁₀) • TC for all gases optional: • EC for O₂, CO VARIOTEC 400 EX • SC for flammable gases (CH₄, C₃H₈, C₄H₁₀)

Operating conditions*

Operating temperature	-20 – 40 °C (-4 – 104 °F)
Humidity	5 – 90% r.h., non-condensing
Atmospheric pressure	800 – 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 °F – 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 • VARIOTEC 480/460/450 EX: % vol. • VARIOTEC 480/460/400 EX: ppm • VARIOTEC 450 EX: % LEL C ₄ H ₁₀ • VARIOTEC 480/460/400 EX: ppm • VARIOTEC 450 EX: % LEL

Sensors

Note:

probes increase the stated response times.

Methane CH₄, propane C₃H₈, butane C₄H₁₀

Type	catalytic combustion sensor		
Use	VARIOTEC 480/450 EX		
Measuring range	0 – 100% LEL		
Resolution	- CH₄: - C₃H₈, C₄H₁₀:	0.05% vol. 0.02% vol.	
Response times	- CH₄: - C₃H₈, C₄H₁₀:	t ₅₀ < 5 s t ₅₀ < 6 s	t ₉₀ < 14 s t ₉₀ < 11 s
Warm-up time	up to 90 s		
Temperature range	-20 – 40 °C (-4 – 104 °F)		
Measuring error	according to EN 60079-29-1 - CH₄: ±1% LEL (short-term stability) ±4% LEL (long-term stability) - C₃H₈: ±1% LEL (short-term stability) ±2% LEL (long-term stability)		
Interference, known	all flammable gases		
Lifetime, expected	5 years		
Adjustment	test gas concentration: - zero point: hydrocarbon-free, clean air - CH₄: 2.20% vol. in synth. air, utilisable 1.00 – 4.00% vol. - C₃H₈: 1.00% vol. in synth. air, utilisable 0.85 – 1.50% vol. - C₄H₁₀: 1.00% vol. in synth. air, utilisable 0.50 – 1.30% vol.		

Methane CH₄, propane C₃H₈

Type	thermal conductivity sensor		
Use	VARIOTEC 480/460/450 EX		
Measuring range	0 – 100% vol.		
Resolution	• 0 – 9.9% vol.:	0.1% vol.	
	• 10 – 100% vol.:	1% vol.	
Response times	• CH4:	t50 < 9 s	t90 < 17 s
	• C3H8:	t50 < 11 s	t90 < 22 s
Warm-up time	up to 90 s		
Temperature range	-20 – 40 °C (-4 – 104 °F)		
Measuring error	according to EN 60079-29-1		
	• CH4, C3H8:	±3% vol.	
Interference, known	all gases with a different thermal conductivity		
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.	

Oxygen O₂

Type	electrochemical sensor		
Use	VARIOTEC 480/460/450 EX		
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. N₂ ◦ 100% vol. CH₄	
	• O ₂ :	20.9% vol., e.g. clean air	

Carbon monoxide CO

Type	electrochemical sensor	
Use	VARIOTEC 480/450 EX	
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	

Methane CH₄, propane C₃H₈

Type	gas-sensitive semiconductor	
Use	VARIOTEC 480/460/400 EX	
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	VARIOTEC 480/460 EX	
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