EX-TEC® PM 580/550/500/400

Technical Data Sheet

Device data	
Dimensions (W × D × H)	• 93 × 47 × 165 mm (3.7 × 1.9 × 6.5 inches) • 93 × 65 × 165 mm (3.7 × 2.6 × 6.5 inches) incl. belt clip
Weight	depends on the built-in sensors • approx. 500 g (14.2 oz) • approx. 523 g (14.8 oz) incl. belt clip
Material	housing: polycarbonate, thermoplastic polyurethane

Certificates	
Certificate	explosion protection test • EU type-examination certificate: TÜV 17 ATEX 171969 X • IECEx: IECEx TUN 17.0027 X functional safety test • for: ◦ Warning application; gas types CH4, C3H8, C9H20 (PM 400 only); gas CO2, O2, CO, H2S ◦ Structure application; gas types CH4, C3H8; gas CO • EU type-examination certificate/type-examination certificate: DEKRA Testing and Certification GmbH: ◦ BVS 19 ATEX G 002 X ◦ PFG 19 G 004 X
Marking	• I M1 Ex ia da I Ma • II2G Ex ia db eb IIC T4 Gb • II2G Ex ia db IIC T4 Gb

Features	
Gas connections	Rectus NW 2.7 quick-release coupling
Display	TFT display, 380 × 224 pixels, size 56 x 33 mm
Buzzer	• frequency: 2.4 kHz • volume: 80 dB (A) / 30 cm
Signal light	red
Pump	diaphragm pump • vacuum: > 150 mbar • volume flow: > 10 l/h • pump error (F100): ≤ 5 l/h
Interface	USB 2.0 • docking station PM 5 or PM 5-T required
Memory	8 MB
Control	membrane keypad
Sensors	PM 580/550/500: • – IR for flammable gases (CH4, C3H8) optional: • IR for CO2 • EC for O2, CO, H2S PM 580 plus: • SC for flammable gases (CH4, C3H8) PM 400 • CC for flammable gases (CH4, C3H8, C9H20, C2H2, H2, JFuel) optional: • IR for CO2 • EC for O2, CO
Filter	can be changed: • hydrophobic filter • dust filter

Operating conditions	
Operating temperature	-20 – 40 ºC (-4 to 104 °F)
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Atmospheric pressure	700 – 1,200 hPa • pressure compensation for IR sensor
Pressure at gas inlet	max. 30 hPa (millibar)
Protection rating	IP65

Storage conditions	
Storage temperature	• devices without an EC sensor: -25 – 60 ºC (-13 to 140 °F) • devices with an EC sensor: -25 – 40 ºC (-4 to 104 °F)
Humidity	5 – 95% r.h., non-condensing
Atmospheric pressure	700 – 1,200 hPa

Power supply	
Power supply	3 cells, type Mignon AA, optionally: • disposable batteries: alkaline • rechargeable batteries: NiMH 2500 mAh alternatively: • PM 5 battery pack
Operating time, typical	at 25 °C (77 °F) depending on the product variant and application • PM 580/550/500, Warning application: 16 h • PM 580/550, Measuring application: 11 h • PM 580, Structure application: 8 h • PM 400, Warning application: 11 h • PM 400 with IR for CO2, Warning application: 9 h the times apply only when no alarm is triggered during operation.
Battery voltage	• NiMH: 3 × 1.2 V • alkaline: 3 × 1.5 V
Charging time	approx. 5 h (fully charged) at 2500 mAh
Charging temperature	0 – 35 °C (32 to 95 °F)
Charging voltage	12 VDC
Charging current	max. 300 mA
Charger	• AC/DC adapter M4 • vehicle cable M4

Data transmission	
Communication	USB 2.0

Gas types	
Default	CH4
Optional	PM 580/550/500: C3H8 PM 400: C3H8, C9H20, C2H2, H2, JFuel

Sensors

Note:
When using probes, the specified response times are longer.

Note for EC sensors:
At temperatures below 0 °C (32 °F) the specified response times and decay times may be longer.

Methane CH4, propane C3H8 (Warning application)	
Type	infrared sensor (IR)
Use	PM 580/550/500
Measuring range	0 – 100% LEL • CH4: 0 – 4.40% vol. (adjustable 4.00 – 5.00% vol.) • C3H8: 0 – 1.70% vol. (adjustable 1.50 – 2.10% vol.)
Resolution	• CH4: 1% LEL or 0.05% vol. • C3H8: 1% LEL or 0.02% vol.
Response times	• CH4: t50 < 13 s t90 < 25 s • C3H8: t50 < 15 s t90 < 28 s
Warm-up time	< 120 s
Temperature range	-20 – 40 ºC (-4 to 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	all hydrocarbons
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Lifetime	24 months (60 months expected)
Test gases	• zero point: clean air • CH4: 2.20% vol. • C3H8: 1.00% vol.
Humidity gas/test gas	5 – 95% r.h., non-condensing • short term: 0% r.h. • error: ±9% of the end of measuring range
Pressure	700 – 1,200 hPa • error: ±2% of the end of measuring range

Methane CH4, propane C3H8 (Measuring application)	
Type	infrared sensor (IR)
Use	PM 580/550
Measuring range	0.0 – 100% vol.
Resolution	• 0 – 9.9% vol.: 0.1% vol. • 10 – 100% vol.: 1% vol.
Response times	• CH4: t50 < 13 s t90 < 23 s • C3H8: t50 < 15 s t90 < 28 s
Warm-up time	< 120 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	• CH4: ◦ to 4.4% vol.: ±10% of measured value (linearity), at least ±0.2% vol. ◦ 4.4% vol. – 9.9% vol.: ±10% of measured value (linearity), at least ±0.5% vol. ◦ 10% vol. – 100% vol.: ±3% of measured value (linearity), at least ±2% vol. • C3H8 ◦ to 1.7% vol.: ±10% of measured value (linearity), at least ±0.2% vol. ◦ 1.7% vol. – 100% vol.: ±5% of measured value (linearity), at least ±0.5% vol.
Interference	all hydrocarbons
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Lifetime	24 months (60 months expected)
Test gases	• zero point: clean air • CH4: 100% vol. • C3H8: 100% vol. setting ranges: • CH4: 50 – 100% vol. • C3H8: 50 – 100% vol.

Methane CH4 (Structure application)	
Type	infrared sensor (IR)
Use	PM 580
Measuring range	0 – 100% vol.
Resolution	• 0.00 – 4.40% vol.: 0.05% vol. • 4.5 – 9.9% vol.: 0.1% vol. • 10 – 100% vol.: 1% vol.
Response times	t50 < 13 s t90 < 23 s
Warm-up time	< 120 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	±3% of measured value (linearity)
Interference	all hydrocarbons
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Lifetime	24 months (60 months expected)
Test gases	• zero point: clean air • CH4: 100% vol. setting ranges: • CH4: 50 – 100% vol.

Propane C3H8 (Structure application)	
Type	infrared sensor (IR)
Use	PM 580
Measuring range	0 – 1.70% vol.
Resolution	0.02% vol.
Response times	t50 < 15 s t90 < 28 s
Warm-up time	< 120 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	±5% of measured value (linearity)
Interference	all hydrocarbons
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Lifetime	24 months (60 months expected)
Test gases	• zero point: clean air • C3H8: 1.00% vol.

Carbon dioxide CO2 (Warning application)	
Type	infrared sensor (IR)
Use	PM 580/550/500/400
Measuring range	0 – 5.00% vol.
Indication range	-0.50 – 5.00% vol.
Resolution	0.02% vol.
Response times	t50 ≤ 15 s t90 ≤ 30 s
Decay times	t10 ≤ 23 s t50 ≤ 13 s
Warm-up time	< 120 s
Stabilisation time	≤ 80 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	• ±3% of measured value (linearity), at least ±0.04% vol. • ±0.04% vol. (long-term stability) as per EN 45544
Drift	≤ 0.05% vol. per month
Zero point deviation	0.04% vol.
Interference	none
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h. • error: ≤ 5% of measured value, at least ±0.04% vol.
Lifetime	24 months (60 months expected)
Test gases	• zero point: clean air ◦ use a CO2 filter! • sensitivity: 2.00% vol. CO2 setting ranges: • CO2: 1.00 – 2.50% vol. humidity: short-term 0% r.h.
Pressure	700 – 1,200 hPa • error: ≤ 5% of measured value, at least ±0.04% vol.

Methane CH4, propane C3H8 (Structure application)	
Type	gas-sensitive semiconductor (SC)
Use	PM 580
Measuring range	• CH4: 0 – 4000 ppm for LEL 4.40% vol. • C3H8: 0 – 1500 ppm for LEL 1.70% vol.
Resolution	1/2/20/200 ppm
Response times	• CH4: 100 ppm: t50 < 7 s t90 < 10 s 1000 ppm: t50 < 5 s t90 < 8 s • C3H8: 3000 ppm: t50 < 8 s t90 < 11 s when using the SPE Autoflow: the response times can be extended by up to 4 s as additional volume must be passed through (test gas hose, conditioner).
Warm-up time	< 120 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	for measurement values > 100 ppm under the same ambient conditions: • CH4: ±20% of measured value (linearity) • C3H8: ±20% of measured value (linearity)
Interference	• all hydrocarbons • H2 • water vapour
Lifetime	12 months (60 months expected)
Test gases	use the conditioner for all test gases! • zero point: clean air • CH4: 1000 ppm in synth. air • C3H8: 0.3 ppm in synth. air setting ranges: • CH4: 100 – 1000 ppm • C3H8: 100 – 3000 ppm

Methane CH4, propane C3H8, nonane C9H20, acetylene C2H2, hydrogen H2, JFuel (kerosene)	
Type	catalytic combustion sensor (CC)
Use	PM 400
Measuring range	0 – 100% LEL • CH4: 0 – 4.40% vol. (adjustable 4.00 – 5.00% vol.) • C3H8: 0 – 1.70% vol. (adjustable 1.50 – 2.10% vol.) • C9H20: 0 – 0.70% vol. • C2H2: 0 – 2.30% vol. • H2: 0 – 4.00% vol. • JFuel: 0 – 0.70% vol.
Resolution	• CH4: 1% LEL or 0.05% vol. • C3H8: 1% LEL or 0.02% vol. • C9H20: 2% LEL or 0.02% vol. • C2H2: 2% LEL or 0.05% vol. • H2: 1% LEL or 0.05% vol. • JFuel: 2% LEL or 0.02% vol.
Response times	• CH4: t50 < 7 s t90 < 13 s • C3H8: t50 < 7 s t90 < 13 s • C9H20: t50 < 23 s t90 < 3 min • C2H2: t50 < 6 s t90 < 10 s • H2: t50 < 6 s t90 < 11 s • JFuel: t50 < 15 s t90 < 60 s
Warm-up time	< 120 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	according to EN 60079-29-1 • CH4: ±1% LEL (short-term stability) ±4% LEL (long-term stability) • C3H8: ±2% LEL (short-term stability) ±2% LEL (long-term stability) • C9H20: ±2% LEL (short-term stability) ±8% LEL (long-term stability) • C2H2: ±1% LEL (short-term stability) ±4% LEL (long-term stability) • H2: ±1% LEL (short-term stability) ±2% LEL (long-term stability) • JFuel: ±2% LEL (short-term stability) ±8% LEL (long-term stability) when using a substitute test gas: • C9H20: ±30% of the measured value • JFuel: ±30% of the measured value
Interference	all flammable gases
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Lifetime	24 months (60 months expected)

Test gases	• zero point: clean air • CH4: 2.20% vol. in synth. air • C3H8: 1.00% vol. in synth. air • C9H20: 0.22% vol. in synth. air (substitute test gas 0.30% vol. C3H8 in synth. air) • C2H2: 1.00% vol. in synth. air • H2: 2.00% vol. in synth. air • JFuel: 0.32% vol. in synth. air (substitute test gas 0.30% vol. C3H8 in synth. air) setting ranges: • CH4: 1.00 – 3.50% vol. • C3H8: 0.50 – 1.30% vol. • C9H20: 0.20 – 0.50% vol. • C2H2: 0.50 – 1.80% vol. • H2: 1.00 – 3.20% vol. • JFuel: 0.20 – 0.50% vol.
Humidity gas/test gas	5 – 95% r.h., non-condensing • short term: 0% r.h. • error: ±5% of the end of measuring range
Pressure	700 – 1,200 hPa error: • CH4: 800 – 1200 hPa (millibar) ±3% of the end of measuring range 700 – 1,200 hPa ±4% of the end of measuring range • C3H8: 800 – 1200 hPa (millibar) ±2% of the end of measuring range 700 – 1,200 hPa ±2% of the end of measuring range

Oxygen O2	
Type	electrochemical sensor (EC)
Use	PM 580/550/500/400
Measuring range	0 – 25.0% vol.
Indication range	-3 – 25.0% vol.
Resolution	0.1% vol.
Response times	t20 < 10 s t90 < 32 s
Warm-up time	< 2 min
Stabilisation time	< 90 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Drift	≤ 3% within 3 months
Interference	none
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Lifetime	24 months (60 months expected)
Test gases	• zero point: clean air • O2: 0.0% vol. setting ranges: • O2: 0.0 – 1.0% vol.
Humidity gas/test gas	5 – 95% r.h., non-condensing • short term: 0% r.h. • error: ±3% of the end of measuring range
Pressure	700 – 1,200 hPa • error: ±3% of the end of measuring range

Carbon monoxide CO	
Type	electrochemical sensor (EC)
Use	PM 580/550/500/400
Measuring range	0 – 300 ppm
Indication range	-30 – 300 ppm
Resolution	1 ppm
Response times	t50 ≤ 12 s t90 ≤ 26 s
Decay times	t10 ≤ 27 s t50 ≤ 14 s
Warm-up time	2 min
Stabilisation time	≤ 2 min
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	• ±3% of measured value (linearity), at least ±3 ppm (±3 digits) • ±5 ppm (long-term stability) as per EN 45544
Drift	< 10% within 6 months
Zero point deviation	±3 ppm
Interference	at 20 ºC • 400 ppm H2: < 70 ppm • 20 ppm H2S: < 0.1 ppm • 100 ppm C2H2: < 200 ppm • 400 ppm C2H4: < 100 ppm • 100 ppm NO: < 50 ppm
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h. • error: ≤ 5% of measured value, at least ±3 ppm (±3 digits)
Lifetime	24 months (36 months expected)
Test gases	• zero point: clean air • sensitivity: 40 ppm CO setting ranges: • CO: 10 – 50 ppm humidity: short-term 0% r.h.
Pressure	700 – 1,200 hPa • error: ≤ 6% of measured value, at least ±3 ppm (±3 digits)

Hydrogen sulphide H2S	
Type	electrochemical sensor (EC)
Use	PM 580/550/500
Measuring range	0 – 50.0 ppm
Indication range	-10 – 100 ppm
Resolution	0.5 ppm
Response times	t50 ≤ 12 s t90 ≤ 29 s
Decay times	t10 ≤ 28 s t50 ≤ 14 s
Warm-up time	< 120 s
Stabilisation time	≤ 2 min
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	• ±3% of measured value (linearity), at least ±3 ppm (±6 digits) • ±2 ppm (long-term stability) as per EN 45544
Drift	≤ 15% within 6 months
Zero point deviation	±2 ppm
Interference	at 25 °C (77 °F) • 400 ppm H2: < 1 ppm H2S • 400 ppm CO: < 1.5 ppm H2S • 100 ppm C2H2: < 2 ppm H2S • 400 ppm C2H4: < 0.1 ppm H2S • 50 ppm NO: < 12 ppm H2S • 10 ppm NO2: < -25 ppm H2S
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h. • error: ≤ 5% of measured value, at least ±2 ppm (±4 digits)
Lifetime	24 months (36 months expected)
Test gases	• zero point: clean air • sensitivity: 40 ppm H2S setting ranges: • H2S: 10.0 – 50.0 ppm humidity: short-term 0% r.h.
Pressure	700 – 1,200 hPa • error: ≤ 4% of measured value, at least ±2 ppm (±4 digits)

COSH: Carbon monoxide CO and hydrogen sulphide H2S	
Type	electrochemical sensor (EC)
Use	PM 580/550/500
Measuring range	• CO: 0 – 300 ppm • H2S: 0 – 50.0 ppm
Indication range	• CO: -30 – 300 ppm • H2S: -10 – 100 ppm
Resolution	• CO: 1 ppm • H2S: 0.5 ppm
Response times	• CO: t50 ≤ 11 s t90 ≤ 28 s • H2S: t50 ≤ 11 s t90 ≤ 27 s
Decay times	• CO: t10 ≤ 28 s t50 ≤ 14 s • H2S: t10 ≤ 27 s t50 ≤ 13 s
Warm-up time	< 120 s
Stabilisation time	≤ 2 min
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	• ±3% of measured value (linearity), at least ±6 ppm (±6 digits) • ±5 ppm (long-term stability) as per EN 45544
Drift	≤ 10% within 6 months
Zero point deviation	• CO: ±2 ppm • H2S: ±2 ppm
Interference	at 20 ºC • 400 ppm H2: < 55 ppm CO, < 1 ppm H2S • 400 ppm CO: < 2 ppm H2S • 40 ppm H2S: ≤ 4 ppm CO • 100 ppm C2H2: < 200 ppm CO, < 2 ppm H2S • 50 ppm NO: < 50 ppm CO, < 10 ppm H2S
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h. error: ◦ CO: ≤ 5% of measured value, at least ±7 ppm (±7 digits) ◦ H2S: ≤ 5% of measured value, at least ±2 ppm (±4 digits)
Lifetime	24 months (36 months expected)
Test gases	• zero point: clean air • sensitivity: 40 ppm CO 40 ppm H2S setting ranges: • CO: 10 – 50 ppm • H2S: 10.0 – 50.0 ppm humidity: short-term 0% r.h.
Pressure	700 – 1,200 hPa error: • CO: ≤ 5% of measured value, at least ±3 ppm (±3 digits) • H2S: ≤ 5% of measured value, at least ±2 ppm (±4 digits)

Subject to technical changes.