



EX-TEC[®] PM

580/550/500/400 (CSA)

Series

Type/model	CSA:
	• PM 400: 050 01
	• PM 400 CO2: 050 02
	• PM 500: 050 11
	• PM 550: 050 21
	• PM 580: 050 31

Certificates

Certificate	explosion protection test
	• EU type examination certificate: TÜV 17 ATEX 171969 X
	• IECEx: IECEx TUN 17.0027 X
	• CSA: CSA19CA80006793X
	functional safety test
	• for:
	◦ Warning application; gas types CH ₄ , C ₃ H ₈ , C ₉ H ₂₀ (PM 400 only); gas CO ₂ , O ₂ , CO, H ₂ S
	◦ Structure application; gas types CH ₄ , C ₃ H ₈ ; gas CO

Marking	PM 580/550/500 and PM 400 with IR for CO ₂ :
	• Ex ia db IIC T3 Gb
	• class I, Zone 1, AEx ia db IIC T3 Gb
	• I.S. Class I, Div. 2, Group A,B,C,D,T3
	PM 400:
	• Ex ia da IIC T3 Ga
	• class I, Zone 0, AEx ia da IIC T3 Ga
	• I.S. Class I, Div. 1, Group A,B,C,D,T3

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 <ul style="list-style-type: none"> • approx. 500 g (14.2 oz) • approx. 523 g (14.8 oz) incl. belt clip
Material	housing: polycarbonate, thermoplastic polyurethane

Features

Gas connections	Rectus NW 2.7 quick-release coupling
Display	TFT display, 380 × 224 pixels, size 56 × 33 mm (2.2 × 1.3 inch)
Buzzer	<ul style="list-style-type: none"> • frequency: 2.4 kHz • volume: 80 dB (A) / 30 cm (11.8 inch)
Signal light	red
Pump	diaphragm pump <ul style="list-style-type: none"> • vacuum: > 150 mbar • volume flow: > 10 l/h • pump error (F100): ≤ 5 l/h
Interface	USB 2.0 <ul style="list-style-type: none"> • docking station PM 5 or PM 5-T required
Memory	8 MB
Operation	membrane keypad
Sensors	PM 580/550/500: <ul style="list-style-type: none"> • IR for flammable gases (CH₄, C₃H₈) optional: <ul style="list-style-type: none"> • IR for CO₂ • EC for O₂, CO, H₂S PM 580 plus: <ul style="list-style-type: none"> • SC for flammable gases (CH₄, C₃H₈) PM 400 <ul style="list-style-type: none"> • CC for flammable gases (CH₄, C₃H₈, C₉H₂₀, C₂H₂, H₂, JFuel) optional: <ul style="list-style-type: none"> • IR for CO₂ • EC for O₂, CO
Filter	can be changed: <ul style="list-style-type: none"> • hydrophobic filter • dust filter

Operating conditions*

Operating temperature	-20 – 40 °C (-4 to 104 °F)
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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 input	max. 30 hPa
Protection rating	IP65

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

Storage conditions

Storage temperature	<ul style="list-style-type: none"> • devices without an EC sensor: -25 – 60 °C (-13 to 140 °F) • devices with an EC sensor: -25 – 40 °C (-13 to 104 °F)
Humidity	5 – 95% r.h., non-condensing
Atmospheric pressure	700 – 1,200 hPa

Power supply

Power supply	PM 5 battery pack
Operating time, typical	<p>at 25 °C (77 °F) depending on the product variant and application</p> <ul style="list-style-type: none"> • 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 <p>the times apply only when no alarm is triggered during operation.</p>
Battery voltage	NiMH: 3 × 1.2 V
Charging time	approx. 5 h (fully charged) at 2500 mAh
Charging temperature	0 – 35 °C (32 to 95 °F)
Charging voltage	12 V DC
Charging current	max. 300 mA
Charger	M4 AC/DC adapter

Data transmission

Communication	USB 2.0
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Gas types

Standard	CH ₄
Optional	PM 580/550/500: C ₃ H ₈ PM 400: C ₃ H ₈ , C ₉ H ₂₀ , C ₂ H ₂ , H ₂ , 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 <ul style="list-style-type: none"> • CH₄: 0 – 4.40% vol. (adjustable 4.00 – 5.00% vol.) • C₃H₈: 0 – 1.70% vol. (adjustable 1.50 – 2.10% vol.) 		
Resolution	<ul style="list-style-type: none"> • CH₄: 1% LEL or 0.05% vol. • C₃H₈: 1% LEL or 0.02% vol. 		
Response times	<ul style="list-style-type: none"> • CH₄: t₅₀ < 13 s • C₃H₈: t₅₀ < 15 s 	<ul style="list-style-type: none"> t₉₀ < 25 s t₉₀ < 28 s 	
Warm-up time	< 120 s		
Temperature range	-20 – 40 °C (-4 to 104 °F)		
Measuring error	according to EN 60079-29-1 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • short term: 0% r.h. 		
Service life	24 months (60 months expected)		
Test gases	<ul style="list-style-type: none"> • zero point: clean air • CH₄: 2.20% vol. • C₃H₈: 1.00% vol. 		
Humidity gas/test gas	5 – 95% r.h., non-condensing <ul style="list-style-type: none"> • short term: 0% r.h. • error: ±9% of end of measuring range 		
Pressure	700 – 1,200 hPa <ul style="list-style-type: none"> • error: ±2% of 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	<ul style="list-style-type: none"> • 0 – 9.9% vol.: 0.1% vol. • 10 – 100% vol.: 1% vol.
Response times	<ul style="list-style-type: none"> • CH₄: t₅₀ < 13 s t₉₀ < 23 s • C₃H₈: t₅₀ < 15 s t₉₀ < 28 s
Warm-up time	< 120 s
Temperature range	-20 – 40 °C (-4 to 104 °F)
Measuring error	<ul style="list-style-type: none"> • CH₄: <ul style="list-style-type: none"> ◦ up to 4.4% vol.: ±10% of measurement value (linearity), at least ±0.2% vol. ◦ 4.4% vol. – 9.9% vol.: ±10% of measurement value (linearity), at least ±0.5% vol. ◦ 10% vol – 100% vol.: ±3% of measurement value (linearity), at least ±2% vol. • C₃H₈ <ul style="list-style-type: none"> ◦ up to 1.7% vol.: ±10% of measurement value (linearity), at least ±0.2% vol. ◦ 1.7% vol. – 100% vol.: ±5% of measurement value (linearity), at least ±0.5% vol.
Interference	all hydrocarbons
Humidity	5 – 95% r.h., non-condensing <ul style="list-style-type: none"> • short term: 0% r.h.
Service life	24 months (60 months expected)
Test gases	<ul style="list-style-type: none"> • zero point: clean air • CH₄: 100% vol. • C₃H₈: 100% vol. setting ranges: <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 0.00 – 4.40% vol.: 0.05% vol. • 4.5 – 9.9% vol.: 0.1% vol. • 10 – 100% vol.: 1% vol. 	
Response times	t ₅₀ < 13 s	t ₉₀ < 23 s
Warm-up time	< 120 s	
Temperature range	-20 – 40 °C (-4 to 104 °F)	
Measuring error	±3% of measurement value (linearity)	
Interference	all hydrocarbons	
Humidity	5 – 95% r.h., non-condensing <ul style="list-style-type: none"> • short term: 0% r.h. 	
Service life	24 months (60 months expected)	
Test gases	<ul style="list-style-type: none"> • zero point: clean air • CH₄: 100% vol. setting ranges: <ul style="list-style-type: none"> • 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	t ₅₀ < 15 s	t ₉₀ < 28 s
Warm-up time	< 120 s	
Temperature range	-20 – 40 °C (-4 to 104 °F)	
Measuring error	±5% of measurement value (linearity)	
Interference	all hydrocarbons	
Humidity	5 – 95% r.h., non-condensing <ul style="list-style-type: none"> • short term: 0% r.h. 	
Service life	24 months (60 months expected)	
Test gases	<ul style="list-style-type: none"> • 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	t ₅₀ ≤ 15 s	t ₉₀ ≤ 30 s
Decay times	t ₁₀ ≤ 23 s	t ₅₀ ≤ 13 s
Warm-up time	< 120 s	
Stabilisation time	≤ 80 s	
Temperature range	-20 – 40 °C (-4 to 104 °F)	
Measuring error	<ul style="list-style-type: none"> • ±3% of measurement 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 <ul style="list-style-type: none"> • short term: 0% r.h. • error: ≤ 5% of measurement value, at least ±0.04% vol. 	
Service life	24 months (60 months expected)	
Test gases	<ul style="list-style-type: none"> • zero point: clean air <ul style="list-style-type: none"> ◦ use a CO₂ filter! • sensitivity: 2.00% vol. CO₂ setting ranges: <ul style="list-style-type: none"> • CO₂: 1.00 – 2.50% vol. humidity: short-term 0% r.h. 	
Pressure	700 – 1,200 hPa <ul style="list-style-type: none"> • error: ≤ 5% of measurement value, at least ±0.04% vol. 	

Methane CH₄, propane C₃H₈ (Structure application)

Type	gas-sensitive semiconductor (SC)
Use	PM 580
Measuring range	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • CH₄: 100 ppm: t₅₀ < 7 s t₉₀ < 10 s 1,000 ppm: t₅₀ < 5 s t₉₀ < 8 s • C₃H₈: 3,000 ppm: t₅₀ < 8 s t₉₀ < 11 s <p>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).</p>
Warm-up time	< 120 s
Temperature range	-20 – 40 °C (-4 to 104 °F)
Measuring error	for measurement values > 100 ppm under the same ambient conditions: <ul style="list-style-type: none"> • CH₄: ±20% of measurement value (linearity) • C₃H₈: ±20% of measurement value (linearity)
Interference	<ul style="list-style-type: none"> • all hydrocarbons • H₂ • water vapour
Service life	12 months (60 months expected)
Test gases	<p>use the conditioner for all test gases!</p> <ul style="list-style-type: none"> • zero point: clean air • CH₄: 1,000 ppm in synth. air • C₃H₈: 0.3% vol. in synth. air <p>setting ranges:</p> <ul style="list-style-type: none"> • 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		
	• CH ₄ :	0 – 4.40% vol.	(adjustable 4.00 – 5.00% vol.)
	• C ₃ H ₈ :	0 – 1.70% vol.	(adjustable 1.50 – 2.10% vol.)
	• C ₉ H ₂₀ :	0 – 0.70% vol.	
	• C ₂ H ₂ :	0 – 2.30% vol.	
	• H ₂ :	0 – 4.00% vol.	
	• JFuel:	0 – 0.70% vol.	
Resolution	• CH ₄ :	1% LEL or 0.05% vol.	
	• C ₃ H ₈ :	1% LEL or 0.02% vol.	
	• C ₉ H ₂₀ :	2% LEL or 0.02% vol.	
	• C ₂ H ₂ :	2% LEL or 0.05% vol.	
	• H ₂ :	1% LEL or 0.05% vol.	
	• JFuel:	2% LEL or 0.02% vol.	
Response times	• CH ₄ :	t ₅₀ < 7 s	t ₉₀ < 13 s
	• C ₃ H ₈ :	t ₅₀ < 7 s	t ₉₀ < 13 s
	• C ₉ H ₂₀ :::	t ₅₀ < 23 s	t ₉₀ < 3 min
	• C ₂ H ₂ :	t ₅₀ < 6 s	t ₉₀ < 10 s
	• H ₂ :	t ₅₀ < 6 s	t ₉₀ < 11 s
	• JFuel:	t ₅₀ < 15 s	t ₉₀ < 60 s
Warm-up time	< 120 s		
Temperature range	-20 – 40 °C (-4 to 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 :	±2% LEL (short-term stability) ±2% LEL (long-term stability)	
	• C ₉ H ₂₀ :	±2% LEL (short-term stability) ±8% LEL (long-term stability)	
	• C ₂ H ₂ :	±1% LEL (short-term stability) ±4% LEL (long-term stability)	
	• H ₂ :	±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:	
	• C ₉ H ₂₀ :	±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.	
Service life	24 months (60 months expected)		

Test gases	<ul style="list-style-type: none"> • zero point: clean air • CH₄: 2.20% vol. in synth. air • C₃H₈: 1.00% vol. in synth. air • C₉H₂₀: 0.28% 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) <p>setting ranges:</p> <ul style="list-style-type: none"> • 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	<p>5 – 95% r.h., non-condensing</p> <ul style="list-style-type: none"> • short term: 0% r.h. • error: ±5% of end of measuring range
Pressure	<p>700 – 1,200 hPa</p> <p>error:</p> <ul style="list-style-type: none"> • CH₄: <ul style="list-style-type: none"> 800 – 1,200 hPa ±3% of the end of measuring range 700 – 1,200 hPa ±4% of the end of measuring range • C₃H₈: <ul style="list-style-type: none"> 800 – 1,200 hPa ±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	t ₂₀ < 10 s	t ₉₀ < 32 s
Warm-up time	< 2 min	
Stabilisation time	< 90 s	
Temperature range	-20 – 40 °C (-4 to 104 °F)	
Measuring error	<ul style="list-style-type: none"> • ±2% of measurement value (linearity), at least ±0.2% vol. (±2 digits) • ±0.2% vol. (long-term stability) as per EN 50104 	
Drift	≤ 3% within 3 months	
Interference	none	
Humidity	5 – 95% r.h., non-condensing <ul style="list-style-type: none"> • short term: 0% r.h. 	
Service life	24 months (60 months expected)	
Test gases	<ul style="list-style-type: none"> • zero point: clean air • O₂: 0.0% vol. setting ranges: <ul style="list-style-type: none"> • O₂: 0.0 – 1.0% vol. 	
Humidity gas/test gas	5 – 95% r.h., non-condensing <ul style="list-style-type: none"> • short term: 0% r.h. • error: ±3% of end of measuring range 	
Pressure	700 – 1,200 hPa <ul style="list-style-type: none"> • error: ±3% of 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	t ₅₀ ≤ 12 s	t ₉₀ ≤ 25 s
Decay times	t ₁₀ ≤ 27 s	t ₅₀ ≤ 14 s
Warm-up time	2 min	
Stabilisation time	≤ 2 min	
Temperature range	-20 – 40 °C (-4 to 104 °F)	
Measuring error	<ul style="list-style-type: none"> • ±3% of measurement value (linearity), at least ±3 ppm (±3 digits) additional influences: <ul style="list-style-type: none"> ◦ humidity: ≤5% of measurement value, at least ±3 ppm ◦ pressure: ≤6% of measurement value, at least ±3 ppm • ±5 ppm (long-term stability) as per EN 45544 	
Drift	< 10% within 6 months	
Zero point deviation	±3 ppm	
Interference	at 20 °C (68 °F) <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • short term: 0% r.h. 	
Service life	24 months (36 months expected)	
Test gases	<ul style="list-style-type: none"> • zero point: clean air • sensitivity: 40 ppm CO setting ranges: <ul style="list-style-type: none"> • CO: 10 – 50 ppm humidity: short-term 0% r.h. 	
Pressure	700 – 1,200 hPa	

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	t ₅₀ ≤ 12 s	t ₉₀ ≤ 29 s
Decay times	t ₁₀ ≤ 28 s	t ₅₀ ≤ 14 s
Warm-up time	< 120 s	
Stabilisation time	≤ 2 min	
Temperature range	-20 – 40 °C (-4 to 104 °F)	
Measuring error	<ul style="list-style-type: none"> • ±3% of measurement 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) <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • short term: 0% r.h. • error: ≤ 5% of measurement value, at least ±2 ppm (±4 digits) 	
Service life	24 months (36 months expected)	
Test gases	<ul style="list-style-type: none"> • zero point: clean air • sensitivity: 40 ppm H₂S setting ranges: <ul style="list-style-type: none"> • H₂S: 10,0 – 50,0 ppm humidity: short-term 0% r.h. 	
Pressure	700 – 1,200 hPa <ul style="list-style-type: none"> • error: ≤ 4% of measurement 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:	t ₅₀ ≤ 11 s	t ₉₀ ≤ 28 s
	• H2S:	t ₅₀ ≤ 11 s	t ₉₀ ≤ 27 s
Decay times	• CO:	t ₁₀ ≤ 28 s	t ₅₀ ≤ 14 s
	• H2S:	t ₁₀ ≤ 27 s	t ₅₀ ≤ 13 s
Warm-up time	< 120 s		
Stabilisation time	≤ 2 min		
Temperature range	-20 – 40 °C (-4 to 104 °F)		
Measuring error	<ul style="list-style-type: none"> • ±3% of measurement 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 °C (68 °F) <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • short term: 0% r.h. error: <ul style="list-style-type: none"> • CO: ≤ 5% of measurement value, at least ±7 ppm (±7 digits) • H2S: ≤ 5% of measurement value, at least ±2 ppm (±4 digits) 		
Service life	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 measurement value, at least ±3 ppm (±3 digits)	
	• H2S:	≤ 5% of measurement value, at least ±2 ppm (±4 digits)	