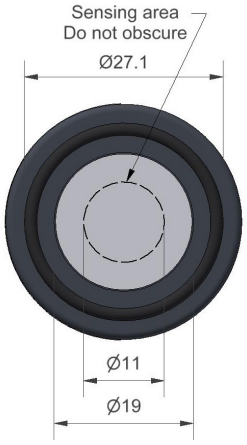
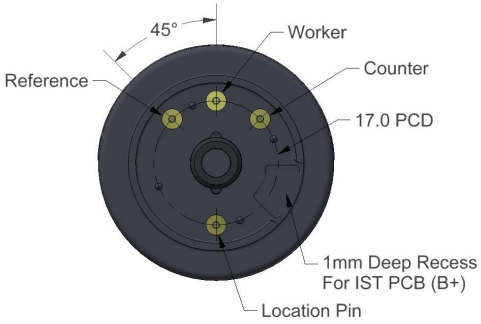
PH3-BE/PH3-BE+ Phosphine Sensor

The PH3-BE sensor is a PPM sensor that is designed for a broad variety of applications and instrumentation including portable gas detectors and fixed gas detection systems for industrial safety, environmental air quality and process control. This product is available in our standard format (PH3-BE) and with our patented Integrated Smart Technology (PH3-BE+) that has an IST board with a memory chip and temperature sensor integrated in the sensor. The + sensors store specific calibration, specification, and identification data on every sensor allowing plug and play operation. The on-board temperature sensor improves the accuracy and simplicity of temperature compensation algorithms.

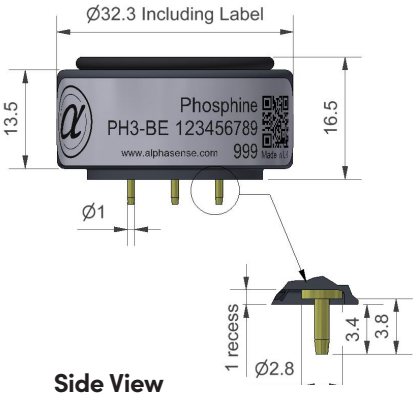
PH3-BE Phosphine Sensor – 3-Electrode



Top View

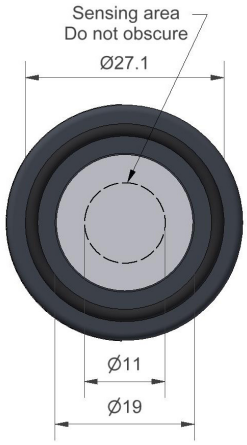


Bottom View

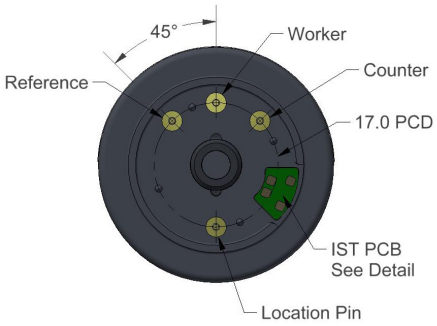


Side View

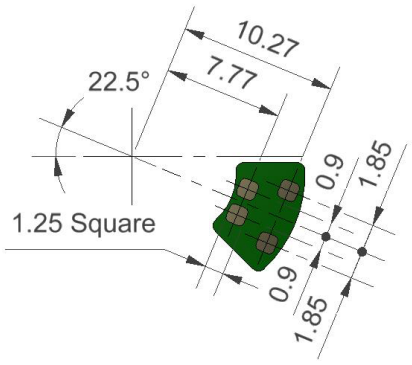
PH3-BE+ Phosphine Sensor – 3-Electrode (with Integrated Smart Technology)



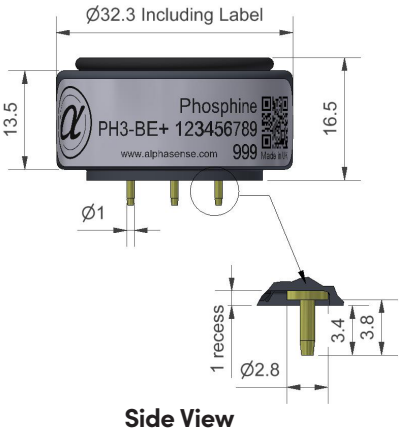
Top View



Bottom View



IST Board



Side View

Dimensions are in millimetres (± 0.15 mm).

T: +44 (0)1376 556700 **E:** sensors.alphasense@ametek.com **W:** www.alphasense.com

For further information on the performance of this sensor, on other sensors in the range or any other subject, please contact Alphasense Ltd. or visit our website at "www.alphasense.com".

Sensor Data

Performance	Sensitivity	nA/ppm in 800 PH_3		15 to 35
	Response time	t90 (s) from zero to 800 PH_3		< 30
	Zero current	ppm equivalent in zero air		< -6 to 20
	Resolution	RMS noise (ppm equivalent)		< 2
	Range	ppm PH_3 limit of performance warranty		2,000
	Linearity	ppm error at full scale, linear at zero, 800ppm PH_3		-50 to -350
	Overgas limit	maximum ppm for stable response to gas pulse		5,000
Lifetime	Zero drift	ppm equivalent change/year in lab air		< 1.5
	Sensitivity drift	% change/year in lab air, monthly test		< 4
	Operating life	months until 80% original signal (24-month warranted)		> 24
Environmental	Sensitivity @ -20°C	% (output @ -20°C/output @ 20°C) @ 800ppm PH_3		65 to 85
	Sensitivity @ 50°C	% (output @ 50°C/output @ 20°C) @ 800ppm PH_3		120 to 140
	Zero @ -20°C	ppm equivalent change from 20°C		< ± 20
	Zero @ 50°C	ppm equivalent change from 20°C		< ± 15
Cross Sensitivity	H_2S sensitivity	% measured gas @ 20ppm	H_2S	< 110
	NO_2 sensitivity	% measured gas @ 10ppm	NO_2	< -35
	Cl_2 sensitivity	% measured gas @ 10ppm	Cl_2	< -30
	NO sensitivity	% measured gas @ 50ppm	NO	< 10
	SO_2 sensitivity	% measured gas @ 20ppm	SO_2	< 25
	CO sensitivity	% measured gas @ 400ppm	CO	< 11
	H_2 sensitivity	% measured gas @ 400ppm	H_2	< 2
	C_2H_4 sensitivity	% measured gas @ 80ppm	C_2H_4	< 60
	NH_3 sensitivity	% measured gas @ 25ppm	NH_3	< 0.1
	CO_2 sensitivity	% measured gas @ 5%	CO_2	< 0.1
Key Specifications	Temperature range	°C		-20 to 50
	Pressure range	kPa		80 to 120
	Humidity range	% rh continuous		20 to 90
	Storage period	months @ 0 to 20°C (stored in original container)		6
	Load resistor	Ω (recommended)		10 to 33
	Bias voltage	mV above analogue ground		not required
	Weight	g		< 13

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Figure 1 Zero Temperature Dependence

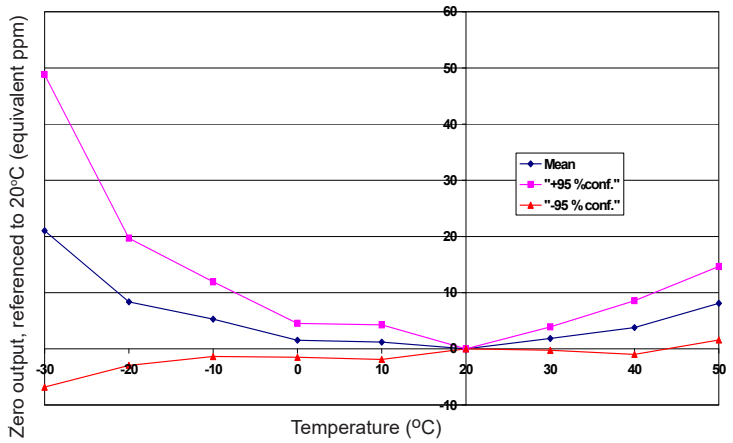
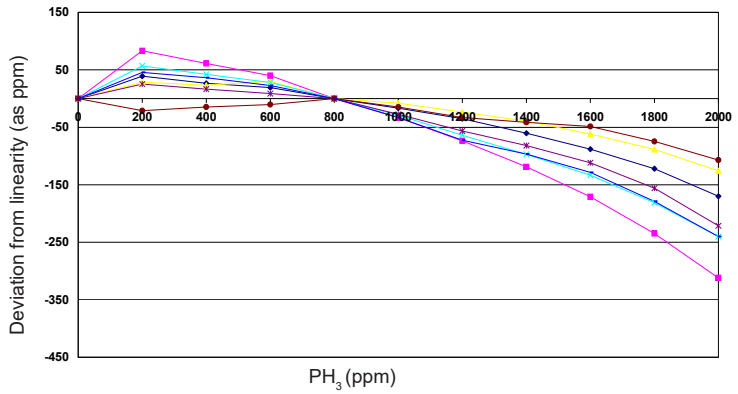


Figure 1 shows the variation in zero output caused by changes in temperature, expressed as ppm gas equivalent, referenced to zero at 20°C.

This data is taken from a typical batch of sensors. The mean and ± 95% confidence intervals are shown.

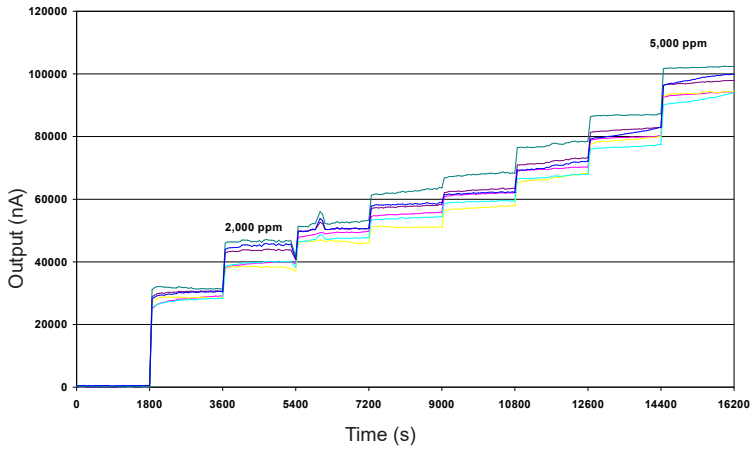
Figure 2 Deviation up to 2,000 ppm



Sensor linearity is repeatable between sensors, allowing for software correction if required.

Data is from a typical batch of sensors.

Figure 3 Overgas Linearity



Sensors respond rapidly and are stable even at 5,000ppm PH_3.

Sensors recover after short high concentration exposure without change to performance.

IST Board Data

Interface	Communication Bus	Compatible with the 400 kHz I²C protocol
	Max. Bus Speed	Up to 1 MHz
	Input Logic Levels	High (Recessive) < 2.3 V | Low (Dominant) < 0.2 V
	Absolute Max. Input Signal	3.6 V
Electrical	Supply Voltage Range	1.7 V to 3.6 V
	Supply current – Stand-By	< 5 µA
	Supply current – Operating	< 0.15 mA (temperature reading only) < 2.15 mA (temperature reading + memory reading/writing)
	Power Supply Conditioning	Built-In 100 nF decoupling capacitor
	ESD Protection	4 kV (human body model) - Enhanced ESD / Latch-Up protection
	Bus Pins Input Capacitance	15 pF max.
Performance	Operational Temperature	–40 °C to +85 °C
	Temperature Sensor Accuracy	±1°C (-0°C to +70°C)
	Memory Data Retention	> 200 years
	Memory Write Cycles	> 4,000,000
Data & Communication	Memory IC & I2C Address	M24128X-FCU | Device Address: R - 0xA0 / W – 0xA1
	Temperature IC & I2C Address	MAX31875R0TZS+T | Device Address: R - 0x90 / W – 0x91
	Product Data Start Address	0x0900
	Calibration Data Start Address	0x0B00
	User Data Area	0x0D00 – 0x18FF (3,072 Bytes)
	CRC Polynomial	0x 01 04C1 1DB7
	Digital Signature Algorithm	SHA-256

Factory-populated data

Product Data
- Data Format Version
- Customer (OEM) ID
- Product ID
- Type of Sensor / Target Gas
- Sensor Serial Number
- End of Storage Period Date
- Sensor Replacement Date
- Product Data Checksum
- Alphasense Digital Signature
- Customer Digital Signature

Calibration
- Calibration Data Units
- Zero (clean dry air) Output
- Calibration Span
- Calibration Output
- Sensitivity
- Calibration Date
- Calibration Data Checksum
- Calibration Data Signature

Sensor Specification
- Over-gas limit
- Concentration Range
- Temperature Range Low
- Temperature Range High
- Humidity Range Low
- Humidity Range High
- Pressure Range Low
- Pressure Range High
- Specification Checksum

15,000+ locations

Customer Specific
- Custom Parameters
- Re-Calibration Due Date
- Operational Limits:
- Low | High | STEL | TWA
- Next Bump Test Due Date
- User Data Area

NOTE: Tested with surrogate gas. All sensors are tested at ambient environmental conditions, with 10 ohm load resistor, unless otherwise stated. As applications of use are outside our control, the information provided is given without legal responsibility. Customers should test under their own conditions, to ensure that the sensors are suitable for their own requirements.

At the end of the product's life, do not dispose of any electronic sensor, component or instrument in the domestic waste, but contact the instrument manufacturer, Alphasense or its distributor for disposal instructions. NOTE: all sensors are tested at ambient environmental conditions unless otherwise stated. As applications of use are outside our control, the information provided is given without legal responsibility. Customers should test under their own conditions, to ensure that the sensors are suitable for their own requirements.

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