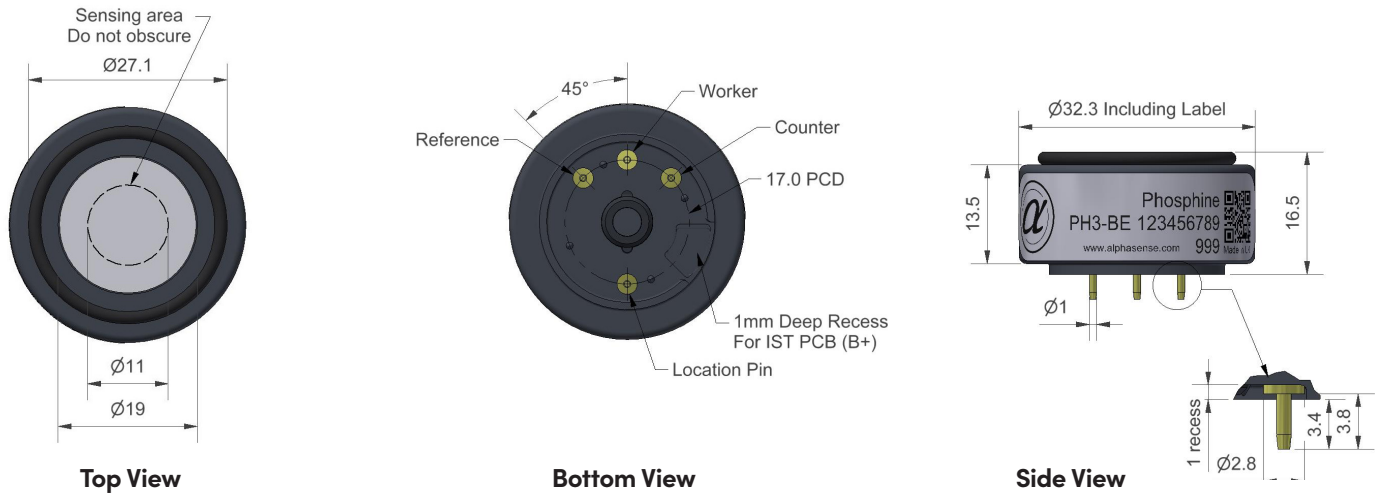


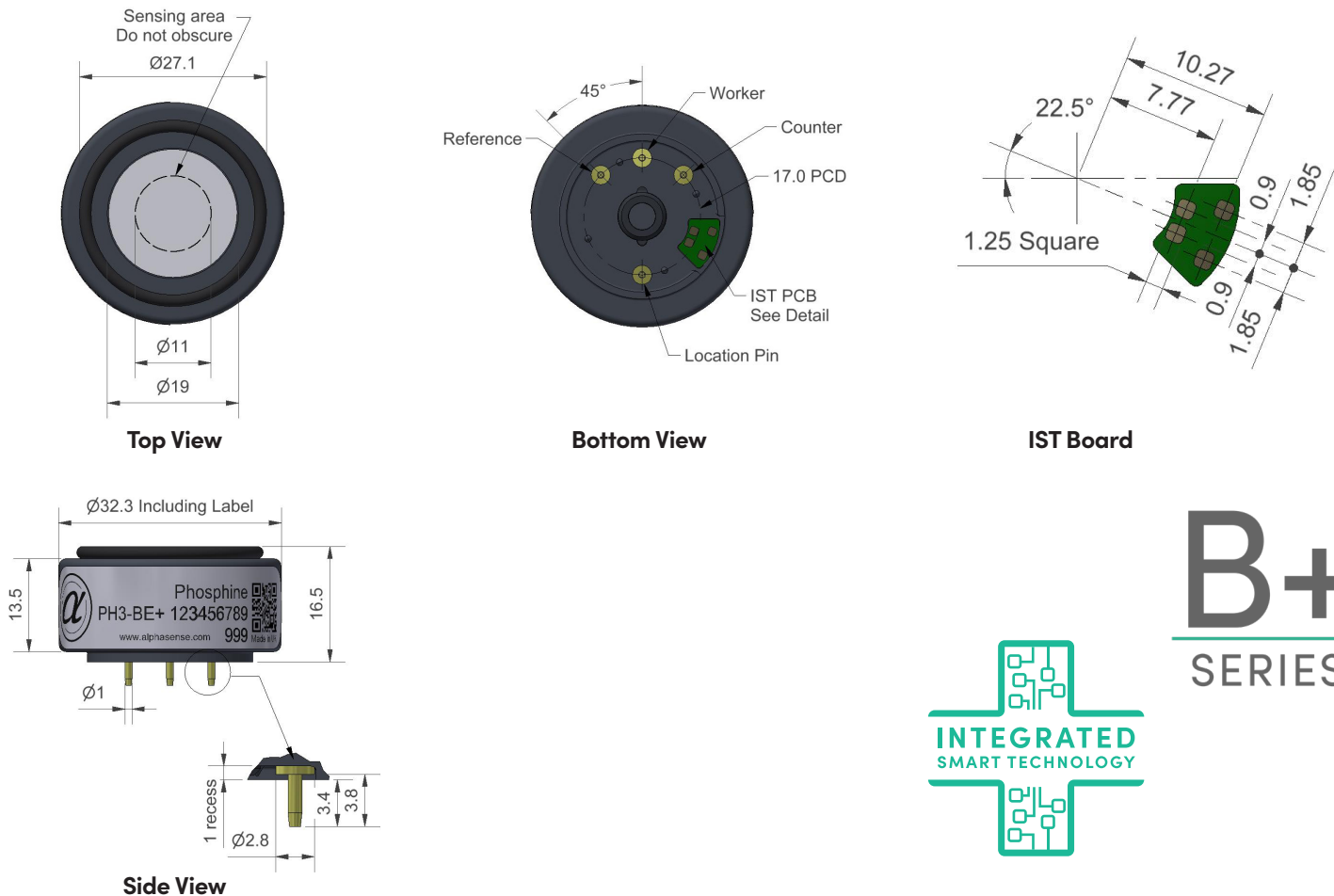
PH3-BE/PH3-BE+ Phosphine Sensor

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.

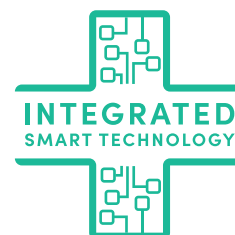
PH3-BE Phosphine Sensor – 3-Electrode



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



Dimensions are in millimetres (± 0.15 mm).



B+
SERIES

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 ₂ S sensitivity	% measured gas @ 20ppm	H ₂ S	< 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 ₂ H ₄ sensitivity	% measured gas @ 80ppm	C ₂ H 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

Figure 1 Zero Temperature Dependence

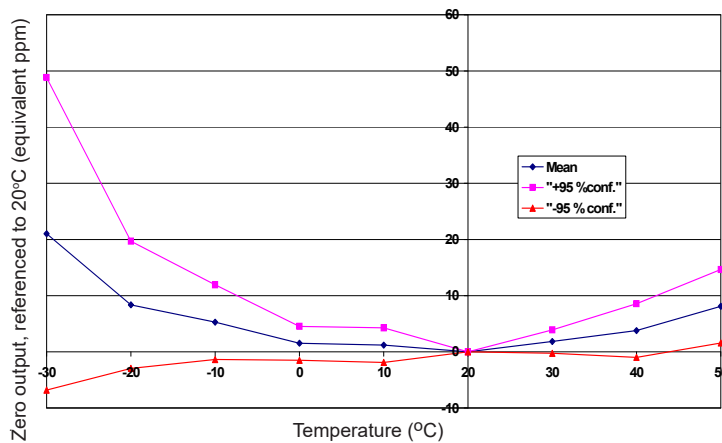
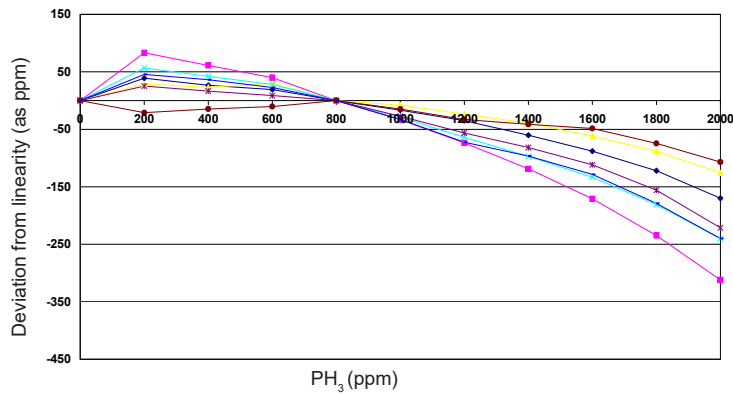


Figure 1 shows the variation in zero output caused by changes in temperature, expressed as ppm gas equivalent, referenced to zero at 20°C.

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

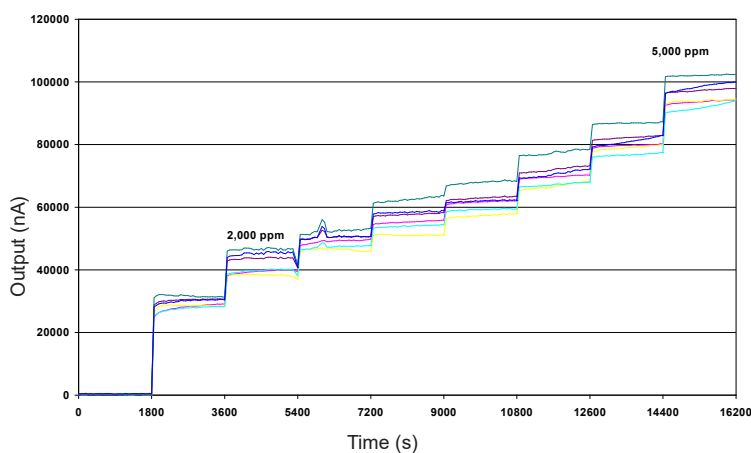
Figure 2 Deviation up to 2,000 ppm



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 I ² C 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.

In the interest of continued product improvement, we reserve the right to change design features and specifications without prior notification. The data contained in this document is for guidance only. Alphasense Ltd accepts no liability for any consequential losses, injury or damage resulting from the use of this document or the information contained within.(©ALPHASENSE LTD) Doc. Ref. PH3-BE/FEB24