

Data Sheet

# SERIES 47K GAS SENSOR

Remote Combustible Gas Detection



Supplied by

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# Series 47K Gas Sensor

## *Remote Combustible Gas Detection*

MSA remote sensors, Series 47K, are designed to detect potentially hazardous concentrations of flammable gas and vapour in air.

A cost effective range of sensors for detecting up to 100% LEL including Poison Resistant, Standard and High Temperature versions.

Series 47K sensors are available with either Ex d – 3/4" NPT or Ex e – M25 junction boxes.

A complete range of accessories for calibration, environmental protection, sampling and duct mounting makes it suitable for virtually all applications in combustible gas detection.

Series 47K sensors used in combination with MSA Controllers fully meet the requirements of ATEX Directive 94/9/EC, including performance, and being SIL 2 capable they can be used as part of a safety related system.

# Broad range of sensors

## Features & Benefits

- 0–100% LEL
- Ex e junction box with M25 cable gland thread
- Ex d junction box with 3/4" NPT cable gland thread
- Standard (ST), Poison Resistant (PRP) and High Temperature (HT) versions
- Suitable for use in safety related systems (ATEX 94/9/EC)
- 3 or 5 wire connection
- Stainless steel body
- Complete range of accessories
- Fast response time
- Excellent performance cost ratio
- Safety Integrity Level – SIL 2

## Installation & Operation

The number and location of sensors is important to achieve the most reliable detection of flammable gas or vapour. There are several factors to be considered before installing the sensor.

(See also EN 60079-29-2 "Guide for selection, installation, use and maintenance of apparatus for the detection and measurement of combustible gases or oxygen")

## Sensor Types

MSA sensors are available as standard in a stainless steel body.

**Series 47K-PRP:** high resistance to atmospheres containing silicones, lead, sulphur compounds and halogenated hydrocarbons over a temperature range –40 °C to +90 °C

**Series 47K-ST:** for general purpose applications over the ambient temperature range –40 °C to +90 °C

**Series 47K-HT:** to operate over a temperature range –40 °C to +160 °C

- Location of potential sources of a gas leak
- Location of potential sources of ignition
- Ventilation and airflow patterns
- The gas or vapour density with respect to air
- The physical properties of the gas or vapour
- Structural arrangements which could allow gas to accumulate
- Environmental conditions

## Applications

- Chemical & Petrochemical Industry
- Printing Industry
- Pipelines
- Gas Industry
- Refrigeration Industry
- LPG Storage and Transportation
- Shipboard
- Paint Manufacture
- Solvent Recovery & Storage
- Loading-Unloading of Hazardous Gas & Vapour
- Automotive Test Benches
- Boiler Rooms
- Turbine & Compressors
- Biofuels



# and accessories

## Accessories

There are applications where the sensors cannot be installed close to the potential source of a gas or vapour leak. This may be due to extremely high temperature, higher or lower atmospheric pressure, difficult to access locations, high flow-rate of air to be monitored or the presence of dust.

For these applications, MSA offers a variety of accessories such as flow-through adaptors or duct mount flanges, which allow reliable, trouble-free detection with minimum maintenance.

Additional accessories are available for environmental protection and a remote/in-situ calibration kit for ease of maintenance.

## Measuring Principle

The MSA 47K Series of sensors operate on the principle of catalytic combustion. The sensing element consists of a pair of filaments (“pellistors”) connected to a pair of precision resistors to form a Wheatstone bridge.

One of the filaments, the detector, is coated with a catalyst, whilst the other, the compensator is used as a reference to achieve the best stability.

The gas or vapour diffuses through a porous Stainless Steel sintered disc, which acts as a flashback arrestor. When gas comes into contact with the surface of the detector filament, it is oxidised.

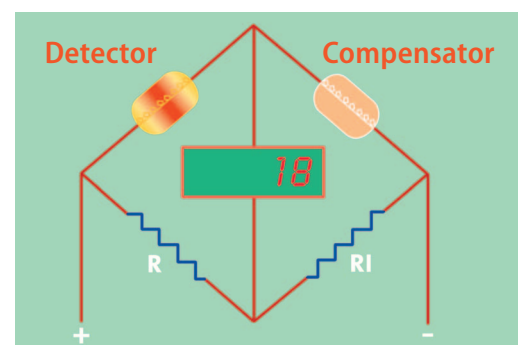
The heat generated by the reaction increases the temperature of the detector, which results in a change of the detector electrical resistance, and hence an unbalance of the Wheatstone bridge. The result is an output signal directly proportional to the concentration of the flammable gas or vapour.



47K 3/4" NPT



47K M25 x 1.5



## Approvals

The Series 47K sensors are “performance” approved according to EN 60079-29-1 when operated in conjunction with an MSA type approved Controller. They can therefore be used as safety related devices meeting the requirements of ATEX Directive 94/9/EC.

The sensors are ATEX approved according to new standards EN 60079-0, EN 60079-1, EN 61241-0, EN 61241-1 for use with or without an Ex d or Ex e certified junction box.

Series 47K sensors are also certified SIL 2 capable by TUV.

## EC Type Certificate:

INERIS 03ATEX 0208

- Ⓜ II 2G Ex d IIC T6 –40 °C +40 °C (ST, PRP)
- T4 –40 °C +90 °C (ST, PRP)
- T3 –40 °C +160 °C (HT)

- Ⓜ II 2D Ex tD A21 IP6X T85 °C –40 °C +40 °C (ST, PRP)
- T135 °C –40 °C +90 °C (ST, PRP)
- T200 °C –40 °C +160 °C (HT)

## EXAM Test Reports:

PFG-41300204P



HT sensor and wall mount bracket

## Technical Specifications

Sensor	
Power consumption	1 watt typical
Measuring range	0–100% LEL
Response time	$\tau_{50} \leq 10$ sec. $\tau_{90} \leq 30$ sec.
Operating life	3 years minimum in clean air @ STP
Storage life	5 years minimum in MSA container @ STP
Storage temperature	-20 °C to +40 °C
Operating temperature range	-40 °C to +55 °C (ST & PRP) -40 °C to +90 °C (extended range*) -40 °C to +160 °C (HT)
Operating humidity range	5% to 95% RH non-condensing
Operating pressure range	100 ±20 kPa
Air velocity	0–6 m/s (with duct mount flange 0.5–20 m/s)
Poison resistance	PRP sensor only: 10 ppm HMDS for 40 min. (max. signal loss 5% of reading)
Weight	ca. 230 g (St.St. sensor)
Dimension	Ø 36 x 56 mm
Material	Stainless steel
Accessory thread	M36 x 1.5 mm
Sensor to junction box	3/4" NPT or M25 x 1.5 mm
Approvals	EC Type Certificate: INERIS 03 ATEX 0208
Safety Integrity Level	SIL 2 (IEC 61508)

\*Extended range: The sensor extended temperature range is greater than the maximum specified in 60079-29-1. It is therefore strongly recommended that if used above +55 °C the sensor is calibrated at the operating temperature.

## Junction Box

	Flameproof (Ex d)	Increased safety (Ex e)
Weight	870 g	813 g
Cable gland thread	3/4" NPT	M25 x 1.5 mm
Terminals	5 x 2.5 mm <sup>2</sup>	5 x 2.5 mm <sup>2</sup>
Material	Aluminium (powder coated)	
Dimension	120 x 97 x 170 mm (W x D x H)	
Approvals	EC Type Certificate: BVS 10 ATEX E 066X	
	II 2G Ex d IIC T6 or T4	II 2G Ex e II T6 or T4
	II 2D Ex tD A21 IP6x T85 °C or T135 °C	
	T6 -40 °C ≤ Ta ≤ +40 °C	
	T4 -40 °C ≤ Ta ≤ +90 °C	
	T85 °C -20 °C ≤ Ta ≤ +40 °C	
	T135 °C -20 °C ≤ Ta ≤ +50 °C	

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## Ordering Information

### Gas Detector (Sensor & Junction Box)

Part-No.	Description	Sensor Material	Junction Box Thread	Type
10120403	47K-ST	St.St. 316	M25 x 1.5	Ex e
10114106	47K-PRP	St.St. 316	M25 x 1.5	Ex e
10120404	47K-ST	St.St. 316	3/4" NPT	Ex d
10114107	47K-PRP	St.St. 316	3/4" NPT	Ex d

### Sensor

Part-No.	Description	Material	Thread
10048117	47K-ST	St.St. 316	M25 x 1.5
10048118	47K-PRP	St.St. 316	M25 x 1.5
10048271	47K-ST	St.St. 316	3/4" NPT
10048272	47K-PRP	St.St. 316	3/4" NPT
10048825	47K-HT	St.St. 316	3/4" NPT
10048199	47K-HT	St.St. 316	M25 x 1.5

### Junction Box & Wall Mount Bracket

Part-No.	Description	Material
10114111	Ex e, 2 x M25 x 1.5	Aluminium
10114112	Ex d, 2 x 3/4" NPT	Aluminium
10048829	Wall mount bracket Ø 25 mm	St.St. 316
10062674	HT junction box 100 °C	Aluminium

### Accessories

Part-No.	Description	Material
10049316	Calibration cap	PVC
10051623	Weather protection cap – hose	St.St. 316
10051731	Weather protection cap – 1/8" NPT	St.St. 316
10051625	Flow-through adapter	St.St. 316
10051626	Flow-through adapter	Aluminium
10051627	Duct mount flange	Aluminium



Flow-through adapter



Calibration cap



Weather protection cap



Duct mount flange

**MSA**  
The Safety Company