



**mm X112**



**Description**

Gauge Head Position Sensor,  
Intrinsically Safe for Hazardous Gas/Vapour Atmospheres

- Measurement Range from 0 ... 10 mm to 0 ... 50 mm
- Linearity  $\pm 0.25$  %
- Supply voltage and output signal via Galvanic Isolation Amplifier X005
- Intrinsically Safe for Gas to: Ex II 1G

This X112 LIPS® (Linear Induction Position Sensor) is designed for gauge head positioning in industrial and scientific applications and is ideal for OEMs seeking good sensor performance for arduous applications in hazardous areas. The X112, like all LIPS sensors, provides a linear output proportional to displacement. Each sensor is supplied with the output calibrated to the travel required by the customer, from 10 mm to 50 mm and with full EMC protection built in.

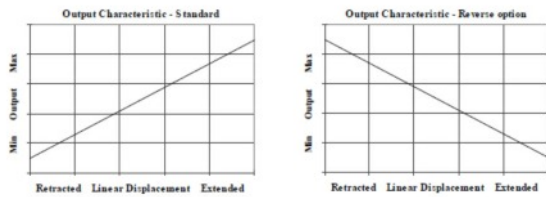
Overall performance, repeatability and stability are outstanding over a wide temperature range. The sensor is very robust, the body and plunger being made of stainless steel for long service life and environmental resistance. The plunger is spring loaded with a domed end. The X112 is easy to install with a long 1/2 inch UNF mounting thread and is supplied with two lock nuts for positioning. Environmental sealing is to IP67.

**Sensor must be used in conjunction with Galvanic Isolation Amplifier X005!**

**Specifications**

Measurement Ranges:	0 ... 10 mm to 0 ... 50 mm, factory-set, in increments of 1 mm
Power Supply (via Galvanic Isolation Amplifier X005):	+5 VDC nom. $\pm 0.5$ V, 10 mA typ, 20 mA max.
Output Signal (to Galvanic Isolation Amplifier X005):	0.5 ... 4.5 V ratiometric, load min. 2 k $\Omega$
Independent Linearity at 20 °C:	$< \pm 0.25$ %
Temperature Coefficient Gain:	$< \pm 0.01$ % / K
Temperature Coefficient Offset:	$< \pm 0.01$ % FS / K
Frequency Range:	0 ... $> 10$ kHz (-3 dB)
Resolution:	Infinite
Noise:	$< 0.02$ % FSO
Spring Force	1.5 ... 4.5 N approx.
Intrinsic Safety:	Ex II 1G Ex ia IIC T4 Ga (Ta = -40 ... +80 °C)
Sensor Input Parameters:	Ui = 11.4 V, Ii = 0.20 A, Pi = 0.51 W Connector: Ci = 1.16 $\mu$ F, Li = 50 $\mu$ H Cable: Ci = 1.36 $\mu$ F, Li = 860 $\mu$ H, cable length max. 1000 m
Operating Temperature Range:	-40 ... +80 °C
Storage Temperature Range:	-40 ... +125 °C
Environmental Sealing:	IP67
EMC Performance:	EN61000-6-2, EN61000-6-3
Vibration, max.:	IEC 68-2-6: 10 g
Shock, max.:	IEC 68-2-29: 40 g
MTBF:	350000 hours, 40 °C, Gf
Electrical Connection:	Connector or 0.5 m cable

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Sensor and Galvanic Isolation Amplifier X005 have to be calibrated altogether at the factory!

## Options

Galvanic Isolation Amplifier	Output
X005-425	4 ... 20 mA
X005-426	20 ... 4 mA
X005-525	0.5 ... 9.5 V
X005-526	9.5 ... 0.5 V

Connector/Cable Options:	
-J	Axial connector, IP67
-K	Radial connector, IP67
-L50	Cable with axial gland, IP67, 50 cm
-I50	Cable with radial gland, IP67, 50 cm

Other cable lengths up to max. 15000 cm available

## Electrical Connection

### Cable (Options Lxx or lxx):

3-core screened PUR cable, 0.2 mm<sup>2</sup>, Ø 4 mm, standard length 50 cm, max 150 m

**Connector:** maximum conductor cross section 0.75 mm<sup>2</sup>

### Connections

Cable	Connector	
Red	Pin 1	+ supply voltage
Black	Pin 3	0 V
White	Pin 2	Output signal
Screen	Pin 4	Body

The Galvanic Isolation Amplifier X005 will compensate for up to 15 Ohms resistance in each conductor, this imposes the following minimum cable sizes:

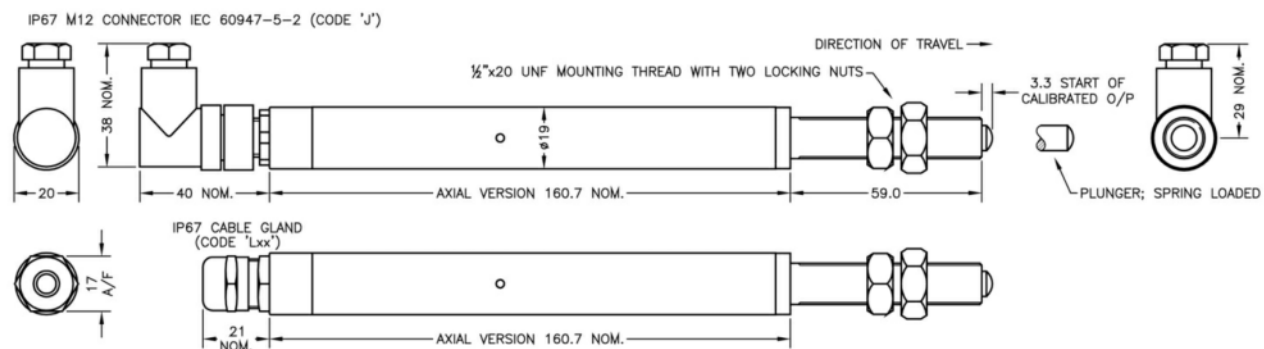
Cross Section	Cable Length
0.25 mm <sup>2</sup>	Up to 150 m
0.5 mm <sup>2</sup>	150 ... 300 m
0.75 mm <sup>2</sup>	300 ... 450 m
1.0 mm <sup>2</sup>	450 ... 600 m
1.5 mm <sup>2</sup>	600 ... 900 m
2.0 mm <sup>2</sup>	900 ... 1000 m

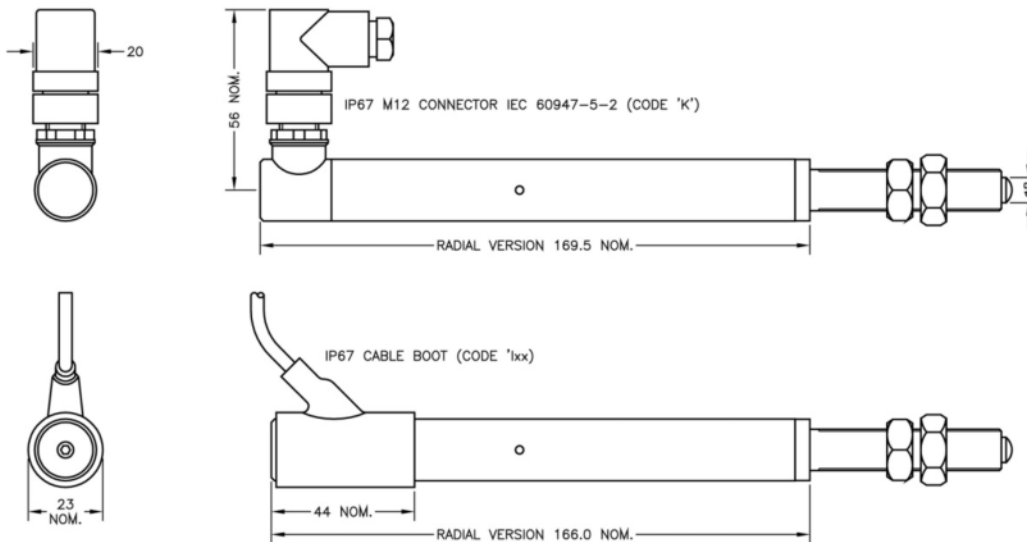
It is imperative position sensor LIPS X111 be used in conjunction with a galvanic barrier X005.

**Note:** The maximum cable length as specified in the sensor's certification takes precedence and must not be exceeded.

For cable lengths exceeding 10 m a 5-wire connection is recommended to eliminate errors introduced by cable resistance and associated temperature coefficients. (see data sheet Amplifier X005)

## Dimensions





All dimensions in mm, approx. values. These drawings are for information only and not intended for construction purpose. Please ask for detailed drawings.

## Intrinsic Safety

Intrinsically safe equipment is defined as “equipment which is incapable of releasing sufficient electrical or thermal energy under normal or abnormal conditions to cause ignition of a specific hazardous atmosphere mixture in its most easily ignited concentration.”

ATEX / IECEx approved to: Ex II 1G  
Ex ia IIC T4 Ga (Ta = -40 ... +80 °C)

Designates the sensor as belonging to:

Group II:	suitable for all areas except mining
Category 1G:	can be used in areas with continuous, long or frequent periods of exposure to hazardous gas (Zone 0)
Protection class ia:	intrinsically safe for all zones
Apparatus group IIC:	suitable for IIA to IIC explosive gas
Temperature class T4:	maximum surface temperature under fault conditions 135 °C
Ambient temperature range Ta:	extended to -40 ... +80 °C

It is imperative LIPS X112 intrinsically safe sensors be used in conjunction with a galvanic barrier X005 to meet the requirements of the product certification. The X005 Galvanic Isolation Amplifier is purpose made for LIPS and RIPS sensors. Refer to the X005 datasheet for product specification and output configuration options.

## Safety Parameters:

Ui: 11.4 V, Ii: 0.20 A, Pi: 0.51 W  
 Ci = 1.36 µF\*    Li = 860 µH\* (cable version)  
 Ci = 1.16 µF    Li = 50 µH (connector version)

\*Figures for 1 km cable Ci = 200 pF/m and Li = 810 nH/m

Sensors can be installed with a maximum of 1000 m of cable. Cable characteristics must not exceed:

Capacitance: ≤200 pF/m for max. total of: 200 nF.  
 Inductance: ≤810 nH/m for max. total of: 810 µH

For cable lengths exceeding 10 metres a five wire connection is recommended to eliminate errors introduced by cable resistance and associated temperature coefficients.

ATEX / IECEx approved sensors suitable for **dust (E series)** and **mining (M series)** applications, are also available.