mm X101

Description

Stand-Alone Linear Position Sensor,
Intrinsically Safe for Hazardous Gas/Vapour Atmospheres

- Measurement ranges from 0 ... 50 mm to 0 ... 600 mm
- Spring-loaded version available
- Linearity ±0.25 % (ranges over 450 mm: ±0.5 %)
- Supply voltage and output signal via Galvanic Isolation Amplifier X005
- Intrinsically Safe for Gas to: Ex II 1G

This intrinsically safe X101 LIPS® (Linear Inductive Position Sensor) is designed for industrial and scientific feedback applications and is ideal for OEMs seeking good sensor performance for arduous applications in hazardous areas. The unit is highly compact and space-efficient, being responsive along almost its entire length.

The X101 provides a linear output proportional to displacement. Each unit is supplied with the output calibrated to the travel required by the customer, from 50 to 600 mm and with full EMC protection built in. The sensor is very robust, the body and push rod being made of stainless steel for long service life and environmental resistance.

Overall performance, repeatability and stability are outstanding over a wide temperature range. The sensor is easy to install with mounting options including M5 rod eye bearings and body clamps. The push rod can be supplied free or captive, with female M5 thread, an M5 rod eye, or dome end, Captive push rods can be sprung loaded, in either direction, on sensors up to 250 mm of travel. The X101 also offers a wide range of mechanical options, environmental sealing is to IP65 or IP67, depending on selected cable or connector options.

Sensor must be used in conjunction with Galvanic Isolation Amplifier X005.

Specifications

Measurement Ranges:	0 ... 50 mm to 0 ... 600 mm, factory-set, in increments of 1 mm
Power Supply *(via Galvanic Isolation Amplifier X005)*:	+5 VDC nom. ±0.5 V, 10 mA typ, 20 mA max.
Output Signal *(to Galvanic Isolation Amplifier X005)*:	0.5 ... 4.5 V ratiometric, load min. 5 kΩ
Independent Linearity at 20 °C:	<±0.25 % for ranges up to 450 mm <±0.5 % for ranges >450 mm
Temperature Coefficient Gain:	<±0.01 %/K
Temperature Coefficient Offset:	<±0.01 % FS/K
Frequency Range:	0 ... >10 kHz (-3 dB)
Resolution:	Infinite
Noise:	<0.02 % FSO
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 µF, Li = 50 µH Cable: Ci = 1.36 µF, Li = 860 µH, cable length max. 1000 m

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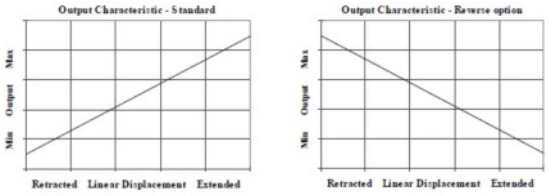
Operating Temperature Range:	-40 ... +80 °C
Storage Temperature Range:	-40 ... +125 °C
Environmental Sealing:	IP65 or IP67 depending on connector / cable option
EMC Performance:	EN61000-6-2, EN61000-6-3
Vibration, max.:	IEC 68-2-6: 10 g
Shock, max.:	IEC 68-2-29: 40 g
MTBF:	350000 hours, 40 °C, Gf
Electrical Connection:	Connector or 0.5 m cable



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 Hirschmann connector, IP65
-K	Radial Hirschmann connector, IP67
-L50	Cable with axial gland, IP67, 50 cm
-M50	Cable with short gland, axial, IP67, 50 cm
-I50	Cable with radial gland, IP67, 50 cm
	other cable lengths available up to max. 15000 cm

Body Mounting Options:	
-N	M5 rod eye bearing (radial versions only)
-P / -P2	Body tube clamps

Push Rod Options:	
-R	Spring return to extended position (for ranges up to 250 mm only)
-S	Spring return to retracted position (for ranges up to 250 mm only)
-T	Dome end (with option –R only)
-U	M5 rod eye bearing
-V	Free
blank	M5 x 0.8 female thread

Potentiometer Option:	
-Y	Sealed trim potentiometers for zero and span

Electrical Connection

Cable (Options Lxx, Ixx or Mxx): 3-core screened PUR cable, 0.2 mm², Ø 4 mm, standard length 50 cm, max 150 m
Connector: maximum conductor cross section 0.75 mm²

Connections

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

It is imperative position sensor LIPS X101 be used in conjunction with a galvanic barrier X005.

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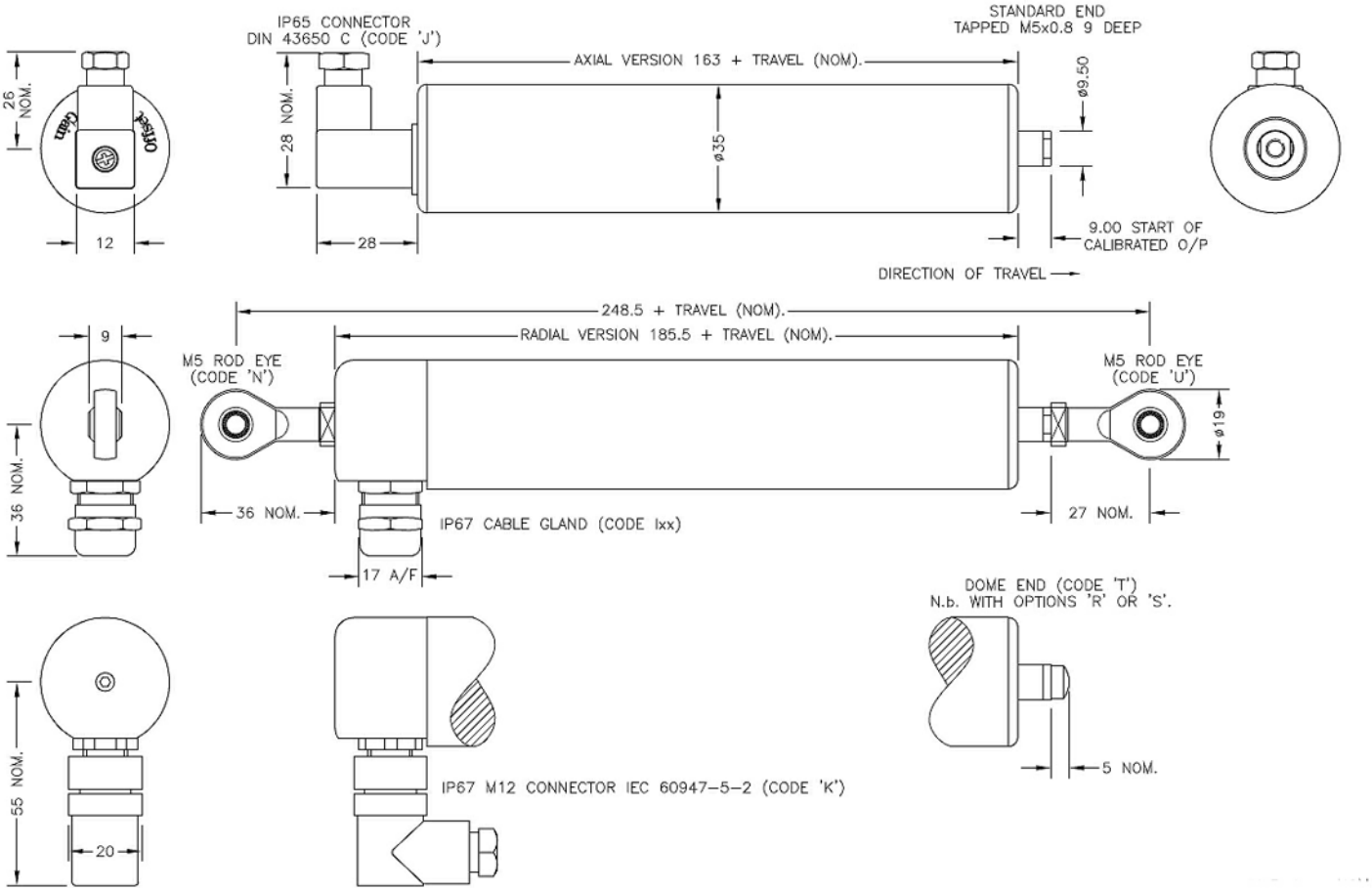
The Galvanic Isolation Amplifier X005 will compensate for up to 15 Ohms resistance in each conductor, this imposes the following minimum cable sizes:

Cross Section	Cable Length
0.25 mm²	Up to 150 m
0.5 mm²	150 ... 300 m
0.75 mm²	300 ... 450 m
1.0 mm²	450 ... 600 m
1.5 mm²	600 ... 900 m
2.0 mm²	900 ... 1000 m

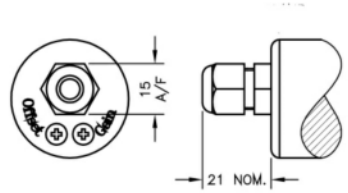
Note: The maximum cable length as specified in the sensor's certification takes precedence and must not be exceeded.

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)

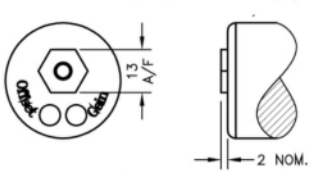
Dimensions



Cable gland, IP67, Option L:



Short Cable Gland, IP67, Option M,



Gain and offset adjustment sealed (Code

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

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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 X101 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.

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