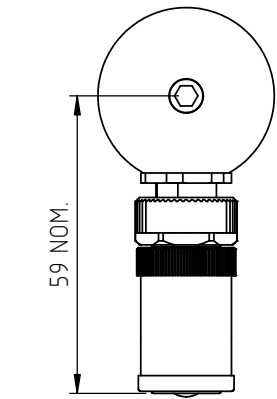
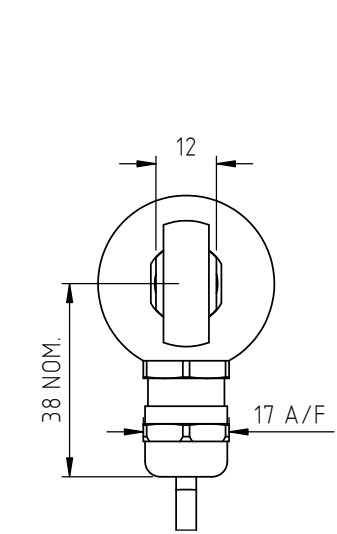
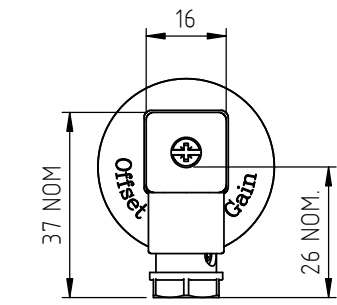
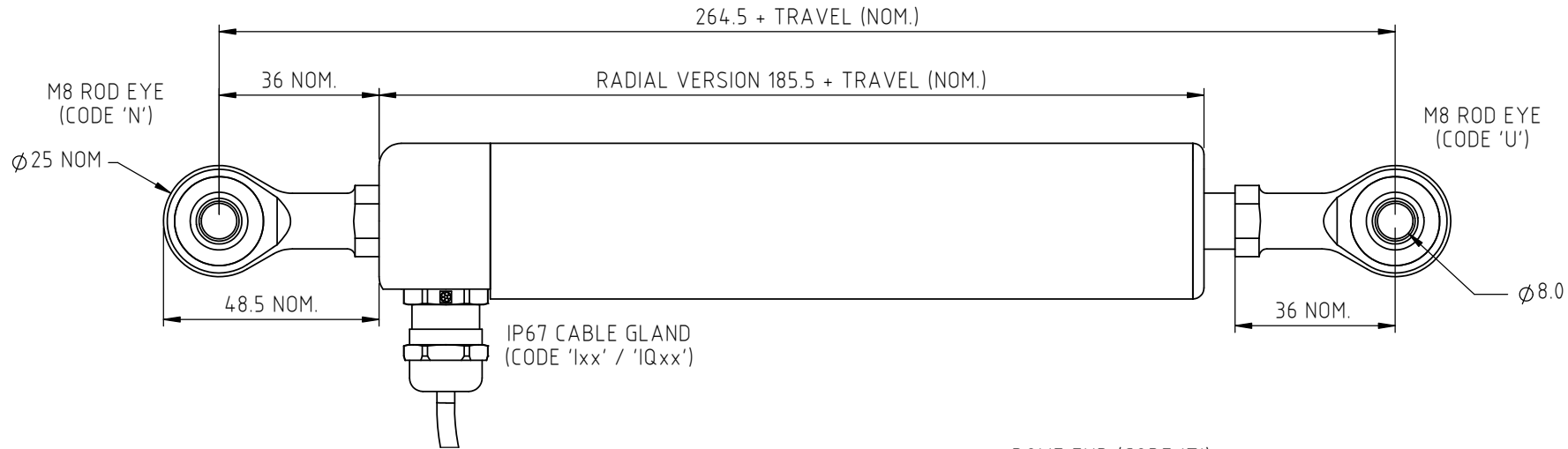
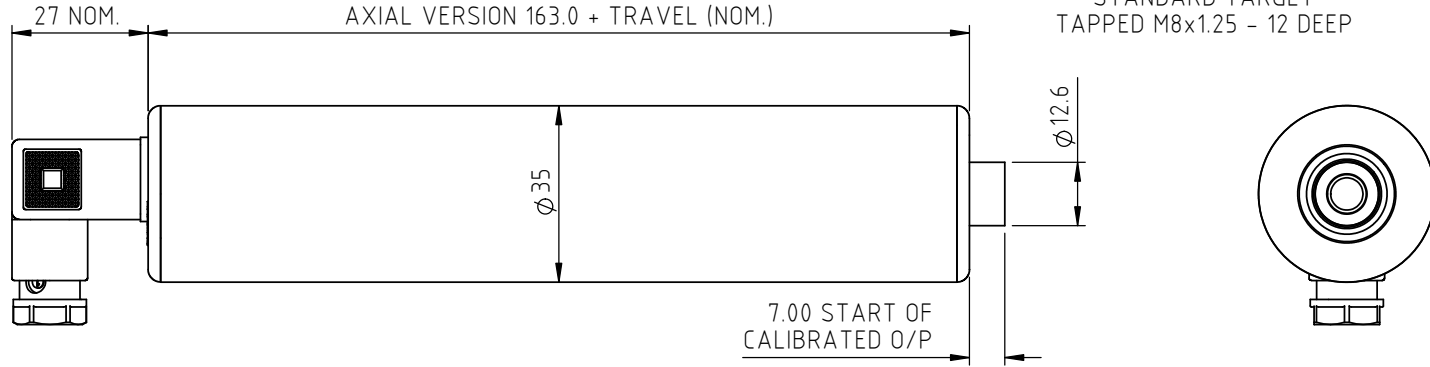


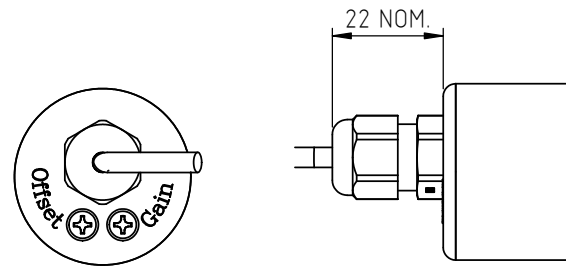
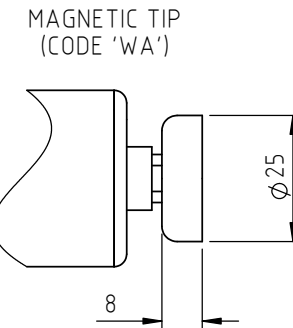
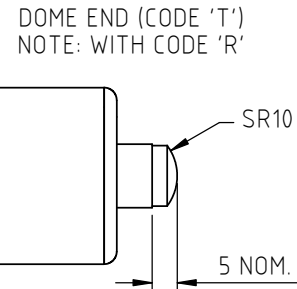
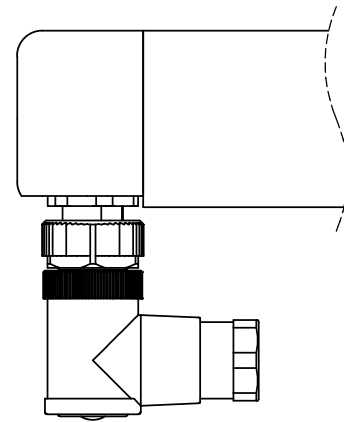
NOTE. ROD-EYE ORIENTATION NOT GUARANTEED



IP65 CONNECTOR
DIN 43650 C
(CODE 'J')

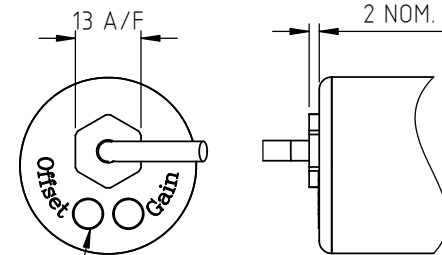


IP67 M12 CONNECTOR
IEC 60176-2-101
(CODE 'K')



IP67 CABLE GLAND
(CODE 'Lxx' / 'LQxx')

GAIN & OFFSET
ADJUSTMENTS SEALED
(CODE 'Y')



IP67 SHORT CABLE GLAND
(CODE 'Mxx' / 'MQxx')

ELECTRICAL OPTIONS/ SPECIFICATIONS

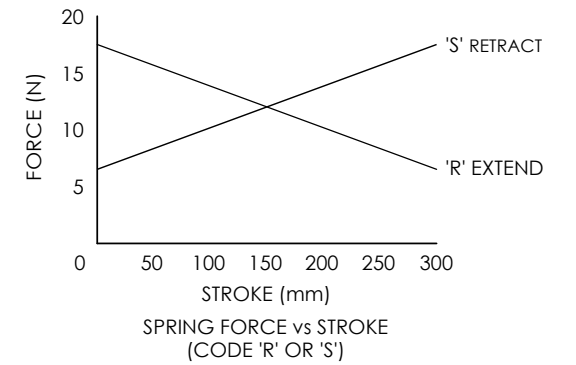
OUTPUT	SUPPLY (NOM)
'A' 0.5 - 4.5V RATIOMETRIC	5V
'B' ±5V	±15V
'C' 0.5 - 9.5V	24V
'D' ±10V	±15V
'G' 0.5 - 4.5V	24V
SUPPLY CURRENT 12mA TYP. 20MA MAX.	
'E' 4 TO 20MA 2-WIRE	24V (18V MIN.)
'F' 4 TO 20MA SINK†	24V
'H' 4 TO 20MA SOURCE‡	24V
† OUTPUT COMPLIANCE 5-28V	
‡ DRIVE 300Ω MAXIMUM TO 0V	

CONNECTIONS:	CABLE	CONNECTOR
+VE	3-CORE RED	:1
0V	BLACK	:3
-VE	-	:4 O/P 'B' & 'D'
OUTPUT	WHITE	:2
BODY	SCREEN	:4 NOT O/P 'B' & 'D'

CABLE: 0.2mm², O/A SCREEN, PUR JACKET. O/D; 3-CORE: Ø4mm, 4-CORE: Ø4.6mm, SUPPLIED WITH 50cm OR REQUIRED LENGTH IN cm. e.g. 'L50' CONNECTORS; MAXIMUM CONDUCTOR CROSS SECTION 0.75mm²

RANGE OF DISPLACEMENT FROM 0-5mm TO 0-800mm e.g.76, IN INCREMENTS OF 1mm
BODY MATERIAL:- STAINLESS STEEL.

FURTHER OPTIONS:
SINGLE PAIR OF BODY CLAMPS 'P'
TWO PAIRS OF BODY CLAMPS 'P2'
SPRING RETURN PUSH-ROD, TRAVEL ≤300mm
RETURN TO EXTENDED POSITION (CODE 'R')
RETURN TO RETRACTED POSITION (CODE 'S')
PUSH-ROD FREE (CODE 'V') - NOT AVAILABLE WITH SPRUNG OPTIONS.
GAIN AND OFFSET ADJUSTMENTS NOT AVAILBLE WITH RADIAL BODY , CODE 'Lxx' AND 'K' OPTIONS.



DRAWINGS NOT TO BE CHANGED WITHOUT REFERENCE TO THE CHANGE PROCEDURE.
CHANGES TO PARTS USED IN INTRINSICALLY SAFE PRODUCT MUST BE APPROVED BY THE AUTHORISED PERSON.
THIS IS AN UNCONTROLLED PRINT AND WILL NOT BE UPDATED.

REV	CHANGE HISTORY	DR'WN	DATE	CHK'D
P	RAN 1311 - MAGNETIC TIP OPTION 'WA' ADDED	ASC	05/06/2023	ASC

THE PUSH-ROD RETRACTS 4mm NOM. BACK FROM THE START OF CALIBRATED TRAVEL.
THE PUSH-ROD EXTENDS 8mm NOM. BEYOND THE END OF CALIBRATED TRAVEL.
SPRUNG OPTIONS:- CODE 'R': 1mm, CODE 'S': 2mm.
CODE 'V': PUSH-ROD NOT RETAINED.



APPROVED BY RDM	REV P		X ±0.4 X.X ±0.2 X.XX ±0.1 DIMS mm
DESCRIPTION P111 RUGGED STAND ALONE LINEAR POSITION SENSOR			
SCALE A3	DRAWING NUMBER P111-11		
SHEET 1 OF 1			

P111 RUGGED STAND-ALONE LINEAR POSITION SENSOR

- **Non-contacting inductive technology to eliminate wear**
- **Travel set to customer's requirement**
- **Compact and self-contained**
- **High durability and reliability**
- **High accuracy and stability**
- **Sealing to IP65/IP67 as required**



As a leading designer and manufacturer of linear, rotary, tilt and intrinsically safe position sensors, Positek® has the expertise to supply a sensor to suit a wide variety of applications.

Our P111 is a heavy-duty version of the P101 sensor with a stronger 12.6mm push rod, recommended for applications where vibration is an issue or there is a need for longer travel sensors, mounted horizontally, and supported between rod eyes. It remains an affordable, durable, high-accuracy position sensor designed for industrial and scientific feedback applications.

The unit is highly compact and space-efficient, being responsive along almost its entire length. Like all Positek® sensors, the P111 provides a linear output proportional to travel. Each sensor is supplied with the output calibrated to the travel required by the customer, any stroke from 0-5mm to 0-800mm 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.

It is particularly suitable for OEMs seeking good sensor performance for arduous applications such as industrial machinery where cost is important. Overall performance, repeatability and stability are outstanding over a wide temperature range. The sensor is easy to install with mounting options including M8 rod eye bearings and body clamps.

The push rod can be supplied free or captive, with female M8 thread, an M8 rod eye, or dome end or magnetic tip. Captive push rods can be sprung loaded, in either direction, on sensors up to 300mm of travel. The P111 also offers a wide range of mechanical and electrical options, environmental sealing is to IP65 or IP67, depending on cable/connector options.

SPECIFICATION

Dimensions

Body diameter	35 mm
Body length (Axial version)	calibrated travel + 163 mm
Body length (Radial version)	calibrated travel + 186 mm
Push rod extension	calibrated travel + 7 mm, OD 12.6 mm

For full mechanical details see drawing P111-11

Independent Linearity

$\leq \pm 0.25\%$ FSO @ 20°C - up to 450 mm
 $\leq \pm 0.5\%$ FSO @ 20°C - over 450 mm
 $\leq \pm 0.1\%$ FSO @ 20°C* available upon request.

*Sensors with calibrated travel from 10 mm up to 400 mm.

Temperature Coefficients

< ± 0.01%FS/°C Offset

Frequency Response

> 300 Hz (-3dB) 2 wire 4 to 20 mA

Resolution

Noise < 0.02% FSO

Enviro

Operating	-40°C to
-----------	----------

Storage	-20°C to +85°C buffered
Sealing	-40°C to +125°C
	IP65/IP67 depending on con

Sealing EMC Box

EMC Performance EN 61000-6-2, EN 61000-6-3
Vibration IEC 68-3-6: 10 g

Vibration Shock

IEC 08-2-29. 40 g
350,000 hrs 40°C Gf

MTBF Drawing 1

P111-11 Sensor Outline

Drawing

Drawings, in A4 format, available on request

Do you need a position sensor made to order to suit a particular installation requirement or specification? We'll be happy to modify any of our designs to suit your needs - please contact us with your requirements.

For further information please contact:

www.positek.com sales@positek.com

Tel: +44(0)1242 820027 fax: +44(0)1242 820615

Positek, Andoversford Industrial Estate, Cheltenham GL54 4LB. U.K.

P111-17n

1 of 2



P111 RUGGED STAND-ALONE LINEAR POSITION SENSOR

Position feedback for industrial and scientific applications

How Positek's technology eliminates wear for longer life

Positek's Inductive technology is a major advance in displacement sensor design. Our displacement transducers have the simplicity of a potentiometer with the life of an LVDT/RVDT.

Our technology combines the best in fundamental inductive principles with advanced micro-electronic integrated circuit technology. A Positek sensor, based on simple inductive coils using Positek's ASIC control technology, directly measures absolute position giving a DC analogue output signal. Because there is no contact between moving electrical components, reliability is high and wear is eliminated for an exceptionally long life.

Our technology overcomes the drawbacks of LVDT technology – bulky coils, poor length-to-stroke ratio and the need for special magnetic materials. It requires no separate signal conditioning.

We also offer a range of ATEX-qualified intrinsically-safe sensors.

TABLE OF OPTIONS

CALIBRATED TRAVEL: Factory set to any length from 0-5mm to 0-800mm (e.g. 254mm)

ELECTRICAL INTERFACE OPTIONS

OUTPUT SIGNAL	SUPPLY INPUT	OUTPUT LOAD
Standard: 0.5-4.5V dc ratiometric	+5V dc nom. \pm 0.5V.	5k Ω min.
Buffered: 0.5-4.5V dc	+24V dc nom. + 9-28V.	5k Ω min.
\pm 5V dc	\pm 15V dc nom. \pm 9-28V.	5k Ω min.
0.5-9.5V dc	+24V dc nom. + 13-28V.	5k Ω min.
\pm 10V dc	\pm 15 V dc nom. \pm 13.5-28V.	5k Ω min.
Supply Current	10mA typical, 20mA maximum.	
4-20mA (2 wire)	+24 V dc nom. + 18-28V.	300 Ω @ 24V.
(3 wire sink)	+24 V dc nom. + 13-28V.	950 Ω @ 24V.
(3 wire source)	+24 V dc nom. + 13-28V.	300 Ω max.

Axial sensors supplied with access to output 'zero' and 'span' calibration adjustments as standard. No access option available.

CONNECTOR/CABLE OPTIONS

Connector - Hirschmann GD series	Axial, IP65
Connector - Hirschmann ELWIK 4102	Radial, IP67
Cable with M12 gland or short gland	Axial, IP67
Cable with Pg 9 gland	Radial, IP67
Cable length >50 cm – please specify length in cm	

MOUNTING OPTIONS

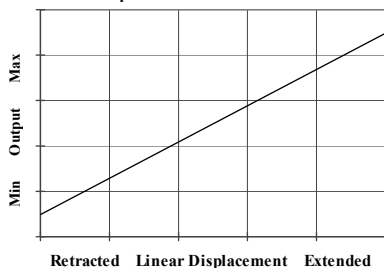
M8 rod eye bearing (radial versions), Body Tube Clamp/s (axial or radial versions).

PUSH ROD OPTIONS – Retained[†] or Free with M8x1.25 female thread, M8 rod eye bearing or Magnetic tip, Spring loaded - retract or extend, Dome end[#].

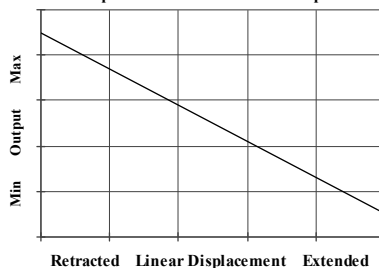
[†] standard, retained with female thread.

[#] with spring extend.

Output Characteristic - Standard



Output Characteristic - Reverse option



For further information please contact:

www.positek.com sales@positek.com

Tel: +44(0)1242 820027 fax: +44(0)1242 820615

Positek, Andoversford Industrial Estate, Cheltenham GL54 4LB. U.K.

P111 Rugged Stand-Alone Linear Position Sensor

	a	b	c	d	e	f	g	h	j	k
P111 .	Displacement	Output	Adjustments	Connections	Option	Option	Option	Option	Option	Z-code

a Displacement (mm)		Value
Displacement in mm	e.g. 0 - 254 mm	254
b Output		
Supply V dc	Output	Code
+5V (4.5 - 5.5V)	0.5 - 4.5V (ratiometric with supply)	A
±15V nom. (±9 - 28V)	±5V	B
+24V nom. (13 - 28V)	0.5 - 9.5V	C
±15V nom. (±13.5 - 28V)	±10V	D
+24V nom. (18 - 28V)	4 - 20mA 2 wire	E
+24V nom. (13 - 28V)	4 - 20mA 3 wire Sink	F
+24V nom. (9 - 28V)	0.5 - 4.5V	G
+24V nom. (13 - 28V)	4 - 20mA 3 wire Source	H
c Calibration Adjustments		Code
Accessible - default [†]	[†] Axial body style only. Radial body style sealed by default.	blank
Sealed		Y
d Connections Cable or Connector		Code
Cable Gland - Radial	IP67 metal	Ixx
	IP65 DIN 43650 'C'	J
Connector - Axial	pre-wired	Jxx
	IP67 M12 IEC 60176-2-101 nylon	K
Connector - Radial	pre-wired	Kxx
Cable Gland - Axial	IP67 nylon	Lxx
Cable Gland [†] - Axial	IP67 Short	Mxx
Specify required cable length 'xx' in cm. e.g. L2000 specifies cable gland with 20 m of cable, 50 cm supplied as standard. [†] Nb: restricted cable pull strength.		
e Body Fittings		Code
None - default		blank
M8 Rod-eye Bearing	Radial body style only	N
f Body Clamps		Code
Body Clamps - 1 pair		P
Body Clamps - 2 pairs		P2
g Sprung Push Rod		Code
None - default		blank
Spring Extend	Up to 300mm displacement.	R
Spring Retract	Captive push rod only.	S
h Push Rod Fittings		Code
None - default	Female Thread M8x1.25x12 deep	blank
Dome end	Requires option 'R'	T
M8 Rod-eye Bearing		U
Magnetic Tip		WA
j Push Rod Options		Code
Captive - default	Push rod is retained	blank
Non-captive	Push rod can depart body	V

k Z-code	Code
Connector IP67 M12 IEC 60176-2-101 must have options 'Y' & 'J'	Z600
Connector IP67 M12 IEC 60176-2-101 must have option 'J'	Z601
≤± 0.1% @20°C Independent Linearity displacement between 10mm & 400mm only!	Z650
1/2" Rod eye options available	Z825
M12 Rod eye options available	Z826

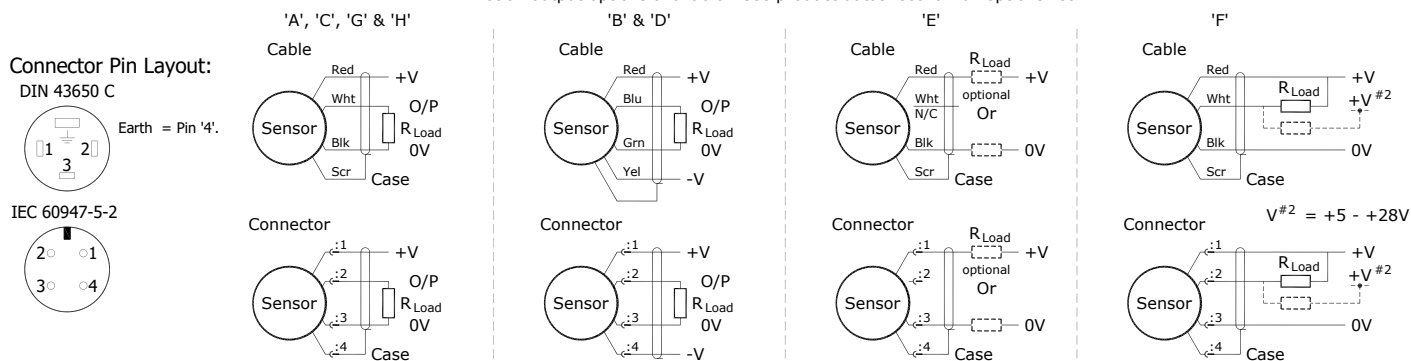


Installation Information

P111 RUGGED STAND-ALONE LINEAR POSITION SENSOR

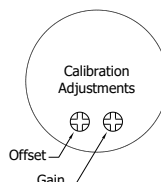
Output Option	Output Description:	Supply Voltage: V_s (tolerance)	Load resistance: (include leads for 4 to 20mA O/Ps)
A	0.5 - 4.5V (ratiometric with supply)	+5V (4.5 - 5.5V)	$\geq 5k\Omega$
B	$\pm 5V$	$\pm 15V$ nom. ($\pm 9 - 28V$)	$\geq 5k\Omega$
C	0.5 - 9.5V	+24V nom. (13 - 28V)	$\geq 5k\Omega$
D	$\pm 10V$	$\pm 15V$ nom. ($\pm 13.5 - 28V$)	$\geq 5k\Omega$
E	4 - 20mA 2 wire Current Loop	+24V nom. (18 - 28V)	$\approx 0 - 300\Omega$ max. @24V ~ 1.2 to 6V across 300 Ω $\{R_L \text{ max.} = (V_s - 18) / 20^{-3}\}$
F	4 - 20mA 3 wire Sink	+24V nom. (13 - 28V)	$\approx 0 - 950\Omega$ max. @24V ~ 3.8 to 19V across 950 Ω $\{R_L \text{ max.} = (V_s - 5) / 20^{-3}\}$
G	0.5 - 4.5V	+24V nom. (9 - 28V)	$\geq 5k\Omega$
H	4 - 20mA 3 wire Source	+24V nom. (13 - 28V)	$\approx 0 - 300\Omega$ max. ~ 1.2 to 6V across 300 Ω

Not all output options available - see product datasheet for full options list



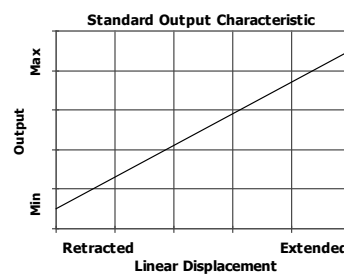
Gain and Offset Adjustment: (Where accessible - Typically $\pm 10\%$ Min available)

To adjust the gain or offset use a small potentiometer adjuster or screwdriver 2mm across. Do not apply too much force on the potentiometers.



Mechanical Mounting: Depending on options; Body can be mounted by M8 rod eye or by clamping the sensor body - body clamps are available, if not already ordered. Target by M8x1.25 female thread or M8 rod eye. It is assumed that the sensor and target mounting points share a common earth.

Output Characteristic: Target is extended 7 mm from end of body at start of normal travel. The output increases as the target extends from the sensor body, the calibrated stroke is between 5 mm and 800 mm.



Warning - The M12 IEC 60947 connector may be rotated for purposes of convenient orientation of the connector and cable, however rotating the connector more than one complete revolution is not recommended.

Repeated rotation of the connector will damage the internal wiring!

Incorrect Connection Protection levels:-

- A **Not protected** – the sensor is **not** protected against either reverse polarity or over-voltage. The risk of damage should be minimal where the supply current is limited to less than 50mA.
- B & D Supply leads diode protected. Output must not be taken outside $\pm 12V$.
- C & G Supply leads diode protected. Output must not be taken outside 0 to 12V.
- E, F & H Protected against any misconnection within the rated voltage.

For further information please contact:

www.positek.com sales@positek.com

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Positek Ltd, Andoversford Industrial Estate, Cheltenham GL54 4LB. U.K.

P111-19m