LIPS® S114 SUBMERSIBLE STAND-ALONE LINEAR POSITION SENSOR

Position feedback for industrial and scientific applications

- **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 IP68 10Bar**

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 S114 LIPS® (Linear Inductive Position Sensor) is an affordable, durable, high-accuracy position sensor. The S114 is an affordable, durable, high-accuracy position sensor. Derived from the P101, it is designed for applications where the sensor would be completely submerged during normal operation, it retains desirable features such as compact size, good sensor performance yet capable of working at pressure. The S114, like all Positek® sensors, provides a linear output proportional to travel. Each unit 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. Overall performance, repeatability and stability are outstanding over a wide temperature range. The sensor is easy to install with mounting options including M5 stainless steel 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 300mm of travel. The S114 also offers a selection of mechanical and electrical options, environmental sealing is to IP68 10Bar.

SPECIFICATION

Dimensions	
Body diameter	35 mm
Body length (Axial version)	calibrated travel + 168 mm
Body length (Radial version)	calibrated travel + 189 mm
Push rod extension	calibrated travel + 9 mm, OD 9.5 mm
For full mechanical details see drawing S114-11	
Independent Linearity	≤ ± 0.25% FSO @ 20°C - up to 450 mm
	≤ ± 0.5% FSO @ 20°C - over 450 mm
	≤ ± 0.1% FSO @ 20°C* available upon request.
*Sensors with calibrated travel from 10 mm up to 400 mm.	
Temperature Coefficients	< ± 0.01%/°C Gain &
	< ± 0.01%FS/°C Offset
Frequency Response	> 10 kHz (-3dB)
	> 300 Hz (-3dB) 2 wire 4 to 20 mA
Resolution	Infinite
Noise	< 0.02% FSO
Environmental Temperature Limits (Non Icing)	
Operating	-40°C to +125°C standard
	-20°C to +85°C buffered
Storage	-40°C to +125°C
Sealing	IP68 10 Bar
EMC Performance	EN 61000-6-2, EN 61000-6-3
Vibration	IEC 68-2-6: 10 g
Shock	IEC 68-2-29: 40 g
MTBF	350,000 hrs 40°C Gf
Drawing List	
S114-11	Sensor Outline

Drawings, in AutoCAD® dwg or dxf 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.

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Position feedback for industrial and scientific applications

How Positek's PIPS® technology eliminates wear for longer life

Positek's **PIPS®** technology (Positek Inductive Position Sensor) is a major advance in displacement sensor design. PIPS®-based displacement transducers have the simplicity of a potentiometer with the life of an LVDT/RVDT.

PIPS® technology combines the best in fundamental inductive principles with advanced micro-electronic integrated circuit technology. A PIPS® 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.

PIPS® 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.

Our LIPS® range are linear sensors, while RIPS® are rotary units and TIPS® are for detecting tilt position. Ask us for a full technical explanation of PIPS® technology.

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. ± 0.5V.	5kΩ min.
Buffered:		
0.5-4.5V dc	+24V dc nom. + 9-28V.	5kΩ min.
±5V dc	±15V dc nom. ± 9-28V.	5kΩ min.
0.5-9.5V dc	+24V dc nom. + 13-28V.	5kΩ min.
±10V dc	±15 V dc nom. ± 13.5-28V.	5kΩ min.
Supply Current	10mA typical, 20mA maximum.	
4-20mA (2 wire)	+24 V dc nom. + 18-28V.	300Ω @ 24V.
(3 wire sink)	+24 V dc nom. + 13-28V.	950Ω @ 24V.
(3 wire source)	+24 V dc nom. + 13-28V.	300Ω max.

CONNECTOR/CABLE OPTIONS

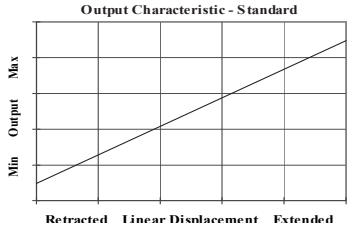
Cable with Pg 7 gland Axial or Radial, IP68 10 Bar

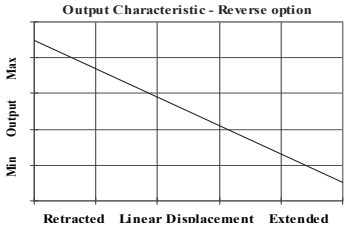
Cable length >50 cm – please specify length in cm

MOUNTING OPTIONS

M5 rod eye bearing (radial versions), Body Tube Clamp/s (axial or radial versions).

PUSH ROD OPTIONS – standard retained with M5x0.8 female thread, M5 rod eye bearing, Dome end, Sprung loaded (retraction or extension) or Free.





LIPS® SERIES S114 Submersible Stand-Alone Linear Position Sensor

	a	b	c	d	e	f	g	h
S114	. Displacement	Output	Connections	Option	Option	Option	Option	Z-code

a **Displacement** (mm)		**Value**
Displacement in mm	e.g. 0 - 254 mm	**254**

b **Output**		
Supply V dc V_s (tolerance)	**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 **Connections** Cable* or Connector		**Code**
Cable Gland - Radial	IP67 Pg7	**Ixx**
Cable Gland - Axial	IP67 Pg7	**Lxx**

*Supplied with 50 cm as standard, specify required cable length specified in cm. e.g. L2000 specifies cable gland with 20 metres of cable. Nb: restricted cable pull strength.

d **Body Fittings**		**Code**
None - default		blank
M5 Rod-eye Bearing	Radial body style only	**N**
Body Clamps - 1 pair		**P**
Body Clamps - 2 pairs		**P2**

e **Sprung Push Rod**		**Code**
None - default		blank
Spring Extend	Up to 300mm displacement. Captive push rod only.	**R**
Spring Retract		**S**

f **Push Rod Fittings**		**Code**
None - default	Female Thread M5x0.8x9 deep	blank
Dome end	Required for option 'R'	**T**
M5 Rod-eye Bearing		**U**

g Push Rod Options		**Code**
Captive - default	Push rod is retained	blank
Non-captive	Push rod can depart body	**V**

h **Z-code**	**Code**
≤± 0.1% @20°C Independent Linearity displacement between 10mm & 400mm only!	**Z650**

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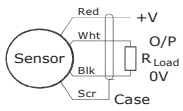
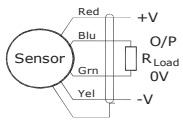
Installation Information
LIPS® S114 SUBMERSIBLE STAND-ALONE LINEAR POSITION SENSOR

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)	≥ 5kΩ
B	±5V	±15V nom. (±9 - 28V)	≥ 5kΩ
C	0.5 - 9.5V	+24V nom. (13 - 28V)	≥ 5kΩ
D	±10V	±15V nom. (±13.5 - 28V)	≥ 5kΩ
E	4 - 20mA 2 wire Current Loop	+24V nom. (18 - 28V)	≈ 0 - 300Ω max. @24V ~ 1.2 to 6V across 300Ω {R_L max. = (V_s - 18) / 20^{-3}}
F	4 - 20mA 3 wire Sink	+24V nom. (13 - 28V)	≈ 0 - 950Ω max. @24V ~ 3.8 to 19V across 950Ω {R_L max. = (V_s - 5) / 20^{-3}}
G	0.5 - 4.5V	+24V nom. (9 - 28V)	≥ 5kΩ
H	4 - 20mA 3 wire Source	+24V nom. (13 - 28V)	≈ 0 - 300Ω max. ~ 1.2 to 6V across 300Ω

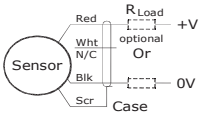
'A', 'C', 'G' & 'H'



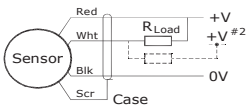
'B' & 'D'



'E'



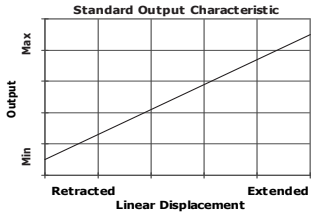
'F'



$V^{\#2}$ = +5 - +28V

Mechanical Mounting: Depending on options; Body can be mounted by M5 rod eye or by clamping the sensor body - body clamps are available, if not already ordered. Target by M5x0.8 female thread or M5 rod eye. It is assumed that the sensor and target mounting points share a common earth.
Where the free end of the cable is to be terminated in a submerged position, adequate sealing must be provided to protect connections.

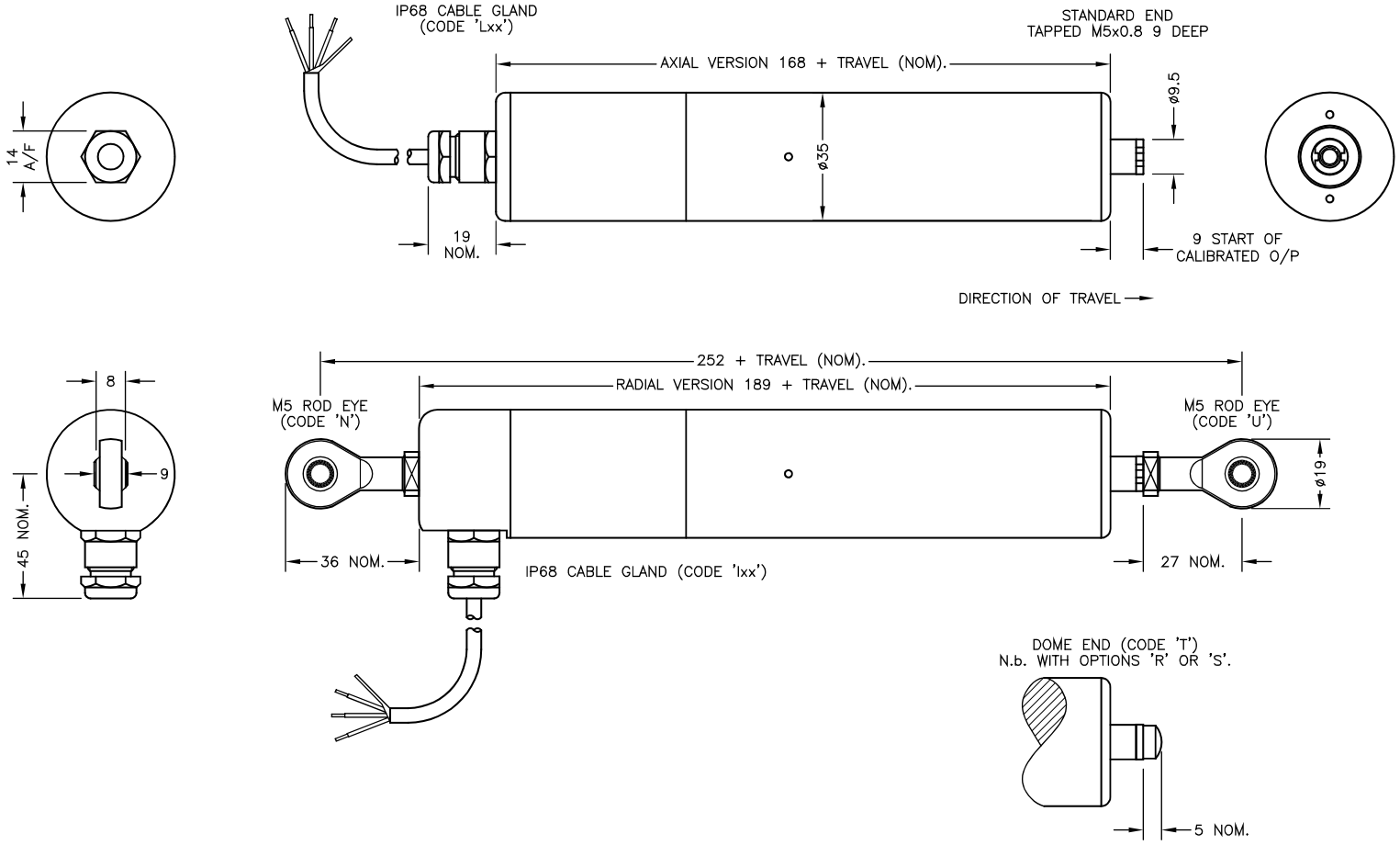
Output Characteristic: Target is extended 9 mm from end of body at start of normal travel. The output increases as the target extends from the sensor body, the calibrated stroke is between 5 and 800 mm.



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 ± 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.

N.b. ROD–EYE ORIENTATION NOT GUARANTEED.



ELECTRICAL OPTIONS/ SPECIFICATIONS

OUTPUT OPTION	OUTPUT	SUPPLY	
A	0.5 TO 4.5V RATIOMETRIC	5V	STANDARD
B	±5V	±15V	BUFFERED
C	0.5 TO 9.5V	24V	BUFFERED
D	±10V	±15V	BUFFERED
G	0.5 TO 4.5V	24V	BUFFERED
	SUPPLY CURRENT 12mA TYP. 20mA MAX.		BUFFERED
E	4 TO 20mA 2–WIRE	24V	BUFFERED
F	4 TO 20mA 3–WIRE SINK	24V	BUFFERED
H	4 TO 20mA 3–WIRE SOURCE	24V	BUFFERED

SINK VERSION OUTPUT COMPLIANCE 5–28V
SOURCE VERSION DRIVE 300Ω MAX TO 0V

CABLE: 0.2mm², O/A SCREEN, PUR JACKET – SUPPLIED WITH 50cm OR REQUIRED LENGTH IN cm. e.g. 'L50'
3–CORE: JACKET ø4mm
4–CORE: JACKET ø4.6mm
CONNECTIONS;

3 CORE	4 CORE	
RED	RED	+Ve
BLACK	GREEN	0V
	YELLOW	–Ve – OPTIONS: B OR D
WHITE	BLUE	OUTPUT
SCREEN	SCREEN	BODY – OPTIONS: A, C, E–H

RANGE OF DISPLACEMENT FROM 0–5mm TO 0–800mm e.g.76, IN INCREMENTS OF 1mm.

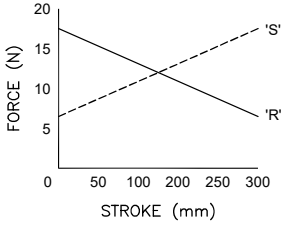
BODY MATERIAL: STAINLESS STEEL 316.

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.



SPRING FORCE v STROKE
(CODE 'R' OR 'S')

MAXIMUM WORKING DEPTH: 100 METRES/328 FEET. WHERE THE FREE END OF THE CABLE IS TO BE TERMINATED IN A SUBMERGED POSITION, ADEQUATE SEALING MUST BE PROVIDED TO PROTECT CONNECTIONS.

THE PUSH–ROD RETRACTS A FURTHER 4mm NOM. FROM START OF CALIBRATED TRAVEL. STANDARD VERSIONS THE PUSH–ROD EXTENDS A FURTHER 8mm NOM. FROM END OF CALIBRATED TRAVEL, FOR SPRUNG VERSIONS: 'R': 1mm, 'S': 2mm.
'V' CODED PUSH–ROD WILL DEPART SENSOR BODY.

A	FIRST ISSUE ~ RAN1044	RDS
B	RANGE WAS 50-600mm RAN1056	RDS
C	OPTION 'S' ADDED ~ RAN1108	PDM
D	RANGE NOTE AMENDED ~ RAN1200	PDM
E	THREAD FORM AMENDED ~ RAN1285	PDM

CE

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.

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A	16/10/15	CHECKED BY	X ±0.4
B	09/11/15	RDM	X.X ±0.2
C	14/09/16		X.XX ±0.1
D	05/09/17		DIMS mm
E	01/04/19		

DESCRIPTION
S114 SUBMERSIBLE STAND-ALONE LINEAR POSITION SENSOR

SCALE 12.5mm

DRAWING NUMBER S114-11 REV E

SHEET 1 OF 1