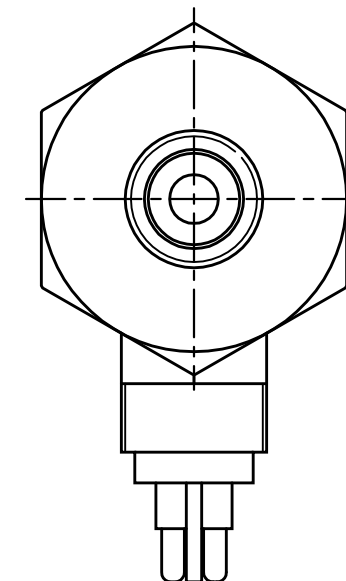
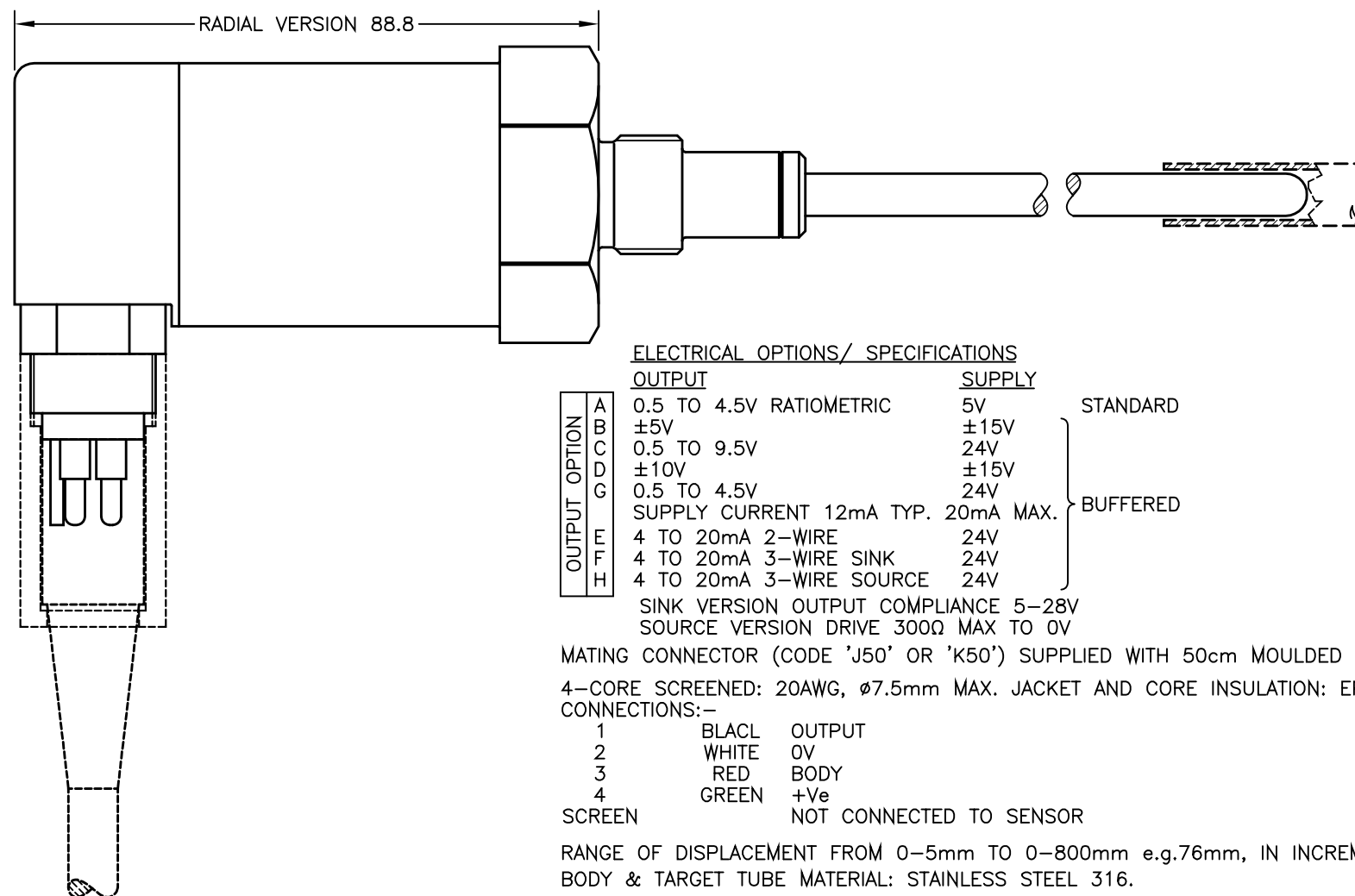
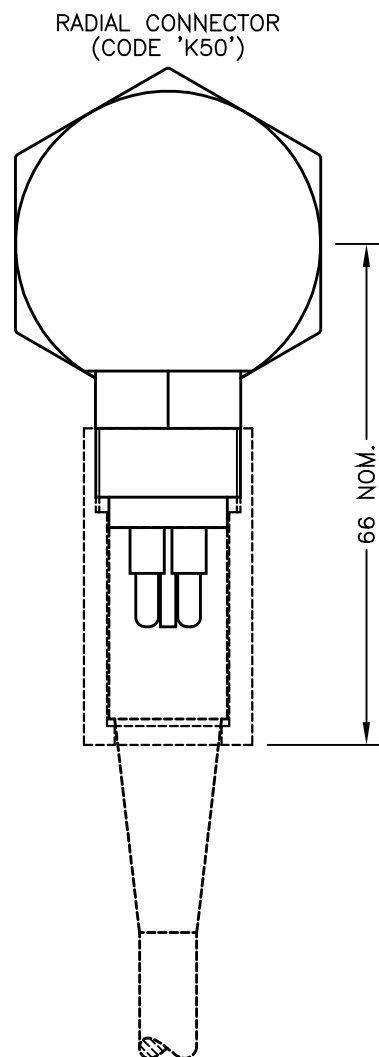
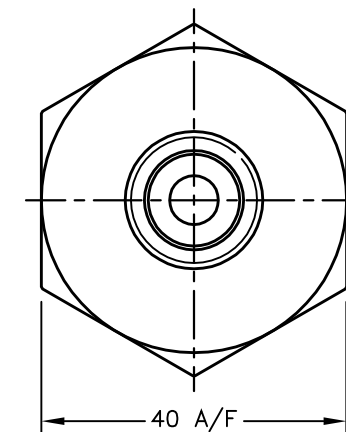
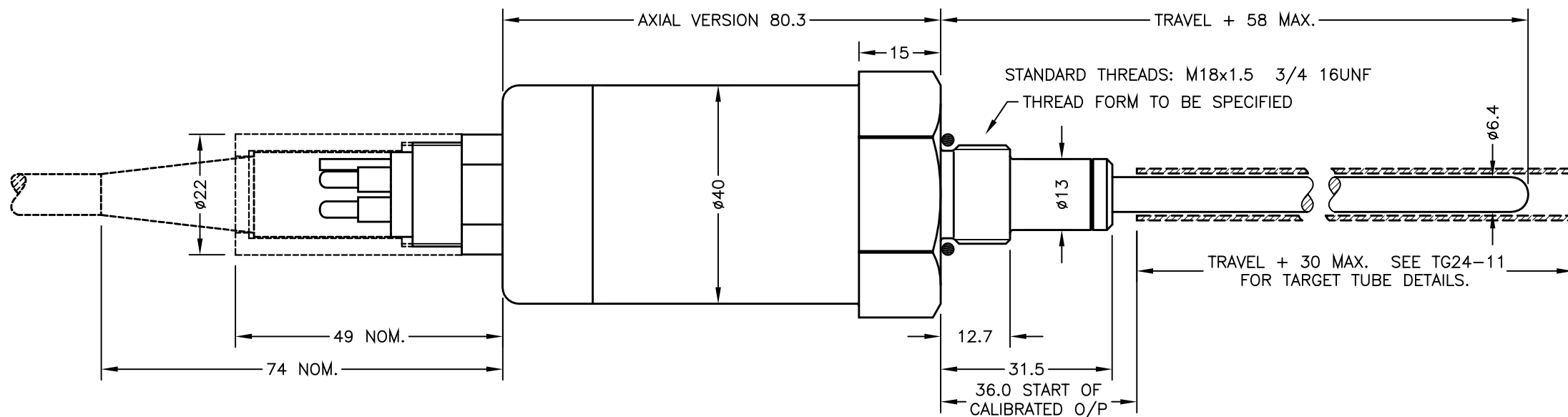
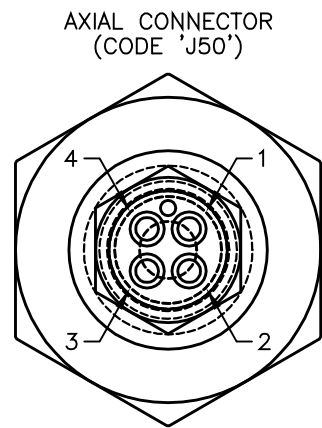


CONNECTORS; MICRO MINI WETMATE, 4-POLE.  
BULKHEAD; MCBH-4-MP-SS, STAINLESS STEEL/MOLDED NEOPRENE, SEALING; 340 BAR OPEN FACE, 600 BAR MATED.  
IN-LINE; MCIL-4-FS, MOLDED NEOPRENE WITH CABLE. LOCKING SLEEVE; MCDLS-F, DELRIN.



### ELECTRICAL OPTIONS/ SPECIFICATIONS

| OUTPUT                               |                          | SUPPLY                   |           |          |
|--------------------------------------|--------------------------|--------------------------|-----------|----------|
| OUTPUT OPTION                        | A                        | 0.5 TO 4.5V RATIO-METRIC | 5V        | STANDARD |
|                                      | B                        | ±5V                      | ±15V      |          |
|                                      | C                        | 0.5 TO 9.5V              | 24V       |          |
|                                      | D                        | ±10V                     | ±15V      | BUFFERED |
|                                      | G                        | 0.5 TO 4.5V              | 24V       |          |
|                                      | SUPPLY CURRENT 12mA TYP. |                          | 20mA MAX. |          |
|                                      | F                        | 4 TO 20mA 2-WIRE         | 24V       |          |
|                                      | H                        | 4 TO 20mA 3-WIRE SINK    | 24V       |          |
|                                      | 4 TO 20mA 3-WIRE SOURCE  | 24V                      |           |          |
| SINK VERSION OUTPUT COMPLIANCE 5-28V |                          |                          |           |          |
| SOURCE VERSION DRIVE 3000 MAX TO 0V  |                          |                          |           |          |

MATING CONNECTOR (CODE 'J50' OR 'K50') SUPPLIED WITH 50cm MOULDED CABLE AS STANDARD.

4-CORE SCREENED: 20AWG, Ø7.5mm MAX. JACKET AND CORE INSULATION: EPDM.

CONNECTIONS:-

|   |       |        |
|---|-------|--------|
| 1 | BLACK | OUTPUT |
| 2 | WHITE | 0V     |
| 3 | RED   | BODY   |
| 4 | GREEN | +Ve    |

SCREEN NOT CONNECTED TO SENSOR

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

BODY & TARGET TUBE MATERIAL: STAINLESS STEEL 316.

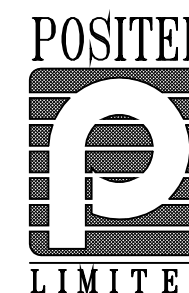
SEE P100-12 FOR DETAILS TYPICAL TARGET TUBE MOUNTING ARRANGEMENTS



MAXIMUM WORKING PRESSURE; HYDRAULIC / PNEUMATIC CYLINDER AND EXTERNAL WATER PRESSURE MUST NOT EXCEED 350 BAR.  
WHERE THE FREE END OF THE CABLE IS TO BE TERMINATED IN A SUBMERGED POSITION, ADEQUATE SEALING MUST BE PROVIDED TO PROTECT CONNECTIONS.

|   |                       |     |
|---|-----------------------|-----|
| A | FIRST ISSUE ~ RAN1219 | PDM |
|   |                       |     |
|   |                       |     |
|   |                       |     |
|   |                       |     |
|   |                       |     |

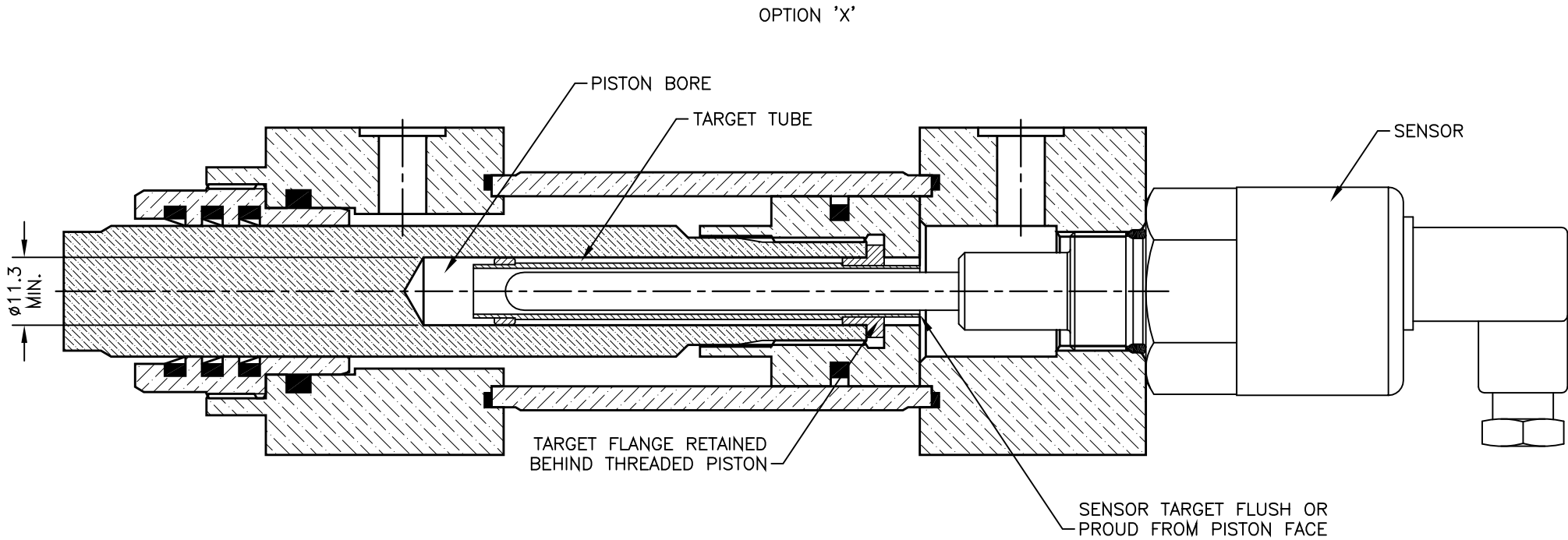
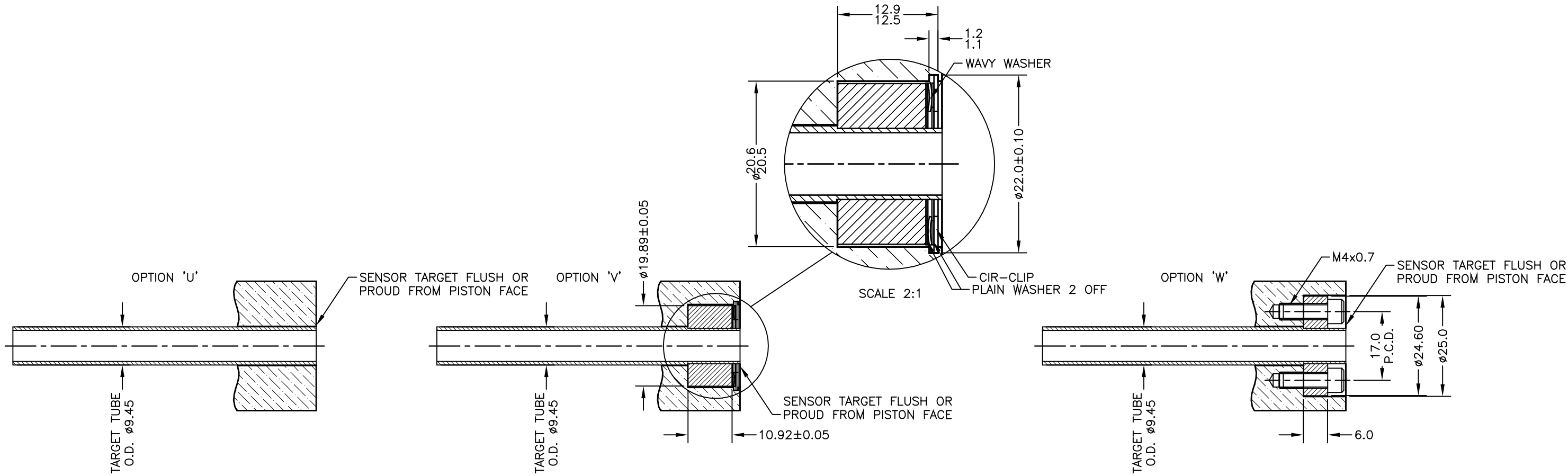


DRAWINGS NOT TO BE CHANGED WITHOUT REFERENCE TO THE CHANGE PROCEDURE.  
 CHANGES TO PARTS USED IN INTRINSICALLY SAFE PRODUCT MUST BE APPROVED  
 BY THE AUTHORISED PERSON  
 THIS IS AN UNCONTROLLED PRINT AND WILL NOT BE UPDATED.



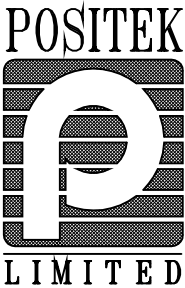
|  |          |   |            |         |  |   |   |
|--|----------|---|------------|---------|--|---|---|
| A  | 23/11/17 |  | CHECKED BY | X       | ±0.0   |   |   |
|  |          |   | RDS        | X.X     | ±0.2   |   |   |
|  |          |   |            | X.XX    | ±0.1   |   |   |
|  |          |   |            | DIMS    | mm   |   |   |
|  |          | DESCRIPTION   |            |         |  |   |   |
|  |          | S120 350 BAR SUBMERSIBLE  |            |         |  |   |   |
|  |          | LIPS CYLINDER LINEAR  |            |         |  |   |   |
|  |          | POSITION SENSOR   |            |         |  |   |   |
| SCALE<br>10mm<br> |          | DRAWING<br>NUMBER   |            | S120-11 | REV <table><tr><td>A</td></tr></table>                                   | A |   |
| A  |          |   |            |         |  |   |   |
|  |          |   |            | SHEET   | <table><tr><td>1</td></tr></table> OF <table><tr><td>1</td></tr></table> | 1 | 1 |
| 1  |          |   |            |         |  |   |   |
| 1  |          |   |            |         |  |   |   |

SEE DRAWING TG24-11 FOR TARGET TUBE FLANGE OPTIONS 'V', 'W' & 'X'.



|   |                                |     |
|---|--------------------------------|-----|
| A | FIRST ISSUE.                   | RDS |
| B | REDRAWN.                       | PDM |
| C | WORDING AMMENDED               | RDS |
| D | TARGET NOTES AMENDED - RAN1349 | PDM |
|   |                                |     |
|   |                                |     |
|   |                                |     |

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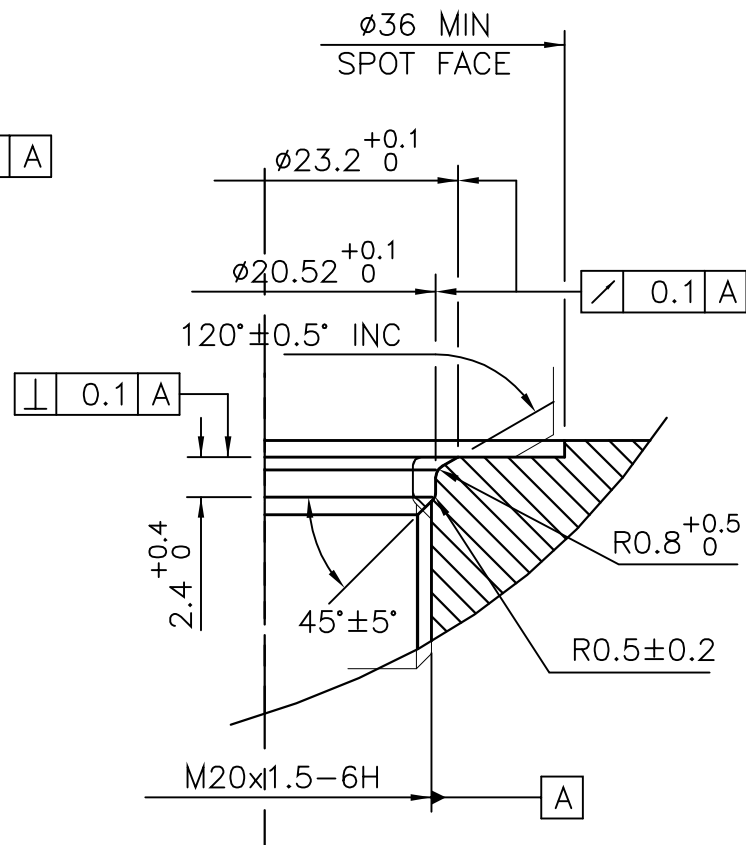
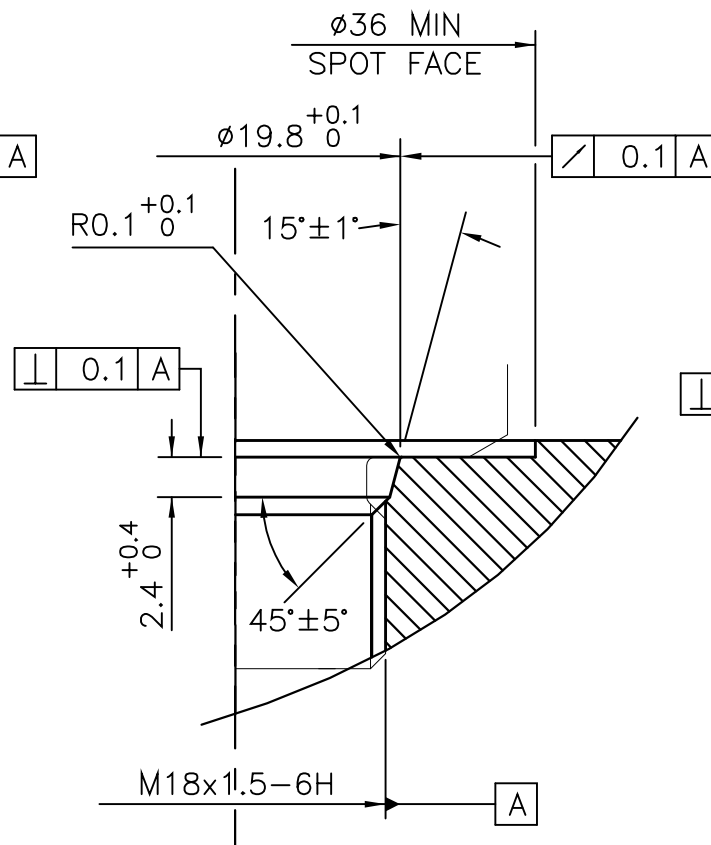
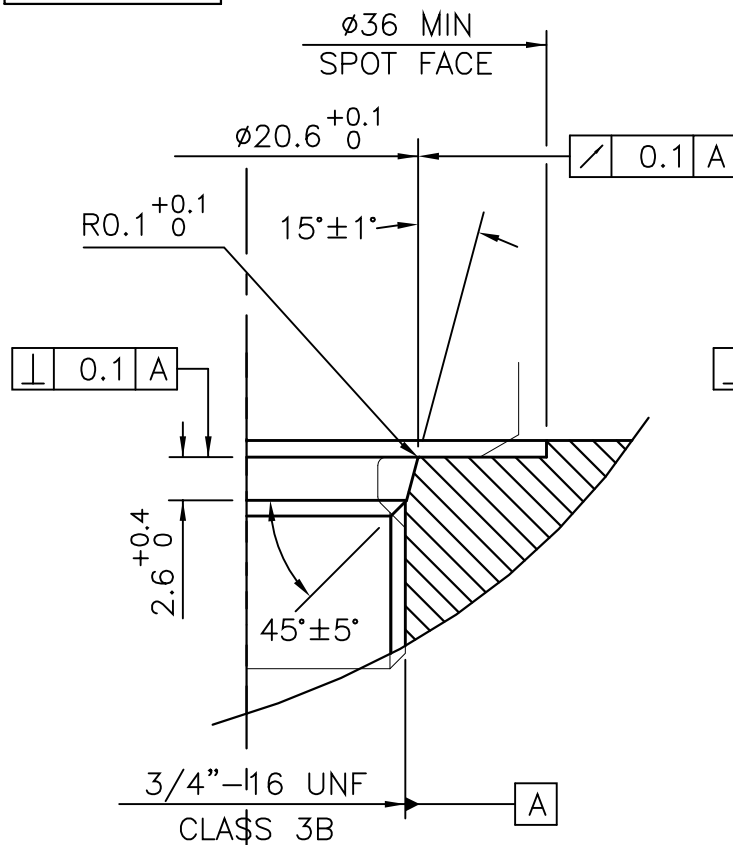
|       |          |                                     |            |              |         |
|-------|----------|-------------------------------------|------------|--------------|---------|
| A     | 28/06/95 |                                     | CHECKED BY | X            | ±0.4    |
| B     | 04/10/11 |                                     | RDM        | X.X          | ±0.2    |
| C     | 26/10/17 |                                     |            | X.XX         | ±0.1    |
| D     | 22/01/21 |                                     |            |              | DIMS mm |
|       |          | DESCRIPTION                         |            |              |         |
|       |          | TYPICAL TARGET TUBE FITTING OPTIONS |            |              |         |
|       |          |                                     |            |              |         |
|       |          |                                     |            |              |         |
| SCALE |          | DRAWING NUMBER                      |            | REV          |         |
| 10mm  |          | P100-12                             |            | D            |         |
|       |          |                                     |            | SHEET 1 OF 1 |         |

CHECKED  
AT REV.

A

RDS

DRAWING NOT TO BE CHANGED WITHOUT REFERENCE TO THE CHANGE PROCEEDURE.  
CHANGES TO PARTS USED IN INTRINSICALLY SAFE PRODUCT MUST BE APPROVED  
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|   |             |        |
|---|-------------|--------|
| A | FIRST ISSUE | COH/DS |
|---|-------------|--------|

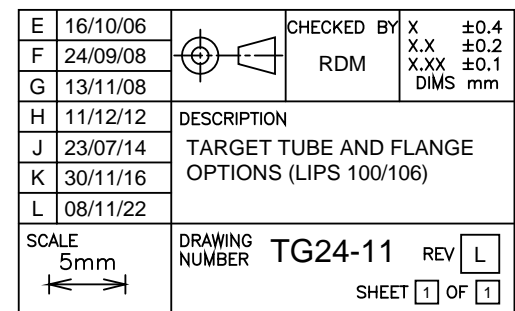
POSITEK  
**P**  
LIMITED

|  |          |                                 |   |
|--|----------|---------------------------------|---|
| A  | 29/01/95 | MATERIAL<br>SEE NOTE 1          | X $\pm 0.4$<br>X.X $\pm 0.2$<br>X.XX $\pm 0.1$<br>ALL DIMS mm |
| DESCRIPTION<br>INSTALLATION DETAILS<br>MOUNTING THREADS<br>& SEALS |          | DRAWING NUMBER<br>P100-15 REV A |   |
| SCALE<br>5mm<br>↔  |          | SHEET 1 OF 1                    |   |

3. SPECIFY DIMENSION 'x' (mm), NOT APPLICABLE CODE 'U' PLAIN TUBE.



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 CHANGES TO PARTS USED IN INTRINSICALLY SAFE PRODUCT MUST BE APPROVED  
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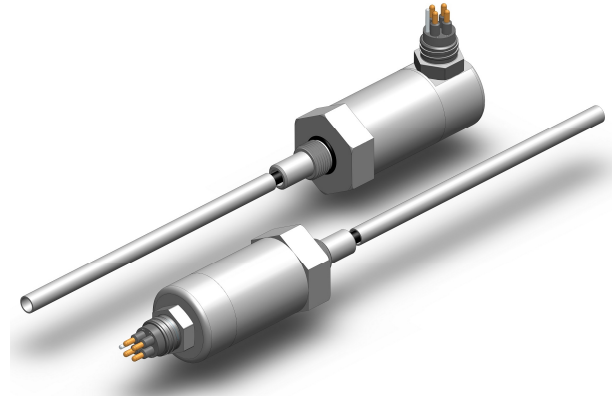




## S120 350 BAR SUBMERSIBLE CYLINDER – LINEAR POSITION SENSOR

High-resolution position feedback for hydraulic and pneumatic cylinders

- **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 350 Bar**



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 S120 is an affordable, durable, high-accuracy position sensor designed for arduous underwater hydraulic or pneumatic cylinder position feedback applications where service life, environmental resistance and cost are important. It is particularly suitable for OEMs seeking good sensor performance for arduous applications such as industrial machinery.

Overall performance, repeatability and stability are outstanding over a wide temperature range. The unit is highly compact and space-efficient, being responsive along almost its entire length. Like all Positek® sensors it 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 rugged, being made of stainless steel with an inert fluoropolymer-sheathed probe with a stainless steel target tube. The sensor is easy to install in cylinders and has a wide range of mechanical and electrical options.

Environmental sealing is to IP68 350 Bar. The maximum system pressure is limited to 350 Bar (Water pressure plus hydraulic pressure).

### SPECIFICATION

#### Dimensions

|                               |                                   |
|-------------------------------|-----------------------------------|
| Body diameter                 | 40 mm                             |
| Body Length (to seal face)    | 80.3 mm (axial), 88.8 mm (radial) |
| Probe Length (from seal face) | calibrated travel + 58 mm         |
| Target Tube Length            | calibrated travel + 30 mm         |

*For full mechanical details see drawing S120-11*

#### 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

|                             |
|-----------------------------|
| $< \pm 0.01\%$ /°C Gain &   |
| $< \pm 0.01\%$ 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

Operating -4°C to +50°C

Storage -4°C to +50°C

#### Sealing

IP68 350 Bar

#### Hydraulic Pressure

350Bar Absolute

#### EMC Performance

EN 61000-6-2, EN 61000-6-3

#### Vibration

IEC 68-2-6: 10 g

#### Shock

IEC 68-2-29: 40 g

Limit of 350 Bar for water pressure + hydraulic pressure

#### MTBF

350,000 hrs 40°C

#### Gf

#### Drawing List

|         |                                     |
|---------|-------------------------------------|
| S120-11 | Sensor Outline                      |
| P100-12 | Typical Target Installation details |
| P100-15 | Mounting Thread details             |
| TG24-11 | Optional Target Tube Flange details |

*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.**

*For further information please contact:*

[www.positek.com](http://www.positek.com) [sales@positek.com](mailto:sales@positek.com)

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

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

S120-17c

1 of 2



# S120 350 BAR SUBMERSIBLE CYLINDER – LINEAR POSITION SENSOR

High-resolution position feedback for hydraulic and pneumatic cylinders

## 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:<br>0.5-4.5V dc ratiometric | +5V dc nom. $\pm$ 0.5V.            | 5k $\Omega$ min.    |
| Buffered:<br>0.5-4.5V dc             | +24V dc nom. + 9-28V.              | 5k $\Omega$ min.    |
| $\pm$ 5V dc                          | $\pm$ 15V dc nom. $\pm$ 9-28V.     | 5k $\Omega$ min.    |
| 0.5-9.5V dc                          | +24V dc nom. + 13-28V.             | 5k $\Omega$ min.    |
| $\pm$ 10V dc                         | $\pm$ 15 V dc nom. $\pm$ 13.5-28V. | 5k $\Omega$ min.    |
| Supply Current                       | 10mA typical, 20mA maximum.        |                     |
| 4-20mA (2 wire)                      | +24 V dc nom. + 18-28V.            | 300 $\Omega$ @ 24V. |
| (3 wire sink)                        | +24 V dc nom. + 13-28V.            | 950 $\Omega$ @ 24V. |
| (3 wire source)                      | +24 V dc nom. + 13-28V.            | 300 $\Omega$ max.   |

### CONNECTOR

Wet mate 4 pin MC BH-4-M (axial or radial)  
Supplied with a connector and 0.5 m, 4x0.5mm<sup>2</sup> cable assembly as standard.  
Mating connector with longer lengths available.

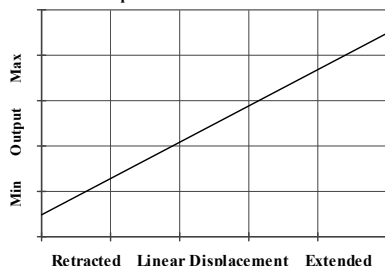
### MOUNTING THREAD OPTIONS

M18 or 3/4 UNF 40 mm hex A/F,  $\varnothing$  40 mm seal face.  
Supplied with O-ring seal.

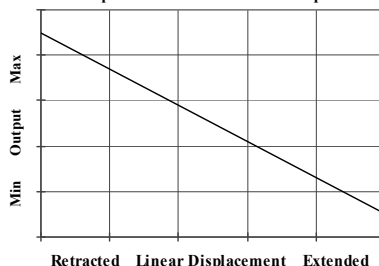
### FLANGE OPTIONS

Penny & Giles HLS120, Temposonics (M4 fixing) and Parker Hannifin cylinders versions available.

Output Characteristic - Standard



Output Characteristic - Reverse option



For further information please contact:

[www.positek.com](http://www.positek.com) [sales@positek.com](mailto:sales@positek.com)

Tel: +44(0)1242 820027 fax: +44(0)1242 820615  
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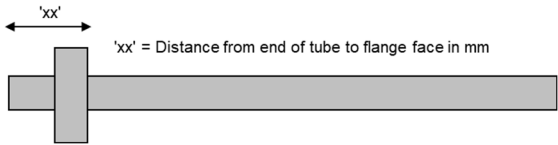
S120-17c

2 of 2

S120 350 Bar Submersible Cylinder – Linear Position Sensor

|      |              |        |             |        |        |
|------|--------------|--------|-------------|--------|--------|
| a    | b            | c      | d           | e      | f      |
| S120 | Displacement | Output | Connections | Option | Option |
|      |              |        |             |        | Z-code |

| a Displacement (mm)   |   | Value |
|---|---|-------|
| Displacement in mm  | e.g. 0 - 254 mm   | 254   |
| b Output  |   |       |
| Supply V dc<br>Vs (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   |   | Code  |
| Connector - Radial  | IP68 350 Bar Wet mate 4 pin MC  | K50   |
| Connector - Axial   | BH-4-M plus pre-wired mating connector with 50 cm 4-core cable.             | J50   |
| d Mounting Thread   |   | Code  |
| 3/4 16 UNF  | Hex. 40 mm A/F, Ø 40 mm seal face.  | P     |
| M18 x 1.5   | Supplied with O-ring seal.  | T     |
| See P100-15 Drawing for Mating Thread Details.                              |   |       |
| e Target Tube Mounting Flange   |   | Code  |
| None  |   | U     |
| Penny & Giles HLP100  | Please specify flange position in mm.                                       | Vxx   |
| Temposonics (M4 fixing)   | eg. W17.5 specifies a Tempo style flange fitted 17.5 mm from the front face | Wxx   |
| Parker Hannifin   |   | Xxx   |
| See TG24-11 Drawing for Target Details.                                     |   |       |
| f Z-code  |   | Code  |
| ≤± 0.1% @20°C Independent Linearity displacement between 10mm & 400mm only! |   | Z650  |

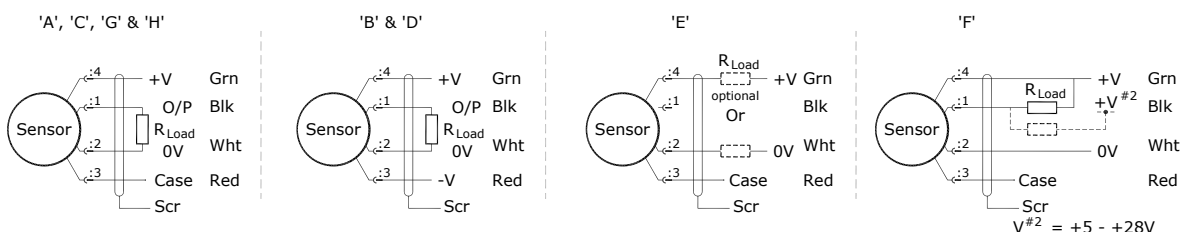
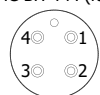


# Installation Information

## S120 350 BAR SUBMERSIBLE CYLINDER – LINEAR POSITION SENSOR

| Output Option | Output Description:                  | Supply Voltage:<br>$V_s$ (tolerance) | Load resistance:<br>(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 $\sim 1.2$ to 6V across 300 $\Omega$ $\{R_L \text{ max.} = (V_s - 18) / 20^{-3}\}$ |
| F             | 4 - 20mA 3 wire Sink                 | +24V nom. (13 - 28V)                 | $\approx 0 - 950\Omega$ max. @24V $\sim 3.8$ to 19V across 950 $\Omega$ $\{R_L \text{ max.} = (V_s - 5) / 20^{-3}\}$ |
| 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. $\sim 1.2$ to 6V across 300 $\Omega$  |

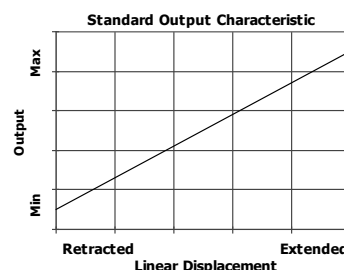
Connector Pin Layout:  
MC BH 4 M (face view)



**Mechanical Mounting:** Via mounting thread, maximum tightening torque: 100Nm. See drawing P100-15, Installation Details Mounting Threads & Seals. An O ring seal is provided, size BS908 for 3/4 UNF thread or 14.3 x 2.4 for M18 thread. Install the target tube using the flange provided or fix directly into the piston rod using adhesive for instance, the end of the target tube can be proud or flush with the piston end face as required.

N.b. cable free end must be appropriately terminated to prevent water ingress into the cable. **See page 2 for connector handling instructions.** The sensor is sealed to IP68 350 Bar.

**Output Characteristic:** Target position at start of normal travel is 36.0 mm from seal face. The output increases as the target is moved away from the sensor body, the calibrated stroke is between 5 mm 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  $\pm 12V$ .
- 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:

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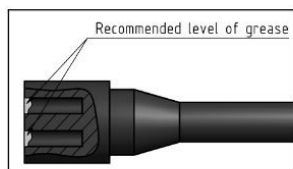
### Handling

- Always apply grease before mating
- Disconnect by pulling straight, not at an angle
- Do not pull on the cable and avoid sharp bends at cable entry
- When using a bulkhead connector, ensure that there are no angular loads
- Do not over-tighten the bulkhead nuts
- SubConn® connectors should not be exposed to extended periods of heat or direct sunlight. If a connector becomes very dry, it should be soaked in fresh water before use

### Cleaning

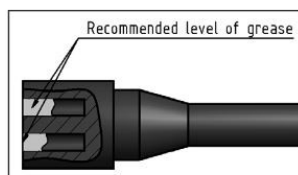
- General cleaning and removal of any accumulated sand or mud on a connector should be performed using spray based contact cleaner (isopropyl alcohol)
- New grease must be applied again prior to mating

### Greasing and mating above water (dry mate)



- Connectors must be greased with Molykote 44 Medium before every mating
- A layer of grease corresponding to minimum 1/10 of socket depth should be applied to the female connector
- The inner edge of all sockets should be completely covered, and a thin transparent layer of grease left visible on the face of the connector
- After greasing, fully mate the male and female connector in order to secure optimal distribution of grease on pins and in sockets
- To confirm that grease has been sufficiently applied, de-mate and check for grease on every male pin. Then re-mate the connector

### Greasing and mating under water (wet mate)



- Connectors must be greased with Molykote 44 Medium before every mating
- A layer of grease corresponding to approximately 1/3 of socket depth should be applied to the female connector
- All sockets should be completely sealed, and transparent layer of grease left visible on the face of the connector
- After greasing, fully mate the male and female connector and remove any excess grease from the connector joint

For further information please contact:

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