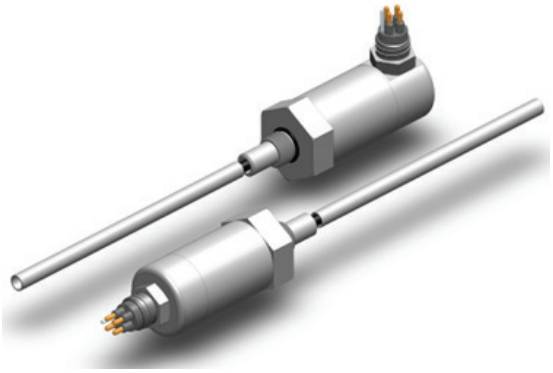
mm **S120**

APPLICATION

- 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, Althen 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 Althen 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).

SPECIFICATIONS

Dimensions[1]	
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, Ø9.45 mm
Independent Linearity	≤ ± 0.25% FSO @ 20°C - up to 450 mm ≤ ± 0.5% FSO @ 20°C - over 450 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	
Operating	-4°C to +50°C
Storage	-4°C to +50°C
Sealing	IP68 350 Bar
Hydraulic Pressure	350Bar Absolute Limit of 350 Bar for water pressure + hydraulic pressure
EMC Performance	EN 61000-6-2, EN 61000-6-3
Vibration	IEC 68-2-6: 10 g
Shock	IEC 68-2-29: 40 g

06.2025 | version 0001

SPECIFICATIONS (CONTINUED)

MTBF	350,000 hrs 40°C Gf
Drawing List[2]	
S120-11	Sensor Outline
P100-12	Typical Target Installation details
P100-15	Mounting Thread details
TG24-11	Optional Target Tube Flange details

[1] *For full mechanical details see drawings S120-11*
[2] *3D models, step or .igs format, available on request*

HOW ALTHEN'S TECHNOLOGY ELIMINATES WEAR FOR LONGER LIFE

Althen'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. An Althen sensor, based on simple inductive coils using Althen'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.

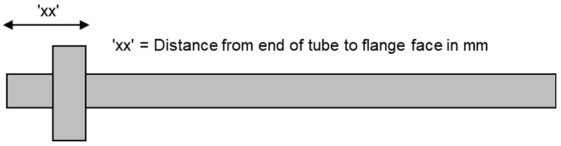
It also overcomes the drawbacks of LVDT technology – bulky coils, poor length-to-stroke ratio and the need for special magnetic materials, no requirement for separate signal conditioning.

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

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

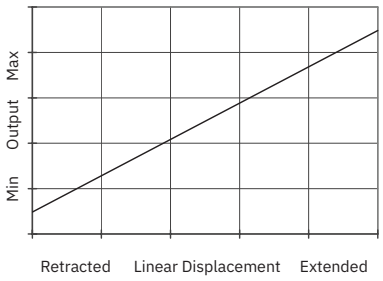
a Displacement		**Value**
Factory set to any length from 0-5 mm to 0-800 mm (e.g. 0-254 mm)		**254**
b Output		
Supply V_{dc} (tolerance)	**Output**	**Code**
+5V (4.5 - 5.5V)	0.5 - 4.5V (ratiometric with supply)	**A**
±15V nom. (±9 - 28V)	±5V	**B**
+24V nom. (13 - 28V)	0.5 - 9.5V	**C**
±15V nom. (±13.5 - 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**
Supply Current: 'A' 10mA nominal, 12mA max. 'B', 'D' & 'G' 12mA nominal, 15mA max. 'E' 26mA max. 'F' & 'H' 32mA nominal, 35mA max.		
c Connections		**Code**
Connector axial IP68 350 Bar Wet mate 4 pin MC BH-4-M		**J50**
Connector radial IP68 350 Bar Wet mate 4 pin MC BH-4-M		**K50**
Supplied with an over-moulded MC IL-4-F connector with 0.5 m, 4-core 20 AWG (0.5mm²) EPDM cable assembly, and locking collar as standard.		

d Mounting Thread		**Code**
3/4 16 UNF	Hex. 30 mm A/F, Ø 30 mm seal face. Supplied with O-ring seal.	**P**
M18 x 1.5		**T**
See P100-15 Drawing for Mating Thread Details.		
e Target Tube Mounting Flange		**Code**
None		**U**
Penny & Giles HLP100		**Vxx**
Temposonics (M4 fixing)	Please specify flange position in mm. 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.		
j Z-code (optional)		**Code**
Tighter Independent Linearity; ≤± xx% FSO @20°C ≤± 0.1% 0 - 10 mm min. to 0 - 450 mm ≤± 0.25% 0 - 451 mm to 0 - 600 mm ≤± 0.5% 0 - 601 mm to 0 - 800 mm max.		**Z650**

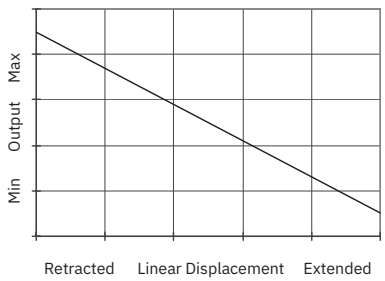


06.2025 | version 0001

Output Characteristic - Standard



Output Characteristic - Reverse option



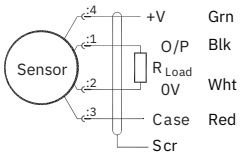
INSTALLATION INFORMATION

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 {RL 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 {RL 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

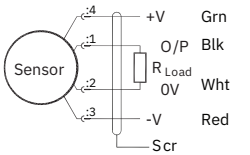
Connector Pinout Layout:

MC BH 4 M (face view)

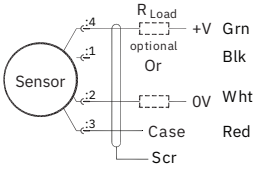
'A', 'C' , 'G' & 'H'



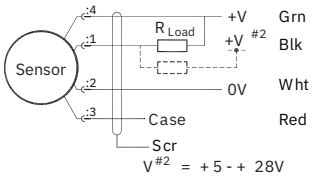
'B' & 'D'



'E'



'F'



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 - see drawing P100-12.

N.b. cable free end must be appropriately terminated to prevent water ingress into the cable. See page 2 for connector handling instructions.

INCORRECT CONNECTION PROTECTION LEVELS

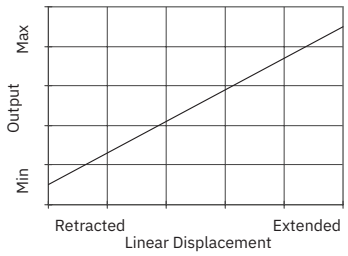
A	**Not protected** – the sensor is **not** protected against either reverse polarity or over-voltage. The risk of damage should be minimal where the supply current is limited to less than 50mA.
B & D	Supply leads diode protected. Output must not be taken outside ± 12V.
C & G	Supply leads diode protected.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

06.2025 | version 0001

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.

Standard Output Characteristic



CONNECTOR MATING INSTRUCTIONS

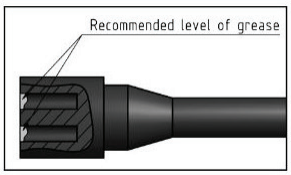
Handling

- Always apply grease mating
- Disconnect by pulling straight, not at an angle
- Do not pull on the cable and avoid sharp bends at cable entry
- When using bulkhead connector, ensure that there are no angular load
- Do not over-tighten the bulkhead nuts
- 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

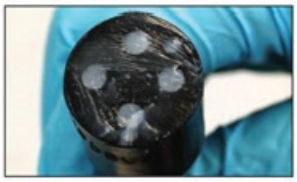
- General cleaning to remove any accumulated sand or mud on a connector should be performed using spray based contact cleaner (isopropyl alcohol)
- New grease must be applied again prior to mating

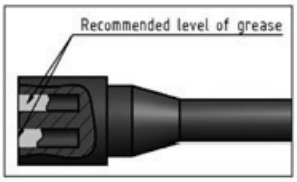
GREASING AND MATING ABOVE WATER (DRY MATE)



- Connectors must be greased with Molykote 44 Medium before every mating
- A layer of grease corresponding to approximately 1/10 of the socket depth should be applied to the female connector
- The inner edge of all the sockets should be completely covered, and a 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 the grease has been sufficiently applied, de- mate and check for grease on every male min. Then re-mate the connector

GREASING AND MATING ABOVE WATER (WET MATE)



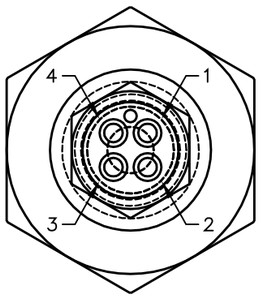


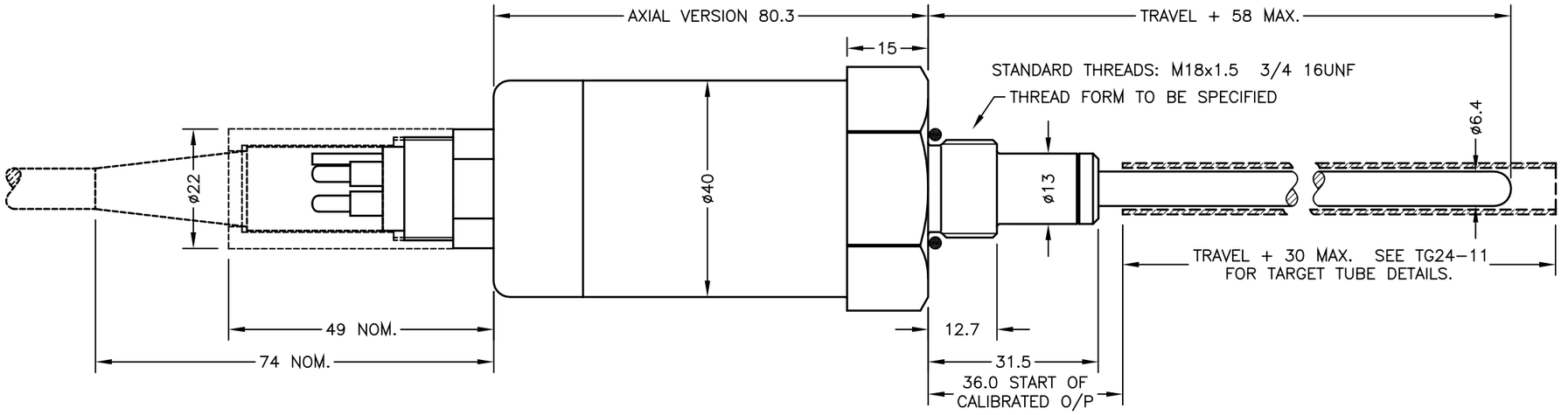
- Connectors must be greased with Molykote 44 Medium before every mating
- A layer of grease corresponding to approximately 1/3 of the socket depth should be applied to the female connector
- All sockets should be completely sealed, and a transparent layer of grease left visible on the face of the connector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

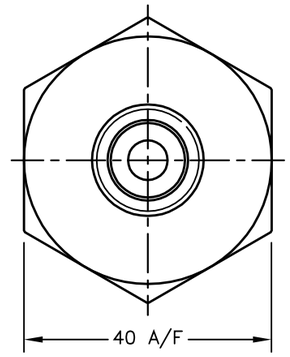
06.2025 | version 0001

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.

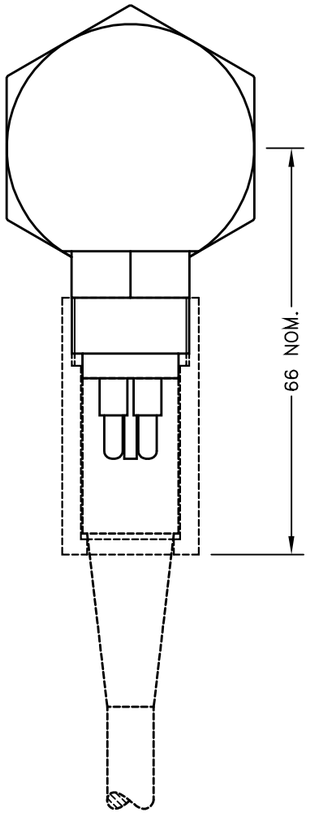
AXIAL CONNECTOR
(CODE 'J50')

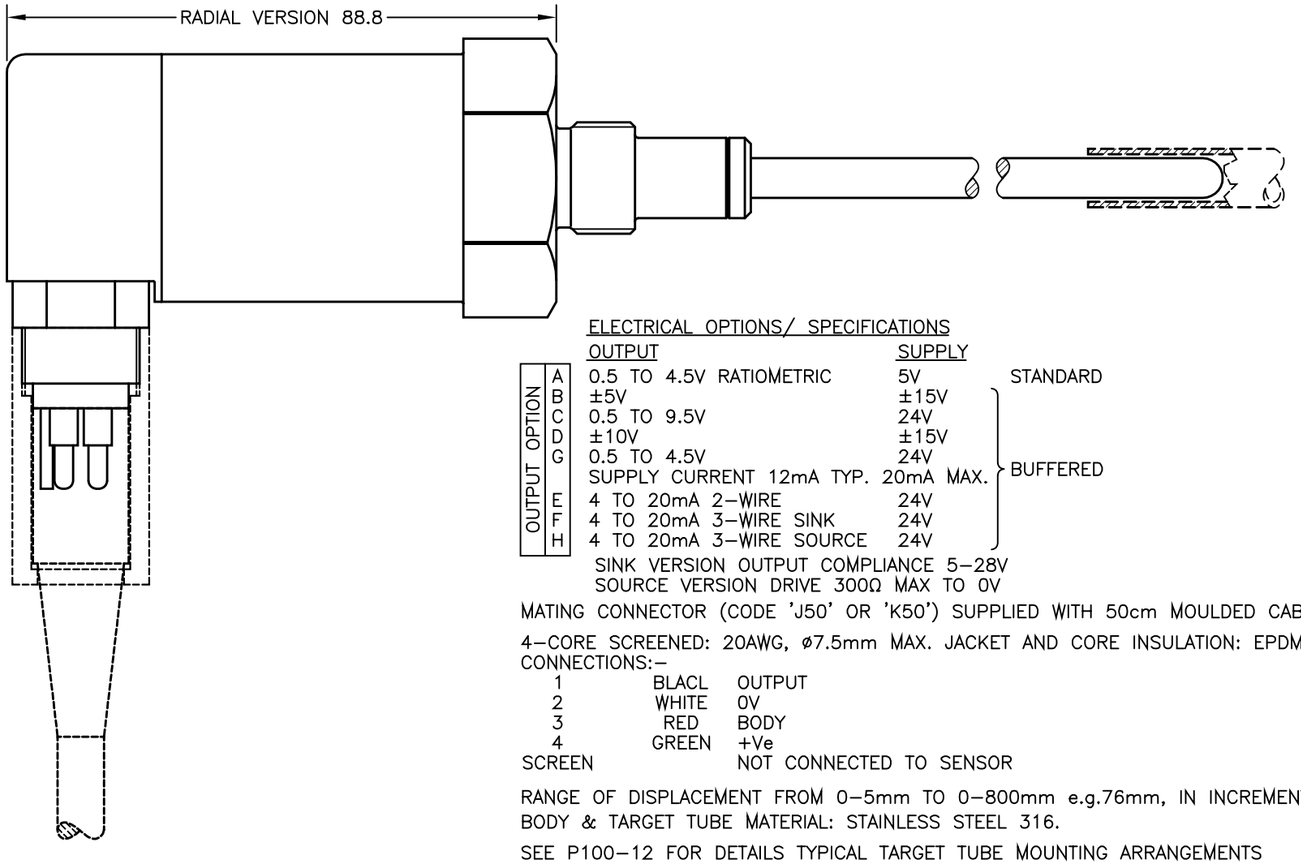


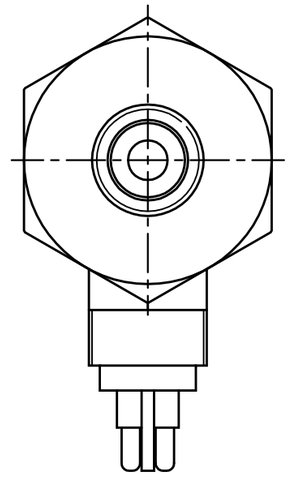




RADIAL CONNECTOR
(CODE 'K50')







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

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	BLACL	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

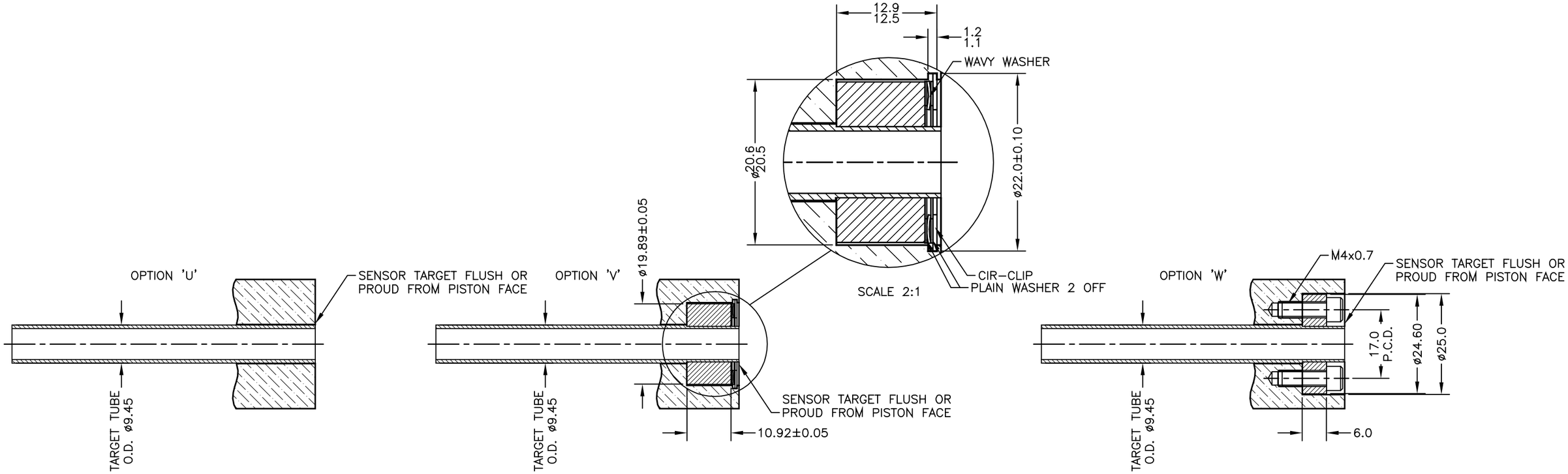
MAXIMUM WORKING PRESSURE; HYDRAULIC / PNEUMATIC CYLINDER AND EXTERNAL WATER PRESSURE MUST NOT EXCEED 350 BAR.
WHERE THE FREE END OF THE CABLE IS TO BE TERMINATED IN A SUBMERGED POSITION, ADEQUATE SEALING MUST BE PROVIDED TO PROTECT CONNECTIONS.

A	FIRST ISSUE ~ RAN1219	PDM

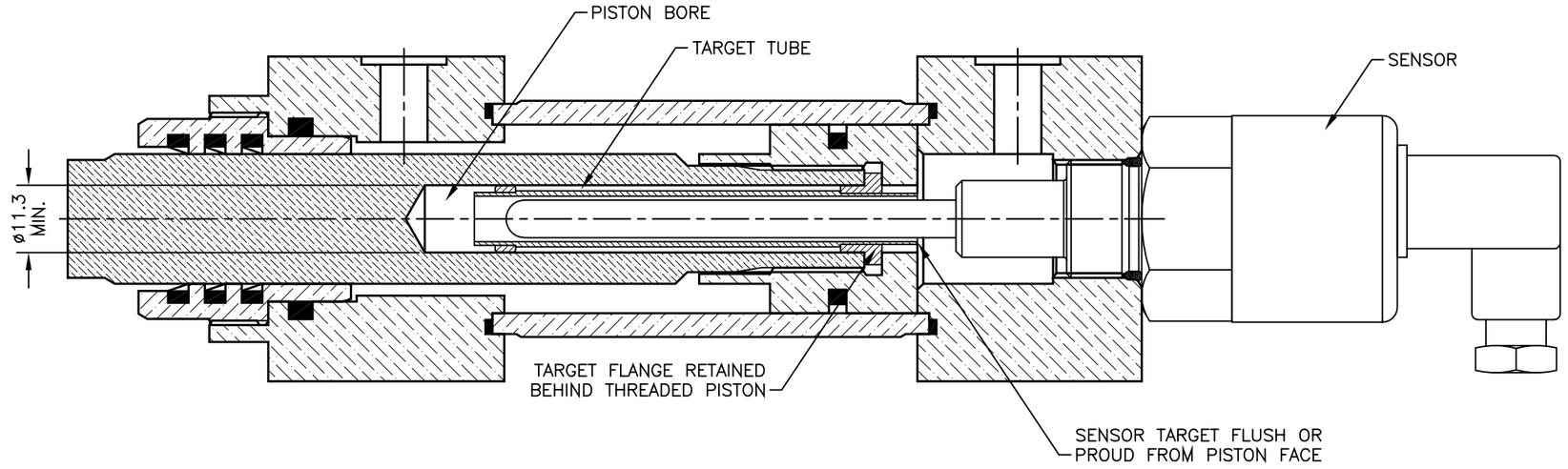
CE

A	23/11/17		CHECKED BY RDS	X ±0.4 X.X ±0.2 X.XX ±0.1 DIMS mm
		DESCRIPTION: S120 350 BAR SUBMERSIBLE LIPS CYLINDER LINEAR POSITION SENSOR		
SCALE 10mm		DRAWING NUMBER S120-11	REV A	SHEET 1 OF 1

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



OPTION 'X'



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

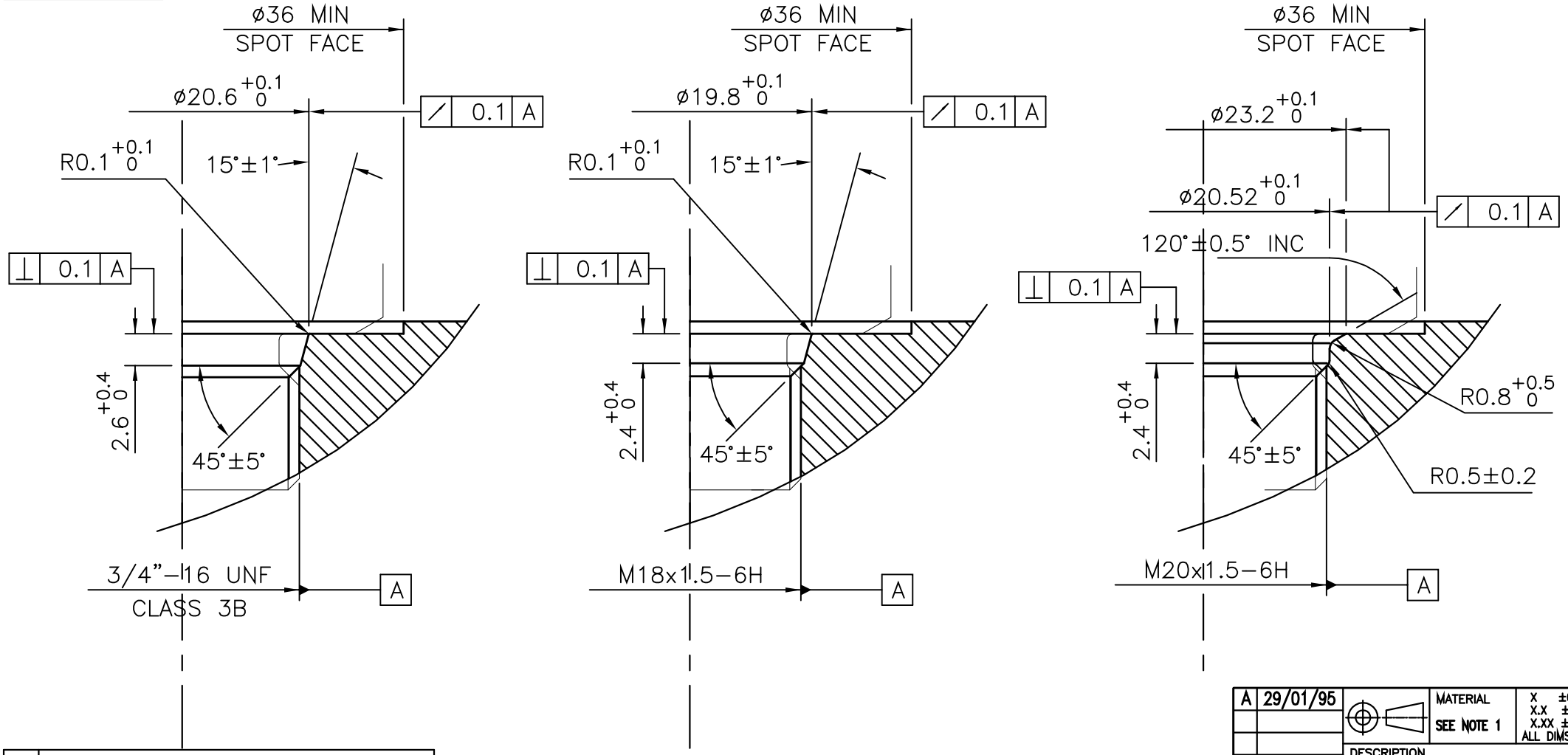
DRAWINGS NOT TO BE CHANGED WITHOUT REFERENCE TO THE CHANGE PROCEDURE.
CHANGES TO PARTS USED IN INTRINSICALLY SAFE PRODUCT MUST BE APPROVED BY THE AUTHORISED PERSON
THIS IS AN UNCONTROLLED PRINT AND WILL NOT BE UPDATED.

A	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 10mm		DRAWING NUMBER P100-12		REV D
				SHEET 1 OF 1

CHECKED AT REV. A

RDS

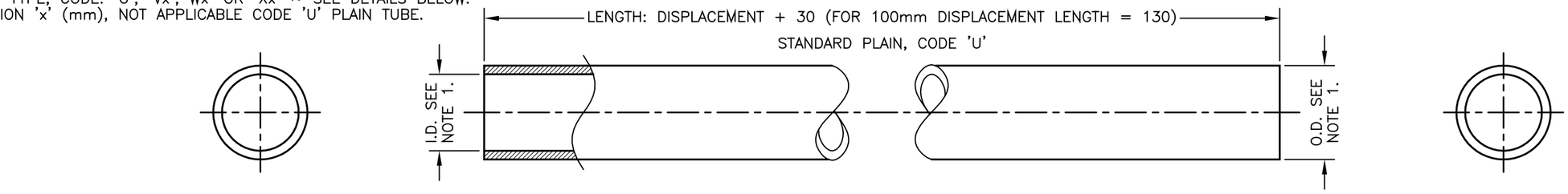
DRAWING NOT TO BE CHANGED WITHOUT REFERENCE TO THE CHANGE PROCEEDURE.
CHANGES TO PARTS USED IN INTRINSICALLY SAFE PRODUCT MUST BE APPROVED
BY THE AUTHORISED PERSON
THIS IS AN UNCONTROLLED PRINT AND WILL NOT BE UPDATED

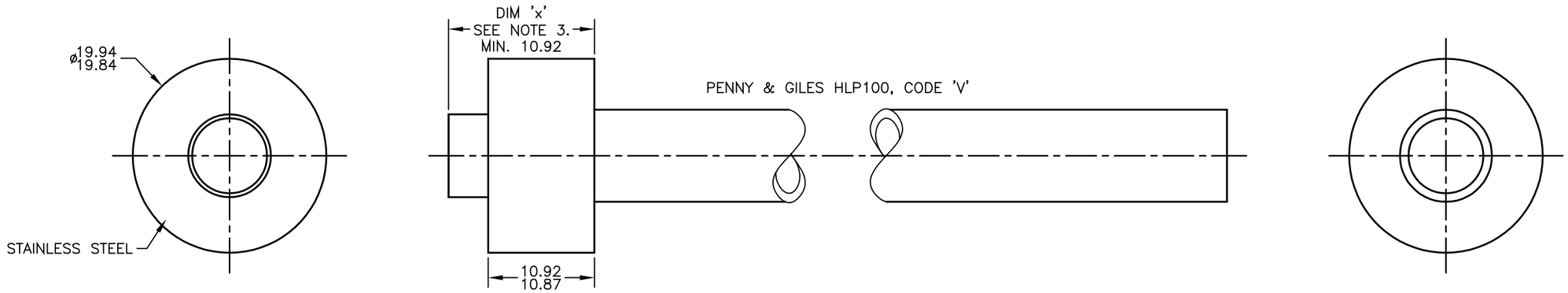


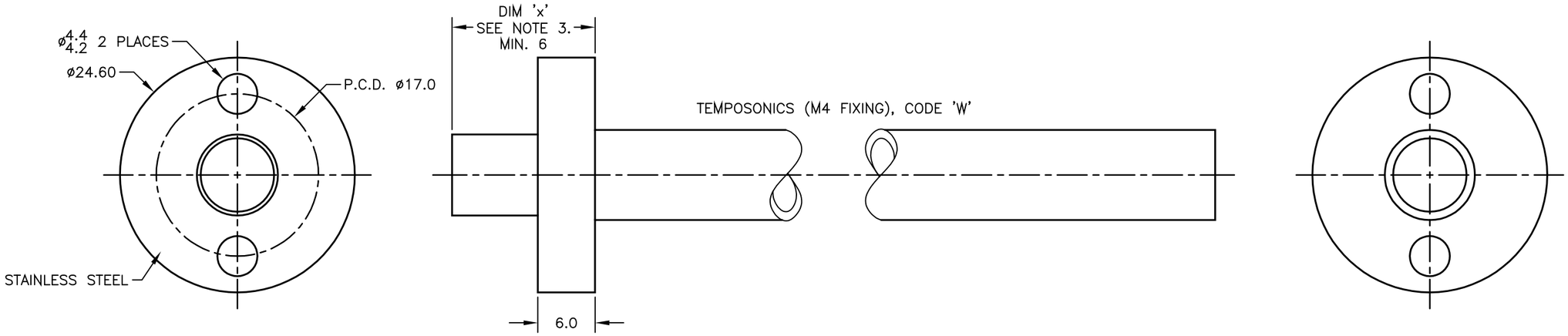
A	FIRST ISSUE	COH/DS

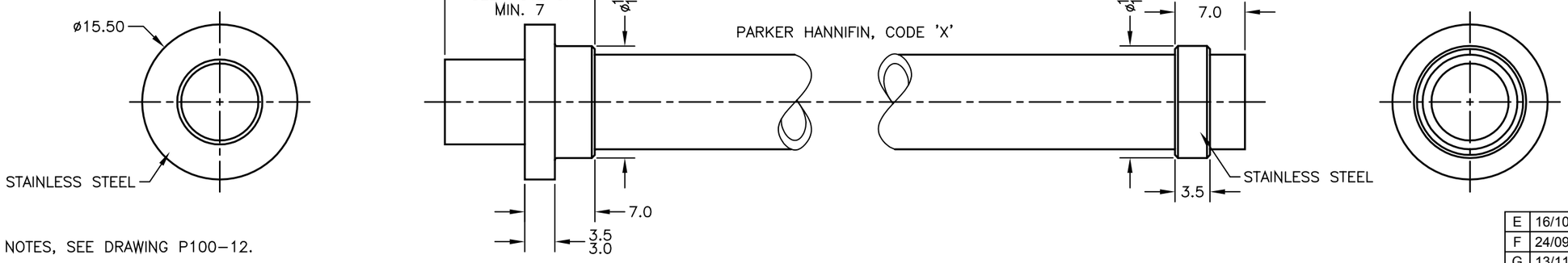
A	29/01/95	MATERIAL SEE NOTE 1	X ±0.4 X.X ±0.2 X.XX ±0.1 ALL DIMS mm
		DESCRIPTION INSTALLATION DETAILS MOUNTING THREADS & SEALS	
		SCALE 5mm	DRAWING NUMBER P100–15 REV A SHEET 1 OF 1

TARGET TUBE OPTION NOTES:–
1. SPECIFY TUBE MATERIAL; CODE:–
   'R' STAINLESS STEEL 316 ø9.45.
   'S' ALUMINIUM 6063 ø3/8" (9.2–9.8). NOTE! ONLY AVAILABLE WITH P100 OR P106 VERSIONS.
2. SPECIFY FLANGE TYPE; CODE: 'U', 'Vx', Wx' OR 'Xx' ~ SEE DETAILS BELOW.
3. SPECIFY DIMENSION 'x' (mm), NOT APPLICABLE CODE 'U' PLAIN TUBE.









TARGET TUBE MOUNTING NOTES, SEE DRAWING P100–12.

E	MATERIAL OPTION REMOVED.	PDM
F	MAT'L OPTION REINSTATED RAN221.	PDM
G	X DIM FOR PH FLANGE SHOWN RAN225	RDS
H	9.45 WAS 9.5 RAN396	RDS
J	REDRAWN, PH FLANGE ROTATED RAN507.	PDM
K	NOTE 1 AMENDED ~ RAN1114.	PDM
L	'x' WAS 'n' ~ RAN1309	PDM

E	16/10/06		CHECKED BY	X ±0.4
F	24/09/08		RDM	X.X ±0.2
G	13/11/08			X.XX ±0.1
H	11/12/12			DIMS mm
J	23/07/14	DESCRIPTION		
K	30/11/16	TARGET TUBE AND FLANGE OPTIONS (LIPS 100/106)		
L	08/11/22			
SCALE 5mm		DRAWING NUMBER	TG24-11	REV L
				SHEET 1 OF 1