Technical **Datasheet**

delta-controls

Industrial Series
Vapour Pressure Temperature Switch
Model: S71

Key **Features**

- Weatherproof and Flameproof models ATEX and NEC 500
- 316 stainless steel capillary and bulb.
- Ranges available up to 160 to 260°C (320 to 500°F). Maximum working temperature up to 270°C (518°F).
- Field set point adjustment against a reference scale.
- Hermetically sealed microswitch options.
- Optional gold alloy contacts.
- Terminal block for easy field wiring.
- Safety vented design as standard

Series **Overview**

- The Industrial Series switches were developed in the mid -1990's to offer customers a robust range of switches suitable for applications where requirements were more standard than those for which the highly configurable Performance Series switches were designed.
- The model S71 Industrial Series temperature switches comprise an armoured capillary or rigid stem thermal system upon which a compression gland slides to enable various depths of thermowell (pocket) to be accommodated. This sensor is coupled to the microswitch via a precision stainless steel mechanism, the combination of which helps deliver the market leading performance customers can expect from the Series.

Other products in the series include:
- Pressure Switches: Model S20
- Temperature Switches: Model S30

Product **applications**

The S71 Industrial Series is suitable for a wide range of applications in:

- Oil & Gas
- Chemical
- Petrochemical
- Refining
- Power
- OEM

The choice of models available ensures that the S71 Industrial Series is suitable for use in:

- Corrosive atmospheres
- Resistant to chemical attack

How can we **help you?**

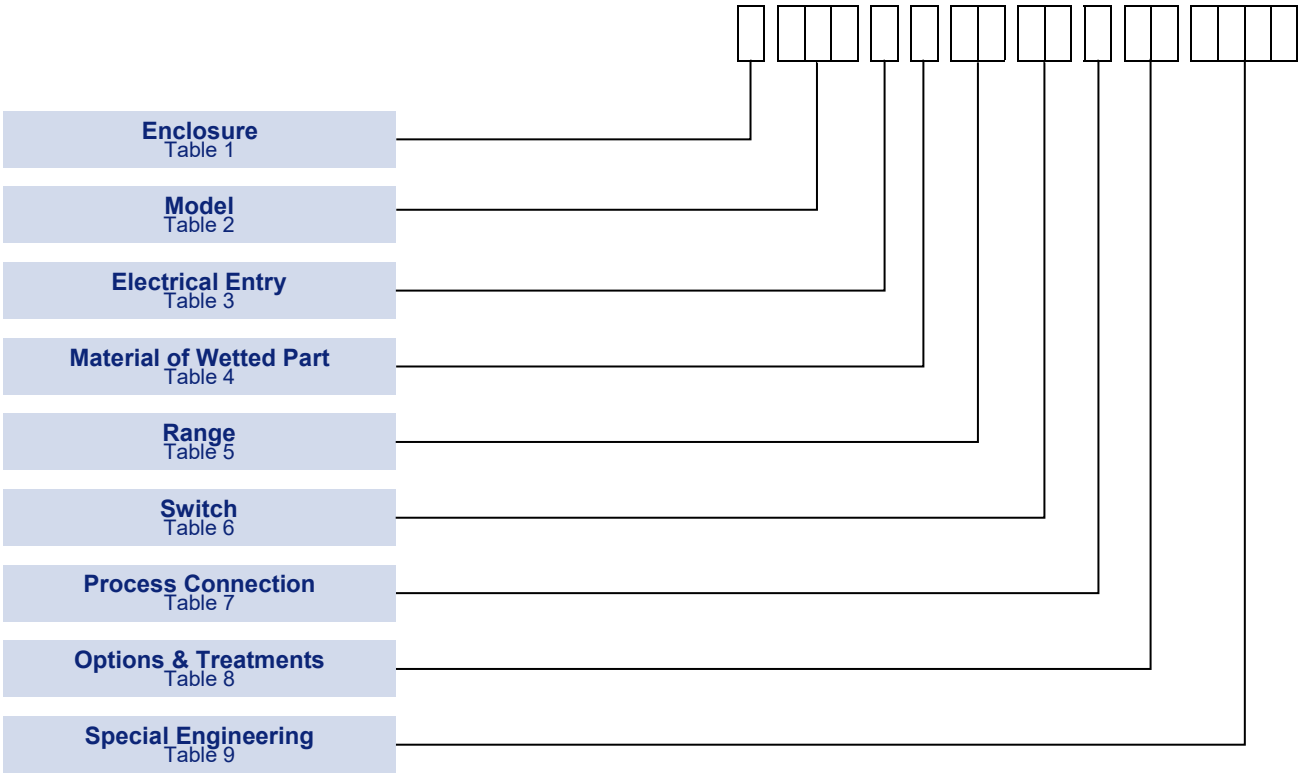
Delta Controls' offers fast, efficient and knowledgeable support when and where you need it. Please visit our web site at www.delta-controls.com to find your local support centre or call us on:

+44 (0)1252 729140

Industrial Series
Models: S71

How to order

Switches can be configured by selecting codes representing the desired features from the tables that follow. The chart below, describes how the model code is built up. For assistance in configuring a switch that best suits your needs, please contact your local sales office.



***NOTE**: Options shaded in the following tables are the most common options and are available on the quickest lead-times and at the lowest cost.*

***NOTE:** Only the most common options are shown in this data sheet. Should you require a feature that is not shown, please contact your local sales office for further details.*

Technical Specification

Accuracy:	Set point repeatability ± 1% of span at 20°C / 68°F ambient.
Storage Temperature:	-25 to +60°C / -13 to +140°F
Ambient Temperature:	-25 to +60°C / -13 to +140°F
Maximum Process Temperature:	Subject to appropriate installation practice, the component parts withstand up to +60°C (+140°F). For higher temperatures, refer to SPECIAL ENGINEERING.
Maximum Working Pressure:	System sensing probes for both the capillary and rigid stem version are designed to withstand 100 bar (1500 psi) without a thermowell.
Enclosure classification:	IP66 / NEMA 4X / Flameproof Ex d.
Switch output:	SPDT or DPDT snap action microswitch (standard). Hermetically sealed (optional).
Electrical rating:	See Table 6.
Process Connection:	3/8 NPT External Sliding Gland, 1/2 NPT External Direct Mounting.
Approximate Weight:	Enclosures: **"H & T"** 2.6kg/5.7lb; **"R & U"** 7.1kg/15.6lb; **"W"** 2.6kg/5.7lb; **"A"** 3.9kg/8.6lb.

Enclosure

TABLE 1

FINISH

All enclosures except Type R, A and U are finished in light grey epoxy resin paint.

Special finishes to order.

INTRINSIC SAFETY

Because of the low voltages and currency of I.S. circuits, we recommend using gold and/or sealed contacts.

NOTE: Codes H, T for 4X

Aluminium Enclosure protected by quality epoxy paint system.

Performance of enclosure requires careful installation and sealing of cable gland connection in site.

Assembly requires to be built for Marine use, See Table 8, Code 2.

Temperature in Table 1 refer to limitations for certified enclosures.

See **TECNICAL DATA.**

ENCLOSURE TYPES	Code
FLAMEPROOF ENCLOSURES	
ATEX Ex d IIC T6 Gb (-60 to +65°C), T5 Gb (-60 to +80°C) II 2 GD (ZONE 1) Gravity die-cast enclosure in aluminium-silicon alloy, epoxy painted. Suitable for outdoor use, IP66 / NEMA 4X. See Note. Ex II 2 GD	**H**
ATEX Ex d T6 Gb (-60 to +65°C), T5 Gb (-60 to +80°C) II 2 GD (ZONE 1) **For Aggressive Atmospheres** Investment cast enclosure in austenitic stainless steel. Suitable for outdoor use, IP66 / NEMA 4X. Ex II 2 GD	**R**
NEC 500, NEMA 7, 9 Gravity die-cast enclosure in aluminium-silicon alloy, epoxy painted. Class 1, Groups C and D, Class II, Groups E, F and G. Suitable for outdoor use, IP66 / NEMA 4X.	**T**
NEC 500, NEMA 7, 9 **For Aggressive Atmospheres** Investment cast enclosure in austenitic stainless steel. Class 1, Groups C and D, Class II, Groups E, F and G. Suitable for outdoor use, IP66 / NEMA 4X.	**U**
WEATHERPROOF ENCLOSURES	
General purpose The basic enclosure is pressure die-cast in zinc alloy, epoxy painted, with weather protection not less than NEMA 4, IP66.	**W**
For Aggressive Atmospheres Investment cast enclosure in austenitic stainless steel with weather protection not less than NEMA 4X, IP66	**A**

Models

Applies to all materials.

TABLE 2

	Code
Fixed Switching Differential SPDT& DPDT options available. See Table 6.	**S71**

Electrical Entry

TABLE 3

Adaptors are available for other popular thread sizes.

*For codes 3 & 6 see approvals and Table 1 Codes T & U

	Code
Enclosure W: Clearance for 20mm (3/4 in) outside dia conduit.	**1**
Enclosure W: M20 x 1.5 elbow adaptor to suit.	**0**
Enclosure W: 3/4-NPT INT. elbow adaptor to suit.	**3**
Enclosures H, R & A: M20 x 1.5 ISO thread.	**0**
Enclosures H, R & A: M20 x 1.5 ISO thread, dual entry.	**5**
Enclosures H, R & A: 1/2" NPT Internal	**2**
Enclosures H, R, T & U: 3/4-NPT INT (direct).	**3***
Enclosures H, R, T & U: 3/4-NPT INT dual entry	**6***

System details

The flexible capillary version of Series S70 comprises an armoured capillary attached to the sensing bulb via a semi -rigid extension on which a 1/2" NPT compression gland slides to enable various depths of thermowell (pocket) to be accommodated. All exposed parts of the thermal system are in 300 series austenitic stainless steel with the capillary and sensing bulb in 316 stainless steel.

TABLE 4

Capillary Length		Semi Rigid Stem Length		Sensing Bulb Length		Code
Metres	Feet	mm	inches	mm	inches	
1.86	6	250	10	75	2.95	**N**
1.86	6	500	20	75	2.95	**P**
Rigid Stem Probe Total Length 216mm (8.5ins)				75	2.95	**R**

Applies to all details in the above table.

The rigid stem version has an integral thread for direct mounting or via a thermowell. Material of probe 316 stainless steel.

NOTE: *Bulb diameter, all ranges 9.5mm or 0.37 inches*.

Setting Ranges

TABLE 5

Table 5A - °C

T_{max}	RANGE	Code
70	-40 to +60	**H1**
110	0 to 100	**K3**
200	110 to 190	**Q6**
270	160 to 260	**U5**

Table 5B - °F

T_{max}	RANGE	Code
158	-40 to +140	**HA**
230	32 to 212	**KB**
392	230 to 374	**QC**
518	320 to 500	**UA**

Applies to all details in the above table.

T_{max}= maximum working temperature

Ranges L5, Q6 and U5 (LC, QC and UA) cannot be used on rigid stem models (system code R).

Limitation due to heat conduction causing an unacceptable rise in surface temperature. See table 1.

When ordering, please state units required. Range and set point will be in units of preference.

Switch Options

TABLE 6

Model S71									
CSA RATING (RESISTIVE) see note	**IEC947-5-1 / EN 60947-5-1 RATING**							Contact	**Code**
	Designation & Utilization Category	Rated operational current / $_e$ (A) At rated operational voltage $_{U e}$	*Ui*	*Uimp*	VA Rating				
						Make	Break		
5 Amps @ 110/250V AC Light Duty for AC only	AC14 D300 DC13 R300	0.6/0.3A @ 120/240 V AC 0.22/0.1A @ 125/250V DC	250V	0.8kV	AC DC	432 28	72 28	SPDT DPDT	**00** **01**
5 Amps @ 110/250V AC and 2 Amps @ 30V DC General purpose precision	AC14 D300 DC13 R300	0.6/0.3A @ 120/240 V AC 0.22/0.1A @ 125/250V DC	250V	0.8kV	AC DC	432 28	72 28	SPDT DPDT	**02** **03**
1 Amp @ 125V AC and ***§ 100mA @ 30V DC*** Gold Alloy contacts for low voltage switching	1A @ 125 VAC RESISTIVE (IEC 1058-1/EN 61058-1)							SPDT DPDT	**04** **05**
§ 5 Amps @ 110/250V AC & 5 Amps @ 30V DC Environmentally sealed	AC14 D300 DC13 R300	0.6/0.3A @ 120/240 V AC 0.22/0.1A @ 125/250V DC	250V	0.5kV	AC DC	432 28	72 28	SPDT* DPDT*	**08** **09**
§ 1 Amp @ 30V AC and 30V DC Environmentally sealed with gold contacts	AC14 E150	0.3A @ 120 V AC	125V	0.5kV	AC	216	36	SPDT DPDT	**0G** **0H**
5 Amps @ 250V AC & 2 Amps @ 30V DC Hermetically sealed. Gold plated silver contacts	AC14 D300 DC13 R300	0.6/0.3A @ 120/240 V AC 0.22/0.1A @ 125/250V DC	250V	0.5kV	AC DC	432 28	72 28	SPDT DPDT	**H2** **H3†,** **H6‡**

† 2 Single pole, double throw, simultaneous falling under pressure
‡ 2 Single pole, double throw, simultaneous rising under pressure

NOTE:

Enclosure Codes T and U.
Microswitch Codes 02 and 03.
CSA rating as follows:-
110/250V AC 5A 250V/125V DC 0.25/0.5A

Enclosure Codes H and R.
Microswitch Codes 02 and 03.
CSA rating as follows:-
110/250V AC 5A 250V/125/30V DC 0.25/0.5/2A

00, 01, 02, 03, 04, 05, H2, H3†, H6‡ microswitches
CSA accepted component for use in hazardous areas Class 1, Div 2, Groups A, B, C and D.
When used in enclosures T and U.

The electrical rating is dependent on the microswitch fitted to the instrument. The electrical ratings defined by each approval that the microswitch complies with and is shown on the product nameplate, ie CSA, or IEC. It should be noted that the instrument must be used within the electrical rating specified from the approval you require. This table lists the actual IEC ratings against the Designation & Utilization Category marked on the nameplates. In the absence of any verification by CSA the microswitch § manufacturer's rating is stated in ***italics and bold. If in doubt seek guidance from the factory.***

NOTE: For low energy circuits e.g. 30V and up to 100mA, we recommend using gold alloy contact switches.
Ui = rated insulation voltage Uimp = rated impulse to withstand voltage across contacts.

Process Connection

TABLE 7

Applies to all connection in this table

	Code
3/8 NPT EXT Sliding Gland	**E**
1/2—14 NPT EXT Direct Mounting	**J**

Options & Treatments

TABLE 8

Combinations available, apply for details.

Applies to all options and treatments in this table.

	Code
Tropicalisation High humidity atmospheres	**01**
Marine and Offshore Saline atmosphere or salt spray	**02**
Ammonia Process (wetted) parts and construction suitable for atmospheric ammonia	**03**
Oxygen Service 2: Process (wetted) parts are cleaned for oxygen	**04**
Oxygen Service 3: Process and non-process parts are cleaned for use with oxygen	**05**
Stainless Steel Pipe Mounting Bracket Permits local 2” pipe work to be utilized for mounting the instrument	**10**
Category IV Safety Accessory as defined in the Pressure Equipment Directive 97/23/EC	**60**
Tagging - Variety of tagging methods are available	**APPLY FOR DETAILS**
Applies when - no option is required and selection is made from special engineering	**00**
PVC covered armoured capillary	**40**

Special Engineering

TABLE 9

Last 4 digits of model code only used when special engineering is required.

Refer to engineering

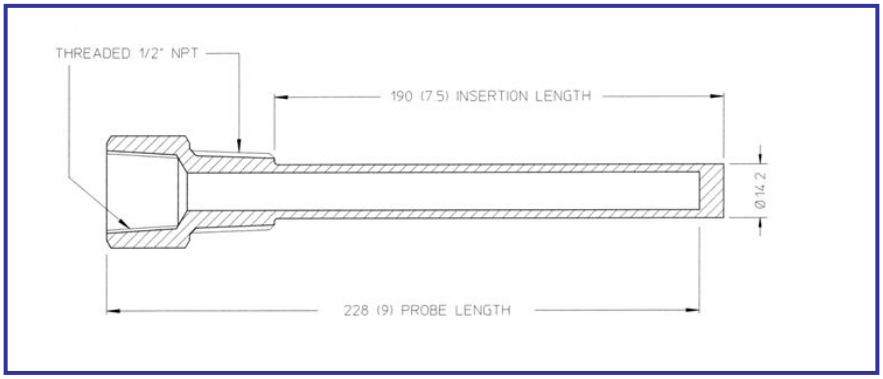
	Code
Please consult Delta sales engineering for special requirements	**TBA**

THERMOWELLS

Material 316SS.
Maximum working pressure 140bar (2000psi) at 20°C.

Thermowells can also be manufactured to customer own drawings/specification requirements.

All dimensions in mm (inches)



Industrial Series
Models: S71

Performance Data

Due to manufacturing tolerances the figures quoted in these tables are for guidance only.

Flameproof models maybe up to 2 times higher depending on the range.

Should the differential be critical for specific applications our engineers should be consulted prior to ordering.

TABLE 10

CELCIUS UNITS											
Range		T_{max} °C	Microswitch - Option Switching Differential °C								
Code	°C		00	01	02	03	04	05	08/0G	06/0H	H2	H3/H6
H1	-40 to +60	70	1.5	2.5	2	4	1.5	3	6	6	8	10
K3	0 to 100	110										
L5	50 to 170	180										
Q6	110 to 190	200										
U5	160 to 260	270										

FARENHEIT UNITS											
Range		T_{max} °C	Microswitch - Option Switching Differential °F								
Code	°C		00	01	02	03	04	05	08/0G	06/0H	H2	H3/H6
HA	-40 to +140	158	2.7	4.5	3.6	7.2	2.7	5.4	10.8	10.8	14.4	18
KB	32 to 212	230										
LC	120 to 340	360										
QC	230 to 374	392										
UA	320 to 500	518										

Electrical Connection

Terminal Block
Cable entry is to a non-pinching terminal block made of a non-hygroscopic thermosetting plastic, suitable for cables up to 2.5mm²/14AWG.

Earthing/Grounding
An earthing stud is provided inside all weatherproof enclosures, adjacent to the entry. External earthing is standard on flameproof versions. Safety note see Table 3.

Dielectric Strength
The electrical assembly is capable of withstanding *2kV between live parts and earth/ground and 500V between open contacts.
* 1.2kV for micro switch Codes H2, H3, H4 and H6. Refer to Table 6.

Electrical Entry
Standard options are listed in Table 3. Other threads can be accommodated by adaptors. Dual entry available, see Table 3.

Optional Extras

Mounting Position/Location/Installation
Vertical as shown, IN DIMENSIONS, taking care to avoid siting in locations that transmit excessive shock or vibration. For further advice contact our engineers.

Pollution degree (EN60947-5-1)
All products are suitable for use in pollution degree 3. For extreme conditions where condensation may readily form, then sealed contacts should be used. See Table 6 Codes 08/09, 0G/0H, H2/H3/H6.

Electrical Isolation
These products are not suitable for electrical isolation. Always isolate circuit separately to carry out any electrical work.

Approvals

EUROPEAN DIRECTIVES

Low voltage Directive (LVD) 2014/35/EU.
Compliant to LVD

ATEX Directive 2014/34/EU:

FLAMEPROOF:
Certificate No. BAS01ATEX2113X
EN 60079-0, EN 60079-1, EN 60079-31, EN 60079-26

For Zone 1 models **(Enclosure code H/R, see table 1)**

Fluorosilicone O-ring

II 2 GD	Ex d IIC T6 Gb (Tamb –60°C to +65°C) Ex tb IIIC T85°C Db
II 2 GD	Ex d IIC T5 Gb (Tamb –60°C to +80°C) Ex tb IIIC T100°C Db

Nitrile O-ring

II 2 GD	Ex d IIC T6 Gb (Tamb –30°C to +65°C) Ex tb IIIC T85°C Db
II 2 GD	Ex d IIC T5 Gb (Tamb –30°C to +80°C) Ex tb IIIC T100°C Db

GLOBAL CERTIFICATION

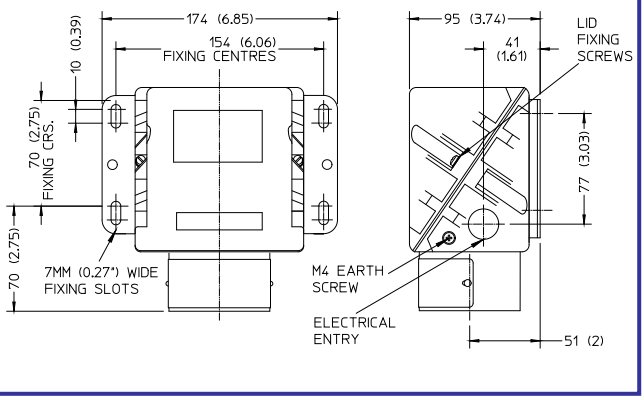
CANADIAN STANDARDS ASSOCIATION
Enclosure codes T & U.
Class 1, Groups C & D Class II, Groups E, F, G.
LR94185-2

SAFETY INTEGRITY LEVEL (SIL)
IEC 61508 Part 1 and 2
Systematic integrity and random integrity SIL2 Capable
Certificate number DC060816C001

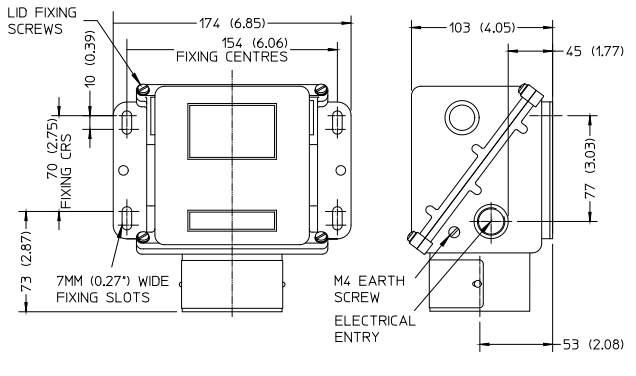
Dimensions

All dimensions mm (inches)

'W' ENCLOSURE



'A' ENCLOSURE



Industrial Series
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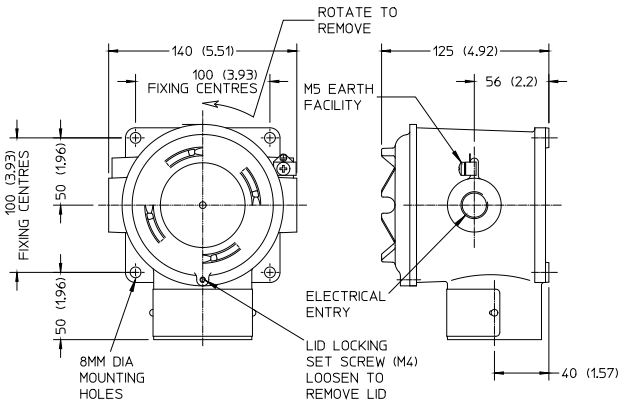
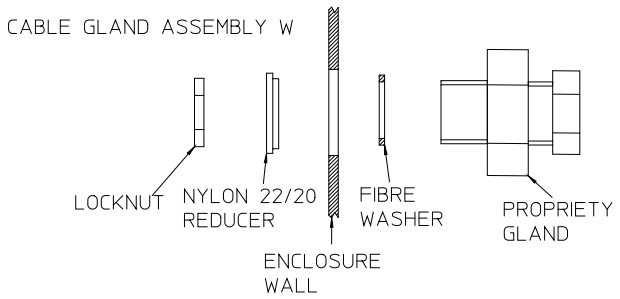
Dimensions

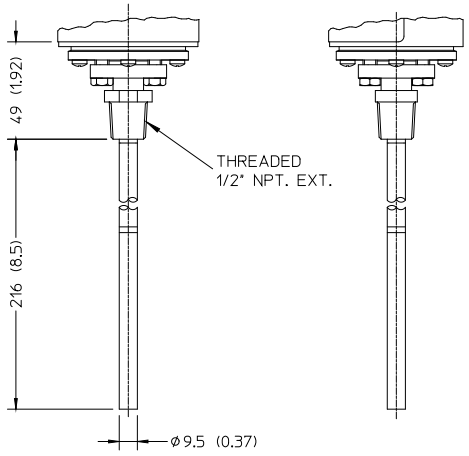
'H', 'R', 'T', 'U' ENCLOSURES



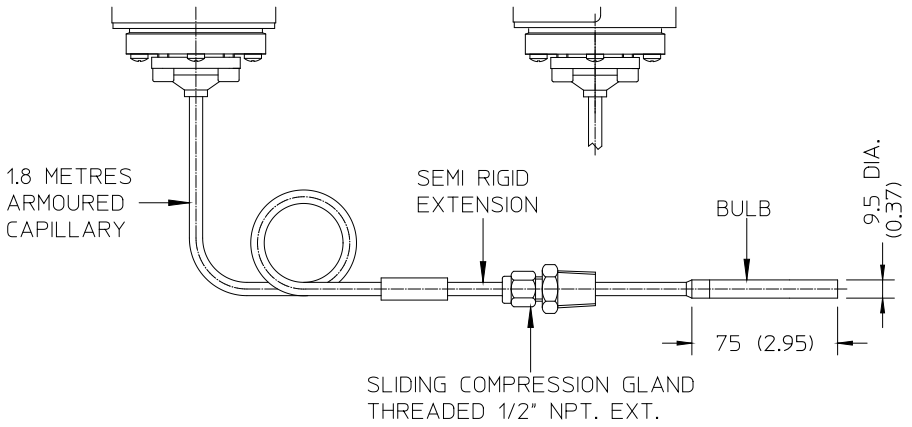
CABLE GLAND ASSEMBLY



RIGID STEM VERSION – CODE R



CAPILLARY VERSION – CODES N & P



Delta Controls Limited
Riverside Business Park, Dogflud Way, Farnham, Surrey GU9 7SS, UK.
T+44 (0)1252 729140 **F**+44 (0)1252 729168 **E** sales@delta-controls.com **W** www.delta-controls.com

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