

# SPECTITE

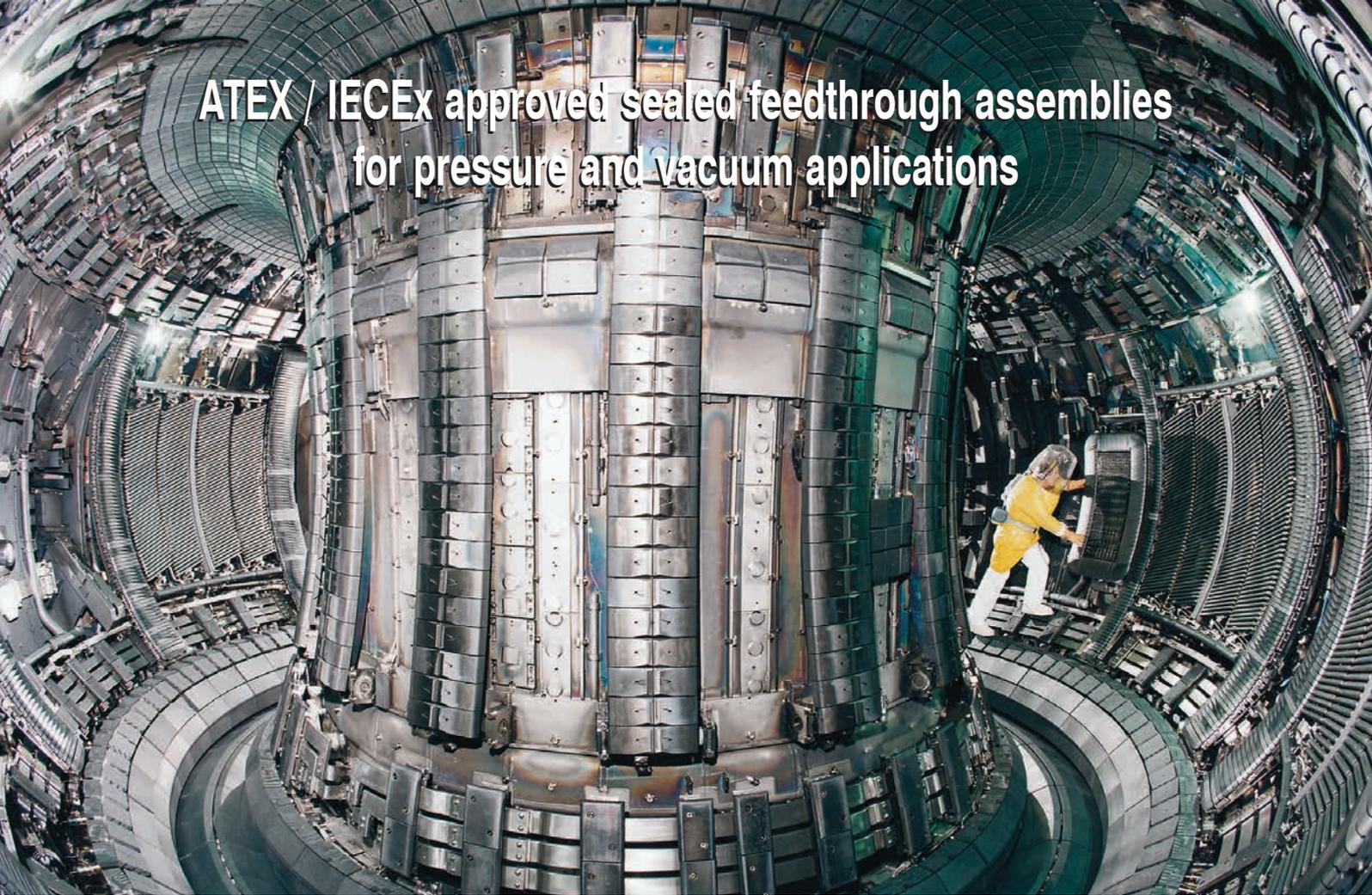
**ATEX / IECEx approved** pressure and vacuum sealed feedthroughs for sensors, probes, electrodes and wires

**from TC Ltd.**



**ATEX / IECEx approved Spectite® sealed feedthroughs from TC Ltd. are essential when probes, sensors, electrodes, wires and other types of static elements need to be sealed as they pass through a pressure or environmental boundary.**

# ATEX / IECEx approved sealed feedthrough assemblies for pressure and vacuum applications



Sealed feedthroughs, sometimes called sealing glands, are used to seal elements under the most arduous conditions and have many applications in a wide variety of industries.

Our extensive range of ATEX / IECEx fittings are designed and tested for use in hazardous areas allowing them to be used for both gas and dust applications in zone 1 and 2 areas with the following approval:

**Ex II 2 GD**  
**Ex d IIC Ex e IIC Gb**  
**Ex ta IIIC Da**

They inhibit the leakage of gases or other media and restrain the elements from moving in the assembly because of differential pressure. In some assemblies, elements are also electrically isolated from the feedthrough body and from each other.

The feedthroughs are typically made from stainless steel and are designed for mounting on to an Ex d, Ex e or Ex tD process vessel or enclosure. Versions can be specified to seal on both single and multiple elements of different types and sizes.

The cap nut is tightened to a pre-set torque to compress an internal sealant. The sealant provides an efficient pressure seal on the elements without damaging them. At the same time it restrains them from moving. Epoxy sealing is not used.

Details of the complete range of ATEX / IECEx approved Spectite® feedthrough assemblies can be found in this catalogue.



**SPECTITE®**

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pressure and vacuum sealed feedthroughs

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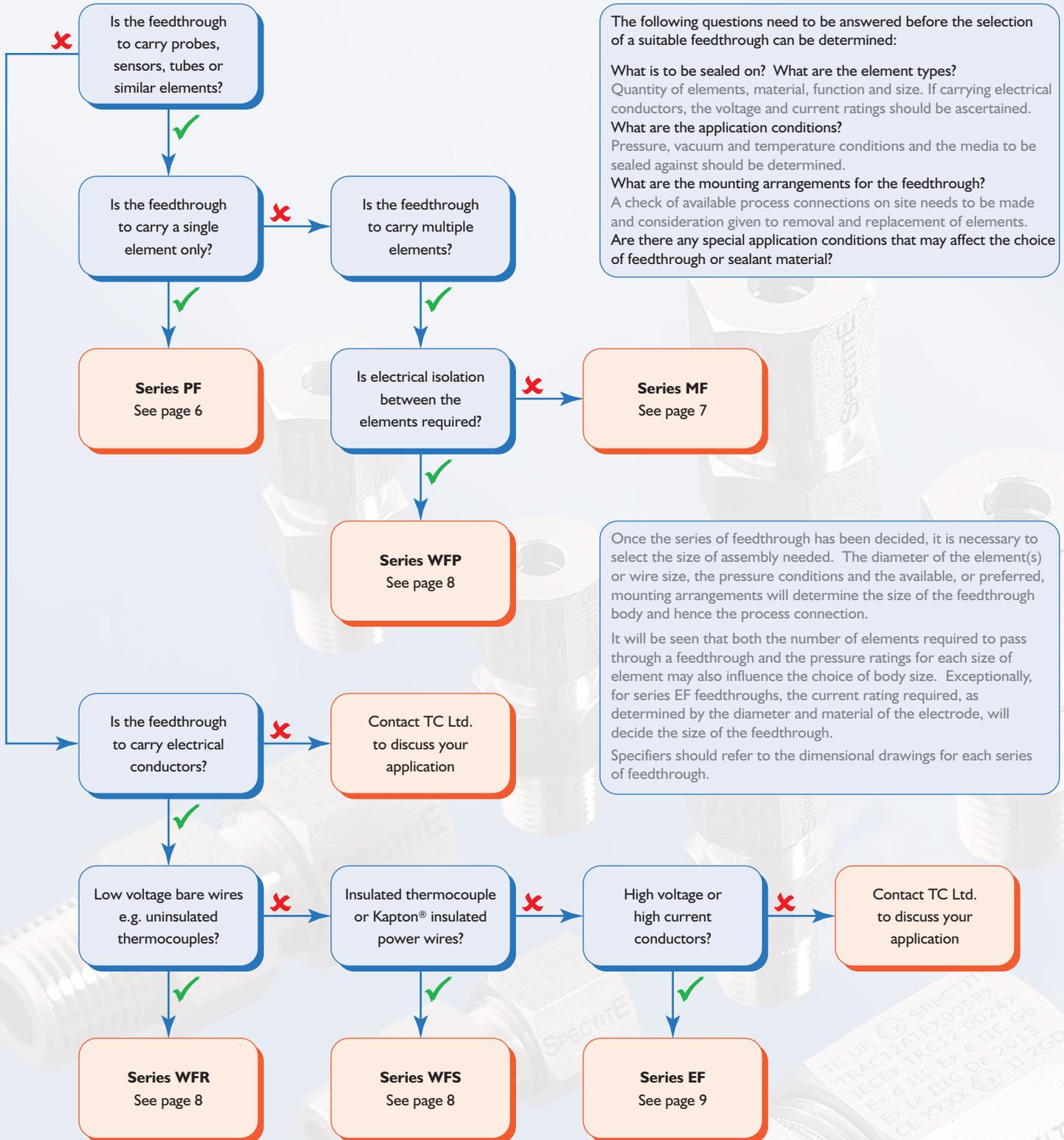
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## Guide to the selection of feedthroughs and ordering

Check the fitting approval is suitable for the application. All products in this catalogue are suitable for use in the following:  
 Gas: Zone 1 / 2, gas group IIC (Acetylene/Hydrogen), with type 'd' (flameproof) or 'e' (increased safety) protection concepts  
 Dust: Zone 20 / 21, group IIIC (combustible dusts) with type 'ta' (enclosure) protection concept, see page 11



The following questions need to be answered before the selection of a suitable feedthrough can be determined:

**What is to be sealed on? What are the element types?**  
 Quantity of elements, material, function and size. If carrying electrical conductors, the voltage and current ratings should be ascertained.

**What are the application conditions?**  
 Pressure, vacuum and temperature conditions and the media to be sealed against should be determined.

**What are the mounting arrangements for the feedthrough?**  
 A check of available process connections on site needs to be made and consideration given to removal and replacement of elements.

**Are there any special application conditions that may affect the choice of feedthrough or sealant material?**

Once the series of feedthrough has been decided, it is necessary to select the size of assembly needed. The diameter of the element(s) or wire size, the pressure conditions and the available, or preferred, mounting arrangements will determine the size of the feedthrough body and hence the process connection.

It will be seen that both the number of elements required to pass through a feedthrough and the pressure ratings for each size of element may also influence the choice of body size. Exceptionally, for series EF feedthroughs, the current rating required, as determined by the diameter and material of the electrode, will decide the size of the feedthrough.

Specifiers should refer to the dimensional drawings for each series of feedthrough.



## Sealants

The key factors in each application - temperature, pressure and process media - determine the choice of material for the internal sealant in all feedthroughs.

Sealant Material	Colour	Example	Operating temperature class	Material definition and properties
Graftite™	Grey / Black		-60°C / +450°C (T1)	Graphite 98% purity. Impermeable to gases and liquids. Resistant to most media, not 'wetted' by molten metals or salts. Asbestos-free. No ageing or embrittlement. Good resistance to thermal shock. Not re-usable.
PTFE	White		-60°C / +200°C (T3)	Polytetrafluoroethylene. FDA approved grade to Title 21 -CFR 17. 1550 and is approved to US Pharmacopoeia Class VI. Has smooth, non-wetting, hydrophobic surfaces that resist biofilm buildup and the lowest coefficient of friction of any solid material. Low thermal transfer. Re-usable.
Viton®	Brown		-40°C / +200°C (T3)	Fluoroelastomer. Resists hydrocarbons, corrosive chemicals and petroleum. Solvent, acid and base resistant. Low permeation rate. Mechanically robust at high temperatures. Re-usable.

## Pressure ratings

The pressure and temperature ratings and typical leak rates quoted are given for guidance only. Pressure tests have been undertaken at 20°C using elements appropriate to the feedthrough under test, i.e., mineral insulated cable in probe feedthroughs, bare or insulated wire in wire feedthroughs, etc. Ratings vary with temperature and sealant used. With an increase in temperature, a reduction in the maximum pressure rating can be expected. Contact TC Ltd. for further details. The BSPT and NPT mounting thread pressure rating is the same or is higher than the feedthrough pressure rating.

Spectite® feedthroughs from TC Ltd. have been designed to provide an efficient seal on the elements and restrain them from moving under pressure and vacuum. It is good installation practice to provide additional, mechanical restraint to the elements when differential pressure exceeds 50% of the feedthrough pressure rating at 20°C. (Not applicable to series EF feedthroughs with integral electrodes). Consult TC Ltd. for further guidance on pressure ratings.

Feedthroughs with Graftite™, PTFE and Viton® sealants are suitable for vacuum applications to 5 x 10<sup>-6</sup> torr (6.67 x 10<sup>-4</sup> Pa or 6.67 x 10<sup>-6</sup> mbar).

## Leak rates

A typical leak rate for Spectite® feedthrough assemblies with Graftite™, PTFE and Viton® sealants is better than or equal to 1 x 10<sup>-6</sup> scc/sec. under 1 Atm. He @ 20°C. (1 Atm. = 9.87 x 10<sup>4</sup> Pa or 987.2 mbar).

## Ordering information

Feedthrough and sealed tube assemblies are specified for ordering by a simple composite description that includes the type of feedthrough, the size of the feedthrough body (defined by the size of the process connection), the size of the element(s) to pass through the feedthrough, the number of elements (not applicable to series PF for single elements) and the sealant material.

An example of a typical order code for a feedthrough for multiple sensors (8 x 1.5mm dia. probes):

**MF - 1/2" BSPT - 1.5mm - 8 - T - EX - Cap BSPT**

If a feedthrough is required with a cap with a threaded conduit extension, the word Cap and the threadform required is added to the end of the order code, as shown in shadow in the example above.

Order code arrangements for feedthroughs for multiple wires and with integral electrodes include additional parameters. Further details are given in the order code information for each series.

For assistance with specifying and ordering Spectite® feedthrough assemblies, particularly where there are high temperatures, high pressures or difficult application environments, contact TC Ltd.

## Replacement parts and thread lubricant

Sealants and other internal components for Spectite® feedthrough assemblies are available as replacement parts. To specify the component needed, prefix the order code of the feedthrough assembly for which the part is required by: **RS** for a replacement sealant; **RP** for a set of internal components, (i) for series MF feedthroughs comprising follower, sealant and seat, or (ii) for series WF feedthroughs comprising two internal insulators and sealant; **RI** for a pair of insulators for series EF feedthroughs; **RE** for a replacement electrode (with nuts and washers) for series EF.

A lubricant is applied to feedthrough bodies, followers and caps during assembly in our factory. It helps to prevent these component parts from binding and minimises friction between mating surfaces. Each time a feedthrough assembly is opened so that elements or sealants can be replaced or elements adjusted, re-application of lubricant is recommended. Spectube Lubricant is available from TC Ltd. in handy 10ml bottles with applicator brushes. Order as **Spectube Thread Lubricant**.



## Series PF

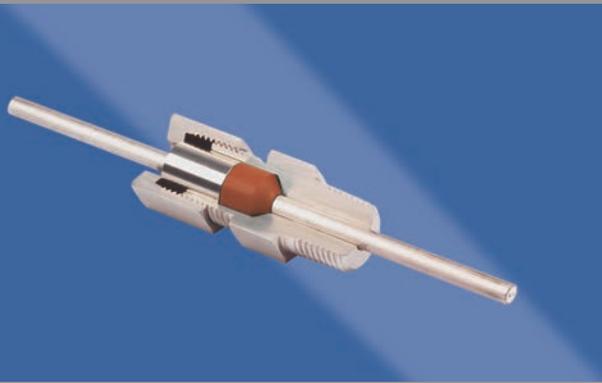
### Feedthroughs for single elements

These feedthroughs are designed for sealing single elements, usually sensors, probes or tubes, where they penetrate a pressure or environmental boundary.

Common applications include sealing sheathed thermocouples and resistance thermometers, small-bore tubes and other types of sensor where they enter a process enclosure.

Series PF feedthroughs seal elements from 0.5mm dia. to 25.4mm (1"). There are five body sizes having 1/8", 1/4", 1/2", 3/4" and 1" process connections with BSPT (conical gas or DIN 2999 'R') and NPT threads.

Spectite® feedthroughs are designed for ease of assembly and installation. Elements can be adjusted, removed and replaced when not under pressure or vacuum conditions.



■ **ATEX / IECEx Approved to Ex II 2 GD, Ex d IIC Gb / Ex e IIC Gb, Ex ta IIIC Da**

■ **Seal on probes, sensors, small-bore tubes and other similar elements**

■ **Immersion length of the element can be easily adjusted**

■ **Five sizes of feedthrough assembly**

■ **Designed for easy installation of single elements 0.5mm to 25.4mm (1") diameter**

■ **Pressure range: Vacuum to 700 bar\***

■ **Temperature range: -60°C to +450°C\***

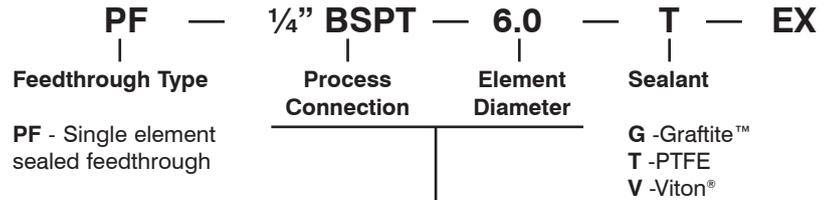
■ **Stainless steel body (316L) and internal metal components**

■ **Choice of three sealant materials**

■ **Reusable fitting – internal components replaceable**

\* dependent on sealant and fitting selected

## Order Code example:



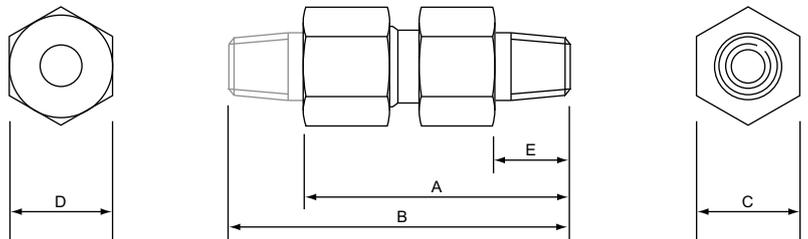
Series PF		Process Connection											
		BSPT (Conical Gas / DIN 2999 'R' thread) or NPT <sup>1</sup>											
		1/8"	1/4"	1/2"	3/4"	1"							
Sealants		G	T	V	G	T	V	G	T	V	G	T	V
Element sizes (dia) <sup>3</sup>		<i>The highlighted areas indicate the available element sizes for each feedthrough body size. The maximum pressure rating (in bar) is shown for each sealant material according to element size.<sup>2</sup></i>											
(ins.)	mm												
0.020	0.5		200	350									
0.032	0.8												
0.040	1.0	450											
0.059	1.5		150	500	550	500							
0.062	1.59												
0.080	2.0												
0.118	3.0	400			700	250							
0.125	3.175		100	550		700							
0.177	4.5												
0.187	4.76	350			550	200							
0.236	6.0												
0.250	6.35			450	150		550		550	400			
0.312	8.0												
0.375	9.53						150	450	100				165
0.393	10.0							350	250				
0.472	12.0						100	350				55	
0.500	12.7												
0.625	15.875								300	200	85		85
0.750	19.05								75	150			
0.840	21.3												30
1.0	25.4											25	

<sup>1</sup> Other types of process connection available, see back cover

<sup>2</sup> The pressure ratings shown for each type of sealant are qualified at 20°C. With an increase in temperature, a reduction in the maximum pressure rating can be expected. Contact TC Ltd. for further details.

<sup>3</sup> The element diameters shown are the common sizes that are routinely demanded by customers for general industrial applications. Any size of element can be accommodated between the minimum and maximum element diameters shown for each size of feedthrough. Blank (undrilled) sealants are also available for series PF feedthroughs. When a blank sealant is required, the word 'Blank' should be inserted in the order code instead of an element diameter. Feedthroughs with blank sealants are not pressure rated.

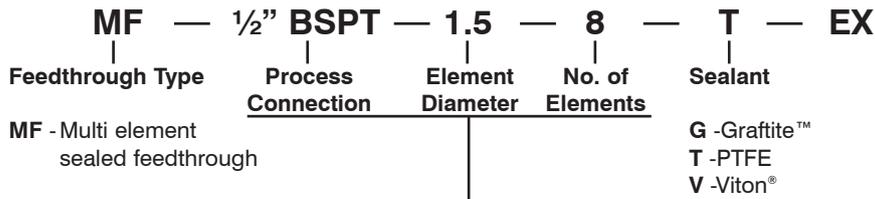
## Dimensions (mm)



Process Connection	Overall length with plain cap	Overall length with cap with extension thread	Body hex.	Cap hex.	Body to process end
	Dim A	Dim B	Dim C	Dim D	Dim E
1/8"	32.5	-	13.0	13.0	9.5
1/4"	52.0	66.5	19.0	19.0	14.5
1/2"	67.5	87.5	25.4	25.4	20.0
3/4"	86.0	106.0	32.0	38.0	20.0
1"	110.0	130.0	50.8	50.8	20.0

For further information on cap styles, see page 5 under 'ordering information' and the back cover of this catalogue.

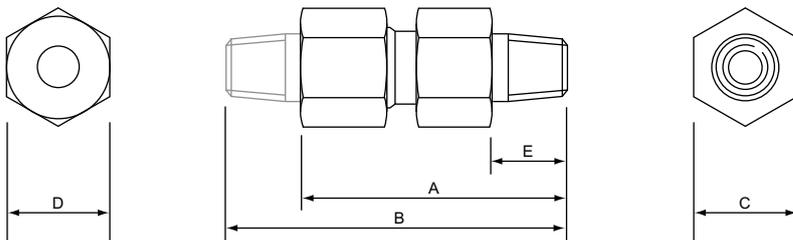
## Order Code example:



Serie MF		Attacco lato processo									
		Filettatura gas Conica (BSPT o DIN 2999 'R') o NPT <sup>1</sup>									
		1/8" <sup>3</sup>		1/4"		1/2"		3/4"		1"	
		Pressione max (in bar) <sup>2</sup>		Pressione max (in bar) <sup>2</sup>		Pressione max (in bar) <sup>2</sup>		Pressione max (in bar) <sup>2</sup>		Pressione max (in bar) <sup>2</sup>	
Sigillanti		Num. di elem. GTV		Num. di elem. GTV		Num. di elem. GTV		Num. di elem. GTV		Num. di elem. GTV	
<b>Diametro elementi</b>		Le caselle più scure indicano il diametro degli elementi compatibili con ciascun passante. I numeri indicano il limite massimo di pressione (in bar).									
(pol.)	mm										
0.020	0.5			400 250 250							
0.032	0.8			400 250 250							
0.040	1.0	2, 4	400	250	250	4, 8		4, 6	8, 12	16	8, 12
0.059	1.5					2, 3	550	500	4, 8	12	8, 12
0.062	1.59					4, 5	200		4, 8	12	8, 12
0.118	3.0					2	150		2, 4		200 350
0.125	3.175										4, 8
0.177	4.5										12
0.187	4.76										8, 10
0.236	6.0										12, 14
0.250	6.35										5, 6
0.315	8.0										7
0.375	9.53										2, 3
											4
											10, 18
											22, 27
											165
											105
											690
											415
											70
											70
											205

1 Other types of process connection available, see back cover  
2 The pressure ratings shown for each type of sealant are qualified at 20°C. With an increase in temperature, a reduction in the maximum pressure rating can be expected. Contact TC Ltd. for further details.  
3 Our 1/8" range utilises ceramic internal parts instead of metal.

## Dimensions (mm)



Filettatura lato processo	Quota A	Quota B	Quota C lato corpo	Quota D lato dado	Quota E
1/8"	35.0	-	15.0	15.0	12.0
1/4"	52.0	66.5	19.0	19.0	14.5
1/2"	67.5	87.5	25.4	25.4	20.0
3/4"	86.0	106.0	32.0	38.0	20.0
1"	110.0	130.0	50.8	50.8	20.0

The dimensions shown in the table above apply to Series MF feedthroughs.  
For further information on cap styles, see page 5 under 'ordering information' and the back cover of this catalogue.

## Series MF Feedthroughs for multiple elements

A single access port into an enclosure or process vessel is all that is needed to allow multiple probes, sensors, etc., to pass through an environmental or pressure boundary using a single feedthrough assembly.

Series MF feedthroughs can seal multiple elements within a single assembly including typically up to 40 x 1.0mm dia., up to 27 x 3.0mm or up to 7 x 6.0mm elements. Please refer to the table for further details of feedthrough capacity and sizes of elements.

There are five body sizes having 1/8", 1/4", 1/2", 3/4" and 1" process connections in either BSPT (conical gas or DIN 2999 'R') and NPT threads.

Spectite® feedthroughs are designed for ease of assembly and installation. Elements can be adjusted, removed and replaced when not under pressure or vacuum conditions.



- ATEX / IECEx Approved to Ex II 2 GD, Ex d IIC Gb / Ex e IIC Gb, Ex ta IIIC Da
- Saves time and costs as multiple sensors pass through one feedthrough
- Immersion length of each element can be easily adjusted
- Five sizes of sealed feedthrough for probes, sensors, etc.
- Designed for carrying multiple elements
- Suitable for a mixture of sizes and types of elements
- Pressure range: Vacuum to 700 bar\*
- Temperature range: -60°C to +450°C\*
- Stainless steel body (316L) and internal metal components
- Reusable fitting – sealant and internal components replaceable

\* dependent on sealant and fitting selected

## Series WF

### For multiple wires & probes

When multiple wires must pass through a pressure boundary, series WF feedthroughs can provide an efficient seal without recourse to epoxies or other non-adjustable fixture methods.

Different types of these assemblies may be specified according to the type of element required to pass through the feedthrough. Series WF assemblies cater for up to 12 bare or insulated wires – sizes from 24AWG (0.2mm<sup>2</sup>) to 8AWG (approx. 8.8mm<sup>2</sup>).

Insulators within WF feedthrough assemblies protect bare wires and provide additional isolation for Kapton® insulated power wires. These are rated 55A @ 600Vdc/850Vac max. Feedthroughs with power wires can be supplied as complete assemblies, ready for installation, with wires cut to specified lengths.

WF feedthroughs can also accommodate up to 12, small diameter sensor elements that must be electrically isolated from each other.



Series WFS shown

- ATEX / IECEx Approved to Ex II 2 GD, Ex d IIC Gb / Ex e IIC Gb, Ex ta IIIC Da
- Seal on Kapton® insulated copper or thermocouple wires – type WFS
- Seal on bare wires carrying instrumentation voltages – type WFR
- Seal on small diameter sheathed sensors, max. 3.2mm dia. – type WFP
- Pressure range: Vacuum to 700 bar\*
- Temperature range: -60°C to +200°C\*
- Stainless steel body (316L) and internal metal components
- Choice of 3 sealant materials
- Individual wires can be replaced without complete disassembly
- Reusable fitting – sealant and internal components replaceable

\* dependent on sealant and fitting selected

## Order Code examples:

WFS — 1/4" BSPT — 24K<sup>1</sup> — 4 — V — EX  
 OR  
 WFR — 3/4" BSPT — 14AWG — 12 — T — EX  
 OR  
 WFP — 1/2" BSPT — 1.0 — 8 — G — EX

Feedthrough Type      Process Connection      Element Size      No. of Elements      Sealant

WFS - for Kapton® insulated wires  
 WFR - for multiple bare wires  
 WFP - for isolated multiple probes

G -Graffite™<sup>1</sup>  
 T -PTFE  
 V -Viton®

Series WFS Kapton® insulated wires <sup>4</sup> Sealants	Process Connection BSPT (Conical Gas / DIN 2999 'R' thread) or NPT <sup>2</sup>															
	1/8"			1/4"			1/2"			3/4"						
	No. of elements	T	V	No. of elements	G	T	V	No. of elements	G	T	V	No. of elements	G	T	V	
wire size AWG	The highlighted areas indicate the available element sizes for each feedthrough body size. The maximum pressure rating (in bar) is shown for each sealant material according to element size. <sup>3</sup>															
24 Cu or T/C	2, 4	350	700	2, 4	550	300	500									
20 Cu or T/C								2, 4	700	250	450	6, 8	12	550	250	350
18 Cu																
16 Cu																
10 Cu												2, 4				
8 Cu												3				

Note: Maximum operating temperature of Series WFS assemblies is 200°C.

<sup>1</sup> Series WFS feedthroughs are supplied with Kapton® insulated copper or thermocouple-material wire to specified lengths, if required. The wires are fitted in the feedthrough, both ends of each wire, or thermocouple pair, are identified with numbered markers and the feedthrough is torqued ready for installation.

#### Current ratings for Kapton® insulated copper wire:

Wire size (AWG)	24	20	18	16	10	8
Max. current rating (A) at 440°F 600V ac / 850V dc max.	5	9	13	17	40	55

To specify the wire length, add (Y mm. / Z mm.) to the order code after the type of sealant specified. Y mm. is the length of wire required on the cap side of the feedthrough. Z mm. is the length of wire required on the process side of the feedthrough. Both dimensions to the nearest 100mm.

Example: WFS - 3/4" NPT - 20Cu - 12 - T (1200mm (Y) / 2200mm (Z)) - EX.

If this information is omitted from the order code, feedthroughs will be supplied untooled without wires.

When constructing the order code for the number of wires, it is essential to verify that the total number of wires specified equals the possible number of wires for the size of feedthrough required, remembering that each thermocouple material pair is two wires. e.g., WFS - 1/4" NPT - 24K - 4 - V (etc.) calls for two pairs (4 wires) 24AWG type K thermocouple material wire. Series WFS assemblies can also be made with a combination of single copper wires and thermocouple pairs. Contact TC Ltd. for further details.

Series WFR Bare wires	Series WFP Multiple sensors	Process Connection BSPT (Conical Gas / DIN 2999 'R' thread) or NPT <sup>2</sup>														
		1/8"			1/4"			1/2"			3/4"					
		No. of elements	T	V	No. of elements	T	V	No. of elements	T	V	No. of elements	T	V			
Wire size (AWG)	Element sizes dia (mm)	The highlighted areas indicate the available element sizes for each feedthrough body size. The maximum pressure rating (in bar) is shown for each sealant material according to element size. <sup>3</sup>														
24	0.5															
20	0.8															
18	1.0	2, 4	350	700	2, 4	300	500	2, 3	4, 6	8	250	450				
14	1.5							2, 4					6, 8, 12			
8	3.0												2, 4	250	350	
	3.2															

<sup>1</sup> Graffite™ sealants are not available for all WFR and WFP feedthroughs, nor WFS feedthroughs with 1/8" process connection.

<sup>2</sup> Other types of process connection available, see back cover

<sup>3</sup> The pressure ratings shown for each type of sealant are qualified at 20°C. With an increase in temperature, a reduction in the maximum pressure rating can be expected. Contact TC Ltd. for further details.

<sup>4</sup> For Graffite & PTFE sealants - wires must be suitably clamped close to the installation to maintain Ex approval

See page 10 for dimensions.

## Order Code example:

EF — 1/2" BSPT — Cu — T — EX

Feedthrough Type      Process Connection      Electrode      Sealant

EF - Sealed feedthrough with integral electrode

Copper (Cu)  
Stainless (SS)  
Steel

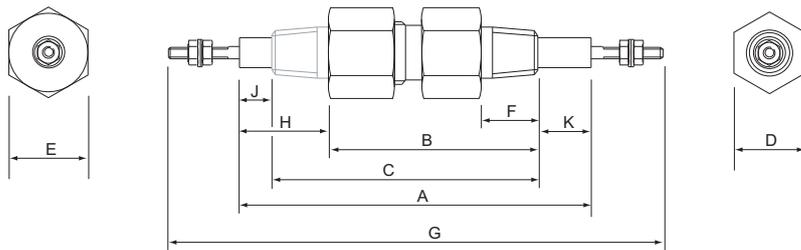
T -PTFE  
V -Viton®

Series EF Max. voltage rating 2KV		Process Connection					
		BSPT (Conical Gas / DIN 2999 'R' thread) or NPT <sup>1</sup>					
Sealants		1/4"		1/2"		3/4"	
		T	V	T	V	T	V
Electrode materials and current ratings	Electrode dia. (mm)	The maximum pressure rating (in bar) is shown for each sealant material <sup>2</sup>					
Cu 40A SS 10A	3.2	350	550				
Cu 100A SS 15A	6.35			150	400		
Cu 200A SS 30A	12.7					150	150

<sup>1</sup> Other types of process connection available, see back cover

<sup>2</sup> The pressure ratings shown for each type of sealant are qualified at 20°C. With an increase in temperature, a reduction in the maximum pressure rating can be expected. Contact TC Ltd. for further details.

## Dimensions (mm)



Process Connection	Length over insulators (both types of cap)	Overall length of body and plain cap	Overall length of body and cap with ext'n thread	Body hex.	Cap hex.	Body to process end
	Dim A	Dim B	Dim C	Dim D	Dim E	Dim F
1/8"	70.0	35.0	-	13.0	13.0	9.5
1/4"	94.0	52.0	66.5	19.0	19.0	14.5
1/2" 3/4"	132.0	67.5	87.5	25.4	25.4	20.0
	162.0	86.0	106.0	32.0	38.0	20.0
	Overall length of electrode	Exposed length of insulator (cap side - plain cap)	Exposed length of insulator (cap side - cap with ext'n thread)	Exposed length of insulator (process side)		
	Dim G	Dim H	Dim J	Dim K		
1/8"	125.0	18.0	-	17.0		
1/4"	125.0	28.5	14.0	13.5		

For further information on cap styles, see page 5 under 'ordering information' and the back cover of this catalogue.

## Series EF

### high voltage/current electrode

The integral electrode mounted in these feedthroughs enables specifiers to provide high-voltage, high-current supplies in process enclosures, autoclaves, vacuum furnaces and reactor vessels to power heaters, electric motors and other devices needing high power supply.

Feedthroughs are available with three sizes of copper electrodes rated 40A, 100A and 200A at 2kV maximum. Stainless steel conductors, that have a lower current rating than copper electrodes, can be specified instead of copper.

Feedthroughs with copper electrodes have brass nuts and washers. Stainless steel nuts and washers are fitted to stainless steel electrodes.

Series EF sealed electrode assemblies are supplied pre-torqued for immediate installation. Integral insulators are Alumina.



- ATEX / IECEx Approved to Ex II 2 GD, Ex d IIC Gb / Ex e IIC Gb, Ex ta IIIC Da
- Copper or stainless steel electrodes
- Three sizes of feedthrough assembly
- Rated for use at 2KV up to 200A
- Pressure range: Vacuum to 550 bar\*
- Temperature range: -60°C to +200°C\*
- Stainless steel body (316L) and internal metal components; Alumina insulators
- Choice of 2 sealant materials
- Maintainable - sealants replaceable
- Electrodes pre-installed in feedthrough and torqued ready for installation

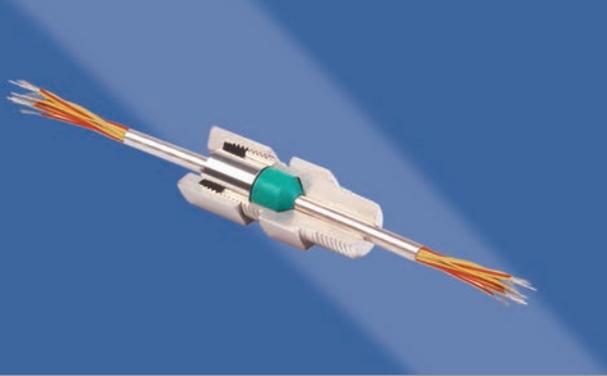
\* dependent on sealant and fitting selected

## Series HF

### High density, insulated wire, sealed tube assemblies

A PTFE-lined, stainless steel tube is swaged over multiple, insulated, single-core copper and/or thermocouple-material wires to make a continuous wire, high-density, sealed feedthrough tube. These are used for thermocouples, resistance thermometers and low voltage instrumentation. The sealed tube assembly is usually mounted in a series PF or MF feedthrough. Series HF feedthroughs are manufactured with customer-specified wire lengths.

Epoxies and other sealants are not used in the construction of HF feedthroughs. They are suitable for use where outgassing is not permitted.



- ATEX / IECEx Approved to Ex II 2 GD, Ex d IIC Gb / Ex e IIC Gb, Ex ta IIIC Da (when sealed with appropriate PF/MF fitting)
- Saves time and costs as multiple sensor wires pass through one feedthrough
- Sealed tubes with continuous, multiple, insulated conductors
- Stainless steel tube (316L) is sealed without potting, epoxies or glues
- Copper or thermocouple-material wires types J, K, T & N
- Max. current rating 500mA at 100Vdc
- Pressure range: Vacuum to 350 bar with low leak rate
- 4 tube sizes carrying 12, 24, 40 or 60 size 24AWG copper or thermocouple material wires

## Order Code examples:

HF2 — 24 — Cu — 1000mm / 2500mm — EX  
OR  
HF1 — 12 — K — 1700mm / 3600mm — EX

Type    No. of wires<sup>2</sup>    Wire material    Wire lengths each side of sealed tube<sup>1</sup>  
(specify to nearest 100mm)

HF - High density tube assembly

No. of wires	12	24	40	60
Type				
HF1	✓			
HF2		✓		
HF3			✓	
HF4				✓

1 The wire lengths on each side of the sealed tube are the actual lengths of wire specified and do not include the length of the metal tube. Dimensions of the sealed tube can be found in the table below. Both ends of each wire, or thermocouple pair, are identified with numbered markers. Minimum wire length 500mm each side. To specify the wire length, add (Y mm. / Z mm.) to the order code after the type of sealant specified. Y mm. is the length of wire required on the cap side of the feedthrough. Z mm. is the length of wire required on the process side of the feedthrough. Both dimensions to the nearest 100mm.

2 The number of wires refers to the total number of single wires, both copper and thermocouple-material wires passing through each size of sealed tube. Each series HF assembly can be specified, if required, with a combination of single copper wires and thermocouple pairs.

When a combination is specified the following typical examples show how the order code can be configured:

HF2 - 12Cu, 12J - 1000mm (Y) / 2000mm (Z) - EX and HF3 - 20K, 12T, 8Cu - 1200mm (Y) / 2800mm (Z) - EX

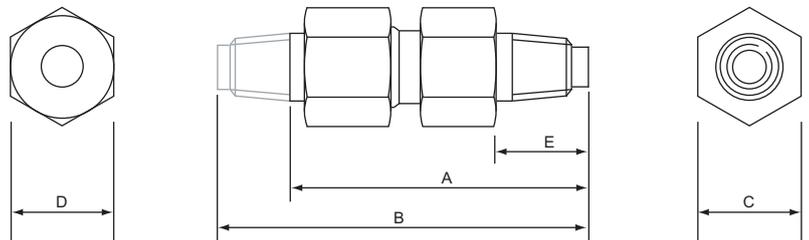
In the first example 12 single copper wires and 6 type-J thermocouple pairs are specified – total 24 wires. In the second example 10 type-K pairs, 6 type-T pairs and 8 single copper wires are specified – total 40 wires. When configuring these combinations of wires it is essential to verify that the total number of wires specified equals the possible number of wires for the size of tube assembly required, remembering that each thermocouple-material pair is two wires.

Temperature rating: -40°C to +125°C.

## Dimensions (mm)

Type	HF1	HF2	HF3	HF4
Tube diameter	4.5	6.0	8.0	10.0
Tube length	80	100	100	100
Wire length	Customer specified			

## Dimensions - Series WF Feedthroughs (mm)

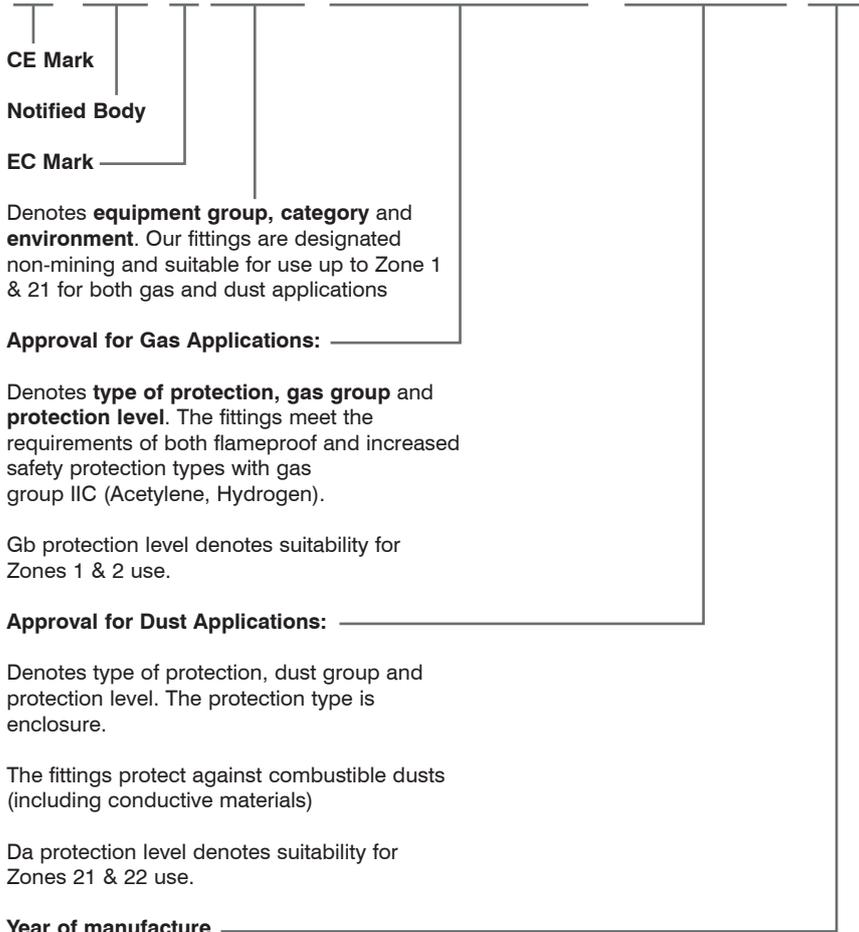


Process Connection	Overall length with plain cap	Overall length with cap with extension thread	Body hex.	Cap hex.	Body to process end
	Dim A	Dim B	Dim C	Dim D	Dim E
1/8"	35.0	-	15.0	15.0	12.0
1/4"	58.0	72.5	19.0	19.0	17.5
1/2"	75.5	95.5	25.4	25.4	25.0
3/4"	94.0	114.0	32.0	38.0	25.0

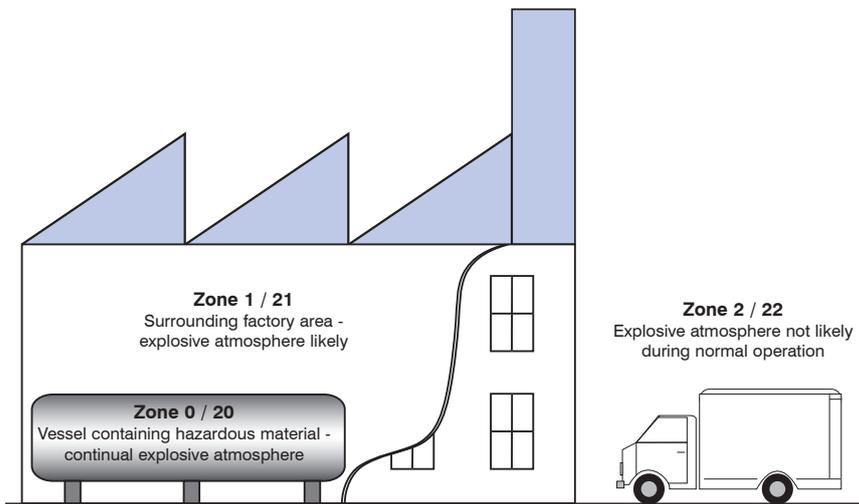
For further information on cap styles, see page 5 under 'ordering information' and the back cover of this catalogue.

# Our ATEX / IECEx Approval Explained

CE XXXX EX II 2 GD Ex d IIC Ex e IIC Gb Ex ta IIIC Da 2013



## Typical ATEX / IECEx Zone Diagram



## Certification

### Our ATEX accreditation

Sealed feedthroughs, sometimes called sealing glands, are used to seal elements under the most arduous conditions and have many applications in a wide variety of industries.

Spectite<sup>®</sup> feedthroughs inhibit the leakage of gases or other media and restrain the elements from moving in the assembly because of differential pressure. In some assemblies, elements are also electrically isolated from the feedthrough body and from each other.

They have been rigorously tested and have been approved to the following standards:

Zone 1 / 21 Explosion Proof - Gas & Dust  
Ex d IIC / Ex e IIC Gb Ex II 2 GD – Gas  
Ex ta IIIC Da Ex II 2 GD – Dust

Sealed feedthrough assemblies are pressure rated up to 700 bar and can be used in applications at a maximum temperature of +450°C, dependent on the sealant used.

Feedthrough bodies can be specified with a choice of threaded process connections. Feedthroughs with the common tapered threadforms, BSPT (Conical gas thread or 'R' thread) to BS21, DIN 2999 ISO 7/1 & JIS B0203; and NPT (National pipe tapered thread) to ANSI/ASME B1.20.1 are generally stocked items.

- Zone 1 / 21 Explosion Proof - Gas & Dust
- Ex d IIC / Ex e IIC Gb Ex II 2 GD – Gas
- Ex ta IIIC Da Ex II 2 GD – Dust
- Part of a range of ATEX approved sensors and equipment available from TC Ltd including thermocouples, resistance thermometers and temperature transmitters
- Available from stock for immediate overnight delivery
- Experienced engineers always available to offer assistance and advice on any aspect of your application

# SPECTITE®

from TC Ltd

## General Specifications

Sealed feedthrough assemblies are pressure rated up to 700 bar and can be used in applications at a maximum temperature of +450°C, dependent on the type of feedthrough and sealant material specified.

Sealed feedthroughs for single elements cater for sensors from 0.5mm (0.020") dia. to 25.4mm (1.0"). Sizes that can be used in multiple element assemblies are from 0.5mm dia. to 9.53mm (0.375").

Spectite® sealed feedthrough assemblies from TC Ltd. have been designed to be easy to install and can be maintained. Sealants and other internal parts are replaceable so that fittings can be re-used over and over again. If elements need replacement or adjustment, the feedthrough cap can be undone - after the pressure or vacuum in the vessel has been released - to allow movement or removal of all or individual elements.

### Process connections

Feedthrough bodies can be specified with a choice of threaded process connections. Feedthroughs with the common tapered threadforms, **BSPT** (conical gas thread or 'R' thread) to BS21, DIN 2999 ISO 7/1 & JIS B0203; and **NPT** (national pipe tapered thread) to ANSI/ASME B1.20.1 are generally stocked items.

Feedthroughs with parallel threaded process connections, **BSPP** (parallel gas thread or 'G' thread) to BS2779, DIN ISO 228/1 & JIS B0202; **UNF/JUNEF** to ANSI/ASME B1.20.1, **PG** to DIN 40430, **ET** to BS31 and **ISO metric** to DIN13, may also be specified. Feedthroughs with parallel mounting threads need an 'O' ring or a gasket seal (not supplied) to prevent leakage at the process connection.

Custom engineered assemblies can be designed and made to meet customers' specific application requirements.

### Caps

Caps with a threaded extension for a conduit connection are also available. Specifiers may choose **NPT**, **BSPP** (parallel gas thread) or **BSPT** (conical gas thread). These caps can be specified for feedthroughs with 1/8", 1/4", 1/2", 3/4" & 1" process connections. Cap threads are the same size as the corresponding feedthrough body process connection.

### Pressure Equipment Directive (PED)

Spectite® sealed feedthroughs have been classified as 'Piping', satisfying the requirements of the category of Sound Engineering Practice (SEP), according to the European Pressure Equipment Directive (PED) 97/23/EC. Caps are marked **SPECTITE** on one of the hexagon faces.

### Feedthrough component materials

Spectite® feedthrough bodies, followers, seats and series EF SS electrodes are manufactured in an austenitic stainless steel UNS S31603, commonly designated 316L. Equivalent grades are: (UK) BS 316 S11; (Germany) W.-Nr. 1.4404, DIN CrNiMo 17.13.2; (France) AFNOR Z2 CND 17.12; (Italy) UNI X2 CrNiMo 17.12; (Sweden) SS2353; (USA) AISI 316L; (Japan) JIS SUS 316L. The typical chemical composition for this steel is 0.03%C, 16.0-18.0%Cr, 10-14%Ni, 2.0-3.0%Mo, 0.10%N. Caps are manufactured in stainless steel UNS S30300 (303) or UNS S30400 (304).

When 316L is unsuitable for an application, the 'wetted' metal parts of feedthroughs, that come into contact with a process, can be manufactured in other stainless grades or other materials such as Hastelloy® and Inconel® grades, and Monel® R-405. There may be minimum manufacturing requirements for feedthroughs in 'exotic' materials.

Insulators in series WF feedthroughs with 1/8" process connections and in series EF feedthroughs are manufactured in high-purity recrystallised Alumina (Aluminium Oxide Al<sub>2</sub>O<sub>3</sub>).

External, single-bore insulators in series WF feedthroughs are manufactured in aluminous porcelain. Internal insulators are manufactured in a high-performance, engineering plastic for use at temperatures up to +230°C or machineable glass ceramic for use up to +450°C.

Electrical conductors for Series EF feedthroughs are made in grade C101 copper or 316L stainless steel (as above). Nuts and washers on copper conductors are brass, stainless steel conductors have stainless steel nuts and washers.

The lubricant used on feedthrough components is Chlorotrifluoroethylene Polymer (PCTFE). A copy of the Safety Data Sheet is available on request. Spectite® feedthroughs should not be degreased before installation.

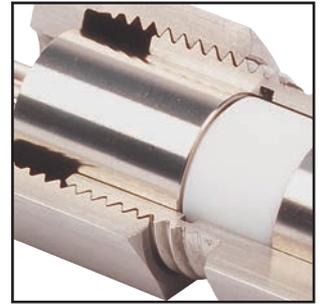
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*Kapton® is a registered trademark of E.I. du Pont de Nemours and Company*

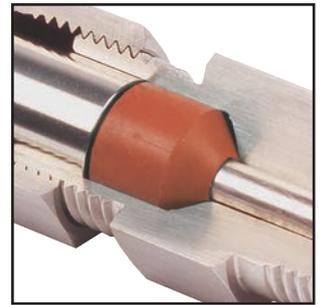
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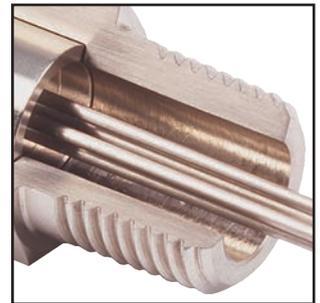
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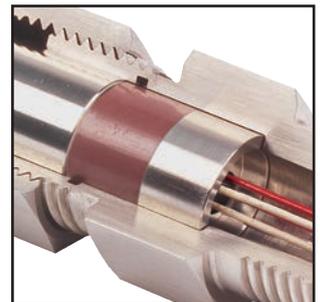
**Spectite® feedthrough bodies, caps, followers and seats are manufactured in stainless steel.**



**A wide range of sealant materials is available to suit the most demanding of applications.**



**Spectite® sealed feedthroughs satisfy the requirements of the European Pressure Equipment Directive (PED).**



**Spectite® sealed feedthroughs have a wide operating temperature range.**

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