

SPECTITE®

SEALED FEEDTHROUGH ASSEMBLIES ASSEMBLY and INSTALLATION INSTRUCTIONS

CAUTION: It is essential that feedthroughs are installed by personnel with appropriate professional qualifications, entirely in accordance with the following instructions and with proper regard to relevant health and safety rules and safe working practices.

Please read the following notes before commencing an installation.

1. The general term 'elements' is used to describe any probes, sensors, tubes, wires, electrodes or other types of components that are to pass through and be sealed in Spectite® feedthrough assemblies. Sealed feedthroughs are sometimes called sealing glands.
2. These assembly and installation instructions assume that there is free access to the process end(s) of the element(s). Unless otherwise stated, elements and internal parts are inserted into feedthrough bodies from the cap thread end. If access is restricted, if it is necessary to mount the feedthrough body before assembly, or there are other installation constraints, it may be necessary to change the order in which the feedthrough components are fitted. Refer to the relevant sealed feedthrough assembly diagram.
3. Feedthrough assemblies are designed for mounting on to a vessel or enclosure using the process connection thread on the feedthrough body. Feedthroughs may also be specified with an unthreaded connection for welding or with an integral flange fitting. If a feedthrough is specified with a cap having a threaded extension for a conduit connection, this thread must not be used for the process connection.
4. Spectite® feedthrough caps are tightened to a specified torque setting for each type and size of assembly, according to the sealant material used. A torque wrench with an open end fitting should be used. Refer to the Torque tables for maximum settings. If feedthrough assemblies are over-torqued, elements may be deformed or broken. If they are under-torqued, the feedthrough may provide a poor seal and the maximum pressure rating may not be achieved. When elements are considered to be fragile, for example, quartz tube, or likely to deform under the sealant pressure, for example, thin walled tube, the maximum torque shown in the torque tables may be found to be excessive. A slightly lighter torque (-10 to -15% of max.) could be advantageous, provided that feedthrough sealing performance is not compromised.
5. Spectite® feedthrough assemblies 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 the differential pressure exceeds 50% of the rated pressure of the feedthrough, particularly when using Teflon sealants or a lighter torque.**
6. When feedthrough bodies must be mounted on to the vessel or enclosure before assembly, and where feedthroughs that have already been installed are slackened or disassembled, they should be torqued or re-torqued when assembled or re-assembled, using a torque wrench on the cap and a spanner or wrench on the hexagonal body to provide a counter-force. To avoid damage, feedthroughs should not be torqued against the vessel or enclosure mounting.
7. When feedthrough assemblies are installed where they may encounter high levels of vibration, consideration should be given to the use of lockwires to prevent unwanted slackening of feedthrough caps.
8. Thread tape is recommended for use on process connection threads. PTFE tape is often used for temperatures to approx. +250°C. Graphite tape may be used for higher temperatures.
9. Feedthrough bodies, followers and caps have a lubricant applied during manufacture to prevent component parts from binding (galling). These components should not be degreased prior to assembly and installation. Substitution of the lubricant applied at the factory may affect torque values. Whenever a feedthrough is disassembled it is recommended that a small quantity of this lubricant is re-applied. See page 7 for lubricant application guidance.
10. Caps may be slackened to adjust elements or disassembled to remove elements or replace sealants and insulators without removing the feedthrough body from the installation. (Except installations where the elements cannot pass through the feedthrough body). Assemblies must not be slackened or disassembled while an installation is in use, under pressure, vacuum or other working conditions. Stub elements to close unused holes in multi-element feedthroughs must be restrained to prevent unwanted ejection.
11. Interchangeability: The interaction of precision parts as designed by Spectite® is essential to safety and reliability. The integrity of complete Spectite® feedthroughs will be compromised by any inclusion of components not of Spectite® design or manufacture. **Injury or damage may result from mixing parts or interchanging of Spectite® assemblies with sealing components made by other manufacturers.**
12. Spectite® feedthrough assemblies are designed to enjoy a long lifespan enduring harsh applications. The different sealant types within the feedthroughs are consumable and each have different general properties which should be chosen by the user according to the application.
13. Users of these assemblies should establish some formal recorded routine maintenance programme for each application. This programme will normally include periodic inspection of the elements, sealants and seal / feedthrough components. The scope and frequency of such a programme should be developed from the user's detailed knowledge of the particular physical, environmental & mechanical conditions their choice of seals / feedthroughs will encounter on their application.
14. Non compliance with these instructions will render any express or implied warranty or liability null and void.

EUROPEAN PRESSURE EQUIPMENT DIRECTIVE

Spectite® sealed feedthrough assemblies have been classified as "Piping". They satisfy the requirements of the SEP category (Sound Engineering Practice) in accordance with the Pressure Equipment Directive (PED) 97/23/EC. The PED does not require the "CE" symbol to be marked on SEP category Pressure Equipment.

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SPECTITE®
pressure and vacuum sealed feedthroughs

from TC Measurement & Control Ltd.
Unit 8, Cookstown Square
Second Ave, Cookstown Ind Est
Dublin 24
D24 VX23
Ireland

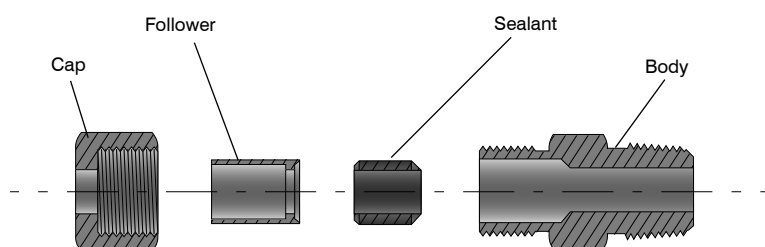
Phone: 01-4146980

Email: info@spectite.ie Web: www.spectite.ie

Series PF feedthroughs for single probes, sensors, tubes, etc.

1. Identify the feedthrough to be assembled. Verify that it has been correctly specified for the application and the probe or element to be used. Ensure that the correct sealant has been chosen for use at the working pressure, temperature and process environment.
2. Disassemble the feedthrough. Refer to the diagram below; identify the components and how they were assembled.
3. During assembly, feedthrough bodies with threaded process connections should be held in a vice or mounted on to a vessel or enclosure. Feedthrough bodies for welded connection should be welded to the vessel and allowed to cool before assembly.
4. Place the cap, then the follower and then the sealant over the element. Refer to the diagram below for the correct orientation of these parts.
5. Insert the element through the feedthrough body from the cap side and slide the sealant and then the follower into the feedthrough body. Ensure that the sealant is pushed down into place.
6. Thread the cap on to the body until finger tight. Adjust the immersion length of the element to the required position. Using a torque wrench, tighten the cap to the specified torque shown in the Torque table for the size of feedthrough and sealant used.
7. If the feedthrough was assembled before installation, it is now ready for mounting on the vessel, housing or enclosure. Tighten the feedthrough body using a spanner or wrench on the feedthrough body flats – do not tighten using the cap.

Unassembled

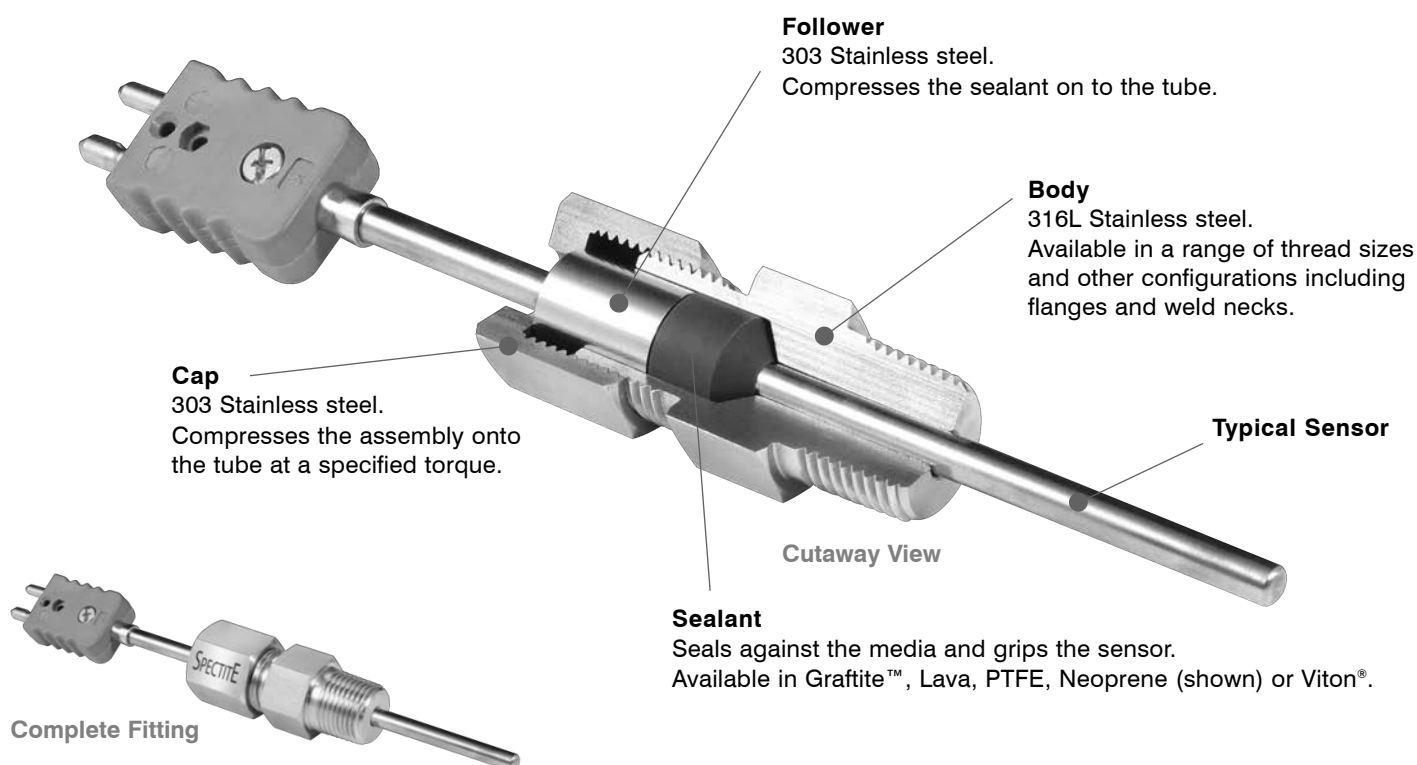


Typical components shown for a PF Series fitting.

Series PF Torque Settings - Max. values in Nm					
Process Connection Size	Sealants				
	G	L	N	T	V
Size 0 (1/16")	20	18	–	3	–
Size 1 (1/8")	20	18	15	12	15
Size 2 (1/4")	60	60	50	30	50
Size 3 (1/2")	135	190	85	75	85
Size 4 (3/4")	260	300	–	120	85
Size 5 (1")	300	350	–	400	300

G = Graftite™, L = Lava, N = Neoprene, T = PTFE, V = Viton®
To convert: ft/lb = Nm x 0.738; Kg/cm = Nm x 10.2.

Typical Assembled Fitting (shown with example sensor)



Series PF feedthroughs
for single probes, sensors, tubes, etc.

Series PF Body Size, Pressure Guide ¹ and available Bore Sizes for BSPT, BSPP and NPT Threads ²																																					
Body Size		Size 0 (1/16")			Size 1 (1/8")					Size 2 (1/4")					Size 3 (1/2")					Size 4 (3/4")				Size 5 (1")													
Sealant		G	L	T	G	L	N	T	V	G	L	N	T	V	G	L	N	T	V	G	L	T	V	G	L	T	V										
Element Sizes (dia) ³		<i>The maximum guide pressure value (in bar) at 20°C is shown for each sealant material according to element size¹. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.</i>																																			
inches	mm																																				
0.020	0.5	650	550	200	450	550	350	200	350																												
0.032	0.8																											150	150	500	550	350	500				
0.040	1.0																																				
0.059	1.5			450			100	400	100																			550	700	200	700						
0.062	1.59																																				
0.080	2.0		450	100	400	100	550	700	200	700	550	700	200	200	550																						
0.118	3.0																																				
0.125	3.2																																				
0.157	4.0															350	80	550	550	125	80																
0.177	4.5																																				
0.187	4.76																																				
0.236	6.0									450				80		700	550	700	200	200	550	550	500	400	400	55	150										
0.250	6.35																																				
0.312	8.0																											350	400	100	250	200	150	400	200	45	40
0.375	9.5																																				
0.393	10.0									300	75	200	150	100	30	20																					
0.472	12.0																																				
0.500	12.7																																				
0.625	15.88																																				
0.750	19.05																																				
0.839	21.3																																				
1.00	25.4																																				

¹ The guide pressures shown for each type of sealant are at 20°C. Spectite® feedthroughs from TC. 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 guide pressure value at 20°C. With an increase in temperature, a reduction in the maximum guide pressure value can be expected. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.

² Other types of process connection are available, please contact us for details.

³ The element diameters shown are the common sizes routinely demanded for general industrial applications. Other sizes can be supplied between the minimum and maximum diameters shown.

Series PSF split feedthroughs for single probes, sensors, tubes, etc.

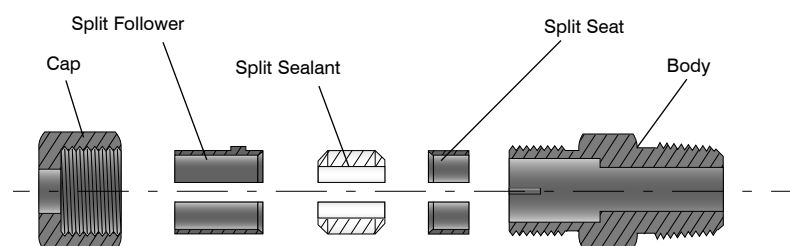
1. Identify the feedthrough to be assembled. Series PSF fittings have two-part followers, sealants and seats. Verify that it has been correctly specified for the application and the probes or elements to be used. Ensure that the correct sealant has been chosen for use at the working pressure, temperature and process environment.

Where PSF feedthroughs are to be assembled with element(s) that have a larger section to pass through the body, e.g., a bulb or fitted connectors, ensure that the largest dimension will pass through the feedthrough body and cap (allowing for the dimensions of the other elements to be fitted, if applicable). Refer to the Clearance Sizes table for maximum dimensions.

2. Disassemble the feedthrough. Refer to the diagram below; identify the components and how they were assembled.
3. During assembly, feedthrough bodies with threaded process connections should be held in a vice or mounted on to a vessel or enclosure. Feedthrough bodies for welded connection should be welded to the vessel and allowed to cool before assembly.

4. Pass the element(s) through the feedthrough body and the cap. This can be done from either direction if access permits. Assemble the split parts of the seat around the element(s) and slide the seat into the body. Repeat this procedure for the split sealant and then the split follower.
5. As the follower enters the body rotate the assembly so that the anti-rotation key on the follower aligns with the keyway in the body. Push in the follower, ensuring that the elements are correctly positioned.
6. Thread the cap on to the body until finger tight. Adjust the immersion length of the element(s) to the required position(s). Using a torque wrench, tighten the cap to the specified torque shown in the Torque table for the size of feedthrough and sealant used.
7. If the feedthrough was assembled before installation, it is now ready for mounting on to the vessel, housing or enclosure. Tighten the feedthrough body using a spanner or wrench on the feedthrough body flats – do not tighten using the cap.

Unassembled

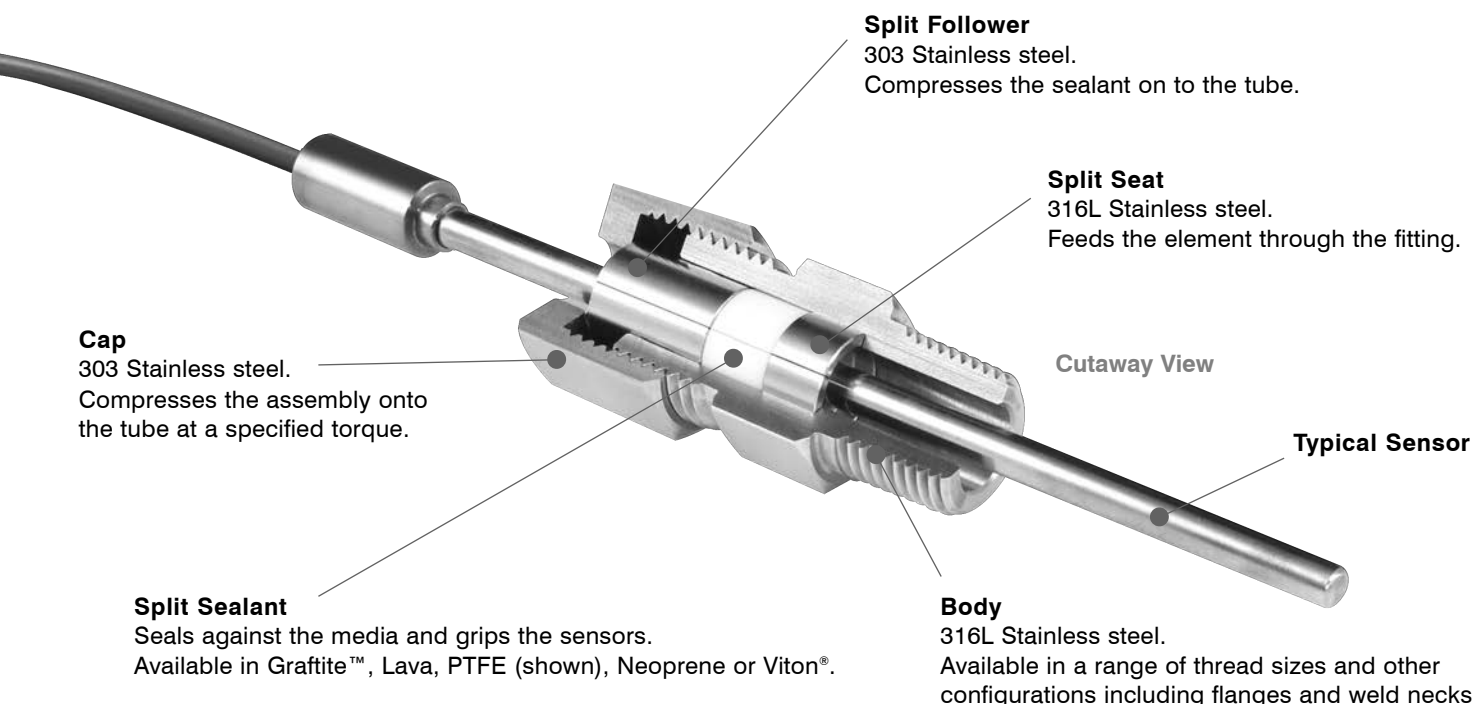


Typical components shown for a PSF Series fitting.

Series PSF Torque Settings - Max. values in Nm					
Process Connection Size	Sealants				
	G	L	N	T	V
Size 2 (1/4")	50	60	40	35	40
Size 3 (1/2")	165	190	125	115	125
Size 4 (3/4")	260	300	–	150	175
Size 5 (1")	400	350	–	250	350

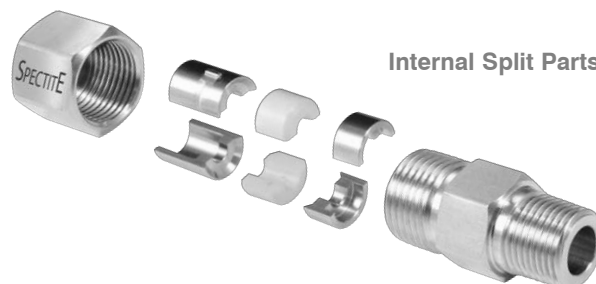
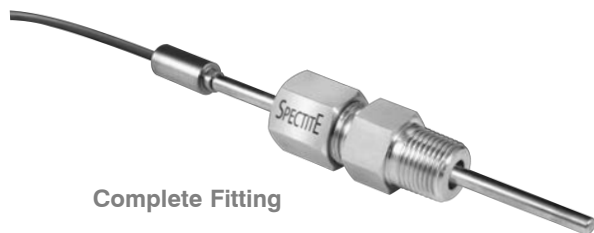
G = Graftite™, L = Lava, N = Neoprene, T = PTFE, V = Viton®
To convert: ft/lb = Nm x 0.738; Kg/cm = Nm x 10.2.

Typical Assembled Fitting (shown with example sensor)



Series PSF split feedthroughs for single probes, sensors, tubes, etc.

SPECTITE®
from TC



Series PSF Body Size, Pressure Guide ¹ and available Bore Sizes for BSPT, BSPP and NPT Threads ²

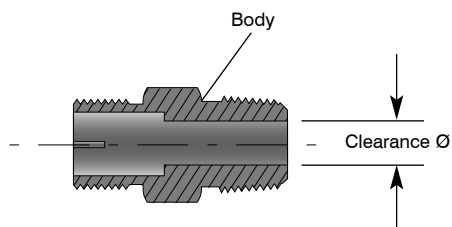
Body Size		Size 2 (1/4")					Size 3 (1/2")					Size 4 (3/4")				Size 5 (1")					
Sealant		G	L	N	T	V	G	L	N	T	V	G	L	T	V	G	L	T	V		
Element Sizes (dia) ³		<i>The maximum guide pressure value (in bar) at 20°C is shown for each sealant material according to element size¹. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.</i>																			
inches	mm																				
0.040	1.0	480	480	300	210	450															
0.059	1.5																				
0.062	1.59																				
0.080	2.0	480	610	180	80	180	500	670	100	100	100										
0.118	3.0																				
0.125	3.2																				
0.157	4.0	260	590	100	50	150	500	670	100	100	100										
0.177	4.5																				
0.187	4.76																				
0.236	6.0	230	500	80	40	120	330	670	100	90	80	100	130	50	140	50	100	20	100		
0.250	6.35																				
0.312	8.0																				
0.375	9.5						300	500	60	80	30	60	130	50	80	30	100	20	40		
0.393	10.0											30			50				20	20	
0.472	12.0																				
0.500	12.7																				
0.625	15.88															20	50		20		
0.750	19.05																				

¹ The guide pressures shown for each type of sealant are at 20°C. Spectite® feedthroughs from TC 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 guide pressure value at 20°C. With an increase in temperature, a reduction in the maximum guide pressure value can be expected. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.

² Other types of process connection are available, please contact us for details.

³ The element diameters shown are the common sizes routinely demanded for general industrial applications. Other sizes can be supplied between the minimum and maximum diameters shown.

Clearance Sizes for split internal components

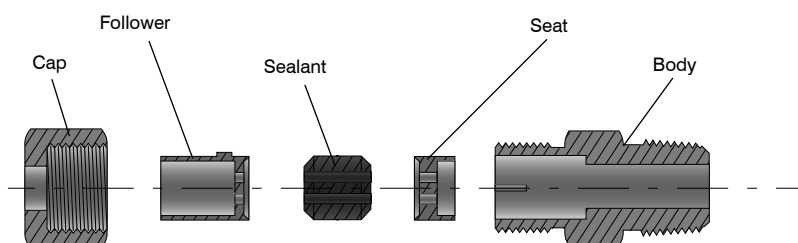


Process Connection Size	Max. Clearance Size
Size 2 (1/4")	8.2mm Ø
Size 3 (1/2")	12.2mm Ø
Size 4 (3/4")	20.2mm Ø
Size 5 (1")	25.6mm Ø

Series MF feedthroughs for multiple probes, sensors, etc.

1. Identify the feedthrough to be assembled. Verify it has been correctly specified for the application and the probes or elements to be used. Ensure that the correct sealant has been chosen for use at the working pressure, temperature and process environment.
2. Disassemble the feedthrough. Refer to the diagram below; identify the components and how they were assembled.
3. During assembly, feedthrough bodies with threaded process connections should be held in a vice or mounted on to a vessel or enclosure. Feedthrough bodies for welded connection should be welded to the vessel and allowed to cool before assembly.
4. Place the cap over the elements. Slide the follower, then the sealant, then the seat over the elements, there are individual holes in these components for each element. Insert the elements through the feedthrough body and slide the seat, the sealant and then the follower into the body.
5. As the follower enters the body rotate the assembly so that the anti-rotation key on the follower aligns with the keyway in the body. Push in the follower, ensuring that the elements are correctly positioned.
6. Thread the cap on to the body until finger tight. Adjust the immersion length of the element(s) to the required position(s). Using a torque wrench, tighten the cap to the specified torque shown in the Torque table for the size of feedthrough and sealant used.
7. If the feedthrough was assembled before installation, it is now ready for mounting on to the vessel, housing or enclosure. Tighten the feedthrough body using a spanner or wrench on the feedthrough body flats – do not tighten using the cap.

Unassembled



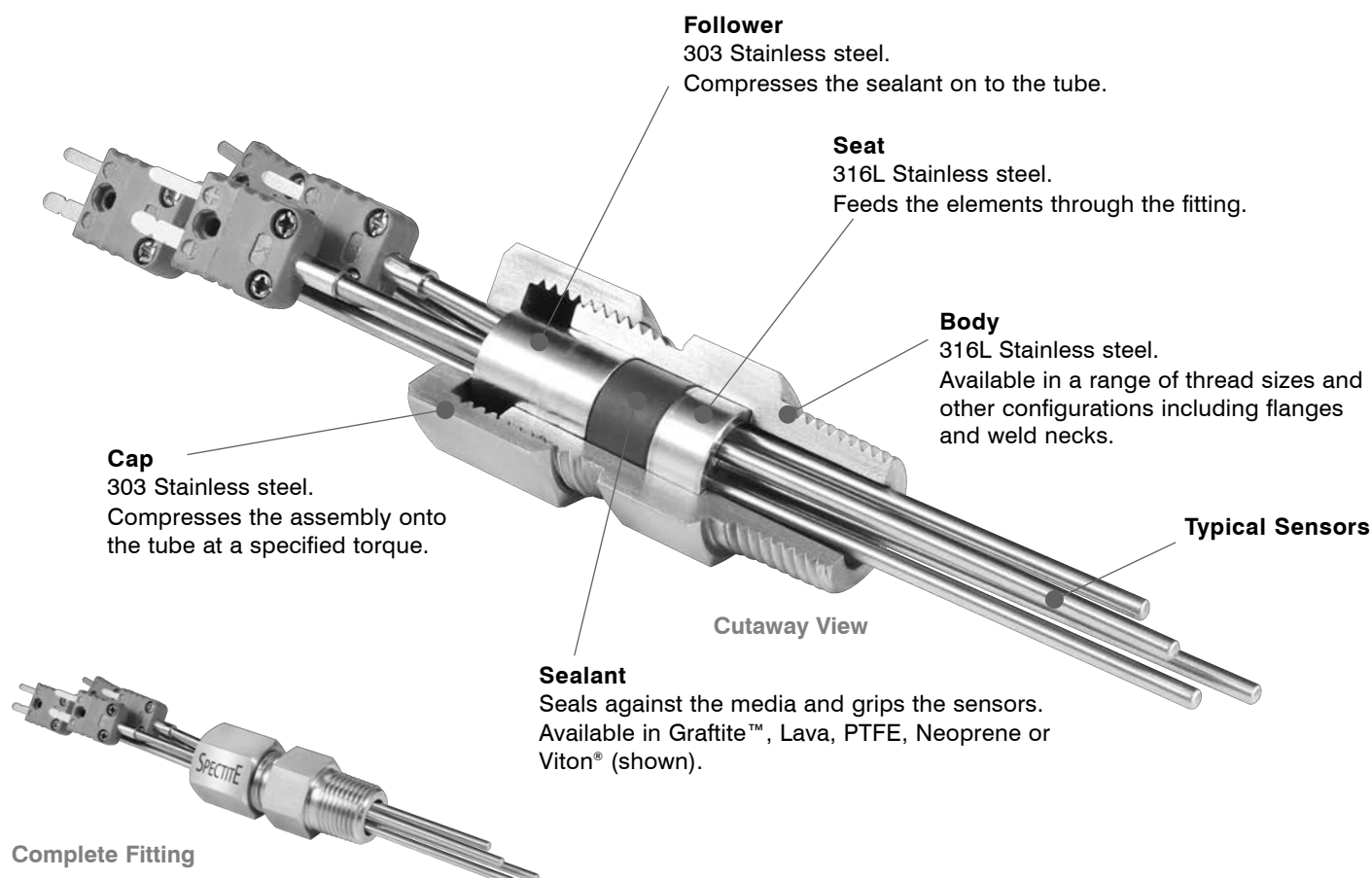
Typical components shown for an MF Series fitting. Size 1 fittings have slightly different components (see page 7).

Series MF Torque Settings - Max. values in Nm

Process Connection Size	Sealants				
	G	L	N	T	V
Size 1 (1/8")	40	45	35	30	35
Size 2 (1/4")	50	60	40	35	40
Size 3 (1/2")	165	190	125	115	125
Size 4 (3/4")	260	300	–	150	175
Size 5 (1")	400	350	–	250	350

G = Graffite™, L = Lava, N = Neoprene, T = PTFE, V = Viton®
To convert: ft/lb = Nm x 0.738; Kg/cm = Nm x 10.2.

Typical Assembled Fitting (shown with example sensors)



Series MF feedthroughs
for multiple probes, sensors, etc.

Series MF Body Size, Pressure Guide ¹ and available Bore Sizes for BSPT, BSPP and NPT Threads ²

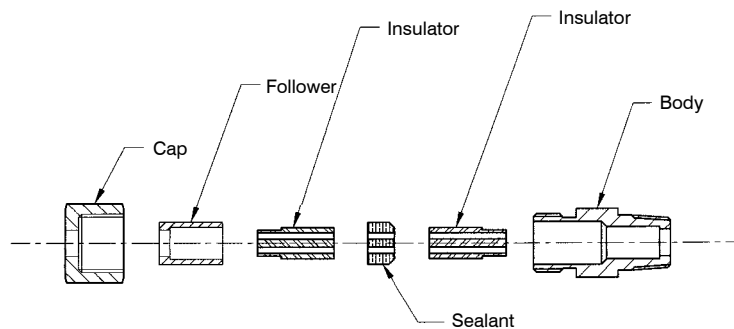
Body Size		No. of Elements	Size 1 (1/8") ^a					No. of Elements	Size 2 (1/4")					No. of Elements	Size 3 (1/2")					No. of Elements	Size 4 (3/4")				No. of Elements	Size 5 (1")			
Sealant			G	L	N	T	V		G	L	N	T	V		G	L	N	T	V		G	L	T	V		G	L	T	V
Element Sizes (dia)		The maximum guide pressure value (in bar) at 20°C is shown for each sealant material according to element size ¹ . These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.																											
inches	mm																												
0.020	0.5	2 to 4	400	400	250	250	250	4 to 8	300	400	250	250																	
0.032	0.8																												
0.040	1.0							4 to 8	500	700	200	500	4 to 16	700	700	400	250	450	8 to 40	550	300	400							
0.059	1.5																												
0.062	1.59																												
0.080	2.0																												
0.118	3.0																												
0.125	3.2							2 to 6	500	700	200	500	4 to 12	700	700	400	250	450	8 to 28	550	250	400							
0.177	4.5																												
0.187	4.76																												
0.236	6.0																												
0.250	6.35																												
0.315	8.0							2 to 4	500	700	200	500	4 to 16	700	700	400	250	450	8 to 40	550	300	400							
0.375	9.53																												

¹ The guide pressures shown for each type of sealant are at 20°C. Spectite® feedthroughs from TC. 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 guide pressure value at 20°C. With an increase in temperature, a reduction in the maximum guide pressure value can be expected. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.

² Other types of process connection are available, please contact us for details.

³ Our Size 1 range utilises different internal parts.

Unassembled Size 1 (1/8") components - applies to MF, WFS, WFR, WFP, HWFR & HWFP fittings



Series MSF split feedthroughs for multiple probes, sensors, etc.

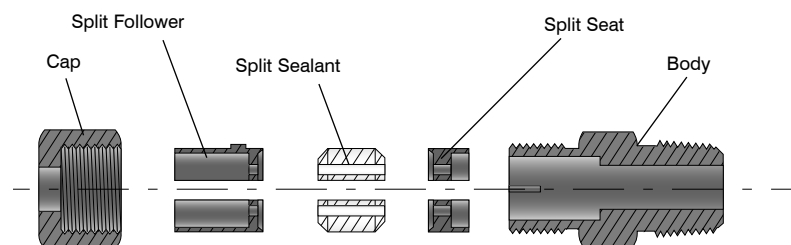
1. Identify the feedthrough to be assembled. Series MSF fittings have two-part followers, sealants and seats. Verify that it has been correctly specified for the application and the probes or elements to be used. Ensure that the correct sealant has been chosen for use at the working pressure, temperature and process environment.

Where MSF feedthroughs are to be assembled with element(s) that have a larger section to pass through the body, e.g., a bulb or fitted connectors, ensure that the largest dimension will pass through the feedthrough body and cap (allowing for the dimensions of the other elements to be fitted, if applicable). Refer to the Clearance Sizes table for maximum dimensions.

2. Disassemble the feedthrough. Refer to the diagram below; identify the components and how they were assembled.
3. During assembly, feedthrough bodies with threaded process connections should be held in a vice or mounted on to a vessel or enclosure. Feedthrough bodies for welded connection should be welded to the vessel and allowed to cool before assembly.

4. Pass the element(s) through the feedthrough body and the cap. This can be done from either direction if access permits. Assemble the split parts of the seat around the element(s) and slide the seat into the body. Repeat this procedure for the split sealant and then the split follower.
5. As the follower enters the body rotate the assembly so that the anti-rotation key on the follower aligns with the keyway in the body. Push in the follower, ensuring that the elements are correctly positioned.
6. Thread the cap on to the body until finger tight. Adjust the immersion length of the element(s) to the required position(s). Using a torque wrench, tighten the cap to the specified torque shown in the Torque table for the size of feedthrough and sealant used.
7. If the feedthrough was assembled before installation, it is now ready for mounting on to the vessel, housing or enclosure. Tighten the feedthrough body using a spanner or wrench on the feedthrough body flats – do not tighten using the cap.

Unassembled



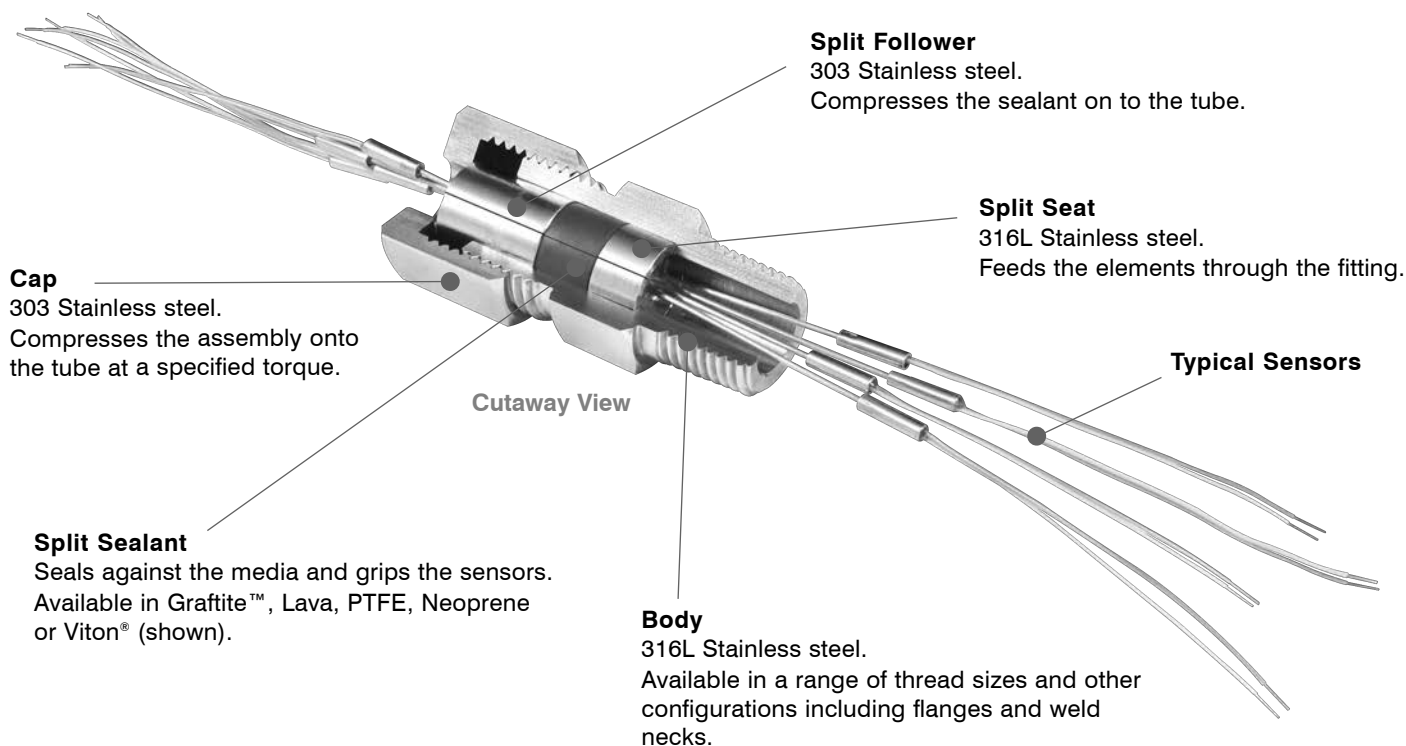
Typical components shown for an MSF Series fitting.

Series MSF Torque Settings - Max. values in Nm

Process Connection Size	Sealants				
	G	L	N	T	V
Size 2 (1/4")	50	60	40	35	40
Size 3 (1/2")	165	190	125	115	125
Size 4 (3/4")	260	300	–	150	175
Size 5 (1")	400	350	–	250	350

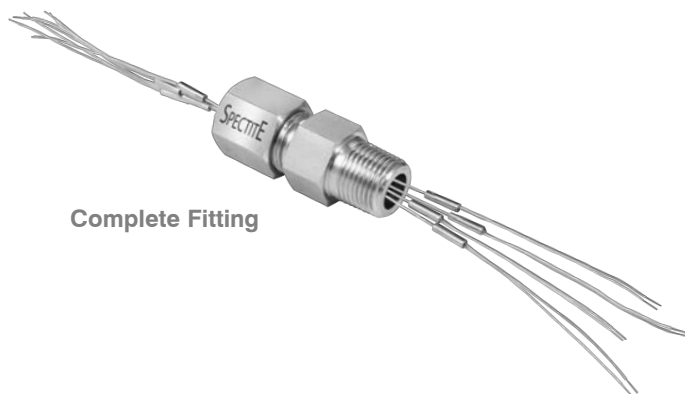
G = Graftite™, L = Lava, N = Neoprene, T = PTFE, V = Viton®
To convert: ft/lb = Nm x 0.738; Kg/cm = Nm x 10.2.

Typical Assembled Fitting (shown with example sensors)



Series MSF split feedthroughs for multiple probes, sensors, etc.

SPECTITE®
from TC



Complete Fitting



Internal Split Parts

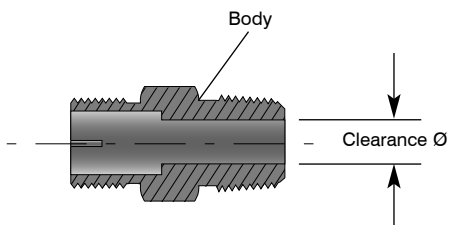
Series MSF Body Size, Pressure Guide ¹ and available Bore Sizes for BSPT, BSPP and NPT Threads ²

Body Size		No. of Elements	Size 2 (1/4")					No. of Elements	Size 3 (1/2")					No. of Elements	Size 4 (3/4")				No. of Elements	Size 5 (1")							
Sealant			G	L	N	T	V		G	L	N	T	V		G	L	T	V		G	L	T	V				
Element Sizes (dia)		The maximum guide pressure value (in bar) at 20°C is shown for each sealant material according to element size ¹ . These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.																									
inches	mm																										
0.040	1.0	2 to 3	400	550	200	200	200	2 to 5	550	550	300	200	350	2 to 9	450	250	300										
0.059	1.5							2 to 4						2 to 7													
0.062	1.59					150		150						2 to 3								2 to 6					
0.080	2.0	2	400	550	150		200	2	550	550	270	150	300	2 to 4	450	200	270	5	150	100	80	100					
0.118	3.0					100																					
0.125	3.2																										
0.177	4.5										250	100	200	2 to 3	300	100	200	4	100	55	55	30					
0.187	4.76												2														
0.236	6.0												2														
0.250	6.35												2														

¹ The guide pressures shown for each type of sealant are at 20°C. Spectite® feedthroughs from TC. 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 guide pressure value at 20°C. With an increase in temperature, a reduction in the maximum guide pressure value can be expected. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.

² Other types of process connection are available, please contact us for details.

Clearance Sizes for split internal components



Process Connection Size	Max. Clearance Size
Size 2 (1/4")	8.2mm Ø
Size 3 (1/2")	12.2mm Ø
Size 4 (3/4")	20.2mm Ø
Size 5 (1")	25.6mm Ø

Series MSFD double split feedthroughs for multiple probes, sensors, etc.

SPECTITE®
from TC

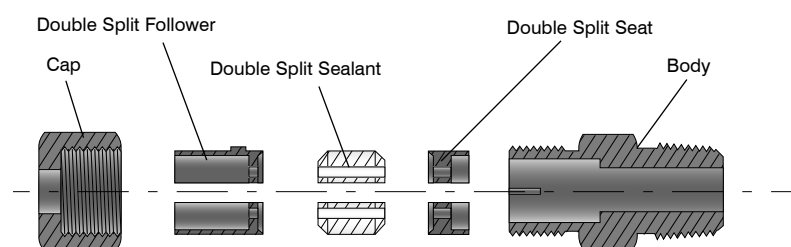
1. Identify the feedthrough to be assembled. Series MSFD fittings have four-part followers, sealants and seats. Verify that it has been correctly specified for the application and the probes or elements to be used. Ensure that the correct sealant has been chosen for use at the working pressure, temperature and process environment.

Where MSFD feedthroughs are to be assembled with element(s) that have a larger section to pass through the body, e.g., a bulb or fitted connectors, ensure that the largest dimension will pass through the feedthrough body and cap (allowing for the dimensions of the other elements to be fitted, if applicable). Refer to the Clearance Sizes table for maximum dimensions.

2. Disassemble the feedthrough. Refer to the diagram below; identify the components and how they were assembled.
3. During assembly, feedthrough bodies with threaded process connections should be held in a vice or mounted on to a vessel or enclosure. Feedthrough bodies for welded connection should be welded to the vessel and allowed to cool before assembly.

4. Pass the element(s) through the feedthrough body and the cap. This can be done from either direction if access permits. Assemble the split parts of the seat around the element(s) and slide the seat into the body. Repeat this procedure for the split sealant and then the split follower. The split component parts for the MSFD range are marked in order for ease of assembly.
5. As the follower enters the body rotate the assembly so that the anti-rotation key on the follower aligns with the keyway in the body. Push in the follower, ensuring that the elements are correctly positioned.
6. Thread the cap on to the body until finger tight. Adjust the immersion length of the element(s) to the required position(s). Using a torque wrench, tighten the cap to the specified torque shown in the Torque table for the size of feedthrough and sealant used.
7. If the feedthrough was assembled before installation, it is now ready for mounting on to the vessel, housing or enclosure. Tighten the feedthrough body using a spanner or wrench on the feedthrough body flats – do not tighten using the cap.

Unassembled



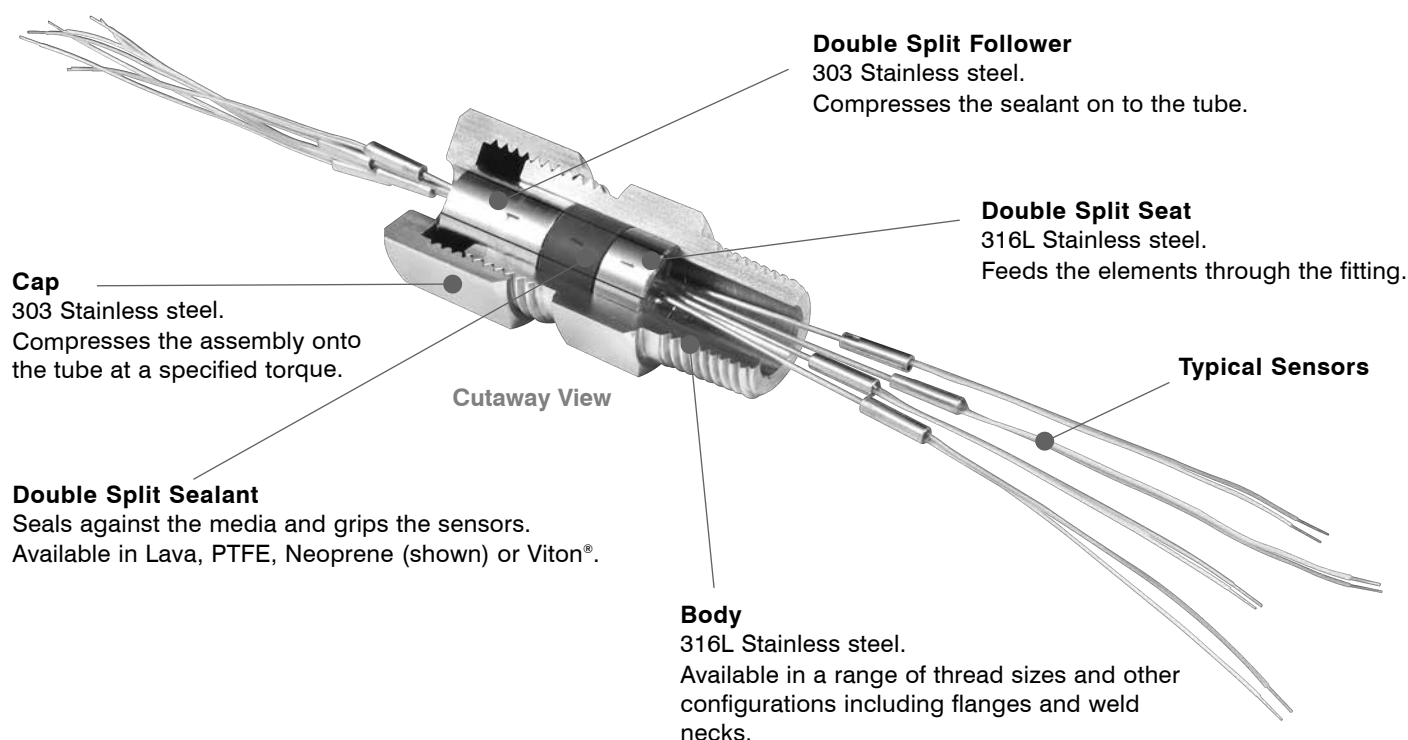
Typical components shown for an MSFD Series fitting.

Series MSFD Torque Settings - Max. values in Nm

Process Connection Size	Sealants			
	L	N	T	V
Size 2 (1/4")	60	40	35	40
Size 3 (1/2")	190	125	115	125
Size 4 (3/4")	300	–	150	175
Size 5 (1")	350	–	250	350

L = Lava, N = Neoprene, T = PTFE, V = Viton®
To convert: ft/lb = Nm x 0.738; Kg/cm = Nm x 10.2.

Typical Assembled Fitting (shown with example sensors)

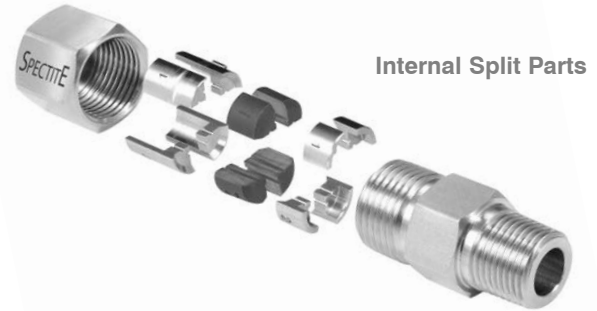


Series MSFD double split feedthroughs for multiple probes, sensors, etc.

SPECTITE®
from TC



Complete Fitting



Internal Split Parts

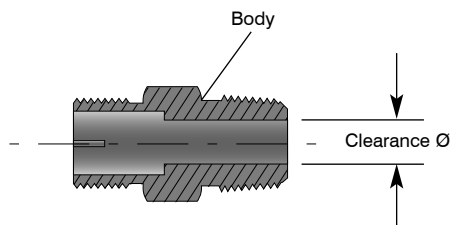
Series MSFD Body Size, Pressure Guide ¹ and available Bore Sizes for BSPT, BSPP and NPT Threads ²

Body Size		No. of Elements	Size 2 (1/4")				No. of Elements	Size 3 (1/2")				No. of Elements	Size 4 (3/4")			No. of Elements	Size 5 (1")				
Sealant			L	N	T	V		L	N	T	V		L	T	V		L	T	V		
Element Sizes (dia)		The maximum guide pressure value (in bar) at 20°C is shown for each sealant material according to element size ¹ . These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.																			
inches	mm																				
0.040	1.0	4 to 8	450	150	150	150	4 to 8	450	250	150	300	4 to 12	350	200	250						
0.059	1.5	4		100	100				80	200	100	250		4 to 8	150					200	4 to 8
0.062	1.59																				
0.080	2.0																				
0.118	3.0																				
0.125	3.2	4	200	80	150	4	80	150	4	80	150	4	40	40	25						
0.177	4.5																				
0.187	4.76																				
0.236	6.0																				
0.250	6.35																				

¹ The guide pressures shown for each type of sealant are at 20°C. Spectite® feedthroughs from TC. 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 guide pressure value at 20°C. With an increase in temperature, a reduction in the maximum guide pressure value can be expected. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.

² Other types of process connection are available, please contact us for details.

Clearance Sizes for split internal components



Process Connection Size	Max. Clearance Size
Size 2 (1/4")	8.2mm Ø
Size 3 (1/2")	12.2mm Ø
Size 4 (3/4")	20.2mm Ø
Size 5 (1")	25.6mm Ø

Series WF feedthroughs (incl. WFS, WFR, WFP, WFRH & WFPH) for multiple, bare or insulated wires and multiple, sheathed probes or sensors

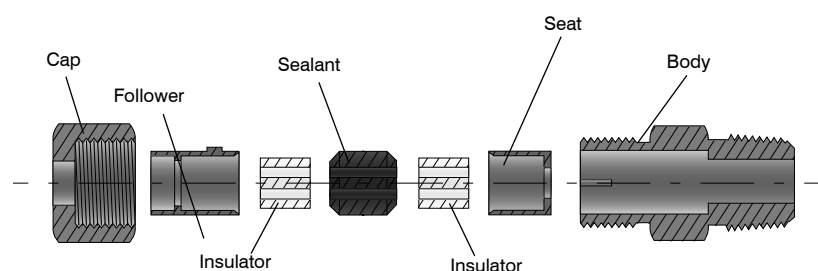
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from TC

1. Identify the feedthrough to be assembled. Verify that it has been correctly specified for the application and the elements to be used. Ensure that the correct sealant and insulators* have been chosen for use at the working pressure, temperature and process environment.
2. Disassemble the feedthrough. Refer to the diagram on the opposite page; identify the components, their orientation and how they were assembled.
3. During assembly, feedthrough bodies with threaded process connections should be held in a vice or can be mounted on to a vessel or enclosure. Feedthrough bodies for welded connection should be welded to the vessel and allowed to cool before assembly.
4. Place one* of the two, tubular, single-bore insulators, the cap and then the follower over the elements. * See note 2 opposite.
5. Slide one of the two identical insulators over the element followed by the sealant, second insulator and seat. The insulators fit inside the follower and seat. There are individual holes in the insulators and sealant for each element. Insert the elements through the feedthrough body and slide the seat and insulator, the sealant and then the follower and body.
6. As the follower enters the body rotate it so that the anti-rotation key on the follower aligns with the keyway in the body. Push in the follower, ensuring that the elements are correctly positioned and the process -side seat is seated on the shoulder in the body.
7. Thread the cap on to the body until finger tight. Adjust the immersion length of the elements to the required positions. Using a torque wrench, tighten the cap to the specified torque shown in the Torque table for the size of feedthrough and sealant used. Insert the remaining, single-bore, tubular insulator over the elements into the body from the process connection end until it is stopped by the seat.
8. Slide the single-bore tubular insulator at the cap end over the elements and insert it through the cap into the body until it is stopped by the follower.
9. If the feedthrough was assembled before installation, it is now ready for mounting on to the vessel, housing or enclosure. Tighten the feedthrough body using a spanner or wrench on the feedthrough body flats – do not tighten using the cap.

Note 1: Graftite sealants are electrically conductive and can be specified for use only in series WFS feedthroughs with Kapton®-insulated wire elements.

Note 2: Use the shorter of the two single-bore tubular insulators at the cap end if the feedthrough is supplied with a plain cap. Exceptionally, if the feedthrough has a cap with a conduit thread extension, use the longer of the two insulators at the cap end. These insulators isolate uninsulated elements from the feedthrough body and cap. Care should be taken to ensure that individual bare elements do not touch. The insulators also provide additional protection for the Kapton® insulation on insulated wires.

Unassembled

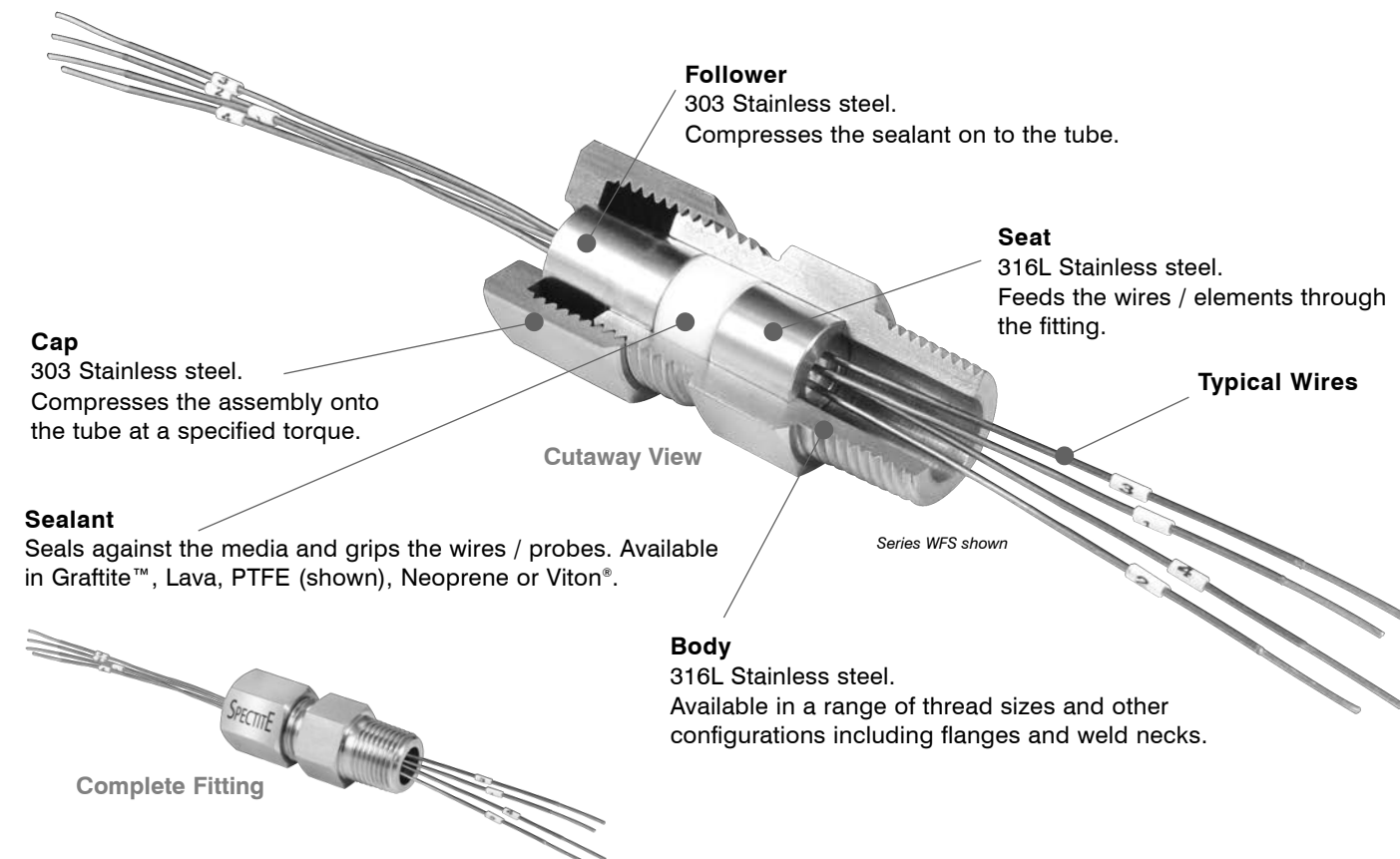


Typical components shown for a WF Series fitting. Some Size 1 fittings have slightly different components, see page 7.

Series WF Torque Settings - Max. values in Nm					
Process Connection Size	Sealants				
	G	L	N	T	V
Size 1 (1/8")	40	45	35	30	35
Size 2 (1/4")	50	60	40	35	40
Size 3 (1/2")	165	190	125	115	125
Size 4 (3/4")	260	300	–	150	175

G = Graftite™, L = Lava, N = Neoprene, T = PTFE, V = Viton®
To convert: ft/lb = Nm x 0.738; Kg/cm = Nm x 10.2.

Typical Assembled Fitting (shown with example wires)



Series WF feedthroughs (incl. WFS, WFR, WFP, WFRH & WFPH)
for multiple, bare or insulated wires and multiple, sheathed probes or sensors

Series WFS - Body Size, Pressure Guide ¹ and available Bore Sizes for BSPT, BSPP and NPT Threads ²
Kapton® insulated wires - Max. 230°C rated

Body Size		No. of Elements	Size 1 (1/8")					No. of Elements	Size 2 (1/4")					No. of Elements	Size 3 (1/2")					No. of Elements	Size 4 (3/4")				
Sealant			G*	L	N	T	V		G*	L	N	T	V		G*	L	N	T	V		G*	L	T	V	
Wire Size		The maximum guide pressure value (in bar) at 20°C is shown for each sealant material according to element size ¹ . These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.																							
AWG	diam. (mm)																								
24 Cu or T/C	0.5mm	2, 4	300	400	250	250	250	2, 4	300	400	250	250	250												
20 Cu or T/C	0.8mm													2, 4	700	700	400	250	450	6, 8 12	550	550	250	350	
18 Cu	1.0mm																								
16 Cu	1.3mm																								
14 Cu	1.6mm																								
12 Cu	2.0mm																								
10 Cu	2.5mm																								
8 Cu	3.2mm																								

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	14	12	10	8
Max. current rating (A) at 230°C 600V AC / 850V DC max.	5	9	13	17	24	30	40	55

Series WFT - Body Size, Pressure Guide ¹ and available Bore Sizes for BSPT, BSPP and NPT Threads ²
PFA insulated wires - Max. 230°C rated

Body Size		No. of Elements	Size 1 (1/8")				No. of Elements	Size 2 (1/4")					No. of Elements	Size 3 (1/2")					No. of Elements	Size 4 (3/4")			
Sealant			L	N	T	V		G*	L	N	T	V		G*	L	N	T	V		G*	L	T	V
Wire Size		The maximum guide pressure value (in bar) at 20°C is shown for each sealant material according to element size ¹ . These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.																					
AWG	diam. (mm)																						
24 Cu or T/C	0.5mm	2, 4	400	250	250	250	2, 4	300	400	250	250	250											
20 Cu or T/C	0.8mm												2, 4	700	700	400	250	450	6, 8 12	550	550	250	350

Series WFT feedthroughs are supplied with PFA 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.

* Graftite™ sealants are conductive. Extra care must be taken where high voltages are present. Please contact TC Ltd for further guidance.

¹ The guide pressures shown for each type of sealant are at 20°C. Spectite® feedthroughs from TC. 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 guide pressure value at 20°C. With an increase in temperature, a reduction in the maximum guide pressure value can be expected. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.

² Other types of process connection are available, please contact us for details.

Body Size, Pressure Guide ¹ and available Bore Sizes for BSPT, BSPP and NPT Threads ²
Series WFR - Bare wires, WFP - Multiple Sensors - Max. 230°C rated, WFRH / WFPH - Max. 870°C rated

Body Size		No. of Elements	Size 1 (1/8")				No. of Elements	Size 2 (1/4")				No. of Elements	Size 3 (1/2")				No. of Elements	Size 4 (3/4")		
Sealant			L	N	T	V		L	N	T	V		L	N	T	V		L	T	V
WFR Wire Sizes (AWG)	WFP Element dia (mm)	<i>The maximum guide pressure value (in bar) at 20°C is shown for each sealant material according to element size¹. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.</i>																		
24	0.5	2, 4	400	250	250	250	2, 4	400	250	250	250									
20	0.8																			
18	1.0											2, 3 4, 6 8	700	400	250					450
14	1.5											2, 4					6, 8, 12	550	250	350
8	3.0																2, 4			
	3.2																			

¹ The guide pressures shown for each type of sealant are at 20°C. Spectite® feedthroughs from TC. 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 guide pressure value at 20°C. With an increase in temperature, a reduction in the maximum guide pressure value can be expected. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.

² Other types of process connection are available, please contact us for details.

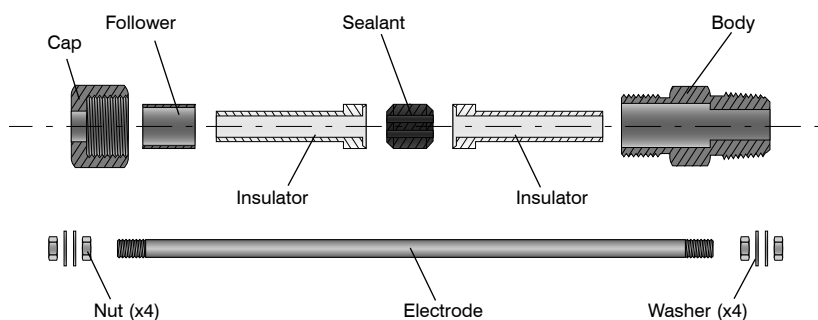
Series EF feedthroughs (incl. EF, EFT, EFP) with an integral, high voltage/high current electrode

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from TC

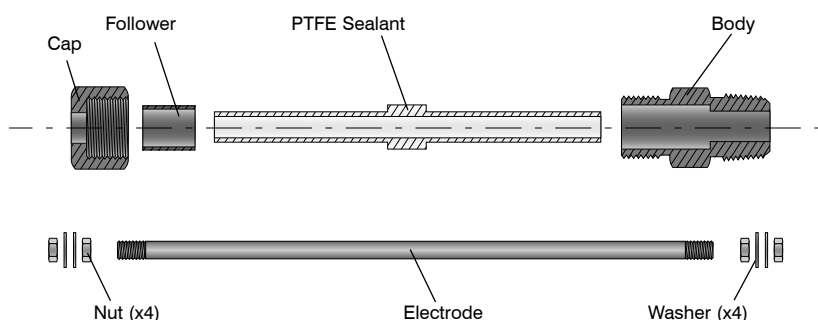
Series EF feedthroughs are supplied already torqued to the correct value and are ready for installation, unless specified differently. It is not necessary to disassemble or re-torque these assemblies. Refer to paragraphs 1, 9 and 10 only unless the feedthrough has been supplied untorqued or without the electrode.

1. Identify the feedthrough to be assembled. Verify that it has been correctly specified for the application. Ensure that the correct electrode material and sealant has been chosen for use at the working voltage, current, pressure, temperature and process environment.
2. Disassemble the feedthrough. Refer to the diagram below; identify the components and how they were assembled. Remove the nuts and washers from one end of the electrode.
3. During assembly, feedthrough bodies with threaded process connections should be held in a vice or can be mounted on to a vessel or enclosure. Feedthrough bodies for welded connection should be welded to the vessel and allowed to cool before assembly.
4. Place the insulator over the electrode including the sealant (EF only).
5. Insert the insulators, sealant and electrode, as assembled, into the cap thread end of the feedthrough body until the ceramic insulator is stopped by the shoulder in the body. Hold the electrode to prevent it from dropping through.
6. Insert the follower over the insulator. Thread the cap on to the body until finger tight.
7. Make the final electrode adjustment, ensuring that the ceramic insulators and sealant are firmly seated and aligned. The exposed sections of the electrode should be equidistant from the insulators at each end. Using a torque wrench, tighten the cap to the specified torque shown in the Torque table for the size of feedthrough and sealant used. Extreme care should be taken when torquing these feedthrough assemblies. Caps should be tightened slowly and smoothly to the recommended maximum torque setting.
8. Fit the remaining nuts and washers at the cap end of the electrode.
9. If the feedthrough was assembled before installation, it is now ready for mounting on the vessel, housing or enclosure. Tighten the feedthrough body using a spanner or wrench on the feedthrough body flats – do not tighten using the cap.
10. Make the electrical connections to the electrode using ring-tongue, lug-type or spade terminals. These are positioned between the washers; the nuts should be tightened securely. Application of a proprietary locking compound is recommended.

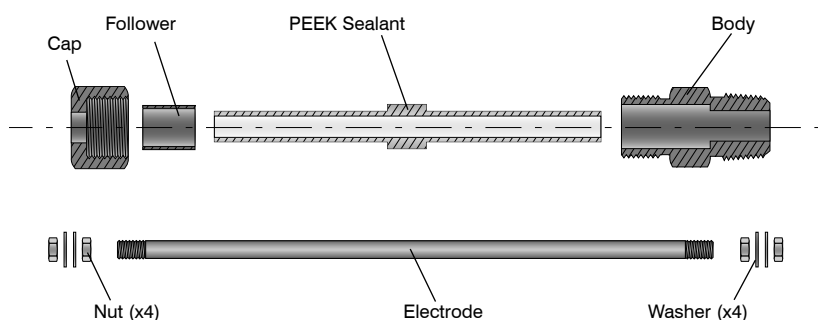
Unassembled



Typical components shown for an EF Series fitting.



Typical components shown for an EFT Series fitting.



Typical components shown for an EFP Series fitting.

Series EF Torque Settings - Max. values in Nm

Process Connection Size	Sealants		
	L	T	V
Size 2 (1/4")	55	40	45
Size 3 (1/2")	90	60	65
Size 4 (3/4")	275	75	100

L = Lava, T = PTFE, V = Viton®

To convert: ft/lb = Nm x 0.738; Kg/cm = Nm x 10.2.

Series EFT Torque Settings - Max. values in Nm

Process Connection Size	Sealant
	One piece PTFE Sealant
Size 1 (1/8")	5
Size 2 (1/4")	10
Size 3 (1/2")	30
Size 4 (3/4")	40

To convert: ft/lb = Nm x 0.738; Kg/cm = Nm x 10.2.

Series EFP Torque Settings - Max. values in Nm

Process Connection Size	Sealant
	One piece PEEK Sealant
Size 1 (1/8")	10
Size 2 (1/4")	40
Size 3 (1/2")	100
Size 4 (3/4")	240

To convert: ft/lb = Nm x 0.738; Kg/cm = Nm x 10.2.

Series EF feedthroughs (incl. EF, EFT, EFP)
with an integral, high voltage/high current electrode

Series EF - Body Size, Pressure Guide ¹ and available Bore Sizes for BSPT, BSPP and NPT Threads ² Maximum voltage rating 2kV											
Body Size			Size 2 (1/4")			Size 3 (1/2")			Size 4 (3/4")		
Sealant			L	T	V	L	T	V	L	T	V
Voltage Rating			2kV			2kV			2kV		
Electrode Material	Electrode Current Ratings	Electrode dia. (mm)	The table indicates the available electrode sizes for each feedthrough body size. The maximum guide pressure value (in bar) at 20°C is shown for each sealant material according to electrode size ¹ . These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.								
Copper 316 Stainless Steel Nickel	40A 10A 15A	3.2	600	350	550						
Copper 316 Stainless Steel Nickel	100A 15A 40A	6.35				450	150	400			
Copper 316 Stainless Steel Nickel	200A 30A 80A	12.7							200	150	150

Series EFT - Body Size, Pressure Guide ¹ and available Bore Sizes for BSPT, BSPP and NPT Threads ² Maximum voltage rating 8kV										
Body Size			Size 1 (1/8")		Size 2 (1/4")		Size 3 (1/2")		Size 4 (3/4")	
Insulator / Sealant			PTFE		PTFE		PTFE		PTFE	
Voltage Rating			2kV		8kV		8kV		8kV	
Electrode Material	Electrode Current Rating	Electrode dia. (mm)	<i>The table indicates the available electrode sizes for each feedthrough body size. The maximum guide pressure value (in bar) at 20°C is shown for each sealant material according to electrode size¹. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.</i>							
Copper 316 Stainless Steel Nickel	40A 10A 15A	3.2	150				80		40	
Copper 316 Stainless Steel Nickel	40A 10A 15A	3.2			80					
Copper 316 Stainless Steel Nickel	100A 15A 40A	6.35					80			
Copper 316 Stainless Steel Nickel	200A 30A 80A	12.7								

Series EFP - Body Size, Pressure Guide ¹ and available Bore Sizes for BSPT, BSPP and NPT Threads ²						
Maximum voltage rating 8kV						
Body Size			Size 2 (1/4")	Size 3 (1/2")	Size 4 (3/4")	
Insulator / Sealant			PEEK	PEEK	PEEK	
Voltage Rating			8kV	8kV	8kV	
Electrode Material	Electrode Current Ratings	Electrode dia. (mm)	The table indicates the available electrode sizes for each feedthrough body size. The maximum guide pressure value (in bar) at 20°C is shown for each sealant material according to electrode size ¹ . These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.			
Copper 316 Stainless Steel Nickel	40A 10A 15A	3.2	500			
Copper 316 Stainless Steel Nickel	100A 15A 40A	6.35		280		
Copper 316 Stainless Steel Nickel	200A 30A 80A	12.7				220

¹ The guide pressures shown for each type of sealant are at 20°C. Spectite® feedthroughs from TC. have been designed to provide an efficient seal on the electrode and restrain them from moving under pressure and vacuum. It is good installation practice to provide additional, mechanical restraint to the electrode when differential pressure exceeds 50% of the feedthrough guide pressure value at 20°C. With an increase in temperature, a reduction in the maximum guide pressure value can be expected. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.

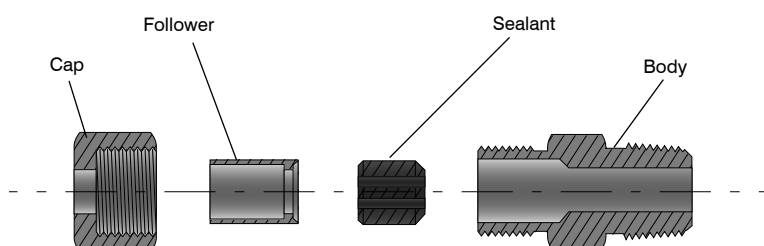
² Other types of process connection are available, please contact us for details.

Series ASF feedthroughs for autoclave sensors

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1. Identify the feedthrough to be assembled. Verify that it has been correctly specified for the application and the wires to be used. Ensure that the Viton® sealant is suitable for use at the working pressure, temperature and process environment.
2. Disassemble the feedthrough. Refer to the diagram below; identify the components and how they were assembled.
3. During assembly, feedthrough bodies with threaded process connections should be held in a vice or mounted on to a vessel or enclosure. Feedthrough bodies for welded connection should be welded to the vessel and allowed to cool before assembly.
4. Place the cap, then the follower and then the sealant over the wires. Refer to the diagram below for the correct orientation of these parts.
5. Insert the element through the feedthrough body from the cap side and slide the sealant and then the follower into the feedthrough body. Ensure that the sealant is pushed down into place.
6. Thread the cap on to the body until finger tight. Adjust the immersion length of the element to the required position. Using a torque wrench, tighten the cap to the specified torque shown in the Torque table for the size of feedthrough and sealant used.
7. If the feedthrough was assembled before installation, it is now ready for mounting on the vessel, housing or enclosure. Tighten the feedthrough body using a spanner or wrench on the feedthrough body flats – do not tighten using the cap.

Unassembled



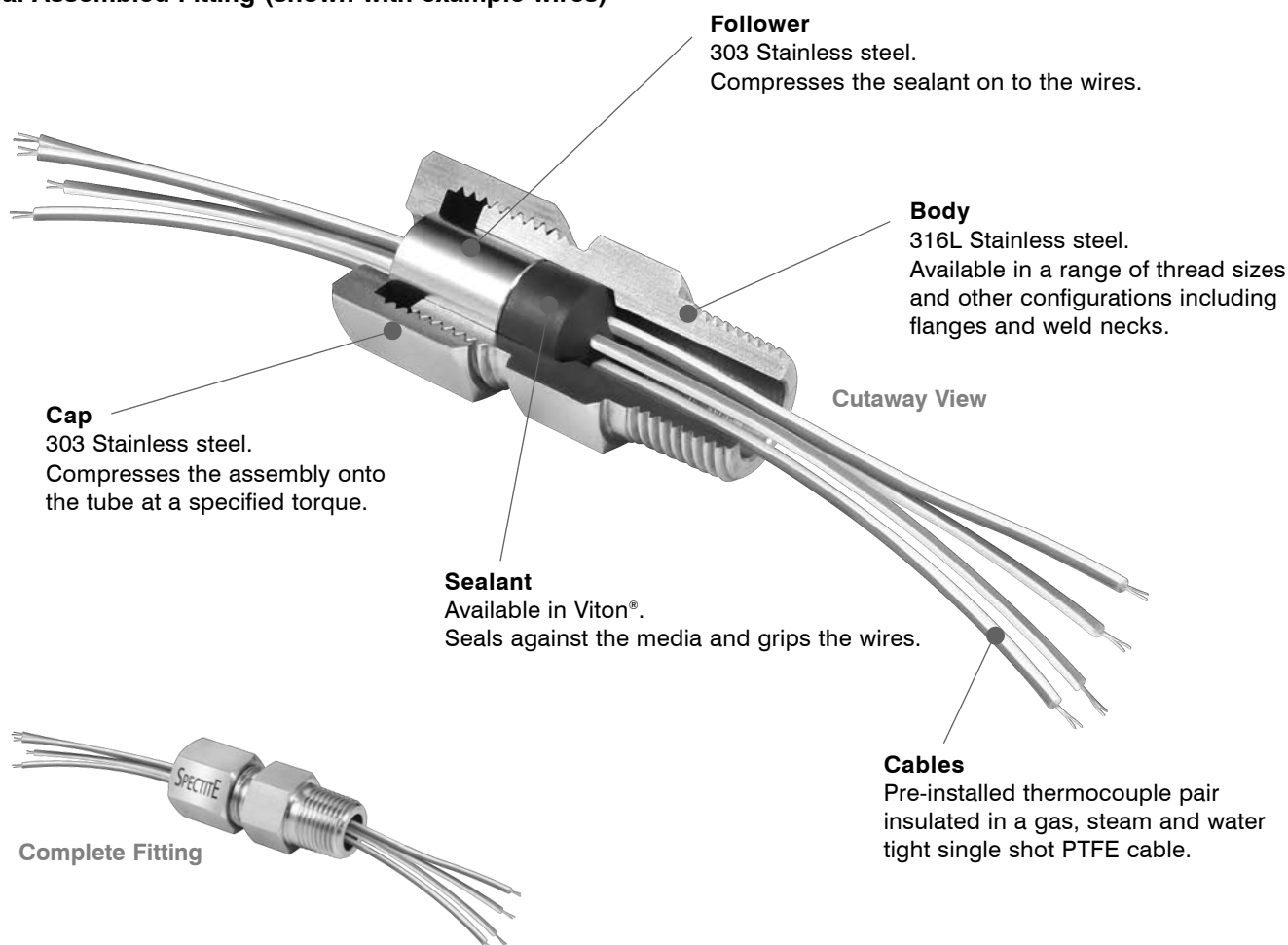
Typical components shown for an ASF Series fitting.

Series ASF Torque Settings - Max. values in Nm

Process Connection Size	Sealants
	V
Size 2 (1/4")	3
Size 3 (1/2")	5
Size 4 (3/4")	15

V = Viton®
To convert: ft/lb = Nm x 0.738; Kg/cm = Nm x 10.2.

Typical Assembled Fitting (shown with example wires)



Series ASF feedthroughs for autoclave sensors

Series ASF - Body Size, Pressure Guide ¹ and available Bore Sizes for BSPT, BSPP and NPT Threads ² Insulated wires

Body Size		Size 2 (1/4")		Size 3 (1/2")		Size 4 (3/4")	
Sealant		No. of Thermocouples	V	No. of Thermocouples	V	No. of Thermocouples	V
Wire Size Ø ³		The maximum guide pressure value (in bar) at 20°C is shown for each sealant material according to element size ¹ . These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.					
Conductor	Overall						
0.376mm	2.3mm	1 to 4	3 bar	1 to 8	3 bar	1 to 24	3 bar

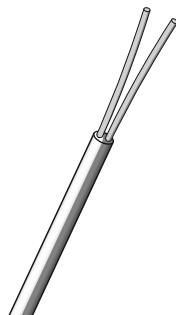
¹ The guide pressures shown for each type of sealant are at 20°C. Spectite® feedthroughs from TC. have been designed to provide an efficient seal on the elements and restrain them from moving under pressure and vacuum. It is good installation practice to provide additional, mechanical restraint to the elements when differential pressure exceeds 50% of the feedthrough guide pressure value at 20°C. With an increase in temperature, a reduction in the maximum guide pressure value can be expected. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.

² Other types of process connection are available, please contact us for details.

³ Each pre-installed element is a single PTFE standard autoclave thermocouple cable - see section 3.

Blank (undrilled) sealants are also available for series ASF 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.

Pre-installed Cable Details

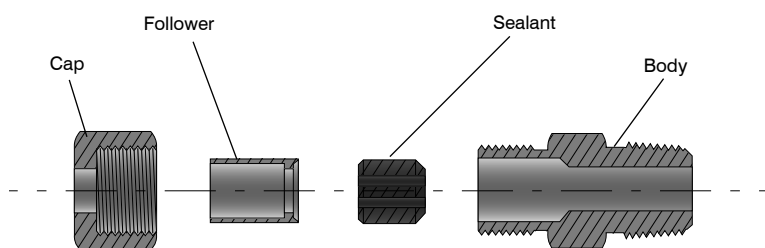
Illustration	Description
	Available in thermocouples types K, J, T and N, this cable comprises a pair of solid thermocouple conductors 1/0.376mm diameter (27AWG) encased in a 'single shot' PTFE insulation (round construction, 2.3mm overall diameter). PTFE 'single shot' cables are gas, steam and water tight making them ideal for autoclave applications. Supplied according to IEC colour codes as standard, although ANSI colours are available on request.

Series BSF feedthroughs for bearing sensors

SPECTITE®
from TC

1. Identify the feedthrough to be assembled. Verify that it has been correctly specified for the application and the wires to be used. Ensure that the Viton® sealant is suitable for use at the working pressure, temperature and process environment.
2. Disassemble the feedthrough. Refer to the diagram below; identify the components and how they were assembled.
3. During assembly, feedthrough bodies with threaded process connections should be held in a vice or mounted on to a vessel or enclosure. Feedthrough bodies for welded connection should be welded to the vessel and allowed to cool before assembly.
4. Place the cap, then the follower and then the sealant over the wires. Refer to the diagram below for the correct orientation of these parts.
5. Insert the element through the feedthrough body from the cap side and slide the sealant and then the follower into the feedthrough body. Ensure that the sealant is pushed down into place.
6. Thread the cap on to the body until finger tight. Adjust the immersion length of the element to the required position. Using a torque wrench, tighten the cap to the specified torque shown in the Torque table for the size of feedthrough and sealant used.
7. If the feedthrough was assembled before installation, it is now ready for mounting on the vessel, housing or enclosure. Tighten the feedthrough body using a spanner or wrench on the feedthrough body flats – do not tighten using the cap.

Unassembled



Typical components shown for a BSF Series fitting.

Series BSF Torque Settings - Max. values in Nm	
Process Connection Size	Sealants
	V
Size 2 (1/4")	3
Size 3 (1/2")	5
Size 4 (3/4")	15

V = Viton®

To convert: ft/lb = Nm x 0.738; Kg/cm = Nm x 10.2.

Typical Assembled Fitting (shown with example wires)



Series BSF - Body Size, Pressure Guide ¹ and available Bore Sizes for BSPT, BSPP and NPT Threads ²							
Insulated wires							
Body Size		No. of Elements	Size 2 (1/4")	No. of Elements	Size 3 (1/2")	No. of Elements	Size 4 (3/4")
Sealant			V		V		V
Wire Size ³		The maximum guide pressure value (in bar) at 20°C is shown for each sealant material according to element size ¹ . These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.					
Minimum	Maximum						
0.5mm	1.5mm	2 to 4	3 bar	2 to 8	3 bar	2 to 14	3 bar
1.6mm	2.8mm			2 to 4		2 to 8	
2.9mm	3.5mm					2 to 6	

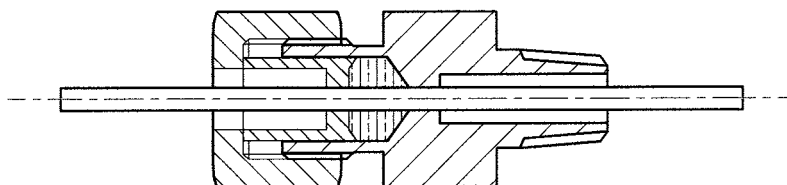
¹ The guide pressures shown for each type of sealant are at 20°C. Spectite® feedthroughs from TC. have been designed to provide an efficient seal on the elements and restrain them from moving under pressure and vacuum. It is good installation practice to provide additional, mechanical restraint to the elements when differential pressure exceeds 50% of the feedthrough guide pressure value at 20°C. With an increase in temperature, a reduction in the maximum guide pressure value can be expected. These ratings are a guide and the suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.

² Other types of process connection are available, please contact us for details.

³ The element diameters shown are the common sizes routinely demanded for general industrial applications. Other sizes can be supplied between the minimum and maximum diameters shown.

Series HF high-density, sealed tube assemblies with multiple, copper or thermocouple-material wires

1. Identify the sealed tube assembly (assemblies) to be fitted in a feedthrough as the sealed element(s). Verify that it (they) have been correctly specified for the application(s).
2. Identify the feedthrough to be assembled. A series PF or PSF assembly may be used for a single HF sealed tube or a series MF or MSF feedthrough for multiple sealed tubes.
3. Refer to the assembly instructions on previous pages for the selected series of feedthrough. The sealed tube assembly should be positioned so that it is equidistant from each side of the feedthrough. Care should be taken with the wire bundles on each side of the sealed tube when internal feedthrough components are passed over them, also as they are fed through the feedthrough body and when the feedthrough body is mounted on the process enclosure.



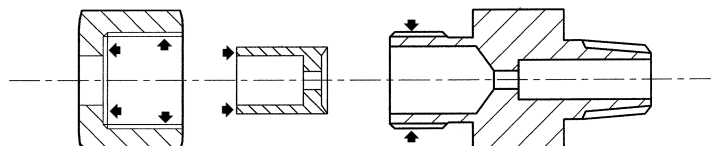
Lubrication application

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, it is recommended that the lubricant is re-applied.

Speclube™ lubricant is available in 10ml bottles complete with applicator brush.

Users are directed to the safety information on the lubricant bottle. A Safety Data Sheet is available from Spectite® on request.

Lubricant should be applied sparingly to the thread for the cap on the feedthrough body, the thread inside the cap, the top surface of the follower and the inside of the top of the cap - as indicated on the diagram.



If another grade of lubricant is used on Spectite® feedthroughs, the torque settings may not be accurate and sealing performance may therefore be affected.

Sealant Identification

Sealant Material	Code	Colour	Operating Temperature Range	Re-usable	Material definition and properties
Neoprene	N	Green	-40°C to +90°C	✓	Synthetic rubber based on polychloroprene. The elastic properties of the polymer are enhanced by vulcanization. It is much more resistant to heat, light, oxidation, and petroleum than ordinary rubber.
Viton®	V	Brown	-40°C to +225°C (intermittently to +285°C)	✓	Fluoroelastomer. Resists hydrocarbons, corrosive chemicals and petroleum. Solvent, acid and base resistant. Low permeation rate. Mechanically robust at high temperatures.
PTFE	T	White	-200°C to +250°C	✓	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.
Graftite™	G	Grey / Black	-200°C to +550°C (to +870°C in a reducing atmosphere)	X	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. Conductive material (not electrically isolated).
Lava	L	Grey Stone	-200°C to +870°C	X	Natural Magnesium Silicate (Soapstone, Steatite or Rock Talc). Crushes to a powder when compressed. Hygroscopic. Porous to light gases. Unsuitable for use with liquid media and in most vacuum applications.

Other sealant materials may be specified, usually for the individual special requirements of particular applications. Please contact TC for assistance.

Spectite® is a registered trademark of Spectite Ltd.
Kapton® is a registered trademark of E.I. du Pont de Nemours and Company
Teflon® is a registered trademark of E.I. du Pont de Nemours and Company
Viton® is a registered trademark of DuPont Performance Elastomers
Spectite Ltd. has a policy of continuous, quality and design improvement for its products.
Minor specification changes may be applied without notice. E & OE.

The technical data and guideline information presented in this publication is provided in good faith; however no warranty, express or implied is given whatsoever as to its accuracy, and no liability is accepted for any errors or omissions. The suitability of any of the products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application. In the event of any problem or difficulty with the application of our products please let us know. It is the policy of this company to entertain information of this nature with a view to a speedy resolution to the benefit of all concerned. This policy is in addition to the purchaser's statutory and common law rights.

TC Direct Part Codes

Torque Settings

TC Direct Code	Spectite Series	Sealant	Torque (Nm)	Page
940-102	PF	N	15	2
940-105	PF	N	15	2
940-108	PF	N	15	2
940-111	PF	N	50	2
940-114	PF	N	50	2
940-117	PF	N	85	2
940-120	PF	N	85	2
940-140	PF	V	15	2
940-143	PF	V	15	2
940-146	PF	V	15	2
940-149	PF	V	50	2
940-152	PF	V	50	2
940-155	PF	V	85	2
940-158	PF	V	85	2
940-161	PF	V	85	2
940-164	PF	V	85	2
940-184	PF	T	3	2
940-187	PF	T	12	2
940-190	PF	T	3	2
940-193	PF	T	12	2
940-196	PF	T	12	2
940-199	PF	T	30	2
940-202	PF	T	30	2
940-205	PF	T	75	2
940-208	PF	T	75	2
940-211	PF	T	120	2
940-214	PF	T	120	2
940-217	PF	T	400	2
940-242	PF	L	18	2
940-245	PF	L	18	2
940-248	PF	L	60	2
940-251	PF	L	60	2
940-254	PF	L	190	2
940-257	PF	L	190	2
940-260	PF	L	300	2
940-263	PF	L	300	2
940-280	MF	N	35	6
940-283	MF	N	40	6
940-286	MF	N	35	6
940-289	MF	N	40	6
940-292	MF	N	40	6
940-295	MF	N	40	6
940-298	MF	N	125	6
940-301	MF	N	125	6
940-304	MF	N	125	6
940-324	MF	V	35	6

TC Direct Code	Spectite Series	Sealant	Torque (Nm)	Page
940-327	MF	V	40	6
940-330	MF	V	35	6
940-333	MF	V	40	6
940-336	MF	V	40	6
940-339	MF	V	40	6
940-342	MF	V	125	6
940-345	MF	V	125	6
940-348	MF	V	125	6
940-351	MF	V	175	6
940-354	MF	V	175	6
940-357	MF	V	175	6
940-366	MF	T	30	6
940-369	MF	T	35	6
940-372	MF	T	30	6
940-375	MF	T	35	6
940-378	MF	T	35	6
940-381	MF	T	35	6
940-384	MF	T	115	6
940-387	MF	T	115	6
940-390	MF	T	115	6
940-393	MF	T	150	6
940-396	MF	T	150	6
940-399	MF	T	150	6
940-428	MF	L	45	6
940-431	MF	L	60	6
940-434	MF	L	45	6
940-437	MF	L	60	6
940-440	MF	L	60	6
940-443	MF	L	60	6
940-446	MF	L	190	6
940-449	MF	L	190	6
940-452	MF	L	190	6
940-455	MF	L	300	6
940-458	MF	L	300	6
940-461	MF	L	300	6
940-504	PF	T	30	2
940-507	PF	T	30	2
940-510	PF	T	75	2
940-513	PF	T	75	2
940-526	PF	T	30	2
940-529	PF	T	30	2
940-532	PF	T	75	2
940-535	PF	T	75	2
940-552	PF	T	30	2
940-555	PF	T	30	2
940-558	PF	T	75	2

TC Direct Code	Spectite Series	Sealant	Torque (Nm)	Page
940-561	PF	T	75	2
940-572	PF	T	30	2
940-575	PF	T	30	2
940-578	PF	T	75	2
940-581	PF	T	75	2
940-585	PF	T	30	2
940-588	PF	T	30	2
940-591	PF	T	75	2
940-594	PF	T	75	2
940-657	EF	V	45	14
940-663	EF	V	65	14
940-672	EF	V	100	14
940-683	EF	T	40	14
940-689	EF	T	60	14
940-698	EF	T	75	14
940-729	EF	L	55	14
940-735	EF	L	90	14
940-744	EF	L	270	14
940-755	EF	T	40	14
940-761	EF	T	60	14
940-767	EF	T	75	14
941-102	PF	N	15	2
941-105	PF	N	15	2
941-108	PF	N	15	2
941-111	PF	N	50	2
941-114	PF	N	50	2
941-117	PF	N	85	2
941-120	PF	N	85	2
941-140	PF	V	15	2
941-143	PF	V	15	2
941-146	PF	V	15	2
941-149	PF	V	50	2
941-152	PF	V	50	2
941-155	PF	V	85	2
941-158	PF	V	85	2
941-161	PF	V	85	2
941-164	PF	V	85	2
941-184	PF	T	3	2
941-187	PF	T	12	2
941-190	PF	T	3	2
941-193	PF	T	12	2
941-196	PF	T	12	2
941-199	PF	T	30	2
941-202	PF	T	30	2
941-205	PF	T	75	2
941-208	PF	T	75	2

TC Direct Part Codes

Torque Settings

TC Direct Code	Spectite Series	Sealant	Torque (Nm)	Page
941-211	PF	T	120	2
941-214	PF	T	120	2
941-217	PF	T	400	2
941-242	PF	L	18	2
941-245	PF	L	18	2
941-248	PF	L	60	2
941-251	PF	L	60	2
941-254	PF	L	190	2
941-257	PF	L	190	2
941-260	PF	L	300	2
941-263	PF	L	300	2
941-280	MF	N	35	6
941-283	MF	N	40	6
941-286	MF	N	35	6
941-289	MF	N	40	6
941-292	MF	N	40	6
941-295	MF	N	40	6
941-298	MF	N	125	6
941-301	MF	N	125	6
941-304	MF	N	125	6
941-324	MF	V	35	6
941-327	MF	V	40	6
941-330	MF	V	35	6
941-333	MF	V	40	6
941-336	MF	V	40	6
941-339	MF	V	40	6
941-342	MF	V	125	6
941-345	MF	V	125	6
941-348	MF	V	125	6
941-351	MF	V	175	6
941-354	MF	V	175	6
941-357	MF	V	175	6
941-366	MF	T	30	6
941-369	MF	T	35	6
941-372	MF	T	30	6
941-375	MF	T	35	6
941-378	MF	T	35	6
941-381	MF	T	35	6
941-384	MF	T	115	6
941-387	MF	T	115	6
941-390	MF	T	115	6
941-393	MF	T	150	6
941-396	MF	T	150	6
941-399	MF	T	150	6
941-428	MF	L	45	6
941-431	MF	L	60	6

TC Direct Code	Spectite Series	Sealant	Torque (Nm)	Page
941-434	MF	L	45	6
941-437	MF	L	60	6
941-440	MF	L	60	6
941-443	MF	L	60	6
941-446	MF	L	190	6
941-449	MF	L	190	6
941-452	MF	L	190	6
941-455	MF	L	300	6
941-458	MF	L	300	6
941-461	MF	L	300	6
941-504	HF (PF)	T	30	19 / 2
941-507	HF (PF)	T	30	19 / 2
941-510	HF (PF)	T	75	19 / 2
941-513	HF (PF)	T	75	19 / 2
941-526	HF (PF)	T	30	19 / 2
941-529	HF (PF)	T	30	19 / 2
941-532	HF (PF)	T	75	19 / 2
941-535	HF (PF)	T	75	19 / 2
941-552	HF (PF)	T	30	19 / 2
941-555	HF (PF)	T	30	19 / 2
941-558	HF (PF)	T	75	19 / 2
941-561	HF (PF)	T	75	19 / 2
941-572	HF (PF)	T	30	19 / 2
941-575	HF (PF)	T	30	19 / 2
941-578	HF (PF)	T	75	19 / 2
941-581	HF (PF)	T	75	19 / 2
941-585	HF (PF)	T	30	19 / 2
941-588	HF (PF)	T	30	19 / 2
941-591	HF (PF)	T	75	19 / 2
941-594	HF (PF)	T	75	19 / 2
941-657	EF	V	45	14
941-663	EF	V	65	14
941-672	EF	V	100	14
941-683	EF	T	40	14
941-689	EF	T	60	14
941-698	EF	T	75	14
941-729	EF	L	55	14
941-735	EF	L	90	14
941-744	EF	L	275	14
941-755	EF	T	40	14
941-761	EF	T	60	14
941-767	EF	T	75	14

Sealed feedthrough assemblies for pressure and vacuum applications

Spectite® Sealed Feedthrough glands are needed when probes, sensors, electrodes, wires and other types of static elements must be sealed as they pass through a pressure or environmental boundary.

Sealed feedthrough assemblies inhibit the leakage of gases and 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.

Sealed feedthrough assemblies are pressure rated up to 700 bar and can be used in applications at a maximum temperature of +870°C, dependent on the type of feedthrough and sealant material specified.

Spectite® sealed feedthrough assemblies have a long service life. Sealants and other internal parts are replaceable so that fittings can be re-used over and over again. When elements need replacement or adjustment, the feedthrough cap can be undone - after the pressure or vacuum in the vessel has been released - to allow individual elements to be moved or replaced.

For further information ask for our product range catalogue or visit our dedicated website at www.spectite.co.uk

We recommend that you retain these instructions.
It may also be found useful to make a record of the descriptions of the assemblies installed for future reference, for example, when re-ordering feedthroughs and when replacement parts are required.

Spectite® feedthroughs supplied by:

SPECTITE®
pressure and vacuum sealed feedthroughs

from TC Measurement & Control Ltd.
Unit 8
Cookstown Square
Second Ave
Cookstown Ind Est
Dublin 24
D24 VX23
Ireland
Phone: 01-4146980
Email: info@spectite.ie
Web: www.spectite.ie

