For the attention of:

EAC Ex Temperature Sensors Hazardous Areas Zones 0, 1 and 2

Thermocouple & RTD sensors and accessories approved for use in explosion proof and intrinsically safe areas zones 0, 1 & 2 for a wide range of temperature measurement applications

TC Ltd for Temperature Sensing, Measurement and Control

Certification

Our EAC Ex protection concepts

All designs of temperature sensor and feedthrough in this catalogue have been approved for use in areas with the following protection concepts:

Ex d Flameproof/Explosion Proof – Category 2, Zones 1, 2 (Gas)

- Ex d IIC T6...T1 Gb Ta = −52°C to 60°C
- Standard GOST IEC 60079-1 refers
- Designed to contain an explosion and quench the flame
- Sensors incorporate a suitable heavy duty enclosure or threaded fitting with tight seals

Ex e Increased Safety – Category 2, Zones 1, 2 (Gas)

- Ex e IIC T6...T1 Gb Ta = −52°C to 60°C
- Standard GOST IEC 60079-7 refers
- Design ensures no arcs, sparks or hot surfaces that could ignite an explosive mixture with a minimum IP54 enclosure rating
- Sensors incorporate a suitable heavy duty enclosure or threaded fitting with tight seals

Ex tb Enclosure – Category 2, Zones 21, 22 (Dust)

- Ex tb IIIC T80°C...T440°C Db
- Standard GOST IEC 60079-31 refers
- Protects against combustible and conductive dusts, rugged tight enclosures are used

Ex ia/Ex ib Intrinsically Safe – Categories 1 & 2, Zones 0, 1, 2 (Gas), Zones 20, 21, 22 (Dust)

- Ex ia IIC T6...T1 Ga Ta = −52°C to 60°C
- Ex ib IIC T6...T1 Gb Ta = −52°C to 60°C
- Ex ia IIIC T80°C...T440°C Da
- Ex ib IIIC T80°C...T440°C Db
- Standard GOST IEC 60079-11 refers
- Designed to limit the energy of arcs or sparks that could potentially ignite an explosive mixture
- Sensors used in this area must be wired through a suitably approved barrier

Also available with ATEX / IECEx approval

Ex areas can be known by different names such as “Hazardous Locations”, “Hazardous Areas”, “Explosive Atmospheres” and the like and relate to areas where flammable vapours, gases, combustible dusts or liquids are likely to occur in quantities sufficient to cause a fire or explosion.

Once an area is classified as potentially explosive, a risk analysis will normally dictate that only electrical and mechanical equipment that is suitably certified can be installed. The European ATEX Directive (2014/34/EU), IECEx and TR CU (EAC) international certification systems force manufacturers to gain certification of electrical and/or mechanical products that can be used in a potentially explosive atmosphere.

Hazardous areas are divided into zones which relate to the predicted occurrence of when an explosive atmosphere may be present (see zone diagram below).

Our extensive range of TR CU 012/2011 EAC Ex approved products is designed and tested for use in hazardous areas with type Ex d Ex e and Ex tb protection concepts allowing them to be used for both gas and dust applications in Zone 1/21 and 2/22 areas.

They are also suitable for installation in Ex ia/Ex ib intrinsically safe (IS) circuits in zones 0/20, 1/21 and 2/22 (see page 22 for details).

Our EAC Ex Approval Explained

EAC Ex | Ex 1 / Ex 0 | Ex d IIC Gb / Ex ia IIC Ga | Ex tb IIIC Db / Ex ia IIIC Da | 2020 / 2020

Ex

Denotes **equipment group, category** and **environment**. Our sensors and feedthroughs are designated non-mining and suitable for use up to zone 0 (gas) and zone 21 (dust).

Approval for Gas Applications:

Denotes **type of protection, gas group** and **protection level**. The sensors and feedthroughs meet the requirements of flameproof, increased safety and intrinsically safe protection types with gas group IIC (Acetylene, Hydrogen).

Ga protection level denotes suitability for Zones 0, 1 and 2 use.

Approval for Dust Applications:

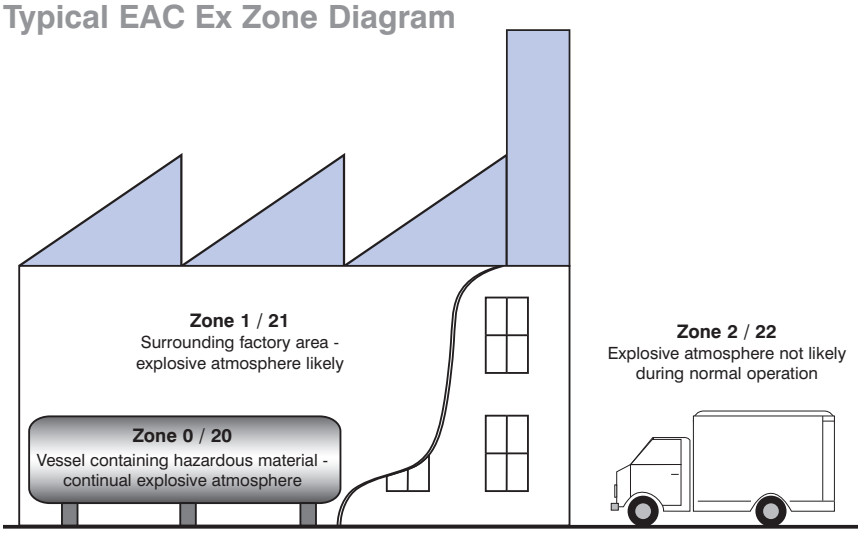
Denotes **type of protection, dust group** and **protection level**. The protection type is enclosure.

The fittings protect against combustible dusts (including conductive materials).

Db protection level denotes suitability for Zones 21 & 22 use.

Year of manufacture

Typical EAC Ex Zone Diagram



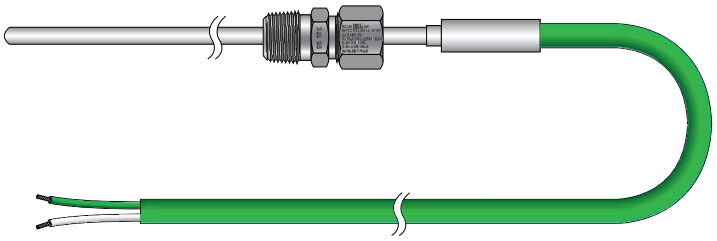
EAC Ex Temperature Sensors and Accessories

EAC Ex Approved Thermocouples with Pot Seal

Mineral Insulated Thermocouples 1.0mm to 3.0mm dia.

Our EAC Ex mineral insulated thermocouple assemblies are manufactured from cable that conforms to IEC 61515 and their semi rigid construction allows them to be bent and formed to suit particular applications without impairing performance. An adjustable threaded compression fitting is required to achieve approval.

- **TR CU 012/2011 Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas Ex 0 Ex ia IIC Ga/IIIC Da, see page 22 for details**
- **Temperature classification T6-T1, ambient temperature range -52 to +60°C**
- **Available in thermocouple types K, T, J, N, E, R, S and B**
- **Sheath diameters from 1.0mm to 3.0mm in a wide choice of materials**
- **Insulated measuring junction gives a floating output with high insulation resistance**
- **PVC or PFA insulated twisted extension cables. Other cables available.**
- **UKAS calibration available**



The above sensor must be installed using the compression fitting supplied to maintain Ex d / Ex tb approval. For Ex ia applications a compression fitting is not required to maintain approval

Also available with ATEX / IECEx approval

SECTION 1	Thermocouple Type	Temperature Range (continuous)
K	Nickel Chromium vs Nickel Aluminium	0°C to +1100°C
T	Copper vs Constantan	-185°C to +400°C
J	Iron vs Constantan	+50°C to +800°C
N	Nicrosil vs Nisil	0°C to +1200°C
E	Nickel Chromium vs Constantan	0°C to +800°C
R	Platinum - 13% Rhodium vs Platinum	0°C to +1600°C
S	Platinum - 10% Rhodium vs Platinum	0°C to +1550°C
B	Platinum - 30% Rhodium vs Platinum - 6% Rhodium	+100°C to +1600°C

SECTION 2	Sheath Material	Operational Properties	Maximum Temperature
321	321 Stainless Steel (Types K, J, T & E)	Very good corrosion resistance throughout the operating temperature range. Suited to a wide range of industrial applications. Enjoys high ductility.	800°C
310	310 Stainless Steel (Type K)	Good high temperature corrosion resistance and suitable for use in sulphur bearing atmospheres. Has high oxidisation resistance which is maintained if subsequent manipulation is strictly limited.	1100°C
600	Inconel 600 (Types K, N, R, S & B)	Suitable for use in severely corrosive atmospheres to elevated temperatures. Enjoys a good resistance to oxidation. Type R, S or B thermocouples with an Inconel 600 sheath are not recommended for use above 800°C. Do not use in sulphur bearing atmospheres above 550°C.	1100°C
114	Nicrobell D (Types K & N)	Recommended for use with high temperature type 'K' and most type 'N' applications. Very good high temperature strength. Excellent performance in oxidising, carburising, reducing and vacuum atmospheres. Do not use in sulphur containing atmospheres.	1250°C
156	Hastelloy X (Type K)	Improved high temperature resistance to oxidation and attack by sulphur. Retains excellent tensile strength at high temperatures. This sheath is applicable to reducing neutral and inert atmospheres. Develops a tightly adherent oxide film which does not spall at high temperatures.	1220°C
446	AISI 446 (Type K)	Suitable for use in severely corrosive atmospheres to elevated temperatures. Particularly suited for use in high concentration sulphur bearing atmospheres at high temperature. ** Should be mounted vertically at temperatures above 700°C.*	1150°C
800	Incoloy 800 (Type K)	Suitable for use in severely corrosive atmospheres to elevated temperatures. Enjoys a good resistance to oxidation and carburisation. Resistant to sulphur bearing atmospheres.	1100°C

SECTION 3	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	1.0mm	0.039"
	1.5mm	0.059"
	2.0mm	0.079"
	3.0mm	0.118"

SECTION 4	Type of Sensing Junction	
2I 2ID 2IT		**INSULATED** The hot (measuring) junction is insulated from the sheath and this gives a floating output with a typical insulation resistance in excess of 100 megohms. Enter **2I** for simplex, **2ID** for duplex or **2IT** if a triplex element is required.

SECTION 5	Extension Cables (please specify length in metres)	
A82	PVC Insulation (105ºC) (Termination: 3P2L seal, temperature rating **90ºC**)	
B55	PFA Insulation (250ºC) (Termination: 3P2LA seal, temperature rating **230ºC**)	

** All cables have 7/0.2mm conductors. If no cable is required, leave this section of the order code blank and the sensor will be supplied with 50mm PTFE 'tails'.*

SECTION 6	Stainless Steel Adjustable Compression Fittings		
Dia.	1/8" BSPT	1/4" BSPT	1/2" BSPT
1.0mm	SFS18T10EAC	SFS14T10EAC	–
1.5mm	SFS18T15EAC	SFS14T15EAC	–
2.0mm	SFS18T20EAC	SFS14T20EAC	–
3.0mm	SFS18T30EAC	SFS14T30EAC	SFS12T30EAC

Other thread sizes are available - please see page 20 for details.

Order Code - Example

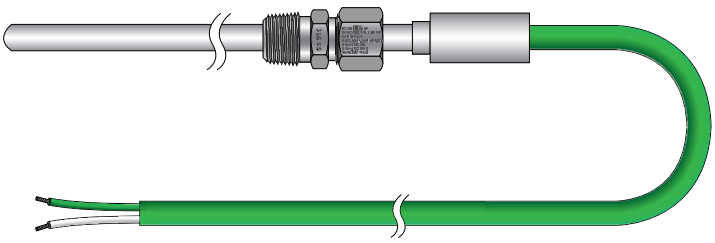
Type Nº	I.S. Version (Optional, please see page 22 for details)	Thermocouple Type (See section 1)	Sheath Length in mm	Sheath Material (See section 2)	Sheath Diameter (See section 3)	Sensing Junction (See section 4)	Termination (Pot seal, see section 5)	Extension Cable (See section 5)	Compression Fitting (See section 6)	Approval
52	IS	K	450	321	3.0	2I	3P2L	2m A82KX	SFS14T30EAC	EAC

EAC Ex Approved Thermocouples with Pot Seal

Mineral Insulated Thermocouples 4.5mm to 8.0mm dia.

Our EAC Ex mineral insulated thermocouple assemblies are manufactured from cable that conforms to IEC 61515 and their semi rigid construction allows them to be bent and formed to suit particular applications without impairing performance. An adjustable threaded compression fitting is required to achieve approval.

- **TR CU 012/2011 Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas to Ex 0 Ex ia IIC Ga/IIIC Da, see page 22 for details**
- **Temperature classification T6-T1, ambient temperature range -52 to +60°C**
- **Available in thermocouple types K, T, J, N, E, R, S and B**
- **Sheath diameters from 4.5mm to 8.0mm in a wide choice of materials**
- **Insulated measuring junction gives a floating output with high insulation resistance**
- **PVC or PFA insulated twisted extension cables. Other cables available.**
- **UKAS calibration available**



The above sensor must be installed using the compression fitting supplied to maintain Ex d / Ex tb approval. For Ex ia applications a compression fitting is not required to maintain approval

Also available with ATEX / IECEx approval

SECTION 1	Thermocouple Type	Temperature Range (continuous)
K	Nickel Chromium vs Nickel Aluminium	0°C to +1100°C
T	Copper vs Constantan	-185°C to +400°C
J	Iron vs Constantan	+50°C to +800°C
N	Nicrosil vs Nisil	0°C to +1200°C
E	Nickel Chromium vs Constantan	0°C to +800°C
R	Platinum - 13% Rhodium vs Platinum	0°C to +1600°C
S	Platinum - 10% Rhodium vs Platinum	0°C to +1550°C
B	Platinum - 30% Rhodium vs Platinum - 6% Rhodium	+100°C to +1600°C

SECTION 2	Sheath Material	Operational Properties	Maximum Temperature
321	321 Stainless Steel (Types K, J, T & E)	Very good corrosion resistance throughout the operating temperature range. Suited to a wide range of industrial applications. Enjoys high ductility.	800°C
310	310 Stainless Steel (Type K)	Good high temperature corrosion resistance and suitable for use in sulphur bearing atmospheres. Has high oxidisation resistance which is maintained if subsequent manipulation is strictly limited.	1100°C
600	Inconel 600 (Types K, N, R, S & B)	Suitable for use in severely corrosive atmospheres to elevated temperatures. Enjoys a good resistance to oxidation. Type R, S or B thermocouples with an Inconel 600 sheath are not recommended for use above 800°C. Do not use in sulphur bearing atmospheres above 550°C.	1100°C
114	Nicrobell D (Types K & N)	Recommended for use with high temperature type 'K' and most type 'N' applications. Very good high temperature strength. Excellent performance in oxidising, carburising, reducing and vacuum atmospheres. Do not use in sulphur containing atmospheres.	1250°C
156	Hastelloy X (Type K)	Improved high temperature resistance to oxidation and attack by sulphur. Retains excellent tensile strength at high temperaturess. This sheath is applicable to reducing neutral and inert atmospheres. Develops a tightly adherent oxide film which does not spall at high temperatures.	1220°C
446	AISI 446 (Type K)	Suitable for use in severely corrosive atmospheres to elevated temperatures. Particularly suited for use in high concentration sulphur bearing atmospheres at high temperature. ** Should be mounted vertically at temperatures above 700°C.*	1150°C
800	Incoloy 800 (Type K)	Suitable for use in severely corrosive atmospheres to elevated temperatures. Enjoys a good resistance to oxidation and carburisation. Resistant to sulphur bearing atmospheres.	1100°C

SECTION 3	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	4.5mm	0.177"
	6.0mm	0.236"
	8.0mm	0.315"

SECTION 4	Type of Sensing Junction	
2I 2ID 2IT		**INSULATED** The hot (measuring) junction is insulated from the sheath and this gives a floating output with a typical insulation resistance in excess of 100 megohms. Enter **2I** for simplex, **2ID** for duplex or **2IT** if a triplex element is required.

SECTION 5	Extension Cables (please specify length in metres)
A82	PVC Insulation (105ºC) (Termination: 3P4CL seal, temperature rating **90ºC**) 
B55	PFA Insulation (250ºC) (Termination: 3P4CLA seal, temperature rating **230ºC**) 

** All cables have 7/0.2mm conductors. If no cable is required, leave this section of the order code blank and the sensor will be supplied with 50mm PTFE 'tails'.*

SECTION 6	Stainless Steel Adjustable Compression Fittings		
Dia.	1/8" BSPT	1/4" BSPT	1/2" BSPT
4.5mm	SFS18T45EAC	SFS14T45EAC	SFS12T45EAC
6.0mm	SFS18T60EAC	SFS14T60EAC	SFS12T60EAC
8.0mm	–	SFS14T80EAC	SFS12T80EAC

Other thread sizes are available - please see page 20 for details.

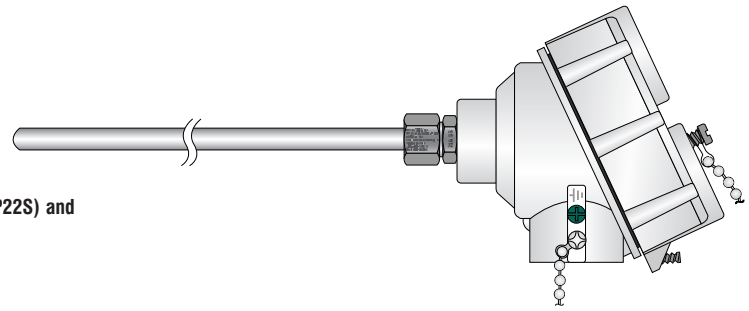
Order Code - Example

Type Nº	I.S. Version (Optional, please see page 22 for details)	Thermocouple Type (See section 1)	Sheath Length in mm	Sheath Material (See section 2)	Sheath Diameter (See section 3)	Sensing Junction (See section 4)	Termination (Pot seal, see section 5)	Extension Cable (See section 5)	Compression Fitting (See section 6)	Approval
52	IS	J	450	321	6.0	2I	3P4CLA	2m B55JX	SFS12T60EAC	EAC

EAC Ex Approved Thermocouples with Terminal Head

Mineral Insulated Thermocouples 4.5mm to 8.0mm dia.

These semi rigid thermocouples are supplied with an IP68 terminal head and are ideal where a heavy duty connection with cable is to be made near the sensor. They can be used with service temperatures up to 1250ºC (minimum stand-off lengths shown on page 23 must be observed).



- **TR CU 012/2011 Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas to Ex 0 Ex ia IIC Ga/IIIC Da (3P22S) and Ex 1 Ex ib IIC Gb/IIIC Db (3P22/3P27), see page 22 for details**
- **Temperature classification T6-T1, ambient temperature range -52 to +60°C**
- **Available in thermocouple types K, T, J, N, E, R, S and B**
- **Sheath diameters from 4.5mm to 8.0mm in a wide choice of materials**
- **Insulated measuring junction gives a floating output with high insulation resistance**
- **Die cast alloy or stainless steel terminal heads available**
- **Simplex, duplex and triplex sensors available as well UKAS calibration**

EAC Ex

IECEx Ex

Also available with ATEX / IECEx approval

SECTION 1	Thermocouple Type	Temperature Range (continuous)
K	Nickel Chromium vs Nickel Aluminium	0°C to +1100°C
T	Copper vs Constantan	-185°C to +400°C
J	Iron vs Constantan	+50°C to +800°C
N	Nicrosil vs Nisil	0°C to +1200°C
E	Nickel Chromium vs Constantan	0°C to +800°C
R	Platinum - 13% Rhodium vs Platinum	0°C to +1600°C
S	Platinum - 10% Rhodium vs Platinum	0°C to +1550°C
B	Platinum - 30% Rhodium vs Platinum - 6% Rhodium	+100°C to +1600°C

SECTION 2	Sheath Material	Maximum Temperature
321	321 Stainless Steel (Types K, J, T & E)	800°C
310	310 Stainless Steel (Type K)	1100°C
600	Inconel 600 (Types K, N, R, S & B)	1100°C
114	Nicrobell D (Types K & N)	1250°C
156	Hastelloy X (Type K)	1220°C
446	AISI 446 (Type K)	1150°C
800	Incoloy 800 (Type K)	1100°C

SECTION 3	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	4.5mm	0.177"
	6.0mm	0.236"
	8.0mm	0.315"

SECTION 4 — Type of Sensing Junction

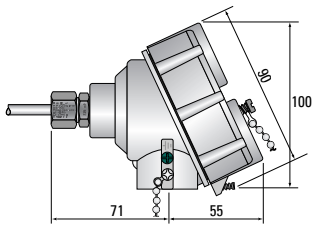
2I
2ID
2IT

INSULATED
The hot (measuring) junction is insulated from the sheath and this gives a floating output with a typical insulation resistance in excess of 100 megohms.
Enter **2I** for simplex, **2ID** for duplex or **2IT** if a triplex element is required.

SECTION 5 — Type of Terminal Head

(supplied with an M20 cable entry as standard. Other sizes are available - please contact us for details)

3P22

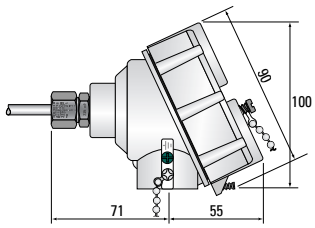


Also available in blue (order code 3P22B)

Standard Die Cast Alloy Head

Weatherproof and explosion proof die cast alloy terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

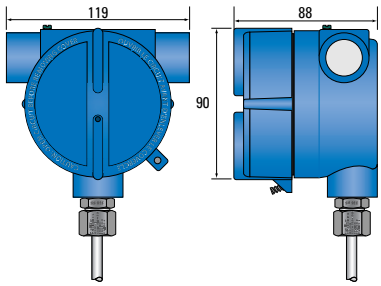
3P22S



Standard Stainless Steel Head

Weatherproof and explosion proof stainless steel terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

3P27



Dual Cable Entry Die Cast Alloy Head

Weatherproof and explosion proof die cast alloy terminal head for large devices with two cable entries at right angles to the tube entry and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

SECTION 6 — Optional Stainless Steel Adjustable Compression Fittings

Dia.	1/8" BSPT	1/4" BSPT	1/2" BSPT
4.5mm	SFS18T45EAC	SFS14T45EAC	SFS12T45EAC
6.0mm	SFS18T60EAC	SFS14T60EAC	SFS12T60EAC
8.0mm	–	SFS14T80EAC	SFS12T80EAC

Other thread sizes are available - please see page 20 for details.

SECTION 7 — Optional 4 to 20mA EAC Ex Approved Head Mounted Transmitter

(please specify range in °C)

TXISO/EAC

Fully Linearised

Microprocessor based head mounted transmitter EAC Ex rated to Ex ia IIC T6. Fully scaleable and fully linearised for thermocouple input. The transmitter is pre-programmed to the required temperature range or, alternatively, it can be re-programmed easily by your PC using our software which should be ordered separately. Other types of transmitter are available on page 22.

Order Code - Example

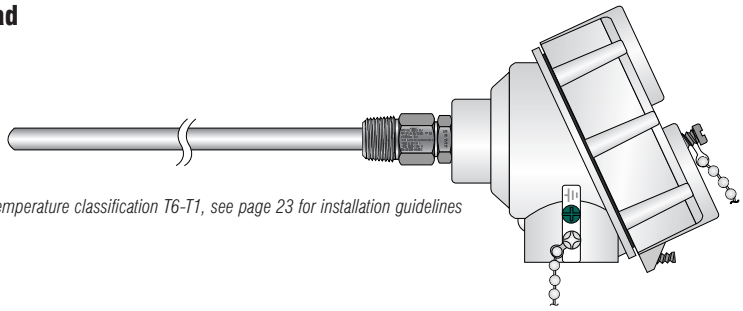
Type Nº	I.S. Version (Optional, please see page 22 for details)	Thermocouple Type (See section 1)	Sheath Length in mm	Sheath Material (See section 2)	Sheath Diameter (See section 3)	Sensing Junction (See section 4)	Termination (See section 5)	Compression Fitting (Optional, see section 6)	Transmitter (Optional, see section 7)	Approval
52	- IS	- K	- 750	- 321	- 6.0	- 2I	- 3P22	- SFS14T60EAC	- TXISO/EAC(0/100°C)	- EAC

EAC Ex Approved Thermocouples with Terminal Head

Mineral Insulated Thermocouples with Fixed Process Thread

These semi rigid thermocouples are supplied with an IP68 terminal head and are ideal where a heavy duty connection with cable is to be made near the sensor. They can be used with service temperatures up to 1250ºC[2] (installation guidelines shown on page 23 must be observed).[1]

- **TR CU 012/2011 Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas to Ex 0 Ex ia IIC Ga/IIIC Da (3P22S) and Ex 1 Ex ib IIC Gb/IIIC Db (3P22/3P27)**
- **Fixed thread for direct process connection**
- **Available in thermocouple types K, T, J, N, E, R, S and B**
- **Sheath diameters from 4.5mm to 8.0mm in a wide choice of materials**
- **Insulated measuring junction gives a floating output with high insulation resistance**
- **Simplex, duplex and triplex sensors available as well UKAS calibration**



Temperature classification T6-T1, see page 23 for installation guidelines

Also available with ATEX / IECEx approval

SECTION 1	Thermocouple Type	Temperature Range (continuous)
K	Nickel Chromium vs Nickel Aluminium	0°C to +1100°C
T	Copper vs Constantan	-185°C to +400°C
J	Iron vs Constantan	+50°C to +800°C
N	Nicrosil vs Nisil	0°C to +1200°C
E	Nickel Chromium vs Constantan	0°C to +800°C
R	Platinum - 13% Rhodium vs Platinum	0°C to +1600°C
S	Platinum - 10% Rhodium vs Platinum	0°C to +1550°C
B	Platinum - 30% Rhodium vs Platinum - 6% Rhodium	+100°C to +1600°C

SECTION 2	Sheath Material	Maximum Temperature
321	321 Stainless Steel (Types K, J, T & E)	800°C
310	310 Stainless Steel (Type K)	1100°C
600	Inconel 600 (Types K, N, R, S & B)	1100°C
114	Nicrobell D (Types K & N)	1250°C
156	Hastelloy X (Type K)	1220°C
446	AISI 446 (Type K)	1150°C
800	Incoloy 800 (Type K)	1100°C

SECTION 3	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	4.5mm	0.177"
	6.0mm	0.236"
	8.0mm	0.315"

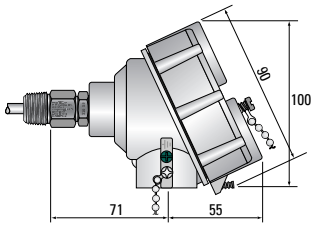
SECTION 4 — Type of Sensing Junction

2I 2ID 2IT	 **INSULATED** The hot (measuring) junction is insulated from the sheath and this gives a floating output with a typical insulation resistance in excess of 100 megohms. Enter **2I** for simplex, **2ID** for duplex or **2IT** if a triplex element is required.

SECTION 5 — Type of Terminal Head

(supplied with an M20 cable entry as standard. Other sizes are available - please contact us for details)

3P22

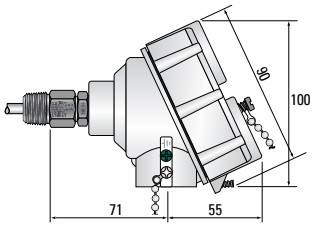


Also available in blue (order code 3P22B)

Standard Die Cast Alloy Head

Weatherproof and explosion proof die cast alloy terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

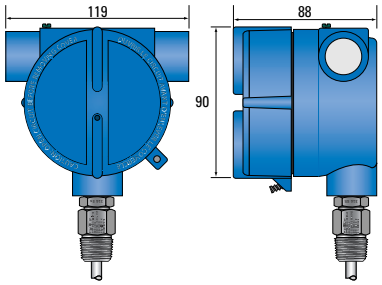
3P22S



Standard Stainless Steel Head

Weatherproof and explosion proof stainless steel terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

3P27



Dual Cable Entry Die Cast Alloy Head

Weatherproof and explosion proof die cast alloy terminal head for large devices with two cable entries at right angles to the tube entry and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

SECTION 6 — Process Connection Thread

Code	Thread Size	Code	Thread Type
12	1/2"	T	BSPT
34	3/4"	P	BSPP
M16	M16 x 1.5mm	N	NPT
M20	M20 x 1.5mm	M	Metric

SECTION 7 — Optional 4 to 20mA EAC Ex Approved Head Mounted Transmitter

(please specify range in °C)

TXISO/EAC

Fully Linearised

Microprocessor based head mounted transmitter EAC Ex rated to Ex ia IIC T6. Fully scaleable and fully linearised for thermocouple input. The transmitter is pre-programmed to the required temperature range or, alternatively, it can be re-programmed easily by your PC using our software which should be ordered separately. Other types of transmitter are available on page 22.

Order Code - Example

Type Nº	I.S. Version (Optional, please see page 22 for details)	Thermocouple Type (See section 1)	Sheath Length in mm	Sheath Material (See section 2)	Sheath Diameter (See section 3)	Sensing Junction (See section 4)	Termination (See section 5)	Process Connection (See section 6)	Transmitter (Optional, see section 7)	Approval
52	- IS -	K	- 750 -	321	- 6.0 -	2I	- 3P22 -	12T	- TXISO/EAC(0/100°C)	- EAC

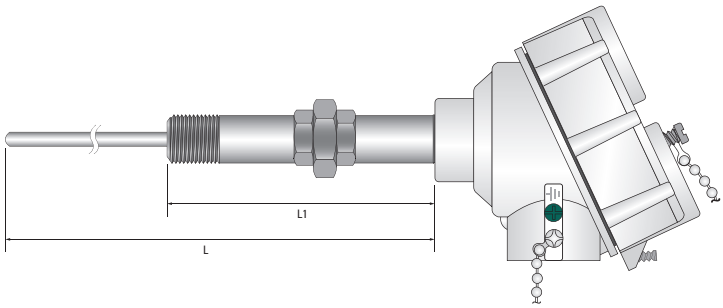
Notes (1)Sensor design shall be assessed by method (b) of our installation guidelines on page 23 as no stand-off is available.
(2) Maximum service temperature of terminal head end seals is 60°C

EAC Ex Approved Spring Loaded Thermocouples

Mineral Insulated Thermocouples 3.0mm to 8.0mm dia.

These semi rigid spring loaded thermocouples are supplied with an IP68 terminal head and threaded flameproof extension and are ideal for installation in thermowell pockets and where good contact with the process is required.They can be used with service temperatures up to 1250ºC (minimum stand-off lengths shown on page 23 must be observed).

- **TR CU 012/2011 Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas to Ex 0 Ex ia IIC Ga/IIIC Da (3P22S) and Ex 1 Ex ib IIC Gb/IIIC Db (3P22/3P22B)**
- **Temperature classification T6-T1, ambient temperature range -52 to +60°C**
- **Available in thermocouple types K, T, J, N, E, R, S and B**
- **Sheath diameters from 3.0mm to 8.0mm in a wide choice of materials**
- **Insulated measuring junction gives a floating output with high insulation resistance**
- **Spring loaded thermocouple insert with wide choice of process connections**
- **UKAS calibration available**



EAC Ex

IECEx Ex

Also available with ATEX / IECEx approval

SECTION 1	Thermocouple Type	Temperature Range (continuous)
K	Nickel Chromium vs Nickel Aluminium	0°C to +1100°C
T	Copper vs Constantan	-185°C to +400°C
J	Iron vs Constantan	+50°C to +800°C
N	Nicrosil vs Nisil	0°C to +1200°C
E	Nickel Chromium vs Constantan	0°C to +800°C
R	Platinum - 13% Rhodium vs Platinum	0°C to +1600°C
S	Platinum - 10% Rhodium vs Platinum	0°C to +1550°C
B	Platinum - 30% Rhodium vs Platinum - 6% Rhodium	+100°C to +1600°C

SECTION 2	Sheath Material	Maximum Temperature
321	321 Stainless Steel (Types K, J, T & E)	800°C
310	310 Stainless Steel (Type K)	1100°C
600	Inconel 600 (Types K, N, R, S & B)	1100°C
114	Nicrobell D (Types K & N)	1250°C
156	Hastelloy X (Type K)	1220°C
446	AISI 446 (Type K)	1150°C
800	Incoloy 800 (Type K)	1100°C

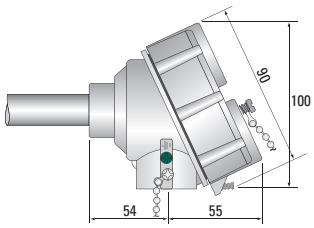
SECTION 3	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	3.0mm	0.177"
	4.5mm	0.118"
	6.0mm	0.236"
	8.0mm	0.315"

SECTION 4	Type of Sensing Junction	
2I 2ID 2IT		**INSULATED** The hot (measuring) junction is insulated from the sheath and this gives a floating output with a typical insulation resistance in excess of 100 megohms. Enter **2I** for simplex, **2ID** for duplex or **2IT** if a triplex element is required.

SECTION 5 — Type of Terminal Head

(supplied with an M20 cable entry as standard. Other sizes are available - please contact us for details)

3P22

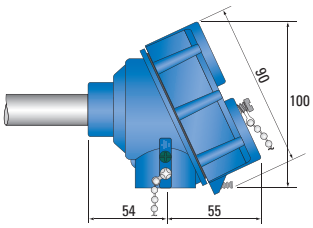


Also available in blue (order code CE22B)

Standard Die Cast Alloy Head

Weatherproof and explosion proof die cast alloy terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

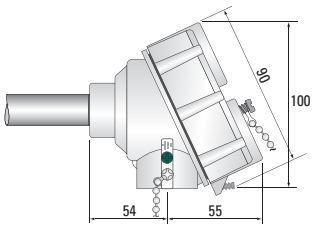
3P22B



Standard Die Cast Alloy Head (Blue)

Weatherproof and explosion proof die cast alloy terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

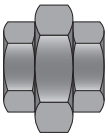
3P22S



Standard Stainless Steel Head

Weatherproof and explosion proof stainless steel terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

SECTION 6	Process Connection Thread
Code	Thread Size
12T	1/2" BSPT
12P	1/2" BSPP
12N	1/2" NPT
M20	M20 x 1.5mm

SECTION 7	Optional (Rotating Union) Fitting	
RUSS		Stainless steel rotating union to allow positioning of the terminal head.

SECTION 8	Optional 4 to 20mA EAC Ex Approved Head Mounted Transmitter (please specify range in °C)	
TXISO/ EAC	 *Fully Linearised*	Microprocessor based head mounted transmitter EAC Ex rated to Ex ia IIC T6. Fully scaleable and fully linearised for thermocouple input. The transmitter is pre-programmed to the required temperature range or, alternatively, it can be re-programmed easily by your PC using our software which should be ordered separately. Other types of transmitter are available on page 22.

Order Code - Example

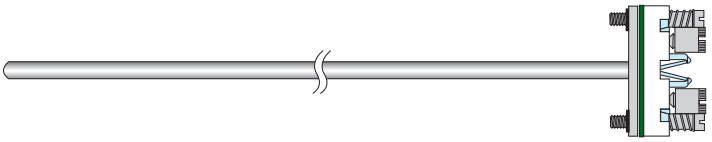
Type Nº	I.S. Version (Optional, please see page 22 for details)	Thermocouple Type (See section 1)	Length 'L' (See diagram)	Sheath Material (See section 2)	Sheath Diameter (See section 3)	Sensing Junction (See section 4)	Termination (See section 5)	Length 'L1' (See diagram)	Process Thread (See section 6)	Rotating Union Fitting (Optional, see section 7)	Transmitter (Optional, see section 8)	Approval
53	- IS	- K	- 300	- 321	- 6.0	- 2I	- 3P22	- 150	- 12P	- RUSS	- TXISO/EAC(0/100°C)	- EAC

EAC Ex Thermocouples with DIN Terminal Block

Mineral Insulated Thermocouples 6.0mm to 8.0mm dia.

Our EAC Ex intrinsically safe mineral insulated thermocouple insert assemblies are manufactured from cable that conforms to IEC 61515 and their semi rigid construction allows them to be bent and formed to suit particular applications without impairing performance.

- **TR CU 012/2011 Approved to Ex 0 Ex ia IIC Ga (Gas) and Ex ia IIIC Da (Dust)**
- **High integrity construction suited to arduous operating conditions**
- **High accuracy and stability maintained throughout operating life**
- **Available in thermocouple types K, T, J, N, E, R, S and B**
- **Sheath diameters from 6.0mm to 8.0mm in a wide choice of materials**
- **Insulated measuring junction gives a floating output with high insulation resistance**
- **Spring loaded thermocouple insert for connection to a standard DIN terminal head (33mm centres)**
- **Simplex, duplex and triplex sensors available**
- **UKAS calibration available**



The above sensor must be terminated in a suitable EAC Ex approved enclosure or box using appropriate glands

Also available with ATEX / IECEx approval

SECTION 1	Thermocouple Type	Temperature Range (continuous)
K	Nickel Chromium vs Nickel Aluminium	0°C to +1100°C
T	Copper vs Constantan	-185°C to +400°C
J	Iron vs Constantan	+50°C to +800°C
N	Nicrosil vs Nisil	0°C to +1200°C
E	Nickel Chromium vs Constantan	0°C to +800°C
R	Platinum - 13% Rhodium vs Platinum	0°C to +1600°C
S	Platinum - 10% Rhodium vs Platinum	0°C to +1550°C
B	Platinum - 30% Rhodium vs Platinum - 6% Rhodium	+100°C to +1600°C

SECTION 2	Sheath Material	Operational Properties	Maximum Temperature
321	321 Stainless Steel (Types K, J, T & E)	Very good corrosion resistance throughout the operating temperature range. Suited to a wide range of industrial applications. Enjoys high ductility.	800°C
310	310 Stainless Steel (Type K)	Good high temperature corrosion resistance and suitable for use in sulphur bearing atmospheres. Has high oxidisation resistance which is maintained if subsequent manipulation is strictly limited.	1100°C
600	Inconel 600 (Types K, N, R, S & B)	Suitable for use in severely corrosive atmospheres to elevated temperatures. Enjoys a good resistance to oxidation. Type R, S or B thermocouples with an Inconel 600 sheath are not recommended for use above 800°C. Do not use in sulphur bearing atmospheres above 550°C.	1100°C
114	Nicrobell D (Types K & N)	Recommended for use with high temperature type 'K' and most type 'N' applications. Very good high temperature strength. Excellent performance in oxidising, carburising, reducing and vacuum atmospheres. Do not use in sulphur containing atmospheres.	1250°C
156	Hastelloy X (Type K)	Improved high temperature resistance to oxidation and attack by sulphur. Retains excellent tensile strength at high temperatures. This sheath is applicable to reducing neutral and inert atmospheres. Develops a tightly adherent oxide film which does not spall at high temperatures.	1220°C
446	AISI 446 (Type K)	Suitable for use in severely corrosive atmospheres to elevated temperatures. Particularly suited for use in high concentration sulphur bearing atmospheres at high temperature. ** Should be mounted vertically at temperatures above 700°C.*	1150°C
800	Incoloy 800 (Type K)	Suitable for use in severely corrosive atmospheres to elevated temperatures. Enjoys a good resistance to oxidation and carburisation. Resistant to sulphur bearing atmospheres.	1100°C

SECTION 3	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	6.0mm	0.236"
	8.0mm	0.315"

SECTION 4 — Type of Sensing Junction

2I 2ID 2IT	

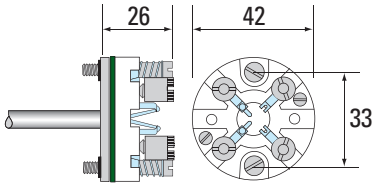
INSULATED

The hot (measuring) junction is insulated from the sheath and this gives a floating output with a typical insulation resistance in excess of 100 megohms.

Enter **2I** for simplex, **2ID** for duplex or **2IT** if a triplex element is required.

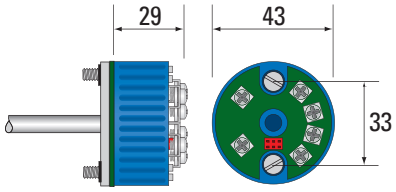
SECTION 5 — Terminal Block

3P20



SECTION 6 — Optional 4 to 20mA EAC Ex Approved Head Mounted Transmitter
(please specify range in °C)

TXISO/EAC



Microprocessor based head mounted transmitter EAC Ex rated to Ex ia IIC T6. Fully scaleable and fully linearised for thermocouple input. The transmitter is pre-programmed to the required temperature range or, alternatively, it can be re-programmed easily by your PC using our software which should be ordered separately. Other types of transmitter are available on request.

Order Code - Example

Type Nº	Thermocouple Type (See section 1)	Sheath Length in mm	Sheath Material (See section 2)	Sheath Diameter (See section 3)	Sensing Junction (See section 4)	Termination (See section 5)	Transmitter (Optional, see section 6)	Approval
52 - IS	- K	- 500	- 600	- 6.0	- 2I	- 3P20	- TXISO/EAC(0/100°C)	- EAC

EAC Ex Thermocouples with Termination Entry Gland

Mineral Insulated Thermocouples 1.0mm to 8.0mm dia.

Our EAC Ex mineral insulated thermocouple assemblies are manufactured from cable that conforms to IEC 61515 and their semi rigid construction allows them to be bent and formed to suit particular applications without impairing performance.

Model shown is fitted with connection tails.
A choice of cables is also available, see section 6
The above sensor must be terminated in a suitable EAC Ex approved Enclosure or Box

- **TR CU 012/2011 Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas to Ex 0 Ex ia IIC Ga/IIIC Da, see page 22 for details**
- **Temperature classification T6-T1, ambient temperature range -52 to +60°C**
- **Available in thermocouple types K, T, J, N, E, R, S and B**
- **Sheath diameters from 1.0mm to 8.0mm in a wide choice of materials**
- **Insulated measuring junction gives a floating output with high insulation resistance**
- **Terminated in a compression gland pot seal with 50mm PTFE sleeved tails**
- **Simplex, duplex and triplex sensors available**
- **UKAS calibration available**

Also available with ATEX / IECEx approval

SECTION 1	Thermocouple Type	Temperature Range (continuous)
K	Nickel Chromium vs Nickel Aluminium	0°C to +1100°C
T	Copper vs Constantan	-185°C to +400°C
J	Iron vs Constantan	+50°C to +800°C
N	Nicrosil vs Nisil	0°C to +1200°C
E	Nickel Chromium vs Constantan	0°C to +800°C
R	Platinum - 13% Rhodium vs Platinum	0°C to +1600°C
S	Platinum - 10% Rhodium vs Platinum	0°C to +1550°C
B	Platinum - 30% Rhodium vs Platinum - 6% Rhodium	+100°C to +1600°C

SECTION 2	Sheath Material	Maximum Temperature
321	321 Stainless Steel (Types K, J, T & E)	800°C
310	310 Stainless Steel (Type K)	1100°C
600	Inconel 600 (Types K, N, R, S & B)	1100°C
114	Nicrobell D (Types K & N)	1250°C
156	Hastelloy X (Type K)	1220°C
446	AISI 446 (Type K)	1150°C
800	Incoloy 800 (Type K)	1100°C

SECTION 3	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	1.0mm	0.039"
	1.5mm	0.059"
	3.0mm	0.118"
	4.5mm	0.177"
	6.0mm	0.236"
	8.0mm	0.315"

SECTION 4	Type of Sensing Junction
2I 2ID 2IT	**INSULATED** The hot (measuring) junction is insulated from the sheath and this gives a floating output with a typical insulation resistance in excess of 100 megohms. Enter **2I** for simplex, **2ID** for duplex or **2IT** for a triplex element.

SECTION 5	Termination Entry Gland (please use code number to specify thread size and material for the sensor diameter chosen)		
Dia.	Thread Size	Order Code for **Brass**	Order Code for **Stainless Steel**
1.0mm	16mm ISO	SFBM16-10CBEAC	SFSM16-10CBEAC
1.5mm	16mm ISO	SFBM16-15CBEAC	SFSM16-15CBEAC
3.0mm	16mm ISO	SFBM16-30CBEAC	SFSM16-30CBEAC
4.5mm	16mm ISO	SFBM16-45CBEAC	SFSM16-45CBEAC
6.0mm	16mm ISO	SFBM16-60CBEAC	SFSM16-60CBEAC
8.0mm	16mm ISO	SFBM16-80CBEAC	SFSM16-80CBEAC
3.0mm	20mm ISO	SFBM20-30CBEAC	SFSM20-30CBEAC
4.5mm	20mm ISO	SFBM20-45CBEAC	SFSM20-45CBEAC
6.0mm	20mm ISO	SFBM20-60CBEAC	SFSM20-60CBEAC
8.0mm	20mm ISO	SFBM20-80CBEAC	SFSM20-80CBEAC

SECTION 6	Optional Extension Cables (please specify length in metres)
A82	PVC Insulation (105°C) (Seal rating: 90°C)
B55	PFA Insulation (250°C) (Seal rating: 230°C)
C40	Fibreglass Insulation (480°C) (Seal rating: 260°C)

** All cables have 7/0.2mm conductors. If no cable is required, leave this section of the order code blank and the sensor will be supplied with 50mm PTFE 'tails' .*

SECTION 7	Optional Stainless Steel Adjustable Compression Fittings		
Dia.	1/8" BSPT	1/4" BSPT	1/2" BSPT
1.0mm	SFS18T10EAC	SFS14T10EAC	–
1.5mm	SFS18T15EAC	SFS14T15EAC	–
3.0mm	SFS18T30EAC	SFS14T30EAC	SFS12T30EAC
4.5mm	SFS18T45EAC	SFS14T45EAC	SFS12T45EAC
6.0mm	SFS18T60EAC	SFS14T60EAC	SFS12T60EAC
8.0mm	–	SFS14T80EAC	SFS12T80EAC

Other thread sizes are available - please see page 20 for details.

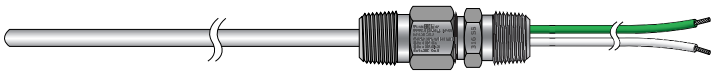
Order Code - Example

Type N°	I.S. Version (Optional, please see page 22 for details)	Thermocouple Type (See section 1)	Sheath Length in mm	Sheath Material (See section 2)	Sheath Diameter (See section 3)	Sensing Junction (See section 4)	Termination (See section 5)	Extension Cable (Optional, see section 6)	Compression Fitting (Optional, see section 7)	Approval
52	IS	K	500	321	3.0	2I	SFSM1630CBEAC	2m A82KX	SFS14T30EAC	EAC

EAC Ex Thermocouples with Termination Entry Gland

Mineral Insulated Thermocouples 1.0mm to 8.0mm dia.

Our EAC Ex mineral insulated thermocouple assemblies are manufactured from cable that conforms to IEC 61515 and their semi rigid construction allows them to be bent and formed to suit particular applications without impairing performance.



Model shown is fitted with connection tails.
A choice of cables is also available, see section 6
The above sensor must be terminated in a suitable EAC Ex approved Enclosure or Box

- **TR CU 012/2011 Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas to Ex 0 Ex ia IIC Ga/IIIC Da, see page 22 for details**
- **Temperature classification T6-T1, ambient temperature range -52 to +60°C**
- **Available in thermocouple types K, T, J, N, E, R, S and B**
- **Sheath diameters from 1.0mm to 8.0mm in a wide choice of materials**
- **Insulated measuring junction gives a floating output with high insulation resistance**
- **Terminated in a compression gland pot seal with threaded process entry and 50mm PTFE sleeved tails**
- **Simplex, duplex and triplex sensors available**
- **UKAS calibration available**

Also available with ATEX / IECEx approval

SECTION 1	Thermocouple Type	Temperature Range (continuous)
K	Nickel Chromium vs Nickel Aluminium	0°C to +1100°C
T	Copper vs Constantan	-185°C to +400°C
J	Iron vs Constantan	+50°C to +800°C
N	Nicrosil vs Nisil	0°C to +1200°C
E	Nickel Chromium vs Constantan	0°C to +800°C
R	Platinum - 13% Rhodium vs Platinum	0°C to +1600°C
S	Platinum - 10% Rhodium vs Platinum	0°C to +1550°C
B	Platinum - 30% Rhodium vs Platinum - 6% Rhodium	+100°C to +1600°C

SECTION 2	Sheath Material	Maximum Temperature
321	321 Stainless Steel (Types K, J, T & E)	800°C
310	310 Stainless Steel (Type K)	1100°C
600	Inconel 600 (Types K, N, R, S & B)	1100°C
114	Nicrobell D (Types K & N)	1250°C
156	Hastelloy X (Type K)	1220°C
446	AISI 446 (Type K)	1150°C
800	Incoloy 800 (Type K)	1100°C

SECTION 3	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	1.0mm	0.039"
	1.5mm	0.059"
	3.0mm	0.118"
	4.5mm	0.177"
	6.0mm	0.236"
	8.0mm	0.315"

SECTION 4	Type of Sensing Junction
2I 2ID 2IT	**INSULATED** The hot (measuring) junction is insulated from the sheath and this gives a floating output with a typical insulation resistance in excess of 100 megohms. Enter **2I** for simplex, **2ID** for duplex or **2IT** for a triplex element.

SECTION 5	Termination Entry Gland (please use code number to specify thread size and material for the sensor diameter chosen)		
Dia.	Thread Size	Order Code for **Brass**	Order Code for **Stainless Steel**
1.0mm	16mm ISO	SFBM16-10CBEAC	SFSM16-10CBEAC
1.5mm	16mm ISO	SFBM16-15CBEAC	SFSM16-15CBEAC
3.0mm	16mm ISO	SFBM16-30CBEAC	SFSM16-30CBEAC
4.5mm	16mm ISO	SFBM16-45CBEAC	SFSM16-45CBEAC
6.0mm	16mm ISO	SFBM16-60CBEAC	SFSM16-60CBEAC
8.0mm	16mm ISO	SFBM16-80CBEAC	SFSM16-80CBEAC
3.0mm	20mm ISO	SFBM20-30CBEAC	SFSM20-30CBEAC
4.5mm	20mm ISO	SFBM20-45CBEAC	SFSM20-45CBEAC
6.0mm	20mm ISO	SFBM20-60CBEAC	SFSM20-60CBEAC
8.0mm	20mm ISO	SFBM20-80CBEAC	SFSM20-80CBEAC

SECTION 6	Optional Extension Cables (please specify length in metres)
A82	PVC Insulation (105°C) (Seal rating: 90°C)
B55	PFA Insulation (250°C) (Seal rating: 230°C)
C40	Fibreglass Insulation (480°C) (Seal rating: 260°C)

** All cables have 7/0.2mm conductors. If no cable is required, leave this section of the order code blank and the sensor will be supplied with 50mm PTFE 'tails' .*

SECTION 7	Process Connection Thread		
Code	Thread Size	Code	Thread Type
12	1/2"	T	BSPT
M16	M16 x 1.5mm	P	BSPP
M20	M20 x 1.5mm	N	NPT
		M	Metric

Order Code - Example

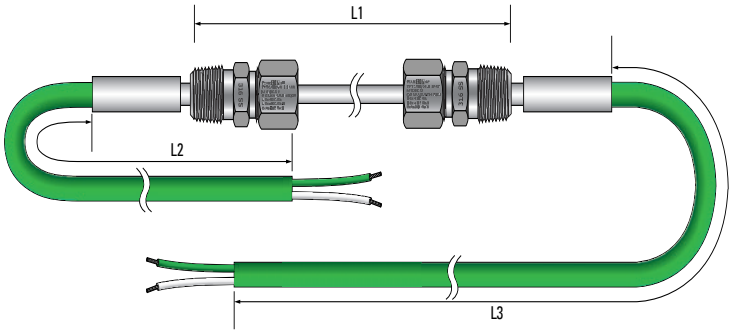
Type N°	I.S. Version (Optional, please see page 22 for details)	Thermocouple Type (See section 1)	Sheath Length in mm	Sheath Material (See section 2)	Sheath Diameter (See section 3)	Sensing Junction (See section 4)	Termination (See section 5)	Extension Cable (Optional, see section 6)	Process Connection (See section 7)	Approval
52	IS	K	500	321	3.0	2I	SFSM1630CBEAC	2m A82KX	12T	EAC

EAC Ex Approved Thermocouple Feedthrough Assemblies

Thermocouple Feedthrough Assemblies

Our EAC Ex mineral insulated feedthrough assemblies are typically used to extend thermocouple signals over medium to long distances up to 200 metres. The seamless metal sheath allows installation in the most arduous conditions.

- **TR CU 012/2011 Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas to Ex 0 Ex ia IIC Ga/IIIC Da, see page 22 for details**
- **Available in thermocouple types K, T, J, N, E, R, S and B**
- **High integrity construction suited to arduous operating conditions**
- **Sheath diameters from 1.5mm to 6.0mm in a wide choice of materials**
- **Simplex, duplex and triplex feedthroughs available**
- **PVC, PFA and fibreglass insulated extension cables. Other cables available**
- **A wide range of connection threads and sizes are available**



Also available with ATEX / IECEx approval

SECTION 1	Thermocouple Type	Temperature Range (continuous)
K	Nickel Chromium vs Nickel Aluminium	0°C to +1100°C
T	Copper vs Constantan	-185°C to +400°C
J	Iron vs Constantan	+50°C to +800°C
N	Nicrosil vs Nisil	0°C to +1200°C
E	Nickel Chromium vs Constantan	0°C to +800°C
R	Platinum - 13% Rhodium vs Platinum	0°C to +1600°C
S	Platinum - 10% Rhodium vs Platinum	0°C to +1550°C
B	Platinum - 30% Rhodium vs Platinum - 6% Rhodium	+100°C to +1600°C

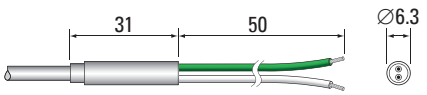
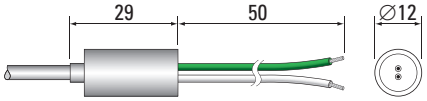
SECTION 2	Sheath Material	Maximum Temperature
321	321 Stainless Steel (Types K, J, T & E)	800°C
310	310 Stainless Steel (Type K)	1100°C
600	Inconel 600 (Types K, N, R, S & B)	1100°C
114	Nicrobell D (Types K & N)	1250°C
156	Hastelloy X (Type K)	1220°C
446	AISI 446 (Type K)	1150°C
800	Incoloy 800 (Type K)	1100°C

SECTION 3	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	1.5mm	0.059"
	2.0mm	0.079"
	3.0mm	0.118"
	4.5mm	0.177"
	6.0mm	0.236"

SECTION 4	Number of Elements
S	Simplex (2 wire)
D	Duplex (4 wire)
T	Triplex (6 wire)

SECTION 5 — Pot Seal Terminations

Standard Pot Seals

Temperature Rating	Dimensions	Description
90ºC for PVC cables **230ºC** for PTFE and PFA cables **260ºC** for fibreglass cables		**For sheath diameters up to 3mm.** Crimp on stainless steel pot seal potted with resin or high temperature resin. Supplied with PTFE solid tails 50mm long as standard.
90ºC for PVC cables **230ºC** for PTFE and PFA cables **260ºC** for fibreglass cables		**For sheath diameters between 3mm and 6mm.** Crimp on stainless steel pot seal potted with resin or high temperature resin. Supplied with PTFE solid tails 50mm long as standard.

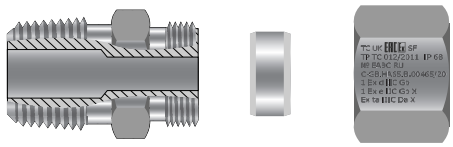
SECTION 6 — Optional Extension Cables

(please specify length in metres)

A82	PVC Insulation (105°C)	
B55	PFA Insulation (250°C)	
C40	Fibreglass Insulation (480°C)	

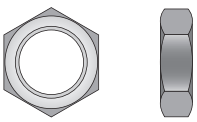
** All cables have 7/0.2mm conductors. If no cable is required, leave this section of the order code blank and the sensor will be supplied with 50mm PTFE 'tails' . Other cables are available on request, please contact us for details.*

SECTION 7 — Stainless Steel Adjustable Compression Fittings with Counter Bore



Code	Thread Size	Code	Thread Type
18	1/8"	T	BSPT
14	1/4"	P	BSPP
12	1/2"	N	NPT
34	3/4"	M	M
M16	M16 x 1.5mm		
M20	M20 x 1.5mm		

Optional Locknut

Code	Diagram
L	 *Only available for 'P' and 'M' threads*

Order Code - Example

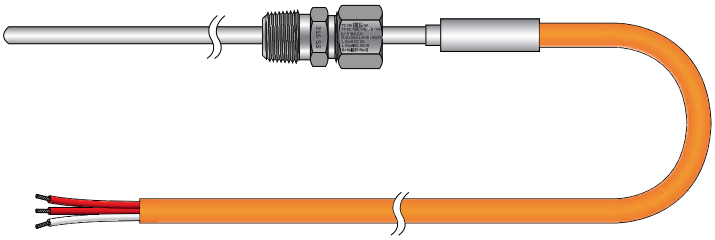
General Details							*Process End*			*Connection End*			
Type Nº	I.S. Version (Optional, please see page 22 for details)	Thermocouple Type (See section 1)	Sheath Length 'L1'	Sheath Material (See section 2)	Sheath Diameter (See section 3)	No. of Elements (See section 4)	Cable Length 'L2'	Cable Type (See section 6)	Fitting Thread 1 (See section 7)	Cable Length 'L3'	Cable Type (See section 6)	Fitting Thread 2 (See section 7)	Approval
54	- IS -	K	- 1000	- 600	- 3.0	- S	- 1m	- A82	- 12PL	- 1m	- A82	- 12PL	- EAC

EAC Ex RTD Pt100 Sensors with Pot Seal

RTD Pt100 Resistance Thermometers 3.0mm to 8.0mm dia.

Our EAC Ex approved flexible mineral insulated platinum resistance thermometers utilise, as standard, detector elements with a resistance of 100 ohms @ 0°C and a fundamental interval of 38.5 ohms to IEC 60751. Single and duplex elements are available. An adjustable threaded compression fitting is required to achieve approval.

- **TR CU 012/2011 Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas to Ex 0 Ex ia IIC Ga/IIIC Da, see page 22 for details**
- **Temperature classification T6-T1, ambient temperature range -52 to +60°C**
- **Available in B, A, 1/3, 1/5 and 1/10 grade accuracies**
- **Sheath diameters from 3.0mm to 8.0mm**
- **PVC or PFA insulated extension cables**
- **Wide operating temperature range of -100°C to +600°C**
- **UKAS calibration available**



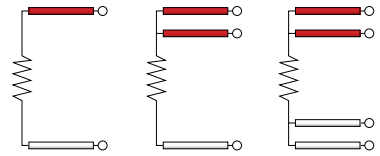
The above sensor must be installed using the compression fitting supplied to maintain Ex d / Ex tb approval. For Ex ia applications a compression fitting is not required to maintain approval

Also available with ATEX / IECEx approval

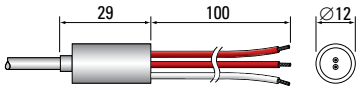
SECTION 1	N° of Elements
1	Simplex
2	Duplex
3	Triplex

SECTION 2	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	3.0mm	0.118"
	4.5mm	0.177"
	6.0mm	0.236"
	8.0mm	0.315"

SECTION 3	N° of Wires
2	2 wire
3	3 wire
4	4 wire



SECTION 4	Sheath Length
As Required	

SECTION 5	Termination
CE4CL	 *Other lengths of cable available*

SECTION 6	Tolerance of Element (IEC 60751)		
Grade	Accuracy @ 0°C	Accuracy @100°C	Order Code
B	±0.30°C	±0.80°C	R100 - B
A	±0.15°C	±0.35°C	R100 - A
1/3	±0.08°C	±0.19°C	R100 - 1/3
1/5	±0.05°C	±0.15°C	R100 - 1/5
1/10	±0.03°C	±0.12°C	R100 - 1/10

SECTION 7	Extension Cables (please specify length in metres)		
RP	PVC Insulation (105°C) (Termination: CE4CL seal, temperature rating 90°C)		**RP37** (3-wire)
			RP47 (4-wire)
			RP67 (Duplex 3-wire)
RT	PFA Insulation (250°C) (Termination: CE4CLA seal, temperature rating 230°C)		**RT37** (3-wire)
			RT47 (4-wire)
			RT67 (Duplex 3-wire)

* *All cables have 7/0.2mm conductors. If no cable is required, leave this section of the order code blank and the sensor will be supplied with 100mm Kapton 'tails'.*

SECTION 8	Stainless Steel Adjustable Compression Fittings		
Dia.	1/8" BSPT	1/4" BSPT	1/2" BSPT
3.0mm	SFS18T30EAC	SFS14T30EAC	SFS12T30EAC
4.5mm	SFS18T45EAC	SFS14T45EAC	SFS12T45EAC
6.0mm	SFS18T60EAC	SFS14T60EAC	SFS12T60EAC
8.0mm	–	SFS14T80EAC	SFS12T80EAC

Other thread sizes are available - please see page 20 for details.

Order Code - Example

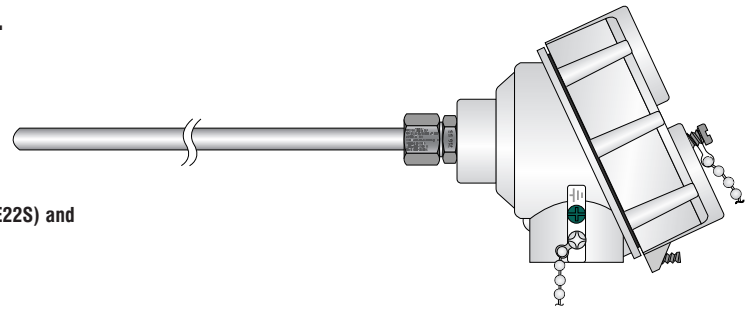
Type N°	I.S. Version (Optional, please see page 22 for details)	N° of Elements (See section 1)	Sheath Diameter (See section 2)	N° of Wires (See section 3)	Sheath Length (mm)	Termination (See section 5)	Resistance Value of Element	Grade of Element (See section 6)	Extension Cable (See section 7)	Compression Fitting (See section 8)	Approval
57	IS	1	6.0	3	250	CE4CL	R100	B	1m RP37	SFS12T60EAC	EAC

Need advice
on using our **EAC Ex** approved products?
Contact one of our experienced engineers on
01895 252222
International +44 1895 252222
or send an email to atex@tc.co.uk

EAC Ex RTD Pt100 Sensors with Terminal Head

RTD Pt100 Resistance Thermometers 4.5mm to 8.0mm dia.

Our EAC Ex approved flexible mineral insulated platinum resistance thermometers utilise, as standard, detector elements with a resistance of 100 ohms @ 0°C and a fundamental interval of 38.5 ohms to IEC 60751. Single and duplex elements are available.



- **TR CU 012/2011 Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas to Ex 0 Ex ia IIC Ga/IIIC Da (CE22S) and Ex 1 Ex ib IIC Gb/IIIC Db (CE22/CE27), see page 22 for details**
- **Temperature classification T6-T1, ambient temperature range -52 to +60°C**
- **Available in B, A, 1/3, 1/5 and 1/10 grade accuracies**
- **Sheath diameters from 4.5mm to 8.0mm**
- **316 seamless stainless steel sheath (other grades/materials available)**
- **Die cast alloy or stainless steel terminal heads available**
- **Wide operating temperature range of -100°C to +600°C, UKAS calibration is also available**

Also available with ATEX / IECEx approval

SECTION 1 – N° of Elements

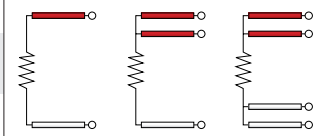
1	Simplex
2	Duplex
3	Triplex

SECTION 2 – Sheath Diameter

	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	4.5mm	0.177"
	6.0mm	0.236"
	8.0mm	0.315"

SECTION 3 – N° of Wires

2	2 wire
3	3 wire
4	4 wire



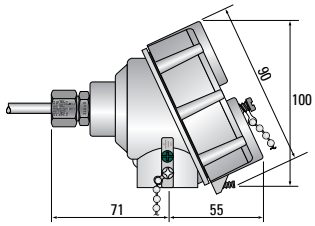
SECTION 4 – Sheath Length

As Required

SECTION 5 – Type of Terminal Head

(supplied with an M20 cable entry as standard. Other sizes are available - please contact us for details)

CE22

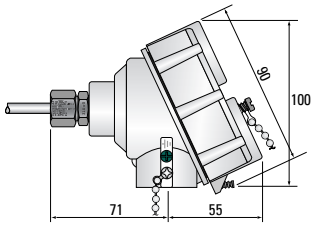


Also available in blue (order code 3P22B)

Standard Die Cast Alloy Head

Weatherproof and explosion proof die cast alloy terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

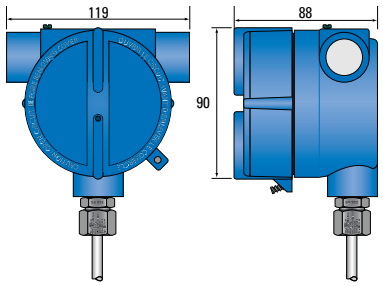
CE22S



Standard Stainless Steel Head

Weatherproof and explosion proof stainless steel terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

CE27



Dual Cable Entry Die Cast Alloy Head

Weatherproof and explosion proof die cast alloy terminal head for large devices with two cable entries at right angles to the tube entry and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

SECTION 6 – Tolerance of Element

(IEC 60751)

Grade	Accuracy @ 0°C	Accuracy @100°C	Order Code
B	±0.30°C	±0.80°C	R100 - B
A	±0.15°C	±0.35°C	R100 - A
1/3	±0.08°C	±0.19°C	R100 - 1/3
1/5	±0.05°C	±0.15°C	R100 - 1/5
1/10	±0.03°C	±0.12°C	R100 - 1/10

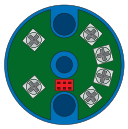
SECTION 7 – Optional Stainless Steel Adjustable Compression Fittings

Dia.	1/8" BSPT	1/4" BSPT	1/2" BSPT
4.5mm	SFS18T45EAC	SFS14T45EAC	SFS12T45EAC
6.0mm	SFS18T60EAC	SFS14T60EAC	SFS12T60EAC
8.0mm	–	SFS14T80EAC	SFS12T80EAC

Other thread sizes are available - please see page 20 for details.

SECTION 8 – Optional 4 to 20mA EAC Ex Approved Head Mounted Transmitter (please specify range in °C)

TXISO/EAC



Fully Linearised

Microprocessor based head mounted transmitter EAC Ex rated to Ex ia IIC T6. Fully scaleable and fully linearised for PT100 input. The transmitter is pre-programmed to the required temperature range or, alternatively, it can be re-programmed easily by your PC using our software which should be ordered separately. Other types of transmitter are available on page 22.

Order Code - Example

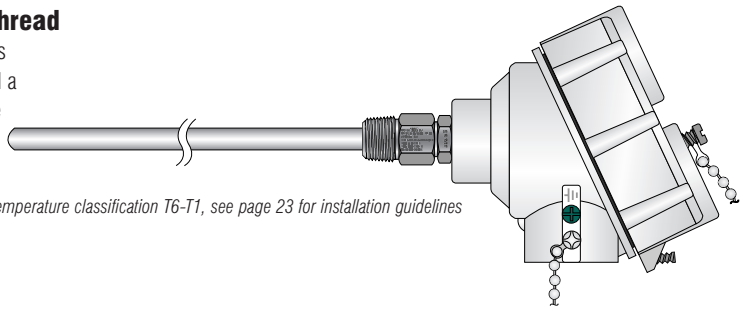
Type N°	I.S. Version (Optional, please see page 22 for details)	N° of Elements (See section 1)	Sheath Diameter (See section 2)	N° of Wires (See section 3)	Sheath Length (mm)	Termination (See section 5)	Resistance Value of Element	Grade of Element (See section 6)	Compression Fitting (Optional, see section 7)	Transmitter (Optional, see section 8)	Approval
57 -	IS -	1 -	6.0 -	3 -	450 -	CE22S -	R100 -	B -	SFS14T60EAC -	TXISO/EAC(0/100°C) -	EAC

EAC Ex RTD Pt100 Sensors with Terminal Head

RTD Pt100 Resistance Thermometers with Fixed Process Thread

Our EAC Ex approved flexible mineral insulated platinum resistance thermometers utilise, as standard, detector elements with a resistance of 100 ohms @ 0°C and a fundamental interval of 38.5 ohms to IEC 60751. Single and duplex elements are available. Installation guidelines shown on page 23 must be observed.[1]

- **Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas to Ex 0 Ex ia IIC Ga/IIIC Da (CE22S) and Ex 1 Ex ib IIC Gb/IIIC Db (CE22/CE27), see page 22 for details**
- **Temperature classification T6-T1, ambient temperature range -52 to +60°C**
- **Available in B, A, 1/3, 1/5 and 1/10 grade accuracies**
- **Sheath diameters from 4.5mm to 8.0mm**
- **316 seamless stainless steel sheath (other grades/materials available)**
- **Die cast alloy or stainless steel terminal heads available**
- **Wide operating temperature range of -100°C to +600°C [2]**

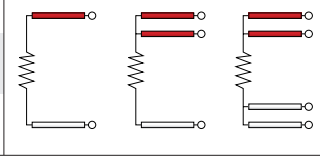


Temperature classification T6-T1, see page 23 for installation guidelines

Also available with ATEX / IECEx approval

SECTION 1	N° of Elements
1	Simplex
2	Duplex
3	Triplex

SECTION 2	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	4.5mm	0.177"
	6.0mm	0.236"
	8.0mm	0.315"

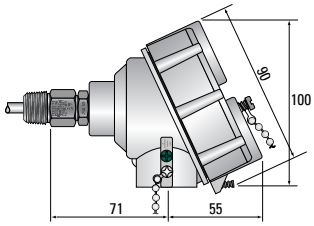
SECTION 3	N° of Wires	
2	2 wire	
3	3 wire	
4	4 wire	

SECTION 4	Sheath Length
	As Required

SECTION 5 — Type of Terminal Head

(supplied with an M20 cable entry as standard. Other sizes are available - please contact us for details)

3P22

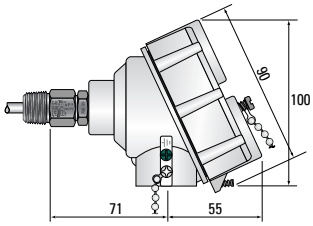


Also available in blue (order code 3P22B)

Standard Die Cast Alloy Head

Weatherproof and explosion proof die cast alloy terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

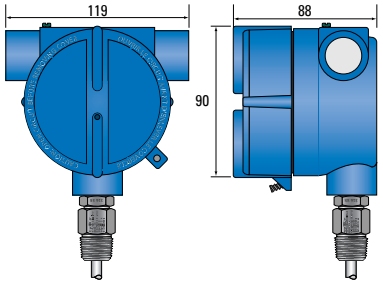
3P22S



Standard Stainless Steel Head

Weatherproof and explosion proof stainless steel terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

3P27



Dual Cable Entry Die Cast Alloy Head

Weatherproof and explosion proof die cast alloy terminal head for large devices with two cable entries at right angles to the tube entry and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

SECTION 6 — Tolerance of Element

(IEC 60751)

Grade	Accuracy @ 0°C	Accuracy @100°C	Order Code
B	±0.30°C	±0.80°C	R100 - B
A	±0.15°C	±0.35°C	R100 - A
1/3	±0.08°C	±0.19°C	R100 - 1/3
1/5	±0.05°C	±0.15°C	R100 - 1/5
1/10	±0.03°C	±0.12°C	R100 - 1/10

SECTION 7 — Process Connection Thread

Code	Thread Size	Code	Thread Type
12	1/2"	T	BSPT
34	3/4"	P	BSPP
M16	M16 x 1.5mm	N	NPT
M20	M20 x 1.5mm	M	Metric

SECTION 8 — Optional 4 to 20mA EAC Ex Approved Head Mounted Transmitter (please specify range in °C)

TXISO/EAC

Fully Linearised

Microprocessor based head mounted transmitter EAC Ex rated to Ex ia IIC T6. Fully scaleable and fully linearised for PT100 input. The transmitter is pre-programmed to the required temperature range or, alternatively, it can be re-programmed easily by your PC using our software which should be ordered separately. Other types of transmitter are available on page 22.

Notes (1) Sensor design shall be assessed by method (b) of our installation guidelines on page 23 as no stand-off is available.
(2) Maximum service temperature of terminal head end seals is 60°C

Order Code - Example

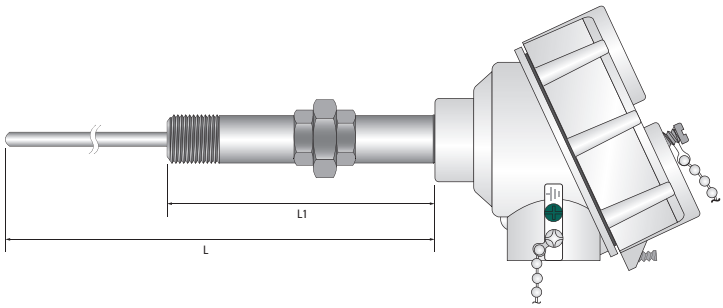
Type N°	I.S. Version (Optional, please see page 22 for details)	N° of Elements (See section 1)	Sheath Diameter (See section 2)	N° of Wires (See section 3)	Sheath Length (mm)	Termination (See section 5)	Resistance Value of Element	Grade of Element (See section 6)	Process Connection (See section 7)	Transmitter (Optional, see section 8)	Approval
57	- IS	- 1	- 6.0	- 3	- 450	- CE22S	- R100	- B	- 12T	- TXISO/EAC(0/100°C)	- EAC

EAC Ex Approved Spring Loaded RTD Pt100 Sensors

RTD Pt100 Resistance Thermometers 3.0mm to 8.0mm dia.

These spring loaded flexible mineral insulated platinum resistance thermometers utilise, as standard, detector elements with a resistance of 100 ohms @ 0°C and a fundamental interval of 38.5 ohms to IEC 60751. The threaded flameproof extension is ideal for installation in thermowell pockets and where good contact with the process is required.

- **TR CU 012/2011 Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas to Ex 0 Ex ia IIC Ga/IIIC Da (CE22S) and Ex 1 Ex ib IIC Gb/IIIC Db (CE22/CE22B)**
- **Temperature classification T6-T1, ambient temperature range -52 to +60°C**
- **Available in B, A, 1/3, 1/5 and 1/10 grade accuracies**
- **Sheath diameters from 3.0mm to 8.0mm**
- **316 seamless stainless steel sheath (other grades/materials available)**
- **Spring loaded RTD Pt100 insert with wide choice of process connections**
- **Wide operating temperature range of -100°C to +600°C**
- **UKAS calibration available**



EAC Ex

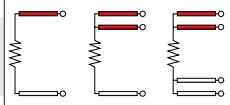
IECEx Ex

Also available with ATEX / IECEx approval

SECTION 1	N° of Elements
1	Simplex
2	Duplex
3	Triplex

SECTION 2	Sheath Dia. (mm)	Sheath Dia. (inches)
Standard Sizes	3.0mm	0.118”
	4.5mm	0.177”
	6.0mm	0.236”
	8.0mm	0.315”

SECTION 3	N° of Wires
2	2 wire
3	3 wire
4	4 wire

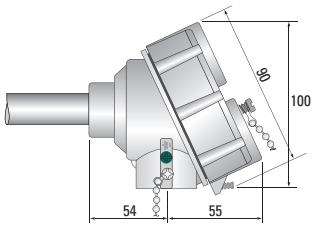


SECTION 4	Tolerance of Element (IEC 60751)		
Grade	Accuracy @ 0°C	Accuracy @100°C	Order Code
B	±0.30°C	±0.80°C	R100 - B
A	±0.15°C	±0.35°C	R100 - A
1/3	±0.08°C	±0.19°C	R100 - 1/3
1/5	±0.05°C	±0.15°C	R100 - 1/5
1/10	±0.03°C	±0.12°C	R100 - 1/10

SECTION 5 — Type of Terminal Head

(supplied with an M20 cable entry as standard. Other sizes are available - please contact us for details)

CE22

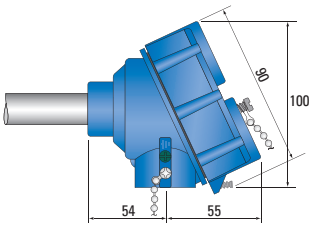


Also available in blue (order code CE22B)

Standard Die Cast Alloy Head

Weatherproof and explosion proof die cast alloy terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

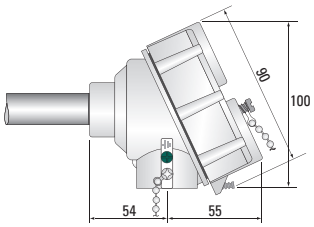
CE22B



Standard Die Cast Alloy Head (Blue)

Weatherproof and explosion proof die cast alloy terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

CE22S



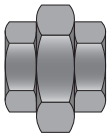
Standard Stainless Steel Head

Weatherproof and explosion proof stainless steel terminal head with tube and cable entry at right angles to each other and ceramic terminal block. Suitable for simplex, duplex and triplex assemblies.

SECTION 6	Process Connection Thread
Code	Thread Size
12T	1/2” BSPT
12P	1/2” BSPP
12N	1/2” NPT
M20	M20 x 1.5mm

SECTION 7 — Optional (Rotating Union) Fitting

RUSS



Stainless steel rotating union to allow positioning of the terminal head.

SECTION 8 — Optional 4 to 20mA EAC Ex Approved Head Mounted Transmitter (please specify range in °C)

TXISO/EAC

Fully Linearised

Microprocessor based head mounted transmitter EAC Ex rated to Ex ia IIC T6. Fully scaleable and fully linearised for PT100 input. The transmitter is pre-programmed to the required temperature range or, alternatively, it can be re-programmed easily by your PC using our software which should be ordered separately. Other types of transmitter are available on page 22.

Order Code - Example

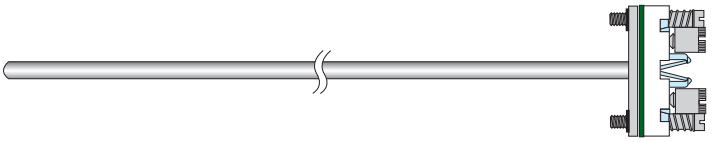
Type N°	I.S. Version (Optional, please see page 22 for details)	N° of Elements (See section 1)	Length ‘L’ (See diagram)	Sheath Diameter (See section 2)	N° of Wires (See section 3)	Termination (See section 5)	Length ‘L1’ (See diagram)	Resistance of Element	Grade of Element (See section 4)	Process Thread (See section 6)	Rotating Union (Optional, see section 7)	Transmitter (Optional, see section 8)	Approval
58	- IS	- 1	- 300	- 4.5	- 3	- CE22	- 150	- R100	- B	- 12P	- RUSS	- TXISO/EAC(0/100°C)	- EAC

EAC Ex RTD Pt100 Sensors with Terminal Block

RTD Pt100 Resistance Thermometers 6.0mm to 8.0mm dia.

These intrinsically safe spring loaded flexible mineral insulated platinum resistance thermometers utilise, as standard, detector elements with a resistance of 100 ohms @ 0°C and a fundamental interval of 38.5 ohms to IEC 60751.

- **TR CU 012/2011 Approved to Ex 1 Ex ia IIC Ga (Gas) and Ex ia IIIC Da (Dust)**
- **Temperature classification T6-T1, ambient temperature range -52 to +60°C**
- **Available in B, A, 1/3, 1/5 and 1/10 grade accuracies**
- **Sheath diameters from 6.0mm to 8.0mm**
- **316 seamless stainless steel sheath (other grades/materials available)**
- **Spring loaded RTD Pt100 insert with wide choice of process connections**
- **Wide operating temperature range of -100°C to +600°C**
- **UKAS calibration available**



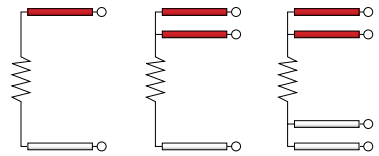
The above sensor must be terminated in a suitable EAC Ex approved enclosure or box using appropriate glands

Also available with ATEX / IECEx approval

SECTION 1	N° of Elements
1	Simplex
2	Duplex
3	Triplex

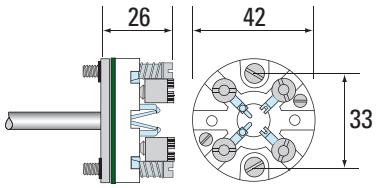
SECTION 2	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	6.0mm	0.236"
	8.0mm	0.315"

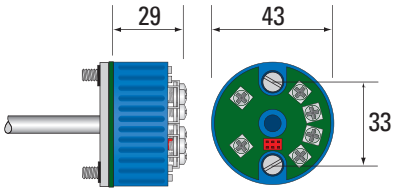
SECTION 3	N° of Wires
2	2 wire
3	3 wire
4	4 wire



SECTION 4	Tolerance of Element (IEC 60751)		
Grade	Accuracy @ 0°C	Accuracy @100°C	Order Code
B	±0.30°C	±0.80°C	R100 - B
A	±0.15°C	±0.35°C	R100 - A
1/3	±0.08°C	±0.19°C	R100 - 1/3
1/5	±0.05°C	±0.15°C	R100 - 1/5
1/10	±0.03°C	±0.12°C	R100 - 1/10

SECTION 5	Sheath Length
As Required	

SECTION 6	Terminal Block
3P20	

7	Optional 4 to 20mA EAC Ex Approved Head Mounted Transmitter (please specify range in °C)	
SECTION TXISO/EAC		Microprocessor based head mounted transmitter EAC Ex rated to Ex ia IIC T6. Fully scaleable and fully linearised for thermocouple input. The transmitter is pre-programmed to the required temperature range or, alternatively, it can be re-programmed easily by your PC using our software which should be ordered separately. Other types of transmitter are available on request.

Order Code - Example

Type N°	N° of Elements (See section 1)	Sheath Diameter (See section 2)	N° of Wires (See section 3)	Sheath Length (mm)	Termination (See section 6)	Resistance Value of Element	Grade of Element (See section 4)	Transmitter (Optional, see section 7)	Approval
57 - IS	- 1	- 6.0	- 3	- 450	- CE20	- R100	- B	- TXISO/EAC(0/100°C)	- EAC

EAC Ex RTD Pt100s with Termination Entry Gland

RTD Pt100 Resistance Thermometers 3.0mm to 8.0mm dia.

Our EAC Ex approved mineral insulated platinum resistance thermometers utilise, as standard, detector elements with a resistance of 100 ohms @ 0°C and a fundamental interval of 38.5 ohms to IEC 60751. Single and duplex elements are available.

- **TR CU 012/2011 Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas to Ex 0 Ex ia IIC Ga/IIIC Da, see page 22 for details**
- **Temperature classification T6-T1, ambient temperature range -52 to +60°C**
- **Available in B, A, 1/3, 1/5 and 1/10 grade accuracies**
- **Sheath diameters from 3.0mm to 8.0mm**
- **316 seamless stainless steel sheath (other grades/materials available)**
- **Terminated in a compression gland pot seal with 100mm Kapton® sleeved tails**
- **Wide operating temperature range of -100°C to +600°C**
- **UKAS calibration available**

Model shown is fitted with connection tails.
A choice of cables is also available, see section 7

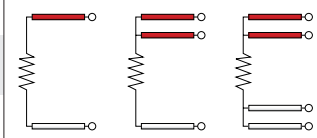
The above sensor must be terminated in a suitable EAC Ex approved Enclosure or Box

EAC Ex

Also available with ATEX / IECEx approval

SECTION 1	N° of Elements
1	Simplex
2	Duplex
3	Triplex

SECTION 2	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	3.0mm	0.118"
	4.5mm	0.177"
	6.0mm	0.236"
	8.0mm	0.315"

SECTION 3	N° of Wires	
2	2 wire	
3	3 wire	
4	4 wire	

SECTION 4	Sheath Length
	As Required

SECTION 5	Termination Entry Gland (please use code number to specify thread size and material for the sensor diameter chosen)		
Dia.	Thread Size	Order Code for **Brass**	Order Code for **Stainless Steel**
3.0mm	16mm ISO	SFBM16-30CBEAC	SFSM16-30CBEAC
4.5mm	16mm ISO	SFBM16-45CBEAC	SFSM16-45CBEAC
6.0mm	16mm ISO	SFBM16-60CBEAC	SFSM16-60CBEAC
8.0mm	16mm ISO	SFBM16-80CBEAC	SFSM16-80CBEAC
3.0mm	20mm ISO	SFBM20-30CBEAC	SFSM20-30CBEAC
4.5mm	20mm ISO	SFBM20-45CBEAC	SFSM20-45CBEAC
6.0mm	20mm ISO	SFBM20-60CBEAC	SFSM20-60CBEAC
8.0mm	20mm ISO	SFBM20-80CBEAC	SFSM20-80CBEAC

SECTION 6	Tolerance of Element (IEC 60751)		
Grade	Accuracy @ 0°C	Accuracy @100°C	Order Code
B	±0.30°C	±0.80°C	R100 - B
A	±0.15°C	±0.35°C	R100 - A
1/3	±0.08°C	±0.19°C	R100 - 1/3
1/5	±0.05°C	±0.15°C	R100 - 1/5
1/10	±0.03°C	±0.12°C	R100 - 1/10

SECTION 7	Optional Extension Cables (please specify length in metres)		
RP	PVC Insulation (105°C) (Seal rating: **90°C**)		**RP37** (3-wire)
			RP47 (4-wire)
			RP67 (Duplex 3-wire)
RT	PFA Insulation (250°C) (Seal rating: **230°C**)		**RT37** (3-wire)
			RT47 (4-wire)
			RT67 (Duplex 3-wire)

* *All cables have 7/0.2mm conductors. If no cable is required, leave this section of the order code blank and the sensor will be supplied with 100mm Kapton 'tails'.*

SECTION 8	Optional Stainless Steel Adjustable Compression Fittings		
Dia.	1/8" BSPT	1/4" BSPT	1/2" BSPT
3.0mm	SFS18T30EAC	SFS14T30EAC	SFS12T30EAC
4.5mm	SFS18T45EAC	SFS14T45EAC	SFS12T45EAC
6.0mm	SFS18T60EAC	SFS14T60EAC	SFS12T60EAC
8.0mm	–	SFS14T80EAC	SFS12T80EAC

Other thread sizes are available - please see page 20 for details.

Need advice
on using our **EAC Ex** approved products?
Contact one of our experienced engineers on
01895 252222
International +44 1895 252222
or send an email to atex@tc.co.uk

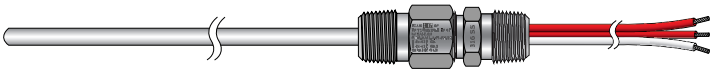
Order Code - Example

Type N°	I.S. Version (Optional, please see page 22 for details)	N° of Elements (See section 1)	Sheath Diameter (See section 2)	N° of Wires (See section 3)	Sheath Length (mm)	Termination (See section 5)	Resistance Value of Element	Grade of Element (See section 6)	Extension Cable (Optional, see section 7)	Compression Fitting (Optional, see section 8)	Approval
57	- IS	- 1	- 3.0	- 3	- 250	- SFSM2030CBEAC	- R100	- B	- 1m RP37	- SFS14T30EAC	- EAC

EAC Ex RTD Pt100s with Termination Entry Gland

RTD Pt100 Resistance Thermometers 3.0mm to 8.0mm dia.

Our EAC Ex approved mineral insulated platinum resistance thermometers utilise, as standard, detector elements with a resistance of 100 ohms @ 0°C and a fundamental interval of 38.5 ohms to IEC 60751. Single and duplex elements are available.



Model shown is fitted with connection tails.
A choice of cables is also available, see section 7

The above sensor must be terminated in a suitable EAC Ex approved Enclosure or Box

- **TR CU 012/2011 Approved to Ex 1 Ex d IIC Gb (Gas) and Ex tb IIIC Db (Dust)**
- **Also suitable for use in intrinsically safe areas to Ex 0 Ex ia IIC Ga/IIIC Da, see page 22 for details**
- **Temperature classification T6-T1, ambient temperature range -52 to +60°C**
- **Available in B, A, 1/3, 1/5 and 1/10 grade accuracies**
- **Sheath diameters from 3.0mm to 8.0mm**
- **316 seamless stainless steel sheath (other grades/materials available)**
- **Terminated in a compression gland pot seal with threaded process entry and 100mm Kapton® sleeved tails**
- **Wide operating temperature range of -100°C to +600°C**
- **UKAS calibration available**

EAC Ex

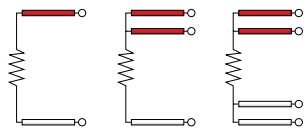
IECEx Ex

Also available with ATEX / IECEx approval

SECTION 1	N° of Elements
1	Simplex
2	Duplex
3	Triplex

SECTION 2	Sheath Diameter (mm)	Sheath Diameter (inches)
Standard Sizes	3.0mm	0.118"
	4.5mm	0.177"
	6.0mm	0.236"
	8.0mm	0.315"

SECTION 3	N° of Wires
2	2 wire
3	3 wire
4	4 wire



SECTION 4	Sheath Length
	As Required

SECTION 5	Termination Entry Gland (please use code number to specify thread size and material for the sensor diameter chosen)		
Dia.	Thread Size	Order Code for **Brass**	Order Code for **Stainless Steel**
3.0mm	16mm ISO	SFBM16-30CBEAC	SFSM16-30CBEAC
4.5mm	16mm ISO	SFBM16-45CBEAC	SFSM16-45CBEAC
6.0mm	16mm ISO	SFBM16-60CBEAC	SFSM16-60CBEAC
8.0mm	16mm ISO	SFBM16-80CBEAC	SFSM16-80CBEAC
3.0mm	20mm ISO	SFBM20-30CBEAC	SFSM20-30CBEAC
4.5mm	20mm ISO	SFBM20-45CBEAC	SFSM20-45CBEAC
6.0mm	20mm ISO	SFBM20-60CBEAC	SFSM20-60CBEAC
8.0mm	20mm ISO	SFBM20-80CBEAC	SFSM20-80CBEAC

SECTION 6	Tolerance of Element (IEC 60751)		
Grade	Accuracy @ 0°C	Accuracy @100°C	Order Code
B	±0.30°C	±0.80°C	R100 - B
A	±0.15°C	±0.35°C	R100 - A
1/3	±0.08°C	±0.19°C	R100 - 1/3
1/5	±0.05°C	±0.15°C	R100 - 1/5
1/10	±0.03°C	±0.12°C	R100 - 1/10

SECTION 7	Optional Extension Cables (please specify length in metres)		
RP	PVC Insulation (105°C) (Seal rating: **90°C**)		**RP37** (3-wire) **RP47** (4-wire) **RP67** (Duplex 3-wire)
RT	PFA Insulation (250°C) (Seal rating: **230°C**)		**RT37** (3-wire) **RT47** (4-wire) **RT67** (Duplex 3-wire)

** All cables have 7/0.2mm conductors. If no cable is required, leave this section of the order code blank and the sensor will be supplied with 100mm Kapton 'tails'.*

SECTION 8	Process Connection Thread		
Code	Thread Size	**Code**	Thread Type
12	1/2"	**T**	BSPT
M16	M16 x 1.5mm	**P**	BSPP
M20	M20 x 1.5mm	**N**	NPT
		M	Metric

Need advice
on using our **EAC Ex** approved products?
Contact one of our experienced engineers on
01895 252222
International +44 1895 252222
or send an email to atex@tc.co.uk

Order Code - Example

Type N°	I.S. Version (Optional, please see page 22 for details)	N° of Elements (See section 1)	Sheath Diameter (See section 2)	N° of Wires (See section 3)	Sheath Length (mm)	Termination (See section 5)	Resistance Value of Element	Grade of Element (See section 6)	Extension Cable (Optional, see section 7)	Process Connection (See section 8)	Approval
57	- IS	- 1	- 3.0	- 3	- 250	- SFSM2030CBEAC	- R100	- B	- 1m RP37	- 12T	- EAC

EAC Ex Approved Compression Fittings

Our extensive range of EAC Ex approved compression fittings is designed and tested for use in hazardous areas with type Ex d, Ex e and Ex tD protection concepts allowing them to be used for both gas and dust applications in zone 1 and 2 areas.

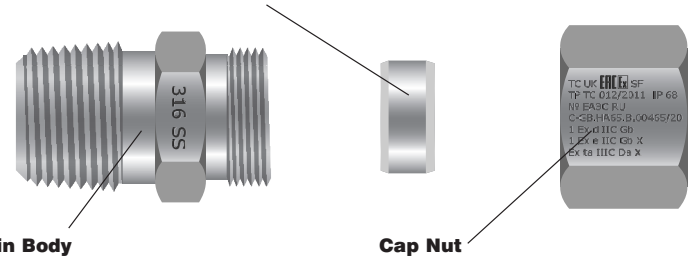
They are available from stock with a variety of thread types and sizes to suit various diameter sensors. As an alternative to 316 stainless steel we can also offer all varieties in Hastelloy X or C276 for more arduous applications.

Compression fittings are essential when probes, sensors and other types of static elements need to be sealed as they pass into the area or enclosure.

Full approval rating is Ex 1, Ex d IIC, Ex e IIC Gb & Ex ta IIIC Da.

Single Ferrule Fittings - Features at a Glance

Ferrule
Seals against the media and grips the sensor



Main Body
Available in a wide range of imperial and metric thread sizes

Cap Nut
Compresses the fitting onto the tube

The single ferrule system gives a reliable seal against the media and ensures a good mechanical grip on the sensor itself.

SECTION 1	Material
S	Stainless Steel
B	Brass
H	Hastelloy

SECTION 2	Thread Size		
Code	Size	Code	Size
18	1/8”	10	1”
14	1/4”	M10	M10 x 1.0mm
38	3/8”	M16	M16 x 1.5mm
12	1/2”	M20	M20 x 1.5mm
34	3/4”	M24	M24 x 1.5mm

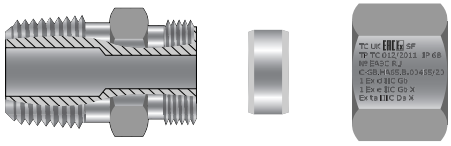
SECTION 3	Thread Type
Code	Type
T	BSPT
P	BSPP
N	NPT
M	ISO

Stainless Steel Locknuts

Available in a range of sizes to suit our range of compression fittings and cable glands.

Code	Type
LN10S	M10 x 1.0mm
LN16S	M16 x 1.5mm
LN20S	M20 x 1.5mm
LN24S	M24 x 1.5mm
LN1/2S	1/2” BSPP

SECTION 4	Insert Diameter (diameter of sensor to suit)				
Code	Size	Code	Size	Code	Size
05	0.5mm	48	4.75mm (3/16”)	120	12.0mm
10	1.0mm	55	5.5mm	127	12.7mm (1/2”)
15	1.5mm	60	6.0mm	159	15.9mm (5/8”)
16	1.59mm (1/16”)	64	6.35mm (1/4”)	190	19.05mm (3/4”)
20	2.0mm	80	8.0mm	213	21.3mm (13/16”)
30	3.0mm	95	9.53mm (3/8”)	254	25.4mm (1”)
32	3.175mm (1/8”)	100	10.0mm		
45	4.5mm	108	10.8mm		

SECTION 5	Optional Counter Bore
Code	Diagram
CB	

All fittings are available with counter bored bodies for use as termination entry glands when sealing probes (with pot seals) or feedthroughs into terminal heads / conduit boxes, etc.

Order Code - Example

Type Nº	Material (See section 1)	Thread Size and Type (See sections 2 and 3)	Insert Diameter (See section 4)	Counter Bore* (if required)	Approval
SF	S	12 T	60	CB	EAC

Also available with ATEX / IECEx approval

EAC Ex Cable Glands

Our range of cable glands is tailored to suit the terminal heads and extension cables available in this catalogue and will maintain the Zone 1/21 Ex d, Ex e and Ex tD approval. The glands are available in either brass or stainless steel and give a reliable IP66 and IP68 seal to 25 metres. An IP O-ring is supplied as standard on metric thread versions.

- **Ex d / Ex e / Ex tD approved to zone 1/21**
- **IP66 and IP68 seal to 25 metres**
- **Supplied with a Neoprene seal which has an operating temperature -20 to +85ºC**
- **Optional accessories include a locknut, earth tag, IP washers, shroud etc. - please contact us for details**
- **Generally ex-stock for quick delivery**

Also available with ATEX / IECEx approval

Cable Gland Selection Table
(diameter of sensor to suit)

Type	Gland Size Code	Cable dia.	Thread Code	Thread Type	Material	Approval
CGA	16	4.0~8.4mm	M20	M20 x 1.5mm	B Brass	EAC
	20S	7.2~11.7mm	12N	1/2” NPT	S St./Steel	
	20	9.4~14.0mm	34N	3/4” NPT		

Order Code - Example

Type Nº	Gland Size	Thread Code	Material	Approval
CGA	16	M20	B	EAC

The above glands are a small part of our cable gland range, selected for use with the sensors and enclosures shown in this catalogue. For other cable types, gland sizes, materials etc., please contact TC Ltd for a quotation.

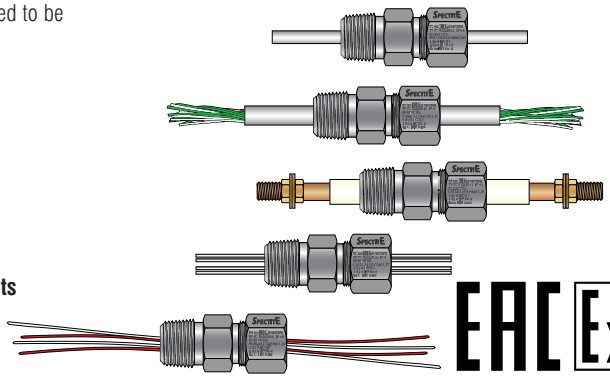
EAC Ex Approved Sealed Feedthroughs

EAC Ex Pressure and Vacuum Sealed Feedthroughs

EAC Ex 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.

- **Approved to Ex 1, Ex d IIC Gb/Ex e IIC Gb, Ex ta IIIC Da**
- **Inhibit the leakage of gas or other media**
- **Restrain the elements from moving in the assembly**
- **Wide choice of feedthroughs to suit most applications**
- **Wide temperature range**
- **Versions available to seal on both single and multiple elements**
- **Generally ex-stock for quick delivery**
- **Technical support and advice available**

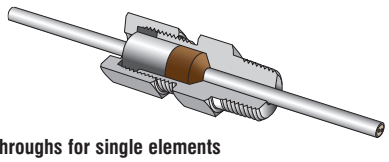
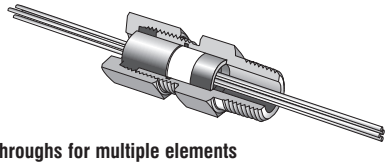
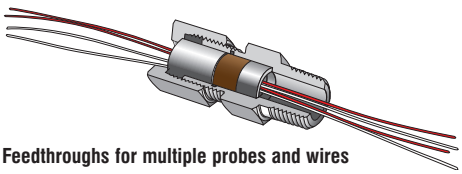
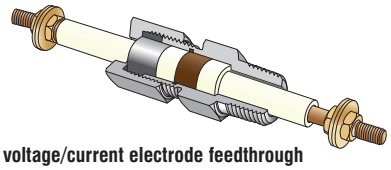
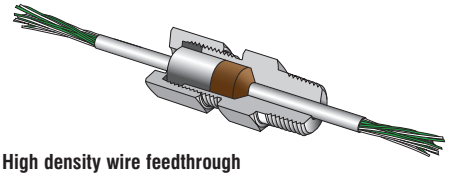
SPECTITE® from TC Ltd



EAC Ex

IECEx Ex

Also available with ATEX / IECEx approval

SECTION 1	Spectite® Sealed Feedthroughs		
Series	Illustration	Features	Notes
PF	 **Feedthroughs for single elements**	• Seals on probes, sensors, small-bore tubes and other similar elements • Immersion length of the element can be easily adjusted • Vacuum to 700 bar	These feedthroughs are designed for sealing single elements, usually sensors, probes or tubes, where they penetrate a pressure or environmental boundary.
MF	 **Feedthroughs for multiple elements**	• Saves time and costs as multiple sensors pass through one feedthrough • Immersion length of the element can be easily adjusted • Vacuum to 700 bar	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.
WF	 **Feedthroughs for multiple probes and wires**	• Seal on Kapton® insulated copper or thermocouple wires - Series WFS • Seal on bare wires carrying instrumentation voltages / currents - Series WFR • Seal on small diameter sheathed sensors up to 3.2mm dia. - Series WFP	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.
EF	 **High voltage/current electrode feedthrough**	• Copper or stainless steel electrodes • Three sizes of feedthrough assembly • Rated for use at 2KV up to 200A • Vacuum to 700 bar	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.
HF	 **High density wire feedthrough**	• Saves time and costs as multiple sensor wires pass through one feedthrough • Sealed tubes with continuous, multiple, insulated conductors - without epoxies or glues • Copper or thermocouple material wires	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.

Ask us about our dedicated

EAC Ex Spectite® Sealed Feedthrough Catalogue

featuring full feedthrough technical specifications, selection guide and ordering information. Contact one of our engineers on **01895 252222** to request your copy.

Notes for Intrinsically Safe Applications

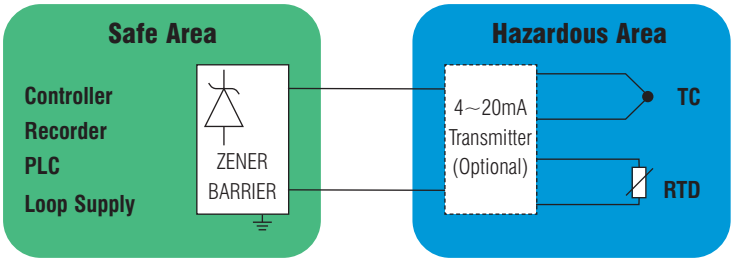
Specifying Sensors for Ex ia/Ex ib Circuits

All thermocouple and RTD sensors shown in this catalogue are suitable for use in intrinsically safe (IS) applications when used with an appropriate barrier. The full classification is Ex 0 Ex ia IIC Ga/IIIC Da for pot seal and Stainless Steel head terminations. Where Aluminum terminal heads are used, the classification is Ex 1 Ex ib IIC Gb/IIIC Db. The mineral insulated construction gives suitable insulation resistance (minimum 1000 M Ω) to guarantee conformance. Extension leads can be supplied with blue outer sheaths upon request.

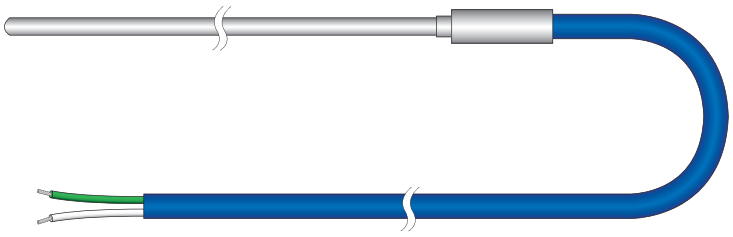
The barrier isolates the signal from the hazardous area and no further certification of the sensor is necessary.

When a 4~20mA transmitter is selected this is also Ex ia approved. When specifying sensors for IS areas please add IS after the type reference i.e. 52-IS and we will provide the following documentation with the order:

- **TC Ltd Ex ia/Ex ib certificate of conformity & letter of conformity**
- **Ex ia/Ex ib tags**
- **EAC Ex certificate for transmitter (if required)**



Example of an IS circuit.

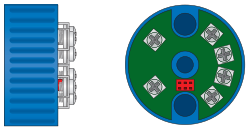


Example of an IS sensor.

Other Products **available from TC to help complete your IS installation**

(Please contact our sales engineers for further information and pricing)

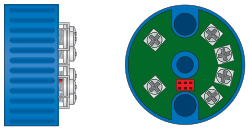
4 to 20mA Transmitters



TXISO/EAC

EAC Ex Approved Head Mounted Transmitter

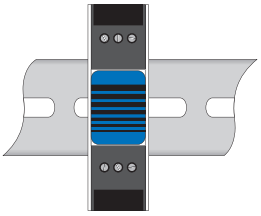
- Approved to: Ex II 1 G Ex ia IIC Ga
- Accepts input from all thermocouple and RTD sensors
- Fully isolated and temperature linearised
- Can be user configured with optional software kit



TXISO/HART/EAC

HART® Protocol EAC Ex Approved Head Mounted Transmitter

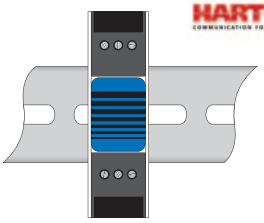
- Approved to: Ex II 1 G Ex ia IIC Ga
- Accepts input from all thermocouple and RTD sensors
- Fully isolated and temperature linearised
- Can be configured by both HART enabled devices and software kit



TDISO/EAC

EAC Ex Approved DIN Rail Mounted Transmitter

- Approved to: Ex II 1 G Ex ia IIC Ga
- Accepts input from all thermocouple and RTD sensors
- Fully isolated and temperature linearised
- Can be user configured with optional software kit

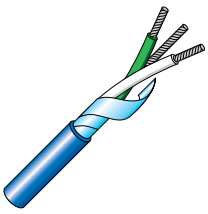


TDISO/HART/EAC

HART® Protocol EAC Ex Approved DIN Rail Mounted Transmitter

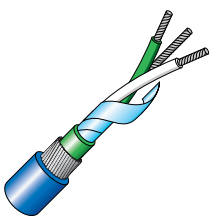
- Approved to: Ex II 1 G Ex ia IIC Ga
- Accepts input from all thermocouple and RTD sensors
- Fully isolated and temperature linearised
- Can be configured by both HART enabled devices and software kit

Thermocouple Cables



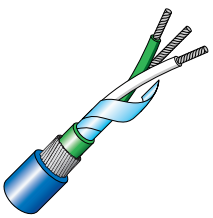
GS29

XLPE insulated, Twisted with Screen (LSF)
One pair of 16/0.2mm (0.5mm²) stranded conductors.
Cores XLPE insulated.
Pair twisted, screened with Mylar® aluminium tape and drain wire.
LSF sheathed overall (blue).



GS94

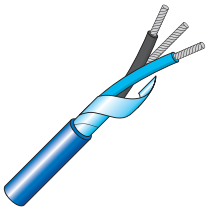
XLPE insulated, Twisted with Screen and Armour (LSF)
One pair of 16/0.2mm (0.5mm²) stranded conductors.
Cores XLPE insulated. Pair twisted, screened with Mylar® aluminium tape and drain wire. LSF bedded.
Steel wire armoured and LSF sheathed (blue).



GS95

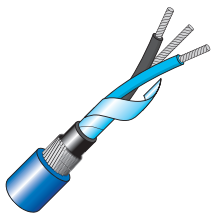
XLPE insulated, Twisted with Screen and Armour (LSF)
One pair of 24/0.2mm (0.75mm²) stranded conductors.
Cores XLPE insulated. Pair twisted, screened with Mylar® aluminium tape and drain wire. LSF bedded.
Steel wire armoured and LSF sheathed (blue).

Instrument Cables



M6101/BLUE

BS5308 Part 1, Type 1 Instrument Cable
16/0.2mm (0.5mm²) copper conductors Polyethylene insulated.
2 cores twisted and screened with Mylar® aluminium tape and drainwire. FR PVC sheathed (blue).



M6101/SWA/BLUE

BS5308 Part 1, Type 2 Instrument Cable
16/0.2mm (0.5mm²) copper conductors Polyethylene insulated.
2 cores twisted and screened with Mylar® aluminium tape and drainwire. PE bedded.
Steel wire armoured and FR PVC sheathed (blue).

General Specifications and Further Information

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/UNEF 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.

UKAS Calibration

We offer a full UKAS calibration service from our in-house accredited laboratory. With the drive towards higher product quality standards and energy efficiency, end users are demanding more certainty and traceability from the products they purchase.

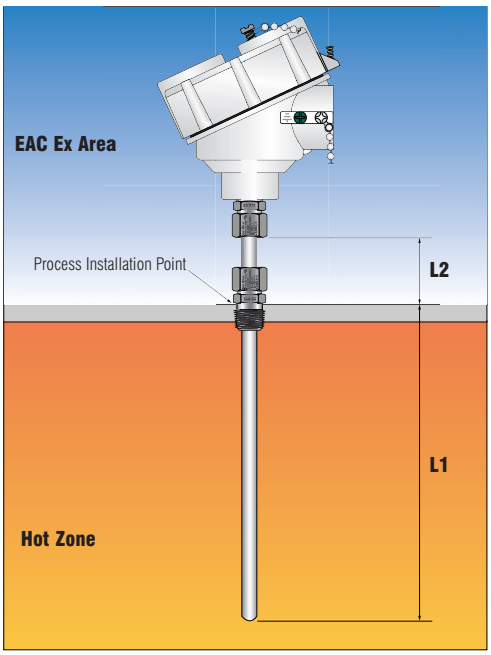
UKAS CALIBRATION 0564

A speedy, economical and reliable calibration service is provided in all respects. Our application engineers who have all been trained in our laboratory are available if required to give assistance in recommending a calibration strategy suitable for your application. Whilst there are some limitations as to which sensors can be calibrated, we can, if necessary custom build sensors in order to meet both the requirements of the application as well as the relevant calibration equipment.

Installation Guidelines:

Stand-Off Length: Our sensors are passive units and are not self-heating. However heat transfer along the sheath shall be considered when positioning the sensor in the process to maintain the temperature rating of the end seal termination. See value L2 shown on the typical installation diagram. The below table gives guidance for stand-off length based on the process temperature[1].

T Class: All the sensors and feedthroughs shown on this catalogue can be used with service temperatures up to 1250ºC dependant on the sheath material used. Typically the hazardous area protection concept is applied to the portion of the assembly outside the process boundary as shown below. When selecting the appropriate sensor design for your application, overall temperature class shall be determined by either:
(a) determined by process temperature as stated in the table below.
Or (b) The temperature class may be determined by temperature measurement on the actual installation. This must be performed when no flammable atmosphere is present. The overall temperature class of the assembly shall be established at the point of exit through the boundary wall into the zoned area.To ensure safe use both calculations (stand-off length to maintain end seal rating and overall t class of assembly) shall be considered.



Process Temperature (Tp) [ºC]	Temperature class of the assembly	Max. surface temperature of the assembly at process installation point [ºC]	To maintain temperature rating of end seal termination (Guideline values, see note[1])	
			Recommended Stand-off L2 (mm) for pot seal and termination entry gland terminations[2]	Recommended Stand-off L2 (mm) for terminal head terminations[3]
<=80	T6	85ºC	60	60
95	T5	100ºC	75	75
130	T4	135ºC	90	90
190	T3	200ºC	105	165
290	T2	300ºC	120	200
440	T1	450ºC	130	210
>440	Tp + 10	Tp + 10	130	210

[1] The values given are considered "worst-case" for assemblies in a vertical installation. If method (b) is used to calculate overall t class then shorter stand-off lengths may also be considered by the same method.
[2] Values for a standard resin filled pot seal with 90ºC rating. High temperature pot seals can achieve shorter stand-off lengths which shall be calculated by temperature measurement on the actual installation as per method (b) above.
[3] Terminal head terminations have a maximum rating of 60ºC .

If you are in any doubt about whether your application meets the requirements of any of the mentioned standards in this catalogue, TC Ltd recommend that independent advice be taken from the appropriate approving body. 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 products described herein for a particular application is entirely at the discretion of the purchaser as being the best judge for that particular application.

PO Box 130
Uxbridge
UB8 2YS
United Kingdom
Tel: +44 (0)1895 252222
Fax: +44 (0)1895 273540
Email: info@tc.co.uk
Web: www.tc.co.uk

ATEX/IECEx literature available from TC Ltd.


ATEX / IEC Ex zones 0, 1 and 2 sensors


Ex nA Zone 2 Bearing Sensors


Compression Fittings

Sealed Feedthroughs