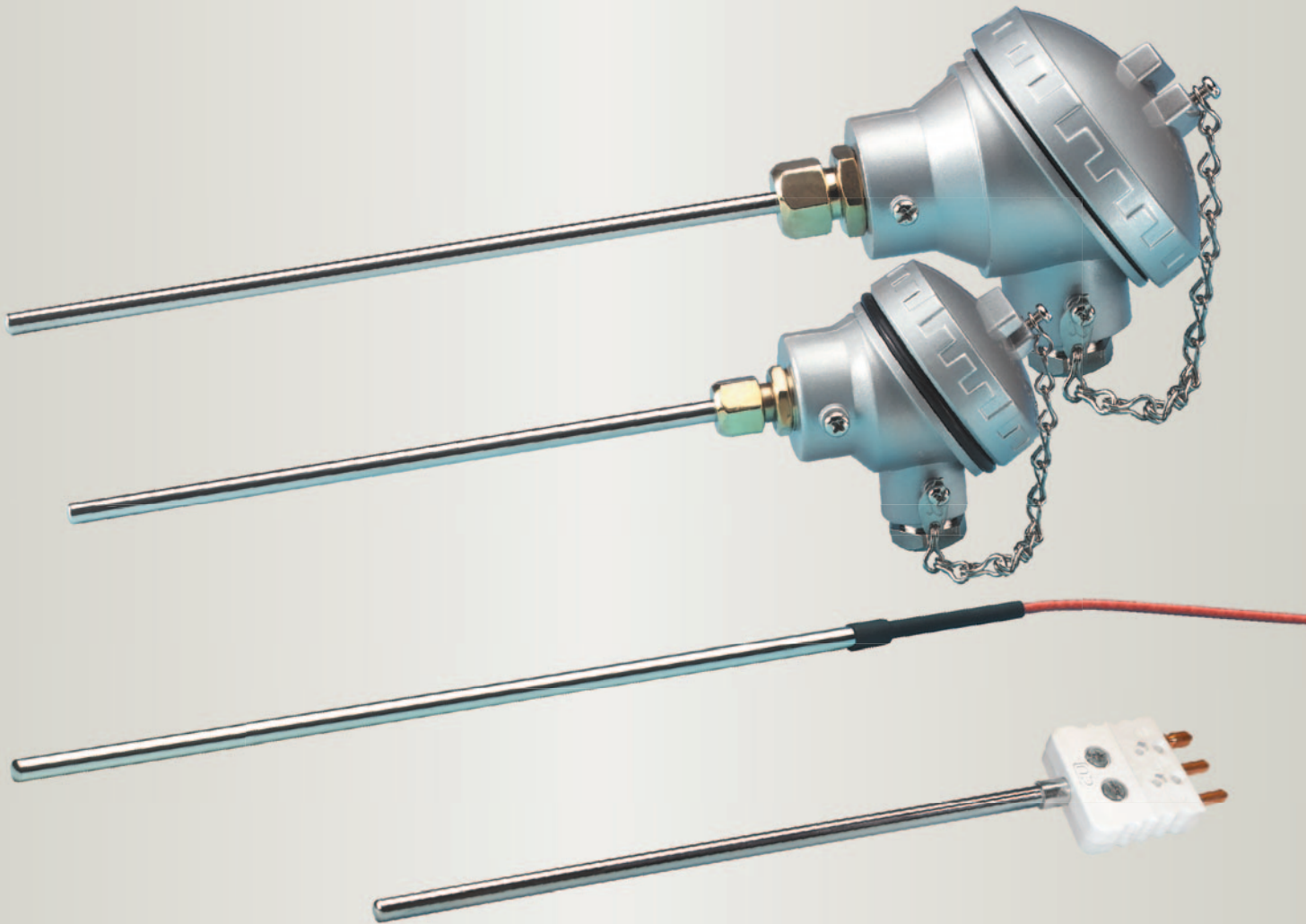




Rigid Stem Resistance Thermometers - Type 16



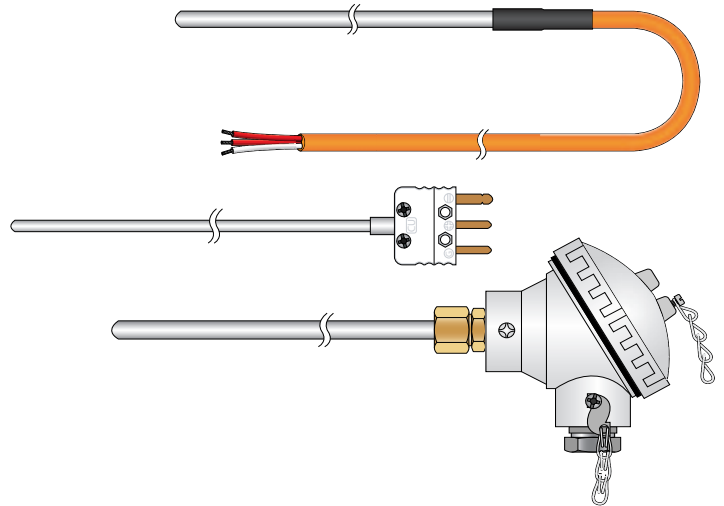
A range of rigid stem 316L stainless steel sheathed resistance thermometers, suited to a wide variety of industrial applications up to 480°F.

Custom built to your specification and terminated in a large choice of end seal terminations and temperature ratings.

Type 16 Rigid Stem Resistance Thermometers

- This style of sensor is ideal for rigid stem applications or where the sensor is shorter than 2". They are suitable for many applications and are rated to 480°F
- Custom built to your specification and terminated in a wide choice of end seal terminations and temperature ratings
- High accuracy, repeatability and reproducibility as simplex, duplex or triplex element assemblies
- Operating temperature range of -100°F to +480°F
- Available in 2, 3 and 4 wire configurations, in grade B, A, 1/3, 1/5 or 1/10 tolerances
- 316L Stainless Steel sheathed and manufactured to IEC 60751
- *NIST traceable calibration is available for our range of Mineral Insulated thermocouple assemblies (our equipment and standards are traceable to NIST via the Mutual Recognition Arrangement)

*traceable to the SI (International System of Units) via a signatory of the CIPM Mutual Recognition Arrangement



Typical Construction

Type 16 platinum resistance thermometer detector elements are normally 100 ohms at 0°C with a fundamental interval of 38.5 ohms. Single, duplex and triplex elements to Class B, A, 1/3, 1/5 & 1/10 tolerance are available.

Voids within the sheaths are normally filled and compacted with inert material and sheaths are then hermetically sealed. This aids heat transfer and protects the assembly from moisture, corrosion and vibration.

The tip and stem operating temperature of Type 16 platinum resistance thermometer assemblies is - 100°F to 480°F. If higher or lower operating temperatures are required, we recommend our Type 17 or 18 mineral insulated resistance thermometers.

Attachment leads within the 316L stainless steel sheath are offered in 2, 3 and 4 wire configurations for single, duplex and triplex element units. As standard, leads are PFA insulated.

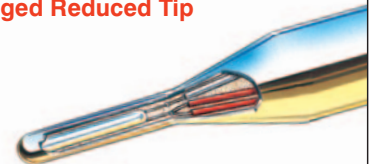
Seamless metal sheath in 316L stainless steel with a welded end cap. Sheath lengths to suit customer requirements. Available in a range of sheath diameters and an optional reduced tip for faster response. Sheaths can be supplied with bends at right angles or otherwise to meet customer requirements. Additionally these sheaths can be supplied with a variety of plastic claddings to suit particularly corrosive environments. Sensors should not be bent after manufacture.

A wide range of adjustable brass or stainless steel compression fittings screwed NPT or BSP are available to suit the various sheath sizes for mounting. A selection of popular fittings is shown in section 9.

If required, extension leads with PVC, PFA or fibreglass insulation are available, along with armored or metal braided wires. Other insulation materials are also available. Please see section 8 or contact us for further information.

Termination heads (including connection blocks), quick release plugs and sockets and many other terminations/ end seals are offered. In this illustration a Type 16 is shown with straight through PFA insulated flying leads. The body of this seal is stainless steel and the seal is made with high temperature epoxy resin. If alternative flying leads are required then they will be bonded to the elements attachment leads prior to the epoxy seal being completed.

Swaged Reduced Tip



Swaged end reduced tip temperature sensors provide a unique fast response, high strength, low displacement, homogenous solution to many problematical temperature measurement applications. The technique combines the two usually mutually exclusive advantages of having a very rugged large diameter metal sheath over most of its length with a low thermal mass, fast response, reduced diameter swaged tip, and with the transition from one to the other maintaining homogeneity and integrity.

Quality Control All materials and assemblies are subject to rigorous quality checks during manufacture through to final test and inspection procedures. Our labs are also equipped to perform additional checks such as Radiography, UKAS Calibration and more.

Rigid Stem Resistance Thermometers **Type 16**

| SECTION 1 | R_0 value |
|-------------------------|--------------------------------------|
| R₁₀₀ | 100Ω@0°C (0.003851°C ⁻¹) |
| R₁₀₀₀ | 1000Ω@0°C (0.03851°C ⁻¹) |

| SECTION 2 | Sheath Diameter (inches) | Sheath Diameter (mm) |
|----------------|--------------------------|----------------------|
| Standard Sizes | 0.079" | 2.0mm |
| | 0.094" | 2.38mm |
| | 0.118" | 3.0mm |
| | 0.125" | 3.2mm |
| | 0.177" | 4.5mm |
| | 0.188" | 4.8mm |
| | 0.236" | 6.0mm |
| | 0.250" | 6.4mm |
| | 0.315" | 8.0mm |
| | 0.394" | 10.0mm |
| | 0.500" | 12.7mm |

| SECTION 3 | Tolerance of Element (IEC 60751 for Pt100) | |
|-------------|--|-------------------|
| | Accuracy at 0°C | Accuracy at 100°C |
| B | ±0.30°C | ±0.80°C |
| A | ±0.15°C | ±0.35°C |
| 1/3 | ±0.10°C | ±0.27°C |
| 1/5 | ±0.06°C | ±0.16°C |
| 1/10 | ±0.03°C | ±0.08°C |

| SECTION 4 | Wiring Configuration | | | |
|-----------|----------------------|--------|--------|-------------------|
| Code | 2 | 3 | 4 | 4BL |
| Schematic | | | | |
| | 2 wire | 3 wire | 4 wire | 4 wire Blind Loop |

| SECTION 5 | Configuration (No. of wires) | Assembly Selector Table | | | | | | | |
|-----------|------------------------------|--|--------|--------|--------|--------|--------|--------|--------|
| | | Sheath Diameter available for each Configuration | | | | | | | |
| Elements | | 0.079" | 0.094" | 0.125" | 0.188" | 0.250" | 0.315" | 0.375" | 0.500" |
| 1 | 2 wire | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 3 wire | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 4 wire | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2 | 2 wire | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 3 wire | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3 | 2 wire | | | | | ✓ | ✓ | ✓ | ✓ |
| | 3 wire | | | | | | ✓ | ✓ | ✓ |
| | 4 wire | | | | | | | ✓ | ✓ |

| Specifications and General Information | |
|--|--|
| Detector Elements | Rigid stem platinum resistance thermometers embody, as standard, detector elements with a resistance of 100 ohms at 0°C with a fundamental interval 38.5 ohms to IEC 60751 class B (BS EN 60751 Class B). Alternative element resistance and tolerances are available (see sections 1 and 3). Single, duplex and triplex element assemblies are available. |
| Sheath Materials | Standard sheaths with welded closed ends are of 316L stainless steel seamless tube. 316L stainless steel is an 18/8 chromium nickel stainless steel modified by the addition of molybdenum which serves to increase its general corrosion resistance and mechanical strength. Assemblies with sheaths in other materials can be supplied upon request. Standard sheath diameters available between 0.079" and 0.500". |
| Operating Temperatures | Standard Type 16 assemblies have an operating temperature range for the tip and stem of -100°F to +480°F. End seals are not normally exposed to the tip and stem environment, and as standard are rated to those maximum temperatures listed in section 7. Assemblies with much wider tip, stem and seal operating temperature ranges are available (for details of these please contact us). |
| Immersion Depth | Minimum recommended immersion length is 2.5". |
| Response Times | Response times are governed by and vary with the environmental conditions of particular applications. Please contact us for further information. |
| Measurement Current | Recommended measurement current is typically 1mA. |
| Insulation Resistance | Between the leads and sheath at 100V DC >100 MΩ at ambient temperature. |
| Standards | The manufacture of Type 16 platinum resistance thermometer assemblies is generally to IEC 60751 (BS EN 60751). |
| Bending Radius | Sensors should not be bent after supply, however, our factory may be able to put right angle bends or other bends in the sheath during manufacture. Contact us for more details. |

Type 16 Rigid Stem Resistance Thermometers

| SECTION 7 | Types of End Seal Configuration | | | | |
|-----------|--|---|------------------------|---------|--|
| 7 | Diagram | Specification | | Diagram | Specification |
| CE1 | | Internal Seal Epoxy Resin Seal for all sheath diameters CE1 Maximum end seal temperature 275°F | MAA | | Micro Die Cast Alloy Head for diameters 0.118" to 0.236" Weatherproof die cast alloy, epoxy coated, screw down terminal head with tube entry and cable entry at a right angle to each other, with a ceramic terminal block. Suitable for simplex and duplex assemblies. Supplied with a metal pinch gland on the cable entry for wires from 0.157" to 0.374" diameter. cable entry thread is M16x1.5mm, process entry thread is M10x1.0mm. |
| CE1WT | | Water Tight End Seal for sheath diameters of 0.236". Must be supplied with Silicone Rubber extension lead. CE1WT Maximum end seal temperature 250°F | | | |
| CE1A | | Internal Seal with Heatshrink Sleeve for all sheath diameters CE1A Maximum end seal temperature 275°F | | | |
| CE2L | | Crimp on Stainless Steel Pot Seal for sheath diameters up to 0.125" CE2L Pot Seal rated to 275°F CE2LA Pot Seal rated to 235°C <i>see section 8 if extension leads are required</i> | CE10/ 12NPT | | Miniature Die Cast Alloy Head for diameters 0.118" to 0.315" Weatherproof die cast alloy, epoxy coated, screw top terminal head with the tube entry and cable entry at a right angle to each other, with a ceramic terminal block. Suitable for simplex and duplex assemblies. Supplied with a metal pinch gland on the cable entry for wires from 0.118" to 0.315" diameter. cable entry thread is M16x1.5mm, process entry thread is 1/2" NPT. |
| CE2 CTRL | <small>* It is unlikely that any benefit would be derived from specifying this type of pot seal with the standard 100mm tails.</small> | Stainless Steel Pot Seal with Anti Chafe Spring for sheath diameters up to 0.125" CE2CTRL Pot Seal rated to 275°F CE2CTRLA Pot Seal rated to 455°F <i>see section 8 if extension leads are required</i> | | | |
| CE4CL | | Crimp on Stainless Steel Pot Seal for sheath diameters between 0.118" & 0.315" CE4CL Pot Seal rated to 275°F CE4CLA Pot Seal rated to 455°F <i>see section 8 if extension leads are required</i> | | | |
| CE4 CTRL | <small>* It is unlikely that any benefit would be derived from specifying this type of pot seal with the standard 100mm tails.</small> | Stainless Steel Pot Seal with Anti Chafe Spring for sheath diameters between 0.118" & 0.315" CE4CTRL Pot Seal rated to 275°F CE4CTRLA Pot Seal rated to 455°F <i>see section 8 if extension leads are required</i> | CE11/ 12NPT | | Standard Die Cast Alloy Head for diameters 0.177" to 0.50" Weatherproof die cast alloy, epoxy coated, screw top terminal head with the tube entry and cable entry at a right angle to each other, with a ceramic terminal block. Suitable for simplex, duplex and triplex assemblies. Supplied with a metal pinch gland on cable entry for wires from 0.236" to 0.551" diameter. cable entry thread is M20x1.5mm, process entry thread is 1/2" NPT. |
| CE3L | <small>Lock nuts are available in stainless steel to suit the CE3L series and should be ordered separately as LN08S.</small> | 8mm ISO x 1mm Threaded Stainless Steel Pot Seal for sheath diameters up to 0.118" CE3L Pot Seal rated to 275°F CE3LA Pot Seal rated to 455°F <i>see section 8 if extension leads are required</i> | | | |
| CE5 | | 16mm ISO x 1.5mm Brass Compression Gland Pot Seal for sheath diameters up to 0.315" CE5 Pot Seal rated to 275°F CE5A Pot Seal rated to 455°F <i>see section 8 if extension leads are required</i> | | | |
| CE5S | | 16mm ISO x 1.5mm St./St. Compression Gland Pot Seal for sheath diameters up to 0.315" CE5S Pot Seal rated to 275°F CE5SA Pot Seal rated to 455°F <i>see section 8 if extension leads are required</i> | CE12 | | Heavy Duty Cast Iron Head for diameters 0.177" to 0.50" Weatherproof cast iron, screw top terminal head with the tube entry and cable entry at a right angle to each other, with ceramic terminal block. Suitable for simplex, duplex and triplex assemblies. Supplied with a metal pinch gland on cable entry for wires from 0.236" to 0.551" diameter. cable entry thread is M20x1.5mm, process entry thread is 1/2" BSP. |
| CE6 | <small>CE6 illustrated</small> | Standard 3-pin (round) Plug for sheath diameters between 0.039" & 0.315" CE6 Plug rated to 425°F CE6H Plug rated to 570°F | CE16 | | |
| CE8 | | Standard 4-pin (round) Plug for sheath diameters between 0.039" & 0.315" CE8 Plug rated to 425°F | | | |
| CE7 | <small>CE7 illustrated</small> | Miniature 3-pin (round) Plug for sheath diameters between 0.039" & 0.125" CE7 Socket rated to 425°F CE7H Socket rated to 570°F | CE17 | | Standard Plastic Head for diameters 0.177" to 0.50" Weatherproof plastic, screw top terminal head with the tube entry and cable entry at a right angle to each other, with a plastic terminal block. Suitable for simplex, duplex and triplex assemblies. Supplied complete with a plastic pinch gland on the cable entry for wires from 0.236" to 0.551" diameter. cable entry thread is 1/2" BSP, process entry thread is 1/2" BSP. |
| CE9 | | Miniature 4-pin (flat) Plug for sheath diameters between 0.039" & 0.125" CE9 Socket rated to 425°F | | | |

Rigid Stem Resistance Thermometers Type 16

| SECTION 7 | | Types of End Seal Configuration (continued) | | | | | |
|---|---|--|---|---|--|---|--|
| Diagram | Specification | Diagram | Specification | Diagram | Specification | | |
| <p>Diagram of CE18 Alloy Straight Through Head showing dimensions: Ø2.68", 2.20", 0.91", 3.88".</p> | <p>Alloy Straight Through Head for diameters 0.177" to 0.50"</p> <p>Die cast alloy straight through terminal head with a bakelite terminal block. Suitable for simplex or duplex assemblies. Supplied with a metal pinch gland on the cable entry for wires from 0.236" to 0.551" diameter. cable entry thread is M20x1.5mm, process entry thread is 1/2" BSP. <i>*If supported at fixing holes, suitable for diameters of 0.039" and above.</i></p> | <p>Diagram of CE20 Spring Loaded Terminal Block showing dimensions: 0.53", 1", 1.65", 1.30".</p> | <p>CE20</p> <p>Spring Loaded Terminal Block for diameters 0.118" to 0.315"</p> <p>Spring loaded insert assemblies. The end seal is incorporated into a terminal block suitable for mounting into a CE11, CE12, CE17 or any other standard terminal head. Suitable for use with 0.118", 0.125", 0.177", 0.188", 0.236, 0.250" and 0.315" sheaths only. The ceramic terminal block has 2 x 1.3" spaced mounting holes. Suitable for simplex, duplex and triplex assemblies.</p> | <p>Diagram of CE19 Stainless Steel Head showing dimensions: Ø3.25", 1.83", 1.93".</p> | <p>CE19</p> <p>Stainless Steel Head for diameters 0.177" to 0.50"</p> <p>Weatherproof stainless steel, screw top terminal head with the tube entry and cable entry at a right angle to each other, with a ceramic terminal block. Suitable for simplex, duplex and triplex assemblies. Supplied with a metal pinch gland on cable entry for wires from 0.236" to 0.551" diameter. cable entry thread is M20x1.5mm, process entry thread is 1/2" BSP.</p> | <p>Diagram of CE20/BP DIN Mounting Plate showing dimensions: 2", 2x Ø0.14", 1.30", 1.65".</p> | <p>CE20/BP</p> <p>DIN Mounting Plate for diameters 0.118" to 0.315"</p> <p>Spring loaded mounting plate assemblies. The end seal is incorporated into a mounting plate suitable for mounting into a CE11, CE12, CE17 or any other standard terminal head. Suitable for use with 0.118", 0.125", 0.177", 0.188", 0.236, 0.250" and 0.315" sheaths only. 4" tails allows for connection to a head mounting transmitter or other suitable terminal block.</p> |

| SECTION 8 | | Extension Wires | | | | | | | | | | | | | | | |
|---|---------|---|--|---------|---|---|---------|--|---|--|---|---|--|--|---|--|--|
| Code | Diagram | Specification | Code | Diagram | Specification | Code | Diagram | Specification | | | | | | | | | |
| <p>RP</p> <p>RP27 - 2 core RP37 - 3 core RP47 - 4 core RP67 - 6 core RP87 - 8 core</p> | | <p>HR PVC Insulated with Screen (220°F) Cores of 24 AWG stranded (7x32 AWG) copper conductors. Cores HR PVC insulated. Cores bunched together. Tinned copper wire braid screen. HR PVC sheathed overall.</p> | <p>TEF</p> <p>TEF7 - 1 core</p> | | <p>PFA 'Single' (480°F) One core of 24 AWG stranded (7x32 AWG) copper single conductor PFA insulated. Red / White.</p> | <p>RT</p> <p>RT27 - 2 core RT37 - 3 core RT47 - 4 core RT67 - 6 core RT87 - 8 core</p> | | <p>PFA Insulated with Screen (480°F) Cores of 24 AWG stranded (7x32 AWG) copper conductors. Cores HR PVC insulated. Cores bunched together. Nickel plated copper wire braid screen. PFA sheathed overall.</p> | <p>RS</p> <p>RS37 - 3 core RS47 - 4 core RS67 - 6 core RS87 - 8 core</p> | | <p>PFA / Silicone Rubber (480°F) Cores of 24 AWG stranded (7x32 AWG) copper conductors. Cores PFA insulated. Cores bunched together. Silicone Rubber sheathed overall.</p> | <p>RT</p> <p>RT38 - 3 core RT48 - 4 core</p> | | <p>PFA Insulated (480°F) Cores of 24 AWG stranded (7x32 AWG, RT38) or 36 AWG stranded (7x34 AWG, RT48) copper conductors. Cores thin PFA insulated and bunched together. Thin PFA sheathed overall.</p> | <p>RF</p> <p>RF37 - 3 core RF47 - 4 core RF67 - 6 core</p> | | <p>Fiberglass Insulated with Steel Braid (900°F) Cores of 724 AWG stranded (7x32 AWG) copper conductors. Cores double glass lapped, glass fibre braided and silicone varnished. Cores bunched together, glass fibre braided overall and impregnated with silicone varnish. Stainless Steel braid overall.</p> |

If no wire is required, leave this section of the order code blank and the sensor will be supplied with PFA tails. Other wires are available on request.

HR = Heat Resistant

| SECTION 9 | | Optional Stainless Steel Compression Fittings | | | | | |
|-----------|----------|---|----------|--------|----------|----------|----------|
| Dia. | 1/8" NPT | 1/4" NPT | 1/2" NPT | Dia. | 1/8" NPT | 1/4" NPT | 1/2" NPT |
| 0.062" | SFS18N16 | SFS14N16 | SFS12N16 | 0.250" | SFS18N64 | SFS14N64 | SFS12N64 |
| 0.125" | SFS18N32 | SFS14N32 | SFS12N32 | 0.313" | - | SFS14N80 | SFS12N80 |
| 0.188" | SFS18N47 | SFS14N47 | SFS12N47 | | | | |

Other sizes and materials are available, please contact us for details.

| SECTION 10 | | Optional 4 to 20mA Head Mounted Transmitter (please specify range in °F) | |
|----------------|------------------|--|--------------------------------------|
| TXL PRT | | Suitable for use with the following terminal heads: 3P11, 3P12, 3P17, 3P18 and 3P19 and other standard heads with 1.3" fixing. | Typical Order Code: TXLPRT (0/300°F) |
| | Fully Linearized | | |

| Order Code - Example | | | | | | | | | | |
|----------------------|---------------------------------|---------------------------------|------------------------------------|---------------------------|--------------------------------------|---|----------------------------------|--------------------------------|--|---------------------------------------|
| Style No. | No. of Elements (see section 5) | Sheath Diameter (see section 2) | No. of Wires (see section 4 and 5) | Sheath Length (in inches) | End Seal Termination (see section 7) | Resistance Value of Element (see section 1) | Grade of Element (see section 3) | Extension Wire (see section 8) | Optional Compression Fitting (see section 9) | Optional Transmitter (see section 10) |
| 16 | - 1 | - 0.250" | - 4 | - 6" | - CE4CL | - R100 | - B | - 2 FT RP47 | - SFS12N64 | - |



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