



## Temperature and Humidity Sensors

Thermoresistances

Thermocouples

Relative Humidity Sensors

Compensation Cable

# Thermoresistances & Thermocouples

## Temperature Sensors



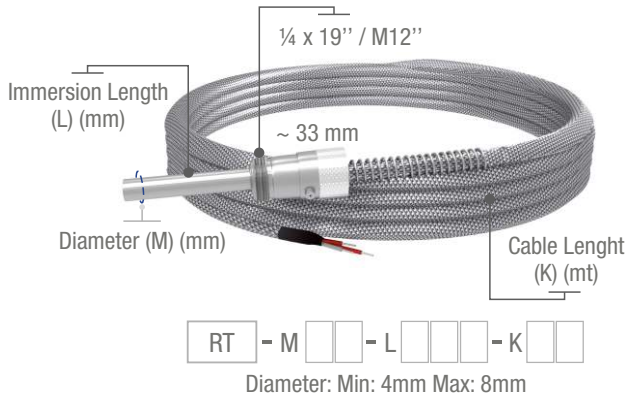
Resistance Thermometers are used widely from  $-200$  to  $+850^{\circ}\text{C}$  in different process. Especially at low temperature, resistance thermometers are preferred since their accuracy is much better than thermocouples. Up to  $400^{\circ}\text{C}$  standard types and between  $400$ - $850^{\circ}\text{C}$  special types are used. The maximum immersion length of the resistance thermometers should be determined by considering the measurement errors that may be caused by heat transfer occurring along the protecting tube and R/T element. The fluid speed where the resistance thermometer is immersed is a factor affecting the measurement sensitivity. In general, R/T should be perpendicular to the flow direction. Copper conductive cables are used between resistance thermometer head and the instruments. Up to 10 meters,  $2 \times 1.5$  mm copper cable, up to 150 meters  $3 \times 1.5$  mm copper cables, after 150 meters  $4 \times 1.5$  mm copper cable are used.

Straight Thermocouple with metal ceramic protecting tubes are widely used in a variety of processes between  $-200^{\circ}\text{C}$  and  $1600^{\circ}\text{C}$ . The maximum operating temperatures given in the catalogue apply to the air where there are no corrosive gases. In general the thermowells chosen for the installation is governed mainly by the corrosion conditions the well will face. The high polish given to all stainless wells provides maximum corrosion resistance. Occasionally, the material consideration is one of the strength rather than corrosion resistance.

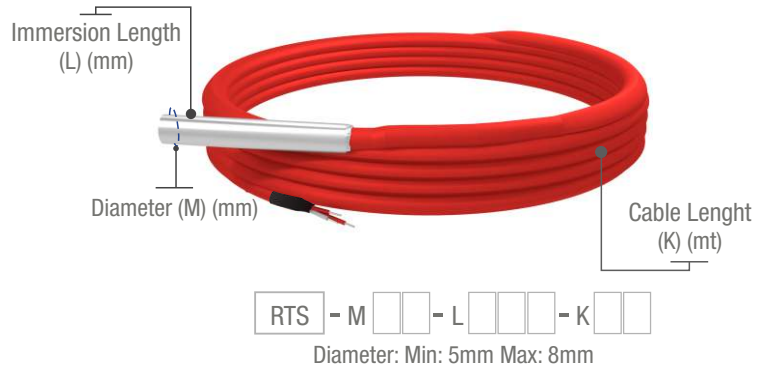
# Temperature Sensors

## Thermoresistances

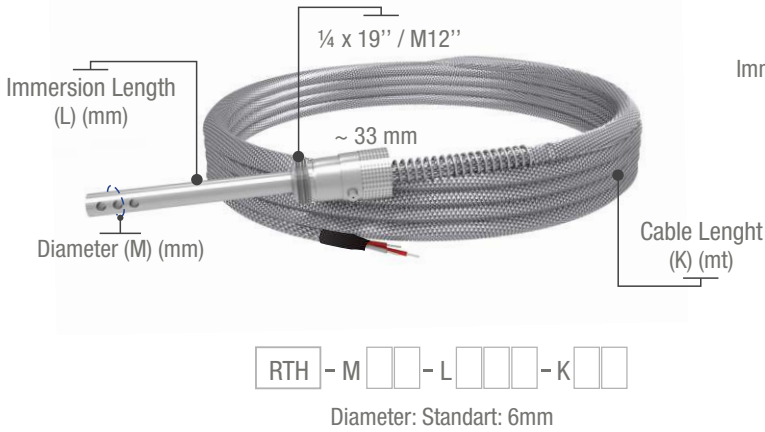
### ► (RT) Bayonet Type



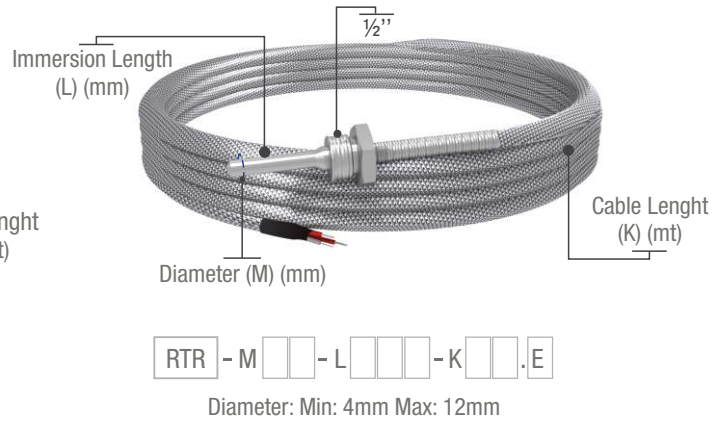
### ► (RTS) Bayonet Bore Type



### ► (RTH) Bayonet Air Type



### ► (RTR) Bayonet Type with Fittingnut

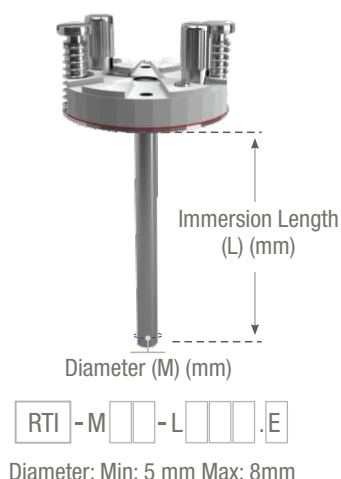


|                            |                                                                                                                                                      |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Max. operating temperature | : 400°C for braided wire, 200°C for silicone                                                                                                         |
| Standard cable types       | : Fiber glass + fiber glass + braided wire, 3x0,22 mm <sup>2</sup> / Silicone + Silicone, 3x0,22 mm <sup>2</sup><br>("Si+Si" is added to order code) |
| Standard cable length (K)  | : K01 = 1m, K02 = 2m, K03 = 3 m, K04 = 4m, K05 = 5 m.                                                                                                |
| Sensor type                | : DIN/EN60751 Class "B" 1xPt-100 için E=1 or 2xPt-100 için E=2 (RTR)                                                                                 |
| Protection tube material   | : Nickel coated brass (RT) or AISI304 (DIN1.4301),<br>"316" is added to order code for AISI316 (RTR)                                                 |
| Connector                  | : 1/4 x 19" (selectable as M12" on ordering)                                                                                                         |
| Fittingnut (RTR)           | : 1/2" fittingnut is used for standard production                                                                                                    |

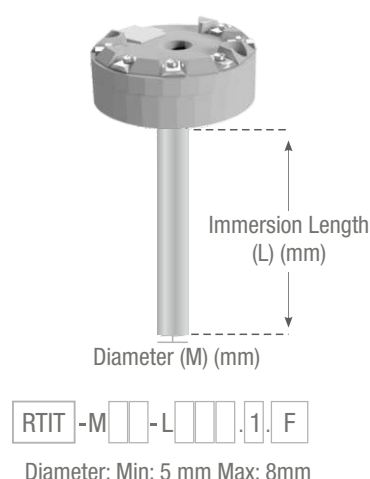
# Temperature Sensors

## Thermoresistances

### ► (RTI) Inset Type

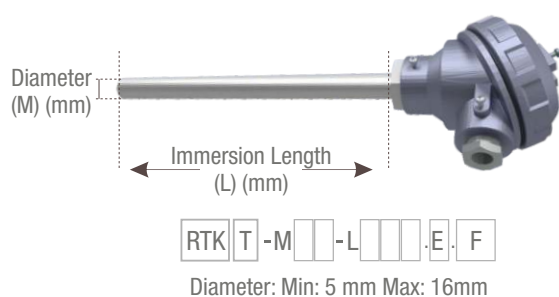


### ► (RTIT) Inset Type with Transmitter

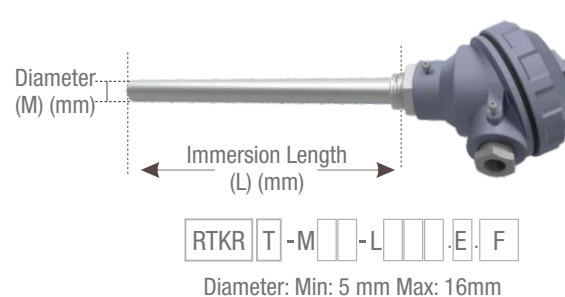


- Max. operating temperature : 500°C
- Protection tube material : AISI304 (DIN1.4301) "316" is added to order code for AISI316
- Sensor type : DIN/EN60751 Class "A" 1xPt-100 **E=1** (RTIT) DIN/EN60751 Class "B" 2xPt-100 **E=2**
- Transmitter (RTIT) : 4...20mA current output, serial connection (Loop Powered) transmitter.  
**F**=Calibration scale must be described on ordering

### ► RTK (Terminal Block Type) ► RTKT (Terminal Block with Fittingnut Type)



### ► RTKR (Terminal Block with Transmitter Type) ► RTKRT (Terminal Block with Fittingnut and Transmitter Type)

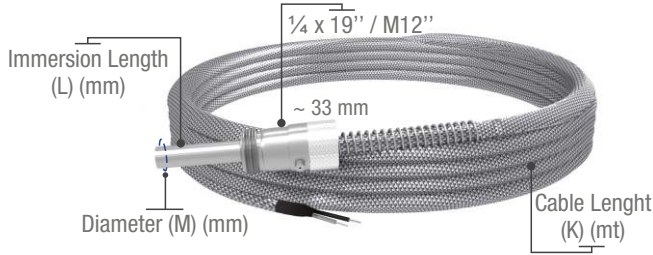


- Max. operating temperature : 500°C
- Protection tube material : AISI304 (DIN1.4301) "316" is added to order code for AISI316
- Sensor type : DIN/EN60751 Class "A" 1xPt-100 for **E=1** (RTKT, RTKRT) / DIN/EN60751 Class "B" 2xPt-100 for **E=2**
- Transmitter (RTIT) : 4...20mA current output, serial connection (Loop Powered) transmitter.  
**F**=Calibration scale must be described on ordering

# Temperature Sensors

## Thermocouples

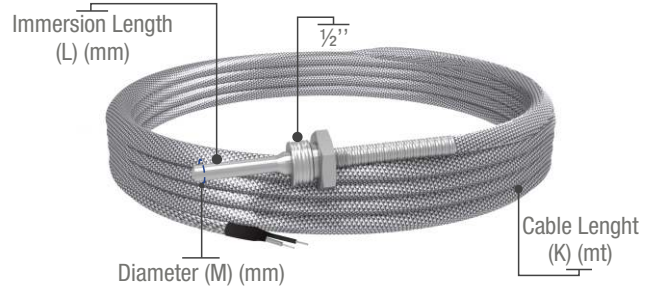
### ► (TC) Bayonet Tipi



TC - M - L - K . E

Diameter : Min: 3mm Max: 8mm

### ► (TCR) Bayonet Rekorlu Tip



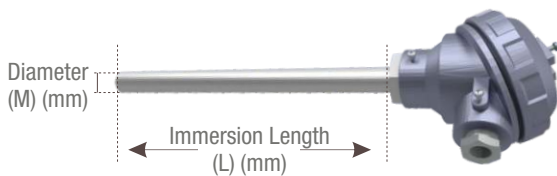
TCR - M - L - K . E

Diameter : Min: 3mm Max: 12mm

- Max. operating temperature : 400°C for braided wire 200°C for silicone
- Standard cable types : Fiber glass + fiber glass + braided wire, 2x0,22 mm<sup>2</sup>  
Silicone + Silicone, 2x0,22 mm<sup>2</sup> ("Si+Si" is added to order code)
- Standard cable length (K) : K01 = 1 m, K02 = 2m, K03 = 3 m, K04 = 4m, K05 = 5 m.
- Sensor type : DIN/IEC-584 "J" FeCu-Ni E=J, DIN/IEC-584 "K" NiCr-Ni E=K
- Protection tube material : Nickel coated brass brass or AISI304 (DIN1.4301)
- Connector (TC) : 1/4 x 19" (selectable as M12" on ordering)
- Fittingnut (TCR) : 1/2" fittingnut is used for standard production

### ► TCK (Terminal Block Type)

#### TCKT (Terminal Block with Fittingnut Type)

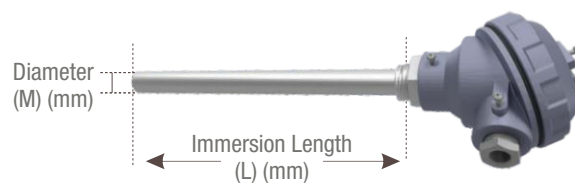


TCK T - M - L . E . F

Diameter : Min: 3mm Max: 22mm

### ► TCKR (Terminal Block with Transmitter Type)

#### TCKRT (Terminal Block with Fittingnut and Transmitter Type)



TCKR T - M - L . E . F

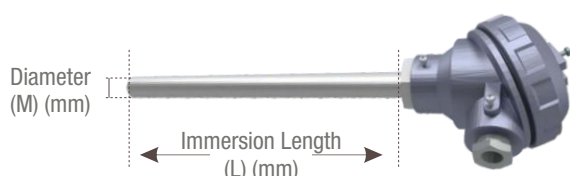
Diameter : Min: 3mm Max: 22mm

- Max. operating temperature : "K" type 1200°C (M22), 900°C (M16), 800°C (M10) "K" and J tipi" 600°C (M06, M08)
- Protection tube material : AISI304 (DIN1.4301)"316" is added to order code for AISI316
- Sensor type : DIN/IEC-584 "J" FeCu-Ni E=1.J,  
DIN/IEC-584 "K" FeCu-Ni E=1.K,  
DIN/IEC-584 2x"J" FeCu-Ni E=2.J, (TCK, TCKR)  
DIN/IEC-584 2x"K" FeCu-Ni E=2.K, (TCK, TCKR)
- Transmitter (TCKT or TCKRT) : 4...20mA current output, serial connection (Loop Powered) transmitter.  
F=Calibration scale must be described on ordering

# Temperature Sensors

## Thermocouples

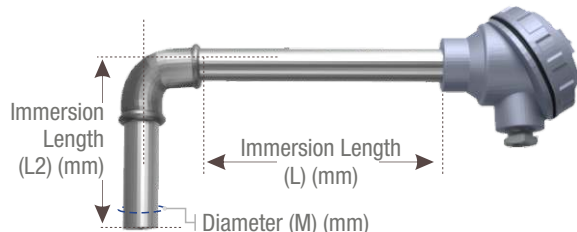
- TCKM (Terminal Block Type)
- TCKMT (Terminal Block with Transmitter Type)



TCKM T-M -L .1.K. F

Diameter : Standard: 6mm

- (TCKL) Terminal Block Type "L" Type
- (TCKLT) Terminal Block Type "L" Type Transmitter Type



TCKL T-M -L L1 x L2 .E. F

Diameter : Min: 16mm Max: 22mm

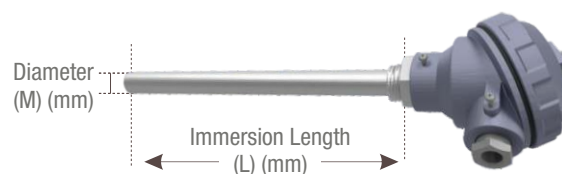
- Max. operating temperature :** 700°C
- Protection tube material :** AISI304 Stainless steel
- Sensor type :** DIN/IEC-584 "J" NiCr-Ni **E=1.J**,  
DIN/IEC-584 "K" NiCr-Ni **E=1.K**,  
2x "J" FeCu-Ni **E=2.J** (TCKK)  
2x "K" NiCr-Ni **E=2.K** (TCKK)
- Transmitter (TCKLT) :** 4...20mA current output, serial connection (Loop Powered) transmitter.  
**F=**Calibration scale must be described on ordering

## Compensation Cable



Silicone + fiber glass + braided wire, 2 x 0,75 mm<sup>2</sup> IEC584 "J" FeCu-Ni  
Silicone + fiber glass + braided wire, 2 x 0,75 mm<sup>2</sup> IEC584 "K" FeCu-Ni  
Silicone + fiber glass + braided wire, 2 x 1,50 mm<sup>2</sup> IEC584 "J" FeCu-Ni  
Silicone + fiber glass + braided wire, 2 x 1,50 mm<sup>2</sup> IEC584 "K" NiCr-Ni  
Silicone + fiber glass + braided wire, 2 x 1,50 mm<sup>2</sup> IEC584 "S" Pt10%Rh-Pt

- TCKRM (Terminal Block with Fittingnut Type)
- TCKRMT (Terminal Block with Fittingnut and Transmitter Type)

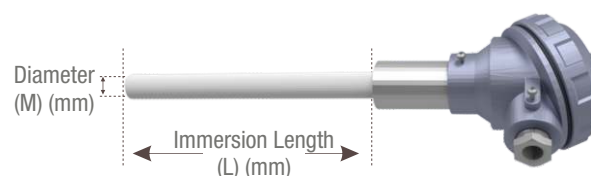


TCKRM T-M -L .1.K. F

Diameter : Standard: 6mm

- Max. operating temperature :** 1200°C
- Protection tube material :** AISI310 (DIN1.4845) "inconel" is added to order code for INCONEL600
- Sensor type :** DIN/IEC-584 "K" NiCr-Ni **E=1.K**,
- Transmitter (TCKMT ve TCKRMT) :** 4...20mA current output, serial connection (Loop Powered) transmitter.  
**F=**Calibration scale must be described on ordering

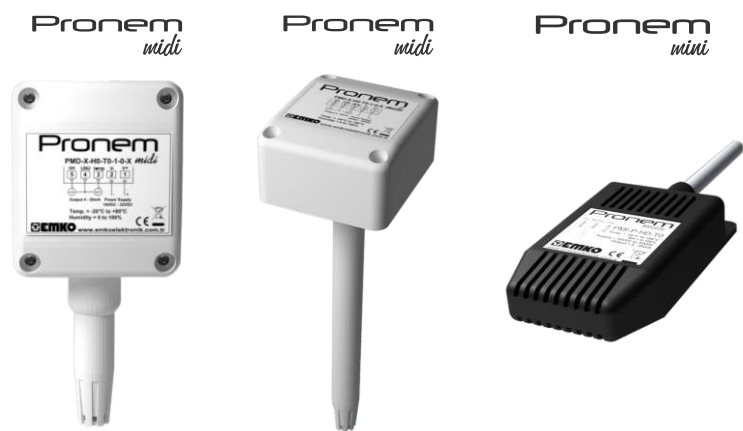
- (TCKK) Klemens Terminalli Tip,
- (TCKKT) Klemens Terminalli Tip



TCKK T-M -L .E. F

Diameter : Min: 15mm Max: 24mm

- Max. operating temperature :** 1200°C for "K" NiCr-Ni  
1600°C for "S" Pt10%Rh-PT  
1600°C for "R" Pt13%Rh-PT
- Wire Diameter :** 3,00mm for "K" type 0,35mm for "S" and "R" type
- Protection tube material :** KER610 Ceramic
- Sensor type :** DIN/IEC-584 "K" NiCr-Ni **E=1.K**,  
DIN/IEC-584 "S" Pt10%Rh-Pt **E=1.S**,  
DIN/IEC-584 "R" Pt13%Rh-Pt **E=1.R**,  
2x "K" NiCr-Ni **E=2.K** (TCKK),  
2x "S" Pt10%Rh-Pt **E=2.S** (TCKK),  
2x "R" Pt10%Rh-Pt **E=2.R** (TCKK)
- Transmitter (TCKKT) :** 4...20mA current output, serial connection (Loop Powered) transmitter.  
**F=**Calibration scale must be described on ordering



Technical Specifications

|                                        |                                            |
|----------------------------------------|--------------------------------------------|
| Measuring range (RH)                   | : %0...100                                 |
| Measuring range (T) (°C)               | : -20°C...+80°C                            |
| Measuring range (T) (°F)               | : -4°F...+176°F (for Pronem Midi LCD type) |
| Accuracy (RH)                          | : ±2 %RH (Typ)@23°C %0...100               |
| Accuracy (T)                           | : ±0,3°C (Typ)@23°C                        |
| Stability (RH)                         | : <0,5 %RH/year (Typ)                      |
| Stability (T)                          | : <0,04°C/year (Typ)                       |
| Analogue Out. Sign. Accuracy (Voltage) | : ±%0,1                                    |
| Analogue Out. Sign. Accuracy (Current) | : ±%0,5                                    |

Working Conditions

|                       |                 |
|-----------------------|-----------------|
| Operating Temperature | : -40°C...+85°C |
| Height                | : Up to 2000 m. |

PRONEM MIDI

| Main Model                                    |      |
|-----------------------------------------------|------|
| Temperature and Relative Humidity Transmitter | P    |
| Sub Model                                     |      |
| PRONEM midi                                   | MD   |
| PRONEM midi LCD                               | MDL  |
| PRONEM midi LCD with Backlight                | MDLB |
| Installation Type                             |      |
| Wall                                          | W    |
| Channel                                       | D    |
| Relative Humidity Signal Output               |      |
| RS-485                                        | 0    |
| 4-20 mA                                       | H0   |
| 0-10V                                         | H1   |
| 2-10V                                         | H2   |

P - - - / . 1 . . .

| Communication     |   |
|-------------------|---|
| None              | 0 |
| RS-485 (isolated) | 1 |

| Option                                       |      |
|----------------------------------------------|------|
| Communication ID with switch (ID:200...207)  | Null |
| Communication ID with software (ID: 1...247) | 250  |
| Tube Length                                  |      |
| None                                         | 0    |
| 59 mm                                        | 1    |
| 159 mm                                       | 2    |
| Supply Voltage                               |      |
| 16...32 VDC                                  | 1    |
| Temperature Signal Output                    |      |
| RS-485                                       | 0    |
| 4-20 mA                                      | T0   |
| 0-10V                                        | T1   |
| 2-10V                                        | T2   |

PRONEM MINI

| Main Model                                    |    |
|-----------------------------------------------|----|
| Temperature and Relative Humidity Transmitter | P  |
| Sub Model                                     |    |
| PRONEM mini                                   | MI |
| Installation Type                             |    |
| Portable                                      | P  |
| Relative Humidity Signal Output               |    |
| RS-485                                        | 0  |
| 4-20 mA                                       | H0 |
| 0-10V                                         | H1 |
| 2-10V                                         | H2 |

P MI - P - - / . 1 . . .

| Communication             |    |
|---------------------------|----|
| None                      | 0  |
| RS-485 (Non-isolated)     | 2  |
| Supply Voltage            |    |
| 16...32 VDC               | 1  |
| Temperature Signal Output |    |
| RS-485                    | 0  |
| 4-20 mA                   | T0 |
| 0-10V                     | T1 |
| 2-10V                     | T2 |



Standard Features

- 2 analogue outputs for temperature and humidity
- High output accuracy
- Small and useful design
- Long-term stability
- Low thermal drift
- Current or voltage output signal selection for temperature and humidity analogue output type

