# TEMPERATURE SENSORS FOR HIGH CURRENT MEASUREMENT













TS01-001

# TS01-001

#### TS0116E300U200PT100 Spring-loaded temperature sensor

| sensor                           |                    |                  |                 | Specifications                                       | _                     |         |          |        |
|----------------------------------|--------------------|------------------|-----------------|--|-----------------------|---------|----------|--------|
| Centers (mm                      | n/mil)             | 5,00 /           | 197             | Measuring principle                                  | resistance            | Ø3 -    | 2        | ł      |
| Sensor Type                      |                    | PT10             | D               | Accuracy / grade                                     | B                     |         |          |        |
| Temperature                      | e                  | -40 °            | C + 200 °C      | Response time t63 related to medium water            | ca. 2 sec.            | Ø4,24   |          |        |
| Spring Force                     | (cN ±2             | 0%)              |                 | Response time t63 related to metal contact in air    | ca. 30 sec.           |         |          |        |
| Standard                         | 70                 | ad               | 200             | Switching type                                       | 2-wire                | Ø4,15 🗕 | -        | 22,7   |
| Travel (mm)                      | , 0                |                  | 200             | Receptacle potential-free<br>/ galvanically isolated | yes                   |         |          |        |
| Version                          | Nomi               | inal             | Maximum         | Cable diameter                                       | ca. 2,0 mm            |         |          |        |
| Standard                         | 3,0                |                  | 4,0             | Cable length   | 1,0 m<br>(extendable) |         | <u>.</u> |        |
| Materials and Plating            |                    |                  |                 | Cable insulation                                     | Teflon                |         |          | ( 1000 |
| Sensor head                      | Stain              | less ste         | el, unplated    | Cable and  | strippod              |         |          |        |
| Barrel                           | Syntetic, unplated |                  | olated          |  | suippeu               |         |          | •      |
| Spring Stainless steel, unplated |                    | Protection class | watertight IP67 |  |                       |         |          |        |
|                                  |                    |                  |                 | Drill size [mm]                                      | 4,2 H7                |         |          |        |

Platinum measuring resistors are designated according to their material and their nominal resistance  $R_0$  at a temperature of 0 °C (PT100 =  $R_0 = 100 \Omega$ ). The PT100 is a fast-response, waterproof miniature temperature sensor suitable for universal temperature measurement even in small of spaces.

**Specifications** 

### TS02-001

### TS0216E300U200PT1000 Spring-loaded temperature sensor

| Centers (mm/mil) 5,00 / 197 |                           | Measuring principle | resistance  | TS02-001        |               |
|-----------------------------|---------------------------|---------------------|---|-----------------|---------------|
|                             |                           | Accuracy / grade    | Α   |                 |               |
| Sensor Type                 | PT                        | 1000                | Posponso timo t62 related                         |                 |               |
| Temperatur                  | <b>e</b> -4               | 0 °C + 200 °C       | to medium water                                   | Ca. 2 Sec.      | ¢3 - 2        |
| C                           | (-N-1200)                 |                     | Response time t63 related to metal contact in air | ca. 30 sec.     | Ø4,5<br>Ø4,24 |
| Spring Force (CN ±20%)      |                           | Switching type      | 2-wire  |                 |               |
| Version                     | Preload                   | Nominal             | Recentacle notential free                         | 1/05            |               |
| Standard                    | 70                        | 200                 | / galvanically isolated                           | yes             | Ø4,15 22,7    |
| Travel (mm)                 |                           |                     | Cable diameter                                    | ca. 2,0 mm      |               |
| Version                     | Nominal                   | Maximum             | Cable length                                      | 1,0 m           |               |
| Standard                    | 3.0                       | 4.0                 |   | (extendable)    |               |
|                             | -,-                       | .,_                 | Cable insulation                                  | Teflon          |               |
| Materials ar                | nd Plating                |                     | Cable end   | stripped        |               |
| Sensor head                 | Stainless steel, unplated |                     | Protection class                                  | watertight IP67 | ( 1000 )      |
| Barrel                      | Syntetic, unplated        |                     | Drill size [mm]                                   | 4.2 H7          |               |
| Spring                      | Stainless                 | steel, unplated     |   | .,              |               |

Platinum measuring resistors are designated according to their material and their nominal resistance  $R_0$  at a temperature of 0 °C (PT1000 =  $R_0 = 1000 \Omega$ ). The PT1000 is a fast-response, waterproof miniature temperature sensor and suitable for universal temperature measurement even in small of spaces.



TS03-001

# TS03-001

#### TS0316E300U200NTC5k Spring-loaded temperature sensor

| sensor                           |                           |                  |                 | Specifications                                    |                       |           |        |
|----------------------------------|---------------------------|------------------|-----------------|---|-----------------------|-----------|--------|
| Centers (mm                      | n/mil)                    | 5,00 /           | 197             | Measuring principle                               | thermistor            | ¢3 -      | _ 2    |
| Sensor Type                      |                           | NTC (            | 5kOhm)          | Accuracy / grade                                  | В                     | 6 015     |        |
| Temperature                      | e                         | -40 °            | C + 200 °C      | Response time t63 related to medium water         | ca. 2 sec.            | ¢4,24     |        |
| Spring Force                     | e (cN ±2                  | 0%)              |                 | Response time t63 related                         | ca. 30 sec.           |           |        |
| Version                          | Prelo                     | ad               | Nominal         | to metal contact in air                           |                       |           |        |
| Standard                         | 70                        |                  | 200             | Switching type                                    | 2-wire                | Ø4,15 — — | 22,7   |
| Travel (mm)                      |                           |                  |                 | Receptacle potential-free / galvanically isolated | yes                   |           |        |
| Version                          | Nomi                      | inal             | Maximum         | Cable diameter                                    | ca. 2,0 mm            |           |        |
| Standard                         | 3,0                       |                  | 4,0             | Cable length                                      | 1,0 m<br>(extendable) |           |        |
| Materials and Plating            |                           |                  |                 | Cable insulation                                  | Teflon                |           | ( 1000 |
| Sensor head                      | Stainless steel, unplated |                  | el, unplated    |   |                       |           |        |
| Barrel                           | Syntetic, unplated        |                  | plated          | Cable end   | stripped              |           |        |
| Spring Stainless steel, unplated |                           | Protection class | watertight IP67 |   | <u>I</u>              |           |        |
|                                  |                           |                  |                 | Drill size [mm]                                   | 4.2 H7                |           |        |

The NTC sensor (NTC = Negative Temperature Coefficient) is a temperature-dependent component. If the temperature rises, the resistance of the NTC sensor decreases. Its characteristic curve is non-linear.

**Specifications** 

### TS04-001

### TS0416E300U200TYPK Spring-loaded temperature sensor

|  |                           |   |             | Maggiuring principle                         | the arms a secural s      |                  |
|--|---------------------------|---|-------------|--|---------------------------|------------------|
| Centers (mm  | /mil)                     | 5,00/1  | 97          | measuring principle                          | thermocouple              |                  |
| Concor Tuno  | ,,                        | Tup K (N  |             | Accuracy / grade                             | 2                         |                  |
| Sensor TypeTyp K (NICT/NI)Temperature-40 °C + 200 °C |                           | -40 °C + 200 °C                                   |             | Response time t63 related<br>to medium water | ca. 2 sec.                | TS04-001         |
|  |                           | Response time t63 related to metal contact in air | ca. 30 sec. | Ø3 <b>-</b> - 2                              |                           |                  |
| Spring Force   | (cN ±20                   | %)  |             | Switching type                               | 2-wire                    |                  |
| Version  | Preloa                    | d   | Nominal     | Recentacle notential-free                    | Vec                       | ∅4,5 <del></del> |
| Standard   | 70                        |   | 200         | / galvanically isolated                      | yes                       | Ø4,24            |
| Travel (mm)  |                           |   |             | Cable diameter                               | ca. 1,0 mm                |                  |
| Version  | Nomin                     | al  | Maximum     | Cable length                                 | 1,2 m<br>(not extendable) | Ø4.15 - 22.7     |
| Standard   | 3,0                       |   | 4,0         |  |                           |                  |
|  |                           |   |             | Cable insulation                             | Teflon                    |                  |
| Materials an   | d Platin                  | g   |             | Cable end                                    | unassembled               |                  |
| Sensor head  | Stainless steel, unplated |   | , unplated  | Protection class                             | watertight IP67           |                  |
| Barrel   | Syntetic, unplated        |   | ated        | Drill size [mm]                              | 4.2 H7                    |                  |
| Spring   | Stainle                   | Stainless steel, unplated                         |             |  | ,                         |                  |
|  |                           |   |             |  |                           | ( 1200           |
|  |                           |   |             |  |                           |                  |
|  |                           |   |             |  |                           |                  |

Thermocouple type K is the most common thermocouple type with a large measuring range. Thermocouple connector not included in scope of delivery.



### TS04-002

#### TS0416Z110UTYPK Rigid temperature sensor

| Centers (mm/mil) | 1,90 / 75       |
|------------------|-----------------|
| Sensor Type      | Туре К          |
| Temperature      | -50 °C + 250 °C |

Materials and Plating

Sensor head Bronze, unplated

Thermocouple type K is the most common thermocouple type with a large measuring range. Thermocouple connector not included in scope of delivery.

| Specifications<br>Temperature Sensor Typ K              |                             |  |  |  |  |
|---|-----------------------------|--|--|--|--|
| Measuring principle                                     | thermocouple                |  |  |  |  |
| Accuracy / grade  | +/-2 °C                     |  |  |  |  |
| Response time t63<br>related to medium water            | ca. 0,2 sec.                |  |  |  |  |
| Response time t63<br>related to metal contact<br>in air | ca. 1 sec.                  |  |  |  |  |
| Switching type  | 2-wire                      |  |  |  |  |
| Receptacle potential-free<br>/ galvanically isolated    | yes                         |  |  |  |  |
| Cable diameter  | ca. 0,9 mm                  |  |  |  |  |
| Cable length  | 1,2 m (not extenda-<br>ble) |  |  |  |  |
| Cable insulation  | Teflon                      |  |  |  |  |
| Cable end   | unassembled                 |  |  |  |  |
| Protection class  | watertight IP65             |  |  |  |  |



### TS04-004

### TS0416Z110U130TYPK Spring-loaded temperature sensor

| Centers (mm   | <b>n/mil)</b> 2,54 / | / 100        | Specifications                            |                     |  |
|---|----------------------|--------------|---|---------------------|--|
| Sensor Type   | Туре                 | К            | Temperature Sensor Ty                     | рК                  |  |
| <b>Temperature</b> $-50^{\circ}$ C $+250^{\circ}$ C |                      |              | Measuring principle                       | thermocouple        |  |
|   |                      |              | Accuracy / grade                          | +/-2 °C             |  |
| Spring Force  | (cN ±20%)            |              | Response time t63 related to medium water | ca. 0,2-0,3 sec.    |  |
| Version   | Preload              | Nominal      | Response time t63                         | ca. 1-2 sec.        |  |
| Standard  | 50                   | 130          | related to metal contact<br>in air        |                     |  |
| Travel (mm)   |                      |              | Switching type                            | 2-wire              |  |
| Version   | Nominal              | Maximum      | Receptacle potential-free                 | yes                 |  |
| Standard  | 3,5                  | 4,3          | / galvanically isolated                   |                     |  |
|   |                      |              | Cable diameter                            | ca. 0,9 mm          |  |
| Materials an  | d Plating            |              | Cable length                              | 1,2 m (not extenda- |  |
| Sensor head   | Bronze, unplated     |              |   | ble)                |  |
| Barrel  | Syntetic, unplated   |              | Cable insulation                          | Teflon              |  |
| Spring  | Stainless ste        | el, unplated | Cable end                                 | unassembled         |  |
|   |                      |              | Protection class                          | watertight IP65     |  |



Thermocouple type K is the most common thermocouple type with a large measuring range. Thermocouple connector not included in scope of delivery.



### TS04-003

# Spring-loaded temperature sensor

| Centers (mm/mil)     | 16,0/406        |
|----------------------|-----------------|
| Sensor Type          | Typ K (NiCr/Ni) |
| Temperature<br>range | -20°C+80°C      |

#### Spring Force (cN ±20%)

|        | Preload | Nominal |
|--------|---------|---------|
| Sensor | -       | 200     |

#### Travel (mm)

| Version | Nominal | Maximum |
|---------|---------|---------|
| Sensor  | 3,0     | 6,0     |

#### **Materials and Plating**

| Sensor head  | Aluminum, anodised        |
|--------------|---------------------------|
| Spring       | Stainless steel, unplated |
| Sensor plate | Brass, unplated           |

#### Specifications

| Measuring principle                                  | thermocouple              |
|--|---------------------------|
| Accuracy / grade                                     | 2                         |
| Response time t63 related to medium water            | ca. 2 sec.                |
| Response time t63 related to metal contact in air    | ca. 30 sec.               |
| Switching type                                       | 2-wire                    |
| Receptacle potential-free<br>/ galvanically isolated | yes                       |
| Cable diameter                                       | ca. 1,0 mm                |
| Cable length   | 1,8 m (not<br>extendable) |
| Cable insulation                                     | Teflon                    |
| Cable end  | Thermo-plug<br>yellow     |



Mounting hole for fixing screw M2 available.

Thermocouple type K (NiCr/Ni), electrically insulated to the sensor head Thermocable teflon insulated, length 1800mm Miniature TE plug type K at free end

# FTS

### Coaxial, spring-loaded temperature sensor, for voltage measurement

| Centers (mm/mil) | 8,50 / 335  |
|------------------|-------------|
| Current          | 5,0 A       |
| R typ (power)    | <6 mOhm     |
| Temperature      | -45°C+200°C |

#### Spring Force (cN ±20%)

|                | Preload | Nominal |
|----------------|---------|---------|
| Total          | -       | 700     |
| Sensor         | 70      | 200     |
| Circular cont. | 400     | 500     |

#### Travel (mm)

| Version        | Nominal | Maximum |
|----------------|---------|---------|
| Sensor         | 0,5     | 4,0     |
| Circular cont. | 4,0     | 5,0     |

#### **Materials and Plating**

| Sensor                   | Stainless steel, unplated |
|--------------------------|---------------------------|
| Circular cont.           | BeCu, gold plated         |
| Barrel                   | Syntetic, unplated        |
| Spring<br>Circular cont. | Stainless steel, unplated |

7,00 -7,03





#### Drill Size (mm)

Barrel with knurl

The contact probe enables the simultaneous electrical contacting and temperature measurement at the contact point in compact design.

| Order Code | Description      | Tip Style | Number | Material | Ø in mm | Plating | TempSensor |
|------------|------------------|-----------|--------|----------|---------|---------|------------|
| 1035102    | FTS0116E0001U700 | (()       | 16     | E        | 3,00    | U       | PT100      |
| 1035100    | FTS0216E0001U700 | (()       | 16     | E        | 3,00    | U       | PT1000     |
| 1035101    | FTS0316E0001U700 | (()       | 16     | E        | 3,00    | U       | NTC        |
| 1035104    | FTS0416E0001U700 | (()       | 16     | E        | 3,00    | U       | Тур К      |



| Resistance Table Sensors |                   |        |          |           |  |  |
|--------------------------|-------------------|--------|----------|-----------|--|--|
| Temperature in °C        | Resistance in Ohm |        |          |           |  |  |
|                          | PT100             | PT1000 | NTC5kOhm | NTC10kOhm |  |  |
| -50                      | 80                | 803,1  | 333914   | 667830    |  |  |
| -40                      | 84                | 842,7  | 167835   | 335670    |  |  |
| -30                      | 88                | 882,2  | 88342    | 176680    |  |  |
| -20                      | 92                | 921,6  | 48487    | 96670     |  |  |
| -10                      | 96                | 961    | 27649    | 55300     |  |  |
| 0                        | 100               | 1000   | 16325    | 32650     |  |  |
| 10                       | 104               | 1039   | 9952     | 19900     |  |  |
| 20                       | 108               | 1078   | 6247     | 12490     |  |  |
| 25                       | 110               | 1097   | 5000     | 10000     |  |  |
| 30                       | 112               | 1117   | 4028     | 8060      |  |  |
| 40                       | 116               | 1155   | 2662     | 5320      |  |  |
| 50                       | 119               | 1194   | 1800     | 3600      |  |  |
| 60                       | 123               | 1232   | 1244     | 2490      |  |  |
| 70                       | 127               | 1270   | 876      | 1750      |  |  |
| 80                       | 131               | 1309   | 628      | 1260      |  |  |
| 90                       | 135               | 1347   | 458      | 920       |  |  |
| 100                      | 139               | 1385   | 339      | 680       |  |  |
| 110                      | 142               | 1422   | 255      | 510       |  |  |
| 120                      | 146               | 1461   | 194      | 390       |  |  |
| 130                      | 150               | 1498   | 150      | 300       |  |  |
| 140                      | 154               | 1536   | 117      | 230       |  |  |
| 150                      | 157               | 1573   | 92       | 180       |  |  |

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