# TSA20

## Electronic Temperature Sensor with LED-display (optional)

- **Pt100 resistance thermometer measuring range: -50...+250 °C**

- **analogue output 4...20 mA (current loop, HART®)**

- **optional with display and additional switching points**

- **accuracy class A, B, AA (B 1/3 DIN)**

- **universe useable as temperature switch, temperature sensor and/or temperature indication**

- **material of wetted parts: stainless steel 1.4571**

- **easy programming of switching points and analogue output with keys**

- **display 330° rotatable and 180° mirror-inverted**

**Description:**

The electronic temperature sensor of the series TSA20 measures the medium temperature with a Pt100 resistance thermometer. The analogue output continuously indicates the current temperature; the optional switching outputs are used for electronic limit control.

In the version with display, the temperature is displayed and the setting can be made directly on the device. The programming of the device without display is done by the factory or via HART® communication.

At higher temperatures, a neck pipe protects the electronics from overheating. Due to the large measuring range from -50 to + 250 °C, the different process connections and installation lengths, a very flexible application is possible in almost all industrial processes.

**Typical applications:**

Due to its versatility, the temperature sensor TSA20 is very universally applicable. It is mainly used in cooling and heating circuits, plants, compressors and motors.

## Materials:

| | |
|---|---|
| **Housing:** | PBT GF30, Display-Top: Polycarbonate |
| **Wetted parts:** | stainless steel, 1.4571 |
| **neck tube (optional):** | stainless steel, 1.4571 |

## Technical data:

| | |
|---|---|
| **Process connection:** | different, see ordering code |
| **Media temperature:** | -50...+250 °C |
| **Ambient temp.:** | -20...+80 °C |
| **Storage temp.:** | -40...+100 °C |
| **Accuracy:** | |
|   Sensor: | Accuracy class A, B, AA (B1/3 DIN) |
|   Transmitter: | +/- 0,3% of measured range |
|   Indication: | +/- 0,2 % of measured range, +/-1 Digit |
| **Resolution:** | 16 Bit |
| **Measuring rate:** | 10 measurements/s |
| **Filter settings:** | 0...99 s |
| **Adjustments:** | Per Software (HART® Communication) or via display (optional) |
| **Transmission behaviour:** | temperature linear |
| **Mounting position:** | any |
| **Pressure:** | PN 25 |
| **Weight:** | ca. 140 g (150 g with display) |
| **Protection class:** | IP65 (electronic) |

## Electrical Data:

| | |
|---|---|
| **Sensor:** | Pt100, class A, B, AA (B 1/3 DIN) |
| **Power supply:** | 12…40 VDC |
| **electr. connection:** | different, see ordering code |
| **Analogue output:** | 4...20 mA current loop, HART® (2-wire) |
|   **Current range:** | 3,8...20,5 mA |
|   **Signal on error:** | 3,6 mA (sensor short circuit, underflow) 21 mA (sensor break, sensor open circuit, overflow) |
|   **Load:** | $R=(U_B-12\ V) / 22\ mA$ |

## Display (optional):

| | |
|---|---|
| **Display:** | 7-segment-LED , red, 8,5 mm, representation mirror-inverted 180° |
| **Head of display:** | rotatable approx. 330° |
| **Memory:** | minimum / maximum values |
| **Indication:** | measuring value / unit of measurement / control menu |
| **Decimal point:** | automatically or manually, dependent on measuring range / unit |
| **Resolution:** | -9999...9999 digit |
| **Error of measurement:** | +/- 0,2 % of range,  +/- 1 digit |
| **Temperature drift:** | 100 ppm/K |

## Limit contacts (optional):

| | |
|---|---|
| **Electronically:** | 1 or 2 NPN or PNP |
| **Max. switching capacity:** | 200 mA (optional 1000 mA), 30 VDC |
| **Indication:** | 1 LED red for each limit value LED lights up: transistor conductive LED dark: transistor locked |
| **Voltage across:** | <1 V |
| **Settings:** | with 3 keys (TouchM-Technology) |
| **Setting range:** | switch point and hysteresis: any value within measuring range |
| **Switching delay:** | 0,0...999,9 s |
| **Failsafe-function:** | adjustable |
| **Galvanical insulation:** | switching outputs are separated from measuring amplifier |

## Programmable Features (via keys):

| | |
|---|---|
| **Measuring amplifier:** | measuring range start (LRV) measuring range end (URV) adjustment, simulation of output current, filter function linear output signal HART®-address 2-point calibration |
| **Display (optional):** | range of indication time of indication decimal point units stabilisation of zero point locking of programming calibration points TAG number |
| **Limit value contacts: (optional)** | limit value 1 and 2 limit value 1 and 2 delay times 1 and 2 |

## Connection Example:

**Assignment plug M12 x 1, 8 pole:**

**Current loop 4… 20 mA, HART®:**

| + | - |
|---|---|
| 1 | 3 |
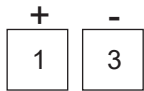
**Electronical limit value contacts (optional):**

| 2 | 4 | 5 |
|---|---|---|

**Shield:**

| 8 |
|---|
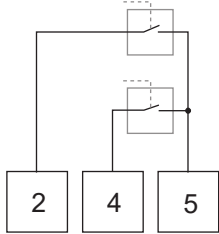
## HART®-Communication:

The HART-Tool is a graphical user interface with menu-driven program for configuration. It can be used for putting into operation, configuration, analysis of signals, data backup and documentation of the device.

| | |
|---|---|
| **Operating systems:** | Windows2000, Windows XP, Windows 7, Windows 8.1 |
| **Connection:** | HART® Interface<br>PC-USB interface<br>hand-held HART®-Communicator |
| **Settings:** | Adjustment of output current<br>Limits of measuring range<br>2-point calibration<br>Simulation of output current<br>Linear output signal<br>Filter function<br>HART® address<br><br>with option switching contacts:<br>limit value 1 and 2<br>hysteresis value 1 and 2<br>delay times 1 and 2 |

**Please note:**
When using communication via a HART modem, a communication resistance of 250 Ω has to be taken into account.

## Ordering code:

**Ordering code:** TSA20. | S. | 1. | 6S. | A. | 1. | 4. | W. | 0. | 0.

**Electronic temperature sensor**

**Version:**
S = without display (no limit contact)
A = with indication and keys

**Model of sensor:**
1 = Class A (Standard)
2 = Class B
3 = Class AA (B1/3 DIN)

**Protective tube:**
6S = Ø 6 mm
1X = others (please specify)
6H = Ø 6 mm with neck tube
1H = others with neck tube (please specify)

**Installation length:**
A = 50 mm
B = 100 mm
C = 200 mm
D = 250 mm
E = 400 mm
F = 600 mm
G = 1000 mm
S = other length (please specify)

**Process connection:**
1 = G 1/4 male thread
2 = G 3/8 male thread
3 = G 1/2 male thread
4 = G 3/4 male thread
5 = G 1 male thread
6 = 1/4" NPT
7 = 3/8" NPT
8 = 1/2" NPT

**Electrical connection:**
4 = M12x1, 4-pole (max. 1 limit switch)
5 = M12x1, 5-pole (for 2 limit switches)
8 = M12x1, 8-pole
1 = Valve connection, 4-pole (max. 1 limit switch)

**Output signal:**
(limit switches only at version A):
0 = 4...20 mA, without limit switches
1 = 4...20 mA and 1 x PNP, 30 VDC, 200 mA
2 = 4...20 mA and 2 x PNP, 30 VDC, 200 mA (standard)
3 = 4...20 mA and 1 x NPN, 30 VDC, 200 mA
4 = 4...20 mA and 2 x NPN, 30 VDC, 200 mA
5 = 4...20 mA and 1 x PNP, 30 VDC, 1000 mA
6 = 4...20 mA and 2 x PNP, 30 VDC, 1000 mA
7 = 4...20 mA and 1 x NPN, 30 VDC, 1000 mA
8 = 4...20 mA and 2 x NPN, 30 VDC, 1000 mA

**Configuration output signal:**
W = 0...200 °C (factory setting)
K = customised, minimum range 50 K (please specify)

**Options:**
0 = without
1 = please specify in writing

## Accessories:

PVC-cable **SM12** with M12 plug, 4-or 5 pole
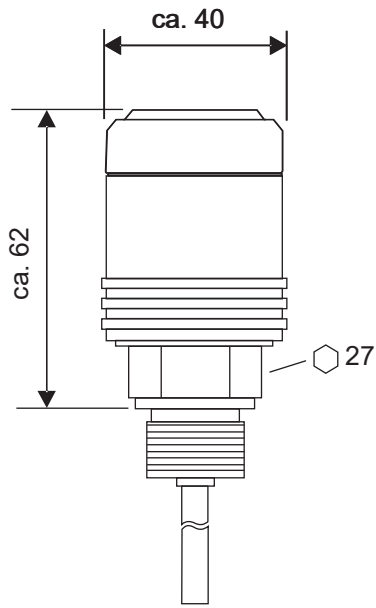HART®-tool: modem with HART®-cable, USB-cable, software

## Dimensions:

**TSA20-S, without Display:**

ca. 40

ca. 62

⬡ 27

ca. 52

ca. 13

ca. 36

Einbau-
länge

**TSA20-A, with Display:**

ca. 40

SW27

ca. 37

ca. 85

Einbau-
länge