



TT7S10E-XP  
(Single Compartment)

TT7S10E-XP  
(Dual Compartment)

# TT7S10E-XP

## Field Mounted HART Temperature Transmitter



User Programmable  
Ranges, Units & Input Types



Touch Key Pad



Password Protected  
Configuration



HART Protocol  
Supported

Masibus Model TT7S10E-XP is a 2-Wire Loop Powered & fully programmable Universal field mounted HART Temperature Transmitter with Display, designed for Isolated and accurate temperature measurements and signal conditioning applications.

Model TT7S10E-XP is Ex-proof transmitter available in Wall or 2" Pipe mount option. TT7S10E-XP is programmable for Thermocouples, Pt-100 RTD, mV and Resistance/Potentiometer. Output signal is standard 4-20mA in 2-wire mode. A built-in 4-digit LED display facilitates the user to monitor process value and helps in instantaneous configuration and calibration. Transmitters have Process Temperature value display setting for °C, °F & K.

Model TT7S10E-XP also supports HART protocol version 7 functionality with HART 5 compatibility for seamless communication, enabling easy configuration and monitoring.

Programming of the Transmitter is done either by touch keys or HART modem or user friendly mTRAN windows-based configuration software.

TT7S10E-XP Transmitter is built using the latest technology to deliver high performance in accuracy, resolution, stability and isolation. Transmitter is equipped with Zero/Span adjustments, sensor break detection, Downscale/Upscale output and Reverse Loop Polarity protection.

Software techniques like polynomial linearization and digital filtering gives linearized and stable output in harsh industrial conditions, high level of isolation between input and output prevents ground loop errors and protects costly measurement and control systems under fault conditions.

Configuration access of device is protected by assigning a Password in order to ensure a high degree of protection against unauthorized modification to configuration and calibration.

### Features

- Universal input
  - ✓ RTD (3W / 4W)
  - ✓ Thermocouple
  - ✓ Resistance
  - ✓ mV
- User friendly configuration and calibration using
  - ✓ Touch keys
  - ✓ Windows based mTran software
  - ✓ HART COMMUNICATOR
- Easy to read - 0.4", 4-digit LED display for efficient monitoring
- HART 7 functionality with HART 5 compatibility
- 1.5 KV RMS Isolation between Input & Output
- Linearized Output
- PV bias for input correction
- Digital Filter
- Built in Reverse polarity protection
- Selectable Direct / Reverse output
- Sensor breaks detection as per NAMUR NE43
- Ex-proof Transmitter with Wall mount and Pipe mount

### Applications

- Power Plants
- Metal Industry
- Oil & Gas
- Chemical
- Glass Industry
- Cement
- Fertilizer
- Paper/Pulp

TECHNICAL SPECIFICATIONS

| PV Input                               |                                                                           |                    | Output                                                        |                                                                                                                   |                                        |  |
|----------------------------------------|---------------------------------------------------------------------------|--------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------|--|
| Input Type                             |                                                                           |                    | mA Output (2 wire)                                            | 4-20mA or 20-4mA (User programmable)                                                                              |                                        |  |
| RTD                                    | PT100 3/4-Wire                                                            |                    | Output Accuracy (D/A)                                         | ± 0.04% of Full Span                                                                                              |                                        |  |
| Resistance/Potentiometer               | 0-2500Ω                                                                   |                    | Sensor Break Output                                           | ≤ 3.6 or ≥21.0mA programmable.                                                                                    |                                        |  |
| Thermocouple                           | E, J, K, T, B, R, S, N with internal CJC (ANSI standard)                  |                    | Output Load                                                   | R load = (V supply - 12.5)/0.021 Ohm                                                                              |                                        |  |
| Linear                                 | 0 to 75mv/500mVDC, 0/4 - 20 mA                                            |                    | Total Accuracy                                                | (A/D Accuracy / Span + D/A Accuracy).                                                                             |                                        |  |
| RTD/Resistance/Potentiometer           | ~0.2 mA                                                                   |                    |                                                               | Example: when selecting Pt100 with measurement range of 0 to 800 °C                                               |                                        |  |
| Excitation Current                     |                                                                           |                    |                                                               | 0.5°C/800°C x100% of span +0.04% of span = 0.1% of span                                                           |                                        |  |
| Input Impedance for mV Input           | ≥ 1M Ω                                                                    |                    | Power Supply                                                  |                                                                                                                   |                                        |  |
| Input Impedance for mA Input           | ≤ 10 Ω                                                                    |                    | Standard                                                      | 12.5 – 36 VDC                                                                                                     |                                        |  |
| Sensor Burnout Current                 | < 1 uA                                                                    |                    | Environmental                                                 |                                                                                                                   |                                        |  |
| Input Range                            | Refer Table -1                                                            |                    | Standard Operating Temperature                                | 0 to 80°C                                                                                                         |                                        |  |
| Zero / Span Adjust                     | Adjustable either from TouchKeys, mTRAN Software or HART Modem            |                    | Storage Temperature                                           | -20 to 85 °C                                                                                                      |                                        |  |
| Accuracy (A/D)                         | ±0.6 °C for E, J, K, T, N.                                                |                    | Humidity                                                      | 30% to 95% RH(Non-condensing)                                                                                     |                                        |  |
|                                        | ±0.5 °C PT100.                                                            |                    | Physical                                                      |                                                                                                                   |                                        |  |
|                                        | ±1.5 °C for B, R, S.                                                      |                    | TT7S10E-XP (Single Compartment) TT7S10E-XP (Dual Compartment) |                                                                                                                   |                                        |  |
|                                        | ±0.020 mV for Linear (0 - 75mV).                                          |                    | Mounting                                                      | Wall (Std) or 2" Pipe mount (optional)                                                                            | Wall (Std) or 2" Pipe mount (optional) |  |
|                                        | ±0.400 mV for Linear (0 - 500mV).                                         |                    | Dimensions in mm                                              | 140(H) x 145(W) x 80(D)                                                                                           | 100(H) x 100(W) x 145(D)               |  |
|                                        | ±1.5 Ω for Resistance (0 - 2500 Ω).                                       |                    | Weight (Without mounting clamps)                              | 1 Kg                                                                                                              | 1.65 Kg                                |  |
| ±0.008 mA for mA (0 - 20 & 4 - 20 mA). |                                                                           | Enclosure Material | Aluminium Alloy LM-6                                          |                                                                                                                   |                                        |  |
| CJC Error                              | ±2 °C                                                                     |                    | Ingress Protection                                            | IP65                                                                                                              | IP66                                   |  |
| ADC Resolution                         | 17 bits                                                                   |                    | Area Classification                                           | Zone 1 & 2, Gas Group: IIA & IIB                                                                                  |                                        |  |
| Stability                              | ±0.1% per year                                                            |                    | Cable Entry Size                                              | 2 nos. of M20 double compression cable glands                                                                     |                                        |  |
| Response Time                          | ≤ 250ms                                                                   |                    | HART Functionality*                                           |                                                                                                                   |                                        |  |
| Digital Filter                         | 0-20 User programmable                                                    |                    | HART Protocol Versions                                        | HART 7                                                                                                            |                                        |  |
| Allowable Wiring Resistance for RTD    | Maximum 15 ohms/wire (Resistance between all wires should be equal)       |                    | HART Physical Layer                                           | FSK 1200                                                                                                          |                                        |  |
| CMRR                                   | >120 dB                                                                   |                    | Baud Rate                                                     | 1200bps                                                                                                           |                                        |  |
| NMRR                                   | ~40 dB                                                                    |                    | NAMUR Compliance                                              | Output limit and failure current acc. To NAMUR NE 43                                                              |                                        |  |
| Temp-co                                | <100 PPM                                                                  |                    | Available Command                                             | Device information, Range, Unit, Damping value, Polling address, Output trimming, Tag, Message, Descriptor, Date. |                                        |  |
| Table-1: Display Range                 |                                                                           |                    | Identified Commands                                           | Generic mode: 0, 1, 3, 6, 12, 13,14, 17, 18, 34, 35, 40, 42, 44, 45, 46.                                          |                                        |  |
|                                        |                                                                           |                    | Generic Command Discription                                   |                                                                                                                   |                                        |  |
| Input Type                             | Ranges                                                                    |                    | 0                                                             | Device Information                                                                                                |                                        |  |
|                                        | E                                                                         | -200 to 1000°C     | 1                                                             | Read PV                                                                                                           |                                        |  |
|                                        | J                                                                         | -200 to 1200°C     | 3                                                             | Read PV,Ambient Temprature & Loop Current                                                                         |                                        |  |
|                                        | K                                                                         | -200 to 1370°C     | 6                                                             | Write Polling Address                                                                                             |                                        |  |
|                                        | T                                                                         | -200 to 400°C      | 12                                                            | Read Massage                                                                                                      |                                        |  |
|                                        | B                                                                         | 450 to 1800°C      | 13                                                            | Read TAG, DESCRIPTOR, DATE                                                                                        |                                        |  |
|                                        | R                                                                         | 0 to 1750°C        | 14                                                            | Read Primary variable sensor information                                                                          |                                        |  |
|                                        | S                                                                         | 0 to 1750°C        | 17                                                            | Write Message                                                                                                     |                                        |  |
| RTD                                    | N                                                                         | -200 to 1300°C     | 18                                                            | Write TAG, DESCRIPTOR, DATE                                                                                       |                                        |  |
|                                        | Pt100 3/4 wire                                                            | -200 to 850.0°C    | 34                                                            | Write Primary Variable Damping Value                                                                              |                                        |  |
| Linear V                               | 0 to 75mV /                                                               | -1999 to 9999      | 35                                                            | Write Primary Variable Range Value                                                                                |                                        |  |
|                                        | 0 to 500mV DC                                                             |                    | 40                                                            | Enter/Exit Fixed Primary Variable Current Mode                                                                    |                                        |  |
| Linear mA                              | 0 to 20mA /                                                               | -1999 to 9999      | 42                                                            | Perform Master Reset                                                                                              |                                        |  |
|                                        | 4 to 20mA                                                                 |                    | 44                                                            | Write Primary Variable Units                                                                                      |                                        |  |
| Resistance/Potentiometer               | 0-2500Ω                                                                   | -1999 to 9999      | 45                                                            | Trim Primary Variable Current DAC Zero                                                                            |                                        |  |
|                                        |                                                                           |                    | 46                                                            | Trim Primary variable Current DAC Gain                                                                            |                                        |  |
| Display & Keys                         |                                                                           |                    | *Note: Features available only in Dual Compartment            |                                                                                                                   |                                        |  |
| Display Type                           | 0.4", 4 Digit 7 Segment Red LED                                           |                    |                                                               |                                                                                                                   |                                        |  |
| Touch Keys                             | 3 Touch keys (ENT, ESC, INC) for configuration, calibration and Operation |                    |                                                               |                                                                                                                   |                                        |  |

| Ordering Code |            |         |                                                                                      |                               |
|---------------|------------|---------|--------------------------------------------------------------------------------------|-------------------------------|
| Model         | Input type |         | Mounting                                                                             |                               |
|               |            |         |                                                                                      |                               |
| TT7S10E-XP    | X          |         | X                                                                                    |                               |
|               | 1          | E       | SW                                                                                   | Wall mount Single Compartment |
|               | 2          | J       | SP                                                                                   | Pipe mount Single Compartment |
|               | 3          | K       | DW                                                                                   | Wall mount Dual Compartment   |
|               | 4          | T       | DP                                                                                   | Pipe mount Dual Compartment   |
|               | 5          | B       |                                                                                      |                               |
|               | 6          | R       |                                                                                      |                               |
|               | 7          | S       |                                                                                      |                               |
|               | 8          | N       |                                                                                      |                               |
|               | 9          | Pt100   |                                                                                      |                               |
|               | C          | 4-20mA  |                                                                                      |                               |
|               | D          | 0-20mA  |                                                                                      |                               |
|               | U          | 0-75mV  |                                                                                      |                               |
|               | H          | 0-500mV | Option: TT7SCC - Configuration cable@ extra cost<br>mTRAN Software: Website download |                               |
|               | I          | 0-2500Ω |                                                                                      |                               |