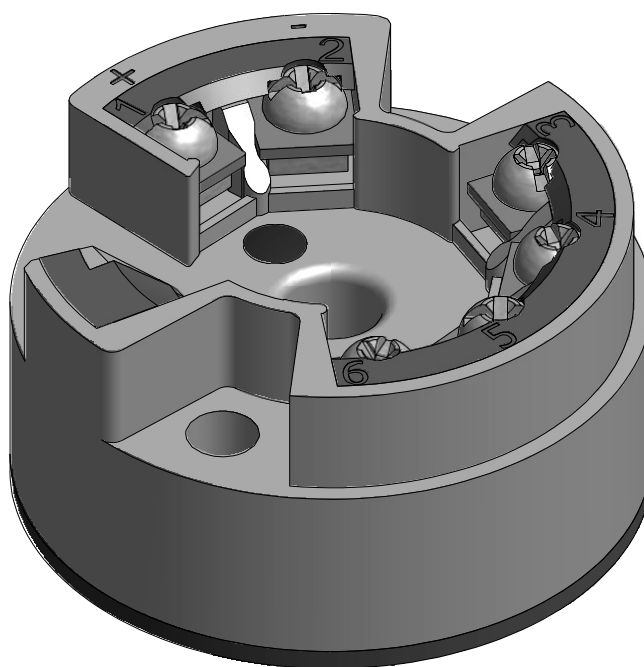


The Series 441 programmable temperature transmitter is a 2-wire transmitter with an analog output. It has measurement input for resistance thermometers (RTD) in 2-, 3- or 4-wire connections, thermocouples, resistance and voltage inputs. Setting up of the transmitter is done using the communication cable. These small units can be mounted in Pyromation DIN (Form B) connection heads or they can be used for surface mounting by using a 35 mm DIN-rail mounting clip.

TEMPERATURE HEAD TRANSMITTER

Universal head transmitter for resistance thermometers (RTD), thermocouples, resistance and voltage inputs, programmable using a PC, for installation in a sensor head (Form B)



Application Areas

- PC programmable temperature head transmitter for converting various input signals into an scalable (4 to 20) mA analog output signal
- Input:
 - Resistance thermometer (RTD)
 - Thermocouple (TC)
 - Resistance (Ω)
 - Voltage (mV)
- Online configuration using PC with SETUP connector

Features and Benefits

- Universally PC programmable for various signals
- Galvanic isolation
- 2-wire technology, (4 to 20) mA analog output
- High accuracy in total ambient temperature range
- Fault signal on sensor break or short circuit
- RFI/EMI Protected, **CE** marked
- **UL** US UL Recognized Component
- **SP** Intrinsically safe and non-incendive for hazardous locations
- **FM** Intrinsically safe and non-incendive for hazardous locations
- Online configuration during measurement using SETUP connector
- Output simulation

ORDER CODES

Unconfigured Order Number: 441-00^[1]

Example Configured Order Number:

4 4 1

1 J U - S (50-300) F

1

| CODE | DESCRIPTION |
|------|-------------------|
| 1 | Thermocouple (TC) |
| 2 | RTD (2-wire) |
| 3 | RTD (3-wire) |
| 4 | RTD (4-wire) |

2

| CODE | DESCRIPTION |
|------|---|
| J | Type J thermocouple |
| K | Type K thermocouple |
| T | Type T thermocouple |
| N | Type N thermocouple |
| E | Type E thermocouple |
| R | Type R thermocouple |
| S | Type S thermocouple |
| B | Type B thermocouple |
| 85 | 100 ohm platinum ($\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$) |
| 55 | 500 ohm platinum ($\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$) |
| 95 | 1000 ohm platinum ($\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$) |
| MV | Millivolts |
| W | Resistance |

[1] Default setting for unconfigured transmitter is 3-wire Pt100 (0 - 100) °C.

3

| CODE | DESCRIPTION |
|------|---|
| U | Upscale Burnout $\geq 21.0 \text{ mA}$ |
| D | Downscale Burnout $\leq 3.5 \text{ mA}$ |

4

| RANGE |
|--------------------------------|
| S (lower limit – upper limit) |

5

| CODE | DESCRIPTION |
|------|-------------|
| C | Celsius |
| F | Fahrenheit |

Accessories

| CODE | DESCRIPTION |
|-------|--|
| 10303 | Communication cable and software (USB) |
| 10307 | 35 mm DIN-rail mounting clip |

INPUT

Resistance Thermometer (RTD)

| TYPE | MEASUREMENT RANGE | MINIMUM RANGE |
|---|---|---------------|
| Pt100 ($\alpha = 0.00385\text{ }^{\circ}\text{C}^{-1}$) | (-200 to 850) °C [-328 to 1562] °F | 10° C [18 °F] |
| Pt500 | (-200 to 250) °C [-328 to 482] °F | 10° C [18 °F] |
| Pt1000 | (-200 to 250) °C [-328 to 482] °F | 10° C [18 °F] |
| Ni100 ($\alpha = 0.00618\text{ }^{\circ}\text{C}^{-1}$) | (-60 to 180) °C [-76 to 356] °F | 10° C [18 °F] |
| Ni500 | (-60 to 150) °C [-76 to 302] °F | 10° C [18 °F] |
| Ni1000 | (-60 to 150) °C [-76 to 302] °F | 10° C [18 °F] |
| Connection type | 2-, 3- or 4-wire connection cable. Resistance compensation possible in the 2-wire system (0 to 20) Ω | |
| Sensor cable resistance | maximum 11 Ω per cable | |
| Sensor current | $\leq 0.6\text{ mA}$ | |

Resistance (Ω)

| TYPE | MEASUREMENT RANGE | MINIMUM RANGE |
|-------------------------|---|-----------------------------|
| Resistance (Ω) | (10 to 400) Ω (10 to 2000) Ω | 10 Ω 100 Ω |

Thermocouples (TC)

| TYPE | MEASUREMENT RANGE | MINIMUM RANGE |
|--|--|-----------------|
| B (PtRh30-PtRh6) | (0 to 1820) °C [32 to 3308] °F | 500 °C [900 °F] |
| C (W5Re-W26Re) | (0 to 2320) °C [32 to 4208] °F | 500 °C [900 °F] |
| D (W3Re-W25Re) [3] | (0 to 2495) °C [32 to 4523] °F | 500 °C [900 °F] |
| E (NiCr-CuNi) | (-200 to 915) °C [-328 to 1679] °F | 50 °C [90 °F] |
| J (Fe-CuNi) | (-200 to 1200) °C [-328 to 2192] °F | 50 °C [90 °F] |
| K (NiCr-Ni) | (-200 to 1372) °C [-328 to 2501] °F | 50 °C [90 °F] |
| L (Fe-CuNi) [2] | (-200 to 900) °C [-328 to 1652] °F | 50 °C [90 °F] |
| N (NiCrSi-NiSi) | (-270 to 1300) °C [-454 to 2372] °F | 50 °C [90 °F] |
| R (PtRh13-Pt) | (0 to 1768) °C [32 to 3214] °F | 500 °C [900 °F] |
| S (PtRh10-Pt) | (0 to 1768) °C [32 to 3214] °F | 500 °C [900 °F] |
| T (Cu-CuNi) | (-200 to 400) °C [-328 to 752] °F | 50 °C [90 °F] |
| U (Cu-CuNi) [2] | (-200 to 600) °C [-328 to 1112] °F | 50 °C [90 °F] |
| MoRe5-MoRe41 [1] | (0 to 2000) °C [32 to 3632] °F | 500 °C [900 °F] |
| Cold junction | internal (Pt100) or external (0 to 80) °C [32 to 176] °F | |
| Cold junction accuracy | $\pm 1\text{ }^{\circ}\text{C}$ | |
| [1] no reference [2] according to DIN 43710 [3] according to ASTM E988 | | |

Voltage (mV)

| TYPE | MEASUREMENT RANGE | MINIMUM RANGE |
|----------------|-------------------|---------------|
| Millivolt (mV) | (-10 to 100) mV | 5 mV |

OUTPUT

Output (Analog)

| | |
|---------------------------|--|
| Output signal | (4 to 20) mA or (20 to 4) mA |
| Transmission as | Temperature linear, resistance linear, voltage linear |
| Maximum load | $(V_{\text{power supply}} - 8 \text{ V}) / 0.025 \text{ A}$ (current output) |
| Digital filter 1st degree | (0 to 8) s |
| Induced current required | $\leq 3.5 \text{ mA}$ |
| Current limit | $\leq 25 \text{ mA}$ |
| Switch on delay | 4 s (during power up $I_a = 3.8 \text{ mA}$) |
| Electronic response time | 1 s |

Failure Mode

| | |
|--|---|
| Undershooting measurement range | Decrease to 3.8 mA |
| Exceeding measurement range | Increase to 20.5 mA |
| Sensor breakage/short circuit ^[1] | $\leq 3.5 \text{ mA}$ or $\geq 21.0 \text{ mA}$ |

Electrical Connection

| | |
|-----------------------------|---|
| Power supply | $U_p = (8 \text{ to } 30) \text{ V}$ dc, polarity protected |
| Galvanic isolation (In/out) | $\hat{U} = 3.75 \text{ kV}$ ac |
| Allowable ripple | $U_{ss} \leq 5 \text{ V}$ at $U_p \geq 13 \text{ V}$, $f_{\text{max}} = 1 \text{ kHz}$ |

ACCURACY

| | |
|----------------------|---|
| Reference conditions | Calibration temperature $(23 \pm 5) \text{ }^\circ\text{C}$ [73 ± 9] $^\circ\text{F}$ |
|----------------------|---|

Resistance Thermometer (RTD)

| TYPE | MEASUREMENT ACCURACY |
|----------------|--|
| Pt100, Ni100 | $\pm 0.2 \text{ }^\circ\text{C}$ or 0.08% ^[2] |
| Pt500, Ni500 | $\pm 0.5 \text{ }^\circ\text{C}$ or 0.20% ^[2] |
| Pt1000, Ni1000 | $\pm 0.3 \text{ }^\circ\text{C}$ or 0.12% ^[2] |

Resistance (Ω)

| TYPE | MEASUREMENT ACCURACY | MEASUREMENT RANGE |
|------------|--|-----------------------|
| Resistance | $\pm 0.1 \Omega$ or 0.08% ^[2] | (10 to 400) Ω |
| | $\pm 1.5 \Omega$ or 0.12% ^[2] | (10 to 2000) Ω |

[1] Not for thermocouple

[2] % is related to the adjusted measurement range (the value to be applied is the greater)

ACCURACY (continued)

Thermocouple (TC)

| TYPE | MEASUREMENT ACCURACY |
|---|---|
| K, J, T, E, L, U N, C, D S, B, R MoRe5-MoRe41 | $\pm 0.5\text{ }^{\circ}\text{C}$ or 0.08% ^[1] $\pm 1.0\text{ }^{\circ}\text{C}$ or 0.08% ^[1] $\pm 2.0\text{ }^{\circ}\text{C}$ or 0.08% ^[1] |
| Influence of the internal reference junction | $\text{Pt100} \pm (0.30 + 0.005 t)\text{ }^{\circ}\text{C}$ t = value of temperature without regard to sign $^{\circ}\text{C}$ |

Voltage (mV)

| TYPE | MEASUREMENT ACCURACY | MEASUREMENT RANGE |
|----------------|---|-------------------|
| Millivolt (mV) | $\pm 20\text{ }\mu\text{V}$ or 0.08% ^[1] | (-10 to 100) mV |

General Accuracy

| | |
|--|--|
| Influence of power supply | $\pm 0.01\%/V$ deviation from 24 V ^[2] |
| Load influence | $\pm 0.02\%/100\ \Omega$ ^[2] |
| Temperature drift | Resistive thermometer (RTD): $T_d = \pm (15\text{ ppm}/^{\circ}\text{C} \times \text{range end value} + 50\text{ ppm}/^{\circ}\text{C} \times \text{measurement range}) \times \Delta$ \emptyset Resistive thermometer Pt100: $T_d = \pm (15\text{ ppm}/^{\circ}\text{C} \times (\text{range end value} + 200) + 50\text{ ppm}/^{\circ}\text{C} \times \text{measurement range}) \times \Delta$ \emptyset Thermocouple (TC): $T_d = \pm (50\text{ ppm}/^{\circ}\text{C} \times \text{range end value} + 50\text{ ppm}/^{\circ}\text{C} \times \text{measurement range}) \times \Delta$ \emptyset Δ = Deviation of the ambient temperature according to the reference condition \emptyset |
| Long term stability | $\leq 0.1\text{ }^{\circ}\text{C}/\text{year}$ ^[3] or $\leq 0.05\%/ \text{year}$ ^{[1][3]} |
| [1] % is related to the adjusted measurement range (the value to be applied is the greater) [2] All data is related to a measurement end value of 20 mA [3] Under reference conditions | |

INSTALLATION CONDITIONS

Ambient Conditions

| | |
|-----------------------|---|
| Ambient temperature | (-40 to 85) $^{\circ}\text{C}$ [-40 to 185] $^{\circ}\text{F}$ |
| Storage temperature | (-40 to 100) $^{\circ}\text{C}$ [-40 to 212] $^{\circ}\text{F}$ |
| Climatic class | To EN 60 654-1, Class C |
| Moisture condensation | Allowable |
| Vibration protection | 4 g / (2 to 150) Hz according to IEC 60 068-2-6 |
| EMC immunity | Interference immunity and interference emission as per EN 61 326-1 (IEC 1326) |

MECHANICAL CONSTRUCTION

| | |
|------------|---|
| Dimensions | <p>DIMENSIONS IN INCHES [mm]</p> <p>0.197 [5] (top hole diameter) 0.28 [7] (terminal hole diameter) 1.3 [33] (top hole offset) 1.73 [44] (total width) 0.89 [23] (height)</p> |
| Weight | approximately 40 g |
| Materials | Housing: Polycarbonate • Potting: Polyurethane |
| Terminals | 15 AWG (maximum) |

Terminal Connections

| | | | | |
|--|---------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <p>Power supply and current output</p> <p>2 (-) 1 (+)</p> <p>(8 to 30) V dc (4 to 20) mA</p> | <p>SETUP socket</p> | | | |
| <p>Sensor Connection</p> <p>6 5 4 3</p> | <p>TC</p> | <p>2-Wire RTD Ω</p> | <p>3-Wire RTD Ω</p> | <p>4-Wire RTD Ω</p> |

Remote Operation

| | |
|-------------------------|--|
| Configurable parameters | Sensor type and connection type, engineering units ($^{\circ}\text{C}/^{\circ}\text{F}$), measurement range, internal/external cold junction compensation, cable resistance compensation on 2 wire connection, fault conditioning, output signal (4 to 20) mA or (20 to 4) mA, digital filter (damping), offset, measurement point |
|-------------------------|--|

Approvals

| | |
|--|---|
| | Unit complies with the legal requirements set forth by the EU regulations. |
| | UL Recognized Component |
| | General Purpose and non-incendive for use in hazardous locations Class I, Division 2 Groups A, B, C and D |