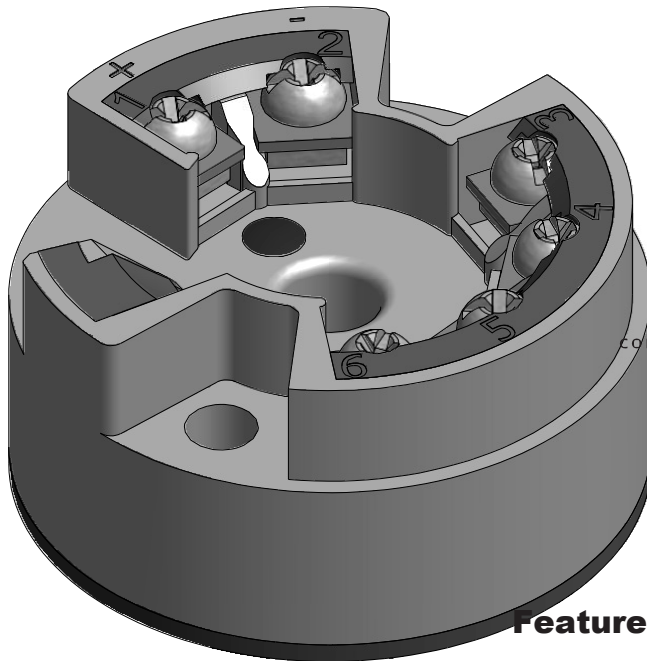


The Series 442 programmable HART® temperature transmitter is a 2-wire transmitter with an analog output. It has measurement input for resistance thermometers (RTD) in 2-, 3- or 4-wire connections, thermocouples, resistance and voltage inputs. The transmitter can be programmed with a PC or HART® protocol hand-held terminal. 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

Intrinsically safe universal head transmitter for resistance thermometers (RTD), thermocouples, resistance and voltage inputs, programmable using HART® protocol, for installation in a sensor head (Form B).



HART COMMUNICATION PROTOCOL

Features and Benefits

- Universal settings with HART® protocol 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, marked UL Recognized Component
- Intrinsically safe and non-incendive for hazardous locations
-  Intrinsically safe and non-incendive for hazardous locations
- Output simulation

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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 250) °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 30) Ω	
Sensor cable resistance	maximum 11 Ω per cable	
Sensor current	≤ 0.2 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)	(-270 to 1000) °C [-454 to 1832] °F	50 °C [90 °F]
J (Fe-CuNi)	(-210 to 1200) °C [-346 to 2192] °F	50 °C [90 °F]
K (NiCr-Ni)	(-270 to 1372) °C [-454 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)	(-50 to 1768) °C [-58 to 3214] °F	500 °C [900 °F]
S (PtRh10-Pt)	(-50 to 1768) °C [-58 to 3214] °F	500 °C [900 °F]
T (Cu-CuNi)	(-270 to 400) °C [-454 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	± 1 °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 75) mV	5 mV

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OUTPUT

Output (Analog)

Output signal	(4 to 20) mA or (20 to 4) mA
Transmission as	Temperature linear, resistance linear, voltage linear
Maximum load	$(V_{\text{power supply}} - 11.5\text{V}) / 0.022 \text{ A current output}$
Digital filter 1st degree	(0 to 60) 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]	$\leq 3.6 \text{ mA}$ or $\geq 21.0 \text{ mA}$
[1] Not for thermocouple	

Electrical Connection

Power supply	$U_p = (11.5 \text{ to } 30) \text{ V dc}$, polarity protected
Galvanic isolation (In/out)	$\hat{U} = 2 \text{ kV ac}$
Allowable ripple	$U_{ss} \leq 3 \text{ V}$ 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] $^\circ\text{F}$
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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	$\pm 0.1 \text{ } \Omega$ or 0.08% [2]	(10 to 400) Ω
	$\pm 1.5 \text{ } \Omega$ or 0.12% [2]	(10 to 2000) Ω

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

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ACCURACY (continued)

Thermocouple (TC)

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

Voltage (mV)

TYPE	MEASUREMENT ACCURACY	MEASUREMENT RANGE
Millivolt (mV)	± 20 µV or 0.08% ^[1]	(-10 to 100) mV

General Accuracy

Influence of power supply	± 0.01%/V deviation from 24 V ^[2]
Load influence	± 0.02%/100 Ω ^[2]
Temperature drift	Resistive thermometer (RTD): $T_d = \pm (15 \text{ ppm/}^\circ\text{C} \times \text{range end value} + 50 \text{ ppm/}^\circ\text{C measurement range}) \times \Delta$
	Resistive thermometer Pt100: $T_d = \pm (15 \text{ ppm/}^\circ\text{C} \times (\text{range end value} + 200) + 50 \text{ ppm/}^\circ\text{C} \times \text{measurement range}) \times \Delta$
	Thermocouple (TC): $T_d = \pm (50 \text{ ppm/}^\circ\text{C} \times \text{range end value} + 50 \text{ ppm/}^\circ\text{C measurement range}) \times \Delta$
	$\Delta = \text{Deviation of the ambient temperature according to the reference condition}$
Long term stability	≤ 0.1 °C/year ^[3] or ≤ 0.05%/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) °C [-40 to 185] °F
Storage temperature	(-40 to 100) °C [-40 to 212] °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)

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MECHANICAL CONSTRUCTION

Dimensions	<p>DIMENSIONS IN INCHES [mm]</p> <p>0.197 [5] (top diameter) 0.28 [7] (terminal diameter) 1.3 [33] (height) 1.73 [44] (total height) 0.89 [23] (width)</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 (-) (11.5 to 30) V dc 1 (+) (4 to 20) mA</p>	HART® Communication on (4 to 20) mA
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<p>Sensor Connection</p>	<p>TC</p>	<p>2-Wire RTD</p>	<p>3-Wire RTD</p>	<p>4-Wire RTD</p>
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Remote Operation

Configurable parameters	Sensor type and connection type, engineering units (°C/°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
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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

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ORDER CODES

Unconfigured Order Number: 442-00^[1]

Example Configured Order Number:

4 4 2 - **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

2

3

1 J U

4

5

S (50-300) F

3

CODE	DESCRIPTION
U	Upscale Burnout $\geq 21.0 \text{ mA}$
D	Downscale Burnout $\leq 3.6 \text{ mA}$

4

RANGE
S (lower limit – upper limit)

5

CODE	DESCRIPTION
C	Celsius
F	Fahrenheit

Accessories

CODE	DESCRIPTION
10307	35 mm DIN rail mounting clip

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

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