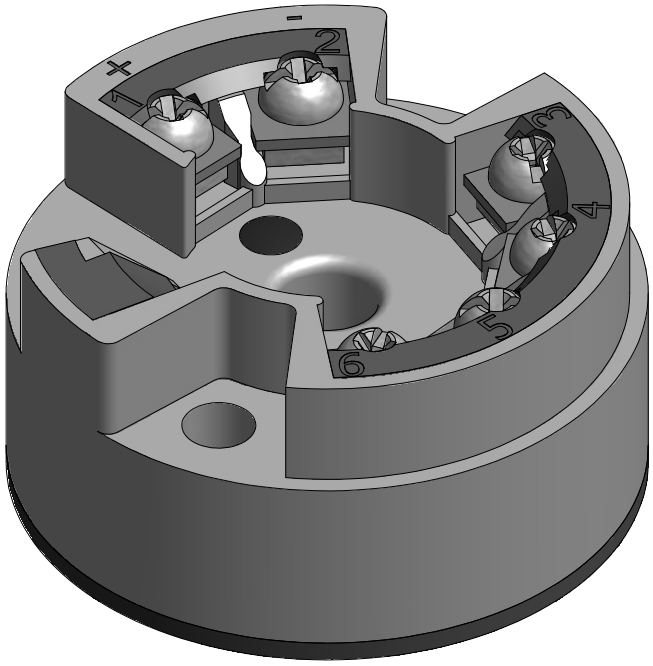
The Series 441 programmable temperature transmitter is a 2-wire transmitter with an analog output. It has measurement input for resistance thermometers (RTD) in 2-, 3- or 4-wire connections, thermocouples, resistance and voltage inputs. Setting up of the transmitter is done using the communication cable. 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
- c UL us UL Recognized Component
- CSA 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

© 2006 Pyromation, Inc.

ORDER CODES

Unconfigured Order Number: **441-00[1]**

Example Configured Order Number:

1	2	3		4	5
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 (α = 0.003 85 $^{\circ}C^{-1}$)
55	500 ohm platinum (α = 0.003 85 $^{\circ}C^{-1}$)
95	1000 ohm platinum (α = 0.003 85 $^{\circ}C^{-1}$)
MV	Millivolts
W	Resistance

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

3

CODE	DESCRIPTION
U	Upscale Burnout ≥ 21.0 mA
D	Downscale Burnout ≤ 3.5 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

© 2006 Pyromation, Inc.

INPUT

Resistance Thermometer (RTD)

TYPE	MEASUREMENT RANGE		MINIMUM RANGE
Pt100 (α = 0.003 85 $^{o}C^{-1}$) Pt500 Pt1000	(-200 to 850) °C (-200 to 250) °C (-200 to 250) °C	[-328 to 1562] °F [-328 to 482] °F [-328 to 482] °F	10° C [18 °F] 10° C [18 °F] 10° C [18 °F]
Ni100 (α = 0.006 18 $^{o}C^{-1}$) Ni500 Ni1000	(-60 to 180) °C (-60 to 150) °C (-60 to 150) °C	[-76 to 356] °F [-76 to 302] °F [-76 to 302] °F	10° C [18 °F] 10° C [18 °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	≤ 0.6 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	± 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 100) mV	5 mV

© 2006 Pyromation, Inc.

OUTPUT

Output (Analog)

Output signal	(4 to 20) mA or (20 to 4) mA
Transmission as	Temperature linear, resistance linear, voltage linear
Maximum load	($V_{power\ supply}$ - 8 V) / 0.025 A (current output)
Digital filter 1st degree	(0 to 8) s
Induced current required	≤ 3.5 mA
Current limit	≤ 25 mA
Switch on delay	4 s (during power up I_a = 3.8 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]	≤ 3.5 mA or ≥ 21.0 mA

Electrical Connection

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

ACCURACY

Reference conditions	Calibration temperature (23 ± 5) °C [73 ± 9] °F

Resistance Thermometer (RTD)

TYPE	MEASUREMENT ACCURACY
Pt100, Ni100 Pt500, Ni500 Pt1000, Ni1000	0.2 °C or 0.08% [2] 0.5 °C or 0.20% [2] 0.3 °C or 0.12% [2]

Resistance (Ω)

TYPE	MEASUREMENT ACCURACY	MEASUREMENT RANGE
Resistance	± 0.1 Ω or 0.08% [2]	(10 to 400) Ω
	± 1.5 Ω 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)

pyromation inc.

© 2006 Pyromation, Inc.

ACCURACY (continued)

Thermocouple (TC)

TYPE	MEASUREMENT ACCURACY
K, J, T, E, L, U N, C, D S, B, R MoRe5-MoRe41	0.5 °C or 0.08% [1] 1.0 °C or 0.08% [1] 2.0 °C or 0.08% [1]
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

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 = ± (15 ppm/°C × range end value + 50 ppm/°C × measurement range) × $\Delta\vartheta$ Resistive thermometer Pt100: T_d = ± (15 ppm/°C × (range end value + 200) + 50 ppm/°C × measurement range) × $\Delta\vartheta$ Thermocouple (TC): T_d = ± (50 ppm/°C × range end value + 50 ppm/°C × measurement range) × $\Delta\vartheta$ $\Delta\vartheta$ = 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	

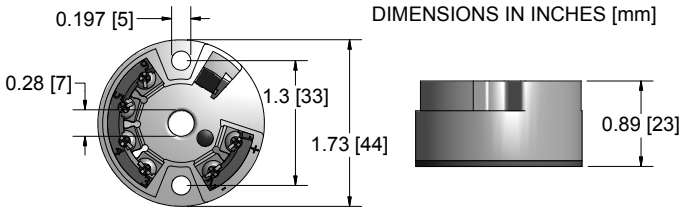
INSTALLATION CONDITIONS

Ambient Conditons

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)

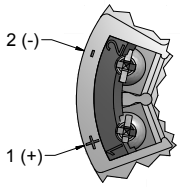
© 2006 Pyromation, Inc.

MECHANICAL CONSTRUCTION

Dimensions	
Weight	approximately 40 g
Materials	Housing: Polycarbonate • Potting: Polyurethane
Terminals	15 AWG (maximum)

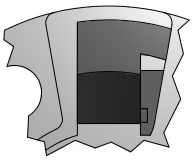
Terminal Connections

Power supply and current output

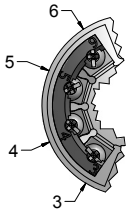


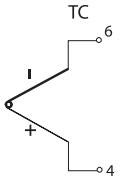
(8 to 30) V dc
(4 to 20) mA

SETUP socket

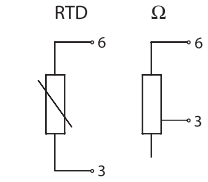


Sensor Connection

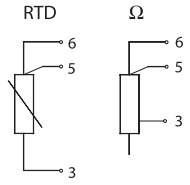




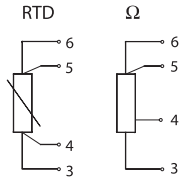
2-Wire



3-Wire



4-Wire



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 identification (8 characters), output simulation

Approvals

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

© 2006 Pyromation, Inc.