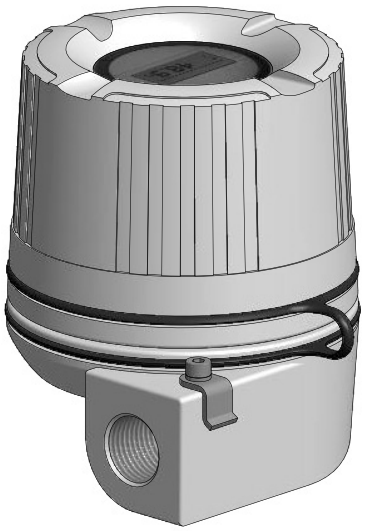
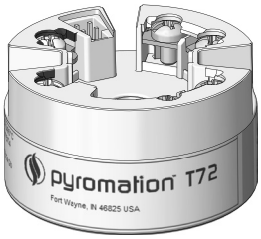
The T72 programmable HART® temperature transmitter is a 2-wire transmitter with an analog output. It has measurement input for resistance thermometers (RTD) in 2-, 3- or 4-wire connections, thermocouples, resistance and voltage inputs. The transmitter can be programmed with a PC, HART® protocol hand-held terminal, or Bluetooth® configuration option. 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.

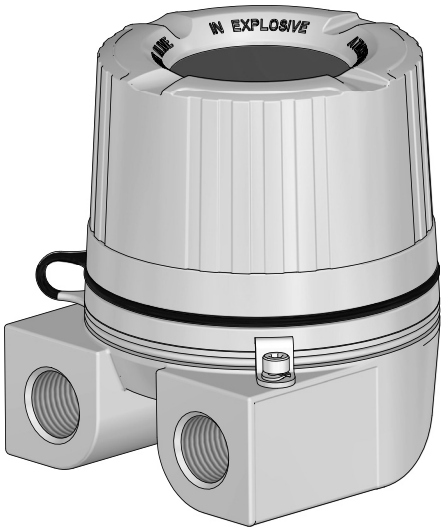
TEMPERATURE HEAD TRANSMITTER

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

- PC programmable temperature transmitter for converting various input signals into a scalable (4 to 20) mA analog output signal
- Universal settings for Input types:
  Resistance thermometer (RTD)
  Thermocouple (TC)
  Resistance (Ω)
  Voltage (mV)
- HART® protocol for operating the device on site with handheld communicator or remotely via a PC
- Optional Display with direct mount or remote mount housing
- Optional Bluetooth® configuration
- HART® 7 protocol

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- CE Marked meets EMC and ROHS Directive (RED with Bluetooth®)
- cULus For use in ordinary locations for US and Canada meets 61010-1
- Galvanic isolation
- cULus Intrinsically safe for hazardous locations
- Ex ia IIC T6...T4Ga
- Ex ia IIC T6...T4Gb
- Class I, Zone 0, AEx ia IIC T6...T4Ga
- Class I, Zone 1, AEx ia IIC T6...T4Gb
- IS Class I, Division 1, Groups A,B,C,D T6...T4
- IS Class I, Division 2, Groups A,B,C,D T6...T4
- cULus Explosion-proof for hazardous locations
- With 79 enclosure
- Class I, Division 1, Groups A,B,C,D; T6...T4
- Class II, Division 1, Groups E, F, G; Class III

ORDER CODES

Example Configured Order Number:

1-0	2-0	3-0	4-0		5-0	6-0		7-0
T72-00	1	J	U	-	S (50-300)	F	-	B

1-0 Transmitter Type

CODE	DESCRIPTION
T72-00	(4 to 20) mA isolated Programmable HART® transmitter
T72-D10	(4 to 20) mA isolated Programmable HART® transmitter with digital display
36T72-D10	(4 to 20) mA isolated Programmable HART® transmitter with digital display and general purpose aluminum housing with glass window
79T72A-D10	(4 to 20) mA isolated Programmable HART® transmitter with digital display: aluminum housing with glass window. Intrinsic Safety: Ex ia [ia Ga] IIC Gb; Class I, Zone 1, AEx ia [ia Ga] IIC T6...T4 Gb; Class I, Division 2, Groups A,B,C,D T6...T4 - NIFW; Class I, Division 2, Groups A,B,C,D;T6…T4 – NIFW and Associated Apparatus for Class I, Division 1, Groups A,B,C,D
79T72B-D10	(4 to 20) mA isolated Programmable HART® transmitter with digital display: Explosion-proof, Dust Ignitionproof aluminum housing with glass window. Class I, Division 1, Groups A,B,C,D; Class II, Division 1 Groups E,F,G; Class III

2-0 Configuration Input

CODE	DESCRIPTION
00[1]	Unconfigured
1	Thermocouple (TC)
2	RTD (2-wire)
3	RTD (3-wire)
4	RTD (4-wire)

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

Accessories

CODE	DESCRIPTION
10303	Communication Cable
10307	35 mm DIN rail mounting clip

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3-0 Sensor Input

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

4-0 Fault Condition

CODE	DESCRIPTION
U	Upscale Burnout ≥ 21.0 mA
D	Downscale Burnout ≤ 3.6 mA

5-0

RANGE
S (lower limit – upper limit)

6-0 Unit of Measure

CODE	DESCRIPTION
C	Celsius
F	Fahrenheit

7-0 Options

CODE	DESCRIPTION
B[1]	Bluetooth® (APP) Configuration

[1] Bluetooth® interface is only active if display is not attached.

INPUT

Complete Specifications are listed in the T72 Manual available at www.pyromation.com/TechInfo/Docs/aspx or scan QR code

Resistance Thermometer (RTD)

AS PER STANDARD	DESIGNATION	MEASURING RANGE LIMITS	MINIMUM SPAN
IEC 60751	Pt100 (α = 0.003 85 °C^{-1}) Pt1000 (α = 0.003 85 °C^{-1})	(-200 to 850) °C [-328 to 1562] °F (-200 to 250) °C [-328 to 482] °F	(10) °C [18] °F (10) °C [18] °F
JIS C1604:1984	Pt100 (α = 0.003 92 °C^{-1})	(-200 to 510) °C [-328 to 950] °F	(10) °C [18] °F
	Pt100 (Callendar van Dusen)	The measuring range limits are specified by entering the limit values that depend on the coefficients A to C and R0.	(10) °C [18] °F
	Connection Type: 2-, 3- or 4-wire connection, sensor current: ≤ 0.3 mA With 2-wire circuit, compensation of wire resistance possible (0 to 30 Ω) With 3- and 4-wire connection, sensor wire resistance up to maximum 50 Ω per wire		
Resistance Transmitter	Resistance Ω	(10 to 400) Ω (10 to 2000) Ω	10 Ω 10 Ω

Thermocouples (TC)

AS PER STANDARD	DESIGNATION	MEASURING RANGE LIMITS	RECOMMENDED TEMPERATURE RANGE	MINIMUM SPAN
IEC 60584-1, ASTM E230	B (PtRh30-PtRh6) E (NiCr-CuNi) J (Fe-CuNi) K (NiCr-Ni) N (NiCrSi-NiSi) R (PtRh13-Pt) S (PtRh10-Pt) T (Cu-CuNi)	(40 to 1820) °C [104 to 3308] °F (-250 to 1000) °C [-482 to 1832] °F (-210 to 1200) °C [-346 to 2192] °F (-270 to 1372) °C [-454 to 2501] °F (-270 to 1300) °C [-454 to 2372] °F (-50 to 1768) °C [-58 to 3214] °F (-50 to 1768) °C [-58 to 3214] °F (-200 to 400) °C [-328 to 752] °F	(500 to 1820) °C [932 to 3308] °F (-150 to 1000) °C [-238 to 1832] °F (-150 to 1200) °C [-238 to 2192] °F (-150 to 1200) °C [-238 to 2192] °F (-150 to 1300) °C [-238 to 2372] °F (50 to 1768) °C [122 to 3214] °F (50 to 1768) °C [122 to 3214] °F (-150 to 400) °C [-238 to 752] °F	(50) °C [90 °F] (50) °C [90 °F] (50) °C [90 °F] (50) °C [90 °F] (50) °C [90 °F] (50) °C [90 °F] (50) °C [90 °F] (50) °C [90 °F]
DIN 43710	U (Cu-CuNi)	(-200 to 600) °C [-328 to 1112] °F	(-150 to 600) °C [-238 to 1112] °F	(50) °C [90 °F]
	Internal reference junction (Pt100) External preset value: Configurable value (-40 to 85) °C [-40 to 185] °F Maximum sensor wire resistance 10 kΩ (If the sensor wire resistance is greater than 10 kΩ, an error message is output in accordance with NAMUR NE89.)			
Voltage transmitter (mV)	Millivolt transmitter (mV)	(-20 to 100) mV	-	5 mV

OUTPUT

Output Signal

Analog Output	(4 to 20) mA or (20 to 4) mA (can be inverted)
Transmission as	Temperature linear, resistance linear, voltage linear
Filter 1st	1st order digital filter: (0 to 120) s
Current Consumption	3.6 to 23 mA
-	Minimum Current Consumption 3.5 mA
-	Current Limit ≤ 23 mA
Switch on delay	≤ 7 s, until the first valid measured value signal is present at the current output and until start of HART® communication. While switch-on delay = I_a ≤ 3.8 mA
Electronic response time	1 s

Failure Mode per NAMUR NE43

Undershooting measurement range	Linear decrease from 4.0 to 3.8 mA
Exceeding measurement range	Linear increase from 20.0 to 20.5 mA
Sensor breakage/short circuit [1]	≤ 3.6 mA or ≥ 21.0 mA

Electrical Connection

Supply Voltage[1]	Values for non-hazardous areas, protected against polarity reversal: 10 V ≤ Vcc ≤ 36 V
Galvanic isolation (In/out)	Û = 2 kV AC for 1 minute (input/output)
[1] Values for hazardous area, see Ex Documentation	

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OUTPUT (continued)

Protocol-specific data

Manufacturer ID	181 (0xB5)
Device type ID	0xB583
HART®-specification	7
Device address in multi-drop mode	Software setting addresses 0 to 63
Device description files (DTM,DD)	Information and files available at: www.fieldcommgroup.org
HART load	min. 250 Ω

Wireless HART data

Minimum starting voltage	10 V
Start-up current	3.58 mA
Starting time	7 s
Minimum operating voltage	10 V_{DC}
Multidrop current	4.0 mA
Time for connection setup	9 s

ACCURACY

Resistance thermometers (RTD) as per standard

STANDARD	DESIGNATION	MEASURING RANGE	TYPICAL MEASURED ERROR (±)
			Value at current output
IEC 60751	Pt100	(0 to 200) °C [32 to 392] °F	(0.10) °C [0.18] °F
	Pt1000		(0.08) °C [0.14] °F
JIS C1604:1984	Pt100		(0.10) °C [0.18] °F
Resistance Ω	10 to 400 Ω	(10 to 200) Ω	(0.06) Ω
	10 to 2000 Ω	(10 to 1000) Ω	(0.32) Ω

Thermocouples (TC) as per standard

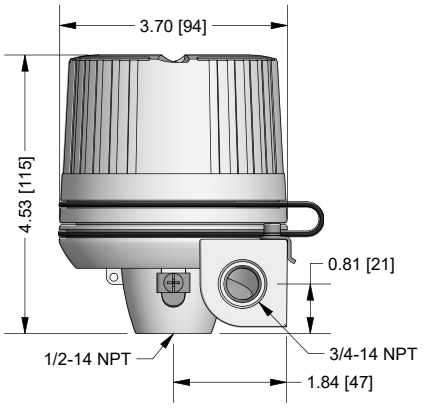
STANDARD	DESIGNATION	MEASURING RANGE	TYPICAL MEASURED ERROR (±)
			Value at current output
IEC 60584-1 ASTM E230-2003	Type B	(0 to 800) °C [32 to 1472] °F	(1.61) °C [2.9] °F
	Type E		(0.34) °C [0.61] °F
	Type J		(0.39) °C [0.70] °F
	Type K		(0.51) °C [0.92] °F
	Type N		(0.62) °C [1.12] °F
	Type R		(1.43) °C [2.57] °F
	Type S		(1.45) °C [2.61] °F
	Type T	(0 to 300) °C [32 to 572] °F	(0.33) °C [0.59] °F
Voltage (mV)	-20 to 100 mV	(0 to 50) mV	25 µV

INSTALLATION CONDITIONS

Environment

Ambient temperature	(-40 to 85) °C [-40 to 185] °F (For hazardous areas see EX documentation)
Storage temperature	(-50 to 100) °C [-58 to 212] °F
Climatic class	To EN 60654-1, Class C1
Moisture condensation	Allowable
Shock and Vibration protection	Per DNVGL-CG-0339 and DIN EN 60068-2-27 - (2 to 100) Hz at 4g
EMC immunity (CE conformity)	Interference immunity and interference emission as per EN 61 326-1 (IEC 1326)
Altitude	up to 4000M (4374.5 yards) above sea level
Over voltage	Over voltage category II
Pollution degree	Pollution degree 2

MECHANICAL CONSTRUCTION

<table>
<tr>
<td>Dimensions</td>
<td>Option 36
 
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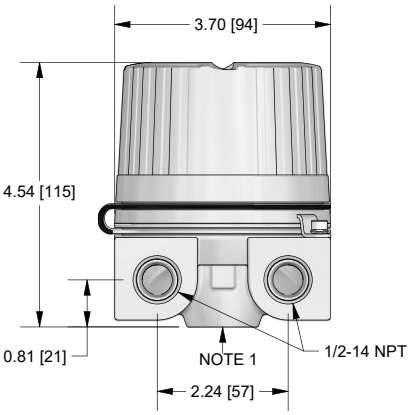
<td>Option 79
 
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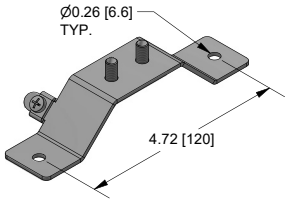
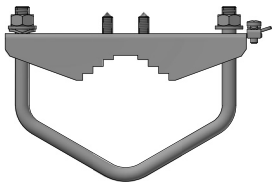
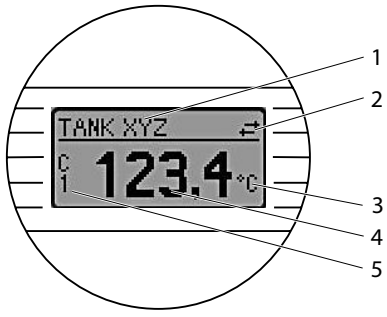
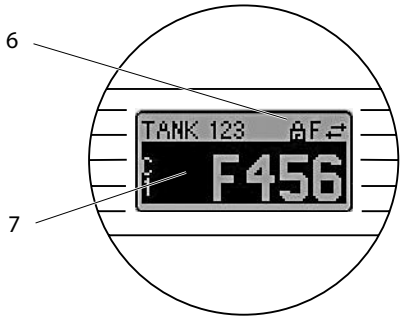
<td> 

Option 79 Wall Mount P/N #22808
 
FITS 1" - 2" OD PIPE
Option 79 Pipe Mount P/N #22809</td>
</tr>
<tr><td>Weight</td><td colspan="3">Approximately 31 ounces</td></tr>
<tr><td>Materials</td><td colspan="3">Aluminum with Polyester coating, Nema 4x, IP66/67</td></tr>
<tr><td colspan="4">Note 1: Series 79 has mounting holes for wall mount or pipe mount bracket</td></tr>
</table>

Display Elements





Item 1: Displays the TAG
Item 2: 'Communication' symbol
Item 3: Unit display
Item 4: Measured value display
Item 5: Value/channel display S1, S2, DT, PV, I, %
Item 6: 'Configuration locked' symbol
Item 7: Status signals

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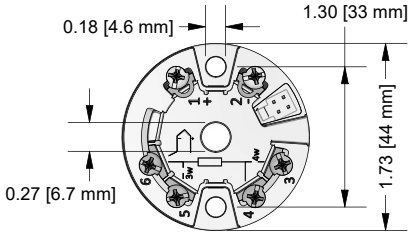
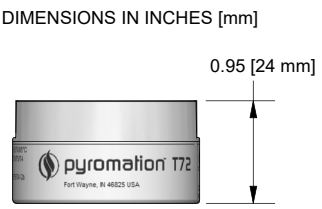
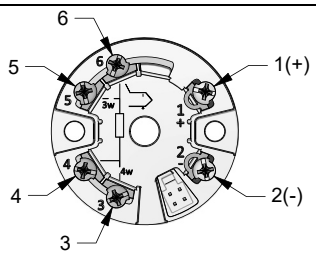
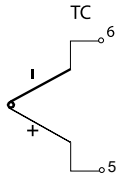
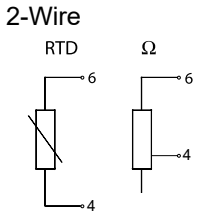
MECHANICAL CONSTRUCTION (continued)

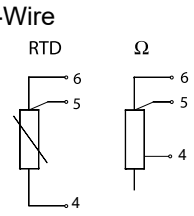
Dimensions	 
Weight	approximately 40 g
Materials	Housing: Polycarbonate • Potting: Polyurethane
Terminals	14 AWG (maximum)

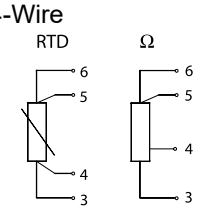
Terminal Connections











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 SP US	For General Purpose use
C SP US	No display: Class I / Division 1 / Groups ABCD Class I, Zone 0 (EPL Ga), IIC Ex ia IIC Ga; AEx ia IIC Ga
C SP US	With display: Class I / Division 2 / Groups ABCD Class I, Zone 1 (EPL Gb), IIC Ex ia IIC Gb; AEx ia IIC Gb
C SP US	With 79 Enclosure - XP: Class I, Division 1, Groups A,B,C,D: Class II, Division 1, Groups E,F,G; Class III
C SP US	With 79 Enclosure - I.S.: Class I, Division 2, Groups A,B,C,D: NIFW and associated apparatus for Class I, Division 1, Groups A,B,C,D
HART® Certification	The temperature transmitter is registerd by the HART® Communication Foundation. The device meets the requirements of the HART® Communication Protocol Specifications, Revision 7.
Radio Approval	This device with Bluetooth® radio approval is in accordance with US FCC Part 15 Rules; and Canada IC Rules.
	Europe - this device meets the requirements of the EMC Directive 2014/30/EU; and Radio Equipment Direct (RED) 2014/53/EU (with Bluetooth®)

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