SERIES T Differential Pressure Transmitters

DESCRIPTION

The Series T family of differential pressure transmitters measure low pressures and feature low power consumption and a variety of analog signal outputs. A wide selection of standard pressure ranges and electrical ratings is available.

These transmitters feature: no moving parts to wear out, reliable long term stability, and are virtually position insensitive.

The Series T transmitters are an excellent choice for many HVAC, process and automation monitoring requirements. These transmitters monitor: filter differential pressures, fan static pressures, clean room pressures, variable air volume systems and velocity pressures. They have been used for bubbler level systems, leak detection and in medical and analytical instruments.

The transmitters are housed in a flame retardant, glass-reinforced polyphenylene oxide (NORYL[™]) case. Electrical connections are made by means of a 3/8" terminal strip with #6 screws.

The Series T includes four models: Model T10, Model T20, Model T30 and Model T40. These four models incorporate a variety of power and signal options.

The span or zero adjustment is performed with a 20-turn potentiometer for fine resolution.

	3-Wire		2-Wire			
T10	DC Voltage In	T30	DC Voltage In			
	DC Voltage Out		4 - 20 mA Out			
	4-Wire		4-Wire			
T20	24, 120, or 240 Vac In	T40	24, 120, 240 Vac In			
	DC Voltage Out		4 -20 mA Out			

OPERATION

The pressure sensing element is a differential capacitance cell for pressure measurements ranging from 0.1 to 5 inches of water (25 Pa to 1.0 kPa), or piezoresistive (silicon) sensors for pressure measurements ranging from 5 inches of water to 30 psi (1.0 kPa to 200 kPa).

The capacitance cell is capable of sensing very low pressures, negative or differential. A very light weight, responsive diaphragm within the cell deflects a small amount when a small pressure is applied. This deflection results in a change in capacitance which is then detected and amplified electronically.

The piezoresistive sensor is a solid state device designed in a Wheatstone bridge configuration. When pressure is applied to the device the resistance of the bridge changes by a small amount. This resistance change is converted to a voltage and amplified.



SPECIFICATIONS

General

Measures differential, gage pressure, or vacuum Suitable for air or inert gases Maximum safe momentary overpressure: see reference table A

Performance

Accuracy: ± 1% of span (including non-linearity and hysteresis) Calibration: (Traceable to N.I.S.T.)

Environmental

Operating temperature range: 0°C to 45°C (32°F to 115°F) Storage temperature: -30°C to 70°C (-20°F to 160°F) Effect of temperature

on zero: ±0.05%/°C

on span: ±0.02%/°C Operating humidity range: 10% to 90% R.H. non-condensing Shock resistance: 10G (11ms) Vibration resistance: 5G to 50 Hz

Electrical Connections

Connections: External 3/8" terminal strip with #6 screws

Physical

Pressure port connections: 3/16" dia. suitable for:

1/8" I.D. Tygon[™] or polyurethane tubing (3 - 4mm) 1/4" O.D. polyethylene tubing (6mm)

Integral filters at both ports

Dimensions: 3.00"W x 5.15"L x 1.40"H (76 x 131 x 36mm)

Material: Flame retardant, glass-reinforced polyphenylene oxide

(NORYL[™]) case Weight: 0.42 lb max (190 g)

MODEL T10

DC Power Input/Voltage Output

Diagram shows area of detail. Please see inset diagrams for wiring of each individual model below.



SPECIFICATIONS

Electrical

Supply Voltage: 11 to 32 Vdc (14.5 to 32 Vdc for 10 Volts output) Protected against reversal of polarity Supply Current: 10mA Output:

0 to 5 Volts, linear 0 to 10 Volts, linear Sink or source 3.5mA Protected against short circuit



Terminal 1 is common to both the DC power supply and the output signal. Terminal 2 is positive DC supply voltage. Terminal 3 is positive signal voltage.

MODEL T20

AC Power Input/Voltage Output

SPECIFICATIONS

Electrical

Transformer isolation between power supply and output is 2500 Vrms Output voltage:

0 to 5 Volts, or 0 to 10 Volts Sink or source 3.5mA Protected against short circuit



Terminals 1 and 2 are AC power input. Terminals 3 and 4 are DC voltage output.

ORDERING INFORMATION

Order Number (See Table below and Reference Table A on page 26) T20 - PPP - S - V - O

EXAMPLE: T20 - 07P - C - X - B

PPP = Pressure Range	<mark>S</mark> = Supply Voltage	V = Voltage Output	0 = Offset (See Note 1)
See Table Reference A	C = 24 Vac	5 = 0 to 5 Volts	- = No offset
	D = 120 Vac	X = 0 to 10 Volts	A = 1/4 offset
	E = 240 Vac		B = 1/2 offset

ORDERING INFORMATION

Order Number (See Table below and Reference Table A on page 26) T10 - PPP - V - O

EXAMPLE: T10 - 01E - 5 - A

PPP = Pressure Range	V = Voltage Output	0 = Offset
		(See Note 1)
See Reference Table A	5 = 0 to 5 Volts	- = No offset
	X = 0 to 10 Volts	A = 1/4 offset
		B = 1/2 offset

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MODEL T30

Two Wire / 4-20mA Output

SPECIFICATIONS

Electrical

Supply Voltage: 11 to 32 Vdc (See diagram below for maximum loop resistance) Protected against reversal of polarity Output limited to approx. 3.85mA at low end of span and approx. 25mA at upper end of span



ORDERING INFORMATION

Wire

Order Number (See Table below and Reference Table A on page 26) T30 - PPP - 0

EXAMPLE: T30 - 06E - B

PPP = Pressure Range	0 = Offset					
	(See Note 1)					
See Reference Table A	- = No offset					
	A = 1/4 offset					
	B = 1/2 offset					

NOTES

Note 1:

If the measured differential pressure is expected to go from positive to negative, a transmitter with offset (elevated zero) should be ordered. Three options are available:

"-" No offset. At zero differential pressure the output signal is:

4mA (4 to 20mA range)

OV (0 to 5V range)

OV (0 to 10V range)

Pressure excursion: 0% to 100% of Range, see Table A

"A" 1/4 span offset. At zero differential pressure the output signal is: 8mA (4 to 20mA range) 1.25V (0 to 5V range) 2.5V (0 to 10V range)

Pressure excursion: -33% to 100% of Range, see Table A

MODEL T40

AC Power Input / 4-20mA Output

SPECIFICATIONS

Electrical

Nominal Input Voltage	Power Consumption	Operating Voltage Range
24 Vac, 50/60Hz	1.5W	20 to 30 Vac
120 Vac, 50/60Hz	1.5W	100 to 140 Vac
240 Vac, 50/60Hz	1.5W	200 to 260 Vac

Transformer isolation between power supply and output is 2500 Vrms Receiver resistance can be from 0 to 600 Ohms Output limited to approx. 27mA at the upper end of span



ORDERING INFORMATION

Order Number (See Table below and Reference Table A on page 26) T40 - PPP - S - O

EXAMPLE: T40 - 03M - E - B

PPP = Pressure Range	<mark>S</mark> = Supply Voltage	0 = Offset
		(See Note 1)
See Reference Table A	C = 24 Vac	- = No offset
	D = 120 Vac	A = 1/4 offset
	E = 240 Vac	B = 1/2 offset

"B" 1/2 span offset. At zero differential pressure the output signal is: 12mA (4 to 20mA range) 2.5V (0 to 5V range) 5V (0 to 10V range) Pressure excursion: -100% to 100% of Range see Table A

To order: determine the positive pressure range; from Table A find the corresponding pressure code, then add the required offset (none, A, or B).

For example, T30 05E A is a transmitter with a maximum range of 1" of H₂O at 20mA and a minimum range of -0.33" of H₂O at 4mA.

TABLE A—STANDARD PRESSURE RANGES

	ENGLISH				METRI	METRIC UNITS			
Pressure	Pressure Range	Max. Safe Momentary	Pressure	Pressure Range	Max. Safe Momentary	Pressure	Pressure Range	Max. Safe Momentary	
Code	English	Overpressure	Code	Pascals	Overpressure	Code	Pascals	Overpressure	
01E	0-0.100 in. H ₂ 0		01P	0-25.0 Pa		01M	0-2.50 mm H ₂ 0		
02E	0-0.200 in. H ₂ 0	5 in. H ₂ 0	02P	0-50.0 Pa	1.25 kPa	02M	0-5.00 mm H ₂ 0	125 mm	
03E	0-0.300 in. H ₂ 0		03P	0-75.0 Pa		03M	0-7.50 mm H ₂ 0		
04E	0-0.500 in. H ₂ 0		04P	0-100.0 Pa		04M	0-10.00 mm H ₂ 0		
05E	0-1.00 in. H ₂ 0		05P	0-250 Pa		05M	0-25.0 mm H ₂ 0		
06E	0-2.00 in. H ₂ 0	20 in. H ₂ 0	06P	0-500 Pa	5 kPa	06M	0-50.0 mm H ₂ 0	500 mm	
07E	0-3.00 in. H ₂ 0		07P	0-750 Pa		07M	0-75.0 mm H ₂ 0		
08E	0-5.00 in. H ₂ 0		08P	0-1.00 kPa		08M	0-100 mm H ₂ 0		
09E	0-10.0 in. H ₂ 0	5 psid	09P	0-2.50 kPa	35 kPa	09M	0-250 mm H ₂ 0	3.5 m	
11E	0-20.0 in. H ₂ 0		11P	0-5.00 kPa		11M	0-500 mm H ₂ 0		
12E	0-30.0 in. H ₂ 0		12P	0-7.50 kPa		12M	0-750 mm H ₂ 0		
13E	0-50.0 in. H ₂ 0		13P	0-10.0 kPa		13M	0-1.00 m H ₂ 0		
14E	0-100 in. H ₂ 0	15 psid	14P	0-25.0 kPa	100 kPa	14M	0-2.5 m H ₂ 0	10 m	
15E	0-1.00 psid		15P	0-50.0 kPa		15M	0-5.0 m H ₂ 0		
16E	0-2.00 psid		-	-		-	-		
17E	0-3.00 psid		-	-		-	-		
18E	0-5.00 psid		-	-		-	-		
19E	0-15.0 psid	30 psid	16P	0-100 kPa	200 kPa	16M	0-10.0 m H ₂ 0	20 m	
20E	0-30.0 psid	60 psid	17P	0-200 kPa	400 kPa	17M	0-20.0 m H ₂ 0	40 m	

TABLE B—STANDARD PRESSURE RANGES FOR W SERIES

	ENGLISH UNIT	S	METRIC UNITS					
Pressure Code	Differential Pressure Range, psid	Operating Static Pressure, psi	Pressure Code	Differential Pressure Range, kPA	Operating Static Pressure, psi	Pressure Code	Differential Pressure Range, k mm H ₂ 0	Operating Static Pressure k mm H ₂ 0
31E	0-6 psid		31P	0-50 kPa		31M	0-5.0 k mm H ₂ 0	
32E	0-10 psid	0-100 nsi*	32P	0-75 kPa	0 - 700 kPa*	32M	0-7.5 k mm H ₂ 0	0-70 k mm H ₂ 0
33E	0-15 psid	0 100 poi	33P	0-100 kPa		33M	0-10 k mm H ₂ 0	
34E	0-30 psid		34P	0-200 kPa		34M	0-20 k mm H ₂ 0	
35E	0-60 psid		35P	0-500 kPa	0.000015.i	35M	0-50 k mm H ₂ 0	0.200 k mm H 0
36E	0-100 psid	0 - 300 psi*	36P	0-750 kPa	0 - 2000 kPa*	36M	0-75 k mm H ₂ 0	0-200 K 11111 1120
37E	0-150 psid		37P	0-1000 kPa		37M	0-100 k mm H ₂ 0	
38E	0-200 psid		38P	0-1500 kPa		38M	0-150 k mm H ₂ 0	

* Maximum safe momentary overpressure at any port is 2X the maximum operating static pressure

TABLE C—STANDARD PRESSURE RANGES FOR MANOMETER

	ENG	LISH					METRIC	C UNITS			
Pressure	Pressure	Displayed	Max. Safe	Pressure	Pressure Range	Displayed	Max. Safe Momentary	Pressure	Pressure Range	Displayed	Max. Safe Momentarv
Code	Range	Units	Overpass	Code	Pascals	Units	Overpass	Code	mm of H_2O	Units	Overpass
01E	0-0.100 in. H ₂ 0	.100		01P	0-25.0 Pa	25.0		01M	0-2.50 mm	2.50	
02E	0-0.200 in. H ₂ 0	.200	5 in H_20	02P	0-50.0 Pa	50.0	1.25 kPa	02M	0-5.00 mm	5.00	125 mm
03E	0-0.300 in. H ₂ 0	.300		03P	0-75.0 Pa	75.0		03M	0-7.50 mm	7.50	
04E	0-0.500 in. H ₂ 0	.500		04P	0-100 Pa	100.0		04M	0-10.0 mm	10.0	
05E	0-1.00 in. H ₂ 0	1.000		05P	0-250 Pa	250		05M	0-25.0 mm	25.0	
06E	0-2.00 in. H ₂ 0	1.999	2H ₂ 0	06P	0-500 Pa	500	5 kPa	06M	0-50.0 mm	50.0	500 mm
07E	0-3.00 in. H ₂ 0	3.00		07P	0-750 Pa	750		07M	0-75.0 mm	75.0	
08E	0-5.00 in. H ₂ 0	5.00		08P	0-1.00 kPa	1.000		08M	0-100 mm	100.0	
09E	0-10.0 in. H ₂ 0	10.00		09P	0-2.50 kPa	2.50		09M	0-250 mm	250	
11E	0-20.0 in. H ₂ 0	19.99	5 psid	11P	0-5.00 kPa	5.00	35 kPa	11M	0-500 mm	500	3.5 m
12E	0-30.0 in. H ₂ 0	30.0		12P	0-7.50 kPa	7.50		12M	0-750 mm	750	
13E	0-50.0 in. H ₂ 0	50.0		13P	0-10.0 kPa	10.00		13M	0-1.00 m	1.000	
14E	0-100 in. H ₂ 0	100.0		14P	0-25.0 kPa	25.0		14M	0-2.50 m	2.50	
15E	0-1.00 psid	1.000	5 psid	15P	0-50.0 kPa	50.0	100 kPa	15M	0-5.00 m	5.00	10 m
16E	0-2.00 psid	1.999		16P	0-100 kPa	100.0		16M	0-10.0 m	10.00	
17E	0-3.00 psid	3.00		17P	0-200 kPa	199.9		17M	0-20.0 m	19.99	
18E	0-5.00 psid	5.00									