

# Outdoor Temperature Sensors

## TO Series



TO

### SPECIFICATIONS

5 Year  
Warranty

<b>Wiring</b>	22 AWG; 2-wire: RTD/Thermistor, 4-20mA; 3-wire: Voltage output models
<b>Junction Box</b>	Weather resistant
<b>TEMPERATURE TRANSMITTER OPTION</b>	
<b>Input Power</b>	4-20mA version - Loop powered 12-30VDC only, 30mA max; 0-5/0-10V versions - 12-30VDC/24VAC, 15mA max
<b>Temp Output</b>	2-wire, loop powered 4-20mA; 3-wire, 0-5V/0-10VDC
<b>Sensor Type</b>	Solid-state, integrated circuit (Transmitter)
<b>Accuracy</b>	±0.5°C (±.9°F) typical*
<b>Ranges</b>	0° to 50°C (32° to 122°F), -40° to 50°C (-40° to 122°F)*
<b>LINTEMP OPTION</b>	
<b>Input Power</b>	5 to 30VDC
<b>Output</b>	10mV/°C
<b>Operating Temp</b>	-25° to 105°C (-13° to 221°F)
<b>Calibration Error</b>	1.5°C (2.7°F) typical; 2.5°C (4.5°F) max. at 25°C (77°F)
<b>Error over Temp</b>	1.8°C (3.24°F) typical; 3.0°C (5.4°F) max. over 0° to 70°C (32° to 158°F) range; 2.0°C (3.6°F) typical; 3.5°C (6.3°F) max. over -25° to 105°C (-13° to 221°F) range
<b>RESISTIVE OPTION</b>	
<b>RTD/Thermistor</b>	See table at right

\* For RTD and thermistor accuracies and ranges, see the table at right.

### Sleek Design, Reduces Solar Heating

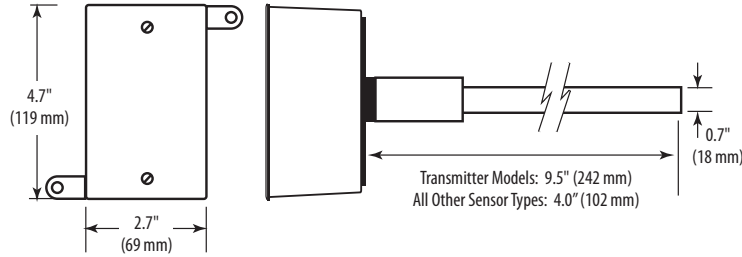
#### FEATURES

- Sleek design reduces solar heating...reliable and accurate
- Available with transmitter, linitemp, RTDs, or thermistors

#### DESCRIPTION

The **TO Series** outdoor temperature sensors feature a sleek, weather resistant design, and provide easy installation. The durable probe is encased in a radiation shield to protect against solar heating. Choose from a variety of RTD, thermistor, or transmitter outputs to suit any application.

**DIMENSIONAL DRAWING**



*To compute Linitemp Temperature*  
 $mV\ reading / 10 - 273.15 = Temperature\ in\ ^\circ C$

Class	Pt RTD		Balco RTD	THERMISTOR											
Type	100 Ohm	1000 Ohm	1000 Ohm	2.2k	3k	10k Type 2	10k Type 3	10k Dale	10k 3A221	10k "G" US	20k	20k "D"	100k	10k Type 2	10k Type 3
Accuracy	±0.3°C 0.00385 curve	±0.3°C 0.00385 curve	±1% @70°C	±0.2°C 0/70°C	±0.2°C 0/70°C	±1.0°C -50/150°C	±0.2°C 0/70°C	±0.2°C -20/70°C	±1.1°C 0/70°C	±0.2°C 0/70°C	Consult Factory	Consult Factory	Consult Factory	±0.1°C 20/70°C ±0.2°C 0/20°C	±0.1°C 0/70°C
Temp. Response*	PTC	PTC	PTC	NTC	NTC	NTC	NTC	NTC	NTC	NTC	NTC	NTC	NTC	NTC	NTC
														High Accuracy	

\*PTC: Positive Temperature Coefficient  
 \*NTC: Negative Temperature Coefficient

**STANDARD RTD AND THERMISTOR VALUES (Ohms Ω)**

°C	°F	100 Ohm	1000 Ohm	1000 Ohm	2.2k	3k	10k Type 2	10k Type 3	10k Dale	10k 3A221	10k "G" US	20k NTC	20k "D"	100k	10k Type 2	10k Type 3
-50	-58	80.306	803.06	740.46	154,464	205,800	692,700	454,910	672,300	-	441,200	1,267,600	-	-	692,700	454,910
-40	-40	84.271	842.71	773.99	77,081	102,690	344,700	245,089	337,200	333,562	239,700	643,800	803,200	3,366,000	344,700	245,089
-30	-22	88.222	882.22	806.02	40,330	53,730	180,100	137,307	177,200	176,081	135,300	342,000	412,800	1,770,000	180,100	137,307
-20	-4	92.160	921.60	841.00	22,032	29,346	98,320	79,729	97,130	96,807	78,910	189,080	220,600	971,200	98,320	79,729
-10	14	96.086	960.86	877.46	12,519	16,674	55,790	47,843	55,340	55,252	47,540	108,380	122,400	553,400	55,790	47,843
0	32	100.000	1,000.00	913.66	7,373	9,822	32,770	29,588	32,660	32,639	29,490	64,160	70,200	326,600	32,770	29,588
10	50	103.903	1,039.03	952.25	4,487	5,976	19,930	18,813	19,900	19,901	18,780	39,440	41,600	199,000	19,930	18,813
20	68	107.794	1,077.94	991.82	2,814	3,750	12,500	12,272	12,490	12,493	12,260	24,920	25,340	124,900	12,500	12,272
25	77	109.735	1,097.35	1,013.50	2,252	3,000	10,000	10,000	10,000	10,000	10,000	20,000	20,000	100,000	10,000	10,000
30	86	111.673	1,116.73	1,035.18	1,814	2,417	8,055	8,195	8,056	8,055	8,194	16,144	15,884	80,580	8,055	8,195
40	104	115.541	1,155.41	1,077.68	1,199	1,598	5,323	5,593	5,326	5,324	5,592	10,696	10,210	53,260	5,323	5,593
50	122	119.397	1,193.97	1,120.52	811.5	1,081	3,599	3,894	3,602	3,600	3,893	7,234	6,718	36,020	3,599	3,894
60	140	123.242	1,232.42	1,166.13	561.0	747	2,486	2,763	2,489	2,486	2,760	4,992	4,518	24,880	2,486	2,763
70	158	127.075	1,270.75	1,210.75	395.5	527	1,753	1,994	1,753	1,751	1,990	3,512	3,100	17,510	1,753	1,994
80	176	130.897	1,308.97	1,254.55	284.0	378	1,258	1,462	1,258	1,255	1,458	2,516	2,168	12,560	1,258	1,462
90	194	134.707	1,347.07	1,301.17	207.4	-	919	1,088	917	915	1,084	1,833	1,542	9,164	919	1,088
100	212	138.506	1,385.06	1,348.38	153.8	-	682	821	679	678	816.8	1,356	1,134	6,792	682	821
110	230	142.293	1,422.93	1,397.13	115.8	-	513	628	511	509	623.6	1,016	816	5,108	513	628
120	248	146.068	1,460.68	1,447.44	88.3	-	392	486	389	388	481.8	770	606	3,894	392	486
130	266	149.832	1,498.32	1,496.28	68.3	-	303	380	301	299	376.4	591	456	3,006	303	380
Sensor Codes	B	C	I	E	F	D	H	J	S	R	M	U	T	W	Y	

**ORDERING INFORMATION**



*RTD/Thermistor Models*

**Sensor Type**  
 TO

**Output**  
 R0 = Resistive Output

**Cal Certificate**  
 0 = None  
 1 = 1 point Cal validation  
 2 = 2 point Cal validation

**Legend:**  
 B = 100R platinum, RTD  
 C = 1k platinum, RTD  
 D = 10k T2, Thermistor  
 E = 2.2k, Thermistor  
 F = 3k, Thermistor  
 G = 10k CPC, Thermistor  
 H = 10k T3, Thermistor  
 I = 1k Balco (Nickel-iron) RTD  
 J = 10k Dale, Thermistor  
 K = 10k w/11k shunt, Thermistor  
 M = 20k NTC, Thermistor  
 N = 1800 ohm, Thermistor  
 P = 10mV/°C, Linitemp  
 R = 10k US, Thermistor  
 S = 10k 3A221, Thermistor  
 T = 100k, Thermistor  
 U = 20k "D"; Thermistor  
 W = 10k T2 high accuracy, Thermistor  
 Y = 10k T3 high accuracy, Thermistor  
 Z = 10k E1, Thermistor  
 CC = 15k, Thermistor

**Example:**  
 TO  C  R0  2

**NOTE:** For 4-20mA transmitter output, order any TO with the 100Ω platinum RTD and accessory AA10xx.

*Temperature Transmitter Models*

**Output**  
 TOA

**Range**  
 M = 4-20mA  
 V = 0.5/0-10VDC

**Cal Certificate**  
 1 = -40 to 50°C (-40° to 122°F)  
 2 = 0° to 50°C (32° to 122°F)

**Example:**  
 TOA  M  1  0