



**Features & Benefits**

- Weatherproof Housing
- Wide range of sensing element types
- Hinged lid with the facility of tamper proofing

**Technical Overview**

This range of temperature sensors are used to detect air outside temperature. Units contain either a high quality thermistor, Nickel or Platinum sensing element. The TT-O has a stainless steel cap containing the sensing element and should be situated in a sheltered position on a north facing wall.

The -CVO active output option combines 4 pre-set ranges and selectable output mode, customised output range scaling enabling a choice of outputs and ranges on one unit.

**Product Codes**

**TT-O** Outside Air Sensor

Sensing Element (add type to above code)

Passive output:

- A (10K3A1) Trend, Cylon, Distech
- B (10K4A1) Andover, Delta Controls
- C (20K6A1) Honeywell
- D (PT100a) Serck
- E (PT1000a) Cylon
- F (NI1000a) Sauter
- G (Ni1000a/TCR(LAN1)) Siemens
- H (SAT1) Satchwell
- K (STA1) Landis & Staefa
- L (TAC1) TAC
- M (2.2K3A1) Johnson Controls
- N (3K3A1) Alerton
- P (30K6A1) Drayton
- Q (50K6A1)
- R (100K6A1) York >40°C
- S (SAT2) Satchwell
- T (SAT3) Satchwell
- V (SAT4) Satchwell
- W (SIE1) Siebe
- Y (STA2) Landis & Staefa
- Z (10K NTC) Carel

Active output:

- CVO 4-20mA/0-10Vdc selectable output
- CVO-C 4-20mA/0-10Vdc selectable output with custom temp. scaling -10 to +100°C

**Specification**

Output types:

Passive	Resistive
Active (selectable)	Current 4-20mA or Voltage 0-10Vdc

Accuracy:

Thermistor	±0.2°C 0 to 70°C
PT100a	±0.2°C @ 25°C
PT1000a	±0.2°C @ 25°C
NI1000	±0.4°C @ 0°C
-CVO	±0.4°C @ 25°C

Probe:

Material	Stainless steel
Dimensions	10mm dia.

Housing:

Material	PC/GF (Halogen free, flame retardant & UV stabilized)
Dimensions	80 x 79 x 44mm
Protection	IP65

Environmental:

Housing:	-30 to 70°C 0 to 95% non-condensing
Media:	-30 to +100°C
Weight	160g

Country of origin:

TT-O-A	Poland
Others	UK

**WEEE Directive:**

At the end of the products useful life please dispose as per the local regulations.  
Do not dispose of with normal household waste.  
Do not burn.



The TT-O-CVO products referred to in this data sheet meet the requirements of EU Directive 2014/30/EU

## Installation

1. Select a suitable location preferably on a north facing wall, ensuring that the sensor is away from direct sunlight and any heat sources.
2. Using the housing as a template mark the hole centres, drill and fix the housing to a flat surface using appropriate screws.
3. Release the snap-fit lid by gently squeezing the locking tab.
4. Feed the cable through the waterproof gland and terminate the cores at the terminal block, leaving some slack inside the unit, tighten the cable gland onto the cable to ensure water tightness.
5. It is recommended that the unit be mounted with the cable entry at the bottom. If the cable is fed from above then into the cable gland at the bottom, it is recommended that a rain loop be placed in the cable before entry into the sensor.
6. Snap shut the lid after the connections have been made.

## Connections

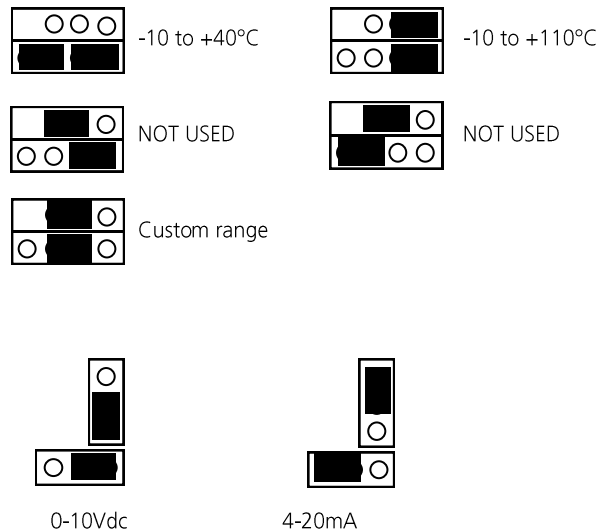
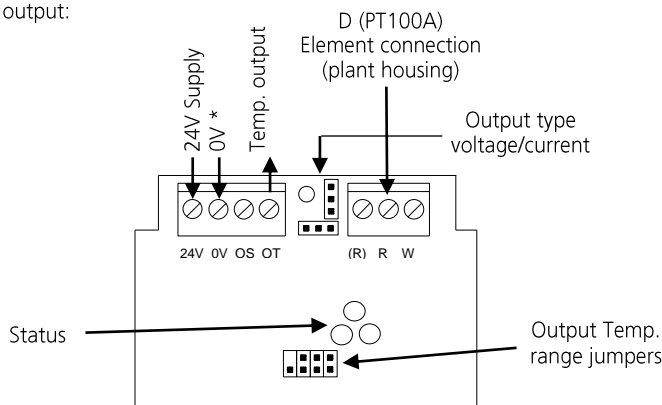
All connections to BEMS controllers, data recorders etc. should be made using screened cable. Normally, the screen should be earthed at one end only (usually the controller end) to avoid earth hum loops which can create noise. Low voltage signal and supply cables should be routed separately from high voltage or mains cabling. Separate conduit or cable trays should be used. Where possible, the controller's earth should be connected to a FUNCTIONAL EARTH, rather than the mains safety earth. This will provide better immunity to high frequency noise. Most modern buildings have a separate earth for this purpose.

Passive output:



Connections are made via the 2-way terminal block. Connections for thermistor, platinum and nickel sensing elements are polarity independent.

Active output:



\* Not required with 4-20mA output

Notes:

Voltage output Nominal voltage 24Vac/dc.

Current output If using in current output mode, the sensor must only be used with a 24Vdc supply. The sensor may be damaged if supplied with AC.

The selectable output temperature ranges are dependent on sensor type, ambient and application. For full connection and specification please refer to the TT-CVO data sheet.

**Temperature vs Resistance Charts**

°C	A	B	C	D	E	F	G	H	K	L	M	N
	10K3A1	10K4A1	20K6A1	PT 100A	PT 1000A	NI1000	LAN1	SAT1	STA1	TAC1	2.2K3A1	3K3A1
	Ω	Ω	Ω	Ω	Ω	Ω	Ω	Ω	Ω	Ω	Ω	Ω
-50	6678528	441667	-	80.3	803	743	790.8	9719	-	-	150395	200348
-40	335671	239831	-	84.3	843	791	826.8	9584	-	-	75593	100701
-30	176683	135233	-	88.2	882	842	871.7	9349	-	-	39789	53005
-20	96974	78930	-	92.2	921	893	913.4	8968	-	-	21839	29092
-15	72895	61030	-	-	-	-	934.7	8708	-	-	16416	21868
-10	55298	47549	-	96.1	961	946	856.2	8396	-	-	12453	16589
-5	42314	37316	-	-	-	-	978.0	8031	-	-	9529	12694
0	32650	29490	70204	100.0	1000	1000	1000.0	7614	2226	5085	7353	9795
1	31030	28157	66525	-	-	-	1004.4	7525	2236	-	6988	9309
2	29500	26891	63059	-	-	-	1008.9	7434	2246	-	6643	8850
3	28054	25689	59793	-	-	-	1013.3	7341	2256	-	6318	8416
4	26688	24547	56713	-	-	-	1017.8	7246	2266	-	6010	8006
5	25396	23462	53809	-	-	-	1022.3	7150	2276	4078	5719	7619
6	24173	22430	51070	-	-	-	1026.7	7053	2286	-	5444	7252
7	23016	21450	48484	-	-	-	1031.2	6954	2298	-	5183	6905
8	21921	20517	46044	-	-	-	1035.8	6853	2306	-	4937	6577
9	20885	19631	43739	-	-	-	1040.3	6752	2316	-	4703	6266
10	19904	18787	41563	103.9	1039	1056	1044.8	6649	2326	3294	4482	5971
11	18974	17983	39506	-	-	-	1049.3	6545	2337	-	4273	5692
12	18092	17219	37562	-	-	-	1053.9	6440	2347	-	4075	5428
13	17257	16490	35724	-	-	-	1058.4	6334	2357	-	3886	5177
14	16465	15797	33986	-	-	-	1063.0	6228	2367	-	3708	4940
15	15714	15136	32342	-	-	-	1067.6	6121	2377	2676	3539	4714
16	15001	14507	30786	-	-	-	1072.2	6013	2388	-	3378	4500
17	14325	13906	29213	-	-	-	1076.8	5905	2398	-	3226	4297
18	13623	13334	27918	-	-	-	1081.4	5786	2408	-	3081	4105
19	13053	12788	26598	-	-	-	1086.0	5684	2418	-	2940	3916
20	12494	12268	25346	107.8	1078	1112	1090.7	5580	2429	2188	2814	3748
21	11943	11771	24160	-	-	-	1095.3	5471	2439	-	2690	3583
22	11420	11297	23036	-	-	-	1100.0	5362	2449	-	2572	3426
23	10923	10845	21970	-	-	-	1104.6	5254	2460	-	2460	3277
24	10450	10413	20959	-	-	-	1109.3	5147	2470	-	2353	3135
25	10000	10000	20000	109.8	1098	-	1114.0	5039	2480	1800	2252	3000
26	9572	9606	19090	-	-	-	1120.0	4933	2491	-	2156	2871
27	9165	9229	18226	-	-	-	1123.4	4827	2501	-	2064	2749
28	8777	8869	17405	-	-	-	1127.1	4721	2512	-	1977	2633
29	8408	8525	16626	-	-	-	1132.9	4617	2522	-	1893	2522
30	8056	8197	15886	111.7	1117	1171	1137.6	4513	2532	1488	1814	2417
35	6530	6754	12697	-	-	-	1161.5	4012	2585	1237	1471	1959
40	5325	5594	10211	115.5	1155	1230	1185.7	3545	2638	1034	1199	1598
45	4367	4656	8260	-	-	-	1210.2	3117	-	-	983.4	1310
50	3601	3893	6719	119.4	1194	1291	1235.0	2730	-	740	810.9	1080
55	2985	3271	5496	-	-	-	1260.1	2386	-	-	672.2	895.5
60	2487	2760	4518	123.2	1232	1353	1285.4	2082	-	540	560.1	746.2
65	2082	2339	-	-	-	-	1311.1	1816	-	-	468.9	624.7
70	1751	1990	-	127.1	1271	1417	1337.1	1585	-	400	394.5	525.5
75	1480	1700	-	-	-	-	1363.5	1385	-	-	333.3	444.0
80	1256	1458	-	130.9	1309	1483	1390.1	1213	-	300	282.9	376.9
85	1070	1255	-	-	-	-	1417.1	1064	-	-	241.1	321.2
90	916.1	1084	-	134.7	1347	1549	1444.4	937	-	230	206.3	274.8
95	787.0	939.6	-	-	-	-	1472.0	828	-	-	177.2	236.1
100	678.6	817.2	-	138.5	1385	1618	1500.0	734	-	180	152.8	203.6
105	587.3	713.0	-	-	-	-	1528.3	654	-	-	132.3	176.2
110	510.1	624.1	-	142.3	1423	1688	1557.0	585	-	-	114.9	153.0
115	444.5	547.9	-	-	-	-	1586.0	525	-	-	100.1	133.3
120	388.6	482.5	-	146.1	1461	1760	1625.4	474	-	-	87.51	116.6
125	340.8	426.0	-	-	-	-	-	429	-	-	76.75	102.2
130	300.0	377.2	-	149.8	1498	1833	-	391	-	-	67.52	89.95
140	234.1	298.1	-	153.6	1536	1909	-	329	-	-	52.72	70.23
150	184.8	238.0	-	157.3	1573	1987	-	281	-	-	41.61	55.44
200	-	-	-	157.8	1758	-	-	-	-	-	-	-
250	-	-	-	194.1	1941	-	-	-	-	-	-	-
300	-	-	-	212.0	2121	-	-	-	-	-	-	-
350	-	-	-	229.7	2297	-	-	-	-	-	-	-
400	-	-	-	247.0	2470	-	-	-	-	-	-	-

**Temperature vs Resistance Charts (continued)**

°C	P	Q	R	S	T	V	W	Y	Z
	30K6A1	50K6A1	100K6A1	SAT2	SAT3	SAT4	SIE1	STA2	10K NTC
-50	2497k	4168k	8337k	-	-	-	10732	-	-
-40	1219k	2033k	4067k	-	-	-	10517	-	-
-30	622911	1038k	2077k	-	-	-	10172	-	-
-20	331876	553243	106k	-	-	-	9654	-	-
-15	24785	409689	819378	-	-	-	6320	-	-
-10	183697	306183	612366	-	-	1733	8933	-	42218
-5	138502	230842	461683	-	-	1617	8496	-	33784
0	105305	175508	351017	2094	-	1504	8044	7490	27197
1	99787	166310	332619	2079	-	-	7910	-	-
2	94588	157644	315288	2061	-	-	7807	-	-
3	89689	149480	298959	2046	-	-	7702	-	-
4	85069	141779	283558	2027	-	-	7596	-	-
5	80713	134521	269041	2010	-	1397	7489	6340	22023
6	76604	127669	255337	1992	-	-	7381	-	-
7	72726	121207	242414	1973	-	-	7271	-	-
8	69064	115105	230210	1951	-	-	7161	-	-
9	65608	109344	218688	1934	-	-	7050	-	-
10	62347	103903	207807	1911	-	1298	6938	5360	17933
11	59257	98761	197521	1897	-	-	6825	-	-
12	56346	93901	187803	1872	-	-	5712	-	-
13	53585	89307	178613	1851	-	-	6598	-	-
14	50978	84962	169924	1810	-	-	6485	-	-
15	45811	80851	161702	1809	-	1208	6370	4540	14684
16	46178	76961	153923	1787	-	-	6256	-	-
17	43969	73280	146560	1764	-	-	6141	-	-
18	41877	69794	139588	1740	-	-	6028	-	-
19	39895	66492	132984	1716	-	-	5913	-	-
20	38019	63364	126729	1690	2708	1128	5798	3840	12087
21	36240	60400	120799	1667	2681	-	5686	-	-
22	34554	57589	115179	1644	2659	-	5573	-	-
23	32955	54925	108950	1621	2618	-	5461	-	-
24	31438	52398	104796	1598	2616	-	5349	-	-
25	30000	50000	100000	1574	2592	-	5238	3250	10000
26	28635	47724	95449	1549	2567	-	5128	-	-
27	27339	45564	81128	1524	2544	-	5019	-	-
28	26108	43513	87026	1500	2520	-	4910	-	-
29	24939	41565	83129	1476	2496	-	4803	-	-
30	23828	39714	79428	1452	2474	-	4696	2750	8315
35	19046	31744	62489	1336	2346	-	4135	2320	6947
40	15317	25529	51058	1219	2216	-	3707	-	5831
45	12390	20650	41301	1113	2086	-	3271	-	4916
50	10079	16799	33598	1011	1850	-	2875	-	4163
55	8243	13740	274479	-	1818	-	2521	-	3540
60	6777	11297	22593	-	1694	-	2203	-	3023
65	5600	9334	18669	-	1758	-	1929	-	2591
70	4650	7751	15502	-	1461	-	1685	-	2230
75	3879	6466	12932	-	1353	-	1472	-	1926
80	3251	5419	10837	-	1258	-	1287	-	1669
85	2737	4560	9121	-	1171	-	1127	-	1451
90	2313	3855	7710	-	1089	-	986	-	1266
95	1963	3271	6543	-	1020	-	866	-	1109
100	1672	2787	5574	-	950	-	760	-	973
105	1430	22384	4767	-	-	-	670	-	-
110	1228	2046	4092	-	-	-	590	-	-
115	1058	1962	3525	-	-	-	522	-	-
120	914.6	1523	3047	-	-	-	462	-	-
125	793.2	1321	2642	-	-	-	410	-	-
130	690.2	1149	2299	-	-	-	365	-	-
140	527.4	878.2	1756	-	-	-	290	-	-
150	407.7	678.8	1357	-	-	-	233	-	-
200	-	-	-	-	-	-	-	-	-
250	-	-	-	-	-	-	-	-	-
300	-	-	-	-	-	-	-	-	-
350	-	-	-	-	-	-	-	-	-
400	-	-	-	-	-	-	-	-	-

Whilst every effort has been made to ensure the accuracy of this specification, Sontay cannot accept responsibility for damage, injury, loss or expense from errors or omissions. In the interest of technical improvement, this specification may be altered without notice.