



STAINLESS STEEL THREADED TEMPERATURE SENSOR

Description

PT or NTC sensor options to monitor the temperature of cooling systems, allowing control of operating temperature within safe limits. The sensor has an O-ring which can achieve IP-67 sealing performance. The hexagonal bolt design of the housing makes it easy to install. The longer probe design provides stable and fast response.

Features

- PT/NTC element
- Temperature range: -40°C ~up to + 115°C
- Insulation resistance: $\geq 50\text{M}\Omega$, 500VDC
- IP67
- Housing: SUS316/ SUS316L
- High reliability and stability

Applications

- Liquid cooling system
- Industrial process control
- Air conditioning systems

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1. Sensor Specifications

PT

Parameters	Condition	Specifications	
Resistance @0°C	R0	100 Ohms	1000 Ohms
Temperature accuracy	Within	$\pm 0.5^{\circ}\text{C}_{(a)}$	
TCR	0°C, 100°C	3850PPM/K	3850PPM/K
Thermal response(time constant)	In stirred water	τ 0.5< 10s ^(b)	
Insulation resistance	500 VDC room temperature	>50M Ω	
Operating current	-	0.3 to 1mA ^(c)	0.1 to 0.3mA ^(c)
Recommended Storage Temperature	-	-40°C~+85°C	

NTC

Parameters	Condition	Specifications	
Resistance @25°C	R25	10,000 Ohms	
Temperature accuracy	Within	$\pm 0.5^{\circ}\text{C}$ @0°C~70°C ^(a)	$\pm 1\%$ @25°C ^(a)
Beta value 25/85	-	3976K	3435K
Thermal response(time constant)	In stirred water	τ 0.632< 15s	
Insulation resistance	500 VDC room temperature	>50M Ω	
Recommended Storage Temperature	-	-40°C~+85°C	

Notes:

- Operation outside the recommended operating temperature range can lead to shifts in the resistance versus temperature characteristics and changes in the overall accuracy of the sensor. Extended operation outside this temperature range can lead to sensor failures.
20026082-01 R50 accuracy $\pm 0.3^{\circ}\text{C}$.
- The thermal response of 20026082-01 with longer tube is faster than 20026082-00 with flat tube, 20026082-00 & 20026498-00&20032851-00 τ 0.5< 10s, 20026082-01& 20032792-00 τ 0.5< 3s.
- The recommended operating conditions must not be exceeded to ensure proper functionality of the device.

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2. Reliability

PT

<i>Item</i>	<i>Condition</i>	<i>Criteria</i>
<i>Thermal Cycling</i>	<i>-40°C to +85°C, 300cycles</i>	<i>$\Delta R/R$ within $\pm 0.5^\circ\text{C}$ (20032792-00/20026082-01)</i>
<i>Thermal Shock</i>	<i>-40°C to +125°C, 5cycles</i>	<i>$\Delta R/R$ within $\pm 0.5^\circ\text{C}$ (20026082-00)</i>
<i>Temperature and Humidity Test</i>	<i>93RH/40°C</i>	<i>$\Delta R/R$ within $\pm 0.5^\circ\text{C}$ (20026082-00 48H / 20026082-01 96H)</i>
<i>Low Temperature Storage</i>	<i>-40°C</i>	<i>$\Delta R/R$ within $\pm 0.5^\circ\text{C}$ (20032792-00/20026082-01 96H / 20026082-00 200H)</i>
<i>IP</i>	<i>IP67</i>	<i>Cross section check, no dust or water observed (20026082-00)</i>
<i>Service life Test</i>	<i>115°C</i>	<i>$\Delta R/R$ within $\pm 0.5^\circ\text{C}$ (20026082-00 660H) $\Delta R/R$ within $\pm 0.3^\circ\text{C}$ (20026082-01 641H) $\Delta R/R$ within $\pm 0.5^\circ\text{C}$ (20032792-00 458H)</i>

NTC

<i>Item</i>	<i>Condition</i>	<i>Criteria</i>
<i>Thermal Cycling</i>	<i>-40°C to +85°C, 300cycles</i>	<i>$\Delta R/R$ within $\pm 2\%$(20032851-00)</i>
<i>Thermal Shock</i>	<i>-40°C to +125°C, 5cycles</i>	<i>$\Delta R/R$ within $\pm 2\%$(20026498-00)</i>
<i>Temperature and Humidity Test</i>	<i>93RH/40°C 48H</i>	<i>$\Delta R/R$ within $\pm 1\%$(20026498-00)</i>
<i>Low Temperature Storage</i>	<i>-40°C</i>	<i>$\Delta R/R$ within $\pm 1\%$ (20026498-00 200H / 20032851-00 96H)</i>
<i>IP</i>	<i>IP67</i>	<i>Cross section check, no dust or water observed (20026498-00)</i>
<i>Service life Test</i>	<i>115°C</i>	<i>$\Delta R/R$ within $\pm 2\%$ (20026498-00 660H / 20032851-00 458H)</i>

3. Diagrams and Dimensions

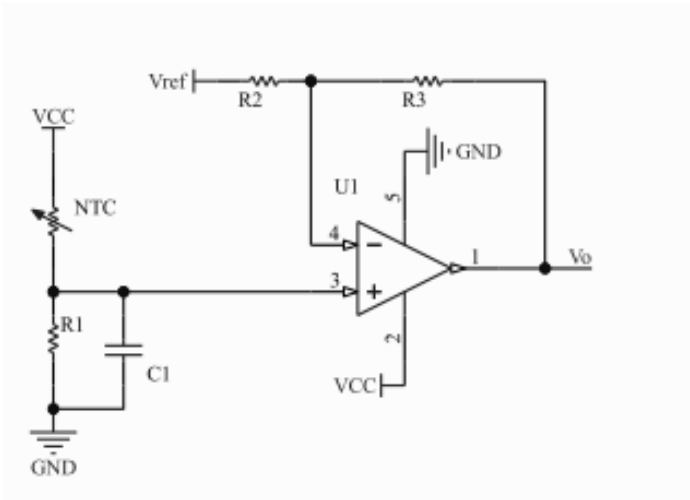


PT



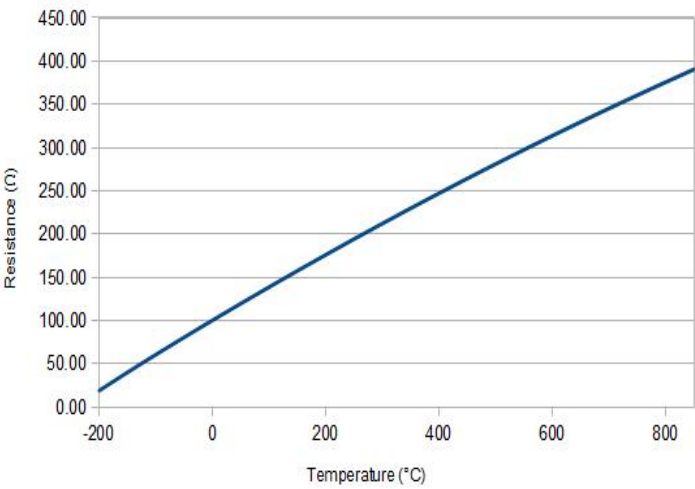
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NTC

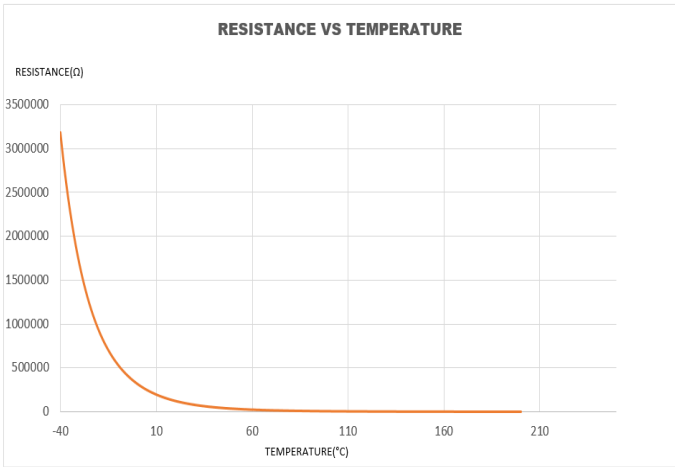


5. Typical Performance Curve

Resistance of PT100



PT



NTC

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6. Relation Temperature vs. Resistance (PT100; PT1000=PT100*10)

°C	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	°C
-40	84.27	83.87	83.48	83.08	82.69	82.29	81.89	81.5	81.1	80.7	-40
-30	88.22	87.83	87.43	87.04	86.64	86.25	85.85	85.46	85.06	84.67	-30
-20	92.16	91.77	91.37	90.98	90.59	90.19	89.8	89.4	89.01	88.62	-20
-10	96.09	95.69	95.3	94.91	94.52	94.12	93.73	93.34	92.95	92.55	-10
0	100	99.61	99.22	98.83	98.44	98.04	97.65	97.26	96.87	96.48	0
0	100	100.39	100.78	101.17	101.56	101.95	102.34	102.73	103.12	103.51	0
10	103.9	104.29	104.68	105.07	105.46	105.85	106.24	106.63	107.02	107.4	10
20	107.79	108.18	108.57	108.96	109.35	109.73	110.12	110.51	110.9	111.29	20
30	111.67	112.06	112.45	112.83	113.22	113.61	114	114.38	114.77	115.15	30
40	115.54	115.93	116.31	116.7	117.08	117.47	117.86	118.24	118.63	119.01	40
50	119.4	119.78	120.17	120.55	120.94	121.32	121.71	122.09	122.47	122.86	50
60	123.24	123.63	124.01	124.39	124.78	125.16	125.54	125.93	126.31	126.69	60
70	127.08	127.46	127.84	128.22	128.61	128.99	129.37	129.75	130.13	130.52	70
80	130.9	131.28	131.66	132.04	132.42	132.8	133.18	133.57	133.95	134.33	80
90	134.71	135.09	135.47	135.85	136.23	136.61	136.99	137.37	137.75	138.13	90
100	138.51	138.88	139.26	139.64	140.02	140.4	140.78	141.16	141.54	141.91	100
110	142.29	142.67	143.05	143.43	143.8	144.18	144.56	144.94	145.31	145.69	110
120	146.07	146.44	146.82	147.2	147.57	147.95	148.33	148.7	149.08	149.46	120

The calculation formulas of this Pt element are defined in DIN EN 60751 as following:

Condition

Formulas

For $T \geq 0^{\circ}\text{C}$

$$R(t) = R(0) * (1 + At + Bt^2)$$

For $T < 0^{\circ}\text{C}$

$$R(t) = R(0) * [1 + At + Bt^2 + C(t-100)t^3]$$

Coefficients

$$A = 3.9083\text{E-}03, B = -5.775\text{E-}07, C = -4.183\text{E-}12$$

Tolerances: class F0.15 (A): $\pm (0.15 + 0.002 * |T/^{\circ}\text{C}|)$ $^{\circ}\text{C}$ (-50 ~ +300 $^{\circ}\text{C}$) (a)

- a) We define the sensor accuracy including the variances of sensor package, and the accuracy apply for temperature range.

Relation Temperature vs. Resistance (NTC 10k Ω @R25, B=3976K)

Temp.(°C)	R (Ω)
-40	336098
-39	314553
-38	294524
-37	275897
-36	258563
-35	242427
-34	227398

Temp.(°C)	R (Ω)
1	31031
2	29500
3	28054
4	26687
5	25395
6	24172
7	23016

Temp. (°C)	R (Ω)
42	4916
43	4724
44	4542
45	4367
46	4200
47	4040
48	3887

Temp. (°C)	R (Ω)
84	1105
85	1070
86	1037
87	1005
88	974
89	945
90	916

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-33	213394	8	21921	49	3741	91	888
-32	200339	9	20885	50	3601	92	862
-31	188163	10	19903	51	3467	93	836
-30	176803	11	18973	52	3339	94	811
-29	166198	12	18092	53	3216	95	787
-28	156294	13	17257	54	3098	96	764
-27	147042	14	16465	55	2985	97	741
-26	138393	15	15714	56	2877	98	720
-25	130306	16	15001	57	2773	99	699
-24	122741	17	14324	58	2674	100	678
-23	115661	18	13682	59	2579	101	659
-22	109032	19	13073	60	2487	102	640
-21	102824	20	12493	61	2399	103	622
-20	97006	21	11943	62	2315	104	604
-19	91553	22	11420	63	2234	105	587
-18	86439	23	10923	64	2157	106	571
-17	81641	24	10450	65	2082	107	555
-16	77138	25	10000	66	2011	108	539
-15	72911	26	9572	67	1942	109	524
-14	68940	27	9165	68	1876	110	510
-13	65209	28	8777	69	1813	111	496
-12	61703	29	8408	70	1752	112	482
-11	58405	30	8056	71	1693	113	469
-10	55304	31	7721	72	1637	114	457
-9	52385	32	7402	73	1582	115	444
-8	49638	33	7097	74	1530		
-7	47050	34	6807	75	1480		
-6	44613	35	6530	76	1432		
-5	42317	36	6266	77	1385		
-4	40151	37	6014	78	1341		
-3	38110	38	5774	79	1298		
-2	36184	39	5544	80	1256		
-1	34366	40	5325	81	1216		
0	32651	41	5116	82	1178		
				83	1141		

Relation Temperature vs. Resistance (NTC 10k Ω @R25, B=3435K)

Temp.(°C)	R (K Ω)	Temp.(°C)	R (K Ω)	Temp. (°C)	R (K Ω)	Temp. °C)	R (K Ω)
-40	201.7	1	26.44	42	5.423	83	1.533
-39	190.6	2	25.32	43	5.240	84	1.492
-38	180.3	3	24.25	44	5.065	85	1.451
-37	170.5	4	23.23	45	4.897	86	1.412
-36	161.4	5	22.27	46	4.734	87	1.374
-35	152.8	6	21.34	47	4.578	88	1.338

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-34	144.7	7	20.46	48	4.429	89	1.302
-33	137.1	8	19.63	49	4.284	90	1.268
-32	129.9	9	18.83	50	4.145	91	1.235
-31	123.1	10	18.07	51	4.012	92	1.203
-30	116.8	11	17.34	52	3.883	93	1.171
-29	110.8	12	16.65	53	3.759	94	1.141
-28	105.2	13	15.98	54	3.640	95	1.112
-27	99.83	14	15.35	55	3.525	96	1.083
-26	94.81	15	14.75	56	3.415	97	1.056
-25	90.07	16	14.17	57	3.308	98	1.029
-24	85.59	17	13.62	58	3.205	99	1.003
-23	81.37	18	13.09	59	3.106	100	0.9777
-22	77.37	19	12.59	60	3.011	101	0.9533
-21	73.6	20	12.11	61	2.919	102	0.9296
-20	70.03	21	11.65	62	2.830	103	0.9066
-19	66.66	22	11.21	63	2.744	104	0.8843
-18	63.47	23	10.79	64	2.662	105	0.8626
-17	60.45	24	10.39	65	2.582	106	0.8416
-16	57.6	25	10.00	66	2.505	107	0.8212
-15	54.89	26	9.631	67	2.431	108	0.8014
-14	52.33	27	9.277	68	2.359	109	0.7821
-13	49.9	28	8.938	69	2.290	110	0.7634
-12	47.6	29	8.613	70	2.223	111	0.7452
-11	45.42	30	8.302	71	2.158	112	0.7276
-10	43.35	31	8.004	72	2.096	113	0.7104
-9	41.38	32	7.718	73	2.036	114	0.6938
-8	39.52	33	7.444	74	1.978	115	0.6776
-7	37.75	34	7.18	75	1.921		
-6	36.07	35	6.928	76	1.867		
-5	34.48	36	6.686	77	1.814		
-4	32.96	37	6.454	78	1.764		
-3	31.52	38	6.23	79	1.714		
-2	30.16	39	6.016	80	1.667		
-1	28.85	40	5.81	81	1.621		
0	27.62	41	5.613	82	1.576		

7. Qualification Standards

- RoHS Compliance
- REACH Compliance



STAINLESS STEEL THREADED TEMPERATURE SENSOR

8. Ordering Information

Order Code	Description	PT: Ω @0°C NTC: Ω @25°C	MOQ	Temperature range
20026082-00	PT100, TEMP, SENSOR, SS316, HEX, HSG	100	2000	-40°C ~+115°C
20026082-01	PT100, TEMP SENSOR, SS316L, HEX	100	2000	-40°C ~+115°C
20026498-00	NTC,10K, SS HEX HSG, SS316 HEX HSG	10000	2000	-40°C ~+115°C
20032792-00	PT1000, TEMP, SENSOR, SS316L, HEX	1000	1000	-40°C ~+85°C
20032851-00	NTC 10K, TEMP SENSOR, SS316L, HEX	10000	1000	-40°C ~+85°C

Change History

Date	Version	Change Description
2022-11-28	1	Initial version
2023-11-27	A	Add 20026082-01, update description
2024-02-23	A1	Add R50 accuracy and thermal response for 20026082-01
2024-05-20	A2	Add 10years MTTF life test for 20026082-01
2025-04-28	B	Add 20032851-00,20032792-00, update description

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