



Ω OMEGA™ **User's Guide**



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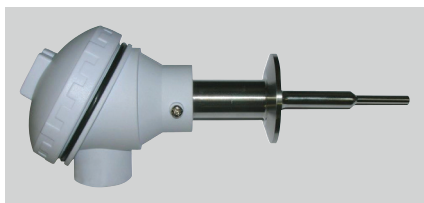
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NB9W CONNECTION HEAD STYLE THS SERIES Sanitary Thermistor Sensors

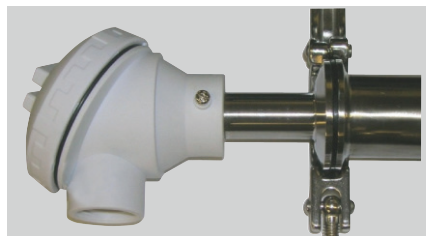
M-4913-D Instruction Manual for NB9W Connection Head Style THS Series Sanitary Thermistor Sensors



GENERAL DESCRIPTION

The **Omega PRS** series sensors are designed for use in Sanitary Clean-In-Place (CIP) systems. They are supplied standard with 1-1/2" 16AMP Style flanges so they can be assembled to like style piping connections. Other connection sizes and styles are available.

These sensors are supplied with thermistor elements that provide a non-linear resistance temperature output that has significantly greater resolution (in ohms per degree) than do our RTD sensors. Please note that thermistor sensors require lower operating currents than do RTD sensors, typically around 12 microamps max, in order to insure that no self-heating occurs. Resistance vs. Temperature Tables and Equations for each thermistor offered are provided on page 2.



PROCESS CONNECTION:

This sensor includes a mounting flange that connects to a similar flange located at the process connection point. A commercially available gasket is used between the sensor flange and the process flange, with a clamp used to compress the two together.

The PRS series sensors are manufactured with 316L stainless steel wetted surfaces that have surface finishes of 32 microinch or better. Care should be exercised when handling the sensors so that the surface finish is not damaged during handling or installation.

WIRING CONFIGURATION:

The Omega THS Style sensors are supplied with 2-wire connections as shown below. The sensor wiring is connected to the two inner screws of the terminal board leaving the outer screw terminals for the instrument connection. Please note that thermistor sensors have no polarity.

OPERATING CURRENT:

As is the case with most precision thermistor sensors, Omega THS series sensors should be powered with no more than 12 microamps of excitation current. If operated at higher currents, self heating errors may occur.

SPECIFICATIONS:

Sensing Element Type: Thermistor

Accuracy: $\pm 0.2^{\circ}\text{C}$ between 0 and 70°C .

Temperature Range: -80 to 150°C (-112 to 302°F).

Excitation Current: 12 microamps max.

Response Time: 2.5 seconds max (63%)

Wetted Surfaces: 316L Stainless Steel with 32 microinch or better surface finish.

Connection Head: White Polypropylene with 3/4" NPT Cable Connection (NB9W Style).

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Resistance Vs. Temperature Table: Resistance Listed in Ohms

		Sensor Code				
Temp (°F)	Temp(°C)	2K	3K	5K	10K	30K
-112	-80	1662564	2220043	3686168	3581357	15739361
-103	-75	1073115	1432900	2378027	2449596	10508458
-94	-70	704145	940215	1559792	1697658	7114634
-85	-65	469308	626650	1039314	1191325	4881167
-76	-60	317460	423899	702918	845998	3391326
-67	-55	217788	290815	482182	607604	2384663
-58	-50	151423	202202	335243	441117	1696095
-49	-45	106630	142392	236082	323559	1219577
-40	-40	76003	101497	168287	239671	886113
-31	-35	54803	73187	121359	179206	650261
-22	-30	39954	53358	88488	135203	481743
-13	-25	29436	39312	65204	102883	360159
-4	-20	21906	29255	48531	78936	271616
5	-15	16459	21981	36470	61042	206557
14	-10	12480	16667	27658	47561	158343
23	-5	9546	12749	21160	37328	122318
32	0	7364	9834	16324	29500	95188
41	5	5726	7646	12695	23470	74601
50	10	4486	5991	9949	18793	58865
59	15	3541	4729	7854	15141	46753
68	20	2815	3759	6244	12271	37367
77	25	2253	3008	4998	10002	30046
86	30	1815	2423	4026	8198	24301
95	35	1471	1964	3264	6754	19765
104	40	1199.5	1601	2661	5593	16162
113	45	983.8	1313	2183	4655	13285
122	50	811.2	1082.5	1800	3892	10975
131	55	672.6	897.3	1492	3270	9111
140	60	560.4	747.6	1243	2758	7599
149	65	469.3	625.9	1041.1	2337	6366
158	70	394.8	526.5	875.8	1988	5357
167	75	333.7	444.9	740.2	1698	4526
176	80	283.3	377.6	628.3	1456	3840
185	85	241.5	321.9	535.5	1253	3271
194	90	206.7	275.5	458.3	1082.4	2797
203	95	177.6	236.7	393.8	938.1	2400
212	100	153.2	204.1	339.6	815.8	2067
221	105	132.6	176.7	293.9	711.7	1786
230	110	115.2	153.4	255.3	622.8	1548
239	115	100.4	133.7	222.5	546.7	1347
248	120	87.8	116.9	194.6	481.3	1175
257	125	77.1	102.6	170.7	424.9	1029
266	130	67.8	90.3	150.2	376.2	902.8
275	135	59.9	79.7	132.5	333.9	794.7
284	140	53.0	70.5	117.3	297.2	701.4
293	145	47.0	62.6	104.1	265.2	620.8
302	150	41.9	55.7	92.6	237.2	550.8

Equations:

Calculating Temperature from Resistance:

$$1/t = A + B[\ln(R)] + C[\ln(R)]^3$$

where t = temperature in °C

Constants:

Code	R	A	B	C
2K	2252	1.468x10-3	2.383x10-4	1.007x10-7
3K	3000	1.403x10-3	2.373x10-4	9.827x10-8
5K	5000	1.285x10-3	2.362x10-4	9.285x10-8
10K	10000	1.032x10-3	2.387x10-4	1.580x10-7
30K	30000	9.376x10-4	2.208x10-4	1.276x10-7

Calculating Resistance from Temperature:

$$R = e^{(\beta - (\alpha/2)) / (1/3 - (\beta + (\alpha/2)) / 1/3)}$$

Constants:

$$\alpha = ((A - (1/T))/C)$$

$$\beta = \sqrt{((B/3C)^3) + (\alpha^2/4)}$$

T = Temperature in Kelvins (°C+273.15)

For Resistance Vs. Temperature Tables in 1°C Increments, go to our website at

<http://www.omega.com/temperature/Z/pdf/z256-257.pdf>



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DISCLAIMER

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY RETURNS**, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY REPAIRS**, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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