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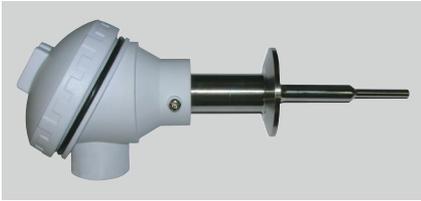
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**NB9W CONNECTION HEAD  
STYLE THS SERIES  
Sanitary Thermistor Sensors**

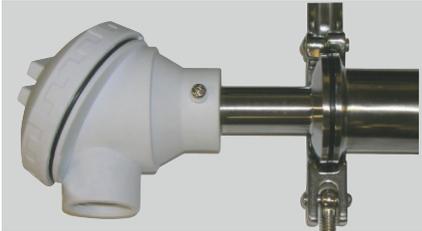
# M-4913-D Instruction Manual for NB9W Connection Head Style THS Series Sanitary Thermistor Sensors



## 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  $70^{\circ}\text{C}$ .

**Temperature Range:**  $-80$  to  $150^{\circ}\text{C}$  ( $-112$  to  $302^{\circ}\text{F}$ ).

**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

| Temp (°F) | Temp(°C) | Sensor Code |         |         |         |          |
|-----------|----------|-------------|---------|---------|---------|----------|
|           |          | 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 <sup>-3</sup> | 2.383x10 <sup>-4</sup> | 1.007x10 <sup>-7</sup> |
| 3K   | 3000  | 1.403x10 <sup>-3</sup> | 2.373x10 <sup>-4</sup> | 9.827x10 <sup>-8</sup> |
| 5K   | 5000  | 1.285x10 <sup>-3</sup> | 2.362x10 <sup>-4</sup> | 9.285x10 <sup>-8</sup> |
| 10K  | 10000 | 1.032x10 <sup>-3</sup> | 2.387x10 <sup>-4</sup> | 1.580x10 <sup>-7</sup> |
| 30K  | 30000 | 9.376x10 <sup>-4</sup> | 2.208x10 <sup>-4</sup> | 1.276x10 <sup>-7</sup> |

**Calculating Resistance from Temperature:**

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

**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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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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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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