OMEGA™

User's Guide

Shop online at omega.com

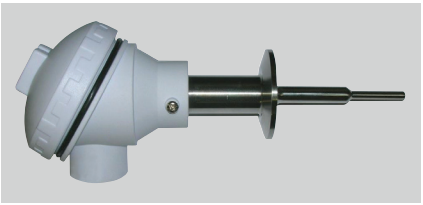
e-mail: info@omega.com
For latest product manuals: www.omegamanual.info

ISO 9001 CERTIFIED CORPORATE QUALITY
NORWALK, CT

ISO 9001 CERTIFIED CORPORATE QUALITY
MANCHESTER, UK

NB9W CONNECTION HEAD STYLE TCS SERIES
Sanitary Thermocouple Sensors

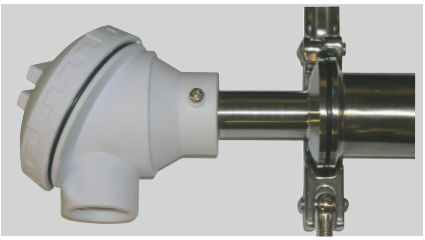
M-4913-G Instruction Manual for NB9W Connection Head Style Sanitary Thermocouple Sensors



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 thermocouple elements that provide a millivolt signal that is proportional to temperature. Omega Engineering uses thermocouple wire which meets the output requirements of ASTM-E-230, and these sensors are available in the four base-metal types (Type J, K, T and E). Please note that when using and installing thermocouples, it is important that the same thermocouple materials be used throughout the sensing circuit. Use of other materials may result in measurement errors. Millivolt vs. Temperature Tables and Equations for each thermocouple type are provided on page 2, with more extensive tables available on our website.



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 TCS Style sensors are supplied with 2 thermocouple wires, a red wire which is always the negative connection, and a different color wire which is the positive connection. The positive connection wire has a specific color based on the thermocouple type (see table below). When connecting to extension cables or connections, like-type thermocouple materials must be used, and polarity maintained, to insure that errors will not occur.

Thermocouple Type	Positive Conductor	Negative Conductor
Type T	Copper (Blue)	Constantan (Red)
Type K	Chromel (Yellow)	Alumel (Red)
Type J	Iron (White)	Constantan (Red)
Type E	Chromel (Purple)	Constantan (Red)

OPERATING CURRENT:

Thermocouples are self-powering devices and therefore need no external power. Thermocouples do require the use of a reference junction to properly indicate temperature. Reference junctions are built in to most thermocouple instruments, or can be added to the measurement circuit for simple applications. Please check out our website at www.omega.com for more information.

SPECIFICATIONS:

Sensing Element Type: Thermocouple
Accuracy: Varies with thermocouple Type
Temperature Range: -50 to 200°C (-58 to 302°F).
Response Time: 3 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).

M-4913-G Instruction Manual for NB9W Style Sanitary Thermocouple Sensors

Output Vs. Temperature Table: Output in millivolts, Ref Junction = 0°C

		Sensor Code			
Temp (°F)	Temp(°C)	Type T	Type J	Type K	Type E
-58	-50	-1.819	-2.431	-1.889	-2.787
-49	-45	-1.648	-2.197	-1.709	-2.523
-40	-40	-1.475	-1.961	-1.527	-2.255
-31	-35	-1.299	-1.722	-1.349	-1.984
-22	-30	-1.121	-1.482	-1.156	-1.709
-13	-25	-0.940	-1.239	-0.968	-1.432
-4	-20	-0.757	-0.995	-0.778	-1.152
5	-15	-0.571	-0.749	-0.586	-0.868
14	-10	-0.383	-0.501	-0.392	-0.582
23	-5	-0.193	-0.251	-0.197	-0.292
32	0	0.000	0.000	0.000	0.000
41	5	0.195	0.253	0.198	0.294
50	10	0.391	0.507	0.397	0.591
59	15	0.589	0.762	0.597	0.890
68	20	0.790	1.019	0.798	1.192
77	25	0.992	1.277	1.000	1.495
86	30	1.196	1.537	1.203	1.801
95	35	1.403	1.797	1.407	2.109
104	40	1.612	2.059	1.612	2.420
113	45	1.823	2.322	1.817	2.733
122	50	2.036	2.585	2.023	3.048
131	55	2.251	2.850	2.230	3.365
140	60	2.468	3.116	2.436	3.685
149	65	2.687	3.382	2.644	4.006
158	70	2.909	3.650	2.851	4.330
167	75	3.132	3.918	3.059	4.656
176	80	3.358	4.187	3.267	4.985
185	85	3.585	4.456	3.474	5.315
194	90	3.814	4.726	3.682	5.648
203	95	4.046	4.997	3.889	5.982
212	100	4.279	5.269	4.096	6.319
221	105	4.513	5.541	4.303	6.658
230	110	4.750	5.814	4.509	6.998
239	115	4.988	6.087	4.715	7.341
248	120	5.228	6.360	4.920	7.685
257	125	5.470	6.634	5.124	8.031
266	130	5.714	6.909	5.328	8.379
275	135	5.959	7.184	5.532	8.729
284	140	6.206	7.459	5.735	9.081
293	145	6.454	7.734	5.937	9.434
302	150	6.704	8.010	6.138	9.789

Please see our Website at www.omega.com for the following information:

For Output Vs. Temperature Tables every °C or °F

For Equations for Calculating Output vs. Temperature

For Equations for Calculating Temperture vs. Output

Thermocouple Types and Color Codes:

Thermocouple Type	Positive Wire	Negative Wire
Type T	Copper (Blue)	Constantan (Red)
Type K	Chromel (Yelllow)	Alumel (Red)
Type J	Iron (White)	Constantan (Red)
Type E	Chromel (Purple)	Constantan (Red)

omega.com info@omega.com

Servicing North America:

U.S.A. Headquarters: Omega Engineering, Inc.
Toll-Free: 1-800-826-6342 (USA & Canada only)
Customer Service: 1-800-622-2378 (USA & Canada only)
Engineering Service: 1-800-872-9436 (USA & Canada only)
Tel: (203) 359-1660 Fax: (203) 359-7700
e-mail: info@omega.com

For Other Locations Visit omega.com/worldwide

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.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY / DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

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.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering. OMEGA is a trademark of OMEGA ENGINEERING, INC.

M4913-G/0418