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User's Guide

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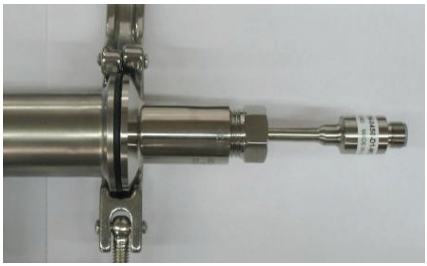
M12 CONNECTOR STYLE PRS SERIES Spring Loaded Sanitary RTD Sensors with Thermowells

M-4913-K Instruction Manual for M12 Connector Style PRS Series Spring Loaded Sanitary RTD Sensors With Thermowells

GENERAL DESCRIPTION

The OMEGA PRS series sensors are designed for use in Sanitary Clean-In-Place (CIP) systems, and are supplied with a Tri-Grip® flanged thermowell for easy installation into Food, Dairy and Biopharmaceutical systems. These sensors are supplied with a stainless steel thermowell, a spring loaded probe assembly with an M12 connector

When assembled, the probe is spring loaded into the thermowell. The probe contains a 4-wire PT100 Platinum RTD (Resistance Temperature Detector) that meets the resistance vs. temperature characteristics and Class A requirements of IEC 60751. Equations for calculating resistance vs. temperature, temperature vs. resistance, and Class A tolerances are included below the resistance vs. temperature table.



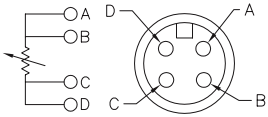
PROCESS CONNECTION

This sensor has a thermowell that includes a Tri-Grip® flange so it can be installed into existing process connections. A commercially available gasket is placed between the thermowell flange and process connection, with a clamp used to complete the connection as shown above.
The Thermowell is made from 316L Stainless Steel, with wetted surfaces that have a surface finish of 32 microinches or better. Care should be exercised when handling sensors so that the surface finish is not damaged during handling or

WIRING CONFIGURATION:

The **Omega PRS** Style sensors are supplied with 4-Pin, M12 connectors for convenient connection to your process instrumentation. The wiring arrangement of the connector pins are as shown in the detail below.

For 4-wire PT100 RTD connections, simply connect the sensor to the instrumentation using a 4-wire extension cable (not supplied, Note: RTD sensors have no polarity). This 4-wire device can also be used with 2-wire or 3-wire devices by connecting only to those pins that are needed (see diagram below). **When used in 3-wire systems, do not twist or short the C and D pins together since this will adversely affect your accuracy by reducing the wire resistance by half. When used in a 2-wire system, simply connect to pin A or B, and C or D to connect across the sensor as shown in the wiring diagram.)**



OPERATING CURRENT:

To insure self heating effects do not occur, the **Omega PRS** series sensors should be powered with no more than **1 milliamp** of excitation current. Although capable of operating at higher current levels, self heating effects may occur.

SPECIFICATIONS:

RTD Type: Platinum per IEC-60751.
Accuracy: Class A per IEC-60751.
Temperature Range: -50 to 250°C.
Excitation Current: 1 milliamp max.
Response Time: 2.5 Seconds max (63%).
Wetted Surfaces: 316L Stainless Steel with 10 microinch or better surface finish.

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Resistance Vs. Temperature Table: (Resistance Values Stated in Ohms)

Temperature °C

	0	1	2	3	4	5	6	7	8	9
-50	80.32	79.92	79.52	79.13	78.73	78.33	77.93	77.54	77.14	76.74
-40	84.28	83.88	83.48	83.09	82.69	82.30	81.90	81.50	81.11	80.71
-30	88.22	87.83	87.44	87.04	86.65	86.25	85.86	85.46	85.07	84.67
-20	92.16	91.77	91.37	90.98	90.59	90.19	89.80	89.41	89.01	88.62
-10	96.09	95.69	95.30	94.91	94.52	94.13	93.73	93.34	92.95	92.55
0	100.00	99.61	99.22	98.83	98.44	98.04	97.65	97.26	96.87	96.48
	100.00	100.39	100.78	101.17	101.56	101.95	102.34	102.73	103.12	103.51
10	103.90	104.29	104.68	105.07	105.46	105.85	106.24	106.63	107.02	107.40
20	107.79	108.18	108.57	108.96	109.35	109.73	110.12	110.51	110.90	111.29
30	111.67	112.06	112.45	112.83	113.22	113.61	114.00	114.38	114.77	115.15
40	115.54	115.93	116.31	116.70	117.08	117.47	117.86	118.24	118.63	119.01
50	119.40	119.78	120.17	120.55	120.94	121.32	121.71	122.09	122.47	122.86
60	123.24	123.63	124.01	124.39	124.78	125.16	125.54	125.93	126.31	126.69
70	127.08	127.46	127.84	128.22	128.61	128.99	129.37	129.75	130.13	130.52
80	130.90	131.28	131.66	132.04	132.42	132.80	133.18	133.57	133.95	134.33
90	134.71	135.09	135.47	135.85	136.23	136.61	136.99	137.37	137.75	138.13
100	138.51	138.88	139.26	139.64	140.02	140.40	140.78	141.16	141.54	141.91
110	142.29	142.67	143.05	143.43	143.80	144.18	144.56	144.94	145.31	145.69
120	146.07	146.44	146.82	147.20	147.57	147.95	148.33	148.70	149.08	149.46
130	149.83	150.21	150.58	150.96	151.33	151.71	152.08	152.46	152.83	153.21
140	153.58	153.96	154.33	154.71	155.08	155.46	155.83	156.20	156.58	156.95
150	157.33	157.70	158.07	158.45	158.82	159.19	159.56	159.94	160.31	160.68
160	161.05	161.43	161.80	162.17	162.54	162.91	163.29	163.66	164.03	164.40
170	164.77	165.14	165.51	165.89	166.26	166.63	167.00	167.37	167.74	168.11
180	168.48	168.85	169.22	169.59	169.96	170.33	170.70	171.07	171.43	171.80
190	172.17	172.54	172.91	173.28	173.65	174.02	174.38	174.75	175.12	175.49
200	175.86	176.22	176.59	176.96	177.33	177.69	178.06	178.43	178.79	179.16
210	179.53	179.89	180.26	180.63	180.99	181.36	181.72	182.09	182.46	182.82
220	183.19	183.55	183.92	184.28	184.65	185.01	185.38	185.74	186.11	186.47
230	186.84	187.20	187.56	187.93	188.29	188.66	189.02	189.38	189.75	190.11
240	190.47	190.84	191.20	191.56	191.92	192.29	192.65	193.01	193.37	193.74
250	194.10	194.46	194.82	195.18	195.55	195.91	196.27	196.63	196.99	197.35
260	197.71	198.07	198.43	198.79	199.15	199.51	199.87	200.23	200.59	200.95

For Determining Resistance from Temperature (0°C and above):

$R_t = R_0(1 + A_t + B_t^2)$

where:

R_t = Sensor Resistance at Temperature (°C)

R_0 = Sensor resistance at 0°C
= (100 Ohms Nominal)

$A = 3.9083 \times 10^{-3}\ °C^{-1}$

$B = 5.775 \times 10^{-7}\ °C^{-2}$

For Determining Temperature From Resistance (0°C and above):

$t = [\text{sqrt}(A^2\text{-}4B(1\text{-}R_t/R_0))\text{-}A]/2B = °C$

where:

t = Temperature at Sensor Resistance R_t

A, B, R_0 and R_t per above

Class A Tolerance = ± (0.15 + 0.002t) = °C

With t = temperature in °C regardless to sign.

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Engineering Service: 1-800-872-9436 (USA & Canada only)
Tel: (203) 359-1660 Fax: (203) 359-7700
e-mail: info@omega.com

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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.

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.

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