



SPRTX-SS SERIES

Industrial RTD Connector/Transmitter



INSTRUCTION
SHEET

M4755/0313

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General Description

The OMEGA® 2-wire SPRTX-SS Series temperature transmitters are high performance, low cost, industrial transmitters designed for direct connection to most CIP (clean-in-place) sanitary Pt100 probes and sensors that incorporate a M12 style connector. All models feature an encapsulated micro miniature signal conditioner built into a sealed connector housing. The signal conditioner converts the resistive change of a 100 Ω , 0.00385 RTD probe or sensor into an industry-standard 2 wire, 4 to 20 mA analog output across a dedicated temperature range. This analog output can be sent hundreds of feet away from the location of your sensor (probe) to an indicating device, controller, PLC, computer, data logger or chart recorder. Your SPRTX-SS temperature transmitter has been factory calibrated to provide maximum performance and requires no field adjustments.

Omega's SPRTX-SS transmitters are available in M12-1 and M12-2 models, allowing for more flexible international use. The SPRTX-SS1-M12-1 and SPRTX-SS2-M12-1 are designed for use commonly in North America. The SPRTX-SS1-M12-2 and SPRTX-SS2-M12-2 are geared towards European applications.

Unpacking

Remove the packing list and verify that you have received all your equipment. If you have any questions about the shipment, please call Customer Service at: 1-800-622-2378 or 203-359-1660.

On the web you can find us at: omega.com e-mail: cservice@omega.com

When you receive the shipment, inspect the container and equipment for any signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE:

The carrier will not honor any damage claims unless all shipping material is saved for inspection. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

The following items are supplied in the box with your SPRTX Connector/Transmitter.

- This User's Manual, # M-4755 (1 ea.)

SPRTX-SS Temperature Transmitter

Model No.	Description*	Range
SPRTX-SS1-M12-1	Pt100 Transmitter, Wiring Option 1	-99 to 20°C (-146 to 406°F)
SPRTX-SS1-M12-2	Pt100 Transmitter, Wiring Option 2	
SPRTX-SS2-M12-1	Pt100 Transmitter, Wiring Option 1	2 to 569°C (36 to 1056°F)
SPRTX-SS2-M12-2	Pt100 Transmitter, Wiring Option 2	

* See Figure 1 for Wiring Option information

Recommended Accessories

Power Supply, OMEGA Part No.: **PSU-93**

Shielded 2-conductor cable (100 ft), OMEGA Part No.: **TX2-100**

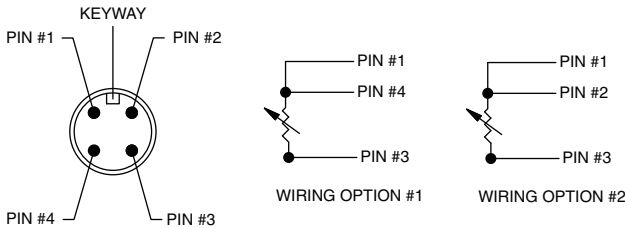


Figure 1. Wiring Options

Introduction/Safety

Your SPRTX-SS Temperature Transmitter has been designed for ease of use and flexibility. It is important that you read this Users Manual completely and follow all safety precautions before operating your unit.

Precautions

1. FOLLOW ALL SAFETY PRECAUTIONS AND OPERATING INSTRUCTIONS OUTLINED IN THIS MANUAL.
2. INSURE PROBE/M12 CONNECTOR CONNECTION IS ALWAYS FULLY TIGHTENED DURING USE.
3. ADD ADDITIONAL SAFE GUARDS TO YOUR SYSTEM IN CRITICAL APPLICATIONS WHERE DAMAGE OR INJURY MAY RESULT FROM PROBE/CONNECTOR SEPARATION OR FAILURE.
4. NEVER EXPOSE THE CONNECTOR/MODULE BODY TO AMBIENT TEMPERATURES ABOVE 85°C (185°F) OR BELOW -40°C (-40°F). DAMAGE MAY RESULT.
5. DO NOT OPERATE IN FLAMMABLE OR EXPLOSIVE ENVIRONMENTS.
6. DO NOT USE IN HUMAN MEDICAL OR NUCLEAR APPLICATIONS.
7. NEVER OPERATE WITH A POWER SOURCE OTHER THAN WHAT IS SPECIFIED IN THIS MANUAL.



8. REMOVE AND OR DISCONNECT POWER SOURCE BEFORE ATTEMPTING INSTALLATION OR MAINTENANCE.
9. ALWAYS OPERATE YOUR UNIT WITH THE SHIELD WIRE CONNECTED TO EARTH GROUND.
10. INSTALLATION AND WIRING SHOULD BE DONE BY TRAINED PROFESSIONALS ONLY.
11. DO NOT OPEN OR DISASSEMBLE YOUR UNIT.

NOTE:

There are no user serviceable parts inside your unit. Attempting to open, repair or service your unit will void your warranty.

Theory of Operation

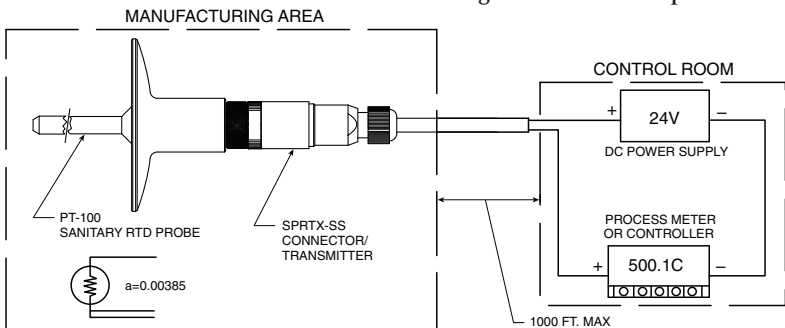
A 4-20 mA loop is a series loop in which a transmitter will vary the current flow depending on the input to the transmitter. With the SPRTX-SS the amount of current allowed to flow in the loop will vary depending on the resistance change, due to changes in the temperature being measured by the Sanitary RTD sensor (probe). Some advantages of a current output over a voltage output is that the signal measured is less susceptible to electrical noise interference and the loop can support more than one measuring instrument as long as the maximum loop resistance is not exceeded.

A typical application utilizing a current loop will normally consist of a power supply, the transmitter and a meter, recorder or controller to measure the current flow. The loop resistance is the sum of the measuring instruments and wire used. The maximum allowable loop resistance for the SPRTX-SS to function properly is found by using the following formula:

$$R_{max} = (\text{power supply voltage} - 9 \text{ volts}) / .02 \text{ amps}$$

For applications that require a voltage output, the 4-20mA signal from the SPRTX-SS can be converted in the field by adding a 250 Ohm shunt resistor that will convert the transmitters output to a 1-5 Vdc signal when wired correctly.

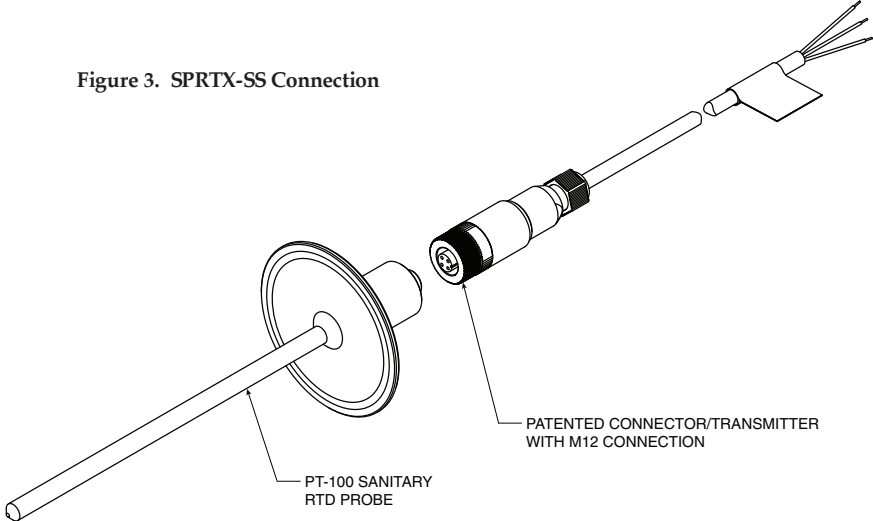
Figure 2. SPRTX-SS Operation



Mounting Your SPRTX to Probes

The SPRTX-SS Series of connector/transmitters are designed for quick connection to Sanitary RTD sensors and probes. See below for correct usage.

Figure 3. SPRTX-SS Connection



Protection from High Ambient Temperatures

NOTE:

Your SPRTX-SS Connector/Transmitter Assembly can be damaged if exposed to ambient temperatures above 85°C (185°F). Some applications may require that you shield the SPRTX-SS unit from radiated heat as shown below. You should always use a probe where the length allows for a safe distance of 76 mm (3") or more between the body of the SPRTX-SS and your source of heat.

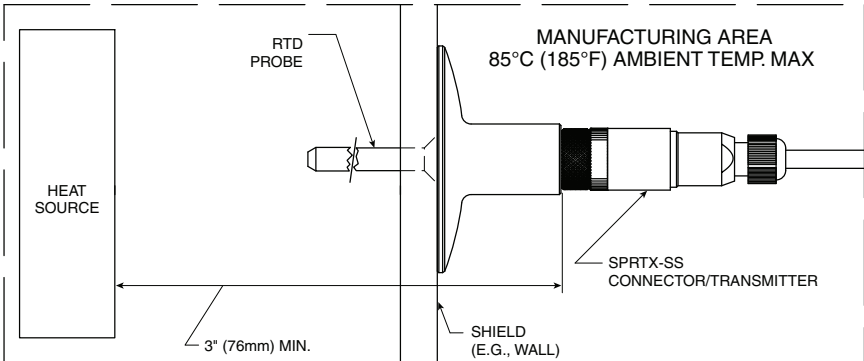
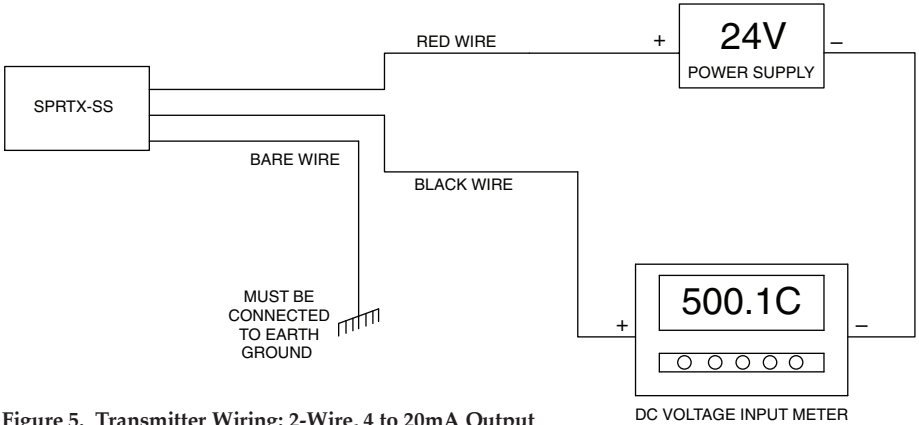


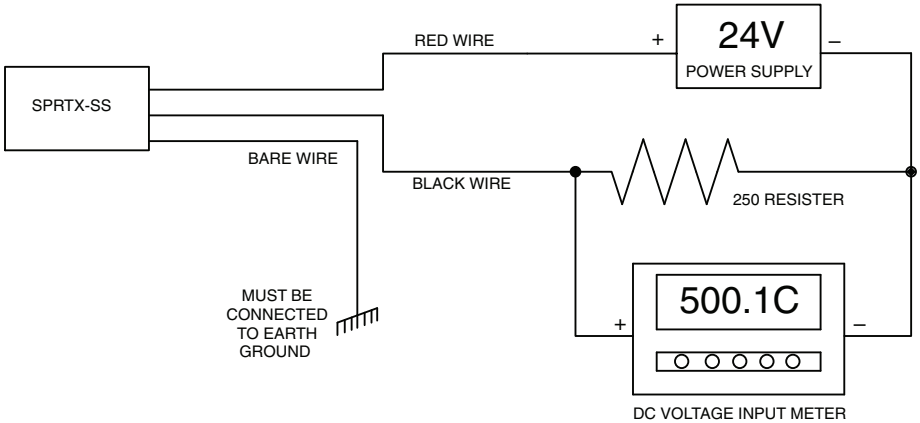
Figure 4. SPRTX-SS Temperature/ Protection



Transmitter Wiring Examples



Converting from 4 to 20mA Output to 1 to 5Vdc Output (3-wire)



NOTE:

WHEN WIRED FOR 1-5 Vdc OPERATION THE MINIMUM OPERATING VOLTAGE MUST BE INCREASED TO 15 Vdc.



Temperature to Analog Output Calculations

Models: SPRTRX-SS1-M12-1, SPRTRX-SS1-M12-2

Temp deg. C	Temp deg. F	RTD Resistance	Output mA
-99	-146	60.67	4.00
-50	-58	80.31	6.55
0	32	100.00	9.16
25	77	109.73	10.46
50	122	119.40	11.77
75	167	128.99	13.07
100	212	138.51	14.37
125	257	147.95	15.67
150	302	157.33	16.98
175	347	166.62	18.28
208	406	178.80	20.00

Models: SPRTRX-SS2-M12-1, SPRTRX-SS2-M12-2

Temp deg. C	Temp deg. F	RTD Resistance	Output mA
-18	0	92.95	3.54
2	36	100.78	4.00
25	77	109.73	4.65
50	122	119.40	5.35
100	212	138.51	6.77
150	302	157.33	8.18
200	392	175.86	9.59
250	482	194.10	11.00
300	572	212.05	12.41
400	752	247.09	15.23
500	932	280.98	18.10
569	1056	303.68	20.00

Calibration/Service

Your transmitter has been factory calibrated to meet or exceed the specifications outlined in this manual. No field adjustments are needed or possible on your unit. If your unit should become damaged or malfunction, please contact Omega Customer Service at:

On the web you can find us at:

omega.com e-mail: cservice@omega.com



Specifications

Supply Voltage:	9 to 24 Vdc @ 30mA max
Max Load:	$R_{max} (\Omega) = (V \text{ supply} - 9V) / 0.02 \text{ A}$
Max Input Lead Resistance:	50V
Output:	Linearized 4 to 20 mA
Accuracy:	$\pm 0.5\%$ of full scale @ 23°C (73°F)
Repeatability:	$\pm 0.25^\circ\text{C}$ ($\pm 0.5^\circ\text{F}$)
Temperature Effect:	$\pm 0.0022 \text{ mA}/^\circ\text{C}$ ($\pm 0.0012 \text{ mA}/^\circ\text{F}$)
Temperature Input Range by model	
SPRTX-SS1:	-99 to 208°C (-146 to 406°F)
SPRTX-SS2:	2 to 569°C (36 to 1056°F)
Input:	3-wire, Pt100 ($\Omega=0.00385$) 4-wire compatible
Probe/ Sensor Input Connection	M12, 4-pin female, (connects to RTD probes having a 12M, 4-pin male connection)
Transmitter Operating Temp:	-40 to 85°C (-40 to 185°F)
Output Connection:	2-wire, Shielded, polyurethane cable 4 m (12') included
Approvals:	CE Marked
Max Loop Resistance:	$\text{Ohms} = (V \text{ supply} - 9 \text{ V}) / 0.02 \text{ A}$
Dimensions:	76 L x 20 mm D (3 x 0.8") without cable
Weight:	110 g (0.25 lb) max with cable



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WARNING: These products are not designed for use in, and should not be used for, human applications.



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

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.

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