



**CHICAGO STAINLESS EQUIPMENT**

1280 SW 34<sup>th</sup> Street  
Palm City, FL 34990  
800-927-8575 – Phone  
772-781-1488 - FAX  
[www.chicagostainless.com](http://www.chicagostainless.com)

# SANI-FLOW RTD

## Instruction Manual

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**DESCRIPTION:**

All CSE RTDs (Resistance Temperature Detectors) have been specially designed for critical temperature measurement in sanitary fluid processing. We use a PT-100 (platinum 100 Ohm) 3 wire thin film RTD which is epoxy encapsulated in an all stainless steel probe to ensure the fastest response characteristics possible. The RTDs are combined with a standard 12mm industrial micro DC male receptacle with gold plated contacts to allow for quick and easy installation and removal. No bulky, complicated, leaking wiring heads or tools required, simply plug in the connector and go. The electrical connection is IP-65/NEMA 4X rated which means that the RTDs can be aggressively washed down or temporarily submerged in water while in use.

An RTD signal should be connected to receiver such as a digital indicator, electronic recorder or PLC. The 3<sup>rd</sup> wire in a CSE RTD is used to compensate for the resistance added by the length of the wires. This allows for maximum cable lengths up to 200 feet. If longer cable lengths are required then it is best to use a temperature transmitter which converts temperature into a 4 to 20 mA signal.

**SPECIFICATIONS:**

- Description: 3 Wire PT-100 (Platinum – 100 Ohm resistor)
- Coefficient: Alpha = 0.00385 Ohms/Ohm/Degree C (Per DIN 43760/IEC751)\*
- Accuracy: ±0.1°C (±0.18°F)
- Stability: Less than 0.05°C drift per year (at 0°C)
- Range: -125°C to 200°C (-193°F to 392°F)
- Material: 316L stainless steel housing
- Surface Finish: R<sub>a</sub>max = 8 micro-inches
- Ratings: Nema 4X, IP-65
- Ambient Temperature Range: -50°C to 125°C (-58° to 257°F)
- Connector: Standard 12mm industrial connector with gold plated copper alloy contacts and a polyamide insert
- CIP/SIP: Yes
- Autoclave: Yes

**CABLE REQUIREMENTS:**

The RTD has a standard 12mm Micro DC male receptacle which is widely accepted in all industries. The contacts are gold plated and have either 3 pins (single element RTD) or 6 pins (dual element RTD).

The cable should be of Polyurethane construction, 22 gauge with 3 conductors (for a single element RTD) or 6 conductors (for a dual element RTD), Nema 4X/IP-65 rated and the contacts should be gold plated. The connectors and cables should be shielded to prevent any RFI or EMI interference.

The cable can be purchased from CSE or from most industrial supply warehouses. We also supply cabling accessories such as extra cable, field wireable connectors, and panel mount connectors; please refer to our Electronic Sensors Cable brochure.

## **INSTALLATION:**

Try to place in a location where the RTD will be the least subjected to physical abuse. Wet locations are acceptable so long as the connector or cap is attached to the RTD during exposure to moisture or during wash down. For installation of a new RTD follow the wiring instructions below. For replacement of an existing CSE RTD, simply install on line then attach the existing cable. No re-wiring or special tools are required.



Always make sure that the connector is clean and dry before connecting.

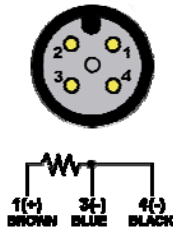


Never use pliers or other tools to tight the connector; *finger tighten only.*

## **WIRING:**

### Single Element RTD (3 Wires)

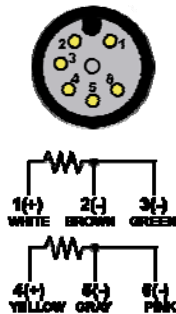
CSE uses a 3 wire platinum thin film RTD (PT-100). CSE cable utilizes the Brown as the signal wire and the Blue and Black as common wires. The shielding should be connected to earth ground at the receiver end.



Pin #	Wire Color	Wire Type
1	Brown	Signal
2	No Pin	---
3	Blue	Common
4	Black	Common

### Dual Element RTD (6 Wires)

For a dual element RTD, CSE uses two 3 wire platinum thin film RTDs (PT-100). For the primary RTD CSE cable utilizes the White as the signal wire and the Brown and Green as common wires. For the secondary RTD CSE cable utilizes the Yellow as the signal wire and the Gray and Pink as common wires. The shielding should be connected to earth ground at the receiver end.



Pin #	Wire Color	Wire Type
1	White	Signal – RTD#1
2	Brown	Common – RTD#1
3	Green	Common – RTD#1
4	Yellow	Signal – RTD#2
5	Gray	Common – RTD#2
6	Pink	Common – RTD#2

## **CALIBRATION:**

RTD's do not need calibration. To check that the RTD is accurate, use the table of temperature versus resistance for a 100 Ohm RTD at the end of this manual. Measure the resistance of the element using a digital multimeter.

### Single Element RTD

Measure the resistance between pin #1 and pin #3 (the brown and blue wires on CSE cable). Then subtract the resistance of the wire by measuring between pin #3 and pin #4 (the blue and black wires on CSE cables). Then look up the value in the table and see if the resistance matches the temperature.

### Dual Element RTD

For the primary element, measure the resistance between pin #1 and pin #2 (the white and brown wires on CSE cables). Then subtract the resistance between pin #2 and pin #3 (the brown and green wires on CSE cables). Then look up the value in the table and see if the resistance matches the temperature.

For the secondary element, measure the resistance between pin #4 and pin #5 (the yellow and gray wires on CSE cables). Then subtract the resistance between pin #5 and pin #6 (the gray and pink wires on CSE cables). Then look up the value in the table and see if the resistance matches the temperature.

### MAINTENANCE:

CSE RTDs require little or no maintenance. On a regular basis, simply check that the inside of the connector is clean and dry and that it is finger tight; *never use tools to tight the connector*. Also check that the probe has not been severely damaged and that the cable is not cracked or cut.

### TROUBLESHOOTING:

- 1) If you suspect that there is a problem with an RTD first check that the wires have been connected properly at the receiving end (see wiring diagram above).
- 2) Disconnect the cable and perform the tests above under "Calibration" on the RTD with out the cable.
- 3) Check that the cable is good by checking the continuity of each wire.
- 4) Replace any damaged components.

### TEMPERATURE vs. RESISTANCE TABLE

DIN 43760\*, 100 Ohm Platinum RTD

Alpha = .00385 ohms/ohm/°C

<u>°C</u>	<u>Ohms</u>	<u>°F</u>	<u>Ohms</u>	<u>°F</u>	<u>Ohms</u>
-50	80.31	-50	82.07	210	138.08
-40	84.27	-40	84.27	220	140.18
-30	88.22	-30	86.47	230	142.29
-20	92.16	-20	88.66	240	144.39
-10	96.09	-10	90.85	250	146.49
0	100.00	0	93.03	260	148.58
10	103.90	10	95.21	270	150.67
20	107.79	20	97.39	280	152.75
30	111.67	30	99.57	290	154.83
40	115.54	40	101.74	300	156.91
50	119.40	50	103.90		
60	123.24	60	106.07		
70	127.08	70	108.23		
80	130.90	80	110.38		
90	134.71	90	112.53		
100	138.51	100	114.68		
110	142.29	110	116.83		
120	146.07	120	118.97		
130	149.83	130	121.11		
140	153.58	140	123.24		
150	157.33	150	125.37		
160	161.05	160	127.50		
170	164.77	170	129.62		
180	168.48	180	131.74		
190	172.17	190	133.86		
200	175.86	200	135.97		

\* Interchangeability tolerance also matches British Standard BS 1904 Temperature vs. resistance curve.