CHICAGO STAINLESS EQUIPMENT, INC

CHICAGO STAINLESS EQUIPMENT

SANI-FLOW
RTD INSTRUCTIONS

QUALITY PRODUCTS SINCE 1937

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Promoting Distribution
Hygienic Processing

CHICAGO STAINLESS EQUIPMENT

SPECIFICATIONS

Description:	3-Wire PT-100 Class A
Compliance:	ANSI / 3-A *, NEMA 4X, IP67, ISO 9001:2015
Coefficient:	Alpha = 0.00385
	Ohms/Ohm/Degree C
	(Per DIN EN 60751 / IEC 751)
Accuracy:	±0.15+0.002|T| °C
Stability:	Maximum - R -drift 0.04% (After 100h at 500°C/932°F)
Process Temperature Limits:	-50°C to 150°C (-58° to 302°F) **
Ambient Temperature Limits:	-25°C to 125°C (-13° to 257°F) ***
Product Contact Material:	316L Stainless Steel
Housing Material:	316L Stainless Steel
Surface Finish:	R_a max = 8 Micro-Inches
Connector:	Standard 12mm Industrial Connector
	Gold Plated Copper Contacts and Polyamide Insert
CIP/SIP:	Yes
Autoclave:	Yes ****

* Sanitary connections only
** High Temperature Option increases maximum process temperature to 204°C (400°F)
*** Verify temperature limit of mating cable
**** Autoclave to 132°C (270°F) maximum - Electronics MUST be removed from housing

All CSE RTD's (Resistance Temperature Detectors) have been specially designed for critical temperature measurement in sanitary (and non-sanitary) processing. We use a Pt-100 (platinum 100 Ohm) 3-Wire thin-film RTD which is encapsulaed in an all stainless steel probe specifically designed to ensure the fastest response characteristics possible. The RTS's are combined with a standard 12mm industrial micro DC male receptable 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 IP67 rated which meas that the RTD's can be aggressively washed don or temporarily submerged in water while in use.

CHICAGO STAINLESS EQUIPMENT

INSTALLATION

- An RTD should be connected to a receiver with a Pt100 RTD input such as a digital indicator, electronic recorder, or PLC. The resistance compensating 3rd wire allows for maximum cable lengths up to 200 feet (4-wire configuration is avaialable - consult your distributor). If longer cable lengths are required, and/or there is a higher likelihood of RFI or EMI interference, a temperature transmitter should be used in conjunction with the RTD.
- Always make sure that the connector is clean and dry before connecting
- 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 expose to moisture or during wash down.
- For replacement of an existing CSE RTD, simply install on line then attach the existing cable. No rewiring or special tools are required.

CABLE REQUIREMENTS

- The cable jacket/sheath should be constructed with the appropriate material for your application. It should be 22 gauge minimum with at least 3 conductors (for a single element RTD) or 6 conductors (for a dual element RTD), IP67 rated, and the contact should be gold plated. Even if the transmitter is used, the cables should be shielded to help protect
- Standard industrial cables can be purchased from Chicago Stainless Equipment. We also supply cable accessories such as extra cable, field wireable connectors, and panel mount connectors. For more information please refer to www.ChicagoStainless.com.from RFI or EMI interference.

WIRING

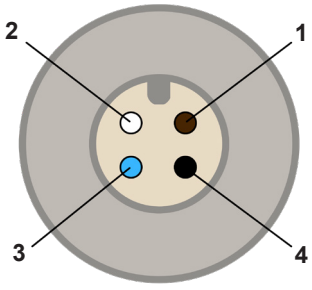
Finger tighten ONLY

Never use pliers or other tools to tighten the connector

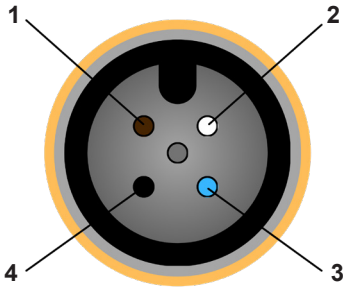
Single Element RTD (3 Wires)

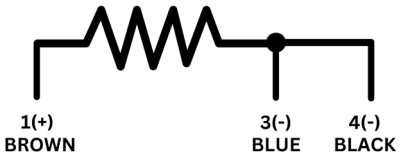
- CSE uses a 3-wire platinum thin film RTD (Pt-100).
- CSE cables utilize the Brown (Pin #1) as the signal wire and the Blue (Pin #3) & Black (Pin #4) as common wires.
- Any shielding should be connected to earth ground at the receiver end.

RTD:



CABLE:





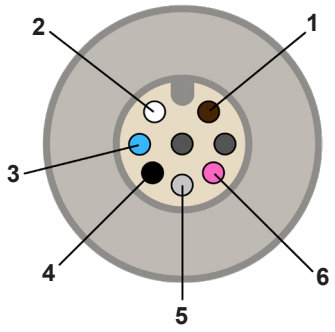
Pin #	Color	Wire Type
1	Brown	Signal
2	White	*Not Used*
3	Blue	Common
4	Black	Common

WIRING CONTINUED...

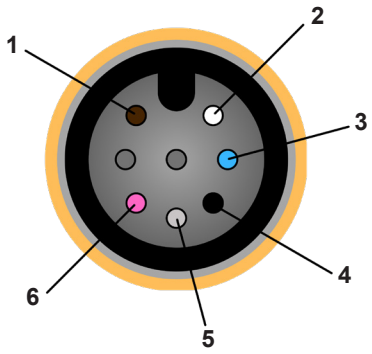
Dual Element RTD (6 Wires)

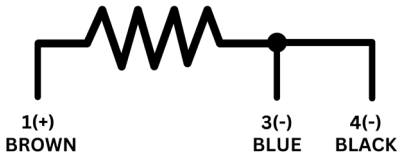
- CSE uses a 3-wire platinum thin film RTD (Pt-100).
- For the primary RTD, CSE cables utilize the Brown (Pin #1) as the signal wire and the White (Pin #2) & Blue (Pin #3) as common wires.
- For the secondary RTD, CSE cables utilize the Brown (Pin #1) as the signal wire and the Gray (Pin #5) & Pink (Pin #6) as common wires.
- Any shielding should be connected to earth ground at the receiver end.

RTD:



CABLE:





Pin #	Color	Wire Type
1	Brown	Signal - RTD #1
2	White	Common - RTD #1
3	Blue	Common - RTD #1
4	Black	Signal - RTD #2
5	Gray	Common - RTD #2
6	Pink	Common - RTD #2

NO CALIBRATION NECESSARY

- RTDs 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 while probe is fully immersed in a stable temperature bath using a reference thermometer and a digital multimeter (both with current NIST traceable certification).

TO CHECK ACCURACY:

Single Element RTD (3 Wires)

- 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 cable. Then look up the value in the table anad see if the resistance matches the temperature.

Dual Element RTD (6 Wires)

- For the primary element, measure the resistance between pin #1 and pin #2 (the brown and white wires on CSE cables). Then subtract the resistance between pin #2 and pin #3 (the white and blue 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 black 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.

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.
2. Make sure connector is tight and the contacts are clean and dry.
3. Disconnect the cable and perform the Calibration tests (next page) on the RTD without the cable.
4. Check the continuity of each wire.
5. Replace any damaged components.

MAINTENENCE

CSE RTDs require little or no maintenance. Although, on a regular basis...

- Check that the inside of the connector is clean and dry and that it is finger tight. (Never using tools to tighten)
- Check that the probe has not been severely damaged and that the cable is not cracked or cut.

RTD TEMPERATURE *vs* RESISTANCE TABLE

Pt100 α = 0.00385

DEGREES FARENHEIT

°F	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	°C
-60	79.86											-60
-50	82.07	81.85	81.63	81.41	81.19	80.97	80.75	80.53	80.31	80.09	79.86	-50
-40	84.27	84.05	83.83	83.61	83.39	83.17	82.95	82.73	82.51	82.29	82.07	-40
-30	86.47	86.25	86.03	85.81	85.59	85.37	85.15	84.93	84.71	84.49	84.27	-30
-20	88.66	88.44	88.22	88.00	87.78	87.56	87.34	87.13	86.91	86.69	86.47	-20
-10	90.85	90.63	90.41	90.19	89.97	89.75	89.54	89.32	89.10	88.88	88.66	-10
0	93.03	92.82	92.60	92.38	92.16	91.94	91.72	91.50	91.29	91.07	90.85	0
°C	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	°C

°F	0	1	2	3	4	5	6	7	8	9	10	°F
0	93.03	93.25	93.47	93.69	93.91	94.12	94.34	94.56	94.78	95.00	95.21	0
10	95.21	95.43	95.65	95.87	96.09	96.30	96.52	96.74	96.96	97.17	97.39	10
20	97.39	97.61	97.83	98.04	98.26	98.48	98.70	98.91	99.13	99.35	99.57	20
30	99.57	99.78	100.00	100.22	100.43	100.65	100.87	101.09	101.30	101.52	101.74	30
40	101.74	101.95	102.17	102.39	102.60	102.82	103.04	103.25	103.47	103.69	103.90	40
50	103.90	104.12	104.34	104.55	104.77	104.98	105.20	105.42	105.63	105.85	106.07	50
60	106.07	106.28	106.50	106.71	106.93	107.15	107.36	107.58	107.79	108.01	108.23	60
70	108.23	108.44	108.66	108.87	109.09	109.30	109.52	109.73	109.95	110.17	110.38	70
80	110.38	110.60	110.81	111.03	111.24	111.46	111.67	111.89	112.10	112.32	112.53	80
90	112.53	112.75	112.96	113.18	113.39	113.61	113.82	114.04	114.25	114.47	114.68	90
100	114.68	114.90	115.11	115.33	115.54	115.76	115.97	116.18	116.40	116.61	116.83	100
110	116.83	117.04	117.26	117.47	117.68	117.90	118.11	118.33	118.54	118.76	118.97	110
120	118.97	119.18	119.40	119.61	119.82	120.04	120.25	120.47	120.68	120.89	121.11	120
130	121.11	121.32	121.53	121.75	121.96	122.18	122.39	122.60	122.82	123.03	123.24	130
140	123.24	123.46	123.67	123.88	124.09	124.31	124.52	124.73	124.95	125.16	125.37	140
150	125.37	125.59	125.80	126.01	126.22	126.44	126.65	126.86	127.08	127.29	127.50	150
160	127.50	127.71	127.93	128.14	128.35	128.56	128.78	128.99	129.20	129.41	129.62	160
170	129.62	129.84	130.05	130.26	130.47	130.68	130.90	131.11	131.32	131.53	131.74	170
180	131.74	131.96	132.17	132.38	132.59	132.80	133.01	133.23	133.44	133.65	133.86	180
190	133.86	134.07	134.28	134.50	134.71	134.92	135.13	135.34	135.55	135.76	135.97	190
200	135.97	136.19	136.40	136.61	136.82	137.03	137.24	137.45	137.66	137.87	138.08	200
210	138.08	138.29	138.51	138.72	138.93	139.14	139.35	139.56	139.77	139.98	140.19	210
220	140.19	140.40	140.61	140.82	141.03	141.24	141.45	141.66	141.87	142.08	142.29	220
230	142.29	142.50	142.71	142.92	143.13	143.34	143.55	143.76	143.97	144.18	144.39	230
240	144.39	144.60	144.81	145.02	145.23	145.44	145.65	145.86	146.07	146.28	146.49	240
250	146.49	146.70	146.91	147.11	147.32	147.53	147.74	147.95	148.16	148.37	148.58	250
260	148.58	148.79	149.00	149.21	149.41	149.62	149.83	150.04	150.25	150.46	150.67	260
270	150.67	150.88	151.08	151.29	151.50	151.71	151.92	152.13	152.33	152.54	152.75	270
280	152.75	152.96	153.17	153.38	153.58	153.79	154.00	154.21	154.42	154.62	154.83	280
290	154.83	155.04	155.25	155.46	155.66	155.87	156.08	156.29	156.49	156.70	156.91	290
300	156.91	157.12	157.33	157.53	157.74	157.95	158.15	158.36	158.57	158.78	158.98	300
310	158.98											310
F°												F°

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RTD TEMPERATURE *vs* RESISTANCE TABLE

Pt100 α = 0.00385

DEGREES CELSIUS

°C	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	°C
-60	76.33											-60
-50	80.31	79.91	79.51	79.11	78.72	78.32	77.92	77.52	77.12	76.73	76.33	-50
-40	84.27	83.87	83.48	83.08	82.69	82.29	81.89	81.50	81.10	80.70	80.31	-40
-30	88.22	87.83	87.43	87.04	86.64	96.25	85.85	85.46	85.06	84.67	84.27	-30
-20	92.16	91.77	91.37	90.98	90.59	90.19	89.80	89.40	89.01	88.62	88.22	-20
-10	96.09	95.69	95.30	94.91	94.52	94.12	93.34	93.34	92.95	92.55	92.10	-10
0	100.00	99.61	99.22	98.83	98.44	98.04	97.26	97.26	96.87	96.48	96.09	0
°C	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	°C

°C	0	1	2	3	4	5	6	7	8	9	10	°C
0	100.00	100.39	100.78	101.17	101.56	101.95	102.34	102.73	103.12	103.51	103.90	0
10	103.90	104.29	104.68	105.07	105.46	105.85	106.24	106.63	107.02	107.40	107.79	10
20	107.79	108.18	108.57	108.96	109.35	109.73	110.12	110.51	110.90	111.29	111.67	20
30	111.67	112.06	112.45	112.83	113.22	113.61	114.00	114.38	114.77	115.15	115.54	30
40	115.54	115.93	116.31	116.70	117.08	117.47	117.86	118.24	118.63	119.01	119.40	40
50	119.40	119.78	120.17	120.55	120.94	121.32	121.71	122.09	122.47	122.86	123.24	50
60	123.24	123.63	124.01	124.39	124.78	125.16	125.54	125.93	126.31	126.69	127.08	60
70	127.08	127.46	127.84	128.22	128.61	128.99	129.37	129.75	130.13	130.52	130.90	70
80	130.90	131.28	131.66	132.04	132.42	132.80	133.18	133.57	133.95	134.33	134.71	80
90	134.71	135.09	135.47	135.85	136.23	136.61	136.99	137.37	137.75	138.13	138.51	90
100	138.51	138.88	139.26	139.64	140.02	140.40	140.78	141.16	141.54	141.91	142.29	100
110	142.29	142.67	143.05	143.43	143.80	144.18	144.56	144.94	145.31	145.69	146.07	110
120	146.07	146.44	146.82	147.20	147.57	147.95	148.33	148.70	149.08	149.46	149.83	120
130	149.83	150.21	150.58	150.96	151.33	151.71	152.08	152.46	152.83	153.21	153.58	130
140	153.58	153.96	154.33	154.71	155.08	155.46	155.83	156.20	156.58	156.95	157.33	140
150	157.33	157.70	158.07	158.45	158.82	159.19	159.56	159.94	160.31	160.68	161.05	150
160	161.05											160
°C												°C