

# SANI-FLOW TEMPERATURE TRANSMITTER INSTRUCTIONS



**QUALITY PRODUCTS SINCE 1937**  
[www.ChicagoStainless.com](http://www.ChicagoStainless.com)

# 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:	$\pm 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 <sub>a</sub> 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 Temperature Transmitters have been specially designed for critical temperature measurement in sanitary (and non sanitary) processing. When attached to a supply voltage of 6 to 32 Volts DC, the instrument provides a 4 to 20 mA output which can be connected to a receiver such as a digital indicator, electronic recorder or PLC which can display temperature. 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 temperature transmitters are manufactured with a standard 12mm industrial micro DC male receptacle with gold plated contacts to allow for quick and easy installation and removal.

**CSE Temperature Transmitters are sold as one piece. No assembly required, no need to purchase several different items.**



**No bulky, complicated leaking wiring heads or tools required. Simply plug in the connector and go.**

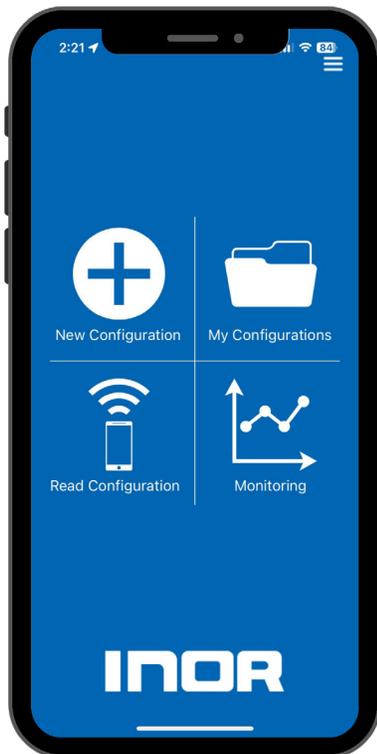
The electrical connection is IP-67 rated which means that the temperature transmitter can be aggressively washed down or temporarily submerged in water while in use.

## ELECTRONICS

Accuracy:	±0.15% of Scale
Range:	-30°C to 150°C (-22°F to 302°F) Factory or Field Rechargeable *
Input:	6 to 32 VDC
Output:	4 to 20 mA (Temperature Linear)
Resolution:	5µA (0.005mA)
Linearity:	±0.1% of Span
Long Term Stability:	±0.05% of Span/Year
Output Load:	$R_{Load} = (V_{Supply} - 8.0V) / 0.022$
Sensor Failure Detection:	Upscale
Isolation:	Not Galvanically Isolated
Calibration:	Field Calibratable Zero and Span Adjustable Rangeable *
Zero Adjustment:	Any value within range limits *
Minimum Span:	20°C (36°F)



\* By a knowledgeable/qualified technician using NFC and a smart phone or tablet and INOR Connect app. Available for free download on App Store, Google Play store and Huawei AppGallery



### Wireless Communication with *INOR Connect*

- Download INOR Connect and connect your smartphone/tablet to your transmitter via NFC® or Bluetooth®.
- INOR Connect offers an intuitive easy-to-use interface all in the palm of your hand.



## INSTALLATION

- Place in a location where the Transmitter will be the least subjected to physical abuse. Wet locations are acceptable as long as the cable is attached to the transmitter during exposure to moisture or during wash down.
- Always make sure that the connector is clean and dry before connecting
- For installation of a new transmitter, follow the wiring instructions below. For replacement of an existing CSE transmitter, simply install on line then attach the existing cable. No rewiring or special tools are required.

## CABLE REQUIREMENTS

- The RTD has a standard 12mm micro DC male receptacle which is widely accepted in all industries. The transmitter has 4 gold plated pins. The cable should be of Polyurethane construction, 22 to 24 gauge with at least 2 conductors. The cable must be IP-67 rated, and the contacts should be gold plated. It is recommended that the connectors and cables should be shielded to prevent any RFI or EMI interference.
- 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](http://www.ChicagoStainless.com).

## WIRING



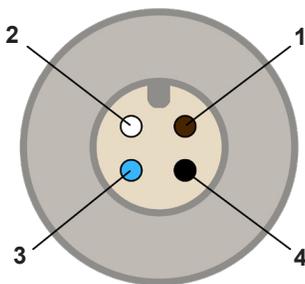
Finger tighten ONLY



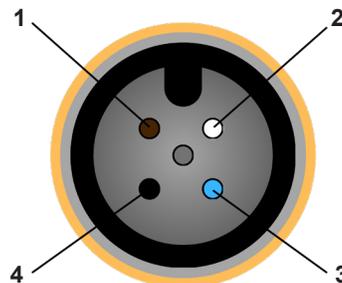
Never use pliers or other tools to tighten the connector

Transmitters use two conductors, one for the signal and one for loop power. The transmitter uses Pin #'s 1 and 3. Pin #1 should be connected to the positive lead from the power supply (LOOP+), and pin #3 should be connected to the signal lead from the power supply (LOOP-). When using a CSE cable, the chart below shows the pin outs and wire colors. Simply connect the Brown wire to the positive lead from the loop power supply (8 to 32 volts DC) and connect the Blue wire to the signal lead from the power supply. If supplied with shielding, the bare wire (shield wire) should be connected to a clean ground terminal at the receiver or power supply. The Black wire is not used.

### TRANSMITTER:



### CABLE:



Pin #	Color	Wire Type
1	Brown	Loop+ (8 to 38 Volts DC)
2	White	Not Used
3	Blue	Signal (Loop- 4 to 20mA)
4	Black	Not Used

## CONFIGURATION

- Setting the transmitter to as small a range as possible is important to get the most accuracy. The transmitter will cover a range of -30°C to 150°C (180° span) with a calibration accuracy of  $\pm 0.1\%$  of full scale or  $\pm 0.18^\circ\text{C}$  ( $.001 \times 180^\circ$ ). If the range of the transmitter is set to 0°C to 50°C (50° span), the calibration accuracy will improve to  $\pm 0.05^\circ\text{C}$  ( $.001 \times 50^\circ$ ). Therefore, it is recommended that the transmitter's range be set as small as possible. The transmitters are set by the factory to -30°C to +150°C; unless a specific range is specified when ordered.
- You can easily configure the transmitters wirelessly via NFC with your smartphone or tablet. There is no need for expensive configuration equipment for transmitter configuration.

## CIP/SIP

- In the event that the transmitter needs to be cleaned in place (CIP) or steamed in place (SIP), no extra precautions are necessary except to ensure that the ambient temperature limit of 85°C (185°F) is not exceeded. It is permissible for the process temperature to exceed the transmitter's range; however, accurate outputs are only available within the set range of the transmitter. If the ambient temperature is expected to exceed the limit of 85°C, follow the procedure below for "Autoclaving".

## AUTOCLAVING

- The transmitter has an ambient temperature limit of 85°C (185°F) which is generally not sufficient for autoclaving. This limit is imposed by the circuit board internal to the transmitter. In the event that the transmitter requires autoclaving, the transmitter must be removed. This is a simple procedure which only requires a ½" wrench.
1. Remove the cable and unscrew the transmitter cap by using a ½" wrench.
  2. Taking note of wires and their terminal numbers, disconnect the 3 RTD wires from the terminals allowing the cap with the circuit board to be completely removed prior to autoclaving. **DO NOT AUTOCLAVE THE ELECTRONICS.**
  3. After autoclaving, reconnect the 3 RTD wires as noted before disconnection.
  4. Replace the transmitter cap and tighten snugly with a ½" wrench. Be careful not to over twist or pinch the wires.

# TROUBLESHOOTING

## Check Wires & Connectors:

1. Check that the wires have been connected properly at the PLC/receiving end. (Refer to installation section of these instructions)
2. Check that all contacts are clean and dry.
3. Make sure connector is fully seated onto the transmitter by finger-tightening. (Do not use tools)
4. Test the continuity of each wire. Replace the cable if necessary.

## Check Transmitter Function:

### 1. Test 4-20mA Output:

Disconnect the transmitter from the PLC/receiver. Wire an Ohm meter to series with the transmitter output wires and calculate the proper mA signal for known temperature using the formula below. If the output is correct, the transmitter is working properly. This means the PLC/receiving device likely needs configuration attention.

$$\text{mA Output} = \left( \frac{\text{Known Temperature} - \text{Transmitter's Low Range Value} \times 16}{\text{Span Set of Transmitter}} \right) + 4.0\text{mA}$$

### 2. Check For Leaks:

- Disconnect the cable and remove the transmitter cap with a ½" wrench.
- Check the condition of the O-ring on the cap and make sure there is no moisture inside of the transmitter and there are no signs of corrosion on the transmitter terminals.

If either of these are observed, replace the transmitter. (Refer to the Transmitter Replacement section on the next page)

### 3. Check the RTD:

Using the table of temperature vs. resistance at the end of these instructions for a 100 Ohm RTD, measure the resistance of the element at a known temperature using a digital Ohm meter.

- Measure the resistance between wires attached to Pin #1 and Pin #3 on the transmitter. Look up the value in the table and see if the resistance closely matched the temperature. If the reading is erroneous, RTD element is likely damaged. At this point, you must send the transmitter to the factory for repair.

# TRANSMITTER REPLACEMENT

If you have found that it is necessary to replace the transmitter, you can obtain a new unit through your local distributor. Simply specify the correct part number with the desired temperature range.

## To Replace:

1. Remove the cable and unscrew the transmitter cap by using a ½” wrench.
2. Disconnect the 2 wire and 3 wire connectors noting their terminal locations for reassembly.
3. Unscrew the two 6-32 screws and remove the transmitter.
4. Replace with new transmitter.
5. Check/reconfigure the transmitter wirelessly via NFC with your smartphone or tablet.
6. Reconnect the 2 and 3 wire connectors to previously noted terminal locations
7. Replace the cap “O” ring if necessary.
8. Replace the transmitter cap and tighten snugly with a ½” wrench. Be careful not to over twist or pinch the wires.

## REPLACEMENT / SPARE PARTS

- Transmitter **Part #: APAG C130**
- Transmitter Cap **Part #: TT-ICAP**
- Transmitter Cap “O” Ring

## CONTACT US

[Sales@ChicagoStainless.com](mailto:Sales@ChicagoStainless.com)

772-781-1441

Or visit our website at [www.ChicagoStainless.com](http://www.ChicagoStainless.com)

# RTD TEMPERATURE vs RESISTANCE TABLE

## Pt100 $\alpha = 0.00385$

### 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°

# RTD TEMPERATURE vs RESISTANCE TABLE

## Pt100 $\alpha = 0.00385$

### 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	93.73	93.34	92.95	92.55	92.16	-10
0	100.00	99.61	99.22	98.83	98.44	98.04	97.65	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	0	1	2	3	4	5	6	7	8	9	10	°C