TE.25 High Accuracy Sensor Assembly c/w Opened-end Thread Thermowell

The Platinum Resistance Temperature Detector (RTD) , Pt100 to IEC 60571 advantages include chemical stability, relative ease of manufacture, the availability of wire in a highly pure form and excellent reproducibility of its electrical characteristic.The result is a truly interchangeable sensing resistor which is widely commercially available at a reasonable cost.

Installation of RTD is simplified since special cabling and cold junction considerations are not relevant. Similarly, instrumentation consideration are less complex in term of input configuration and enhanced stability. The Platinum RTD is one of the most linear and practical temperature transducer in existence.

The Callendar - Van Dusen coefficients A, B and C for a standard sensor are stated in **IEC751**. If a standard sensor is not available or if a greater accuracy is required then can be obtained from the coefficients in the standard, the coefficients can be measured individually from each sensor.

The simple coefficient can be determined as below,

$$R_t = R_0 [1 + At + Bt^2 + C(t-100)t^3]$$

In which C is only applicable when t < 0°C.

$$A = a + \frac{a*\delta}{100} \qquad B = -\frac{a*\delta}{100^2} \qquad C = -\frac{a*\delta}{100^4}$$

According to this equation the error will be less then 0.03°C in the measurement of temperature between 0 to 50°C ranges.

Tolerance of PT 100, 1/10 DIN, as per IEC 60751

Temp (°C)	Resistance (Ω)	Tolerance (±°C)
0.01	100.004	0.03
15.00	105.849	0.0375
29.765	111.581	0.0498

Thermistors are temperature Sensors that are made from a variety of metal-oxide semiconductor materials. The semiconductor material used determines the temperature range, sensitivity and resistance ranges involved in its application.

In order to achieve the accurate temperature reading, the resistance / temperature curve of the device also need to use the **Steinhard-Hart equation and coefficients** for approximation;

$$\frac{1}{T} = a + b\,In(R) + c(In(R))^3$$

$$a = \left(\frac{1}{T_0}\right) - \left(\frac{1}{B}\right) In(R_0) \qquad b = \left(\frac{1}{B}\right) \qquad c = 0$$

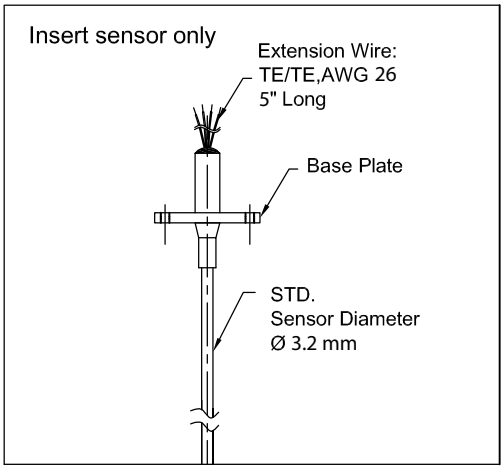
Where the temperature are in Kelvin and R_0 is the resistance at temperature T_0 (25°C = 298.15°K)

According to this equation the error will be less than 0.03°C in the measurement of temperature between 0 to 50°C ranges.

Resistance @+25°C = 10,000 Ohm (10k Ω) Nominal

Temperature coefficient @+25°C = -4.4%/ °C

Temp (°C)	Resistance (Ω)	Tolerance (±°C)
0.01	32650	0.05
15.00	15711	0.05
29.765	8139	0.05



Standard Lead Wire

All standard RTD sensor is stranded as Teflon insulation.
Teflon insulated leads are rated at 200°C maximum.

Connection Head Type

Recommended to use polypropylene material rather than die cast aluminum in order to prevent the heat loss which will cause when it is passing through the housing.Standard colour for polypropylene is white and die cast aluminum head is available as either blue or silver upon requested

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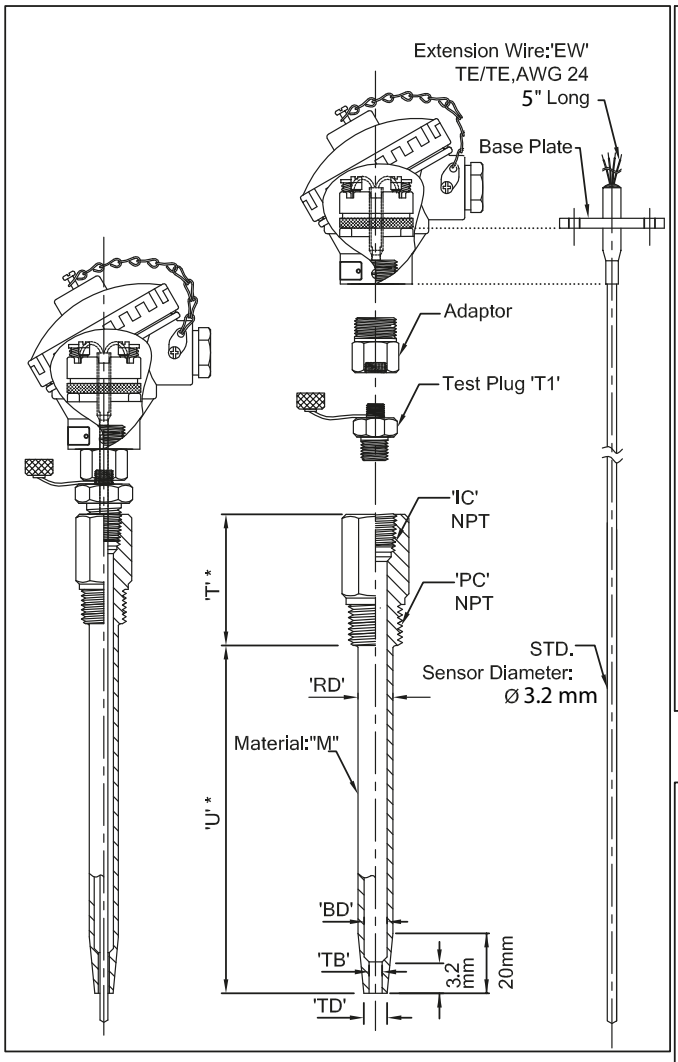
TE.25 High Accuracy Sensor Assembly c/w Opened-end Thread Thermowell

Sensor & opened-end thread thermowell with housing (TE-25)

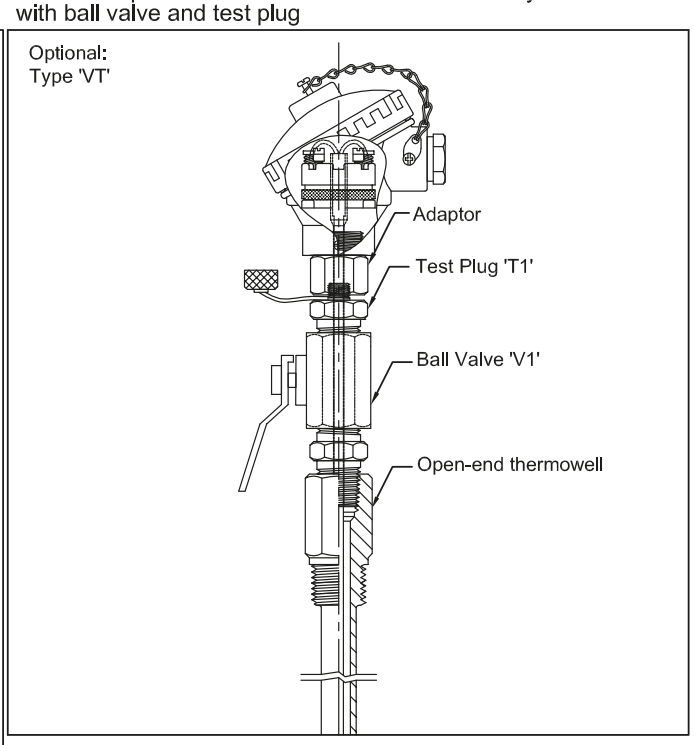
This sensor is designated for HVAC application. Exposed sensor tip will allow to get faster response from the process temperature and temperature readings are even more accurate based on sensor type.

Optional:
(1) Stainless Steel Test Plug, max pressure1000psi (Brass Test Plug available upon request)
(2) Stainless Steel Ball Valve, max pressure 1000psi

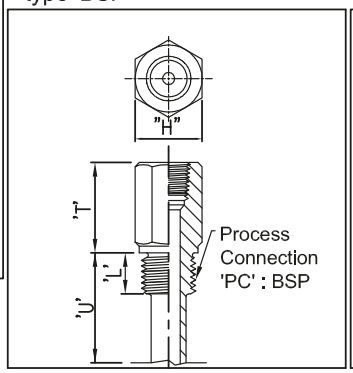
Assembly drawing for sensor & opened-end thread thermowell



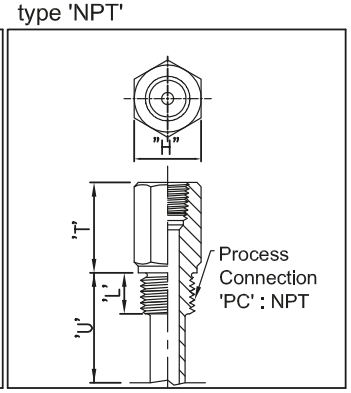
Sensor & opened-end thread thermowell assembly with ball valve and test plug



*For process connection type 'BSP'



*For process connection type 'NPT'



U = Insertion length
T = Lagging length
BD = Bore diameter
TB = Tip bore diameter
RD = Root diameter
TD = Tip diameter
M = Material
PC = Process connection
IC = Instrument connection
V1 = Ball valve
T1 = Test plug
L = Thread length
EW = Extension wire

BSP :
(British Standard Pipe Thread)

Process Connection	Hex F/F Size:'H'	Thread Length:'L'
½" BSP	28.5 mm	14 mm
¾" BSP	31.75 mm	16 mm

NPT :
(National Pipe Thread)

Process Connection	Hex F/F Size:'H'	Thread Length:'L'
½" NPT	25.4 mm	19 mm
¾" NPT	28.5 mm	19 mm

Process Connection,
NPT or BSP, measurement system of insertion length 'U' and lagging length 'T' will reflect upon the selected connection type.

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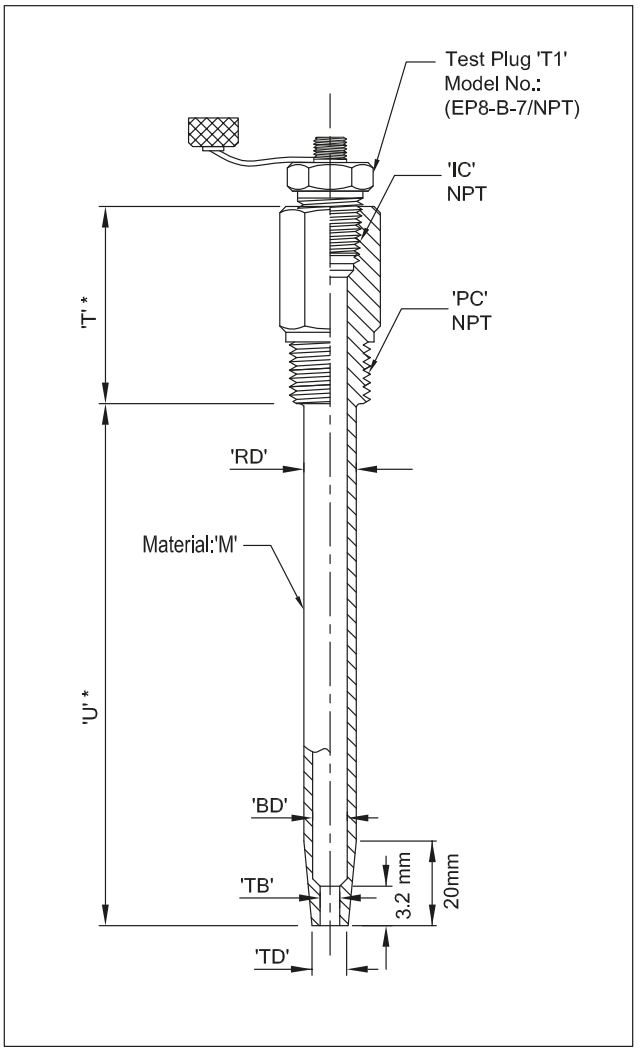
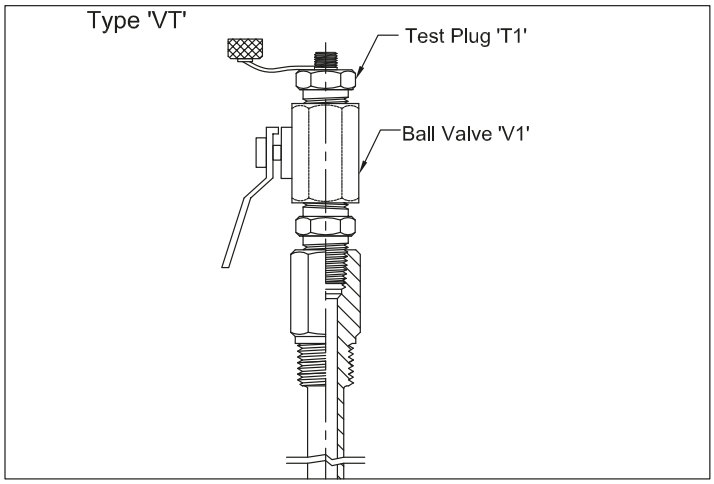
Assembly drawing for opened-end thread thermowell

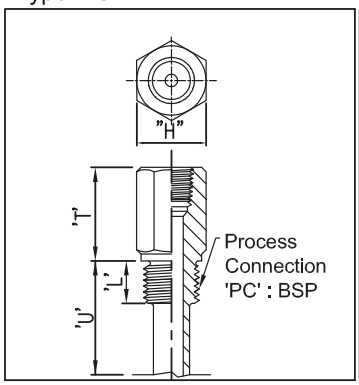
Thermowell will protect the exposed sensor tip to get better accuracy at stable position rather than the vibration which can be occured due to certain noise level of environmental. It will also support the running process at certain period of changing sensor and test plug will play the esssential role for thermowell to prevent the particles coming from outside of process into the thermowell during the absent of sensor.

Optional:
(1) Stainless Steel Test Plug, max pressure1000psi (Brass Test Plug available upon request)
(2) Stainless Steel Ball Valve, max pressure 1000psi

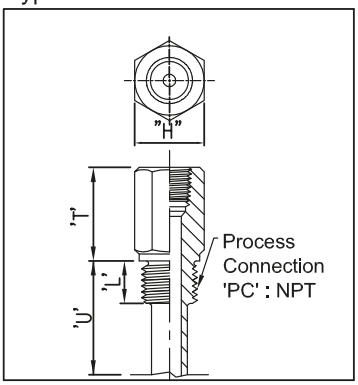




*For process connection type 'BSP'



*For process connection type 'NPT'



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(British Standard Pipe Thread)

Process Connection	Hex F/F Size:'H'	Thread Length:'L'
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NPT :
(National Pipe Thread)

Process Connection	Hex F/F Size:'H'	Thread Length:'L'
½" NPT	25.4 mm	19 mm
¾" NPT	28.5 mm	19 mm

U = Insertion length
T = Lagging length
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TD = Tip diameter
M = Material
PC = Process connection
IC = Instrument connection
V1 = Ball valve
T1 = Test plug
L = Thread length
EW = Extension wire

Process Connection,
NPT or BSP, measurement system of insertion length 'U' and lagging length 'T' will reflect upon the selected connection type.

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Sensor Type

R	RTD , PT 100 , 1/10 DIN , ±0.03℃ at 0℃
T1	Thermistor 10 K , ±0.05℃ at (0 to 50℃)

Tolerance Type

1	± 0.03°C at 0 °C (For 1/10 DIN) , IEC 751
2	± 0.05°C at (0 to 50 °C) For Thermistor 10K

Note: Singlas accredited calibration report ISO17025 with calibration and measurement uncertainty of 11mk (0.011 °C)

Sensor Sheath

TU1	Tubing-RTD-Ø 3.2 mm -Single-4 Wires-SS 316
TU3	Tubing-10K Thermister-Ø 3.2 mm -Single-2 Wires-SS 316

*Note: 10K Thermistor, 4 wires available upon request

Wire Junction

U	Ungrounded (Std for this design)

Complete design

W	With Open-end Thread thermowell
WO	Thermowell is not required
B	Base plate and terminal block
L1	Epoxy holder and lead wire (TE/TE, AWG 26) , 125 mm (STD)

(Note : 150 mm , 200 mm , 250 mm and 300 mm are avaliable as option)

Process connection (PC)

PC1	1/2" NPT M
PC2	1/2" BSP M
-	Not Applicable
Y2	Special version to be specified

Thermowell Stem Dimensions

TW1	Root Dia : Ø14 mm , Tip Dia : Ø10.5 mm , Bore Dia : Ø6.6 mm
-	Not Applicable
Y3	Special version, to be specified

Thermowell Insertion Length/Sensor Length if thermowell is not require

XXXX	To be specified (e.g 0125 mm for 125 mm long)

Lagging length "T"

T	45 mm (STD)
Y4	Special version to be specified

Accessories

T1	Test Plug Size : 1/4 " NPT M , Material : SS 316
V1	Ball valve Size : 1/4" NPT F , Material : SS 316
VT	Ball valve (V) and Test plug (T) , size : 1/4" NPT
-	Not Applicable
Y5	Special version, to be specified

Housing / Enclosure

W1	Weather Proof , IP65, Polypropylene , White colour
W2	Weather Proof , IP65, Die Cast Aluminum , Blue colour
W2	Weather Proof ,IP 65, Die Cast Aluminum , Silver colour
-	Connection head is not required
Y6	Special version to be specified

Accessories (from customer to assembly with)

TX	Head mounted transmitter
-	Not Applicable

Documents (Optional)

Calibration Certificate, Three points (0°C to 50°C)

1	Singlas Accredited Calibration http://www.isolab.com.sg/wp-content/uploads/2017/04/SAC-SINGLAS-ISO-17025.pdf
2	Non-Singlas (Traceable) Calibration
3	Factory Test Report

TE25														← Order Code
	1	2	3	4	5	6	7	8	9	10	11	12	13	

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