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Aim :- To understand the working principle of RTD.

Objectives :-

1. Study static and dynamic characteristics of RTD
2. Study effect of various parameters on RTD performance

Expt. 1: Static Characteristics of RTD

Aim : Study the change in resistance of RTD probe depending on the process temperature.

Procedure:

1.select material :- platinum

α is temperature co-efficient of material

for platinum α = 0.00385

2 Resistance (R_0) :100

3 Equation For Calculating R_t

$$R_t = R_0 (1 + \alpha * \Delta T)$$

Measurement Temperature :212

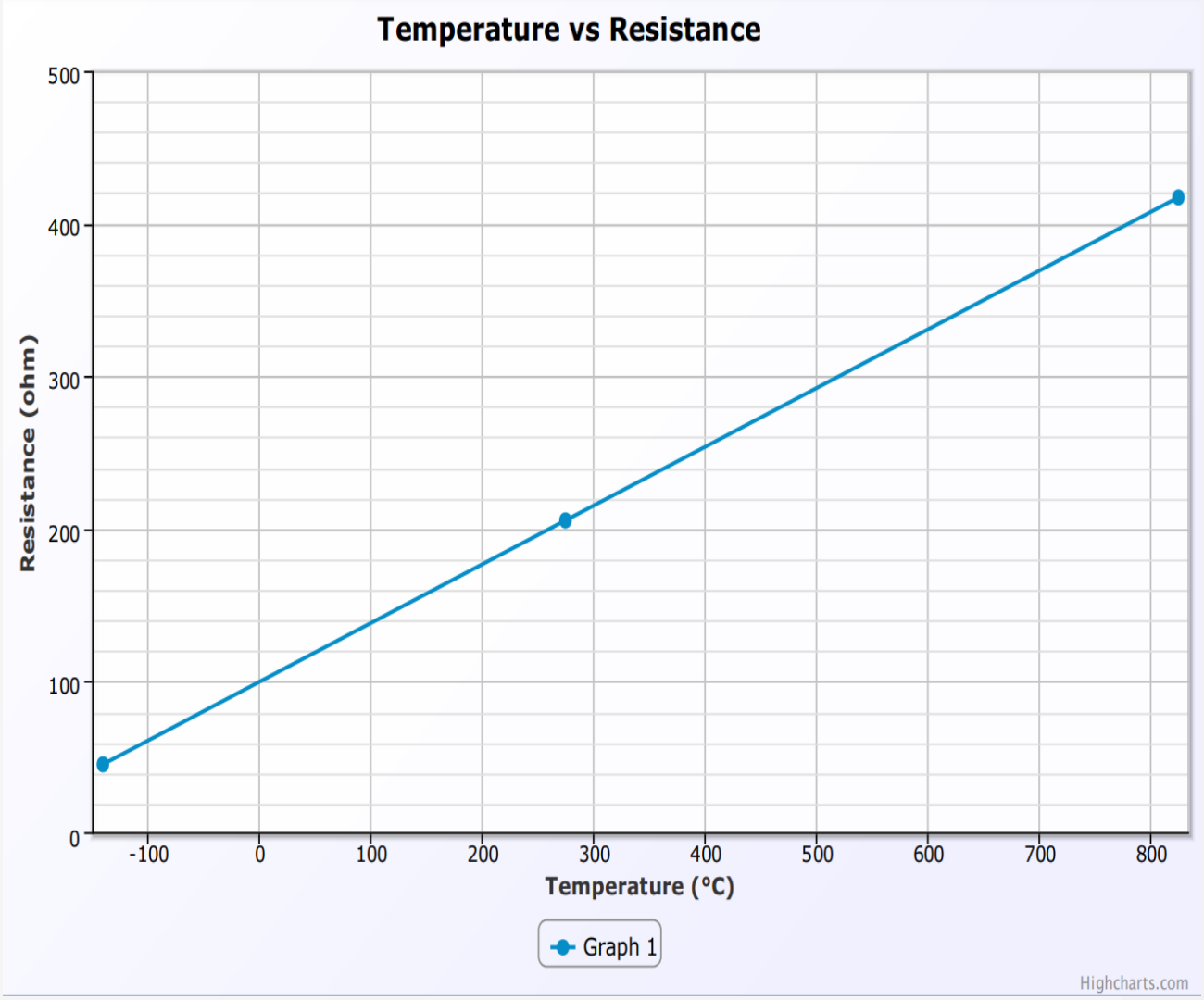
R_t :181.62

Measurement Temperature :108

R_t :141.58

Measurement Temperature :227

R_t :187.395



Expt. 2: Dynamic characteristics

Aim : Study the dynamic response of RTD probe

Calculations for time constants are done using equation
τ=(x/k)*ρ*L*s

Where, x- thickness(m)
k- thermal conductivity of material(W/m-k)
ρ- density of material(kg/m3)
s- Specific heat capacity of the material(J/Kg- ^{o}c)
L- length of the element(m)
For bare element the material considered is platinum with Thickness:2mm
Length:15mm
For Time constant for Withsheath the total time constant is

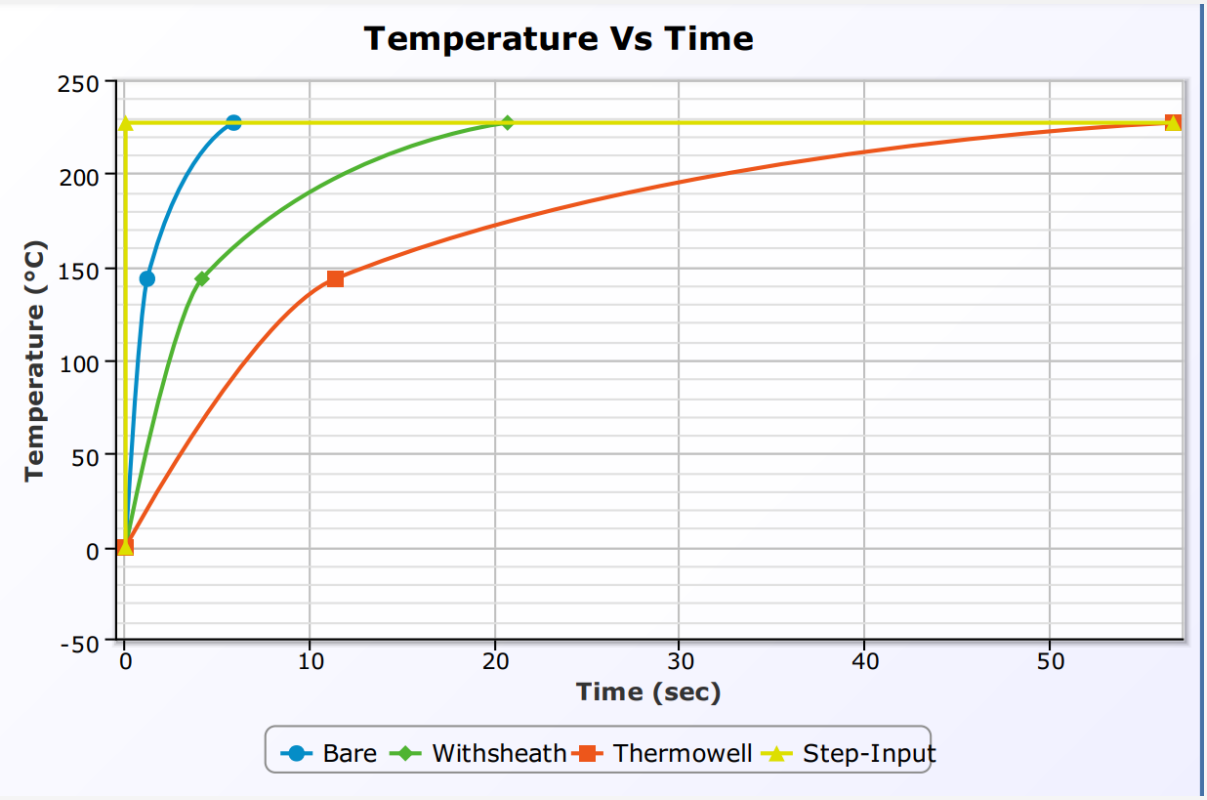
τ_sheath=τ_bareelement+τ_air+τ_sheath

τ_sheath = 4.13 sec

τ_thermowell=τ_sheath+τ_filling material+τ_thermowell

τ_thermowell = 11.33 sec

filling material is mgo powder



Conclusion :-

1.thus we studied RTD and its characteristics which are linear in nature Pt -100 is having positive temperature coefficient of resistance

2. response time of RTD which is generally 5 times the time constant value