Electro-thermomechanical behavior of a thermoelastic dielectric body subject to external loading has been investigated theoretically in the present analysis. The theory is formulated in the context of continuum electrodynamics. The reaction of the body subject to external loads is expressed in symmetric stress, electrical polarization and heat flux. The solid medium is assumed to be linear, dielectric, isotropic, incompressible and dependent on temperature gradient. It has been observed that, as a result of thermodynamic constraints, the stress potential function is dependent on the deformation tensor, the electric field vector and the temperature, while the heat flux vector function is dependent on the deformation tensor, the electric field vector, the temperature and temperature gradient.

To determine arguments of the stress potential and the heat flux vector functionals, findings of the theory of invariants have been used as a method because of that isotropy constraint is imposed on the material. As a result, constitutive equations of symmetric stress, polarization field and heat flux vector have been obtained in both material and spatial coordinates and asymmetric stress has been found using the expressions of symmetric stress and polarization field.