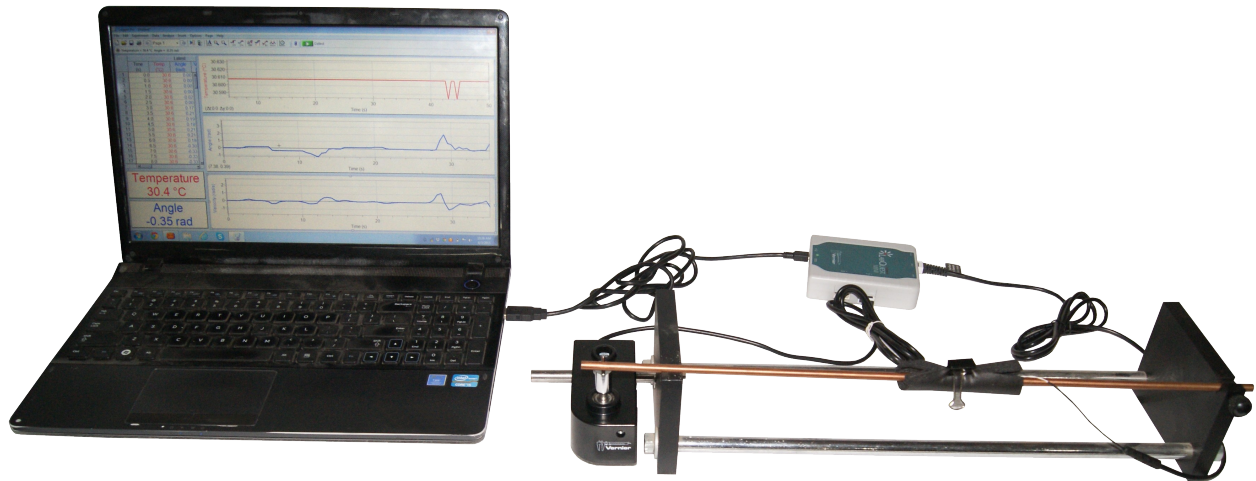


THERMAL EXPANSION APPARATUS



About:-

COEFFICIENT OF LINEAR EXPANSION:-

it is defined as the change in length per unit length , per degree rise in temp

if ΔL is the change in length of length L at temp T , when temp rise by ΔT
Then exp shows that

$$\Delta L \propto L$$

$$\Delta L \propto \Delta T$$

it depends upon the nature of material

$$\Delta L = \alpha L \Delta T$$

where

$$\alpha = \Delta L / L \Delta T$$

α is coefficient of linear expansion

$$\text{if } L = 1$$

$$\Delta T = 1$$

$$\alpha = \Delta L$$

so it is defined as the change in length per unit original length per degree rise in temp .

WARNING! HIGH TEMPERATURE

The metal tube gets hot during the experiment. Steam can cause burns. Do not touch the metal tube during operation.

PROCEDURE:-

1:- Measure L , the length of the tube at room temperature.

2:-Mount the aluminum tube in the apparatus frame as shown in Figure

3:-Tighten the thumbscrew in the “high” end frame against the tube until it can no longer be moved.

4:-Attach the rubber tubing to the end of the metal tube. Connect the other end of the tubing to the steam generator.

5:-Place a container under the other end of the tube to catch the draining water that condenses in the tube.

6:-Now connect the rotary sensor as shown in the fig. With thermal expansion app. As well as with lab quest mini ,and then connect labquest mini to computer before doing so install the logger pro software in system

7:-Run the software interface after connecting the sensor with computer.

8:- Turn on the steam generator , connect the surface temp sensor with tube.

9:- Now software will automatically plot temp v/s expansion table.

Sr	Metal	Length at room temp	Temp after heating	Change in length	Change in temp(Thot-Troom)
1	al				
2	br				
3	cu				

Using the equation $\alpha = \Delta L / L \Delta T$, calculate α for aluminum, brass, and copper.

- Aluminum = _____
- Brass = _____
- Copper = _____