

7. CALIBRATION OF POWER FACTOR METER

Objective:

To calibrate the given power factor meter using calibrated voltmeter, ammeter and wattmeter.

Apparatus:

Hardware:	Name of the apparatus	Quantity
	0.5 lead to 0.5 lag power factor meter	1 No
	3.0kw, u.p.f. digital wattmeter	1 No
	0-10 amps digital ammeter	1 No
	230 v rated resistive, inductive	1 No
	0-300 volts digital voltmeter	1 No

Theory:

The power factor of an a.c circuit can be calculated using the relationship $\cos \theta = P/VI$.

This method of determining the power factor of an electric circuit is however, of low accuracy and has several disadvantages. It is difficult to find out the instantaneous p.f. value by this method. Power factor meters have deflection force and controlling force only.

There are two types of power factor meters.

- (a) Electro dynamo meter type (b) Moving Iron type

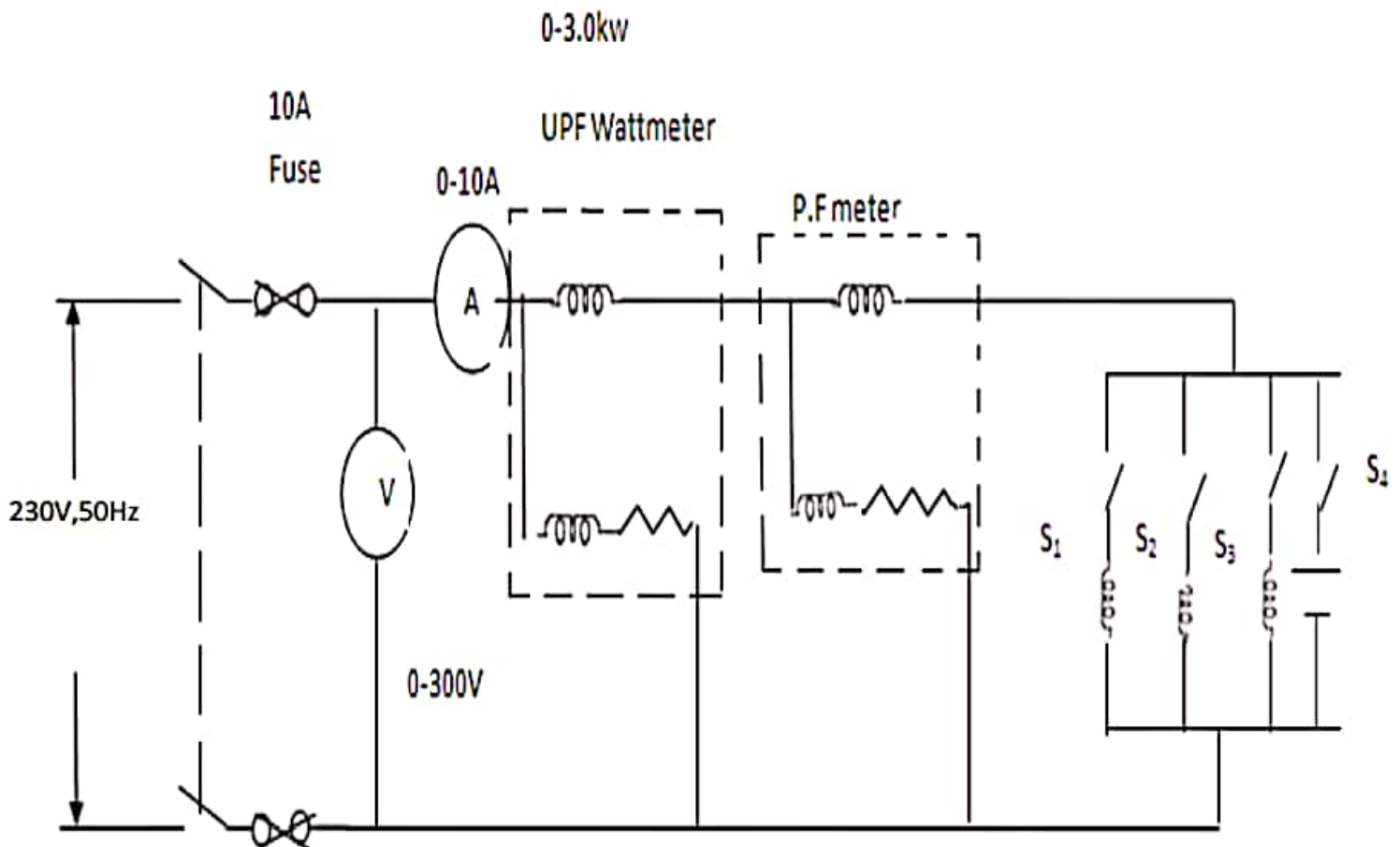
These meters possess a current coil circuit and a pressure coil circuit. The pressure coil circuit connected across the supply lines is split up into two parallel paths. One inductive and the other is resistive. The deflection of the instrument depends upon the phase difference between the main current and currents in the two coils.

The accuracy obtained with the use of power factor meters is sufficient for most of the purposes, other than the precision testing.

The power factor meter may become inaccurate during the period of its use due to several reasons. Hence, it is to be calibrated, periodically.

Procedure :

1. Connect the circuit as per the circuit diagram.
2. Keep the auto-transformer at zero position and switch ON the supply.
3. Switch 'ON' the resistive (bulb), inductive (choke) and capacitive loads with different combinations.
4. Note down the ammeter, voltmeter, wattmeter and power factor meter readings at different current values.
5. Switch 'OFF' the supply and load switches.



Observation:

Load	V _{th} (volts)	I (amps)	P (KW)	Cosθ (observed)	Cosθ (theoretical)	% Error

Sample Calculations:

$$\text{Cos}\theta_{th} = \frac{P}{VI}$$

$$\text{and } \% \text{ error} = \frac{\text{Cos}\theta_{(\text{observed})} - \text{Cos}\theta_{(\text{theoretical})}}{\text{Cos}\theta_{(\text{theoretical})}}$$

Result :

The given P.F meter is calibrated by using a calibrated ammeter, voltmeter and wattmeter.