



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

19EET304/ IOT FOR ELECTRICAL SCIENCES

III YEAR VI SEM

UNIT 4 – ACTIVATION DEVICES

TOPIC 1 – Digital Energy Meter



Consider an example,

Mr.Alex has vehicle with some small parcel to calculate the weight of all



A



B

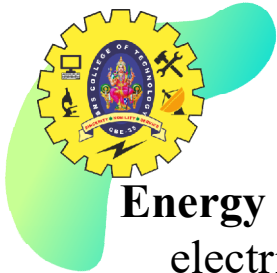


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C

What strategy Alex used to know correct weight.





ENERGY METER

Energy Meter or **Watt-Hour Meter** is an electrical instrument that measures the amount of electrical energy used by the consumers.

The basic unit of power is watts and it is measured by using a watt meter. One thousand watts make one kilowatt. If one uses one kilowatt in one-hour duration, one unit of energy gets consumed. So energy meters measure the rapid voltage and currents, calculate their product and give instantaneous power. This power is integrated over a time interval, which gives the energy utilized over that time period.





DIGITAL ENERGY METER

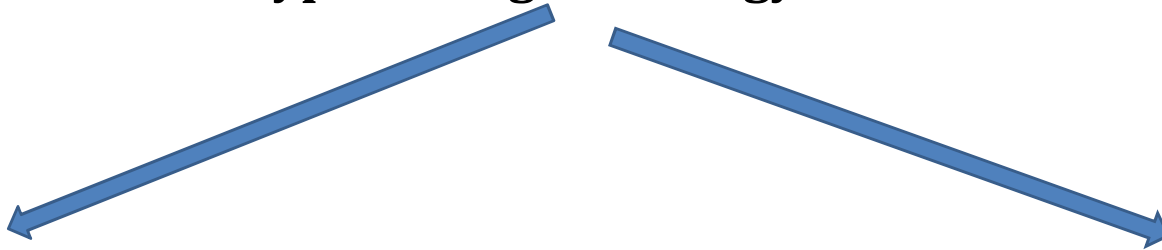
- The digital energy meter working principal operates by continuously measuring the instantaneous voltage (volts) and current (amperes) and finding the product of these to give instantaneous electrical power (watts) which is then integrated against time to give energy used (Joules, Kilowatt-hours etc.)
- Meters for smaller services (such as small residential customers) can be connected directly in-line between source and customer.
- For larger loads, more than about 200 amps of load, current transformers are used, so that the meter can be located other than in line with the service conductors





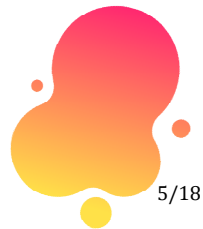
TYPES OF DIGITAL ENERGY METER

Types of Digital Energy Meters



Electromechanical Meters

Electronic Meters





Electromechanical Meters

It has a spinning disc and a mechanical counter display. This type of meter operates by counting the revolutions of a metal disc that rotates at a speed proportional to the power drawn through the main fuse box.

Nearby coils spin the disc by inducing eddy currents and a force proportional to the instantaneous current and voltage. A permanent magnet exerts a damping force on the disc, stopping its spin after power has been removed.

This class of meters has a number of limitations that has made it grossly irrelevant for use in smart energy initiative environment which include but not limited to its degree of accuracy.





Electromechanical Meters

There are many methods of error correction in digital electricity meters which are usually based on the known methods of A/D converters error correction.

Most of these methods use software correction based on calibration process. While in digital electricity meter, percentage error could be as low as 0.01%, in analogue meters it is usually above 0.05%.

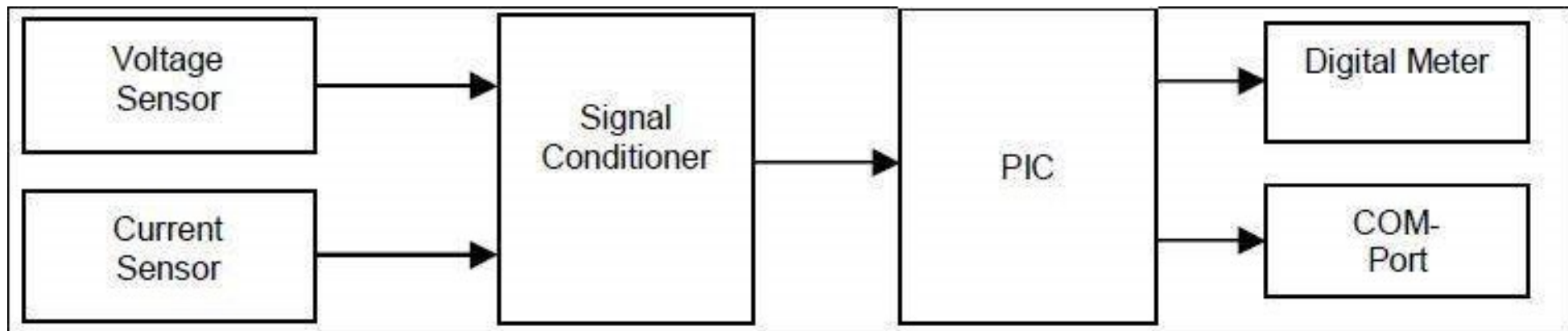
The user friendly display in the digital meters makes energy reading from time to time very easy.

The orientation problem associated with electromechanical energy meter is completely a nonissue in a digital energy meter. Hence installation is made easier





Construction





ASSESSMENT - 1

Find the Reason



Why energy meter are not called wattmeter?

What is the difference between the typical wattmeter and a energy meter?





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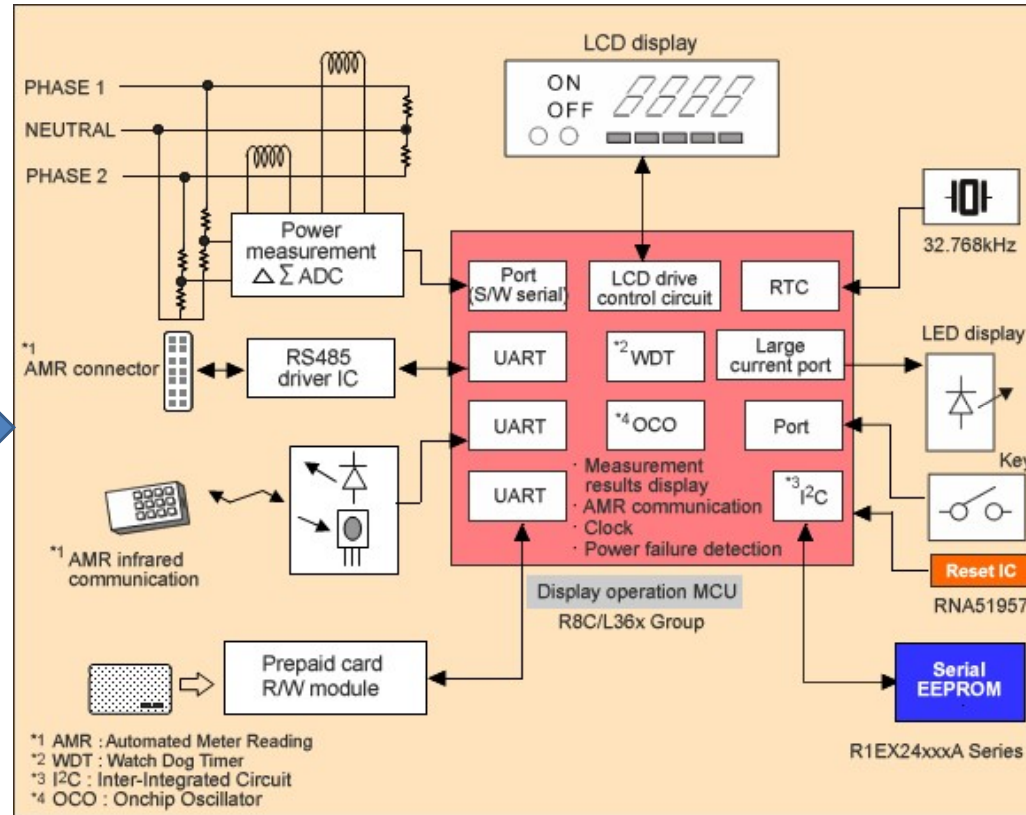
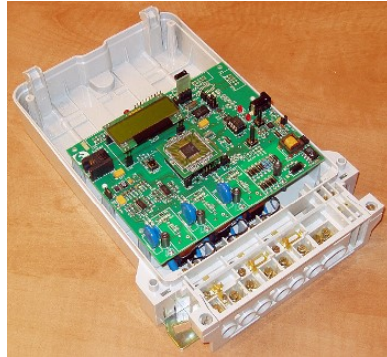


The Wattmeter works on the principle that the force acts on the current carrying conductor when it is placed in an electromagnetic field





Inside Image of the Electronic Meter



Power rating of household appliances

Appliance	Power rating(in Watts) Standard	Current consumption in 1 Hour (in Amps)
Compact Fluorescent Lamp CFL	8,11,18,35	0.03,0.040,0.078,0.15
Bulb Fluorescent Lamp	25,40,60,100 20,40	0.11,0.17,0.26,0.43 0.01,0.2
Fan	25-80	0.1-0.4
TV	80-400	0.4--2
Fridge	200-300	1-1.4
Heater	1000-3000	4.5-15
Vacuum cleaner	150-400	0.7-2
Mixi	300-600	1.4-2.8
Washing Machine	800-1000	4-4.5
Microwave Oven	600-1500	2.6-6.5
Table Fan	10-25	0.04-0.11
Computer	80-150	1-1.3
Laptop	20-50	0.09-0.22
Laser Printer	1000-1500	4.3-6.5
Ink Jet Printer	25-50	0.11-0.22
Electric Iron	450-1000	2-3
DVD	20-50	0.09-0.22
A/C 1HP	1000-1500	4.3-6.5
Water Pump ½ HP	500-1000	2.17-4.3
Hair Dryer	1200-1500	5.2-6.5
Music system	20-40	0.09-0.17

DIGITAL ENERGY METER / 19EET304- IOT FOR ELECTRICAL SCIENCES/S.SHARMILA/EEE/SNSCT



Tips to save energy

1. Check the domestic wiring periodically for leakage and current loss.
2. Install ELCB (Earth Leakage Circuit Breaker) which will immediately disconnect the power when it senses more than 40 milli ampere current through earth line.
3. Fridge is one of the current hungry appliances. Do not keep the door opened for more than 2 minutes. Do not keep hot food materials inside the fridge. Defrost weekly; otherwise current consumption will be more.
4. Do not keep TV or Computer in the standby mode for long periods. Switch off immediately after the use. Even in the standby mode these devices takes 10 watts or more power
5. Unplug all the instruments which are not using daily.





Tips to save energy




6. Make all the preparations before switching on the instruments like Washing machine, Mixi, Iron etc.
7. Use heater or water heater only in extreme cold conditions.
8. Restrict the use of Iron and use one with temperature regulator.
9. Overheating and humming from fans indicate defects which lead to over meter readings.
10. Switch off fans and lights after the use.





Tips to save energy



11. Do not charge UPS, Inverter or Emergency lamp battery continuously (If there is no cut off facility). It will consume more current as well as reduce the life of battery. One hour charging at an interval of two days is sufficient to keep the battery in top condition. Over charging will heat up the battery and reduce its life along with unnecessary power loss.

12. Keep the plugs and sockets clean to avoid sparking and power loss.

13. Avoid the use of Mixi, Heater, Iron etc during the peak hours from 6 pm to 10 pm.

14. Replace all the bulbs with Fluorescent lamps and low watt CFL

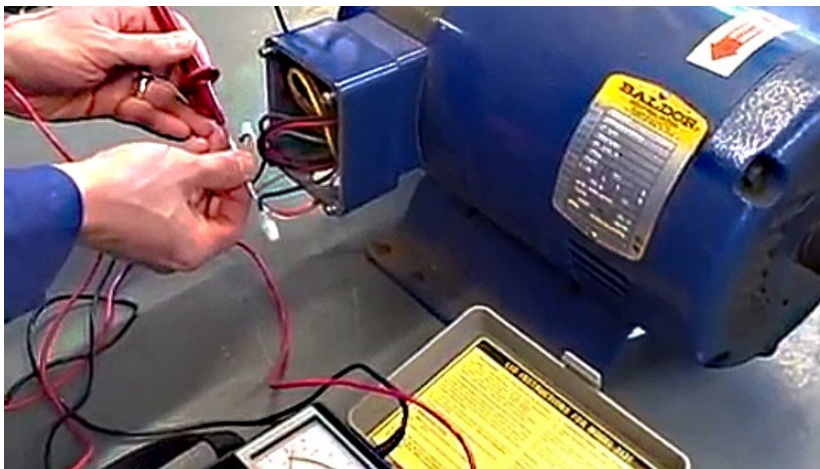
15. Use low wattage CFL lamps or LED Lamps in rooms or places where bright light is not required.

16. Do not charge Mobile phone daily. Equal charging and discharging will keep the battery in top condition. Charge the mobile phone only when the charge indicator shows 50% or less. Over charging will reduce the life of battery.



ASSESSMENT – 2

Find Reason



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Thank You

