

## **Prepaid Energy Meter**

### **Need for Prepaid Energy Meter System:**

The conventional method of electricity billing involves a person from the distribution unit reading the number of units of electricity consumed in the energy meter, conveying this information to the distribution unit and then preparing the bill according to the units consumed for a fixed amount of time. This can prove quite tedious as it involves various tasks like reading, then preparing the bill. Still accuracy cannot be guaranteed as there can be errors in human reading. Even though digital meters are being replacing conventional electromechanical meters and provide much accurate readings, still the problem of deliberately making a false reading can exist (political reasons). Despite this, the task of billing for every consumer is a time consuming job for the distribution grid. Also the consumer can deliberately consume more amount of power than required and still refrain from paying the bill and nothing can be done to severe the electric power supply.

To eliminate all these problems, the most convenient method is making the whole system prepaid similar to a mobile phone recharge or a DTH recharge.

### **Defining a Prepaid Energy Meter System:**

Basically like in a mobile phone recharging, the consumer buys a recharge card and gets some energy units in return of the balance amount. The balance amount will keep reducing for every unit of energy consumed and once zero, the power supply would be automatically cut off. The amount deducted for every unit of energy consumed can be controlled by the distribution unit according to the peak hours.

### **The Main Advantages of this Method are:**

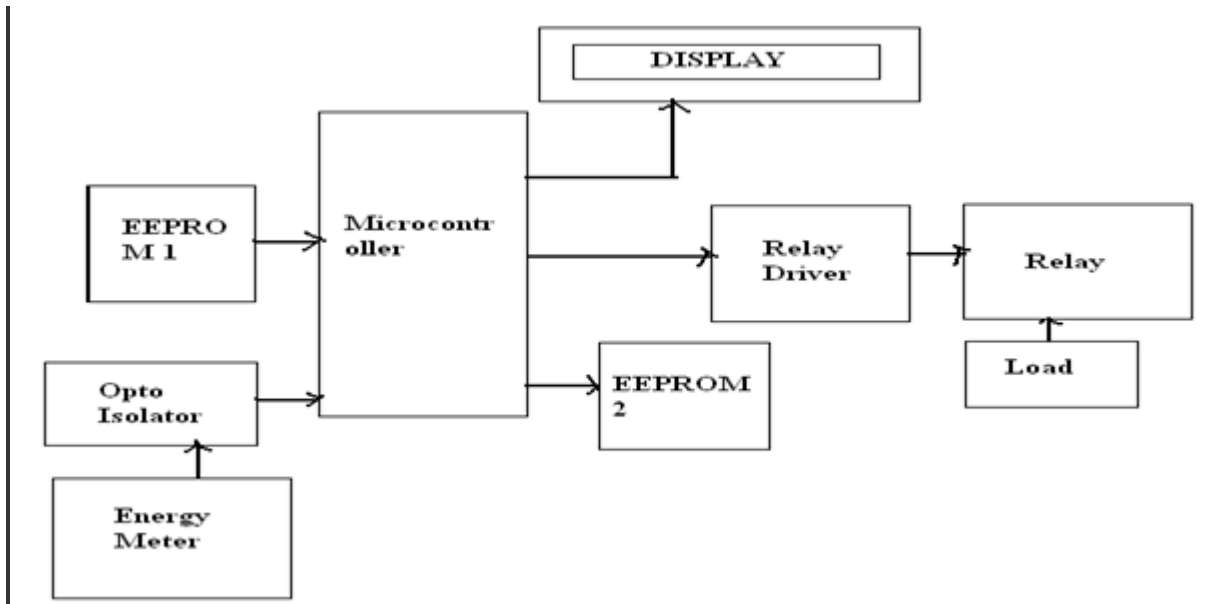
- It is highly accurate as the whole idea of reading the units and then billing manually or any other means is eliminated.
- Consumer cannot escape from paying the electricity bill and the State Electricity Board gets free from debts.
- On the consumer front, the tedious task of paying the bill and waiting anxiously for the bill is eliminated.
- Wastage of energy is diminished as now only the required energy will be consumed as allotted.
- The power grid can monitor the overall energy consumption and any tampering attempts are actually of no use and can be detected if still prevalent.

### **Simple Prepaid Energy Meter Kit:**

A simplest type of prepaid energy meter consists of 2 EEPROMs interfaced to a microcontroller. One EEPROM contains the recharged balance amount. The microcontroller reads this balance and stores it in the other EEPROM along with the tariff.

The energy meter supplies pulses to the microcontroller for every unit of energy consumed. The microcontroller increases the spent energy unit by one and decreases the balance amount in the

EEPROM by the fixed tariff. As soon as the balance amount in the EEPROM comes down to zero, the microcontroller sends a signal to the relay driver which in turn switches off the relay, such that the main supply to the load is switched off. An LCD is also interfaced to the microcontroller which displays the amount of energy consumed.



### Energy Meter by [Edgefx Kits](#)

The recharge card is actually an EEPROM in which the balance amount along with the allocated energy units is stored. The Microcontroller reads the balance amount and stores it along with the tariff and the energy units allocated in its RAM and are programmed to delete off the information present in the EEPROM (making the card invalid for further use). The energy meter gives electric signal to the opto isolator which consists of an LED and an opto-transistor combination such that the LED glows and emits light for every electric signal received by the energy meter (which sends a electric signal for every unit consumed). The opto-transistor starts conducting and sends high and low pulses to the microcontroller. The microcontroller is programmed such that a counter is kept incrementing for every pulse rate, which gives the value of the energy consumed.

Another EEPROM is interfaced to the microcontroller where the balanced amount and the energy units consumed are stored. For every increment in count, the balanced amount in this EEPROM is deducted. Finally when the balance amount is zero, the microcontroller sends a low signal to the Relay driver to give a high signal at its output, which switches off the relay. Normally the microcontroller gives a high signal to the input pin of the relay driver, which develops a logic low signal at its corresponding output pin and the relay coil is energized, thus connecting the load to the main supply.

### Practical Prepaid Energy Meters:



Prepaid Energy Meter PE5120

It is a 3 in 1 dual source meter. It also monitors water and gas consumption along with electrical consumption. All the consumer has to do is to display the card in the front panel of the meter for a time of 3 seconds. The microcontroller stores the number of units allocated and measures the energy consumed. This system automatically switches off the power supply once purchased units are used up. Its applications include shopping malls, residential townships, commercial buildings, employee quarters etc.

### Power Accent Prepaid Energy Meter:



Power Accent Prepaid Energy meter

It comes along with features like anti mechanical and electrical tamper and consists of a smart card and vending station software to recharge the smart card. It can store a maximum credit of 10,000kWh.