Electricity Energy Meter

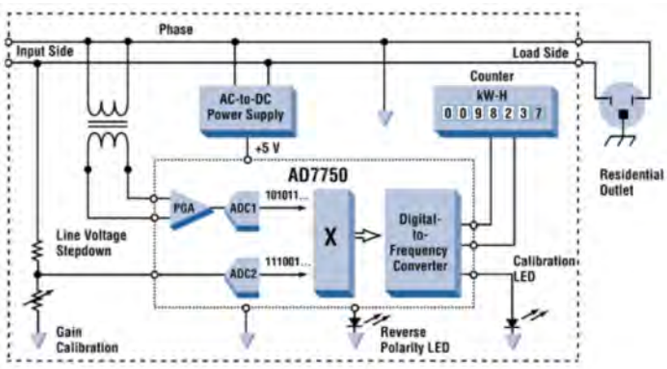
Energy Meter or Watt-Hour Meter is an electrical instrument that measures the amount of electrical energy used by the consumers. Utilities are one of the electrical departments, which install these instruments at every place like homes, industries, organizations, and commercial buildings to charge for electricity consumption by loads such as lights, fans, refrigerators, and other home appliances.

Electricity meters operate by continuously measuring the instantaneous voltage (volts) and current (amperes) to give energy used (in joules, kilowatt-hours, etc.).

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.

There are two types of energy meters, namely Electromechanical and Electronic meters. On a single-phase AC supply, the electromechanical induction meter operates through electromagnetic induction by counting the revolutions of a non-magnetic, but electrically conductive, metal disc which is made to rotate at a speed proportional to the power passing through the meter.

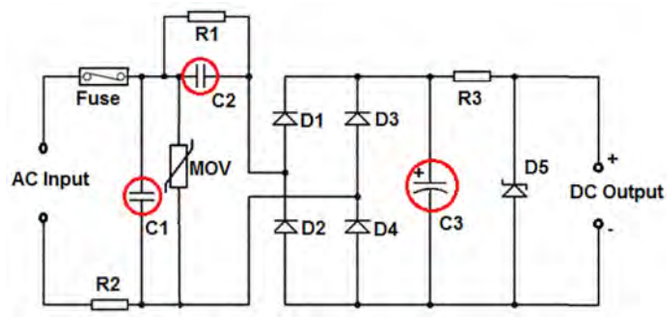
Electronic meters display the energy used on an LCD or LED display and some can also transmit readings to remote places. In addition to measuring the energy used, electronic meters can also record other parameters of the load and supply such as instantaneous and maximum rate of usage demands, voltages, power factor and reactive power used. They can also support time-of-day billing, for example, recording the amount of energy used during on-peak and off-peak hours.



In an Energy Meter, the AC to DC power supply comprises of the following capacitors; X2 or THB Grade, voltage dropper capacitor and an electrolytic capacitor.

The selection of the voltage dropping capacitor and the circuit design requires some technical knowledge to get the desired voltage and current. An ordinary capacitor will not do the job since the device will be destroyed by the rushing current from the mains. Mains spikes will create holes in the dielectric and the capacitor will fail to work. AC-rated capacitor specified for the use in AC mains is required for reducing voltage level.

Some of the most common capacitive power supply based applications include smart meters, switch gears and relays, LED drivers, etc.



C1: X2 Capacitor, **C2:** Voltage Dropper Capacitor, **C3:** Electrolytic Capacitor

X2 capacitor suppresses the incoming electromagnetic interference from the mains line. Then the voltage dropper capacitor reduces the high voltage to low voltage and the rectifier converts the low voltage AC signal into pulsating DC signal and the electrolytic capacitor also reduces ripple signal.

Any circuit being used today will be subjected to high temperature and high humidity conditions during its service life. It is extremely important that even under the worst environmental conditions, these circuits continue to operate without failure. Deki has conducted extensive research and trials to design a specific series of High Stability capacitors that will perform even under the worst conditions. This ensures that the circuit will not cease to operate even when the climatic conditions are extreme.

Advantages of capacitive power supply

- Significantly smaller than the transformer-based power supply.
- Fewer harmonics as compared to a transformer-based power supply.
- More cost-effective than a transformer-based or switch-based power supply.
- Capacitive power supply is more efficient than a resistive transformerless power supply.

Deki capacitor range for electricity energy meter applications given overleaf.

Electricity Energy Meter

Deki Capacitors Range for Electricity Energy Meter Application

Series Name	Deki Series Code	Capacitance Range	Rated Voltage
Interference Suppression Capacitor Class X2	07, 20	0.01 to 10 µF	275 VAC, 310 VAC
High Capacitance Stability Interference Suppression Capacitor Class X2 Humidity Robustness Grade	151	0.01 to 10 µF	275 VAC, 310 VAC
Metallized Polypropylene Film Capacitor (MPP-AC)	17, 22, 112	0.01 to 2.2 µF	275 VAC - 440 VAC
Metallized Polypropylene High Capacitance Stability Film Capacitor (MPP-AC-S)	117, 122	0.022 to 2.2 µF	305 VAC - 500 VAC
Metallized Polyester High Capacitance Stability Film Capacitor	23, 24	0.1 to 1 µF	310 VAC

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For details regarding Deki's electric energy meter capacitors, please contact shariq@dekielectronics.com