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# Hall Effect Sensor Based Digital Smart Three Phase Energy Meter

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**Abstract -***Conventional electromechanical Energy Meters for electricity are now replaced by digital meters in domestic as well as commercial applications. In the proposed system presents a total electronic three phase four wire energy meter. All power measurements are taken in the digital domain. These readings are transmitted to the mobile of user by way of wireless GSM technology. User can have the updates of electric energy utilization data on his mobile. Controller is used for controlling all functions of meter. Proposed algorithm for power calculation eliminates hardware requirements as power factor is calculated in algorithm which reduces the need of the zero crossing detector circuit.*

***Key Words***: Three phase1, prepaid meter2, wireless communication3, GSM technology4, User Mobile5.

## 1. INTRODUCTION

Electrical Energy is becoming very important in human life. We never think the life without the electrical power because human continued existence and development totally depends on it. Now a day's energy controlling of commercial consumer is becoming critical. Proposed system helps the consumer to manage showing and monitoring their energy use for each phase in watts. Energy meter with a display outside their homes and industries could provide up-to-date information on electricity utilization and in doing so help people to handle their energy use.

Main aim of this system in the field of energy management system (EMS) is to improve the efficiency of the electric power system. The effective control of the system requests a large amount of information for the parameters in great number of points. This requires controlling of the system parameters in different places power plants, substations. The main parameters of the three-phase electric power system are voltage, current, frequency, active power, reactive power, power factor, active energy and reactive energy. The purpose of this paper is to build a KWH meter that can conscious the users with messages. An Energy meter or KWH meter is a device that measures the amount of electrical energy provided to or produced by a residence, business or machine. Electricity is a clean and suitable way to deliver energy. When used in electricity retailing, the utilities record the values measured by these meters to generate voice for the electricity. They may also record other variables includes the time when the electricity was used.

Now a day's technology is developing rapidly, High automated and secured systems are used in all fields including electricity distribution and billing. The development of automation is incorporated in presently working digital energy meters. The proposed meter measures Voltage, Current, Active Power, Reactive Power, Power Factor, Power consumption for a three-phase load attached to the meter. This system keeps the updates of calendar and clock by using RTC. Data related to power consumption and billing information will be sent to the mobile of the user according to his request by calling the GSM modem. ARM LPC2138 is brain of the meter.

## 2. SMART METER FOR ECONOMIC ENERGY USAGE

The system consists of three parts like Measurement unit, Controller, Display and Communication unit. Hall Effect Sensors measures Voltage and current. Output soft hesesen sorsare 3Vpp bipolar sine waves.

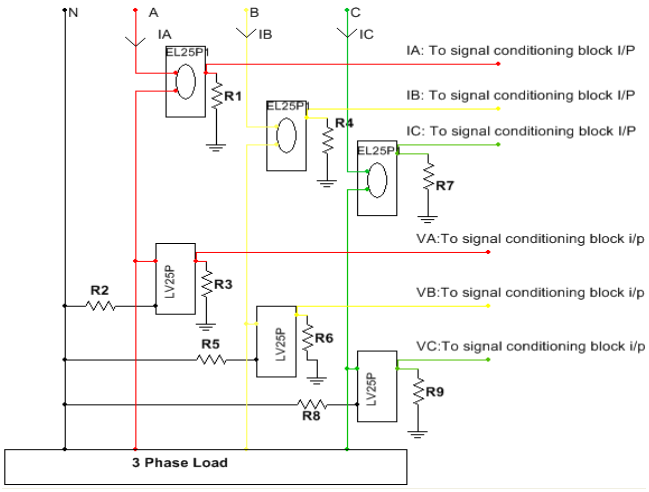


Figure1. Measurement unit

These signals are passed through RC low pass filter with cutoff frequency 1 KHz to remove high frequency interference. Further these signals are given to ADC of ARM controller which accepts only unipolar signals from 0-3.3V. So these bipolar sine waves are first shifted to unipolar by level shifter block designed using Op-Amp (LM358). After proper signal conditioning, inputs are given to the inbuilt ADC of ARM controller. This ADC will convert these signals to digital and display it on LCD. Inbuilt RTC of ARM is used as clock and calendar. Data of power consumption by user can be sent to mobile of user by GSM modem interfaced with the ARM controller. ARM controller has the two

UARTs among which one is used for ISP programming and second for GSM module interfacing. Power required for all sensors and signal conditioning blocks is provided by designed power supply.

The foreground process contains the initialization of ADC, RTC, TIMER, UART, GSM and LCD. The process was triggered after every second during which, the background process calculations will finish. The voltage, current, power, power factor, energy readings are displayed on LCD. Real time clock data (clock and calendar) was also be displayed. During this if GSM interrupt occurs (call on SIM in GSM module) controller executes the interrupt routine to send SMS regarding power consumption and billing to the registered mobile number of user. SCB is the signal conditioning block.

## 3. RESULT

When user from registered mobile number called to GSM Modem then SMS regarding current status of energy consumed and bill has been sent to mobile of user.

## 4. CONCLUSION

The design and implementation of three phase energy meter is describe in this paper. The selected hall effect sensor for voltage and current sensing shows linear output characteristics. SMS regarding power consumption and billing has been successfully sent to mobile of user on his request by call to GSM module.

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