WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Maximum Demand Controller

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ABSTRACT :

The commercial and industrial installation in the country has so much electrical loads which are inductive in nature cousing lagging power factor then it gives high penalties to consumer by electricity board. Asset management is an important part of every industrial plant. However in order to reduce the consequences of component failure on the operation of the overall a multi- mode energy distribution is proposed for the DC sector, including an advanced enery distribution as the storing phase utilizing conventionally non- peak hours, and on open energy distribution.

The power distribution optimization scheme has been prepared and resolved separately for various processes. Maximum demand control which is part of demand side management which will reduce the electric power consumption also reduce penalties in electricity bill and automatically load is off as given priority of loads and it also alter the shape of the whole system demand versus time curve which it the aim of achieving.

1. Introduction :

The general purpose of maximum Demand controller is to control the maximum power demand in order also can reduced the monthly electricity bill by using maximum demand controller the users do not have to worry that their electricity bill will increase thus have to pay lot of money on bills. maximum demand controller control load as per the priority of appliances. At that time load increases above rated load or above rated value at that time unnecessary load is off using maximum demand controller and it provide benifits every user especially factories, industries and also commercial and residential applications.

Electrical energy aids in the development of technology. All new technological advancements in commercial, domestic and industrial sectors are established with the electrical resource. Thus, electrical energy is the need of the hour to support the rapid developments in the world. Considering the actual scenario, electrical energy is not generated to meet the increasing demand, as it is dynamic in nature and production cannot be increased.every day. It requires a lot of planning and execution based on the requirements. So, this leaves a huge gap between generation and consumption of electrical power. This gap can be bridged by disconnecting the loads during peak hours. But this will lead to inconvenience for the consumers. This situation can be overcome by using maximum demand controller.

2. Library servey

MEHTA, V.K. PRINCIPALS OF POWER SYSTEM NEW DELHI-

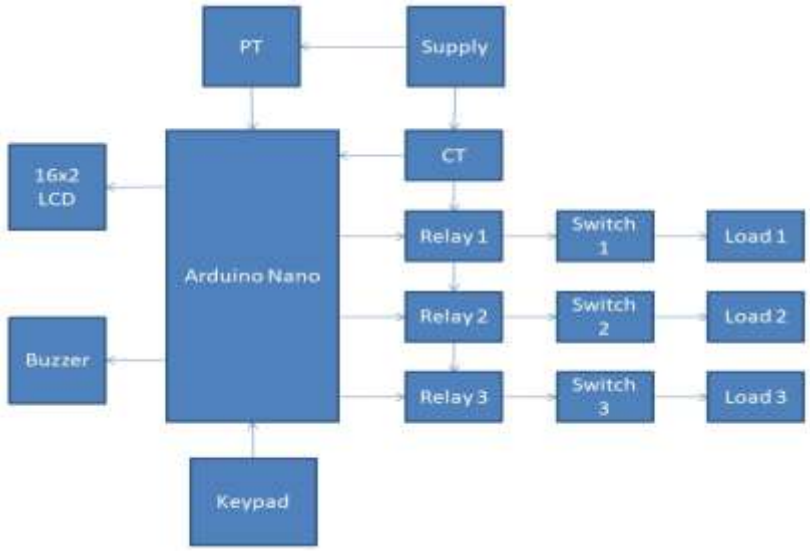
S. Chand and Company ltd 2005. A rectifier is a electrical device that convert alternating current to direct current that flows only in one direction and this process is known as rectification. Rectifiershave many uses including as component of power supplies and as a detector of radio signal. Rectifiers may be made of solid state diode, vacuum tube diode, mercury arc valve, and other components. The output from the transformer is fed to the rectifier it convert ac into pulsating dc.

I BRIGHT GREAT RESOURCES-

Proposed that when algorithms predicted a high maximum demand it will automatically signal for load shedding and when demand is low GUI(graphics user interface) will indicate operators to maximum output by running machines harder where feasible.

3. System Modeling

3.1 Block Diagram



3.2 Block Diagram Discription

3.2.1 Arduino Nano

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED. Each of the 14 digital pins on the Nano can be used as an input or output, using pin Mode, digital Write, and digital Read functions. In maximum demand controller A0 to A4 pins for input connection like lamp load output, CT output and converting voltage 230v to 12 v also connected to input pin of arduino nano. A5 pin connected to switches mode switch,ON switch,value set switch.A5 to A7 also analog input switches. Digital pins D6 to D12 pins connected to LCD and D5 pin connected to Buzzer and second terminal of buzzer is connected to first pin of LCD, D4 to D2 connected to switches. USB is Universal Serial Bus it is a common platform that allows communication between devices and a controller.RST Pin(Reset) This pin is used to reset the microcontroller Analog Pins (A0-A7):These pins are used to calculate the analog voltage of the board within the range of 0V to 5V.

3.2.2. Relay

In maximum demand controller we can use 3 relay because3 lamp load use.relay 1 is connected to lamp load 1 and arduino nano pin A1, second relay is connected to lamp load 2 and pin number A2 of arduino nano, third relay is connected to lamp load 3 and pin number A3 of arduino nano.In this circuit we are used small range relay its operate 12v supply and provide signal to lamp load at that time when load is increased above rated value then relay get signal from ardino nano and this signal pass to lamp load and and lamp load will be off as per priority of load.

3.2.3 LCD

All the parameter's like voltage, current, power, time will be displayed on LCD. In the below circuit we are using a 16 character by 2 line alphanumeric LCD. In project we are set the value of maximum power in kV also set variable load values according to priority of load.

3.2.4 Buzzer

These audio signals can be generated using various devices. The most common device used for this purpose is the buzzer. Also known as a sounder, audio alarm or audio indicator, a buzzer is a basic audio device that generates a sound from an incoming electrical signal.when load is set value then in starting time buzzer is sound and also load is off as set priority at that time buzzer also sound.

3.2.5 CT and PT

Potential transformer is used for in this project is convert single phase AC supply (230v) into 12 v AC supply and also measure voltage in the circuit.Current transformer is used for measure the current in Amp it's rating is 230v, 50Hz Ac supply. Current transformer and voltage transformer is used in this circuit because find the load power in Circuit,

Power= voltage*current

P= V*I

P= V*I.....watts/VA

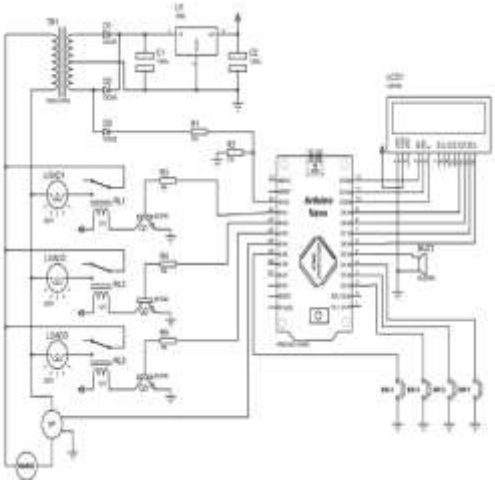
4. Performance Analysis

Maximum Demand in watt	**Ex-200w**				
Lamp load 1	**100w**	**ON**	**ON**	**ON**	**OFF**
Lamp load 2	**60w**	**ON**	**ON**	**OFF**	**OFF**
Lamp load 3	**40w**	**ON**	**OFF**	**OFF**	**OFF**

5. Working Methodology

The general purpose of maximum demand meter is to monitor and control the maximum power demand in order also can reduced the monthly electricity bill. Byusing the meter, the user do not have to worry that their electricity bill will increase thus have to pay lot of money on bills. Maximum power demand meter can benefit every user specially factories. The information and also knowledge that been used to produce the meter can benefit the society. Assembly language will be used to design a program for specific purpose which is to be monitor and control power demand.
To avoid the penalty for maximum demand we must ensure that this value never exceed contracte power. Usually in electricity bill the highest demand value recorded by the meter is compared to the contracted power, whenever this value is higher than the contracted power there will be an economic penalty.

Circuit Diagram



1. A 230 v, 50 Hz, ac supply is fed to potential transformer. This transformer step down the voltage 230/12v to power supply circuit and measure voltage in volt.

2. Power supply circuit is directly fed to the Arduino Nano (microcontroller) but micro controller require 5v dc supply so power supply circuit converted 12v to 5v DC.
3. Relays are used as a switch for sensing the fault and trip the load.
4. CT is a current transducer to measure the current as well as voltage in terms of phase and neutral and fed to the ADC.
5. PT is potential transformer to step down the voltage and given to the potential divider circui through ADC.
6. LCD is liquid crystal display which shows all the parameters like voltage, current, maximum power and set power etc.

6. Proposal :

The Proposed system represents maximum demand control by microcontroller system. In this system we are using resistance,diode,CT, PT to get maximum demand control. like arduino nano (14 digital pins,5v DC supply) This controller is monitoring the load and also calculate the voltage, current,

total power, instantaneous power. We are use CT it's measure the current of another circuit. PT is used for measure voltage level and reduce voltage 230v to 12 v and measure voltage in the circuit.

Enables production to increase output when MD is predicted to be low. This increases productivity. Enables Production Control and Finance to budget for a target MD, given a target production output. Provides real-time energy and demand cost. This allows you to know your expenditure before the month-end electricity bill. Comparable (within 1%) to the actual electricity Bill. Integrated with TNB Meters for accurate control. This is done with formal TNB approval prior to installation. Proven to control a load of 60MW, base load of 40MW to a target maximum demand of between 60MW to 90MW. Algorithm is designed for Tenaga Nasional Berhad (TNB) billing rules; suitable for all industrial tariffs.

For the Maximum demand controller to work effectively, operations will need to have loads which can be shed when demand is high. Possible actions in order to shed loads include: waste-processing machines, slowing down motors and machines, shutting down of non-critical machines, reduction in chiller power and usage of alternative cooling methods.

7. RESULT:

 To control maximum demand and reduce high penalties to consumer by electricity board.

 To control load commercial, Residential and Industrial load.

 Achieve Better utilization of availability power and Avoid penalty.

 Result control fo essential and non essential loads during peak or off peak periods by the help of maximum demand controller.

FUTURE SCOPE:

1. Primarily the MD Controller can be interfaced with the computer and the Maximum Demand can be monitored through the SCADA system itself.

2. The controller can be made foolproof by using GSM (Globle system for mobile communication) with technology.

Advantages

1. Avoid penalty.

2. measure current, voltage in circuit also measure load in KV.

3. We can set load as per demand or priority.

4. Unnecessary load is off and save electricity.

Applications

1. Proces control industries

2. Hostels

3. Hotels, function hall

4. Office's

5. College, school

6. Small single phase MD controller and be used for domestic purpose.

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