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A Pic 18f458 Study On Electrical Data Monitoring, Management,And Reactive Power Compensation

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Abstract

The voltage stability of the ac system has become a significant source of concern in recent decades because to the dramatic increase in electronic devices, power systems, and high-voltage electrical systems. The bulk of industrial and commercial systems across the country have large, multiple-inductive electrical loads, which causes a low power factor and heavy penalties from the electricity board for customers. PFC is in charge of this. Fixed loadsonly operated with manually by switching capacitors, but when dealing with distributed loads that fluctuate rapidly. In order to change the load by manually seems to be more struggle to reach the high level. To circumvent this issue, an APFC panel is utilised. The PIC microcontroller used in this study measures power factor from the load and activates the required capacitors.

Keywords: PIC, Hardware, Power factor, electricity, fixed loads

I. INTRODUCTION

Many academics have developed reliable and accurate methods for digitally measuring electrical power over the course of many years. Attempts were made utilising a variety of techniques, including the use of a microprocessor, linear or non-linear. For the purpose of managing the out-of-hospital care for patients with a moderate cardiovascular risk, a hardware and software architecture has been created. "Windows Media Center" has employed a multi parametric technique based on time and frequency (linear and non linear analysis) domain study to automatically decipher wireless ECG broadcasts [2]. ADC, etc. In this work, a straightforward method has been tried to digitally realise reactive and active power. This method is based on the development of three values using an analogue circuit; these data are proportional to Vm, Im, cos, and sin; consequently, their multiplication by a microcontroller will produce Vm Im cos, which stands for active power, and Vm Im sin, which stands for reactive power [1]. In this work, the PIC18F458 microcontroller is used to demonstrate a straightforward way for measuring reactive and active power digitally. When the PC is

connected, automatic transmission of events, temperatures, and humidity readings occursto the computer and saved in an Excel sheet for Microsoft Office for further use [3].As was already mentioned, this project introduces a straightforward technique for measuring reactive and active power electronically using a PIC18F458 microcontroller.

This isalso done by PLC and SCADA panels in large scale industries. These panels are soexpensive and accommodate large space. But the circuits we do is much cheaper and accommodate less space compare to PLC and SCADA panels and this circuit is use not only in small scale industries but also use for domestic purpose.mputees with prostheses that havetactility sensors integrated in the cosmetic silicone covering, which functions as a sensory "skin" that provides the sensation of touch, have enhanced grip, object manipulation, andmovement [4].

LITERATURE SURVEY

BACKGROUND STUDY:

According to the inventor, measuring electrical characteristics and pf development are now crucially important. By implementing contemporary technology, we may avoid using lagging PF. The ability to take in the reactive power generated by a load is known as power component adjustment. Which dc-dc boost converter raises the specified input power to the desired level? It provides a model for conserving energy byregulating the artificial light's intensity to a tolerable range and making use of daylight wherever practical [5].

Automated correction of power factors based on the Alienation method suggested. Currently working on medium-sized sub-orbital rockets, PSAS's ultimate objective is to launch nanosatellites (satellites weighing less than 10 kg) into orbit. Since entering orbit requires a navigation system that can guide the rocket along an orbital trajectory, PSAS is leading the charge in building an open source and open hardware avionics system that is capable of active guidance [7]. Additionally, a technique called alienation was created to calculate the original power component online, active and compensatory reactive power, and the amount of capacitor banks needed to achieve the target power factor. The PIC18F458 chip was used in the development of the active power to accomplish the desired effectiveness and

cheap cost [6]. As part of the solution, a switching capacitor is activated using an algorithm tocompute the power coefficient value of the load and to make up for too many reactive elements. This raises power factor values.

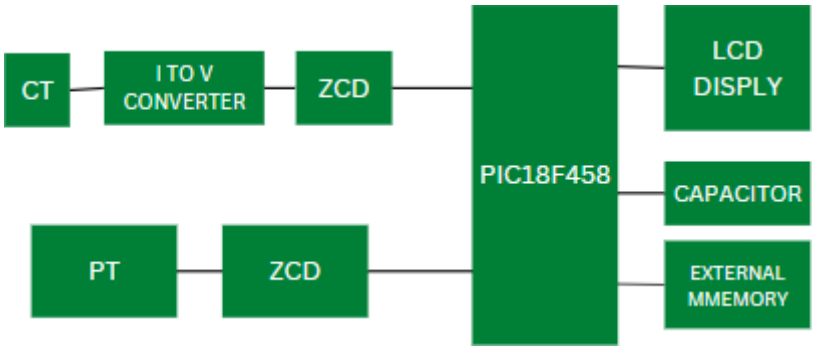

Fig.1.1 Working Block Diagram

WORKING PRINCIPLE

Using a PIC18F458 microcontroller, the system can increase its power factor. Consider a typical three-wire power system, whose current and voltage outputs under stable state are of sinusoidal form. As the motor turns in the forward position, it reconnects both spans so that people may easily cross them.

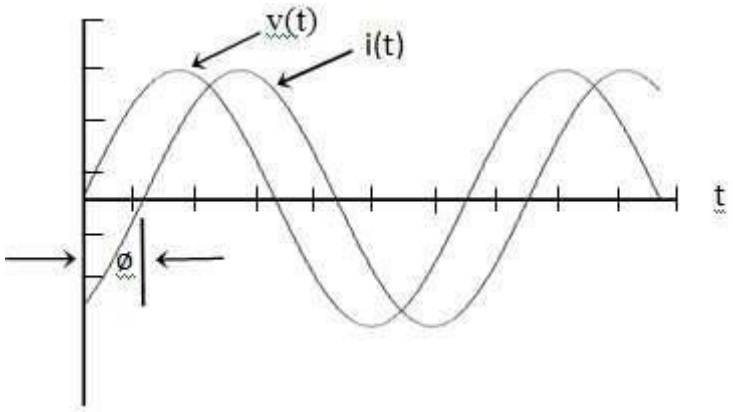

Fig 1.2 Voltage and Current waveforms

REQUIRED COMPONENTS1)

PIC18F458:

The PIC, or peripheral interaction controller, is an 8-bit microcontroller that was first releasedin 1989 by MTC. This microcontroller featured just a few hundred bytes of on-chip ROM for the programme, as well as a modest amount of information RAM. Because they are 8-bit devices, the CPU only can process 8 bits of data at once [8]. There are

numerous new commands in the 16 bit PIC18XXX instruction. There are 40 pins accessible for the PIC18F458.

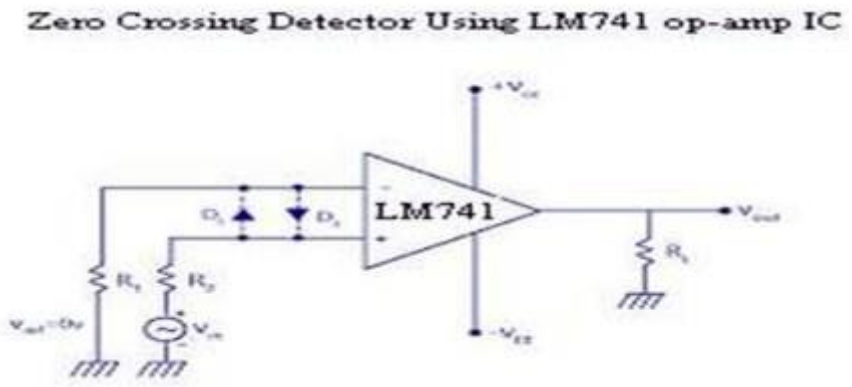

Fig 1.3 construction diagram for ZCD

3) Converter of current to voltage:

A converter of current to voltage will create a voltage that is proportionate to the input current. If your measuring device can only detect volts and you require to monitor the current output, you need to get this circuit. A straightforward resistor circuit may be utilised to perform the translation if your sensor or DAQ has an input resistance that is a few orders greater than the converting resistance [9]. However, the accompanying op amp circuit must be utilised if your instrument's input resistance is minimal in comparison to the conversion resistor.

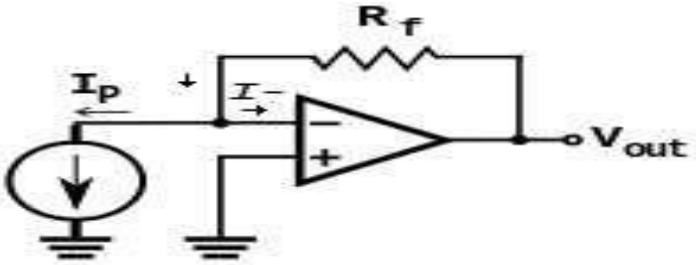

Fig: 1.4 I to V Converter

4) POTENTIAL TRANSFORMER:

A transformer called a potential transformer has been used to scale down voltage. By scaling down the AC voltage, it is employed to monitor AC voltage. For instance, a potential transformer is utilised in this project to reduce the voltage from 220V AC to 5V AC. Secondary windings in potential transformers have fewer turns than main windings. As a result, it steps down AC voltage using the formula for turns proportion below.

Ns/Nv = Vs/Vp

Instrument transformers of the VT (also known as PT) type are parallel-connected transformers. They have a precise voltage proportion and phase connection that enables accurate secondary linked metering and are made to put a minimal stress on the supply being monitored.

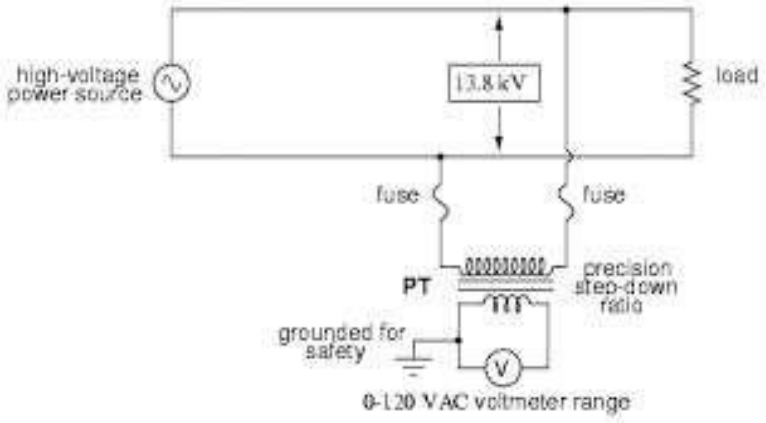

Fig: 1.5 Circuit diagram of PT

5) Current transformer:

A current transformer (CT) is a type of transformer that generates an AC in its second that is proportionate to the primary's primary AC current. Instrument transformers are definedas CT, VTs, or PTs that are intended for measurement. A power converter was an instrument converter that is used with measurement or protective equipment and in which, under typical operating conditions, the secondary voltage is proportionate to the source voltage and deviates from it by an angle about equal to zero.A current transformer may be utilized to produce a separated lower power in its secondary that is proportionate to the current in the main circuit when a current becomes too large to detect directly or the polarity of the wire is too excessive. The induced secondary winding is therefore appropriate for treatment in electronic devices or measurement instruments. Additionally, current converters barely affect the primary network. The separation between the secondary and primary circuits is frequentlythe key feature in electronic devices.

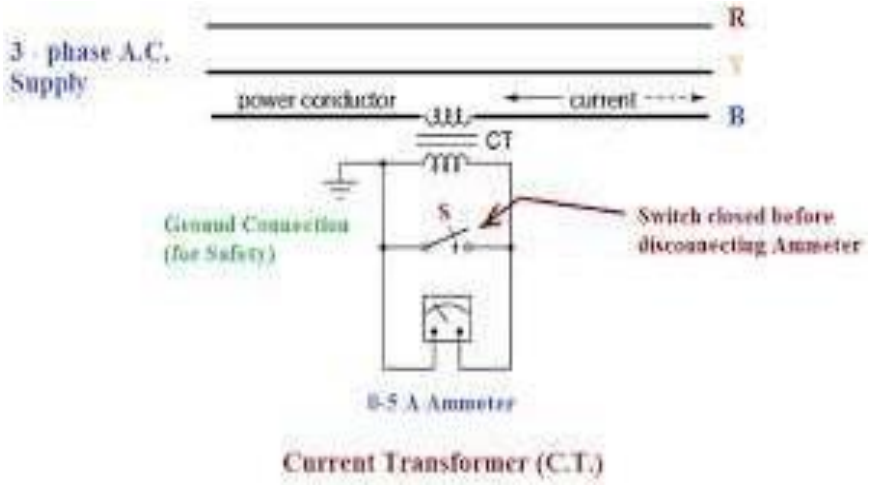

Fig 1.6 Circuit diagram of CT

6) LCD:

The technology utilized for screens in laptops and other portable computers is known as LCD (liquid crystal display). LCDs enable displays to be noticeably thinner than CRT technology, similar to LED and gas-plasma techniques. As opposed to LED and gas-display screens, LCDs operate on the idea of absorbing light instead of producing it, which results ina significant reduction in power consumption. Either a liquid crystal display panel or a passive matrix screen grid is used to create LCDs. The term "TFT display" is also used to describe the active matrix LCD.A grid of connections with pixels positioned at each junction makes up the passively matrix LCD. To regulate the lighting for any pixel on the grid, a current is delivered through 2 conductors. Since each pixel crossing in an active grid has a transistor, controlling the brightness of a pixel with less current is possible. Because of this, an active matrix display's voltage could be turned on and off more often, resulting in faster screen refresh rates.

Fig1.7 Pin diagram of LCD

ADVANTAGES:

1) Simple in construction.
2) Cheap in cost.
3) Real time data can be monitored.
4) Continuous data can be stored and read as per requirement in future.
5) It can be used for domestic as well as small scale industries.

DISADVATAGES:

1) It cannot be used for large scale industries**.**
2) Only limited data can be monitored.

APPLICATION:

1) Measurement of active power
2) Measurement of reactive power
3) Measurement of power factor
4) Power factor correction
5) Reactive power compensation
6) Storage of data

IV. CONCLUSION:

Designer a good PIC18F458 microcontroller based power factor correction devices to help improve power factor, reduced high current flow through the system and also reduced harmonics in the system.In this study, a distant Distribution Transformer (DT) monitoring system is presented and designed to address the issues with the existing remote monitoring system's excessively complex wiring, difficulty in fault diagnosis, and trouble in maintaining.The 16 bit PIC18F458 chip and GSM module TC35i-based system hardware design is suggested [10]. Improving the efficiency of the system and reducing high electricity cost.it isapplicable on commercial and residential system. The technology described in this presentation offers a relatively straightforward way to assess reactive and active power digitally. The several industrial sectors can use this strategy. PIC18F458 is used to perform calculations. The system may be evaluated using PROTEUS under various loading scenarios, and the MATLAB simulation has demonstrated linear behaviour under such circumstances.

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