

# A Compact Remote Switching With Efficient Monitoring For AC Plants

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## ABSTRACT

Remote monitoring has been implemented in many areas. This paper introduces its specific application to air-conditioning plant control and monitoring using PIC Microcontroller. Remote monitoring and intelligent maintenance is one of the most important criteria for maximizing production and process plant availability. Initially switching and monitoring were done through manually and the control switches and level monitoring unit were placed at separate places. Due to this, we cannot monitor all units at a time. In our proposed system, remote switching and monitoring is done in the control room itself. Majority of industries use distributed control system for high reliability, improve response time, improved operator interface to plant, improved accessibility of plant data.

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## I. INTRODUCTION

This project is Undergone At All India Radio Chennai. In the existing central air conditioning systems, control should be near to the plant. There is a plant room where large compressor, condenser, thermostatic expansion valve and evaporator are kept. They perform all the functions as usual similar to a typical refrigeration system. However, all these parts are larger in size and have higher capacities. The compressor is of open reciprocating type with multiple cylinders and is cooled by the water just like the automobile engine. The chilled air is passed via the ducts to all the rooms, halls and other spaces that are to be air conditioned. Thus in all the rooms there is only the duct passing the

chilled air and there are no individual cooling coils, and other parts of the refrigeration system in the rooms. What is we get in each room is the completely silent and highly effective air conditions system in the room. Further, the amount of chilled air that is needed in the room can be controlled by the openings depending on the total heat load inside the room.

The central air conditioning systems are complex, used for highly sophisticated applications. It is due to this reason very few Industries throughout the world prefer this system. In the modern era of computerization a number of additional electronic utilities have been added to the central conditioning systems. There are two types of central air conditioning plants or systems:

**1. Direct expansion or DX central air conditioning plant.**

In the DX system the air used for cooling the room or space is directly passed over the cooling coil of the refrigeration plant. In case of the chilled water system the refrigeration system is used to first chill the water, which is then used to chill the air used for cooling the rooms or spaces. In this system the huge compressor and the condenser are housed in the plant room, while the expansion valve and the evaporator or the cooling coil and the air handling unit are housed in separate room. The cooling coil is fixed in the air handling unit, which also has large blower housed in it. The blower sucks the hot return air from the room via ducts and blows it over the cooling coil. The cooled air is then supplied through various ducts and into the spaces which are to be cooled. This type of system is useful for small buildings.

**2. Chilled water central air conditioning plant**

The chilled water types of central air conditioning plants are installed in the place where whole large buildings, shopping mall, airport, hotel, etc, comprising of several floors are to be air conditioned. While in the direct expansion type of central air conditioning plants, refrigerant is directly used to cool the room air; in the chilled water plants the refrigerant first chills the water, which in turn chills the room air.

In chilled water plants, the ordinary water or brine solution is chilled to very low temperatures of about 6 to 8 degree Celsius by the refrigeration plant. This chilled water is pumped to various floors of the building and its different parts. In each of these parts the air handling units are installed, which comprise of the cooling coil, blower and the ducts. The chilled water flows through the cooling coil. The blower absorbs return air from the air conditioned rooms that are to be cooled via the ducts. This air passes over the cooling coil and gets cooled and is then passed to the air conditioned space.

This type of system is more useful for large buildings comprising of a number of floors. It has the plant room where all the important units like the compressor, condenser, throttling valve and the evaporator are housed. The evaporator is a shell and tube. On the tube side the Freon fluid passes at extremely low temperature, while on the shell side the brine solution is passed.

After passing through the evaporator, the brine solution gets chilled and is pumped to the various air handling units installed at different floors of the building. The air handling units comprise the cooling coil through which the chilled brine flows, and the blower. The blower sucks hot return air from the room via ducts and blows it over the cooling coil. The cool air is then supplied to the space to be cooled through

the ducts. The brine solution which has absorbed the room heat comes back to the evaporator, gets chilled and is again pumped back to the air handling unit. To operate and maintain central air conditioning systems we need to have good operators, technicians and engineers. Proper preventative and breakdown maintenance of these plants is vital.

**II. SYSTEM ARCHITECTURE**

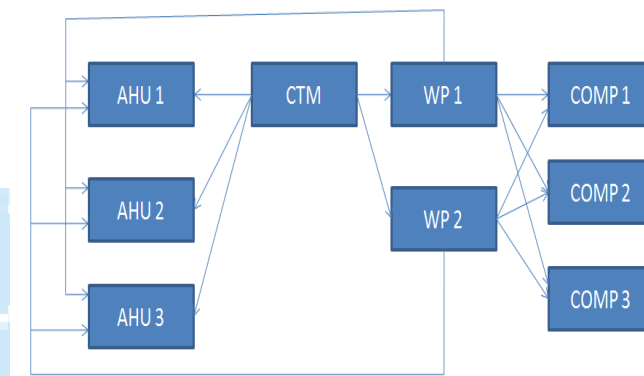


Fig.1: AC plant system.

CTM-cooling tower motor  
 WP-water pump  
 AHU-air handling unit  
 COMP-compressor

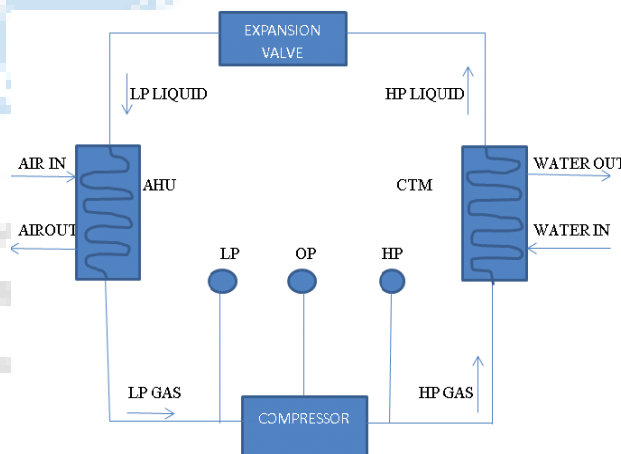


Fig.2: Function of AC plant system.

LP-low pressure  
 OP-oil pressure  
 HP-high pressure

The existing system consists of three parts they are cooling tower motor, water pump for condenser, air handling unit and compressor. there are three ac plants are located, cooling tower motor was common for all the three plants two water pumps are available and the air handling unit and the compressor are separately located for all the three plants First the water was given to the cooling tower motor inside

the cooling tower motor. The water inlet was 10hp then water was converted as a high pressure liquid with high pressure the water was sent to the expansion valve via water pump in the expansion valve in the range of 10-11 tone inside the expansion valve the high pressure liquid was converted to the low pressure liquid. Then using the low pressure liquid the air handling unit converts the liquid into air. The air handling unit also ducts the air which was out by the studio also and it also convert the LP liquid to air and then the chilled air was given to the all part of the stations Then the low pressure gas given to the compressor inside the compressor low pressure, oil pressure and the high pressures are measured again the hp gas was return back to compressor. The master controller acquires the room temperature via the sensor, provided no deviation from the set point occurs, the slave controller (PI controller) keeps the supply air temperature constant at the set point specified by the room temperature controller using the supply air temperature sensor. The gas which was used inside the plant was Freon-22 which was called as chcl<sub>2</sub>. The figure1 determines the architecture setup and the figure2 determines the operation inside the ac plant the station was 6HC75. The section temperature inside the compressor was 70.5 psig. The discharge temperature was 183psig (significant pressure), capacity of the plant was 35.10TR

$$\text{Capacity} = \frac{\text{cfm}(\text{air flow}) \times \text{diffusion entropy} \times 60}{\text{specific volume} \times 1200}$$

### III. EMBEDDED FEATURES

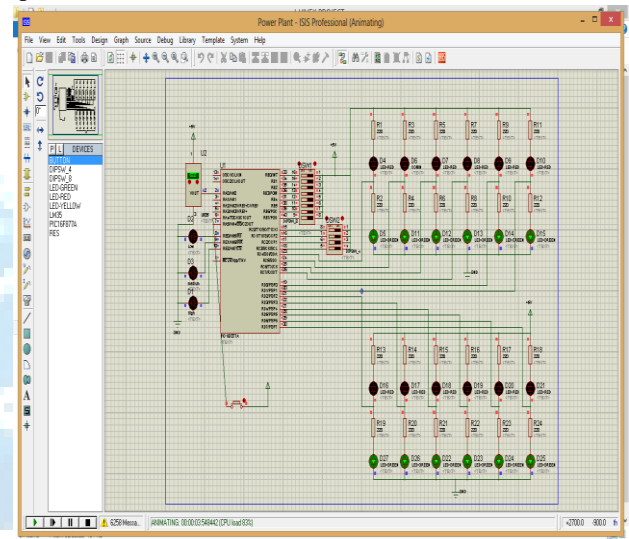
Embedded systems are designed to do some specific task, rather than be a general-purpose computer for multiple tasks. Some also have real-time performance constraints that must be met, for reasons such as safety and usability; others may have low or no performance requirements, allowing the system hardware to be simplified to reduce costs. Embedded systems are not always standalone devices. Embedded systems range from no user interface at all dedicated to one task. Complex graphical user interfaces that resemble modern computer desktop operating systems. Embedded devices which are simple use buttons, LEDs, graphic, character LCDS (for example popular HD44780 LCD) with a simple menu system.

More sophisticated devices which use a graphical screen with touch sensing or screen-edge buttons provide flexibility while minimizing space used: the meaning of the buttons can change with the screen, and selection involves the natural behavior of pointing at what's desired. Handheld systems often have a screen with a "joystick button" for a pointing device.

Embedded systems often reside in machines that are expected to run continuously for years without errors and in some cases recover by them if an error occurs. Therefore the software is usually developed and tested more carefully than that for personal computers, and unreliable mechanical moving parts such as disk drives, switches or buttons are avoided.

### IV. EXPERIMENTAL OUTPUT

The figure 4 gives the clear output about the function of the ac plant.

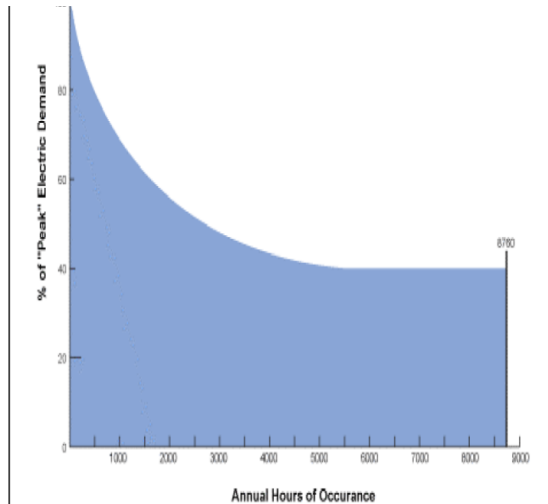


The Above Table describes the difference between outside air temperature and room temperature According to the VDI directives for ventilation, the room temperature should be raised to a maximum of 26 °C when the outside temperature is 32 °C. The following room temperature set points apply as per VDI for the outside temperature range from 20 °C to 32 °C:

During winter operation, when the outside temperature is below 0 °C, for example, the room temperature control set point is also control. The graph concludes about the temperature range and the changes of the temperature between the summer and the winter. Because during the winter the amount of cooling given out by the ac plant was very low when compare to summer.

**Table.1. Temperature difference between outside and room temperature**

Outside air temp. °C	20	22	24	26	28	30	32	34
Room temperature °C	20	21	22	23	24	25	26	27



## V. CONCLUSION

By using the a compact remote switching with efficient monitoring for the ac plants we can determine that how an different plant and various components of the ac plants can be monitored and switched in a single control room can be determined all the function of the plant can be monitored and fault tolerance can be achieved in a single control room. Thus an efficient way to determine the monitoring and determine the working of the ac plants is determined. applications and extensions.

## REFERENCES

- [1] H. A. Dharmawan and S. A. M. Ali "A modular approach and controller area network bus implementation in an embedded system of a 3-phase 10 kVA energy efficient switchable distribution transformer", Proc. 5th IEEE Conf. Ind. Electron. Appl., pp.62 -67, 2010
- [2] J. K. Pylvanainen , K. Nousiainen and P. Verho "Studies to utilize loading guides and ANN for oil-immersed distribution transformer condition monitoring", IEEE Trans. Power Del., vol. 22, no. 1, pp.201 -207, 2007
- [3] S. A. M. Ali , S. C. Chew and R. H. Kiefer "Temperature monitoring of an energy efficient three-phase three-kVA switchable transformer", Proc. 3rd Jpn., Australia, New Zealand Joint Seminar Appl. Electromagn. Phenom. Elect. Mech. Syst., 2004
- [4] H. Abniki , H. Afsharirad , A. Mohseni , F. Khoshkhati , H. Monsef and P. Sahmsi "Effective on-line parameters for transformer monitoring and protection", Proc. NAPS, pp.1 -5, 2010
- [5] B. Chatterjee , D. Dey and S. Chakravorti "Implementation of an integrated, portable

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