Water Level Controller

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***Abstract*- In this review paper,I have studied how to control water level in tank automatically rather than manually in order to reduce Human efforts and also wastage of water. In intention of solving this problem, i have used Programmable Logic Control.**

INTRODUCTION

Fast and Easy PLC Control The object of a PLC simulator is to 'fake out' the input into a PLC so that the programmer can test and debug the program before installation into it's operating environment. Our patent pending PLC simulators achieve this by mounting on the existing terminal strip of the PLC card and providing easy controls to turn digital inputs on/off or adjust analog signals. If you are a engineer who programs PLCs or even a technician in need of a quick way to test a PLC functionality then these devices are for you. Save time, money and embarrassment by fixing problems before they start. These PLC simulators are for sale in our products section

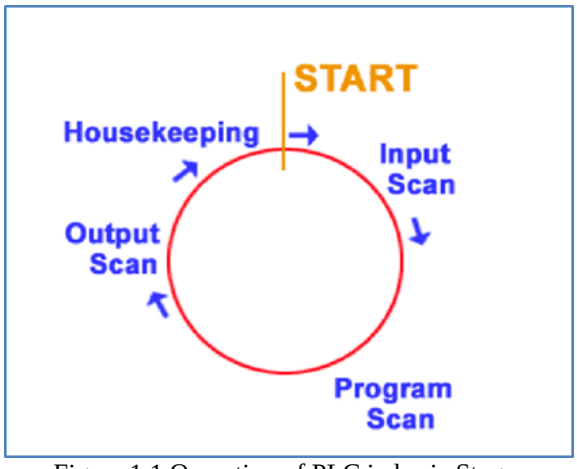


Figure 1.1 Operation of PLC in basic Stages

Recently, the International standard IEC 61131-3 has become popular. IEC 61131-3 currently defines five programming languages for programmable control systems: FBD (Function block diagram), LD (Ladder diagram), ST (Structured text, similar to the Pascal programming language), IL (Instruction list, similar to assembly language) and SFC (Sequential function chart). These techniques emphasize logical organization of operations.

While the fundamental concepts of PLC programming are common to all manufacturers, differences in I/O addressing, memory organization and instruction sets mean that PLC programs are never perfectly interchangeable between different makers. Even within the same product line of a single manufacturer, different models may not be directly compatible.

INTRODUCTION OF WATER LEVEL CONTROL

The water level control is commonly used in the industrial production process parameters, while closely related to people's lives. In many fields of scientific research and production practice, the water control occupies a very important position, especially in metallurgy, chemical industry, building materials, food, machinery, petroleum and other industries, has a important role. Programmable Logic Controller (PLC) is an industrial control computer; inherit computer, automatic control technology and communication technology as one of the new automatic device. It has strong anti-interference ability and cheap price, reliability, programming is simple, easy to learn and use, by the project operator, like in the industrial field, the PLC has been widely used in various areas of industrial control. The configuration software is an automatic control system monitoring layer a software platform and development environment. Its flexible configuration will provide users with software tools to quickly build industrial automatic control system monitoring and general level.

A manufacturing plant requires continuous monitoring and observation at regular intervals. When it is controlled manually, it increases

possibilities of errors at measuring level of a process. To overcome such problems concept of automation came into play.

A control system can be manage and regulate the behaviour of other devices or systems. The controller is used the sensors for sensing the variation in the level and temperature of water inside a tank. They used conventional relay control system to control level of fluid.

PROBLEM DEFINITION

REVIEW STATEMENT:

How to control water level in tank and its rather than manually in order to reduce Human efforts and also wastage of water. In intention of solving this problem, I have used Programmable Logic Control.

REVIEW OBJECTIVES:

Problem statement The traditional fluid level control tank had many disadvantage such as :

1. Traditional fluid level must draw the water manually to the tank when there is no water in the tank.
2. The problem of manual control is sometimes people turn off or turn on the valve.
3. For the automatic water level control, if the manual float broken or damages, all the system cannot function properly.
4. There is over flow of in the open container in the industries.
5. Time delay.
6. less reliable.
7. Difficult to maintain.

MONITORING:

a. control To and measure the liquid level in the tank
b. To ensure that enough material is available to complete a particular batch
c. To designed an Automatic water monitoring system
d. To incorporates an interactive medium between the end user and the machine
e. To develop controller using PLC as programming.

SAFETY:

a. To prevent an industrial accident by over filling an open container
b. To monitor tank over filling.

ECONOMY:

a. Good level control of solid also desirable, excessive built up in hoppers can be expensive to clear
b. To avoid wastage of Water

To prevent over labour of the pumping Machine. Since the demand of electric city is very high, Automatic water level control saves energy.

REQUIREMENT SPECIFICATION

PROGRAMMING LANGUAGES AND HARDWARE

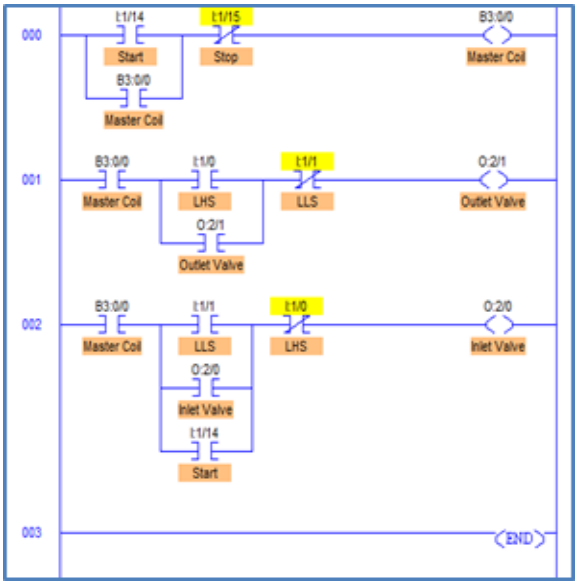
- Ladder Diagram
- Functional Block Diagram
- Instruction List
- Level Switch
- Pump

PROGRAMMING LANGUAGE DESCRIPTION

LADDER DIAGRAM:

WATER LEVEL CONTROL:

One open tank is installed in the plant of which liquid level is to be controlled. When level reaches the Level Low, Outlet flow is blocked and inlet flow is allowed until high level is achieved. And when Level High is detected, outlet flow is allowed and inlet flow is blocked.

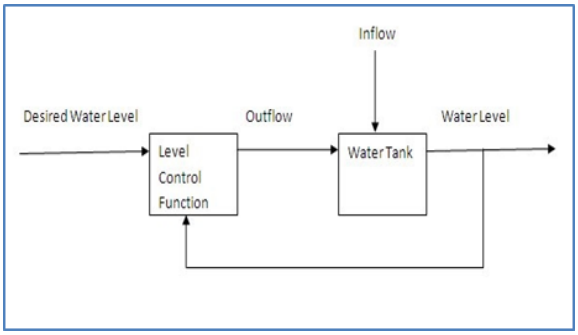


Figure, Water Level Control

- RUNG000 is simply for latching a coil and master start-stop buttons.
- RUNG001 is to control the outlet valve through O:2/1. This is done when Level High is detected.
- Latching of Output O:2/1 is done because when High Level is detected, input to RUNG001 is temporary, like Push Button. So in order to keep outlet valve open until the Level Low I:1/1 is detected, latching is done. XIO of Level Low Switch is connected in series so that when Level Low is detected, it goes true closing the outlet valve.
- Similarly in RUNG002, it works exactly same. The only difference in RUNG002 is that extra I:1/14 contact in parallel with LLS.
- Suppose when the system is started and the tank is partially filled, neither LHS nor LLS is detected, in this case, outlet and inlet valves remain closed while inlet valve should open to start filling the tank because it's partially filled.
- To eliminate this error, I:1/14 (Start) is connected in parallel to LLS I:1/1 contact. This checks if LHS (I:1/0) is detected or not. If LHS is not detected, then it opens the inlet valve until LHS is detected.

FUNCTIONAL BLOCK DIAGRAM

WATER LEVEL CONTROL:



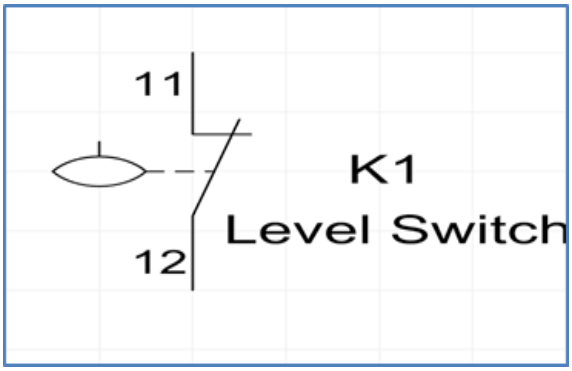
Water Level Control Functional Block Diagram

- Auto : if Auto Mode selected in Local Control Panel, then pump will be logically controlled based on Low Level Switch and High Level Switch
- Manual: if Manual Mode Selected in Local Control Panel, then irrespective of Low Level Switch & High Level Switch Status, Pump will be controlled manually using ON/OFF button in Local Control Panel.
- When the water level reaches low level then pump will be stopped.
- if the level of the water reaches high point, the pump will started so that the water can be drained and thus lowering the level.
- Indication Panel: This panel contains LED's to show the status of the water levelcontrol. It has Pump Running, Low Level &High Level Signals
- If pump is running then the Pump Running status lamp will be ON.
- then, if Low Level Switch activated then Low Level Status lamp will be ON.
- if High Level Switch activated then High Level Status lamp will be ON.

INSTRUCTION LIST:

- All coil pilot lights, and other outputs are on the right.
- An input line can feed more than one output. If it does the Output are connected in parallel.
- Switches, contacts and other device are inserted in ladder line starting on left.
- Switches, contact and other device may be multiple contacts in series, parallel or series - parralel.
- Line are numbered consecutively downward on the left.
- Every connection node is given a unique identification number.
- Output can be identified by function on right.
- Cross identification system may be included on the right.

LEVEL SWITCH :



Level Switch

When the water level in the elevated tank is low, water is pumped up from the ground tank to supplement it. When the water level reaches a certain level, the pump stops.

When electrode E1 is not in contact with the conductive liquid as shown in figure 2, the electrical circuit is open, and no current flows between electrodes E1 and E3. Consequently relay X does not operate and the contact remains at the b side.

When electrode E1 is in contact with the conductive liquid as shown in figure 3, the circuit closes due to the conductive fluid completing the circuit between E1 and E3. Relay X operates and switches to the a side. By connecting the relay contacts to a contactor, the pump can be turned ON and OFF. However in practice, with only two electrodes, ripples on the surface of the liquid cause the relay to switch rapidly. This problem can be solved by forming a self-holding circuit.

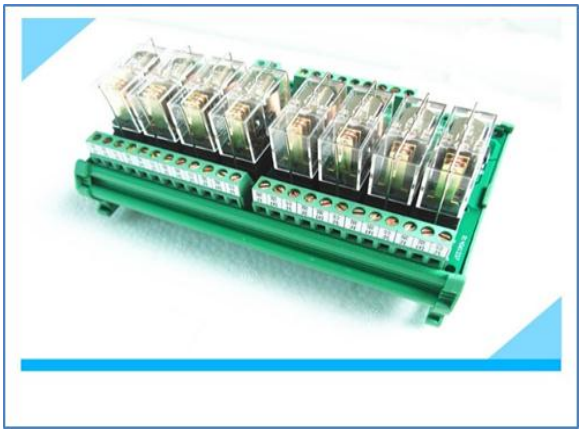
PUMP:

Pump

A pump is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps.

Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work moving the fluid. Pumps operate via many energy sources, including manual operation, electricity, engines, or wind power, come in many sizes, from microscopic for use in medical applications to large industrial pumps.

24V RELAY SWITCH BOARD:



24V Relay Switch Board

Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. As relay diagrams show, when a relay contact is normally open (NO), there is an open contact when the relay is not energized. When a relay contact is Normally Closed (NC), there is a closed contact when the relay is not energized. In either case, applying electrical current to the contacts will change their state.

Relays are generally used to switch smaller currents in a control circuit and do not usually control power consuming devices except for small motors and Solenoids that draw low amps. Nonetheless, relays can "control" larger voltages and amperes by having an amplifying effect because a small voltage applied to a relays coil can result in a large voltage being switched by the contacts.

Protective relays can prevent equipment damage by detecting electrical abnormalities, including overcurrent, undercurrent, overloads and reverse currents. In addition, relays are also widely used to switch starting coils, heating elements, pilot lights and audible alarms.

ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

1. The work has automated with this system.
2. As we have used PLC for Automation; it is very easy to learn and understand.
3. This gives proper visual presentation to students and gives them little bit idea about industrial environment.

4. Flexible
5. Faster response time.
6. Less and simpler wiring.
7. Solid – state - no moving parts.
8. Handles much more complicated system.
9. Less Expensive.
10. Easy to troubleshoot.

DISADVANTAGES:
Without electricity it is not able to operate.

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CONCLUSION

Automation is wheels on which world's vehicle is running. So automation is not important but it is need. This controlling of water level using PLC helps us not only to bring automation but also to reduce use of electricity and wastage of water.
Hence by using various electrically, electronically and mechanical operated devices, we have assembled and operated assembled instrument successfully.

GUIDANCE UNDER:
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