Report 1 Part 1

Pool Control System



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**Section I – Customer Statement of Requirements**

**Overview**

If you have a pool, would you like to control and monitor it with a computer. There are many people that own a pool, and almost everyone leaves the residence on which the pool is located for one reason or another. For some people it is a vacation home and they are gone more often than they are there. Do you want to raise and lower the temperature of the pool? How will you know if your pool is working so that it can be enjoyed upon returning? There are a lot of things that could go wrong. [insert things that could go wrong?]

The problem is there is no way to monitor your pool while you are away unless you hire someone to come check it for you. That sounds expensive. It is a lot cheaper and easier to just check it yourself online. That is why there is a system designed to monitor different components of your pool.

There are many individual components that make up the complete pool system. The pool system is a closed loop system with the most important part being the pool pump motor which draws pool water from the pool and forces it through the filter and other system components and back into the pool. This system must include a solar heating system control, pool motor starter, and pressure monitoring system. With a graphical user display that is easy to use and intuitive.

**The Basics**

The basic components of the system shall be:

Inputs:

* T1 – Temp sensor 1 (temp of the pool water)
* T2 – Temp sensor 2 (Temp of the roof)
* P1 – Pressure Sensor 1

Outputs:

* M1 – Motor contactor 1 for the main pump
* V1 – Valve 1, for Solar Heat
* V2 – For by pass

The system shall operate as follows, the user is allowed to enter the following Values on the graphical user display:

* Pump Start Time
* Pump Stop Time
* Target Pool Temp
* Max Pressure
* Min Pressure
* Bypass Valve Enable

To access the pool system, you would go online to a website and enter your username and password. From there you will see the following: the temperature of the water in the pool, the set temperature that you would like the water to reach, the temperature on the roof where the solar panels are located, an on/off switch to enable pool heating, the pressure of the water in the tubing of the filtering system, the minimum and maximum pressures allowed by the system, the start and stop times for the pump, and the valves’ statuses (open or closed).

There will be controls to change the target temperature. This is the temperature to which the pool will heat up. The solar heating is based on several factors. When it is enabled on the user display. The control system shall monitor pool temp and roof temp. If the pool temp is below the “Target Pool Temp” and the roof temp is at least 20 degrees above the pool temp, then V2 should be enabled and the pool water shall be directed through the solar heating panels.

There will also be controls to change the minimum and maximum pressures allowed in the system to prevent damage to the pump, filter, and other parts of the system. Anytime the Pool pump is running the pressure should always be monitored. If the pressure is detected to be greater than the “Max Pressure”, it shall immediately shut the pump down and display a warning on the display. This warning shall be reset by the user only while the pump is off. The minimum pressure is active two minutes after the pump has been turned on. If at any point passed the two minutes the pressure is below the “Min Pressure” setpoint, the system should immediately shut down and display a warning. This would indicate a possible leak in the system.

There will also be controls for the start and stop times for the pump. The Pool Control shall turn the pump M1 on at the “Pump Start Time” and turn it off at the “Pump End Time”. These can be programmed for any time of the day. Every day that the system is turned to on, the pump will start at the given time and stop at the given time.

There are two valves that are used in the heating system. The valves are two position. Valve 1 is used as a bypass valve that will divert the water from the filter to the second valve when off and from the filter directly to the pool when on. The second valve V2 will direct the water from Valve 1 to the solar heating when enabled or through the regular return path. The bypass valve V1 shall always be in the off position unless it is selected on from the graphical user interface, if the bypass valve is on all V2 shall immediately be disabled and all heating functions shall be disabled.

**Section II – System Requirements:**

The main controller system shall be a microprocessor that has Wi-Fi capability. It should have an open source firmware to allow easy adaption and future upgrades. A graphical user interface shall also be including with the design along with easy to use functions. The controller should be able to be connected to through a network connection. The user interface can be though and app or means other then an HMI.