Design Features Explanation

1. F style container

A bioreactors format and shape depend on the culture capacity in production environments and the performance of the system. In the scenario of insulin production, the F-Style containers are made of durable plastic that is efficient for holding liquids, oil, and cleaners. Their shape makes it easy to transport and store and simple to pour liquids into. They can be fluorinating, meaning that their shape, design, and use can be preserved.They can hold 4 to 5 gallons of liquid, depending on the dimensions and area.

2. Waterproof DS18B20 Digital Temperature Sensor

The Waterproof DS18B20 temperature sensor doesn't need any other external temperature sensors if used. It measures temperatures from -55°C to +125°C with ±0.5°C Accuracy, which is significant for this bioreactor as the desired temperature is 100°C.

3. Silicone Heating Pad (2x)

Temperature regulation is crucial to maintaining the culture's environment within the bioreactor. Some variables considered in regards to the regulation of the environment are: heat from the agitation system, surrounding temperature, and metabolic heat. In this case, the silicone heating pads will contribute to regulating the overall temperature of the system.

4. Rectangular air stone

This will provide oxygen to cultures through bubbles. It is useful for aierating and circulating the water throughout the system. Additionally, the air stone is very cost efficient.

5. Air Pump

Airlift bioreactors are tower reactors for large-scale aerobic cultures where the mixing of the culture broth is done by the inserted gas via an airlift pump. This pump injects compressed air at the bottom of the discharge pipe, which is immersed in the liquid.

6. Teflon Tubing

Teflon is the most flexible type of tubing. It has low friction and lubricity and liquids can flow through it easily. The tubing is heat resistant, chemical resistant, and non flammable. Lastly, it prevents residue, all of which reasons as to why it is efficient to use in our model.

7. pH sensor for arduino

Having a pH sensor is common for bioreactor models. These sensors maintain the pH levels within your bioreactor by measuring the activity of the hydrogen ions in the solution. This is necessary, because if pH levels become too high, the liquids become alkaline and can ruin the equipment/kill

less pathogens.

8. Mylar Tape

Mylar Tape is a polyester film that comes from polyethylene terephthalate. This tape is useful for chemical/dimensional stability, electrical insulation, refectivity, transparaceny/reflectivity, and strength. This tape is less pervious to gases. (https://www.sorbentsystems.com/mylarinfo.html)

9. Motor Controller

The Motor Controller provides power to the motors via the motor cables, and it is very important that the Motor Controller always is turned off and is unplugged from the power source when any cables are connected or disconnected from the motors. Turning the switch off is not enough. The Motor Controller is the hub of the agitation system. It interprets the speed signal sent from the Detection Unit (of the AMPTS II, Biogas Endeavour or BRS) and controls the direction of the motors. All the mixers receive the same information from the Motor Controller.

10. Turbidity Sensor

Turbidity probes with highly accurate measurement for applications such as cell culture turbidity monitoring, pharmaceutical crystallization control, and industrial separation of liquids and solids are necessary to achieve your desired results. The METTLER TOLEDO optical fiber turbidity probe uses backscattered-light technology, making it possible to achieve highly accurate process monitoring. These sensors offer a wide measuring range for high performance turbidity measurement in media with high-to-medium turbidity levels. These single-fiber and dual-fiber turbidity sensors meet your precise resolution requirements.

11. Peristaltic Pump

Peristaltic pumps are typically used to pump clean/sterile or aggressive fluids without exposing those fluids to contamination from exposed pump components.

12. Flow Sensor

Flow sensors are devices used for measuring the flow rate or quantity of a moving liquid or gas (22). New materials have been introduced into flow sensors to improve their performance.

13. Arduino Mega

The Arduino Mega is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

14. LCD Screen

Stands for "Liquid Crystal Display." LCD is a flat panel display technology commonly used in TVs and computer monitors. It is also used in screens for mobile devices, such as laptops, tablets, and smartphones.

15. Ethernet Shield w/micro SD

The Ethernet Shield w/micro SD is a synonym of an Arduino Shield. This part of the bioreactor is necessary, as it allows the Arduino Mega to connect to the internet and find/keep files on the micro SD card. More specifically, the shield connects to the internet to Arduino with ITS Ethernet Library. This library shapes the shield with sketches to connect to the internet.

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