Chemical Test Tube Mixer

User module

- ## Brief Introduction

The **chemical test tube mixer** is a laboratory device designed to automate the mixing of chemical substances in test tubes. Powered by a **12V/1-2A power supply**, the mixer allows users to select different mixing types and adjust the speed of the mixing process. It features **three distinct mixing modes**, each selected through individual push buttons.

The device includes a **speed control knob** that lets users fine-tune the mixing speed, ensuring flexibility for various applications. A **16x2 LCD display** provides real-time feedback, showing the selected mixing type and speed. Additionally, an **adjustable test tube holder** ensures that test tubes are securely positioned before mixing begins.

The system is controlled by an **ATmega328P microcontroller**, making the operation of the mixer efficient and user-friendly, with clear guidance on the display at every stage. This device is ideal for laboratory settings, where precise and consistent mixing of test tube contents is crucial.

Note: Always follow the safety guidelines when operating the Chemical Test Tube Mixer to ensure a safe and effective experience.

1. Power Button

- **Functionality**: A **single power button** allows the user to turn the device ON or OFF.
- **Power Supply**: The user connects a **12V/1-2A power supply**, which powers the entire system. Ensure proper voltage regulation for the ATmega328P and other components.

2. Mixing Type Selection (Three Push Buttons)

- **Mixing Types**:

- **Type 1**: 30 Degree

- **Type 2**: 180 Degree
- **Type 3**: 360 Degree

- **Button Layout**: Three push buttons are provided, each corresponding to one mixing type. When a button is pressed, the respective mixing type should be displayed on the **16x2 LCD** and selected in the system.

3. Speed Control

- **Speed Adjuster**: A **rotary knob** (or potentiometer) is used to control the speed of the mixing. The user can fine-tune the speed after selecting the mixing type.
- **Speed Display on LCD**: The **speed value** should be shown on the **16x2 LCD** along with the selected mixing type.

4. Operation Flow

- **Step 1**: **Power ON the Device**.

  On power up.

- **Step 2**: **Select Mixing Type**.

  a. The user presses one of the three buttons to select a mixing type.
  b. Display mixing Type on LCD

- **Step 3**: **Adjust Speed**.
  a. The user adjusts the mixing speed using the speed controller (rotary knob)
  b. Display speed on LCD
- **Step 4**: **Start Mixing**.
  a. Once everything is set the mixing begins at the selected speed and type
- **Step 5**: **Mixing Complete**.
  a. After the mixing is complete user can stop mixing press again push button

5. Power Supply Requirements

- **12V/1-2A Power Supply**: Ensure the power supply is adequate for driving the motor and controlling the microcontroller. Include a **voltage regulator (7805)** to provide 5V to the ATmega328P and other low-power components.

6. Safety Guidelines

- **Chemical Handling**: Always wear appropriate safety gear such as gloves and goggles when handling chemicals.
- **Device Environment**: Ensure the device is operated in a well-ventilated space, free from hazardous chemicals or vapors.
- **Test Tube Placement**: Make sure the test tubes are securely positioned in the holder before mixing to avoid spills or accidents.
- **Power Supply Precaution**: Use only the recommended 12V/1-2A power supply. Do not expose the device to water or moisture.

7. Maintenance Instructions

- **Cleaning**: Always turn off the device before cleaning. Use a soft, damp cloth to clean the external parts. Avoid getting moisture inside the device.
- **Regular Inspection**: Check the motor and rotary knob regularly for proper functioning.
- **Test Tube Holder Care**: Ensure that the test tube holder is free of debris or residual chemicals before use.
- **Component Wear**: Over time, components like buttons or the rotary knob might wear out. Contact support for replacement options.

8. Hardware Implementation

ATmega328P: The microcontroller that handles input from the buttons, speed controller, and test tube holder status.

16x2 LCD: Interface with the LCD to display current status and user inputs.

Buttons: Three push buttons for selecting the mixing type.

Rotary Knob (Speed Controller): Use a potentiometer encoder for speed control.

Motor Driver: Control the motor for mixing based on the selected speed and mixing type.

Power Supply: Regulate the 12V/1-2A power supply for powering the motor and ATmega328P.

9. Warranty and Support

- **Warranty**: The device is covered by a 1-year manufacturer warranty. This includes coverage for malfunctions related to the motor, buttons, and microcontroller.
- **Customer Support**: For any issues, contact our support team at [iwanthiabeysinghe@gmail.com]. Be sure to include your device's serial number and a description of the problem.