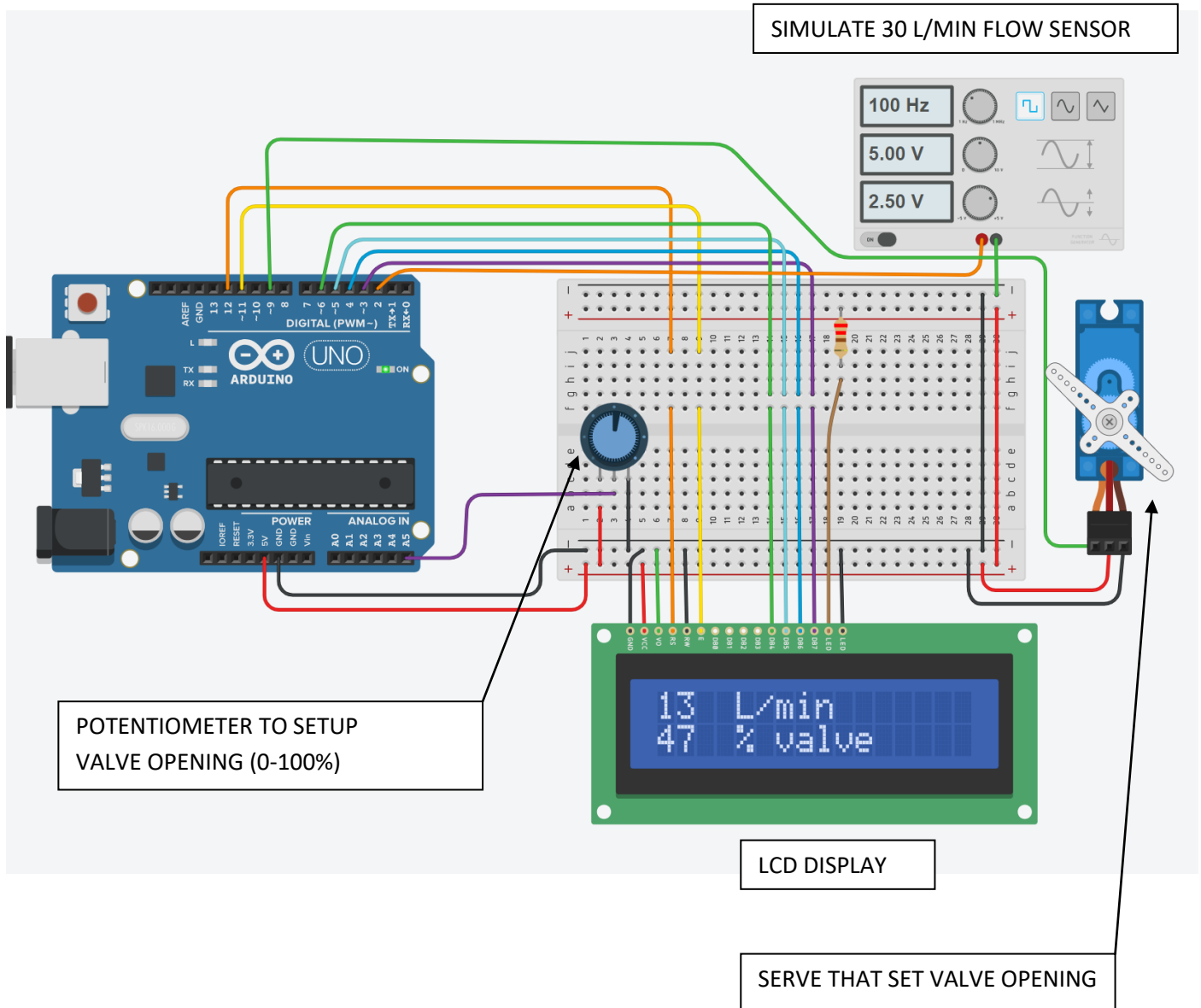


ARDUINO SERVO VALVE FLOW CONTROL



The flow rate passing through the valve is shown on the LCD display.

Acting on the potentiometer it is possible to adjust the valve opening percentage from 0 to 100% and consequently the flow rate is adjusted.

The regulation takes place at the expense of the fluid energy lost due to the increase in localized pressure drops (K_v) which increase with the decrease in the passage area in the valve.

This regulation technique should be avoided if it is possible to act directly on the duct supply system (e.g. pump) in order to avoid pressure drops.

CODE

```
// include libraries:
#include <LiquidCrystal.h>
#include <Servo.h>

// initialize the library with the numbers of the interface pins
LiquidCrystal lcd(12, 11, 6, 5, 4, 3);

// VALVE
int ADC_value;
int manual_opening;
int remote_opening;

// FLOW SENSOR
int flow_frequency; // Measures flow sensor pulses
int l_hour; // Calculated litres/hour
char flowsensor = 2; // Sensor Input
long currentTime;
long cloopTime;

// SERVO
#define pinservo 9 // Servo Pin
int myservo_angle = 0;
Servo myservo;

// Interrupt function
void flow ()
{
    flow_frequency++;
}

void setup() {
    pinMode(flowsensor, INPUT);
    pinMode(A5, INPUT);
    pinMode(9, OUTPUT);

    Serial.begin(9600);

    digitalWrite(flowsensor, HIGH); // Optional Internal Pull-Up
    attachInterrupt(0, flow, RISING); // Setup Interrupt
    sei(); // Enable interrupts
    currentTime = millis();
    cloopTime = currentTime;

    myservo.attach(pinservo);

    // set up the LCD's number of columns and rows:
    lcd.begin(16, 2);
    lcd.print("READY");
}

void loop() {

    currentTime = millis();
```

```

// Every second, calculate and print litres/hour
if(currentTime >= (cloopTime + 1000))
{
  cloopTime = currentTime; // Updates cloopTime
  Serial.println(flow_frequency);

  // Pulse frequency (Hz) = 7.5Q, Q is flow rate in L/s.
  l_hour = (flow_frequency / 7.5);
  Serial.print(l_hour); // Print litres/hour
  Serial.println("L/min");
  flow_frequency = 0; // Reset Counter

  // Setup valve opening from potentiometer
  ADC_value= analogRead(A5);
  manual_opening = map(ADC_value, 0, 1023, 0, 100);
  Serial.println(manual_opening);
  myservo.write(manual_opening);

  lcd.clear();
  // set the cursor to column 0, line 1
  lcd.setCursor(0, 0); lcd.print(l_hour);
  lcd.setCursor(4, 0); lcd.print("L/min");

  lcd.setCursor(0, 1); lcd.print(manual_opening);
  lcd.setCursor(4, 1); lcd.print("% valve");
}
}

```