5 VDC STEPPER MOTOR WITH ULN2003 DRIVER BOARD

USER MANUAL

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1. Introduction

To all residents of the European Union
Important environmental information about this product

This symbol on the device or the package indicates that disposal of the device after its lifecycle could harm the environment. Do not dispose of the unit (or batteries) as unsorted municipal waste; it should be taken to a specialized company for recycling. This device should be returned to your distributor or to a local recycling service. Respect the local environmental rules.

If in doubt, contact your local waste disposal authorities.

Thank you for choosing Velleman®! Please read the manual thoroughly before bringing this device into service. If the device was damaged in transit, do not install or use it and contact your dealer.

2. Safety Instructions

⚠	• This device can be used by children aged from 8 years and above, and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning the use of the device in a safe way and understand the hazards involved. Children shall not play with the device. Cleaning and user maintenance shall not be made by children without supervision.

🏠	• Indoor use only. Keep away from rain, moisture, splashing and dripping liquids.

3. General Guidelines

ⓘ	• Refer to the Velleman® Service and Quality Warranty on the last pages of this manual. • Familiarise yourself with the functions of the device before actually using it. • All modifications of the device are forbidden for safety reasons. Damage caused by user modifications to the device is not covered by the warranty. • Only use the device for its intended purpose. Using the device in an unauthorised way will void the warranty. • Damage caused by disregard of certain guidelines in this manual is not covered by the warranty and the dealer will not accept responsibility for any ensuing defects or problems. • Nor Velleman nv nor its dealers can be held responsible for any damage (extraordinary, incidental or indirect) – of any nature (financial, physical…) arising from the possession, use or failure of this product. • Due to constant product improvements, the actual product appearance might differ from the shown images. • Product images are for illustrative purposes only. • Do not switch the device on immediately after it has been exposed to changes in temperature. Protect the device against damage by leaving it switched off until it has reached room temperature. • Keep this manual for future reference.

4. What is Arduino®

Arduino® is an open-source prototyping platform based in easy-to-use hardware and software. Arduino® boards are able to read inputs – light-on sensor, a finger on a button or a Twitter message – and turn it into an output – activating of a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so, you use the Arduino programming language (based on Wiring) and the Arduino® software IDE (based on Processing).

Surf to www.arduino.cc and www.arduino.org for more information.

5.   Overview

VMA401

A small and versatile motor and driver set. This 5 VDC stepper motor controlled by the ULN2003 driver can be used with any Arduino® or compatible boards via jumper leads. A four-phase LED indicates the status of the stepper motor.

> rated voltage: 5-12 VDC
> steps/revolution: 64
> stride angle: 5.625°/64
> frequency: 100 Hz
> DC resistance: 50 Ω ± 7 % (25 °C)
> idle in-traction frequency: > 600 Hz
> idle out-traction frequency: > 1000 Hz
> in-traction torque: > 34.3 mN.m (120 Hz)
> self-positioning torque: > 34.3 mN.m
> friction torque: 600-1200 gf.cm
> pull-in torque: 300 gf.cm
> insulation grade: A
> controller: ULN2003
> motor diameter: 28 mm
> reduction ratio: 1:64
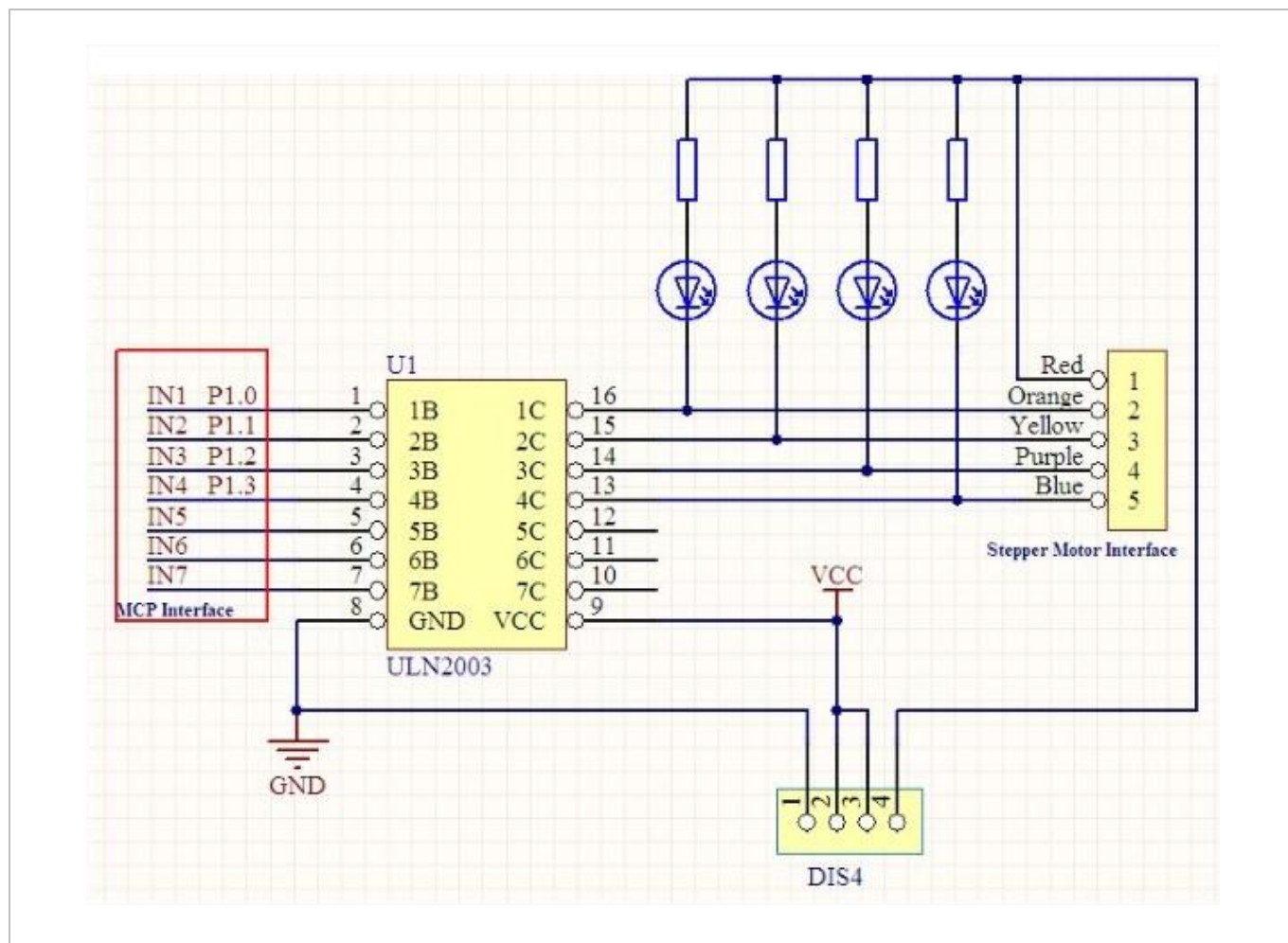> number of phases: 4
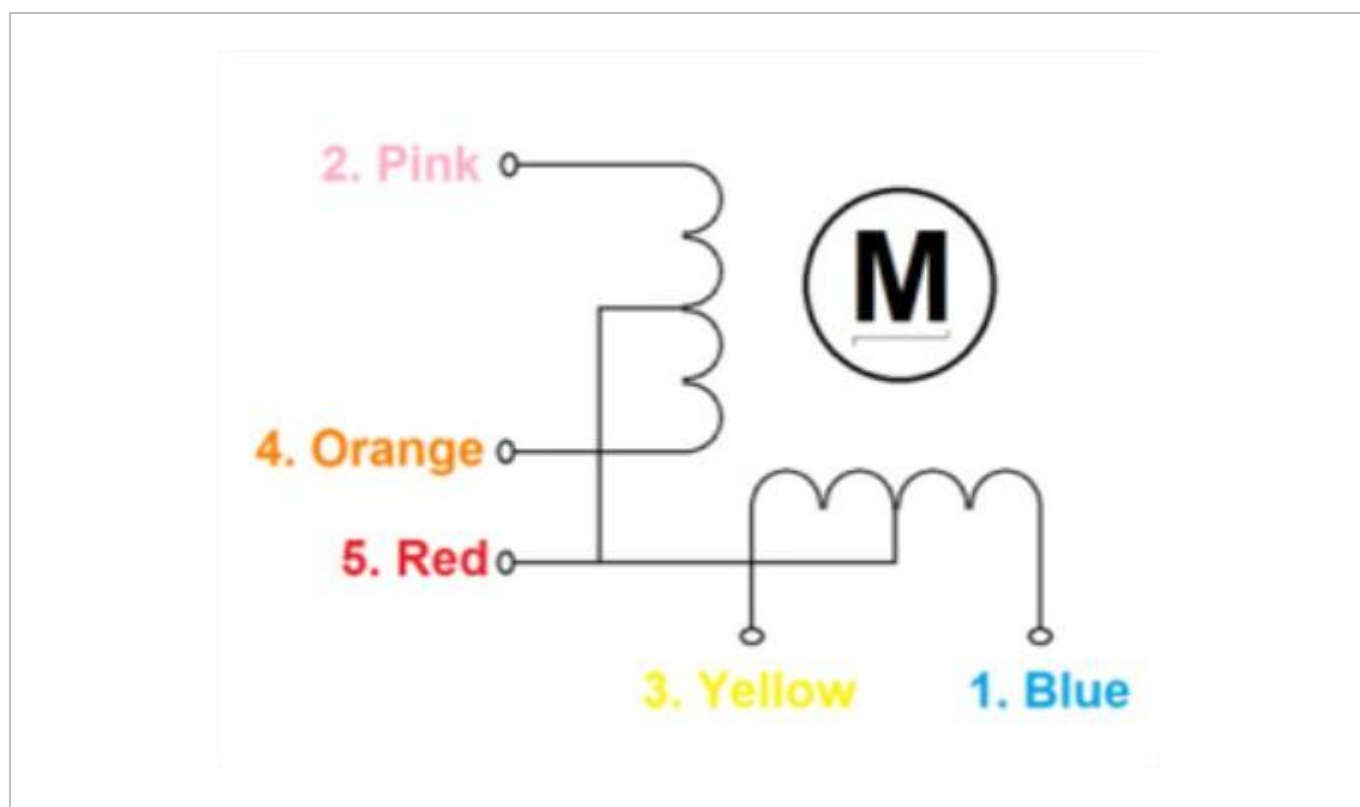> dimensions: 35 x 32 x 10 mm

6.   Connection
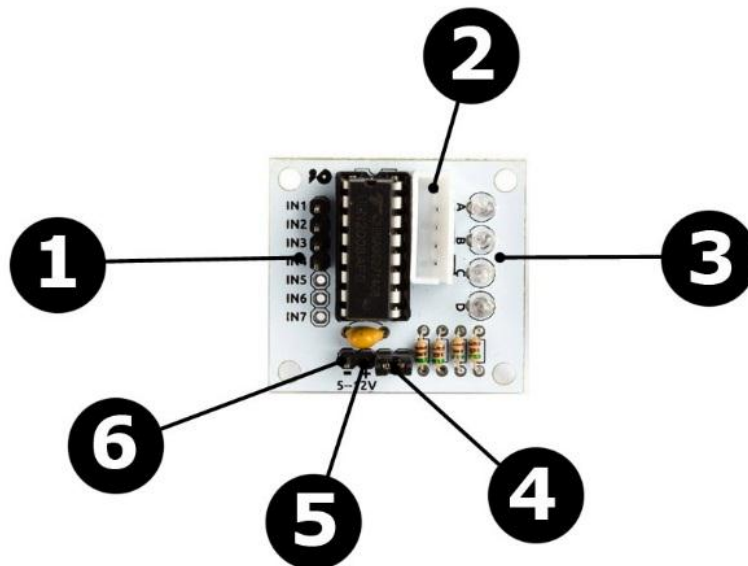
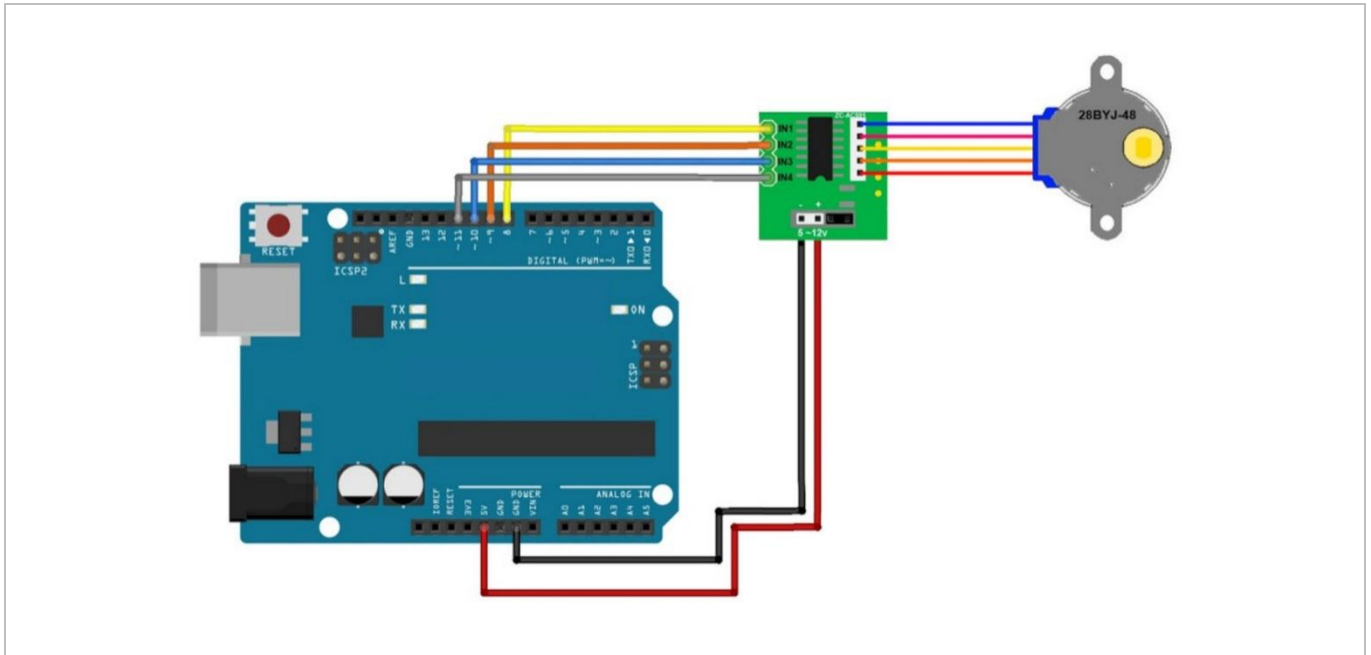| 1	microcontroller I/O port connection	4	positive power supply
2	stepper motor interface	5	+5 V
3	4-phase work indicator	6	ground

7.   Driver Board

8.   Stepper Motor Connection

9.   Example

Example of connecting the VMA401 to the VMA100. An additional power supply is advised to power the motor.


```
// This Arduino example demonstrates bidirectional operation of a
// 28BYJ-48, using a VMA401 - ULN2003 interface board to drive the stepper.
// The 28BYJ-48 motor is a 4-phase, 8-beat motor, geared down by
// a factor of 68. One bipolar winding is on motor pins 1 & 3 and
// the other on motor pins 2 & 4. The step angle is 5.625/64 and the
// operating Frequency is 100pps. Current draw is 92mA.
/////////////////////////////////////////////
//declare variables for the motor pins
int motorPin1 = 8;    // Blue   - 28BYJ48 pin 1
int motorPin2 = 9;    // Pink   - 28BYJ48 pin 2
int motorPin3 = 10;    // Yellow - 28BYJ48 pin 3
int motorPin4 = 11;    // Orange - 28BYJ48 pin 4
                           // Red    - 28BYJ48 pin 5 (VCC)
int motorSpeed = 1200;  //variable to set stepper speed
int count = 0;          // count of steps made

int countsperrev = 512; // number of steps per full revolution
int lookup[8] = {B01000, B01100, B00100, B00110, B00010, B00011, B00001, B01001};
//////////////////////////////////////////////////////////////////////////////
void setup() {
//declare the motor pins as outputs
  pinMode(motorPin1, OUTPUT);
  pinMode(motorPin2, OUTPUT);
  pinMode(motorPin3, OUTPUT);
  pinMode(motorPin4, OUTPUT);
  Serial.begin(9600);
}
//////////////////////////////////////////////////////////////////////////////
void loop(){
  if(count < countsperrev )
    clockwise();
  else if (count == countsperrev * 2)
    count = 0;
  else
    anticlockwise();
```

```
  count++;
}
//////////////////////////////////////////////////////////////////////
//set pins to ULN2003 high in sequence from 1 to 4
//delay "motorSpeed" between each pin setting (to determine speed)
void anticlockwise()
{
  for(int i = 0; i < 8; i++)
  {
    setOutput(i);
    delayMicroseconds(motorSpeed);
  }
}

void clockwise()
{
  for(int i = 7; i >= 0; i--)
  {
    setOutput(i);
    delayMicroseconds(motorSpeed);
  }
}

void setOutput(int out)
{
  digitalWrite(motorPin1, bitRead(lookup[out], 0));
  digitalWrite(motorPin2, bitRead(lookup[out], 1));
  digitalWrite(motorPin3, bitRead(lookup[out], 2));
  digitalWrite(motorPin4, bitRead(lookup[out], 3));
}
```