

# velleman<sup>®</sup>

## VMA437

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1.3 INCH OLED SCREEN FOR ARDUINO<sup>®</sup> (SH1106 DRIVER, SPI)



USER MANUAL



# USER MANUAL

## 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](http://www.arduino.cc) and [www.arduino.org](http://www.arduino.org) for more information.

## 5. Overview

### VMA437

OLED displays are great in many ways. They use very little power, are bright, easy to read with a large viewing angle and have high resolution considering their small size.

resolution: 128 x 64 dots  
 viewing angle: > 160°  
 working voltage: 3 to 5 V  
 recommended library: U8glib  
 interface: SPI  
 driver: SSH1106  
 working temperature: -30 °C to 70 °C  
 OLED colour: blue  
 dimensions: 35 x 33.5 mm

## 6. Pin Layout

VDD	2.8-5.5 V power supply
SCK	CLK clock
SDA	MOSI data
RES	reset
DC	data/command
CS	chip-select signal
GND	ground

## 7. Example

Connect the VMA437 to your Arduino® Uno-compatible board (VMA100) this way:

```

Connection.
Vcc=====5V
Gnd=====Gnd
D0 (SCL)=====D4
RES=====Reset
D1 (SCK)=====D5
CS=====D6
DC=====D7

```

Go to the product page on [www.velleman.eu](http://www.velleman.eu) and download the U8glib.zip file.

Start the Arduino® IDE and import this library: Sketch → Include Library → Add Zip library.

Once finished, go back to Sketch → Include Library → Manage library's, and scroll down until you find the U8glib library. Select this library and tap "Update". Now you have the latest version with examples.

Go to Files → Examples and scroll down to U8glib. Open the example Graphicstest.

In the sketch "Graphicstest", several types of displays can be selected. Just "un-comment" the one you need. For the VMA437 you have to un-comment:

```

U8GLIB_SH1106_128X64 u8g(4, 5, 6, 7); // SW SPI Com: SCK = 4, MOSI = 5, CS = 6, A0 = 7 (new blue HalTec OLED).

```

Compile and upload the sketch to your VMA100 and enjoy!

The "Graphicstest" sketch with only the correct driver line for VMA437 looks like this:

```

/*

GraphicsTest.pde

>>> Before compiling: Please remove comment from the constructor of the
>>> connected graphics display (see below).

Universal 8bit Graphics Library, https://github.com/olikraus/u8glib/

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CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT,
STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE)
ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF
ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

*/

#include "U8glib.h"

// setup u8g object, please remove comment from one of the following constructor calls
// IMPORTANT NOTE: The following list is incomplete. The complete list of supported
// devices with all constructor calls is here: https://github.com/olikraus/u8glib/wiki/device

U8GLIB_SSD1306_128X64 u8g(U8G_I2C_OPT_NO_ACK); // Display which does not send AC VMA437 -
Velleman , UN-comment this line as it is now

```

```
void u8g_prepare(void) {
    u8g.setFont(u8g_font_6x10);
    u8g.setFontRefHeightExtendedText();
    u8g.setDefaultForegroundColor();
    u8g.setFontPosTop();
}

void u8g_box_frame(uint8_t a) {
    u8g.drawStr( 0, 0, "drawBox");
    u8g.drawBox(5,10,20,10);
    u8g.drawBox(10+a,15,30,7);
    u8g.drawStr( 0, 30, "drawFrame");
    u8g.drawFrame(5,10+30,20,10);
    u8g.drawFrame(10+a,15+30,30,7);
}

void u8g_disc_circle(uint8_t a) {
    u8g.drawStr( 0, 0, "drawDisc");
    u8g.drawDisc(10,18,9);
    u8g.drawDisc(24+a,16,7);
    u8g.drawStr( 0, 30, "drawCircle");
    u8g.drawCircle(10,18+30,9);
    u8g.drawCircle(24+a,16+30,7);
}

void u8g_r_frame(uint8_t a) {
    u8g.drawStr( 0, 0, "drawRFrame/Box");
    u8g.drawRFrame(5, 10,40,30, a+1);
    u8g.drawRBox(50, 10,25,40, a+1);
}

void u8g_string(uint8_t a) {
    u8g.drawStr(30+a,31, " 0");
    u8g.drawStr90(30,31+a, " 90");
    u8g.drawStr180(30-a,31, " 180");
    u8g.drawStr270(30,31-a, " 270");
}

void u8g_line(uint8_t a) {
    u8g.drawStr( 0, 0, "drawLine");
    u8g.drawLine(7+a, 10, 40, 55);
    u8g.drawLine(7+a*2, 10, 60, 55);
    u8g.drawLine(7+a*3, 10, 80, 55);
    u8g.drawLine(7+a*4, 10, 100, 55);
}

void u8g_triangle(uint8_t a) {
    uint16_t offset = a;
    u8g.drawStr( 0, 0, "drawTriangle");
    u8g.drawTriangle(14,7, 45,30, 10,40);
    u8g.drawTriangle(14+offset,7-offset, 45+offset,30-offset, 57+offset,10-offset);
    u8g.drawTriangle(57+offset*2,10, 45+offset*2,30, 86+offset*2,53);
    u8g.drawTriangle(10+offset,40+offset, 45+offset,30+offset, 86+offset,53+offset);
}
```

```

void u8g_ascii_1() {
    char s[2] = " ";
    uint8_t x, y;
    u8g.drawStr( 0, 0, "ASCII page 1");
    for( y = 0; y < 6; y++ ) {
        for( x = 0; x < 16; x++ ) {
            s[0] = y*16 + x + 32;
            u8g.drawStr(x*7, y*10+10, s);
        }
    }
}

void u8g_ascii_2() {
    char s[2] = " ";
    uint8_t x, y;
    u8g.drawStr( 0, 0, "ASCII page 2");
    for( y = 0; y < 6; y++ ) {
        for( x = 0; x < 16; x++ ) {
            s[0] = y*16 + x + 160;
            u8g.drawStr(x*7, y*10+10, s);
        }
    }
}

void u8g_extra_page(uint8_t a)
{
    if ( u8g.getMode() == U8G_MODE_HICOLOR || u8g.getMode() == U8G_MODE_R3G3B2 ) {
        /* draw background (area is 128x128) */
        u8g_uint_t r, g, b;
        b = a << 5;
        for( g = 0; g < 64; g++ )
        {
            for( r = 0; r < 64; r++ )
            {
                u8g.setRGB(r<<2, g<<2, b );
                u8g.drawPixel(g, r);
            }
        }
        u8g.setRGB(255,255,255);
        u8g.drawStr( 66, 0, "Color Page");
    }
    else if ( u8g.getMode() == U8G_MODE_GRAY2BIT )
    {
        u8g.drawStr( 66, 0, "Gray Level");
        u8g.setColorIndex(1);
        u8g.drawBox(0, 4, 64, 32);
        u8g.drawBox(70, 20, 4, 12);
        u8g.setColorIndex(2);
        u8g.drawBox(0+1*a, 4+1*a, 64-2*a, 32-2*a);
        u8g.drawBox(74, 20, 4, 12);
        u8g.setColorIndex(3);
        u8g.drawBox(0+2*a, 4+2*a, 64-4*a, 32-4*a);
        u8g.drawBox(78, 20, 4, 12);
    }
}

```

```

else
{
  u8g.drawStr( 0, 12, "setScale2x2");
  u8g.setScale2x2();
  u8g.drawStr( 0, 6+a, "setScale2x2");
  u8g.undoScale();
}
}

uint8_t draw_state = 0;

void draw(void) {
  u8g_prepare();
  switch(draw_state >> 3) {
    case 0: u8g_box_frame(draw_state&7); break;
    case 1: u8g_disc_circle(draw_state&7); break;
    case 2: u8g_r_frame(draw_state&7); break;
    case 3: u8g_string(draw_state&7); break;
    case 4: u8g_line(draw_state&7); break;
    case 5: u8g_triangle(draw_state&7); break;
    case 6: u8g_ascii_1(); break;
    case 7: u8g_ascii_2(); break;
    case 8: u8g_extra_page(draw_state&7); break;
  }
}

void setup(void) {

  // flip screen, if required
  //u8g.setRot180();

#ifdef ARDUINO
  pinMode(13, OUTPUT);
  digitalWrite(13, HIGH);
#endif
}

void loop(void) {
  // picture loop
  u8g.firstPage();
  do {
    draw();
  } while( u8g.nextPage() );

  // increase the state
  draw_state++;
  if ( draw_state >= 9*8 )
    draw_state = 0;

  // rebuild the picture after some delay
  //delay(150);

}

```

## 8. More Information

Please refer to the VMA437 product page on [www.velleman.eu](http://www.velleman.eu) for more information.

**Use this device with original accessories only. Velleman nv cannot be held responsible in the event of damage or injury resulting from (incorrect) use of this device. For more info concerning this product and the latest version of this manual, please visit our website [www.velleman.eu](http://www.velleman.eu). The information in this manual is subject to change without prior notice.**

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# Velleman® Service and Quality Warranty

Since its foundation in 1972, Velleman® acquired extensive experience in the electronics world and currently distributes its products in over 85 countries.

All our products fulfil strict quality requirements and legal stipulations in the EU. In order to ensure the quality, our products regularly go through an extra quality check, both by an internal quality department and by specialized external organisations. If, all precautionary measures notwithstanding, problems should occur, please make appeal to our warranty (see guarantee conditions).

## General Warranty Conditions Concerning Consumer Products (for EU):

- All consumer products are subject to a 24-month warranty on production flaws and defective material as from the original date of purchase.
- Velleman® can decide to replace an article with an equivalent article, or to refund the retail value totally or partially when the complaint is valid and a free repair or replacement of the article is impossible, or if the expenses are out of proportion.

You will be delivered a replacing article or a refund at the value of 100% of the purchase price in case of a flaw occurred in the first year after the date of purchase and delivery, or a replacing article at 50% of the purchase price or a refund at the value of 50% of the retail value in case of a flaw occurred in the second year after the date of purchase and delivery.

### • Not covered by warranty:

- all direct or indirect damage caused after delivery to the article (e.g. by oxidation, shocks, falls, dust, dirt, humidity...), and by the article, as well as its contents (e.g. data loss), compensation for loss of profits;
- consumable goods, parts or accessories that are subject to an aging process during normal use, such as batteries (rechargeable, non-rechargeable, built-in or replaceable), lamps, rubber parts, drive belts... (unlimited list);
- flaws resulting from fire, water damage, lightning, accident, natural disaster, etc....;
- flaws caused deliberately, negligently or resulting from improper handling, negligent maintenance, abusive use or use contrary to the manufacturer's instructions;
- damage caused by a commercial, professional or collective use of the article (the warranty validity will be reduced to six (6) months when the article is used professionally);
- damage resulting from an inappropriate packing and shipping of the article;
- all damage caused by modification, repair or alteration performed by a third party without written permission by Velleman®.
- Articles to be repaired must be delivered to your Velleman® dealer, solidly packed (preferably in the original packaging), and be completed with the original receipt of purchase and a clear flaw description.
- Hint: In order to save on cost and time, please reread the manual and check if the flaw is caused by obvious causes prior to presenting the article for repair. Note that returning a non-defective article can also involve handling costs.
- Repairs occurring after warranty expiration are subject to shipping costs.
- The above conditions are without prejudice to all commercial warranties.

**The above enumeration is subject to modification according to the article (see article's manual).**