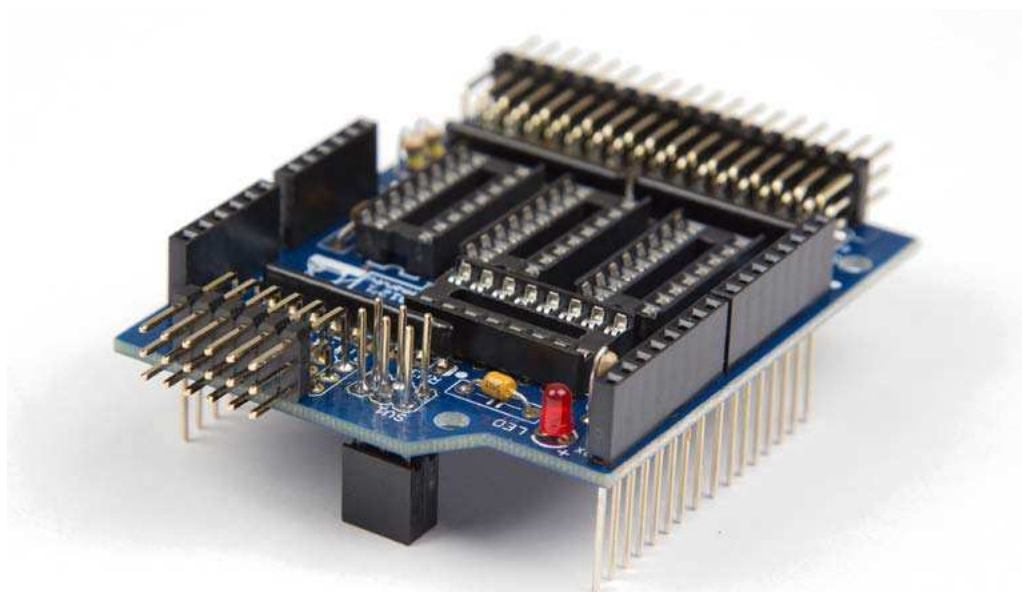**ASSEMBLY MANUAL**

OCTOBER 2016

ANALOG INPUT EXTENSION SHIELD FOR ARDUINO
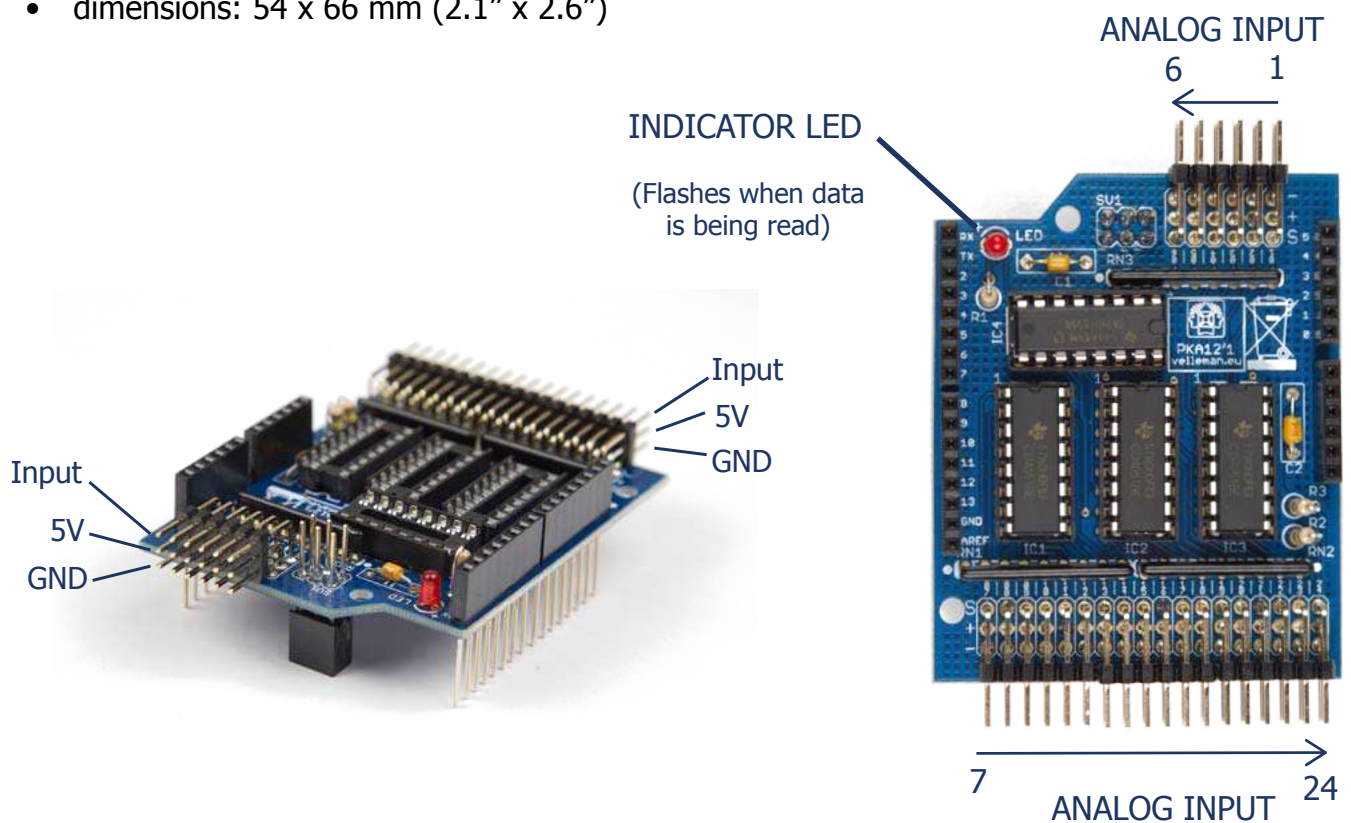
Introduction

The Arduino UNO™ is equipped with 6 analog inputs but some projects call for more. For example; sensor- or robot projects. The analog input extension shield only uses 4 I/O lines (3 digital, 1 analog) but adds a whopping 24 inputs, so in total you have 29 analog inputs at your disposal.

Features:

- 24 analog inputs
- only 4 I/O lines are used
- stackable design
- complete with library and examples
- works with Arduino UNO™ and compatible boards

Specifications:

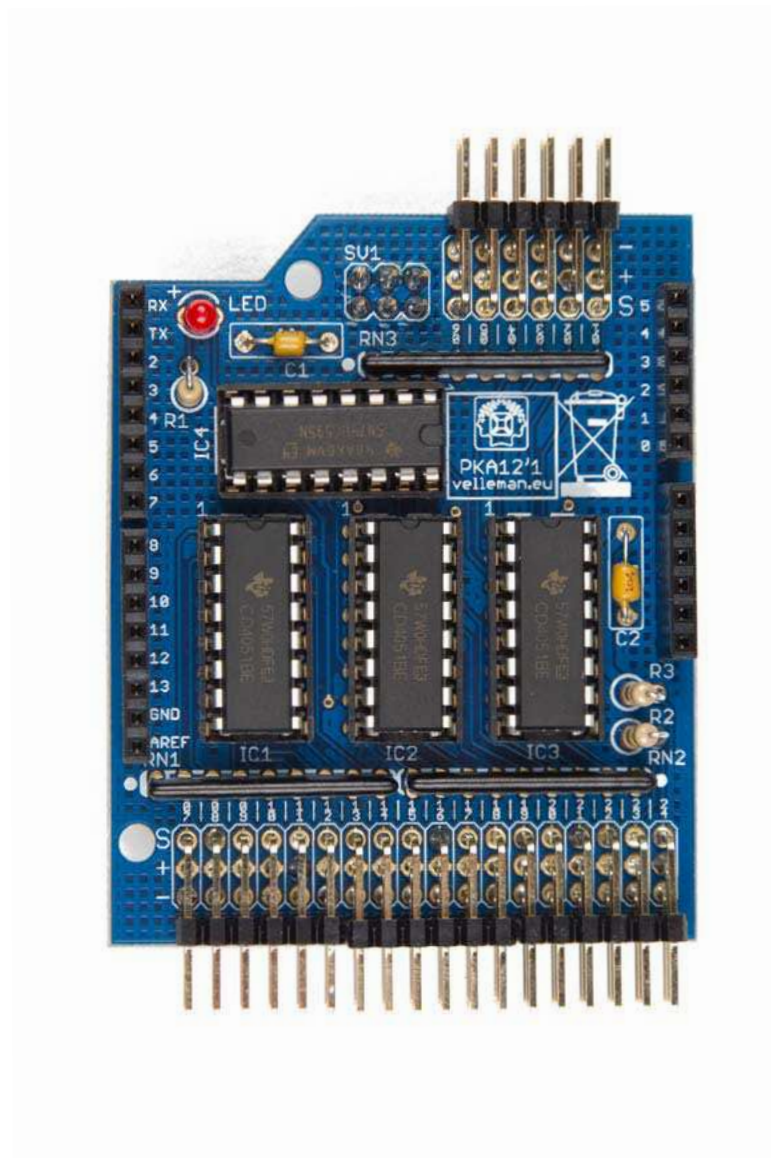- analog inputs: 0 - 5 VDC
- uses pins: 5, 6, 7 and A0 on Arduino UNO™ board
- dimensions: 54 x 66 mm (2.1" x 2.6")

ANALOG INPUT
6   1

INDICATOR LED

(Flashes when data
is being read)

Input
5V
GND

Input
5V
GND

7   24
ANALOG INPUT

In this manual, we will explain how to assemble the KA12 and how to install the included Arduino library with an example sketch.
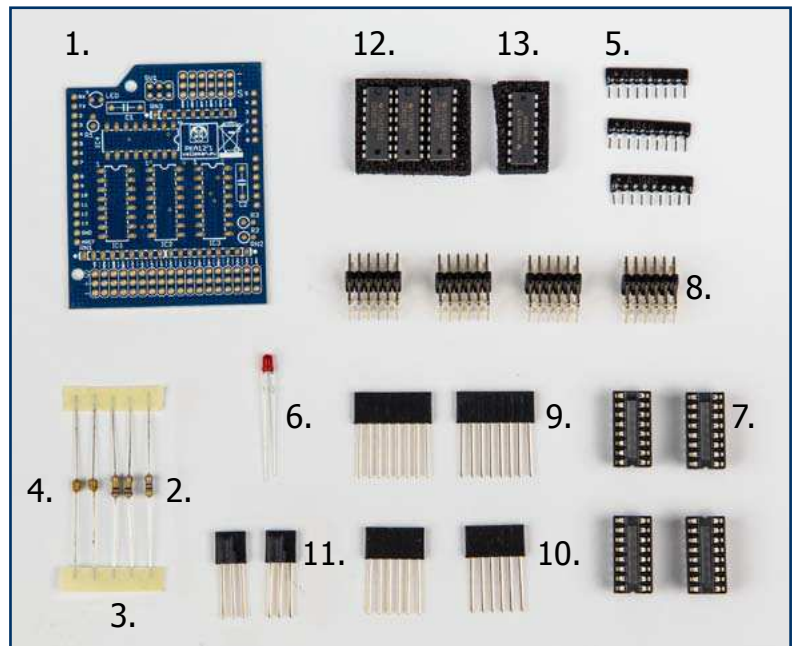
Table of contents

1. What's in the box

1. 1 X PCB
2. 1 X 470 Ohm resistor
   (yellow, purple, brown)
3. 2 X 100k Ohm resistor
   (brown, black, yellow)
4. 2 X ceramic multilayer capacitor
5. 3 X resistor array 100k
6. 1 X 3 mm red LED
7. 4 X IC holder (16 pins)
8. 4 X pinheader with 6x3 pins
9. 2 X 8 pin female header
10. 2 X 6 pin female header
11. 2 X 3 pin female header
12. 3 X IC - CD405BE
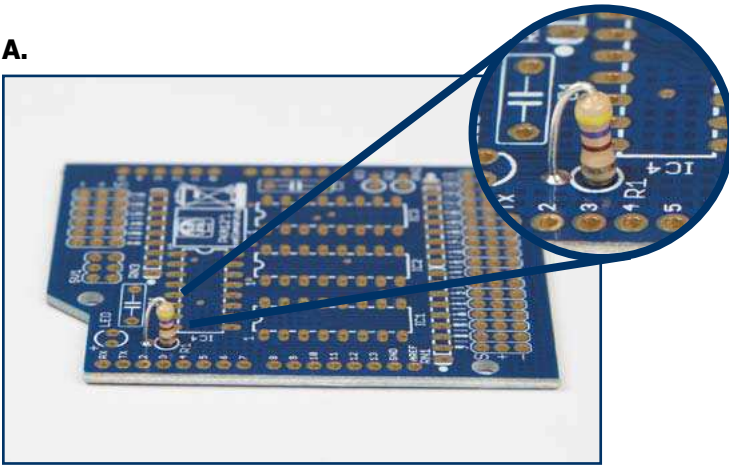13. 1 X IC - SN74HC595N

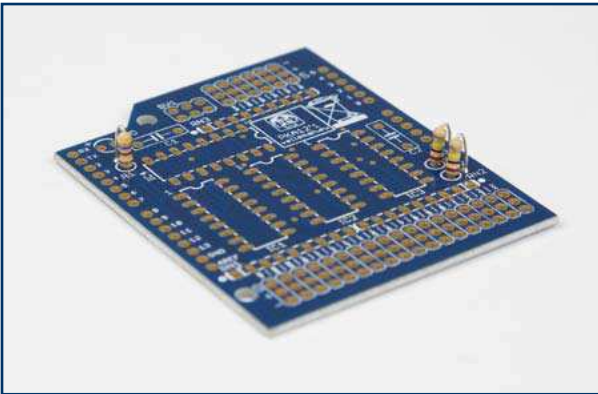

2. Building instructions
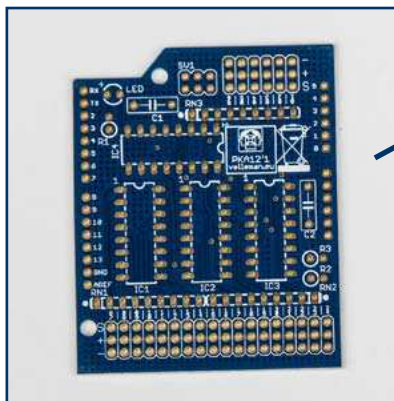
Component side
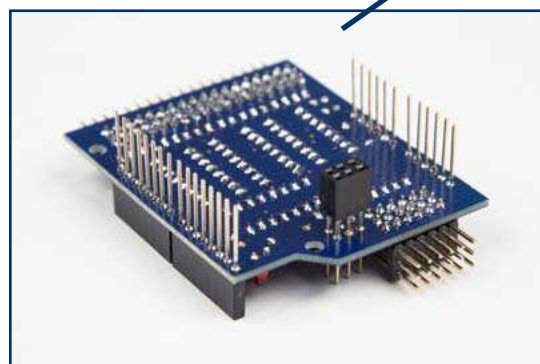
Solder side

A.

Position the **470 Ohm resistor** as shown in the picture and solder.

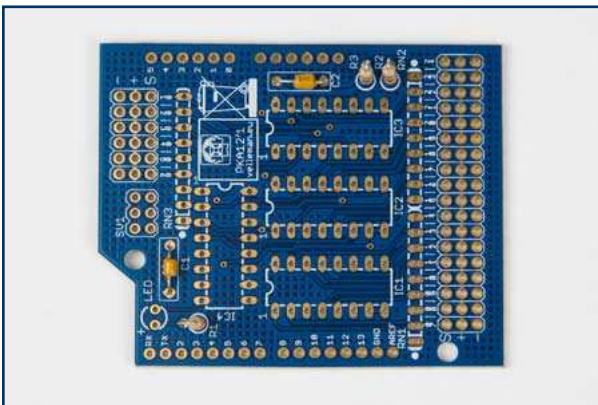**R1**: 470 Ohm (yellow, black, brown)

B.

Position the two **100k Ohm resistors** as shown in the picture and solder them.
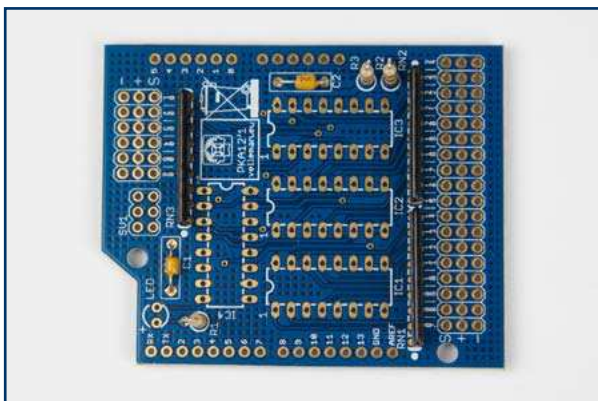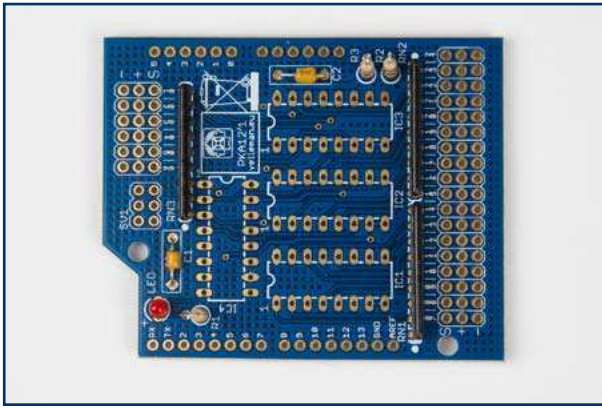
R2, R3: 100k Ohm (brown, black, yellow)

C.

C1, C2: carmic multilayered capacitors

D.

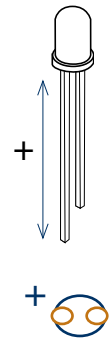**RN1, RN2, RN3**: resistor array 100k
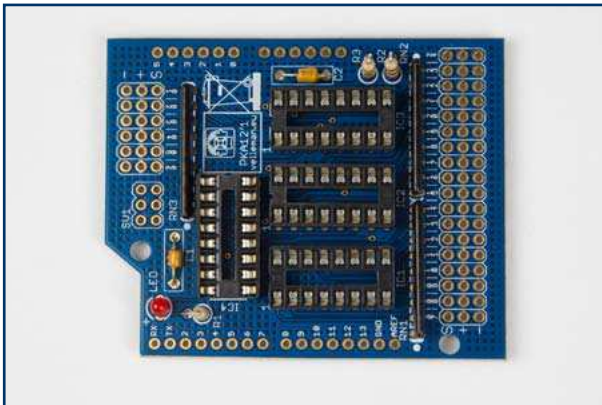
E.

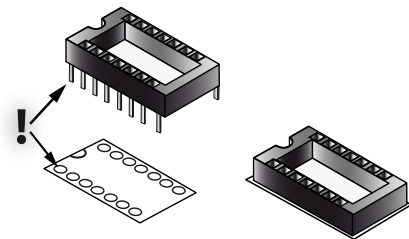**LED**: red LED

Mind the polarity!
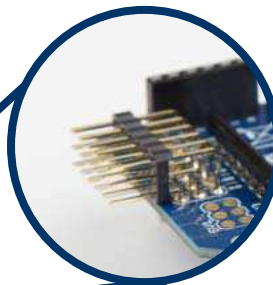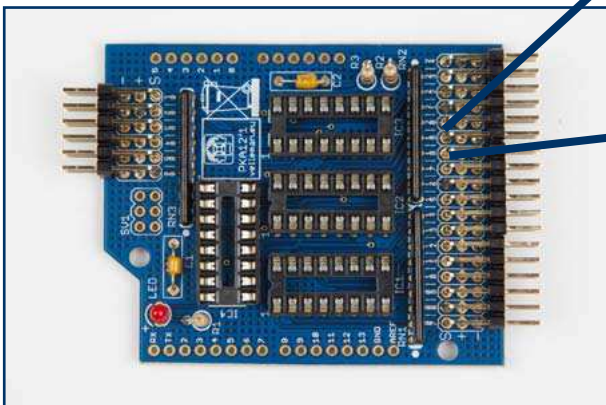

F.

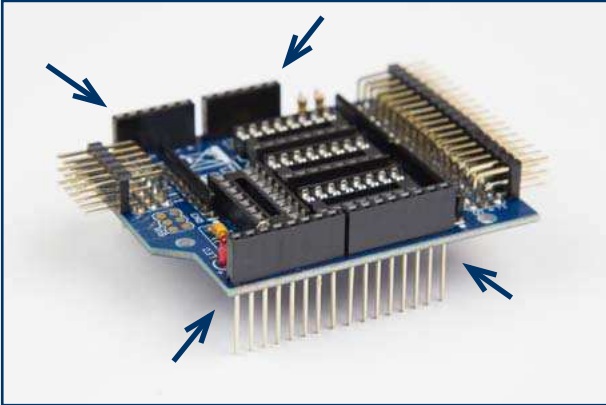**IC1, ..., IC4**: IC holders

Mind the direction of the notch!

G.

Solder all the 6x3 pinheader connectors.

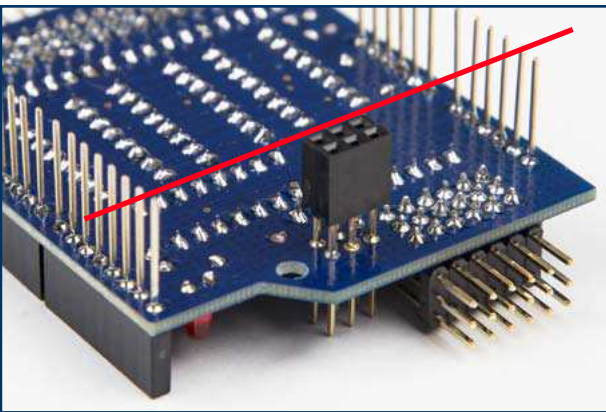**Make sure the bent pins are soldered!**

H.

Solder both the 6 pin female headers and the 8 pin female headers into place.
Do not cut the pins!

I.

SV1: two 3 pin female headers
Insert the pins on the solder side and solder on the component side!
Make sure the top of the headers are equally leveled and do not exceed the top of the other pins. This way, it will fit nicely onto your Arduino Uno.

Do not cut the pins!

J.
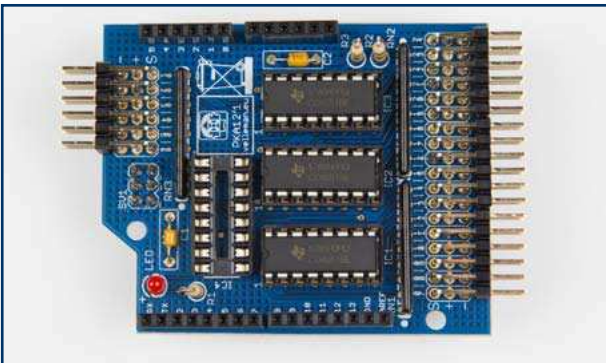
IC1, IC2, IC3: IC - CD405BE

Mind the direction of the notch! It should match the notch on the IC holder!

K.

IC4: IC - SN74HC595N

Mind the direction of the notch! It should match the notch on the IC holder!

3. Connecting the KA12

It is very important to insert the KA12 correctly onto the Arduino Uno to avoid damage to the pins and to ensure a good connection. Here are the most important attention points:
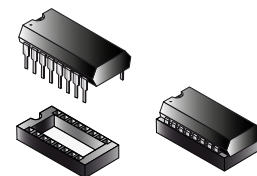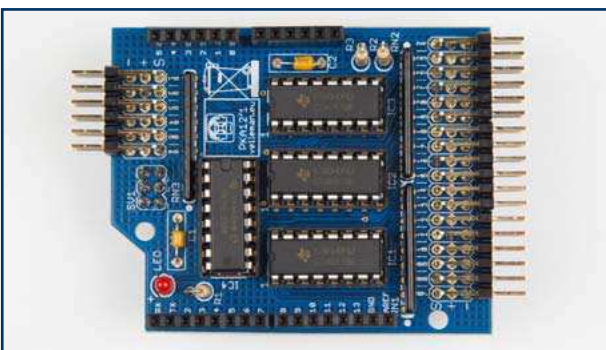
A. This 6 pin female header fits precisely into the 'ANALOG IN' on the Arduino.
B. The two 3 pin female headers slide over the 6 ICSP pins on the Arduino.
C. The numbers beside the 8 pin female headers on the KA12 should correspond with the Digital I/O's.
D. Slide the pins carefully into the Arduino to prevent damage.
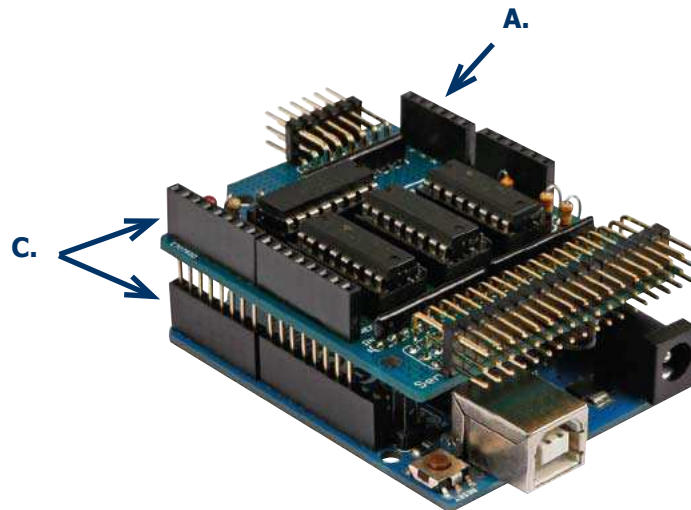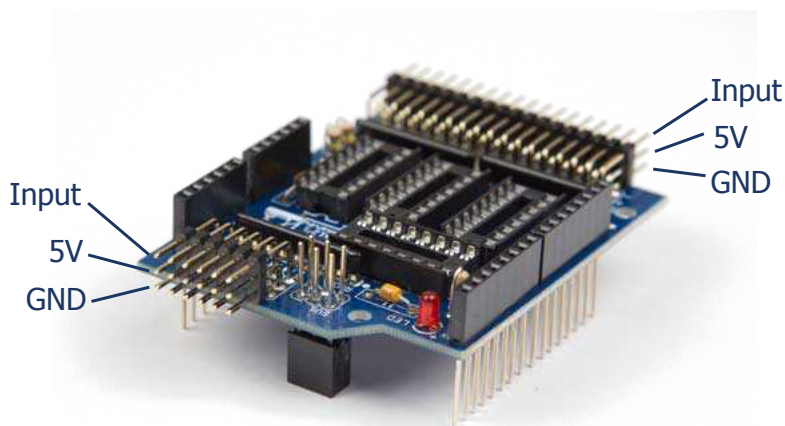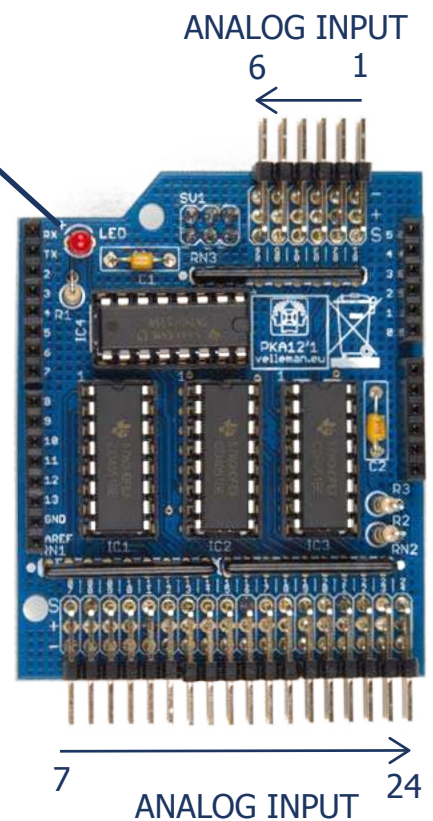
4. Installing the Arduino Library

1. Install the library:

Go to the KA12 download page on the Velleman website:
http://www.vellemanprojects.eu/support/downloads/?code=KA12

Download 'velleman_KA12' extract and copy the "velleman_KA12" folder to your Documents\Arduino\libraries.

2. Example sketch:

A. Open the Arduino software
B. Then click file/Examples/Velleman_KA12/Velleman_KA12

3. The code:

```
1        #include <Velleman_PKA12.h>

2        int all[24];
3        int sensor;

4        void setup() {
5               Serial.begin(115200);
6               pka12_init();
         }

7        void loop() {
8               pka12_readAll(all);
9               for (int i=0; i < 24; i=i+1) {
10              Serial.print(i);
11              Serial.print(" / ");
12              Serial.println(all[i]);
                }
13              sensor = pka12_read(1);
14              Serial.print("Waarde sensor 1 :");
15              Serial.println(sensor);

16              delay(1000);
         }
```

4. Line by line

In order to make the KA12's functions easy to use, we made a library.
Line 1 and 6 declare the use and initialize the library. This must be done in every sketch that uses the KA12. The library gives you the possibility to easily read all sensor values and save them in an int-array or to read one value and save this to an int.
To read all sensors you should declare an int-array with 24 places (line 2). To fill the array we use the readAll command (line 8). In the example we display all the values to the serial monitor using a for loop (line 9 to 12). The serial communication is set up in line 5.
If you only need one value you can use the "pka12_read" command (line 13).

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