

KA08

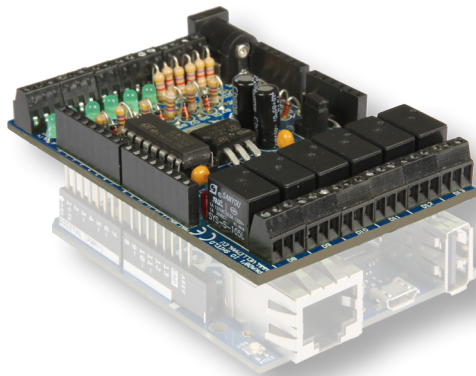
ILLUSTRATED ASSEMBLY MANUAL HKA08P'1

I/O SHIELD FOR ARDUINO® YÚN



velleman®
projects

🐦 @velleman_RnD



General purpose INPUT - OUTPUT shield for Arduino Yún

Features

- suited for Arduino Yún
- requires 1 Arduino Yún (not included)

Specifications

- inputs:
 - » 6 analogue
 - » 6 digital
- outputs: 6 NO/NC relay outputs (1A/30VDC)
- LED status indicators
- power supply: 7-15VDC
- dimensions: 80x54mm / 3.15 x 2.12"





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NEW MK193 LED CUBE

CubeAnimator software available for download here!!!

Posted on 04-06-12

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2	Forum Administration Velleman Introduce Forum Discussions Moderation: Velleman Support	1	4	The Mon 03, 2013 1:22 pm VEL421
Velbus				
3	Velbus Home Automation Special section for our new Velbus Home Automation System (Domoticz) Moderation: Velleman Support	404	3072	Tue Sep 11, 2012 1:11 pm Civano
Kits (Soldering projects - Projects à souder)				
4	General For other topics, general tips and tricks, new ideas Moderation: Velleman Support	131	428	Wed Sep 05, 2012 3:37 pm VEL421
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assembly hints

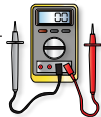
1. Assembly (Skipping this can lead to troubles !)

Ok, so we have your attention. These hints will help you to make this project successful. Read them carefully.

1.1 Make sure you have the right tools:

- A good quality soldering iron (25-40W) with a small tip.
- Wipe it often on a wet sponge or cloth, to keep it clean; then apply solder to the tip, to give it a wet look. This is called 'thinning' and will protect the tip, and enables you to make good connections. When solder rolls off the tip, it needs cleaning.
- Thin raisin-core solder. Do not use any flux or grease.
- A diagonal cutter to trim excess wires. To avoid injury when cutting excess leads, hold the lead so they cannot fly towards the eyes.
- Needle nose pliers, for bending leads, or to hold components in place.
- Small blade and Phillips screwdrivers. A basic range is fine.

☞ For some projects, a basic multi-meter is required, or might be handy.



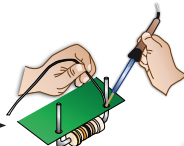
1.2 Assembly Hints :

- Make sure the skill level matches your experience, to avoid disappointments.
- Follow the instructions carefully. Read and understand the entire step before you perform each operation.
- Perform the assembly in the correct order as stated in this manual.
- Position all parts on the PCB (Printed Circuit Board) as shown on the drawings.
- Values on the circuit diagram are subject to changes, the values in this assembly guide are correct*.
- Use the check-boxes to mark your progress.
- Please read the included information on safety and customer service.

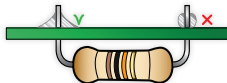
* Typographical inaccuracies excluded. Always look for possible last minute manual updates, indicated as 'NOTE' on a separate leaflet.

1.3 Soldering Hints :

1. Mount the component against the PCB surface and carefully solder the leads. →

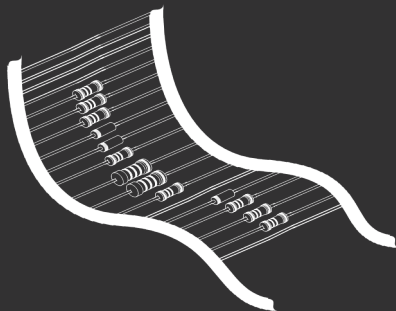


2. Make sure the solder joints are cone-shaped and shiny. →



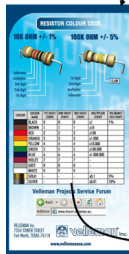
3. Trim excess leads as close as possible to the solder joint. →



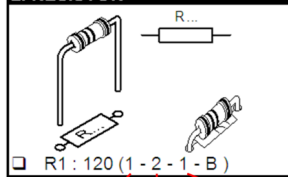


REMOVE THEM FROM THE TAPE ONE AT A TIME !

Included in
this kit



2. RESISTOR



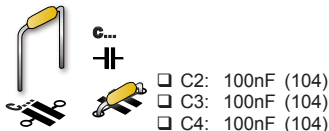
R1 : 120 (1 - 2 - 1 - B)

COLOUR	COLOUR NAME	1ST DIGIT/ STRIPE	2ND DIGIT/ STRIPE	3RD DIGIT/ STRIPE	MULTIPLIER STRIPE	TOLERANCE
Black	BLACK	0	0	0	x1	1%
Brown	BROWN	1	1	1	x10	
Red	RED	2	2	2	x100	
Orange	ORANGE	3	3	3	x1.000	
Yellow	YELLOW	4	4	4	x10.000	
Green	GREEN	5	5	5	x100.000	
Blue	BLUE	6	6	6	x1.000.000	

DO NOT BLINDLY FOLLOW THE ORDER OF THE COMPONENTS ONTO THE TAPE. ALWAYS CHECK THEIR VALUE ON THE PARTS LIST!

I CONSTRUCTION

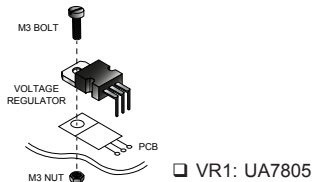
1 Ceramic capacitors



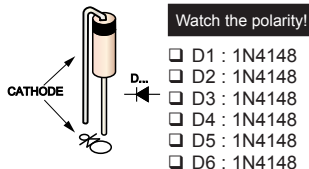
2 Shotkey diode



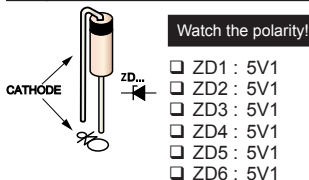
3 Voltage regulator



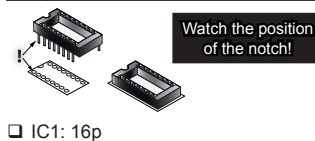
4 Diodes



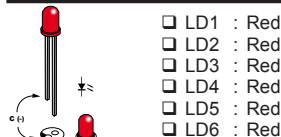
5 Zenerdiodes



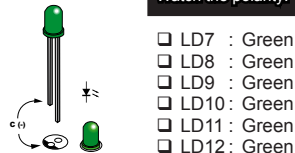
6 IC-socket



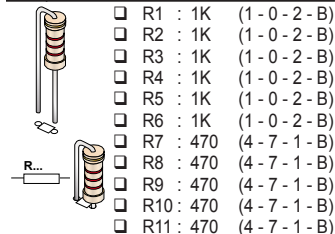
7 LED's



Watch the polarity!

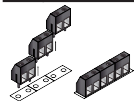


8 Resistors



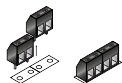
- ☐ R12: 470 (4 - 7 - 1 - B)
- ☐ R13: 4K7 (4 - 7 - 2 - B)
- ☐ R14: 4K7 (4 - 7 - 2 - B)
- ☐ R15: 4K7 (4 - 7 - 2 - B)
- ☐ R16: 4K7 (4 - 7 - 2 - B)
- ☐ R17: 4K7 (4 - 7 - 2 - B)
- ☐ R18: 4K7 (4 - 7 - 2 - B)

9 Terminal blocks



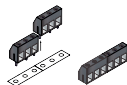
Analog IN

- ☐ 3 x 2p



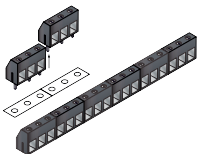
V-out

- ☐ 2 x 2p



Digital IN

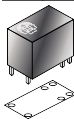
- ☐ 2 x 3p



INPUTS

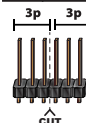
- ☐ D8 : 2p
- ☐ D9 : 2p
- ☐ D10 : 2p
- ☐ D11 : 2p
- ☐ D12 : 2p
- ☐ D13 : 2p

10 Relays

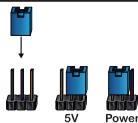


- ☐ RY1
- ☐ RY2
- ☐ RY3
- ☐ RY4
- ☐ RY5
- ☐ RY6

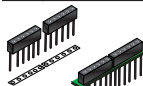
11 Male header



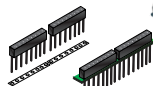
- ☐ SK16: 3p



12 Female headers



- ☐ 2 x 6p



- ☐ 2 x 8p



Do not cut the connector pins!

13 DC-jack



- ☐ SK15



14 Electrolytic capacitors



Watch the polarity!



- ☐ C1 : 100µF
- ☐ C5: 100µF

15 IC



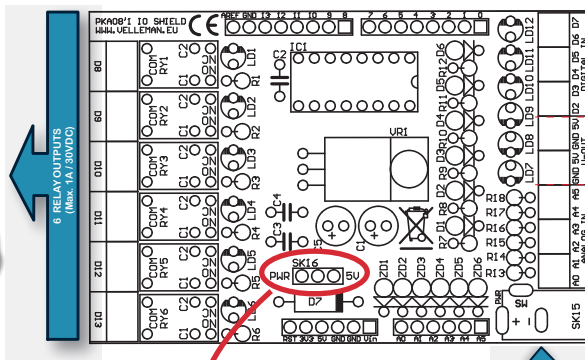
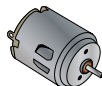
Watch the position of the notch!



- ☐ IC1: ULN2003

II CONNECTION DIAGRAM

1 OUTPUT MAX. 1A / 30VDC



2 DIGITAL INPUTS



101011101011001...



6 DIGITAL INPUTS



VOLTAGE OUT

3 VOLTAGE OUT



6 ANALOG INPUTS



4 ANALOG INPUTS 0 ... 5V

5 POWER SUPPLY



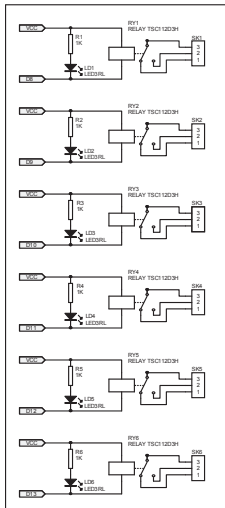
7 - 15VDC

Contrary to the Arduino Uno, the use of the Arduino YUN requires an external power supply. (Attention: the relays only switch when a 12 VDC power supply is connected)

III GENERAL INFORMATION

The I/O shield makes it easy to switch loads and handle digital/analog signals. The digital inputs and outputs feature an LED that show the status of the port.

DIGITAL OUTPUT SECTION (FIG.1):



The digital outputs correspond to Arduino lines 8, 9, 10, 11, 12 and 13. Each line drives a relay through a transistor.

Fig.1 Digital output section

DIGITAL INPUT SECTION (FIG.2):

The digital inputs correspond to Arduino lines 2, 3, 4, 5, 6 and 7, configured as digital input. Protection diodes secure the inputs in case voltages higher than 5 V are applied.

Activate the input by bringing it to a low logic level (GND) (inverse logic).

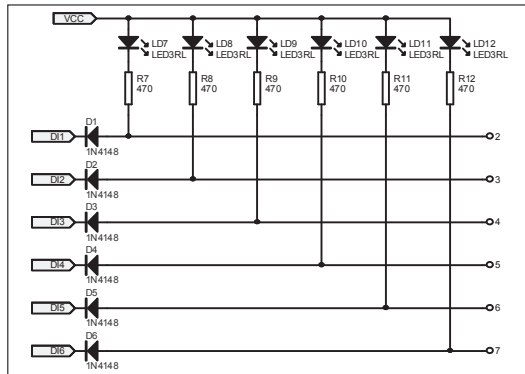


Fig.2 Digital input section

ANALOGUE OUTPUTS (PWM):

Lines 3, 5 and 6 can be configured as analogue output (PWM, +5 V). With a value between 0 and 255, the duty cycle can vary between 0 and 100 %. Attention: The LED will have an inverse logic in this mode: 0 % duty cycle = LED on, 100 % duty cycle = LED off. All digital inputs have a common ground (GND).

ANALOGUE INPUT SECTION (FIG.3):

Each analogue input (A0..A5) features a series resistor and a protection diode.

The shield requires an external power supply (9-12 VDC). Place jumper JP5V between the central pin and the PWR pin. In this way, the shield as the Arduino Yun are powered by their own power supply.

You can also use the shield with a classic Arduino board, which can be equipped with a power supply. Place the jumper between the central pin and 5 V pin. The Yun does not allow this because of the higher current absorption.

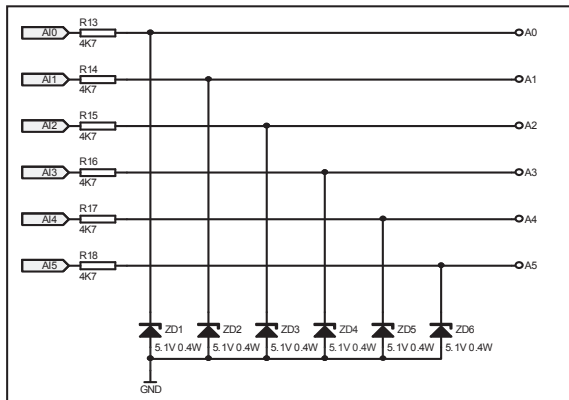
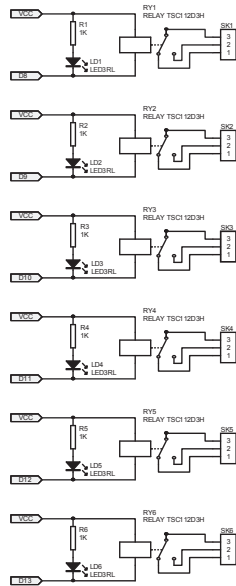
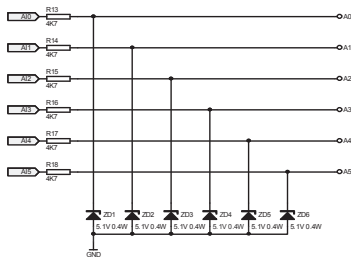
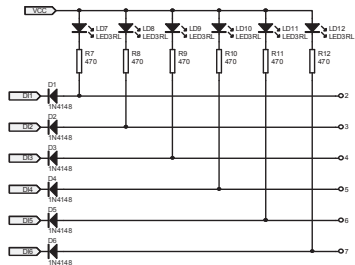
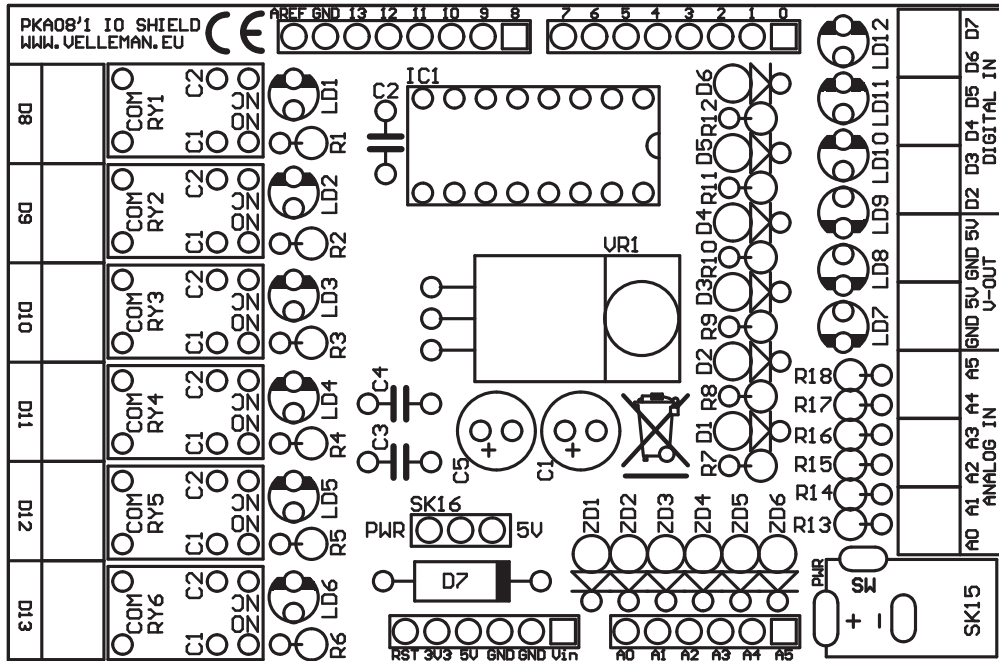
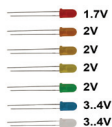


Fig.3 Analogue output section

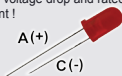




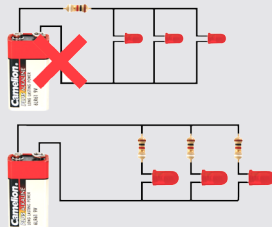
Leds and how to use them



Leds feature a specific voltage drop, depending on type and colour. Check the datasheet for exact voltage drop and rated current !



Never connect leds in parallel



How to Calculate the series resistor:

Example: operate a red led (1.7V) on a 9Vdc source.

Required led current for full brightness: 5mA (this can be found in the datasheet of the led)

$$\frac{\text{Supply voltage (V)} - \text{led voltage (V)}}{\text{required current (A)}} = \text{series resistance (ohms)}$$

$$\rightarrow \frac{9V - 1.7V}{0.005A} = 1460 \text{ ohm}$$

closest value :
use a 1k5 resistor

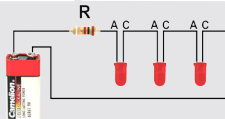
Required resistor power handling=
voltage over resistor x current passed trough resistor

$$\rightarrow (9V - 1.7V) \times 0.005A = 0.036W$$

a standard 1/4W resistor
will do the job

LEDs in series:

Example: 3 x red led (1.7V) on 9V battery
Required led current for full brightness: 5mA
(this can be found in the datasheet of the led)



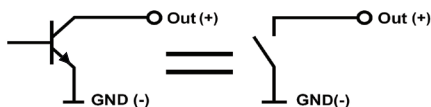
$$\frac{\text{Supply voltage (V)} - (\text{number of leds} \times \text{led voltage (V)})}{\text{required current (A)}} = \text{series resistance (ohms)}$$

$$\rightarrow \frac{9V - (3 \times 1.7V)}{0.005A} = 780 \text{ ohm}$$

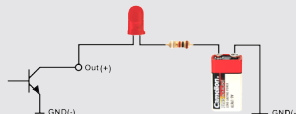
use an
820 ohm resistor

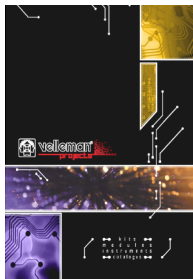
open collector outputs

An open collector output can be compared to a switch which switches to ground when operated



Example: How to switch an LED by means of an open collector output





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