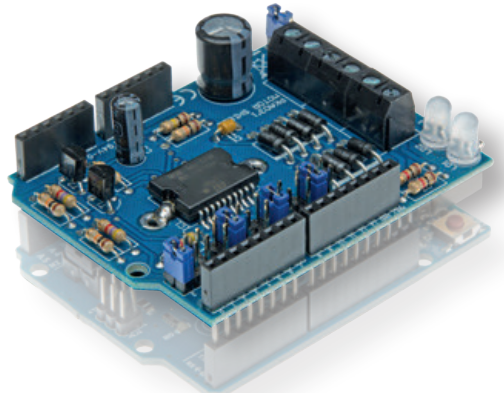
KA03

ILLUSTRATED ASSEMBLY MANUAL HKA03IP1

Motor & Power shield Arduino®



Power shield that can drive: relays, solenoids, DC and stepper motors

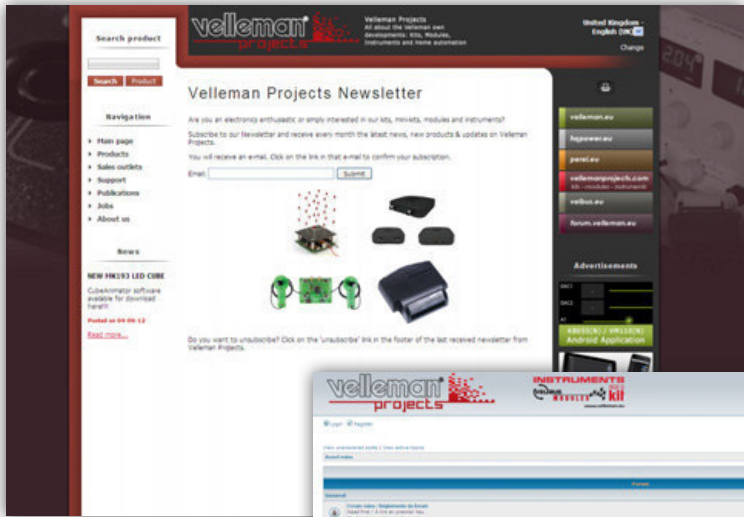
Features

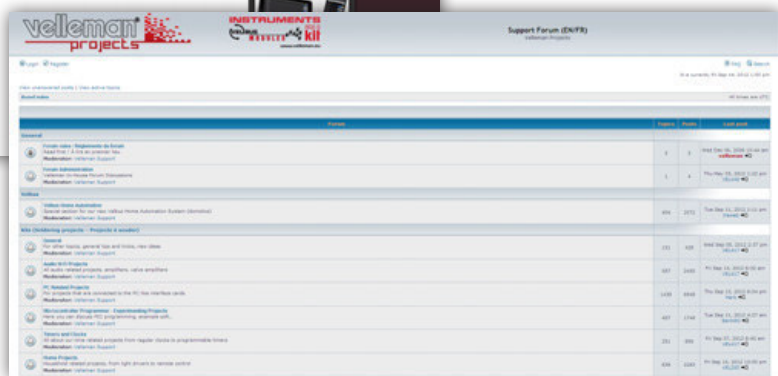
- For use with Arduino Due™, Arduino Uno™, Arduino Mega™
- Based on L298P dual full bridge driver IC
- Outputs: up to 2 DC motors or 1 bipolar stepper motor
- Power supply: external power or power from Arduino board

Specifications

- Power supply: 7..46VDC
- Max current: 2A
- Dimensions: 68 x 53mm / 2.67 x 2.08”

Made for ARDUINO





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9890 Gavere
(België)

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 :

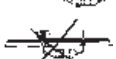
- Make sure the skill level matches your experience, to avoid disappointments.
- Follow the instructions carefully. Read and understand the entire step before you perform each operation.
- Perform the assembly in the correct order as stated in this manual
- Position all parts on the PCB (Printed Circuit 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.

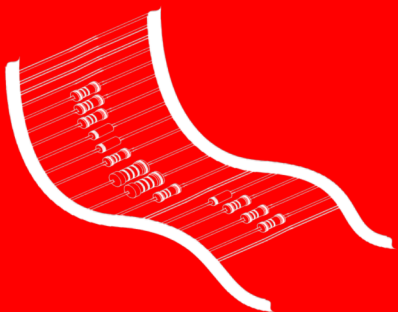
1.3 Soldering Hints :

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

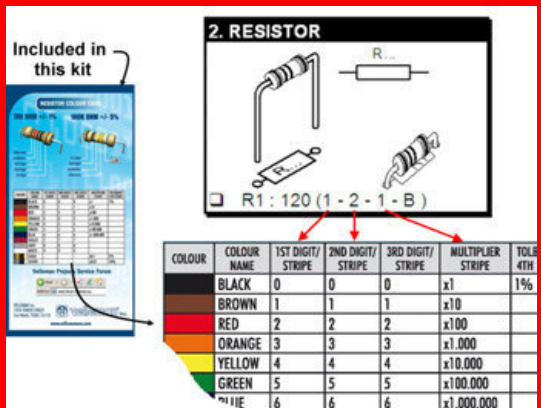
2. Make sure the solder joints are cone-shaped and shiny



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



REMOVE THEM FROM THE TAPE ONE AT A TIME !

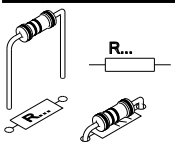


COLOUR	COLOUR NAME	1ST DIGIT/ STRIPE	2ND DIGIT/ STRIPE	3RD DIGIT/ STRIPE	MULTIPLIER STRIPE	TOLE 4TH
	BLACK	0	0	0	x1	1%
	BROWN	1	1	1	x10	
	RED	2	2	2	x100	
	ORANGE	3	3	3	x1.000	
	YELLOW	4	4	4	x10.000	
	GREEN	5	5	5	x100.000	
	BLUE	6	6	6	x1.000.000	

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

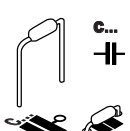
I CONSTRUCTION

1 Resistors



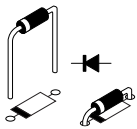
- ❑ R1: 4K7 (4 - 7 - 2 - B)
- ❑ R2: 10K (1 - 0 - 3 - B)
- ❑ R3: 4K7 (4 - 7 - 2 - B)
- ❑ R4: 4K7 (4 - 7 - 2 - B)
- ❑ R5: 10K (1 - 0 - 3 - B)
- ❑ R6: 4K7 (4 - 7 - 2 - B)
- ❑ R7: 1K (1 - 0 - 2 - B)
- ❑ R8: 1K (1 - 0 - 2 - B)
- ❑ R9: 100K (1 - 0 - 4 - B)
- ❑ R10: 10K (1 - 0 - 3 - B)

2 Ceramic capacitors



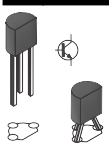
- ❑ C1: 100nF (104)

3 Shottky diode



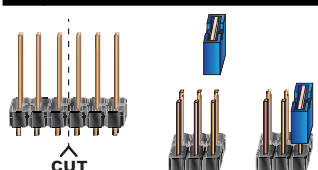
- ❑ D1: 1N5819
- ❑ D2: 1N5819
- ❑ D3: 1N5819
- ❑ D4: 1N5819
- ❑ D5: 1N5819
- ❑ D6: 1N5819
- ❑ D7: 1N5819
- ❑ D8: 1N5819

4 Transistors



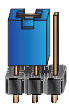
- ❑ T1: BC547B
- ❑ T2: BC547B

5 Male header



- ❑ SK8... SK10 : 2x3pin

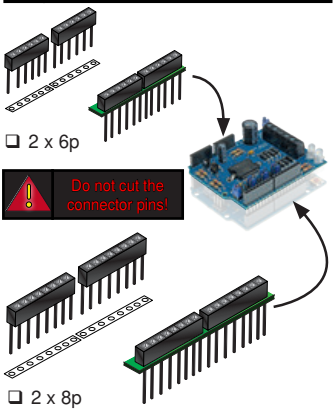
- ❑ 3pin



EXTernal
power (max. 50V)

INTernal
power from Arduino
Max. 2A

6 Female header

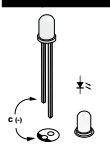


❑ 2 x 6p

Do not cut the connector pins!

❑ 2 x 8p

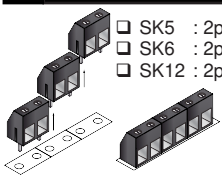
7 LED's



Watch the polarity!

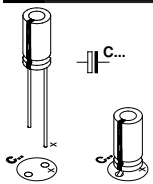
❑ LD1
❑ LD2

8 Terminal blocks



❑ SK5 : 2p (motor 1)
❑ SK6 : 2p (motor 2)
❑ SK12 : 2p (power supply)

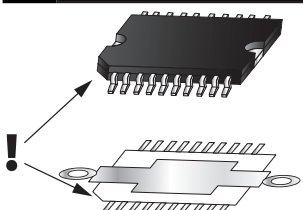
9 Electrolytic capacitors



Watch the polarity!

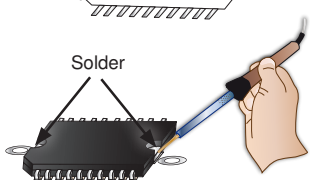
❑ C3: 22µF
❑ C2: 100µF

10 Dual Full Bridge driver



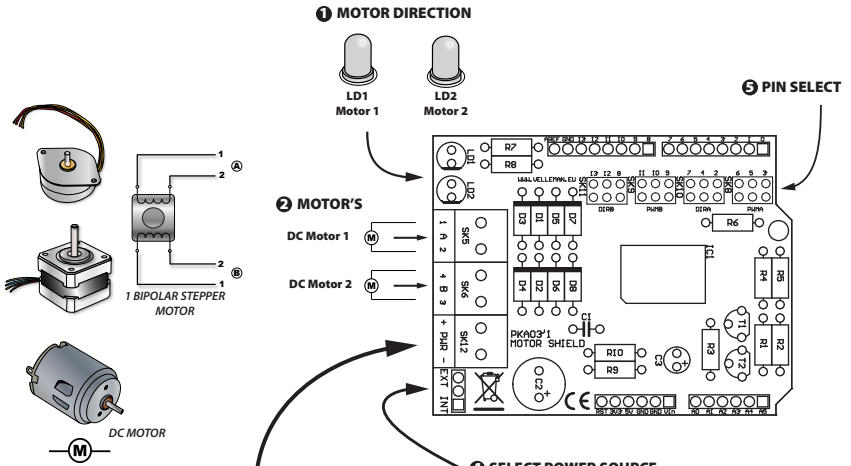
Watch the position of the notch!

❑ IC1: L298P

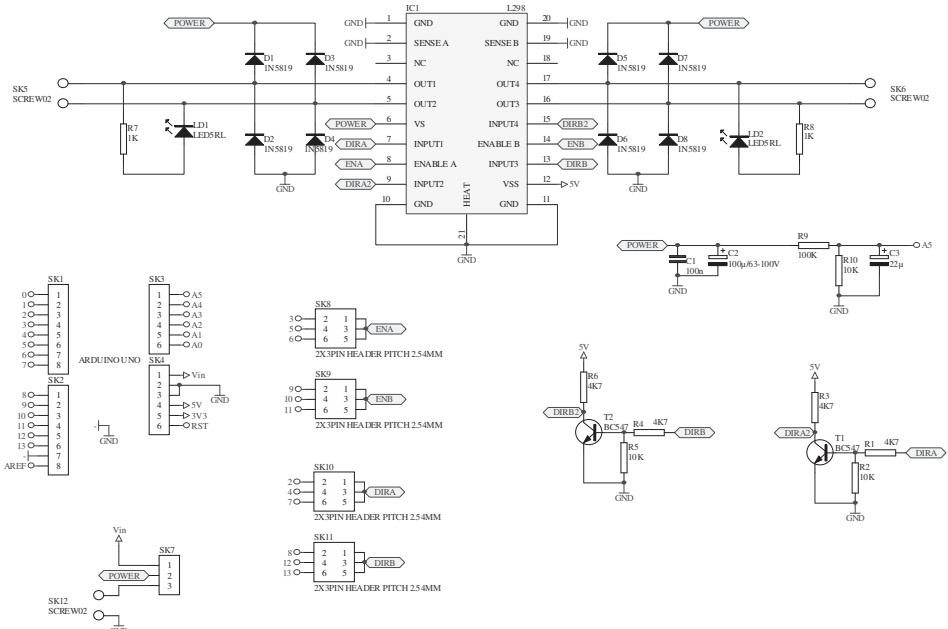


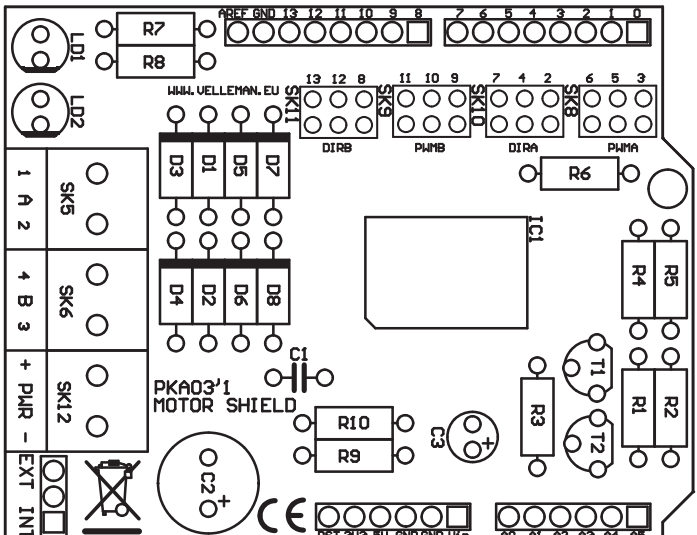
Solder each connection

II CONNECTION DIAGRAM

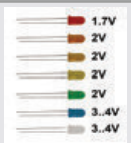


DOWNLOAD SAMPLE CODE FROM KA03 PAGE ON WWW.VELLEMAN.BE

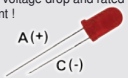

IC1
L298
GND
SENSE A
NC
OUT1
OUT2
VS
INPUT1
ENABLE A
INPUT2
SENSE B
OUT4
OUT3
INPUT4
ENABLE B
INPUT3
VSS
HEAT
POWER
SK5
SCREW02
SK6
SCREW02
D1 1N5819
D2 1N5819
D3 1N5819
D4 1N5819
D5 1N5819
D6 1N5819
D7 1N5819
D8 1N5819
LD1 LED5RL
LD2 LED5RL
R7 1K
R8 1K
DIRA
ENA
DIRA2
DIRB2
ENB
DIRB
5V
C1 100n
C2 100µ/63-100V
R9 100K
R10 10K
C3 22µ
A5
SK1
SK2
SK3
SK4
ARDUINO UNO
A5
A4
A3
A2
A1
A0
Vin
5V
3V3
RST
AREF
SK8
SK9
SK10
SK11
2X3PIN HEADER PITCH 2.54MM
R6 4K7
R5 10K
R4 4K7
T2 BC547
R3 4K7
R2 10K
R1 4K7
T1 BC547
SK7
SK12
SCREW02


AREF GND 13 12 11 10 9 8
7 6 5 4 3 2 1 0
R7
R8
LD1
LD2
WWW.VELLEMAN.EU
SK11
13 12 8
SK9
11 10 9
SK10
7 4 2
SK8
6 5 3
DIRB
PWMB
DIRA
PWMA
D3 D1 D5 D7
D4 D2 D6 D8
R6
IC1
R4 R5
R1 R2
R3
T1
T2
C1
C3
C2
R10
R9
PKA03'1
MOTOR SHIELD
SK5
1 A 2
SK6
4 B 3
SK12
+ PWR -
EXT INT
RST 3V3 5V GND GND Vin
A0 A1 A2 A3 A4 A5

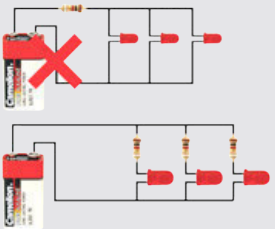
Leds and how to use them



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)

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

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

closest value : use a 1k5 resistor

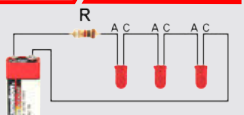
Required resistor power handling=
voltage over resistor x current passed trough resistor

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

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)



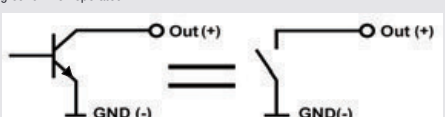
$$\frac{\text{Supply voltage (V) - (number of leds x led voltage (V))}}{\text{required current (A)}} = \text{series resistance (ohms)}$$

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

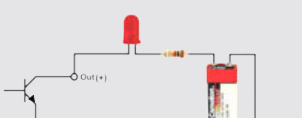
use an 820 ohm resistor

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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