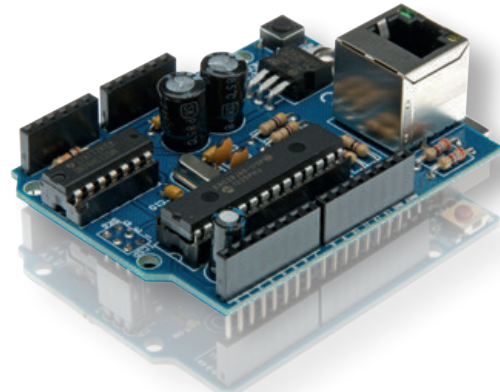
KA04

ILLUSTRATED ASSEMBLY MANUAL HKA04IP1

Ethernet shield for Arduino®



Configure your Arduino™ as a simple web server or let it get data from the worldwide web.

Features

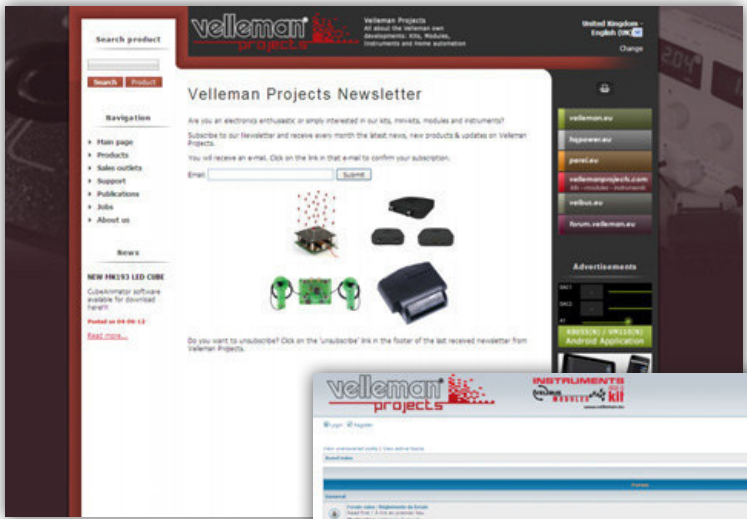
- For use with Arduino Uno™, Arduino Mega™
- Based on Microchip ENC28J60
- IEEE 802.3 compatible Ethernet controller
- Integrated MAC & 10BASE-T PHY
- SPI interface
- With RJ45 connector

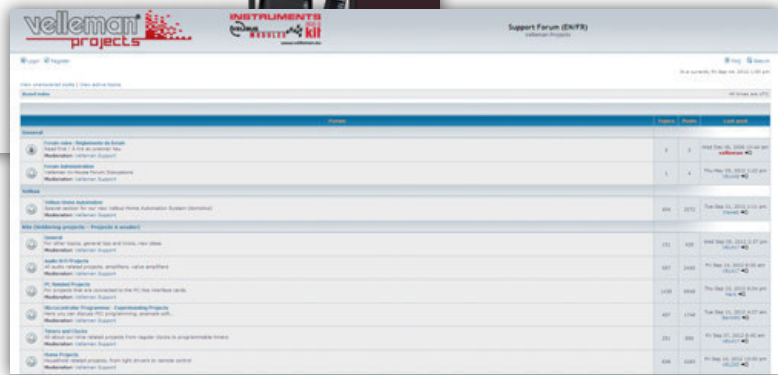
Specifications

- Max. clock speed: 20MHz
- Transmit/receive buffer: 8kB
- Dimensions: 68 x 53mm / 2.67 x 2.08”

velleman® projects

Made for ARDUINO™





Subscribe Newsletter

Subscribing our newsletter?, visit www.vellemanprojects.eu

View Forum

Participate our Velleman Projects Forum

Velleman N.V.
Legen Heirweg 33
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

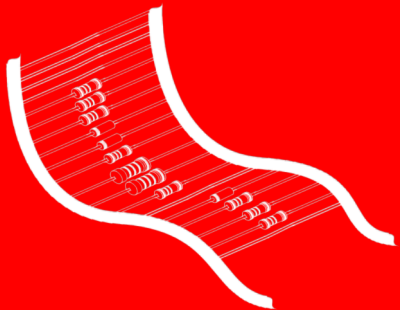
* Typographical inaccuracies excluded. Always look for possible last minute manual updates, indicated as 'NOTE' on a separate leaflet.

1.3 Soldering Hints :

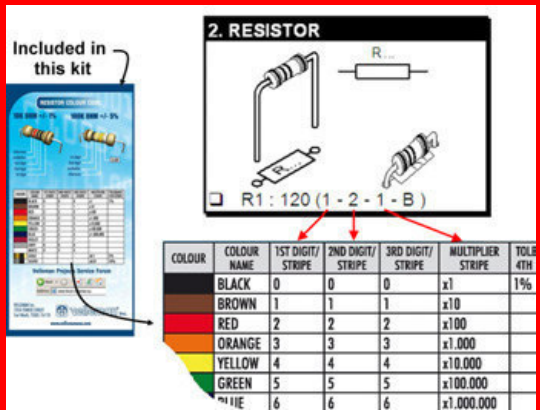
1. Mount the component against the PCB surface and carefully solder the leads

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 !

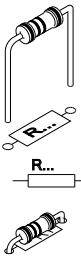


COLOUR	COLOUR NAME	1ST DIGIT/ STRIPE	2ND DIGIT/ STRIPE	3RD DIGIT/ STRIPE	MULTIPLIER STRIPE	TOLE 4TH
	BLACK	0	0	0	x1	1%
	BROWN	1	1	1	x10	
	RED	2	2	2	x100	
	ORANGE	3	3	3	x1.000	
	YELLOW	4	4	4	x10.000	
	GREEN	5	5	5	x100.000	
	BLUE	6	6	6	x1.000.000	

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

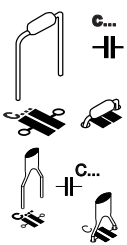
I CONSTRUCTION

1 Resistors



- ❑ R1: 47 (4 - 7 - 0 - B)
- ❑ R2: 47 (4 - 7 - 0 - B)
- ❑ R3: 18 (1 - 8 - 0 - B)
- ❑ R4: 47 (4 - 7 - 0 - B)
- ❑ R5: 47 (4 - 7 - 0 - B)
- ❑ R6: 270 (2 - 7 - 1 - B)
- ❑ R7: 270 (2 - 7 - 1 - B)
- ❑ R8: 2K7 (2 - 7 - 2 - B)
- ❑ R9: 10K (1 - 0 - 3 - B)
- ❑ R10: 10K (1 - 0 - 3 - B)
- ❑ R11: 10K (1 - 0 - 3 - B)

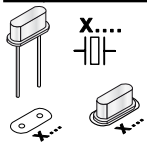
2 Ceramic capacitors



- ❑ C1: 100nF (104)
- ❑ C2: 100nF (104)
- ❑ C3: 100nF (104)
- ❑ C4: 100nF (104)
- ❑ C10: 100nF (104)

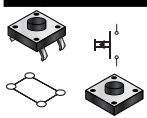
- ❑ C7: 15pF (15)
- ❑ C8: 15pF (15)

3 Crystal



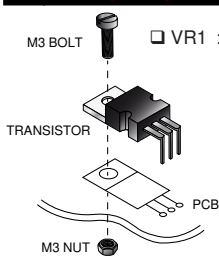
❑ X1 : 25MHz

4 Push button



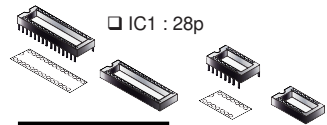
❑ SW1 : Reset

5 Voltage regulator



❑ VR1 : LD1086V33

6 IC socket

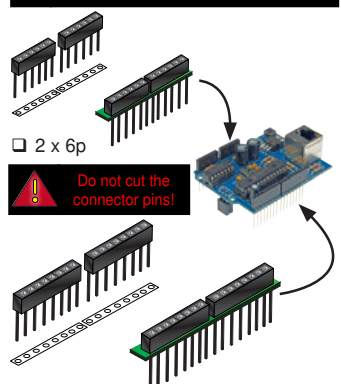


❑ IC1 : 28p

Watch the position of the notch!

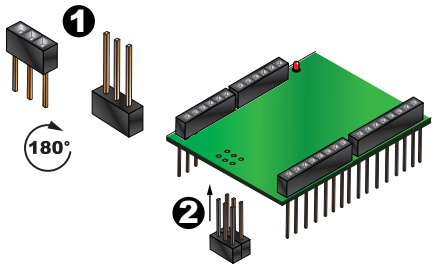
❑ IC1 : 14p

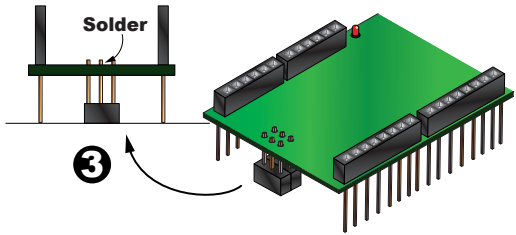
7 Female header



❑ 2 x 6p

Do not cut the connector pins!





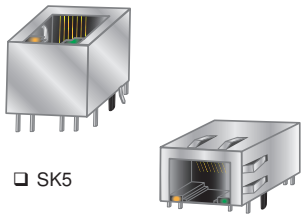
❑ SK6: 2 x 3p

8 Electrolytic capacitors

Watch the polarity!

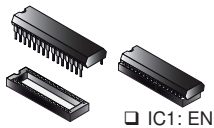
❑ C5 : 470µF
❑ C6 : 10µF
❑ C9 : 470µF

9 LAN connector



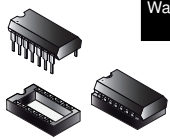
❑ SK5

10 IC



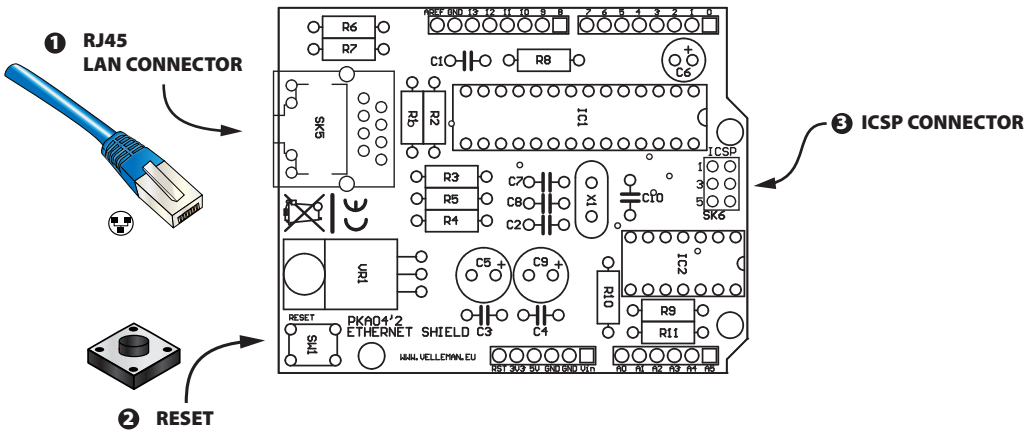
❑ IC1: ENC28J60-I/SP

Watch the position of the notch!

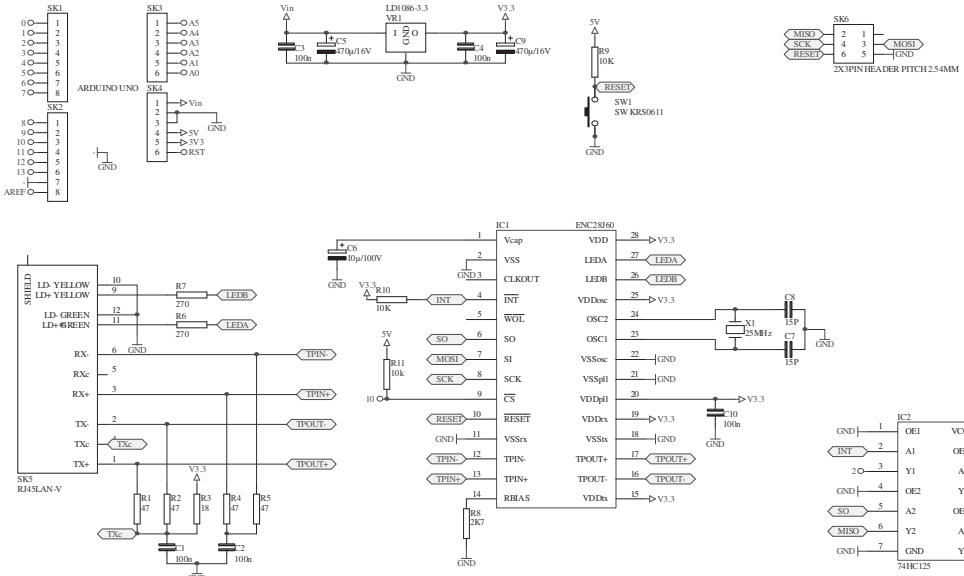


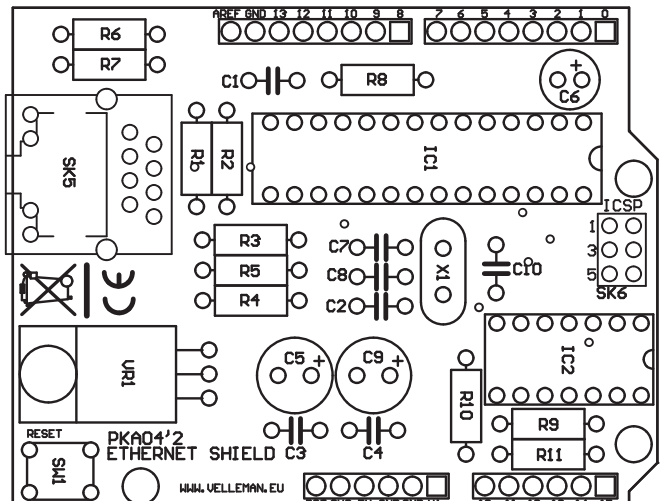
❑ IC2: 74HC125

II CONNECTION DIAGRAM

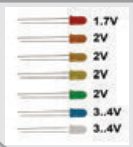


DOWNLOAD SAMPLE CODE FROM KA04 PAGE ON WWW.VELLEMAN.BE

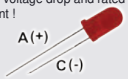

SK1
SK3
SK2
SK4
ARDUINO UNO
A5
A4
A3
A2
A1
A0
Vin
5V
3V3
RST
GND
AREF
LD1086-3.3
VR1
IN
OUT
C3
100n
C5
470µ/16V
C4
100n
C9
470µ/16V
V3.3
R9
10K
RESET
SW1
SW KRS0611
SK6
MISO
SCK
RESET
MOSI
GND
2X3PIN HEADER PITCH 2.54MM
IC1
ENC28J60
Vcap
VSS
CLKOUT
INT
WOL
SO
SI
SCK
CS
RESET
VSSrx
TPIN-
TPIN+
RBIAS
VDDpll
VSSpll
VSSosc
OSC1
OSC2
VDDosc
TPOUT-
TPOUT+
VSStx
VDDtx
VDDrx
LEDA
LEDB
C6
10µ/100V
R10
10K
R11
10k
R8
2K7
X1
25MHz
C8
15P
C7
15P
C10
100n
SHIELD
LD- YELLOW
LD+ YELLOW
LD- GREEN
LD+ GREEN
RX-
RXc
RX+
TX-
TXc
TX+
R7
270
R6
270
SK5
RJ45LAN-V
R1
47
R2
47
R3
18
R4
47
R5
47
C1
100n
C2
100n
IC2
74HC125
OE1
A1
Y1
OE2
A2
Y2
GND
OE3
A3
Y3
OE4
A4
Y4
VCC

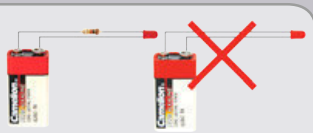

AREF GND 13 12 11 10 9 8
7 6 5 4 3 2 1 0
R6
R7
C1
R8
C6
SK5
R1
R2
IC1
ICSP
R3
R5
R4
C7
C8
C2
X1
C10
SK6
VR1
C5
C9
IC2
R10
R9
R11
RESET
SW1
PKA04'2
ETHERNET SHIELD
C3
C4
WWW.VELLEMAN.EU
RST 3V3 5V GND GND Vin
A0 A1 A2 A3 A4 A5

Leds and how to use them

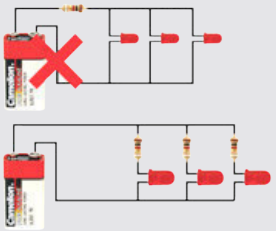


Leds feature a specific voltage drop, depending on type and colour. Check the datasheet for exact voltage drop and rated current !





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

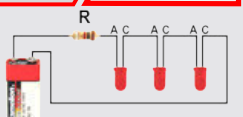
Required resistor power handling=
voltage over resistor x current passed trough resistor

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

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)



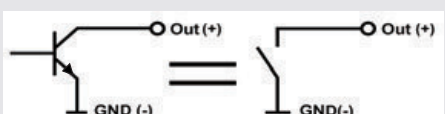
$$\frac{\text{Supply voltage (V) - (number of leds x led voltage (V))}}{\text{required current (A)}} = \text{series resistance (ohms)}$$

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

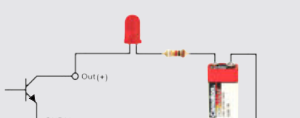
use an 820 ohm resistor

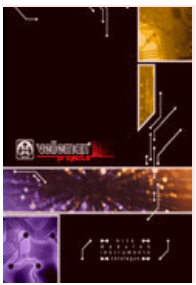
open collector outputs

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





The new Velleman Projects catalogue is now available. Download your copy here:
www.vellemanprojects.eu

5 410329 556488

Velleman NV, Legen Heirweg 33 - 9890 Gavere.