

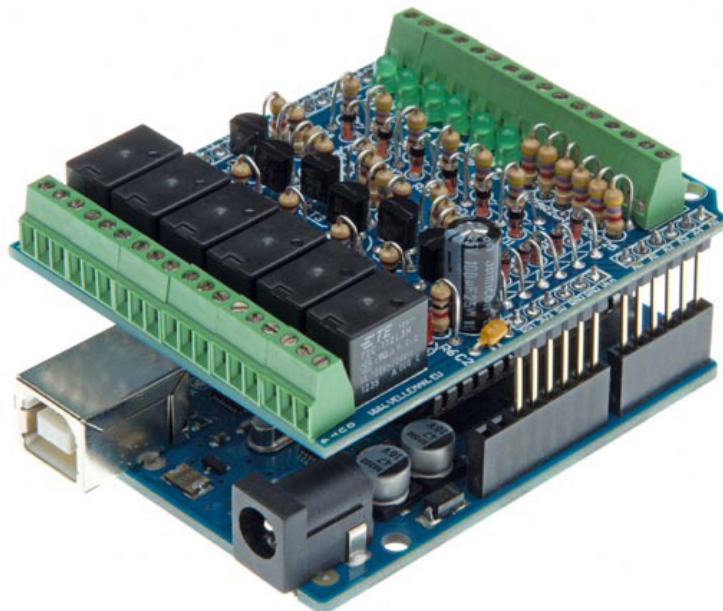
WHADDA KA05 Expansion Module Instruction Manual

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velleman®

KA05
ILLUSTRATED ASSEMBLY MANUAL HKA05P'1
IN/OUT shield for Arduino®



General-purpose INPUT-OUTPUT shield for Arduino®

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Features


- For use with Arduino Due, Arduino Uno, Arduino Mega
- 6 analog inputs
- 6 digital input
- 6 relay contact outputs: 0.5A max 30V (*)
- Indicator leds for relay outputs and digital inputs

Specifications


- Analog inputs: 0..+5VDC
- Digital inputs: dry contact or open collector
- Relays: 12V
- Relay contacts: NO/NC 24VDC/1A max.
- Dimensions: 68 x 53mm / 2.67 x 2.08"

It is required to power the Arduino UNO (not supplied) with a 12V DC 500mA power supply (not supplied). This shield will not work with the Arduino Yún. Use the KA08 or VMA08 with the Arduino Yún.





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Cube Animation software
available for download
here!!

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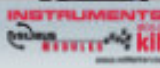
A1

[K8055\(N\) / VM110\(N\)](#)
Android Application

[K8055 / VM8050](#)
iPad/iPod/iPhone app

[K8055\(N\) / VM110\(N\)](#)
iPhone application


















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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. **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.

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.

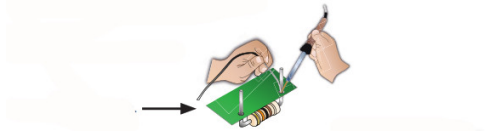
* Typographical inaccuracies excluded. Always look for possible last-minute manual updates, indicated



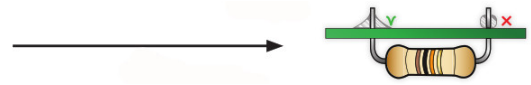
as 'NOTE' on a separate leaflet. 1.3

3. Soldering Hints :

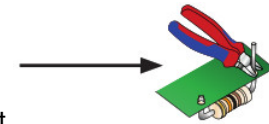
1. Mount the component against the PCB surface and carefully solder the leads.

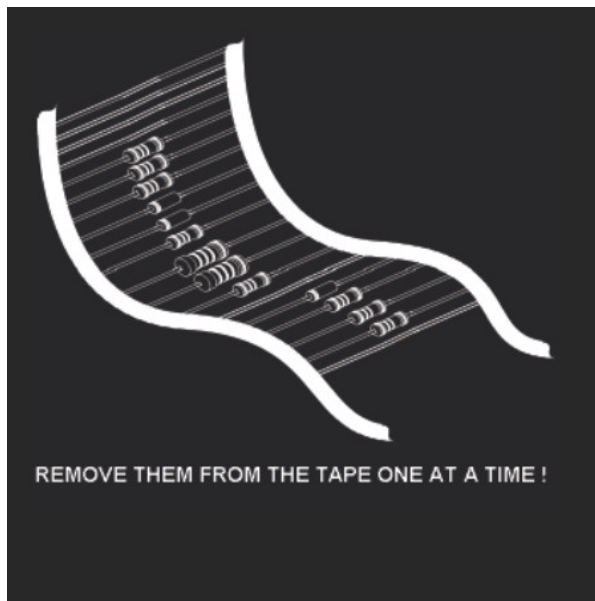


2. Make sure the solder joints are cone-shaped and shiny.




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



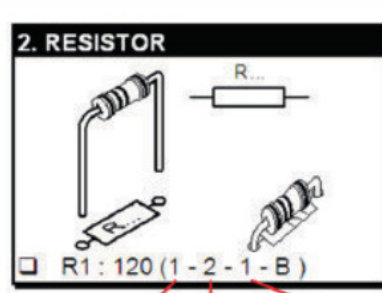


REMOVE THEM FROM THE TAPE ONE AT A TIME !

Included in this kit



2. RESISTOR



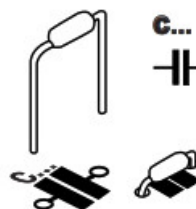
R1 : 120 (1 - 2 - 1 - B)

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 ON THE TAPE. ALWAYS CHECK THEIR VALUE ON THE PARTS LIST!

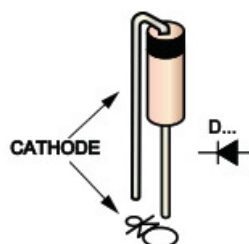
CONSTRUCTION

1. Ceramic capacitor



- C2: 100nF (104)

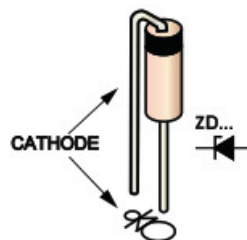
2. Diodes



Watch the polarity!

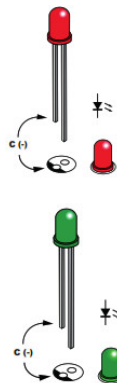
- D1: 1N4148
- D2: 1N4148
- D3 : 1N4148
- D4: 1N4148
- D5: 1N4148
- D6: 1N4148

- D7: 1N4148
- D8: 1N4148
- D9: 1N4148
- D10: 1N4148
- D11: 1N4148
- D12: 1N4148

3. Zenerdiodes**Watch the polarity!**

- ZD1 : 5V1
- ZD2 : 5V1
- ZD3 : 5V1

- ZD4 : 5V1
- ZD5 : 5V1
- ZD6 : 5V1

4. LED

- LD1 : Red
- LD2 : Red
- LD3 : Red
- LD4 : Red
- LD5 : Red
- LD6 : Red

Watch the polarity!

- LD7 : Green
- LD8 : Green
- LD9 : Green
- LD10 : Green
- LD11 : Green
- LD12 : Green

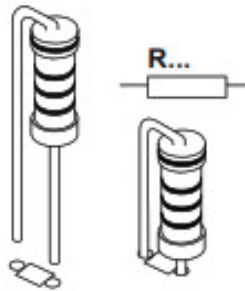
5. Transistors



- T1: BC547B
- T2: BC547B
- T3: BC547B

- T4: BC547B
- T5: BC547B
- T6: BC547B

6. Resistors

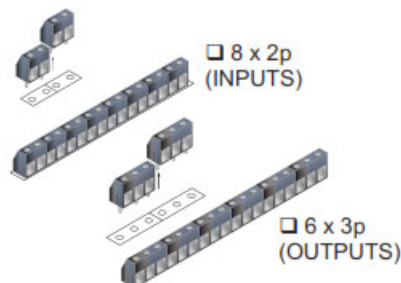


- R1 : 1K (1 – 0 – 2 – B)
- R2 : 1K (1 – 0 – 2 – B)
- R3 : 1K (1 – 0 – 2 – B)
- R4 : 1K (1 – 0 – 2 – B)
- R5 : 1K (1 – 0 – 2 – B)
- R6 : 1K (1 – 0 – 2 – B)
- R7: 4K7 (4 – 7 – 2 – B)
- R8 : 10K (1 – 0 – 3 – B)
- R9 : 4K7 (4 – 7 – 2 – B)
- R10 : 10K (1 – 0 – 3 – B)

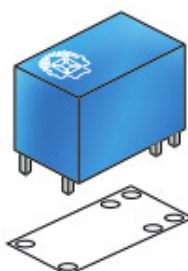
- R11 : 4K7 (4 – 7 – 2 – B)
- R12 : 10K (1 – 0 – 3 – B)
- R13 : 4K7 (4 – 7 – 2 – B)
- R14 : 10K (1 – 0 – 3 – B)
- R15: 4K7 (4 – 7 – 2 – B)
- R16 : 10K (1 – 0 – 3 – B)
- R17: 4K7 (4 – 7 – 2 – B)
- R18 : 10K (1 – 0 – 3 – B)
- R19 : 470 (4 – 7 – 1 – B)
- R20 : 470 (4 – 7 – 1 – B)

- R21 : 470 (4 – 7 – 1 – B)
- R22 : 470 (4 – 7 – 1 – B)
- R23 : 470 (4 – 7 – 1 – B)
- R24 : 470 (4 – 7 – 1 – B)
- R25 : 4K7 (4 – 7 – 2 – B)
- R26: 4K7 (4 – 7 – 2 – B)
- R27 : 4K7 (4 – 7 – 2 – B)
- R28 : 4K7 (4 – 7 – 2 – B)
- R29 : 4K7 (4 – 7 – 2 – B)
- R30 : 4K7 (4 – 7 – 2 – B)

7. Terminal blocks



8. Relays



9. Electrolytic capacitors



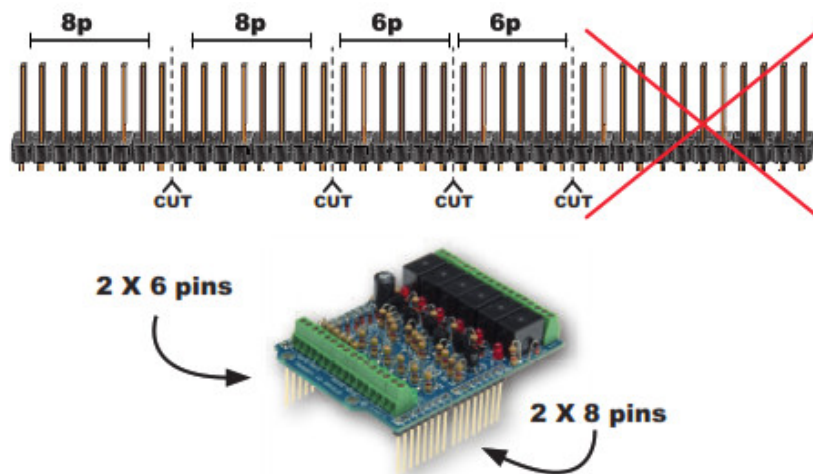
- RY1
- RY2
- RY3

- RY4
- RY5
- RY6

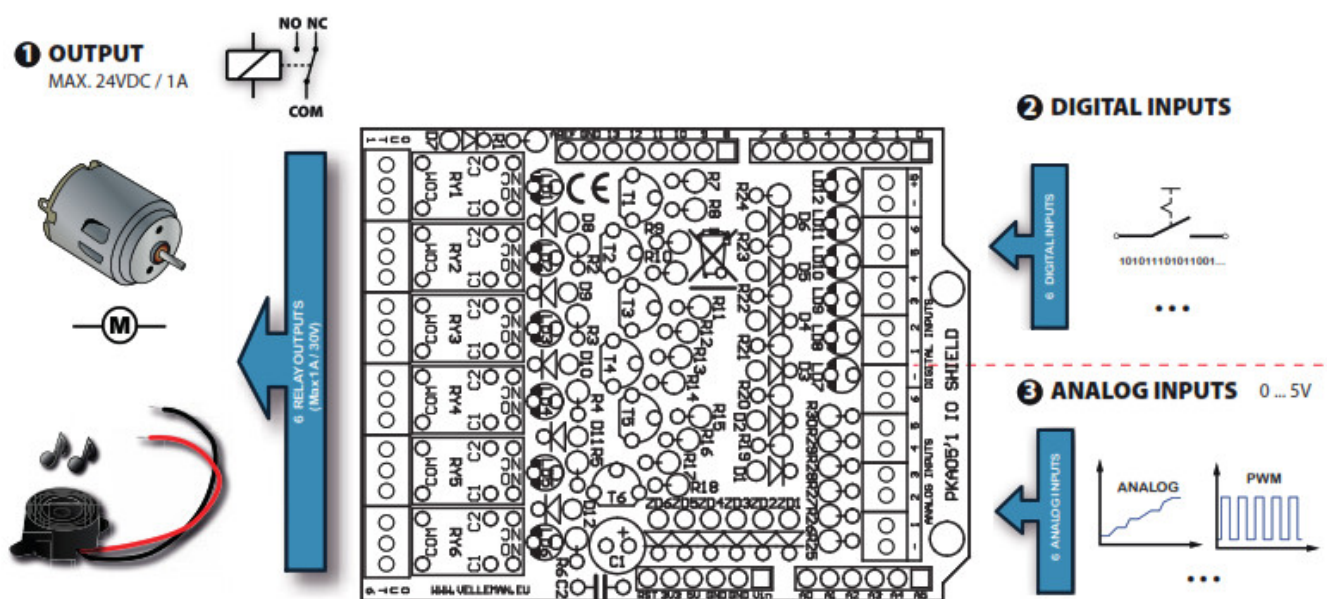
Watch the polarity!

- C1: 100 μ F

10. Male header

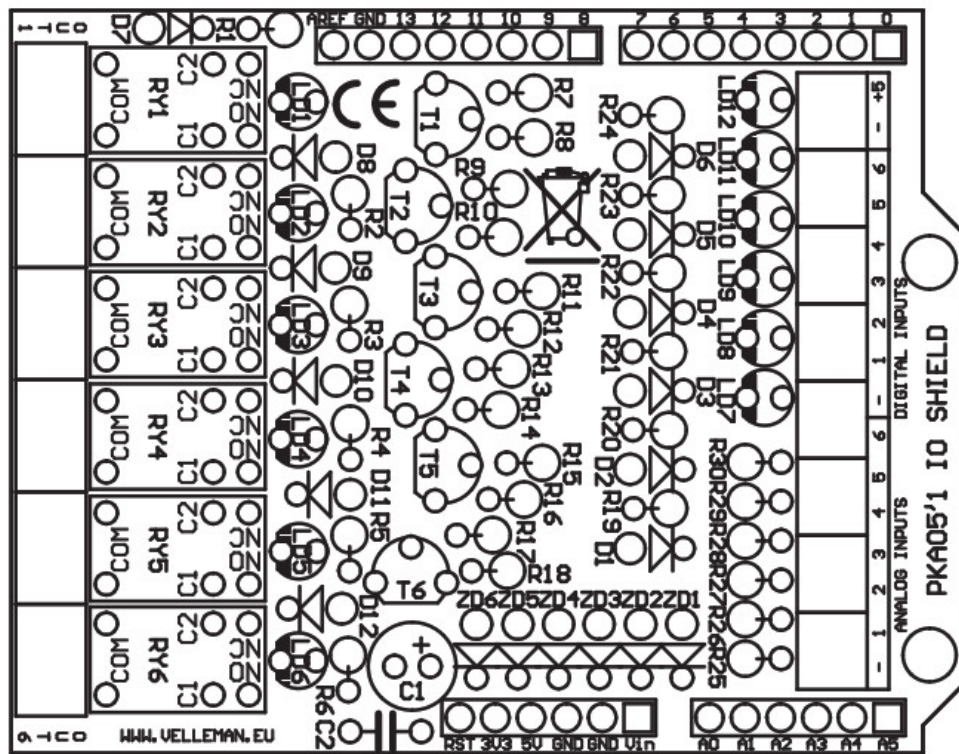
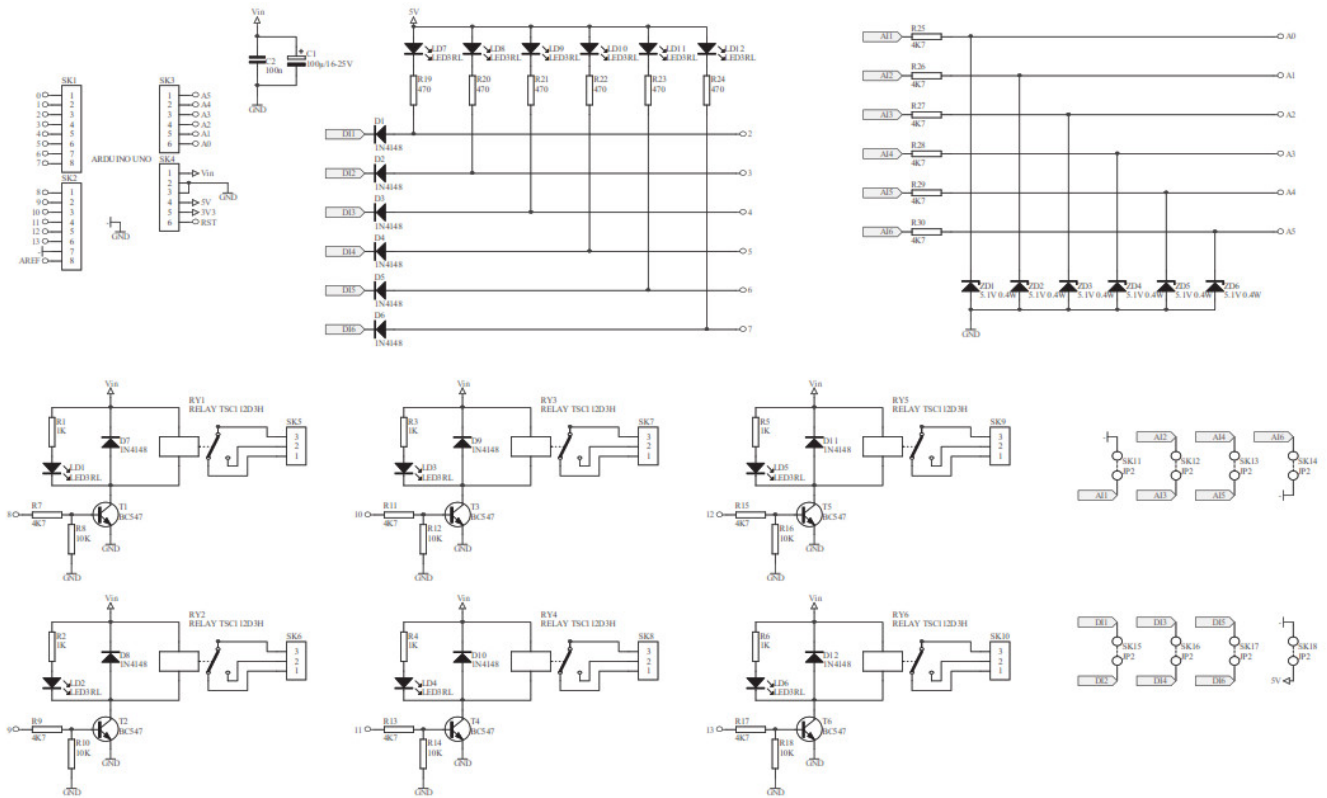


CONNECTION DIAGRAM

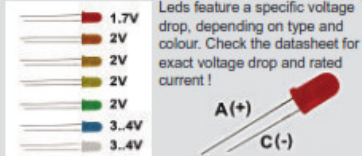


DOWNLOAD SAMPLE CODE FROM KA05 PAGE ON WWW.VELLEMAN.BE

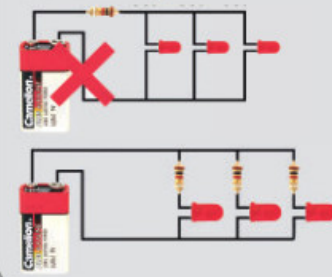
PCB



Leds and how to use them



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

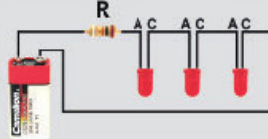
Required resistor power handling= voltage over resistor x current passed trough resistor

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

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)



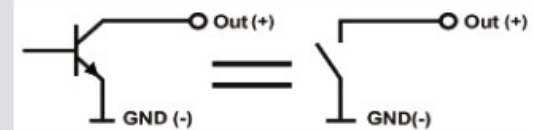
$$\frac{\text{Supply voltage (V)} - (\text{number of leds} \times \text{led voltage (V)})}{\text{required current (A)}} = \text{series resistance (ohms)}$$

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

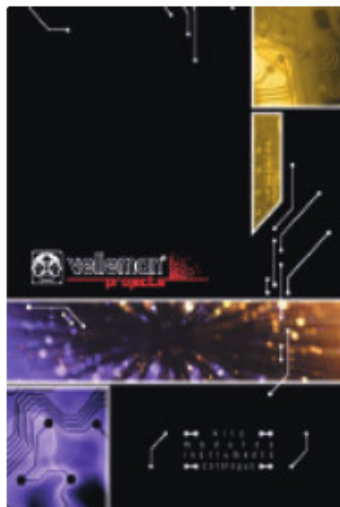
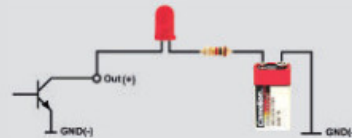
use an 820 ohm resistor

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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Manuals+.