General purpose INPUT - OUTPUT shield for Arduino®

Features
• For use with Arduino Due™, Arduino Uno™, Arduino Mega™
• 6 analog inputs
• 6 digital input
• 6 relay contact outputs
• 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"
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
DO NOT BLINDLY FOLLOW THE ORDER OF THE COMPONENTS ONTO THE TAPE. ALWAYS CHECK THEIR VALUE ON THE PARTS LIST!
1 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

- Watch the polarity!

- LD1: Red
- LD2: Red
- LD3: Red
- LD4: Red
- LD5: Red
- LD6: Red
- 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)
7 Terminal blocks

- 8 x 2p (INPUTS)
- 6 x 2p (OUTPUTS)

8 Relays
- RY1
- RY2
- RY3
- RY4
- RY5
- RY6

9 Electrolytic capacitors
- C1 : 100 μF

Watch the polarity!

10 Male header

2 X 6 pins
2 X 8 pins
II CONNECTION DIAGRAM

1. OUTPUT
   MAX. 24VDC / 1A

2. DIGITAL INPUTS

3. ANALOG INPUTS
   0...5V

DOWNLOAD SAMPLE CODE FROM KA05 PAGE ON WWW.VELLEMAN.BE
Supply voltage (V) - led voltage (V)
required current (A)
= series resistance (ohms)

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

9V - 1.7V
0.005A
= 1460 ohm

9V - (3 x 1.7V)
0.005A
= 780 ohm

(9V - 1.7V) x 0.005A = 0.036W

closest value:
use a 1.5k resistor
use an 820 ohm resistor
a standard 1/4W resistor will do the job

Leds and how to use them

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 dataset of the led)

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 dataset of the led)

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

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Never connect leds in parallel

Leds and how to use them

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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