

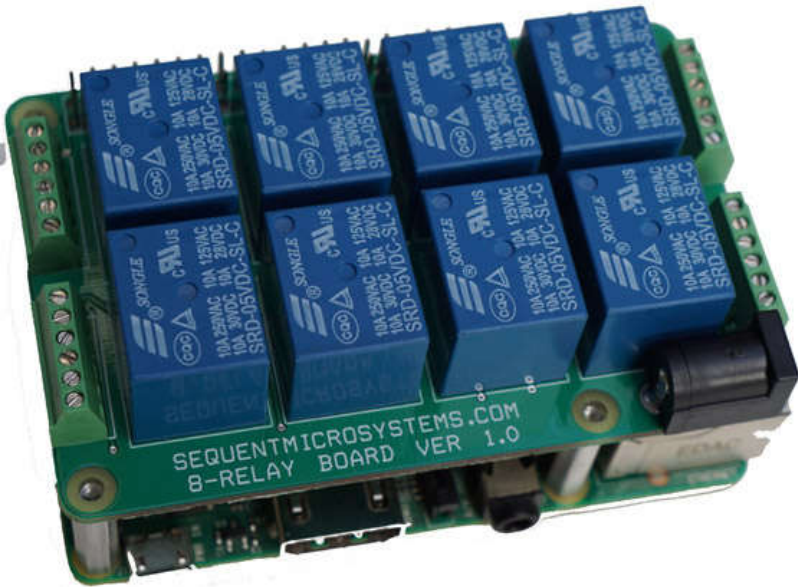
8-RELAY EXPANSION CARD FOR RASPBERRY PI

www.sequentmicrosystems.com

USER'S GUIDE VERSION 1.1

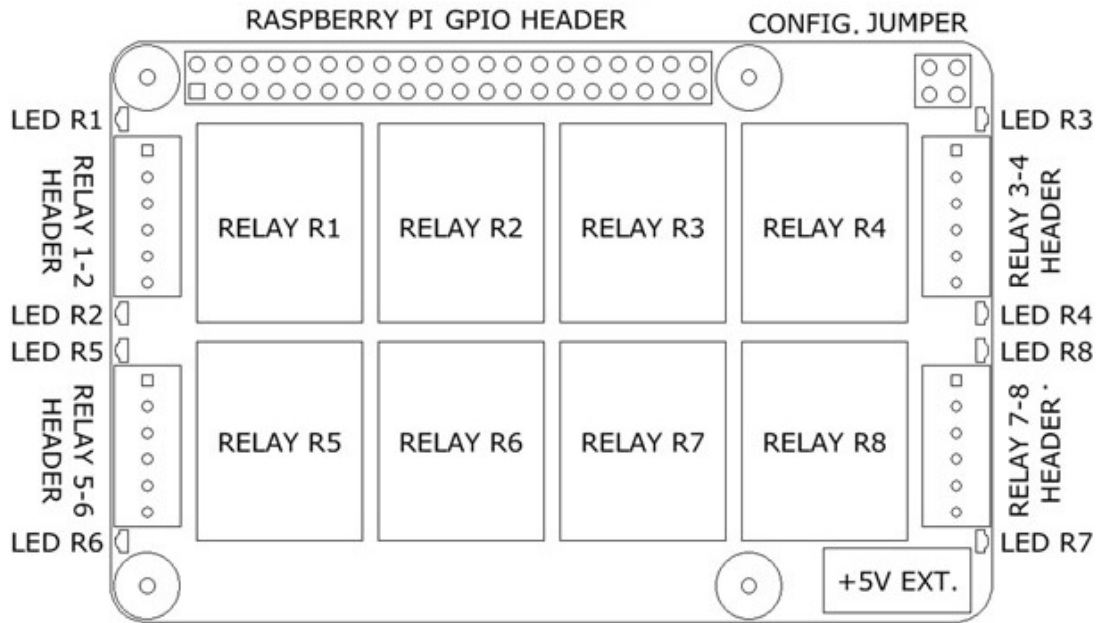
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GENERAL DESCRIPTION

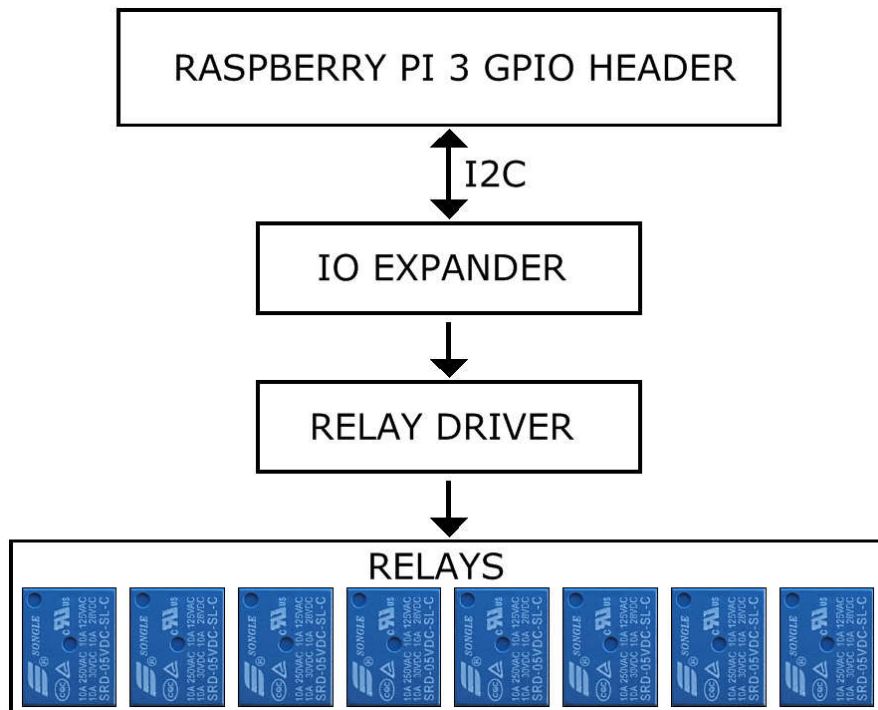


The 8-RELAY card is a stackable expansion card for Raspberry Pi B+, 2, 3 and Zero. It offers a compact and inexpensive solution for adding up to 64 relays to a Raspberry Pi project. Two of the Raspberry Pi's GPIO pins are used for I2C communication, leaving 24 GPIO pins available for the user.

BOARD LAYOUT



BLOCK DIAGRAM



COMPONENT DESCRIPTION

The top 40 pin header plugs into the Raspberry Pi GPIO header and passed through the pins to the next MEGA-IO expansion card.

The eight relays are numbered from upper left to lower right. Numbering the Relays is important to associate them correctly with the Relay Headers and Relay LEDs. The Relays are SPST, with three output pins labeled COM, NO and NC.

The Relay LEDs are right angle, to permit visual inspection of the relays status when multiple cards are stacked.

CONFIGURATION JUMPERS

Stack Level. Three jumpers permit addressing multiple MEGA-IO cards on the I2C bus. No jumpers need to be installed if only one card is present. If two or more cards are stacked up, the card is addressed as follows:

| | | | | | | | | |
|-------------|------|------|------|------|------|------|------|------|
| ID Jumper | 000 | 001 | 010 | 011 | 100 | 101 | 110 | 111 |
| Stack level | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| I2C Address | 0x20 | 0x21 | 0x22 | 0x23 | 0x24 | 0x25 | 0x25 | 0x27 |

RELAY HEADERS

RELAYS 1-2 HEADER

| Pin# | | |
|------|--------|---|
| 1 | R1-COM | □ |
| 2 | R2-COM | ○ |
| 3 | R2-NC | ○ |
| 4 | R2-NO | ○ |
| 5 | R1-NC | ○ |
| 6 | R1-NO | ○ |

RELAYS 3-4 HEADER

| Pin# | | |
|------|--------|---|
| 1 | R4-COM | □ |
| 2 | R3-COM | ○ |
| 3 | R3-NO | ○ |
| 4 | R3-NC | ○ |
| 5 | R4-NO | ○ |
| 6 | R4-NC | ○ |

RELAYS 5-6 HEADER

| Pin# | | |
|------|--------|---|
| 1 | R5-COM | □ |
| 2 | R6-COM | ○ |
| 3 | R6-NC | ○ |
| 4 | R6-NO | ○ |
| 5 | R5-NO | ○ |
| 6 | R5-NC | ○ |

RELAYS 7-8 HEADER

| Pin# | | |
|------|--------|---|
| 1 | R8-COM | □ |
| 2 | R7-COM | ○ |
| 3 | R7-NO | ○ |
| 4 | R7-NC | ○ |
| 5 | R8-NO | ○ |
| 6 | R8-NC | ○ |

POWER REQUIREMENTS

The 8-RELAY card requires +5V power, supplied either from the Raspberry Pi expansion bus, or from its own 2.1mm power jack. The on-board relays are connected to the +5V.

Only one +5V source can be used to power both the Raspberry Pi and the 8-Relay card.

Raspberry Pi 3 current consumption: 250 mA @ +5V

8-RELAY Card current consumption: 10 mA @ +5V (all relays OFF)

750 mA @ +5V (all relays ON)

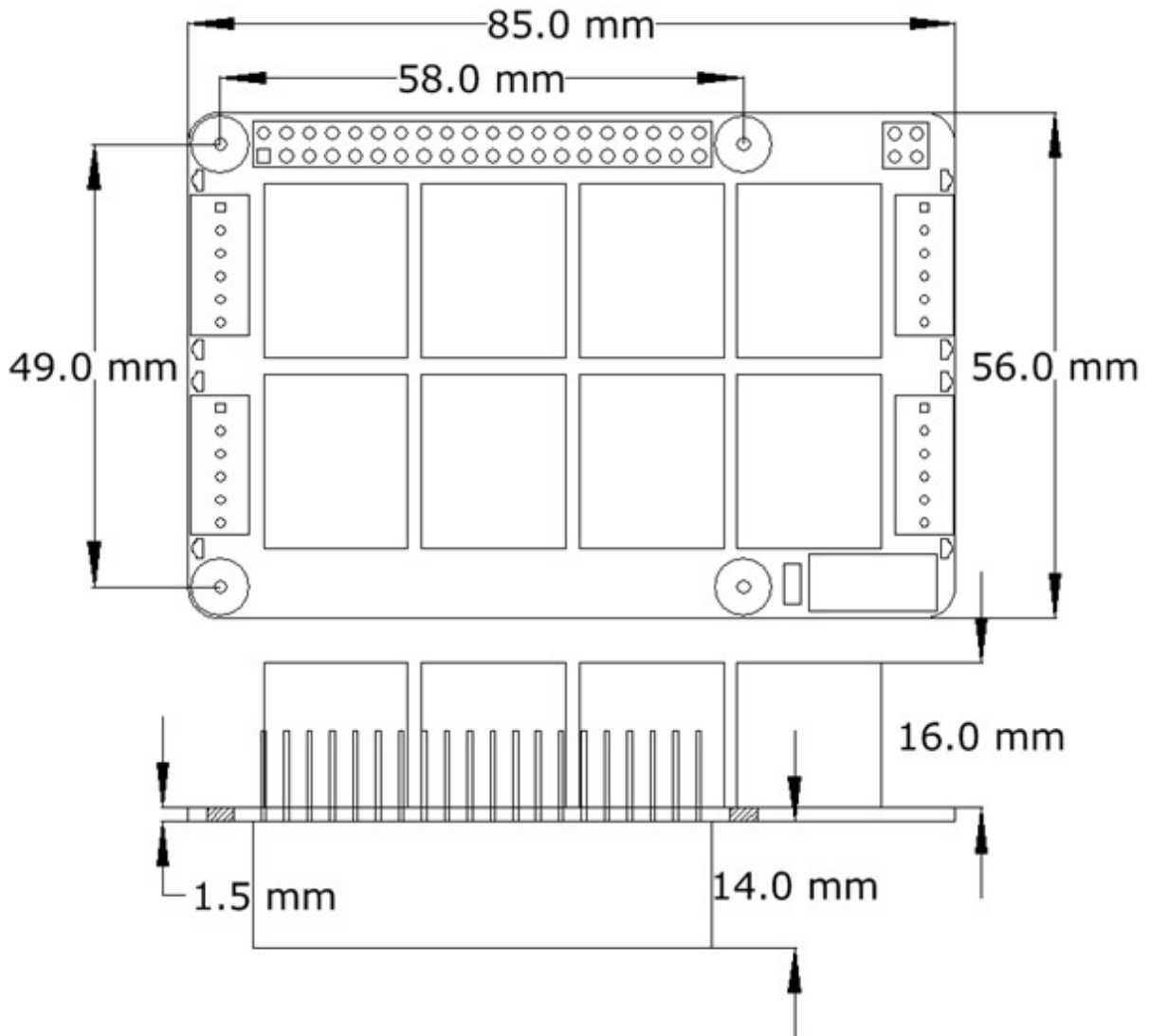
The USB connector which powers the Raspberry Pi can supply maximum 1.5A.

The jack which powers the 8-RELAY card can supply 3A. We strongly recommend using this jack and a 5V regulated power supply rated at 3A or higher.

The 8-RELAY card can be stacked up to eight levels. A multi-stack configuration can be powered from any of the cards. A four stack needs 300 mA for electronic circuits, leaving 2.5A for relays. With some margin of error, not more than 24 relays can be ON at the same time.

In the rare event that your application uses four 8-RELAY cards and requires that all relays be ON at the same time, you need a power source that can supply minimum 4A. You also need to split the power cable and feed the +5V through two 8-RELAY cards.

MECHANICAL SPECIFICATIONS



SOFTWARE SETUP

The 8-Relay board occupies the I2C addresses from 0x20 to 0x27.

1. Have your Raspberry Pi ready with the [latest OS](#).
2. Install the [Wiring Pi](#) library (many thanks to Gordon Henderson)
3. Enable I2C communication:

```
~$ sudo raspi-config
```

```
 1 Change User Password Change password for the default user
 2 Hostname                Set the visible name for this Pi on a
 3 Boot Options            Configure options for start-up
 4 Localisation Options   Set up language and regional settings
 5 Interfacing Options     Configure connections to peripherals
 6 Overclock               Configure overclocking for your Pi
 7 Advanced Options       Configure advanced settings
 8 Update                  Update this tool to the latest versio
 9 About raspi-config     Information about this configuration

P1 Camera                 Enable/Disable connection to the Raspberry Pi Camera
P2 SSH                    Enable/Disable remote command line access to your Pi
P3 VNC                    Enable/Disable graphical remote access to your Pi usin
P4 SPI                    Enable/Disable automatic loading of SPI kernel module
P5 I2C                    Enable/Disable automatic loading of I2C kernel module
P6 Serial                 Enable/Disable shell and kernel messages on the serial
P7 1-Wire                 Enable/Disable one-wire interface
P8 Remote GPIO           Enable/Disable remote access to GPIO pins
```

4. Install the relay8 software from github.com:

```
~$ git clone https://github.com/SequentMicrosystems/relay8.git
```

5.

```
~$ cd /home/pi/relay8-rpi
```
6.

```
~/relay8-rpi$ sudo make install
```
7.

```
~/relay8-rpi$ relay8
```

The program will respond with a list of available commands.

Type "`relay8 -h`" for online help.

After installing the software, you can update it to the latest version with the commands:

1.

```
~$ cd /home/pi/relay8-rpi
```
2.

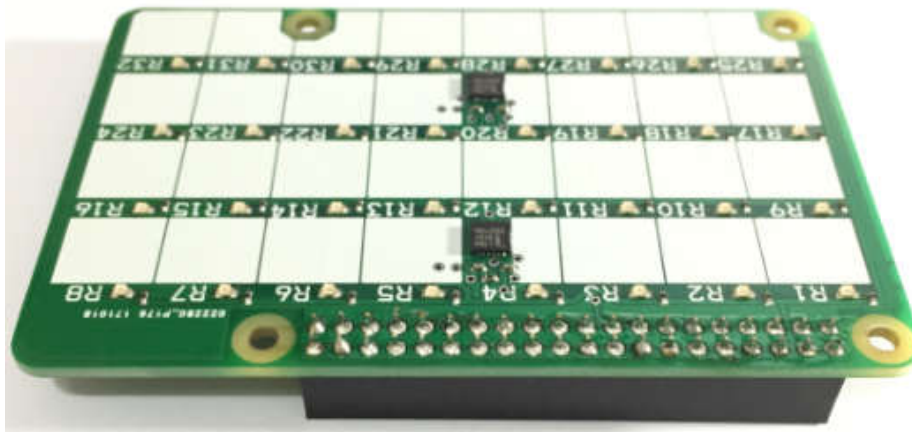
```
~/relay8-rpi$ git pull
```


3. ~/relay8-rpi\$ **sudo make install**

AD-ON CARDS

LED-CARD

The LED card plugs into the Raspberry Pi expansion connector. Its main function is to show in top-view the status of the relays, but it can be used as a general purpose, 32 LED card to show the status of any input or output.



Any LED can be turned on or off using the command “relay8 led [1-32] on/off”.

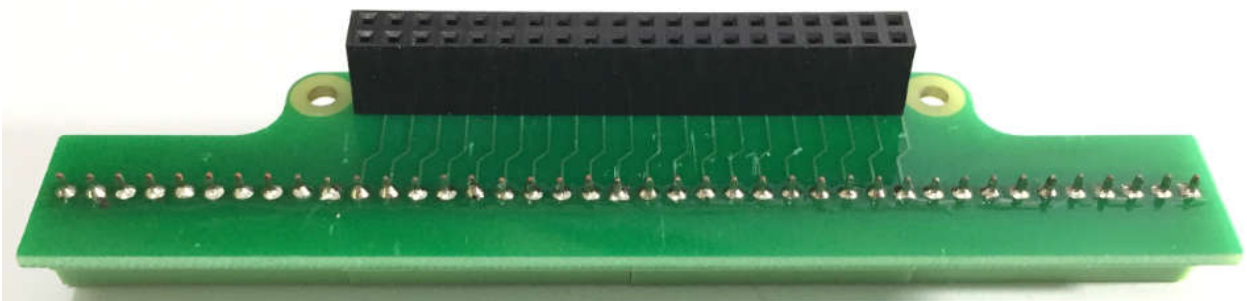
The LED card can show the status of relays from up to four 8-Relay cards. If more than four cards are used, the LED card cannot be used since the I2C address will conflict with the relays.

BREAK-OUT CARD

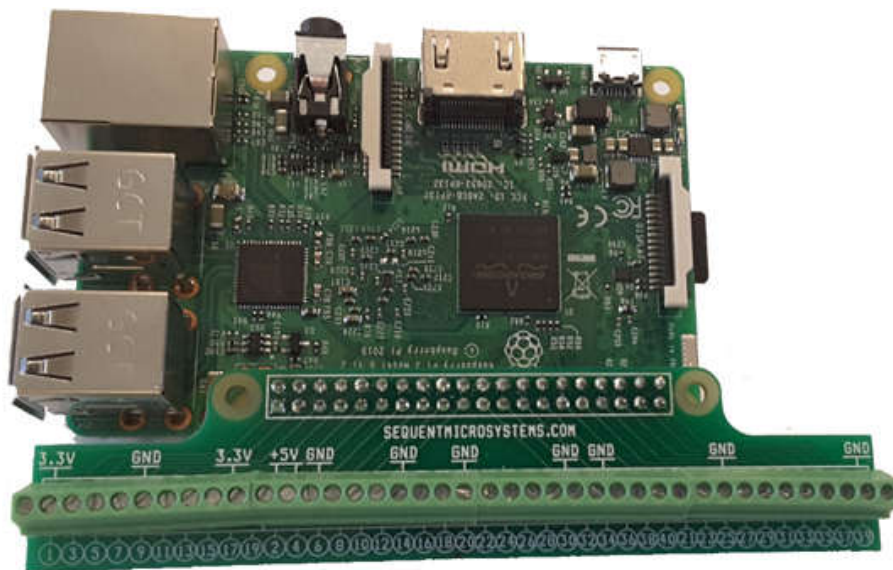
The Break-out card plugs into the Raspberry Pi expansion connector and brings all the IO pins to screw-type terminal blocks.



Break-out card top view



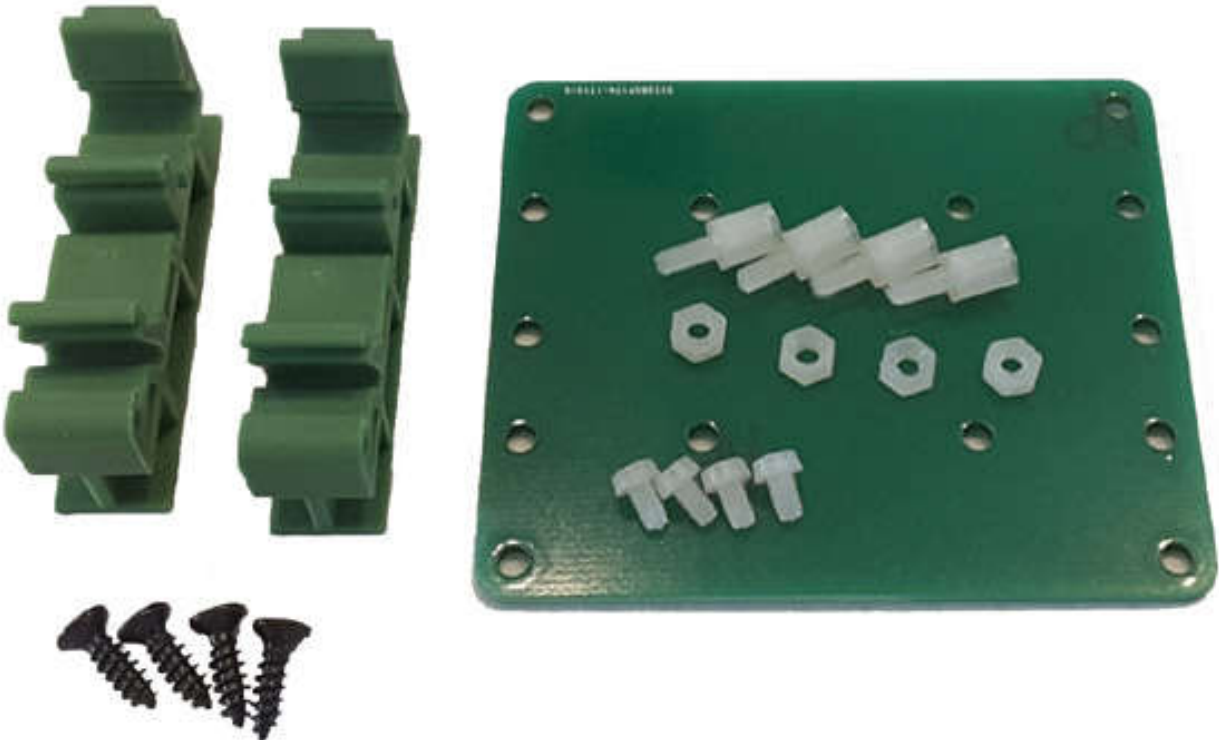
Break-out card back view



Raspberry Pi with Break-out card

DIN-RAIL KIT for RASPBERRY PI

The DIN-Rail Kit permits mounting any Raspberry Pi on a DIN-Rail. It contains all the necessary screws and stand-offs.



MEGA-IO EXPANSION CARD

The MEGA-IO is a stackable expansion card for Raspberry Pi B+, 2, 3 and Zero. Up to four MEGA-IO and/or 8-RELAY cards can be mixed in the same stack. The MEGA-IO card adds the following I/O functions:

- Eight on-board relays
- Eight 12 bit A/D inputs
- Eight optically isolated inputs
- One 12 bit DAC Output
- Four open collector outputs
- Six GPIO's

The MEGA-IO card can be mixed with the 8-Relay card on the same stack