PoExtBus
User's manual

PoExtBus user's manual

1. Description

PoExtBus is a five pin extension bus which is used to connect various peripheral devices to some PoLabs products. It is used to transfer power and signals to the connected peripherals.

Since both PoExtBus and PoNET bus use the same dedicated PoExtBus connector, some explanation is needed to understand it. PoExtBus devices are simple peripherals, designed around 74HC595 (serial to parallel shift register) ICs and support only outputs, while PoNET devices are intelligent peripherals that are using I^2C bus and support input and output capabilities.

Detailed explanation of both PoExtBus and PoNET can be found in the PoKeys user manual. Users should pay attention to the way how PoExtBus and PoNET must be connected to PoKeys device if both types are used at the same time.

Master devices supporting PoExtBus:

- PoKeys55 (only PoExtBus devices)
- PoKeys56 and PoKeys57 series: PoExtBus and PoNET on a dedicated 5-pin connector

Slave devices supporting PoExtBus:

- PoExtBusOC
- PoExtBusOC16
- PoExtBusRe

Features

- Uses only 3 signal wires to control up to 80 digital outputs
- Peripheral devices can be daisy-chained (up to 10 devices in the chain for PoExtBusRe and up to 5 devices for PoExtBusOC16)
- Standardized connectors
- Simple and cheap additional output devices for PoKeys master devices

Requirements

- Master device with available PoExtBus port or
- Master device with available Extension port

2. PoExtBus/PoExtension technical information

Schematics of PoExtBus device is as following. It is intended for use only by experienced electrical engineers, as PoLabs will not explicitly support custom slave devices. Custom slave devices must follow the exact schematic to be compatible. Note that the schematic is not complete, but shows the essential parts of the device.

The PoExtBus devices are compatible with PoExtBus and PoExtension connectors - only one of the input connectors can be connected at a time (PoExtBusIn or PoExtensionIn).

PoLabs develops general purpose PoExtBus devices, as well as custom devices on customer request (in bigger quantities) which are compatible with PoKeys master devices.

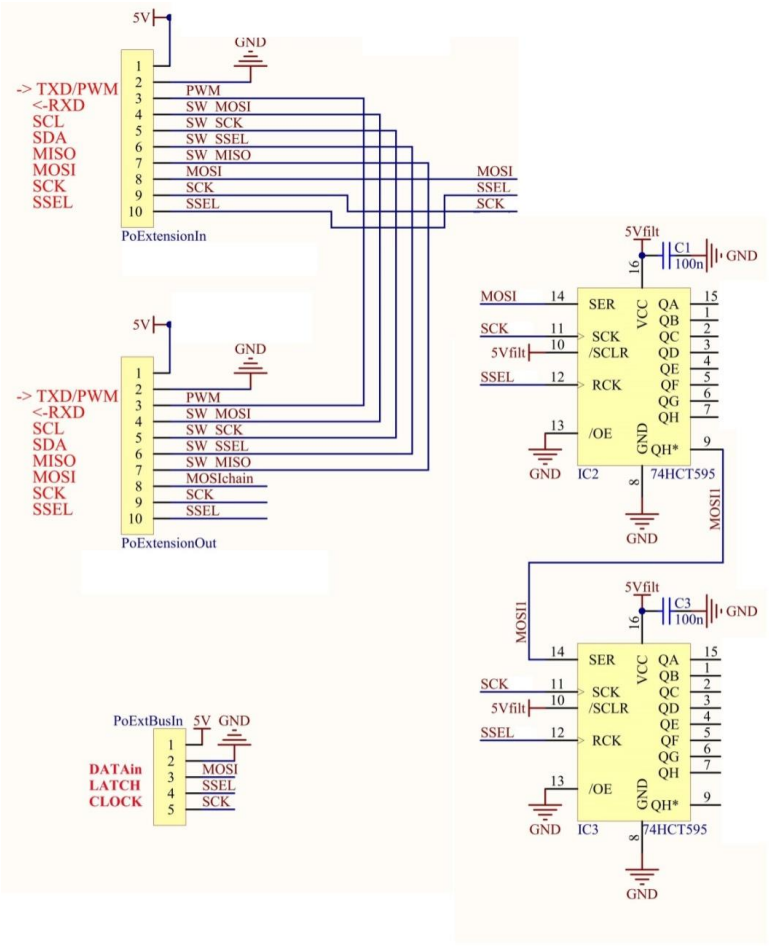


Figure 1: PoExtBus devices template

3. PoExtBus installation

a) Using 5-pin PoExtBus connectors

Identical connectors are used for both "PoExtBus in" and "PoExtBus out". Multiple PoExtBus devices can be daisy-chained together. The user should connect the master device to "PoExtBus in" of the first slave device. The "PoExtBus in" of the second slave device can be attached to "PoExtBus out" of the first slave device. Up to 10 devices (with 8 outputs each) or 5 (with 16 outputs each) can be connected in the same fashion.

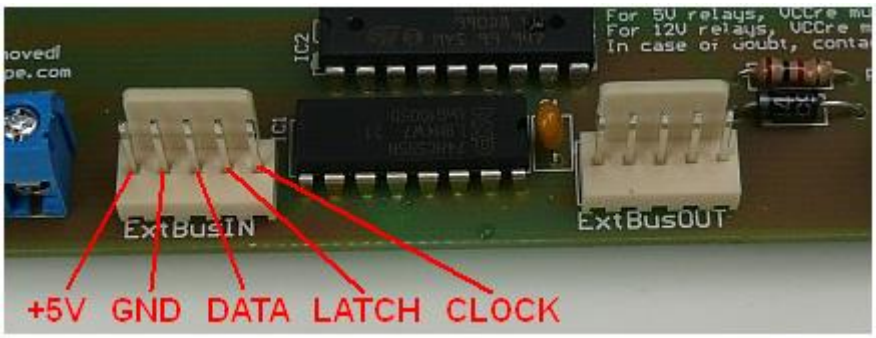


Figure 2: PoExtBus connector layout

Master device must be configured to drive slave devices. Please refer to the PoKeys user manual.

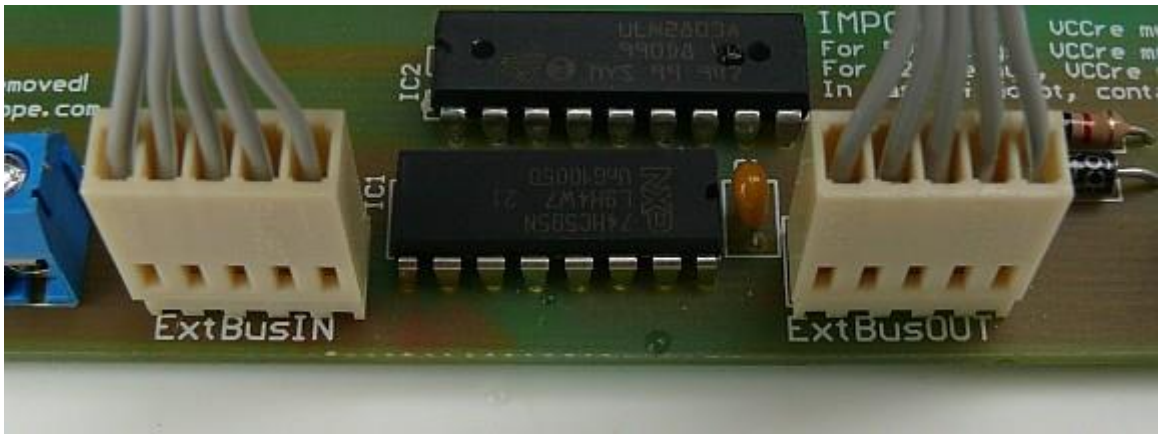


Figure 3: PoExtBus with attached connectors

b) Using PoExtension connectors

Devices with PoExtension connectors must be chained with 10-pin PoExtension cable. Connect the PoExtensionOut of one device to the PoExtensionIn of the next device in the chain.

The connection between the master device and first device in the chain (that with a free PoExtensionIn connector) can be made using either PoExtBus connector or PoExtension connector, but not both.

4. PoExtBusOC (obsolete, for reference only)

Overview:

PoExtBusOC allows expanding the number of outputs of the PoExtBus master devices with 8 opne collector outputs. It can drive relays, lamps, LEDs, solenoids, small DC motors etc. Absolute maximum DC power supply is 40 V maximum, while each channel is capable of sinking up to 400 mA.

Features:

- Use up to 10 boards in cascade using PoExtBus
- 8 open collector outputs per board
- Integrated clamp diodes for transients suppression
- 5 wires board to board ribbon cable to connect to master device or chaining

Absolute maximum ratings:

DC power supply on COM terminal is 40 V max.
DC current on outputs ocA – ocH is 400 mA

PoExtBusOC is simple 8 channel open collector output device.

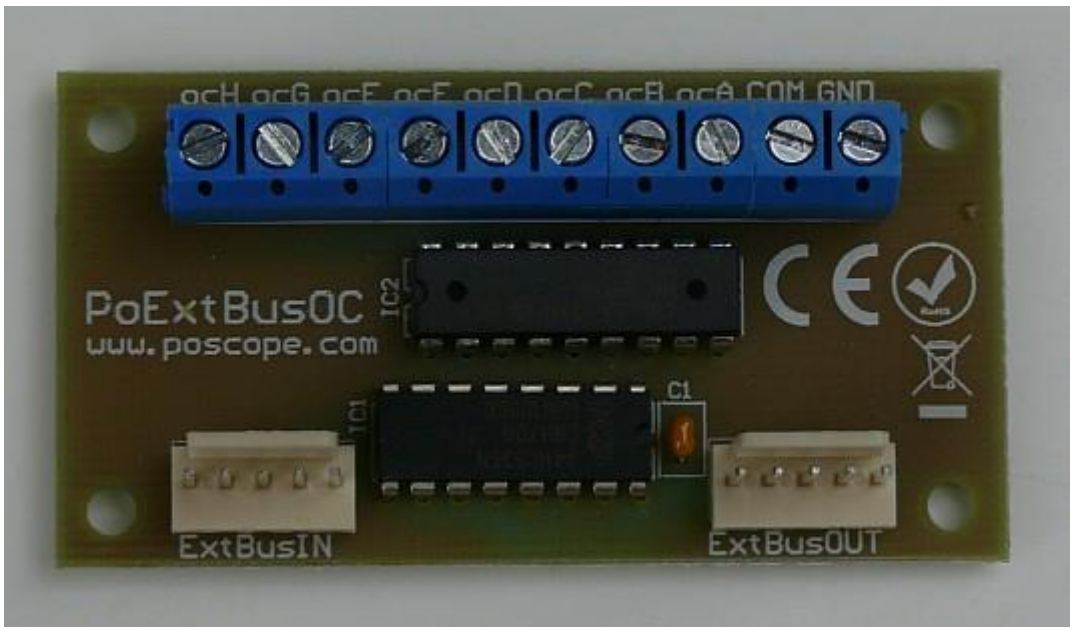


Figure 4: PoExtBusOC

Power supply connection:

Connect Power supply GND to PoExtBusOC GND. Power supply + (max 40 V) must be connected to PoExtBusOC COM terminal.

Loads connections:

Load`s positive terminal (+) must be connected to COM terminal of PoExtBusOC. Load`s negative terminal (-) must be connected to ocA – ocH of PoExtBusOC. Please notice that the maximum current is 400 mA per output.

5. PoExtBusOC16

Overview:

PoExtBusOC allows expanding the number of outputs of the PoExtBus master devices with 16 open collector outputs. It can drive relays, lamps, LEDs, solenoids, small DC motors etc. Absolute maximum DC power supply is 40 V maximum, while each channel is capable of sinking up to 400 mA.

Features:

- Use up to 5 boards in cascade using PoExtBus
- 16 open collector outputs per board
- 16 LEDs to monitor statuses of the outputs
- Integrated clamp diodes for transients suppression
- 5 wires board to board ribbon cable or red PoExtension connector to connect to master device or chaining

Absolute maximum ratings:

DC power supply on COM terminal is 40 V max.

DC current on outputs ocA – ocP is 400 mA

PoExtBusOC is simple 16 channel open collector output device.

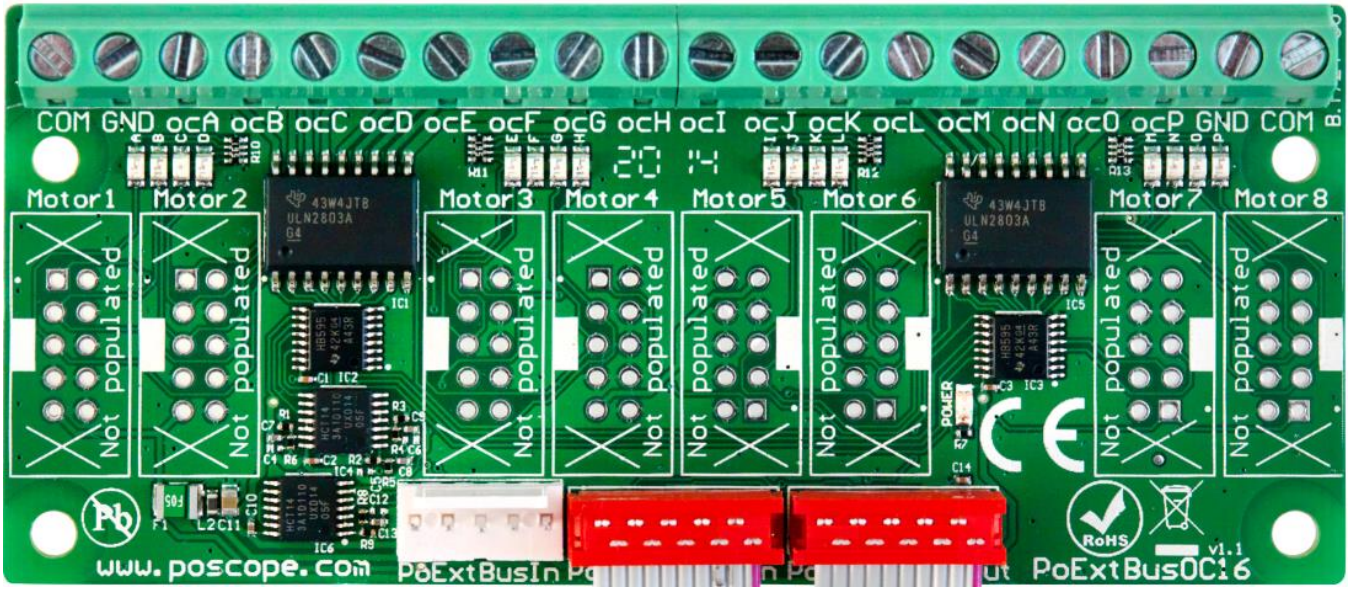


Figure 5: PoExtBusOC

Power supply connection:

Connect Power supply GND to PoExtBusOC GND. Power supply + (max 40 V) must be connected to PoExtBusOC COM terminal.

Loads connections:

Load`s positive terminal (+) must be connected to COM terminal of PoExtBusOC. Load`s negative terminal (-) must be connected to ocA – ocP of PoExtBusOC. Please notice that maximum current is 400 mA per output.

6. PoExtBusOC16CNC - non-PoExtBus device

Overview:

PoExtBusOC16CNC is **not a PoExtBus device**, although it is similar to PoExtBusOC16. PoExtBusOC16CNC is an external pulse generator board, that allows expanding the number of axis (step/direction signals) which PoKeys can control to 8. It uses standard 10 pin 2,54 mm headers/connectors to connect stepper motor drivers. The PoExtBusIn connector should not be used on this board and is left unpopulated, as well as the load connectors on the top of the board.

Please check PoKeys user manual and Pulse engine manual for more information.

Features:

- Up to 8 step and direction signal pairs to control CNC machine
- Connects with only 3 signal pins to a PoKeys device or with a dedicated red PoExtension connector
- Integrated clamp diodes for transients suppression

Absolute maximum ratings:

DC power supply: 5,3 V max.

DC current on step and direction outputs: 10 mA max

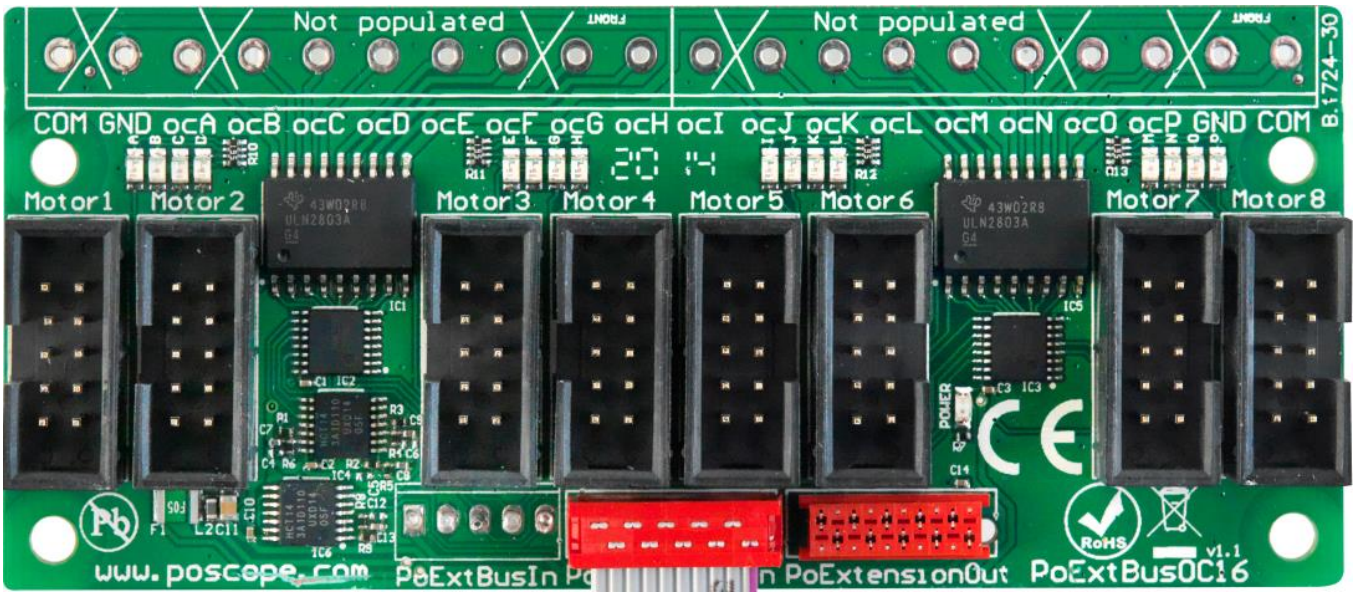


Figure 6: PoExtBusOC

Motor drivers connection:

Use 10 pin 2,54mm raster IDC connectors with flat cable. PoStep and other compatible motor drivers can be connected directly.

PoExtBusOC16-CNC installation

PoExtBusOC16-CNC is shipped with the cable attached to the PoExtensionIn. To use PoExtBusOC16-CNC connect the flat cable to the appropriate pins of PoKeys57E/57U device (PoKeys56U/56E are also supported, see the table below for the PoKeys57 series equivalents). The following table shows how to connect PoExtBusOC16-CNC:

Pin	Description	PoKeys57U pin	PoKeys57E pin
1 (red)	5 V power supply to the PoExtBusOC16-CNC – **must supply at least 40mA for correct operation**	5 V	**5 V**
2	PoKeys ground	**GND**	**GND**
8	Signal for pulse generation	**23**	**9**
9	Signal for pulse generation	**25**	**11**
10	Signal for pulse generation	**26**	**51**

Other pins are not used.

Postep25-32 has the same pinout as PoExtBusOC16-CNC so simply connect pin to pin.

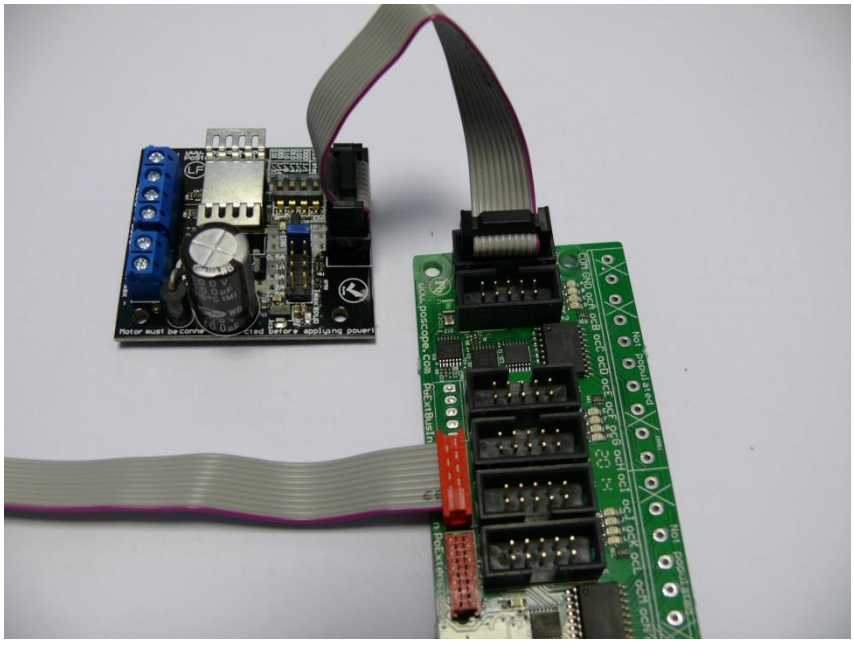


Figure 4: Postep25-32 connected to PoExtBusOC16-CNC

7. PoExtBusRe

Overview:

PoExtBusRe allows expanding the number of outputs of the PoExtBus master devices with 8 channel electromechanical relay extension. It has Vin, NO and NC connections for each relay, ExtBusIn, ExtBusOut and VCCre connectors. There is one green LED for power supply indication and 8 red LEDs for relay operation indications.

PoExtBusRE can also be used with parallel inputs - see chapter below.

Features:

- Use up to 10 boards in cascade using PoExtBus
- 8 built-in electromechanical relays with NO and NC contacts
- 5 wires board to board ribbon cable to connect to master device or chaining
- Can be also used with parallel inputs

Absolute maximum ratings:

VCCre: same supply voltage as relays. If relays are 12 V, 12 V power supply with current capability of 400 mA must be connected to this connector.
Relays on Vin, NO and NC terminals: max. 7 A / 240 VAC or max. 10 A / 125 VAC or max. 10 A / 28 VDC.

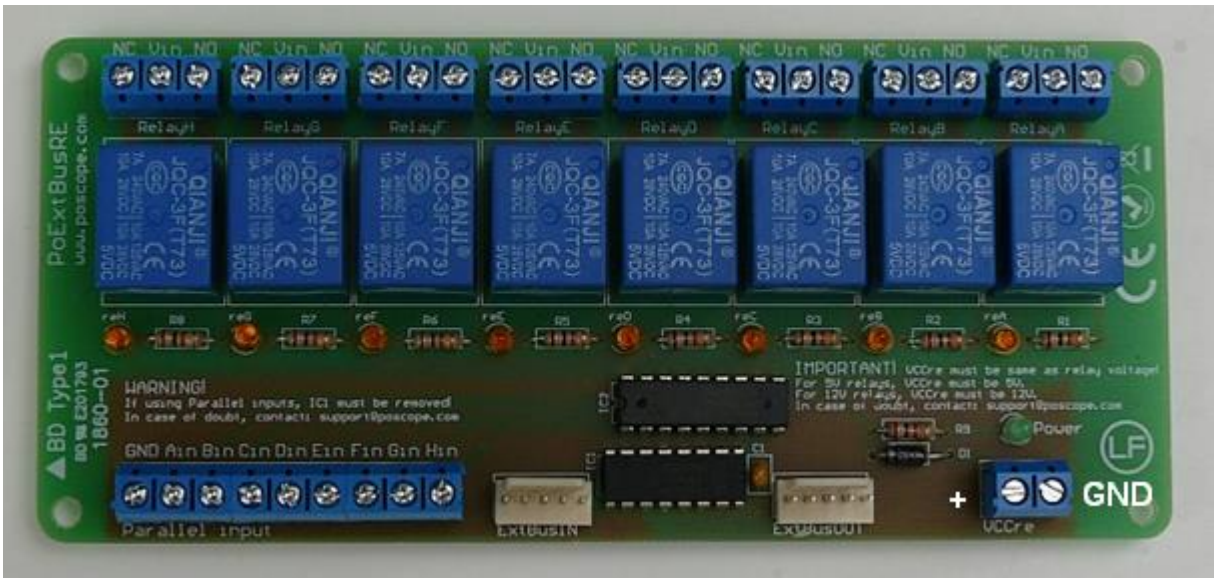


Figure 7:PoExtBusRe

Relays connections:

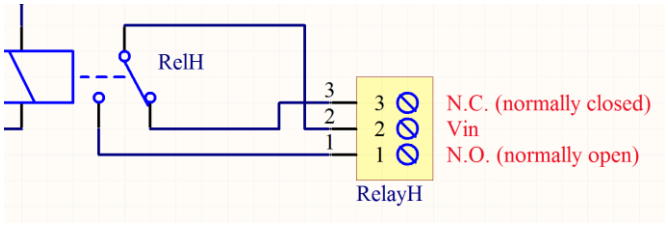


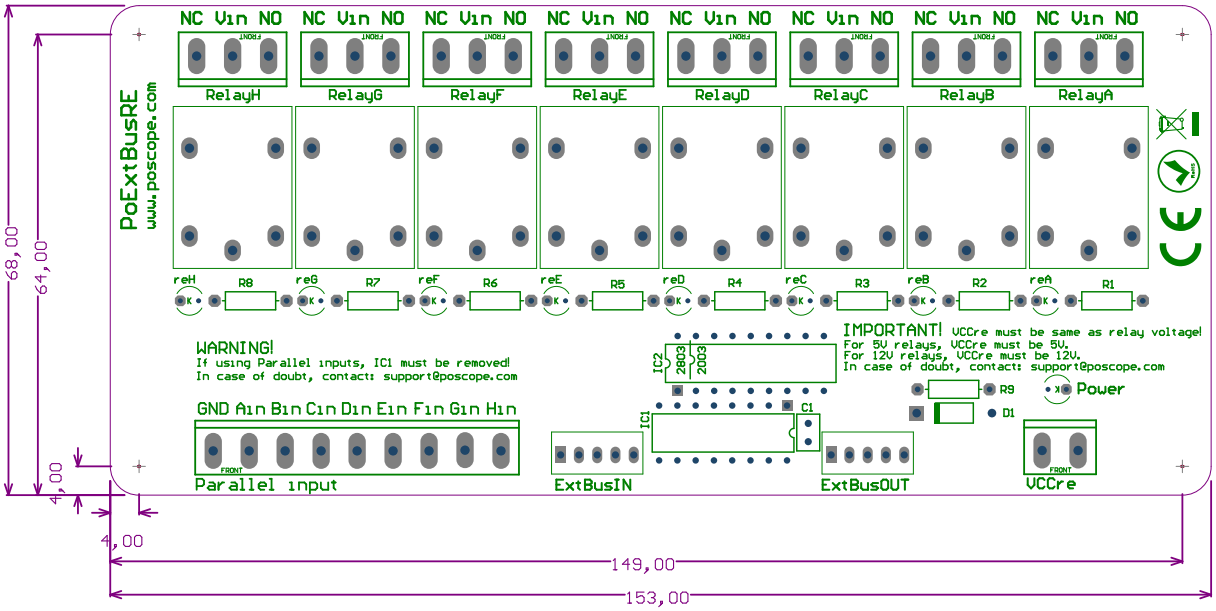
Figure 8: PoExtBusRE relay connection schematics

Connect one part of power supply to Vin. NO, means "Normally open" These contact will close after it will be selected in software. NC means "Normally closed".

Using PoExtBusRE with parallel inputs

If PoExtBusRE will be used with paralel inputs, remove IC1 which is mounted on socket. After that, connect GND and signals to Parallel input connectors. Positive voltage level of the input signal must be between 3,3 V and 5 V.

PoExtBusRE board dimensions



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