For Raspberry Pi® - Getting started

Extend your PiFace™ Relay+ with the PiFace™ Motor EXTRA board, allowing you to control DC motors.

Product highlights

Typical applications:

- Robotics
- Motor control
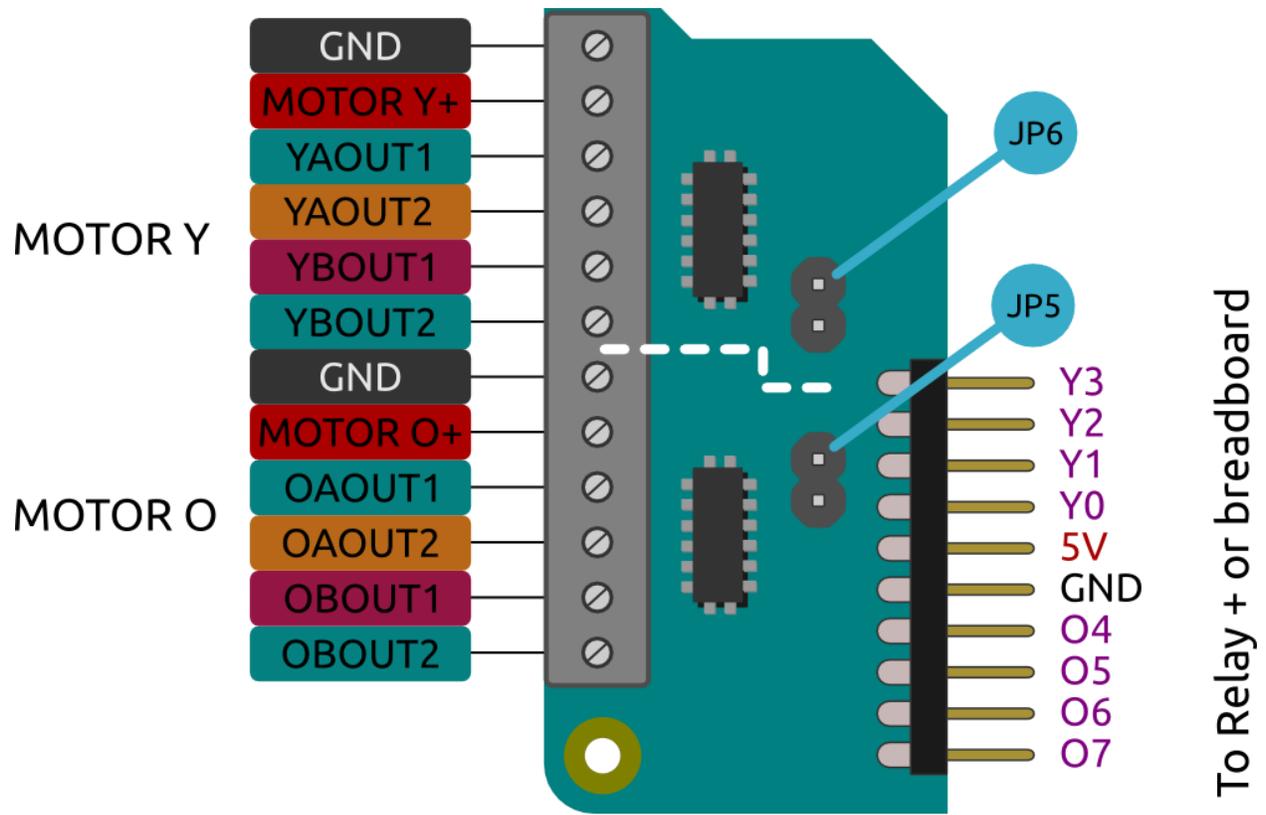- Home automation

Features:

- 2 Dual-H-Bridge motor drivers, allowing you to drive 4 DC motors
- Raspberry Pi® HAT footprint when used with PiFace™ Relay+
- Easy connection with screw terminals
- Compact size
- Can be used directly in breadboards, prototyping and custom designs

Technical specifications:

- Motor power supply voltage 0V to 11V
- Device power supply voltage 2V to 7V
- 4 changeover relays, 20V 1A switching max
- Operating Temp -40° to 70°
- Standard 0.1" pin spacing (breadboard & veroboard compatible)

PiFace™ Relay+ is a highly expandable interface board for Raspberry Pi® with easy to connect screw terminals. A range of pick and mix EXTRA boards allow you to further expand the capabilities. If you need even more connectivity, up to eight PiFace™ Relay+ boards can be stacked on a single Raspberry Pi®. As PiFace™ Relay+ is HAT compatible, the stack fits perfectly on the Raspberry Pi® A+ and B+ models.

Tour of hardware

MOTOR Y

GND	
MOTOR Y+	
YAOUT1	
YAOUT2	
YBOUT1	
YBOUT2	

MOTOR O

GND	
MOTOR O+	
OAOUT1	
OAOUT2	
OBOUT1	
OBOUT2	

JP6

JP5

To Relay + or breadboard

Y3
Y2
Y1
Y0
5V
GND
O4
O5
O6
O7

JP5 Disconnect for Phase/Enable mode on motor O (advanced)

JP6 Disconnect for Phase/Enable mode on motor Y (advanced)

Before using any PiFace™ Relay+ or any PiFace™ EXTRA board always read the instructions and precautions carefully.
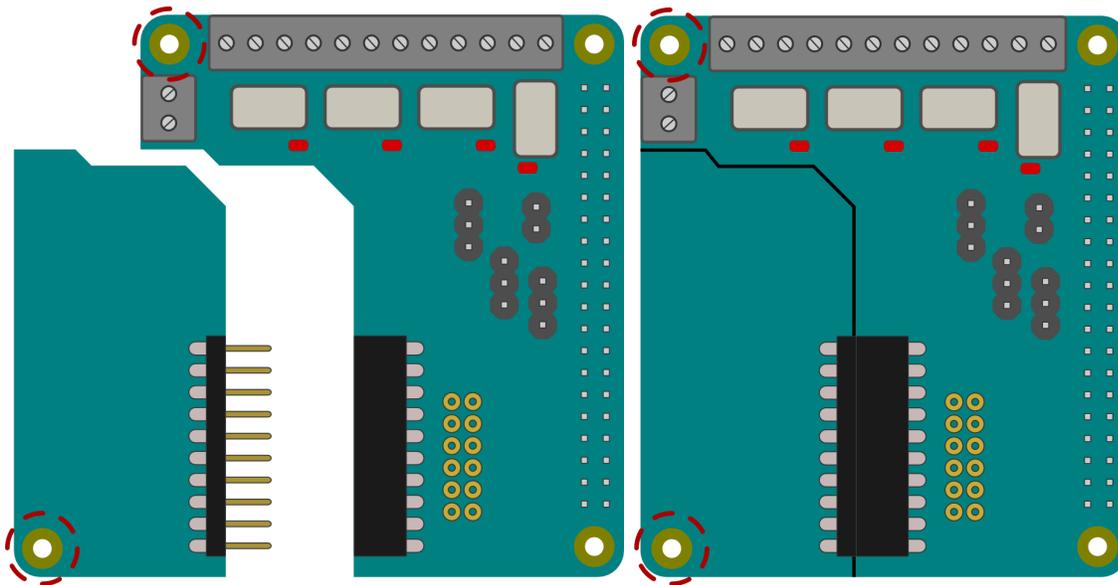
Fitting instructions

Warnings

- Ensure that no power is supplied to Raspberry Pi®, PiFace™ Relay+ or PiFace™ EXTRA boards when fitting any of them together.

Attaching EXTRA boards

Carefully line up all the pins of the PiFace™ EXTRA board with all the sockets on the PiFace™ Relay+. Once aligned, gently push the EXTRA board in until flush.


*PiFace™ EXTRA board simplified in this diagram.

Mounting PiFace™ Relay+ on the Raspberry Pi®

To stop the PiFace™ Relay+ board from wobbling, use the plastic spacer provided. Fit it in the mounting hole that is circled in the diagram above. When attaching a PiFace™ EXTRA board, use the plastic spacer provided with it in the board's only mounting hole, also circled above.

Ensure any spacers are properly lined up, then gently push the Raspberry Pi®'s GPIO pins into the connector. When stacking multiple PiFace™ Relay+s, fit the spacers first before connecting the PiFace™ Relay+ boards.
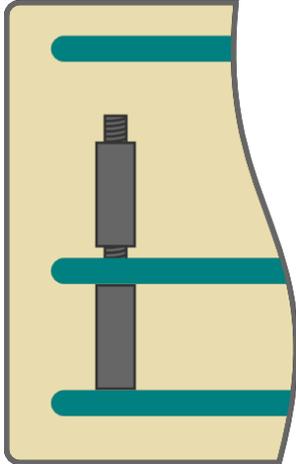
Hardware features

2 motor drivers

On PiFace™ Motor EXTRA there are 2 Dual-H-Bridge motor drivers. These drivers can control 2 DC motors each, via their screw terminals. The drivers are labeled O and Y, and when controlling DC motors, their motors are called A and B, so the 4 motors are called OA, OB, YA and YB. Each DC motor will be driven by two screw terminals (e.g. OA1 and OA2). The terminals are labeled on the underside of the board and in diagram above.
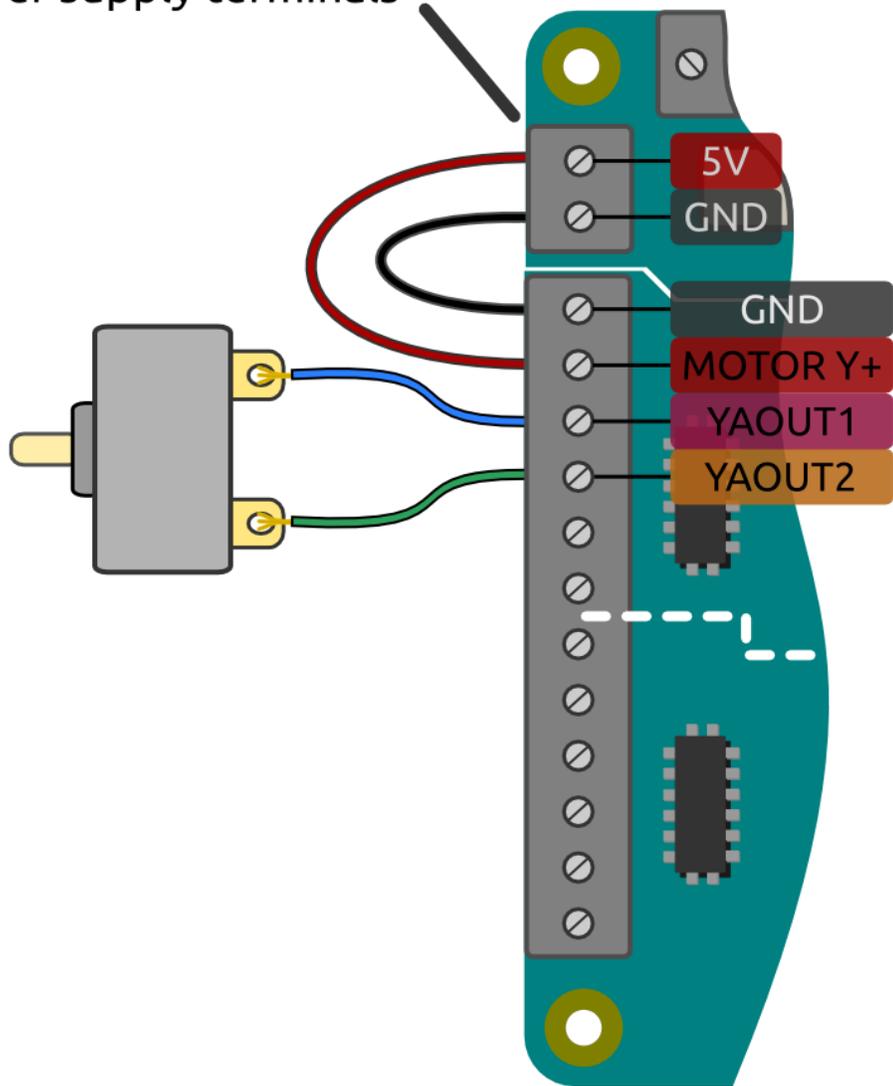
Warning

Never connect the power (5V) and ground (GND) pins together as this will create a short-circuit.

Example of how to wire up PiFace™ Motor EXTRA

This example shows how to wire up a 2-wire motor using power supplied through Relay+ from the Raspberry Pi®.

Relay+ power supply terminals

5V
GND

GND
MOTOR Y+
YAOUT1
YAOUT2

Installing software under Linux

Refer to PiFace™ Relay+ getting started guide for notes on software installation and usage.

Writing an example Python program

This example will walk you through how to write a Python program for PiFace™ Relay+ and Motor EXTRA to control a motor. To write your program, open a Terminal window on your Raspberry Pi® and type `nano motorcontrol.py` to create the program file.

Note:

When you initialise your PiFace™ Relay+ you will have to specify that you are using a PiFace™ Motor EXTRA board.

Import the Relay+ module and the time module (which you will use for delays).

```
import pifacerelayplus
import time
```

Now initialise your Relay+.

```
pfr = pifacerelayplus.PiFaceRelayPlus(pifacerelayplus.MOTOR_DC)
```

In this line the `pifacerelayplus.MOTOR_DC` refers to the PiFace™ EXTRA board you have attached.

Now drive the first motor forward for a couple of seconds with the following lines. The motors are addressed 0-3 in the square brackets.

```
pfr.motors[0].forward()
time.sleep(2)
```

Now stop the motor and reverse the direction for a couple of seconds. To stop the motor we will use `brake`, which locks the motor shaft in place giving a quick stop.

```
pfr.motors[0].brake()
pfr.motors[0].reverse()
time.sleep(2)
```

Now stop the motor using `coast`. This cuts the power but does not lock the motor so it will come to a gradual stop.

```
pfr.motors[0].coast()
```

Now save your program by hitting Ctrl-X then Y. Now run your program in the Terminal window to see the motor shaft move, you may want to attach a wheel or strip of paper to the shaft so you can see the effect more clearly.

```
python3 motorcontrol.py
```

Now try controlling another motor by repeating some of the lines but replacing the number `0` in this code `pfr.motors[0]` with 1, 2 or 3 and running the program again.

Warnings

- PiFace™ Relay+ and PiFace™ EXTRA boards are not intended for use in critical systems.
- Do not expose to water, moisture or extremes of temperature (below -40°C or above 85°C).
- Take care whilst handling to avoid mechanical and electrical damage to the device and connectors.
- Take suitable precautions to minimise risk of causing damage by electrostatic discharge.
- Connection to unapproved devices may affect compliance or result in damage to unit and invalidate any warranty.
- Connections to PiFace™ Relay+, including connecting external circuits and PiFace™ EXTRA boards, should only be made with the power supply disconnected.
- Ensure that PiFace™ Relay+ and PiFace™ EXTRA boards are powered by a suitably rated power supply that complies with the relevant regulations and standards applicable to the country of intended use.
- PiFace™ Relay+ and PiFace™ EXTRA boards will require more power when used in conjunction than when they are used separately.

Compliance information

- This PiFace™ board complies with the relevant provision of the RoHS Directive for the European Union. In common with all Electronic and Electrical Equipment this PiFace™ board should not be disposed of in household waste. Alternative arrangements may apply in other jurisdictions.
- PiFace™ Relay+ board is CE marked. It is a class B product. The EMC emission test was performed with a PiFace™ Relay+ to a Raspberry Pi® Model B+. Due to the nature of the board, as a prototyping and development board, fast transient immunity tests and conducted radio-frequency immunity tests have not been executed. ESD handling precautions should be observed. The board may be considered a component if integrated into another product. Any person designing or developing a product that uses one or more PiFace™ Relay+ boards is responsible for ensuring that it is compliant and any modification to a PiFace™ board or inter-connection of other elements and devices with a board does not change compliance.
- This Class B digital apparatus complies with CAN ICES-3 (B). Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.
- This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.