

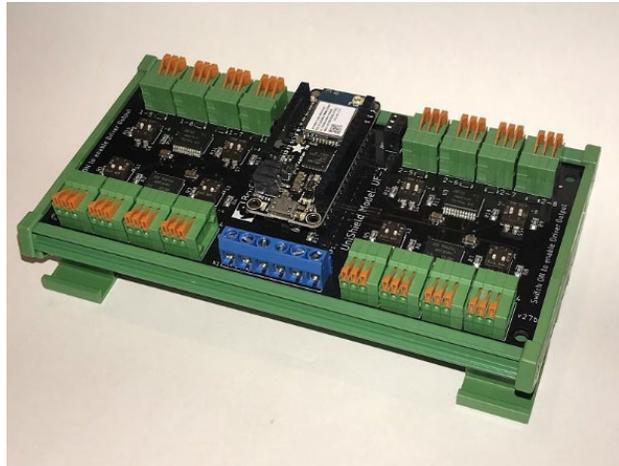
BRUCONTROL

Process Automation Made Personal

Model UF-1

Feather UniShield

(Board version: 27b, updated January 27, 2018)



Description:

This assembled shield contains drivers to allow direct connection of high-current devices such as relays, valves, pumps, small motors, etc. Can output voltages ranging from 5 to 24 VDC and has a pair of banks to accommodate two different voltages simultaneously. Current is as high as 4 A per output. Outputs contain flyback diodes for inductive load noise suppression. Contains headers for an [Adafruit Feather](#) to plug in to shield, allowing for the selection of different Feather models. Includes quick release terminals for I/O connections (direct pin, ground, and driver output) which eliminates the requirement for additional terminal blocks. Design allows for expansion boards to be stacked vertically (pending). Assembled, including DIN-rail carrier.

Specifications:

Input/Output terminals: 16

Driver Output banks: 2 (V1 and V2)

Driver Output voltage range: 5 – 24 VDC

Terminals per I/O: 3 (Direct Pin, Ground, Driver Output)

Driver Output current maximums: 4 A per I/O terminal, 7 A per half bank, 12 A per bank (V1 or V2)

Power Terminals wire size: 14 – 22 AWG

I/O Terminals wire size: 20 – 26 AWG

Dimensions: L x W x H: 153 x 87 x 60mm (6 ¹/₃₂ x 3 ⁷/₁₆ x 2 ³/₈ inches)

Models:

Model UF-1: Feather UniShield, without Feather.

Model UF-1-M0U: Feather UniShield, with Feather M0 Wi-Fi, external antenna. Includes installed [Feather M0 WINC1500](#) Wi-Fi with uFL connector and non-stacking headers (see notes). External [antenna](#) and antenna [cable](#) included.

Model UF-1-M0P: Feather UniShield, with Feather M0 Wi-Fi, internal antenna. Includes installed [Feather M0 WINC1500](#) Wi-Fi with onboard antenna and non-stacking headers (see notes).

Model UF-1-M0B: Feather UniShield, with [Feather M0](#). Includes installed Feather M0 Basic Proto with stacking headers (see notes).

Model UF-1-ESP: Feather UniShield, with [Feather ESP32](#) Wi-Fi, internal antenna. Includes installed Feather ESP32 with onboard antenna and non-stacking headers (see notes).

Notes:

The Feather UniShield will accommodate any Adafruit Feather footprint microcontroller board, however the installer should select one which meets the design criteria and for BruControl applications, where applicable firmware exists. Those models include the Feather M0, the Feather ESP32, the Feather ESP8266, and the Feather M4 (pending). Feathers may be changed simply by plugging/unplugging the desired models.

Feathers with either non-stacking or stacking headers may be used, as long as they contain male pins extending below. Feathers with non-stacking headers do not allow for an expansion Feather shield (e.g. [Ethernet shield](#)) to be plugged on top of the Feather, which will allow an expansion I/O UniShield board (pending) to be stacked vertically on top of the UniShield.

Feathers with stacking headers allow for an expansion Feather shield (e.g. [Ethernet shield](#)) to be plugged on top of the Feather, however this will prevent an expansion I/O UniShield board (pending) to be stacked vertically on top of the UniShield. Expansion I/O UniShield boards can be located next to the UniShield instead in these circumstances.

UniShields which hold Feathers with radios (Wi-Fi, Bluetooth, etc.) with onboard antennas should be mounted in plastic enclosures to ensure adequate signal strength and communication externally. If mounting in a metal enclosure, models with external antennas should be used.

The Feather UniShield contains two banks of I/O terminals: 1-1 through 1-8 on the left side (powered by V1) and 2-1 through 2-8 on the right side (powered by V2). There are three terminals in each I/O terminal group: Direct-pin (DP), Ground (G), and Driver Output (DO). When looking directly into a terminal group, DP is the left-most terminal, G is the middle, and DO is the right-most.



DP terminals connect directly to the associated Feather pin. These can be used for low-current outputs, inputs, 1-wire sensors, etc. just as if the wiring were being directly connected to the Feather. Where used as an output, the current limitations for that particular Feather must be followed (e.g. 10 mA @ 3.3 VDC max).

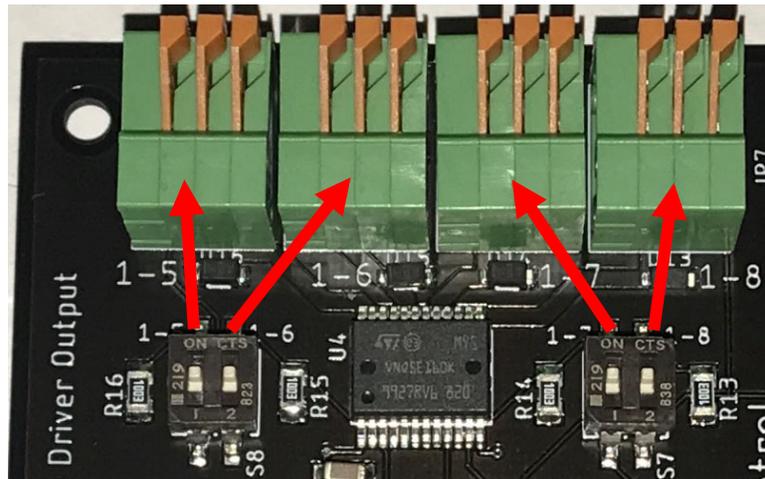
The G terminals are provided for ease of wiring, so that an additional ground terminal block is not required per input/output.

The DO terminals are driven by the high-current driver chips on the board. These are automotive grade and contain protection circuitry to handle overtemperature, overcurrent, and other fault situations. The DO terminals will output the matching voltage input via V1 or V2 when ON, therefore only Active-High configurations can be implemented (do not use Active Low settings in BruControl Device Elements). These terminals will support PWM output by the Feather pins, therefore devices like pumps can be directly power regulated.

The blue screw terminal block (6 position at bottom center of board) is for power input. The 5V terminal feeds the Feather power and is required, otherwise the Feather needs be powered via its USB port. The V1 terminal delivers power to the first bank of driver output terminals (1-1 through 1-8) and the V2 terminal delivers power to the second bank of driver output terminals (2-1 through 2-8).

On either side of the driver chips are pairs of miniature slide switches. These switches connect the respective Feather pin to the driver chip input. These are defaulted in the ON position, but the user may opt to switch them OFF in cases where the driver output will not be used or where complete removal of the driver from the circuit is desired. Turning these OFF will only

disable the DO output terminal – it will have no effect on the DP terminal. The switch location is aligned with the I/O terminal block it affects. These switches are delicate and should be gently switched with an appropriate flat blade screwdriver.



Jumper JP3 (right-angle, male 2-pin header located above the Power Terminals and under the Feather mount) contains the Feather's 3.3 VDC (lower pin) and its AREF input (higher pin). This is shunted (jumped) by default, setting the external analog reference voltage to 3.3V. This jumper may be removed and a different external reference voltage attached to the AREF (higher pin), so long as that voltage does not exceed the minimum input for the Feather (3.3 VDC).

Jumper JP5 (vertical, female 6-position header located to the upper-right of the Feather) contains the following signals:

- 1: 3.3 VDC – Tied to the Feather's power regulator.
- 2: Ground
- 3: Reset – Tied to the Feather's reset pin for external reset.
- 4: SPI SCK / Pin 24 – Tied to the Feather's SPI bus on the SCK line (pin 24).
- 5: SPI MOSI / Pin 23 – Tied to the Feather's SPI bus on the MOSI line (pin 23).
- 6: SPI MISO / Pin 22 – Tied to the Feather's SPI bus on the MOSI line (pin 22).

Jumper JP6 (vertical, male 3-position header located to the left of the Feather) determines if the Feather's extra pin or SCL (pin 21) is connected to I/O terminal 1-8. The Feather extra pin is WAKE on some models, and an I/O number on others. This should be set appropriate to the Feather model being used. If the I2C bus is being used (expansion UniShield I/O boards, for example), this header should be set to the extra pin location, which will have the jumper across the lower and middle pins (1 & 2). The default jumper position is lower & middle pins (1 & 2).

Jumper JP7 (vertical, male 3 position header located to the left of the Feather) contains the I2C bus signals. This bus will be used for expansion UniShield I/O boards.

Switch block 9 (located centrally, under the Feather) applies 10 k-ohm pull-up resistors when ON for the SCL (switch position 1) and SCA (switch position 2) signals. This is ON by default. Turn these OFF if not using the I2C bus or if using SCL/pin 21 as an I/O point (additionally setting jumper JP6 to positions middle and upper pins (2 & 3)).

Installation:

Mount shield assembly to DIN rail base by locating upper track of DIN carrier and snap lower down. Care must be taken to provide adequate ventilation such that the heat generated by these chips can transfer away from the board. Care also must be taken to prevent any contact to board circuitry by external wires, tools, or equipment. Good installation practice dictates that low voltage devices such as microcontrollers be isolated and shielded from high voltage devices and equipment.

Using appropriate wire size for current loads, wire blue power screw terminals: 5V to 5 VDC power supply, V1 to driver output power supply, V2 to driver output power supply (can be same or different as V1), ground to DC ground bus (all power supplies should be tied to single ground point aka star pattern). If powering both V1 and V2, both ground terminals should be wired to accommodate current requirements.

Using appropriate wire size for current load, wire each I/O terminal as needed for application. Consult the Interface Wiring Map for the Feather to determine which I/O terminal applies to which BruControl port and its possible I/O modes. Use a small flat blade screw driver to gently push the orange terminal latch parallel along the board until it is fully depressed, and while holding, insert the wire fully into the terminal, then release the latch. Give the wire a tug to ensure it is seated.

Ensure that the selected Feather model has male pins extending down from its board (these may need to be soldered on by the installer). Gently plug-in the Feather by ensuring the pins are aligned to the 2-row header on the UniShield.

Before powering the Feather or the board, set the appropriate switches and jumpers. If needed, install the correct BruControl firmware into the Feather using a USB connection, set up its network (if using), and test connection to BruControl. Once this is functioning, the Feather and board can now be powered via the power terminals.

Contact BruControl at info@brucontrol.com with any questions or concerns.