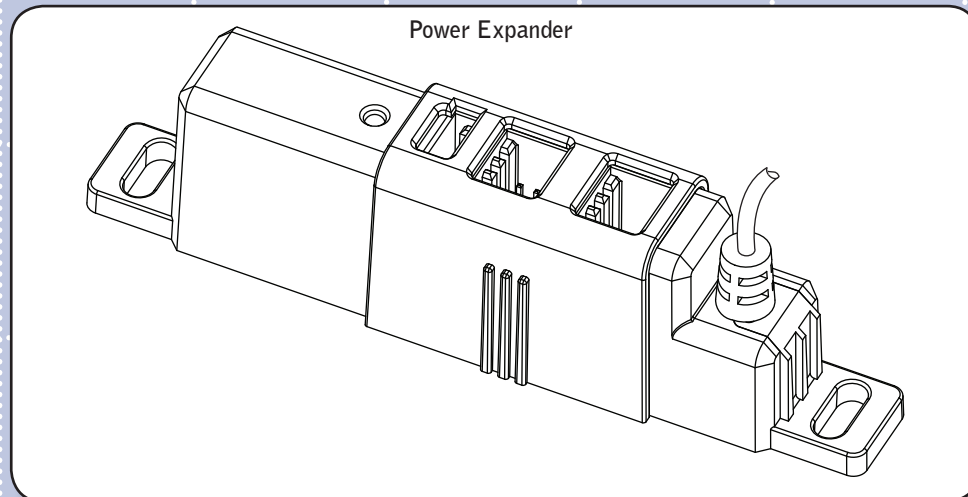
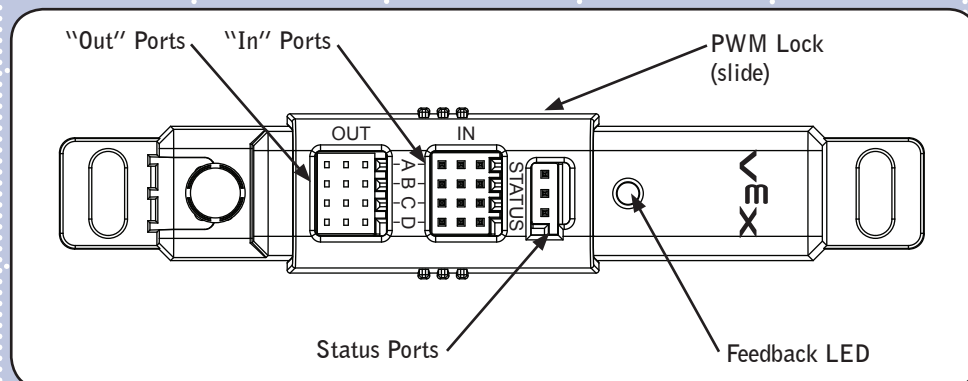


# Power Expander

Use the VEX Power Expander to add a secondary power source for four of the PWM outputs on the VEX Microcontroller. Balance a robot's motor load across two batteries to extend robot run time and increase performance.



The "In" and "Out" ports are labeled "A, B, C, D". Each "In" port is paired with an "Out" port. A motor or servo connected to an "Out" port is controlled by the Microcontroller Motor Port connected to its corresponding "In" port. (i.e. "In" port A controls "Out" port A)



### Usage

- Connect a secondary 7.2V battery to the power connector of the Power Expander. The Power Expander LED should flash green briefly signaling power is being supplied to it.
- Connect up to four (4) Microcontroller Motor Ports to the "In" ports of the Power Expander using 3-Wire Extension Cables.
- Connect Continuous Rotation Motors or Servos to the corresponding "Out" ports of the Power Expander.
- Slide the Power Expander PWM Lock to secure cables.
- Turn on your Microcontroller. The feedback LED should now show the status of the Power Expander and motors/servos should respond normally based on the secondary battery power.

### Limited 90-day Warranty

This product is warranted by VEX Robotics, Inc. against manufacturing defects in material and workmanship under normal use for ninety (90) days from the date of purchase from authorized Innovation First dealers. For complete warranty details and exclusions, check with your dealer.

VEX Robotics, Inc.  
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For More Information, and additional Parts & Pieces refer to:  
[www.VEXrobotics.com](http://www.VEXrobotics.com)

### Power Expander, continued

#### Status Port

The Power Expander includes a Status port that can be connected to an Analog/Digital input on the VEX Microcontroller. The VEX Microcontroller can use this data to calculate the approximate voltage of the battery connected to the Power Expander. To determine this value, divide the Power Expander read-out as follows. The examples are for a 10-bit result (maximum value of 1023). If using a compiler with 12-bit resolution (max value of 4095), multiply the analog values and divisors by 4.

#### Power Expanders, no revision, Rev NC1, A or A1:

With PIC Microcontrollers, divide the analog port value by 70.8.

Example: The PIC analog value is 460.  $460 / 70.8 = 6.5$

6.5v is the current voltage of your Power Expander battery.

With Cortex Microcontrollers divide the analog port value by 45.6.

Example: The Cortex analog value is 297.  $297 / 45.6 = 6.5$

6.5v is the current voltage of your Power Expander battery.

(See errata)

#### Power Expanders of revision A2:

With PIC Microcontrollers, divide the analog port value by 155.

Example: The PIC analog value is 930.  $930 / 155 = 6.0$

6.0v is the current voltage of your Power Expander battery.

(See errata)

With Cortex Microcontrollers divide the analog port value by 70.

Example: The Cortex analog value is 455.  $455 / 70 = 6.5$

6.5v is the current voltage of your Power Expander battery.

#### Errata, Rev A and Rev A1 Power Expanders with Cortex:

Due to loading of the Cortex analog circuit, the Power Expander LED will blink red even though the battery is good and the internal circuit breaker is not tripped. VEX Robotics can update Rev A and Rev A1 Power Expanders to Rev A2. This will restore normal LED response.

#### Errata, Rev A2 Power Expanders with PIC:

NOTE: Analog values are valid over the range of 6.5v - 4.5v. Suggested threshold values are: above 974 is good ( $6.3v \leq \text{batt}$ ), between 851 - 973 is battery low ( $5.5v \leq \text{batt} \leq 6.3v$ ) and below 851 is battery critical ( $\text{batt} \leq 5.5v$ )

If the value drops below 4.8v, the internal Circuit Breaker may have tripped.

#### LED Feedback

The Power Expander also incorporates an internal circuit breaker to prevent damage to the unit or connected devices. Refer to the following LED status chart for more information. The Feedback LED provides the battery and circuit breaker status of the unit.

Green	Battery Good
Yellow	Battery Low
Red	Battery Critical
Slow Red Blink	Circuit breaker is tripped
Fast Green Blink	Circuit breaker was tripped / Battery Good
Fast Yellow Blink	Circuit breaker was tripped / Battery Low - Charge soon
Fast Red Blink	Circuit breaker was tripped / Battery Critical - Charge Now