

## Receive Power LED Indicators

The receiver power LEDs indicate the receiver is getting power. It does not actually recognize if the receiver is getting the 5V it should get.

## Optional Failsafe-switch

**Warning: Always make sure the failsafe-switch is off before charging through the PowerExpanderPro.**

**Failure to do so may result in the servos getting a voltage too high for them resulting in servo failure.**

**The failsafe-switch and charge jacks can only be used when batteries are plugged directly into the PowerExpander.**

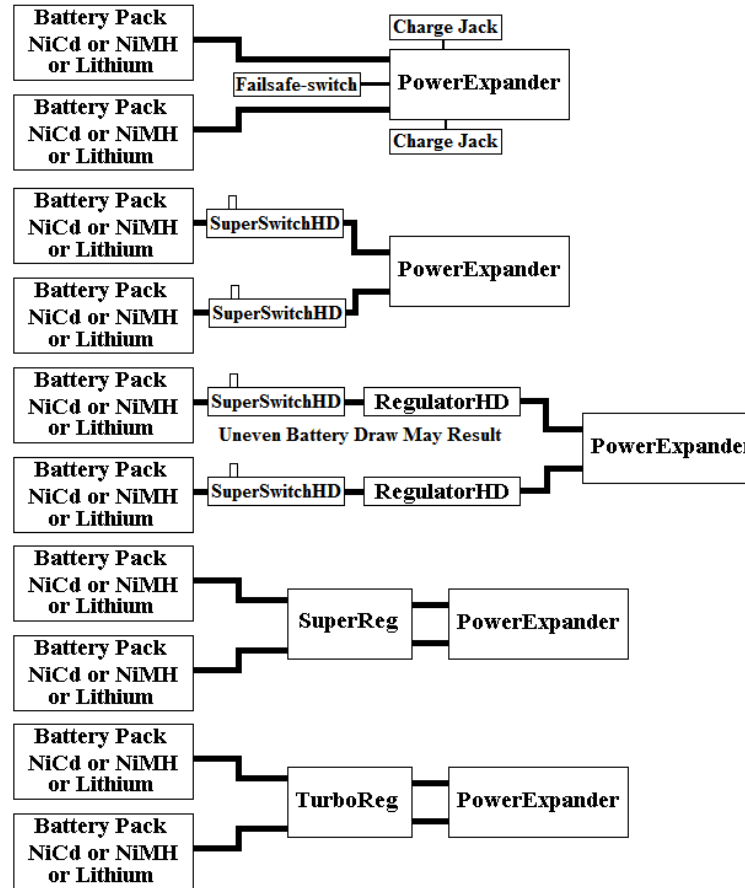
The PowerExpander Pro supports the addition of a failsafe switch (optional package) for use when batteries are being used without regulators. The PowerExpander Pro supports 5-cell NiCd or NiMH or 2-cell lithium packs, ion or poly. When using the failsafe-switch, the switch lead is plugged into the input marked "Sw" near the bottom right of the servo connections as shown on the reference drawing.

Smart-Fly provides two types of failsafe switches. First is the standard slide switch that most people are familiar with. This is a small slide switch with out a charge jack. The second failsafe-switch is the Pin&Flag switch, where a pin, with a flag on in, is inserted into the switch to turn the system off. To fly, the pin is pulled out of the switch. The advantage of the Pin&Flag switch is that the system cannot accidentally be turned off, as can be the case with a slide switch. The failsafe switch lead can be extended using a standard Futaba extension.

The PowerExpander Pro also supports charging the batteries through the two "Chg" connections, one on the bottom of each servo output rail as shown on the reference drawing. The optional failsafe-switch package includes two charge leads and two Ernst charge jack mounts. The charge leads have a Futaba male on one end and a JR male on the other end. You may use these by plugging either end into the PowerExpander Pro and the other end into the charge jack holder.

The charge jacks on the PowerExpander Pro can also be used to connect to a battery meter. One thing to keep in mind when using a battery meter and the failsafe-switch is that the jacks are not switched off when the unit is off so the battery meter will continue to draw power when the unit is turned off.

## Typical Installation Configurations



Additional information and technical help can be found at [www.Smart-Fly.com](http://www.Smart-Fly.com)

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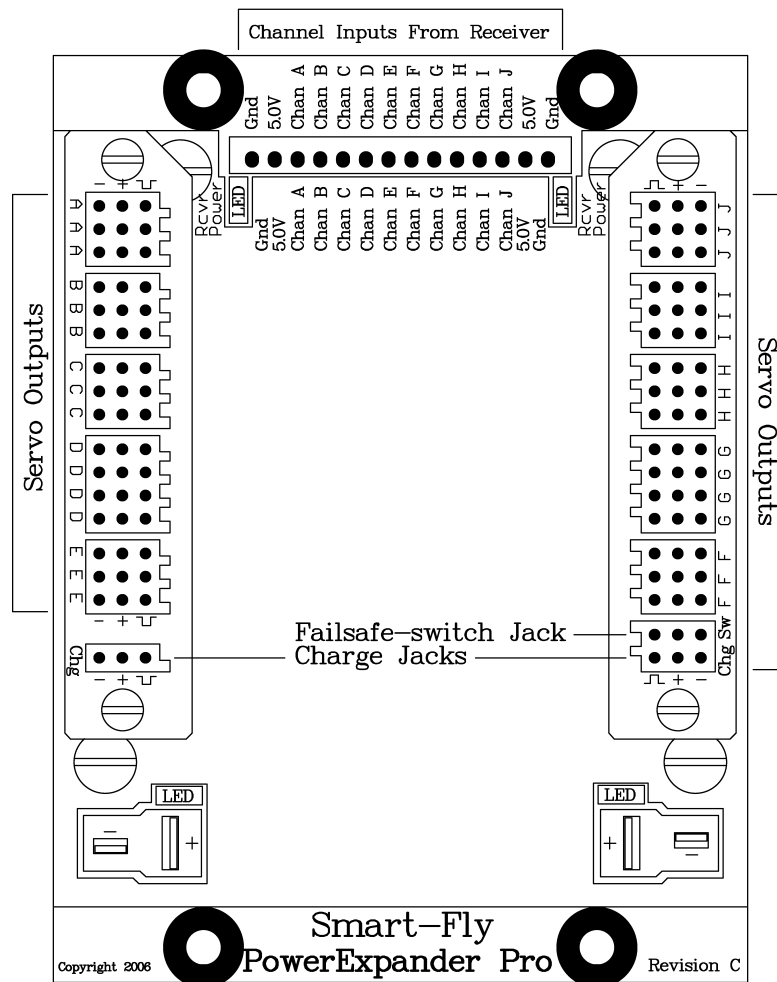
## User Guide

*Thank you for purchasing the Smart-Fly PowerExpander Pro!*

This manual takes you through the installation and operation of the Smart-Fly PowerExpander Pro unit. The unit is a power distribution unit that supplies full power to your servos while supplying a clean, regulated voltage to your receiver. Features of the PowerExpander Pro are:

- ❖ Light weight, 2.6oz, 74g
- ❖ Compact design, footprint is 4" x 3"
- ❖ End-loading and top-loading receivers supported
- ❖ Filtered and regulated 5.0V power to the receiver
- ❖ 1-amp receiver regulator
- ❖ "Smart-Sense" inputs for error detection
- ❖ Long servo lead line matching
- ❖ LED power indicators for input and receiver power
- ❖ Fully buffered outputs on all channels
- ❖ Full RF filtering of all signals in and out of the unit
- ❖ High-current Deans UltraPlug power input connectors
- ❖ Optional failsafe-switch and charge jack package available
- ❖ Compatible with 8.4V lithium packs direct input (for use with Hitec 5995 servos)

## Reference Drawing



### Receiver Mounting

The receiver mounts in the center of the unit. 3M dual-lock mounting tape has been supplied to mount the receiver. This tape's holding power is extremely strong so it is recommended that the whole 1"x2" piece not be used. Instead it is recommended that you cut some 1"x 1/2" strips and use these on either end of the receiver.

### Receiver Connections

The receiver servo outputs are connected to the pigtailed coming out of the PowerExpander Pro in the area marked "Channel Inputs From Receiver" on the reference drawing. The two channels on the end

("Chan A" and "Chan J") have power connections to the receiver in addition to the signal connection. It is recommended that if you have a receiver that has less than ten channels that you still use both the end connections as this will provide you with power redundancy to the receiver in event that a power or ground lead should fail.

The unit will accommodate both end-loading receivers and top-loading receivers. All signals coming from the receiver into the PowerExpander Pro are RF filtered. This prevents noise from the servos from going out the receiver connectors into the receiver. If not all channels are going to be used then the unused pigtail can be tucked away.

### Connections Directly To Receiver

If you want to connect a device directly to the receiver instead of going through the PowerExpander Pro, make sure the current draw of the receiver and the device is less than one amp.

There are several reasons that a device might be connected directly to the receiver instead of going through the PowerExpander Pro. The most likely reason would be when lithium batteries are connected directly to the PowerExpander Pro, with no regulators, when Hitec 5995 servos are used. In this case a servo other than a 5995 might be used for the throttle. As long as the combined current draw of the receiver and servo does not exceed one amp this will work just fine.

### Servo Connections

Servos are connected to the PowerExpander Pro along the two rails on either side of the receiver. The servo connectors are universal in that they will work with Futaba or JR connectors. When using a JR connector please be careful to observe the polarity of the connection. The negative servo power lead (black on Futaba, brown on JR) is indicated by the "minus" sign. The positive servo power lead (red on Futaba and JR) is indicated by the "plus" sign. The servo signal line (white on Futaba, orange on JR) is indicated by the "top hat" symbol.

All receiver channels have each servo signal output individually buffered. If a servo were to short out its signal wire, the other servos on that channel would not be affected. Eight of the channels have three servo outputs and two of the channels have four servo outputs. The channels with four servo outputs correspond to Futaba's and JR's assignments of the rudder channel.

The unit also RF filters each signal output and matches line impedance resulting in a cleaner signal down long servo leads. The impedance matching reduces the electrical "ringing" that can occur on long servo

leads. Ringing can generate RF interference and can reduce receiver range.

### "Smart-Sense" Power Connections

Power is connected to the unit through the two Deans UltraPlug male connectors. The polarity of the Deans connector is shown on the reference drawing. The "Smart-Sense" power inputs will show, by the LED for that input being lit, that the input connector is enabled. When an input is enabled, the voltage drop into the unit is less than 0.15V at five amps and less than 0.3V at ten amps. This is much less than a diode voltage drop, which most other units use. The "Smart-Sense" input recognizes this by the fact the two input sources are within 20 millivolts of each other. When the LED for an input is not lit that input is turned off and power cannot flow out of the connector, as would be the case if a pack shorted.

If one LED is not lit then the power on that connector may have something wrong with it. This could be one of several things. If you have batteries connected directly to the unit then the two packs may not be charged to the same level. The higher pack will be drawn from until the two packs equalize in voltage. After the pack voltages equalize power will be drawn from both batteries. If one pack has lost a cell and is at a much lower voltage this equalization will never happen and the power to the system will come from the good pack. If a pack should short, that input will be disabled and the system will run off the good pack.

If regulators are being used on the two inputs then one regulator may be set more than 20 millivolts below the regulator that has the LED lit or the regulator may have gone bad. The "Smart-Sense" inputs can be used to get dual regulators in the "neighborhood" of being equal but it should be remembered that regulators will not draw evenly when their outputs are connected together, unless they are matched to less than a hundredth of a volt which is very hard to do and may be impossible for a given set of regulators. One thing to remember if you are using adjustable regulators and one battery pack is going down faster than the other, adjust the voltage up of the regulator on the battery pack that is being used less.

It is highly recommended that you beef up the power wiring between the battery and the PowerExpander Pro above the standard 22ga wiring. Failure to do this will diminish the effectiveness of the PowerExpander Pro at providing the highest possible voltage to the servos. Servos operating at lower voltages produce less torque than they are rated at.