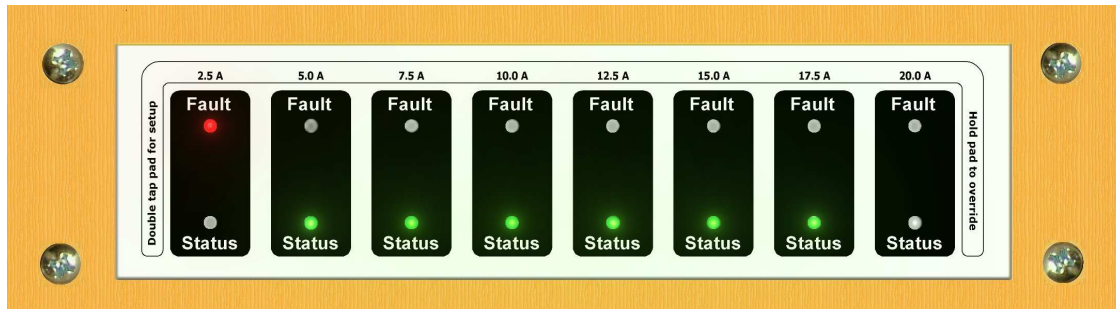


Ztron Labs ZL-BP8 + BP4 User Guide



Introduction

ZL-BP8

The ZL-BP8 is an extremely simple, load power switching and protection device, yet is a precision instrument.

Replacing eight conventional switches and circuit breakers, in less space for about the same cost.

These units use advanced microprocessor circuitry to provide the highest accuracy and greatest flexibility in the industry.

Comprising eight individual channels of power monitoring and control in a single, all solid-state unit.

These units can be reprogrammed to different current settings at any time with just three taps on the keys.

There are no fancy or required installation extras, just four 5/32" holes for mounting bolts and a small 1.5"x5.5" rectangular cutout in your instrument panel.

Because these units are solid-state and use capacitive sense buttons, they are extremely reliable and consistent in use, with no moving parts to wear out!

Simplifies power wiring and lets you decide on the protection level needed after installation.

ZL-BP4

The ZL-BP4 is the BP8's smaller brother. It has the same features, but used where only 4 switches are needed.

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Power Channels

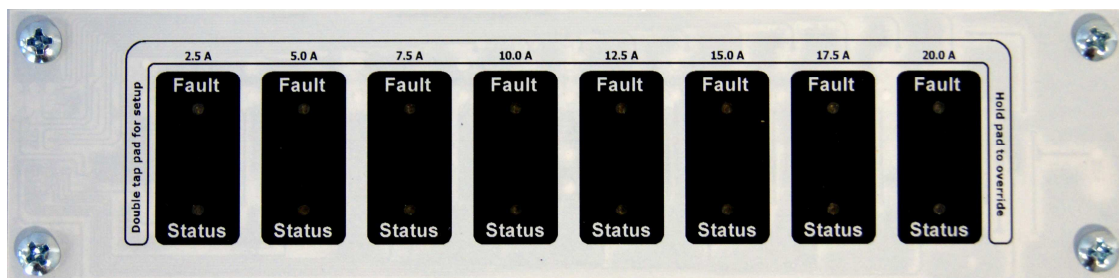
The ZL-BP8 is an eight channel electronic power-switching device, which also monitors and controls the current into each of these channels. All channels are equivalent, but for discussion purposes we will identify them as Channels CH1 through CH8, left to right on the front side and CH8 through CH1 on the back side.

Each channel can switch up to 15 Amps from the supply input through to its attached load. Each channel can be switched On or Off manually by touching the associated key pad, and each channel can be switched Off automatically if excessive current is drawn.

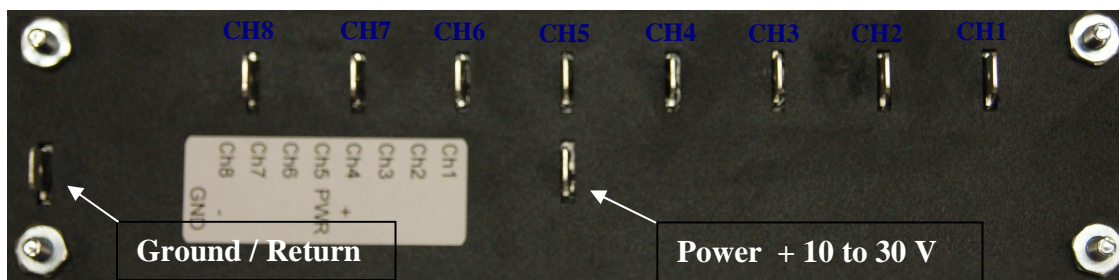
The current threshold at which any channel will trip off is selectable by the user (see the programming section). When we ship the ZL-BP8 or ZL-BP4, each unit is preset with all channel having 10 Amp trip thresholds.

ZL-BP8 Front Side

CH1 CH2 CH3 CH4 CH5 CH6 CH7 CH8



ZL-BP8 Back Side

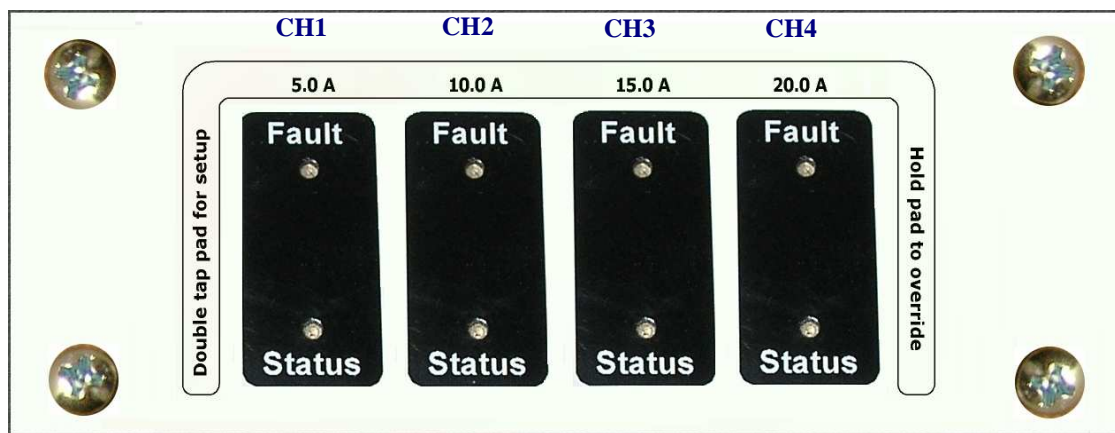


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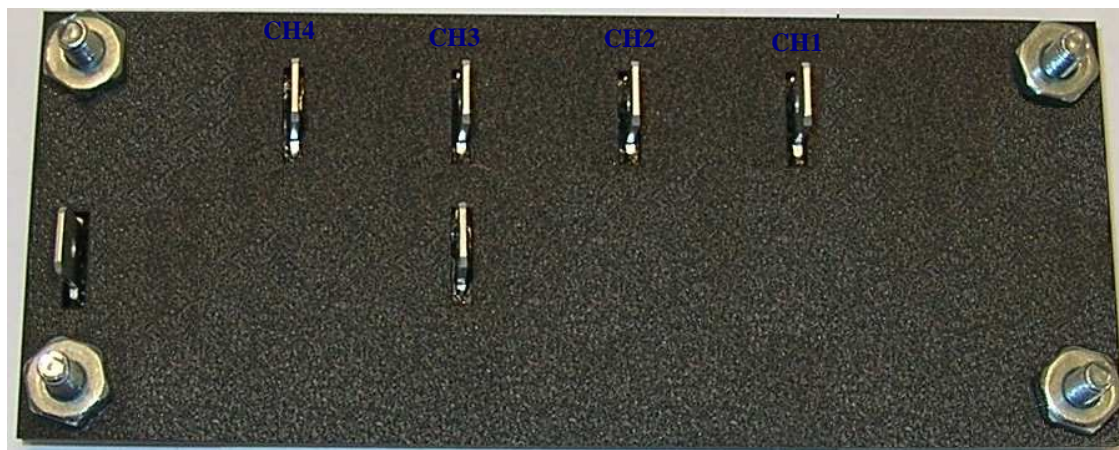
The positive power input is identified as the center spade on the back. While the negative power input (ground or return) is identified as the far left side spade. The eight channel load ports are along the top.

Recommendation: The Power input should use wire rated for 50 Amps, such as 10 AWG while the individual channels can use 16 down to 26 AWG depending on the load. The Ground / Return line only has this units current flowing (30 mA) and can be as small as 26 AWG.

ZL-BP4 Front Side



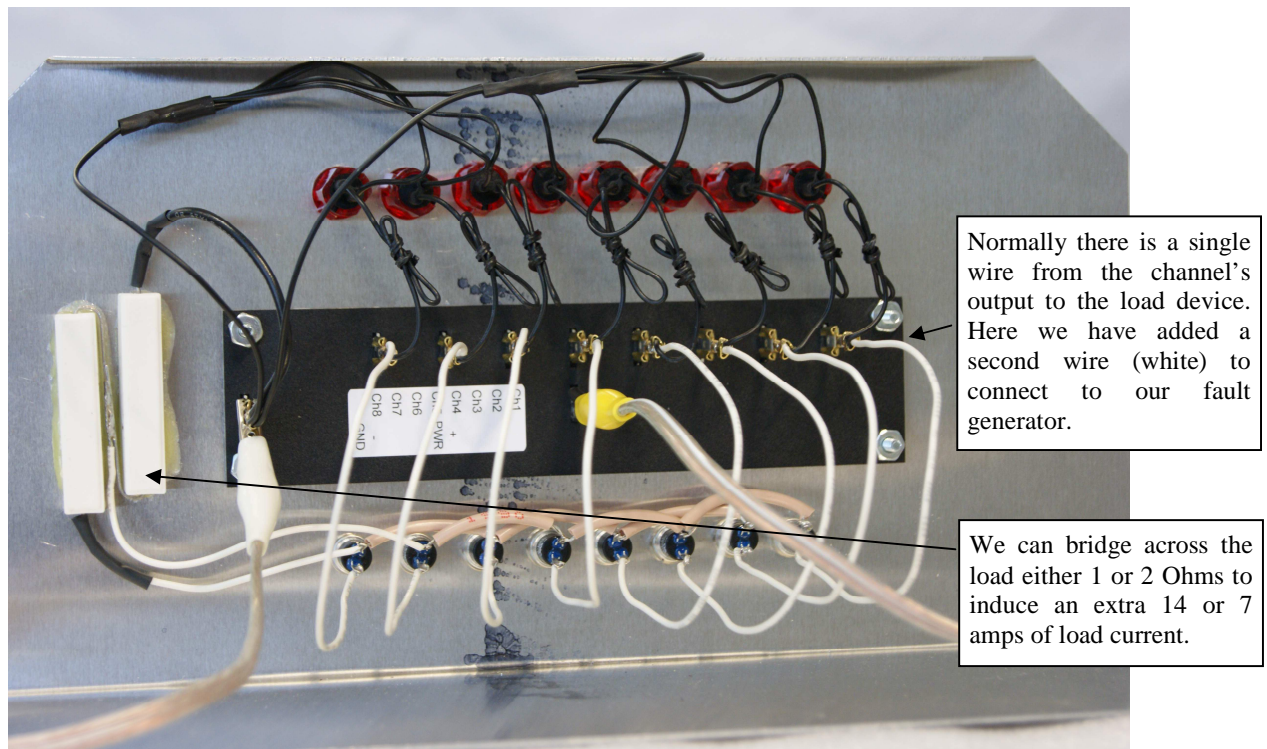
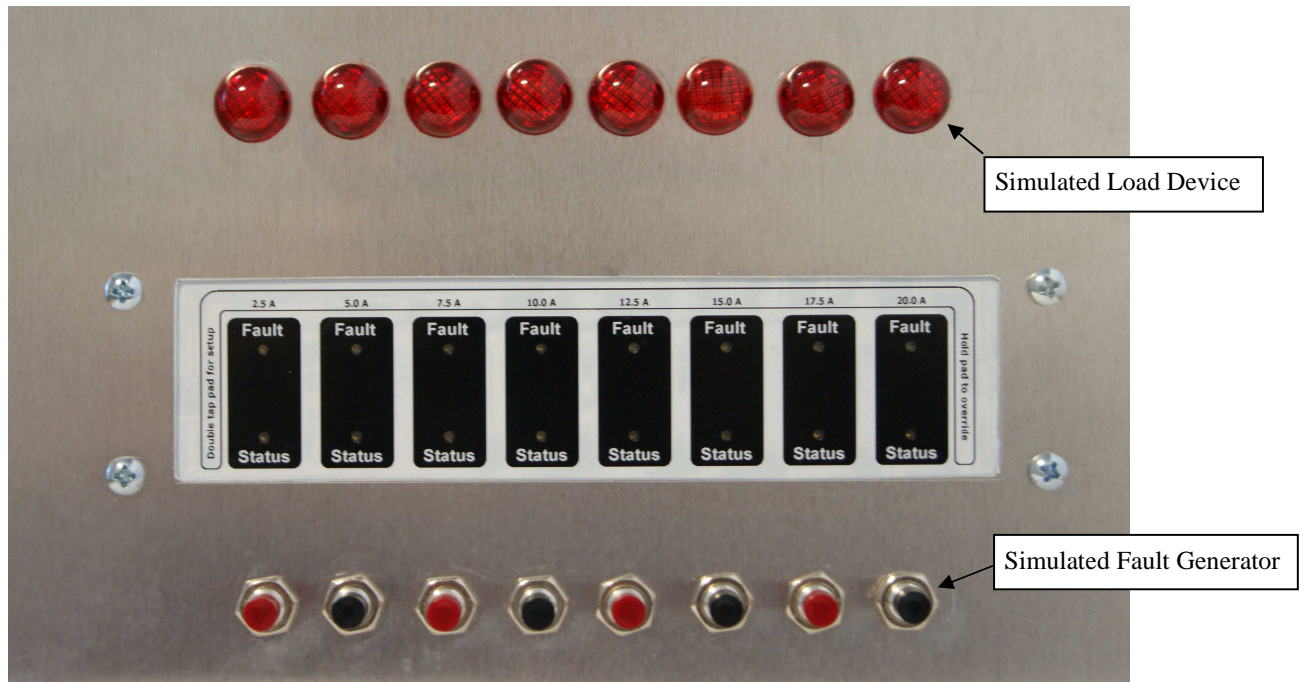
ZL-BP4 Back Side



Demo Panel

To demonstrate the ZL-BP8 we installed the unit into a demo-panel for our Videos.

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Indicator LEDs

There are two indicator LEDs for each channel: a Green status indicator at the bottom and a Red fault indicator at the top. When the units is first powered on or if the unit resets from extremely low voltage (see specifications) these 16 LEDs will light in sequence as a visual check of each channels initial operational readiness. Revision 1.0 units do a single sequence, while revision 2.0 will do two rotations.

The brightness of each LED is low by default; the brightness is increased only when a unit is powering up or when the unit is being interacted with. An example of the latter is selecting a channel to set its trip setting.

Channel States

Each channel can be in one of several states. The normal state for a channel is On, supplying power to its load. Unless a channel has faulted from excessive current or you the user have turned it Off, this will be the state of the channel. It is indicated by a steady Green color of the Status LED.

The User can override a channel and turn it Off. The load is disconnected from the Supply and no current flows or is monitored. This state is indicated by all its LEDs being off.

If for some reason the current flowing into the load of a channel exceeds the user selected current threshold, the channel will go into the Fault state. The channel's power will be cut off, and the Red Fault indicator LED will light steadily.

Current Overload and Faulting

Every channel that is On is continuously having its load current measured. This current is averaged and filtered and then checked against the channels preset trip threshold. If the current exceeds the trip value the channel will fault Off. As of revision 2.0 these units will trip on within 0.001 seconds on an overload.

Standard circuit breakers have trip times in the minutes to hours for less than 100 % overload. The ZL-BP8/4's ultra fast response is very useful if one is trying to protect aircraft wiring. However, it can be an annoyance with some avionics loads that have exceeding high peak to average current consumption AND the user has set too low a trip threshold. Be sure to read the specifications for each load device attached.

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The ZL-BP8/4 uses a Digital Signal Processing algorithm to condition the current measurements. This allows for fast over-current response and effective glitch / spike / noise removal to prevent false tripping.

Override

A channel is normally On. If the keypad associated with a channel is held down for two seconds or greater, the Green LEDs will flash at the two second mark to acknowledge the long key press AND the state of the channel will change depending on its current state as follows:

- An On state will turn Off (Green LED will go out)
- An Off state will turn On (Green LED will go on)
- A faulted Off state will turn On (may quickly fault back off if a short circuit is still present)

A channel that has been overridden by the user (ie. Turned Off) will be off every time the unit is re-powered (the plane's main-bus power is cycled on). An overridden channel does not monitor the current flowing, as it is always zero. To re-activate the channel, simply hold the keypad down for two seconds.

A channel that has faulted Off will be turned back to On every time the main-bus power is cycled. If the load is still drawing excessive current the channel will go into the Fault state immediately. While the channel is faulted, re-connection of power to the load must be done manually and there is no automated mechanism to determine if the load has returned to a low current consumption.

Programming

To program a channel or confirm that channel's trip setting the keypad for the channel is tapped once with your finger. This puts that channel into trip status display mode. One of the eight Red LEDs will blink under the current value label on the front panel. These trip levels are labeled 2.5Amps through 20 Amps along the top of the unit. The unit will go back to normal display mode after it times out in about 4 seconds.

Whenever a keypad is touched, this action is acknowledged by all Green LEDs flashing once.

For example: All units come from the factory with all channels defaulted to 10 Amps threshold. Tapping any keypad will cause the fourth Red LED from the left to blink. The blinking will persist until a key is tapped or it times out.

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If any key is tapped while in this display mode, the associated trip value over that key will become the new value. The new value will now blink. One can continue to tap other keys and choose other trip values. The last trip selected when the display mode times-out will be the new programmed value.

This procedure to change a channels trip value can be performed any time (as long as the unit has not been locked). Even while flying, the trip value can be changed. If for some reason the current draw by a channel's load exceeds the trip level for which the user had inadvertently selected as too low a value, that channel will fault and turn off the load. The user can tap in a new higher threshold, and then turn the channel on. This is only slightly more disruptive than if one has just turned a switch off.

If you are satisfied with your channel settings, you may choose to 'lock' the unit. Do so by holding the first and last channel keys for two seconds or longer, all LEDs will blink to confirm this action. In the locked mode the unit will perform all regular function, and additionally allowing you to view current trip settings, but will *not* allow the settings to be changed. To return the unit to normal mode, please hold the first and last channel keys for two seconds or longer again.

Important: A channels trip threshold should always be set well above the maximum rated current of the instruments attached as a load. There are always random and systematic fluctuations in the current being drawn by load devices and sufficient margin for these fluctuations needs to be accounted for. ***It is not the load that is being protected; it is the wires that run from the breakers to the load.***

Low Voltage

The ZL-BP8/4 has been designed to function correctly when the main-bus voltage is greater than 10V. A lower voltage than this implies that there is a problem in your electrical system. These units will retain its last state when the voltage drops below 10 V, but you will be unable to change settings or override states.

When the bus-voltage drops below 6V the unit will reset / reboot and restore previous settings. This behavior will ensure its correct operation when and if your main bus power ever recovers.

Because power is switched to the loads if the main bus voltage drops dramatically, any attached avionics that are turned on during this event will see the bus drop. Many modern avionics instruments have been designed to work correctly during a major bus drop. Your EFIS probably has this feature. Therefore these instruments will not have to reboot during a bus drop. Such conditions are likely to happen during engine cranking!

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Installation

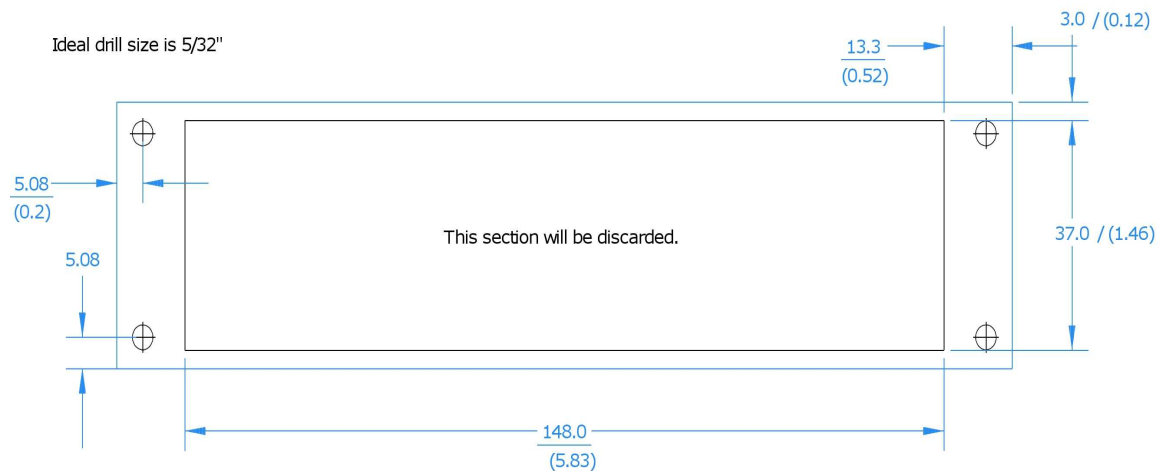
Appendix 1 shows the hole/cutout pattern to mount a ZL-BP8. Four 5/32 drill holes for the mounting bolts (included) and a single rectangular cutout to expose the key pads.

The unit is intended to be mounted behind a thin flat panel such as a standard instrument panel. **Do not** install the unit in front of the panel! The reason for this should be obvious, so we apologize for this disclaimer.

The power into the unit will come from your main-bus switch, such as provided by our ZL-MB50 main-bus contactor.

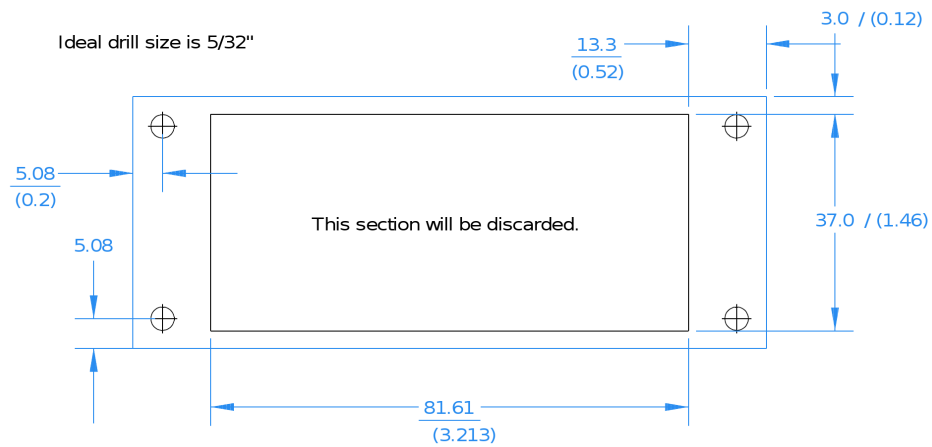
The female terminal connector that attaches to each of the 10 sites on the back of the ZL-BP8 is a 0.25" x 0.05" standard spade terminal, which can be found at all home improvement stores or any electronics distributor.

Panel Cutouts



ZL-BP8

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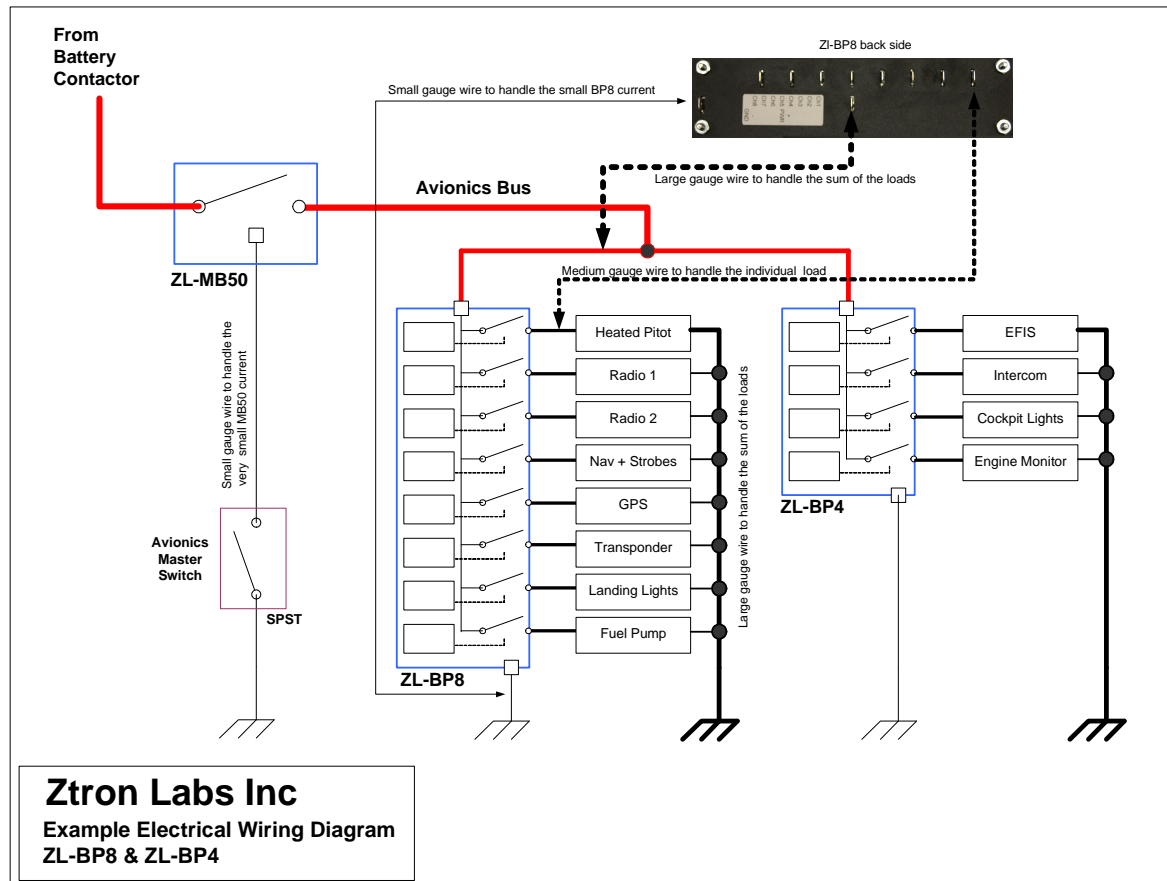


ZL-BP4

Note: Above are not to scale. Look on our web product page for a printable to-scale version.

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The following diagram shows an example wiring. *Do not connect the return from the various loads to the connector, which is the ZL-BP8 return.* A small gauge wire should connect from the ZL-BP8's return to a common bus return point in your instrument panel.



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ZL-BP8 Specifications

Dimensions	6.84"x 1.69"x 0.5" (174 x 43 x 12 mm)
Weight	1.75oz (50 grams)
Input Voltage	10-30 V DC
Current Draw	30mA maximum
Power	0.4 Watts maximum
Total Operating Capacity	50 Amps maximum ¹
Individual channel capacity	15 Amps maximum
Operating voltage	10 – 30 V ² 6 – 30V ³
Current trip accuracy	5 %
Trip speed	1 ms nominal
Current trip resolution	0.1 Amp internally 2.5 to 20 Amps, in 2.5 A steps
Warranty	3 years

- Notes:
- ¹ Sum of operating current flowing through all channels
 - ² Supply voltage range for current monitoring to be valid
 - ³ Supply voltage range for switching function to deliver power to loads.

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ZL-BP4 Specifications

Dimensions	4.260"x 1.69"x 0.5" (108.2 x 43 x 12 mm)
Weight	1.1oz (31 grams)
Input Voltage	10-30 V DC
Current Draw	30mA maximum
Power	0.2 Watts maximum
Total Operating Capacity	50 Amps maximum ₁
Individual channel capacity	15 Amps maximum
Operating voltage	10 – 30 V ₂ 6 – 30V ₃
Current trip accuracy	5 %
Trip speed	1 ms nominal
Current trip resolution	0.1 Amp internally 5 to 20 Amps, in 5 A steps
Warranty	3 years

- Notes:
- 1** Sum of operating current flowing through all channels
 - 2** Supply voltage range for current monitoring to be valid
 - 3** Supply voltage range for switching function to deliver power to loads.

Watch our breakers in action; look for our video at www.ZtronLabs.com/Products