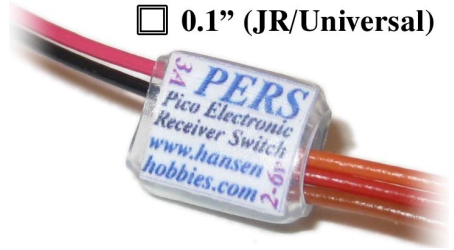


Thanks for purchasing this **Hansen Hobbies Pico Electronic Receiver Switch (PERS)**! The **PERS** is designed to allow **ON/OFF** control of onboard devices like lights, glow plug drivers, motors, smoke systems, rocket igniters, solenoids, relays, and whatever else you can think up. The **PERS** is not proportional, which means it is either fully-**ON** or fully-**OFF**. The **PERS** performs the operation equivalent to a servo moving a mechanical switch back and forth, but in a much smaller package, and with no moving parts.

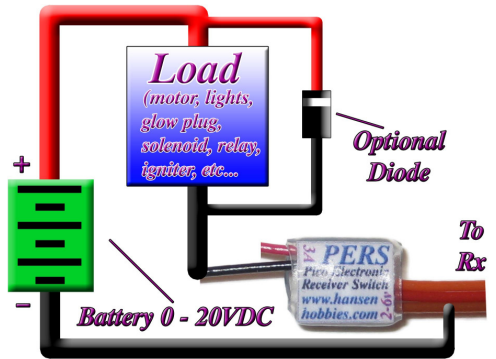
Using the **PERS**, you can safely power any load using power from your receiver battery (**2-6V**) at up to **3A** (up to **4A** for short periods <2s). Switching more current than recommended could overheat and damage the **PERS**.

- 1.00mm (AR6400)
- 1.25mm (R616FFM)
- 1.50mm (AR6300)
- 0.1" (JR/Universal)



Theory: All modern RC systems send **1-2ms** pulses at **50Hz** to the servos to send positional data. The **PERS** switches from **OFF** to **ON** at **1.5ms** (mid-stick), so that it is always **OFF** below **1.5ms**, and always **ON** above **1.5ms**. The **PERS** can be used on any receiver channel, but is best placed on the gear channel or any other auxiliary channel that allows you to flip a 2-position switch on your transmitter to control the **PERS**. Adjust the end-points of this channel to their full minimum and maximum positions.

Hook up (see diagram to right): The **PERS** has two output wires that connect directly to the device you want to power. The **PERS** will pass-through your receiver voltage to your load. You can also use the **PERS** with a separate battery as shown below. In this case the red wire from the **PERS** is ignored and you have to make sure the battery has a common ground with the **PERS/Rx**. If the separate power source you want to use is actually powering your receiver through the **ESC/BEC**, then the ground connection likely already exists and all you would have to do is tap into the positive end of the battery. When the **PERS** switches **ON**, current will flow through your load, **PERS**, **Rx**, **ESC**, and back into the battery. If you decided to test the **PERS** before making your load connections please be considerate of the output wires - if the **PERS** were turned on and the bare ends of the output wires touched it would cause a short, which could damage the **PERS** and/or your receiver system. The diode shown is required only if you have an inductive load like a motor or solenoid (see notes).



Operation: The small red LED on the **PERS** lights up when the **PERS** turns the output **ON**. If the **PERS** stops receiving a good signal from the receiver (occurs if there is any radio interference or if you turn off your transmitter) it will hold the last state (**ON/OFF**) indefinitely until it sees a valid signal again. If your radio system has a failsafe setting then you can use that to set what the **PERS** will do in case of a lost signal.


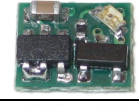
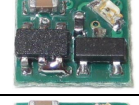
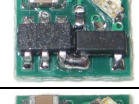
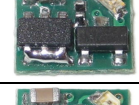
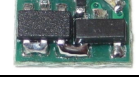
If your application requires more security (like an igniter for a booster rocket), then it is suggested that you power on your receiver and check the **PERS** for correct operation before flight by observing its LED, and then plug your device into the **PERS** right before takeoff. If the **PERS** isn't easily accessible then you can achieve the same effect by putting a mechanical switch in series with your load.

Modifications: There are two built-in modifications that can be made to the **PERS** which require soldering. If you're unsure of your ability to safely perform the modification please enlist the help of someone more experienced with this kind of work. You can do one or both modifications.

1) The **ON/OFF** operation described above can be reversed (so that it is **ON** below **1.5ms** and **OFF** above **1.5ms**) by bridging two pins as shown in the images on the right. The **PERS** actually turns on above **1.54ms** and when reverse, below **1.46ms**. This allows for a dead space so two **PERS**'s can be plugged into the same channel and the user can toggle back and forth or have both **OFF**.

2) The failsafe setting can be changed so that if the **PERS** loses the signal it will turn **ON** or **OFF** instead of keeping the last state. The left-most pin on the 6-pin chip can be bridged to the left of right as shown in the chart.

Only the combinations shown in the chart to the right are valid. Any other modification could cause damage to the **PERS** and/or your receiver system. After modification the **PERS** should be protected with heat shrink. **3/16"** clear heat shrink is available on our website in lengths as short as **1ft**.

	Normal Operation Output is ON above 1.5ms and holds last state in case of lost signal.
	Reverse Operation Output is ON below 1.5ms and holds last state in case of lost signal.
	Failsafe ON Operation Output is ON above 1.5ms and turns ON in case of lost signal.
	Failsafe OFF Operation Output is ON above 1.5ms and turns OFF in case of lost signal.
	Reverse + Failsafe ON Output is ON below 1.5ms and turns ON in case of lost signal.
	Reverse + Failsafe OFF Output is ON below 1.5ms and turns OFF in case of lost signal.

Notes:

- If your device is a motor, relay, solenoid, electromagnet, etc... a diode (included) should be connected across its terminals as shown in the connection diagram (pay special attention to its orientation). This will give protection from the reverse high-voltage spikes associated with inductive devices. For motors, you should also place **.01uF** capacitors between each of its leads and the motor casing (many motors come with these caps installed). All mentioned parts are available on our website and any electronics store.
- If your receiver has a failsafe option you will want to take advantage of this with the **PERS**.
- Make sure that your receiver battery can safely supply enough current for the device you're switching. Don't forget that the battery also needs to power your receiver and servos.
- When connecting your device, consider the wire gauge and length, as well as the connector types for determining safe current draw. It may not be advisable to run **3A** through your receiver connectors.
- The **PERS** current limits were tested in open air at room temperature. Enclosed spaces and/or hot environments may restrict the safe current ceiling. A good test is to feel the temperature of the **PERS** - a little warm after extended use is acceptable, very hot is not acceptable.
- If using the **PERS** for a rocket igniter you need to make sure the current is limited to **3A**. Many rocket igniters can draw over **10A** at **5-6V**. Adding a **2ohm** resistor in series with the igniter would work.
- The maximum allowable current through the **PERS** is **3A**, even all the way down to only a **2V** supply. However, below **3V** the **PERS** becomes more sensitive to voltage spikes. When supplying **2.5V** to the **PERS**, for example, suddenly switching **3A** through it could cause it to reset itself. This can be observed by looking at the **LED** very closely - it will blink on just slightly then turn back off, every second or so. To fix this, place a capacitor (a **10uF** electrolytic cap will work) across the supply voltage no more than a couple inches from the **PERS**. If the **PERS** is plugged directly into a receiver (not on an extension), chances are the receiver already has large filtering caps built-in, so this may not be needed. Almost all receiver systems available run on a minimum of one LIPO cell (**3.7V**), and the vast majority run on **4.8-6V**, so this won't be an issue for most users.
- The **PERS** is available with several different receiver connector types. Whichever type you're using, please be careful about unplugging the connector from the receiver. Some of these small connectors can take a lot of force to unplug and if the wires are pulled on too hard they could pull out of the connector housing. We recommend pulling on the plastic connector housing itself (this may require pliers) to keep the connector in good shape. This is especially true the first few plug/unplug cycles when the connection force is very high.

Have fun, and fly safe!

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