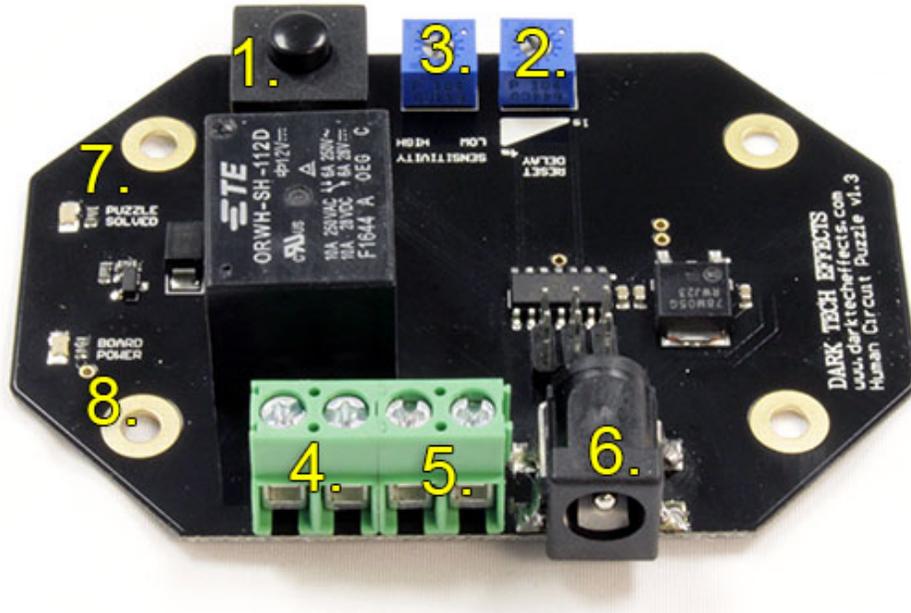# Human Circuit Puzzle – v1.3

Options for Puzzle:

1. NC or NO Solution – Do you want the puzzle to turn on or off the output voltage to the solution terminals when the puzzle is solved?

   > NC – Provides power until the puzzle is solved then turns off power
   >
   > NO – Provides no power until puzzle is solved then turns on output power.

   This feature allows for two different situations. When using a mag lock you will want it in the NC position, when using a light or controlling a larger system you may want to use it in the NO position. The puzzle is in the NC position when the blue LED is illuminated, and NO position when the blue LED is not illuminated. Press the switch labeled "1." To switch between NO and NC positions. You can check the output voltage across the terminals labeled "5."

2. Delay – When the puzzle is solved, the dial labeled "2." will allow you to configure the output on/off time between 1 second and 4 minutes. If you require a specific delay or one that falls outside of the normal range, we can provide a custom option for nearly any desired delay time.

3. Sensitivity – Change the sensitivity of the contact pads. Clockwise rotation increases the sensitivity and vice versa. Increasing the sensitivity will make your device more prone to electrical noise or sporadic instances of the puzzle seeming to solve itself. You may require a high sensitivity if you anticipate requiring a large chain of people to solve the puzzle. Decreasing the sensitivity makes the sensor less prone to electrical noise. You should attempt to decrease the sensitivity as much as possible while still being able to reliably solve the puzzle with the expected number of people in the human circuit.

It is **highly** recommended that you tune the sensitivity of the puzzle before final installation. See the section below on tuning the human touch sensitivity.

4. Solution Output – Wire your 12 V DC mag lock, light or other device to be turned on/off when the puzzle is solved. Pay attention to polarity so as to not damage your device. There is Pwr (+), and Gnd (-) terminals labeled on the board.

   When the puzzle solves you should hear a "click" from the relay activating or de-activating.

5. Contact Pad Terminal – Wire your metal (preferably copper) plates, items, etc. here. One metal item should have one wire going to one terminal and the 2nd item should have one wire going to the second terminal. It does not matter which item goes to the 1st or 2nd terminal.

6. Power Supply – Plug in the provided 12V power supply here. This powers the electronics board as well as the output voltage. There is no need to use a second power supply for your mag lock or lights unless your system requires more than 1 Amp. It is recommended but not required that you use the power supply provided with your purchase.

7. Puzzle Solved LED – This light will illuminate to indicate when the puzzle has been solved. It will remain illuminated for the entirety of the time for which the puzzle state is "solved". This time is set through the dial from section 2.

8. Power LED – This red light will illuminate solid red when the board is receiving power and the puzzle is turned on. If the red LED is not on when plugged in, there may be an issue with your puzzle.

Puzzle Sensitivity Tuning

The goal of adjusting the sensitivity is to minimize the device's sensitivity while still able to consistently solve the puzzle with the maximum expected number of people in the human circuit. For example, if you expect between 3 and 7 people to be in the human circuit you should attempt to tune the sensitivity with 7 people. The more people in the chain, the higher the sensitivity must be. You should also do this with the contact pads fully assembled if possible. Follow the below steps for tuning your sensor's sensitivity:

1. Turn the sensitivity knob to the maximum allowable position in the counter-clockwise direction (minimum sensitivity).
2. Power on the Human Circuit Puzzle. Ensure the red LED is glowing.
3. Adjust the "delay time" knob to a position such that the puzzle will only remain solved for a second or two.
4. Attempt to solve the puzzle. If the green "puzzle solved" LED does not illuminate, slowly turn the sensitivity knob clockwise while continuously attempting to solve the puzzle.
5. When the puzzle first solves, stop turning the sensitivity knob.
6. Ensure you are able to consistently solve the puzzle at the current sensitivity. If so, the puzzle sensitivity has been tuned and you are ready to continue installation.

Contact Pad Guide

For best results, your contact pads and connection to the knock puzzle should have as low electrical resistance as possible. Solid copper contact pads are best but any electrically conductive metal will work. Either solder a wire to each contact pad or mount firmly with a bolt and washer. The wire should be 22 gauge or thicker.