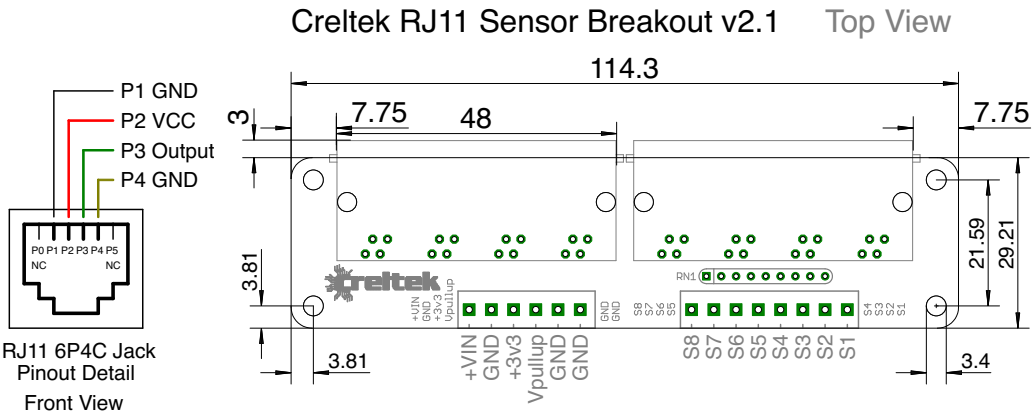

All dimensions in millimeters. Tolerance ±0.5 mm.

Specifications subject to change without notice.

The Creltek RJ11 Sensor Breakout board provides connections for up to eight Creltek Limit Sensors. Each jack provides power, ground, and signal lines to the sensor along with proper signal termination. Miniature screw terminal blocks provide connections back to your motion control system for each sensor. “Active Low” open-collector outputs are compatible with most popular motion control systems, and outputs can be wired in parallel to combine multiple sensor signals. The board can be powered directly from a 3.3V power supply or from a 4.5V to 16V power supply, thanks to the on-board voltage regulator. The breakout board can be mounted behind a panel if desired, and features four mounting holes suitable for M3 screws.

Usage

Along the front of the board are eight RJ11 jacks, supporting the connection of up to eight Creltek Limit Sensors. Looking at the top of the board as shown above, these jacks are labeled, from left to right: S8, S7, S6, S5, S4, S3, S2, and S1. Creltek limit sensors use a four-wire connection, which is illustrated in the pinout detail above. (Although RJ11 jacks can support up to six pins, only the center four positions are used.) Looking at the front of the jack, the pin assignments using standard four-conductor flat modular telephone cord are as follows:

Wire Color		*Description*	*Function*
Black	=	Power Ground (GND): [-] connection (0V)	Power Supply to Sensor
Red	=	Power Supply (VCC): [+] connection (3.3V)	Power Supply to Sensor
Green	=	Sensor Signal, Active Low: 3.3V=“normal”, 0V=“triggered”	Signal Return from Sensor
Yellow	=	Signal Ground (internally connected to GND)	Signal Ground

Along the back of the board are two screw terminal blocks. The leftmost block has six connections, and they are, from left to right:

Pin Label		*Description*	*Function*
VIN	=	Power Supply: [+] connection (4.5V to 16V)*	Power Supply to Board
GND	=	Power Ground: [-] connection (0V)	Common Ground
+3v3	=	Power I/O: [+] connection for 3.3V*	+3.3V Power In or Out
Vpullup	=	Connect to desired output “pullup” voltage (28V max)**	Voltage Reference (input)
GND	=	Spare Ground connection	Common Ground
GND	=	Spare Ground connection	Common Ground

*The Creltek RJ11 Sensor Breakout board can be powered either by a 3.3V supply connected to the +3v3 terminal, ***or*** a 4.5V to 16V supply connected to the VIN terminal. See section on Power Supply below.

**The Vpullup input can be used to supply a weak “pull-up” (bias) voltage to the sensor output terminals when resistor network RN1 is installed. This can be useful for motion controllers that do not include internal pull-ups on their inputs. If this feature is not needed, resistor network RN1 may be removed and the Vpullup terminal left unconnected.

Power Supply

The Creltek RJ11 Sensor Breakout board uses 3.3V power internally, and supplies 3.3V power to all connected sensors. The Sensor Breakout board itself must be connected to an external power supply, which can often be shared with, or

provided by, your motion controller.

The Sensor Breakout board can be connected directly to an external 3.3V supply using the "+3v3" terminal for the positive [+] power connection and the GND terminal for the negative [-] connection. Alternatively, a higher voltage power supply between 4.5V and 16V can be used; in this case, the VIN terminal is the positive [+] power connection and the GND terminal is the negative [-] connection.

Important Precautions:

- *When using a 3.3V power supply, never exceed 3.5V on the +3v3 terminal*
- *When using a 4.5V–16V power supply, never exceed 18V on the VIN terminal*
- *When using a 4.5V–16V power supply connected to VIN, you may optionally tap 3.3V power **output** on the +3v3 terminal, up to 100 mA, for auxiliary use. Be careful not to overheat the on-board voltage regulator.*
- *Never connect power supplies to both the VIN and +3v3 terminals simultaneously.*
- *For proper operation, resistor network RN1 should be removed when the Vpullup terminal is left unconnected.*
- *Never exceed 30V on the Vpullup terminal. Higher voltages may damage the signal output transistors.*

Regardless of which power supply option you choose, the GND terminal functions as a common ground between your power supply, the Sensor Breakout board, and your motion control device. Although there are three GND terminals present, only one needs to be connected to your power supply; the other two are available as spare GND connections for your convenience.

Sensor Outputs

The Creltek RJ11 Sensor Breakout board offers true "open collector" sensor outputs. The outputs are driven by individual NPN transistors in a "common emitter" "open collector" configuration. When the associated limit sensor is "inactive" ("untriggered"), the output is "open", and may optionally be pulled "high" by the pull-up resistor network RN1. When the limit sensor is "active" ("triggered"), the output is "closed", which means it is pulled to GND. The maximum open-state ("pull-up") voltage is 30V, and the maximum closed-state ("sinking") current is 250 mA. Exceeding these limits may damage the output transistor; if you need to drive a bigger load, please use an appropriate buffer circuit.

Optional On-Board Pull-Up Resistors

The Creltek RJ11 Sensor Breakout board offers optional on-board pull-up resistors for the sensor outputs. These resistors are in the form of a 9-pin SIP resistor network which can be plugged in to the SIP socket near the sensor output terminals on the Breakout board. A 4.7kΩ resistor network is supplied with your board; this value should be appropriate for most applications. If pull-up resistors are not desired, simply remove the resistor network from the socket. A different value resistor network can be substituted if desired.

When using the on-board pull-up resistors, the Vpullup terminal must be connected to the desired "pull-up" voltage. This should be chosen to provide the appropriate high-level output voltage for your motion controller's sensor inputs. If your motion controller expects a 3.3V high-level voltage, you may connect the Vpullup terminal to the 3v3 terminal. For motion controllers expecting 5V or 12V high-level voltages, you may connect the Vpullup terminal to the VIN terminal and power the board from a 5V or 12V supply, respectively. **Caution:** *When choosing VIN as the pull-up voltage, check to make sure that your power supply voltage is not too high for your controller's inputs!*

Combined Sensor Outputs

Some motion control systems have only a single limit switch input for each axis. In such a system, if the user desires both a "maximum" and "minimum" limit switch on the same axis, two conventional "normally open" limit switches would be wired in parallel so that the closure of either switch will trigger a single input.

The outputs from multiple sensors may be combined by simply connecting the desired outputs together. For example, to combine the signals from sensors S1 and S2, simply place a jumper wire between the S1 and S2 output terminals and run a signal lead from either terminal to your motion controller's input. When *either* sensor S1 ***or*** S2 is triggered, the combined output will be pulled low. (This is similar to wiring traditional "normally open" limit switches in parallel.) In this way, a large number of sensors can be connected to a motion controller that offers a limited number of inputs. This is useful in systems where only a single motion controller limit input is available for each axis. By combining sensor outputs in pairs, you can have both a "minimum" and "maximum" limit sensor for each axis.