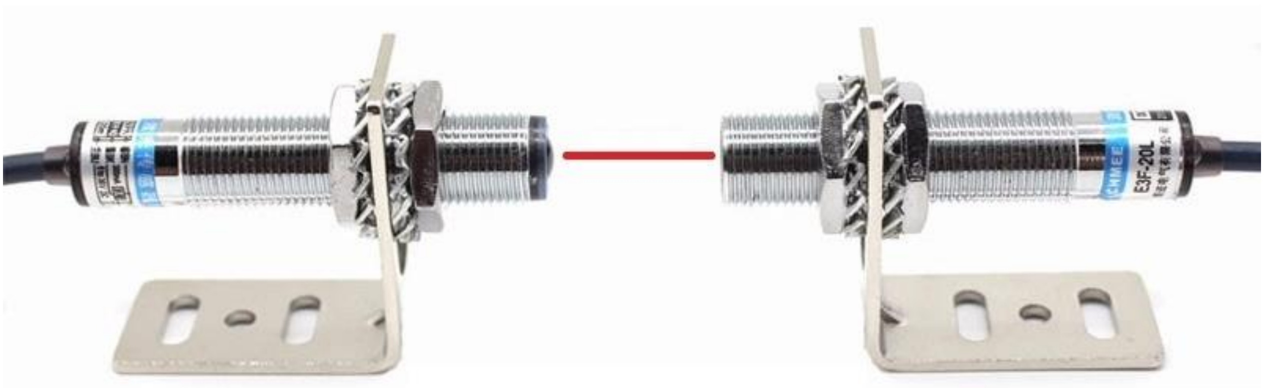
PS-BB-E3F

Breakbeam Laser Sensor

Wiring & Application Guide



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0.0 Safety Statement

All machinery, especially CNC or automated machinery, has inherent dangers and risks. It is the responsibility of the system designer to ensure that any systems built using any Viking Machinery Ltd. products are safe for use. Any technical information is provided as a reference only, and does not constitute a recommendation as to the fitness of use in any particular application.

Viking Machinery Ltd. strongly urges customers to seek expert advice when dealing with potentially dangerous electrical voltages and sources of mechanical energy. Information contained in this document does not constitute a substitute for expert advice.

Under no circumstances should this product ever be used in a safety critical application.

1.0 Product Specifications

- Supply Voltage – 12-24VDC
- Operating Current – 30mA (Both Laser and Receiver)
- Current Ripple – 10% peak to peak maximum
- Maximum Output Current – 300mA
- Sensing Distance – 15,000mm (up to 20,000 in ideal conditions)
- NPN Operation (Receiver) / 2 Wire Connection (Laser Emitter)
- Operating temperature – -15°C to 50°C
- Response Time – 5µS
- Sensing media – Interruption of laser beam

2.0 Scope of Document

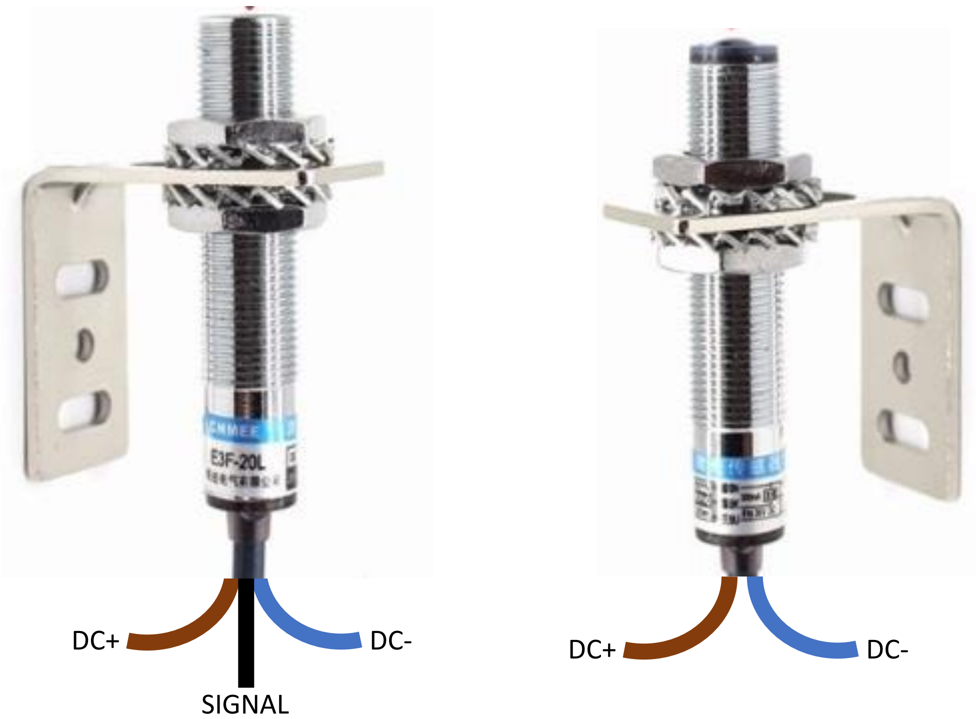
This document is designed to give an overview of the wiring options for the PS-BB-20L breakbeam laser sensor. This sensor will change state when an object blocks the laser light beam from the laser transmitter to the laser receiver.

Wiring examples are given for typical microcontroller examples. These are by no means exhaustive, but are a good starting point for beginners. If you plan to use this device with a PLC, wire the receiver unit as a standard NPN field sensor as per your PLC's instructions.

3.0 Wire Colours & Connection

Your proximity sensor receiver comes with a 1000mm flylead attached. This is unshielded and contains three Ø0.42mm wires. 1 Brown, 1 Blue and 1 Black. Your laser transmitter only has two wires – one Brown and one Blue.

The brown wires are to be connected to a 12-24VDC supply, and the blue are to be connected to the common DC 0V rail. It is important that all 0V terminals are connected in common between all devices used in the system, or else you risk damaging the sensor and equipment. You now need to align the laser transmitter to the laser receiver. At this point passing an object between the laser transmitter and sensor will trigger the receiver unit.



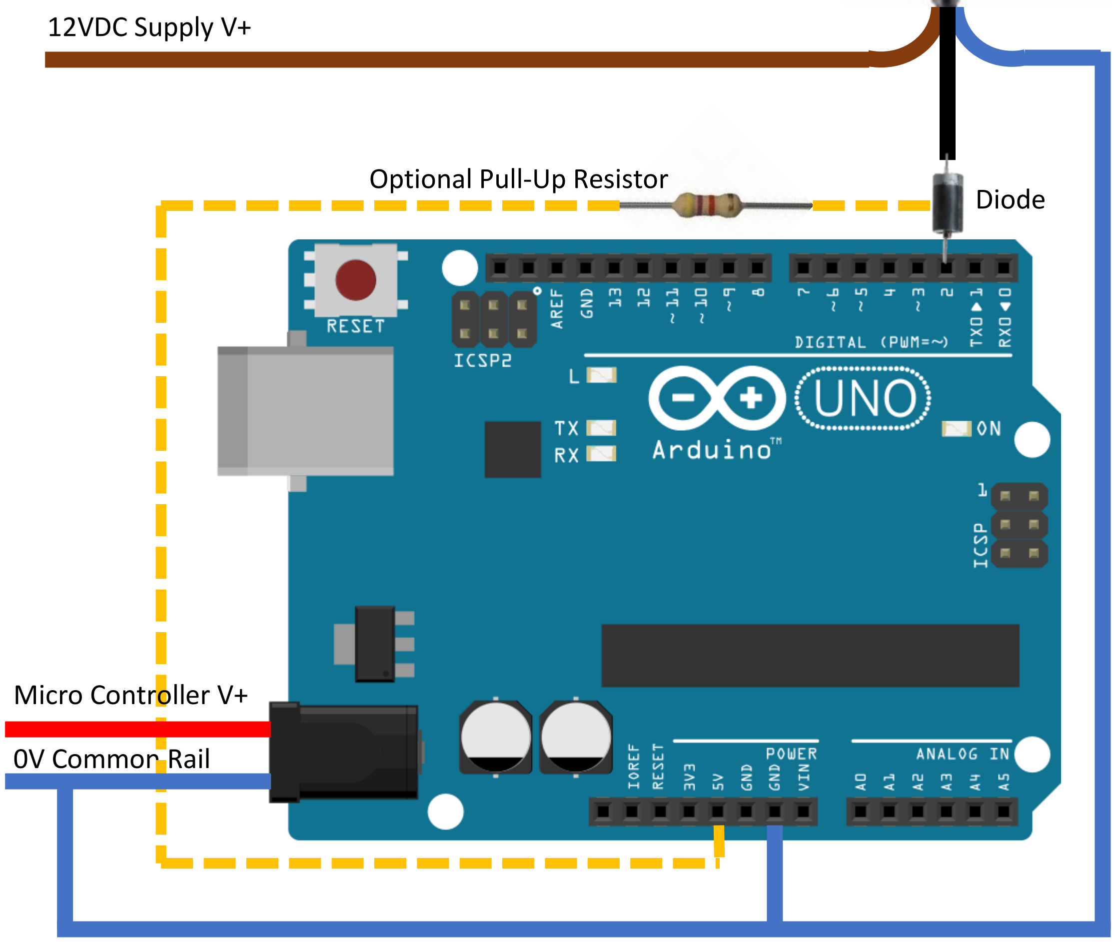
The back wire is our signal wire. We will use this wire to switch our device later. For now we can test the switch by connecting our multimeter (on the DC Volts setting) between the blue wire and the black wire of the reciever. In its normal state the multimeter should read “24V” (or whatever voltage value you are supplying to the unit). Placing an object between the laser source and the reciever will drop the voltage read on the multimeter to “0V”. When the object is removed, the reading should return to “24V”

4.0 Wiring to a Microcontroller

For this example, we will use the popular Arduino micro controller.
The principle is the same for most 5V TTL input devices.

If your board does not have an onboard pull-up resistor you will need to wire one between the input pin you are using and the 5V common on the micro controller (example shown in dashed yellow below).
5kΩ or 10kΩ are good pull-up resistor values.

We need to use a diode to protect the 5V TTL Logic of the Arduino from the higher voltage used to drive the sensor. There are other ways to do this, but we find this is easy and works well.

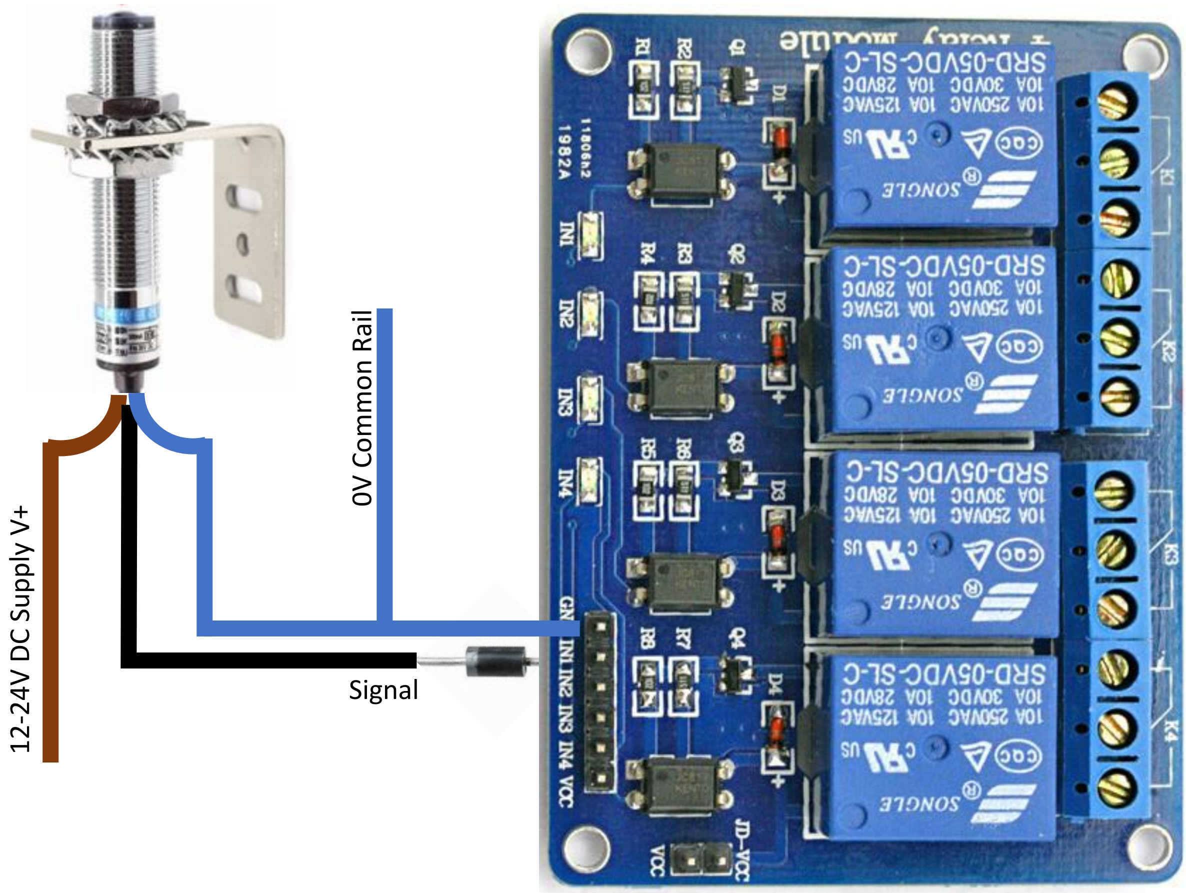


For this example, we would need to set pin 2 to INPUT (with external pull-up resistor wired) or INPUT_PULLUP to use the onboard pullup resistor.

When the sensor is activated, it will allow current flow out of pin 2, dropping the voltage to near zero and reading as a logic signal. When the sensor is deactivated, the voltage rises on the sensor, blocking the current flow. The pull-up resistor now does its magic and gives us a nice clean 5V signal on the pin.

5.0 Wiring to a Relay Module

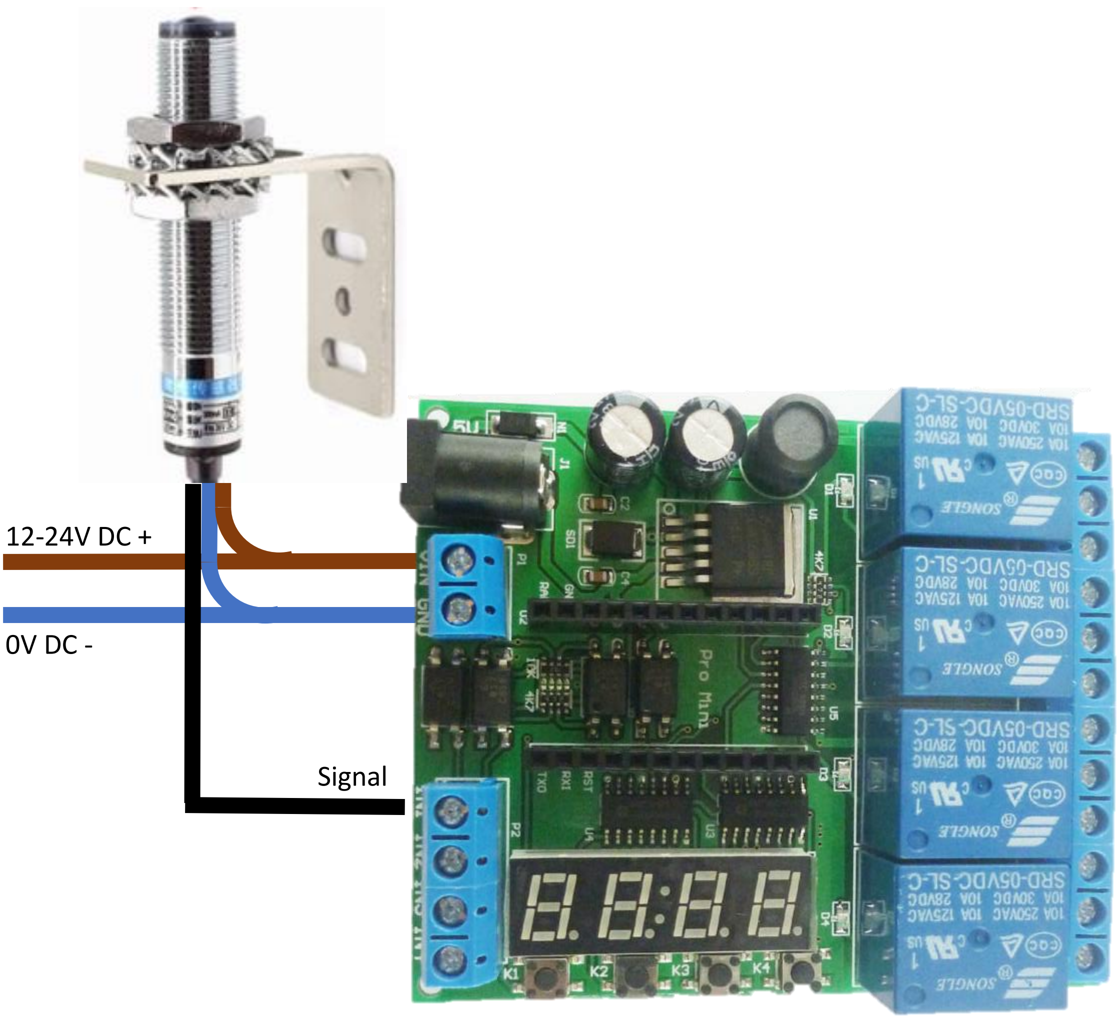
Sometimes you will want to switch a power load with a proximity sensor. The easiest way to do this is to use a relay module. The wiring diagram below shows the typical wiring for one channel on our four-channel relay module. This particular board has inbuilt pull-up resistors so you do not need to wire an external one here. We have used a diode here to protect the 5V TTL of the relay module from the higher voltage of the sensor. If you have the same voltage on the pins of the relay module as the sensor, then you can omit this part.



6.0 Wiring to the PLC Shield

Wiring to the PLC shield that Viking Machinery sells is easily accomplished in the manner shown below. The PLC shield will run on 12-24V DC, which makes wiring into the sensor very convenient.

The PLC shield supports up to four proximity sensor inputs, four relay outputs and allows logic processing using the plug in Arduino Pro Mini.



7.0 Reference Links

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