



**BLACK LAB SYSTEM
TECHNICAL NOTE #102**

SUBJECT: Connecting Digital Sensors to the Black Lab
 See also Bulletin on CIM (Connector Interface Modules) available from Analog Interfaces

DATE OF LATEST REV: 10/17/05

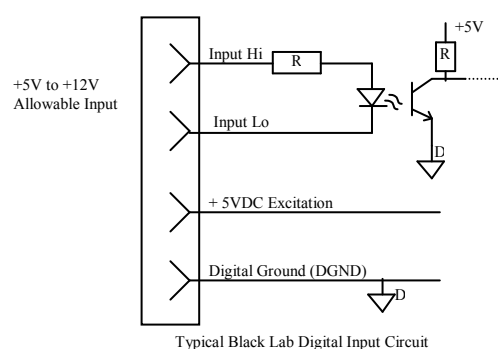
REV # 1

Digital Input Structure

The general input structure of a digital input is shown in the figure below. Each of the HI and LO input lines is connected to the input of an optical isolator designed to accept inputs ranging from 5 volts to 12 volts. The input current for each line is 2 mA at 5 volts.

Excitation for the digital inputs is provided with the Type I, II and III Connector Interface Modules as an aid to providing the inputs connections. The standard excitation voltage is +5 VDC.

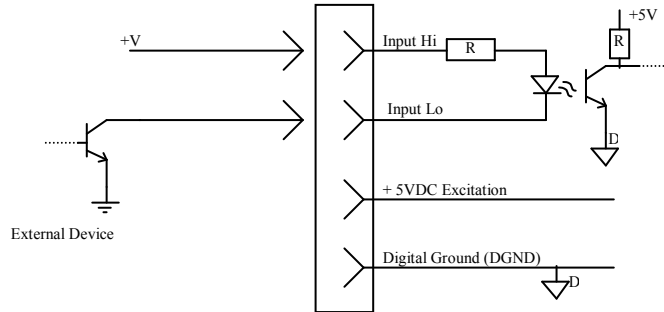
DO NOT CONNECT THE DIGITAL GROUND TO AN EXTERNAL EARTH GROUND! Potential damage to the Black Lab could occur.



The following sections show how to connect various types of sensors to achieve the best results. However, since installations vary from place to place, these may not cover all possible situations. Call us if you need help with sensor connections that are not shown here.

Open Collector Using External Power

The following diagram shows how to connect an open collector type of sensors to drive the optically isolated digital input. In this method, power from the external device (from 5 to 12 volts) is used to actuate the optical isolator by means of an open collector NPN transistor. There is no connection from the ground or common of the external device to the digital ground of the Black Lab

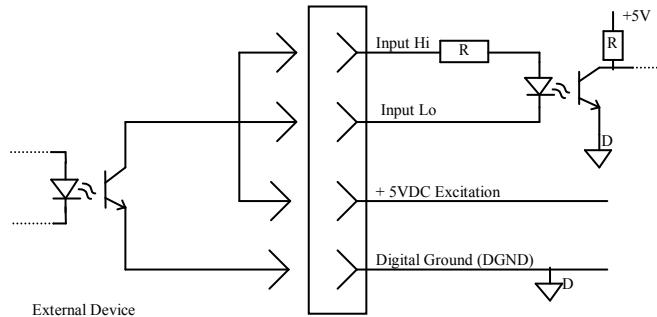


Typical Connection to a Black Lab Digital Input Circuit Using an External Power Supply and an Open Collector Device

Open Collector Using Internal Black Lab Power

When the external device has an optically isolated output, you can use the excitation from The Black Lab to actuate the input as shown in the diagram below. Here the excitation is jumpered to the Input HI and the external transistor is connected to the Input LO and the digital ground.

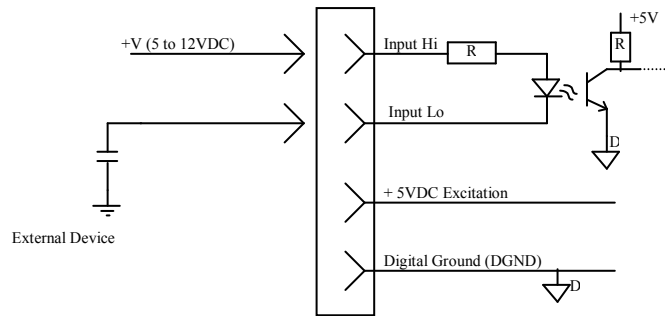
THE USER MUST MAKE SURE THAT THERE IS NO CONNECTION BETWEEN THE DIGITAL GROUND OF THE BLACK LAB AND THE GROUND OF THE EXTERNAL DEVICE.



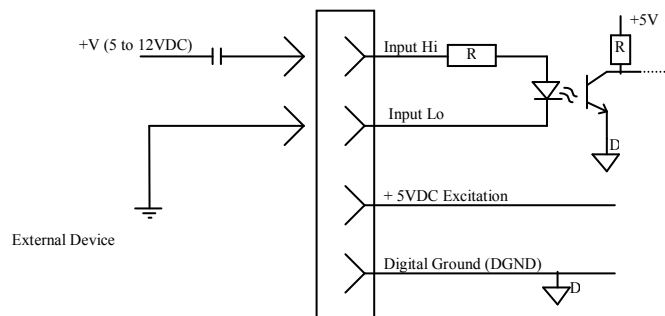
Typical Connection to a Black Lab Digital Input Circuit Using the Internal +5 VDC Excitation and an Open Collector Device

Relay Contact Using External Power

The following diagrams show 2 different methods of connecting a relay contact to drive the optically isolated digital input. In these methods, power from the external source (from 5 to 12 volts) is used to actuate the optical isolator by means of a relay contact. There is no connection from the ground or common of the external device to the digital ground of the Black Lab



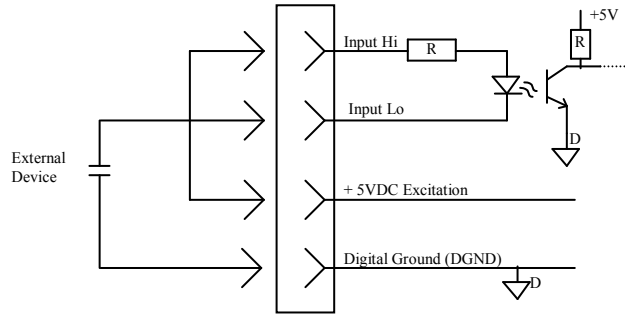
Typical Connection to a Black Lab Digital Input Circuit Using an External Power Supply with the Relay Contact in the Low Side.



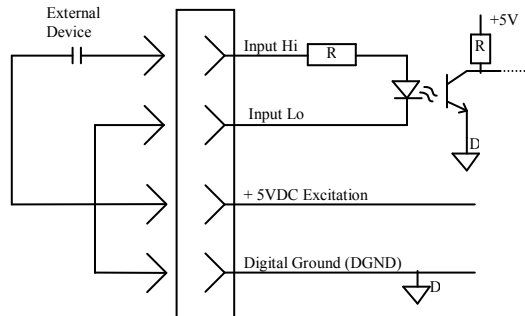
Typical Connection to a Black Lab Digital Input Circuit Using an External Power Supply with the Relay Contact in the High Side.

Relay Contact Using Internal Black Lab Power

The following diagrams show 2 different methods of connecting a relay contact to drive the optically isolated digital input. In these methods, power from the Black Lab +5 VDC internal power supply is used to actuate the optical isolator by means of a relay contact.



Typical Connection to a Black Lab Digital Input Circuit Using the Internal Power Supply with the Relay Contact in the Low Side.



Typical Connection to a Black Lab Digital Input Circuit Using the Internal Power Supply with the Relay Contact in the High Side.