

## T E C H N I C A L   N O T E

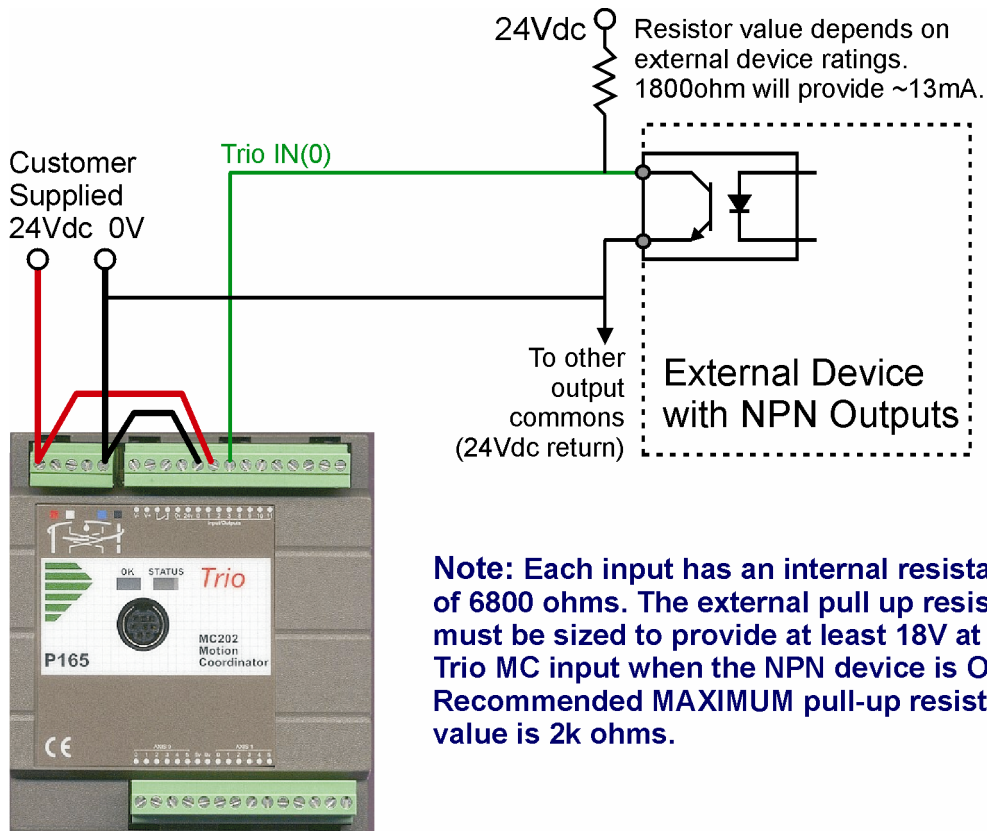
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**Subject:** Connecting Trio Inputs to an NPN output

All Trio Motion Coordinators use a PNP (sourcing) type of input and output. To read a Trio input, you must apply an external 24Vdc to that input point referenced to the 0V.

The state of the input can be read in a program using: **IF IN(1)=ON THEN....**

Sometimes an NPN (sinking) external device is required to interface to the Trio controller. The NPN device activates by pulling (sinking) to 0v, which is opposite of what the Trio input requires. Most NPN outputs are open-collector requiring a pull-up resistor. Trio controllers do not provide a pull-up resistor so one must be added externally for each input. The value of the resistor will be determined by the output drive capability of the NPN device. Typical values for 24Vdc will be from **1k to 2k ohms** (24mA and 12mA respectively).

NPN vs. PNP reverses the logic in a Trio Basic program. For example, when the NPN device is active the Trio will see it as a 0v level. This is a "0" or "OFF" condition in a program. To solve this, the **INVERT\_IN(x,ON)** command can be used, where **x** is the input to invert. Using this command will return a "1" or "ON" value in a program when the NPN device is actually ON.



**Note:** Each input has an internal resistance of 6800 ohms. The external pull up resistor must be sized to provide at least 18V at the Trio MC input when the NPN device is OFF. Recommended **MAXIMUM** pull-up resistor value is 2k ohms.