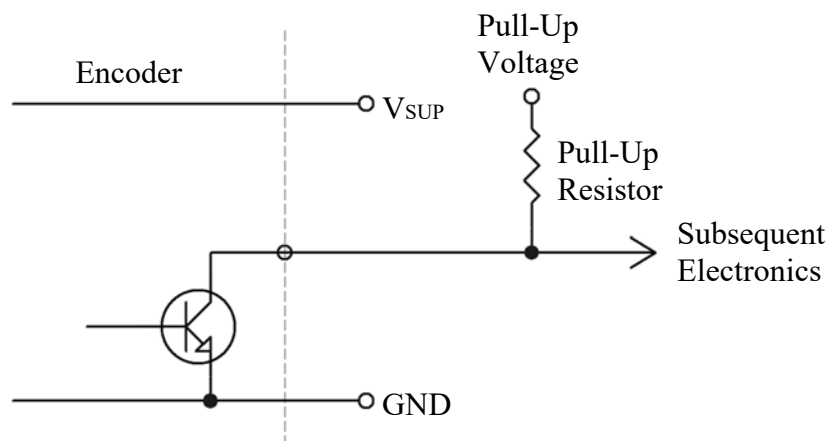


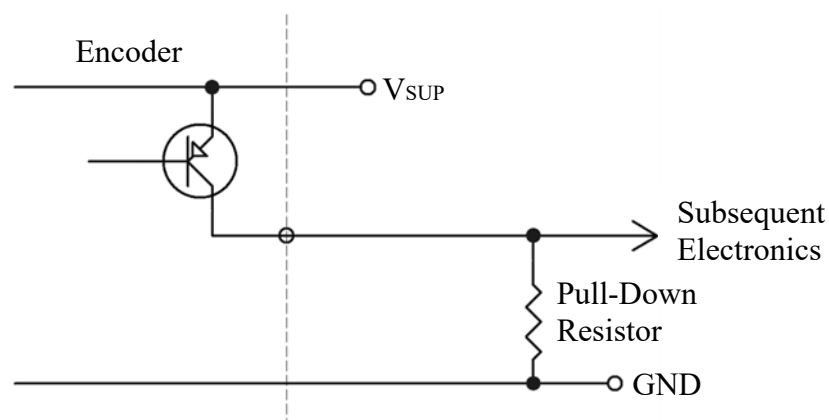
Open Collector Outputs on Scancon Encoders

Scancon Encoders can be delivered with either a NPN-type or a PNP-type open collector output. The characteristic of an open collector output is that the output signal can only be actively pulled to one supply rail (low or high depending on type) by the output transistor, the other state must be pulled up or down passively by a pull-up or pull-down resistor. For an NPN-type output it is only possible for the encoder to pull the output low, the output must therefore be pulled high by a connected pull-up resistor. For a PNP-type output it is only possible for the encoder to pull the output high, the output must therefore be pulled low by a connected pull-down resistor.

Below is shown the typical configurations for an NPN-type output and a PNP-type output



Open Collector NPN-type Output



Open Collector PNP-type Output

Note, that the pull-up voltage for the NPN-type output does not necessarily need to be the same as the supply voltage of the encoder (V_{SUP}) as long it does not exceed the maximum voltage for the encoder as specified in the datasheet.

The pull-down voltage for the PNP-type output will normally be the 0-volt line (GND).

There are no strict rules for the value of the pull-up/pull-down resistor as this is very much dependent on the users requirements but the following guidelines can be given:

1. The value of the resistor must not be so low that the maximum current for the output is exceeded. Consult the datasheet for the encoder for information on this parameter.
2. The maximum frequency from the encoder is dependent on the value of the resistor (the current through the resistor). A high resistor value will give a lower maximum frequency whereas a lower resistor value will give a higher maximum frequency. A lower value of the resistor must, though, respect the rule as set under point 1.

The current through the resistor can be calculated through a variation of Ohm's law that says:

$$I(\text{current}) = \frac{\text{Voltage over Resistor}}{\text{Resistor Value}}$$

A recommendation can be to use a resistor that results in an output current from the encoder of approx. 5mA. Using the above formula will give a resistor value of 1K Ω if there is 5V over the resistor and 4.7K Ω if there is 24V over the resistor. If current consumption is critical higher resistor values (lower current through resistor) can be used.