

Outputs on Scancon Encoders

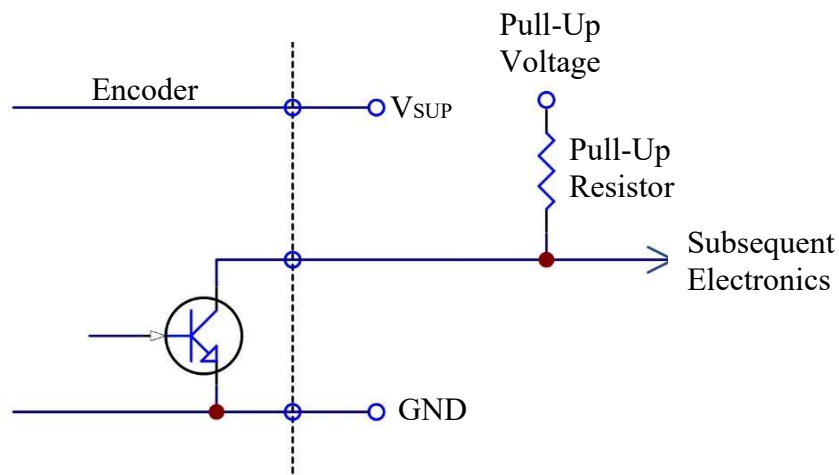
Scancon Encoders can be delivered with either open collector outputs or push-pull outputs. Below is a short description of the most important properties of the different output types.

Open Collector Outputs

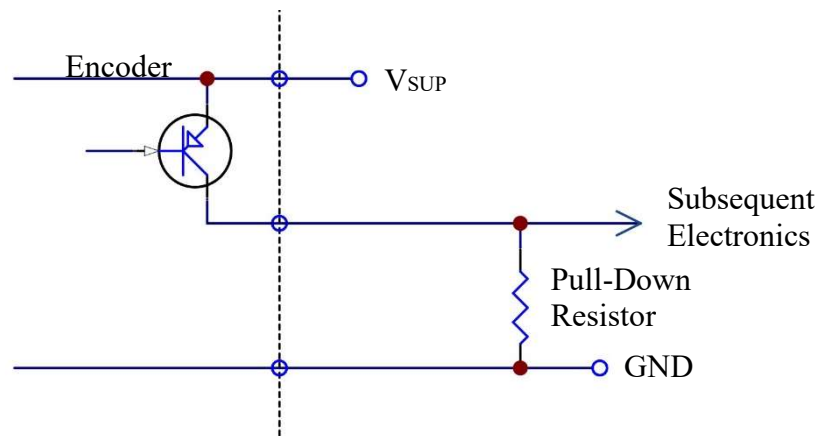
Scancon encoders give the choice of either an NPN-type or a PNP-type open collector output.

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.

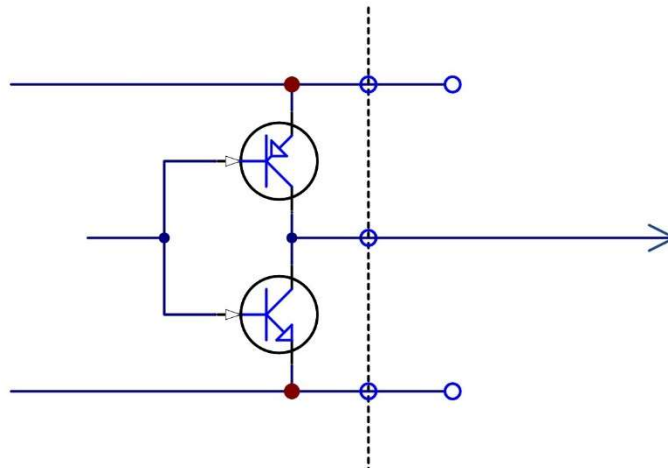
The open collector output is less resistant to electrical noise than the totem pole output when it is pulled up/down by a resistor due to the higher resistance of the resistor when the transistor is in its off-state.

For Scancon encoders the open collector NPN output can be selected as NON, the open collector PNP output can be selected as NOP.

Totem Pole Outputs

A totem pole output will actively pull the output to both its high level and its low level.

Below is shown the typical configuration for a totem pole output.



Totem Pole Output

The totem pole output is more resistant to electrical noise than the open collector output because of the low output resistance as there is always one transistor that is in the on state.

For Scancon encoders the totem pole output can typically be selected as N, D, M or MS giving different possibilities and driving strength of the output.