

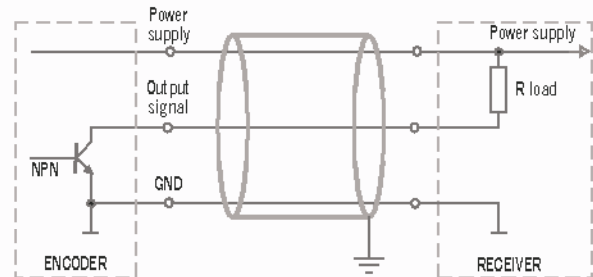
### NPN AND NPN OPEN COLLECTOR ELECTRONIC

It is composed by an NPN transistor and a pull-up resistor used to match the output voltage to the power supply when the transistor is off.

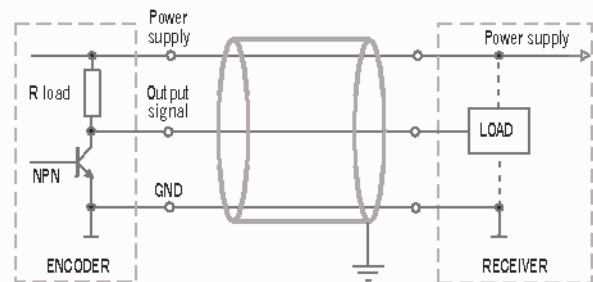
It has low saturation levels at 0 Vdc and close to 0 at the positive. It is proportionally influenced by the cable length, pulses frequency and by the load.

Please consider these specs for a proper use. On the open collector variant there's no pull-up resistor, freeing in such way the transistor collector from the tie of the encoder power supply allowing to obtain signals with different voltage.

### NPN OPEN COLLECTOR



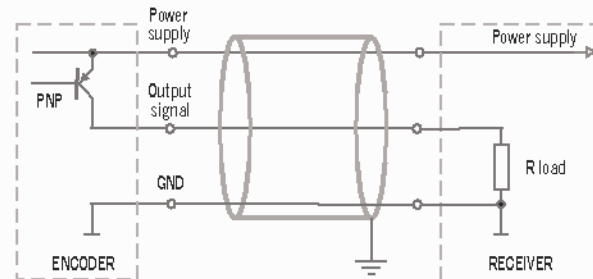
### NPN



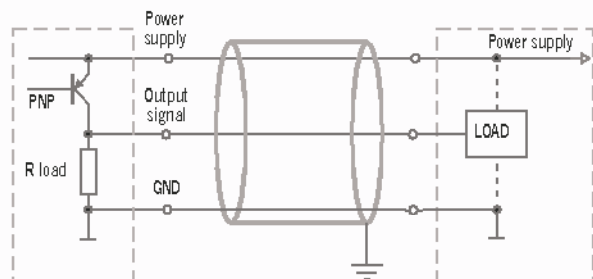
### PNP AND PNP OPEN COLLECTOR ELECTRONIC

Main characteristics and limitations are the same as for NPN electronics. Main difference is the transistor, which is a PNP type. The resistor, if present, is a pull-down one. Therefore, it is connected between the output and 0V.

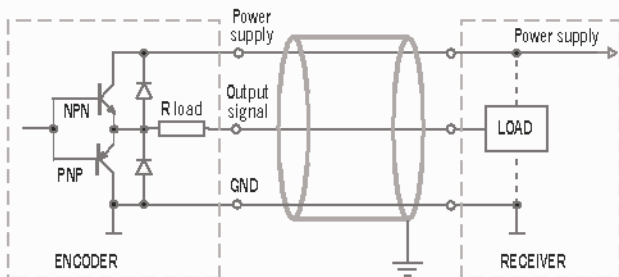
### PNP OPEN COLLECTOR



### PNP



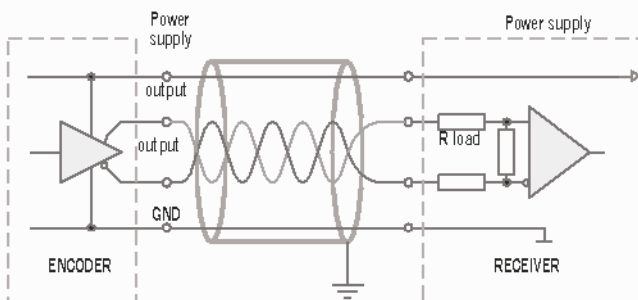
## PUSH-PULL



## PUSH-PULL ELECTRONIC

In NPN or PNP major limitations are caused by the resistor, which works with a much higher impedance than a transistor. To overcome this issue, push-pull electronic uses a complementary transistor, so the impedance is lower for commutation to positive and to zero. This solution increases frequency performances allowing longer cable connections and an optimal data transmission even at high working speed. Saturation signals are low but sometimes higher than in NPN and PNP electronics. Anyway, PUSH-PULL electronics is in any case indifferently applicable instead of NPN or PNP.

## LINE DRIVER



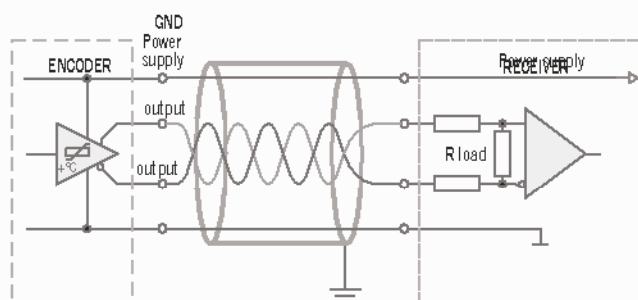
## LINE DRIVER ELECTRONIC

LINE DRIVER is used when operating environments are particularly exposed to electrical disturbances or when the encoder is quite far from the receiver system.

Data transmission and receiving work on two complementary channels so disturbances are limited (cross talk from other cables). These interferences are known as «common mode disturbances» as their generation is due to a common point which is 0V.

Instead, in LINE-DRIVER transmitted and received signals are in «differential» way. In other words, it works basing the communication on voltage differences between complementary channels. Therefore it is not effective to common way disturbances. This type of transmission is used in 5 Vdc systems and it is also known as RS422. It is available also with power supplies up to 24 Vdc.

## PROTECTIONS



## OUTPUT STAGE PROTECTION

A highly integrated ASIC is used to protect outputs from short circuits. This solution is based on an active sensor which controls instantly the temperature reached by the element to be protected. In this way, protection is very effective.

Moreover, it ensures a constant protection against repetitive and permanent short circuits, that is why is strongly suggested for heavy usages.

It is available for LINE-DRIVER and PUSH-PULL electronics.