## WARNING – SAFETY APPLICATIONS

All safety applications must be in accordance with NEMA Standards Publication No. ICS 1.1-1984 (R1988, R1993, R1998, R2003, R2009) or other applicable standards and must be approved by a qualified safety engineer. When using sensors as nonincendive for Class I, Division 2, Groups A, B, C and D or Class II, Division 1, Groups E, F and G hazardous locations, installation should be in accordance with Pepperl+Fuchs' instructions and the National Electrical Code. See the Certifications and Testing Standards section in the catalog Appendix.

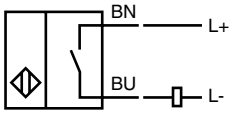
# Sensor Connections/Sensor Outputs

Pepperl+Fuchs provides sensors that can be operated with AC and/or DC supply voltages.
The following list provides an overview.

### Two-wire DC sensors

These are operated in series with the load or connected device. Most are voltage polarity independent (function independent of connection polarity) and are predominantly short-circuit proof, while others offer reverse polarity protection (function only with correct polarity, otherwise the proximity sensor remains at high impedance) and are short-circuit proof. While in the OFF state, a low level of current will flow into the sensor to power the electronics. While in the ON state, conduction current will flow and a minor voltage drop appears across the switch.

Switching example:

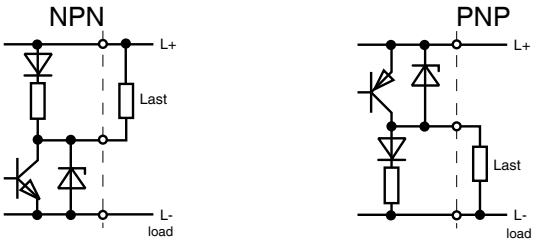



The model number for sensors of this type includes the reference -Z. Two-wire sensors are supplied as:

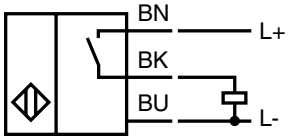
- *NO contact (Z/Z0, Z3, Z4)*
- *NC contact (Z1, Z5)*
- *Configurable by wiring (Z2)*

### Three-wire DC sensors

These sensors have separate connections for the power supply and the load. They are overload protected, short-circuit proof, and reverse polarity protected. The leakage current is negligible. This group is divided into switched high (PNP) sensors and switched low (NPN) sensors. Depending on the type of sensor, the load is connected between output and 0 V or between the output and $+U_B$.




Switching example:



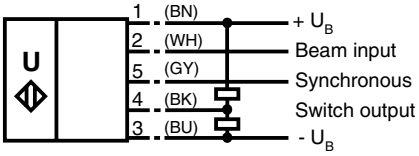

The model number for the vast majority of this type of sensor includes the reference -E.
Sensors of this type are supplied as:

- *NPN NO contact (E or E0)*
- *NPN NC contact (E1)*
- *PNP NO contact (E2)*
- *PNP NC contact (E3)*
- *NPN NO/NC contact convertible (E4)*
- *PNP NO/NC contact convertible (E5)*
- *PNP NO contact, dual channel (E8)*

### DC sensors, push-pull

These proximity switches are equivalent to the E-types, but are equipped with both a PNP and an NPN transistor. This enables the load to be switched between the output cable and +UB or -UB. A push-pull output combines the properties of a PNP and an NPN output.

Switching example:



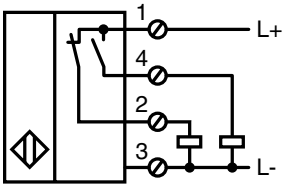

*Sensors with push-pull output are included in:*

- *Photoelectric sensors*
- *Ultrasonic sensors*
- *Incremental rotary encoders*

### Four-wire DC sensors

These proximity switches are equivalent to E-types, but are equipped with an NC contact output and an NO contact output.

Switching example:




:

The model number for this type of sensor includes the reference -A. They are supplied as:

- *NC/NO contacts, current sinking NPN (A or A0)*
- *NC/NO contacts, current sourcing PNP (A2)*


Refer to General Notes Relating to Product Information
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USA: +1 330 486 0001 fa-info@us.pepperl-fuchs.com
Germany: +49 621 776-4411 fa-info@de.pepperl-fuchs.com
Singapore: +65 6779 9091 fa-info@sg.pepperl-fuchs.com
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