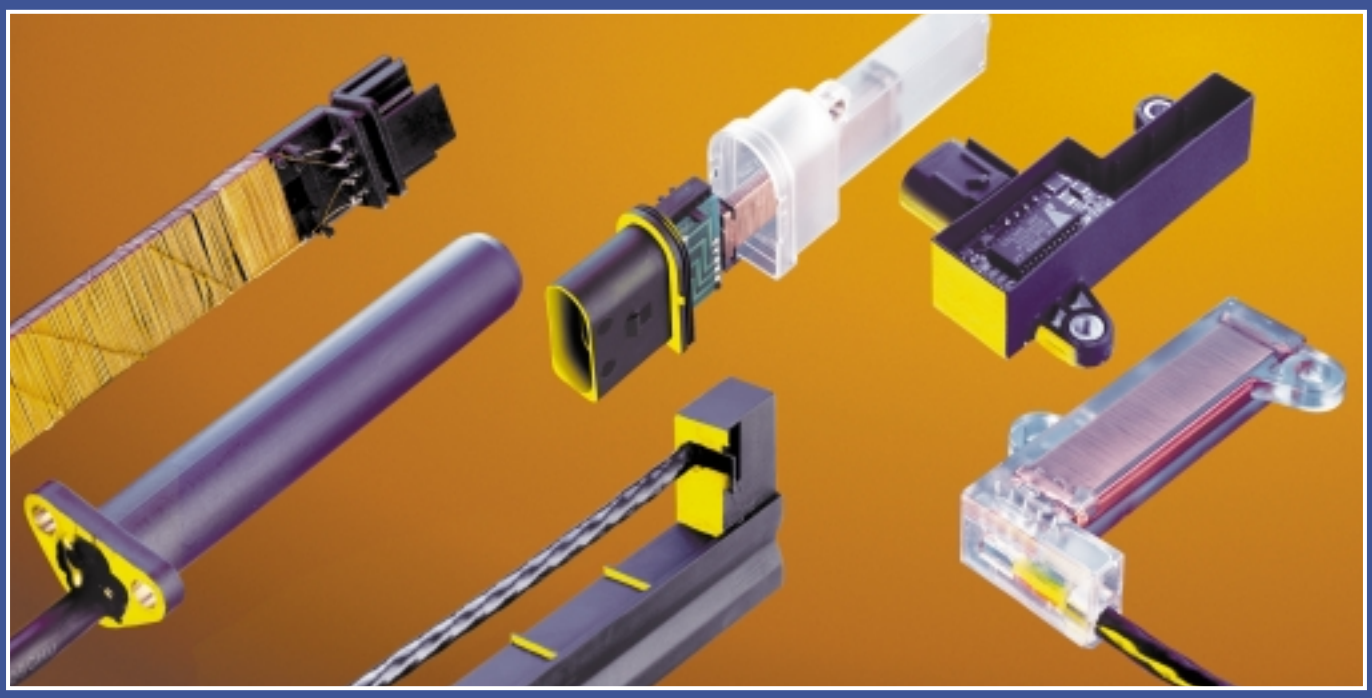
tyco Electronics

The Technology Company

PLCD Displacement Sensor for Industrial Applications



Essential Fields of Application

- **Special Vehicles:**
  e.g. excavators, forklifts
- **Hydraulic, Pneumatic, Electric Drives:**
  e.g. position of piston in cylinders, positioning of valves
- **Machines, Plants, and Installation**
- **Level Metering, Flow Metering**
- **Automation:**
  e.g. servomechanism, linear and rotary actuators
- **Conveyor Technology and Storage Technique**
- **Building and Safety Engineering**

AMP

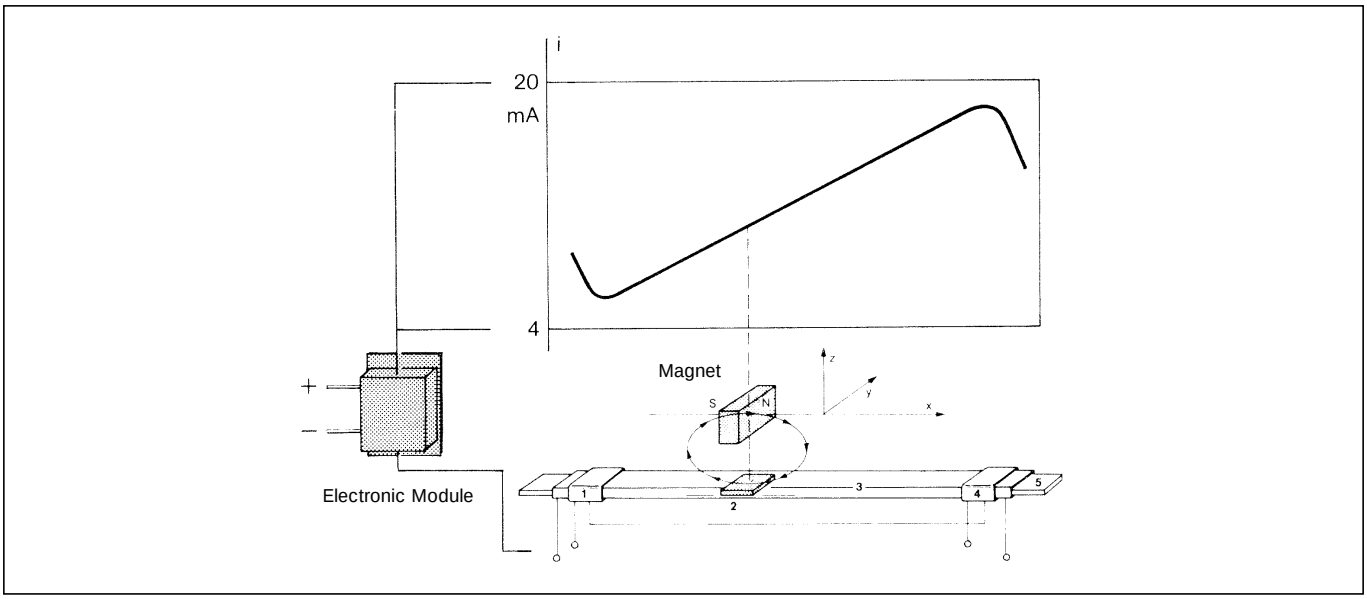
Construction and Principle of Function

PLCD-Displacement Sensors (**P**ermanentmagnetic **L**inear **C**ontactless **D**isplacement Sensors) basically consist of a special soft magnetic core surrounded by a coil, wound arround its entire length. On each end of the core there is a second short coil.

A permanent magnet guided close to the sensor causes localized magnetic saturation and thereby a virtual division of the core. The position of the saturated area along the sensor axis can be determinated by the coil system.

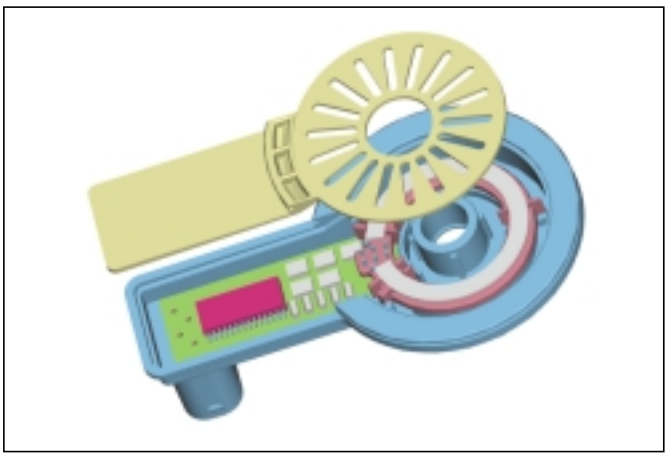
The sensor is supplied by an external electronic module or by an integrated circuit which also produce the output signal.

The output signal is linearly dependent on the position of the magnet. The signal can be conditioned by a standard electronic module, which gives either a current output (4 ... 20 mA) or a voltage output (0 ... 5 V or 0 ... 10 V). Customer specific interfaces are possible.



Construction and principle of function of PLCD

Measuring of Circular Motion



Even in the case of bent arrangements of the sensor the principle of function of the displacement sensor is true. Therefore the PLCD is also suited to measure non-linear motions, e.g. rotary actuators.

Example of PLCD layout for angle measurement

Magnetic Drive

The most significant property of Displacement Sensors PLCD is their operation without any mechanical connection between driving magnet and sensor element.This property enables the driving of the sensor through walls made of nonmagnetic materials. The applications, for which the advantages of this quality are very significant, is the indication of the position of a piston in hydraulik or pneumatic systems. The permanent magnet is simply fixed on the piston and drives the PLCD sensor through the cylinder from e.g. aluminum or brass.

The driving distance between magnet and sensor (air gap) is determined mainly by the dimensions and the strength of the magnet. For the above mentioned drive through partitions it is important that only moderate magnet allows rather large air gaps (e.g. approx. 15 mm with a 1 cm^3 magnet).

For the PLCD sensor the driving magnetic field is only the indicator for the position of the driving magnet. The absolute magnetic field strength, in the first order, does not affect the measurement signal, provided that it is large enough to saturate the sensor core.

This fact is very important for the mounting tolerances and the influence of air gap variations on the measurement signal. As long as the air gap distance remains inside a certain range of operation arround the optimum distance the influence on the sensor characteristic is neglectable.

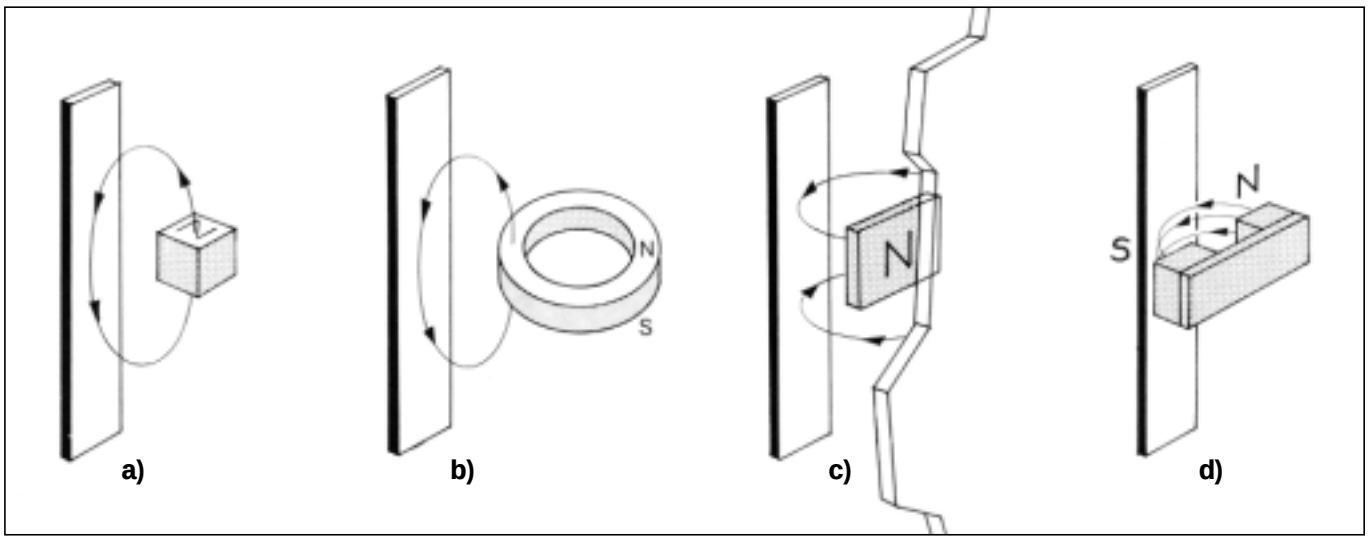
The optimum driving distance and the extensoin of the range of operation depend on the dimensions and the configuration of the permanent magnet used. Too close air gaps with rather large magnets result in a non-linear characteristic. If the air gap is too large, the usable measurement range will be markedly reduced.

The driving magnets selected are basically governed by the application and economic requirements.

Magnetic shielding parts protect the sensor system against the interference of magnetic fields, if necessary.

Characteristics

- Continuous, contactless, linear displacement measurement
- No mechanical connection between driving magnet and sensor
- Magnetic operation adaptable to individual applications
- Control through partitions of non-ferromagnetic materials
- Large mounting tolerances

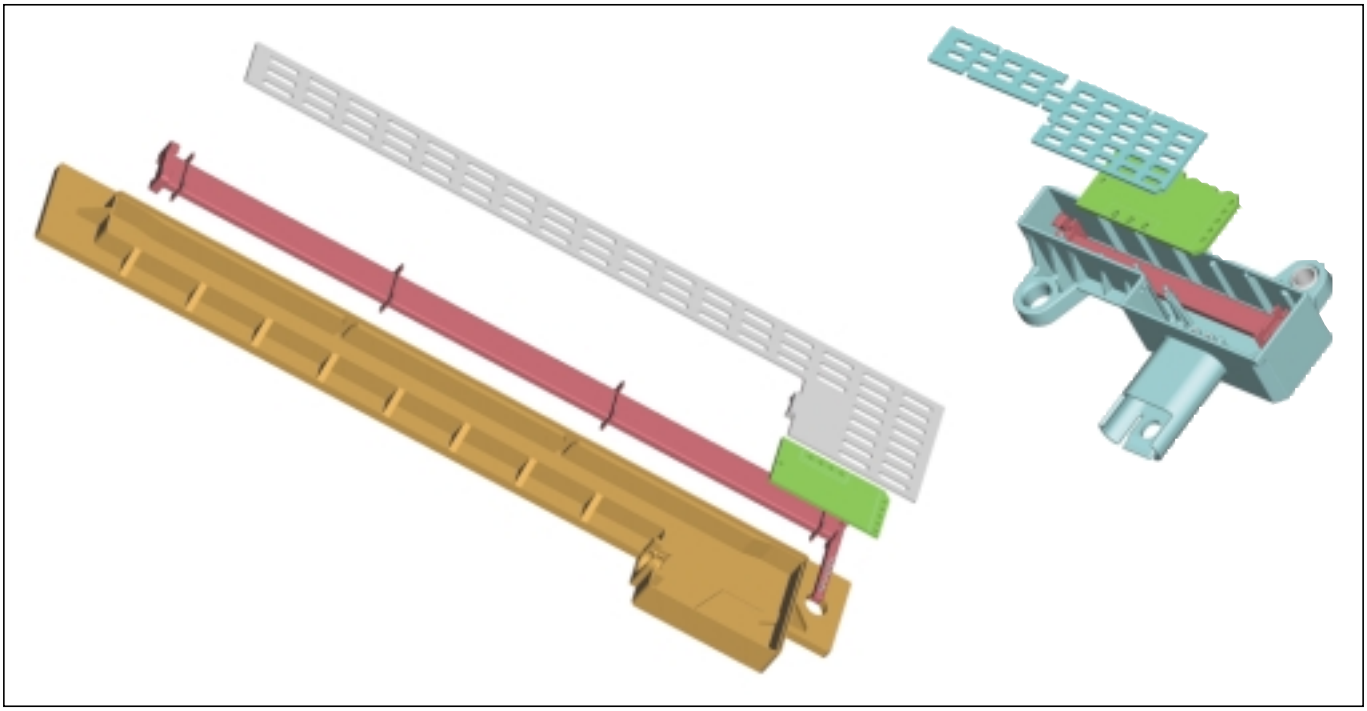


Basical magnetic drive configurations

Engineering Competencies

The majority of our products is developed in close co-operation with our customers. Tyco Electronics offers a comprehensive service and customized package. This covers the entire range from the specific design of complex sensor housings through the development of signal prozessing, the dimensioning of magnetic systems, the simulation, the qualification and the prototyping up to the serial production of customized solutions. On request, we will be able to integrate our prototypes for functional test purposes directly into the customer application.

If necessary, an integrable standard signal prozessing (ASIC) is available. The performance of the ASIC includes the appropriate alternating current supply, the self control of the ASIC by internal process signal supervision as well as the linear output signal 0 V to 5 V.



Examples of Housings of PLCD

Typical Specification of the PLCD

Measurement Range Linear:
15 mm to 400 mm

Measurement Range Angle:
20° to 270°

Gap Magnet – Sensor:
1–20 mm

Driving Magnetic Field:
20–30 mT

Operating Temperatur Range:
up to 180 °C

Protection Class:
IP 67 (higher on request)

Typical Linearity:
<2 %

Typical Resolution:
0.1 % of measurement range

Hysteresis:
<0,2 % of measurement range

Threshold Frequencies:
0 Hz / <100 Hz

Available Signal Processing (ASIC):

Operating Voltage:
V_P = 5 V ±10 %

Current Consumtion:
<20 mA

Output Signal U_a:
0.5 V ... 4.5 V

Second Output Signal U_{ak}:
4.5 V ... 0.5 V

Tyco Electronics AMP GmbH certified according ISO 9001, QS 9000/VDA 6.1, ISO 14000 certification is in preparation.

http://www.tycoelectronics.com
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For further informations please contact your local
Tyco Electronics Office or your Product Information Center