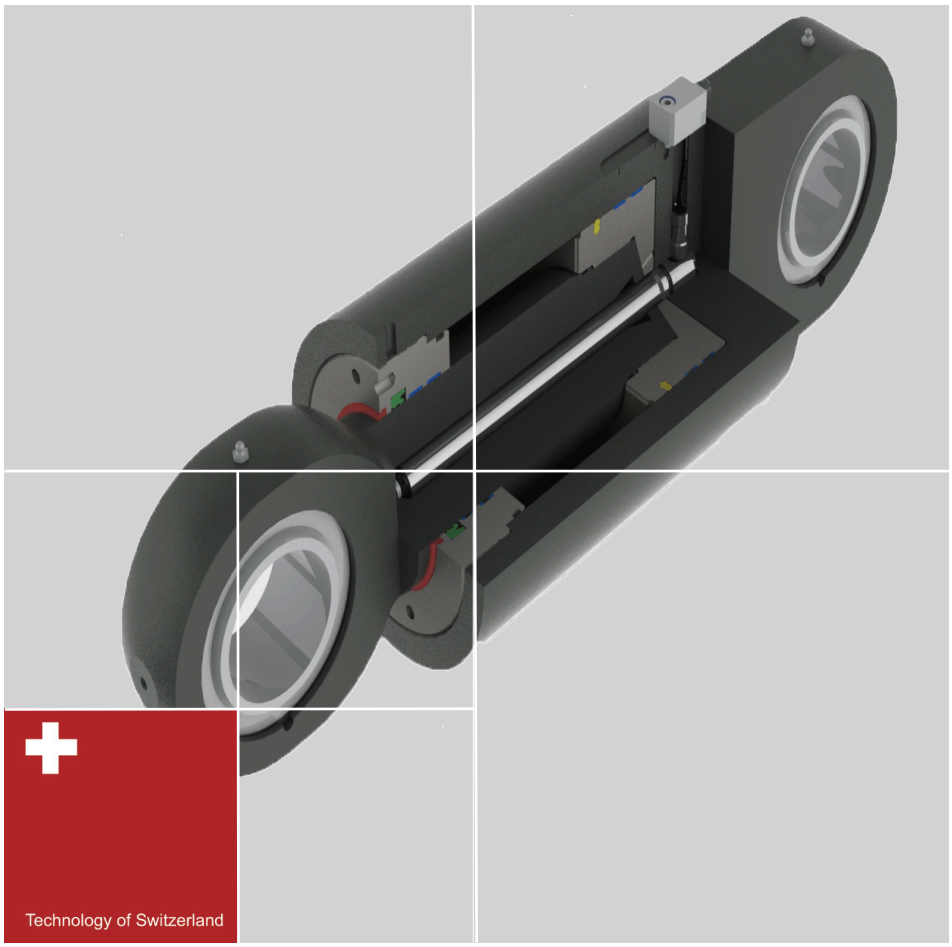
IMS Measuring System

Technology and Technical Specifications



- Installation kit for hydraulic cylinder
- Presssures up to 700 bar
- Very sturdy / high reliability
- Electronics as 1, 3 and 4 duct version
- Electronics watertight
- Strokes up to 500 mm

HAGENBUCH
Hydraulic Systems

Introduction

The IMS position sensor is ideally suitable for installation in hydraulic cylinders thanks to its compact and sturdy design. The technology is based on a linear variable differential transformer (LVDT). This electromechanical sensor consists of a moving core and a stationary coil system. If the core is immersed in the coil system without contact, an electrical signal will be generated proportionally to the cover. This analogue sensor measuring absolutely has a range of important advantages:

Non-contact measurement / Long service life
All parts moving relative to one another are non-contact. Good encapsulation of the coil system (IP68) and the absence of friction ensure a long service life, even under tough environmental conditions.

Absolute position signal
The analogue sensor supplies a position signal immediately after switching on the power supply. A reference movement is not required.

Good zero point stability
The symmetrical structure of the coil system ensures good zero point stability and a repeat accuracy.

Integrated electronics
The evaluation electronics of the LVDT are an integral component of the sensor, with the result that a standard signal is available at the interface to the control.

High pressure resistance
The pressure resistance of the IMS system is limited almost exclusively by the cylinder design.

Good dynamics
The low moving mass of the core ensures goods dynamics of the LVDT, which is only limited by the processing speed of the electronics.

Large temperature range
The standard sensor works in a wide temperature range from -20°C to 85°C. The temperature compensation of the electronics guarantees an almost constant measuring value in the entire temperature range.

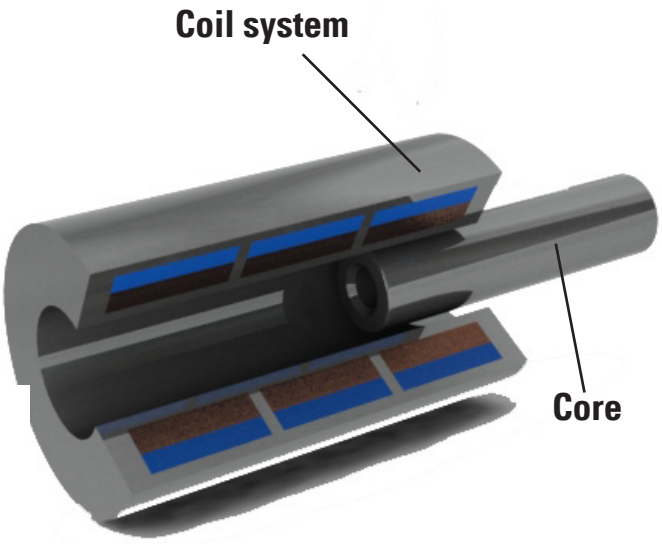
Very good vibration resistance
Vibrations have practically no effect on the sensor signal.

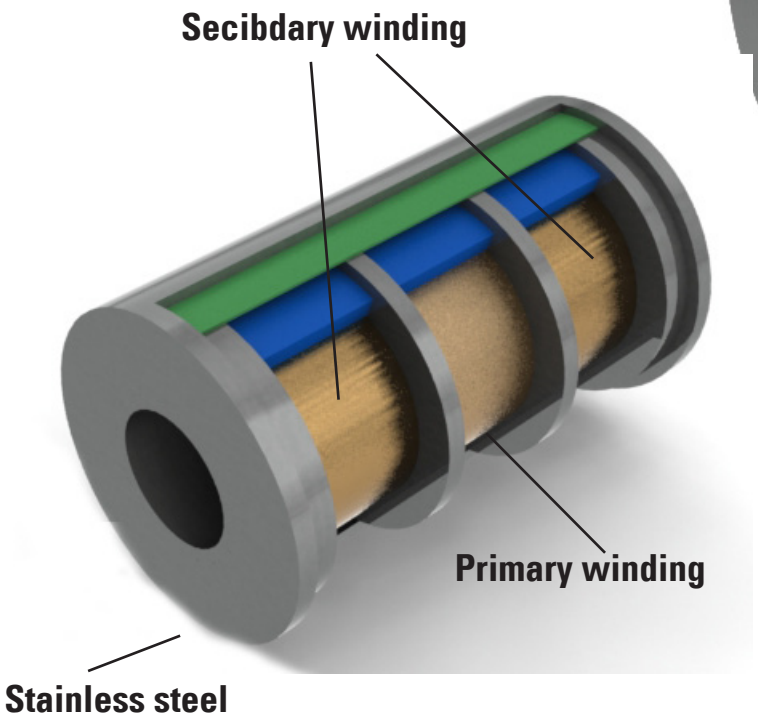
Large mechanical tolerances
Errors in the diameter and angular position of the core and coil system are uncritical, which is crucial for the high functional reliability of the system.

For use with all pressures fluids
The IMS system is suitable for both water-based or synthetic pressure fluids.

IMS sensor system technology

The LVDT supplies a displacement proportional electrical sensor signal. The coil system consists of a primary winding in the centre and two secondary windings on the sides. If the moving nickel-iron core is immersed in the coil hole, a magnetic field will build up between the coils.





The primary winding is connected to an AC power source so that voltages are induced in both secondary coils. If these secondary coils are switched in series, the two voltages will have different signs. The sensor signal is the difference between the voltages. The signal is zero in the central position of the core. The differential signal changes proportionally with the deflection.

The design and material selection for the LVDT form the basis for a robust sensor, which can also be used under tough environmental conditions. The insulation of the coils made from epoxy resin prevents penetration by moisture or the formation of condensation. At the same time, the coils are able to resist large vibrations and impacts. The sheath has a high magnetic permeability and thus offers good protection against external alternating current fields.

The evaluation electronics can be installed either directly at the sensor on the cylinder or detached from this. In both cases, the electronics are well protected in a metallic housing. In the „detached electronics" variant, the electronics and sensor are connected via a shielded cable.

Technical data

The following technical data refer to the standard sensor system

Repea accuracy:	0.02 % nominal stroke
Power consumption:	50 mA (Electronics 3 = 150mA)
Linearity error:	+/- 0.25 % nominal stroke (best fit)
Vibration resistance:	20 g to 2 kHz
Impact resistance:	1000 g for 11 ms
Supply:	24 V DC +/- 15 %
Measuring length:	2,5 mm to 500 mm
Temperature range:	-20°C to +85°C
Output signal:	4 - 20 mA
Maximum load:	500 Ohm
Recommended load:	100 Ohm
Pressure resistance:	to 700 bar
Fluid:	All common hydraulic oils based on mineral oil. HFC, Skydrol etc.
Limit frequency:	600 Hz

Electronics

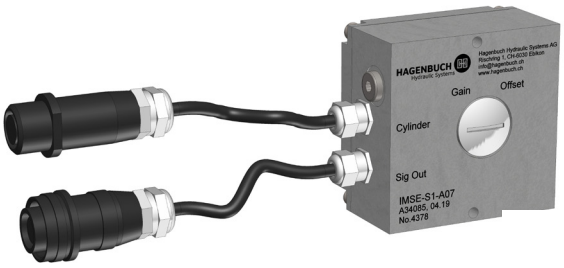
Introduction

The evaluation electronics of the IMS position sensor are responsible for supplying power to the coil system and preparing the path signal. They are housed in a metal housing with high protection class (IP68). The configuration and calibration are carried out at the electronics. The trimmers and DIP switches for these settings are located below the relevant closing cover. The „test port" is only required for assembly inspections. The two through holes at the edges serve for mounting the electronics.

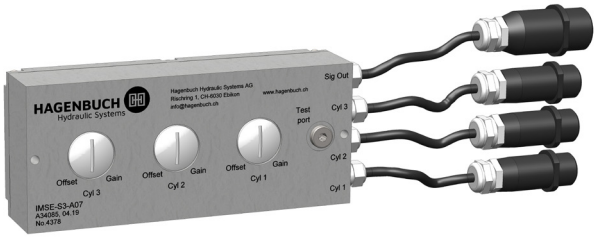
Standard settings

The sensor electronics are set and calibrated at Hagenbuch AG according to the following specifications:

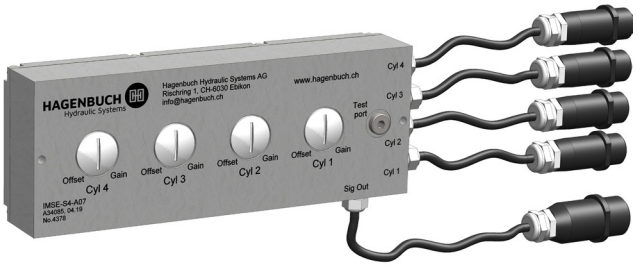
1. The coil type is set
2. The output signal is set as SOURCE Mode
3. The maximum cylinder stroke is calibrated at 4-20 mA
4. The extreme values for the signal are calibrated at 4 mA in the retracted cylinder position and at 20 mA in the extended cylinder position. Depending on the application and customer requirements, the signal can also be inverted.



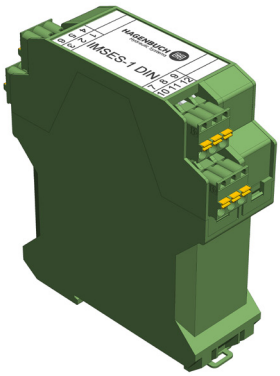
IMS-Electronics 1
Evaluation electronics for 1 cylinder



IMS-Electronics 3
Evaluation electronics for 3 cylinders



IMS-Electronics 4
Evaluation electronics for 4 cylinders



IMS-Electronics in DIN-housing
Evaluation electronics for 1 cylinder

Electronics

Order code

IMSE

Electronics for IMS sensor

S1

S1 = connection of one sensor
S3 = connection of three sensors
S4 = connection of four sensors

A07

A07 = coil type for 700 bar maximum pressure

1000

200 = coil PR 750 200 with +/- 5 mm stroke
300 = coil E 300 200 with +/- 7.5 mm stroke
500 = coil PR 750 500 with +/- 12.7 mm stroke
1000 = coil PR 750 1000 with +/- 25.4 mm stroke
2000 = coil PR 750 2000 with +/- 50.8 mm stroke

Configuration and calibration

Two dip switch rows are located below the closing cover of the sensor electronics, these enabling the following three properties to be set:

1. Signal adjustment
2. Calibration of the sensor

The fine calibration of the output signal is carried out via 2 potentiometers.

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