DFI Inductive Sensor

Integrated Electronics with
24 VDC supply / 4…20mA output

LVDT displacement transducer

For valve position and piston displacement measurement

Ultra-compact design with integrated electronic unit / amplifier

3- wire connection with standard radial M12 connector

Usable for 20-30mm displacement

Pressure resistant up to 32o bar

Technical Data

	DFI 30
Electrical stroke	20…30 mm
Dimension A	30 mm
Body length	94,5 mm
Connection	M18 x 1,5
Transducer weight	~200 g
Core weight	5 g
Supply voltage	10...36 VDC
Power consumption	60 mA @ 24 V
Output signal	4 ... 20 mA
Linearity error	< 0,5% FS
Carrier frequency	5 kHz
Dynamic bandwidth	500 Hz
Static resolution	virtually infinite
Temperature coefficient of zero	±0,2% / 10K
Temperature coefficient of span	±0,2% / 10K
Operating temperature	-20°C ... +70°C
Protection class	IP 54

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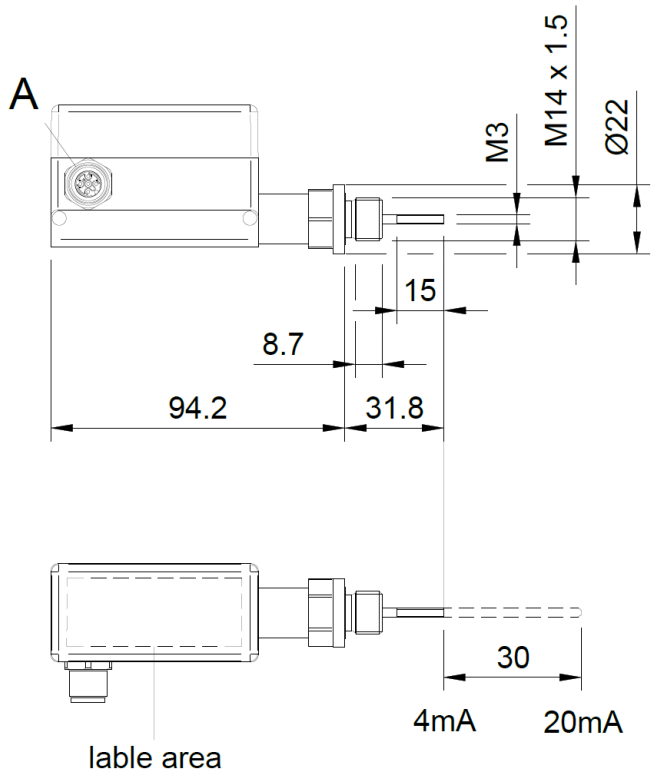
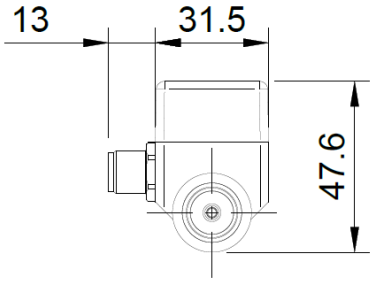
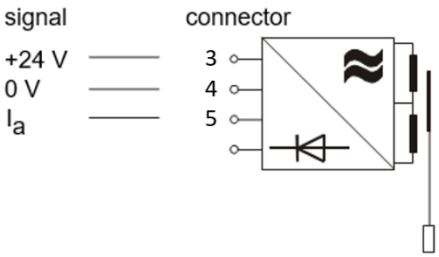
Dimensions





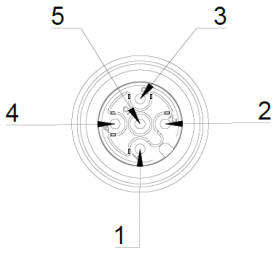


Bill of materials

Position	Name	Material / Supplier	Information
1	core rod	stainless steel	n.a.
2	seal ring	FKM / Parker	ED14X1.5VITX
3	pressure tube	stainless steel	WAF 19mm
4	coil housing	stainless steel	n.a.
5	cover	ABS	UL94-HB
6	connector	/	M12
7	electric housing	aluminium	n.a.
8	grub screw	stainless steel	M5x8, allen key 2.5mm

Wiring Details

PIN	color	assignment
1	BN	do not connect
2	WH	do not connect
3	BU	signal out 4...20mA
4	BK	power supply +24V
5	GY	GND



Safety instructions

During commissioning and operation, all precautionary measures must be taken to avoid damage to persons or property.

Installation, wiring, commissioning, and calibration of the LVDT sensor must only be carried out by qualified personnel. Check the installation situation for possible mechanical collisions.

Connection cables and plugs as well as protective parts e.g., housing cap and core rod must be checked regularly for damage and are to be replaced if necessary.

Main Characteristic

The LVDT sensors of the DFI type are sensors with integrated signal conditioning electronics. They are supplied with a nominal supply voltage of +24 VDC and provide an output of 4 ... 20 mA proportional to the core displacement.

The housing of the transducer is made of high-grade stainless steel. The built-in electronic unit is encapsulated in an aluminum housing covered with a plastic cap. The sensors operate based upon a non-contact measuring method and are therefore not subject to any significant wear if the core is not in touch with the body or internal lining. Routine maintenance work is therefore not required.

The number of connection lines for the sensor is reduced to only 3 by a common GND line. The current loop is characterized by low susceptibility to EMC interference and best safety features. The transducer is designed to achieve good linearization and low temperature drift.

The built-in electronics power the internal measuring coil system, amplify, and filter the signal and convert it into a 4 ... 20 mA output for the nominal measuring range. The electronics are protected against polarity reversal. Overvoltage must be avoided.

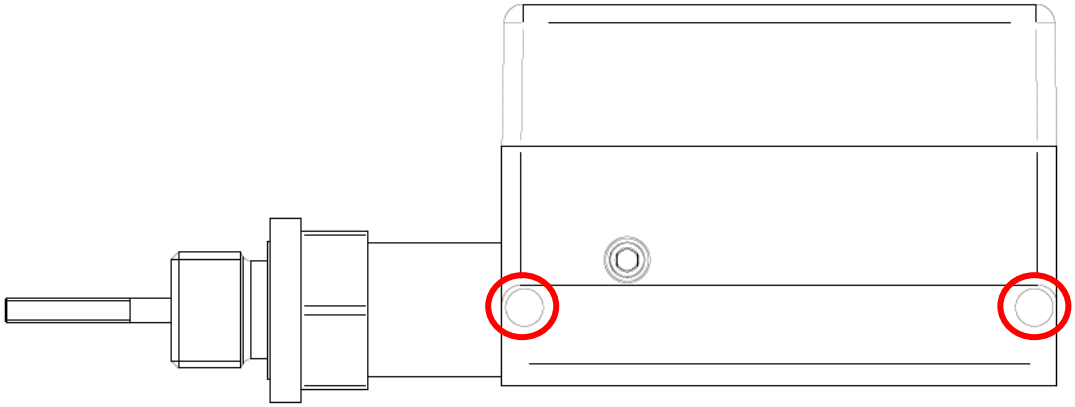
Externally connected devices must not exceed a maximum total resistance of 400 ohms. Despite protection on the output side, applying an external voltage to the measuring signal output pin will lead to destruction of the sensor.

Measuring principle

The linear displacement of the core is measured based on the differential transformer principle LVDT. This means that the magnetic core changes the impedance in a system of a primary and two secondary coils in such a way, that a signal is proportional to the movement.

Commissioning

For adjustment or calibration of the sensor, the plastic cap needs to be removed by unscrewing the 4 screws from the bottom of the housing.



Electronics / Amplifier

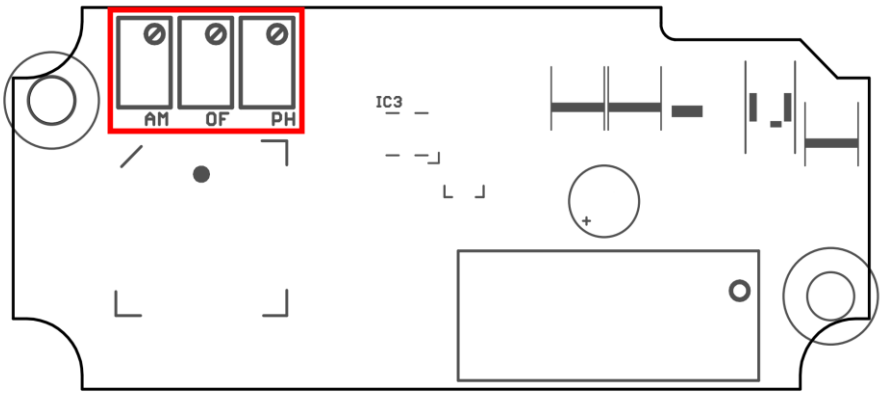
The sensor comes with integrated signal conditioning electronics. The amplifier is powered with a nominal supply voltage of +24 VDC and provides an output of 4 ... 20 mA proportional to the core displacement.

There are three trim potentiometers for adjusting **gain**, **offset** and **phase-shift** of the sensor. The sensor can be set to a nominal range of 20mm to 30mm by adjusting the gain and if required the offset. Do NOT change the setting of the phase shift, as this will result in a modification of the signal quality.

AM = Amplification/Gain

OF = Offset

PH = Phase (Do not change standard setting)

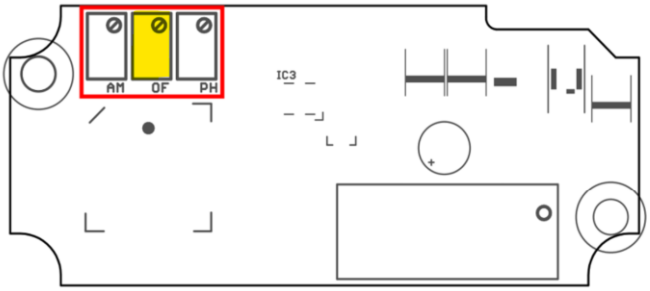


Calibration

Perform all adjustments at operating temperature and, if possible, with the sensor installed.

To calibrate the LVDT sensor, remove the connector plug. For initial zero-point adjustment, the core rod is typically removed from the transducer housing and the output current of the amplifier is set to 12 mA with the zero-point potentiometer “OF” to 12 mA.

The original factory setting of the zero-point is as per the mechanical drawing above. Install the sensor and its core rod mechanically to the device and put the device in zero position. Then adjust the mechanical position of the core rod in a way that the zero-point (12 mA) setting is again retained. After finally mounting the core mechanically to the device, small deviations can be corrected with the zero point / offset potentiometer “OF”.



The device is now moved to its limit position wherein the core rod is moved to one of the end positions of the measuring range. In the inner end position (pushed in / fully retracted) the amplifier is adjusted with the sensitivity potentiometer "AM" to the desired lower value, typically 4 mA. Simultaneously the outer end position (pulled out / fully extracted) is adjusted to the upper value, typically 20 mA.

If the required 20 mA output cannot be achieved by setting the gain potentiometer, check again the setting of the offset and readjust the min / max output once again according to the above-mentioned procedure.