IN - 081 / 083 / 084 / 085

Non-Contacting Displacement Sensor with integrated Oscillator

Displacement measuring range: 1,5 mm

1 Application

The non-contacting displacement sensors are used to measure ralative shaft vibration, relative shaft displacement, rotor speeds ect. A presprequisite for measurement is a metallic measuring surface, preferrably made o 42CrMo4.

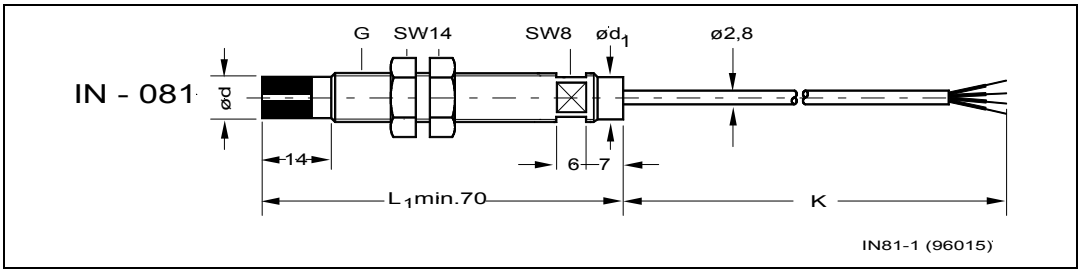
The output voltage of the sensor is proportional to the distance between the probe tip and the measuring surface, within the displacement measuring range. Extraneous disturbances, such as earth loops, temperature influences and dielectric influences like oil and gas can be neglected.

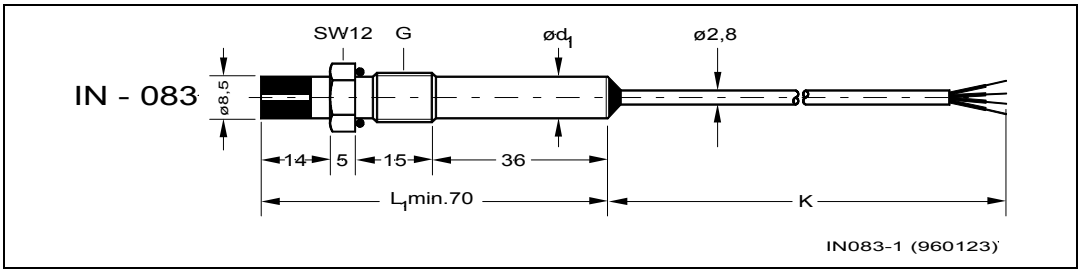
Direct connection of signal cables with a length up to 1000 m , is possible. More-ever, the sensor can be replaced without recalibration.

The sensor complies with the essential accuracy requirements of standards API 670 and DIN 45670.

2 Dimensioned Drawing

2.1 Dimensioned drawing IN-081 and IN-083

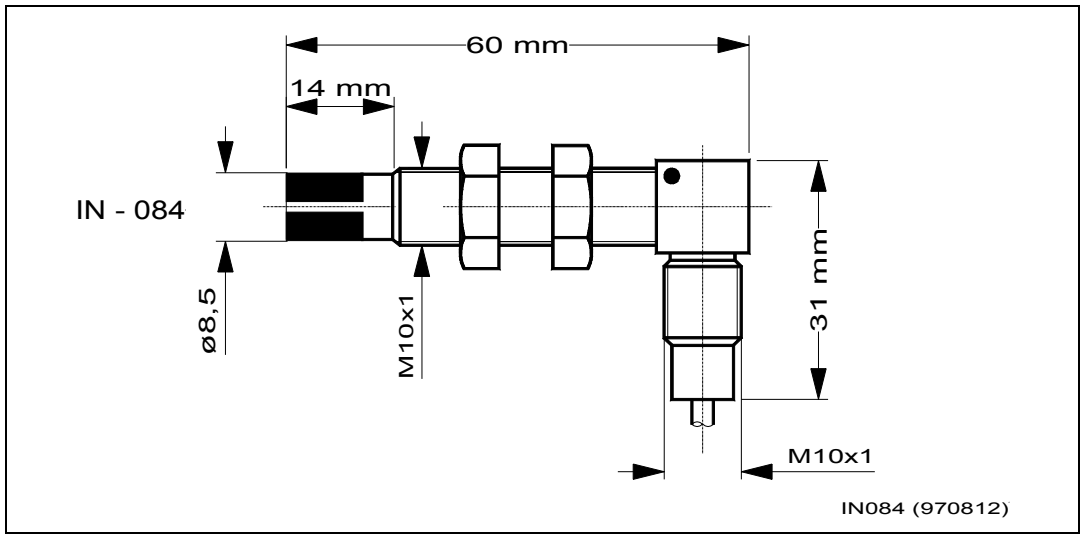




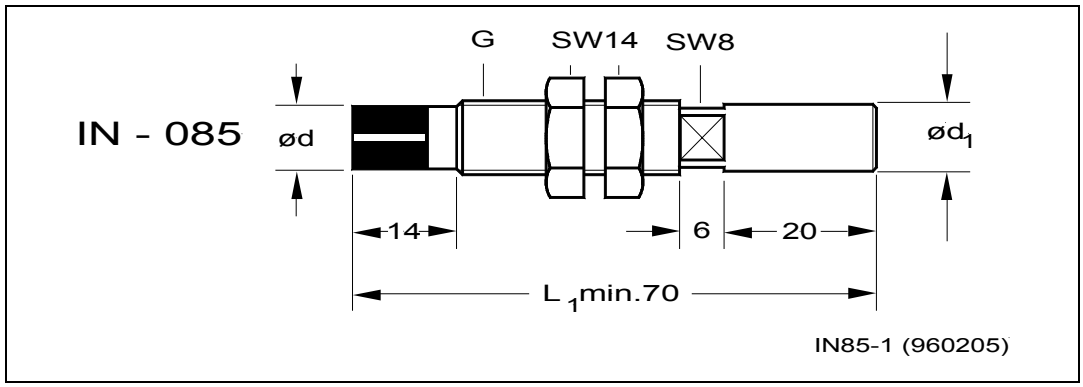
2.1.1 Variable dimensions IN-081 und IN-083

Thead G, diameter d_1	M10 x 1 - 6 g, ∅ 8,5 mm 3/8" - 24 UNF -2 A, ∅ 8 mm
Sensor length L_1	70 ... 250 mm
Cable length K	approx. 2.3 m with pig-tails

2.2 Dimension drawing IN-084



2.3 Dimension drawing IN-085



2.3.1 Variable dimensions IN-085

Thread G, diameter d_1	M10 x 1 - 6 g, ∅ 8,6 mm 3/8" - 24 UNF -2 A, ∅ 9 mm
Sensor length L_1	70 ... 250 mm
Probe tip d	∅ 8,5 for M10 x 1 - 6 g ∅ 8,2 for 3/8" - 24 UNF -2 A

3 Technical Data

Measured parameter	relative shaft vibration relative shaft displacement
Measuring principle	eddy-current principle
Operating frequency range	0 ... 10 000 Hz (-3 dB)
Sensitivity	-8 mV/µm (material 42CrMo4) For other material refer to table page 6
displacement measuring range, linear	1,5 mm
Sensitivity error	< ± 5 % at room temperature + 22 °C < ± 10 % in operating temperature range
Deviatation from reference line	± 2 % at room temperature + 22 °C ± 10 % in operating temperature range
Displacement measuring range with additional devitation of 5 %	2,4 mm
Average working position	Gap voltage -9 V

The tip of the IN-084 sensor is sealed with lacquer for protection against humidity (water). This is also available as an option for other sensors of the type IN-08x.

Temperatures

Operating temperature range	0 °C	...	+ 110 °C
Usuable temparature range	0 °C	...	+ 110 °C
Storage temperature range	-50 °C	...	+ 150 °C

Supply

Supply Voltage U_B	-18 V ... -30 V DC (non polarized)
Power consumption (idling)	max. 20 mA
Power voltage feedthrough	≤ 46 dB (f = 100 Hz) ≤ 27 dB (f ≤ 10 kHz)
Isolation resistance between housing and 0V	R_{IS} > 20 M Ω

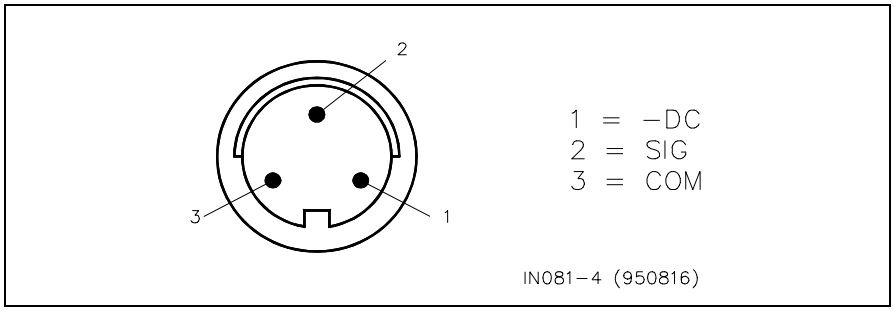
Output

Signal-Voltage	$U_{SIG} = U_B + 2$ V
Signal current	$I_{max} = 15$ mA
Noise	< 1 mV_{ss} (... 10 kHz)
Source resistance, dynamic	< 5 Ω
R_{Load}	> 1 k Ω

Connection for IN-081, IN-083 and IN-084

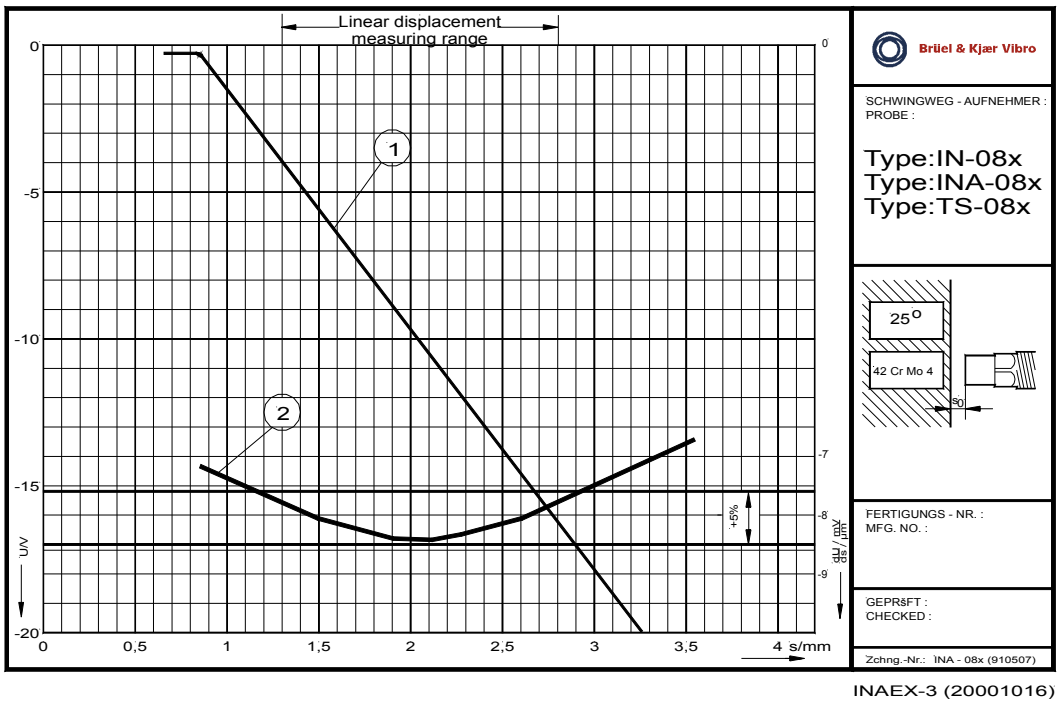
Cable	3 cores, shielded, pig tails		
Shielding	not connected to sensor housing		
Core colour	red	=	-DC
	white	=	COM
	yellow	=	SIG
	yellow/black	=	Shield
Admissible cable length	1000 m		
Weight	approx. 120 g		
EMC	see EMV-Data sheet: EMC data of displacement sensors Type IN - ...		

Connection for IN-085 (Socket assignment)



Enclosure IN-085	IP54

3.1 Characteristic curve of displacement sensor



INAEX-3 (20001016)

Constant sensor temperature (T = 25 °C). Supply voltage -24 V.
Specism material 42CrMo4 AISI4140

Typical Transfer characteristic (pos. 1)
Typical characteristic of sensivity (pos. 2)

Transfer characteristic U = f (s) (pos. 1)

It represents the gap voltage of the distance between probe tip and measuring track

Characteristic of sensitivity $\frac{dU}{ds}$ = U'(s) (pos. 2)

It represents the sensitivity for minor displacement changes as a funktion of the distance.

Nominal measuring sensitivity	-8 mV/µm (-200 mV/mil) (for standard shaft material Material No.: 1.7225 as per DIN 17 200 with composition 42CrMo4)

3.1.1 Sensitivity of displacement sensor as a function of the material of the measuring track

The displacement sensor is calibrated for material no.: 1.7225 (42CrMo4) in accordance with DIN 17 200, corresponding to AISI/SAE 4140.

The sensitivity in -8mV/mil).

Further materials and their sensitivities are listed in the table below. The sensitivity of a material can be determined by means of a material specimen with the help of a Brüel & Kjær Vibro calibration unit AC-126

Calibration to other materials is effected at the electronic at the measuring system.

Sensitivity of sensor at room temperature

Material no. as per DIN 17 200	Abbreviation	Sensitivity - mV / µm
1.0050	St 50-2	7,90
1.0062	St 60	7,90
1.0501	C 35	7,95
1.0503	C 45 G	7,80
1.1181	CK 35	7,85
1.1191	C 45	7,90
1.2241	51 CrV4	8,20
1.2841	90MnCrV4	7,80
1.4006	X10Cr13	7,40
1.4028	X30Cr13	7,50
1.4057	X22CrNi17	7,25
1.4104	X12CrMoS17	7,50
1.4313	G-X5CrNi13 4	7,35
1.4406	X5CrNiMoN18 12	10,45
1.4449	X5CrNiMo17 19	7,65
1.4500	G-X7 NiCrMoCaNb2520	10,35
1.4541	X10CrNiTi189	7,80
1.4571	X8CrNiMoTi17 12(2)	10,40
1.4922	X22CrMoV12 1	7,45
1.6562	40NiMoCr7.3	7,50
1.6580	30CrNiMo8	7,80
1.6587	17CrNiMo6	7,80
1.7219	27CrMo5	8,05
1.7225	42CrMo4	8,00
1.8070	21CrMoV5 11	7,80

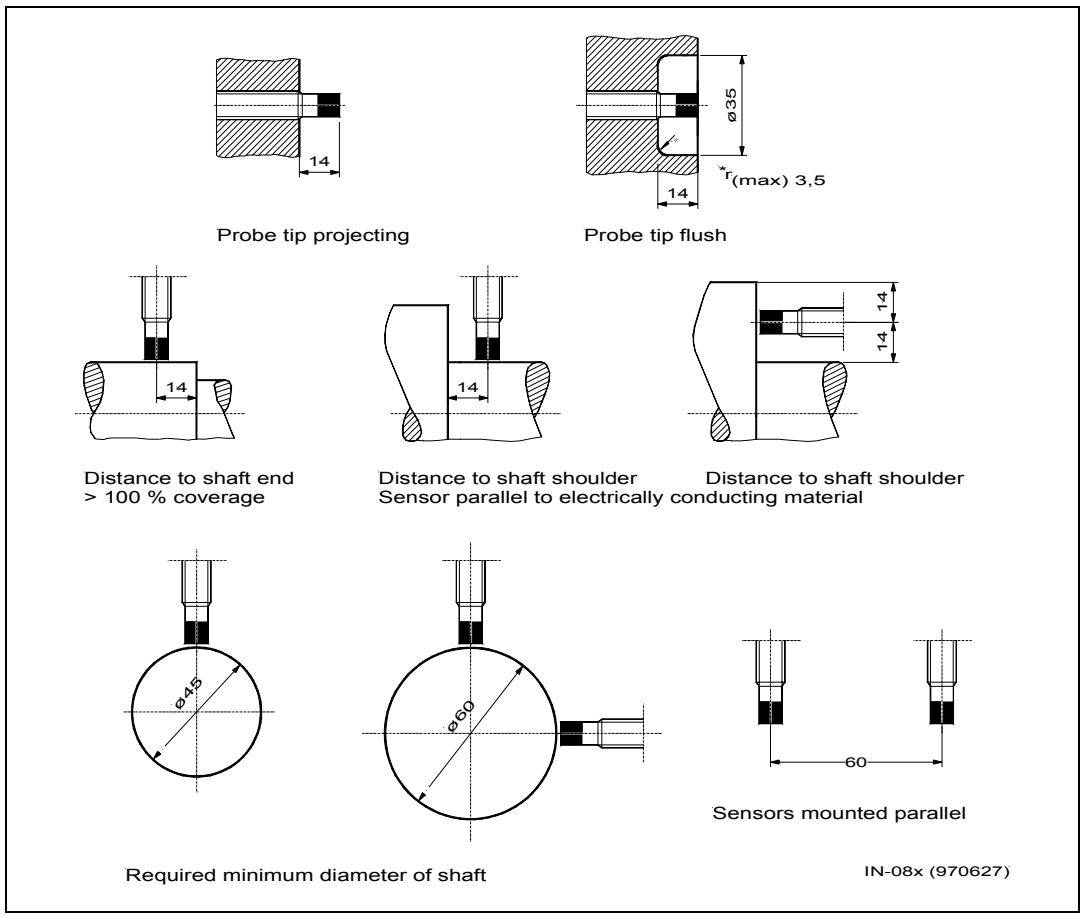
4 Mounting Instructions

The installation of the displacement sensor must be result accordingly at the „Mounting instructions for displacement sensors„ !

Sensors for non-contacting displacement measurement are pre-ferrably to be mounted onto such machine components whose natural vibration does not falsify the measured result.

4.1 Free space and minimum distances for non-contacting displacement sensors

Non-contacting displacement sensors produce a high-frequency electro-magnetic field. If any electrically conductive material apart from the measuring object is within this field, the measuring result will be falsified. Therefore the following free spaces and minimum distances must be adhered to during installation of the non-contacting displacement sensors:



If minimum free spaces and distances cannot be realized by machine design, please contact the manufacturer.