

# OD - 081 / 083

## Oscillators for Non-contacting Displacement Sensors

Measuring displacement 3.5 mm

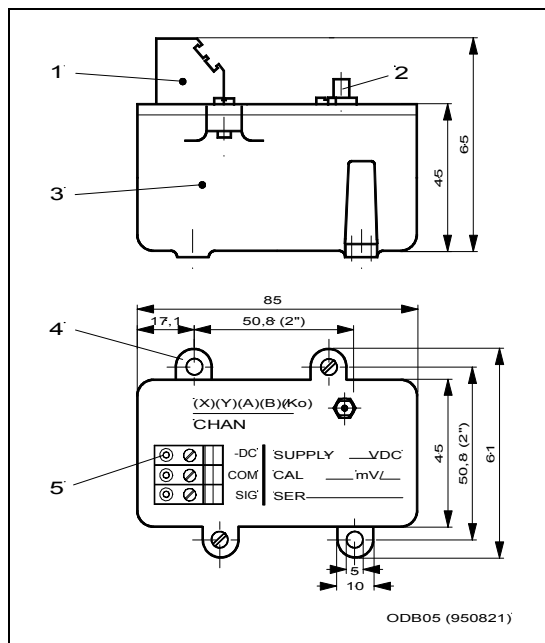
### 1 Application

The Oscillator *is part of the Brüel & Kjær Vibro displacement measuring chain*, comprising:

- Non-contacting displacement sensor
- Extension cable
- Oscillator.

The displacement measuring chain serves for non-contacting displacement measurement according to the eddy-current measuring principle. When used together with safety barriers the oscillator is permitted to be utilized in hazardous areas, classification EEx ib IIC T 6.

#### 1.1 Dimensioned drawing



- (1) 3-pole terminal block
  - signal cable input
- (2) Coaxial socket for connecting the extension cable EC-xxx
  - External conductor connected with housing and COM terminal
- (3) Aluminium housing (G-Al Si 12)
  - protection type IP 20
- (4) Fixing straps
- (5) Test sockets

## 2 Technical Data

Oscillator suitable for non-contacting displacement sensor	SD-081, SD-083, SD-084, SD-087, SD-088, SD-089
Admissible nominal length of sensor extension cable	5 m (OD-081) 10 m (OD-083)
Measuring displacement	max. 3.5 mm
Working frequency range	0 ... 10 kHz (-3 dB)
Output signal	-1.5 V ... -20 V (max. $U_B + 2$ V)
Supply voltage ( $U_B$ )	-18 V ... -26 V direct current
Current consumption	max. 30 mA
Source impedance, dynamic	approx. 5 $\Omega$ , max. 5 mA
Working temperature range	-30 °C ... + 65 °C
Working temperature range with Ex-protection supply	-20 °C ... + 65 °C
Storage temperature range	-55 °C ... + 100 °C
Length of signal cable	max. 1000 m
Weight of oscillator	approx. 300 g

### Electrical connection

Terminal	-DC	Connection -24 V (-18 ... -26 V)
Terminal	COM	Reference conductor connection (0 V operating voltage and 0 V signal)
Terminal	SIG	Measuring signal output
Installation		The oscillator must be electrically isolated from the housing in which it is installed.

### Reference to zener barriers

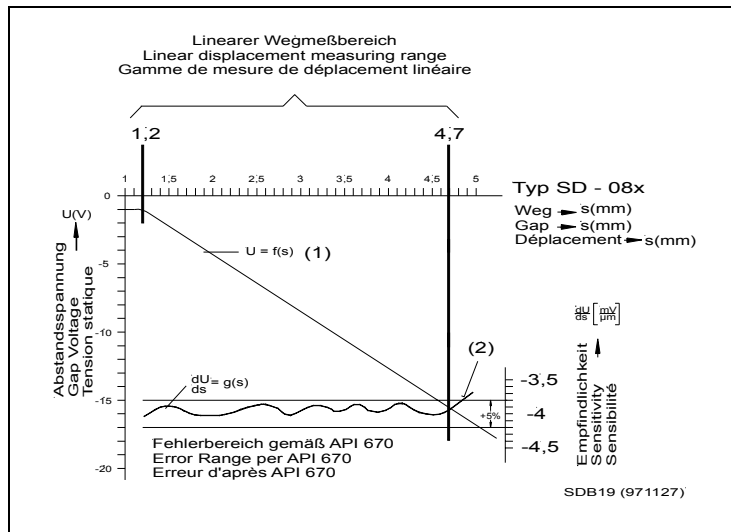
The range of prescribed zener barriers of types 8901 / 30 - 199 / 020 / 00 (signal barrier) and 9003 / 50 - 220 / 030 / 00 (supply barrier)

**has been extended to include effective immediately types :**

9004 / 50 - 220 - 030 - 00 (supply barrier) and 9001 / 00 - 199 - 020 - 10 (signal barrier)  
(see type plate on oscillator)

EMC	see appendix „EMC details for displacement measuring chains types SD-... / OD-...“
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## 2.1 Sensitivity of displacement measuring chain



**In the case of operation with chemically resistant displacement sensors**

**SD - 087**

**SD - 088**

**SD - 089**

**the linear displacement measuring range begins at approx. 0.2 mm and ends at approx. 3.7 mm.**

Sensor, extension cable und oscillator temperature constant ( $T = 21\text{ °C}$ ).  
Voltage supply -24 V DC. Test material, material no. 1.7225 (42CrMo4) as per DIN 17200, according to AISI/SAE 4140.

Typical transfer characteristic (item 1)

Typical characteristic of sensitivity (item 2)

### Transfer characteristic $U = f(s)$ (item 1)

it describes the relationship of the gap voltage to the distance between sensor tip and measuring track.

### Linearity error for gradient (4 V/mm)

— at room temperature (25 °C) ± 1 %

### Deviation from the characteristic measured at room temperature

— in working temperature range of oscillator (-30 °C ... + 65 °C) ± 7 %

— in working temperature range of sensor (-30 °C ... + 180 °C) ± 7 %

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

it describes the sensitivity as a function of the gap.

Nominal measuring sensitivity      -4 mV/ $\mu\text{m}$  (-200 mV/mil)  
(for standard shaft material,  
material no.1.7225 (42CrMo4) as per  
DIN 17 200 according to AISI/SAE 4140.

### Deviation from nominal measuring sensitivity

- at room temperature (25 °C) ± 5 %
- in working temperature range  
of oscillator (-30 °C ... + 65 °C) ± 10 %
- in working temperature range  
of sensor (-30 °C ... + 180 °C) ± 10 %

#### 2.1.1 Sensitivity of displacement measuring chain as a function of the material of the measuring track

The displacement measuring chain is calibrated to material no. 1.7225 (42CrMo4) as per DIN 17 200, according to AISI/SAE 4140.

The sensitivity is -4 mV/ $\mu\text{m}$

Further materials and their sensitivities are listed in the following table.

The sensitivity of a material can be determined on a material sample by using the Brüel & Kjær Vibro calibration unit AC-126.

If no calibration instrument is available, the sensitivity can be determined at the Brüel & Kjær Vibro factory if a sample of the respective shaft material is supplied.

Calibration of the displacement measuring chain to another material is effected on the electronic measuring system.

Material no. as per DIN 17 200	Abbreviation	Sensitivity -mV / $\mu\text{m}$
1.0050	St 50-2	3.90
1.0052	St 50-1	4.00
1.0060	St 60-2	3.90
1.0062	St 60-1	3.90
1.0501	C 35	3.95
1.0503	C 45	3.90
1.1181	Ck 35	3.90
1.1191	Ck 45	3.90
1.2842	90 Mn Cr V 8	3.95
1.4006	G-X10 Cr13	3.65
1.4028	X30 Cr13	3.70

## Table continuation

Material no. as per DIN 17 200	Abbreviation	Sensitivity -mV / $\mu\text{m}$
1.4057	X20 Cr Ni 17 2	3.60
1.4104	X12 Cr MoS 17	3.60
1.4301	X5 Cr Ni 18 10	4.80
1.4306	G-X2 Cr Ni N 18 9	5.20
1.4313	G-X5 Cr Ni 13 4	3.65
1.4401	X5Cr Ni Mo 17 12 2	5.10
1.4404	Z3 CND 18 12 02	5.15
1.4500	G-X7NiCrMoCuNb25 20	4.80
1.4539	Z2 CND U 25 20	5.05
1.6562	40 Ni Cr Mo 8 4	3.80
1.6580	30 Cr Ni Mo 8	3.85
1.6587	17 Cr Ni Mo 6	3.80
1.6985	28 Cr Mo Ni V 4 9	3.90
1.7035	Italien 41 Cr 4	3.60
1.7045	42 Cr 4	3.95
1.7131	16 Mn Cr 5	3.85
1.7219	GS-26 Cr Mo 4	4.00
1.7225	GS-42CrMo4	4.00
1.7258	24 Cr Mo 5	4.00
1.8070	21 Cr Mo V 5 11	3.95
1.8509	UA 11	5.75
2.1096	G-Cu Sn 5 Zn Pb	6.40
	Al Mg Si F 20	6.90
	Z5 CND 17 08	3.75
	GG-25	3.50
	Alu 35/38	6.55
	Cu	6.90
	Al	6.65
	MS63 F45	6.60
	Titan	4.75

Sensitivity for different materials (room temperature of measuring chain)

### 3 Mounting Instructions

The oscillator must be installed according to the „Installation instructions for displacement measuring chains“.

#### Oscillators in Ex-areas

If the displacement measuring chain (displacement sensor, oscillator and extension cable) is to be used in an Ex-area, the installation instructions in the attached data sheet „Installation of displacement sensors in hazardous areas“ must be observed.