

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

BRUEL & KJAER

DS822.OD110

EDDY CURRENT SENSOR DRIVER

Used with the applicable ds822 ATEX configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: ds822 ATEX manufacturer technical reference



Product specification



2 mm Measuring Range

Non-Contacting Displacement Sensor System Series ds821 / Series ds822

Features

- Non-contacting displacement measurement based on the eddy-current principle
- System length: 5 m or 10 m
-  Series ds822 with ATEX approval
- Temperature range displacement sensor: -55 °C ... +180 °C
- Frequency: DC ... 10 kHz
- Compact design of the driver housing (oscillator / demodulator)
- Enhanced tip design
- One driver for both system lengths: system length detected automatically by the driver
- Reduction of spare parts storage
- Easy assembly due to
 - self-latching push-pull plug connections
 - one mounting adapter for hat-rail or drill-hole mounting
- Excellent precision and temperature stability
- When ordering a complete displacement sensor system, the delivery comes with an acceptance test certificate, including measurement report (factory calibration).

Use



Relative shaft vibration



Eccentricity



Axial shaft position



Speed



Radial shaft position



Reciprocating Piston drop

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Product description

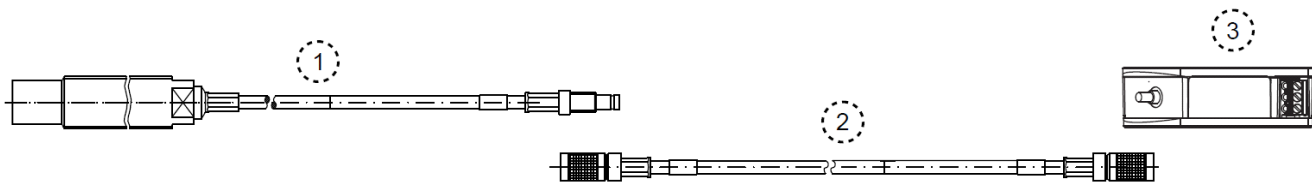
The displacement sensor systems of the ds820 family are based on the non-contacting eddy-current measurement process. The distance is measured between the tip of the displacement sensor and an electrically conductive surface and sent via a proportional voltage signal to a subsequent monitoring system. In the application range of machine monitoring, this makes it possible to record the status of rotating shafts.

The ECDS system (**E**ddy **C**urrent **D**isplacement **S**ensor) consists of the components of displacement sensor with an integrated cable, an optional separate extension cable and the driver (oscillator/demodulator).

The displacement sensor is available as a forward as well as a reverse-side mountable version.

The ECDS system (**E**ddy **C**urrent **D**isplacement **S**ensor) is available as series ds821 Standard and ds822 ATEX. Each series is available in system lengths of 5 m and 10 m.

The name of a component is a combination of the series name (ds821 or ds822 ATEX) and the component designation (**mc** = complete system, **ds** = displacement sensor, **ec** = connection cable or **od** = driver).



	Displacement sensor system	2 mm Series ds821 Standard:	2 mm Series ds822 ATEX:
	Complete system (mc)	ds821.mc10x	ds822.mc10x
①	Displacement sensor (ds)	ds821.ds10xx	ds822.ds10xx
②	Connection cable (ec)	ds821.ec10x	ds822.ec10x
③	Driver (oscillator/demodulator) (od)	ds821.od110	ds822.od110

Colour coding

The non-contacting displacement sensor systems series ds821 and ds822 are available with various measuring ranges. Each measuring range is identified by a coloured mark at the end of the integrated cable of the displacement sensor, at the ends of the extension cable and on the driver unit. This makes it easy to identify associated components during installation. The colour codes according to measuring range are as follows:

Colour code	Blue	Red
Measuring range	2 mm	4 mm

Scope of delivery

Depending on the order, the delivery includes the following components:

Supplied components	Displacement sensor	Connection cable	Driver	Complete sensor system
Displacement sensor	X			X
Protection cap	X			X
2 nuts ¹	X			X
1 O-ring ²	X			X
Connection cable³		X		X
Driver			X	X
Assembly adapter			X	X
Acceptance test certificate acc. to DIN EN 10204	X	X	X	X
Measurement protocol (works calibration)				X
User Manual	X	X	X	X

1. **not** available for ds1003 (reverse mount sensor)

2. **only** available for ds1003 (reverse mount sensor), operating temperature range for o-ring -40 °C to +180 °C, for lower temperatures down to -55 °C o-ring (silicone) on request

3. **not** available if the length of the displacement sensor with integrated cable corresponds to the nominal system length of 5 m or 10 m

Technical data

These performance characteristics are valid under the following conditions unless specified otherwise:
+18 °C to +27 °C ambient temperature, -24 VDC supply voltage, 100 kΩ load at signal output, 42CrMo4 B&K Vibro reference material, -10 V Gap Voltage (approx. 1.4 mm measuring distance between sensor and measuring surface), all components are at their operating temperature.

Non-Contacting Displacement Sensor System Series ds821 and Series ds822 ATEX

Measurand	Displacement
Measuring principle	Eddy-current measuring principle
Nominal system lengths	5 m and 10 m
Linear measuring range	2 mm (approx. 0.4 ... 2.4 mm distance from the object to be measured corresponding to an output signal of approx. -2 VDC ... -18 VDC)
Colour code	blue

Dynamic characteristics¹:

Sensitivity (ISF)
in regard to B&K Vibro Reference material
42CrMo4 (material no. 1.7225) acc. to DIN 17 200,
acc. to AISI/SAE 4140.

-8 mV/μm (-203 mV/mil)

Accuracy of the sensitivity
(ISF error/%) within temperature range of:
0 °C ... +45 °C (total system)
at a nominal system length of 5 m
at a nominal system length of 10 m

±5.0 %
±7.5 %

-35 °C ... +120 °C (displacement sensor) and
-35 °C ... +85 °C (driver od130)
at a nominal system length of 5 m
at a nominal system length of 10 m

±10 %
±15 %

Deviation from the reference line.
(DSL/μm = Deviation from best fit straight line) the
temperature range of:

0 °C ... +45 °C (total system)
at a nominal system length of 5 m
at a nominal system length of 10 m

± 25 μm
± 50 μm

-35 °C ... +120 °C (displacement sensor) and
-35 °C ... +85 °C (driver od130)
at a nominal system length of 5 m
at a nominal system length of 10 m

±75 μm
±150 μm

Operating frequency range

DC ... 10 kHz (-3 dB damping of the output signal)

Electrical characteristics:

Within the temperature range of -35 °C and -55 °C the stated
accuracies of dynamical characteristics further decrease.



Supply voltage (U_B)

-24 VDC (-18 VDC ... -28 VDC)

Output range

0 V ... (U_B +2 V)

Current consumption

max. 12 mA

Output impedance

50 Ω

Mechanical characteristics:

Connector type

Coaxial connector (SAA), push-pull self-latching

Cable:

Cable type

Coaxial

2 mm Measuring Range

Non-Contacting Displacement Sensor System Series ds821 / Series ds822

EN

Cable jacket and colour	FEP, blue
Impedance	95 Ω
Diameter	$\varnothing$ 3.5 mm ($\pm$ 0.15 mm)
Altitude	< 2000 m

1. ISF (Incremental Scale Factor), DSL (Deviation from best fit straight line) and temperature ranges according to API 670

Displacement sensor type ds82x.ds100S

Sensor tip:	
Material	Ceramic
Tip diameter	$\varnothing$ 7,2 mm ($\pm$ 0.1 mm)
Sensor housing	
Material	Stainless steel (material no. 1.4301 acc. to DIN 17200)
Length	
Including integral cable (measured from the sensor's tip to the end of the integral cable)	0.5 m (-0 m / +0.3 m) 1.0 m (-0 m / +0.3 m) 5.0 m (-0 m / +1.0 m) 10.0 m (-0 m / +1.8 m)
Integrated cable	
Minimum bending radius	35 mm without cable protection 35 mm with steel protective conduit 75 mm with PTFE protective conduit ² 100 mm with corrugated tube protection
Connector	Socket (female) or Plug (male) with nominal system length
Ambient conditions:	
Degree of protection for the tip acc. to EN 60529	IP 68 / 2 h at 10 bar
Pressure tightness (expected as based on the design):	
Sensor tip	25 bar
Sensor and corrugated tube protection	25 bar (valid only for ds1002)
Temperature range	
Operating temperature range ³	-55 °C ... +180 °C
Storage temperature range ⁴	-20 °C ... +70 °C

Connection cable type ds82x.ec10x (dependent on system design)

Length	
	4.0 m (-0 m / +0.8 m) 4.5 m (-0 m / +0.8 m) 9.0 m (-0 m / +1.6 m) 9.5 m (-0 m / +1.6 m)
Minimum bending radius	
	35 mm without cable protection 35 mm with steel protective conduit 75 mm with PTFE protective conduit ²
Connection	
	Plug (male) at each end
Ambient conditions	
Operating temperature range ³	-55 °C ... +180 °C
Storage temperature range ⁴	-20 °C ... +70 °C

2. The PTFE protective conduit may only be used outside the potentially explosive area or, to prevent static charging, must be fitted with a steel protective conduit or steel tube.

3. When used in hazardous areas, the ambient temperatures of the series ds822 ATEX must be observed, see page 18.

4. When stored in original package

Driver ds82x.od110

Electric characteristics

Supply voltage (U_B)	-24 VDC (-18 VDC ... -28 VDC)
Current consumption	max. 12 mA ($R_L \geq 100 \text{ k}\Omega$)
Power supply	max. 1A and short-circuit proof
Source resistance dynamic	50 Ω

Mechanical characteristics

Housing material	Aluminium alloy (ADC 12)
Dimensions (WxHxD)	26,5 mm x 83 mm x 60 mm
Weight of the driver	approx. 200 g
Connection	Socket (female)

Ambient conditions

Degree of protection according to EN 60529	IP 20
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Temperature

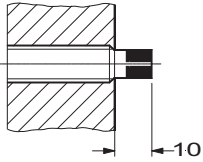
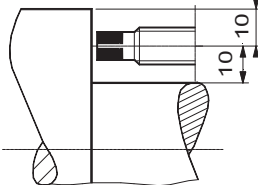
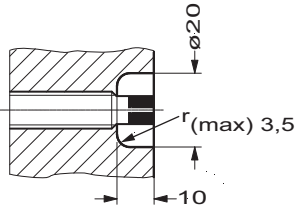
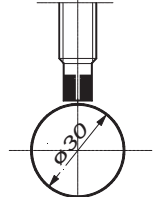
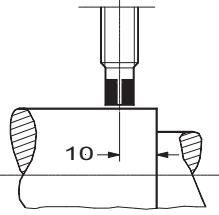
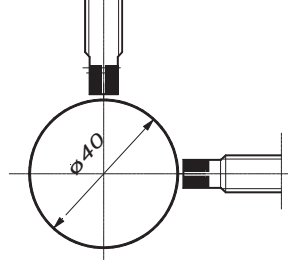
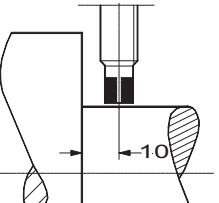
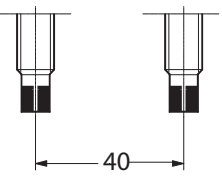
Operating temperature range ⁵	-55 °C ... +85 °C
Storage temperature range ⁶	-20 °C ... +70 °C
Humidity	100 % non-condensing with protection of the plug connections and cable clamp

5. When used in hazardous areas, the ambient temperatures of the series ds822 ATEX must be observed, see page 18.

6. When stored in original package

Clearances and minimum distances

The clearances and minimum distances specified below must be observed when mounting sensors.

	Sensor tip protruding		Distance to the shaft shoulder, sensor parallel to electrically conductive material
	Sensor tip flush		Required minimum diameter of the shaft for one sensor
	Distance to a shaft end		Required minimum diameter of the shaft with two sensors
	Distance to the shaft shoulder, sensor parallel to electrically conductive material		Parallel arranged sensors

Notes on the diagrams:
All specifications in [mm]

Diagram of driver (od)

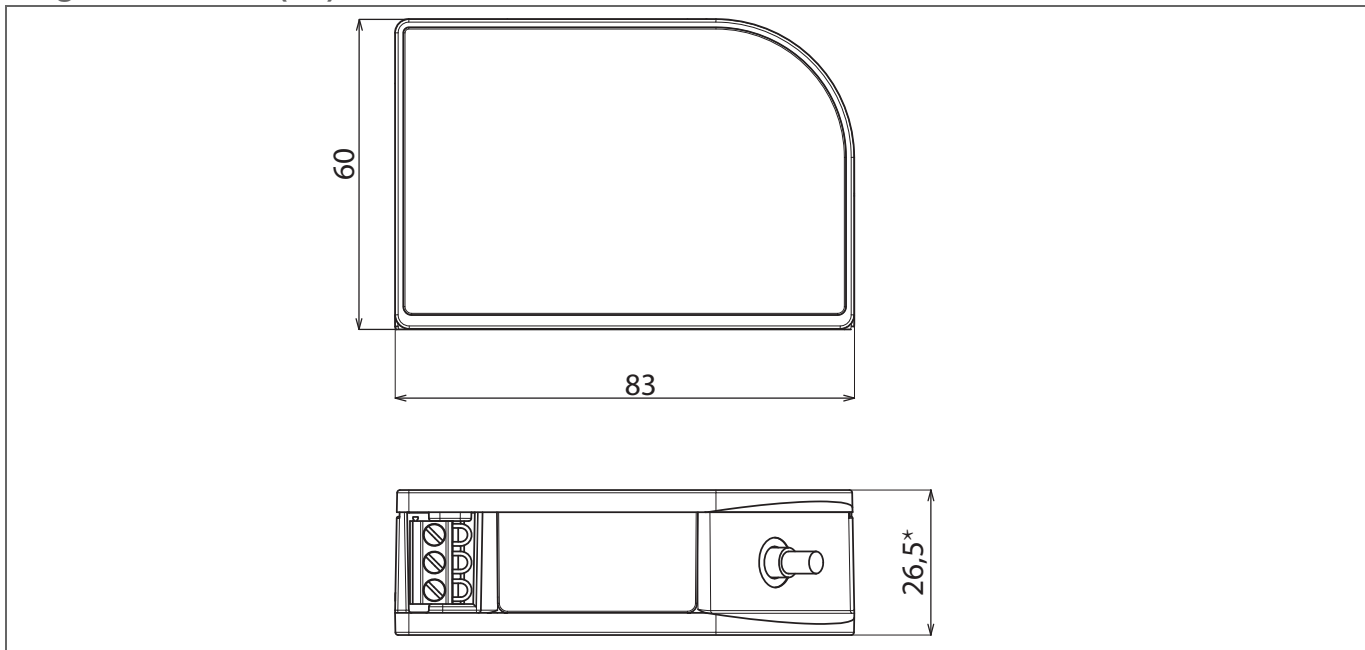


Figure 4 Dimensions of driver ds82x.od110

Order code for driver (od) **ds82x.od110 / R**

Displacement sensor series	ds821	ds822
Standard	•	
ATEX		•

X
1
2

Order code

ds82  .od110

Special requirements - need to be put in writing		/ R
No	•	0
Yes	upon request	1

/ 

For an order, write the number of the selected option in the corresponding boxes on the right. Read from top to bottom, an order code has the following form:

ds82x.od110 / R

Order examples ds82x.od110:

Serie ds821 Standard

ds821.od110/0

Standard Sensor
no special requirements

Approvals

Displacement sensor systems of the series ds822 and series ds821 are:

CE compliant acc. to EMC Directive and



RCM for Australia and New Zealand



Displacement sensor system series ds822 ATEX is additionally approved for:

use in hazardous Ex-area according 2014/34/EU.



EC type examination certificate PTB 12 ATEX 2011 designation

II 1/2 G Ex ia IIC T6...T1 Ga/Gb or II 2G Ex ia IIC T6...T1 Gb

II 2 D Ex ia IIIC T168 °C Db

in compliance with EN 60079-0:2012+A13, and EN 60079-11:2012, EN 60079-26:2015.

IECEx certificate: IECEx PTB 13.0010 mark

Ex ia IIC T6...T1Ga/Gb or Ex ia IIC T6...T1 Gb

Ex ia IIIC T168 °C Db

Voltage supply: type of protection Intrinsic Safety EX ia IIC only for connection to a certified intrinsically safe circuit

Maximum values:

$U_i = 28 \text{ V}$

$I_i = 140 \text{ mA}$

$P_i = 840 \text{ mW}$

$L_i = \text{negligibly low}$

$C_i = 12 \text{ nF}$

In Compliance with

TR-TS 012/2011 (*TP-TC 012/2011*)

EAC Ex Certificate:

RU-C-DE.AA87.B.00334

Ga/Gb Ex ia IIC T6...T1 X or

1Ex ia IIC T6...T1 Gb X

Ex ia IIIC T 168°C Db

