burster

THE MEASUREMENT **SOLUTION**

YOUR INDIVIDUAL PRODUCT INFORMATION

THE MEASUREMENT **SOLUTION**

HIGH-TECH FROM A STRONG SOURCE

burster specializes in the development, production and sale of measuring and test devices, sensors and measurement systems as well as calibration services. Since 1961, burster has set standards for precision, quality and flexibility. This has made the German medium-sized enterprise one of the world's foremost suppliers of sensor signal processing and process monitoring systems.

Globally, burster is in contact with more than 140,000 people in industry and R&D. We are partners for mechanical and plant engineering and automation, the automotive industry and its suppliers, electrical and electronic engineering, the chemicals industry, e-mobility as well as many other sectors and future or niche markets such as medical engineering, biotechnology and robotics.

SENSORS

DISPLACEMENT SENSORS

INDUCTIVE DISPLACEMENT SENSORS

TYP **8739**

LVDT transducer with IN-LINE amplifier

- Principle: Inductive
- Measuring range: 1 mm ... 25 mm
- Return spring: Yes

TYP **8740;8741**

DC/DC displacement transducers

- Principle: Inductive
- Measuring range: 1 mm ... 150 mm
- Measurement accuracy: < 0.25 % F.S.
- Return spring: No / Yes

TYP **87350**

DC/DC displacement transducer

- Principle: Inductive
- Measuring range: ± 1,27 mm ... ± 76,2 mm
- Return spring: Yes

TYP **87240**

DC/DC displacement transducer

- Principle: Inductive
- Measuring range: ± 1.27 mm ... ± 82.5 mm
- Return spring: No

POTENTIOMETRIC DISPLACEMENT SENSORS

TYP **8709**

Potentiometric displacement sensor (miniature version)

- Principle: Potentiometric
- Measuring range: 25 mm ... 250 mm
- Return spring: No

TYP **8710;8711**

Potentiometric displacement sensors

- Principle: Potentiometric
- Measuring range: 25 mm ... 150 mm
- Return spring: No

TYP **8712;8713**

Potentiometric displacement transducers

- Principle: Potentiometric
- Measuring range: 10 mm ... 150 mm
- Return spring: Yes

TYP **8718**

Potentiometric displacement sensor

- Principle: Potentiometric
- Measuring range: 100 mm ... 2000 mm
- Measurement accuracy: ≥ ± 0.05 % F.S.
- Return spring: No

TYP **8719**

Potentiometric displacement sensor

- Principle: Potentiometric
- Measuring range: 50 mm ... 900 mm
- Measurement accuracy: ≥ ± 0.05 % F.S.
- Return spring: No

INCREMENTAL DISPLACEMENT SENSORS

TYP **8738-DK805, DK812**

High precision incremental displacement transducer

- Principle: Incremental
- Measuring range: 5 mm ... 12 mm
- Return spring: Yes

TYP **8738-DK25, DK50, DK100**

High precision incremental displacement transducer

- Principle: Incremental
- Measuring range: 25 mm ... 100 mm
- Return spring: Yes

TYP **8738-DK830**

High precision incremental displacement transducer

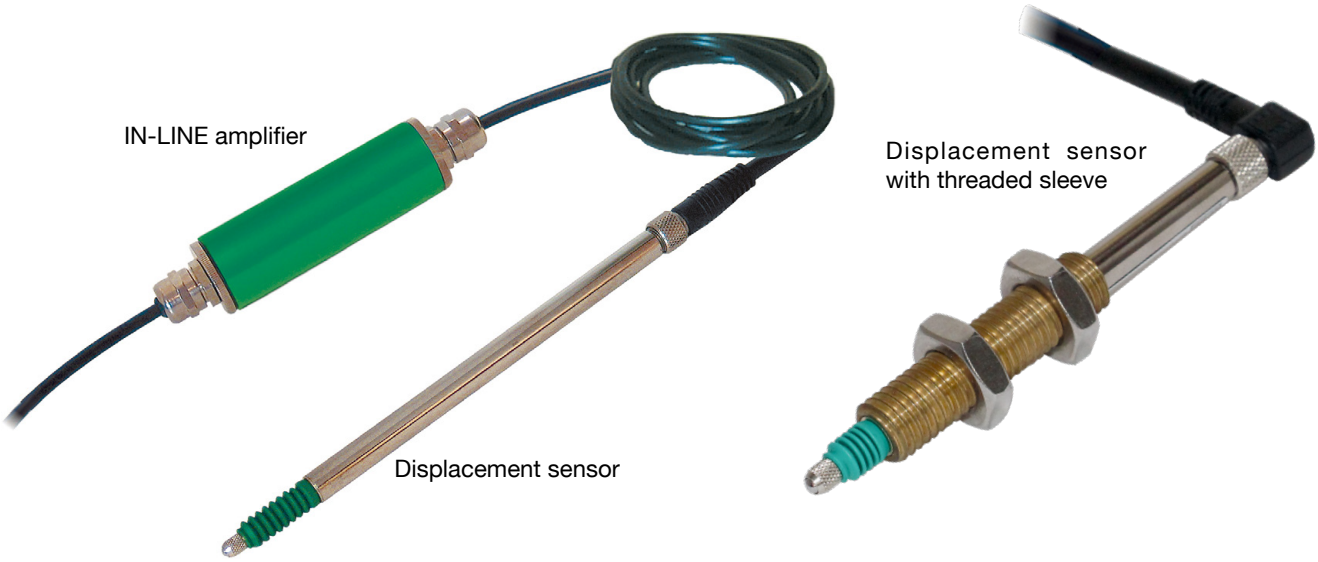
- Principle: Incremental
- Measuring range: 0 mm ... 30 mm
- Return spring: Yes

LVDT Displacement Sensor

With IN-LINE Amplifier

Model 8739

Code:	8739 EN
Delivery:	ex stock
Warranty:	24 months



8739 EN

- **Ranges from 0 … 1 mm to 0 ... 25 mm**
- **Non-linearity 0.25 % F.S.**
- **Sensor diameter 8 mm**
- **Output 0 ... 10 V**
- **Optional output 0 ... 5 V, ± 5 V, 4 ... 20 mA**
- **Sensor with or without IN-LINE amplifier**
- **Vibration and wear free**

Application

Inductive displacement sensors of this series measure linear displacements and indirectly all mechanical values convertible into displacements by additional equipment (i.e. tension and compression forces, extension, torque, vibration). The sensor body equipped with a connector has an outer diameter of only 8 mm and therefore is especially well suitable for the integration in dimensionally restricted structures.

Typical application fields are displacement and extension measurements on

- ► Machines
- ► Servo systems
- ► Motor vehicles
- ► Test benches
- ► Production plants

Description

The cylindrical case made of stainless steel, houses a differential transformer (LVDT). It consists of a primary and two secondary coils with axially moveable core. A displacement of this core changes the magnetic induction of the coils. The IN-LINE carrier frequency amplifier converts the displacement into a direct proportional electrical DC voltage.
The transducer is constructed as a probe at which within the measuring range a spring pushes the probe tip towards the measuring object. Bellows protect the mechanical guidance of the probe tip against pollution and splash water.
The IN-LINE amplifier is integrated in the connector cable and adjusted specifically to the sensor. Both components form a unit while they can be separated for mounting purposes (miniature plug connection at the transducer). The use of not harmonized components may lead to increased measurement errors. For the IN-LINE amplifier version the sensor body is galvanically isolated from the excitation and from the measuring signal.
Lateral forces decrease the durability.

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Technical Data

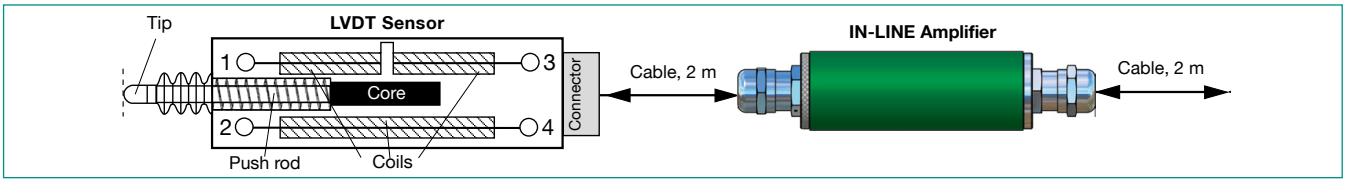
Model 8739

Order Code	Measuring Range	Dimensions [mm] L	A	B	H	Cut-Off Frequency [Hz]	Tip Force at Full Scale max. [N]	Weight [g]
8739-5001-V501	0 ... 1 mm	103	97.5	15.5	4	100	1.2	25
8739-5002-V501	0 ... 2 mm	103	97.5	15.5	4	100	1.5	25
8739-5005-V501	0 ... 5 mm	140	130	23	7	100	2.3	25
8739-5010-V501	0 ... 10 mm	146	140	27	12	100	2.4	25
8739-5025-V501	0 ... 25 mm	driving rod without return spring with sliding rings made of teflon				100	0	25

Model 8739 without IN LINE Amplifier

Order Code	Measuring Range	Sensitivity	Sensor Excitation Voltage [V]	Operation Frequency [kHz]	Calibrator Resistor [kΩ]
8739-5001-V000	0 ... ± 0.5 mm	106 mV/V /mm	2	5	10
8739-5002-V000	0 ... ± 1 mm	106 mV/V /mm	2	5	10
8739-5005-V000	0 ... ± 2.5 mm	62 mV/V /mm	2	5	10
8739-5010-V000	0 ... ± 5 mm	62 mV/V /mm	2	5	10

Measuring range 0 ... 25 mm on request



Electrical values

Excitation voltage (protected against wrong polarity): 13.5 ... 28 V DC
Excitation voltage at Ua 0 ... 5 V: 9 ... 28 VDC
Current input: < 30 mA
Output voltage of measuring range: (standard): 0 ... +10 V
Ripple of output voltage: approx. 20 mV_{ss}
Internal carrier frequency: 4 kHz
Output resistance: 1 kΩ
Load resistor: reccom. > 1 MΩ

Environmental conditions

Operation temperature range (only sensor): - 20 °C ... 80 °C
Nominal temperature range (only sensor): - 20 °C ... 80 °C
Influence of temperature*: 0.03 % F.S./K
* relating to the range of nominal temperature.

Mechanical values

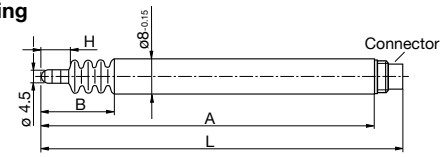
Non-linearity: < 0.25 % F.S.
Non-repeatability: ± 0.1 % F.S.
Hysteresis: ± 0.1 % F.S.
Driving rod: guided by ball-bearings
Probe tip (included in scope of delivery): thread M 2.5
Case material of sensor body: ST 25, nickel-plated
Case material IN-LINE amplifier: Aluminium
Protection class: according to EN 60529 Model 8739 IP60
Protection class of IN-LINE amplifier: IP65
Dimensions of IN-LINE amplifier: 25 x 73.7 [mm]
Dimensions with PG bolts: 25 x 114 [mm]
Electrical connection: shielded, PVC insulated wire, total length 4 m, the IN-LINE amplifier is centrically and inseparably mounted, bending radius ≥ 10 mm, with a 4 pin connector to sensor, other side open ends.

Pin assignment:		with IN-LINE Amp.	without Amp.	Pin
excitation	(+)	brown	OSC+	4
signal	(+)	green	OSC-	2
excitation/signal	(-)	white	OUT+	1
		Connect the shield to ground (GND)	OUT-	3

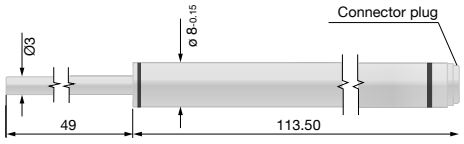
Manufacturer Calibration Certificate (WKS)

Standard manufacturer calibration raising in 20 % increments, with or without indicator.

Dimensional drawing model 8739 0 ... 1/2/5/10 mm



Dimensional drawing model 8739 0 ... 25 mm



The CAD drawing (3D/2D) for this sensor can be imported online directly into your CAD system.
Download via www.burster.com or directly at www.traceparts.com. For further information about the burster traceparts cooperation refer to data sheet 80-CAD-EN.

Order Information

Displacement sensor with measuring range 0 ... 5 mm
IN-LINE amplifier Ua 0 ... 10 V **Model 8739-5005-V501**
Inductive displacement sensor with measuring range 0 ... 2 mm **Model 8739-5002-V000**

Accessories

Clamp (s. accessory data sheet) **Model 8739-Z005**
Fixing bracket (s. accessory data sheet) **Model 8739-Z003**
Threaded sleeve (s. accessory data sheet) **Model 8739-Z004**
Connector 12 pin suitable to burster desktop devices **Model 9941**
Installation of connector to cable **Model 99004**
Connector 9 pin Min-D for model **9310** **Model 9900-V209**

Upon connection of the sensor to DIGIFORCE® 9310 display version an external excitation voltage is requested for the IN-LINE amplifier version (model 8739 - 5XXX-V505 or -V506).

Devices or systems for measuring value collection or process monitoring: **refer to section 9 of the catalog.**

Optionen

V302: Sensor housing with fixing thread M12x1.75x45 including two nuts (refer to mounting advice). The thread sleeve is mounted flush to the housing.
V502: Sensor plug with 90° depature
V503: Inductive displacement sensor with voltage output 0 ... 5 V
V504: Combination of V502 and V503
V510: Inductive displacement sensor with voltage output ± 5 V
V514: Inductive displacement sensor with current output 4 ... 20 mA

Dragchain cable on request
Other cable lengths on request
Comparsion in Inch on request
Other adjustment of the amplifier, e. g. 0 ... 4 mm ≙ 0 ... 10 V on request

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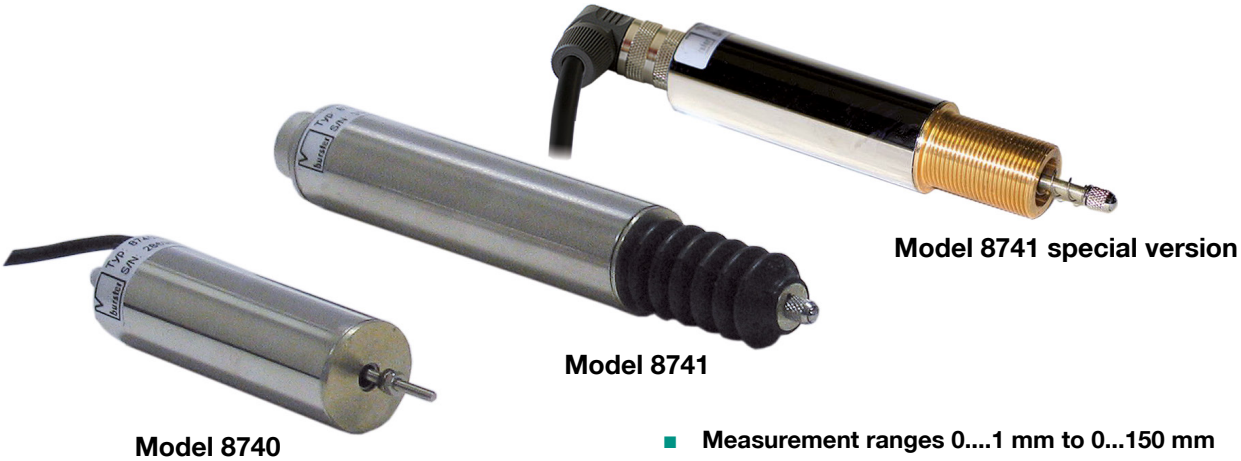
4015-008739EN-5699-111531

DC/DC Displacement Sensors

Model 8740
Model 8741 with spring probe tip

Code:	8740 EN
Delivery:	ex stock
Warranty:	24 months



Model 8741 special version

Model 8741

Model 8740

- **Measurement ranges 0....1 mm to 0...150 mm**
- **Non-linearity ± 0.25 % F.S., optional to 0.1 % F.S.**
- **Integrated measuring amplifier, output 0 ... 5 V**
- **Optional 0 ... 10 V, 4 ... 20 mA**
- **Potted electronics not susceptible to vibration or impact**
- **Special versions on request (see options)**

Application

Inductive displacement sensors using the principle of the differential transformer (LVDT) can be used to measure displacement and, indirectly, magnitudes that can be converted into displacements such as force, pressure, strain, torque, vibration and so forth.
Thanks to the high quality of their measurements, their high protection and long service life, these sensors are used in many technologies (industry, research, development, etc.).
Applications include measuring, controlling, regulating and monitoring both slow and fast movements between machine parts, measurements of position and positional changes of components and structural foundations, servo regulators, valve and robot controllers, growth measurements and so on.

Their design is robust - the internal coils and electronics are potted - as a result of which the sensors can easily withstand shock and vibration. This makes the sensors also suitable for mobile applications (e.g. in vehicles) and for test installations where they will be subject to many test cycles.

Description

These inductive displacement sensors with integrated electronics incorporate a differential transformer and a carrier frequency measuring amplifier, potted and protected by a stainless steel housing.
The differential transformer consists of one primary winding and two secondary windings; these are arranged symmetrically on either side of the primary winding. The integrated electronics demodulates, filters and amplifies the AC voltage induced in the secondary windings. A rod-shaped core is able to move inside the differential transformer.
As an output, the sensor delivers a DC voltage whose magnitude proportionally depends on the position of the moveable core inside the sensor.

Model 8740 incorporates a freely moveable, non-sprung core with two sliding Teflon rings that center the core in the hole through the body of the sensor. At the end of the moving rod is an M2 thread that can be used to couple the core mechanically to the object being measured. Any lateral force acting on the rod should be avoided.

The moveable rod of **model 8741** is mounted on ball bearings. A spring holds the tip of the probe against the object being measured. This version is advantageous when it is difficult or entirely impractical to implement a mechanical coupling. Once again, lateral forces will shorten the service life. The measuring side of the sensor is protected against pollution and splash water by a bellows.

8740 EN

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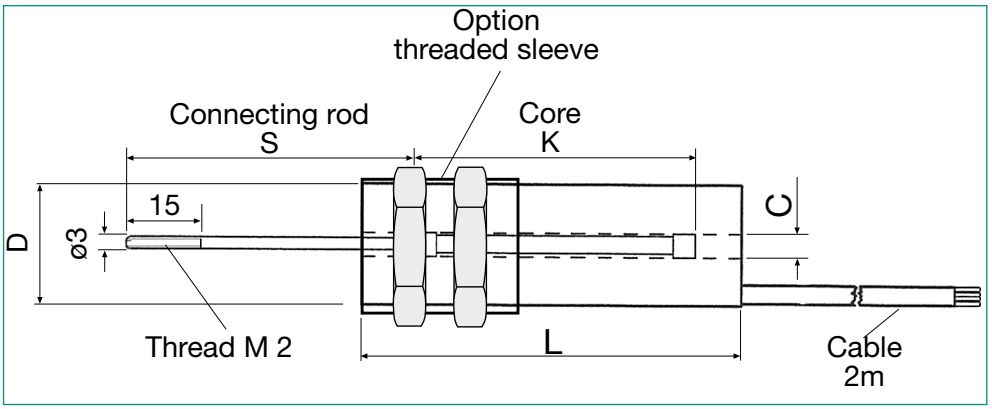
Technical Data

Model 8740

Order Code	Measuring Range	Dimensions [mm] L	øD	øC	K	S	Cut-Off Frequency [Hz]	Sensor Weight [g]	Moveable Mass [g]
8740 - 5001	0 ... 1 mm	45	20	4	27	34	300	30	2
8740 - 5002	0 ... 2 mm	45	20	4	27	34	300	30	2
8740 - 5005	0 ... 5 mm	61	20	4	45	40	150	60	3.3
8740 - 5010	0 ... 10 mm	61	20	4	45	40	150	60	3.3
8740 - 5025	0 ... 25 mm	91	20	4	56	69	100	90	4.7
8740 - 5050	0 ... 50 mm	151	20	4	97	84	100	130	6.9
8740 - 5100	0 ... 100 mm	271	20	4	136	164	100	250	11.7
8740 - 5150	0 ... 150 mm	441	20	4	288	212	100	400	17.1

Dimensional drawing
Model 8740
with optional
fastening thread
(V302 - see options on page 3)

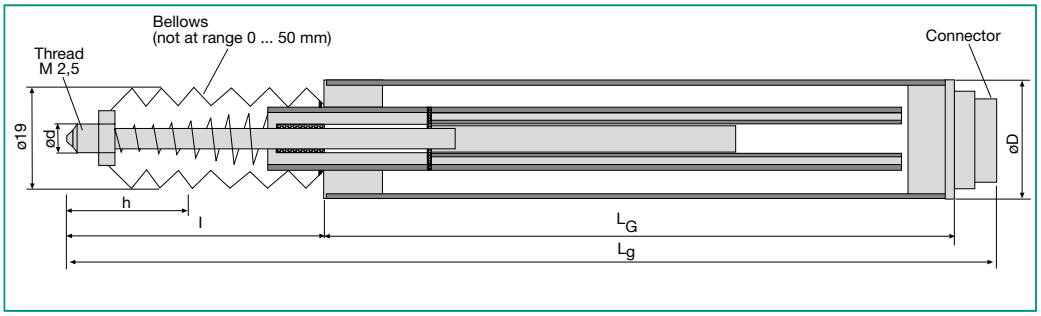


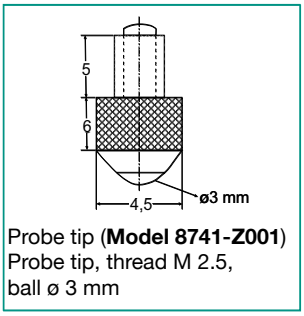
Model 8741

Order Code	Measuring Range	Dimensions [mm] lg	LG	l	h	øD	ød	Tip Force max. [N]	Natural Frequency [Hz]	Masse des Senors [g]
8741 - 5001	0 ... 1 mm	98	66	25	3	20	4.5	2	10	85
8741 - 5002	0 ... 2 mm	98	66	25	4	20	4.5	2	10	85
8741 - 5005	0 ... 5 mm	125	84	34	7	20	4.5	3	10	110
8741 - 5010	0 ... 10 mm	130	84	39	12	20	4.5	3	5	120
8741 - 5025	0 ... 25 mm	190	133	50	27	20	4.5	5	5	150
8741 - 5050 *	0 ... 50 mm	310	210	90	70.5	20	4.5	8	5	250

* To protect the ball bearing guides, sensors with this measuring range have a sealing lip instead of the bellows.

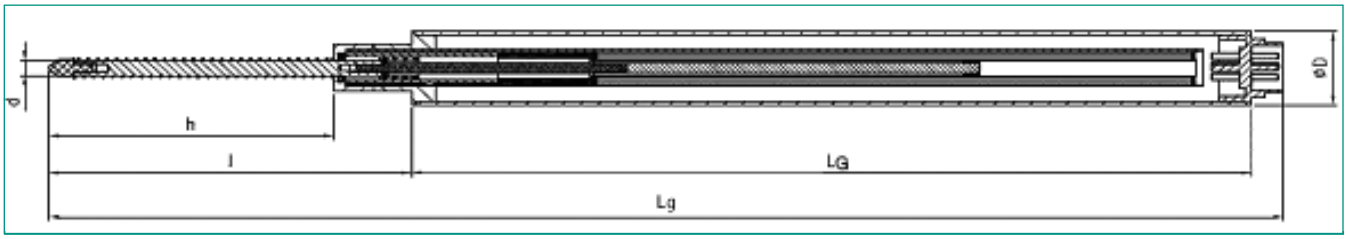
Dimensional drawing model 8741





Probe tip (**Model 8741-Z001**)
Probe tip, thread M 2.5,
ball ø 3 mm

Dimensional drawing model 8741-5050



The CAD drawing (3D/2D) for this sensor can be imported online directly into your CAD system.
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3063-008740EN-5699-081528

Electrical values

Excitation voltage (protected against polarity reversal):	9 ... 28 V DC
Current consumption:	≤ 30 mA
Output voltage (standard):	0 ... 5V
Ripple of output voltage:	approx. 20 mVeff
Internal carrier frequency:	12 kHz
Output resistance:	1 kΩ
Load resistor:	recommended >1 MΩ

Environmental conditions

Range of operating temperature:	from -20 °C to 80 °C
Range of nominal temperature:	from -20 °C to 80 °C
Influence of temperature*:	0.03 % F.S./K

* with reference to the rated temperature range

Mechanical values

Linearity deviation:	< 0.25% F.S.
Variation in unchanged mounting position:	< 0.01% F.S.
Material:	ST 37, nickel-plated
Protection class: according to EN 60529	model 8740 IP65 model 8741 IP40
General dimensional tolerances:	according to ISO 2768-f

Electrical connection

Model 8740: 3 wire, screened PVC cable, ø 3 mm, bending radius ≥ 20 mm, length 2 m

Model 8741: connector 7 pin, (model 9952 mating connector is included in scope of delivery)

Wiring:		Model 8740 with 2 m connection cable	Model 8741 for 7 pin connector
Excitation	(+)	brown	1
Signal	(+)	green	2
Excitation/signal	(-)	white	3
		(Connect screen to ground)	

Mounting Instructions

Fastening the sensor body using a holder or the mounting thread (see Fig. 1 to Fig. 3).

Coupling to the moveable rod (8740) with thread M 2 x 1.5 (2 nuts are included in scope of delivery).

Fastening options for the 8740 an 8741.

Order Information

Inductive displacement sensor 8740, measuring range 10 mm
Model 8740-5010

Inductive displacement sensor 8740, measuring range 25 mm, with mounting thread option M 24 x 1.5
Model 8740-5025-V302

Inductive displacement sensor 8741, measuring range 10 mm, with linearity deviation option ± 0.15 % F.S.
Model 8741-501-V511

Accessories

Holder for model 8740 and 8741 **Model 8740-Z002** (see Fig. 1)

Fixing bracket for model 8740 an 8741 **Model 8740-Z003** (see Fig. 2)

for **model 8740**:

Plug, 12 pin for burster desktop devices **Model 9941**
Plug mounting, to the sensor cable **Model 99004**

Only for connection to SENSORMASTER model 9163 desktop version **Model 99002**

for **model 8741**:

Mating connector (coupling socket), 7 pin, ø 18 mm, length 70 mm (included in scope of delivery) **Model 9952**

Mating connector, 7 pin, angled 90° IP40 length 30 mm **Model 9900-V557**

Connecting cable, 4 wire, length 3 m one end free **Model 99552-000A-0090030**

Connecting cable, 4 wire, for connection to the burster desktop devices **Model 99141-552A-0090030**

Probe tip, thread M 2.5, ball ø 3 mm (included in 8741 scope of delivery) **Model 8741-Z001**

Devices and systems for measurement data acquisition or process monitoring **see section 9 of catalog.**

Fig. 1

Model 8740-Z002

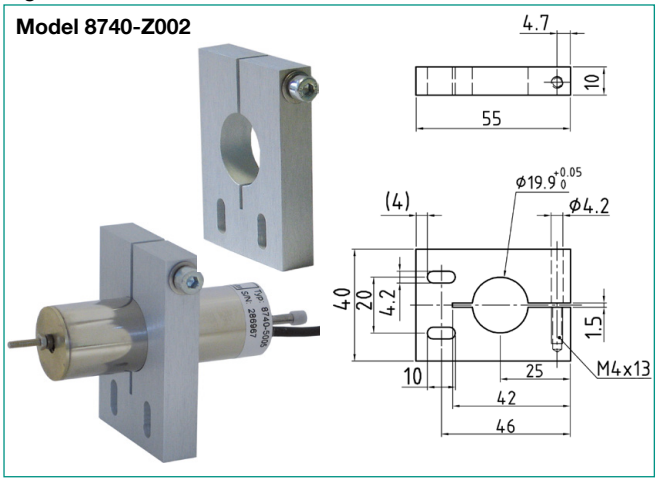


Fig. 2

Model 8740-Z003

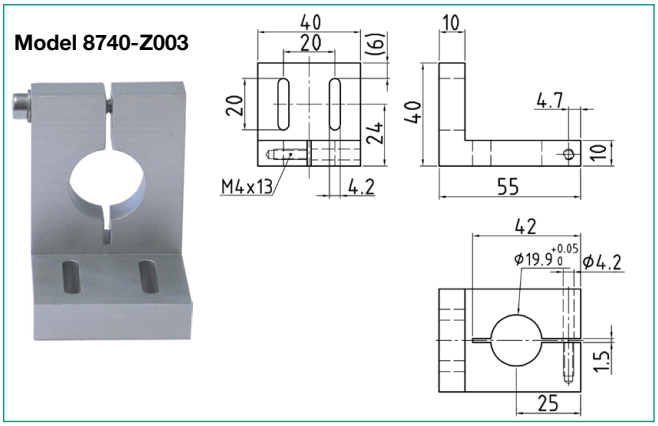
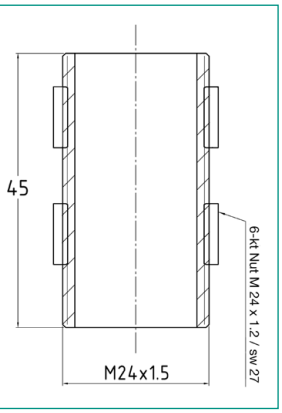


Fig. 3

Model 8740-Z004



Option threaded sleeve (-V302)

Options

V514: Inductive displacement sensor with current output 4-20 mA, excitation voltage 15-30 V

V201: Portable cable 3 m (other cable lengths on request)

V302: Sensor housing with mounting thread M 24 x 1.5 x 45 including 2 nuts (see drawing). The threaded sleeve is mounted flush at the front of the sensor housing.

V501: Output voltage 0 ... 10 V excitation voltage 13.5-28 V

V511: Linearity deviation ± 0.15 % F.S.

Manufacturer Calibration Certificate (WKS)

Standard manufacturer calibration certificate in 20 % steps, rising, with or without indicator.

8740 EN

Special versions (by request)

Sensor with **radial cable outlet**
Option V606
The radial cable outlet allows to use the space behind the sensor for other purposes.

Sensor with **mounting thread**
Option V302
The unit can be fastened easily and without strain using the mounting thread and the 2 supplied nuts.

90° angled connector
Model 9900-V557
Various alignment options and the housing thread permit easy adjustment of the sensor during mounting.

Application example

Task:

In a water bath a structured, metallic mesh is squeezed to a small diameter. The metallic mesh expands again as the water is heated. This extension is to be measured by a very precise inductive displacement sensor, whose rod can move very smoothly within the body of the sensor. The expansion of the sample results in a movement of 15 mm. In spite of the extremely low weight of the sensor bat, it is necessary to ensure that its weight does not affect the measurement.

Solution:
Model 8740, with a measuring range of 25 mm, offers the necessary precision. It can measure the expansion accurately with its extremely light moveable rod in conjunction with a well-adjusted counterbalance. The optionally modifiable mounting thread allows it to be easily mounted without straining the sensor body. Extending the sensor's rod by means of a special ceramic tappet ensures that mechanical expansion as a result of temperature changes is almost entirely eliminated.

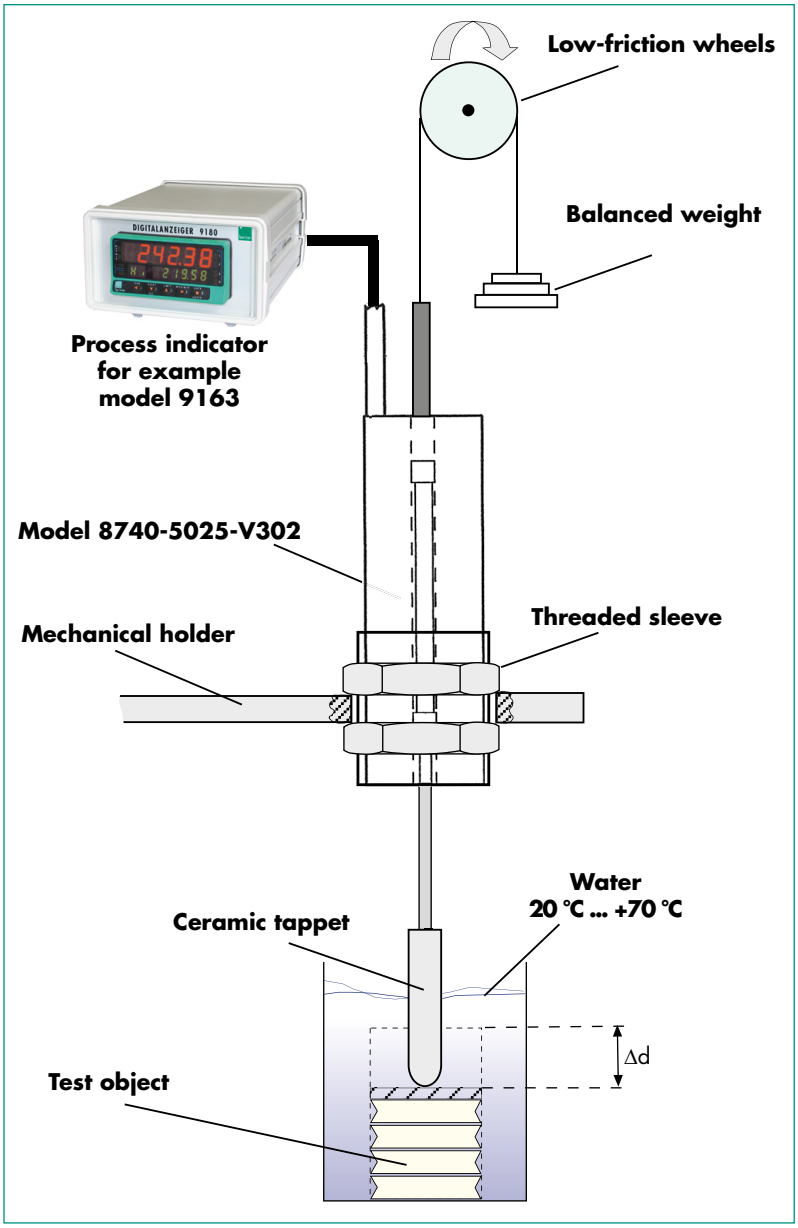


Fig. 4 Application example

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3063-008740EN-5699-081528

DC/DC Displacement Sensors

Series 87350

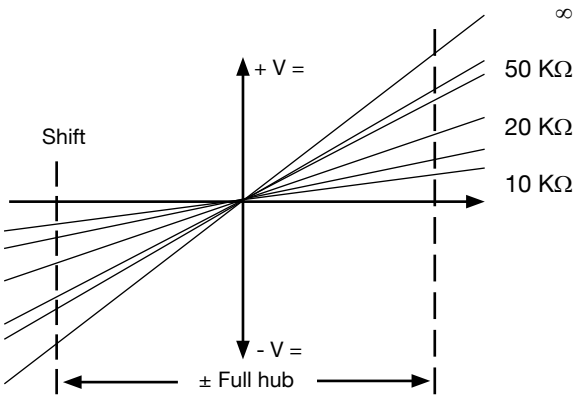
Code:	87350 EN
Delivery:	ex stock
Warranty:	24 months

- **Ranges 0 ... ± 1.27 mm to 0 ... ± 76.20 mm**
- **Non-linearity ± 0.5 % F.S.**
- **Integrated amplifier**
- **High output voltage**
- **Free of hysteresis**
- **Input and output galvanically separated**
- **Reverse voltage protection**

87350 EN

Application

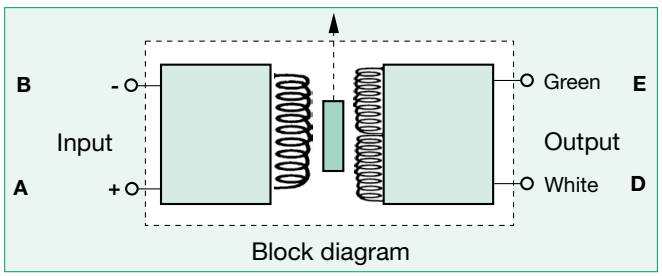
Linear displacements and mechanical values which can be converted to displacements (e.g. compressive and tensile force, strain, torque and vibration) may be measured by these DC/DC displacement sensors. The probe tip of these sensors is pushed onto the measuring object by a spring. This makes it possible to use these sensors were a mechanical modification of the measurement object (mounting hole) is not allowed or difficult.
An integrated maintenance-free electronic and a high-level DC output signal provide an easy handling without any problems.



Output voltage as function of the displacement with the impedance as parameter.

Description

Sensors of series 87350 generally consist of an oscillator, a demodulator and a transformer with moveable core. They are energized by DC voltage. The oscillator uses this DC voltage to generate the carrier frequency, which is needed for the operation of the sensor. Dependent on the position of the core, which is made of ferromagnetic material, voltages are induced by the two secondary coils of the transformer. These voltages will be demodulated, filtered and switched against each other. The result is, if the core is in its centre position, a 0 V output. Each other position of the core causes a DC voltage on the sensor's output terminal. This output voltage is proportional to the linear deflection of the core.
Input and output terminals of these sensors are galvanically separated from each other, a connection to the sensor's housing does not exist.



Block diagram

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Technical Data

Displacement Sensor	Models	87350-000	87351-000	87352-000	87353-000	87354-000	87355-000	87356-000
Measurement Range	[mm]	± 1.27	± 2.54	± 6.35	± 12.70	± 25.40	± 50.80	± 76.20
Max. Deflection of the Probe Tip	[mm]	4.0	8.0	19.0	32.0	57.0	108.0	159.0
								Nominal Output Voltage for Measurement
Excitation Voltage:	+ 6 VDC	± 1.2 V	± 2.1 V	± 1.6 V	± 3.0 V	± 4.3 V	± 4.0 V	± 3.1 V
	+ 15 VDC	± 3.0 V	± 5.4 V	± 4.2 V	± 7.5 V	± 10.8 V	± 10.0 V	± 7.8 V
	+ 24 VDC	± 5.0 V	± 9.0 V	± 7.0 V	± 12.5 V	± 18.0 V	± 16.0 V	± 13.0 V
	+ 28 VDC	± 5.6 V	± 10.1 V	± 7.9 V	± 14.0 V	± 20.3 V	± 18.7 V	± 14.6 V
Internal Carrier Frequency (st.)	[kHz]	13.0	12.0	3.6	3.4	3.2	1.5	1.4
Ripple of Output Voltage	[% eff]	0.7	0.7	0.8	0.8	0.8	1.0	1.0
Output Resistance	[kΩ]	2.5	3.5	5.2	5.5	5.6	5.5	5.6
Influence of Temperature	[% Rdg./K]	+ 0.1	+ 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1
Design Based on Scale Drawing (see Picture)		1	1	2	2	2	2	2
Dimensions:	A [mm]	76.5	89.4	251.0	277.0	389.0	646.0	890.0
	B [mm]	10.4	14.2	36.1	36.1	61.5	121.0	172.0
	B [mm]	30.0	33.3	38.1	38.1	38.1	38.1	38.1
Reset Force max.	[N]	0.6	1.7	3.1	4.2	4.8	12.7	13.6
Natural Frequency of Probe Tip	[Hz]	49.0	33.0	18.0	15.0	9.0	7.0	5.0
Weight	[kg]	0.2	0.21	0.25	0.3	0.4	0.65	0.85

Figure 1
Models 87350-000 and 87351-000

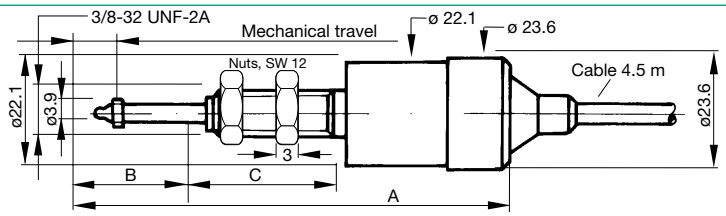
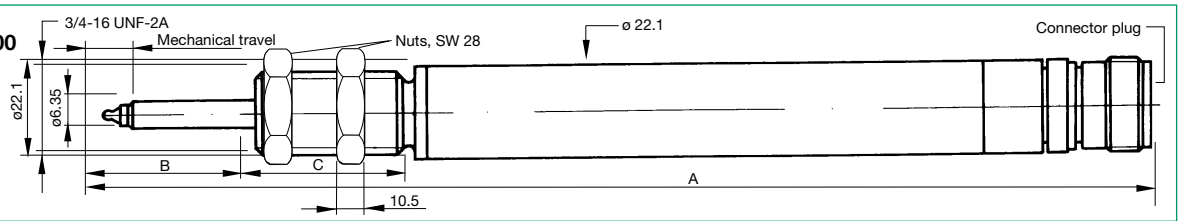


Figure 2
Models 87352-000 to 87356-000



The CAD drawing (3D/2D) for this sensor can be imported online directly into your CAD system.
Download via www.burster.com or directly at www.traceparts.com. For further information about the burster traceparts cooperation refer to data sheet 80-CAD-EN.

Electrical values

Excitation voltage: 6.0 V DC/approx. 7 mA to 28 V DC/approx. 48 mA, protected against polarity reversal, refer to table

Output voltage: refer to table

Environmental conditions

Operation temperature range: - 50 °C to 90 °C

Influence of temperature to sensitivity: refer to table

Mechanical values

Non-linearity: ± 0.5 % F.S.

Resolution: analog signal

Protection class acc. to EN 60529: IP40

Electrical connection:

models 87350-000 and 87351-000 and models 87352-000 up to 87356-000: color coded, teflon isolated cable with open ends, length approx. 4.5 m, 5 pin plug-in connection, mating connector model 9947 (included in scope of delivery)

Wiring code:

Connector	Cable		
pin A	red	excitation	positive
pin B	black	excitation	negative
pin D	white	output*	
pin E	green	output**	

*Core outside: negative, inside: positive, with relation to**

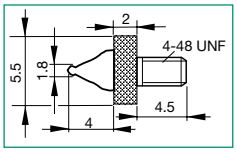
Mounting:
The installation of the sensor is realized with two nuts. These two nuts are included in scope of delivery. Mechanical tensions on the sensor housing caused either by the backmost nut or by any other surrounding parts have to be avoided.

Order Information

DC/DC displacement sensor range ± 2.54 mm **Model 87351-000**

Accessories

Probe tip
with thread 4-48 UNF
(included in scope
of delivery)



Model 87350-Z003

Set of 2 nuts for sensor mounting (included in scope of delivery)
for models 87350-000 and 87351-000 **Model 87350-Z001**
for models 87352-000 to 87356-000 **Model 87350-Z002**

for models 87350-000 and 87351-000:
Connector, 12 pin for burster desktop devices **Model 9941**
Mounting of connector to sensor cable **Order Code 99004**
Mounting of mating connector for model 9163 desktop version **Code 99002**

for models 87352-000 to 87356-000:
Mating connector 5 pin socket (included in scope of delivery) **Model 9947**
Connection cable, length 3 m, one end open **Model 99547-000A-0160030**
Connection cable to burster desktop devices, length 3 m **Model 9915**

Manufacturer Calibration Certificate (WKS)

Standard manufacturer calibration in 20 % increments in raising direction, with or without indicator.

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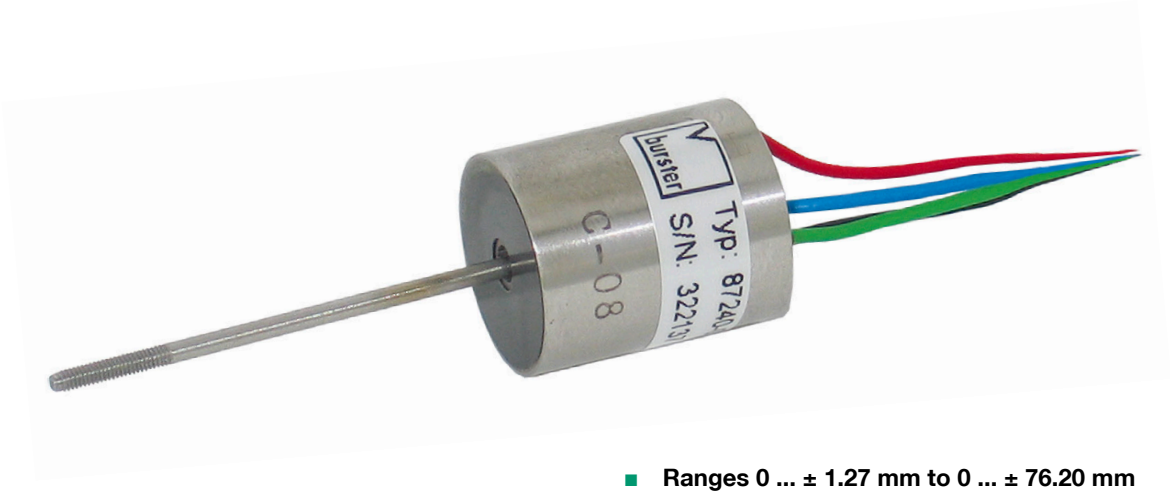
2408-087350EN-5672-081524

DC/DC Displacement Sensor

Series 87240

Code:	87240 EN
Delivery:	ex stock
Warranty:	24 months

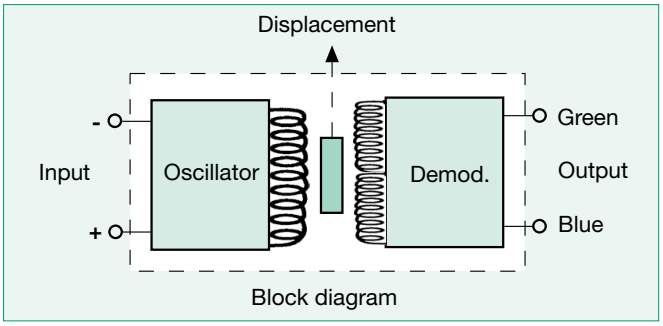


- **Ranges 0 ... ± 1.27 mm to 0 ... ± 76.20 mm**
- **Integrated amplifier**
- **Free of hysteresis**
- **Large temperature range from -50° C ... 120° C**
- **Suitable for operation in hydraulic fluid up to 3 bar**
- **Protection IP64**

87240 EN

Application

Displacement and all mechanical values which can be converted to displacements (e.g. compressive and tensile force, strain, torque and vibration) may be measured by this DC/DC displacement sensor. Typical application areas are the measurement of displacement and strain on machines, servo systems, vehicles, on test plants, in civil engineering and tunnel construction.
An integrated maintenance-free electronic and a high-level DC output signal provide an easy handling without any problems.



Block diagram

Description

Displacement sensors of series 87240 convert a displacement into an analog electrical signal. They consist of a differential transformer with moveable core, an oscillator and a demodulator. These components are integrated and encapsulated in a cylindrical housing made of stainless steel. The sensors are energized by DC voltage, which is converted to AC by the oscillator and brought to the primary coil of differential transformer. The voltages induced by the two secondary windings of the transformer are demodulated, filtered and switched inverse to each other. The result is a 0 V signal, if the core is in the center position.
The direction of an axial core displacement is shown by the polarity of the output voltage. The amplitude of the voltage changes proportional to the magnitude of the core's displacement and respectively to the measured deflection.

In and output terminals of the displacement sensor are galvanically insulated and there is no connection to the housing of the sensor.
The mounting of the DC/DC displacement sensor will be done e.g. by a clip enclosing the sensor's housing. The dynamic unit to be measured should be connected to the core of the sensor. To avoid an influence to the magnetic field and the measured value, coupling elements have to consist of a non magnetizable material like brass, aluminium or non-magnetizable steel.

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Technical Data

Displacement Sensor	Models	87240-000	87241-000	87242-000	87243-000	87244-000	87245-000	87246-000
Measurement Range	[mm]	± 1.27	± 2.54	± 6.35	± 12.70	± 25.40	± 50.80	± 76.20
Extended	[mm]	± 1.8	± 3.8	± 9.5	± 19.0	± 38.1	± 69.5	± 82.5
								Nominal F.S. output (output unloaded)
Excitation VDC:	+ 6 VDC	± 1.3 V	± 2.4 V	± 1.8 V	± 3.1 V	± 4.6 V	± 3.9 V	± 3.3 V
	+ 15 VDC	± 3.4 V	± 6.4 V	± 4.8 V	± 8.3 V	± 12.1 V	± 10.2 V	± 8.7 V
	+ 24 VDC	± 5.5 V	± 10.4 V	± 7.8 V	± 13.5 V	± 18.7 V	± 16.5 V	± 14.1 V
	+ 30 VDC	± 7.0 V	± 13.0 V	± 9.7 V	± 17.0 V	± 24.8 V	± 20.7 V	± 17.7 V
Internal Carrier Frequency	[kHz]	13.0	12.0	3.6	3.4	3.2	1.5	1.4
Ripple of Output Voltage	[% eff]	0.7	0.7	0.8	0.8	0.8	1.0	1.0
Output Resistance	[kΩ]	2.5	3.5	5.2	5.5	5.6	5.5	5.6
Cut-Off Frequency	[Hz]	300	140	115	110	100	110	75
Influence of Temperature	[% Rdg./K]	+ 0.1	+ 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1
Dimensions:	A [mm]	22.1	28.4	81.5	94.2	119.6	208.5	267.2
	E [mm]	8.6	11.7	36.6	42.9	55.6	100.1	129.3
Weight of Sensor	[g]	22	28	70	80	104	180	220
Core Version 1 (Standard Version, see below**)**	**Models**	**87C04-000**	**87C04-004**	**87C04-010**	**87C04-011**	**87C04-012**	**87C04-013**	**87C04-014**
Dimensions:	B [mm]	14.3	19.1	44.5	47.5	50.8	88.9	88.9
	E [mm]	62.5	67.3	92.7	108.5	132.1	221.0	302.3
Core Weight	[g]	1.6	2.1	3.4	3.8	4.3	7.0	8.1
Core Version 2 (Option, siehe unten**)**	**Models**	**87C05-002**	**87C05-009**	-	-	-	-	-
Dimension:	B [mm]	14.3	19.1	-	-	-	-	-
	D [mm]	continuous	4.8	-	-	-	-	-

Electrical values

Excitation voltage: 6 V DC ... 30 V DC, protected against reverse polarity

Excitation current: 10 mA (at 6 V DC) ... 50 mA (at 30 V DC)

Voltage output: symmetrical to electrical center — refer to table

Resistance: > 100 kΩ

Test voltage: input/output 500 V

Environmental conditions

Operation temperature range: - 50 °C ... 120 °C

Influence of temperature to measurement signal: refer to table

Mechanical values

Non-linearity: measurement range ± 0.5 % F.S; extended range ± 1 % F.S

Resolution: analog signal

Protection class: acc. to EN 60529 IP 64

Electrical connection: 4 teflon insulated wires, length 45 cm, color coded

Wiring code:

red:	excitation	positive	green:	signal output	
black:	excitation	negative	blue:	signal output	
			blue	is positive, if the core is on the side of the connector wires.	

Order Information

DC/DC displacement sensor range ± 1.27 mm **Model 87240-000**

DC/DC displacement sensor range ± 1.27 mm plug-in connector **Model 87240-000-V001**

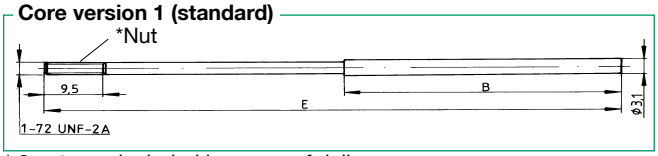
Accessories

1 set (2 pcs) nuts for the rod thread 1-72 UNF-2A (included in scope of delivery) **Model 87240-Z001**

Amplifiers, process indicators like e.g. model 9163 and model 9243 **please refer for product section 9 of catalog.**

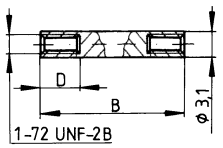
Dimensional drawings

Core version 1 (standard)



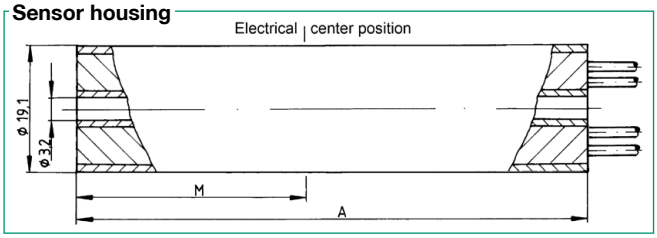
* 2 nuts are included in scope of delivery.

Core version 2 (option for model 87240-000 and 87241-000)



The sensor could be delivered with core version 2 on request, without extra charges.

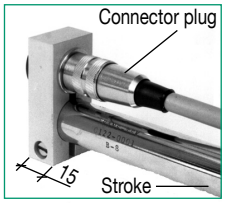
Sensor housing



The CAD drawing (3D/2D) for this sensor can be imported online directly into your CAD system.
Download via www.burster.com or directly at www.traceparts.com. For further information about the burster traceparts cooperation refer to data sheet 80-CAD-EN.

Option

Version with electrical plug-in connector, 5 pin, mating connector model 9991 included **V001**



Manufacturer Calibration Certificate (WKS)

Standard manufacture calibration, 20 % increments in raising direction, with or without indicator.

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2407-087240EN-5672-081524

Potentiometric Displacement Sensor

Miniature design

Model 8709

Code:	8709 EN
Delivery:	ex stock
Warranty:	24 months

- **Measurable displacements between 0 ... 25 mm and 0 ... 250 mm**
- **Non-linearity max. ± 0.05 % F.S.**
- **Housing diameter 12.7 mm**
- **Service life: 10^8 movements**
- **Adjustment speed: up to 10 m/s**
- **Integrated cable 1 m**
- **Special versions: Coupling with ball joints or flange fastening by request**

8709 EN

Application

Potentiometric displacement sensors are used for direct, precise measurement of mechanical displacements. The mechanical parts of the measuring equipment must be set-up in such a way that the sliding shaft can move without play or lateral forces.
A special multi-finger slider ensures good contact even when the adjustment speed is high or in the presence of vibration. With its housing diameter of only 12.7 mm, the model 8709 is also suitable for highly compact structures.
The movable fastening clamps allow the user variable options for attaching the sensor without complication.
Optionally available adaptations, such as flange and ball joint versions, extend and complement the range of possible applications.

Typical fields of application include:

- ► Measuring the stroke on riveting machines
- ► Measuring insertion distances
- ► Offset measurements on bearings
- ► Spring travel measurements on axes
- ► Measurements of the movement of hoisting platforms
- ► Length measurements on pipe bending machines

Description

Due to the technology employed in potentiometric displacement sensors, they always operate with a sliding contact system. Special processes are applied to give the resistance tracks low friction, low tendency to stick/slip, resistance to abrasion and long-term stability.
The driving rods are guided in long-life, low-friction sliding bearings with close tolerances; this results in highly precise measurements. Transverse forces reduce the service life and can be avoided by using, for instance, ball joint couplings.
Due to the pump effect, the driving rod has double sliding bearings. All the figures quoted in the data sheet for non-linearity, service life, reproducibility and temperature coefficient apply to the use of the sensor as a voltage divider with a maximum current of 0.1 µA.
A ball joint coupling (see accessories) at the end of the sliding shaft minimizes axial errors between the sensor and the equipment.

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Technical Data

Order Code	Range [mm]	Linearity* +1/-0	Resistance	Dissipation at 40 °C (0W at 120 °C)	Maximum Voltage	Length of Housing **A** [mm]	Distance of Holder (recom.) **B** [mm]	Total Movement **C** [mm]	Mass [g]
8709-5025	0 ... 25	± 0.2 % F.S.	1 kΩ	0.5 W	20 V	74.5	42	30	45
8709-5050	0 ... 50	± 0.1 % F.S.	2 kΩ	1 W	40 V	99.5	67	55	55
8709-5075	0 ... 75	± 0.1 % F.S.	3 kΩ	1.5 W	60 V	124.5	92	80	65
8709-5100	0 ... 100	± 0.1 % F.S.	4 kΩ	2 W	60 V	149.5	117	105	75
8709-5125	0 ... 125	± 0.05 % F.S.	5 kΩ	2.5 W	60 V	174.5	142	130	85
8709-5150	0 ... 150	± 0.05 % F.S.	6 kΩ	3 W	60 V	199.5	167	155	95
8709-5200	0 ... 200	± 0.05 % F.S.	8 kΩ	3 W	60 V	249.5	217	205	115
8709-5250	0 ... 250	± 0.05 % F.S.	6 kΩ	3 W	60 V	299.5	267	255	135

* without mounting parts

Electrical values

Resistance: refer to table
Tolerance of resistance: ± 20 %
Maximum operating voltage: refer to table
Operating current in the slider circuit: recommended < 0.1 µA
maximum 10 mA
(> 0.1 µA: negative influence to linearity and durability)
Dissipation: refer to table
Insulation resistance: > 100 MΩ at 500 V=, 2 s, 1 bar
Electric strength: < 100 µA at 500 V~, 50 Hz, 2 s,1 bar

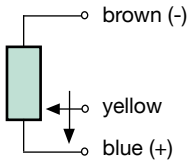
Environmental conditions

Operating temperature range: - 30 °C ... 100 °C
Storage temperature range: - 50 °C ... 120 °C
Influence of temperature:
to resistance - 200 ± 200 ppm/°C
to output voltage < 1.5 ppm/°C

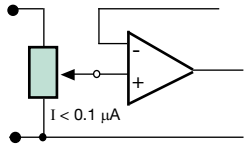
Mechanical values

Non-linearity: refer to table
Resolution: 10 µm
Displacement force, horizontal: ≤ 0.5 N
Displacement speed: ≤ 10 m/s
Vibration resistance: 5 ... 2000 Hz, A_{max} = 0.75 mm, a_{max} = 20 g
Shock resistance: 50 g, 11 ms
Protection class: acc. to EN 60529 IP60
Electrical connection: integrated, shielded cable, length 1 m, diameter 4 mm

Wiring code



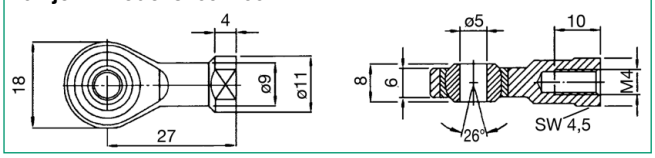
Recommended wiring



Important:
The outstanding properties of these sensors are only available when the slider current in the voltage divider is kept < 0.1 µA. If the measuring chain draws higher currents, the use of an operational amplifier as a voltage follower (I < 0.1 µA) is recommended (see drawing).

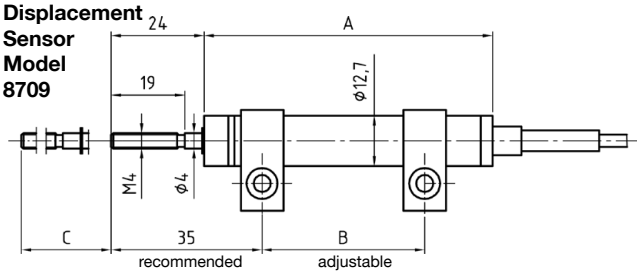
Assembly
Two fastening clamps for mounting purposes are included with the device, see dimensional drawing. The recommended spacings are given in the table.

Ball joint model 8709-Z002

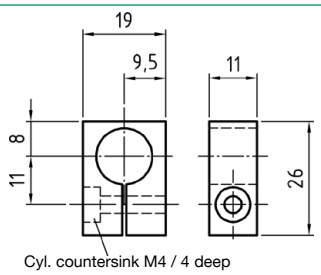


Dimensional drawings

Displacement Sensor Model 8709



Holder Model 8709-Z001



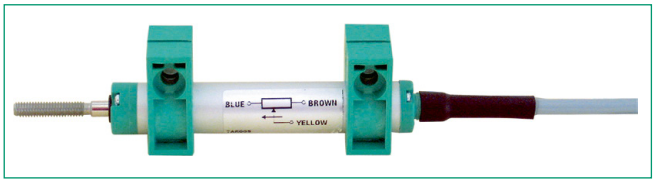
The CAD drawing (3D/2D) for this sensor can be imported online directly into your CAD system.
Download via www.burster.com or directly at www.traceparts.com. For further information about the burster traceparts cooperation refer to data sheet 80-CAD-EN.

Order Information

Potentiometric displacement sensor **Model 8709-5100**
Range 100 mm

Accessories

Mounting set **Model 8709-Z001**
(2 holders for mounting, refer to drawing)
1 set is part of delivery



Ball joint (refer to drawing, in the lower left) **Model 8709-Z002**
Connector 12 pin, for burster desktop devices **Model 9941**
Connector 9 pin, for DIGIFORCE® 9310 **Model 9900-V209**
Connector 5 pin, for extension **Model 99121**
Mounting of a connector to the sensor cable **Order Code: 99004**
only for connection to SENSORMASTER 9163 desktop version **Order Code: 99002**

Analysis and amplifier units like digital indicator 9180, amplifier 9243 or USB sensor interface 9206 or DIGIFORCE®
refer to section 9 of the catalog

Manufacturer Calibration Certificate (WKS)

Calibration of the sensor with or without evaluation electronics. Calibration with 6 calibration points in 20 % increments.

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2402-008709EN-5672-081524

Potentiometric Displacement Sensors

Models 8710, 8711

Code:	8710 EN
Delivery:	ex stock
Warranty:	24 months

Model 8711

Model 8710

- **Measurement ranges 0 ... 25 mm to 0 ... 150 mm**
- **Non-linearity: max. ± 0.05 %**
- **Duration: 10^8 operations**
- **Displacement speed: up to 10 m/s**
- **Drive free of lateral forces caused by ball joint coupling**
- **Integrated cable or plug connection**

8710 EN

Application

Displacement sensors models 8710 and 8711 with resistance tracks made of conductive plastic material are designed for a direct and accurate measuring of mechanical displacements. A special ball joint coupling is mountable on both ends of the driving rod. Because of this the sensor may be used free of clearance or lateral forces also with angular or parallel misalignment between sensor and measuring device.
A special multi-fingered slider provides a good electrical contact also at high adjustment speeds or vibrations.

Areas of application are:
- ► Electromagnets
- ► Switch and button deflections
- ► Pneumatic cylinders
- ► Press-fits (longitudinal press-fits)
- ► Hydraulic cylinders
- ► Measurements of deformation and bending
- ► Length tolerances
- ► Feeding paths

Description

Due to the technology employed in potentiometric displacement sensors, they always operate with a sliding contact system. Special processes are applied to give the resistance tracks low friction, low tendency to stick/slip, resistance to abrasion and long-term stability.
The driving rods are guided in long-life, low-friction sliding bearings with close tolerances; this results in highly precise measurements. Lateral forces reduce the service life and can be avoided by using, for instance, ball joint couplings, included in the burster product range.
Due to the pump effect, the driving rod has double sliding bearings.

Mounting

The sensor is mounted at the left and right longitudinal slot by four mounting angles.

These slots (W = 2.2 mm, D = 1.6 mm) are closed at the side of the electrical connector.

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Technical Data

* without mounting parts ** total mechanical deflection

Order Code	Measuring Range [mm]	Non Linearity *	Dimensions [mm] A	B **	C	Dissipation at 40 °C (0W at 120 °C)	Total Weight	Moveable Weight
8710 - 25	0 ... 25	± 0.2 % F.S.	63	30	107	0.6 W	83	32
8710 - 50	0 ... 50	± 0.1 % F.S.	88	55	157	1.2 W	102	40
8710 - 75	0 ... 75	± 0.1 % F.S.	113	80	207	1.8 W	121	48
8710 - 100	0 ... 100	± 0.1 % F.S.	138	105	257	2.5 W	140	56
8710 - 150	0 ... 150	± 0.1 % F.S.	188	155	357	3.6 W	178	72
8711 - 25	0 ... 25	± 0.2 % F.S.	63	30	107	0.6 W	83	32
8711 - 50	0 ... 50	± 0.1 % F.S.	88	55	157	1.2 W	102	40
8711 - 75	0 ... 75	± 0.1 % F.S.	113	80	207	1.8 W	121	48
8711 - 100	0 ... 100	± 0.1 % F.S.	138	105	257	2.5 W	140	56
8711 - 150	0 ... 150	± 0.05 % F.S.	188	155	357	3.6 W	178	72

Electrical values

Resistance: measurement range 25 mm 1 kΩ; measurement ranges 50 ... 150 mm 5 kΩ

Tolerance of resistance: ± 20 %

Max. voltage: measurement range 25 mm 25 V DC; measurement ranges 50 ... 150 mm 60 V DC

Operating current in slider circuit: recommended < 0.1 µA; maximum 10 mA
(> 0.1 µA: negative influence to linearity and duration)

Dissipation: refer to table

Insulation resistance: > 100 MΩ at 500 V DC, 2 s, bar

Voltage resistance: < 100 µA at 500 V AS, 50 Hz, 2 s, 1 bar

Environmental conditions

Operation temperature range: - 30 °C ... 100 °C

Storage temperature range: - 50 °C ... 120 °C

Influence of temperature:
to resistance - 200 ± 200 ppm/°C
to output voltage < 1.5 ppm/°C

Mechanical values

Non-linearity: refer to table

Resolution: 0.01 mm

Displacement force, horizontal: ≤ 0.3 N

Displacement speed: ≤ 10 m/s

Vibration resistance: 5 ... 2000 Hz, A_{max} = 0,75 mm, a_{max} = 20 g

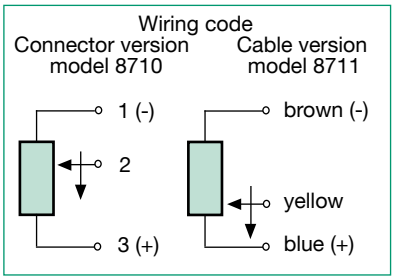
Shock resistance: 50 g, 11 ms

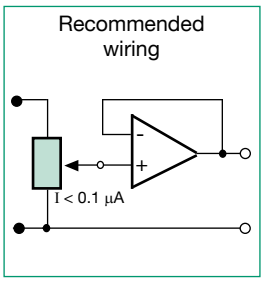
Radial clearance of driving rod: ≤ 0.015 mm

Flexibility of ball joint coupling: parallel ± 0.5 mm; angle ± 10 °

Protection class: acc. to EN 60529 IP40

Electrical connection:
model 8710 plug connection, 5 pin
(Mating connector model 9991 refer to accessories)
model 8711 integrated connection cable, length 1 m, cross section 4 mm

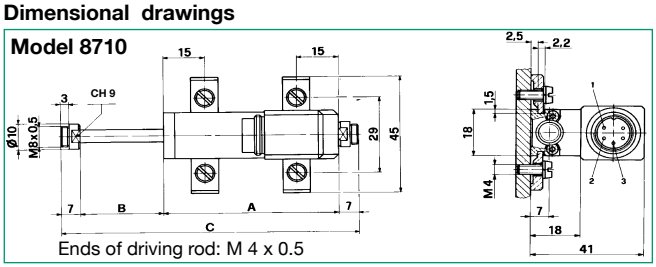


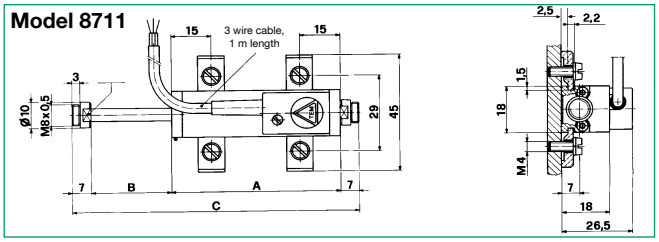


Important:
The excellent characteristics of the sensor are evident, if the slider load in the voltage divider is < 0.1 µA. If the measurement chain requires higher currents, an operational amplifier should be used, connected as a voltage follower (I < 0.1 µA) (see diagram above).

Mounting: with two 2 axial moveable clips, refer to diagram (in scope of delivery)

Dimensional drawings





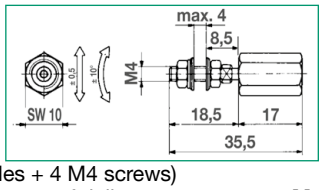
The CAD drawing (3D/2D) for this sensor can be imported online directly into your CAD system.
Download via www.burster.com or directly at www.traceparts.com.
For further information about the burster traceparts cooperation refer to data sheet 80-CAD-EN.

Order Information

Potentiometric displacement sensor
measurement range 100 mm with cable 1 m **Model 8711-100**

Accessory

Ball joint coupling
1 unit is included in scope of delivery



Model 8702

Mounting set (4 angles + 4 M4 screws)
1 set is included in scope of delivery **Model 8710-Z001**

for Model 8710

Mating connector (coupling socket 5 pin)
(1 unit is included in scope of delivery) **Model 9991**

Mating connector (coupling socket 5 pin)
IP40, 90° angle **Model 9900-V590**

Connecting cable, length 3 m, one end open **Model 99130**

Connecting cable
suitable to burster desktop devices, length 3 m **Model 99132**

Connecting cable
length 3 m, for DIGIFORCE® 9310 **Model 99209-591A-0090030**

for Model 8711

Connector 12 pin, for burster desktop devices **Model 9941**
Connector 9 pin, for DIGIFORCE® 9310 **Model 9900-V209**
Connector 5 pin, for extension **Model 99121**

Mounting of a connector to the sensor cable **Oder Code: 99004**
only for connection to SENSORMASTER model 9163
desktop version **Order Code: 99002**

Evaluation units and amplifiers like digital indicator 9180, amplifier 9243, USB sensor interface 9206 or DIGIFORCE®
refer to section 9 of the catalog.

Manufacturers calibration certificate (WKS)

Calibration of the displacement sensor with or without evaluation electronics in 20 % increments of the measurement range (6 points).

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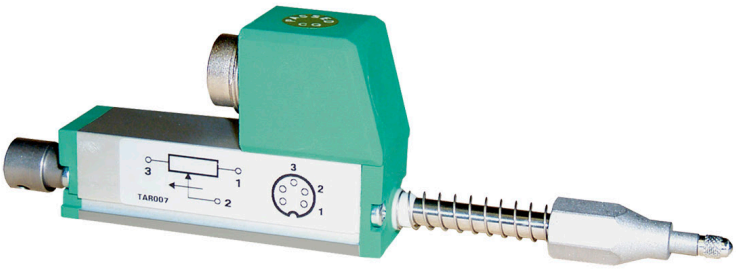
2403-008710EN-5672-081524

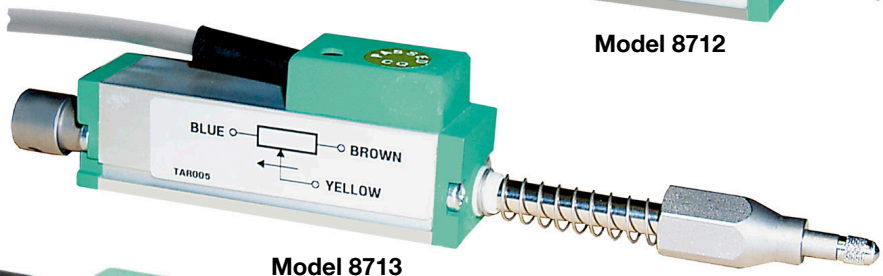
Potentiometric Displacement Sensors

Models 8712, 8713

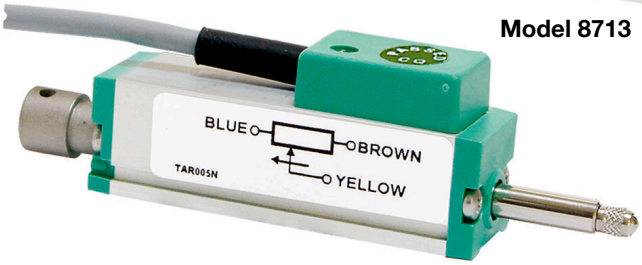
Code:	8712 EN
Delivery:	ex stock
Warranty:	24 months



Model 8712



Model 8713



Model 8713-5xxx-V302
Internal spring

- **Measurement ranges: 0 ... 10 mm to 0 ... 150 mm**
- **Non-linearity from 0.05 % F.S.**
- **Durability 10^8 operations**
- **Resolution 0.01 mm**
- **Follower roll on request**
- **Optional with internal spring**

8712 EN

Application

These displacement sensors are potentiometric displacement sensors used for direct measurement, testing and monitoring of mechanical displacements. The spring-loaded control rod eliminates the need of coupling with the measurement object.

A prerequisite for a very long life duration of the devices is a parallel alignment of the motion direction of the measurement object and the rod.

Areas of application are:

Displacement on

- Electromagnets
- Hydraulic cylinders
- Switches and buttons

Measurements of

- Deformation
- Bending
- Press-fits
- Feed strokes

Description

Due to the technology employed in potentiometric displacement sensors, they always operate with a sliding contact system. Special processes are applied to give the resistance tracks low friction, low tendency to stick/slip, resistance to abrasion and a long-term stability.

The rods are guided in long-life, low friction sliding bearings with close tolerances which provide high durability and measuring quality. The pre-stressed spring presses the sensor tip against the measurement object. This spring is double-guided and disappears in the probe head, if the rod is in its end position.
The probe tip consists of a ball made of stainless steel. The bore at rod end serves for coupling retraction units.
The rod is protected against twist for measurement ranges up to 50 mm. The probe tip (hexagonal) must not be turned by any tool, otherwise its anti-twist protection will be destroyed.

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Technical Data

*length of housing **total mechanical deflection

Order Code	Measuring Range (+1/-0) [mm]	Dimensions [mm] A*	B**	C	D	-V302 A*	B**	C	D	Non-Linearity [% F.S.]	Total Mass	Moveable Mass	Dissipation at 40 °C
8712 - 10	10	48	16	32	108	60.8	6.5	15	95.3	± 0.3	60 g	18 g	0.2 W
8712 - 25	25	63	31	32	138	75.8	19.7	30	138.5	± 0.2	75 g	23 g	0.6 W
8712 - 50	50	88	56	40	196	112.7	14.2	55	194.9	± 0.1	95 g	33 g	1.2 W
8712 - 100	100	139	106	40	307	185.1	13.4	105	316.5	± 0.1	140 g	50 g	2.2 W
8712 - 125	125	163	148	40	364	221.6	13.4	130	378	± 0.05	190 g	58 g	2.2 W
8712 - 150	150	188	186	40	427	270.1	13.4	155	451.5	± 0.05	245 g	66 g	2.2 W
8713 - 10	10	48	15	32	108	60.8	6.5	15	95.3	± 0.3	60 g	18 g	0.2 W
8713 - 25	25	63	30	32	138	75.8	19.7	30	138.5	± 0.2	75 g	23 g	0.6 W
8713 - 50	50	88	55	40	196	112.7	14.2	55	194.9	± 0.1	95 g	33 g	1.2 W
8713 - 100	100	138	115	40	298	185.1	13.4	105	316.5	± 0.1	140 g	50 g	2.2 W
8713 - 125	125	163	148	40	364	221.6	13.4	130	378	± 0.05	190 g	58 g	2.2 W
8713 - 150	150	188	186	40	427	270.1	13.4	155	451.5	± 0.05	245 g	66 g	2.2 W

Electrical values

Resistance:
- measuring range 10 mm and 25 mm: 1 kΩ
- measuring range 50 mm up to 150 mm: 5 kΩ

Tolerance of resistance: ± 20 %

Max. operating voltage:
- measuring range 10 mm: 14 V
- measuring range 25 mm: 25 V
- measuring range 50 mm up to 150 mm: 60 V

Recommended current in slider circuit: < 0.1 µA

Max. current in slider circuit: 10 mA
(> 0.1 µA negative influence to linearity and durability)

Insulation resistance: > 100 MΩ at 500 V

Electrical strength: 500 V_{eff} at 50 Hz

Environmental conditions

Storage temperature range: - 50 °C ... 120 °C

Nominal temperature range: - 30 °C ... 100 °C

Temperature coefficient:
- of connection resistance: max. - 200 ± 200 ppm/K
- of output voltage: < 1.5 ppm/K

Mechanical values

Non-linearity: refer to table

Resolution (mechanically from slider): 0.01 mm

Durability: > 25 x 10^6 m strokes, or 100 x 10^6 operations, whichever is less (within useful electrical stroke)

Displacement force, horizontal: ≤ 4 N

Displacement speed: max. 10 m/s

Endurance limit: 5 ... 2000 Hz, A_{max} = 0.75 mm, a_{max} = 20 g

Shock resistance: 50 g, 11 ms

Protection class: acc. to EN 60529 IP40

Material: housing aluminium, anodized; rod stainless steel AISI 303

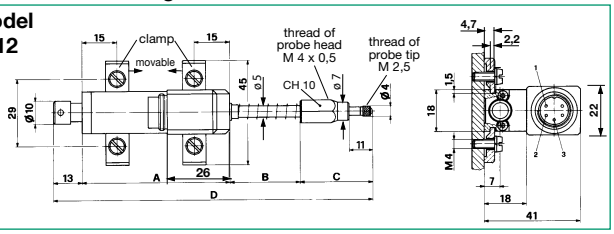
Electrical connection:
- model 8712: Plug-in connector 5 pin
- model 8713: connecting cable, length 1 m, ø 4 mm

Important:

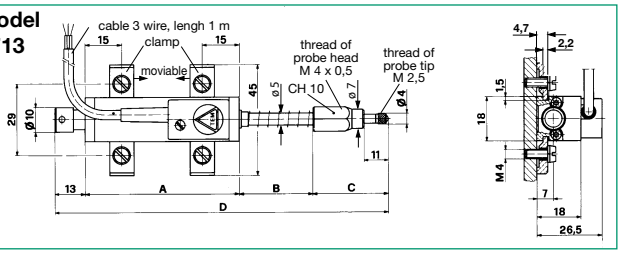
The excellent characteristics of these sensors are only evident when the slider current is < 0.1 µA. If the measuring chain requires higher currents, it is recommended to use an operational amplifier connected as a voltage follower (I < 0.1 µA).

Dimensional drawings

Model 8712

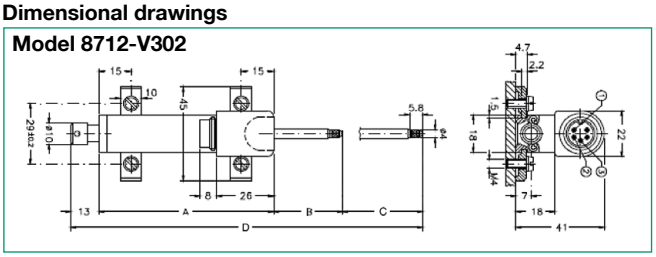


Model 8713

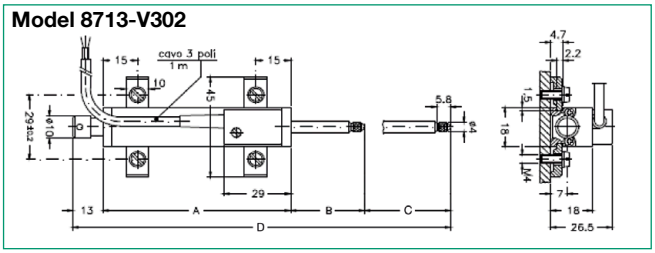


Dimensional drawings

Model 8712-V302



Model 8713-V302



The CAD drawing (3D/2D) for this sensor can be imported online directly into your CAD system.
Download via www.burster.com or directly at www.traceparts.com.

Scope of delivery:

Sensor 8712, mating connector 9991, probe tip 8707, Mounting set 8710-Z001, test and calibration certificate.
Sensor 8713, probe tip 8707, mounting set 8710-Z001, test and calibration certificate.

Accessories

Probe tip (Ball ø = 3)	**Model 8707**
Mounting set (4 angle + 4 M4 screws)	**Model 8710-Z001**
Tip with roller bearing for displacement sensor	**Model 8708**
Further probe tip	**on request**

for Model 8712:

Mating connector, 5 pin	**Model 9991**
Mating connector, 5 pin, 90° outlet	**Model 9900-V590**

Connecting cable, length 3 m, between 8712 and -

One end open	**Model 99130**
9180 or 9186 desktop version	**Model 99132**
DIGIFORCE® 9307, 9310, 9311	**Model 99209-591A-0090030**
SENSORMASTER 9163 desktop version	**Model 99209-591B-0090030**
ForceMaster 9110	**Model 99221-591A-0090030**

Connector and connector mounting for sensor 8713 to:

9180 or 9186 desktop version
Connector model 9941 mounting: 99004
ForceMaster 9110 **Connector model 9900-V221 mounting: 99005**
DIGIFORCE® 9307, 9310, 9311
Connector model 9900-V209 mounting: 99004
SENSORMASTER 9163 desktop version
Connector model 9900-V209 mounting: 99002
Connector for extension cable **Model 99121**

Manufacturers Calibration Certificate (WKS)

Calibration of a displacement sensor with or without evaluation electronics in 20 % increment of the measurement range (6 points).
Typ 87WKS-87xx

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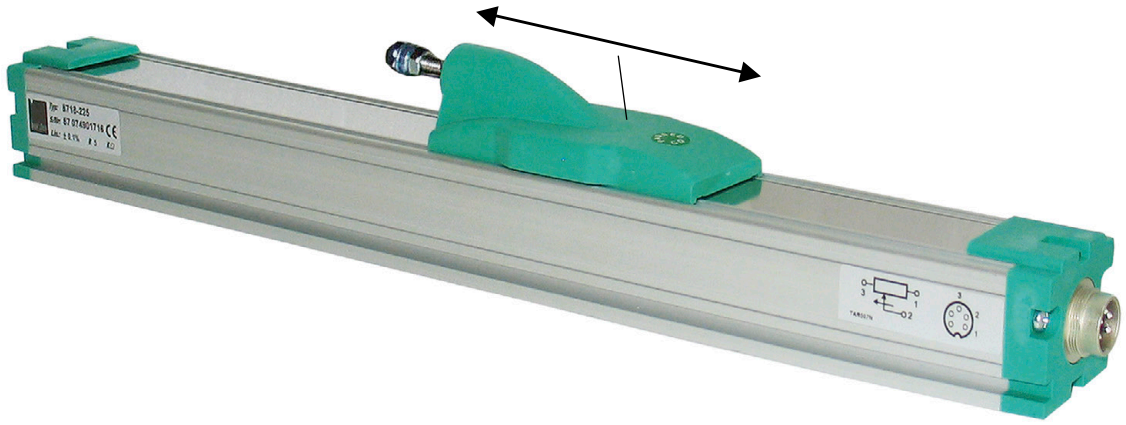
2404-008712EN-5672-081524

Potentiometric Displacement Sensor

Without rod

Model 8718

Code:	8718 EN
Delivery:	ex stock
Warranty:	24 months



- **Measurement ranges from 0 ... 100 mm to 0 ... 2000 mm**
- **Non-linearity up to 0.05 % F.S.**
- **Compact design, without rod**
- **Displacement speed up to 10 m/s**
- **Durability >10^8 operations**

8718 EN

Application

The high resolution allows linear measurements to be accurately sized even in large measurement ranges. Conversion of rotatory and translational motion by spindles, wires or others is not necessary for direct displacement measurement.

Areas of application are:

- ► Hydraulic and pneumatic cylinders
- ► Detection of positions on coordinate inspection machines
- ► Displacement of plungers, knee levers or extruders
- ► Coil and de coil lengths
- ► Strokes on chassis
- ► Metering strokes

Description

Displacement sensors model 8718, using a resistance track made of conductive plastic material, are suitable for direct, accurate and absolute measurements of displacements and lengths.

Special processes are applied to give the resistance tracks low friction, low tendency to stick/slip, resistance to abrasion and long-term stability.

The vibration-cushioned slider allows a clear signal output even by slight shocks or high operating speeds up to 10 m/s. Due to its simple design the sensor is largely protected against electrical interference fields (Al-housing), it keeps the measured value after a power failure and does not generate any electrical interference.

A magnetically hold steel band covers the whole measurement device gap free. Any lateral forces are avoided by a ball joint coupling mounted to the sensor.

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Technical Data

Meas. Range [mm]	100	150	200	300	400	500	600	750	1000	1250	1500	1750	2000
Max. Electr. +3/-0 Usable Length [mm]	103	153	204	305	406	509	611	763	1017	1271	1521	1771	2021
Max. Deflection A [mm]	113	163	214	315	416	519	621	773	1027	1281	1531	1781	2031
Non-Linearity [F.S.]	±0.1%	±0.1%	±0.1%	±0.1%	±0.1%	±0.05%	±0.05%	±0.05%	±0.05%	±0.05%	±0.05%	±0.05%	±0.05%
Resistance [kΩ]	5	5	5	5	10	10	10	10	10	20	20	20	20
Length of Housing B [mm]	253	303	354	455	556	659	761	913	1167	1421	1671	1921	2171
Total Weight [kg]	0.5	0.58	0.65	0.80	0.95	1.1	1.25	1.5	1.85	2.25	2.6	3.0	3.8
Order Code 8718-	100	150	200	300	400	500	600	750	1000	1250	1500	1750	2000

Electrical values

Tolerance of resistance:		± 20 %
Operating current in slider circuit:	recomm.	< 0.1 µA
	max.	10 mA
Max. power rating at 40 °C (0 W at 120 °C):		3 W
Max. operating voltage:		50 V
Insulation resistance:		> 100 MΩ at 500 V, 2s
Voltage resistance:		< 100 µA at 500 V~, 50 Hz, 2s

Environmental conditions

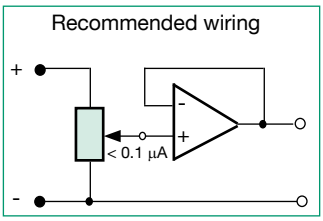
Operation temperature range:	- 30 °C ... + 100 °C
Storage temperature range:	- 50 °C ... + 120 °C
Temperature coefficient of resistance:	- 200 ... ± 200 ppm/K
Temperature coefficient of output voltage:	< 1.5 ppm/K

Mechanical values

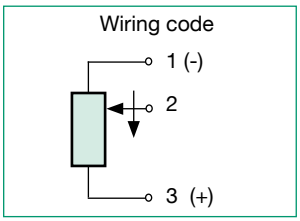
Resolution:		0.01 mm
Durability:		10^8
Displacement force (horizontal):		≤ 1.2 N
Displacement speed:		standard 10 m/s
Vibration:	5 ... 2000 Hz, A_{max} = 0.75 mm, a_{max} = 20g	
Acceleration in operation:		max. 200 m/s² (20g)
Shock resistance:		50 g, 11 ms
Weight of the slider:		67 g
Protection class:	acc. EN 60529	IP40
Material:	slider	stainless steel AISI303
	housing	anodized aluminium

Electrical connection:
Plug-in connector 5 pin model 9991 in scope of deliver
(Mating connector refer to accessories)

Recommended wiring



Wiring code



Important

The technical data stated are only evident, if the sensor is used properly. The sensor only shows its excellent characteristics when the slider current in the voltage divider is < 0.1 µA. If the measurement chain requires higher currents, it is advisable to connect an operational amplifier as a voltage follower (I < 0,1 µA) (refer to drawing above). Usage near the slider blocks (slider at the end of the conductor track) may cause a higher measurement error.

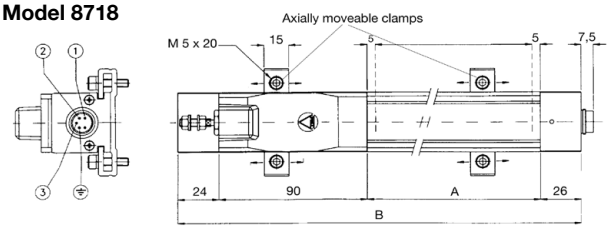
Mounting:
By clamps with adjustable distance or with guard rail on the bottom side for alternative mounting.

Mounting Advice

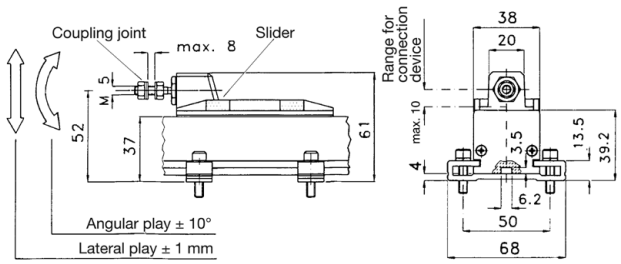
The clamps allow a fine adjustment of the sensor's mounting position. It may be an advantage to mount the sensors with the ball joint coupling in the lower position. This will bring the drainage areas on both sides of the slider into work and the masking band is better protected against pollution, also in rough environments.

Dimensional drawing

Model 8718



Slider with coupling joint



The CAD drawing (3D/2D) for this sensor can be imported online directly into your CAD system.
Download via www.burster.com or directly at www.traceparts.com. For further information about the burster traceparts cooperation refer to data sheet 80-CAD-EN.

Order Information

Potentiometric displacement sensor
standard version, measurement range 500 mm **Model 8718-500**

Accessories

Mating connector (cable coupling 5 pin)
1 unit is part of delivery **Model 9991**

Connecting cable, length 3 m, one end open **Model 99130**

Connecting cable suitable to burster desktop devices with 12 pin plug-in connector, length 3 m **Model 99132**

Connecting cable to DIGIFORCE® 9310, length 3 m **Model 99209-591A-0090030**

Connecting cable to 9163 desktop version: **Model 99209-591B-0090030**

Mounting clamps (1 set is included in scope of delivery)
for sensors with meas. lengths up to 750 mm* **Model 87018**

for sensors with meas. lengths from 1000 to 2000 mm** **Model 87019**
*(1 set = 2 parts), **(1 set = 3 parts)

Supply units, amplifiers and process control units like indicator model 9163, modular amplifier model 9243 or DIGIFORCE®
refer to section 9 of the catalog.

Manufacturer Calibration Certificate (WKS)

Calibration of the displacement sensor with or without evaluation electronics in 20 % increments of the whole measurement range (6 points).

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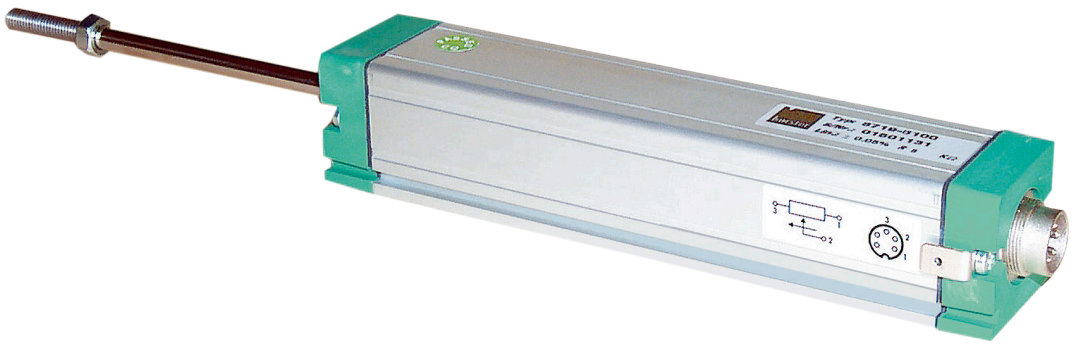
2405-008718EN-5672-081524

Potentiometric Displacement Sensor

Model 8719

Code:	8719 EN
Delivery:	ex stock / 5 weeks
Warranty:	24 months



NEW **Option Protection Class IP67**

- **Measuring ranges: between 0 ... 50 mm and 0 ... 900 mm**
- **Non-linearity ± 0.05% F.S.**
- **Resolution: 0.01 mm**
- **Durability: Up to 100 x 10^6 movements**
- **Adjustment speed up to 10 m/s**
- **Plug or cable connection**
- **Optional protection classes IP65 and IP67**

8719 EN

Application

Due to its high resolution also when measuring long distances, linear displacement measurements up to 900 mm can be carried out. Conversions between rotatory and translation movements through ball screws, wire or cord connections and so on are not necessary for direct displacement measurement.

Application fields include

- ► Electromagnets
- ► Deformations - bending
- ► Pneumatic cylinders
- ► Length tolerances
- ► Press-insertions (longitudinal press-fits)
- ► Feed strokes
- ► Machine hubs
- ► Punch, knee lever or extruder distances
- ► Hydraulic cylinders

Description

Due to the technology employed in potentiometric displacement sensors, they always operate with a sliding contact system. Special processes are applied to give the resistance tracks low friction, low tendency to stick/slip, resistance to abrasion and long-term stability.

The rod is guided in a low-play floating frontal bearing. This absorbs small angular and parallel displacements. The guide lug and slide block have particularly tight tolerances, in order to ensure reliable slider contact.

A ball joint coupling (see accessories) at the end of the sliding shaft minimizes axial errors between the sensor and the equipment.

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Technical Data

Measuring Range [mm]	50	100	130	150	175	200	225	275	300	375	400	450	500	600	750	900
Length of Housing [mm]	112	163	192	212	237	263	288	338	363	439	465	516	571	672	825	977
Total Displacement [mm]	59	109	139	159	184	210	235	285	310	386	412	463	518	619	772	924
Weight of Rod and Slider ca. [g]	50	50	50	50	50	50	100	100	100	200	200	250	250	300	350	400
Total Weight ca. [g]	300	350	400	500	500	500	600	600	650	700	800	900	1000	1200	1400	1600
Order Code 8719-	5050	5100	5130	5150	5175	5200	5225	5275	5300	5375	5400	5450	5500	5600	5750	5900

Electrical values

Resistance:	50-600 mm electr. usable length	5 kΩ
	750-900 mm electr. usable length	10 kΩ
Tolerance of resistance:		± 20 %
Operating voltage:		max. 50 V DC
Operating current in slider circuit (see drawing 2):		recom. < 0.1 µA max. 10 mA
Dissipation at 40 °C:		max. 3 W
Insulation resistance:		> 100 MΩ at 500 V DC, 2s
Electric strength:		< 100 µA at 500 V AC, 50 Hz, 2s

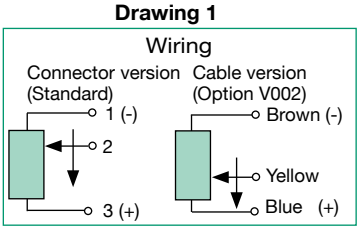
Environmental conditions

Range of operating temperature:		- 30 °C ... 100 °C
Range of storage temperature:		- 50 °C ... 120 °C
Influence of temperature:	to resistance	- 200 ± 200 ppm/°C
	to output voltage	< 1.5 ppm/°C

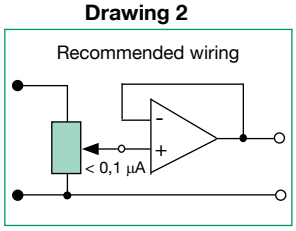
Mechanical values

Non-linearity:		± 0.05 % F.S.
Resolution:		0.01 mm
Durability:		10^8
Displacement force:		≤ 4 N at IP60 and ≤ 25 N at IP65
Displacement speed:		max.10 m/s
Vibrations:		5 ... 2000 Hz, A_{max} = 0,75 mm, a_{max} = 20 g
Acceleration in operation:		max. 200 m/s² (20 g)
Shock resistance:		50 g, 11 ms
Material:	Rod	stainless steel AISI303
	Housing	anodized aluminium
Protection class:	acc. to EN 60529	standard IP60 (IP65 option)
Electrical connection:		refer to drawing 1

Drawing 1



Drawing 2



Important:

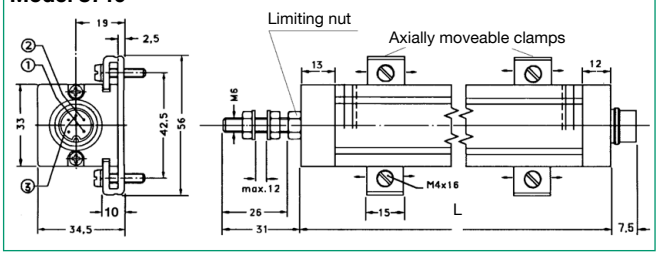
The technical data quoted can only be maintained if the sensors are used properly. Their outstanding properties are only available when the loading of the slider in the voltage divider is kept < 0.1 µA. If the measuring chain draws higher currents, the use of an operational amplifier as a voltage follower (I < 0.1 µA) is necessary (see Drawing 2).
If used close to the stops (slider at the end of the conductor track) the measurement errors can be higher.

Mounting Instructions:

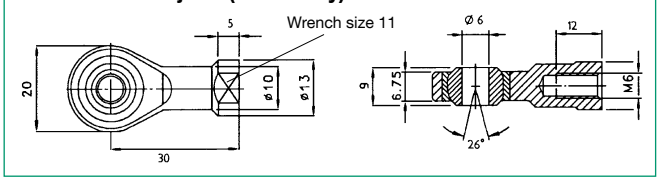
Clamps with adjustable clearance; sensor can be clipped into the fitted clamps.

Dimensional drawings

Model 8719



Model 8705 ball joint (accessory)



The CAD drawing (3D/2D) for this sensor can be imported online directly into your CAD system.
Download via www.burster.com or directly at www.traceparts.com. For further information about the burster traceparts cooperation refer to data sheet 80-CAD-EN.

Order Information

1. Potentiometric displacement sensor standard version, range 200 mm **Model 8719-5200**
2. Potentiometric displacement sensor range 375 mm, Option: protection class IP65 **Model 8719-5375-V001**

Accessories

Ball joint, refer to drawing above	**Model 8705**
Mounting set, 2 clamps and 4 screws included in scope of delivery	**Model 8719-Z001**
Mating connector, 5 pin (socket, IP40) included in scope of delivery	**Model 9991**
Mating connector, 5 pin (socket, IP40) 90°-outlet	**Model 9900-V590**
Mating connector (socket, IP67) for sensor with mating connector IP65	**Model 9900-V554**
Mating connector for sensors with IP67	**Model 8719-Z002**
Cable, length 3 m, one end open	**Model 99130**
Cable for connection to burster desktop devices, length 3 m	**Model 99132**
Connecting cable to DIGIFORCE® 9310, length 3 m	**Model 99209-591A-0090030**
Connecting cable to 9163 desktop version, length 3 m	**Model 99209-591B-0090030**
Supply units, amplifiers or indicators like digital indicator 9163, amplifier 9243 or DIGIFORCE®	**refer to section 9 of the catalog**

Options

Identification	Meaning
V001	protection class IP65
V002	cable outlet (length of the cable 1 m)
V004	V 001 and V 002
V007	protection class IP67

Manufacturer Calibration Certificate (WKS)

Calibration of the sensor with or without evaluation electronics in 20 % steps (6 calibration points).

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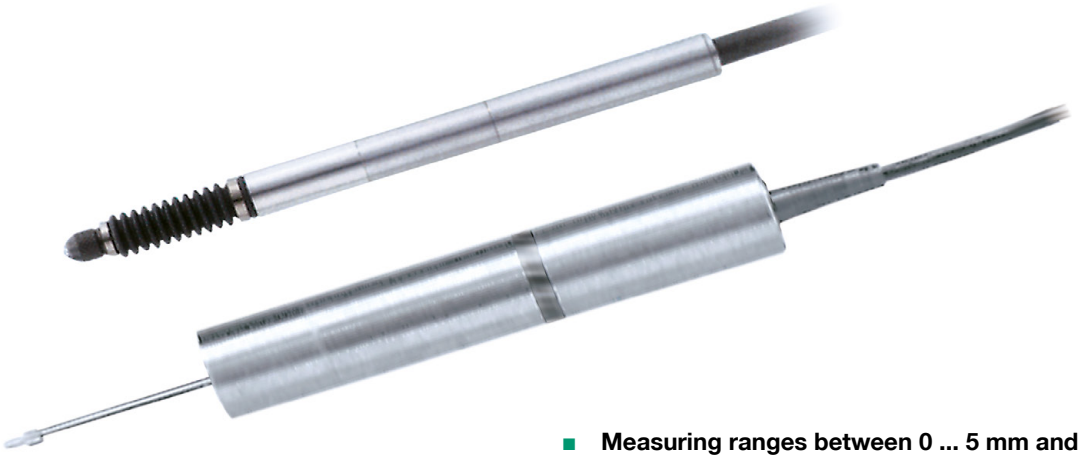
2406-008719DE-5672-081524

High-precision Incremental Displacement Sensor

Series 8738

Code:	8738 EN
Delivery:	ex stock
Warranty:	24 months



- **Measuring ranges between 0 ... 5 mm and 0 ... 100 mm**
- **Accuracy up to ± 0.5 µm**
- **Diameter up to 8 mm**
- **Vibration resistant and dust proof**
- **High protection class up to IP66**

8738 EN

Application

Incremental magnetic measuring heads offer maximum precision over the full range of measurements. As a result of the magnetic operating principle and the robust mechanical construction, they are insensitive to soiling and are therefore ideally suited to use in production facilities.
Thanks to the high quality of their measurements, their high protection and long service life, these sensors are used in many technologies (industry, research, development etc.).

Typical applications include:

- ► Monitoring both slow and fast movements between machine parts
- ► Measurements of position and positional changes in components and structural foundations, of servo regulators, valve and robot controllers
- ► Measurement of growth, and so on

Description

The incremental displacement sensors are based on a magnetic principle: consisting of a magnetic scale and a multi-slot reading head that responds to changes in magnetic flux, they detect linear movements with high precision and resolution. The scale of ferromagnetic alloy – or magnetic tape – is magnetized by an alternating magnetic field with a pole spacing of 0.2 mm. A special recording head and a laser measurement system guarantee that the graduations are very precise. From the magnetic pattern on the scale, the multi-slot reading head generates a signal proportional to the movement.
The analog signal generated by the reading head is electronically divided and digitized. Changes in length can be measured with a resolution of from 1 µm down to 0.1 µm.
Thanks to its slim shape with a diameter of 8 mm and its high accuracy over the full range of measurements, model **8738 DK** is particularly suitable for use in multi-point measuring equipment. The spindle and spindle guide are protected from dust by a bellow.

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Technical Data

Order Code	Measuring Range [mm]	Dimensions [mm] L	L1	L2	L3	øD1	øD2	KA	øW	TS	Resolution [µm]	Accuracy [µm]	Max. Reaction Speed [m/min]	Mass of Sensor without Cabel [kg]	Protection Class
8738-DK805R5	0 ... 5	82	22.3	11	49.5	8	8	-	-	8.1	0.5	1.5	100	0.02	IP66
8738-DK812R5	0 ... 12	109.7	33	19.5	57.2	8	8	-	-	8.1	0.5	1.5	100	0.03	IP66
8738-DK25PR5	0 ... 25	179.5	38.5	33.8	107.2	20	20	20	6	12	0.5	2	250	0.3	IP64
8738-DK830R	0 ... 30	195.2	39.6	45.7	109.9	8	12	17	4	8.1	0.1	1.3	80	0.07	IP53
8738-DK50PR5	0 ... 50	286	63	44	179	20	20	20	6	12	0.5	2	250	0.36	IP64
8738-DK100PR5	0 ... 100	443.5	114	38.5	291	20	25	20	8	12	0.5	4	250	0.63	IP64

Electrical values

Excitation voltage : 5 V ± 5 %
Output signal: A/B/Z phasing signal (line driver RS422)
Current consumption: max. 300 mA
Power consumption: 1 W

Environmental conditions

Nominal temperature range: from 0 °C to 50 °C
Storage temperature range: from -20 °C to 60 °C

Mechanical values

Influence of temperature: (coefficient of thermal expansion of steel) 12 x 10^{-6} /K
Rod drive: spring force (compressed air, vacuum optional)
Protection class without interpolator and connector: model 8738-DK IP64
Weight: < 0.6 kg
Bending radius: with flexible mounting position < 50 mm
with fix mounting position < 20 mm
Vibration resistance: 100 m/s
Shock resistance: 1000 m/s
Reference marker: 1
Displacement force (horizontal): < 0.4 ± 0.25 N
Durability: 5 million cycles
Electrical connections:
Shielded cable, length 2.5 m (model 8738-DK830R, length 2.4 m, interpolation box and 8 pin connector, (DK series) for 9140.

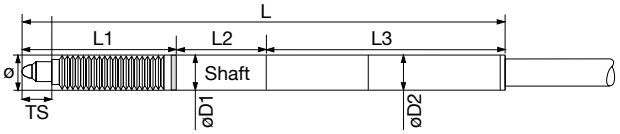
Wiring:

Output signal	8738-DK	8738-CE-22
+5 V	purple	red
0 V/GND	black	white
A	blue	blue
*A	yellow	yellow
B	orange	orange
*B	grey	grey
Z	red	green
*Z	white	purple

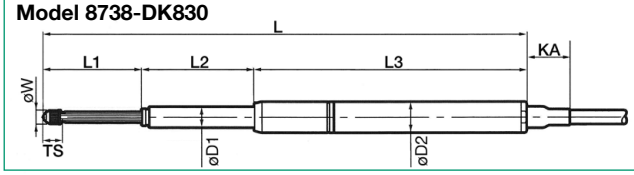
Mounting instructions
It is important to ensure that the sensor housing is not too tightly clamped when mounting. Although the shaft has been specially hardened, excessive tightening torques should be avoided (max. 0.06 Nm).
The accuracy of the measurement depends on the parallelism achieved during assembly; the mounting bracket should be designed and machined in such a way that the parallelism of the measuring head to the surface achieved during assembly is kept within 0.3 mm/100 mm.

Dimensional drawing

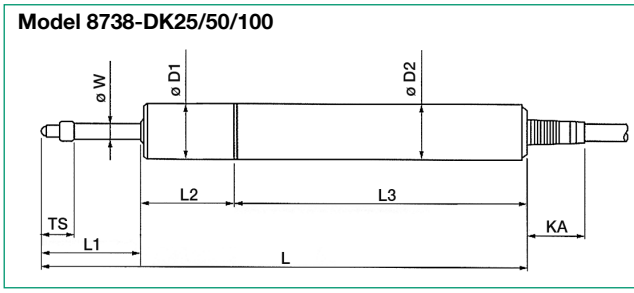
Model 8738-DK805/812



Model 8738-DK830



Model 8738-DK25/50/100



The CAD drawing (3D/2D) for this sensor can be imported online directly into your CAD system.
Download via www.burster.com or directly at www.traceparts.com. For further information about the burster traceparts cooperation refer to data sheet 80-CAD-EN.

Order Information:

Incremental displacement sensor, measurement range 5 mm, straight cable outlet, 1.5 µm accuracy **Model 8738-DK805R5**

Incremental displacement sensor, measurement range 25 mm, straight cable outlet, 2 µm accuracy **Model 8738-DK25PR5**

Accessories

Probe tip with carbide ball, ø 3 mm, M 2.5 (part of delivery) **Model 8738-Z001**

Indicator: Digital display 9140, DIGIFORCE® 9307 **please refer to section 9 of the catalog.**

Connecting cable

Connecting cable, length 3 m, for connection to DIGIFORCE® 9307 **Model 99163-8738-CE22-03**

Connecting cable for incremental displacement sensor 8738-DK, length 3 m, **Model 8738-CE22-03**

Connecting cable, length 3 m, for connection to Digital Display 9140 **Model 8738-CK22-03**

Options

Resolution 0.1 µm, accuracy 1 µm **Model 8738-DK805R**

Pneumatic lining (Push): **Model 8738-DK812VR**
The rod is pushed inside by spring forces and pushed outside by compressed air.
minimum pressure: 0.25 bar
maximum pressure: 0.45 bar

Resolution 0.5 µm, accuracy 1.5 µm, 90° cable outlet **Model 8738-DK805LR5**

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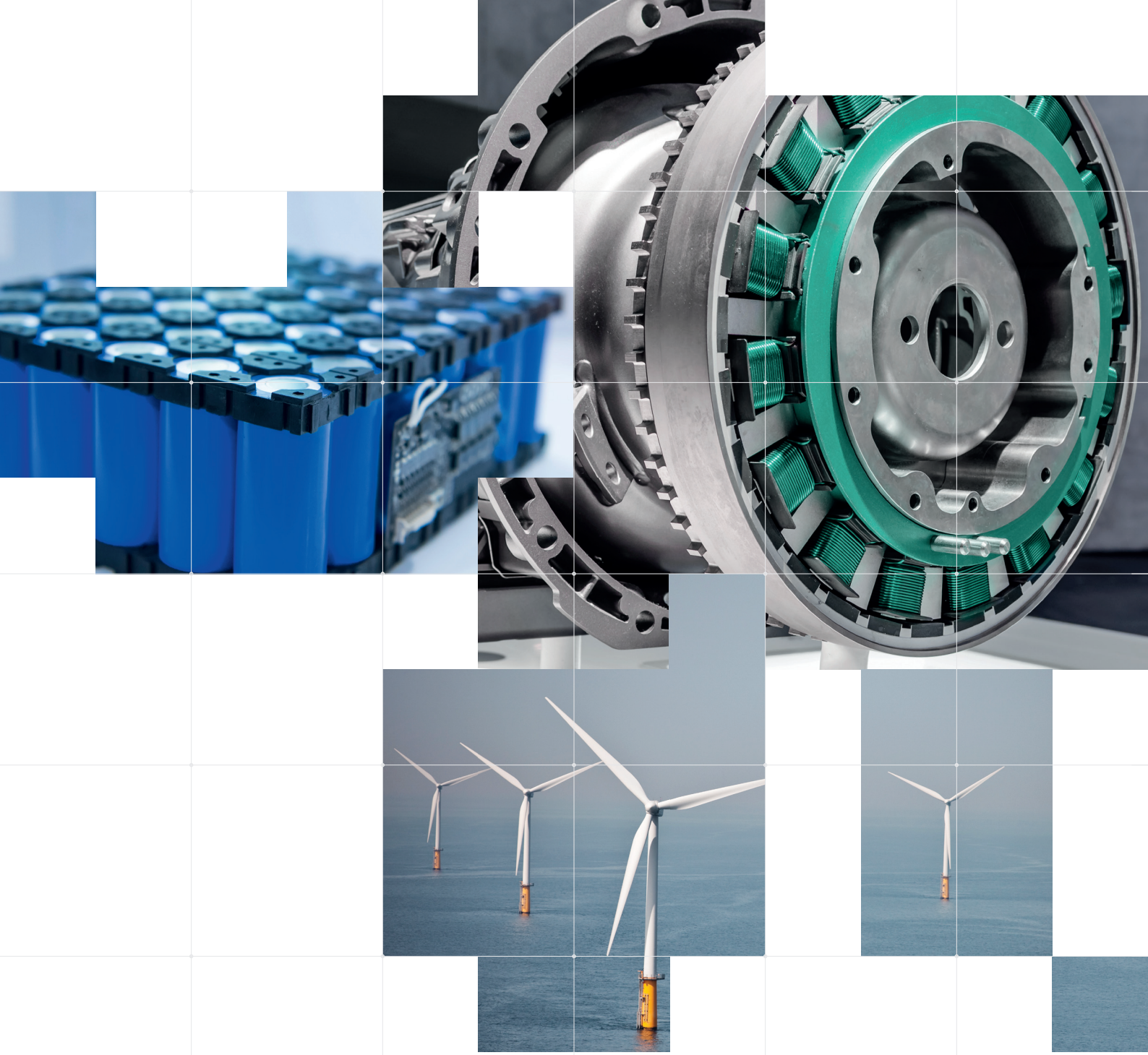

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