THE MEASUREMENT SOLUTION.

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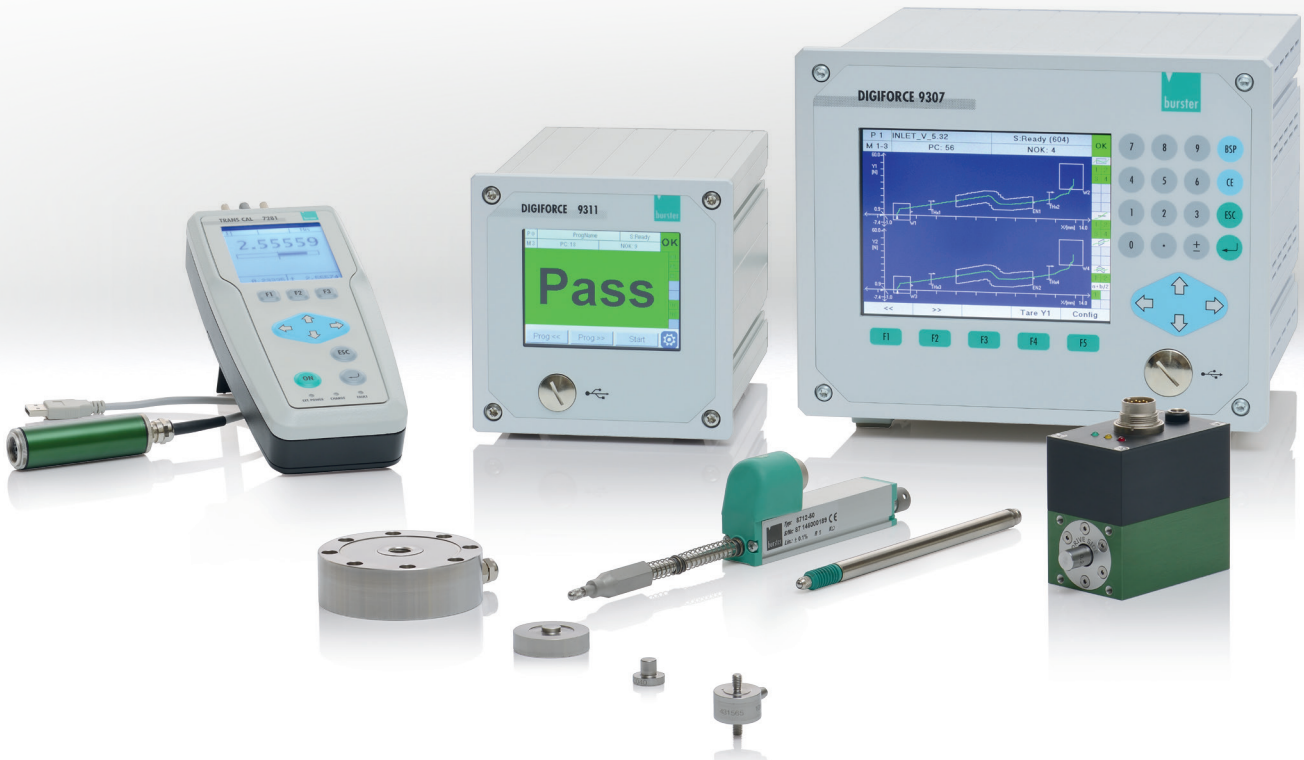

Sensors and Process Instruments

PRODUCTS AND SOLUTIONS FOR AUTOMATION, QUALITY ASSURANCE AND PRODUCTION MONITORING

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Precision

MEASURING TECHNOLOGY WITH PERSPECTIVE.

BECAUSE PROGRESS NEEDS VISION

burster, the specialist for measuring equipment and sensors, delivers the ideal solution that meets your requirements to a T. We offer you forward-looking products, system solutions and a comprehensive suite of services to supplement our product range. With personal commitment and an uncompromising focus on quality.

„THE ONLY CONSTANT IN THE UNIVERSE IS CHANGE.“.

These words by a Greek philosopher could equally apply to the markets and technical challenges you face on a daily basis. This catalogue presents you with a multitude of intelligent, high-quality solutions, all of which are state-of-the-art. Sensors, measuring instruments, test and calibration equipment from burster cover almost every conceivable need, and are explicitly designed to meet the requirements of automation, quality assurance and production monitoring.

Intelligent interaction between components, production processes and equipment as well as the people in charge of their operation is key to success in a world increasingly reliant on information exchange.

Since we offer the measurement solution, we also offer an extensive suite of services for our products on all channels, as well as personalized advice from the application analysis and tailored product development through to optimization, setup, configuration and training. The catalogue gives an overview, our website provides more insight, and in-depth details are available by contacting our experts as well as our partners in your country.

We wish you great success with our sensors and process instruments.

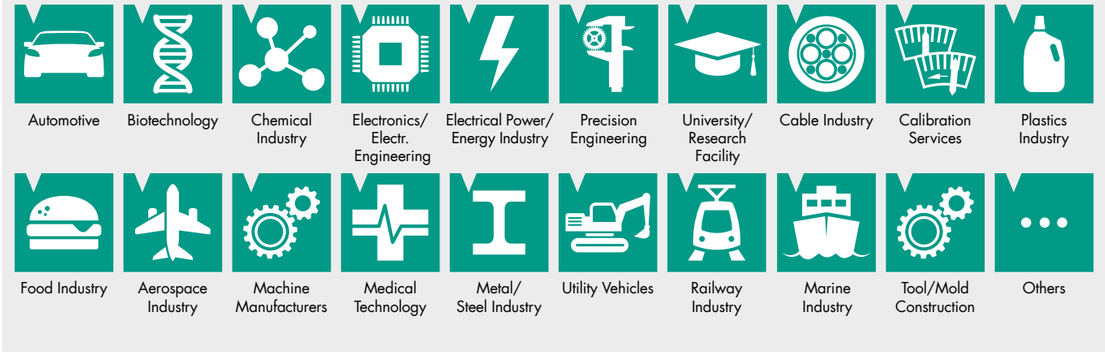
The burster Sales Team

WE KNOW YOUR INDUSTRY

burster's extensive experience in developing measuring sensors and equipment is complemented by in-depth knowledge of the needs and measuring tasks of a wide variety of industries.

Measuring technology ranging from individual sensors to system solutions benefits users in mechanical and plant engineering, automation, the automotive industry including its suppliers, as well as many other sectors and markets of the future such as medtech, biotech and drive technology.

Our customers trust in our measurement technology solutions. Many of our regular customers are globally operating organizations who demand very high standards, such as ABB, AUDI, Bayer, Beckhoff Automation, BMW, Bombardier, Bosch, Braun, Brose, BSHG, CONTI, Continental, Daimler, DELPHI, Edscha Automotive, Festo, FIAT, Ford, General Motors, Hella, Knorr-Bremse, Lufthansa, LUK, MAN, Mann + Hummel, Michelin, MTU, Opel, Pierburg, Pirelli, Porsche, Renault, Schaeffler, SEW-Eurodrive, Siemens, SKF, Toyota, Valeo, VW, ZF and others. burster has earned its reputation for customer-oriented innovation and comprehensive customer service.



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GLOBAL NETWORK OF DEDICATED MEASUREMENT PEOPLE FOR YOUR GLOBAL SUCCESS.

THE MEASUREMENT SOLUTION.

It's with this ambition and for over half a century burster, a global player in the precision measurement and sensor technology, supplies some of the world's most recognizable brands with sensors, precision measuring devices and measuring systems for sensor signaling processing. Where quality assurance and production control play a significant role, burster in on bord.

Though "think global – act local" isn't a new idea, it needs to be demonstrated anew on a daily basis, everywhere that our customers operate around the world, by providing fast, competent support – to secure your success. This is why we serve and support you worldwide, helping to implement and integrate your measurement applications, by drawing on our expertise and partner network that has grown over decades including our own sites in Europe, Asia and North America.

To view the contact details for your country, whether corporate or sales representative, simply browse our website www.burster.com and enter your country of origin.

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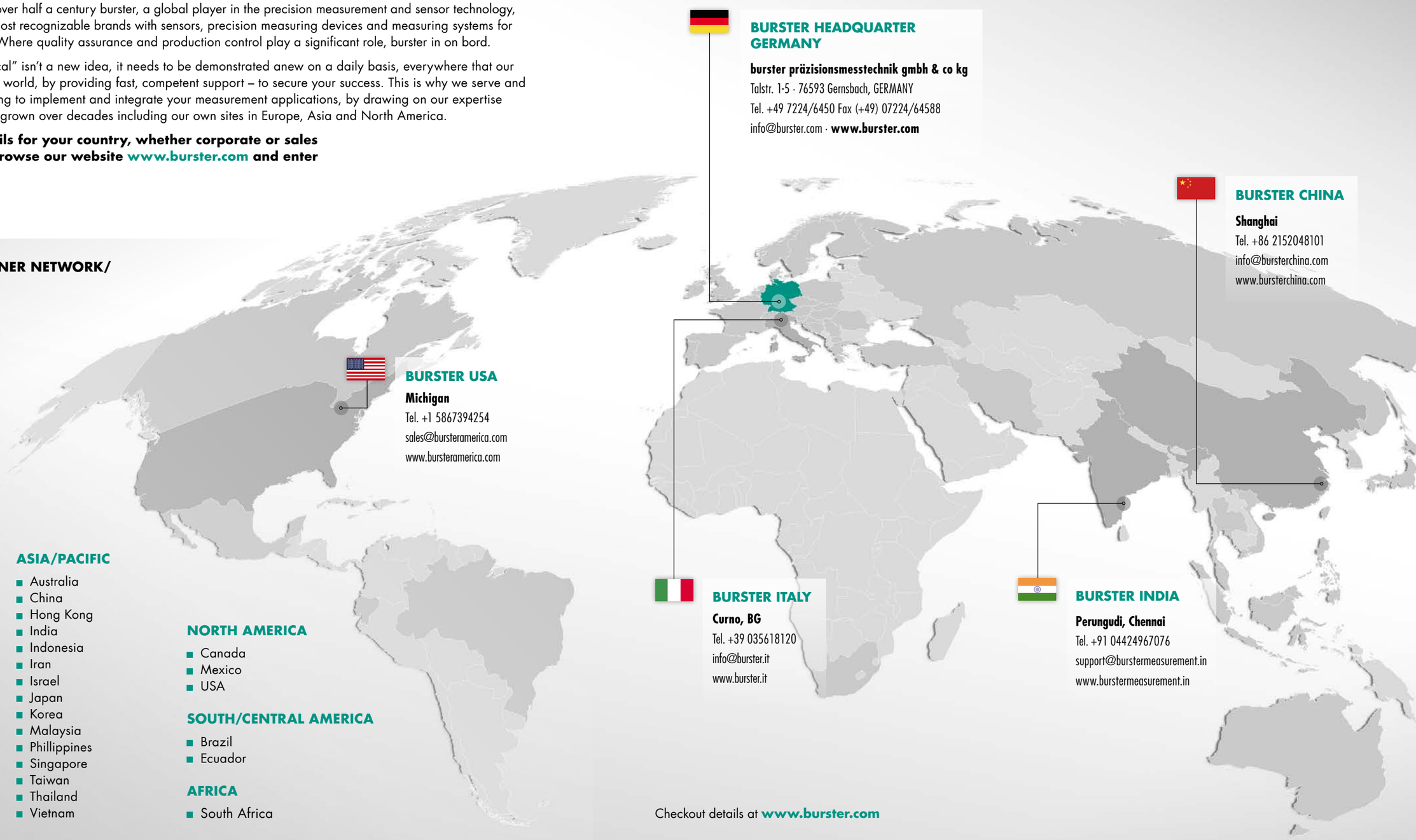

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Products by model number

Get to know our whole extensive product range.

At **www.burster.com** alongside the sensors and process instruments shown here, you can also find our special sensors as well as resistance measurement devices and further calibration equipment.

Products by groups

CATALOGUE CONTENTS

SENSORS

PROCESS INSTRUMENTS

Highlights

PRODUCTS IN FOCUS.

PAGE **191**

FORCEMASTER 9110
100 % quality control at workstations

- Simple force monitoring for hand presses
- Smart, practical and easy to use
- Unparalleled value for the money
- Optic and acoustic signal

PAGE **185**

NEW

DIGIFORCE® 9311

- Process controller with pioneering features
- Flexible fieldbus integration
- Security of burster TEDS
- Automated setup

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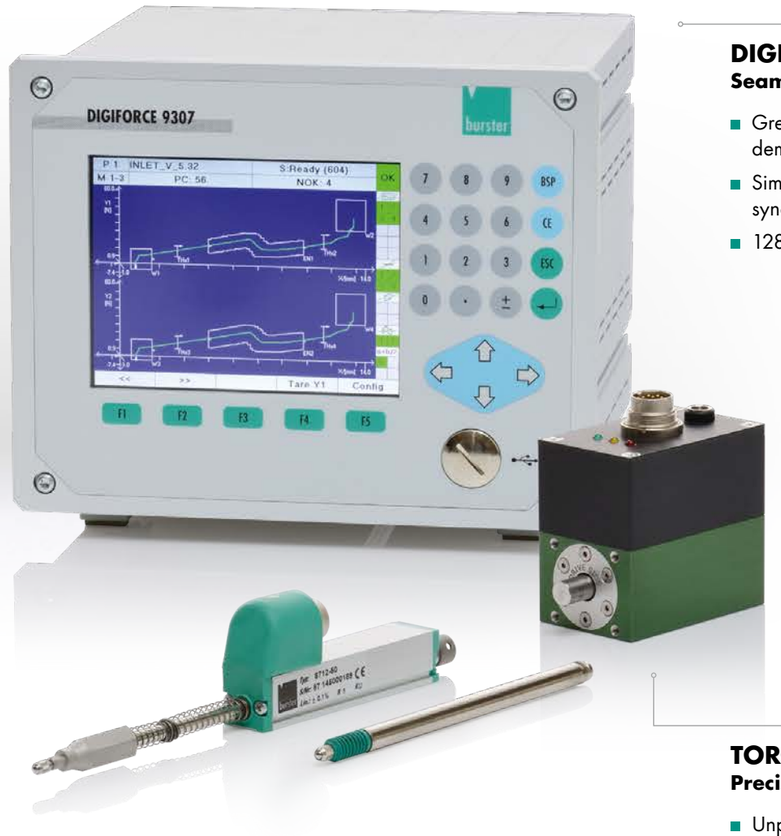
DIGIFORCE® 9307
Seamless process monitoring

- Greatest precision for the toughest demands
- Simultaneous monitoring of two synchronous processes
- 128 measurement programs



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TRANS CAL 7281
Mobile calibrator and testing device

- High-precision
- Device test/Strain gauge simulator
- Reference measurement chain
- Sensor test
- Security of burster TEDS

PAGE **13**

SENSOR SPECIALISTS

- Force
- Miniature load
- Torque
- Displacement
- Pressure
- OEM sensors
- Special sensors

Your company's security in the dynamic markets of the future will be determined not least by new and better-performing products. burster's highly skilled development department supports technological advancement and extends your opportunities to enhance the efficiency of production processes.

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TORQUE SENSOR 8661
Precision all-in-one device

- Unparalleled torque sensor with this range of functionality
- Measurement ranges 0.02 Nm ... 1000 Nm
- Remarkable accuracy of 0.05%
- USB and dual range option
- High-resolution angle measurement

For more information, visit:
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Industry 4.0

NETWORKED WITH THE FUTURE.

Whether production processes are manual, partly automated or fully automated, it is always important that they can be measured, analyzed and controlled.

Networking between humans, machines and products is a reality in many businesses today. It will become even more important for a business's success in the future. One of burster's tasks, therefore, is to give you optimum support with the goal of realizing the maximum economic potential from measurement technology.

EXPLOIT THE EXTENSIVE CAPABILITIES OF OUR SYSTEMS:

- burster TEDS is an innovative technology that quickly and reliably transfers sensor-specific data to compatible monitoring systems for easy configuration.

- Process-monitoring systems visualize, analyze and evaluate vital, user-configurable process parameters, and can transfer them to suitable data storage media via state-of-the-art communication interfaces.

- Essential and process-relevant parameters and process status notifications are transferred in real-time to higher-level controllers via Ethernet-based fieldbuses.

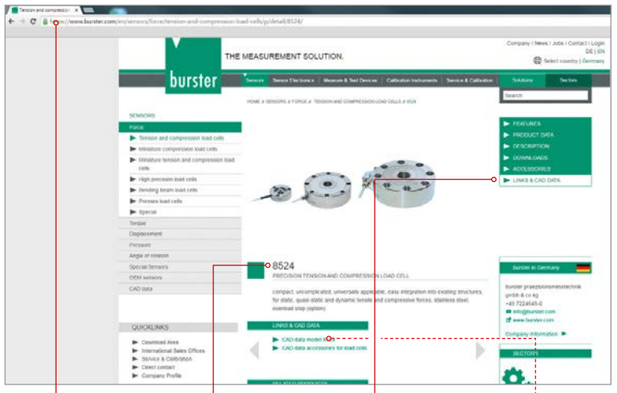
To ensure that all of this measurement technology works optimally for you, we invite you to partner with us to solve the measurement challenges of Industry 4.0.

CAD data

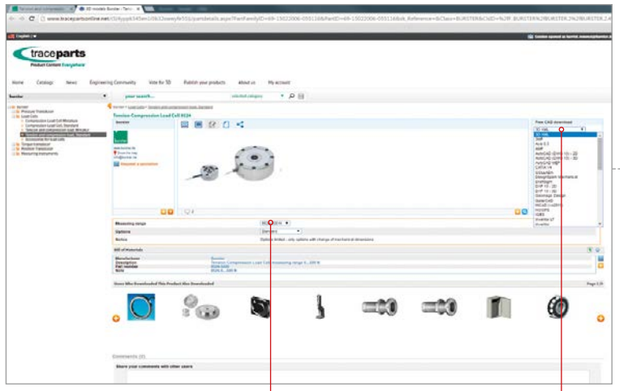
OF OUR PRODUCTS IN THE INTERNET.

You can integrate CAD data for our sensors and several process instruments directly into your CAD system with just a few simple steps.

This quick guide shows you how to find product-specific CAD data on our website **www.burster.com**

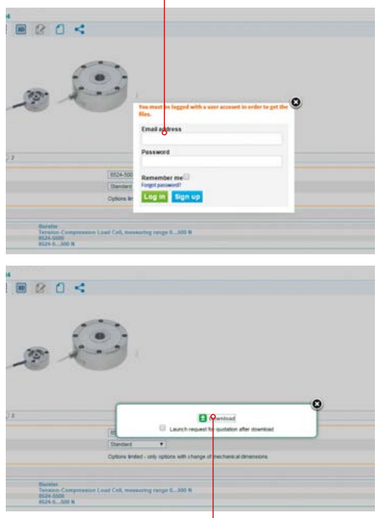


1. www.burster.com → Product → Links & CAD Data **2.** Click on the link



3. Select measuring range **4.** Select CAD format

5. Log in or register



6. Download the generated file any time, any place

General information

If you often need to access CAD data for several components from a single manufacturer, you can download all of the manufacturer's CAD data as a component catalogue at **www.tracepartsonline.net**. The tracepartsonline.net CAD portal is available free of charge to millions of CAD users worldwide. It contains hundreds of manufacturer catalogues and hundreds of millions of CAD models as well as product documents for the design, purchasing, production and maintenance processes in industries including drive technology, electrical engineering, electronics, energy management, factory automation, manufacturing technology, materials and materials engineering, mechanical and plant engineering, mechanics, mechatronics, measurement and control technology, and robotics.

Pressure Transducers

PRESSURE TRANSDUCERS

8103, 81530	Pressure transducers, Miniature pressure transducers
8201 – 8267	High-precision pressure transducers, high-pressure transducers, low-cost pressure transmitters
8303 – 8315	Differential pressure transducers

Overview Pressure Transducers model numbers 81 ... | 82 ...

MODELS	8103	81530	8201	8221	8227	8262/8263	8264/8267
Figure							
Accuracy (≤ % F.S.)	0.5	from 1.1	0.1 to 0.25	0.2	0.25	0.05	0.1
Description	**Pressure transducer**	**Miniature pressure transducer**	**High precision pressure transducers**	**High pressure transducer**	**Low-Cost pressure transmitter**	**High precision pressure transducers**	**Precision pressure transducers**
Measuring Ranges smallest: largest:	0 ... 5 bar 0 ... 1000 bar	0 ... 1 bar 0 ... 1000 bar	0 ... 5 bar 0 ... 1000 bar	0 ... 1000 bar 0 ... 5000 bar	–1 ... 10 bar 0 ... 0.05 bar 0 ... 500 bar	0 ... 0.7 bar 0 ... 500 bar	0 ... 0.1 bar 0 ... 2000 bar
Special Features	Flush front diaphragm, titanium material, high protection class up to IP67, very little hysteresis, designed for relative pressure measurements	Suitable for static and dynamic measurements, temperature range up to 200° C, extremely robust, small dimensions, with front-end diaphragm, measurement against atmospheric pressure, IP68	Stainless steel material, with standardized sensitivity, extremely reliable with high long-term stability, measurement against atmospheric pressure, with very little sensitivity to shock and vibration, optional amplified output	High reliability for static and dynamic measurements, stainless steel material, increased operating reliability thanks to onepiece measuring element, optional amplified output	Relative and absolute pressure measurements, particularly economical for liquid and gaseous media, with integrated measuring amplifier 0 ... 10 V, compact implementation, option flush front diaphragm	Relative and absolute pressure measurements, out-standing longterm stability, maximum accuracy, excellent thermal insulation properties, manufactured of highquality stainless steel	Relative and absolute pressure measurements are possible, small measuring ranges of the absolute pressure sensor with overload protection, suitable for liquid and gaseous media, temperature range -70 ... 160 °C
Main Application Fields	Food industry, medical engineering, chemical and pharmaceutical industries, hydraulically operated brake test beds, very suitable for applications with viscous or corrosive media	Shipbuilding, metering equipment for viscous media, determining the pressure in pressurized cabins, flow measurements in ventilation ducts, handling and assembly equipment	Hydraulic test beds, packaging industry, power industry, measuring the advance pressure of pneumatic cylinders	Water-jet cutting machines, aerospace, high-pressure pipelines, turbines and high-pressure units, hydraulic applications	Measuring the operating pressure in refrigeration and air conditioning equipment, monitoring line pressure in pneumatic handling equipment, measurement of compressor test pressure	Measurements of reference pressure in laboratory, research and development, applications in the pharmaceutical and chemical processing field	Medical engineering, motor vehicle supplier industry, machine tooling, assembly and jointing technology, factory automation

Options:	■ Variable cable lengths ■ Integrated measuring amplifier ■ Extension of the nominal temperature range ■ Higher protection class
Accessories:	Connectors, connecting cables, threaded adapter, sealings
Services:	Connector mounting, manufacturer calibration certificate, CAD data, DAkkS certificates

Overview Differential Pressure Transducers model numbers 83 ...

MODELS	8303	8310	8313/8314	8315
Figure				
Accuracy (≤ % F.S.)	0,5	0,25	0,25 bis 0,5	0,25
Description	**Miniature differential pressure transmitter**	**Differential pressure transducer**	**Differential pressure transducer**	**Differential pressure transducer**
Measuring Ranges smallest: largest:	0 ... 50 mbar 0 ... 10 bar	0 ... 35 mbar 0 ... 2000 mbar	0 ... 5 bar 0 ... 50 bar	0 ... 100 bar 0 ... 500 bar
Special Features	Very robust due to two-chamber implementation separated by a diaphragm, with integrated measuring amplifier, high line pressure possible, for liquid or gaseous media, low dead volume	Very high system reliability, extremely high line pressure up to 345 bar is possible, excellent accuracy, measurement of gaseous or liquid media, suitable for static and dynamic applications, easy mounting and assembly	Stainless steel material, extremely high line pressure up to 345 bar is possible, easy and robust measurement operation through bidirectional measuring principle, measurement of gaseous or liquid media, simple mounting	Stainless steel material, extremely high line pressure up to 345 bar is possible, easy and robust measuring operation through bidirectional measuring principle, hermetically sealed measuring chambers each with its own diaphragm, suitable for gaseous or liquid media
Main Application Fields	Measurement of pneumatic and hydraulic differential pressures, flow rate measurement in fluid engineering	Shipbuilding, metering equipment for viscous media, determining the ram pressure in pressurized cabins, flow measurements in ventilation ducts, handling and assembly equipment, explosion tests	Measurement of differential pressure in double-acting hydraulic cylinders of materials testing machines, test beds for engines and brakes	Measurement of differential pressure in double-acting hydraulic cylinders of materials testing machines, test beds for engines and brakes

Options:	■ Higher line pressure ■ With integrated unipolar or bipolar measuring amplifier ■ Extension of the nominal temperature range ■ Overload protection
Accessories:	Connecting cables
Services:	Manufacturer calibration certificate, CAD data, DAkkS certificates

2362-000089EN-5872-081524

Pressure Transducer

Model 8103

Code: 8103 EN
Delivery: 2 - 3 weeks
Warranty: 24 months

- **Measuring ranges between 0 ... 5 bar and 0 ... 1000 bar**
- **Accuracy < 0.5 %**
- **Flush mounted diaphragm**
- **Made of titanium**
- **Not magnetic**
- **Protection class IP67**

Application

This transducer can be used anywhere thanks to its small size. Designed to work without a measuring chamber (uses a flush front diaphragm instead), this transducer is ideal for any measurements where the material to be measured may leave problematic residues. The range of suitable applications is even greater thanks to a choice of screw-on or weld-on adapters.

Areas of use:
- ► Bottling plants, food industry
- ► Mixing facilities for the chemicals industry
- ► Pharmaceuticals
- ► Cosmetics industry
- ► Bioengineering

Description

These pressure transducers are made entirely of titanium and therefore have outstanding resistance to corrosion. These convert the pressure-induced deflection of the diaphragm into a change in electrical resistance, which can be amplified, measured and processed by external electronic circuitry.

The transducers come in a choice of measuring ranges: up to 20 bar for measurements with respect to atmospheric pressure, or a range of 50 bar and above for measurements with respect to a sealed atmosphere.

Technical Data

Order Code	* Measuring Range	Resonance Frequency [kHz]
8103-5005	0 ... 5 bar	28
8103-5010	0 ... 10 bar	28
8103-5020	0 ... 20 bar	36
8103-5050	0 ... 50 bar	54
8103-5100	0 ... 100 bar	77
8103-5200	0 ... 200 bar	108
8103-5500	0 ... 500 bar	160
8103-6001	0 ... 1000 bar	229

Electrical values

Bridge resistance: foil strain gauge 1000 Ω ± 0.5 %

Excitation voltage: 5 V, max. 10 VDC or AC

Nominal sensitivity:
measuring range 0 ... 5 bar: 1 mV/V, nominal
measuring range ≥ 0 ... 10 bar: 2 mV/V, nominal

Environmental conditions

Limit temperature range: - 55 °C ... 150 °C

Nominal temperature range: 0 °C ... 100 °C

Influence of temperature on zero:
measuring range 0 ... 5 bar: < ± 0.04 % F.S./K
measuring range ≥ 0 ... 10 bar: < ± 0.02 % F.S./K

Influence of temperature on sensitivity: < ± 0.02 % F.S./K

Mechanical values

Accuracy:
Combined error consisting,of non linearity, hysteresis and variation < ± 0.5 % F.S.

Kind of measurement:
measuring range ≤ 20 bar: against atmosphere
measuring range ≥ 50 bar: against sealed atmosphere

Measuring ranges: refer to table

Overload: 400 % over capacity

Dynamic performance:
recommended: 70 % of capacity
maximum: 100 % of capacity

Design: pressure transducer with flush mounted diaphragm

Material: diaphragm and housing made of titanium grade 5 (Material 3.7165)

Pressure connector: refer to accessories, threaded and welding adapter

Sealing:
The sealing of the transducer is made by an O-ring 18.77 x 1.78 (Shore 90), which is included in scope of delivery. The use of a support ring is recommended for dynamic pressures of above 200 bar.

Mounting torque: 2 Nm

Protection class acc. to EN 60529: IP67

Sock resistance acc. to IEC 60068-2-27: 1000 g/1 msec.

Vibration resistance acc. to IEC 60068-2-6: max. 30 g at 10 ... 2000 Hz

Surface roughness: > 0.4 µm

Dimensions: see dimensional drawing

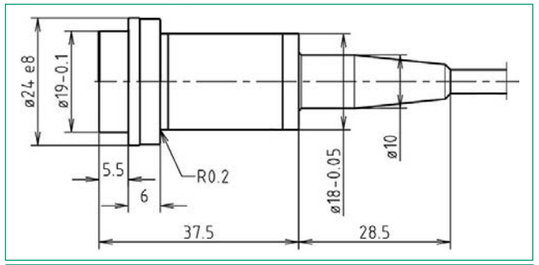
Weigth: 40 g

Electrical connection:
shielded, Teflon isolated cable, color coded with open ends for soldering, bending radius > 30 mm, length 2 m

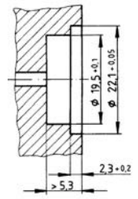
Wiring code:

Color	
red	excitation +
blue	excitation -
green	signal +
yellow	signal -

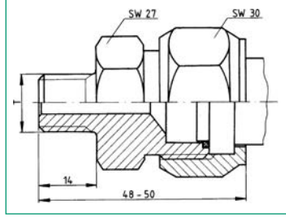
Dimensional drawing



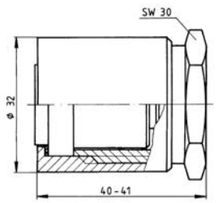
Recommended installation



Threaded adapter model 8103-Z005



Welding adapter model 8103-Z003



Order Information

Pressure transducer, measuring range 20 bar **Model 8103-5020**

Accessories

O-ring, Shore 90 A, Nitril Butadin **Model 8103-Z001**

Support ring made of polycarbonat **Model 8103-Z002**

Welding adapter with O-ring, material 1.4057, refer to drawing **Model 8103-Z003**

O-ring PTFE (Teflon) **Model 8103-Z004**

Threaded adapter with O-ring, material Sandviken 1802 (SIS 2382) with connecting thread T = 1/4", refer to drawing **Model 8103-Z005**

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Factory Calibration Certificate (WKS)

Calibration of a pressure transducer separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments and covering the complete measuring range. Special calibrations on request. Calculation of costs by base price plus additional costs per point.

Order Code 81WKS-81XX

2363-008103EN-5672-081524

Miniature Pressure Transducer

Model 81530

Code:	81530 EN
Delivery:	ex stock
Warranty:	24 months

- **Measuring ranges between 0 ... 1 bar and 0 ... 1000 bar**
- **Flush-mounted diaphragm**
- **Temperature range up to 200 °C**
- **Suitable for static and dynamic measurings**
- **Made of stainless steel**
- **Reliable and robust**
- **Protection class IP68**

Application

This transducer is really versatile thanks to its flush-mounted front diaphragm and small size. Whether used for measurements in the food industry or engineering sector, it is equally at home in high-viscosity fluids as it is in corrosive liquids and gases. Its excellent dynamic response means that the transducer can also measure very rapid changes in pressure.

Areas of use:
- ► Plastics industry
- ► Aerospace engineering
- ► Chemicals industry
- ► Test station construction
- ► Biotechnology

Description

The diaphragm, body and bayonet connector form a single unit in this miniature pressure transducer. The thin diaphragm fabricated from a single piece with clamping ring, and the connector, are welded to the sensor body to provide a hermetic seal. Pressures are measured with respect to a sealed atmosphere of approximately 1 bar as reference pressure (kind of measurement: absolute pressure measurements).
The screw thread of the pressure transducer ends in an O-ring groove, sealed by a rubber, plastic or metal O-ring according to the pressure range and medium.

Technical Data

Order Code	Measuring Range	Nominal Sensitivity*	Influence of Temperature to zero [% F.S./K]	Influence of Temperature to Sensitivity [% Rdg./K]
81530-1	0 ... 1 bar	0.3 mV/V	< ± 0.18	< ± 0.24
81530-2	0 ... 2 bar	0.6 mV/V	< ± 0.10	< ± 0.14
81530-5	0 ... 5 bar	1.5 mV/V	< ± 0.04	< ± 0.05
81530-10	0 ... 10 bar	1.5 mV/V	< ± 0.02	< ± 0.04
81530-20	0 ... 20 bar	1.5 mV/V	< ± 0.02	< ± 0.04
81530-50	0 ... 50 bar	1.5 mV/V	< ± 0.02	< ± 0.04
81530-100	0 ... 100 bar	1.5 mV/V	< ± 0.02	< ± 0.04
81530-200	0 ... 200 bar	1.5 mV/V	< ± 0.02	< ± 0.04
81530-500	0 ... 500 bar	1.5 mV/V	< ± 0.02	< ± 0.04
81530-1000	0 ... 1000 bar	1.5 mV/V	< ± 0.02	< ± 0.04

* Deviations from the stated value are possible. Please refer to the calibration protocol for more accurate values.

Electrical values

Output resistance: foil strain gauge	350 Ω, nominal
Excitation voltage:	5 VDC or AC
Output signal:	refer to table

Environmental conditions

Limit temperature range:	- 55 °C ... 200 °C
Nominal temperature range:	15 °C ... 150 °C
Influence of temperature on zero:	refer to table
Influence of temperature on sensitivity:	refer to table

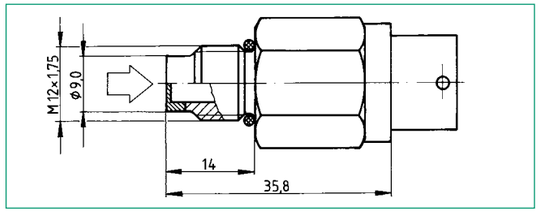
Mechanical values

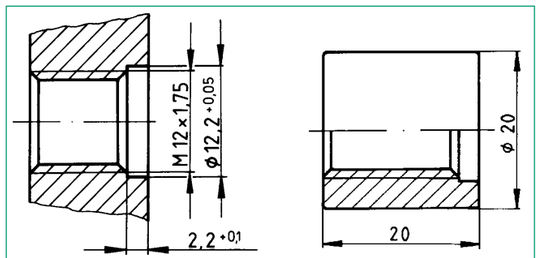
Kind of measurement:	absolute (reference 1 bar)
Error of non-linearity and hysteresis:	
measuring range ≤ 0 ... 5 bar	< ± 1.3 % F.S.
measuring range ≥ 0 ... 10 bar	< ± 1.0 % F.S.
Error of variation:	
measuring range ≤ 0 ... 5 bar	< ± 0.3 % F.S.
measuring range ≥ 0 ... 10 bar	< ± 0.1 % F.S.
Change in volume:	negligibly small
Overload:	50 % over capacity
Burst pressure:	400 % over capacity
Natural Frequency:	
measuring range 0 ... 5 bar	approx. 35 kHz
measuring range 0 ... 50 bar	approx. 100 kHz
measuring range 0 ... 500 bar	approx. 200 kHz
Dynamic performance:	
recommended	70 % of capacity
maximum	100 % of capacity
Design:	flush-mounted, welded diaphragm
Material:	stainless steel 17-4 PH (like 1.4542)
Pressure connection:	external thread M 12 x 1,75
Mounting torque:	max. 5 Nm
Wrench size:	19 mm
Electrical connection:	
6 pin bayonet plug-in connector	Souriau 851 07A 10 - 6P
Mating connector:	model 9945
Amphenol 62 GB-16F-10-6S or	Souriau 851-06E-C-10-6S
usable up to 120 °C, included in scope of delivery	
Dimensions:	see scale drawing
Weight:	approx. 40 g
Protection class acc. to EN 60529:	IP68

Wiring code:

Pin	Function
A	excitation +
B	
C	excitation -
D	
E	signal -
F	signal +

Dimensional drawing model 81530





Opening for mounting the pressure transducer

Welding sleeve model 82996

Accessories

Welding sleeve with O-ring nut, material 17 - 4 PH, length 20 mm	**Model 82996**
Mating connector usable up to 175 °C, 6 pin socket with strain relief	**Model 9900-V544**
Connecting cable usable up to 175 °C for burster desktop devices with 12 pin connector, length 3 m	**Model 9990**
Connection cable (standard) for connection to burster desktop devices	**Model 9911**
Connecting cable usable up to 175 °C, open, color coded and tinned cable ends, length 3 m	**Model 99544-000A-0170030**
O-ring 12.8 x 1.8, usable up to 200 °C, 1 exemplar is included in scope of delivery	**Model 81530-Z001**

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Factory Calibration Certificate (WKS)

Calibration of a pressure transducer separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments and covering the complete measuring range. Special calibrations on request. Calculation of costs by base price plus additional costs per point.

Order Code 81WKS-81XX

2364-081530EN-5672-081524

High Precision Pressure Transducer

Series 8201
Version H

Code:	8201 H EN
Delivery:	ex stock/3 weeks
Warranty:	24 months

- **Measuring ranges from 0 ... 30 bar to 0 ... 500 bar**
- **Accuracy < 0.1 %**
- **Output 0 ... 5 V, 0 ... 20 mA or 4 ... 20 mA available**
- **Suitable for liquid and gaseous media**
- **Can be used for dynamic and static measurements**
- **Made of stainless steel, reliable and sturdy**
- **Standardized sensitivity to 1.0 mV/V**

Application

High-precision pressure sensors from the 8201 series provide exact measurements while exhibiting very little sensitivity to mechanical stresses. Their application therefore goes well beyond research and development laboratories. They are also outstandingly suited to industrial use in quality assurance or for measurement and control tasks in production. Their robust mechanical and electrical construction guarantees good long-term stability and high reliability, while being resistant to aggressive media – which can be measured in liquid or gaseous states.
The structure of the sensors includes no mechanical moving parts, which is why they show so little sensitivity to impact and vibration.
The pressure sensors can be configured with options to suit the user. Standard types are available ex-stock, and customized customer versions can also be provided.

Aeras of application are:
- ► Research and developmemt
- ► Test rigs
- ► Mechanical engineering
- ► Plant control and monitoring

Description

The medium reaches the interior of the measuring chamber through the pressure port. This is closed by a membrane which is welded on, and which represents the sensor element itself. The bending of this membrane increases in proportion to the applied pressure. Four strain gauges, interconnected as a Wheatstone bridge, are attached at the rear. The physical magnitude of pressure is converted by the wire strain gauges into a change in electrical resistance. The resulting output signal is standardized to 1.0 mV/V.
The pressure is measured relative to the surrounding air pressure, and the space behind the membrane is therefore connected to the atmosphere through a small, protected opening in the housing.
All the sensors can be supplied with an integrated amplifier having a voltage or current output. The input to the integrated amplifier is protected against reverse polarity connection, and the output is protected against overvoltage.

Technical Data

Order Code (see Order Code)	Measuring Range	Resonance Frequency [kHz]
8201-5030-xxxxx	0 ... 30 bar	5.0
8201-5050-xxxxx	0 ... 50 bar	7.0
8201-5100-xxxxx	0 ... 100 bar	10.0
8201-5200-xxxxx	0 ... 200 bar	12.5
8201-5300-xxxxx	0 ... 300 bar	15.0
8201-5500-xxxxx	0 ... 500 bar	20.0

Electrical values

Bridge resistance:
full bridge circuit of foil strain gauge 350 Ω, nominal
Calibration resistor: 100 kΩ
The bridge output voltage resulting from a shunt of this value is shown in the test certificate.
Excitation voltage: recommended 5 V DC
maximum 10 V DC
Nominal sensitivity: standardized; 1.0 mV/V ± 0.25 %

Environmental conditions

Range of operating temperature: - 30 °C ... 120 °C
Nominal temperature range: 0 °C ... 70 °C
Influence of temperature on zero: ≤ ± 0.005 % F.S./K
Influence of temperature on sensitivity: ≤ ± 0.005 % F.S./K

Mechanical values

Measurement accuracy: Combined error consisting of non-linearity, hysteresis and variation: < ± 0.1 % F.S, as specified at BFSL
Kind of measurement: measurement against atmosphere (relatively)
Dead volume: 5.8 cm^3
Volume change: negligibly small
Overload: measuring range ≤ 300 bar 50 % over capacity
measuring range ≥ 500 bar 25 % over capacity
Burst pressure: >100 % over capacity
Dynamic performance: recommended 50 % of capacity
maximum 70 % of capacity
Design:
Diaphragm pressure transducer with hermetically sealed measuring chamber (without internal sealing elements).
Material: stainless steel, 1.4548.9
Pressure port: internal thread M 16 x 1.5
Sealing: Support ring and O-ring, is included in scope of delivery
Mounting torque: max. 3 Nm
Electrical connection:
6 pin bayonet model connector Souriau 851 07A 10 - 6 P
Wiring code: pins A + B excitation voltage positive
pins C + D excitation voltage negative
pins E signal output negative
pins F signal output positive
Dimensions: refer to dimensional drawing
Weight: approx. 420 g ... 650 g
Protection class acc. to EN 60529: IP65
Mating plug: model 9945
Amphenol 62-GB-16F-10-6S or Souriau 851-06E-C-10-6S

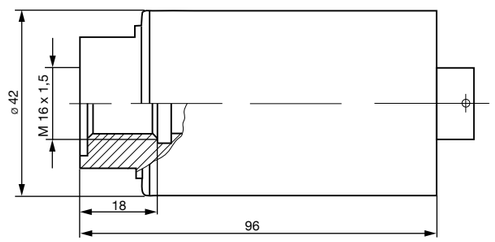
Technical Data of the Internal Amplifier

	Voltage output	Current output
Excitation voltage	15 ... 30 V DC	
Current consumption	max. 40 mA	max. 65 mA
Connection technology	3 wire	
Load impedance	-	< 200 Ω + 40 Ω/V (U_{Ref} -15 V DC)
Nominal temperature range	0 °C ... 60 °C	
Range of operating temperature	0 °C ... 60 °C	
Cut-off frequency	(- 3 dB) 1 kHz	
Protection against short-circuit and polarity	yes	
Zero offset and span setting	± 0.25 % F.S.	

Wiring Code

Pin	without Amplifier	Voltage output	Current output
A	excitation +	excitation +	excitation +
B		signal - and	signal - and
C	excitation -	excitation -	excitation -
D		signal +	signal +
E	signal -	NC	NC
F	signal +	NC	NC

Dimensional drawing model 8201 H



Transducers with integrated amplifier are 35 mm longer.

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.

Accessories

Thread adapter, material 1.4571, for following connecting threads

External thread M 16 x 1.5	**Model 8281**
External thread G 1/2" A	**Model 8283**
External thread R 1/4" (max. 500 bar)	**Model 8285**
External thread M 20 x 1.5	**Model 8286**
External thread 3/4 - 16 UNF	**Model 82822**
External thread M 14 x 1.5	**Model 82825**
Internal thread 3/4 - 16 UNF	**Model 82827**
Internal thread 1/4 - 18 NPT (max. 500 bar)	**Model 82829**
Standard sealing ring set (included in scope of delivery)	**Model 82911**
TFE sealing ring set for critical applications; Teflon-coated Viton® thrust and O-ring	**Model 82910**
Mating plug (included in scope of delivery)	**Model 9945**

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Connecting Cables

for transducers plug-in connection and bridge output, completely with connector and socket, 6 wire, shielded PVC isolated cable, bending radius > 5 mm, standard length of 3 m.

to burster desktop indicators with 12 pin connection **Model 9911**
to SENSORMASTER 9163 **Model 99209-545D-0160030**
with open, color coded and tinned cable ends **Model 9986**
for transducers with internal amplifier; with open, color coded and tinned cable ends **Model 99545-000D-0160030**
Other cable lengths or customized cables on request.

Order Code

High precision pressure transducer 8201-XXXX-H□1A

without amplifier	02
integrated amplifier with voltage output 0 ... 5 V	33
integrated amplifier with current output 0 ... 20 mA	37
integrated amplifier with current output 4 ... 20 mA	39

Order Information

High precision pressure transducer, measuring range 0 ... 200 bar, integrated amplifier for 0 ... 5 V **8201-5200-H331A**

DAkkS Calibration Certificate

According to standard DKD-R 6-1 with 21 measuring points in 10 % increments for rising and falling pressure. **Order Code 82DKD-XX**

Factory Calibration Certificate (WKS)

Calibration of a pressure transducer separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments and covering the complete measuring range. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 82WKS-82XX

2366-08201-HEN-5672-081524

High Precision Pressure Transducer

Series 8201
Version N

Code:	8201 N EN
Delivery:	ex stock/3 weeks
Warranty:	24 months

- **Measuring ranges from 0 ... 5 bar to 0 ... 1000 bar**
- **Accuracy < 0.25 %**
- **Output 0 ... 5 V, 0 ... 20 mA or 4 ... 20 mA available**
- **For liquid and gaseous media**
- **Can be used for dynamic and static measurements**
- **Made of stainless steel, reliable, sturdy**

Application

Model number 8201 precision pressure sensors are robust, economical, and are available in standard measuring ranges. Their good technical specification and high reliability make them optimum for measuring pressure in all fields of machine construction, process technology, as well as in measurement and control technology.

The pressure transducers are easy to handle and immune to shock loads and vibrations as they are designed without moving parts.

All pressure transducers without an internal amplifier have a standardized output signal of 1.0 mV/V. This enables the user to change a transducer in a measuring chain as liked without following readjustment of the electronic.

Customized designs are available on request.

Aeras of application are:
- ► Hydraulic or pneumatic machines
- ► Mechanical engineering
- ► Plant control and monitoring

Description

The measuring element of the precision pressure transducer consists of a diaphragm. On its reverse side a strain gauge rosette is applied, which is an assembly of 4 active strain gauges arranged in a bridge circuit. The pressure is measured against atmosphere, that means the space behind the diaphragm is connected to the surrounding atmosphere (relative) via a small outlet in the housing.

Each transducer is available with an internal amplifier, a so-called pressure transmitter, with voltage or current output. The input of the internal amplifier is immune against polarity reversal and the output is immune against over-voltage.

Technical Data

Order Code (see Order Code)	Measuring Range	Resonance frequency [kHz]
8201-5005-xxxx	0 ... 5 bar	1.5
8201-5010-xxxx	0 ... 10 bar	3.0
8201-5020-xxxx	0 ... 20 bar	3.5
8201-5050-xxxx	0 ... 50 bar	10.0
8201-5100-xxxx	0 ... 100 bar	15.0
8201-5200-xxxx	0 ... 200 bar	20.0
8201-5300-xxxx	0 ... 300 bar	20.0
8201-5500-xxxx	0 ... 500 bar	20.0
8201-5800-xxxx	0 ... 800 bar	20.0
8201-6001-xxxx	0 ... 1000 bar	20.0

Electrical values

Bridge resistance:
full bridge circuit of foil strain gauges 350 Ω, nominal
Calibration resistor: 100 kΩ
The bridge output voltage resulting from a shunt of this value is shown in the test certificate.
Excitation voltage: recommended 5 V DC
maximum 10 V DC
Nominal sensitivity: standardized; 1.0 mV/V ± 0.25 %

Environmental conditions

Range of operating temperature: - 30 °C ... 120 °C
Nominal temperature range: 0 °C ... 70 °C
Influence of temp. on zero: measuring range ≤ 10 bar ± 0.005 % F.S./K
measuring range ≥ 20 bar ± 0.01 % F.S./K
Influence of temp. on sensitivity: measuring range ≤ 10 bar ± 0.005 % F.S./K
measuring range ≥ 20 bar ± 0.01 % F.S./K

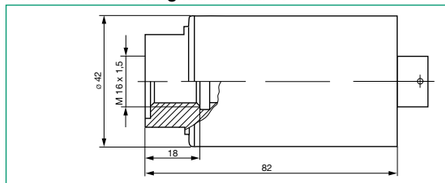
Mechanical values

Measurement accuracy: Combined error consisting of non-linearity, hysteresis and variation: < ± 0.25 % F.S., as specified at BSFL
Kind of measurement:
pressure measurement against atmosphere (relative)
Dead volume: measuring range ≤ 10 bar 5.8 cm³
measuring range ≥ 20 bar 2.5 cm³
Volume change: negligibly small
Overload: measuring range ≤ 300 bar 50 % over capacity
measuring range ≥ 500 bar 50 % over capacity
Burst pressure: measuring range ≤ 500 bar >100 % over capacity
measuring range 1000 bar > 50 % over capacity
Dynamic performance:
measuring range ≤ 10 bar recommended 50 % of capacity
maximum 70 % of capacity
measuring range ≥ 20 bar recommended 70 % of capacity
maximum 100 % of capacity
Design: Diaphragm pressure transducer with hermetically sealed pressure chamber (without internal sealing elements).
Material: stainless steel; 1.4548.9
Pressure connection: internal thread M 16 x 1.5
Sealing: Support ring and O-ring, is included in scope of delivery
Mounting torque: max. 3 Nm
Electrical connection:
6 pin bayonet connector Souriau 851 07A 10 - 6 P
Dimensions: refer to dimensional drawing
General tolerance for length measurement acc. to ISO 2768-f
Weight: approx. 420 g ... 650 g
Protection class: acc. to EN 60529 IP65
Mating connector:
Amphenol 62-GB-16F-10-6S or Souriau 851-06E-C-10-6S

Technical Data of the Internal Amplifier

	Voltage output	Current output
Excitation voltage	15 ... 30 V DC	
Current consumption	max. 40 mA	max. 65 mA
Connection technology	3 wire	
Load impedance	-	< 200 Ω + 40 Ω/V (U_{Ref} -15 V DC)
Nominal temperature range	0 °C ... 60 °C	
Range of operating temperature	0 °C ... 60 °C	
Cut-off frequency	(- 3 dB) 1 kHz	
Protection against short-circuit and polarity	yes	
Zero offset and span setting	± 0.25 % F.S.	

Dimensional drawing model 8201 N



Option / N-Model	5 ... 10 bar	20 bar ... 1000 bar
Standard/Option 42	96 mm	81 mm
Option 33,37,39,41	131 mm	96 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.

Wiring Code

Pin	without Amplifier	Voltage output	Current output
A	excitation +	excitation +	excitation +
B		signal - and excitation -	signal - and excitation -
C	excitation -		
D		signal +	signal +
E	signal -	NC	NC
F	signal +	NC	NC

Accessories

Thread adaptor, material 1.4571 for following connecting threads
External thread M 16 x 1,5 **Model 8281**
External thread G 1/2" A **Model 8283**
External thread R 1/4" (max. 500 bar) **Model 8285**
Internal thread R 1/4" - 18 NPT (max. 500 bar) **Model 82829**
Standard sealing ring set (included in scope of delivery) **Model 82911**
TFE sealing ring set for critical applications; Teflon-coated Viton® thrust and O-ring **Model 82910**
Mating connector (is included in scope of delivery) **Model 9945**

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Connecting Cables

for sensors without amplifier, 6 wire, shielded PVC isolated cable, bending radius > 5 mm, length of 3 m
to burster desktop indicators with 12 pin connection **Model 9911**
to SENSORMASTER 9163 **Model 99209-545D-0160030**
with open, color coded and tinned cable ends **Model 9986**
for transducers with internal amplifier; with open, color coded and tinned cable ends **Model 99545-000D-0160030**
Other cable lengths or customized cables on request.

Order Code

High precision pressure transducer 8201-XXXX-N□1A

without amplifier	02
integrated amplifier with voltage output 0 ... 5 V	33
integrated amplifier with current output 0 ... 20 mA	37
integrated amplifier with current output 4 ... 20 mA	39

Order Information

Precision pressure transducer, range 0 ... 100 bar, with internal amplifier for 0 ... 5 V **8201-5200-H331A**

DAkkS Calibration Certificate

According to standard DKD-R 6-1 for 21 points in 10 %-steps up and down. **Order Code 82DKD-XX**

Factory Calibration Certificate (WKS)

Calibration of a pressure transducer separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments and covering the complete measuring range. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 82WKS-82XX

2365-08201NEN-5672-081524

High Pressure Transducer

Model 8221

Code: 8221 EN
Delivery: ex stock
Warranty: 24 months

NEW
Resistant to shock and vibration

- **Measuring ranges from 0 ... 1000 bar to 0 ... 5000 bar**
- **Accuracy ≤ 0.2 % F.S.**
- **Medium temperature range from - 30 °C ... 120 °C**
- **Ideal for dynamic measurements**
- **Protection class IP66**
- **Digital calibration with the option of integrated instrumentation amplifier**

Application

The reliability and safety of a sensor is extremely important, particularly in high-pressure applications such as water-jet cutting equipment and hydraulic circuits. The dynamic loading encountered in these applications requires the use of sensors that are specially adapted for high pressure ranges. It is exactly these tough requirements that are satisfied by the model number 8221 sensor. With dynamic pressures, for example, an unlimited number of measurements can be taken if the pressure lies within the range from 0 ... 70% full scale.

The strong construction allows liquid or gaseous media to be measured in the laboratory, production department or in mobile hydraulic applications.

Range of applications:

- ► Laboratory
- ► Production
- ► Aeronautical engineering
- ► Cutting equipment
- ► Hydraulics
- ► Test benches

Description

The monolithic sensor membrane guarantees a high level of precision, reliability and safety, since the medium does not come into any contact with welded seams. Great emphasis has been placed on safety in the mechanical design. It is fitted with relief holes, which permit the measurement of static and dynamic pressures, even under unfavorable environmental conditions.

In order to facilitate the exchange of the sensors without having to recalibrate the following electronics, the sensitivity of the high-pressure sensor is standardized at 1.0 mV/V. The sensor is fitted with an integrated shunt resistor to enable easy calibration or checking of the subsequent electronics.

In combination with the option of an integrated amplifier (0 ... 10 V, 0 ... 5 V and 4 ... 20 mA) the new, innovative function for digital calibration can be used: All that is necessary is to touch the marked surface of the sensor with the enclosed magnetic pen.

Technical Data

Order Code	Measuring Range
8221-6001	0 ... 1000 bar
8221-6002	0 ... 2000 bar
8221-6003	0 ... 3500 bar
8221-6004	0 ... 4000 bar
8221-6005	0 ... 5000 bar

Electrial values

Bridge resistance: metal-coated strain gauge 350 Ω, nominal
Calibration resistor: integrated in sensor;
Activated by bridging pin E and F. The resulting bridge output voltage is shown in the test certificate 80 % F.S. ± 1 %
Excitation voltage: 10 ... 15 VDC or AC
Nominal sensitivity: 1,0 mV/V ± 1 %
Insulation resistance: > 1000 MΩ at 50 V DC

Environmental conditions

Range of operating temperature: - 30 °C ... 105 °C
Nominal temperature range: - 10 °C ... 85 °C
Medium temperature range: - 30 °C ... 120 °C
Influence of temperature on zero: ± 0.02 % F.S./K
Influence of temperature on sensitivity: ± 0.02 % F.S./K

Mecanical values

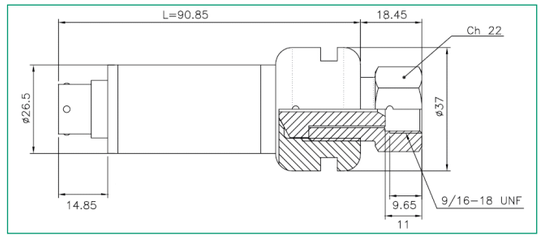
Accuracy: sum of linearity error, hysteresis error and precision error: ≤ 0.2 % F.S.
Kind of measurement: against atmosphere (relative)
Measuring range: refer to table
Dead volume: 74 mm³
Overload: 100 % over capacity or maximum 6 kbar
Burst pressure: 300 % over capacity or maximum 7.5 kbar
Resonance frequency: all measuring ranges 2 kHz
Dynamic performance
recommended: 70 % of capacity
maximum: 100 % of capacity
Material:
Measuring element stainless steel 15-5PH (simular 1.4545)
Housing AISI 304
Pressure port: autoclave F-250-C; internal thread 9/16 -18 UNF
Torque assembling: max. 100 Nm
Sealing: by metallic cone
Electrical connection:
6 pin bayonet model connector VPT02A10-6PT2
Mating connector: Souriau 851-06E-C-1-6S
Dimensions: see technical drawing
Weight: approx. 350 g
Protection class: acc. to EN 60529 IP66
Resistance to shock meeting IEC 60068-2-27: 100 g/11 msec
Resistance to vibration meeting IEC 60068-2-6: max. 20 g at 10 ... 2000 Hz

Technical Data of the Internal Amplifier

	Voltage output	Current output
Excitation	15 ... 30 VDC	10 ... 30 VDC
Power input	max. 13 mA	max. 32 mA
Wiring technology	4-wire	2-wire
Load impedance	-	500 Ω
Nominal temperature ranges	- 10 °C ... 85 °C	
Operating temperature	- 30 °C ... 85 °C	
Maximum response time (0-90 % F.S.)	< 1 ms	
Protection against short-circuit and polarity	yes	

Digital calibration function --> see manual

Dimensional drawing model 8221

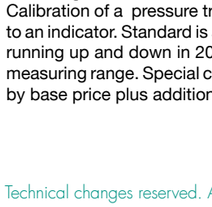


The CAD drawing (3D/2D) for tis sensor can be imported online directly into your CAD system.
Download via www.burster.com or directly www.traceparts.com. For further information about the burster traceparts cooperation refer to data sheet 80-CAD-EN.

Wiring code:

		With amplifier	
Pin	Without amplifier	Voltage output	Current output
A	Signal +	Signal +	Connection for +
B	Signal -	Signal -	Connection for -
C	Excitation +	Excitation +	NC
D	Excitation -	Excitation -	NC
E	Calibration shunt	Calibration *	Calibration *
F	Calibration shunt	Calibration *	Calibration *

* see manual



The diagram shows the optimal relation of load and excitation voltage of the amplifier with open V103 (current output).

Accessories

Connecting cable for sensors without amplifier, bending radius > 5 mm; PVC insulation, shielded, length 3 m
for burster bench-top units other than 9163 **99141-545H-0160030**
to 9163, 9235 or 9310 **99209-545B-0160030**
with open, color-coded and tinned cable ends **99545-000G-0160030**
to 7281 with TEDS **99229-545B-0160030**
Mating connector (included in delivery) **9945**

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Order Code

High Pressure Transducer Model 8221-XXXX-V10□

Without amplifier	without - Vxxx
Internal amplifier with current output 4 ... 20 mA	3
Internal amplifier with voltage output 0 ... 5 V	6
Internal amplifier with voltage output 0 ... 10 V	7

Order Information

High Pressure Transducer, measuring range 0 ... 2000 bar,
Internal amplifier with voltage output 0 ... 5 V **Model 8221-6002-V106**
without amplifier Model 8221-6002

Factory Calibration Certificate (WKS)

Calibration of a pressure transducer separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments and covering the complete measuring range. Special calibrations on request. Calculation of costs by base price plus additional costs per point.

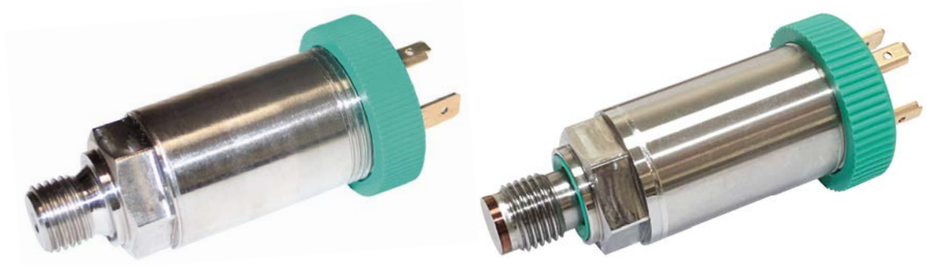
Order Code 82WKS-82XX

2367-008221EN-5672-081524

Pressure Transmitter

Model 8227

Code: 8227 EN
Delivery: ex stock
Warranty: 24 months



NEW
Option front flush diaphragm in G 1/4 and M10 x 1

- **Measuring ranges between 0 ... 0.05 bar to 0 ... 500 bar and -1 ... 1 bar to -1 ... 10 bar**
- **Accuracy 0.25 %**
- **Output 0 ... 10 V, optional 0 ... 5 V or 4 ... 20 mA**
- **Suitable for liquid and gaseous media**
- **For dynamic and static measurements**
- **Option: absolute measurement**
- **Very economic price**

Application

This sensor is designed specifically for industrial use: industry-standard signal outputs and connectors, standard measurement ranges, rugged design and low cost.
With its rugged housing, high-quality electrical connector and a stainless steel sensor element, the transducer is particularly robust and ideally suited to the harshest environments. This also means that the sensor can be installed anywhere with no effect on the measurement signal. The built-in instrumentation amplifier converts the sensor signals into noise-immune voltage signals that can be transmitted over relatively long distances (current-signal output available as an option). For high viscose materials, a front-level membrane is available, and with this disruptive dead volumes can be expelled.

Areas of use:
- ► Controlling and monitoring of production facilities
- ► Cooling and air-conditioning systems
- ► Hydraulic or pneumatic machinery
- ► Monitoring of compressors and pumps
- ► Manufacturing systems
- ► Plastics processing industry

Description

The sensor element located inside the transducer comprises a diaphragm that measures the applied pressure with respect to the current atmospheric pressure (relative reading). For the front-level option, the measuring element is situated directly behind the very stable membrane manufactured from stainless steel. The sensor has a small protected hole on the rear to allow measurement of atmospheric pressure. For the absolute measurement option, the applied pressure is measured with respect to an enclosed vacuum.
As an electrical connection, a DIN 43650A valve connector or an M12 x 1 connection is available. A process connection can be chosen from several alternatives.
The built-in instrumentation amplifier outputs a voltage or current according to the pressure. The output is protected against short-circuit and polarity reversal of the supply voltage.

Technical Data

Order Code	Measuring Range 0 ... [bar]	Size in connection with option			
		relative -V1XX	absolute -V2XX	- 1 ... (bar) -V3XX	front flush -VXXX1
8227-4050-VXXX	0.05	A	-	-	-
8227-4100-VXXX	0.1	A	-	-	-
8227-4250-VXXX	0.25	A	-	-	-
8227-4500-VXXX	0.5	A	-	-	-
8227-5001-VXXX	1	A	A	B	-
8227-5002-VXXX	2	A	A	B	-
8227-5005-VXXX	5	B	A	B	-
8227-5010-VXXX	10	B	A	B	-
8227-5020-VXXX	20	B	A	-	-
8227-5030-VXXX	30	B	A	-	B
8227-5050-VXXX	50	B	A	-	B
8227-5100-VXXX	100	B	-	-	B
8227-5200-VXXX	200	B	-	-	B
8227-5500-VXXX	500	B	-	-	B

Size A: L 82 mm, D 22 mm; **Size B**: L 72 mm, D 26.5 mm

Electrical values

Excitation voltage:
- voltage output 10 V: 15 ... 30 VDC
- voltage output 5 V: 10 ... 30 VDC
- current output 4 ... 20 mA: 10 ... 30 VDC

Current consumption:
- voltage output: < 13 mA
- current output: < 32 mA

Insulation resistance: at 50 V DC: > 1000 MΩ
Load resistance: at 30 V DC excitation: max. 750 Ω
Cut-off frequency: (-3dB) 250 Hz
Reaction time: (10 ... 90 % F.S.) < 1 ms

Environmental conditions

Operating temperature:
- measuring range ≤ 0 ... 2 bar: - 20 °C ... 85 °C
- measuring range ≥ 0 ... 5 bar: - 40 °C ...105 °C

Rated temperature range: - 10 °C ... 85 °C
Temperature effect on zero signal: ± 0.02 % F.S./K
Temperature effect on characteristic value: ± 0.02 % F.S./K

Mechanical values

Combined error consisting of non-linearity, hysteresis and non-repeatability: ± 0.25 % F.S. relative, ± 0.5 % F.S. absolute
Measuring Ranges: see table
Dead volume at restored diaphragm: 0.5 cm³
Overpressure limit:
- measuring range ≤ 0 ... 2 bar: 400 % over capacity
- measuring range ≥ 0 ... 5 bar: 100 % over capacity

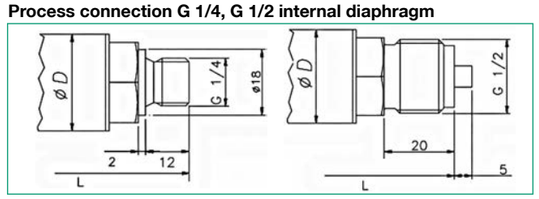
Burst pressure:
- measuring range ≤ 0 ... 2 bar: 900 % over capacity
- measuring range ≥ 0 ... 5 bar: 300 % over capacity, max. 1200 bar

Dynamic performance: recommended 70 % of capacity, maximum 100 % of capacity
Dimensions: refer to drawing and table
Weight: 110 g
Protection class acc. to EN 60529: connector EN 175301 IP65, connector M12 x 1 IP67
Mechanical shock: 100 g/1 ms, according to IEC 68-2-6
Vibration: max. 20 g at 15-2000 Hz according to IEC 68-2-6
Mounting torque: max. 3 Nm
Material:
- measuring range 0 ... 2 bar
- measuring chamber: stainless steel AISI 316, AISI 304, NBR, Viton
- housing: stainless steel AISI 304, Nylon 66F35VO
- measuring range 0 ... 5 bar
- measuring chamber: stainless steel AISI 430 F
- housing: stainless steel AISI 304, Nylon 66F35VO

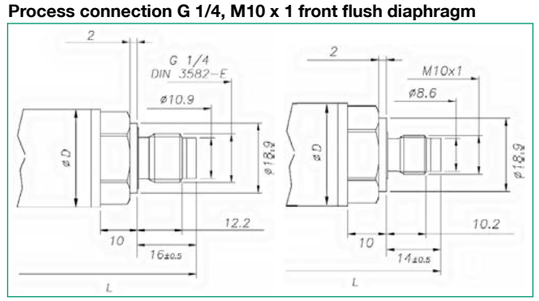
Connection setting

pin	voltage output	current output (2 wire)
1	signal +	connection +
2	common ground (GND)	connection
3	power +	NC
E	housing	housing

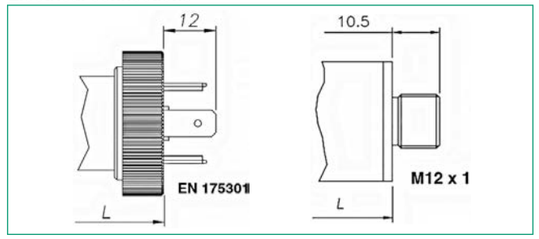
Process connection G 1/4, G 1/2 internal diaphragm



Process connection G 1/4, M10 x 1 front flush diaphragm



Electrical connections



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.

Accessories

Connecting cable with coupling plug EN 175301; shielded; bending radius > 5 mm; PVC insulation, length 3 m with color coded open and tinned cable ends **Model 99654-000C-0090030**
Connecting cable with coupling plug M12 x 1, series 713; shielded; bending radius > 5 mm; PVC insulation, length 3 m with color coded open and tinned cable ends **Model 9900-K304**
Sealing ring or 1/4" connection **Model 8227-Z001**
Mating connector coupling plug EN 175301: (included in scope of delivery) **Model 9900-V654**
Mating connector coupling plug M12 x 1, series 713: (included in scope of delivery) **Model 9900-V624**

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Order Code

Pressure sensor Model 8227-XXXX-V □ □ □ □

option relative measurement	1
option absolute measurement	2
option measuring range start - 1 bar	3
4 pin EN 175301-803/DIN 43650A	3
4 pin connector M12 x 1, 4 pin, series 713	4
voltage output 0 ... 5 V	3
voltage output 0 ... 10 V	4
current output 4 ... 20 mA, 2 wire	8
external thread G 1/4" (DIN 3852 A)	0
external thread G 1/2" (DIN 16288)	1
front flash diaphragm external thread G 1/4" (DIN 3852 A)	2
front flash diaphragm external thread M 10 x 1	3

SIL2/ATEX certification on request.

2368-008227EN-5672-081524

High Precision Pressure Trancducer

For absolute pressure measurement Model 8262
For relative pressure measurement Model 8263

Code: 8262 EN
Delivery: 12 weeks
Warranty: 24 months

- **Measuring ranges between 0 ... 10 psi to 0 ... 7500 psi (0 ... 0.7 bar to 0 ... 500 bar)**
- **Accuracy < 0.05 %**
- **For dynamic and static measurements**
- **Very low sensitivity to temperature**
- **Very high operating temperature range**
- **Output 0 ... 10 V or 4 ... 20 mA available (optional)**
- **Protection class IP67**

Application

High-precision pressure transducers of this type are a very attractive and economic solution for making extremely accurate pressure measurements for users from all fields of engineering. Thanks to their excellent long-term stability, reliability and rugged construction, these pressure transducers are suitable for use in both research and production, in mechanical engineering, industrial processes, aerospace engineering and many other applications.

These high-precision pressure transducers can be used for static and dynamic measurements on gaseous and liquid media.

Range of applications:

- Process monitoring
- Aerospace engineering
- Research and science
- Reference measurements on calibration equipment

Description

The high precision, extraordinary temperature compensation and high reliability are achieved through extremely precise manufacturing and calibration.

The medium to be measured is conducted via the pressure connector into a sealed chamber where it acts on a diaphragm. This diaphragm is connected to the sensor element, a double bending beam, via a rod.

There are two types of transducers for different measuring modes:
8262: Measurement of absolute pressure with respect to enclosed vacuum or, for measurement ranges of 500 psi and up, with respect to a permanently enclosed atmosphere (sealed gauge).

8263: Relative pressure sensors for measuring the pressure with respect to the atmosphere (true gauge). In this type, contact is made to the surrounding air pressure by means of a second membrane made of stainless steel. This allows the sensor to be used in harsh industrial environments as well, without the sensor element being attacked.

A special connecting cable is available to let you benefit from the burster TEDS electronic data sheet (memory chip fitted in the plug and containing sensor-specific data).

Technical Data

Order Code Absolute **Model 8262**	Order Code Gauge **Model 8263**	Measuring Range psi	Measuring Range bar	Resonance-Frequency [kHz]
-	8263-10	10	0.7	1.6
8262-15	8263-15	15	1.0	2.1
8262-25	8263-25	20	1.7	2.5
8262-50	8263-50	50	3.4	2.9
8262-75	8263-75	75	5.2	3.5
8262-100	8263-100	100	6.9	4.5
8262-150	8263-150	150	10.3	6.0
8262-200	8263-200	200	13.8	7.0
8262-300	8263-300	300	20.7	9.0
8262-500	8263-500	500	34.5	9.5
8262-750	8263-750	750	51.7	12.0
8262-1000	8263-1000	1000	68.9	17.0
8262-1500	8263-1500	1500	103.4	20.0
8262-2000	8263-2000	2000	137.8	35.0
8262-3000	8263-3000	3000	206.7	40.0
8262-5000	8263-5000	5000	344.5	54.0
8262-7500	8263-7500	7500	516.8	60.0

Electrical values

Bridge resistance: Foil strain gauges; input and output resistance 350 Ω ± 1.5 %

Calibration resistor: 59 kΩ ± 0.1 %
The output voltage caused by a shunt of this value is given in the calibration protocol.

Excitation voltage: 10 V DC

Nominal sensitivity: standardized 2.0 mV/V ± 0.2 %

Environmental conditions

Range of operating temperature: - 70 °C ... 120 °C

Nominal temperature range: 15 °C ... 70 °C

Influence of temperature on zero: ± 0.0015 % F.S./K

Influence of temperature on sensitivity: ± 0.0015 % F.S./K

Mechanical values

Accuracy: Combined error consisting of non-linearity, hysteresis and variation: < ± 0.05 % F.S.

Kind of measurement:
- model 8262
  - measuring range ≤ 300 psi: absolute measurement
  - measuring range ≥ 500 psi: against sealed atmosphere (sealed gauge)
- model 8263: gauge/relative pressure measurement

Dead volume: 2.8 cm^3

Volume change: negligibly small

Overload: 50 % over capacity

Burst pressure: 200 % over capacity

Dynamic load:
- recommended: 70 % of capacity
- possible: 100 % of capacity

Design:
Pressure transducer with hermetically sealed measurement chamber, diaphragm and housing are welded.

Material: stainless steel 17 - 4 PH (similar to material 1.4542)

Pressure connection:
- measuring range ≤ 1500 psi: external thread 1/4 - 18 NPT
- measuring range ≥ 2000 psi: internal thread 1/4 - 18 NPT

Sealing: self-sealing, conic thread at sensor's side

Electrical connection:
6 pin bayonet plug in connector, Souriau 851-07A-10-6P

Mating connector:
Souriau 851-06E-C-1-6S or Amphenol 62 GB-16F-10-6S included in scope of delivery

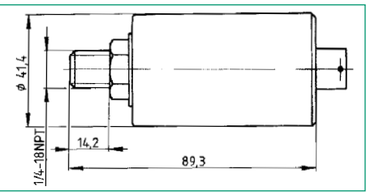
Dimensions: refer to dimensional drawing

Weight: approx. 360 g

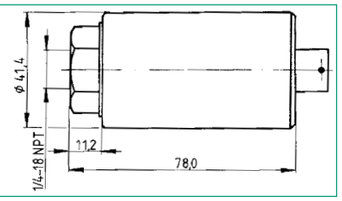
Protection class acc. EN 60529: IP67

Dimensional drawing models 8262 and 8263

Measuring range ≤ 1500 psi



Measuring range ≥ 2000 psi



Tranducers with measuring ranges 10 psi and 15 psi have a diameter of 51 mm. Transducers with internal measurement amplifier are 26 mm longer and approx. 100 g heavier.

Technical Data with Internal Amplifier

	Voltage output 0 ... 10 V	Current output 4 ... 20 mA
Excitation voltage	15 ... 28 V	22 ... 32 V
Current consumption	max. 40 mA	max. 65 mA
Connection technology	4 wire	3 wire
Load impedance	-	500 Ω
Measuring rate	3 kHz	2.5 kHz
Range of operating temperature	- 40 °C ... 85 °C	- 20 °C ... 85 °C

Wiring Code

Pin	without Amplifier	Voltage output	Current output
A	excitation +	excitation +	excitation +
B		signal -	Signal - and excitation -
C	excitation -	excitation -	
D		signal +	signal +
E	signal -	calibration resistor	calibration resistor
F	signal +	calibration resistor	calibration resistor

Order Code

Refer to table, mention options with corresponding short terms.

Accessories

Connecting cable for transducers without amplifier, complete with connector and mating connector (socket), 6 wires, shielded, bending radius > 5 mm, PVC isolation, standard length 3 m

to burster evaluation electronics with 12 pin connector **Model 9911**

with open, color coded and tinned cable ends **Model 9986**

for sensors with integrated amplifier and open, color-coded, tinned cable ends **Model 99545-000D-0160030**

to 7281 with burster TEDS **Model 99229-545D-0160030**

Mating connector (is included in scope of delivery) **Model 9945**

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Options

Internal measurement amplifier with voltage output 0 ... 5 V DC **...-x1xxxxx**
Internal measurement amplifier with voltage output 0 ... 10 V DC **...-x2xxxxx**
Internal measurement amplifier with voltage output 4 ... 20 mA **...-x4xxxxx**

DAkkS Calibration Certificate

According to guideline DKD-R 6-1 with 21 points in 10 % increments, for raising and falling pressure. **Order Code 82DKD-82XX**

Factory Calibration Certificate (WKS)

Calibration of a pressure transducer separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments and covering the complete measuring range. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 82WKS-82XX

2369-00826EN-5672-081524

High Precision Pressure Sensor

For absolute pressure measurement
Model 8264
For relative pressure measurement
Model 8267

Code:	8264 EN
Delivery:	ex stock
Warranty:	24 months

- **Measuring ranges between 0 ... 100 mbar to 0 ... 2000 bar**
- **Accuracy < 0.1 %**
- **Output 0 ... 10 V or 4 ... 20 mA available (optional)**
- **Suitable for liquid and gaseous media**
- **For dynamic and static measurements**
- **Nominal temperature up to 160 °C (optional)**
- **Protection class IP67**

Application

High-precision pressure transducers of these models are a very attractive and economic solution for making extremely accurate pressure measurements for users from all fields of engineering. Thanks to their excellent long-term stability, reliability and rugged construction, the pressure transducers are suitable for use in both research and production and many other applications.

These pressure transducers can be used for static and dynamic measurements on gaseous and liquid media. Being made of stainless steel they are also suitable for measurements on corrosive media. Critical media may result in damage around the welded seams inside the transducer. Please contact us.

Range of applications:
- ► Test benches
- ► Machine building
- ► Aerospace engineering
- ► Process technology

Description

Model 8264 pressure transducers measure the absolute pressure with respect to a vacuum. Built-in overload protection for measuring ranges ≤ 500 mbar prevents the sensor element being damaged by atmospheric pressure.
Model 8267 pressure transducers measure the pressure with respect to the surrounding atmosphere in measuring ranges ≤ 20 bar. They are designed as „true gauge“ sensors, i.e. the chamber behind the diaphragm is in direct contact with the atmosphere through a small opening in the sensor body. This atmosphere can be damp and corrosive, because the sensor element is protected by a second diaphragm.
In measuring ranges ≥ 50 bar, pressures are measured with respect to a sealed atmosphere of approximately 1 bar as reference pressure.

A special connecting cable is available to let you benefit from the burster TEDS electronic data sheet (memory chip fitted in the plug and containing sensor-specific data).

Technical Data

Order Code Absolute 8264	Order Code Gauge 8267	Meas. Range [bar]	Dimensions [mm] 8264 øD	8264 L	8267 øD	8267 L	Resonance Frequency [kHz]	Dead Volume [cm³]
-	8267-4100	0.1	-	-	57.2	67.9	0.5	5.24
-	8267-4200	0.2	-	-	57.2	67.9	1.0	5.24
8264-4500	8267-4500	0.5	38.1	81.7	44.5	72.8	1.3	4.10
8264-5001	8267-5001	1	38.1	81.7	44.5	72.8	1.6	4.10
8264-5002	8267-5002	2	38.1	81.7	38.1	73.0	1.7	2.79
8264-5005	8267-5005	5	38.1	81.7	38.1	73.0	2.5	2.79
8264-5010	8267-5010	10	38.1	81.7	38.1	73.0	4.0	2.79
8264-5020	8267-5020	20	38.1	81.7	38.1	73.0	7.2	2.79
8264-5050	8267-5050	50	38.1	81.7	38.1	81.7	12.0	2.79
8264-5100	8267-5100	100	38.1	81.7	38.1	81.7	20.0	2.79
8264-5200	8267-5200	200	38.1	71.9	38.1	71.9	40.0	1.97
8264-5500	8267-5500	500	38.1	71.9	38.1	71.9	80.0	1.97
8264-6001	8267-6001	1000	38.1	67.3	38.1	67.3	95.0	1.97
8264-6002	8267-6002	2000	38.1	67.3	38.1	67.3	110.0	1.97

Electrical values

Bridge resistance: foil strain gauges 350 Ω , nominal

Calibration resistor: 59 kΩ ± 0.1 %
The bridge output voltage caused by a shunt of this value is given in the calibration protocol.

Excitation voltage: 10 V

Sensitivity: 3 mV/V, nominal
measuring range 0.1 bar 1 - 2 mV/V, nominal

Environmental conditions

Range of operating temperature:
measuring range ≤ 1000 bar - 70 °C ... 160 °C
measuring range 2000 bar - 70 °C ... 95 °C

Nominal temperature range: 15 °C ... 70 °C

Influence of temperature on zero: ≤ ± 0.025 % F.S./K

Influence of temperature on sensitivity: ≤ ± 0.025 % F.S./K

Mechanical values

Accuracy: Combined error consisting of linearity deviation, hysteresis and variation: < ± 0.1 % F.S.

Kind of measurement:
model 8264 absolute pressure measurement
model 8267 gauge/relative pressure measurement

Measuring ranges: refer to table

Dead volume: refer to table

Overload: 50 % over capacity
pressure transducers of model 8264 with measuring range ≤ 500 mbar have a internal overload protection, active up to 1 bar.

Burst pressure:
measuring range ≤ 200 bar 300 % over capacity
measuring range 500 bar 200 % over capacity
measuring range ≥ 1000 bar 70 % over capacity

Dynamic load recommended: 70 % of capacity
possible: 100 % of capacity

Design:
Pressure transducer with hermetically sealed measurement chamber, diaphragm and housing are welded. Pressure transducers of model 8264 with measuring range ≥ 50 bar uses a sealed atmosphere, pressure approx. 1 bar, as reference.

Material: stainless steel 17 - 4 PH (similar to material 1.4542)

Pressure connection:
measuring range ≤ 100 bar external thread 1/4-18NPT
measuring range 200 bar, 500 bar int. thread 1/4-18NPT
measuring range ≥ 1000 bar Autoklave AE F250-C

Sealing: self-sealing, conic thread at sensor's side

Electrical connection:
6 pin bayonet plug-in connector, Souriau 851-07A10-6P

Mating connector:
Souriau 851-06E-C-10-6S or Amphenol 62GB-16F-10-6S included in scope of delivery

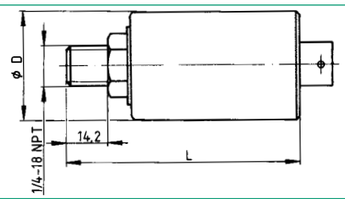
Dimension: refer to table and dimensional drawing

Weight: approx. 290 g

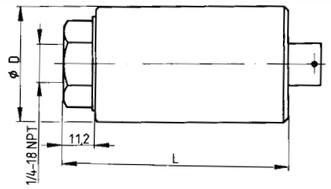
Protection class: IP67

Dimensional drawing models 8264 and 8267

Measuring range ≤ 100 bar



Measuring ranges ≥ 200 bar



Technical Data with Internal Amplifier

	Voltage output 0 ... 10 V	Current output 4 ... 20 mA
Excitation voltage	15 V ... 28 V	22 ... 32 V
Current consumption	max. 40 mA	max. 65 mA
Connection technology	4 wire	3 wire
Load impedance	-	500 Ω
Measuring rate	3 kHz	2.5 kHz
Range of operating temperature	- 40 °C ... 85 °C	- 20 °C ... 85 °C

Wiring Code

Pin	without Amplifier	Voltage output	Current output
A	excitation +	excitation +	excitation +
B		signal -	signal - and excitation -
C	excitation -	excitation -	
D		signal +	signal +
E	signal -	calibration resistor	calibration resistor
F	signal +	calibration resistor	calibration resistor

Order Codes

Refer to tables, mention options with corresponding short terms

Accessories

Connecting cable for transducers without amplifier, 6 pin, shielded, bending radius > 5 mm, PVC insulated, length 3 m with open, color coded and tinned cable ends **Model 9986**

to burster evaluation electronics (desktop versions) with 12 pin connector **Model 9911**

for transducers with internal amplifier, with open color coded and tinned cable ends **Model 99545-000D-0160030**

to 7281 with burster TEDS **Model 99229-545D-0160030**

Mating connector (is included in scope of delivery) **Model 9945**

Other lengths or special cable versions on request.

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Options

Extension of the nominal temperature range to 20 °C ... 120 °C ...-**xxFxxxxx**

Extension of the nominal temperature range to 20 °C ... 160 °C, possible for measuring range ≥ 1 bar ...-**xxGxxxxx**

Internal measurement amplifier with voltage output 5 V =...-**x1xxxxxx**

Internal measurement amplifier with voltage output 10 V =...-**x2xxxxxx**

Internal measurement amplifier with current output 4 ... 20 mA...-**x4xxxxxx**

Factory Calibration Certificate (WKS)

Calibration of a pressure transducer separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments and covering the complete measuring range. Special calibrations on request. Calculation of costs by base price plus additional costs per point.

Order Code 82WKS-82XX

2370-008264EN-5672-081524

Miniature Differential Pressure Transmitter

Model 8303

Code:	8303 EN
Delivery:	4 - 5 weeks
Warranty:	24 months

- **Measuring ranges from 0 ... ± 50 mbar to 0 ... ± 10 bar**
- **Measurement accuracy < 0.5 %**
- **High line pressure**
- **For liquid or gaseous media**
- **Integrated measurement amplifier**

Application

The pressure transmitter illustrated here measures differences in pressure between the two connections of the measuring element. Pressure differences can be measured with respect to a reference pressure, such as atmosphere, or to the command variable of a regulation system. Equally, however, it is possible to measure pressure differences within systems that have a high static pressure. One practical example of this would be measuring a flow rate by determining the pressure drop occurring across a metering diaphragm.
The differential pressure transmitter measures in both directions and can therefore, for instance, be used on double-acting hydraulic cylinders. Its construction permits it to be used with liquid or gaseous media. Venting holes simplify installation. The robust design and the use of stainless steel make it possible to use the pressure transmitter under tough operating conditions.
It is fitted with integrated electronics to make the pressure transmitter even easier to use. This delivers the usual current or voltage outputs familiar in measurement and control engineering.

Description

The differential pressure transmitter has a chamber on each pressure port. The chambers are separated by a diaphragm. Coils are located, and hermetically sealed, within the two halves of the sensor housing on both sides of the diaphragm. If there is a difference in the pressures on the two sides of the center element, the diaphragm is deflected from its rest position. As a result, the reluctance of the two coils, which are wired as differential inductances, changes. The integrated electronics converts the changed inductance ratio into the desired output signals, which are then available for further processing.

Technical Data

Order Code	Measuring Range	Overload one Side [bar]
8303 - 0.05 - ▭	0 ... ± 50 mbar	0.15
8303 - 0.1 - ▭	0 ... ± 100 mbar	0.3
8303 - 0.2 - ▭	0 ... ± 200 mbar	0.6
8303 - 0.5 - ▭	0 ... ± 500 mbar	1.5
8303 - 1 - ▭	0 ... ± 1 bar	3.0
8303 - 2 - ▭	0 ... ± 2 bar	6.0
8303 - 5 - ▭	0 ... ± 5 bar	15.0
8303 -10 - ▭	0 ... ± 10 bar	30.0

▭ Refer to the table below for the output signal codes.

Electrical values

Excitation voltage: 12 ... 30 V DC
Current consumption: load-dependent max. 25 mA
Internal carrier frequency: 5 kHz, ± 20 %
Range of amplification: ± 10 %
Range of zero adjustment: ± 10 %
Variation of output signal at load reversal: < 0.1 % at ΔR_L max
Variation of output signal at change of excitation voltage, between 12 V DC and 30 V DC: < 0.1 %
Rise time: 6 msec for 0 ... 100 %
Ripple of output voltage: 0.05 $\%_{eff}$ F.S.
Capacitive load: < 1 µF
Noise suppression: at 9 ... 32 V < 0.1 % F.S.
Reaction time (0 ... 100 %): 6 ms

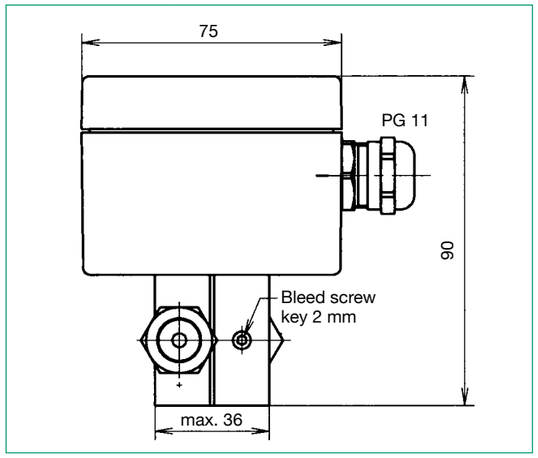
Environmental conditions

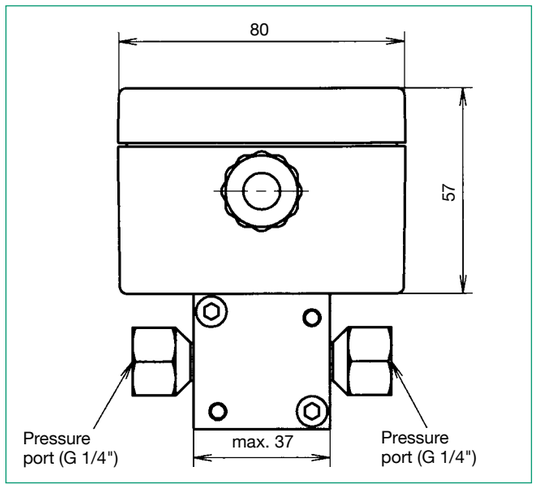
Range of operating temperature: - 25 °C ... 85 °C
Nominal temperature range: 0 °C ... 70 °C
Influence of temperature on zero: < ± 0.05 % F.S./K
Influence of temperature on sensitivity: < ± 0.05 % Rdg./K

Mechanical values

Kind of measurement: Measurement of differential pressure (both direct.)
Combined error of non-linearity, hysteresis and variation: < ± 0.5 % F. S.
Dead volume: on both sides 0.35 cm^3
Volume change: 0.03 cm^3
Line pressure: max. 100 bar
influence on zero signal (steady) < ± 1.5 % F.S.
Over load: refer to table
influence on zero signal (steady) < ± 0.5 %
Dynamic load:
recommended 70 % of nominal pressure
possible 100 % of nominal pressure
Design:
The pressure chambers are sealed hermetically, the protective membranes are welded.
Material: stainless steel AISI 410 (similar to material 1.4006)
Pressure connection: internal thread G 1/4"
Venting holes:
closed at delivery internal thread M4
Electrical connection:
terminal strip for max. wire cross-section 1.5 mm^2
wire cross-section 5 ... 10 mm
Wiring code: refer to diagram in housing
Dimensions: refer to dimensional drawing
Weight: 750 g
Protection class: IP65

Dimensional drawing model 8303





Order Information

Miniature differential pressure transmitter **Model 8303-0.5-D1**
Range 0 ... ± 500 mbar, analog output 0 ... ± 2.5 V for 0 ... ± 500 mbar.

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Factory Calibration Certificate (WKS)

Calibration of a pressure transducer separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments and covering the complete measuring range. Special calibrations on request. Calculation of costs by base price plus additional costs per point.

Order Code 83WKS-83...

...	A	B	BA	C	A1	B1	BA1	C1	D1
- End of Measuring Range	-	-	-	-	4 mA	0 mA	4 mA	0 V =	- 2.5 V =
0 bar	4 mA	0 mA	4 mA	0 V =	12 mA	10 mA	12 mA	2.5 V =	0 V =
+ End of Measuring Range	20 mA	20 mA	20 mA	5 V =	20 mA	20 mA	20 mA	5 V =	+ 2.5 V =
Number of Wires	2	3	3	4	2	3	3	4	3 oder 4
Load Resistance R_L	500 Ω at 20...30 V	< 700 Ω	< 700 Ω	> 5 kΩ	500 Ω at 20...30 V	< 700 Ω	< 700 Ω	> 5 kΩ	> 20 kΩ

2371-008303EN-5672-081524

Differential Pressure Transducers

Model 8310
Models 8313, 8314
Model 8315

Code: 8310 EN
Delivery: 10 - 12 weeks
Warranty: 24 months

Model 8310
for lower pressure ranges

Models 8313, 8314
for medium pressure ranges

Model 8315
for high pressure ranges

- **Measuring ranges from 0 ... ± 35 mbar to 0 ... ± 500 bar**
- **Accuracy < 0.25% or < 0.5%**
- **Available for line pressures up to 345 bar**
- **Optional output available as ± 5 V or 4 ... 20 mA**
- **Suitable for liquid or gaseous media**
- **Made of stainless steel, reliable, robust**

Application

Sensors in the 831x series measure differences in pressure between the two ports of the measuring element. Pressure differences can be measured with respect to a reference pressure, such as atmospheric, or to the command variable of a regulation system. Equally, however, it is possible to measure pressure differences within systems that have a high static pressure.

The differential pressure transducers sense in both directions and can handle liquid or gaseous media applied to either port. Vents make installation easier. The robust design and the use of stainless steel make it possible to use the differential pressure transducer under tough operating conditions.

Example applications:
- ► Measuring flow rates
- ► Clean room technology
- ► Monitoring and control of heating/ventilation/ air-conditioning systems

Description

On both pressure ports, the differential pressure transducers include a closed chamber, each with a membrane. Both membranes, like all the parts that come into contact with the medium, are made of stainless steel and are welded to create a hermetic seal against the inner space of the measuring element. Transducers with this structure are also referred to as wet/wet; it allows differential pressure of gaseous and liquid media to be measured directly. The differential pressure sensors work in both directions, i.e. either port can be the higher pressure connection. Integrated measurement amplifiers for ± 5 V or 4 ... 20 mA are offered as an option; this increases the height by 29 mm.

Technical Data - Model 8310

Model	Order Code	Measurement Range [bar]	Typical Measurement Error* [% v.E.]	Characteristic Nominal [mV/V]
8310	8310-4035	0 ... ± 0.035	< ± 0.25	1
	8310-4100	0 ... ± 0.1	< ± 0.25	1.5
	8310-4200	0 ... ± 0.2	< ± 0.25	2
	8310-4500	0 ... ± 0.5	< ± 0.25	2
	8310-5001	0 ... ± 1	< ± 0.25	2
	8310-5002	0 ... ± 2	< ± 0.25	2

* Total error consisting of non-linearity, hysteresis and variation.

Electrical values

Bridge resistance: foil strain gauge 350 Ω, nominal

Calibration shunt resistor: 59 kΩ ± 0.1 %
The bridge output voltage, caused by a shunt resistor of this value is given in the calibration protocol.

Excitation voltage: 10 V DC or AC

Sensitivity: refer to table

Insulation resistance: 5 GΩ at 50 V DC

Environmental conditions

Operating temperature: 0 °C ...90 °C

Nominal temperature range: 0 °C ...55 °C

Influence of temperature to zero signal: < ± 0.009 % F.S./K

Influence of temperature to characteristic: < ± 0.009 % F.S./K

Mechanical values

Kind of measurement: measurement of differential pressure

Dead volume: every side approx. 6.6 cm^3

Variation of volume: for range 0 ... ± 200 mbar approx. 0.17 cm^3

Pressure of system[1]: max. 100 bar

Influence of system pressure to zero signal: < ± 0.5 % F.S./70 bar

Overload[2]: one side max. 100 bar

Resonance frequency:
for range 0 ... ± 200 mbar liquid media 5 Hz, gaseous media 10 Hz

Dynamic load:
recommended 70 % of nominal pressure
possible 100 % of nominal pressure

Design:
Both pressure chambers are sealed hermetically, the membranes are welded. The outer caps of the pressure chamber are bolt. They are sealed by O-rings, made of VITON®.
All differential pressure transducers used for low pressure ranges contain silicone oil between their membranes. Due to this their maximum operation and storage temperature is 90 °C

Mounting:
Mounting hole with internal thread 1/4-28 UNF, 8 mm deep, central on both sides of the differential pressure transducer.

Material: stainless steel 316SS (like 1.4571)

Pressure connection: internal thread 1/8 - 27 NPT

Bleeder holes:
closed at delivery internal thread 1/8 - 27 NPT

Electrical connection:
6 pin bajonett lock, Amphenol 62GB-16F-10-6S

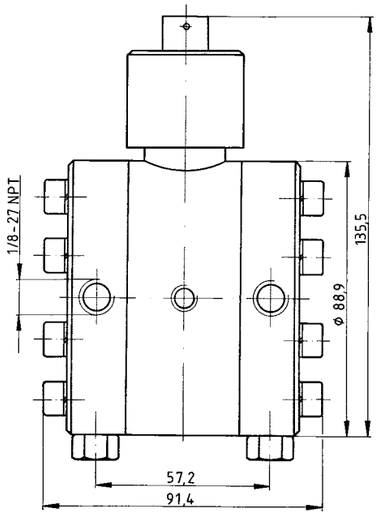
Mating connector: model 9945
Amphenol 62GB-16F10-6S or Souriau 851-06EC-10-6S in scope of delivery

Dimensions: refer to dimensional drawing

Mounting:
Mounting hole with internal thread 1/4-28 UNF, 8 mm deep on both sides of the differential pressure transducer.

Weight: approx. 3.8 kg

Dimensional drawing model 8310



[1] The differential pressure transducers for low pressure ranges may be used to take measurements on systems with line pressures up to 100 bar (or, with the option, up to 345 bar). The line pressure is the maximum static pressure that is permitted simultaneously on both ports of a differential pressure transducer. The result of adding the static pressure to the pressure to be measured must also not exceed the maximum line pressure. For instance, a transducer with a measuring range of 0 ... ± 100 mbar may be exposed to 100 bar at one pressure port and 99.9 bar at the other, or may have 0 bar at one port and 0.1 bar at the other. It should be noted that when the line pressure changes, the zero point moves. The shift in the zero point is reproducible. It is normal and is compensated for a line pressure of 100 bar.

[2] All the differential pressure transducers have mechanical protection against overload. If the measuring range is exceeded by more than 50%, the membrane presses against a stop. Because this stop places a heavy mechanical stress on the membrane, overload should be avoided entirely if at all possible. If, however, overloading does occur, the zero point will move; a change in precision or damage is prevented. Damage will only be caused by frequent or sudden overload.

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Options

Internal amplifier with voltage output - 5 V...+ 5 V = **...-V2xxxxxx**

Internal amplifier with current output 4...20 mA;
Δp ≙ 0 bar = 4 mA, Δp = full scale positive ≙ 20 mA **...-V4xxxxxx**

Extension of max. pressure of system **on request**

Factory Calibration Certificate (WKS)

Calibration of a pressure transducer separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments and covering the complete measuring range. Special calibrations on request. Calculation of costs by base price plus additional costs per point.

Order Code 83WKS-83XX

2372-008310EN-5672-081524

Technical Data - Models 8313, 8314

Model	Order Code	Measurement Range [bar]	Typical Measurement Error* [% F.S.]
8313	8313-5	0 ... ± 5	< ± 0.25
	8313-10	0 ... ± 10	< ± 0.25
	8313-20	0 ... ± 20	< ± 0.25
	8313-50	0 ... ± 50	< ± 0.25
8314	8314-5	0 ... ± 5	< ± 0.50
	8314-10	0 ... ± 10	< ± 0.50
	8314-20	0 ... ± 20	< ± 0.50
	8314-50	0 ... ± 50	< ± 0.50

* Total error consisting of non-linearity, hysteresis and variation.

Electrical values

Bridge resistance: foil strain gauge 350 Ω, nominal

Calibration shunt resistor: 59 kΩ ± 0.1 %
The bridge output voltage, caused by a shunt resistor of this value, is given in the calibration protocol.

Excitation voltage: recommended 10 V DC or AC
possible 15 V DC or AC

Characteristic: 2 mV/V, nominal

Environmental conditions

Range of operation temperature: - 50 °C ... 120 °C

Range of nominal temperature: 15 °C ... 70 °C

Influence of temperature to zero signal:
model 8313 < ± 0.009 % F.S./K
model 8314 < ± 0.014 % F.S./K

Influence of temperature to characteristic:
model 8313 < ± 0.009 % F.S./K
model 8314 < ± 0.018 % F.S./K

Mechanical values

Kind of measurement: measurement of differential pressure

Individual error:
model 8313 non-linearity < ± 0.15 % F.S.
hysteresis < ± 0.10 % F.S.
variation < ± 0.05 % F.S.
model 8314 non-linearity < ± 0.25 % F.S.
hysteresis < ± 0.13 % F.S.
variation < ± 0.07 % F.S.

Dead volume: every side approx. 4.1 cm^3

Variation of volume: for range 0 ... ± 20 bar approx. 0.1 cm^3

Pressure of system: maximum 100 bar

Maximum overload for one side: 100 bar

Natural frequency:
for range 0 ... ± 20 bar liquid media 10 Hz, gaseous media 20 Hz

Dynamic load:
recommended 70 % of nominal pressure
possible 100 % of nominal pressure

Design:
Both pressure chambers are sealed hermetically, the membranes are welded. The outer caps of the pressure chamber are bolt. They are sealed by O-rings, made of viton.

Mounting:
Mounting hole with internal thread 1/4-28 UNF, 8 mm deep, central on both sides of the differential pressure transducer.

Material: stainless steel 17 - 4 PH, like 1.4542

Pressure connection: internal thread 1/8 - 27 NPT

Bleeder holes:
closed at delivery internal thread 1/8 - 27 NPT

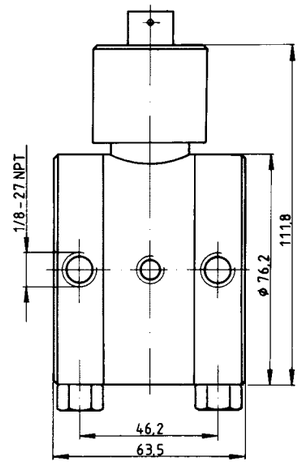
Electrical connection:
6-pin bajonett lock Souriau 851-07A-10-5P

Mating connector: model 9945
Amphenol 62GB-16F10-6S or Souriau 851-06EC-10-6S in scope of delivery

Dimensions: refer to dimensional drawing

Weight: approx. 2.3 kg

Dimensional drawing models 8313 and 8314



The differential pressure transducer for medium pressure ranges can be used to take measurements on systems up to a line pressure of 100 bar. The line pressure is the maximum static pressure that is permitted simultaneously on both ports of a differential pressure sensor. The result of adding the static pressure to the pressure to be measured must also not exceed the maximum line pressure. For instance, a transducer with a measuring range of ± 10 bar may be exposed to 100 bar at one pressure port and 90 bar at the other, or may have 0 bar at one port and 10 bar at the other. It should be noted that when the line pressure changes, the zero point moves. The shift in the zero point is reproducible. It is normal and is compensated for a line pressure of 100 bar.

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Options

Internal amplifier with voltage output - 5 V...+ 5 V = **...-V2xxxxxx**

Internal amplifier with current output 4...20 mA;
Δp ≙ 0 bar = 4 mA, Δp = full scale positive ≙ 20 mA **...-V4xxxxxx**

Extension of max. pressure of system **on request**

Factory Calibration Certificate (WKS)

Calibration of a pressure transducer separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments and covering the complete measuring range. Special calibrations on request. Calculation of costs by base price plus additional costs per point.

Order Code 83WKS-83XX

Technical Data - Model 8315

Order Code	Measure-ment Range [bar]	Measure-ment Error* [% v.E.]	Max. System Pressure [bar]	Max. Overload to One Side [bar]
8315-100	0 ... ± 100	< ± 0,25	240	200
8315-200	0 ... ± 200	< ± 0,25	340	400
8315-500	0 ... ± 500	< ± 0,25	640	750

* Total error consisting of non-linearity, hysteresis and variation.

Electrical values

Bridge resistance: foil strain gauge 350 Ω , nominal
Calibration shunt resistor: 59 Ω ± 0.1 %
The bridge output voltage, caused by a shunt resistor of this value is given in the calibration protocol.
Excitation voltage: 10 V DC or AC
Sensitivity: 2 mV/V, nominal

Environmental conditions

Operating temperature: - 50 °C ...120 °C
Nominal temperature range: 15 °C ... 70 °C
Influence of temperature to zero signal: ≤ ± 0.009 % F.S./K
Influence of temperature to characteristic: ≤ ± 0.009 % F.S./K

Mechanical values

Kind of measurement: measurement of differential pressure
Individual error: non-linearity < ± 0.15 % F.S.
hysteresis < ± 0.10 % F.S.
variation < ± 0.05 % F.S.
Dynamic load: recommended 70 % of nominal load
possible 100 % of nominal load
Design:
Both pressure chambers are sealed hermetically, the membranes are welded. The outer caps of the pressure chamber are bolt. They are sealed by O-rings, made of metal.
Mounting:
One side of the differential pressure transducer, opposite to the connector, has a mounting hole. Internal thread 10 - 32 UNF, 9.5 mm deep.
Material: stainless steel 17-4 PH (similar to 1.4542)
Pressure connector: internal thread 1/4 - 18 NPT
Electrical connector:
6 pin bajonett lock Souriau 851-07A-10-6P
Mating connector: model 9945
Amphenol 62GB-16F10-6S or Souriau 851-06EC-10-6S in scope of delivery
Dimensions: refer to dimensional drawing
Weight: approx. 1.8 kg

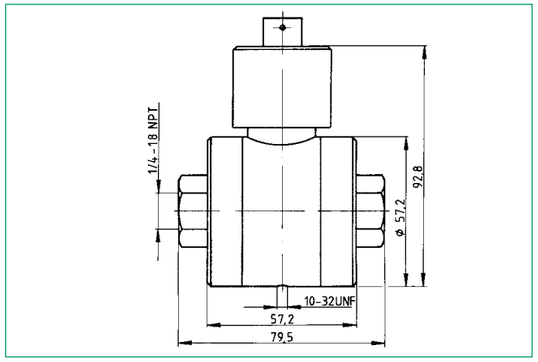
Technical data with integrated amplifier, all 831x

	Voltage output ± 5 V	**Current output 4...20 mA**
Excitation voltage	26 ... 32 V or ± 15 V	22 ... 32 V
Current consumption	max. 45 mA	max. 65 mA
Circuit technology	4 wire	3 wire
Burden	-	500 Ω
Measuring rate	2 kHz	2.5 kHz
Operating temperature	- 20 °C ... 85 °C	

Pin assignment, all 831x

Pin	**without Amplifier**	**Voltage output**	**Current output**
A	Excitation +	Excitation +	Excitation +
B		Signal -	Signal - and Excitation -
C	Excitation -	Excitation -	
D		Signal +	Signal +
E	Signal -	Calibration shunt resistor	Calibration shunt resistor
F	Signal +	Calibration shunt resistor	Calibration shunt resistor

Dimensional drawing model 8315



The differential pressure transducers are designed for a line pressure up to 140 bar and are designed for large pressure differences such as occur on double-acting hydraulic cylinders in construction machinery or material test devices. If the measuring range in the positive direction is restricted, the transducers can be used at a higher line pressure - up to the maximum value given in the table.
Thus the sensor that has a measuring range of ± 100 bar, when connected to 0 bar line pressure, operates over the range - 100 ... + 100 bar (figure 1), while when connected to 140 bar line pressure it operates from 40 ... 240 bar (figure 2). If the same sensor is connected to a 240 bar line pressure, only the range from 140 bar ... 240 bar is available for measurements (figure 3).

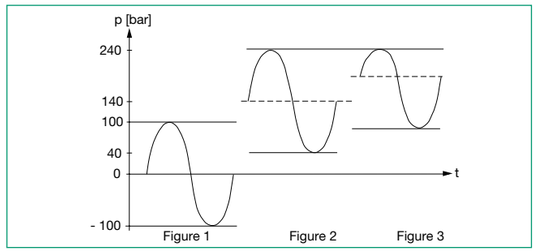


Figure 1 Figure 2 Figure 3

For any applications of the differential pressure sensors, care must be taken to ensure that the value for „overload, one side“ is not exceeded. If the line pressure changes, the sensor's zero point moves. The shift in the zero point is reproducible and is in most cases less than 2% of full-scale. It is normal and is compensated for a static pressure 140 bar on both sides.

Accessories, all 831x

Connecting cable for sensors with bridge output, complete with coupling plug and socket, 6 core, screened, bending radius > 5 mm, PVC insulation, standard length 3 m
for any type of burster analysis electronics in desktop housing with 12 pin connection **Model 9911**
with open, color-coded and tinned cable ends **Model 9986**
7281 with burster TEDS **Model 99229-545D-0160030**

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Options

Internal amplifier with voltage output - 5 V...+ 5V DC **...-V2xxxxxx**
Internal amplifier with current output 4...20 mA;
Δp ≙ 0 bar = 4 mA, Δp = full scale positive ≙ 20 mA **...-V4xxxxxx**
Extension of max. pressure of system **on request**

Factory Calibration Certificate (WKS)

Calibration of a pressure transducer separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments and covering the complete measuring range. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 83WKS-83XX

2372-008310EN-5672-081524

Load Cells

LOAD CELLS

8402 – 8438 Miniature load cells in various designs

8451 / 8552 Press load cell for manually operated and pneumatic presses

8510 – 85082 Load cells in various designs

Overview Miniature Load Cells model numbers 84 ...

MODELS	8402	8411	8413	8414	8415	8416	8417	8431	8432	8435	8438	8451/8552
Figure												
Relative Non-Linearity (≤ % F.S.)	0.5	0.5	0.5	0.5	0.5/0.75	0.5	0.5	0.2	0.2	0.25	1.0	from 0.5
Description	**Miniature load cell**	**Subminiature load cell**	**Subminiature load cell**	**with overload protection**	**Miniature load cell**	**Ultra miniature tension/ compression load cell**	**Miniature tension/ compression load cell**	**Precision miniature load cell**	**with overload protection**	**Tension/ compression load cell**	**Miniature ring load cell**	**Load cell for presses**
Measuring Range smallest: largest:	0 ... 1 kN 0 ... 100 kN	0 ... 2.5 N 0 ... 5 kN	0 ... 2.5 N 0 ... 5 kN	0 ... 2.5 N 0 ... 100 N	0 ... 200 N 0 ... 5 kN	0 ... 20 N 0 ... 5 kN	0 ... 50 N 0 ... 5 kN	0 ... 5 N 0 ... 100 kN	0 ... 2.5 N 0 ... 2 kN	0 ... 200 N 0 ... 5 kN	0 ... 5 N 0 ... 200 kN	0 ... 100 N 0 ... 100 kN
Special Features	Large measuring ranges combined with small dimensions, small measuring displacement	Smallest external, dimensions easy fitting into measuring bars and punches	Smallest external dimensions, flat structure with temperature compensation, high resonance frequency (up to 167 kHz)	With overload protection combined with very small external dimensions	Economical flat disc sensor, external diameter 20 mm	Particularly small load cell, 10.6 mm external diameter and 4.5 mm height	Only 10 mm diameter and 6.5 mm height, easy assembly via external thread	Versatile precision sensor, mostly insensitive to transverse, bending and torsion forces, several options available	Like model 8431 but with overload protection in both directions	Tension and compression sensor of stainless steel for OEM applications	Central throughhole, low height	Easy, direct assembly, 5-fold mechanical overload protection, holder for displacement sensor actuation
Main Application Fields	Measurement of press-fit forces on longitudinal and lateral press-fit seatings-measurement of force at punches, in clamping jaws and tools	Places in test equipment to which access is difficult in precision engineering and microtechnology	Where space is very narrow when testing contact force, keys, switches and frictional forces	For automatic production lines, for testing joints and clearances	Contact forces, positioning forces, pressing forces on machines	Machine tooling, microsystem technology, production lines, handling equipment	Micromechanics, actuator systems, switches, bowden cables	Draw bars and pusher rods, scales, electromagnets, baffles	Production and testing lines, as well as also for laboratory equipment	Pressinsertions, forming operations, proportioning, connector tests	Measurement of bolting force, contact forces of bolts, threaded bars, cutting forces	Manual presses and automatic press-in stations

Overview Load Cells model numbers 85 ...

MODELEN	8510	8511	8523	8524	8526	8527	8531	8532	85041/85043 85073/85075	85081 85082
Figure										
Relative Non-Linearity (≤ % F.S.)	0.25	from 0.1	0.15	0.25	0.25	0.05	0.15	1	0.1	0.2
Description	**Miniature bending beam load cell**	**Load bending beam**	**Tension and compression load cell**	**Tension and compression load cell**	**Compression load cell**	**High precision compression load cell**	**Low-Cost compressive load cell**	**Load cell**	**High precision load cell**	**Tensile force sensor**
Measuring Range smallest: largest:	0 ... 1 N 0 ... 20 N	0 ... 5 N 0 ... 2 kN	0 ... 20 N 0 ... 500 N	0 ... 500 N 0 ... 200 kN	0 ... 100 N 0 ... 200 kN	0 ... 500 N 0 ... 100 kN	0 ... 1 kN 0 ... 5 kN	0 ... 500 N 0 ... 20 kN	0 ... 20 N 0 ... 2 MN	0 ... 10 kN 0 ... 1 MN
Special Features	Mechanical overload protection, very small sizes	Not sensitive to interfering pertubations and lateral forces	Economical, universal sensor made of aluminum, lightweight, low height, disc-shaped	Robust load cell for industrial and laboratory applications, available with overload protection	Small construction design with high measuring ranges, protection class IP64	High precision sensor, protection class IP65, simple assembly	Economical aluminium sensor, particularly suited for static applications, easy fitting	Particularly economical load cell with In-Line amplifier, output 0 ... 10 V DC	Precision sensors, hermetically sealed, very low sensitivity to lateral forces, also suitable for highly dynamic applications	Model 85081: range of cylindrical sensors, threaded bolts at the face Model 85082: with internal thread on the front face
Main Application Fields	Test equipment (switches, keys), contact forces, packaging and adhesive technolog	Weighing equipment, filling scales, water level gauges, filling equipment	Bar, rod, latticework forces, counting and testing scales	Monitoring jointing processes, torque measurement through force x lever	Contact forces, foot forces, filling systems, presses	As reference for precision measurements in laboratory and industry	Scales and filling level measurement systems, cable forces, thread tensions	Weights, pressinsertions, advance forces	Presses, containers (e.g. silos), materials tests, calibrations	Model 85081: tensile tests, tearing tests, jointing forces Model 85082: tension-extension tests, cables, bars

Options:
- Extension of the nominal temperature range
- Hermetically sealed version (IP68) / underwater vented cable
- Integrated amplifiers
- Integrated cable, variable cable lengths
- Standardization of the sensitivity
- Load application parts
- Load centering plates

Services: Connector mounting, manufacturer calibration certificate, CAD data, DAkkS certificates

2373-000089EN-5872-081524

burster

Miniature Load Cell

Model 8402

Code: 8402 EN
Delivery: ex stock
Warranty: 24 months

- **Available ranges from 0 ... 1 kN up to 0 ... 100 kN**
- **Very small dimensions**
- **Drug chain qualified cable**
- **Made of stainless steel**
- **With standardized output signal**

Application

This, related to its measuring range, miniaturized load cell enables an universal and reliable operation in industries and laboratories. It is well suited for compression measurements in very restricted structures. The load cell is a compact construction and made of superrefined steel. Therefore it can be used in many fields of industry, like.

Examples are:

- ► Press-in force measurements on longitudinal and transversal connections
- ► Compression force measurements on punch and roller applicancy
- ► Spring tension measurements on shock absorbers for cars
- ► Contact pressure determination in push rods
- ► Compression force measurements on compressed-air knee-lever presses

Description

Thanks to the rounded top, in shape of a little hat, the force to be measured is led into the sensor centrically and free of lateral force.

Strain gauges arranged in a full bridge are applied on the generated surface of the sensor. By applying a force to the strain gauge bridge the resistance change of the strain gauges is transformed into an output voltage which is directly proportional to the measured force.

The load cells have to be mounted on a smooth, plane parallel surface. They can be fixed with contact glue or silicone. To receive an adequate measurement accuracy neither transversal nor lateral forces have to influence the load cell.

Clamp forces acting laterally on the load cell have to be avoided. During installation or mounting you have to take care that the cable outlet and the cable of the load cell are not stressed by tension and bending forces.

The output signal of the connecting plug is 1.5 mV/V, so that a parallel connection or an exchange can easily be done, without the need to re-adjust the processing electronics.

Technical Data

Order Code	Measuring Range	Accuracy [% F.S.]	Non-Repeatability [% F.S.]	ø D1	ø D2	F	A	H	G	ø C	ø K	M	Weight without Cable [g]
8402-6001	0 ... 1 kN	≤±0.75	≤±0.4	6.4	12.7	3.05	14.9	9.6	0.25	1.9	2.8	1.6	4
8402-6002	0 ... 2 kN	≤±0.5	≤±0.25	6.8	12.7	3.05	14.9	9.6	0.25	1.9	2.8	1.6	4
8402-6005	0 ... 5 kN	≤±0.5	≤±0.25	7.7	12.7	3.05	14.9	9.6	0.25	1.9	2.8	1.6	5
8402-6010	0 ... 10 kN	≤±0.5	≤±0.25	10.0	12.7	3.05	14.9	9.6	0.25	1.9	2.8	1.6	7
8402-6020	0 ... 20 kN	≤±0.5	≤±0.25	14.0	15.9	6.0	16.5	16.0	0.25	1.9	2.8	3.1	19
8402-6050	0 ... 50 kN	≤±0.75	≤±0.25	19.7	22.4	6.0	19.7	16.0	0.25	1.9	2.8	3.1	40
8402-6100	0 ... 100 kN	≤±0.75	≤±0.25	26.5	44.0	15.0	35.0	38.0	0.5	3.0	7.0	7.5	260

Electrical values

Bridge resistance: full bridge circuit of foil strain gauge
350 Ω, nominal[1)]

Excitation: recommended 3 V DC or AC
max. 5 V DC or AC

Nominal sensitivity: (standardized in the cable) 1.5 mV/V, ±0.5 %

Insulation resistance: >10 MΩ

[1)] Deviation from stated value is possible.

Environmental conditions

Range of operating temperature: -30 °C ... +100 °C
Nominal temperature range: +15 °C ... 70 °C
Influence of temperature on zero: ≤±0.05 % F.S./K
Influence of temperature on sensitivity: ≤+0.05 % Rdg./K

Mechanical values

Deflection: ≤50 µm
Overload: 150 % of capacity
Dynamic performance: recommended 70 % of capacity
Material: stainless steel 1.4542
Resonance frequency: all ranges >20 kHz
Electrical connection:
4 wire, shielded, TPE coated cable, length approx. 2 m, measuring range ≥0 ... 20 kN additionally with anti-kink coil length approx. 35 mm, ø3.5 mm, drag chain qualified.
Standardization: circuit board (70 x 8 mm) at the connection cable, 30 cm away from the end
Bending radius: measuring range ≤0 ... 50 kN ≥20 mm
measuring range 0 ... 100 kN ≥30 mm
Protection class: acc. to DIN 60529 IP54

Wiring code:

white	excitation voltage	positive
brown	excitation voltage	negative
yellow	signal output	positive
green	signal output	negative

Dimensions: refer to table and scale drawing
General tolerance of dimension: according to ISO 2768-f
Weight: according to measuring range, refer to table

Order Information

Miniature load cell, measuring range 0 ... 2 kN **Model 8402-6002**

Accessories

Mating connector
12 pins, suitable to all burster desktop devices **Model 9941**
9 pins, suitable to SENSORMASTER and DIGIFORCE® **Model 9900-V209**

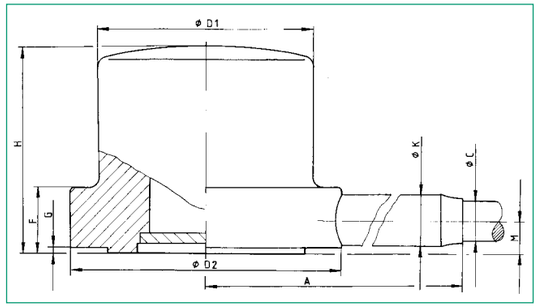
Mounting of mating connector to conductor cable **Order Code: 99004**

Only for connection between sensor and SENSORMASTER model 9163 desktop version **Order Code: 99002**

Amplifiers, sensor supplying instruments and process controllers as e.g. digital measuring indicator, series 9180, model 9163, model 9243 or DIGIFORCE® model 9307 **see section 9 of the catalog**

Strain gauge simulator as supporting accessory for creating strain gauge source signals in order to adjust amplifiers and monitors **Model 9405**

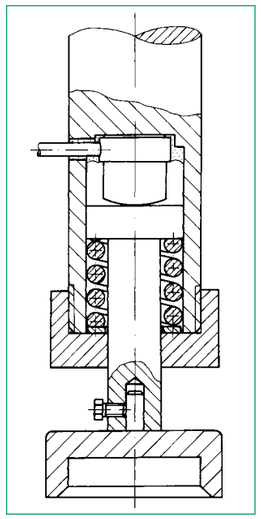
Dimensional drawing model 8402



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.

Application example

The load cell can be fastened either with wax or silicone to its lateral surface. An attachment is most appropriate by means of pre-loading (spring).
The two surfaces affecting the cell must be polished evenly and at any time react angular to the sensor axle as well as they have to be through-hardened (HRC 60).



Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Factory Calibration Certificate (WKS)

Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 84WKS-84...

2374-008402EN-5672-081524

Subminiature Load Cell

Model 8411

Code: 8411 EN
Delivery: 10 weeks
Warranty: 24 months

- **Very small dimensions**
- **Robust construction**
- **Made of stainless steel**
- **High resonance frequency**
- **For tensile and compressive forces**
- **Characteristic curve deviation < 0.5% F.S.**

Application

The sensors series 8411 have deliberately been given small dimensions, so that they can easily be incorporated into existing structures or fitted into locations where access is difficult. Tensile and compressive forces are introduced to the cylindrical sensor housing through the two threaded bolts. Typical applications for these subminiature load cells include their use as measuring devices in equipment construction in general, in production lines, in measurement and control equipment, test equipment and so forth.
The sensor is to be carefully screwed into place using the threaded bolts. Tools must not be used for assembly.
The force must only be applied centrally, along the center line, and only through the threads. Other fitted parts must not touch the sensor housing; it is recommended that adhesive is applied to the threads. Bending, flexing or torsion forces will cause errors in the measurements and can damage the sensor. To avoid overload during assembly, it is helpful if electrical connections are made to the sensor beforehand and if the measurement on the display is watched during the process.

Description

The forces to be measured are applied centrally to the load cell through the two threaded pins. One covering surface of the cylindrical sensor housing is implemented as a measuring element, with the strain gauge being applied to its inner side.
Under the influence of force, the full bridge circuit is unbalanced, and an output signal proportional to the force is generated.
A rigid compensation circuit board, 7 mm wide and 70 mm long, is located in the connecting cable to the sensor about 900 mm from the sensor body. This contains a resistor network for balancing the bridge and for temperature compensation. Removing the circuit board, or changing the cable length, will disturb the sensor's calibration figures.
The strong, rigid design leads to high natural frequencies up to 160 kHz as a result, which is beneficial for dynamic measurements. The active side is the thread next to the cable.

Technical Data

Order Code	Measuring Range	Dimensions [mm] ø D	H	B	L	M	ø K	Thread T	Resonance Frequency [kHz]	Charac-teristic Nominal [mV/V]	Torsional Moment max. [Nm]
8411-2,5	0 ... 2,5 N	12.7	6.6	7.4	5.1	2.2	1.9	M 3 x 0,5	3.0	15	0.45
8411-5	0 ... 5 N	12.7	6.6	7.4	5.1	2.2	1.9	M 3 x 0,5	4.0	15	0.45
8411-10	0 ... 10 N	12.7	6.6	7.4	5.1	2.2	1.9	M 3 x 0,5	7.0	2	0.45
8411-20	0 ... 20 N	12.7	6.6	7.4	5.1	2.2	1.9	M 3 x 0,5	11.0	2	0.45
8411-50	0 ... 50 N	12.7	6.6	7.4	5.1	2.2	1.9	M 3 x 0,5	18.0	2	0.45
8411-100	0 ... 100 N	12.7	6.6	7.4	5.1	2.2	1.9	M 3 x 0,5	26.0	2	0.45
8411-200	0 ... 200 N	12.7	6.6	7.4	5.1	2.2	1.9	M 3 x 0,5	40.0	2	0.45
8411-500	0 ... 500 N	12.7	6.6	7.4	5.1	2,2	1.9	M 3 x 0,5	67.0	2	0.45
8411-1000	0 ... 1000 N	19.1	9.7	-	7.9	4.6	2.5	M 6 x 1,0	85.0	2	2.25
8411-2000	0 ... 2000 N	19.1	9.7	-	7.9	4.6	2.5	M 6 x 1,0	98.0	2	2.25
8411-5000	0 ... 5000 N	19.1	9.7	-	7.9	4.6	2.5	M 6 x 1,0	167.0	2	2.25

Electrical values

Bridge resistance (full bridge):
measuring range ≤ 0 ... 5 N semiconductor strain gauge 500 Ω, nominal
measuring range ≥ 0 ...10 N foil strain gauge 350 Ω, nominal
Reference excitation voltage: 5 V DC
Nominal sensitivity: refer to table
Insulation resistance: > 5000 MΩ at 50 V DC
Shunt resistor: 59 kΩ ±0.1 %
The bridge output voltage, caused by a shunt resistor of value is given in the calibration protocol.

Environmental conditions

Range of operating temperature: - 55 °C ... + 120 °C
Nominal temperature range: + 15 °C ... + 70 °C
Influence of temperature on zero: ≤ ± 0.02 % F.S./K
Influence of temperature on sensitivity: ≤ + 0.02 % Rdg./K

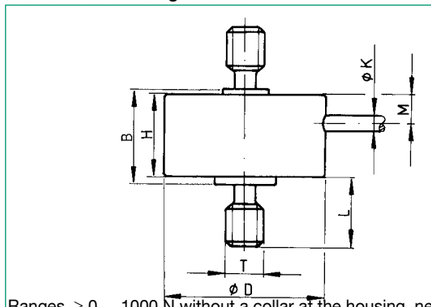
Mechanical values

Relative error: < ± 0.5 % F.S.
Relative hysteresis error: < ± 0.5 % F.S.
Relative variation: < ± 0.1 % F.S.
Kind of measurement: tensile and compressive forces, calibration in tensile direction (preferential direction)
On operation against preferential direction, you have to count with changed characteristics.
Deflection: 13 µm ... 38 µm
Maximum static load: 150 % of nominal load
Dynamic load: recommended 70 % of nominal load
possible 100 % of nominal load
Material: stainless steel 17-4 PH (similar to 1.4542)
Electrical connection:
High flexible, color coded, teflon isolated wire with open end for soldering. Length 1.5 m. Steep circuit board, width approximately 7 mm, length 70 mm, for bridge leveling, calibration and temperature compensation, 0.7 m away from the sensor body. Cable shield between sensor and circuit board.
Protection class: acc. to EN 60529 IP54
Wiring code: red excitation voltage positive
black excitation voltage negative
green signal output negative
white signal output positive
Dimensions: refer to table and dimensional drawing
Ranges ≥ 0 ... 1000 N have a steep cable cover at the sensor body length 7.6 mm, ø 2.5 mm.
Weight:
measuring range ≤ 0 ... 500 N without cable approx. 7 g
measuring range ≥ 0 ... 1000 N without cable approx. 19 g

Mounting Instructions

The force to be measured must be applied centrally, without transverse force, through the external thread. It is essential that the sensor is not exposed to clamping forces that act sideways, as this can cause errors in the measurement or damage to the sensor.
In order to ensure that the load cell is securely fastened in its proper position, adhesive can be applied to the thread. Suitable design, such as the provision of guides for mounted parts, must be used to ensure that buckling does not occur when compression forces are applied.
Take care when handling and fitting to ensure that the point where the cable emerges and the sensor connection cable are not subjected to unacceptably large tensile or bending forces. Proper strain relief may need to be provided.

Dimensional drawing model 8411



Ranges ≥ 0 ... 1000 N without a collar at the housing, near the thread.

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

Subminiature load cell
measuring range 0 ... 20 N **Model 8411-20**

Accessory

Connector
12 pin, suitable to all burster desktop devices **Model 9941**
9 pin, suitable to SENSORMASTER and DIGIFORCE®
Model 9900-V209

Installation of a connector to the sensor cable for primary use:
in preferential direction (positive measuring signal for tensile forces)
Order Code: 99004
only for connection to SENSORMASTER model 9163 desktop unit
Order Code: 99002
against preferential direction (positive measuring signal for compressive forces) **Order Code: 99007**
only for connection to SENSORMASTER model 9163 desktop unit
Order Code: 99008
Analysis units, amplifiers and controllers like amplifier module model 9243, digital indicator model 9180 or
DIGIFORCE® model 9307 **please refer to section 9 of the catalog**

Option

Standardization of characteristic in the sensor cable,
only for ranges ≥ 0 ... 10 N to 1.0 mV/V ± 0.5 % **...-V010**

Factory Calibration Certificate (WKS)

Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 84WKS-84...

2375-008411EN-5672-081524

Subminiature Load Cell

Model 8413
Model 8414 with overload protection

Code: 8413 EN
Delivery: ex stock
Warranty: 24 months

- **Measuring ranges 0 ... 2.5 N to 0 ... 5 kN**
- **Especially flat design from 3.3 mm**
- **Non-linearity 0.25 % of full scale**
- **Model 8414 with mechanical overload protection**
- **Temperature compensation - 55 °C ... 120 °C**
- **Made of high quality stainless steel**
- **High frequencies of resonance**

Application

This miniature force sensor was optimised with respect to its height and is, at only 3.4 mm, the lowest known sensor with strain gauge technology. Hardly higher than the diameter of its connection cable, it can also be housed in conditions where space is limited. Along with its minimal geometry, the force sensor is also particularly light. It has a high resonance frequency to follow quickly changing load alternations. Despite its extreme miniaturisation, in its application it remains completely robust and suitable for industry, not only with regard to the highly flexible cable connections or the full welding of sensors for the measurement ranges ≥ 0 … 10 N.

Examples of applications are

- ► Adjustment of gauges
- ► Force measurements on the inside of precision tools
- ► Monitoring of control elements
- ► Regulation of forces in medical technology
- ► Control instruments in precision machinery
- ► Adjustment and pre-load of devices
- ► Measurement technology in aircraft construction
- ► Fitting of test components and prototypes

Description

The miniature compression force sensors are flat, cylindrical discs with covered bottoms. The central load application button for taking on compression forces is an integrated part of the top, which is the sensor's membrane. On its bottom, the strain gauges are fixed on the inside of the housing and interconnected with a full Wheatstone bridge. This passes on, for force applications, an output voltage which is directly proportional to the size of the measurement.
The connection cable exits radially from the sensor housing and is additionally stabilised by a case for measurement ranges ≥ 0 … 10 N. The support area of the bottom of the sensor is circular, however arranged circularly for measurement ranges ≤ 0 … 5 N.

Technical Data

Model 8413

Order Code	Measuring Range	Dimensions [mm]									Resonance Frequency [kHz]	Nominal Value [mV/V]	Weight without Cable [g]
		Ø D 1	Ø D 2	Ø D 3	H 1	H 2	A	M	Ø L	Ø K			
8413-5002	0 ... 2.5 N	9.7	-*	2.3	3.3	2.6	11.0**	1.2	-	1.2	3	15	1.2
8413-5005	0 ... 5 N	9.7	-*	2.3	3.3	2.6	11.0**	1.2	-	1.2	4	15	1.2
8413-5010	0 ... 10 N	9.7	8.3	2.2	3.4	2.6	9.0	1.0	1.6	1.0	4	1	1.5
8413-5020	0 ... 20 N	9.7	8.3	2.2	3.4	2.6	9.0	1.0	1.6	1.0	6	1	1.5
8413-5050	0 ... 50 N	9.7	8.3	2.2	3.4	2.6	9.0	1.0	1.6	1.0	12	1	1.5
8413-5100	0 ... 100 N	9.7	8.3	2.2	3.4	2.6	9.0	1.0	1.6	1.0	15	1	1.5
8413-5200	0 ... 200 N	9.7	8.3	2.2	3.4	2.6	9.0	1.0	1.6	1.0	15	2	2.0
8413-5500	0 ... 500 N	12.7	10.0	3.0	3.8	3.3	10.5	1.0	1.6	1.0	16	2	3.0
8413-6001	0 ... 1000 N	12.7	10.0	3.0	3.8	3.3	10.5	1.0	1.6	1.0	20	2	3.0
8413-6002	0 ... 2000 N	19.1	16.0	6.4	6.4	5.7	13.7	1.5	1.6	1.0	13	2	10.0
8413-6005	0 ... 5000 N	19.1	16.0	6.4	6.4	5.7	13.7	1.5	1.6	1.0	15	2	10.0

Model 8414 with overload protection

Order Code	Measuring Range	Dimensions [mm]									Resonance Frequency [kHz]	Nominal Value [mV/V]	Weight without Cable [g]
		Ø D 1	Ø D 2	Ø D 3	H 1	H 2	A	M	Ø L	Ø K			
8414-5002	0 ... 2,5 N	9.4	-*	2.3	6.4	5.8	11.0**	4.2	-	1.2	3	12	3.8
8414-5005	0 ... 5 N	9.4	-*	2.3	6.4	5.8	11.0**	4.2	-	1.2	4	12	3.8
8414-5010	0 ... 10 N	9.7	7.0	2.2	6.4	5.6	9.0	4.0	1.6	1.0	4	1	4.0
8414-5020	0 ... 20 N	9.7	7.0	2.2	6.4	5.6	9.0	4.0	1.6	1.0	6	1	4.0
8414-5050	0 ... 50 N	9.7	7.0	2.2	6.4	5.6	9.0	4.0	1.6	1.0	12	1	4.0
8414-5100	0 ... 100 N	9.7	7.0	2.2	6.4	5.6	9.0	4.0	1.6	1.0	15	1	4.0

* Measurement ranges ≤ 0 … 5 N have circular contact surfaces on the bottom with Ø 8.5 mm
** Cable at this length rigid but without a case

Electrical values

Bridge resistance (full bridge):
measuring ranges ≤ 0 ... 5 N semiconductor 500 Ω, nominal
measuring ranges ≥ 0 ...10 N foil 350 Ω, nominal
Excitation: 5 V DC
Nominal value: refer to table
Insulation resistance: > 5000 MΩ by 50 V DC
Shunt calibration resistor:
measuring ranges ≤ 0 ... 5 N 10 kΩ ± 0.1 %
measuring ranges 0 ... 10 N to 0 ... 100 N 100 kΩ ± 0.1 %
measuring ranges ≥ 0 ... 200 N 59 kΩ ± 0.1 %
The bridge output voltage caused by a shunt of this value is shown in the calibration certificate.

Environmental conditions

Range of operating temperature: - 55 °C ... + 120 °C
Nominal temperature range: + 15 °C ... + 70 °C
Influence of temperature on zero: ≤ ± 0.02 % F.S./K
Influence of temperature on sensitivity: < + 0.02 % Rdg./K

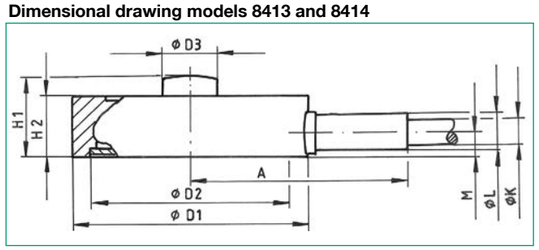
Mechanical values

Non-linearity: < ± 0.5 % F.S.
Accuracy: < ± 0.5 % F.S.
Non-repeatability: < ± 0.1 % F.S.
Deflection full scale:
measuring ranges ≤ 0 ... 5 N 13 µm ... 38 µm
measuring ranges ≥ 0 ...10 N 25 µm ... 50 µm
Static overload capacity: model 8413, 150 % of nominal load
Maximum static overload stop: model 8414, 500 % of nominal load
Dynamic load: recommended 70 % of nominal load
maximum 100 % of nominal load
Material: stainless steel 17-4 PH (similar to 1.4542)
Electrical connection: length approx. 1.5 m
Measuring range ≤ 0 ... 5 N
Highly flexible teflon isolated with open ends for soldering. Length approx. 1.5 m. Steep board, with approx. 7 mm, length 50 mm, for bridge balance, calibration and temperature compensation approx. 0.6 m away from the sensor body. Open cable shielding between sensor and board. Covered in housing without case.
Measuring range ≤ 0 ... 10 N
Shielded, highly flexible, Teflon-insulated cable, 1 mm diameter. Minimal bend radius 15 mm, for static use 10 mm.
Protecting class: measuring range ≤ 0 ... 10 N acc. to EN 60529 IP54

Wiring code:			
	red	excitation voltage	positive
	black	excitation voltage	negative
	green	signal output	negative
	white	signal output	positive

Dimensions: refer to table and dimensional drawing
Weight: refer to table

Dimensional drawing models 8413 and 8414



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

Subminiature load cell, measuring range 0 ... 50 N **8413-5050**

Accessories

Connector
12 pin, suitable to all burster desktop devices **Model 9941**
9 pin, suitable to SENSORMASTER and DIGIFORCE® **Model 9900-V209**

Mounting of mating connector to conductor cable **Oder Code: 99004**

Only for connection of sensor to SENSORMASTER Model 9163 desktop housing **Oder Code: 99002**

Amplifiers, sensor supply instruments and process controllers as e.g. digital indicator model 9163, model 9243 or DIGIFORCE® 9307 **refer to section 9 of the catalog.**

Option

Standardization of the nominal value only for measuring range ≥ 0 ... 10 N in the connection cable to 1.0 mV/V ± 0.25 % **...-V010**

Extension of the nominal temperature range to - 55 ° ... 120 °C for measuring range ≥ 0 ... 10 N **...-Vx1xxxxx**

Factory Calibration Certificate (WKS)

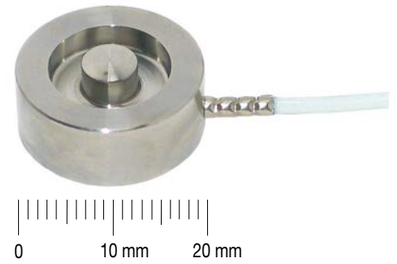
Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 84WKS-84...

2376-008413EN-56722-081524

Miniature Load Cell

Model 8415

Code: 8415 EN
Delivery: ex stock
Warranty: 24 months



- **Measuring ranges from 0 ... 200 N up to 0 ... 5000 N**
- **Smallest dimensions**
- **Inexpensive**
- **Made of stainless steel**

Application

Due to their small dimensions and sturdy construction, these miniature compression load cells made of stainless steel can be used in a wide range of industrial applications and in laboratories. This compression load cell is easy to handle and its installation is uncomplicated. Its small size makes it perfect for use in very restricted structures for both static and dynamic compression force measurements.

You can apply this miniature compression load cell as a measuring element in

- ► Fully automated production centers
- ► Measuring and controlling equipment
- ► Precision mechanics
- ► Tool manufacturing
- ► Equipment construction, etc.

Description

The miniature compression load cell model 8415 is a flat cylindrical disc, the bottom of which is closed with a cover. The load application button for receiving the compression forces is an integrated part of the sensor.
A strain gauge full bridge is applied in the gauging member of the measuring element. This produces bridge output voltage directly proportional to the measured force. The small diameter of the sensors results in high rigidity and a short measurement range. The measuring force has to be applied centrically and free from lateral forces. The sensor has to be mounted on a smooth and even surface.

Technical Data

Order Code	Measuring Range	Dimensions [mm]					Resonance Frequency [kHz]
		ø D1	ø D2	ø D3	H1	H2	
8415-5200	0 ... 200 N	20	6	16	5.5	7	2.0
8415-5500	0 ... 500 N	20	6	16	5.5	7	4.0
8415-6001	0 ... 1000 N	20	6	16	8	9	6.5
8415-6002	0 ... 2000 N	20	6	16	8	9	10.5
8415-6005	0 ... 5000 N	20	6	16	8	9	20.0

Electrical values

Bridge resistance (full bridge): foil strain gauge 350 Ω, nominal
Excitation: 5 V DC
Nominal sensitivity: 1 mV/V, nominal*
Insulation resistance: > 10 MΩ
Calibration resistor: 100 kΩ ± 0.1 %
The bridge output voltage, resulting from a shunt of this value, is shown in the calibration certificate.

*Deviations from the stated value are possible.

Environmental conditions

Operating temperature: 0 °C ... + 80 °C
Nominal temperature range: + 15 °C ... + 70 °C
Influence of temperature on zero: ≤ ± 1.50 % F.S./50 K
Influence of temperature on sensitivity: ≤ + 1.50 % Rdg./50 K

Mechanical values

Non-linearity:
measuring range ≤ 0 ... 2000 N < 0.5 % F.S.
measuring range 0 ... 5000 N < 0.75 % F.S.
Hysteresis:
measuring range ≤ 0 ... 2000 N < 0.25 % F.S.
measuring range 0 ... 5000 N < 0.5 % F.S.
Non-repeatability on unchanged mounting position: < 0.2 % F.S.
Deflection, full scale: approx. 30 µm
Static overload safe: 150 % of capacity
Dynamic performance:
recommended 50 % of capacity
maximum 70 % of capacity
Material: High-grade stainless steel 1.4542
Electrical connection:
shielded, TPE coated cable with bare ends for soldering, length approx. 2 m, bending radius ≥ 10 mm, drag chain qualified
Protection class: acc. to EN 60529 IP54
Wiring code:
white excitation voltage positive
brown excitation voltage negative
yellow signal output positive
green signal output negative
Dimensions: see table and scale drawing
General tolerances of dimensioning: acc. to ISO 2768-f
Weight: approx. 20 g

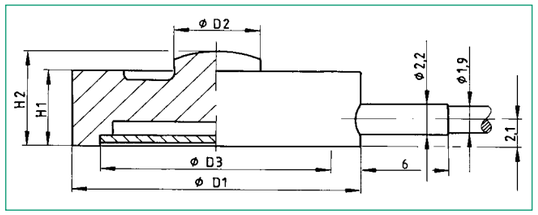
Mounting Instructions

The measurement force must be introduced centrically and without any lateral forces. To prevent contact at just a few points, ensure that the sensor is installed on a flat surface.

The sensor can be secured, for example, with silicon, wax or adhesive cement. Do not subject the sensor to lateral clamping forces as these would lead to measurement errors.

When handling and installing the sensor, ensure that the cable outlet and sensor cable are not subject to excessively high tensile or lateral forces. Strain relief may be necessary.

Dimensional drawing model 8415



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

Miniature load cell, measuring range 0 ... 200 N **Model 8415-5200**

Accessories

Mating connector
12 pins, to all burster table housings **Model 9941**
9 pins, suitable to SENSORMASTER and DIGIFORCE®
Order code: 9900-V209
Mounting of mating connector to conductor cable
Order Code: 99004
Only for connection of 8415 to SENSORMASTER model 9163 desktop version
Order Code: 99002

Amplifiers, sensor supplying instruments and process controllers as e.g. digital measuring indicator, series 9180, modular amplifier, model 9243 or DIGIFORCE® model 9307
refer to section 9 of the catalog.

Strain gauge simulator as supporting accessory for creating strain gauge source signals in order to adjust amplifiers and monitors
Model 9405

Option

Standardization of the sensitivity in the sensor connection cable to 0.8 mV/V ± 0.5 % **Order Code ...-V008**

Order Information

Miniature load cell **Model 8415-5500-V008**
measuring range 0 ... 500 N
standardization of sensitivity to 0.8 mV/V

Factory Calibration Certificate (WKS)

Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 84WKS-84...

2377-008415EN-5672-081524

Ultra-Miniature Load Cell

Model 8416

Code: 8416 EN
Delivery: ex stock
Warranty: 24 months

Original size

NEW
now measuring ranges from 0 ... 20 N

- **Inexpensive**
- **Measuring ranges from 0 ... 20 N to 0 ... 5 kN**
- **Dragchain cable**
- **Option standarization the nominal sensitivity**
- **Option temperature compensated range - 40 °C ... 90 °C**

Application

Due to their extremely compact design, these load cells can be used wherever static or dynamic load forces have to be measured in very tight spaces.

Model 8416 is perfect for use in micro-technology and just as suitable for measuring tasks in the research and development sector.

Typical applications for these ultra-miniature compression load cells include

- Equipment construction
- Production lines
- Measuring and control equipment
- Testing systems
- Handling gear
- Universal testing machines, etc.

Description

The ultra-miniature compression load cell model 8416 is a flat, circular disc, the bottom of which is sealed with a cover. The load application button for receiving the compression forces is an integrated part of the sensor.

The sensor element inside the body carries a strain gauge full bridge which outputs voltage directly proportional to the measurement variable upon application of force.

The short nominal measurement distance of the ultra-miniature compression load cells due to their design provides a high degree of rigidity. If needed, the nominal characteristic value can be standardized in the sensor connection cable. This allows for quick and easy interchange or simultaneous connection of several sensors to a single evaluation unit.

Technical Data

Order Code	Measuring Range	Dimensions [mm]					Resonance Frequency [kHz]
		ø D1	ø D2	ø D3	H1	H2	
8416-5020-V100	0 ... 20 N	10.6	3	7.6	4.5	5	6
8416-5050-V100	0 ... 50 N	10.6	3	7.6	4.5	5	6
8416-5100	0 ... 100 N	10.6	3	7.6	4.5	5	6
8416-5200	0 ... 200 N	10.6	3	7.6	4.5	5	20
8416-5500	0 ... 500 N	10.6	3	7.6	5.5	6	18
8416-6001	0 ... 1000 N	10.6	3	7.6	6.5	7	30
8416-6002	0 ... 2000 N	10.6	3	7.6	6.5	7	45
8416-6005	0 ... 5000 N	12.6	3	7.6	6.5	7.5	80

Electrical values

Bridge resistance:	350 Ω, nominal*
Excitation:	5 V DC
Nominal sensitivity:	1 mV/V, nominal*
Insulation resistance:	> 10 MΩ

*Deviations from the stated value are possible.

Environmental conditions

Nominal temperature range:		
measuring range	≤ 0 ... 50 N	+ 15 °C ... + 60 °C
measuring range	≥ 0 ...100 N	+ 15 °C ... + 70 °C
Operating temperature:		0 °C ... + 80 °C
Influence of temperature on zero:		≤ ± 0.3 % F.S./10 K
Influence of temperature on sensitivity:		≤ ± 0.3 % Rdg./10 K

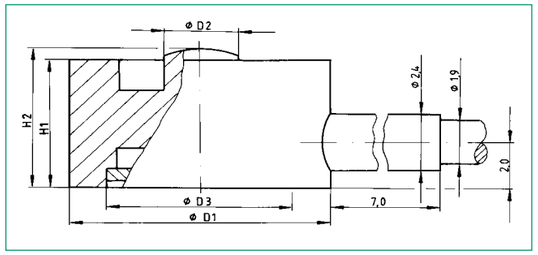
Mechanical values

Non-linearity:		< 0.5 % F.S.
Hysteresis:		0.25 % F.S.
Non-repeatability on unchanged mounting position:		< 0.1 % F.S.
Deflection:		approx. 20 µm
Static overload safe:		150 % of capacity
Dynamic performance:		
recommended		50 % of capacity
maximum		70 % of capacity
Material:		High-grade stainless steel 1.4542
Electrical connection:		
shielded, dragchain TPE coated cable with bare ends for soldering, PUR coat, length approx. 2 m, bending radius ≥ 20 mm moving, ≥ 6 mm rigidly laid		
Protection class:	acc. to EN 60529	IP54
Wiring code:		
white	excitation voltage	positive
brown	excitation voltage	negative
yellow	signal output	positive
green	signal output	negative
Dimensions:		refer to table and scale drawing
General tolerance of dimensioning:		acc. to ISO 2768-f
Weight:		approx. 10 g without cable

Mounting Instructions

The measuring force is to be applied centrically and free from lateral force. To prevent contact at just a few points, ensure that the sensor is installed on a flat surface.
The sensor can be secured using silicon, wax or an adhesive for example. Do not subject the sensor to lateral clamping forces as these would result in measurement errors.
When handling and installing the sensor, ensure that the cable outlet and sensor cable are not subjected to excessively high tensile or lateral forces. Strain relief may be necessary.

Dimensional drawing model 8416



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

Ultra-miniature compression load cell, measuring range 0 ... 200 N **Model 8416-5200**

Accessories

Mating connector
12 pins, to 9180 and 9186 in table housings **Model 9941**
9 pins, to TRANS CAL, SENSORMASTER and DIGIFORCE® **Order Code: 9900-V209**

Mounting of a connector to the sensor cable **Order Code: 99004**

Only for connection of 8415 to SENSORMASTER model 9163 desktop version **Order Code: 99002**

Amplifiers, sensor supplying instruments and process controllers as e.g. digital measuring indicator for strain gauges model 9180, model 9163, modular amplifier model 9243
refer to section 9 of the catalog.

Option

Standardization of the sensitivity in the sensor connection cable, only for measuring ranges > 0 ... 100 N to 0.8 mV/V ± 0,25 % **...-V008**

Extension of temperature compensated range
- 40 °C ... 90 °C **...-V420**

Temperatures < - 20 °C: not approved for moving cable

Factory Calibration Certificate (WKS)

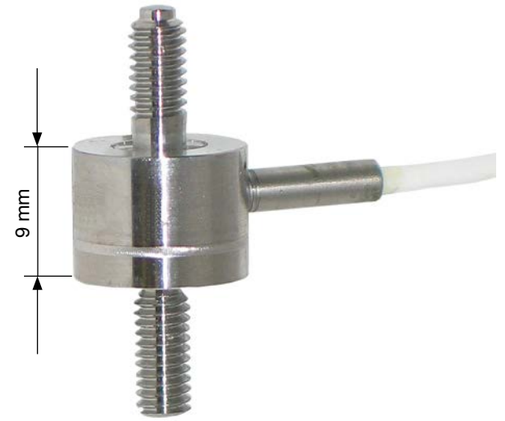
Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 84WKS-84...

2378-008416EN-5672-081524

Subminiature Load Cell Tension/Compression

Model 8417

Code:	8417 EN
Delivery:	ex stock
Warranty:	24 months



Original size

NEW
measuring ranges from 0 ... 50 N

- **Measuring ranges from 0 ... 50 N to 0 ... 5 kN**
- **Very small dimensions**
- **Made of stainless steel**
- **Rugged construction**
- **Simple screw mounting**

Application

This tension/compression load cell is an especially small component, which can be easily integrated in a girder assembly between two cables or chains for measuring force. The outside threadings along its axis of symmetry can accommodate various adapters or are suitable for screwing into a threaded hole that is quick and easy to produce.

The radial connection cable is extremely flexible and designed for a wide range of motion. In order to achieve the greatest possible stability for such a small sensor, making it suitable not only for the laboratory but also for industrial use, all parts have been welded together including the cable guide bush in the sensor housing.

Typical areas of application include the determining forces in Bowden cable, testing the durability of soldered and welded joints, measuring tractive forces of plug connections or monitoring forces when winding cables onto cable reels.

Description

Load cell model 8417 measures the tension or compression force between both axially mounted metric exterior threads on the cylindrical sensor housing. Forces are only applied to the threadings, which are especially long, to accommodate counter nuts and must not be affected by external influences such as bending, lateral force or torsion.
Any contact with units affixed to the sensor housing - even on the front - must be avoided.

The measurement element is a membrane perpendicular to the axis of the sensor with a strain gauge full bridge applied to the inner surface, which requires stable excitation with a rated value of approx. 1.2 mV/V.
The connection cable is fed radially through a sleeve from the housing. Standardization of the output signal in the cable to 1.0 mV/V is optional.

Technical Data

Order Code	Measuring Range	Dimensions [mm] Ø D	H	L	A	B	Thread T	Weight with / without Cable [g]
8417-5050	0 ... 50 N	12.0	9.0	9.5	14.0	4.1	M4 x 0,7	20 / 8
8417-5100	0 ... 100 N	12.0	9.0	9.5	14.0	4.1	M4 x 0,7	20 / 8
8417-5200	0 ... 200 N	12.0	9.0	9.5	14.0	4.1	M4 x 0,7	20 / 8
8417-5500	0 ... 500 N	12.0	9.0	9.5	14.0	4.1	M4 x 0,7	20 / 8
8417-6001	0 ... 1000 N	12.0	9.0	9.5	14.0	4.1	M4 x 0,7	20 / 8
8417-6002	0 ... 2000 N	20.0	12.0	14.0	18.0	6.6	M6 x 1.0	40 / 28
8417-6005	0 ... 5000 N	20.0	12.0	14.0	18.0	6.6	M6 x 1.0	40 / 28

Electrical values

Bridge resistance:
- measuring range 0 ... 50 N: 500 Ω, nominal*
- measuring range ≥ 0 ... 100 N: 350 Ω, nominal*

Excitation: 5 V DC

Nominal value:
- measuring range 0 ... 50 N: 5 ... 30 mV/V, nominal*
- measuring range ≥ 0 ... 100 N: 1.2 mV/V, nominal*

Insulation resistance: > 10 MΩ

*Deviations from the stated value are possible.

Environmental conditions

Nominal temperature range:
- measuring range 0 ... 50 N: + 15 °C ... + 60 °C
- measuring range ≥ 0 ... 100 N: + 15 °C ... + 70 °C

Range of operating temperature:0 °C ... + 80 °C

Influence of temperature on zero:
- measuring range 0 ... 50 N: ≤ ± 2.5 % F.S./50 K
- measuring range ≥ 0 ... 100 N: ≤ ± 1.5 % F.S./50 K

Influence of temperature on sensitivity:
- measuring range 0 ... 50 N: ≤ ± 2.5 % Rdg./50 K
- measuring range ≥ 0 ... 100 N: ≤ ± 1.5 % Rdg./50 K

Mechanical values

Combined value consisting of non-linearity, hysteresis and non-repeatability, in installation position:
- measuring range ≤ 0 ... 500 N: < ± 0.9 % F.S.
- measuring range ≥ 0 ... 1000 N: < ± 0.5 % F.S.

Kind of measurement: compressive and tensile forces
calibration in tensile direction (preferential direction)
Upon operation against the preferential direction a changed characteristic is possible.

Deflection, full scale: max. 20 µm

Static overload safe: 100 % of capacity

Overload: 200 % of capacity

Dynamic performance: recommended 50 % of capacity
maximum 70 % of capacity

Material: 1.4542

Electrical connection: measuring range ≤ 0 ... 50 N shielded, PTFE coated cable with an open end for soldering. Circuit board (70 x 8 mm) with balance resistors 30 cm away from the cable's end, drag chain qualified.

Range ≤ 0 ... 500 N: shielded, TPE coated cable with an open end for soldering, drag chain qualified.

Cable length: 2 m

Bending radius: 30 mm

Protection class: acc. to EN 60529 IP54

Wiring code:

white	excitation voltage	positive
brown	excitation voltage	negative
green	signal output	negative
yellow	signal output	positive

Dimensions: refer to drawing

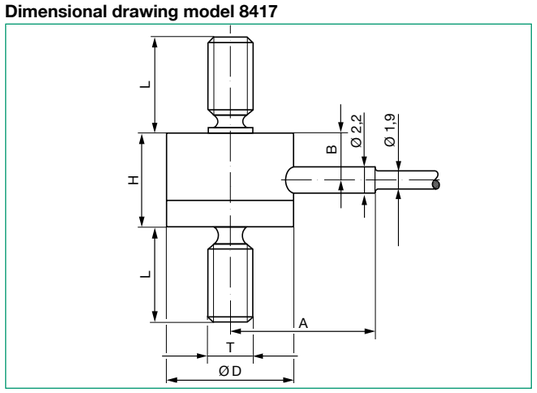
General tolerance of dimensioning: acc. to ISO 2768-f

Weight: refer to table

Mounting Instructions

The measuring force has to be applied centrically and free from lateral force via the exterior threading. All lateral loading forces must be kept away from the sensor as they could result in incorrect measurements or damage.
In order to ensure that the force sensor is securely fitted, it is possible to affix it to the threading with adhesive. When applying compression force, appropriate means (e.g. attachments) are to be used to prevent buckling.
During handling and installation it is important to ensure that the cable outlet and sensor connection cable are not subject to too much tensile or bending force. Effective strain relief may be necessary.

Dimensional drawing model 8417



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

Subminiature load cell tension/compression,
measuring range 0 ... 500 N **Model 8417-5500**

Accessories

Mating connector
12 pins, to all burster table housings **Model 9941**
9 pins, to SENSORMASTER and DIGIFORCE®
Order code: 9900-V209

Mounting of a mating connector for preferential usage of the sensor in preferential direction (positive signal in tensile direction)
Order Code: 99004

Only for connection to SENSORMASTER model 9163 desktop version **Order Code: 99002**

Against preferential direction (positive signal in compressive direction)
Oder Code: 99007

Only for connection to SENSORMASTER model 9163 desktop version **Oder Code: 99008**

Evaluation electronics, amplifiers and process controllers, e.g. digital indicators for strain gauges model 9163, 9180, amplifier module model 9243 or DIGIFORCE® 9307 **refer to section 9 of the catalog.**

Strain gauge simulator for creating a strain gauge signal in order to adjust amplifiers and indicators. **Model 9405**

Option

Standardization in preferential direction to 0.8 mV/V ± 0,25 % in the sensor cable. Only for ranges > 0 ... 500 N. **...-V008**

Factory Calibration Certificate (WKS)

Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 84WKS-84...

2379-008417EN-5672-081524

Precision Load Cell

Model 8431
Model 8432 with overload protection

Code: 8431 EN
Delivery: ex stock
Warranty: 24 months

- **Small dimensions**
- **For tension and compression forces**
- **Temperature compensation starting at - 55 °C and up to 200 °C optional**
- **Minimum lateral sensitivity due to supporting membranes**
- **Measurement accuracy from 0.2 % F.S.**
- **Measurement ranges from 0 ... 2.5 N to 0 ... 100 kN**
- **Model 8432 with overload protection for directions tension and compression**

Application

Precise tension and compression force measurements can be performed in limited space with model 8431 and 8432 precision miniature load cells. High precision, various measuring ranges, convenient load application via threaded pins with external winding and small dimensions offer a wide scope of applications in laboratories and production.

The series are among our most precise and yet mechanically sturdy miniature load cells. All options, typical only for larger load cells, are available with this miniature series such as hermetically sealed construction, overload protection and boring for pressure compensation when applied under vacuum.

Its complex design with integrated support membranes and overload protection reduces additional construction effort for external overload protection or guidance of force of applied parts in many applications. This requires little space, has little material and weight and almost no component friction, which could falsify the measurement result.

The connection cable suitable for robot applications make the precision miniature load cells especially suitable for use in the areas of special purpose

- ► Machinery manufacture
- ► Tool manufacturing
- ► Handling gear

Description

The force to be measured is applied to the cylindrical sensor unit in the tension or compression direction by means of the two external threads. This means that the sensor must be mounted without any attachments touching the end faces of the sensor housing. This avoids excessive contact pressures on the material and tensions inside the sensor that would affect its measuring element. Please refer to the sensor user manual for guidance on the various options for fitting the sensor, which depend amongst other factors on its measurement range. Although the precision miniature load cell is designed to isolate the measuring element from external forces, torsion and bending moments should be avoided.

Two stabilizing support diaphragms inside the sensors for small measurement ranges minimize the effect of transverse forces and moments and ensure long-term mechanical stability for measurements.

The network for temperature compensation or standardization of the output signal is located on a sheathed circuit board in a wider section of the sensor's connecting cable.

The maximum static operational force is the maximum force in the direction of the measurement axis that the sensor can tolerate. The overload protection is not designed for frequent use of the sensor in the overload range or for sudden loads. The sensors work in any orientation. They have an active side which acts directly on the measuring element, whereas the passive side is fixed to the housing.

Technical Data

Model 8431

Order Code	Measurement Range	Dimensions [mm] ø D	H	Thread T	C	A	F	G	B
8431-5005	0 ... 5 N	25.4	12.7	M 4 x 0.7	6.4	17.4	2.8	0.8	5.9
8431-5010	0 ... 10 N	19.0	12.7	M 4 x 0.7	6.4	17.4	1.3	0.4	5.9
8431-5020	0 ... 20 N	19.0	12.7	M 4 x 0.7	6.4	17.4	1.3	0.4	5.9
8431-5050	0 ... 50 N	19.0	12.7	M 4 x 0.7	6.4	17.4	1.3	0.4	5.9
8431-5100	0 ... 100 N	25.4	16.0	M 5 x 0.8	6.4	25.4	2.8	0.2	6.6
8431-5200	0 ... 200 N	25.4	16.0	M 5 x 0.8	6.4	25.4	2.8	0.2	6.6
8431-5500	0 ... 500 N	25.4	16.0	M 5 x 0.8	6.4	25.4	2.8	0.2	6.6
8431-6001	0 ... 1 kN	25.4	14.0	M 6 x 1.0	9.7	25.4	0.8	0.5	7.0
8431-6002	0 ... 2 kN	25.4	14.0	M 6 x 1.0	9.7	25.4	0.8	0.5	7.0
8431-6005	0 ... 5 kN	25.4	14.0	M 6 x 1.0	9.7	25.4	0.8	0.5	7.0
8431-6010	0 ... 10 kN	25.4	19.1	M 10 x 1.5	12.7	25.4	0.8	-	6.5
8431-6020	0 ... 20 kN	31.8	25.4	M 12 x 1.5	16.0	28.6	0.3	-	14.2
8431-6040	0 ... 40 kN	35.0	28.7	M 20 x 1.5	22.4	30.3	0.5	-	15.0
8431-6050	0 ... 50 kN	35.0	28.7	M 20 x 1.5	22.4	30.3	0.5	-	15.0
8431-6100	0 ... 100 kN	60.0	48.0	M 30 x 2.0	42.0	45.0	0.5	-	23.6

Model 8432 with bidirectional overload protection

Order Code	Measurement Range	Dimensions [mm] ø D	H	Thread T	C	A	F	G	B
8432-5002	0 ... 2.5 N	25.4	21.9	M 4 x 0.7	6.4	25.4	2.8	0.2	9.6
8432-5005	0 ... 5 N	25.4	21.9	M 4 x 0.7	6.4	25.4	2.8	0.2	9.6
8432-5010	0 ... 10 N	25.4	21.9	M 4 x 0.7	6.4	25.4	2.8	0.2	9.6
8432-5020	0 ... 20 N	25.4	21.9	M 4 x 0.7	6.4	25.4	2.8	0.2	9.6
8432-5050	0 ... 50 N	25.4	21.9	M 4 x 0.7	6.4	25.4	2.8	0.2	9.6
8432-5100	0 ... 100 N	25.4	21.9	M 5 x 0.8	6.4	25.4	2.8	0.2	9.6
8432-5200	0 ... 200 N	25.4	21.9	M 5 x 0.8	6.4	25.4	2.8	0.2	9.6
8432-5500	0 ... 500 N	25.4	21.9	M 5 x 0.8	6.4	25.4	2.8	0.2	9.6
8432-6001	0 ... 1 kN	31.8	23.9	M 6 x 1.0	8.0	29.4	2.4	0.4	10.8
8432-6002	0 ... 2 kN	38.1	26.7	M 6 x 1.0	9.6	31.8	0.7	0.4	14.9

Electrical values

Bridge resistance: (full bridge):
- measuring range ≤ 0 ... 5 N: semi conductor strain gauge 500 Ω, nominal
- measuring range ≥ 0 ... 10 N: foil strain gauge 350 Ω, nominal

Reference excitation voltage:
- measuring range ≤ 0 ... 50 N: 5 V DC or AC
- measuring range ≥ 0 ... 100 N: 10 V DC or AC

Nominal sensitivity:
- measuring range ≤ 0 ... 5 N: 15 mV/V ... 40 mV/V, nominal
- measuring range 0 ... 10 N: 1.5 mV/V, nominal
- measuring range ≥ 0 ... 20 N: 2 mV/V, nominal

Insulation resistance: 5000 MΩ at 50 V DC

Calibration resistor: 59 kΩ ± 0.1 %
The bridge output voltage caused by a shunt of this value is given in the calibration protocol.

Environmental conditions

Range of operating temperature: - 55 °C ... +120 °C

Nominal temperature range: + 15 °C ... + 70 °C

Influence of temperature on zero:
- measuring range ≤ 0 ... 5 N: ≤ ± 0.05 % F.S./K
- measuring range ≥ 0 ...10 N: ≤ ± 0.03 % F.S./K

Influence of temperature on sensitivity:
- measuring range ≤ 0 ... 5 N: ≤ ± 0.05 % F.S./K
- measuring range ≥ 0 ...10 N: ≤ ± 0.03 % F.S./K

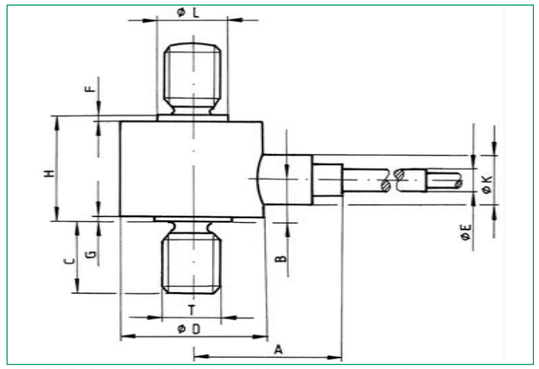
Mechanical Value

Measurement error, consisting of relative non-linearity:
- measuring range ≤ 0 ... 1 kN: < ± 0.15 % F.S.
- measuring range ≥ 0 ... 2 kN: < ± 0.2 % F.S.

Relative hysteresis:
- measuring range 0 ... 5 N: < 0.3 % F.S.
- measuring range ≥ 0 ... 10 N: < 0.2 % F.S.

Kind of measurement: Tensile and compressive forces
calibration in tensile direction (preferential direction) expect a changed characteristic, if using the sensor against the preferential direction.

Dimensional drawing models 8431 and 8432



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.

Maximum static force in operation:
model 8431
- all measuring range: bidirectional 150 % of nominal load

model 8432
- all measuring range: bidirectional 100 % of nominal load

Maximum static load to overload stop:
model 8432
- measuring range ≤ 0 ... 500 N: bidirectional 500 % of nominal load
- measuring range 0 ... 1000 N: bidirectional 250 % of nominal load
- measuring range 0 ... 2000 N: bidirectional 200 % of nominal load

Dimensions: refer to table and dimensional drawing

2380-008431EN-5672-081524

Technical Data

Model 8431

Order Code	Measurement Range	Dimensions [mm] ø K	ø L	ø E	Resonance Frequency [kHz]	Weight [g] with / without Cable	Thread Adapter* Model
8431-5005	0 ... 5 N	4.8	9.6	-	0.3	25 / 18	8431-Zx01
8431-5010	0 ... 10 N	4.8	5.9	2.5	0.3	25 / 18	8431-Zx01
8431-5020	0 ... 20 N	4.8	5.9	2.5	0.7	25 / 18	8431-Zx01
8431-5050	0 ... 50 N	4.8	5.9	2.5	0.9	25 / 18	8431-Zx01
8431-5100	0 ... 100 N	6.4	6.6	3.6	1.2	65 / 34	8431-Zx02
8431-5200	0 ... 200 N	6.4	6.6	3.6	2.7	65 / 34	8431-Zx02
8431-5500	0 ... 500 N	6.4	6.6	3.6	3.3	65 / 34	8431-Zx02
8431-6001	0 ... 1000 N	6.4	7.0	3.6	5.3	68 / 40	-
8431-6002	0 ... 2000 N	6.4	7.0	3.6	7.5	68 / 40	-
8431-6005	0 ... 5000 N	6.4	7.0	3.6	9.7	68 / 40	-
8431-6010	0 ... 10 kN	9.5	6.5	3.6	1.3	88 / 60	-
8431-6020	0 ... 20 kN	9.5	14.2	3.6	1.0	144 / 124	-
8431-6040	0 ... 40 kN	9.5	15.0	3.6	1.0	264 / 238	-
8431-6050	0 ... 50 kN	9.5	25.0	3.6	1.0	264 / 238	-
8431-6100	0 ... 100 kN	13.0	23.6	-	0.5	1150 / 1124	-

Model 8432 with bidirectional overload protection

Order Code	Measurement Range	Dimensions [mm] ø K	ø L	ø E	Resonance Frequency [kHz]	Weight [g] with / without Cable	Thread Adapter* Model
8432-5002	0 ... 2.5 N	9.7	9.6	-	0.2	92 / 68	8432-Zx01
8432-5005	0 ... 5 N	9.7	9.6	-	0.2	92 / 68	8432-Zx01
8432-5010	0 ... 10 N	9.5	9.6	3.6	0.2	92 / 68	8432-Zx01
8432-5020	0 ... 20 N	9.5	9.6	3.6	0.35	92 / 68	8432-Zx01
8432-5050	0 ... 50 N	9.5	9.6	3.6	0.6	92 / 68	8432-Zx01
8432-5100	0 ... 100 N	6.4	9.6	3.6	1.2	92 / 68	8432-Zx02
8432-5200	0 ... 200 N	6.4	9.6	3.6	2.7	92 / 68	8431-Zx02
8432-5500	0 ... 500 N	6.4	9.6	3.6	3.3	92 / 68	8432-Zx02
8432-6001	0 ... 1000 N	9.5	10.8	3.6	3.4	142 / 125	8432-Zx03
8432-6002	0 ... 2000 N	9.5	14.5	3.6	3.8	238 / 210	8432-Zx04

* By ordering studs as spare parts, state serial number of the load cell.

Dynamic load:
- recommended: 70 % of nominal load
- possible: 100 % of nominal load

Deflection: 15 µm ... 50 µm

Material: stainless steel 17-4 PH (similar to 1.4542)

Electrical connection:
Shielded, high flexible, Teflon isolated cable, length approx. 1.5 m, diameter 2.0 mm. The cable has a 50 mm bend protection at the sensor body, outer diameter ø B = 3.6 mm. The minimum bending radius of the cable is 30 mm, or 8 mm at static operations.

Only model 8431-6100, measuring range 0 ... 100 kN
High flexible, Teflon isolated strands, length approx. 1.5 m, overall diameter 2.5 mm; minimum bending radius of the cable 20 mm, or 5 mm for static operations. There is no bend protection available. Cable port with PG screwing mini M8.

Protection class: acc. to EN 60529 IP65

Wiring code:

red	excitation voltage	positive
black	excitation voltage	negative
green	output signal	negative
white	output signal	positive

Dimensions: refer to table and dimensional drawin

Wiring for submarine cable:

red	excitation voltage	positive
brown	excitation voltage	negative
yellow	output signal	negative
orange	output signal	positive

Dimensions: refer to table and dimensional drawing

Weight: see table

General tolerance of dimensioning: acc. to ISO 2768-f

Order Information

Precision miniature load cell, measurement range 0 ... 2000 N
state options additionally **8431-6002**

Options

Extension of the nominal temperature range
to -30 °C ... 95 °C for measuring ranges ≥ 0 ... 100 N **...-VxExxxxx**

Extension of the nominal temperature range
to 20 °C ... 120 °C for all measuring ranges available **...-VxFxxxx**

Extension of the nominal temperature range
to 20 °C ... 160 °C for measuring ranges ≥ 0 ... 100 N **...-VxGxxxxx**

Extension of the nominal temperature range
to 20 °C ... 200 °C, for measuring ranges ≥ 0 ... 100 N **...-VxHxxxxx**

Extension of the nominal temperature range
to -55 °C ... 120 °C for measuring ranges ≥ 0 ... 20 N **...-VxIxxxxx**

Submarine cable, up to 80 °C, pressure proof up to 35 bar,
length of cable 3 m, diameter of cable 7.3 mm, bending radius 60 mm
Please inform us, if you wish another cable length.
Although the dimensions A and ∅ B - see drawing - are changing to A = 90 mm, ∅ B = 12.7 mm. **...-VxxxIxxx**

Note: All options, stated above, are only available for load cells of measurement ranges ≤ 0 ... 40 000 N.

Standardization of the characteristic in the sensors connection cable to 1.5 mV/V ± 0.25 %. Therefore a small circuit board (L 30 mm x W 8 mm) with resistors is attached to the cable, approx. 30 cm away from the cable's end.
Available for measurement ranges ≥ 0 ... 10 N **...-V015**

Longer Cable

In general, with regard to the delivery time, it is possible to attach a longer cable to each sensor. If the sensor is available ex stock it is possible to extend the cable by a circuit board. This will result in a shorter delivery time as for a new cable.

Permissible External Forces

Due to this precision miniature load cells construction with two stabilizing support membranes, it is only slightly sensitive to non-centrical forces applied to the sensor.
The influence of these undesired external forces cannot be globally quantified with certainty. It depends on the sensor's measuring range and from which side the force is applied. As a rule of thumb, the amount of external force influence on the measurement signal is between 0.25 % and 1 % depending on the measurement range as long as it is within the range of the table below.

The table shows the maximum percentage values that the external forces can have in relation to the respective measurement range of the load cell. The total of all loads on the load cell (forces and torques) should not exceed 100% of the measurement range.

The torque entries refer to a gap of 25 mm from the point of force application to the sensor surface or the sensor axis.

End Value of Meas. Range up to	Shear Force (Lateral Force) [% F.S.]	Bending Torque (Bending Force) [% F.S.]	Torsion (Torque) [% F.S.]
0 ... 2 kN	50	40	25
0 ... 10 kN	30	25	25
0 ... 100 kN	20	20	10

Accessories

Connectors
12 pin suitable to all burster desktop units **Model 9941**
9 pin, suitable to SENSORMASTER and DIGIFORCE® model 9310 **Model 9900-V209**

Mounting of a connector to the sensors connection cable for main usage

in preferential direction (positive signal for tensile load)
Order code: 99004

only for connection of the sensor to SENSORMASTER model 9163 desktop unit **Order Code: 99002**

against the preferential direction (positive signal for compressive load)
Order Code: 99007

only for connection of the sensor to SENSORMASTER model 9163 desktop unit **Order Code: 99008**

Sensor electronics, amplifier and process control units like modular amplifier model 9243, digital indicator model 9180 or DIGIFORCE® model 9307 **refer to section 9 of the catalog.**

Spare part threaded bolt
The threaded bolts attached to the sensor are also available as a substitution part. The bolt suitable to the particular sensor is given in the table.

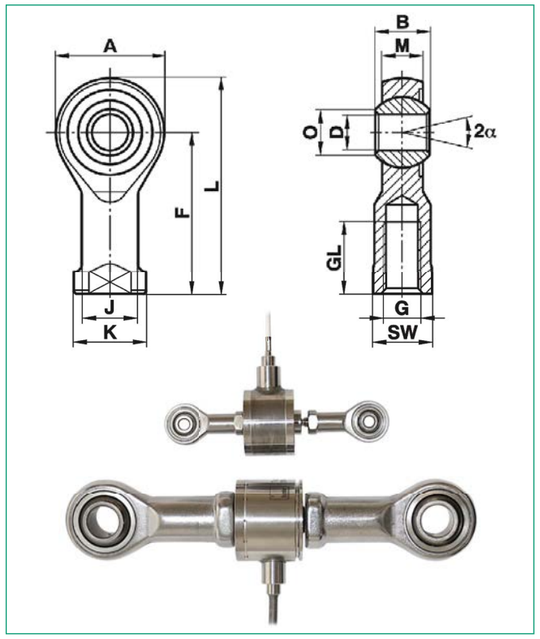
Adapter
If a sensor of the model 8431 or 8432 should be mounted on a plunger of a press, a centering and mounting adapter with a 10 H7 mounting hole is available.

Centering and mounting adapter with internal thread M 4 x 0.7
5501-Z014

Centering and mounting adapter with internal thread M 5 x 0.8
5501-Z015

Rod ends with female thread **Model 8591**
through hole with fit size H7 for spigot fit size g6, continuously rotatable inner ring, maintenance-free, stainless steel, temperature range - 45 °C ... 120 °C see accessories data sheet 8591

Rod ends model 8591



Factory Calibration Certificate (WKS)

Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 84WKS-84...

Application example

Automatic mechanical haptics test on high-quality control elements

Inspecting the tactile behavior entails the precise measurement of the most minute operational forces, click ratio, blocking loads, et al.

The precision miniature pressure sensor should be installed simple and with reduced engineering effort between a linear unit operated with an electric multiphase motor and a tappet. This ensures the exact and sensitive activation of the switch and pushbutton, whose actuating force, switch points, stop points and release points should be defined. Any lateral forces on the sensor axis which might be caused by the "soft" placement of operating elements are absorbed by the supporting diaphragms inside the sensor and kept away from the actual sensing element. This prevents them from having any influence on the sensor results.

2380-008431EN-5672-081524

Tension Compression Load Cell

Model 8435

Code:	8435 EN
Delivery:	ex stock
Warranty:	24 months

- **Measuring ranges from 0 ... 200 N to 0 ... 5000 N**
- **Small dimensions**
- **Simple mounting**
- **Made of stainless steel**
- **For tension and compression forces**

Application

This tension and compression load cell is designed as a compact and universal sensor, which provides a high level of precision at a low price.

Made of stainless steel, the sensor has small dimensions and allows easy assembly in existing structures where static and dynamic forces need to be measured.

This load cell is typically used for measuring forces, weights, coefficients of friction, sliding friction and adhesion on fitting devices, handling gear, coupling mechanisms, loading machines and operating devices.

A load-centering plate is offered as an accessory for simple installation of the load cell in a girder assembly.

Description

This model of load cell uses proven strain gauge technology to perform measurements. Strain gauges are applied to the sensitive element and connected to form a full bridge. The electrical resistance of this full bridge increases with the load acting on it, so that the bridge supplies an output voltage proportional to the measurement variable.

This model allows the force application of two kinds: compression via the load application button and tension via the centric internal thread. The measurement range of 0 ... 5000 N is supplied exclusively with the integrated load application button. The sensor has to be mounted on a level surface using screws fitted through the three bore holes in the outer ring.

To achieve the highest possible measurement accuracy, the sensor should not be subject to lateral forces.

A strain-relief and an anti-bend mechanism for the connection cable are integrated in the sensor housing.

Technical Data

Order Code	Measuring Range	Resonance Frequency [kHz]
8435-5200	0 ... 200 N	5
8435-5500	0 ... 500 N	9
8435-6001	0 ... 1000 N	14
8435-6002	0 ... 2000 N	18
8435-6005	0 ... 5000 N	22

Electrical values

Bridge resistance (full bridge circuit): foil strain gauge 350 Ω, nominal[1)]

Calibration shunt resistor: 100 kΩ ± 0.1 %
The bridge output signal resulting from a shunt of this value is shown in the calibration certificate.

Excitation: recommended 5 V DC
measuring range 0 ... 200 N maximum 5 V DC
measuring range ≥ 0 ... 500 N maximum 10 V DC

Nominal sensitivity: 1 mV/V, nominal[1)]

Insulation resistance: > 30 MΩ

[1)] Deviations from the stated value are possible.

Environmental conditions

Range of operating temperature: - 30 °C ... 80 °C

Nominal temperature range: 15 °C... 70 °C

Influence of temperature on zero: ≤ ± 0.02 % F.S./K

Influence of temperature on sensitivity: ≤ + 0.03 % Rdg./K

Mechanical values

Non-linearity: < 0.25 % F.S.

Hysteresis: < 0.20 % F.S.

Non-repeatability on unchanged mounting position: < 0.15 % F.S.

Kind of measurement: Tension and compression (calibration in compression direction); measuring range 0 ... 5000 N compression only

Deflection, full scale: approx. 20 µm

Mounting: Three clearance holes with a diameter of 3.2 mm at reference diameter 23.0 mm and division 120°. One hole is across from the cable exit.

Overload safe (static): 150 % of capacity

Overload burst: > 200 % of capacity

Dynamic performance: recommended 50 % of capacity
maximum 70 % of capacity

Material: stainless steel 1.4542

Electrical termination: shielded, suitable for drag chain 4 leaded TPE isolated cable with open ends for soldering; additional buckling protector and adapter for cable holder; length approx. 2 m, bending radius > 30 mm

Protection class: acc. to EN 60529 IP54

Wiring code:

white	excitation voltage	positive
brown	excitation voltage	negative
yellow	signal output	positive
green	signal output	negative

Dimensions: refer to dimensional drawing

Weight: approx. 40 g without cable

General tolerance of dimensioning: acc. to ISO 2768-f

Order Information

Tension and compression load cell, range 0 ... 500 N
Model 8435 - 5500

Accessories

Load introduction button (not included in scope of delivery) made of stainless steel 1.2842, HRC 60 **Model 8580-V004**

Pull-plate, material and design as load cell **Model 8590-V001**

Mounting of mating connector to conductor cable for preferential usage of the sensor:

In preferential direction (positive signal for compression load) **Order Code: 99004**

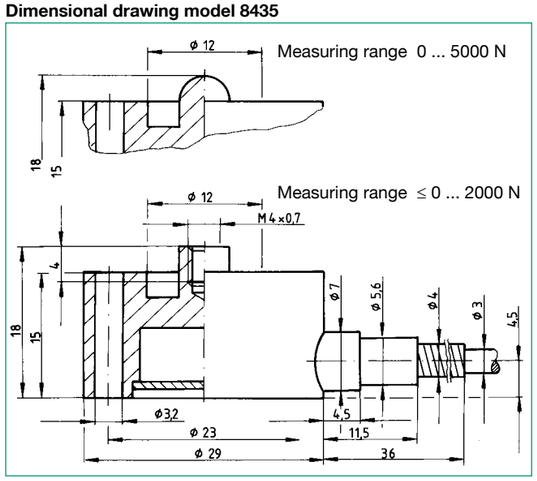
Only for connection to SENSORMASTER model 9163 desktop version **Order Code: 99002**

Against preferential direction (positive signal for tension load) **Order Code: 99007**

Only for connection to SENSORMASTER model 9163 desktop version **Order Code: 99008**

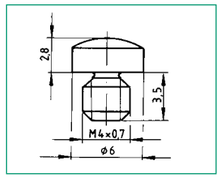
Evaluation instruments, amplifiers and process controllers **refer to section 9 of the catalog.**

Dimensional drawing model 8435

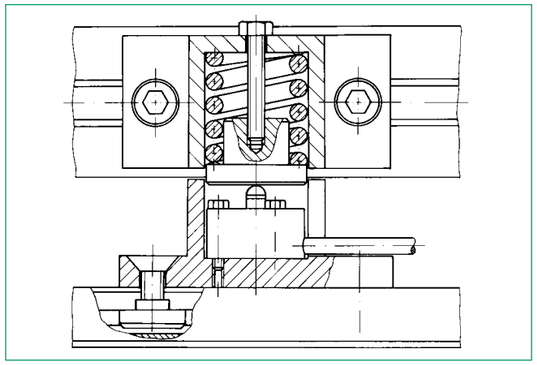


The CAD drawing (3D/2D) for this sensor can be imported online directly into your CAD system.
Download via www.burster.com or directly at www.traceparts.com. For further information about the burster traceparts cooperation refer to data sheet 80-CAD-EN.

Load introduction button model 8580-V004



Installation example



Overload of the load cell is impossible due to a suitable spring. When the units are locked the spring will transfer not more load to the cell than the measuring range can cope with.

Option

Standardization of sensitivity to 0.8 mV/V, done in conductor cable **Order Code: ...-V008**

Factory Calibration Certificate (WKS)

Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 84WKS-84...

2381-008435EN-5672-081524

Miniature Ring Load Cell

Model 8438

Code:	8438 EN
Delivery:	ex stock/6 weeks
Warranty:	24 months

- **Measuring ranges from 0 ... 5 N to 0 ... 200 kN**
- **Centric throughout hole**
- **Flat disc design**
- **Made of stainless steel**
- **Completely welded sensor body**
- **Nominal characteristic value standardization possible**

Application

The miniature ring load cells of the 8438 series have been specially designed to show-up with small external dimensions. These sensors can be used for a wide range of industrial and laboratory applications due to their small size. The small diameter and height make this miniature ring load cell perfect for installation in structures, in which the measured force is guided directly through the sensor after disconnection.

Examples of this are force measurements on

- Bolts
- Screws
- Plate and cover fasteners
- Bearing contact forces
- Spot welding machines
- Cutting tools

Description

The measured tension and compression force must be introduced axially and perpendicularly to the entire surface of the inner and outer bands of the sensor in the opposite direction. Conversion of the acting force into an electrical output signal is performed by strain gauges connected together in a full bridge circuit. To achieve optimal accuracy, the base of the sensor should rest on a smooth level surface, hardened to at least 63 HRC with sufficient dimensions. The base cover welded to the surface has a stabilizing effect on the sensor element. Lateral forces should be avoided anyway as they distort the measured results.
During installation or operation, ensure that the cable outlet and the sensor cable are not subject to excessively high tensile or bending forces. Strain and bend relief may be necessary for the sensor cable on the machine side.

Technical Data

Order Code	Measuring Range	D1	ø D2	ø D3	ø D4	ø D5	A	H	ø C	L	ø K	M	B	ø T	Thread G	Resonance Frequency [kHz]
8438-5005	0 ... 5 N	12.7	11.4	10.2	5.1	2.5	3.0	3.8	-	-	1.2	1.2	-	-	-	0.4
8438-5010	0 ... 10 N	12.7	11.4	10.2	5.1	2.5	3.0	3.8	-	-	1.2	1.2	-	-	-	0.7
8438-5020	0 ... 20 N	25.4	21.6	20.6	6.6	5.1	6.4	7.1	4.8	8.0	1.4	3.0	-	-	-	1.0
8438-5050	0 ... 50 N	25.4	21.6	20.6	6.6	5.1	6.4	7.1	4.8	8.0	1.4	3.0	-	-	-	1.1
8438-5100	0 ... 100 N	28.0	25.0	22.0	9.0	5.5 H8	7.0	8.0	2.2	8.0	1.9	2.5	-	-	-	1.2
8438-5200	0 ... 200 N	28.0	25.0	22.0	9.0	5.5 H8	7.0	8.0	2.2	8.0	1.9	2.5	-	-	-	2.0
8438-5500	0 ... 500 N	28.0	25.0	22.0	9.0	5.5 H8	7.0	8.0	2.2	8.0	1.9	2.5	-	-	-	3.7
8438-6001	0 ... 1 kN	38.0	29.0	25.0	13.5	7.0 H8	9.0	10.0	3.6	8.0	3.0	3.0	3.0	33.5	M 2.5x0,45	3.4
8438-6002	0 ... 2 kN	38.0	29.0	25.0	13.5	7.0 H8	9.0	10.0	3.6	8.0	3.0	3.0	3.0	33.5	M 2.5x0,45	5.5
8438-6005	0 ... 5 kN	38.0	29.0	25.0	13.5	7.0 H8	9.0	10.0	3.6	8.0	3.0	3.0	3.0	33.5	M 2.5x0,45	10.0
8438-6010	0 ... 10 kN	38.0	29.0	25.0	13.5	7.0 H8	9.0	10.0	3.6	8.0	3.0	3.0	3.0	33.5	M 2.5x0,45	15.0
8438-6020	0 ... 20 kN	49.0	41.0	35.0	23.0	15.0 H8	15.0	16.0	3.6	8.0	3.0	4.5	3.0	45.0	M 2.5x0,45	14.0
8438-6050	0 ... 50 kN	49.0	41.0	35.0	23.0	15.0 H8	15.0	16.0	3.6	8.0	3.0	4.5	3.0	45.0	M 2.5x0,45	24.0
8438-6100	0 ... 100 kN	78.0	60.0	54.0	42.0	28.0 H8	24.0	25.0	5.6	10.0	5.0	6.5	5.5	69.0	M 4.0x0,7	22.0
8438-6200	0 ... 200 kN	78.0	60.0	54.0	42.0	28.0 H8	24.0	25.0	5.6	10.0	5.0	6.5	5.5	69.0	M 4.0x0,7	37.0

Electrical values

Bridge resistance (full bridge):
- measuring range ≤ 0 ... 10 N semiconductor strain gauge 500 Ω, nominal*
- measuring range ≥ 0 ... 20 N foil strain gauge 350 Ω, nominal*

Excitation:
- measuring range ≤ 0 ... 10 N max. 5 V DC
- measuring range ≥ 0 ... 20 N max. 10 V DC

Nominal sensitivity:
- measuring range ≤ 0 ... 10 N 20 mV/V, nominal*
- measuring range 0 ... 20 N and 0 ... 50 N 2 mV/V, nominal*
- measuring range 0 ...100 N 1.0 mV/V, nominal*
- measuring range ≥ 0 ...200 N 1.5 mV/V, nominal*

* Deviations from the stated value are possible.

Environmental conditions

Range of operating temperature: 0 °C ... + 85 °C
Nominal temperature range: +15 °C ... + 70 °C
Influence of temperature on zero: ≤ ± 0.03 % F.S./K
Influence of temperature on sensitivity: ≤ + 0.03 % Rdg./K

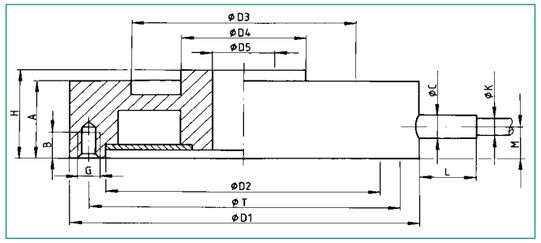
Mechanical values

Non-linearity: ≤ 1.0 % F.S.
Relative hysteresis: ≤ 0.75 % F.S.
Non-repeatability with unchanged assembly position: ≤ 0.25 % F.S.
Kind of measurement: tensile and compressive forces
calibration in compressive direction (preferential measuring direction)
Upon operation against the preferential measuring direction a changed characteristic value is possible.
Deflection full scale: approx. 60 µm
Mounting: measuring range ≥ 0 ... 1000 N
there are three mounting holes on the lower side of the sensor, equally spaced on T diameter with division 120°, one hole is located directly across the cable exit. This kind of mounting is allowed for compression load only.
Operating force max.: 150 % of capacity
Dynamic load capacity: recommended 50 % of capacity
max. 70 % of capacity
Material: stainless steel 1.4542
Electrical connection:
all cables for measuring range ≥ 0 ... 100 N are suitable for drag chains
- measuring range ≤ 0 ... 500 N: shielded, TPE insulated cable with open ends for soldering, length appr. 2 m. bending radius ≥ 20 mm
- measuring range 0 ... 1 kN to 0 .. 50 kN: additionally equipped with anti-kink protection length appr. 40 mm, bending radius ≥ 30 mm
- measuring range ≥ 0 ...100 kN: additionally equipped with anti-kink protection and adapter for cable holder, length approx. 50 mm, bending radius ≥ 30 mm

Protection class: acc. to EN 60529 range ≤ 0 ... 50 kN IP54
range ≥ 0 ...100 kN IP65
Dimensions: refer to table and dimensional drawing
General tolerance of dimensioning: acc. to ISO 2768-f
Weight: depending on the measuring range, from 5 g up to 900 g
Wiring code: measuring range ≤ 0 ... 50 N / ≥ 0 ...100 N

red	/ with	excitation voltage	positive
black	/ brown	excitation voltage	negative
green	/ green	signal output	negative
white	/ yellow	signal output	positive

Dimensional drawing model 8438



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

Miniature ring load cell, measuring range 500 N **Model 8438-5500**

Accessories

Mating connector
12 pins, for all burster desktop devices **Model 9941**
9 pins, for SENSORMASTER and DIGIFORCE®
Order Code: 9900-V209

Installation of a mating connector for main usage of the sensor in preferential direction (positive signal for compressive load)
Order Code: 99004

Only for connection to SENSORMASTER model 9163 desktop version **Order Code: 99002**

Against preferred direction (positive signal for tensile load) **Order Code: 99007**

Only for connection to SENSORMASTER model 9163 desktop version **Order Code: 99008**

Option

Standardization of the sensitivity to 1.0 mV/V ± 1 %, integrated to connector cable only for measurement ranges ≥ 0 ... 20 N **...-V010**

Factory Calibration Certificate (WKS)

Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 84WKS-84...

2382-0084438EN-5672-081524

Precision Load Cells

Series 85040 and 85070 for compressive load, for tensile and compressive forces

Code: 85040 EN
Delivery: 12 weeks / ex stock
Warranty: 24 months

Model 85043 / Model 85073

Model 85041 / Model 85075

- **Measuring ranges from 0 ... 20 N to 0 ... 2 MN**
- **For static and dynamic forces**
- **High linearity from ± 0.1 % F.S.**
- **Very low sensitivity to lateral forces**
- **Models 85073 / 85075 suitable for extremely high dynamic stress, series 85070 up to 10^9 load cycles**
- **Extended temperature compensation range -55 °C to 120 °C (optional)**
- **Protection class IP68 (optional)**

Application

These load cells feature an outstanding ability to withstand static and dynamic stress and have exceptional precision and service life. These products have a huge range of applications in industry, R+D and testing thanks to the optional IP68 degree of protection and low sensitivity to lateral forces.

Examples of applications would be the measurement of:

- ► Insertion forces
- ► Reference measurement
- ► Weights (e.g. silos, skips)
- ► Tensile forces (tension in cables, chains etc. with load centering plate)
- ► Materials testing

For the compressive force sensors (models 85043 and 85073) the force must be applied through a plane plate, hard enough for the range of forces being measured, or a piston.

Description

The force-sensitive diaphragm with fitted strain gauges is located between the central part, where the force is applied (force application), and the outer ring (containing fixing holes).

Two support diaphragms are additionally fitted, above and below the actual measuring element, to desensitize the sensors to extraneous lateral forces or moments. (see „Permitted external forces“ on page 2).

Models 85041/85075 (tension/compression) are calibrated in the tensile direction. The characteristic figure for the compression direction can nominally vary by ± 0.25 % from the figure for the tensile direction. The output signal is positive when the applied force is tensile.

The 8507X series (models 85073 and 85075) is designed for the highest possible dynamic stress and service life. This is > 10^9 cycles from zero up to the full value of the measuring range in the tensile or compressive direction and tolerates a maximum operational force of up to 200 % of the nominal range.

Dimensions

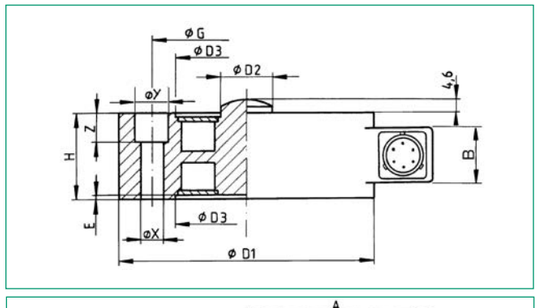
Compressive load cell model 85043 - for static and dynamic operations

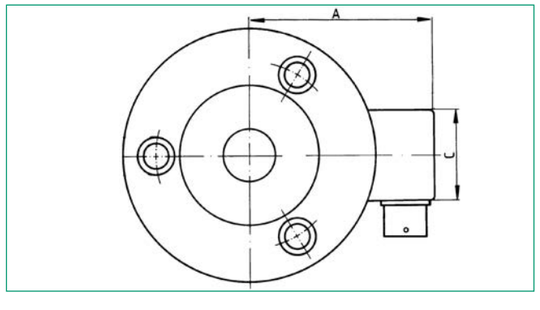
Order Code	Measurement Range	Dimensions [mm]												Number of Holes in ø G	Natural Frequency [kHz]
		øD1	øD2*	øD3*	H	A	B	C	E*	øG	øX	øY	Z		
85043-0.02	0 ... 20 N	63.5	9.4	43.2	20.3	52.6	19	31.8	0.5	50.8	4.5	8.0	4.6	6	2
85043-0.05	0 ... 50 N	63.5	9.4	43.2	20.3	52.6	19	31.8	0.5	50.8	4.5	8.0	4.6	6	2
85043-0.1	0 ... 100 N	63.5	9.4	43.2	20.3	52.6	19	31.8	0.5	50.8	4.5	8.0	4.6	6	2
85043-0.2	0 ... 200 N	76.2	14.2	46.0	25.4	58.9	19	31.8	1.0	57.2	6.6	11.0	6.8	6	4.5
85043-0.5	0 ... 500 N	76.2	14.2	46.0	25.4	58.9	19	31.8	1.0	57.2	6.6	11.0	6.8	6	4.5
85043-1	0 ... 1 kN	76.2	14.2	46.0	25.4	58.9	19	31.8	1.0	57.2	6.6	11.0	6.8	6	4.5
85043-2	0 ... 2 kN	76.2	14.2	46.0	25.4	58.9	19	31.8	1.0	57.2	6.6	11.0	6.8	6	4.5
85043-5	0 ... 5 kN	76.2	14.2	46.0	25.4	58.9	19	31.8	1.0	57.2	6.6	11.0	6.8	6	4.5
85043-10	0 ... 10 kN	88.9	17.5	52.3	25.4	65.3	19	31.8	1.3	66.7	9.0	15.0	9.0	6	11
85043-20	0 ... 20 kN	88.9	17.5	52.3	25.4	65.3	19	31.8	1.3	66.7	9.0	15.0	9.0	6	11
85043-50	0 ... 50 kN	114.3	38.1	80.5	46.2	88.9	39	50.8	2.5	96.3	11.0	17.0	11.0	3	9
85043-100	0 ... 100 kN	114.3	38.1	80.5	46.2	88.9	39	50.8	2.5	96.3	11.0	17.0	11.0	3	9
85043-200	0 ... 200 kN	114.3	38.1	80.5	46.2	88.9	39	50.8	2.5	96.3	11.0	17.0	11.0	3	13
85043-500	0 ... 500 kN	114.3	38.1	80.5	46.2	88.9	39	50.8	2.5	96.3	11.0	17.0	11.0	3	13
85043-1 MN	0 ... 1 MN	139.7	50.8	98.4	50.8	101.6	39	50.8	2.5	122.2	11.0	17.0	11.0	3	11
85043-1.5 MN	0 ... 1.5 MN	190.5	63.5	143.0	63.5	127.0	39	50.8	2.5	171.5	11.0	17.0	11.0	3	10
85043-2 MN	0 ... 2 MN	279.4	120.7	203.1	109.7	171.5	39	50.8	2.5	241.3	11.0	17.0	11.0	3	8.4

Compressive load cell sensor model 85073 - also suitable for highest dynamic operations

Order Code	Measurement Range	Dimensions [mm]												Number of Holes in ø G	Natural Frequency [kHz]
		øD1	øD2*	øD3*	H	A	B	C	E*	øG	øX	øY	Z		
85073-0.02	0 ... 200 N	76.2	14.2	46.0	25.4	58.9	19	31.8	1.3	57.2	6.6	11.0	6.8	6	4.4
85073-0.05	0 ... 500 N	76.2	14.2	46.0	25.4	58.9	19	31.8	1.3	57.2	6.6	11.0	6.8	6	4.4
85073-1	0 ... 1 kN	76.2	14.2	46.0	25.4	58.9	19	31.8	1.3	57.2	6.6	11.0	6.8	6	4.4
85073-2	0 ... 2 kN	76.2	14.2	46.0	25.4	58.9	19	31.8	1.3	57.2	6.6	11.0	6.8	6	9.3
85073-5	0 ... 5 kN	88.9	17.5	52.3	25.4	65.3	19	31.8	0.8	66.5	9.0	15.0	9.0	6	9.3
85073-10	0 ... 10 kN	88.9	17.5	52.3	25.4	65.3	19	31.8	0.8	66.5	9.0	15.0	9.0	6	9.3
85073-20	0 ... 20 kN	114.3	38.1	75.9	46.2	88.9	39	50.8	2.5	96.3	11.0	17.0	11.0	3	5.9
85073-50	0 ... 50 kN	114.3	38.1	75.9	46.2	88.9	39	50.8	2.5	96.3	11.0	17.0	11.0	3	5.9
85073-100	0 ... 100 kN	114.3	38.1	75.9	46.2	88.9	39	50.8	2.5	96.3	11.0	17.0	11.0	3	5.9
85073-200	0 ... 200 kN	114.3	38.1	75.9	46.2	88.9	39	50.8	2.5	96.3	11.0	17.0	11.0	3	5.3
85073-500	0 ... 500 kN	139.7	50.8	104.9	50.8	101.6	39	50.8	2.5	122.2	11.0	17.0	11.0	3	
85073-1000	0 ... 1000 kN	190.5	63.5	139.7	63.5	127.0	39	50.8	2.5	171.5	11.0	17.0	11.0	3	

Dimensional drawings models 85043 and 85073 from 50 kN





Permitted external forces

As a result of the two stabilizing membranes with which these load cells have been designed, they only have very low sensitivity to forces that do not act centrally on the sensor. The effect of these undesirable external forces cannot be expressed in blanket figures; it depends on the sensor's range of measurement and also on the side from which the forces act. As a rule of thumb, it can be said that the contribution of the effect of external forces to the measuring signal, provided it is kept within the range of forces listed in the table below, is between 0.25 % and 1 % of the measuring range.
The table lists how large the external forces may be, expressed as a percentage of the load cell measuring range. The total of all the stresses acting on the load cell (forces and torques) should not exceed 100% of the measuring range. The forces quoted for the torques assume a distance of 2.5 cm from the point of action of the force.

End of Measurement Range up to	Shear Force (Lateral Force) [% F.S.]	Bending Torque (Bending Force) [% F.S.]	Torsion [% F.S.]
2 kN	50	40	25
10 kN	30	25	25
100 kN	20	20	15
500 kN	20	20	10

2383-085040EN-5672-081524

Dimensions

Tensile and compressive load cell model 85041 - for static and dynamic operations

Order Code	Measurement Range	Dimensions [mm]												Thread	Number of Holes in ø G	Natural Frequency [kHz]
		øD1	øD2*	øD3*	H	A	B	C	E*	øG	øX	øY	Z	T		
85041-0.02	0 ... 20 N	63.5	9.4	43.2	20.3	52.6	19	31.8	0.5	50.8	4.5	8.0	4.6	M 6 x 1.0	6	
85041-0.05	0 ... 50 N	63.5	9.4	43.2	20.3	52.6	19	31.8	0.5	50.8	4.5	8.0	4.6	M 6 x 1.0	6	
85041-0.1	0 ... 100 N	63.5	9.4	43.2	20.3	52.6	19	31.8	0.5	50.8	4.5	8.0	4.6	M 6 x 1.0	6	
85041-0.2	0 ... 200 N	76.2	14.2	46.0	25.4	58.9	19	31.8	1.0	57.2	6.6	11.0	6.8	M 10 x 1.0	6	
85041-0.5	0 ... 500 N	76.2	14.2	46.0	25.4	58.9	19	31.8	1.0	57.2	6.6	11.0	6.8	M 10 x 1.0	6	
85041-1	0 ... 1 kN	76.2	14.2	46.0	25.4	58.9	19	31.8	1.0	57.2	6.6	11.0	6.8	M 10 x 1.0	6	2
85041-2	0 ... 2 kN	76.2	14.2	46.0	25.4	58.9	19	31.8	1.0	57.2	6.6	11.0	6.8	M 10 x 1.0	6	
85041-5	0 ... 5 kN	76.2	14.2	46.0	25.4	58.9	19	31.8	1.0	57.2	6.6	11.0	6.8	M 10 x 1.0	6	
85041-10	0 ... 10 kN	88.9	17.5	52.3	25.4	65.3	19	31.8	1.0	66.7	9.0	15.0	9.0	M 12 x 1.5	6	4
85041-20	0 ... 20 kN	88.9	17.5	52.3	25.4	65.3	19	31.8	1.0	66.7	9.0	15.0	9.0	M 12 x 1.5	6	
85041-50	0 ... 50 kN	139.7	48.3	95.3	45.7	101.6	39	50.8	2.5	114.3	11.0	18.0	11.0	M 24 x 1.5	8	4
85041-100	0 ... 100 kN	152.4	58.9	105.9	45.7	108.0	39	50.8	2.5	123.8	13.5	-	-	M 36 x 3.0	8	20
85041-200	0 ... 200 kN	152.4	58.9	105.9	45.7	108.0	39	50.8	2.5	123.8	13.5	-	-	M 36 x 3.0	8	
85041-500	0 ... 500 kN	228.6	115.5	165.0	63.5	146.1	39	50.8	2.5	196.5	17.5	-	-	M 64 x 2.0	12	
85041-7001	0 ... 1 MN	279.4	136.9	203.1	76.2	171.5	39	50.8	2.5	241.3	26.0	-	-	M 64 x 2.0	12	
85041-7002	0 ... 2 MN	355.6	160.8	254.0	108.0	241.3	39	63.5	2.5	298.5	26.0	-	-	M 90 x 4.0	12	

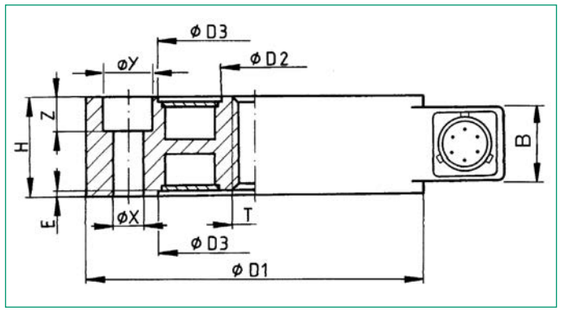
* These values are nominal values

Tensile and compressive load cell model 85075 - also suitable for high dynamic operations

Order Code	Measurement Range	Dimensions [mm]												Thread	Number of Holes in ø G	Natural Frequency [kHz]
		øD1	øD2*	øD3*	H	A	B	C	E*	øG	øX	øY	Z	T		
85075-0.2	0 ... 200 N	76.2	14.2	46.0	25.4	58.9	19	31.8	1.3	57.2	6.6	11.0	6.8	M 10 x 1.0	6	4.4
85075-0.5	0 ... 500 N	76.2	14.2	46.0	25.4	58.9	19	31.8	1.3	57.2	6.6	11.0	6.8	M 10 x 1.0	6	4.4
85075-1	0 ... 1 kN	76.2	14.2	46.0	25.4	58.9	19	31.8	1.3	57.2	6.6	11.0	6.8	M 10 x 1.0	6	4.4
85075-2	0 ... 2 kN	76.2	14.2	46.0	25.4	58.9	19	31.8	1.3	57.2	6.6	11.0	6.8	M 10 x 1.0	6	9.3
85075-5	0 ... 5 kN	88.9	17.5	52.3	25.4	65.3	19	31.8	2.3	66.7	9.0	15.0	9.0	M 12 x 1.5	6	9.3
85075-10	0 ... 10 kN	88.9	17.5	52.3	25.4	65.3	19	31.8	2.3	66.7	9.0	15.0	9.0	M 12 x 1.5	6	9.3
85075-20	0 ... 20 kN	139.7	48.3	95.3	45.7	101.6	39	50.8	2.5	114.3	11.0	18.0	11.0	M 24 x 1.5	8	5.9
85075-50	0 ... 50 kN	152.4	59.2	106.2	45.7	108.0	39	50.8	2.5	123.8	13.5	-	-	M 36 x 3.0	8	5.9
85075-100	0 ... 100 kN	152.4	59.2	106.2	45.7	108.0	39	50.8	2.5	123.8	13.5	-	-	M 36 x 3.0	8	5.9
85075-200	0 ... 200 kN	190.5	78.2	125.2	50.8	127.0	39	50.8	2.5	152.4	22.0	-	-	M 52 x 3.0	8	5.3
85075-500	0 ... 500 kN	228.6	115.5	165.0	76.2	133.4	39	50.8	2.5	196.9	26.0	-	-	M 64 x 2.0	12	

* These values are nominal values

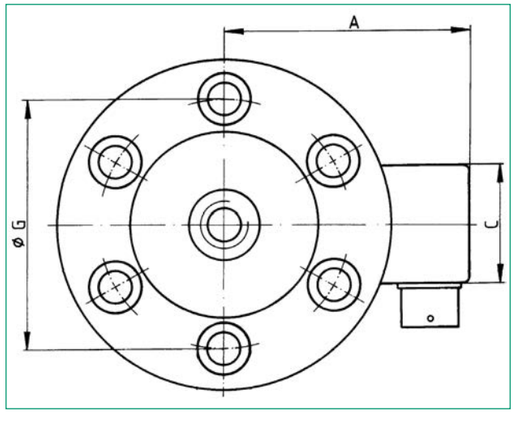
Dimensional drawing models 85041 and 85075 as well as 85041 and 85043 to 20 kN



Notes:

1. A hole in the mounting surface allows force to be applied from below. If the sensor is mounted on a surface that has not been drilled, it is necessary to ensure that the threaded bolt that is screwed in from above does not press on the mounting face. This would cause a permanent error in measurements, or even damage the sensor.

2. Sensors for the measuring ranges 50 kN or 100 kN and above do not have counter-bored holes (see table, columns øY and Z).



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.

Technical Data

Electrical values

Bridge resistance: full bridge (foil strain gauges) 350 Ω, nominal[1]

Calibration resistor: 59 kΩ ± 0.1 %
The bridge output voltage caused by a shunt of this value is given in the calibration protocol.

Excitation voltage: recommended 10 V DC or AC
maximum 15 V DC or AC

Nominal value: 2 mV/V, nominal[1]

Models 85041/85043, > 100 N: 3 mV/V, nominal[1]

Isolation resistance: > 10^9 Ω at 50 VDC

[1]) Deviations from the stated value are possible.

Environmental conditions

Range of operation temperature: - 55 °C ...120 °C

Range of nominal temperature (compensated range): 15 °C ... 70 °C

Influence of temperature in the range of nominal temperature:
to zero signal ± 0.004 % F.S./K
to characteristics + 0.004 % Rdg./K

Mechanical values

Models 85041 and 85043

Non-linearity:
measurement range ≤ 0 ... 100 N < ± 0.2 % F.S.
measurement range ≤ 0 ... 200 kN < ± 0.1 % F.S.
measurement range ≥ 0 ... 500 kN < ± 0.2 % F.S.

Hysteresis:
measurement range ≤ 0 ... 100 N < ± 0.1 % F.S.
measurement range ≤ 0 ... 200 kN < ± 0.08 % F.S.
measurement range ≥ 0 ... 500 kN < ± 0.2 % F.S.

Spread at unchanged installation position:
measurement range ≤ 0 ... 100 N < ± 0.1 % F.S.
measurement range ≥ 0 ... 200 N < ± 0.03 % F.S.

Operational force: 150 % of nominal load

Maximum dynamic force:
recommended between 50 % and 70 % of nominal load
possible 100 % of nominal load

Deflection full scale: < 80 µm

Material:
stainless steel 17-4 PH (similar to material 1.4542)
only model 85041 range ≥ 0 ... 1.5 MN coated steel 4340 (similar to material 1.7707)

Protection class: according EN 60529 IP64
IP 68 (refer to option)

Electrical connection:
range ≤ 0 ... 20 kN: 6 pin bajonett plug-in connector
mating connector model 9945 in scope of delivery
range ≥ 0 ... 50 kN: 6 pin screw connector
mating connector model 9946 in scope of delivery

Models 85073 and 85075

Non-linearity: < ± 0.1 % F.S.

Relative hysteresis: < ± 0.1 % F.S.

Relative spread at unchanged installation position: < ± 0.03 % F.S.

Operational force: 200 % of nominal force

Maximum dynamic load: 100 % of nominal force

Deflection full scale: approx. 50 µm ... 100 µm

Material: stainless steel 17-4 PH (similar to material 1.4542)

Protection class: accord. EN 60529 IP64
IP68 (refer to option)

Electrical connection:
Range ≤ 0 ... 10 kN: 6 pin bajonett plug-in connector
mating connector model 9945 in scope of delivery
Range ≥ 0 ... 20 kN: 6 pin screw connector
mating connector model 9946 in scope of delivery

Models 85041 and 85075

Bolts with a strength class of at least 10.9 should be used to mount these tensile and compression load cells. The preference direction is that of tension. The output signal is positive when the applied force is tensile.

All models

Wiring (standard):

pin	A + B	excitation	positive
pin	C + D	excitation	negative
pin	E	output	negative
pin	F	output	positive

Label

The label at sensor's surface has a height of approximately 0.5 mm.

Order Information

Precision load cell for compressive loads,
measurement range 0 ... 200 N **Model 85073-0,2**

Precision load cell for tensile and compressive loads,
extended range of nominal temperature - 55 °C ... 120 °C,
measurement range 0 ... 100 kN **Model 85041-6100-V0I0000**

Accessories

Mating connector (cable coupling), in scope of delivery with the sensor

Model 85041 und 85043
6 pin bajonett connector (to 20 kN) **Model 9945**
6 pin bajonett connector (from 50 kN) **Model 9946**

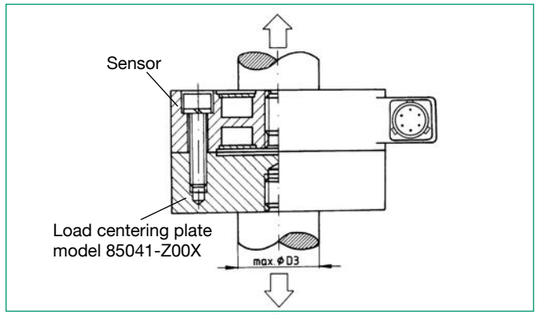
Model 85073 und 85075
6 pin bajonett connector (to 10 kN) **Model 9945**
6 pin bajonett connector (from 20 kN) **Model 9946**

Connection cable, length 3 m (one end open for soldering)
with coupling model 9945 **Model 9986**
with coupling model 9946 **Model 99546-000A-0150030**

Connection cable for burster desktop units, length 3 m
with coupling model 9945 and connector 9941 **Model 9911**
with coupling model 9946 and connector 9941 **Model 9912**

Connection cable for 9235 and 9310
with coupling model 9945 and connector 9900-V209
Model 99209-545A-0160030
with coupling model 9946 and connector 9900-V209
Model 99209-546A-0160030

Load centering plate for models 85041 and 85075
The purpose of these plates is that for the second assembly reference point for the force application it is possible, rather than using the fastening holes (F around the circumference G) to again use a threaded bolt with an optimally central line of action. The diameters D1 to D3 and the thread T of the centering plate correspond to those of the associated sensor.
Dimensions and prices for the load centering plates are available on request.



Signal processing
Digital indicator like model 9180, amplifiers like model 9243, process measuring and control units like DIGIFORCE®
refer to section 9 of the catalog.

Reference measurement chain
Combined with the TRANS CAL 7281 it is the ideal tool for mobile calibration and adjustment of force-application equipment.
refer to data sheet 7281 in section 7 of the catalog.

Options

Hermetically closed version, IP68, with waterproofed cable connection, length 3 m, usable up to 80 °C. (cannot be combined with the extended measurement temperature range) **...-VxxxIxx**

Range of nominal temperature (compensated range)
extended to - 55 °C ... 120 °C (cannot be combined with IP68) **...-VxIxxxx**

Factory Calibration Certificate (WKS)

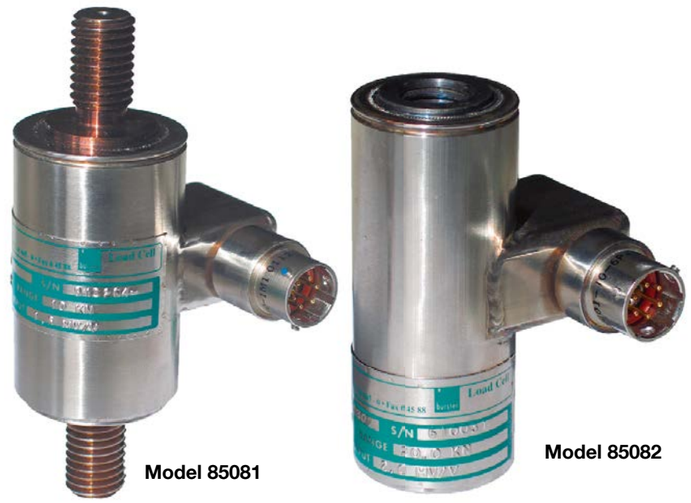
Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 85WKS-85...

2383-085040EN-5672-081524

Tensile Force Sensors

Models 85081 and 85082

Code:	85081 EN
Delivery:	approx. 12 weeks
Warranty:	24 months



Model 85081 **Model 85082**

- **Measuring ranges from 0 ... 10 kN to 0 ... 1000 kN**
- **Non-linearity < 0.2% F.S.**
- **For static and dynamic measurements**
- **Made of stainless steel**
- **Welded construction**
- **Optionally IP68**
- **Special versions, e.g. for tensile and compressive force, by request**

Application

These load cells have an external or internal thread on both sides and can therefore be used for accurately measuring tensile forces in rods or, using thread eyes, in cables. The robust construction – welded of stainless steel – allows the sensor to be used in many fields such as research, development, test engineering and quality control.

Applications:

- ► Vehicle and container scales
- ► Test machines
- ► Measurements of proportioning and filling level
- ► Measurement of cable forces and cranes
- ► Avalanche research
- ► Oil production

Description

Both load cell types have cylindrical bodies, with a thread at each end for the application of the force. The good figures for linearity, hysteresis and long-term stability are achieved as a result of the special design of the measuring element, on which there is a full-bridge wire strain gauge. The sensors are constructed of stainless steel and are welded to hermetically seal them. The electrical connection has an important effect on the degree of protection of the sensors. Splash-proof protection is achieved here through a high-quality military standard plug-in connector. They are totally sealed by an integrated, waterproof cable connection (optional).
On the model 85081 there is a threaded bolt with an external thread on each side of the cylindrical body. These threaded bolts are integral components of the sensor. On the model 85082, both sides of the cylindrical body have an internal thread.

Technical Data

Model 85081

Order Code	Measuring Range	Tread T	Dimensions [mm] ø D	L	G1 nom.	A	B
85081-10	0 ... 10 kN	M 14 x 2.0	38.1	66.0	24	19.1	39.9
85081-20	0 ... 20 kN	M 14 x 2.0	38.1	66.0	24	19.1	39.9
85081-50	0 ... 50 kN	M 39 x 1.5	63.5	77.5	38	19.1	52.6
85081-100	0 ... 100 kN	M 39 x 1.5	63.5	77.5	38	19.1	52.6
85081-200	0 ... 200 kN	M 39 x 1.5	63.5	77.5	38	19.1	52.6
85081-500	0 ... 500 kN	M 64 x 2.0	88.9	101.6	76	38.1	76.3
85081-1000	0 ... 1000 kN	M 90 x 4.0	114.3	127.0	102	38.1	89.0

Model 85082

Order Code	Measuring Range	Tread T	Dimensions [mm] ø D	L	G1 nom.	A	B
85082-10	0 ... 10 kN	M 14 x 2.0	38.1	108.0	24	9.1	39.9
85082-20	0 ... 20 kN	M 14 x 2.0	38.1	108.0	24	19.1	39.9
85082-50	0 ... 50 kN	M 39 x 1.5	63.5	177.8	38	19.1	52.6
85082-100	0 ... 100 kN	M 39 x 1.5	63.5	177.8	38	9.1	52.6
85082-200	0 ... 200 kN	M 39 x 1.5	63.5	177.8	38	9.1	52.6
85082-500	0 ... 500 kN	M 64 x 2.0	114.3	355.6	76	8.1	89.0
85082-1000	0 ... 1000 kN	M 90 x 4.0	139.7	457.2	102	38.1	101.7

Electrical values

Bridge resistance: foil strain gauges 350 Ω, nominal*

Calibration resistor: 59 kΩ ± 0.1 %
The bridge output voltage caused by a shunt of this value is given in the calibration protocol.

Reference excitation voltage: 10 V DC or AC

Characteristic: 2 mV/V, nominal*

Isolation resistance: > 5 MΩ

* Deviation from the stated value are possible.

Environmental conditions

Operation temperature range: - 55 °C ... 120 °C

Nominal temperature range: 15 °C ... 70 °C

Influence of temperature to:
zero signal ± 0.01 % F.S./K
characteristic + 0.01 % Rdg./K

Mechanical values

Non-linearity: < ± 0.2 % F.S.

Hysteresis: < ± 0.2 % F.S.

Spread at unchanged mounting position: < ± 0.05 % F.S.

Max. operation force: 150 % of nominal force

Nominal deflection at nominal force:
measurement range ≤ 0 ... 20 kN approx. 80 µm
measurement range ≥ 0 ... 50 kN approx. 100 µm

Maximum dynamic load:
recommended 70 % of nominal load
possible 100 % of nominal load

Design:
The tensile load cells are welded hermetically close. KAPTON is used as an isolation material.

Material: stainless steel 17 - 4 PH (similar to 1.4542)

Dimensions: refer to table and dimensional drawing

Protection class: according to EN 60529 IP64
(IP68 refer to options)

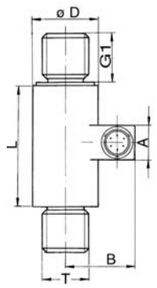
Electrical connection: MIL plug-in connector
measurement range ≤ 0 ... 200 kN 6 pin bajonett connector
measurement range ≥ 0 ... 500 kN 6 pin screw connector

Wiring of the connector (plug):

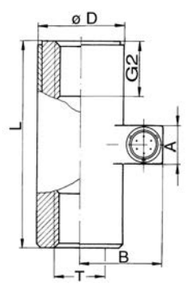
pin	A + B	excitation	positive
pin	C + D	excitation	negative
pin	E	output	negative
pin	F	output	positive

Dimensional drawing

Model 85081



Model 85082



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

Tensile load cell model 85081, range 0 ... 20 kN **Model 85081-20**

Tensile load cell model 85082, range 0 ...100 kN **Model 85082-100**

Please use the short term to state options
e.g. option IP68 **Order Code ...-Vxxx1xx**

Accessories

for measurement range ≤ 0 ... 200 kN
Mating connector (6 pin cable coupling)
in scope of delivery **Model 9945**

Connection cable, one end open for soldering,
PVC, length 3 m **Model 9986**

Connection cable, suitable to burster desktop devices,
PVC, length 3 m **Model 9911**

for measurement range ≥ 0 ... 500 kN
Mating connector (6 pin cable coupling)
in scope of delivery **Model 9946**

Connection cable, one side open for soldering,
PVC, length 3 m **Model 99546-000A-0150030**

Connection cable, suitable to burster desktop devices,
PVC, length 3 m **Model 9912**

Options

Option **Order Code ...-VxFxxxx**
Extension of the nominal temperature range to 20 °C ... 120 °C

Option IP68 **Order Code ...-Vxxx1xx**
internal, waterproofed cable connection, length 3 m, approx. ø 6 mm, usable up to 80 °C, instead of a plug-in connector

2384-085081EN-5672-081524

Miniature Bending Beam Load Cell

With mechanical overload protection

Model 8510

Code: 8510 EN
Delivery: ex stock
Warranty: 24 months

- **For tension and compression forces**
- **Small measuring ranges from 0 ... 1 N to 0 ... 20 N**
- **Mechanical protection against overload up to quintuple range**
- **Compact size**
- **Easy installation**
- **Special design upon request**

Application

The model 8510 bending beam load cell is suitable for measuring small and extremely small applied forces. The mechanical overload protection available for all measuring ranges prevents the sensor from being damaged by excessively high static and quasi-static loads which can occur during measurement and installation.

The sensor can be extended axially, e.g. by a finger, which does not influence the measuring.

Essential application of this sensor include measurement and testing of the following components:

- ► Switches (limit-, micro- and toggle-switches)
- ► Buttons
- ► Contact coupling and contact decoupling forces
- ► Frictional forces
- ► Spring characteristics
- ► Tension of wire and string windings

Description

The sensor element consists of a double bending beam with applied strain gauges.
Changes in the ohmic resistance of the strain gauge full-bridge caused by applied forces are converted into electrical voltages. The precise value (characteristic value) of the output voltage, resulting from the application of a rated force to the sensor, is specified in the accompanying calibration protocol.

The sensor has to be mounted by two screws on the cable side. The opposite side is meant to receive applied forces (loads).

Once the rated stress or strain is exceeded by 20 %, further deflection of the bending beam is prevented by an integrated, mechanical stop. This protects the sensor element against permanent deformation.

Technical Data

Order Code	Measuring Range	Overload Protection up to	Natural Frequency [Hz]	Weight [g]
8510-5001	0 ... 1 N	5 N	100	50
8510-5002	0 ... 2 N	10 N	150	50
8510-5005	0 ... 5 N	15 N	250	50
8510-5010	0 ... 10 N	20 N	300	50
8510-5020	0 ... 20 N	40 N	500	50

Electrical values

Bridge resistance:
full-bridge, foil type strain gauge 350 Ω, nominal*

Excitation:
measuring range 0 ... 1 N max. 3 V
measuring range 0 ... 2 N and above max. 5 V

Nominal value: 1 mV/V, nominal*

Insulation resistance: > 10 MΩ

Calibration resistance: 100 kΩ ± 0.1 %
The bridge output voltage resulting by a shunt of this value is specified in the calibration certificate.

* Deviations from the stated value are possible

Environmental conditions

Temperature operating: 15 °C ... 70 °C
Temperature compensated: - 20 °C ... 80 °C
Temperature effect zero: ≤ 0.03 % F.S./K
Temperature effect span: ≤ 0.03 % Rdg./K

Mechanical values

Measurement accuracy: ≤ ± 0.25 % F.S.
Combined value consisting of non-linearity, hysteresis and non-repeatability in constant installation position.

Measurement type: compression and tension force

Preferential direction of measurement:
The direction of calibration is indicated by an arrow on the sensor. The output voltage will be positive, if a load is given in this direction.

Deflection (full scale): 0.15 mm, nominal

Maximum effective force:
mechanical stop at approx. 120 % of full scale

Overload limits: see table

Dynamic performance: up to 50 % F.S.
model 8510 is not qualified for a very large number of loadings.

Material: sensor element: high-strength aluminium; housing: high-grade steel shell

Protection class: in accordance to EN 60529 IP20

Weight: see table

Electrical connection: shielded flexible cable, ø 2 mm, length 2 m, bending radius ≥ 20 mm, with kink-protection sleeve, ø 3 mm, length 40 mm

Wiring code:

white	excitation	positive
brown	excitation	negative
yellow	signal output	positive
green	signal output	negative

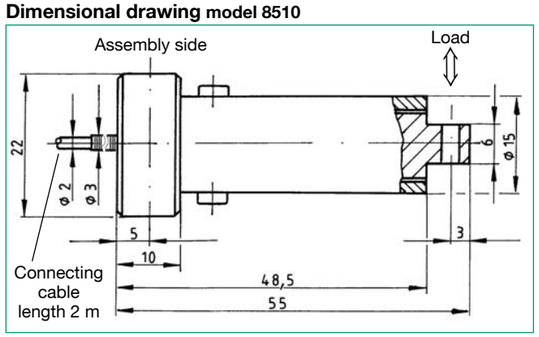
Installation Instructions

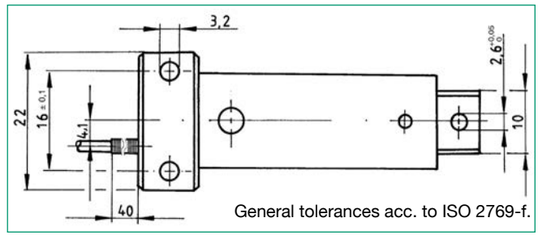
2 clearance holes designed to accommodate M3 screws are provided for mounting the sensor (refer to the drawing).

Forces are exerted on the opposite side. The hole on that side is meant for mounting a suitable force application device (e.g. a load knob).

The correct application of forces is of crucial importance for achieving a high measurement quality. It ensures that the measurement accuracy is not affected by lateral forces or moments.
Lateral forces and moments are produced mainly by eccentric and slanted loads.

Dimensional drawing model 8510





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

Miniature bending beam load cell measuring range 0 ... 1 N
Model 8510-5001

Miniature bending beam load cell measuring range 0 ... 5 N
Standardization of the rated characteristic value to 1 mV/V
Model 8510-5005-V010

Accessories

Mating connector, 12 pin for burster desktop units except for 9163
Model 9941

Mating connector, 9 pin, for SENSORMASTER and DIGIFORCE®
Model 9900-V209

Mounting of mating connector to conductor cable for general use in preferential direction (positive measuring signal in preferential direction)
Order Code 99004

Against preferential direction (positive measuring signal against preferential direction)
Order Code 99007

Force simulator model 9405 refer to data sheet 76-9405 in section 7.
(replaces the sensor for checking the amplifier or the indicator)

Supply devices, amplifiers and process monitoring units, such as the digital display model 9180, USB sensor interface model 9206, In-line amplifier model 9235 and module amplifier model 9243
refer to section 9 of the catalog.

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Option

Standardization of the rated characteristic value in the connection cable to 1,0 mV/V ± 0.25 % **...-V010**
(The standardization, length 70 mm, diameter approx. 8 mm, is integrated in the cable, approx. 30 mm before the cable end.)

Factory Calibration Certificate (WKS)

Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 85WKS-85...

2385-008510EN-5672-081524

Load Bending Beam

Model 8511

Code:	8511 EN
Delivery:	ex stock
Warranty:	24 months

- **For tension and compression forces**
- **Measuring ranges from 0 ... 5 N to 0 ... 2000 N**
- **High linearity up to 0.1 %**
- **Very low mounting height**
- **Simple force application**
- **Material aluminium or stainless steel**
- **Special design on request**

Application

Model 8511 bending beam load cells are designed for measuring tension and compression forces. Their high accuracy, low torque sensitivity and very low mounting height make these sensors particularly suitable for use in weighing and dosing technology as well as for laboratory and production use.

Extremely simple force application makes the sensor easy to handle. It offers a very favorable price/performance ratio and can be used universally for static and dynamic measurements.

Examples of application:

- ► Dosing system
- ► Load deflection curve
- ► Tension force measurement for wire or thread winders
- ► Friction forces
- ► Cable force
- ► Withdrawal force, etc

Description

The measuring element of this load cell consists of a double bending beam with strain gauges, the resistance of which changes with the application of force. Upon applying a voltage to the strain gauge bridge, the change in the strain gauge resistance is converted into output voltage, which is directly proportional to the force. The strain gauges and the entire measuring element are protected from water spray by rubber bellows.
To install the load cell, it is securely clamped on the side with 2 bore holes. The tension or compression force to be measured is applied at the other end. Force is applied easily perpendicular to the sensor axis. This serves to prevent falsification of the measured values. The influence on the measuring signal resulting from the increase of load distance on the mounting side (e.g. by a touch finger) is negligible. Overload protection can be realized with little effort using a mechanical stop.

Technical Data

Dim. tolerances acc. ISO 2768-f

Model	Measuring Range [N]	Accuracy* [%F.S.]	Dimensions [mm] ø A	B	C	D	E	F	G	ø H	ø K	L	ø M	N	Deflection Full Scale [mm]	Natural-frequency [Hz]	Weight [g]
8511-5005	0 ... 5	≤ ± 0.5	19.5	10	5	15	22	6.5	18.5	5.5 E9	4.5	86.5	28	6	0.15	130	50
8511-5010	0 ... 10	≤ ± 0.5	19.5	10	5	15	22	6.5	18.5	5.5 E9	4.5	86.5	28	6	0.2	180	50
8511-5020	0 ... 20	≤ ± 0.25	19.5	10	5	15	22	6.5	18.5	5.5 E9	4.5	86.5	28	6	0.15	150	50
8511-5050	0 ... 50	≤ ± 0.25	19.5	10	5	15	22	6.5	18.5	5.5 E9	4.5	86.5	28	6	0.15	120	50
8511-5100	0 ... 100	≤ ± 0.1	28	15	7.5	20	29	8.5	20	5.5 E9	5.5	101	40	8.5	0.3	280	100
8511-5200	0 ... 200	≤ ± 0.1	28	15	7.5	20	29	8.5	20	5.5 E9	5.5	101	40	8.5	0.2	230	100
8511-5500	0 ... 500	≤ ± 0.1	28	15	7.5	20	29	8.5	20	6.5 E9	6.5	101	40	8.5	0.2	200	350
8511-6001	0 ... 1000	≤ ± 0.1	28	15	7.5	20	29	8.5	20	6.5 E9	6.5	101	40	8.5	0.2	180	350
8511-6002	0 ... 2000	≤ ± 0.1	28	15	7.5	20	29	8.5	20	6.5 E9	6.5	101	40	8.5	0.3	300	350

* Combined value consisting of non-linearity, hysteresis and non-repeatability in constant installation position.

Electrical values

Bridge resistance: full bridge, foil model strain gauge 350 Ω, nominal

Excitation voltage:
- up to range 0 ... 20 N: max. 5 V DC
- over range 0 ... 50 N: max.10 V DC

Sensitivity:
- up to range 0 ... 20 N: 1.0 mV/V, nominal*
- over range 0 ... 50 N: 1.5 mV/V, nominal*

Isolation resistance: > 30 MΩ

Shunt calibration resistance: 100 kΩ ± 0,1 %
The bridge output voltage evoked by a shunt of this value is indicated in the calibration protocol.

* Deviations from the stated values are possible.

Environmental conditions

Temperature operating: - 30 °C ... 90 °C

Temperature compensated: 15 °C ... 70 °C

Temperature effect zero: ≤ 0.01 % F.S./K

Temperature effect span: ≤ 0.02 % Rdg./K

Mechanical values

Accuracy: see table

Measurement type: tension and compression

Preferential direction of measurement:
The direction of calibration is indicated by an arrow on the sensor. At this load direction, the output voltage is positive.

Deflection, full scale: see table

Static overload safe: 150 % of capacity

Dynamic performance: recommended 50 % of capacity
Up to measuring range 0 ... 200 kN the load cell is not suitable for an extremely high number of cyclical loads.

Design: double bending beam

Material:
- range ≤ 0 ... 200 N: sensor body made of high-strength aluminium, anodized
- range ≥ 0 ... 500 N: sensor body made of stainless steel 1.4542
bellows wear and weather resistance rubber

Protection class: acc. EN 60529 IP54

Dimension: see table and dimensions drawing

Weight: see table

Electrical termination: 4
4 wire screened PVC cable with free soldered ends, length 2 m, diameter 4.5 mm, bending radius ≥ 20 mm. Kink protection is realized by an additional polymer coat, length approx. 30 mm, diameter 5.5 mm

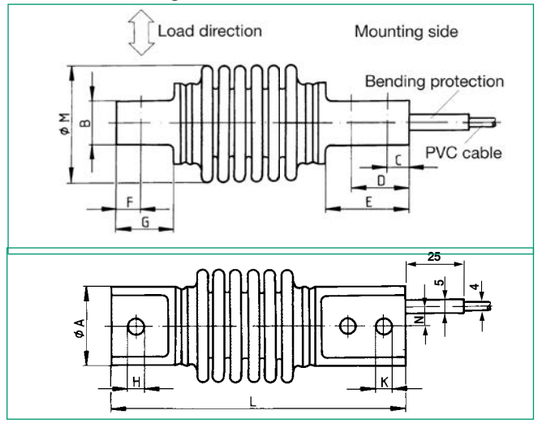
Wiring code:

white	excitation	positive
brown	excitation	negative
yellow	signal output	positive
green	signal output	negative

Mounting:

Up to measurement range 0 ... 200 N screws of strength class 8.8 necessary, for measurement ranges from 0 ... 500 N screws strength class 12.9.

Dimensional drawing model 8511



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

Load bending beam, measuring range 10 N **Model 8511-5010**

Load bending beam, measuring range 20 N, standardization of output 1.0 mV/V **Model 8511-5020-V010**

Accessories

Mating connector, 12 pins for burster desktop devices **Model 9941**

Mating connector, 9 pins for 9163-V3, 9235 and 9310 **Model 9900-V209**

Mounting of mating connector on sensor cable upon prevalent use of the load cell

in preferential direction (positive sensor signal in preferential direction) **Order Code 99004**

opposite to preferential direction (positive sensor signal opposite preferential direction) **Order Code 99007**

Analysis devices, amplifier and process controller like digital display model 9180, USB sensor interface model 9206, sensor profibus module model 9221, In-line amplifier model 9235 and modular amplifier model 9243 **refer to section 9 of the catalog.**

Test and Calibration Certificate

Included in delivery, et al. with specification of zero output, sensitivity and shunt calibration factor.

Option

Standardization of output integrated part of cable to 1.0 mV/V **...-V010**
(refer to order information)

Factory Calibration Certificate (WKS)

Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 85WKS-85...

2386-008511EN-5672-081524

Tension-Compression Load Cells

Model 8523
Model 8531

Code: 8523 EN
Delivery: ex stock
Warranty: 24 months

Model 8523

Model 8531

- **Measuring ranges from 0 ... 20 N to 0 ... 5000 N**
- **High measurement accuracy up to 0.15 % F.S.**
- **Material high-strength aluminium**
- **Standardized nominal characteristic value starting with a measurement range of 0 ... 100 N**
- **Especially inexpensive**

Application

These sensor series are especially suitable for the measurement of static and semi-static tension and compression measurements. The membrane load cells are designed based on proven principles. Their compact design and very solid construction makes them suitable for use in manufacturing plants as well as in laboratories and testing. Sensor characteristic value is standardized with the exception of model 8523-20/50 N. This makes it possible to replace the measurement amplifier without adjusting it. Furthermore it is possible to connect several load with the same measurement range at the same time by totaling the individual forces.

Applications:

- Cable force
- Measurement of bar, rods and framework forces
- Press-fit processes
- Balance and test scales
- Friction forces
- Withdrawal forces

Description

The load to be measured is applied either using a load button or an application specific thread part to the load cell via a M8 thread, which is located in the axis of the tension and compression sensors. A strain gauge full bridge is in the sensor element, which converts the applied load into an electrical signal.
The mounting of the load cells is unproblematic due to the three-point support. This reduces the mounting surface requirements.
In order to achieve an optimal measuring result, the force to be measured must be applied to the sensor axially.
Lateral forces can be avoided by constructional measures like mounting the load cell on movable bearings, guiding sleeves, etc.
Load buttons (see drawings) enable an optimal appliance of the compression forces to the load cells. The measurement error upon non-axial load application is negligible up to an angle error of 3° due to the sensor's convex surface. The output signal is positive in the calibrated direction of motion (compression force). The characteristic value in the direction of tension can deviate from the calibrated direction of compression by up to 0.3 %.

Technical Data

Dim. tolerances acc. ISO 2768-f

Order Code	Load Range	Accuracy[1] [%F.S.]	Sensitivity [mV/V]	ø D [mm]	H [mm]	Natural Frequency [kHz]	Weight [kg]	Wrench Torque for Mounting Screw 12.9
8523-5020	0 ... 20 N	≤ ± 0.5	nominal [2] 1.0	54.5	16	0.5	0.15	3 Nm
8523-5050	0 ... 50 N	≤ ± 0.5	nominal [2] 1.0	54.5	16	0.75	0.15	3 Nm
8523-5100	0 ... 100 N	≤ ± 0.5	standardized 1.5 ± 0.5	54.5	16	0.80	0.15	3 Nm
8523-5200	0 ... 200 N	≤ ± 0.2	standardized 1.5 ± 0.2 %	54.5	16	1.1	0.15	3 Nm
8523-5500	0 ... 500 N	≤ ± 0.2	standardized 1.5 ± 0.2 %	54.5	16	2.3	0.15	3 Nm
8531-6001	0 ... 1000 N	≤ ± 0.25	standardized 1.5 ± 0.2 %	89.5	22	1.0	0.35	6 Nm
8531-6002	0 ... 2000 N	≤ ± 0.15	standardized 1.5 ± 0.2 %	99.5	30	1.8	0.35	6 Nm
8531-6005	0 ... 5000 N	≤ ± 0.15	standardized 1.5 ± 0.2 %	99.5	30	3.0	0.35	6 Nm

[1] Combined value consisting of non-linearity, hysteresis and non-repeatability in constant installation position.
[2] More or less deviation from stated is possible.

Electrical values

Bridge resistance (full bridges): foil strain gauges 350 Ω, nominal [2]

Calibration resistor:
- model 8523-5020 150 kΩ ± 0.1 %
- model 8523-5050 100 kΩ ± 0.1 %
- others 80 kΩ ± 0.1 %

The bridge output voltage resulting from a shunt resistor of these values is shown in the calibration certificate.

Excitation:
- range 0 ... 20 N max. 5 V DC or AC
- range ≥ 0 ... 50 N max. 10 V DC or AC

Environmental condition

Temperature operating: - 30 °C ... + 80 °C

Temperature compensated: + 15 °C ... + 70 °C

Temperature effect:
- model 8523 ≤ ± 0.01 % F.S./K
- model 8531 ≤ ± 0.02 % F.S./K

Temperature effect to span: ≤ + 0.02 % Rdg./K

Mechanical values

Kind of measurement: tension or compression direction (calibrated in compression direction)

Deflection full scale: approx. 80 µm

Overload safe: 130 % of capacity

Overload burst: approx. 300 % of capacity

Dynamic performance: recommended 50 % of capacity, not suitable for large number of load cycles in tension or compression direction.

Casing material: high-grade aluminium, anodized

Natural frequency: see table

Protection class: acc. EN 60529
- model 8523 IP52
- model 8531 IP64

Electrical termination:
Screened, highly flexible cable with free soldered ends, length approx. 2 m, ø 4.5 mm, bending radius > 40 mm. For model 8523 range ≥ 0 ... 100 N the standardization is integrated in the sensor cable (length 7 cm, ø 8 mm, distance from cable end 30 cm).

Wiring code:

white	excitation	positive
brown	excitation	negative
yellow	signal output	positive
green	signal output	negative

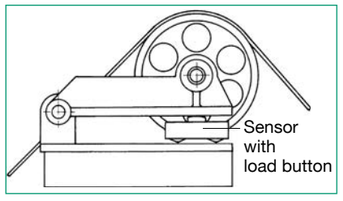
Dimension: see table and dimensions drawing

Weight: see table

Mounting: wrench torque for mounting screws, strength class 12.9 see table

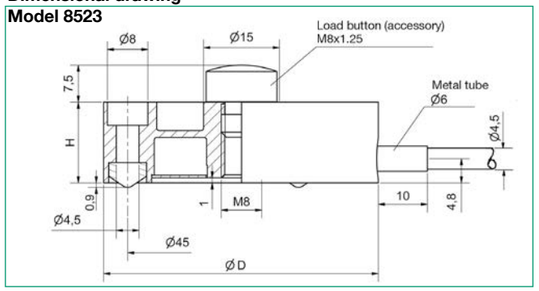
Application example

A stable joint fastening of the arm protects the load cell against impermissible lateral and torsion forces.

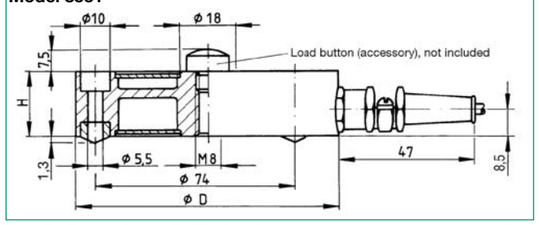


Dimensional drawing

Model 8523



Model 8531



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

Compression and tension load cell, range 200 N **Model 8523-5200**

Accessories

Mating connector, 12 pin for burster desktop units except for 9163 **Model 9941**

Mating connector, 9 pins, for 9163-V3xxx, 9235, 9311 and 7281 **Model 9900-V209**

Mounting of mating connector to conductor cable for general use in preferential direction

in preferential direction (positive signal for compression) **Order Code 99004**

Against preferential direction (positive signal for tension) **Order Code 99007**

Load button for introduction of compressive forces polished and induction hardened (not included delivery) **Model 8580-V008**

Pull plate for measuring tension and compression forces (on both sides rings can be mounted)
- for model 8523 **Model 8590-V002**
- for model 8531 range 0...1 kN **Model 8590-V006**
- for model 8531 range 0...2 kN and 0...5 kN **Model 8590-V007**

Amplifier, analysis and process control devices e.g. digital display 9180, In-line amplifier model 9235, modular amplifier model 9243, DIGIFORCE® 9307, TRANS CAL 7281

refer to section 9 of the catalog.

Factory Calibration Certificate (WKS)

Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.

Order Code 85WKS-85...

2387-008523EN-5672-081524

Precision Tension and Compression Load Cell

Model 8524

Code: 8524 EN
Delivery: ex stock
Warranty: 24 months

Small measurement ranges

Medium measurement ranges

Large measurement ranges

Optional overload protection up to the fivefold of measurement range

- **Measuring ranges from 0 ... 500 N to 0 ... 200 kN**
- **Measurement accuracy better than 0.25 % F.S.**
- **Output signal 1.5 mV/V, standardized**
- **Highly versatile and for universal use**
- **Type of protection acc. EN 60529 IP67 for measuring ranges ≥ 0 ... 20 kN**
- **Measuring accuracy 0.1 % F.S. for measuring ranges ≤ 0 ... 5 kN (option)**
- **Cable suitable for drag chains and highly flexible**

Application

Due to their compact design and construction, these tension-pressure load cells can be operated without any problems in laboratories as well as in industrial environments. Made of corrosion-resistant steel, these load cells can be integrated easily in existing structures, due to their standardized nominal characteristic value and simple assembly. Model 8524 can be used to measure static, semi-static and dynamic tension and compression forces depending on the measurement task.

Areas of application include:

- ► Measurement of press-in and insertion forces
- ► Measurement of spring forces
- ► Measurement of shearing and cutting forces
- ► Force measurement and control during assembly
- ► Measurement of pressure on drilling machines

A load-centering plate mounted on the load cell can be used to measure joint lugs, tension forces in ropes, chains, etc. (refer to page 4: load-centering plate).

Description

The bending diaphragm inside the load cell is equipped with strain gauges which, on the exertion of a force, supply a bridge-output voltage directly proportional to the measurement variable. The center axis of the tension/compression load cells incorporates a continuous thread through which the measurement force is applied free from lateral or torsion force either using a load application button or an application-specific adapter part. Starting at a measurement range of 0 ... 5 kN, the measurement accuracy is ideal if the load cell has been mounted on a levelled, hard and polished base. This condition is not necessary for small measurement ranges of 0 ... 2 kN due to 3 special knife-edge bearings (see dimensional drawing 1).
Structural measures should be taken to avoid exposing the load cell to lateral forces (for instance, mounting on movable bearings, levers held by roller bearings). Attachment via the clearance bore holes integrated in the external ring allows simple handling of the sensor.
A stop serves as overload protection against damages caused by impermissible high compression forces (option up to measurement range 0 ... 20 kN). Lateral forces of up to 5 % nominal strength only have little influence.

Technical Data

Dim. tolerances acc. ISO 2768-f

Order Code	Measuring Range	Dimensions [mm] øD1	øD2	øD3	øD4	H	øG	øX	øY	Thread T	Number of Holes on øG	Natural Frequency [kHz]	Mass [kHz]	Wrench for Mounting Screws 12.9	Designated Mounting Screws
8524-5500	0 ... 0.5 kN	54.5	15	35.5	33.5	16	45	4.5	8	M 8x1.25	3	> 2	0.25	3 Nm	M 4
8524-6001	0 ... 1 kN	54.5	15	35.5	33.5	16	45	4.5	8	M 8x1.25	3	> 3	0.25	3 Nm	M 4
8524-6002	0 ... 2 kN	54.5	15	35.5	33.5	16	45	4.5	8	M 8x1.25	3	> 5	0.25	3 Nm	M 4
8524-6005	0 ... 5 kN	54.5	15	35.5	34.5	16	45	4.5	8	M 8x1.25	6	> 8	0.25	3 Nm	M 4
8524-6010	0 ... 10 kN	54.5	15	35.5	34.5	16	45	4.5	8	M 8x1.25	6	> 12	0.25	3 Nm	M 4
8524-6020	0 ... 20 kN	79	22	59	58.6	25	68	4.5	8	M 12x1.5	8	> 4	0.65	3 Nm	M 4
8524-6050	0 ... 50 kN	119	44	94	92.6	35	105	6.6	11	M 24x1.5	8	> 3	2	10 Nm	M 6
8524-6100	0 ... 100 kN	155	60	109	107	50	129	13.5	20	M 36x3	8	> 3	5	100 Nm	M 12
8524-6200	0 ... 200 kN	155	60	109	107	50	129	13.5	20	M 36x3	8	> 5	5	100 Nm	M 12

Electrical values

Bridge resistance (full bridge): foil strain gauge 350 Ω, nominal*

Excitation: max. 10 V DC or AC

Sensitivity: 1.5 mV/V ± 0,25 %
positive output at compression

Calibration resistor (burster model 1148-6080): 80 kΩ; 0.1 %
The bridge output signal resulting from a shunt of this value is shown in the calibration certificate. Calibration certificate includes the traceability verification of measuring equipment and is part of delivery.

* Deviation from stated values are possible.

Environmental conditions

Temperature compensated: 15 °C ... 70 °C

Temperature operating: - 30 °C ... 80 °C

Temperature effect zero shift: ≤ 0.02 % F.S./K

Temperature effect span shift: ≤ 0.02 % Rdg./K

Mechanical values

Accuracy: ≤ ± 0.25 % F.S.
Combined value consisting of non-linearity, hysteresis and non-repeatability in constant installation position.

Kind of measurement: Tension and compression
Load calibration in compression direction (preferential direction, output signal positive).
At use with tension load deviant output signal can be expected.

Deflection full scale: < 80 µm

Overload safe: 150 % of capacity

Overload burst: > 250 % of capacity

Dynamic performance:
recommended 70 % of capacity
maximum 100 % of capacity

Material: stainless steel 1.4542

Protection class: acc. EN 60529 measuring range ≤ 0 ... 10 kN: IP65
measuring range ≥ 0 ... 20 kN: IP67

Electrical termination:
highly flexible, oil resistant, drag chains suitable, shielded cable with bare ends for soldering. Bending radius three times the diameter for fixed cable, ten times the diameter for cable permanently moving, length 2 m. Further details see dimensional drawing.
range ≤ 0 ... 50 kN PUR, ø 4.2 mm
range ≥ 0 ... 100 kN TPE-V, ø 6,3 mm

Wiring code:

white	excitation	positive
brown	excitation	negative
yellow	signal output	positive
green	signal output	negative

Dimensions: see table dimensional drawing
Units with range ≤ 0 ... 2 kN are equipped with bearing edges within clearance holes. Therefore they are 1 mm higher.

Mass: 250 g ... 5 kg, see table

Assembly:
measuring ranges up to 0 ... 2 kN: 3 clearance holes with edges for three-point-support (see dimension drawing 1)
measuring ranges from 0 ... 5 kN: 6 resp. 8 clearance holes (see dimensions drawing 2-4)

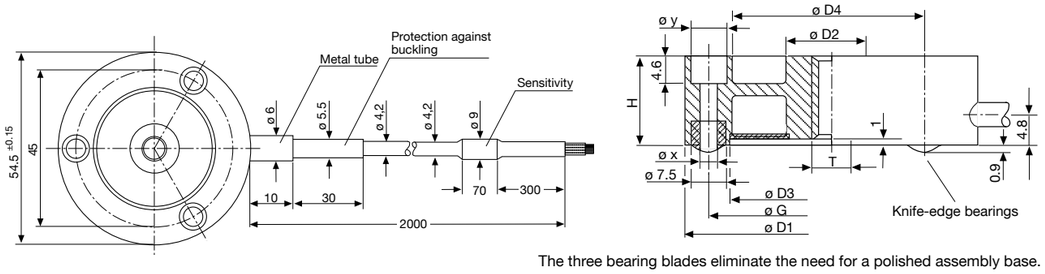
The entire bearing area of the sensor must be mounted on a base which is hardened (60 HRC), flat, polished or better lapped.

Counter bores in compliance with DIN 74-km, in compliance with DIN 912 head cap screws.

Mechanical strength of screws: 12.9 or better

Also refer to the accessories comprising load-centering plates and load introduction buttons, page 4.

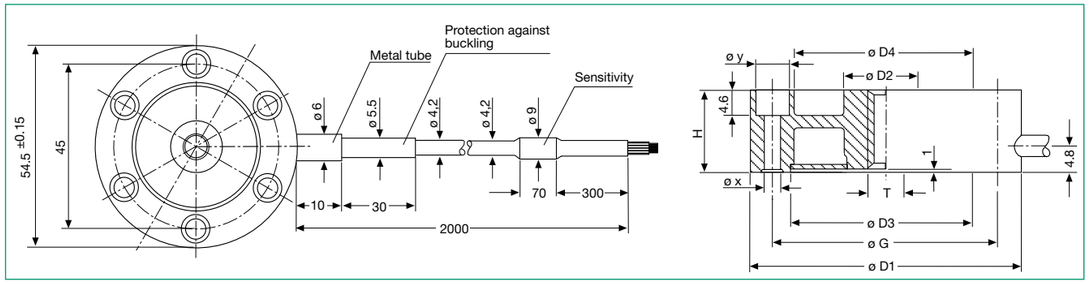
Dimensional drawing 1 measuring range 0 ... 0.5 kN and 0 ... 2 kN



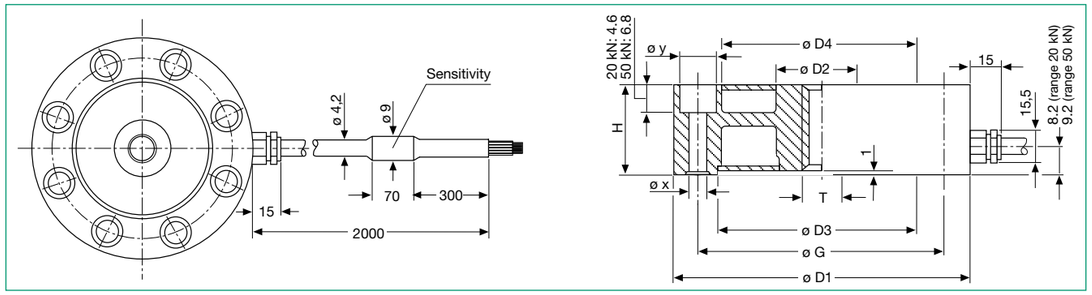
The three bearing blades eliminate the need for a polished assembly base.

2388-008524EN-5672-081524

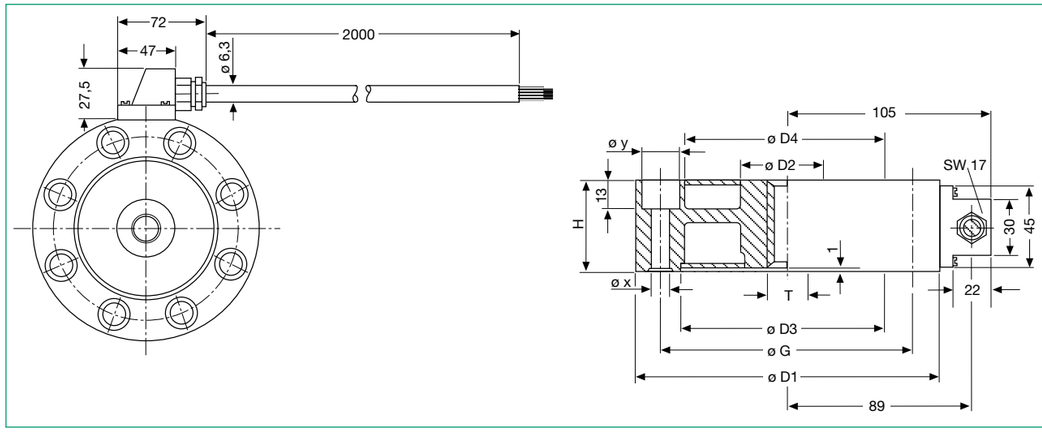
Dimensional drawing 2 measuring ranges 0 ... 5 kN and 0 ... 10 kN



Dimensional drawing 3 measuring ranges 0 ... 20 kN and 0 ... 50 kN



Dimensional drawing 4 measuring ranges 0 ... 100 kN and 0 ... 200 kN



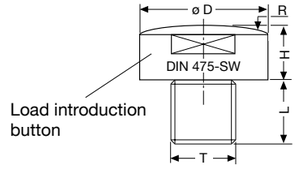
The CAD drawings (3D/2D) for this sensors can be imported online directly into your CAD system.
Download via www.burster.com or directly at www.traceparts.com. For further information about the burster traceparts cooperation refer to data sheet 80-CAD-EN.

Accessories

Load buttons

load buttons for introducing compressive forces

Order Code	for Load Cell with Nominal Load	Dimensions [mm] øD	H	L	T	SW	R	Tightening Torque	Mass [kg]
8580-V008	0.5 ... 10 kN	14	7.3	7	M 8 x 1.25	-	20	up to 2 kN: max. 5 Nm / 5 kN and 10 kN: max. 8 Nm	0.01
8580-V012	20 kN	20	15.1	12	M 12 x 1.5	16	25	" 10 Nm	0.05
8580-V024	50 kN	40	20	17	M 24 x 1.5	32	100	" 20 Nm	0.25
8580-V036	100 kN, 200 kN	57	30	40	M 36 x 3	46	200	" 50 Nm	1



These load buttons prove extremely useful if a mechanical coupling (for instance, by means of a threaded rod) is not necessary or possible for a measurement of compressive forces. The spherical surface minimizes measurement errors in case of not axial force introduction.
The compression force needs to be introduced into the load button by means of a component with a plane surface, hardness ≥ 60 HRC. Calibration Certificates for compression load require a load button, which consequently is part of the load cell and must be ordered along with.

Pull Plates

A pull plate extends the range of application of flat-design tension-pressure load cells to include the measurement of tensile forces in freely movable arrangements (rope tension, joint tension ...).
A pull plate has roughly the same dimensions as the sensor body and is mounted on the load cell (see drawing). The central tapped holes allow an installation of customer-specific or standard threaded components (for example, joint heads).

Order Code	for Nominal Load [kN]	Centric Thread	Mass [kg]	max. Wrench Torque for Screws 12.9
8590-V002	bis 10	M 8 x 1.25	0.28	3 Nm
8590-V003	20	M 12 x 1.5	0.70	3 Nm
8590-V004	50	M 24 x 1.5	2.2	100 Nm
8590-V005	100, 200	M 36 x 3	5.5	100 Nm

Screws of strength class 12.9 are required for attaching the pull plates to the load cells.

Strain gauge simulator serves as appliance for the controlled generation of strain gauge sensor signals 0/0.5/1/1.5/2/3 mV/V for the adjustment or verification of amplifiers or indicator devices
Model 9405
refer to data sheet 76-9405 in section 7 of the catalog.

Mating connection, 12 pins for burster desktop devices **Model 9941**

Mating connection, 9 pins for 9163-V3, 9235 and 9310
Model 9900-V209

Mounting of mating connector on sensor cable upon prevalent use of the load cell

in preferential direction (output signal is positive) **Order Code 99004**

only for connection to SENSORMASTER model 9163 desktop version **Order Code 99002**

opposite to preferential direction (output signal is positive)
Order Code 99007

only for connection of the sensor to SENSORMASTER model 9163 desktop version **Order Code 99008**

Options

Overload protection compression direction (see drawing on the right)
Order Code V400

Load cell with option overload protection for compression direction					
Order Code	Measuring Range	Protected up to	Dimensions [mm] øD1	H1	H
8524-5500-V400	0 ... 500 N	2.5 kN	54.5	19	16
8524-6001-V400	0 ... 1 kN	5 kN	54.5	19	16
8524-6002-V400	0 ... 2 kN	10 kN	54.5	19	16
8524-6005-V400	0 ... 5 kN	20 kN	54.5	19	16
8524-6010-V400	0 ... 10 kN	30 kN	54.5	19	16
8524-6020-V400	0 ... 20 kN	80 kN	79	25	25

The overload protection protects the load cell against damages resulting from loads higher than the operating load value (150 % of the nominal load). The overload protection is realized through a dead stop limiting the displacement of the spring bellow upon load application to max. 130 % of the nominal load. The measurement of tension forces is possible also with mounted overload stop. For this reason the overload protection has the same external mounting bores as the sensor itself.

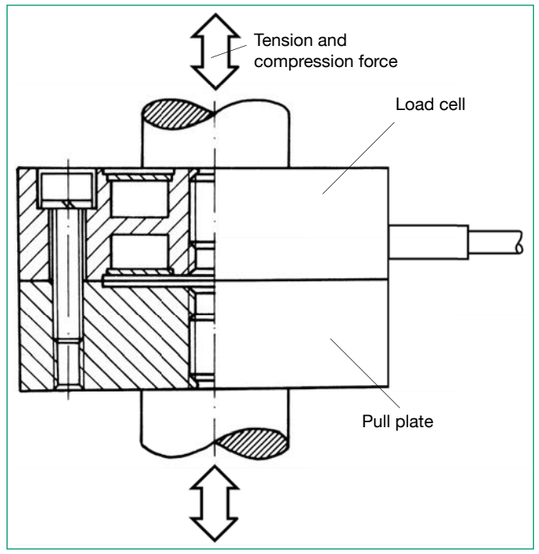
Useful Information

- Overload protection for compression only.
- Overload protection mounting by factory only.
- Tolerance of standardized output of load cell at overload protection ± 0.5 %.
- Do not use the overload protection often.
- It is not allowed to introduce overload on load cell by thread (allowed are load buttons, see accessories or similar parts.)
- The overload protection does not have any centric threaded holes.

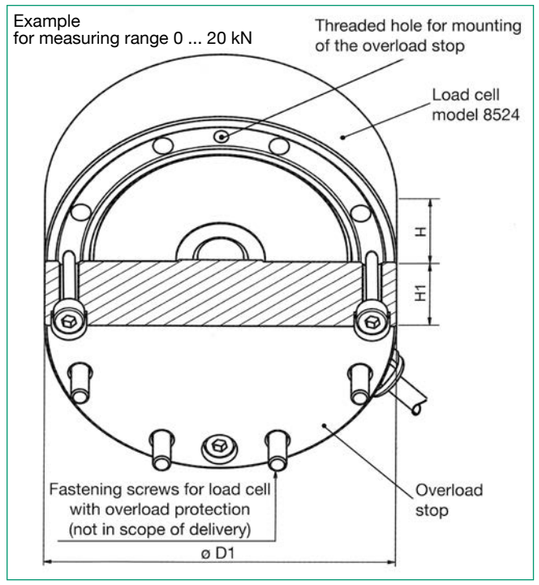
Options

Standardized sensitivity, 1 mV/V ± 0.25 % **- V010**
Cable length 3 m **- V203**
Cable length 5 m **- V206**
Better accuracy ± 0.1 % F.S.
(only for measurement ranges ≤ 0 ... 5 kN) **- V502**

Sensor with pull plate



Sensor with overload protection; available up to ≤ 0 ... 20 kN



Order Information

Tension and compression, range 0 ... 20 kN **Model 8524-6020**

Tension and compression, range 0 ... 5 kN, overload protection up to 20 kN **Model 8524-6005-V400**

Signal conditioning

Digital indicator e.g. model 9180, amplifier e.g. model 9243 or DIGIFORCE® **refer to section 9 of the catalog.**

Factory Calibration Certificate (WKS)

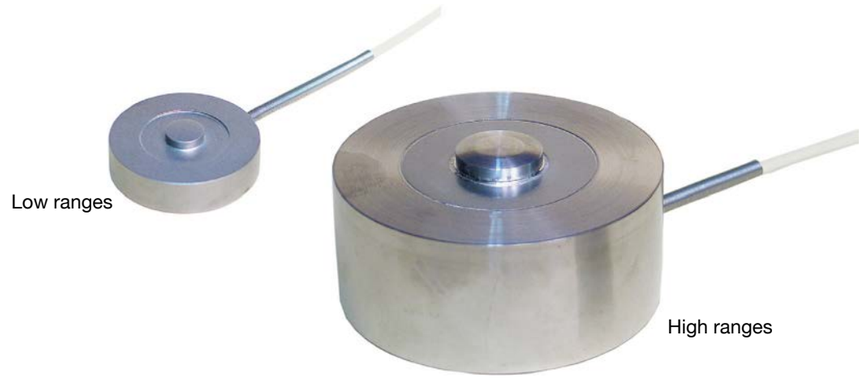
Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 85WKS-85...

2388-008524EN-5672-081524

Compression Load Cell

Model 8526

Code:	8526 EN
Delivery:	ex stock
Warranty:	24 months



- **Measuring ranges from 0 ... 100 N to 0 ...200 kN**
- **Small dimensions**
- **Easy to mount**
- **For static and dynamic measurements**
- **Made of high-grade stainless steel**
- **Welded construction, protection class IP64**
- **With standardized output signal 1 mV/V**
- **Three threaded holes on bottom for mounting**

Application

A high price/performance ratio and robust design characterize the compression load cells even in the high measuring ranges. Their small dimensions allow these load cells to be used for measuring static and dynamic compressive forces in restricted spaces.
The model 8526 load cell has a sealed body, allowing it to be used even under dirty and harsh industrial conditions.

These sensors are used as measuring elements mainly in:

- Device manufacture
- Production lines
- Measurement and control systems
- Manufacture of fixtures and special machines
- Geological applications

Description

The model 8526 load cell is designed as a flat, circular disc. 4 strain gauges are applied at the measuring element of the sensor body. The measuring element inside the body carries a strain gauge full bridge which outputs a voltage directly proportional to the measurement variable on the application of a force.

The load application knob for receiving compressive forces is an integral part of the sensor. The compressive force must be applied with a part that leans on a sensor parallel plain with reference to the application knob. This ensures only minor influence of smaller angle faults between the force application and the sensor axis to the measurement signal. Basically the measurement force must be applied centrically without any lateral vectors of force.

A ground bearing surface for the sensor as well as a hardness of at least 60 HRC of the bearing surface of the force application are precondition for an optimum in measurement quality.

The standardized nominal value (1.0 mV/V) simplifies the exchange of sensors. Furthermore the sensors can be switched parallel for the summation of singular forces.

Technical Data

Dim. tolerances acc. ISO 2768-f

Order Code	Measuring Range	Dimensions [mm]															3 Mounting Holes with Metric Thread G	Mass [kg]	Natural-Frequency [kHz]
		øD1	øD2	øD3	øD4	øD5	+0,2 -0,4 H1	H2	øT	øA	øB	øC	K	L	M	N			
8526 - 5100	0 ... 100 N	31.8	29.4	21.2	8.1	19.0	9.9	8.1	25.5	-	3	2	-	40	2.5	3	M 2.5	0.04	2
8526 - 5200	0 ... 200 N	31.8	29.4	21.2	8.1	19.0	9.9	8.1	25.5	-	3	2	-	40	2.5	3	M 2.5	0.04	3
8526 - 5500	0 ... 500 N	31.8	29.4	21.2	8.1	19.0	9.9	8.1	25.5	-	3	2	-	40	2.5	3	M 2.5	0.04	5
8526 - 6001	0 ... 1 kN	31.8	29.4	21.2	8.1	19.0	9.9	8.1	25.5	-	3	2	-	40	2.5	3	M 2.5	0.04	8
8526 - 6002	0 ... 2 kN	31.8	29.4	21.2	8.1	19.0	9.9	8.1	25.5	-	3	2	-	40	2.5	3	M 2.5	0.04	11
8526 - 6005	0 ... 5 kN	31.8	29.4	21.2	8.1	19.0	9.9	8.1	25.5	-	3	2	-	40	2.5	3	M 2.5	0.04	17
8526 - 6010	0 ... 10 kN	31.8	29.4	21.2	8.1	19.0	9.9	8.1	25.5	-	3	2	-	40	2.5	3	M 2.5	0.05	25
8526 - 6020	0 ... 20 kN	38.1	35.0	28.0	10.7	27.0	16.0	14.0	31.5	-	4.5	3	-	40	3	3	M 2.5	0.05	25
8526 - 6050	0 ... 50 kN	38.1	35.0	28.0	10.7	27.0	16.0	14.0	31.5	-	4.5	3	-	40	3	3	M 2.5	0.05	40
8526 - 6100	0 ... 100 kN	50.8	48.0	36.0	15.2	33.0	25.4*	22.4	42.0	7	4.5	3	11	45	6	6	M 4	0.3	40
8526 - 6200	0 ... 200 kN	76.2	74.0	460	20.0	45.0	38.1*	33.5	60.0	7	4.5	3	11	45	6	6	M 4	1.2	40

Electrical values

Bridge resistance (full bridge):
foil-model strain gauge 350 Ω, nominal**

Excitation: measuring range ≤ 0 ... 1 kN max. 5 V DC
measuring range ≥ 0 ... 2 kN max. 10 V DC

Output: 1.0 mV/V ± 0.25 % for ranges to 0 ... 1 kN
1.0 mV/V ± 0.5 % for ranges from 0 ... 2 kN

Calibration resistor: 100 kΩ ± 0.1 %, model 1148-6080
The bridge output voltage resulting from a shunt of this value is stated in the calibration certificate.

** Deviations from the stated value are possible. Resistance between supply lines max. 500 Ω for standardization.

Environmental conditions

Temperature operating: - 20 °C ... +100 °C
Temperature compensated: +15 °C ... + 70 °C
Temperature:
to effect zero ≤ ± 0.02 % F.S./K
to effect span ≤ + 0.03 % Rdg./K

Mechanical values

Measuring accuracy:
Combined value consisting of non-linearity, hysteresis and non-repeatability in constant installation position.
ranges up to 0 ... 1 kN ≤ 0.25 % F.S.
ranges from 0 ... 2 kN ≤ 0.5 % F.S.

Deflection, full scale: 40 µm ... 80 µm
Overload safe: 150 % of capacity
Dynamic performance:
recommended 50 % of capacity
permitted 70 % of capacity

Mounting:
Bottom side with three 3 mm M 2.5 or 6 mm M 4 deep mounting holes on diameter T, sharing 120°, see table and dimensional drawing.

Design: bending membrane, welded cover
Material: high-grade stainless steel 1.4542
Protection class acc. to EN 60529: IP64

Electrical termination:
For all measuring ranges the adapter for standard output 1.0 mV/V (length 70, diameter 8) is integrated in the connection cable distanced ca. 30 cm from wire end.

measuring range ≤ 0...10 kN high flexible, shielded TPE insulated cable, ø 2 mm, with bare ends for soldering, length 2 m, at sensor body 40 mm anti-kink coil, ø 3 mm, bending radius ≥ 25 mm

measuring range 0...20 kN and 0...50 kN high flexible, shielded TPE insulated cable, ø 3 mm, with bare ends for soldering, length 2 m, at sensor body 40 mm anti-kink coil, ø 5 mm, bending radius ≥ 30 mm

measuring range ≥ 0...100 kN high flexible, shielded TPE insulated cable, ø 3 mm, with bare ends for soldering, length 2 m, reinforced strain relief through a 10 mm long metal sleeve at cable outlet at sensor body 45 mm anti-kink, ø 5 mm, bending radius ≥ 30 mm cable outlet centric between two threaded holes

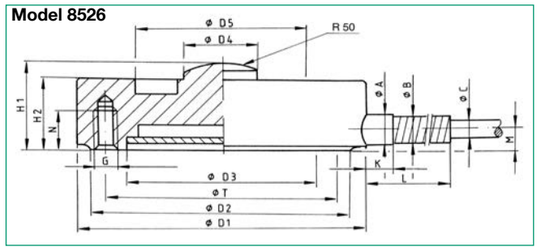
Wiring code:

white	supply	positive
brown	supply	negative
yellow	signal output	positive
green	signal output	negative

Dimensions and weight: see table and dimension drawing

Dimensional drawing

Model 8526



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

Compression load cell, measuring range 0 ... 2 kN **8526-6002**

Accessories

Mating connector, 12 pins, for burster desktop devices **Model 9941**

Mating connector, 9 pins, for SENSORMASTER and DIGIFORCE® **Model 9900-V209**

Mounting of mating connector on sensor cable **Order Code 99004**

only for connection to SENSORMASTER model 9163 desktop version **Order Code 99002**

Strain gauge simulator
The simulator replaces the strain gauge sensor for the adjustment or verification of the amplifier **Model 9405**
refer to data sheet 76-9405 in section 7 of the catalog.

Signal processing
Amplifier, supplies and process controllers e.g. digital display model 9180, USB sensor interface model 9206, modular amplifier model 9243 and DIGIFORCE® **refer to section 9 of the catalog.**

Factory Calibration Certificate (WKS)

Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 85WKS-85...

2389-00852EN-5672-081524

High Precision Compression Load Cell

Model 8527

Code: 8527 EN
Delivery: ex stock
Warranty: 24 months

Low range

High range

- **Measuring ranges from 0 ... 500 N to 0 ... 100 kN**
- **Very high linearity < 0.05 % F.S.**
- **Highest precision and manufacturing quality**
- **Static and dynamic measurements**
- **Protection class IP65**
- **Made of high quality stainless steel**
- **With standardized output signal**
- **WKS (Factory Calibration Certificate) or DKD/DAkkS (Deutsche Akkreditierungsstelle GmbH - German Accreditation Body) calibration optional**
- **Simplest mounting**

Application

High quality sensors are required due to the constantly rising demand in accuracy and reliability in almost all technical fields. In addition to particularly small linearity errors, measuring applications often call for improved reversal errors, longtime stability and temperature constancy.

This highly precise load cell in combination with qualitatively adequate evaluation electronics can solve many ambitious force measurement tasks. Its area of application is also extended to include today's various needs of exact reference systems for quality control.

Examples of application:

- ► Reference sensor for adjustment and control of force measurement facilities in production and in laboratories
- ► Material testing
- ► Spring fame force measurements
- ► Press-in operating
- ► Weighing technology

Description

The high precision load cell model for compression forces consists of a circular body, in which a load button is integrated. The load to be measured is transferred via its convex surface to the measuring element where it is converted into an electrical voltage by a strain gauge full bridge. The output voltage is proportional to the measuring force.
The measuring element is located between two stabilizing membranes protecting the central part from lateral displacement when subjected to lateral force. A high level of measurement accuracy requires force application using a flat and hard stamp or plate while the load cell is mounted on a plane surface. The surface should be polished or even lapped and hardened. Its thickness should correspond to the forces in order to prevent bending.
The force should be applied axially and centrically. Even if smaller angle errors influence the measuring signal, they are minimized by the convex and plane surface of the load application button.
Two laterally located M8 threaded holes support the handling and transport of the sensor.

Technical Data

Dim tolerance acc. ISO 2768-f

Order Code	Measuring Range	Dimensions [mm]													Mass [kg]	Natural Frequency [Hz]
		øB	øD1	øD3	øD4	øG	H	H1	K	R	V	W	øX	øY		
8527-5500	0 ... 500 N	21	79	59	58.6	68	20	22	7.5	50	4.6	15.4	4.5	8	0.5	365
8527-6001	0 ... 1 kN	42	79	59	58.6	68	20	22	7.5	50	4.6	15.4	4.5	8	0.5	540
8527-6002	0 ... 2 kN	42	79	59	58.6	68	25	27	7.5	50	4.6	20.4	4.5	8	0.6	700
8527-6005	0 ... 5 kN	43	119	94	92.6	105	30	33	9	150	6.8	23.2	6.6	11	1.6	470
8527-6010	0 ... 10 kN	43	119	94	92.6	105	45	48	9	150	6.8	38.2	6.6	11	2.4	580
8527-6020	0 ... 20 kN	43	119	94	92.6	105	60	63	9	150	6.8	53.2	6.6	11	3.2	715
8527-6050	0 ... 50 kN	59	155	109	107	129	60	63	25	200	13	47	13.5	20	6.5	850
8527-6100	0 ... 100 kN	59	155	109	107	129	75	78	25	200	13	62	13.5	20	8.0	1000

Electrical values

Bridge resistance (full bridge): foil-model strain gauge 350 Ω
Excitation: max. 10 V DC or AC
Sensitivity: 1.5 mV/V, ± 0.2 %
Calibration resistor (burster model 1148-6080): 80 kΩ; 0.1 %
The bridge output voltage resulting from a shunt of this value is stated in the calibration certificate.

Environmental conditions

Temperature compensated: 15 °C ... 70 °C
Temperature operating: - 30 °C ... 80 °C
Temperature effect zero: ≤ 0.01 % F.S./K
Temperature effect span: ≤ 0.01 % v.S./K

Mechanical values

Non-linearity: ≤ ± 0.05 % F.S.
Kind of measurement: compression force
Deflection, full scale: < 80 µm
Overload safe: 120 % of capacity
Overload burst: > 200 % of capacity
Dynamic performance:
permitted 70 % of capacity
maximum 100 % of capacity
Material: high-grade stainless steel 1.4542
Protection class EN 60529: IP65
Electrical termination: shielded, flexible cable, with bare ends for soldering, length 2 m
Ranges 0 ... 500 N to 0 ... 20 kN: cable diameter 5 mm bending radius at least 30 mm, cable output radial, high-strength cable gland, standardized in cable
Range 0 ... 50 kN and 0 ... 100 kN: cable diameter 5 mm bending radius at least 30 mm, cable output tangential, high-strength cable gland, flange bracket

Wiring code:

white	excitation	positive
pink		+ sense wire
brown	excitation	negative
grey		- sense wire
yellow	signal output	positive
green	signal output	negative

Mass: 0.5 ... 8.5 kg (see table)
Mounting:
4 through-holes (see dimensions drawing)
The complete bearing face of the load cell must be seated on a through hardened (60 HRC), plane, grinded or better lapped mounting surface. Countersinks according DIN 74-km, for hexagon socket screw according to DIN 912.

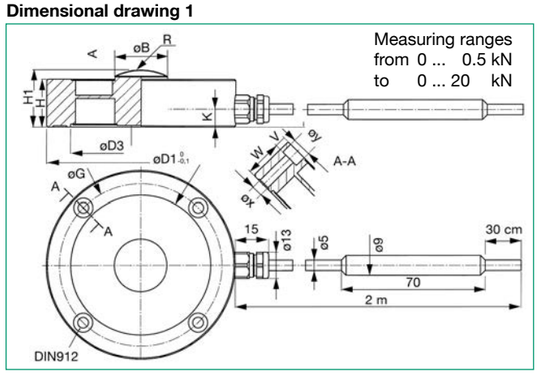
Order Information

High precision compression load cell, range 0 ... 20 kN **Model 8527-6020**

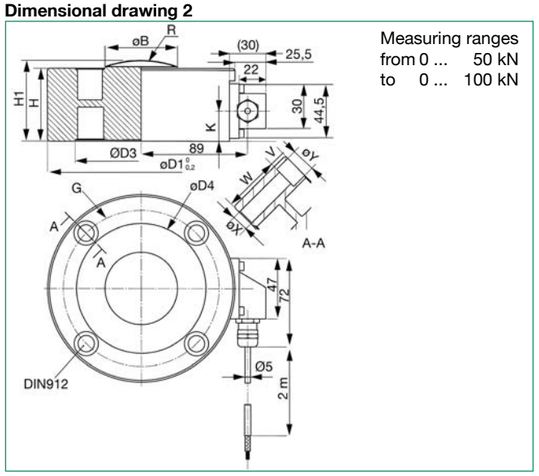
Accessories

Mating connector, 12 pins, for burster desktop units except for 9163 **Model 9941**
Mating connector, 9 pins, for 9163-V3xxx, 7281 and 9310 **Model 9900-V209**
Mounting of mating connector on sensor cable **Order Code 99004**

Dimensional drawing 1



Dimensional drawing 2



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.

Signal conditioning
TRANS CAL 7281, sensor profibus module model 9221, modular amplifier model 9243 or DIGIFORCE®
refer to section 9 of the catalog.

Factory Calibration Certificate (WKS)

Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.
Order Code 85WKS-85...

2390-008527EN-5672-081524

Low-Cost Compressive Load Cell

With IN-LINE amplifier

Model 8532

Code: 8532 EN
Delivery: ex stock
Warranty: 24 months

Very economical price

- **Measuring ranges between 0 ... 500 N and 0 ... 20 kN**
- **Measurement accuracy < 1% F.S.**
- **Normalized output signal 0 ... 10 V**
- **Stainless steel sensor**
- **Compact design**
- **Customer-specific versions possible from 20 pieces up**

Application

This force measurement chain was developed for applications where a low cost solution is more important than achieving high levels of accuracy. The sensors strain gauge technology allows the measurement of static and dynamic forces. The load cell is also designed for applications that provide only little space due to its compact design. These properties, together with the sensors dust protection, make the measuring chain suitable for a wide range of applications, such as

- ► Industrial manufacture
- ► Manufacture of customized machinery
- ► Geological investigations
- ► Motor vehicle engineering
- ► Commercial agriculture
- ► Bridge building

Description

The body of the sensor is a flat, cylindrical disk, into which a domed force application knob is integrated. It is important that the force is applied axially to the center of the sensor. The domed form, however, minimizes the effect of a force that is not exactly axial.
A full-bridge strain gauge is used as the measuring element inside the sensor, by means of which the force to be measured is converted into a proportional electrical voltage.
The in-line amplifier increases this voltage from 0 up to 10 V. The surface against which the sensor rests is important for the quality of the measurement. It should be ground. It must be sufficiently hard and thick and not deform under load.

Technical Data

Order Code	Measuring Range	Dimensions [mm] A	B	øC	øD	E	F	øG	R
8532-5500	0 ... 500 N	25	21	50	10	51	M 5 x 0,8 / 5 tief	42	50
8532-6001	0 ... 1 kN	25	21	50	10	51	M 5 x 0,8 / 5 tief	42	50
8532-6002	0 ... 2 kN	25	21	50	10	51	M 5 x 0,8 / 5 tief	42	50
8532-6005	0 ... 5 kN	25	21	50	10	51	M 5 x 0,8 / 5 tief	42	50
8532-6010	0 ... 10 kN	25	21	50	10	51	M 5 x 0,8 / 5 tief	42	50
8532-6020	0 ... 20 kN	25	21	50	10	51	M 5 x 0,8 / 5 tief	42	50

Electrical values

Excitation voltage:	15 ... 30 V DC
Output voltage:	0 ... 10 V
Output resistance:	440 Ω, nominal
Limit frequency:	1 kHz
Isolation resistance (sensor):	> 2000 MΩ
Bridge resistance (sensor):	350 Ω, nominal
Power consumption:	max. 0.3 VA

Environmental conditions

Sensor

Range of operation temperature:	- 20 °C ... 80 °C
Range of nominal temperature:	- 10 °C ... 40 °C
Influence of temperature to zero signal:	≤ 0.02 % F.S./K
Influence of temperature to measurement signal:	≤ 0.02 % Rdg./K

IN-LINE amplifier

Ambient temperature:	0 °C ... 60 °C
Temperature coefficient:	< 0.1 % / 10 K

Mechanical values

Measurement accuracy:		< 1 % F.S.
Combined value consisting of non-linearity, hysteresis and non-repeatability in constant installation position.		
Maximum static operational force:		120 % of nominal load
Dynamic forces:		up to 70 % of nominal load
Material:		
sensor	stainless steel	
amplifier housing	aluminium natural anodized with 2 x PG 7	
Protection class according to EN 60529:		
	Sensor	IP60
	IN-LINE amplifier	IP67
Weight:	Sensor	approx. 250 g
	IN-LINE amplifier	approx. 150 g
Mounting:		
Sensor	4 threaded holes on reference cycle G, refer to table and dimensional drawing	
IN-LINE amplifier	cable clip, in scope of delivery	

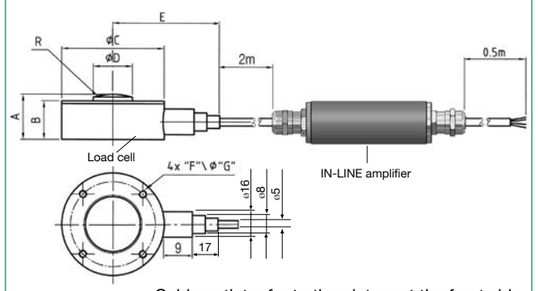
Electrical connection

Shielded PVC cable:		ø 5 mm, 4 wires black coated bending radius ≥ 30 mm bend protection, length approx. 20 mm
Cable length between sensor and amplifier:		2 m
Cable length between amplifier and open end:		0.5 m
Wiring code of the IN-LINE amplifier:		
red	excitation	positive
black	excitation	negative
white	signal output	positive
green	signal output	negative
Wiring code of the load cell cable:		
red	excitation	positive
black	excitation	negative
white	measurement signal	negative
green	measurement signal	positive
Dimensions:		
sensor		refer to table
amplifier (L x ∅D):		120 x 25 [mm]

Caution!
Do NOT open the screw joint at the cable outlet!

Dimensional drawing

Model 8532



Cable outlet refer to the picture at the front side

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

Low-Cost load cell, measurement range 0 ... 5 kN
with IN-LINE amplifier, output 0 ... 10 V **Model 8532-6005**

Signal processing
Supply units, amplifier and process control units like digital indicator model 9180 or sensor profibus module model 9221
refer to section 9 of the catalog.

2391-008532EN-5672-081524

Low-Cost Measuring Chain

For basic force measurements

Digital indicator model 9186 and load cell model 8532

Code:	8532-ANZ EN
Delivery:	1 week
Warranty:	24 months

- **Measuring ranges from 0 ... 500 N to 0 ... 20 kN**
- **Extremely economical force indicator**
- **Compact sensor design**
- **Threaded holes for easy assembly**
- **Very good visual indication via 20 mm display**
- **Up to 2 limit values optionally possible**
- **Optionally as built-in or bench top housing**
- **Measuring chain is trimmed and ready for immediate use**

Application

The force measuring chain has been developed for applications where the requirements for precision are not the primary focus, but rather where an economical purchase price and simple functionality are the key criteria. The sensor's strain gauge technology allows both static and dynamically changing forces to be measured. The large display means that the force acting on the sensor can be read easily. The four integrated threaded holes allow the sensor to be integrated quickly and easily into existing production and assembly equipment.

Typical applications include

- ► Testing the strength of welded joints
- ► Sports medicine
- ► Monitoring the clamping force of hose connections

Description

The body of the sensor is a flat, cylindrical disk, into which a domed force application knob is integrated. It is important that the force is applied axially to the center of the sensor.
A full-bridge strain gauge is used as the measuring element inside the sensor, by means of which the force to be measured is converted into a proportional electrical voltage. This is indicated as a force on the display.
It has been possible to implement this extremely economical digital indicator through the use of the latest microprocessor technology. The simplicity of operation and adjustment need hardly be explained. The self-explanatory abbreviations allow even an inexperienced user to configure the device in a very short time.

Technical Data

Digital indicator model 9186

Strain gauge

Connection technology:	4 wire
Bridge resistance:	120 ... 1000 Ω
Bridge voltage:	30 V / 300 mV choice per Menu
Sensor excitation:	5 V / 30 mA 10 V / 30 mA

General data

Measurement error:	0,1 % F. S. ± 4 Digit
Display:	- 1999 ... + 9999
Measurement rate:	25/s
Protection class front panel:	IP65

Standard function

TARA:	tare of an offset
Digital control input:	TARA

Auxiliary excitation

Panel version:	115 / 230 V AC 50-60 Hz
Desktop version:	115 / 230 V AC 50-60 Hz
Power consumption:	3 VA

Option

Digital limits

2 Relay contacts:	250 V AC / 150 V AC / 8 A, for 2 limits
Response time:	≤ 10 ms (typ.)

Please refer to data sheet 9186 for further information.

Technical Data

Compressive load cell model 8532

Measurement range:	0 ... 500 N up to 0 ... 20 kN
Bridge resistance:	350 Ω
Accuracy:	< 1 % F.S.
Operation temperature range:	- 20 °C ... 80 °C
Protection class accord. to EN 60529:	IP60
Length of cable:	3 m

Please refer to data sheet 8532, for further information.

Order Information

Low-cost measuring chain completely configured for a range of 20 kN, in panel housing, without limits

Sensor	1 x	**8532-6020-V400**
Indicator	1 x	**9186-V0100**
Adjustment (Service)	1 x	**91ABG**

Low-cost measuring chain completely configured for a range of 20 kN, in desktop housing, with 2 limits

Sensor	1 x	**8532-6020-V400**
Connector	1 x	**9941**
Mounting of connector	1 x	**99004**
Indicator	1 x	**9186-V3102**
Adjustment (Service)	1 x	**91ABG**

Accessories

Mating connector, 12 pins, for burster desktop devices except 9163 **Model 9941**

Mating connector, 9 pins, for SENSORMASTER and DIGIFORCE® **Model 9900-V209**

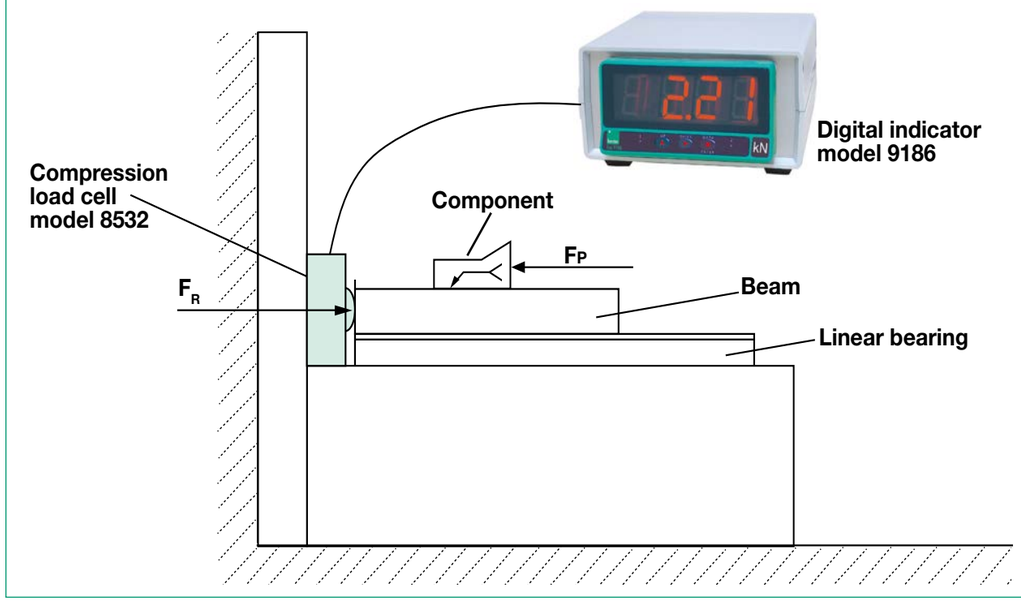
Mounting of mating connector on sensor cable **Order Code: 99004**

Only for connection to SENSORMASTER model 9163 desktop version **Order Code: 99002**

Application

Checking welding seams

A component is welded to a beam. For checking the joint, this component is stressed by the test force F_P in parallel direction to the jointed surfaces. Now the reaction force F_R is measured by a load cell 8532. This is done by the help of a linear bearing. The digital indicator 9186 shows the test force in kN.



2392-8532ANZEN-5672-081524

burster

Presses Load Cell

For hand and automatic operated presses

Model 8552
Model 8451

Code:	8552, 8451
Delivery:	ex stock
Warranty:	24 months

Model 8552
Standard model for manual presses up to 25 kN

Model 8451-6002
Precision model for up to 2 kN

Model 8451-6100
for high compression forces of up to 100 kN

- **Measuring ranges from 0 ... 100 N up to 0 ... 100 kN**
- **Measurement range to 25 kN with mechanical overload protection**
- **Simplest mounting on press ram**
- **Compact and very robust construction**
- **Suitable for all standard manual presses with stamp holes of 8 H7 resp. 20 H7**
- **Choice of diameter for pin and hole**

Low installation height with up to tenfold overload protection

Application

Load cell models 8451 and 8552 have been developed for measuring the forces that occur during press operation.
The internal measuring elements have a rugged design, which mean they can cope reliably with the steep force curves that are typical of press applications. They can be fitted or replaced quickly and easily on the press ram without the need for additional components around them. With a compact overall height of just 50 mm, the load cell is placed between tool and press ram and can therefore measure the actual compression force directly in the axis of operation.

Typical applications include:

- ► Forces in component joining
- ► Press-fitting
- ► Bending forces during material deformation
- ► Cutting forces when severing material
- ► Forces during stamping processes
- ► Punching forces for blanks
- ► Break-out forces used in destructive testing

Description

The load cell measures the compression forces between the circular contact surfaces of plunger and tool. The pin on its top side and hole on its lower face are simply provided for mechanical fixing and centering the components correctly. To provide as large a range of mechanical compatibility as possible, the pins/holes are available in different diameters. The connecting cables are designed like robot cables to allow frequent movement and are fixed securely to the sensor housing. Attachments are available which clamp onto the press sensors to enable easy mounting of displacement sensors according to the circumstances of use.

8451

- ► Measurement precision of 0.5 % of full scale for small measurement ranges
- ► Rugged construction, works even under transverse forces
- ► Protection class IP67

8552

- ► Short, compact design
- ► Pin/hole diameter from 8 mm to 16 mm
- ► Mechanical overload protection for all measurement ranges
- ► Choice of diameter for pin and hole

Technical Data

Model 8552 - Standard version

Order Code	Measurement Range	Max. Overload [kN]
8552-5100-V0000	0 ... 100 N	1
8552-5250-V0000	0 ... 250 N	2,5
8552-5500-V0000	0 ... 500 N	5
8552-6001-V0000	0 ... 1 kN	10
8552-6002-V0000	0 ... 2.5 kN	25
8552-6005-V0000	0 ... 5 kN	30
8552-6010-V0000	0 ... 10 kN	30
8552-6025-V0000	0 ... 25 kN	30

Standard version
The standard version of the 8552 sensor model has the following features:

- Fixing pin diameter 10 e7 (dimension A)
- Receiving hole diameter 10 H7 (dimension B)
- Cable length 1 m
- With nominal sensitivity and open cable end (no connector fitted)

Electrical values

Bridge resistance:	350 Ω, nominal*
Reference excitation voltage:	max. 10 VDC
Nominal sensitivity:	1.0 mV/V, nominal*
Isolation resistance:	> 10 MΩ

* Deviations from stated value are possible.

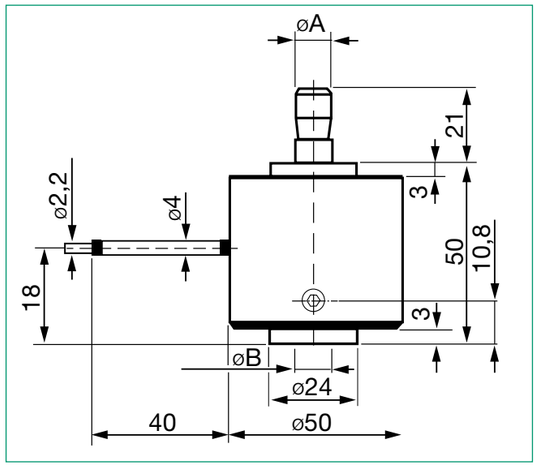
Environmental conditions

Operation temperature range:	0 °C ... 70 °C
Nominal temperature range:	0 °C ... 70 °C
Influence of temperature on zero:	0.03 % F.S.
Influence of temperature on sensitivity:	0.03 % F.S.

Mechanical values

Measurement accuracy:		2 % F.S.
Deflection:		< 0.1 mm
Maximum static operation load:		120 % of nominal load
Overload protection:		mechanical, refer to table
Material:		
measurement range ≤ 0 ... 1 kN		Sensor body made of high-grade anodized aluminum
measurement range ≥ 0 ... 2.5 kN		Sensor body made of stain less steel 1.4542
Electrical connection:		shielded, 4 wire, TPE isolated cable, length 1 m, with open ends for soldering, outer diameter 4 mm
Bending radius:		> 30 mm
Protection class:	according to EN 60529	IP65
Wiring code:		
red	excitation voltage	positive
black	excitation voltage	negative
white	output signal	positve
green	output signal	negative
Dimensions:		refer to dimensional drawing
General tolerance of dimensions:		according to ISO 2768-f
Clamping screws for tool pin:		M6
Weight:		approx. 300 g

Dimensional drawing model 8552



The CAD drawings (3D/2D) for this sensors 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 Code

Press load cell **Model 8552-XXXX-V□□□0**

Measuring range, refer to table

Nominal sensitivity		0
Mounted connector model 9900-V245 for ForceMaster 9110		1
Standardized sensitivity 0.8 mV/V		2
Diameter for pin	10 mm	0
Diameter for pin	8 mm	1
Diameter for pin	12 mm	2
Diameter for pin	15 mm	3
Diameter for pin	16 mm	4
Diameter for hole	10 mm	0
Diameter for hole	8 mm	1
Diameter for hole	12 mm	2
Diameter for hole	15 mm	3
Diameter for hole	16 mm	4

Accessories 8552

Mounting parts for fixing potentiometric displacement sensors from the 871x model range to the press head or the sensor body. The kit comprises mounting plate, bracket for clamping onto 8552 model load cells with 50 mm housing diameter, pivoting adapter for angle adjustment, all fixing screws, small parts and installation diagram.
Model 5501-Z004

(Picture see page 4 of the data sheet)

Options

Electrical
- With standardized sensitivity of 0.8 mV/V, achieved by inserting a circuit board populated with suitable resistors 30 cm before end of cable
- Available with different cable lengths

Mechanical
- Comes in range of pin/hole diameters, which are not necessarily identical: Ø 8 mm, Ø 10 mm, Ø 12 mm, Ø 15 mm, Ø 16 mm. The f7/H7 tolerance pair always applies to the pin and hole.
- Longer connecting cable available on request

The order code shows the option notations.

2478-008552EN-5170-111527

Technical Data — Model 8451

Order Code	Measurement Range	Max. Overload [kN]	Measuring Range [%F.S.]	Nominal Characteristic [mV/V]	Influence of Temperature on Zero Signal [%F.S./K]	Influence of Temperature on Characteristic [%Rdg./K]	Resonance Frequency [kHz]	Weight [g]
8451-5500	0 ... 0.5 kN	2.5	≤ ± 0.5	1.5	0.02	0.02	> 2	500
8451-6001	0 ... 1 kN	5	≤ ± 0.5	1.5	0.02	0.02	> 3	500
8451-6002	0 ... 2 kN	10	≤ ± 0.5	1.5	0.02	0.02	> 5	500
8451-6005	0 ... 5 kN	30	≤ ± 1.5	0.35	0.1	0.1	> 20	220
8451-6010	0 ... 10 kN	30	≤ ± 1.5	0.7	0.05	0.05	> 20	220
8451-6020	0 ... 20 kN	30	≤ ± 0.75	1.5	0.03	0.03	> 20	220
8451-6050	0 ... 50 kN	75	≤ ± 0.5	0.9	0.03	0.03	> 20	900
8451-6100	0 ... 100 kN	150	≤ ± 1.0	1.0	0.03	0.03	> 20	900

Electrical values

Bridge resistance:	350 Ω, nominal*
Reference excitation voltage:	max. 10 VDC
Nominal sensitivity:	refer to table
Isolation resistance:	> 10 MΩ at 40 V

* Deviations from stated value are possible.

Environmental conditions

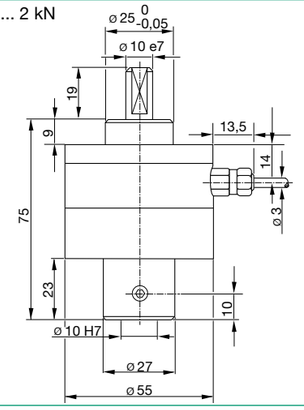
Operation temperature range:	-20 °C ... 80 °C
Nominal temperature range:	15 °C ... 70 °C
Influence of temperature on zero:	refer to table
Influence of temperature on sensitivity:	refer to table

Mechanical values

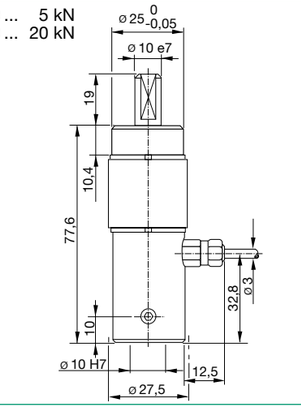
Deflection:	< 50 µm
Maximum static operation load:	refer to table
Dynamic load:	recommended 70 % of nominal load
Overload protection:	5 fold, mechanical, to 0 ... 2 kN
Material:	1.4542
Resonance frequency:	refer to table
Electrical connection:	shielded, 4 wire, drug chain qualified TPE isolated cable, length approx. 2 m with open ends for soldering, outer diameter 3 mm
Bending radius:	> 30 mm
Protection class:	according to EN 60529
measurement range ≤ 0 ... 2 kN	IP65
measurement range ≥ 0 ... 5 kN	IP67
Wiring code:	
white	excitation voltage positive
brown	excitation voltage negative
yellow	output signal positve
green	output signal negative
Dimensions:	refer to dimensional drawing
General tolerance of dimensions:	according to ISO 2768-f
Weight:	refer to table

Dimensional drawing model 8451

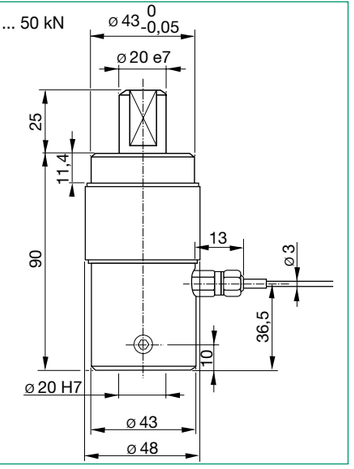
Measuring range ≤ 0 ... 2 kN



Measuring range ≥ 0 ... 5 kN
≤ 0 ... 20 kN



Measuring range ≥ 0 ... 50 kN



Order Information

Load cell, measuring range 0 ... 2 kN **8451-6002**

Accessories 8451

Clamp mounting to operate displacement transducer
Measuring range ≤ 0 ... 20 kN **Model 8451-Z001**
Measuring range ≥ 0 ... 50 kN **Model 8451-Z002**

Options

Electrical
- Connector plug programmed with sensor data for automatic identification and operation by the ForceMaster 9110 analysis system. May only be suitable with the standardized sensitivity option **Model 9900-V245**
- Programming and fitting of plug 9900-V245 to the sensor connecting cable **Model 99005**
- Standardization of nominal sensitivity in sensor connecting cable to a value of 1 mV/V ±0.25 %. This is achieved by fitting a small circuit board (l = 30 mm x B = 8 mm) containing electrical resistors in a position 30 cm before the end of the cable. Possible for measurement ranges ≤ 0 ... 2 kN **...-V010**

Mechanical
- For measurement ranges ≤ 0 ... 2 kN, special version fitted with ball guide for zero radial backlash **...-V301**

Example showing use of mounting parts to fit displacement sensor, Model 5501-Z004

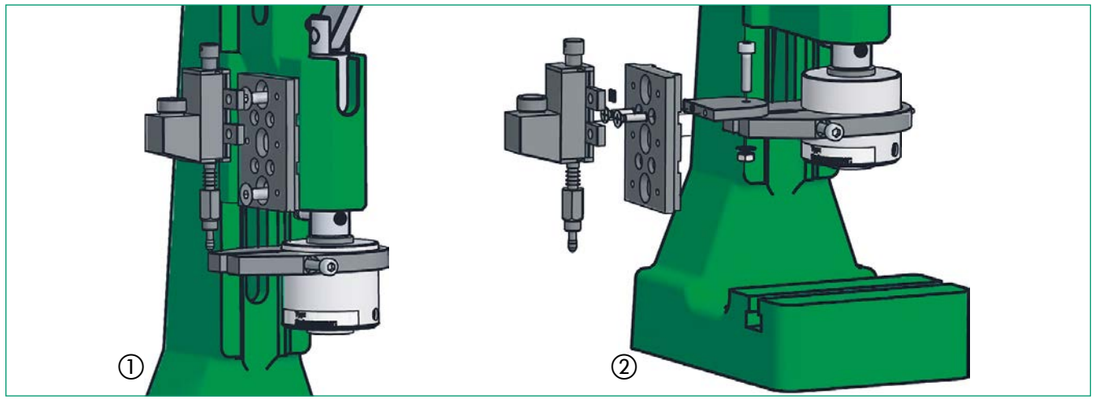
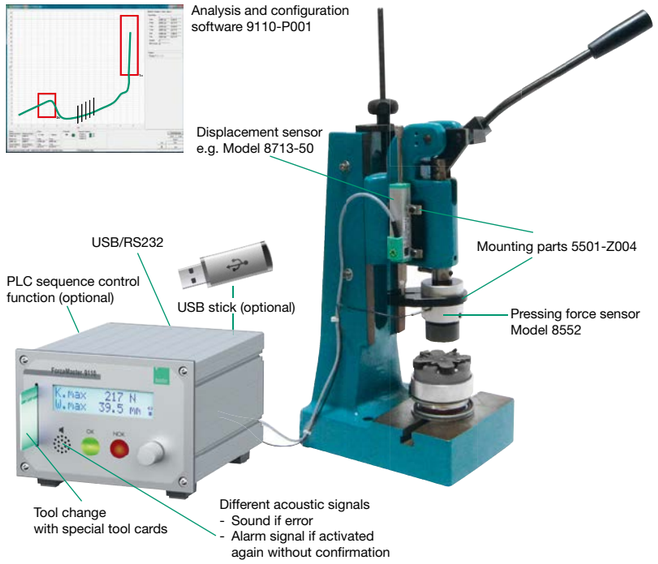


Figure 1: The displacement sensor is mounted on the press head. Its push rod rests on the bracket that is clamped onto the load cell.

Figure 2: The displacement sensor is flange-mounted to the bracket and requires its own external reference from which to measure the displacement.

Example of a measuring chain

Load cell	8552-6005-V1000
Displacement sensor	8713-50
Connector plug	9900-V221
Fitting of plug	99005
Mounting parts	5501-Z004
ForceMaster	9110-V0000




Mounting parts 5501-Z004

Mounting Instruction

The cylindrically shaped body of the load cell has to be mounted until it's block touches the ring shaped contact areas of the press stamp. A good fit and a homogenous force distribution is assured this way. For the specific measuring accuracy and long-life stability an axial introduction of the force is recommended.
The immersing pin, flattened on both sides of the upper end, has to be mounted to the press stamp by means of a screw with flat surface. The two parallel flattened surfaces on the pin allow the alignment of the cable outlet in a way that left handed workers as well as right handed workers may operate the press.
The tool will be fastened and centered in the boring of the sensor body clamping M6 resp. M8 (≥ 0 ... 50 kN).
The sensor cable must not be exposed to tensile or buckling stress. Because of this, install the cable with enough space.

Accessories

Force displacement controlled hand lever presses like series 5501, evaluation electronics or process control units like ForceMaster model 9110 and DIGIFORCE® model 9311.

Connector

9 pin,	suitable for e.g. DIGIFORCE® 9307/9311	**Model 9900-V209**
	Fitting of plug for compression load cells	**Model 99004**
8 pin,	for potentiometric displacement sensors suitable for ForceMaster 9110	**Model 9900-V221**
	Fitting of plug	**Model 99005**

Strain gauge simulator as extra tool for generating specific strain gauge signals in order to calibrate amplifiers and display equipment **Model 9405**

2478-008552EN-5170-111527

Torque Sensors

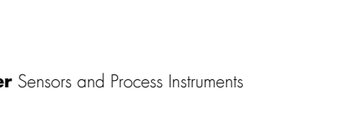
TORQUE SENSORS

8625 – 8632 Torque sensors for non-rotating applications

86403 – 8661 Torque sensors for rotating applications

Overview Torque Sensors model numbers 86 ...

MODELS	8625	8627	8628	8632
Figure				
Rel. Non-Linearity (≤ ± % F.S.)	0.05	0.1	0.2	0.2
Description	**Precision torque sensor non-rotating**	**Torque sensors non-rotating**	**Torque sensors non-rotating**	**Torque sensors non-rotating**
Measuring Ranges smallest: largest:	0 ... 0.01 Nm 0 ... 10 Nm	0 ... 10 Nm 0 ... 5000 Nm	0 ... 5 Nm 0 ... 1000 Nm	0 ... 2 Nm 0 ... 1000 Nm
Special Features	High precision, compact design, optional integrated amplifier + USB, various accessories for different mounting possibilities, with burster TEDS available	Robust, reliable, precise, easy handling, for static and dynamic applications, with burster TEDS available	Various Modeles with internal square drive, external square driver or round shaft	Compact design, versatile
Main Application Fields, Examples of Application	Reference sensor for experimental set-ups in precision engineering, determination of bearing friction torques, measurement of very small adjusting torques on vehicle operating elements	Static and dynamic measurements of non-rotating torque transmissions such as agitator drives, reaction torques of motors	Testing and calibration of assembly tools for screws and nuts, test setups for precision mechanics	Checking tightening torques, determining frictional torques, measuring opening torques e.g. on screw caps

MODELS	86403/86413/86423	8645/8646	8661
Figure			
Rel. Non-Linearity (≤ ± % F.S.)	0.1	1	0.05
Description	**Torque sensors rotating**	**Torque sensors rotating**	**Precision torque sensors rotating**
Measuring Ranges smallest: largest:	0 ... 1 Nm 0 ... 1000 Nm	0 ... 2.5 Nm 0 ... 500 Nm	0 ... 0.02 Nm 0 ... 1000 Nm
Special Features	Small size, reliable, precise, rotating, turns clockwise or counter clockwise, for static and dynamic measurements, slip-ring transmission	Maintenance-free through contactfree signal transmission, integrated amplifier, round or square shaft versions, speed of rotation up to 5000 min^{-1}, very economical	Maintenance-free operation, 0 … ±10 V voltage output, operational status indicator, high quality material and bearings, rotational speeds up to 25000 rpm Options: Angle and speed measurement up to 0,088°, 2 measuring ranges, shaft end with keyway, USB incl. software
Main Application Fields, Examples of Application	Inspection and adjustment of bolting tools such as screw-drivers, testing screwed joints, drag torque of motors and pumps, friction torques in gearboxes, bearings and seals, testing torsion springs, adjusting equipment in the automobile industry	Automobile technology (steering, gear-boxes, engines), drilling systems, bolting tools, textile machines, test beds, printing technology, pumps, fitness equipment, conveying equipment, household devices	Measurement of actuating, holding-, breakaway or tightening torques, USB interface makes on-side measurements with visualization and archival of measurement values possible, robust and vibration-proof, operation in bio, precision and micro mechanics, at engine test-benches, in medical and test-bench engineering

Options	■ Modified mechanical adaptations ■ Higher accuracy ■ Measurement of rotary speed and angle displacement ■ 2 measurement ranges ■ USB
Accessories:	Connectors, connecting cables, sensor mounting racks, assembly blocks, couplings, software
Services:	Connector mounting, manufacturers calibration certificates, DAkkS calibration certificates

2394-000089EN-5872-081524

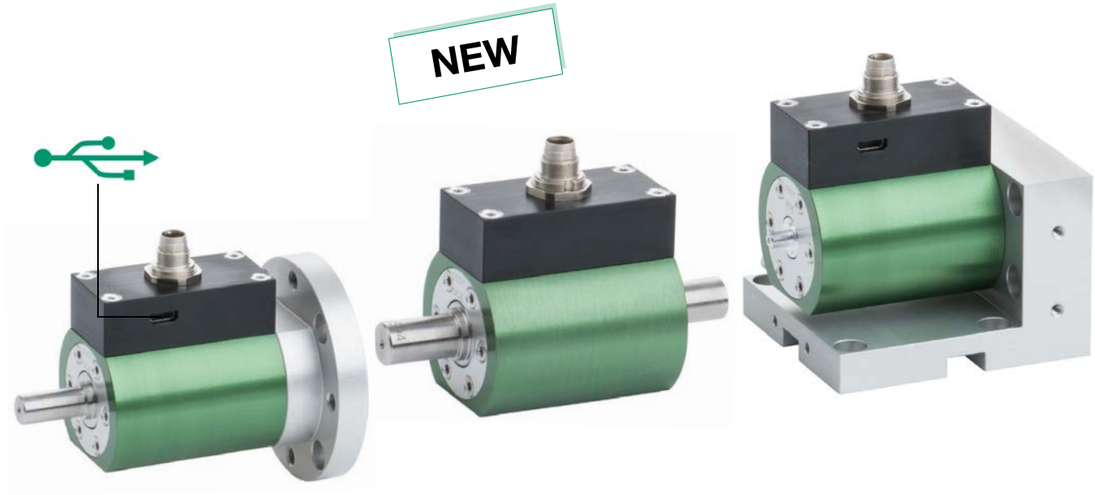
burster

High Precision Torque Sensor

For non-rotating applications

Model 8625

Code:	8625 EN
Delivery:	ex stock / 2 weeks
Warranty:	24 months



burster TEDS

- **Measurement ranges from 0 ... 0.01 Nm to 0 ... 10 Nm**
- **Linearity error from ≤ 0.05 % F.S.**
- **Standardized output signal**
- **Output signal ± 10 V / USB (optional)**
- **Tare function, filter and average values configurable**
- **Optional with burster TEDS**

Application

This high precision torque sensor is designed for both static and dynamic measurements on non-rotating applications. It is particularly suitable for torque measurements on, for instance, extremely small electrical actuating drives and micro-mechanical actuator elements, or for measuring reaction torques e.g. on micro-motors.

The high accuracy of measurement also makes this sensor ideal for use as a reference in many fields of industrial manufacture as well as laboratory research and development projects. Not containing any rotating parts, it requires no maintenance if properly used.

Available accessories include mounting brackets and flange adapters, which enable quick, easy and practical integration of the sensor into existing or newly developed setups and test benches.

Other possible applications:

- ► Test setup for precision mechanics
- ► Measuring the frictional torque of bearings
- ► Measuring the torques applied to vehicle control elements and knobs
- ► Acquisition of breakage moments on screw caps

Description

The strain-gauge based sensor's modular design allows precise configuration for the desired application:

- ► mV/V with standardized output signal
- ► ± 10 V output signal, configuration via USB
- ► ± 10 V output signal, configuration and measurement via USB

With the integrated amplifier option, the sensor directly supplies a voltage signal of 0 ... ± 10 V that is proportional to the torque. The sensor can be configured via the micro-USB interface, providing access to, for example, a filter frequency setting, averaging, and a tare function. With the USB option, in addition to the voltage output, the measurement function is available via USB as well. The supplied DigiVision software can be used for measuring and storing data, or additionally drivers for e.g. LabVIEW are available. Integration into custom software is possible via DLL.

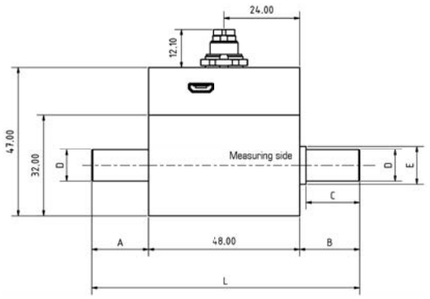
The burster TEDS option (electronic data sheet, memory chip with sensor-specific data) allows rapid configuration of compatible evaluation units (instrumentation amplifier, indicator, ...).

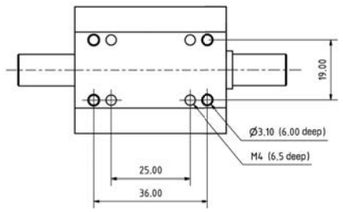
Technical Data

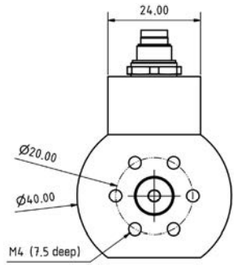
Order code	Measurement Range	Dimensions [mm]					
		L	A	B	C	D	E
8625-4010-VXXXXX	0 ... ± 0.01 Nm	59	5,5	5,5	5	4	8
8625-4020-VXXXXX	0 ... ± 0.02 Nm	59	5,5	5,5	5	4	8
8625-4050-VXXXXX	0 ... ± 0.05 Nm	65	8	9	7	6	8
8625-4100-VXXXXX	0 ... ± 0.1 Nm	85	18	19	17	8	10
8625-4200-VXXXXX	0 ... ± 0.2 Nm	85	18	19	17	8	10
8625-4500-VXXXXX	0 ... ± 0.5 Nm	85	18	19	17	8	10
8625-5001-VXXXXX	0 ... ± 1 Nm	85	18	19	17	8	10
8625-5002-VXXXXX	0 ... ± 2 Nm	85	18	19	17	8	10
8625-5005-VXXXXX	0 ... ± 5 Nm	85	18	19	17	8	10
8625-5010-VXXXXX	0 ... ± 10 Nm	85	18	19	17	10	12

higher measurement ranges on request

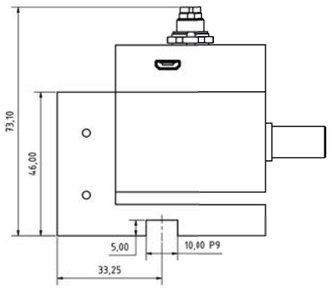
Dimensional drawing standard sensor

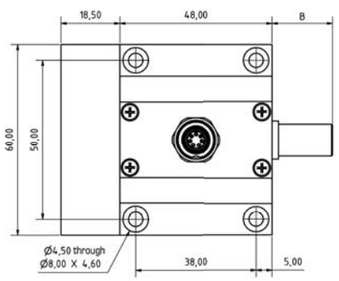


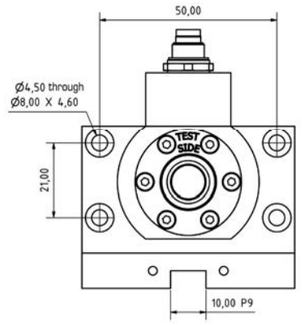




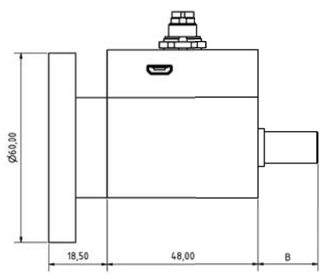
Dimensional drawing bracket-mounted model

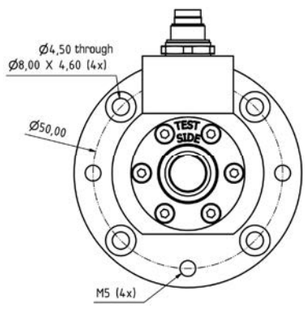






Dimensional drawing flange-mounted model





2487-008625EN-5672-111527

Flange-mounted model

The flange adapter allows easy integration of the sensor in existing equipment with a flange connection. When ordered with the sensor, the flange adapter comes pre-fitted; please refer to order code.

Alternatively it can be ordered separately as an accessory. Model 8625-Z001

Please refer to the accessories data sheet for further technical details.

Bracket-mounted model

The bracket provides a quick-to-fit and stable fixture for the sensor. When ordered with the sensor, the bracket comes pre-fitted; please refer to order code.

Alternatively it can be ordered separately as an accessory. Model 8625-Z002

Please refer to the accessories data sheet for further technical details.

Torque sensor with built-in USB port (option)

This sensor model comes with a USB port in addition to the 0 ... ± 10 V output.

Two versions are available:

- ± 10 V output signal, USB used solely for configuration
- ± 10 V output signal, USB used for both configuration and measurement

When a USB-based measurement is launched, the analog output signal is disabled because it is not possible to use both forms of output simultaneously.

Metal-bellows coupling, 8691 series, accessory

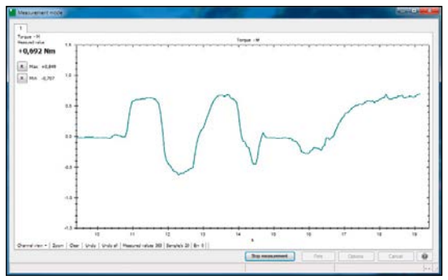
Metal-bellows couplings provide optimum misalignment correction. For the best possible misalignment correction, we recommend torsionally rigid metal-bellows couplings. These couplings feature extremely high torsional stiffness under applied torque and extremely low restoring forces. The clamp fasteners come in two parts for easy and reliable fitting/removal.

Please refer to the accessories data sheet for further technical details.

DigiVision configuration and analysis software

DigiVision Features

- ► Can be used to actuate tare function, with value stored in sensor
- ► Configuration options for averaging and filters; value stored in sensor
- ► Intuitive user interface
- ► Automatic sensor identification
- ► Sensor calibration data readout



DigiVision Light PC software

DigiVision configuration and analysis software (supplied with sensor) **Model 8625-P001**

DigiVision Standard PC software

DigiVision configuration and analysis software; up to 400 measurements/s for up to 16 channels **Model 8625-P100**

DigiVision Professional PC software

DigiVision configuration and analysis software with additional configurable maths channel; up to 32 channels **Model 8625-P200**

USB measurement option

- ► Numerical & graphical display and measurement of the physical torque value
- ► Practical start and stop trigger functions
- ► 4 limits can be configured for each measurement channel
- ► MIN/MAX value acquisition
- ► Automatic scaling
- ► Measurement reports can be saved as Excel or PDF file
- ► Archive viewer for displaying sets of curves
- ► Full version allows multichannel measurements, even with different sensors (e.g. 9206, 8661)

Technical Data

Order Code	End of Measuring Range	Rel. Non-linearity [% F.S.]	Rel. Hysteresis [% F.S.]	Tolerance of Sensitivity: [% F.S.]	Sensi-tivity [mV/V]	Maximum Axial Load [N]	Maximum Radial Load [N]	Spring Constant [Nm/rad]	Mass Moment of Inertia Measuring side [10^{-6} kg*m²]	Weight [g]
8625-4010-VXXXXX	± 0.01 Nm	0.15	0.15	0.2	0.25	50	1	5	0.022	150
8625-4020-VXXXXX	± 0.02 Nm	0.1	0.1	0.1	0.25	50	1	8	0.026	150
8625-4050-VXXXXX	± 0.05 Nm	0.1	0.1	0.1	0.5	50	1	10	0.059	150
8625-4100-VXXXXX	± 0.1 Nm	0.05	0.1	0.1	0.5	50	1	18	0.749	180
8625-4200-VXXXXX	± 0.2 Nm	0.05	0.1	0.1	0.5	50	1.5	41	0.812	180
8625-4500-VXXXXX	± 0.5 Nm	0.05	0.1	0.1	0.5	50	2	115	0.886	180
8625-5001-VXXXXX	± 1 Nm	0.05	0.1	0.1	0.5	50	3	261	1.15	190
8625-5002-VXXXXX	± 2 Nm	0.05	0.1	0.1	1.0	50	6	304	1.17	190
8625-5005-VXXXXX	± 5 Nm	0.05	0.1	0.1	1.0	200	15	1242	1.44	190
8625-5010-VXXXXX	± 10 Nm	0.05	0.1	0.1	1.0	200	30	2604	2.2	210

Higher measuring ranges on request.

Technical Data without amplifier

Electrical values

Bridge resistance (full bridge):	1000 Ω
Excitation voltage:	5 V
Max. excitation voltage:	10 V

Environmental conditions

Range of operating and nominal temperature:		- 20 °C ... + 80 °C
Sensitivity of temperature effects:		
at zero:	≤ 0.05 Nm	0.020 % F.S./K
	≥ 0.1 Nm	0.015 % F.S./K
on final value:	≤ 0.05 Nm	0.015 % F.S./K
	≥ 0.1 Nm	0.010 % F.S./K

Electrical connection

7 pins plug connection (mating connector included on sensor delivery)

Technical Data with amplifier/USB

Electrical values

Rated supply voltage range:	5 ... 30 VDC (or 5 V via USB)
DC power consumption:	approx. 1 W
Output voltage at ± rated torque:	± 10 V
Output resistance:	< 500 Ohm
Insulation resistance:	zero (binding capability)
-3 dB cut-off frequency:	5000 Hz
Ripple:	< 50 mV_{ss}
Calibration signal:	10.00 VDC

Environmental conditions

Range of operating and nominal temperature:		- 20 °C ... + 60 °C
Sensitivity of temperature effects:		
at zero:	≤ 0.05 Nm	0.020 % F.S./K
	≥ 0.1 Nm	0.015 % F.S./K
on final value:	≤ 0.05 Nm	0,015 % F.S./K
	≥ 0.1 Nm	0.010 % F.S./K

Electrical connection

7-pin miniature connector, additionally micro-USB interface for configuration/measurement (mating connector and USB cable supplied)

Mechanical values

Linearity error and hysteresis:	refer to tables
Dynamic overload safe:	up to 70 % from nominal value
Protection class:	acc. EN 60529 IP40
Max. operation torque ≤ 0.1 Nm:	200 % of nominal torque
Max. operation torque ≥ 0.2 Nm:	150 % of nominal torque
Breakaway torque:	300 % of nominal torque
Alternating load:	70 % of nominal torque
Material:	
housing:	made of anodized aluminium
shaft ≤ 0.05 Nm:	high-strength aluminium 3.1354
shaft ≥ 0.1 Nm:	steel shell 1.4542
Weight:	refer to tables
Mounting:	refer to dimensional drawing

Mounting instructions

- make sure the connecting shaft is exactly aligned
- suitable couplings must be used to prevent any forces arising from a parallel or angular offset of the shafts
- do not exceed the permitted axial and radial forces during fitting and operation
- follow the mounting instructions when fitting the flange adapter or bracket to an existing sensor
- please refer to our operating instructions for detailed information (www.burster.com)

Accessories

Mating connection	**Model 9900-V594**
Mating connection 90°-angle	**Model 9900-V596**
Connecting cable, length 3 m, other end free	**Model 99594-000A-0150030**
Connecting cable for burster desktop instruments with 12 pin socket, 3 m	**Model 99141-594A-0150030**
for model 9235 and model 9311	**Model 99209-594A-0150030**

Order code

Torque sensor **Model 8625-XXXX-V00□□0**

Output voltage 10 V incl. configuring USB	0
Output voltage 10 V incl. configuring and measuring USB	1
Output signal standardized, mV/V	3
Output signal standardized, mV/V with TEDS	4
both round shaft ends	0
flange-mounted	4
bracket-mounted	7

Order information

8625 with 10 Nm measurement range, ± 10 V output signal, USB port, measurement via USB, flange-mounted, including 8661-P001 measurement and analysis software **8625-5010-V00140**

Manufacturer Calibration Certificate (WKS)

Calibration of a sensor or a measuring chain, clockwise and/or counterclockwise torque in 20 % steps, increasing and decreasing.

German-accredited DAkkS calibration

The DAkkS calibration certificate (in accordance with German Calibration Service DKD-R 6-1 guidelines, clockwise and/or anticlockwise torque) includes at least three measurement cycles in steps of 10% of the measurement range, rising and falling.

Please ask for out new torque brochure or take a look at **www.burster.com**

2487-008625EN-5672-111527

Torque Sensor

For static and dynamic applications, non-rotary

Model 8627

Code:	8627 EN
Delivery:	ex stock/4 weeks
Warranty:	24 months

- **Measurement range from 0 ... 10 Nm to 0 ... 5000 Nm**
- **Linearity error 0.1 % F.S.**
- **Reliable and durable**
- **Simple handling and assembly**
- **Output signal standardized**
- **Optional linearity error 0.05 % F.S.**
- **Optional with burster TEDS**

Application

This torque sensor is qualified for static and dynamic measurements on non-rotary applications.

Further the measurement of reaction torques on rotating machine parts is possible. Especially torque sensors with flanges are preferred. They are mounted between motor and stator, e.g. in agitator drives. This enables a maintenance-free torque measurement.
For individual measuring tasks the design of our torque sensors can be adapted to the customer's installation conditions.

More application examples:

- Test structures in the field of precision mechanics
- Determination of friction torques
- Acquisition of breakage moments on screw caps

Description

The design is optimized regarding overall length, weight and volume, so that axial forces up to relatively high limit values and bending moments of up to 20 % of the measuring range have only a small effect to the influence of the measuring element. Four metal film strain gauges are mounted on the measuring element and connected to form a full bridge. When applying AC or DC voltage on the bridge, the mechanical value torque is converted into electrical voltage. The necessary amplifier either delivers a norm signal (0 … 10 V, 0/4 … 20 mA) or – with indicator module – a torque signal truly corresponding to the measured variable.

The sensor output signal is standardized, so that an exchange of the sensor (spare part) does not require any new adjustment of the measuring chain.

The burster TEDS option (electronic data sheet, memory chip with sensor-specific data) allows rapid configuration of compatible evaluation units (instrumentation amplifier, indicator, ...).

Technical Data

Order Code	Measuring Range	Dimensions [mm]								Bore Holes		P
		øA	øB	øD	F	G	L	øT	øQ	Number	Pitch	
8627-5010-VXXXXX	0 ... ± 10 Nm	20H7	10	70	12	M8	65	58	45	6	60°	33
8627-5020-VXXXXX	0 ... ± 20 Nm	20H7	10	70	12	M8	65	58	45	6	60°	33
8627-5050-VXXXXX	0 ... ± 50 Nm	20H7	10	70	12	M8	65	58	45	6	60°	33
8627-5100-VXXXXX	0 ... ± 100 Nm	20H7	10	70	12	M8	65	58	45	6	60°	33
8627-5200-VXXXXX	0 ... ± 200 Nm	20H7	10	70	12	M8	65	58	45	6	60°	33
8627-5500-VXXXXX	0 ... ± 500 Nm	20H7	18	100	15	M10	80	82	60	8	45°	39.5
8627-6001-VXXXXX	0 ... ± 1000 Nm	20H7	18	100	15	M10	80	82	60	8	45°	39.5
8627-6002-VXXXXX	0 ... ± 2000 Nm	75H7	20	130	20	M12	100	100	80	12	30°	45
8627-6005-VXXXXX	0 ... ± 5000 Nm	75H7	20	130	20	M12	100	100	80	12	30°	45

Higher measuring ranges upon request.

Electrical values

Resistor bridge (full bridge): foil strain gauge 350 Ω, nominal*
* Deviation from the indicated values are possible.

Excitation voltage: 2 ... 12 V
recommended 10 V

Nominal value: standard, 1 mV/V
10 Nm and 50 Nm: 0.5 mV/V

Environmental conditions

Operating temperature range: - 15 °C ... + 55 °C

Rated temperature range: - 5 °C ... + 45 °C

Temperature effect:
on zero signal: ± 0.02 % F.S./K
on characteristic value: ± 0.01 % F.S./K

Mechanical values

Relative linearity error: ± 0.1 % F.S.

Relative reversibility error: ± 0,1 % F.S.

Relative repeatability error: ± 0,1 % F.S.

Max. operating torque (static): 150 % of nominal value

Torque limit (static): 200 % of nominal value

Breaking moment (static): > 300 % of nominal value

Dynamic load: recommended ≤ 70 % of nominal value

Rated torsion angle: < 0.1°

Material: steel, 1.2826 res. 1.2738

Degree of protection: acc. EN 60529 IP50

Pins assignment:

	Pin
excitation -	1
excitation +	2
shield (TEDS GND)	3
signal +	4
signal GND	5
NC TEDS V0	6

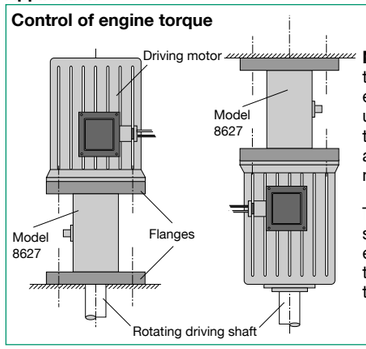
Mechanical connection: both ends with flag

Electrical connection: 6 pins plug connection

Mating: 6 pole model 9953
(included is scope of delivery)

Application

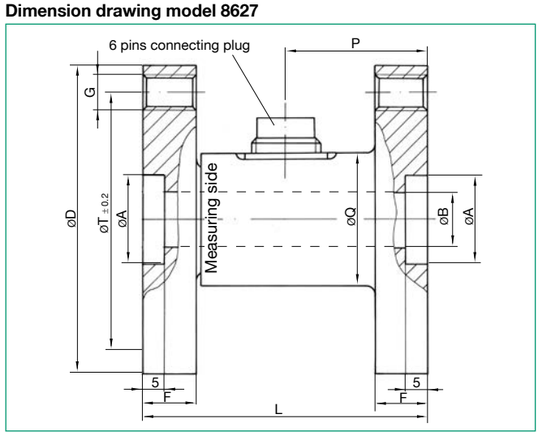
Control of engine torque



Model 8627, with its two flanges on both ends, enables the user to seize reaction torques without any problems and maintenance-free.

The arrangement showed on the left is especially suitable for the measurement of torque on agitators.

Dimension drawing model 8627



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

Torque sensor, non-rotary, both ends with flags, burster TEDS, measurement ±100 Nm **Model 8627-5100-V00430**

Options

Torque sensor	Model 8627-XXXX-V00□30
with mV/V output, standardized	3
with mV/V output, burster TEDS	4

Accessories

Mating connector, 6 pole cable coupling **Model 9953**

Mating connector, 6 pole, 90°- phase shift **Model 9900-V589**

Connection cable with one end free, length 3 m, with connector model 9953 **Model 99553-000A-0110030**

Connection cable, length 3 m
- for burster desktop instruments with 12 pin connectors **Model 99141-553A-0150030**
- for model 9235, model 9311 and model 7281 **Model 99209-553A-0110030**

Amplifier, process indicators, digital displays **see section 9 of the catalog.**

Manufacturer Calibration Certificate (WKS)

Special calibration for clockwise or/and counter clockwise direction torque, in 20 % steps of range up and down.

2396-008627EN-5672-081524

burster

Torque Sensor

For static and dynamic applications, non-rotary

Model 8628

Code: 8628 EN
Delivery: 4 weeks
Warranty: 24 months

- **Measurement range from 0 ... 2 Nm to 0 ... 1000 Nm**
- **Linearity error 0.2 % F.S.**
- **Reliable and durable**
- **Simple handling and assembly**
- **Output signal standardized**
- **Different mechanical versions**
- **Special versions and higher measurement ranges on request**
- **Optional linearity error 0.1 % F.S.**

Application

The 8628 torque sensor is suitable for both static and dynamic measurements in non-rotating torque-transmission systems. Typical uses include testing and calibrating power screwdrivers and torque wrenches and measuring reactive torques on test benches.

For individual measuring tasks the design of our torque sensors can be adapted to the customer's installation conditions.

More application examples:
- ► Test structures in the field of precision mechanics
- ► Determination of friction torques
- ► Acquisition of breakage moments on screw caps
- ► Quality assurance in power screwdrivers

Description

The design has been optimized regarding overall length, weight and volume, so that axial forces up to relatively high limit values and bending moments of up to 20 % of the measuring range have only a small effect to the influence of the measuring element. Four metal film strain gauges are mounted on the measuring element and connected to form a full bridge. When applying AC or DC voltage on the bridge, the mechanical value torque is converted into electrical voltage. The necessary amplifier either delivers a norm signal (0 ... 10 V, 0/4 ... 20 mA) or – with indicator module – a torque signal truly corresponding to the measured variable.

The sensor output signal is standardized, so that an exchange of the sensor (spare part) does not require any new adjustment of the measuring chain.

Technical Data

Order Code	Measurement Range	Dimensions [mm]								Bore		P	Weight [kg]
		A	øB	øD	F	L	øT	øW	øQ	number	pitch		
8628-5005-VXXXXX	0 ... ± 5 Nm	15	5.5	70	10	70	50	12	40	4	90°	36	0.5
8628-5010-VXXXXX	0 ... ± 10 Nm	15	5.5	70	10	70	50	12	40	4	90°	36	0.5
8628-5020-VXXXXX	0 ... ± 20 Nm	15	5.5	70	10	70	50	12	40	4	90°	36	0.6
8628-5050-VXXXXX	0 ... ± 50 Nm	28	6.6	80	12	90	60	18	45	4	90°	41	0.8
8628-5100-VXXXXX	0 ... ± 100 Nm	28	6.6	80	12	90	60	18	45	4	90°	41	0.8
8628-5200-VXXXXX	0 ... ± 200 Nm	50	9	100	15	120	80	30	58	6	60°	43	1.2
8628-5500-VXXXXX	0 ... ± 500 Nm	50	9	100	15	120	80	30	58	6	60°	43	1.2
8628-6001-VXXXXX	0 ... ± 1000 Nm	70	11	120	15	140	100	40	65	6	60°	41	1.8

Electrical values

Resistor bridge (full bridge): foil strain gauge 350 Ω, nominal*
* Deviations from the indicated values are possible.
Excitation voltage: 2 ... 12 V
recommended 10 V
Nominal value: standardized, 1 mV/V

Environmental conditions

Operating temperature range: - 15 °C ... + 55 °C
Nominal temperature range: - 5 °C ... + 45 °C
Temperature effect on zero signal: ± 0.02 % F.S./K
Temperature effect on characteristic value: ± 0.01 % F.S./K

Mechanical values

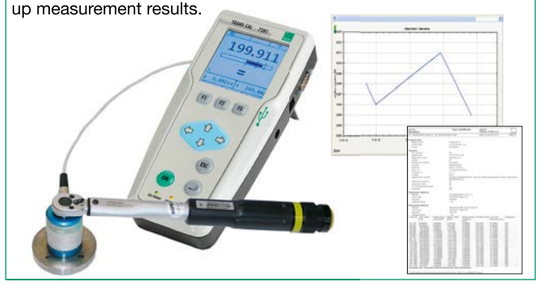
Relative linearity error: ± 0.2 % F.S.
Relative reversibility error: ± 0.2 % F.S.
Relative repeatability error: ± 0,1 % F.S.
Max. operating torque (static): 150 % of nominal value
Torque limit (static): 200 % of nominal value
Breaking moment (static): > 300 % of nominal value
Dynamic load: recommended ≤ 70 % of nominal value
Rated tension angle: < 0.1°
Material: steel, 1.2826 res. 1.2738
Degree of protection: acc. EN 60529 IP50
Pins assignment: 6 pole plug

excitation -	1
excitation +	2
shield	3
signal +	4
signal GND	5
NC	6

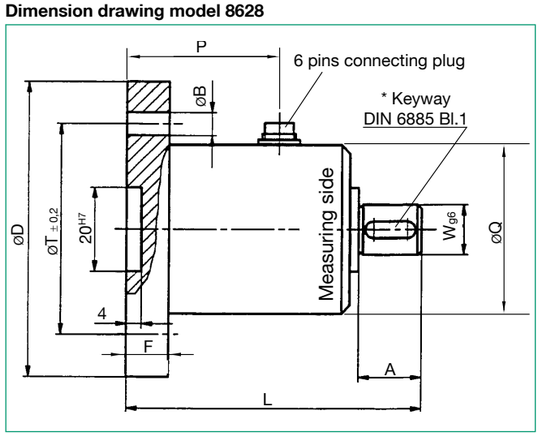
Mechanical connection: one end with flag, and one end with keyway shaft end acc. DIN 6885, page 1 (keyway included in scope of delivery)
Electrical connection: 6 pins plug connection
Mating connector (cable coupling): 6 pole model 9953 (one included in scope of delivery)

Application

Quality test and calibration of torque wrenches
As different as the application field of torque wrenches are, as different are their environmental conditions: heat, cold, humidity, pressure and vibrations have to be resisted while they are expected to function precisely anyway.
Therefore it is strongly recommended to calibrate a torque wrench once a year.
The 8628 torque sensor is available with an internal/external square drive for this application. The sensor can be used with the TRANS CAL 7281 to form a mobile measurement chain for checking and calibrating torque wrenches.
The DigiCal software provides an easy way to document and back-up measurement results.



Dimension drawing model 8628



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

Torque sensor for non-rotary applications one end with flag, one end with shaft, measurement range ± 1000 Nm **Model 8628-6001**

Option

Linearity error ± 0.1 % F.S. **-V503**

Accessories

Mating connector, 6 pole cable coupling **Model 9953**
Mating connector, 6 pole, 90°- phase shift **Model 9900-V589**
Connection cable with one end free, length 3 m, with connector model 9953 **Model 99553-000A-0110030**
Connection cable, length 3 m
- for burster desktop instruments **Model 99141-553A-0150030**
- for model 9235, model 9311 and model 7281 **Model 99209-553A-0110030**
- for model 7281 with burster TEDS **Model 99229-553A-0110030**

Amplifier, process indicators, digital displays **see section 9 of the catalog.**

Manufacturer Calibration Certificate (WKS)

Special calibration for clockwise or/and counter clockwise direction torque, in 20 % steps of range up and down.

2397-008628EN-5672-081524

burster

Torque Sensor

For static and dynamic applications, non-rotary

Model 8632

Code:	8632 EN
Delivery:	ex stock/4 weeks
Warranty:	24 months

- **Measurement range from 0 ... 2 Nm to 0 ... 500 Nm**
- **Linearity error 0.2 % F.S.**
- **Reliable and durable**
- **Simple handling and assembly**
- **Output signal standardized**
- **Different mechanical versions**
- **Optional linearity error 0.1 % F.S.**

Application

The 8632 torque sensor is suitable for both static and dynamic measurements in non-rotating torque-transmission systems.
Typical uses include testing and calibrating power screwdrivers and torque wrenches and checking tightening torques in joining technology.

For individual measuring tasks the design of our torque sensors can be adapted to the customer's installation conditions.

More application examples:
► Test structures in the field of precision mechanics
► Determination of friction torques
► Acquisition of breakage moments on screw caps
► Quality assurance in power screwdrivers

Description

The design has been optimized regarding overall length, weight and volume, so that axial forces up to relatively high limit values and bending moments of up to 20 % of the measuring range have only a small effect to the influence of the measuring element. Four metal film strain gauges are mounted on the measuring element and connected to form a full bridge. When applying AC or DC voltage on the bridge, the mechanical value torque is converted into electrical voltage. The necessary amplifier either delivers a norm signal (0 … 10 V, 0/4 … 20 mA) or – with indicator module – a torque signal truly corresponding to the measured variable.

The sensor output signal is standardized, so that an exchange of the sensor (spare part) does not require any new adjustment of the measuring chain.

Technical Data

Order Code	Measuring Range	Dimensions [mm]						Weight
		A	B	øD	L	Square V	P	[kg]
8632-5002	0 ... ± 2 Nm	8	7.2	15	64	¼"	22.7	0,1
8632-5005	0 ... ± 5 Nm	8	7.2	15	64	¼"	22.7	0.1
8632-5012	0 ... ± 12 Nm	8	7.2	15	64	¼"	22.7	0.1
8632-5025	0 ... ± 25 Nm	12.2	10.4	30	71	⅜"	34.5	0.2
8632-5063	0 ... ± 63 Nm	12.2	10.4	30	71	⅜"	34.5	0.2
8632-5100	0 ... ± 100 Nm	15	15.1	30	76	½"	35	0.2
8632-5160	0 ... ± 160 Nm	15	15.1	30	76	½"	35	0.25
8632-5200	0 ... ± 200 Nm	15	15.1	30	76	½"	35	0.25
8632-5500	0 ... ± 500 Nm	24	22.9	49	100	¾"	46	0.8

Higher measuring ranges upon request.

Electrical values

Resistor bridge (full bridge): foil strain gauge 350 Ω, nominal
Excitation voltage: 2 ... 12 V recommended 10 V
Nominal value: standard, 1 mV/V

Environmental conditions

Operating temperature range: - 15 °C ... + 55 °C
Nominal temperature of operating range: - 5 °C ... + 45 °C
Temperature effect on zero signal: ± 0.02 % F.S./K
Temperature effect on charateristic value: ± 0.01 % F.S./K

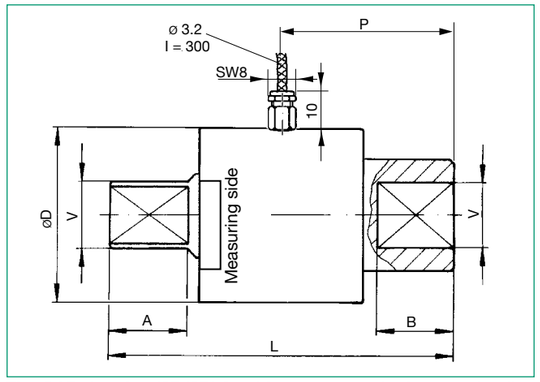
Mechanical values

Relative linearity error: ± 0.2 % F.S.
Relative reversibility error: ± 0.2 % F.S.
Relative repeatability error: ± 0.1 % F.S.
Max. operating torque (static): 150 % of nominal value
Torque limit (static): 200 % of nominal value
Breaking moment (static): > 300 % of nominal value
Dynamic load: recommended ≤ 70 % of nominal value
Rated tension angle: < 0.1°
Material: steel, 1.2826 res. 1.2738
Degree of protection: acc. EN 60529 IP50
Pins assignment:

function	wire color
excitation voltage (-)	brown
excitation voltage (+)	white
signal (+)	yellow
signal (-)	green
shield	shield

Mechanical connection:
external square and square drive acc. to DIN 3121
e.g. for the linkage to screwdriver tools
Electrical connection: shielded PVC cable, 3 m
PVC cable is not suitable for too many bending cycles
trailing capable upon request

Dimension drawing model 8628



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

Torque sensor for static application (non-rotary), with internal and external square ends, measurement range ± 12 Nm
Model 8632-5012

Accessories

Mating connector
- 12 pins to all burster table housings **Model 9941**
- 9 pins for e.g. model 9163-V3, model 9235, model 9311, model 7281 **Model 9900-V209**
- 9 pins with burster TEDS **Model 9900-V229**

Mounting of a connector to the sensor cable **Order Code: 99004**

Mounting of a connector to the sensor cable
- for model 9163 in table housing **Order Code: 99002**
- for model 7281 with burster TEDS **Order Code: 99011**

Amplifier, process indicators, digital displays
see section 9 of the catalog.

Manufacturer Calibration Certificate (WKS)

Special calibration for clockwise or/and counter clockwise direction torque, in 20 % steps of range up and down.

2398-008632EN-5672-081524

burster

Torque Sensor

Rotating, contact ring transfer

Model 86403 with square end
Model 86413 with round shaft ends
Model 86423 with hexagonal shaft end

Code: 86403 EN
Delivery: 4 weeks
Warranty: 24 months


Model 86403


Model 86413


Model 86423

- **Measuring ranges between 0 ... ± 1 Nm and 0 ... 1000 Nm**
- **Excellent reproducibility**
- **Standardized output signal makes exchange easy**
- **Optionally available with factory calibration certificate**
- **Designed for clockwise and counterclockwise torque**
- **Optionally available with integrated angle measurement**
- **Rotation speed up to 3000 min^{-1} (short-term)**

Application

Precise, reliable measurements of both static and dynamic torques in either direction can be made with this range of sensors.
This opens a wide range of possible applications to the user. These torque sensors are standard equipment in a wide range of industrial automation, quality control and automotive components industry applications, as well as in laboratories.

Typical applications:

Screwing technology
► Checking and adjusting bolting tools such as torque limiting wrenches, screwdrivers
► Testing bolted connections

Measuring the drag torque of motors and pumps
► Frictional torques of gears, bearings and seals
► Testing torsion springs
► Adjusting equipment in the automobile industry (sunroof, power windows etc.)

Description

Strain gauges are mounted on the torsion shaft of the sensor element, itself made of steel, connected to form a full bridge. The electrical power excitation for the wire strain gauge full bridge and the transmission of the measured signal is provided through a high-quality slip-ring system between the stator and the rotor.
For a clockwise torque, the measurement signal is positive, and it is negative for a counterclockwise torque.
The sensor for the optionally available angle measurement for the square shaft versions is fitted with an additional pulse-generating disk.
With the aid of a second encoder track, displaced by 90°, allows the subsequent evaluation units to perform 4-fold edge evaluation. This allows significantly improved resolution to be achieved. The offset track makes it possible to detect the direction of the rotation.
The characteristic parameters for the sensors are standardized in order to reduce the effort required to check a connected amplifier or to exchange the sensor.

Technical Data

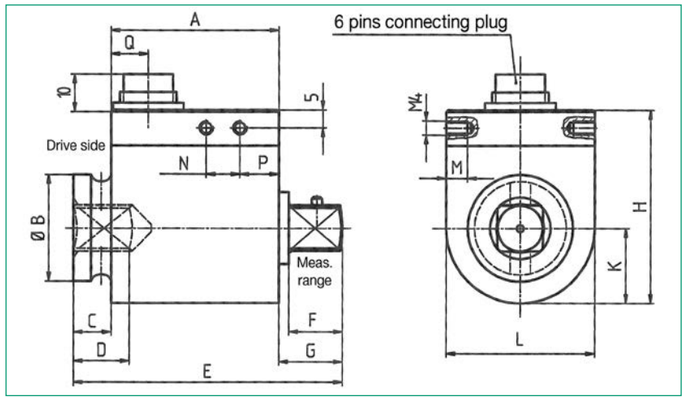
Model 86403

Toque sensor, rotating, standard square ends according to DIN 3121

Order Code	Measurement Range	Sensitivity [mV/V]	Square Ends	Spring Constant [Nm/rad]	Max. Lateral Force [N]	Torque of Inertia Drive End J in [kg m²]	Mass [kg]	Dimensions [mm] A	B	C	D	E	F	G	H	L	K	M	N	P	Q
86403-5001	0 ... ± 1 Nm	0.5	1/4"	$1.9 \cdot 10^2$	4	$2.9 \cdot 10^{-7}$	0.14	45.5	13	8.6	8	64	7.2	9.9	39	24	12	5	9	8.6	12.2
86403-5002	0 ... ± 2 Nm	0.5	1/4"	$4.3 \cdot 10^2$	5	$2.9 \cdot 10^{-7}$	0.14	45.5	13	8.6	8	64	7.2	9.9	39	24	12	5	9	8.6	12.2
86403-5005	0 ... ± 5 Nm	2	1/4"	$2.7 \cdot 10^2$	7	$2.9 \cdot 10^{-7}$	0.14	45.5	13	8.6	8	64	7.2	9.9	39	24	12	5	9	8.6	12.2
86403-5012	0 ... ± 12 Nm	2	1/4"	$6.6 \cdot 10^2$	7.5	$3.0 \cdot 10^{-7}$	0.14	45.5	13	8.6	8	64	7.2	9.9	39	24	12	5	9	8.6	12.2
86403-5025	0 ... ± 25 Nm	2	3/8"	$2.3 \cdot 10^3$	12	$1.2 \cdot 10^{-5}$	0.32	47.5	22	10.1	12.2	71	10.4	13.5	54	42	21	6	9.5	11	10.5
86403-5063	0 ... ± 63 Nm	2	3/8"	$5.7 \cdot 10^3$	28	$1.2 \cdot 10^{-5}$	0.32	47.5	22	10.1	12.2	71	10.4	13.5	54	42	21	6	9.5	11	10.5
86403-5160	0 ... ± 160 Nm	2	1/2"	$1.4 \cdot 10^4$	65	$1.7 \cdot 10^{-5}$	0.35	47.5	29.7	10.7	15.9	76	15.1	17.9	54	42	21	6	9.5	11	10.5
86403-5500	0 ... ± 500 Nm	2	3/4"	$5.9 \cdot 10^4$	200	$1.1 \cdot 10^{-4}$	0.80	55	44	19.1	24.9	100	22.6	25.9	68	60	30	-	-	-	10.5
86403-6001	0 ... ± 1000 Nm	2	1"	$1.1 \cdot 10^5$	240	$2.6 \cdot 10^{-4}$	1.40	55	54	33.1	29.6	132	27.4	43.9	68	60	30	-	-	-	10.5

Higher ranges on request

Dimensional drawing
Model 86403

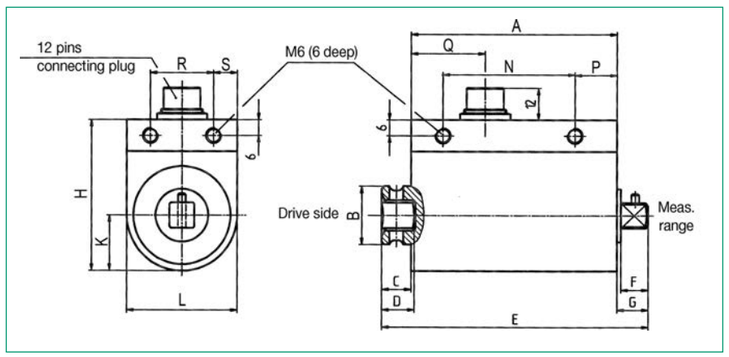


Model 86403-...-V501

Torque sensor, rotating, standard square ends, with angle measurement

Order Code	Measurement Range	Sensitivity [mV/V]	Square Ends	Spring Constant [Nm/rad]	Max. Lateral Force [N]	Torque of Inertia Drive End J in [kg m²]	Mass [kg]	Dimensions [mm] A	B	C	D	E	F	G	H	L	K	M	N	P	Q	R	S
86403-5001-V501	0... ± 1 Nm	0.5	1/4"	$1.4 \cdot 10^2$	4	$3.2 \cdot 10^{-6}$	0.5	65	13	9	8	84	7.2	10	48.5	34	17	4	9	10.5	30.5	10	12
86403-5002-V501	0... ± 2 Nm	0.5	1/4"	$4.5 \cdot 10^2$	5	$3.3 \cdot 10^{-6}$	0.5	65	13	9	8	84	7.2	10	48.5	34	17	4	9	10.5	30.5	10	12
86403-5005-V501	0... ± 5 Nm	2	1/4"	$3.0 \cdot 10^2$	7	$3.3 \cdot 10^{-6}$	0.5	65	13	9	8	84	7.2	10	48.5	34	17	4	9	10.5	30.5	10	12
86403-5012-V501	0... ± 12 Nm	2	1/4"	$6.7 \cdot 10^2$	7.5	$3.3 \cdot 10^{-6}$	0.5	65	13	9	8	84	7.2	10	48.5	34	17	4	9	10.5	30.5	10	12
86403-5025-V501	0... ± 25 Nm	2	3/8"	$2.4 \cdot 10^3$	12	$1.2 \cdot 10^{-5}$	0.5	78	22	11	12.2	100.8	10.4	11.8	57	42	21	6	50	16	28	24	9
86403-5063-V501	0... ± 63 Nm	2	3/8"	$6.8 \cdot 10^3$	28	$1.2 \cdot 10^{-5}$	0.5	78	22	11	12.2	100.8	10.4	11.8	57	42	21	6	50	16	28	24	9
86403-5160-V501	0... ± 160 Nm	2	1/2"	$1.2 \cdot 10^4$	65	$1.7 \cdot 10^{-5}$	0.6	78	29.8	12	16.9	106	15.1	16	57	42	21	6	50	16	28	24	9
86403-5500-V501	0... ± 500 Nm	2	3/4"	$3.9 \cdot 10^4$	200	$9.2 \cdot 10^{-5}$	1.3	92	44	18	24.9	135	22.6	25	70	56	28	10	66	13	43	24	16
86403-6001-V501	0... ±1000 Nm	2	1"	$8.9 \cdot 10^4$	240	$3.6 \cdot 10^{-4}$	1.5	92	54	53.1	29.9	177	27.3	31.9	70	56	28	10	66	13	43	24	16

Dimensional drawing
Model 86403-...V501



2399-086403EN-5672-081524

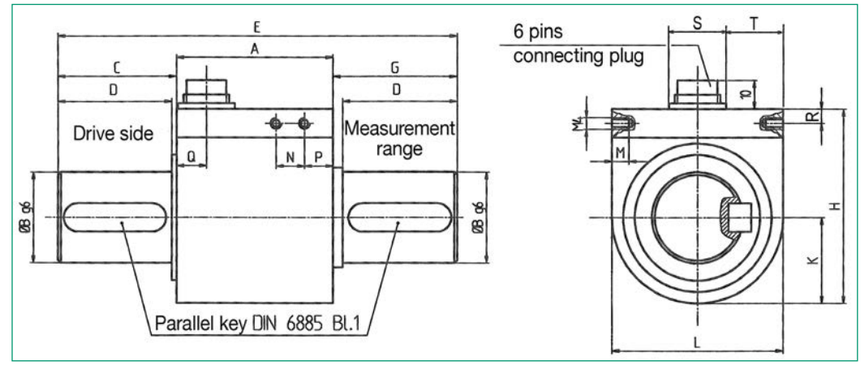
Technical Data

Model 86413

Torque sensor, rotating, round shaft ends with parallel key

Order Code	Measurement Range	Sensitivity [mV/V]	Spring Constant [Nm/rad]	Max. Lateral Force [N]	Torque of Inertia Drive End J in [kg m²]	Mass [kg]	Dimensions [mm] A	B	C	D	E	G	H	L	K	M	N	P	Q	R
86413-5001	0 ... ± 1 Nm	0.5	$1.9 \cdot 10^2$	4	$1.34 \cdot 10^{-6}$	0.16	45.5	8	19.7	18	85	19.7	39	24	12	5	9	27.9	33.3	5
86413-5002	0 ... ± 2 Nm	0.5	$1.9 \cdot 10^2$	5	$1.34 \cdot 10^{-6}$	0.16	45.5	8	19.7	18	85	19.7	39	24	12	5	9	27.9	33.3	5
86413-5005	0 ... ± 5 Nm	2	$2.43 \cdot 10^2$	7	$1.34 \cdot 10^{-6}$	0.16	45.5	8	19.7	18	85	19.7	39	24	12	5	9	27.9	33.3	5
86413-5010	0 ... ± 10 Nm	2	$4.56 \cdot 10^2$	7.5	$1.35 \cdot 10^{-6}$	0.16	45.5	8	19.7	18	85	19.7	39	24	12	5	9	27.9	33.3	5
86413-5020	0 ... ± 20 Nm	2	$1.77 \cdot 10^3$	12	$1.16 \cdot 10^{-5}$	0.35	47.5	15	21.1	20	90	21.5	54	42	21	6	9.5	11	10.5	5
86413-5050	0 ... ± 50 Nm	2	$4.82 \cdot 10^3$	28	$1.17 \cdot 10^{-5}$	0.38	47.5	15	21.1	20	90	21.5	54	42	21	6	9.5	11	10.5	5
86413-5100	0 ... ± 100 Nm	2	$9.85 \cdot 10^3$	65	$1.25 \cdot 10^{-5}$	0.42	47.5	18	24	22	95	23.6	54	42	21	6	9.5	11	10.5	5
86413-5200	0 ... ± 200 Nm	2	$2.80 \cdot 10^4$	80	$9.15 \cdot 10^{-5}$	0.90	55	32	41.6	40	140	43.4	68	60	30	-	-	-	10.5	5
86413-5500	0 ... ± 500 Nm	2	$6.33 \cdot 10^4$	200	$9.42 \cdot 10^{-5}$	0.90	55	32	41.6	40	140	43.4	68	60	30	-	-	-	10.5	5

Dimensional drawing
Models 86413 and 86413-...V501



Model 86413-...V501

Torque sensor, rotating, round shaft with keyways and internal angle measurement

Order Code	Measurement Range	Sensitivity [mV/V]	Spring Constant [Nm/rad]	Max. Lateral Force [N]	Torque of Inertia Drive End J in [kg m²]	Mass [kg]	Dimensions [mm] A	B	C/G	D	E	H	L	K	M	N	P	Q	R	S	T
86413-5001-V501	0 ... ± 1 Nm	0.5	$2.3 \cdot 10^2$	4	$3.3 \cdot 10^{-6}$	0.5	65	10	17.5	15.5	100	48.5	34	17	4	9	10.5	30.5	6.5	20	7
86413-5002-V501	0 ... ± 2 Nm	0.5	$2.3 \cdot 10^2$	5	$3.3 \cdot 10^{-6}$	0.5	65	10	17.5	15.5	100	48.5	34	17	4	9	10.5	30.5	6.5	20	7
86413-5005-V501	0 ... ± 5 Nm	2	$2.9 \cdot 10^2$	7	$3.3 \cdot 10^{-6}$	0.5	65	10	17.5	15.5	100	48.5	34	17	4	9	10.5	30.5	6.5	20	7
86413-5010-V501	0 ... ± 10 Nm	2	$5.6 \cdot 10^2$	7.5	$1.1 \cdot 10^{-5}$	0.5	65	10	17.5	15.5	100	48.5	34	17	4	9	10.5	30.5	6.5	20	7
86413-5020-V501	0 ... ± 20 Nm	2	$1.6 \cdot 10^3$	12	$1.1 \cdot 10^{-5}$	0.6	78	15	21	20	120	57	42	21	6	50	16	28	6	20	11
86413-5050-V501	0 ... ± 50 Nm	2	$4.1 \cdot 10^3$	28	$1.1 \cdot 10^{-5}$	0.6	78	15	21	20	120	57	42	21	6	50	16	28	6	20	11
86413-5100-V501	0 ... ± 100 Nm	2	$7.9 \cdot 10^3$	65	$1.3 \cdot 10^{-5}$	0.6	78	18	25	24	128	57	42	21	6	50	16	28	6	20	11
86413-5200-V501	0 ... ± 200 Nm	2	$2.8 \cdot 10^4$	80	$1.0 \cdot 10^{-4}$	1.3	92	32	44	40	180	70	56	28	10	66	13	43	6	20	18
86413-5500-V501	0 ... ± 500 Nm	2	$5.3 \cdot 10^4$	200	$1.0 \cdot 10^{-4}$	1.3	92	32	44	40	180	70	56	28	10	66	13	43	6	20	18

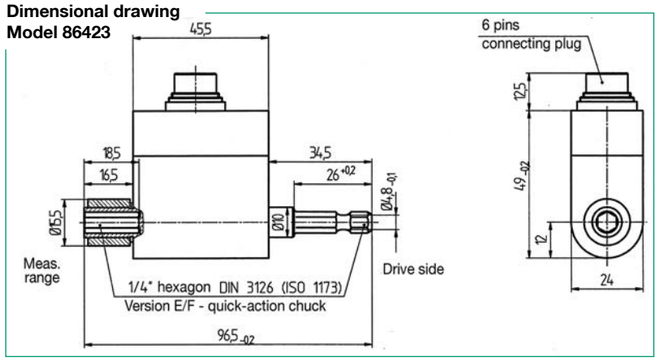
Model 86423

Torque sensor, rotating, standard hexagonal shaft ends 1/4" DIN 3126 Form E/F

Order Code	Measurement Range	Sensitivity [mV/V]	Mass [kg]
86423-5001	0 ... ± 1 Nm	0.5	0.2
86423-5002	0 ... ± 2 Nm	1	0.2
86423-5005	0 ... ± 5 Nm	1	0.2
86423-5010	0 ... ± 10 Nm	2	0.2
86423-5020	0 ... ± 20 Nm	2	0.2

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.

Dimensional drawing
Model 86423



- Drive end --- hexagon head
- Measurement side --- hexagon socket
- Quick-action chuck

Note: The max. allowed static lateral force is smaller than 10 % of the lower value of the measurement range.

General Technical Data for all Sensors

Electrical values

Torque sensor

Bridge resistance (full bridge):	350 Ω
Excitation voltage:	2 ... 12 V DC
Characteristic:	standardized 0.5 mV/V, 1mV/V or 2 mV/V (refer to tables)
Tolerance of characteristic:	± 0.1 %

Test (option):
If the full bridge is connected to the positive strain gauge excitation voltage, it generates an electrical signal equivalent to 100 % of the nominal signal.

Angle displacement sensor (refer to options)

Excitation voltage:	5 V DC
Angle displacement measurement:	360 pulses/rotation

2 TTL outputs with two encoders, angle displacement 90° for detection of direction.

Environmental conditions

Range of operation temperature:	±10 °C ... + 60 °C
Range of nominal temperature:	± 5 °C ... + 50 °C

Influence of temperature in range of nominal temperature:

to zero signal	±0.01 % F.S./K
to characteristic	±0.003 % F.S./K

Mechanical values

Measurement error, consisting of non-linearity and hysteresis	≤ ± 0.1 % F.S.
Relative spread in unchanged mounting position:	≤ ± 0.05 % F.S.

Range of rotation:
an exceedance of the max. rotary speed, up to 1.5 x max. rotary speed, is possible only for short time

max. rotary speed for

ranges from von	≤0 ...	12 Nm		2000¹/min
ranges from	0 ...	25 Nm	to 0 ... 160 Nm	1500¹/min
ranges from	0 ...	500 Nm	to 0 ... 1000 Nm	1000¹/min
ranges from	0 ...	2000 Nm	to 0... 5000 Nm	500¹/min

Max. operation torque:	120 % of nominal torque
Dynamic torques (peak-peak):	max. 70 % of nominal torque
Limit torque (static):	130 % of nominal torque
Breakaway torque (static):	250 % of nominal torque
Angle displacement at nominal torque:	< 0.5 °
Material:	high strength heat-treated steel, similar to 1.2826 or 12738
Protection class:	acc. to EN 60529 IP50
Dimensions:	refer to table and dimensional drawing
Maintenance/cleaning (contact ring abrasion, recommended change of the brushes):	after approx. 5 x 10^7 rotations

Mechanical connection:

model 86403	Internal and external square acc. to DIN 3121, used for connection to assembling tools for bolt and nuts.
model 86413	Version with keyways on both shaft ends (2 x 180 °) acc. to DIN 6885 page 1
model 86423	Hexagon head and socket 1/4", acc. to DIN 3126 (ISO 1173) version E/F quick-action chuck

Electrical connection:
Sensors without measurement of angle displacement
6 pin plug-in connection Mating connector model 9953

Wiring:

1	excitation	negative	
2	excitation	positive	
3	shield (not connected in the sensor)		
4	output	positive	for clockwise torques
5	output signal	negative	for clockwise torques
6	100 % check		

Sensors with measurement of angle displacement
12 pin plug-in connection Mating connector model 9940

Wiring:

A	excitation	negative	for torque	(0 V DC)
B	excitation	positive	for torque	(2 ... 12 V DC)
C	output signal	positive	for clockwise torque	
D	output signal	negative	for clockwise torque	
E	excitation	negative	for angle displ.	(0 V DC)
F	excitation	positive	for angle displ.	(+ 5 V DC)
G	angle output 1	(TTL pulses)		
H	angle output 2	(TTL pulses)		
J	angle output			(0 V DC)
K	check, shunt calibration (option)			
L	NC			
M	shield			

Order Information

1. Torque sensor, rotating, square end
   measurement range 0 ... 1 Nm **Model 86403-5001**
2. Torque sensor, rotating, square end, with meas. of angle displ.
   measurement range 0 ... 63 Nm **Model 86403-5063-V501**

Accessories

for sensors without measurement of angle displacement

Mating connector 6 pin, in scope of delivery	**Model 9953**
Mating connector 6 pin, 90° outlet	**Model 9900-V589**
Connection cable, one end open, length 3 m	**Model 99553-000A-0110030**
Connection cable to burster desktop devices with 12 pin panel jack, length 3 m	**Model 99141-553A-0150030**
Connection cable to 9235 and 9310 length 3 m	**Model 99209-553A-0110030**
Cable adapter to 9163-V3XXXX length 0.2 m	**Model 99209-609A-0090002**

for sensors with measurement of angle displacement

Mating connector 12 pin, in scope of delivery	**Model 9940**
Mating connector 12 pin, 90° outlet	**Model 9900-V539**
Connection cable, one end open, length 3 m	**Model 99540-000K-0270030**
Connection cable to model 9307, length 3 m	**Model 99163-540C-0270030**
Strain gauge simulator	**Model 9405**

The sensor will be replaced by the strain gauge simulator for checking amplifiers or indicators.

Supply units, amplifiers and process control units like modular amplifiers models 9243, 9206, 9163 or 9307
refer to section 9 of the catalog.

Options

Higher measurement ranges on request.

Manufacturers Calibration Certificate (WKS)

Calibration of a torque sensor with or without amplifier / indicator (measurement chain) in clockwise or / and counter clockwise direction in increments of 20 % of the measurement range.

Mounting Instructions

The sensors, particularly those with small measuring ranges, must be mounted carefully. It is important that the drive and measuring ends are not reversed during assembly. The slip-ring rotation transmitter is located on the drive side. If fitted incorrectly (measuring side and drive side swapped), its friction, which is unavoidable, will be included in the measurement.
The correct position of the measuring side is indicated on the corresponding dimensional drawing. The measuring shaft should always be cleaned prior to assembly and should be supported during fitting, to ensure that no foreign objects are sticking to it. It is recommended that the sensor is electrically connected and that the output signal is watched at the time of fitting. Vibrations originating in the equipment should be kept away from the sensor. The sensor should only be mounted on the coupling after the parts have been accurately aligned. This should be done without free play or lateral forces. It is recommended that the cable connection points upwards, so that abrasion dust cannot fall onto the brush connections.

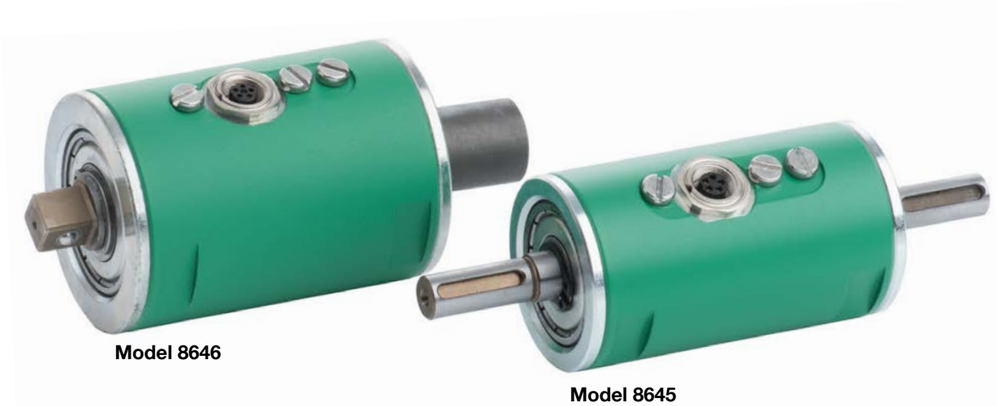
2399-086403EN-5672-081524

Torque Sensor

Rotating, non-contact transfer

Model 8645 with round shaft
Model 8646 with square ends

Code:	8645 EN
Delivery:	ex stock
Warranty:	24 months



Model 8646

Model 8645

Very low price

- **Measuring range 0 ... 2.5 Nm to 0 ... 500 Nm**
- **Very low price**
- **Speed up to 5000 ¹/min**
- **Integrated amplifier**
- **High axial and radial load allowed**
- **Extended temperature range - 40 °C ... + 120 °C on request**

Application

This torque sensor enables the maintenance-free measurement of static and dynamic torques. It opens up new applications thanks to its low price, ease of use and high insensitivity to lateral forces and bending moments.

In addition to classic torque measurement on test benches, in production facilities and for monitoring bolting tools, cost-effective torque measurement is also possible in applications including:

- ► Automotive (steering, gearing, motors)
- ► Drilling systems
- ► Textile machines
- ► Pumps
- ► Fitness and workout gears
- ► Mechanical conveying technology
- ► Household appliances

Description

This sensor uses a non-contact and maintenance-free technology to convert the torque into an electrical signal.
The nickel steel shaft is conditioned with a permanent magnetic pattern. Apart from this, no other components such as strain gauges or wiring are required on the shaft.
The magnetic pattern changes as a result of the torque being measured. This produces a measurement signal that is dependent on the torque.
Via the integrated amplifier, the sensor supplies an output voltage of 0.5 ... 4.5 V. The zero point is at 2.5 V, which makes it easy to evaluate the direction of torque.

Technical Data

Model 8645, round ends

Dim. tolerance acc. ISO 2768-f

Order Code	Measuring Range	Dimensions [mm] A	B	C	ø D_{k6}	$E^{+0,3}$	F	G	H	K	L	M	N	P	S	Moment of Inertia [g · cm²]	Weight [g]	Max. axial force [N]*	Max. lateral force [N]*	Max. bending moment [Nm]*
8645-5002.5	0 ... ± 2.5 Nm	125	70	27.5	9	40	-	8	5	-	23	43.9	15	37	1.5	5.97	400	1000	20	2.5
8645-5005	0 ... ± 5 Nm	125	70	27.5	9	40	-	8	5	-	23	43.9	15	37	1.5	5.97	400	1000	20	2.5
8645-5007.5	0 ... ± 7.5 Nm	125	70	27.5	9	40	-	8	5	-	23	43.9	15	37	1.5	6.62	400	1000	30	3.7
8645-5017.5	0 ... ± 17.5 Nm	125	70	27.5	9	40	-	8	5	-	23	43.9	15	37	1,5	10.73	450	1000	100	12.5
8645-5075	0 ... ± 75 Nm	139	70	34.5	14	50	-	8	5	-	30	43.9	18	47	1.5	49.22	700	2600	300	41.7
8645-5175	0 ... ± 175 Nm	179	70	54.5	19	50	-	8	5	-	50	43.9	18	47	1.5	191.26	900	4000	500	89.5
8645-5250	0 ... ± 250 Nm	179	70	54.5	19	50	-	8	5	-	50	43.9	18	47	1.5	191.26	1000	4000	500	89.5
8645-5500	0 ... ± 500 Nm	220	87	66.6	25	60	-	10.5	2	-	-	61.4	19	57	1.5	797.54	1300	7000	800	176

Model 8646, square end

Order Code	Measuring Range	Dimension [mm] A	B	C	Square	E	F	G	H	K	L	M	N	P	S	Moment of Inertia [g · cm²]	Weight [g]	Max. axial force [N]*	Max. lateral force [N]*	Max. bending moment [Nm]*
8646-5002,5	0 ... ± 2.5 Nm	95.5	70	9.5	1/4"	40	16	8	5	12	-	43.9	15	37	1.5	5.82	400	1000	20	2.5
8646-5005	0 ... ± 5 Nm	95.5	70	9.5	1/4"	40	16	8	5	12	-	43.9	15	37	1.5	5.82	400	1000	20	2.5
8646-5007,5	0 ... ± 7.5 Nm	95.5	70	9.5	1/4"	40	16	8	5	12	-	43.9	15	37	1.5	6.48	400	1000	30	3.7
8646-5017,5	0 ... ± 17.5 Nm	95.5	70	9.5	1/4"	40	16	8	5	12	-	43.9	15	37	1.5	9.04	450	1000	100	12.5
8646-5075	0 ... ± 75 Nm	107	70	13	3/8"	50	24	8	5	18	-	43.9	18	47	1.5	33.39	700	2600	300	41.7
8646-5175	0 ... ± 175 Nm	123.5	70	18.5	1/2"	50	35	8	5	24	-	43.9	18	47	1.5	132.94	800	4000	500	89.5
8646-5250	0 ... ± 250 Nm	123.5	70	18.5	1/2"	50	35	8	5	24	-	43.9	18	47	1.5	132.94	800	4000	500	89.5
8646-5500	0 ... ± 500 Nm	146	87	29.6	3/4"	60	29.6	10,5	2	33.5	-	61.4	19	57	1.5	577.70	900	7000	800	176

* Every irregular exposure (axial force, lateral force, bending moment, overstepping of max. operating force) is acceptable if only on of them occurs.

Electrical values

Excitation voltage:	9 ... 12 V DC
Excitation current (40 mA for a period of 10 ms at the start):	10 mA
Analog output signal (dependent on sensor):	≈ 0.5 V ... 4.5 V
Signal output at 0 Nm (adjustable):	2.5 VDC
Output resistance:	50 Ω
Cut-off frequency (-3 db):	1 kHz

Environmental conditions

Operating temperature range:	0 ... 70 °C
Temperature effect on zero signal:	< ± 0.1 % F.S./K
Temperature effect on characteristic value:	< ± 0.1 % F.S./K

Do not apply torque sensor within dynamic magnetic fields, e.g. near high running motors.
Resistance to magnetic fields:
max. 300 kA/m at distance of 70 mm (4000 Oe)

Mechanical values

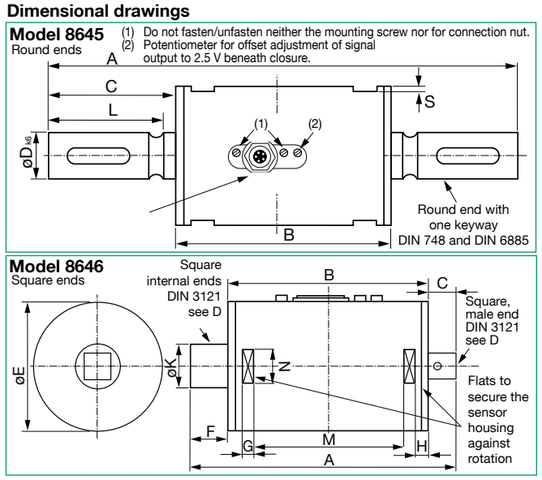
Relative linearity error, relative reversibility error and signal variations during rotation:

measuring ranges up to 250 Nm	< ± 1 % F.S.
measuring range 500 Nm	< ± 2 % F.S.
Relative repeatability error:	< ± 0.1 % F.S.
Resolution:	0.1 % F.S.
Rotary speed:	
model 8645 (permanent ≤ 3000)	max. 5000 min^{-1}
model 8646	max. 1000 min^{-1}
Protection class: acc. EN 60529	IP50
Max. operating torque:	150 % of nominal torque
Breaking moment:	300 % of nominal torque
Shaft material housing:	Ni Cr Ni 14
Electrical connection:	5 pin socket, mating connector mounted on cable 5 m, included in delivery
Mechanical connection:	
Model 8645	both shaft ends with keyway acc.
measuring range up to 250 Nm	1 keyway acc. DIN 6885-1A
measuring range 500 Nm	2 keyways acc. DIN 6885-1A
Model 8646	Square, male and female, acc. DIN 3121

Wiring Code Cable	Wiring Code		Connection at Sensor
excitation	+	white	1
signal output	+	brown	2
excitation/signal GND	-	black	3
free			4
reference voltage	V_{ref} (2,5 V)	grey	5

Upon delivery without mounted connector please use a connector with shielding. Generally the shielding should escort the signal as far as possible. The use of another cable than the one included in delivery can affect the proper function of the sensor system.

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.

Mounting Instructions

For mounting the sensor it should be respected that the shafts are arranged exactly in line to the connecting shafts. There should not exit any axial and radial load. To avoid that please use flexible shaft couplings, torsionally stiff. The four flats on the housing should be only used to secure the sensor against rotation. Refer to clamps and accessories. Avoid any axial or radial load between housing and shaft during the installation.

Order Information

Torque sensor, round ends, measuring range 0 ... ± 5 Nm, (cable 5 m included) **Model 8645-5005**

Accessories

Connector for connecting the sensor to burster desktop devices **Model 9941**
Installation of a connector to the sensor cable **Order Code 99004**
Connecting cable length 5 m, one end free (included in delivery) **Model 8645-Z005**
Clamp for 8645 and 8646
for ranges up to 17.5 Nm **Model 8645-Z003**
for ranges from 75 Nm **Model 8645-Z004**
Amplifier, process indicators like e.g. digital displays 9163, 9180 **see section 9 of the catalog.**

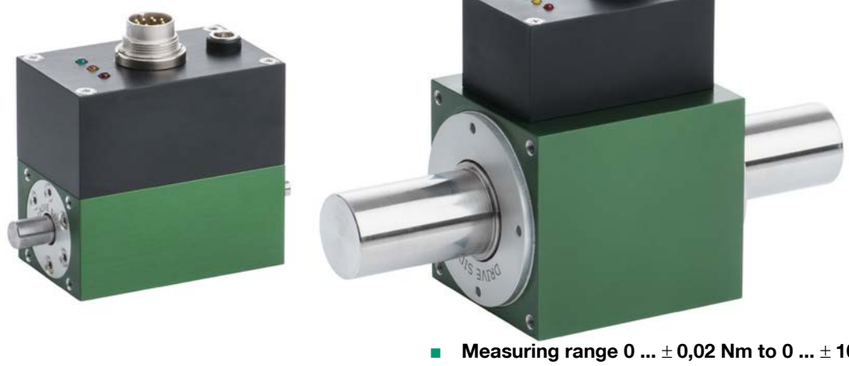
2473-008645EN-5170-101526

Precision Torque Sensor

Non-contact transmission for rotating applications
Optional measurement of angle and speed

Code:	8661 EN
Delivery:	2 - 3 weeks
Warranty:	24 months

Model 8661



Optional:
- ► **USB interface**
- ► **Dual range**

- **Measuring range 0 ... ± 0,02 Nm to 0 ... ± 1000 Nm**
- **Low linearity deviation of ≤ ± 0.05 % F.S.**
- **Intelligent operating state indicator**
- **16 bit D/A- converter including digital adjustment**
- **Output signal 0 ... ±10 V (optional 0 ... ± 5 V)**
- **Angle measurement with 2000 increments / 0.045° (option)**
- **Speed measurement to 25 000 min^{-1} (option)**
- **High performant software (option USB) including mechanical power computation, multichannel operation, freely editable mathematical auxiliary channel**
- **Excellent price-performance ratio**
- **From 500 Nm 4 x keyway (optionally in other measuring ranges possible)**

Application

The series 8661 precision torque sensor is the ideal choice for reliable measurement of static and dynamic clockwise and counter-clockwise torques.
Thanks to the non-contact transmission of the excitation voltage and measurement signal, the sensor offers virtually maintenance-free and fail-safe operation. This makes it perfect for industrial production and assembly applications where there is a need to measure actuating or breakaway torques, holding torques or tightening torques.
Its high measurement quality means that the sensor is equally suited to quality control applications and laboratory-based research and development projects.
The applied torque can be read easily by evaluation units or controllers connected to the normalized analog interface.
For network-independent, mobile use, the torque sensor offers an optional USB interface. This can be connected to a notebook running the PC software supplied with the device to take on-site measurements with accompanying visualization and archival of measurement values.
Its compact, robust and vibration-proof construction makes it suitable for use in the following example applications:

- ► Test setups for precision mechanics
- ► Measurements on micromechanical actuator elements
- ► Engine test benches including measurement of mechanical power
- ► Recording biomechanical movements in medical engineering
- ► Precision frictional torque measurements on bearings
- ► Use as test-bench measuring device

Description

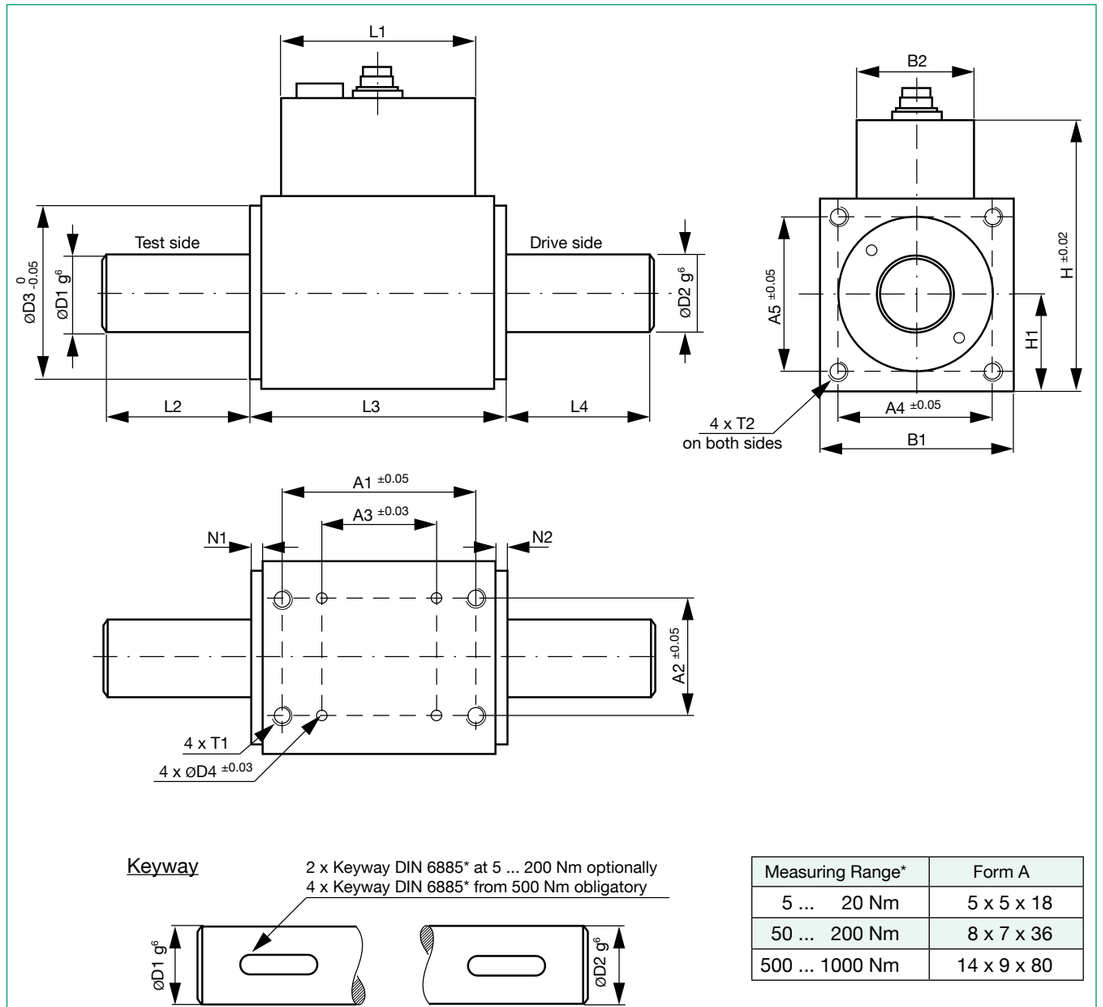
The measuring shaft, which is made of high-quality materials, carries metal-film strain gauges. Torsion of the shaft by the torque to be measured produces a change in resistance in the full bridge, which is converted into a measurement signal that is proportional to the torque.
To ensure wear-free operation, the power is supplied by inductive coupling and the measurement signals are transmitted optically.
The signal, which has been digitized already on the shaft, is converted and amplified into a 0 … ± 10 V signal by a 16 bit digital-to-analog converter on the stator. A high-resolution TTL output signal for the angular displacement and rotational speed measurement is achieved by optical sensing of an incremental encoder disk with up to 1024 divisions and two offset tracks plus four-edge decoding.
An extra socket in addition to the standard 12 pin connector provides another option for connecting an external supply.
Continuous, online display of the various operating states is provided by a 3 LED optical indicator.
High-quality bearings, tight manufacturing tolerances and excellent balance are essential for achieving the optimum running stability that this sensor delivers at speeds of over 25 000 rpm.

Technical Data

Table 1

Order Code	L2	L3	L4	B1	H	H1	D1	D2	D3	D4 Ø	D4 deep	A1	A2	A3	T1	T1 deep	T2	T2 deep	A4	A5	N1	N2
8661-4020-VXXXX	10	66	11	40	60	15	5	8	29	3.1	5	45	31	30	M4	8	M3	5,5	26	24	1.5	0
8661-4050-VXXXX	10	66	11	40	60	15	5	8	29	3.1	5	45	31	30	M4	8	M3	5,5	26	24	1.5	0
8661-4100-VXXXX	10	66	11	40	60	15	5	8	29	3.1	5	45	31	30	M4	8	M3	5,5	26	24	1.5	0
8661-4200-VXXXX	10	66	11	40	60	15	5	8	29	3.1	5	45	31	30	M4	8	M3	5,5	26	24	1.5	0
8661-4500-VXXXX	10	66	11	40	60	15	5	8	29	3.1	5	45	31	30	M4	8	M3	5,5	26	24	1.5	0
8661-5001-VXXXX	10	66	11	40	60	15	5	8	29	3.1	5	45	31	30	M4	8	M3	5,5	26	24	1.5	0
8661-5002-VXXXX	14	66	14	40	60	15	6	8	29	3.1	5	45	31	30	M4	8	M3	5,5	26	24	1.5	0
8661-5005-VXXXX	30	83	30	55	85	27.5	15	15	54	3.1	5	57	44	41	M5	9	M4	6	45.3	45.3	1.5	0
8661-5010-VXXXX	30	83	30	55	85	27.5	15	15	54	3.1	5	57	44	41	M5	9	M4	6	45.3	45.3	1.5	0
8661-5020-VXXXX	30	83	30	55	85	27.5	15	15	54	3.1	5	57	44	41	M5	9	M4	6	45.3	45.3	1.5	0
8661-5050-VXXXX	45	78	45	64	94	32	26	26	58.5	3.1	5	57	44	41	M5	8	M4	6	54.4	54.4	3	3
8661-5100-VXXXX	45	78	45	64	94	32	26	26	58.5	3.1	5	57	44	41	M5	8	M4	6	54.4	54.4	3	3
8661-5200-VXXXX	45	78	45	64	94	32	26	26	58.5	3.1	5	57	44	41	M5	8	M4	6	54.4	54.4	3	3
8661-5500-VXXXX	96.25	95	96.25	107	137	53,5	45	45	97	4.1	10	50	90	30	M8	20	M6	10	88.4	88.4	2.5	2.5
8661-6001-VXXXX	96.25	95	96.25	107	137	53,5	45	45	97	4.1	10	50	90	30	M8	20	M6	10	88.4	88.4	2.5	2.5

Dimensional drawing



Measuring Range*	Form A
5 ... 20 Nm	5 x 5 x 18
50 ... 200 Nm	8 x 7 x 36
500 ... 1000 Nm	14 x 9 x 80

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Specifications, based on measurement range

Table 2

Order Code	Measurement Range [Nm]	Spring Constant [Nm/rad]	Mass Moment of Inertia Drive Side [10^{-6} kg*m²]	Mass Moment of Inertia Measuring Side [10^{-6} kg*m²]	Maximum Permissible Axial Load [N]	Maximum Permissible Radial Load [N]	Weight [g]	Max. Rotary Speed** [min^{-1}]
8661-4020-V0XXX	0 ... ± 0.02	10	2.2	0.048	50	3	300	25 000
8661-4050-V0XXX	0 ... ± 0.05	10	2.2	0.048	50	3	300	25 000
8661-4100-V0XXX	0 ... ± 0.1	20	2.2	0.048	50	3	300	25 000
8661-4200-V0XXX	0 ... ± 0.2	50	2.2	0.05	50	3	300	25 000
8661-4500-V0XXX	0 ... ± 0.5	100	2.2	0.06	50	4	300	25 000
8661-5001-V0XXX	0 ... ± 1	100	2.2	0.062	50	7	300	25 000
8661-5002-V0XXX	0 ... ± 2	180	2.2	0.077	50	13	300	25 000
8661-5005-V0XXX	0 ... ± 5	800	14.3	2.2	200	15	900	15 000
8661-5010-V0XXX	0 ... ± 10	1700	14.3	2.35	200	30	900	15 000
8661-5020-V0XXX	0 ... ± 20	3000	14.6	2.6	200	60	900	15 000
8661-5050-V0XXX	0 ... ± 50	14000	85.7	33.30	300	125	1500	15 000
8661-5100-V0XXX	0 ... ± 100	25000	85.9	33.70	300	215	1500	15 000
8661-5200-V0XXX	0 ... ± 200	40000	87.5	35.00	300	215	1500	15 000
8661-5500-V0XXX	0 ... ± 500	150000	1200	600.00	500	250	6000	7000
8661-6001-V0XXX	0 ... ± 1000	220000	1200	600.00	500	500	6000	7000

** Max speed with option angle and speed measurement refer to page 5.

Sensor with 2 Measurement Ranges (option)

The sensor with two measuring ranges has the same dimensions as the standard version but it also has two different calibrated measuring ranges.
The dual range sensor offers significant advantages:

1. With a single sensor a very wide range of torques can be measured accurately.
2. Good overload protection particularly in smaller measuring ranges: For the smaller measuring range the sensor provides the overload protection of the larger measuring range.
3. No retooling time at all and only one coupling pair is needed.

Possible ratio of dual ranges sensor:

- 1:4
- 1:5
- 1:10

With the sensor with the 12 pin connector the measuring range is switched by applying a voltage level whose magnitude and whose ground reference correspond to the control signal. (For measuring range 1:1, 0 ... 3 V, for the extended measuring range 10 ... 30 V).
The switching time is max. 50 ms.

Typical applications of the dual range sensor are:

- Test stands for motors, turbines and gears, extruders
- Engineering
- Drive engineering
- Aeronautics and space sector
- Automotive
- Product development
- Quality assurance

Specification, based on measurement range

Table 3

Order Code	Upper Range Value [Nm]	Measuring Range Extension End Value Second Range 1:10	1:4	1:5
8661-4500-VX000*	0 ... ± 0,5	-	-	± 0.1 Nm
8661-5001-VX000*	0 ... ± 1	-	-	± 0.2 Nm
8661-5002-VX000*	0 ... ± 2	± 0.2 Nm	± 0.5 Nm	-
8661-5005-VX000*	0 ... ± 5	± 0.5 Nm	-	± 1 Nm
8661-5010-VX000*	0 ... ± 10	± 1 Nm	-	± 2 Nm
8661-5020-VX000*	0 ... ± 20	± 2 Nm	± 5 Nm	-
8661-5050-VX000*	0 ... ± 50	± 5 Nm	-	± 10 Nm
8661-5100-VX000*	0 ... ± 100	± 10 Nm	-	± 20 Nm
8661-5200-VX000*	0 ... ± 200	± 20 Nm	± 50 Nm	-
8661-5500-VX000*	0 ... ± 500	± 50 Nm	-	± 100 Nm
8661-6001-VX000*	0 ... ± 1000	± 100 Nm	-	± 200 Nm

*X = 1: range extension 1:10, X = 2: range extension 1:5, X = 3: range extension 1:4

Torque Sensor with integrated USB Interface (option)

- **Includes powerful data acquisition software DigiVision**
- **Plug & Measure**
- **Numerical and graphical display of torque/speed/mechanical power as well as editable mathematical factors/results, etc.**
- **Suitable for mobile use with a notebook**
- **Power supply via the USB-port (External power supply is not required)**
- **DLL and LabView-driver for free**

This sensor version has an USB-port instead of the 0 ... ± 10 V output. The measurement signal is transferred digitally from the measuring shaft and then transmitted serially. This allows a PC-based evaluation of the measurement signals.
Beside torque, speed or angular displacement measurement values are provided optionally. The DigiVision software displays the mechanical power values also calculated by the sensor.

Configuration and Evaluation Software DigiVision

Multichannel configuration and evaluation software suitable for easy PC-based analysis and reporting in mobile and stationary applications field such as lab, R & D and industrial environment.

DigiVision Features

- ► Numerical and chart representation of the torque, speed, angle and mechanical power
- ► Intuitive user interface
- ► Automatic sensor detection
- ► Practical start and stop trigger features
- ► 4 limits per channel configurable
- ► Peak value memory for MIN/MAX
- ► Auto scale
- ► Storage function of the measuring log as Excel or PDF file
- ► Archive viewer including curve array display
- ► Multichannel operation with full version possible also with other sensors, e.g. 8625, 9206
- ► Calibration data are stored in the sensor

Signal processing
Measuring rate:
up to 200 meas./s (with 8661-P001) for each channel
up to 400 meas./s (with 8661-P100) for each channel
up to 1000 meas./s (with 8661-P200) for each channel
A/D conversion 16 bit

Operating System requirements
Windows 2000, XP, Vista, Windows 7, Windows 8 und Windows 10

Accessories
Configuration and evaluation software DigiVision for torque / speed / mechanical power (up to 200 meas/s supply with the device) **8661-P001**

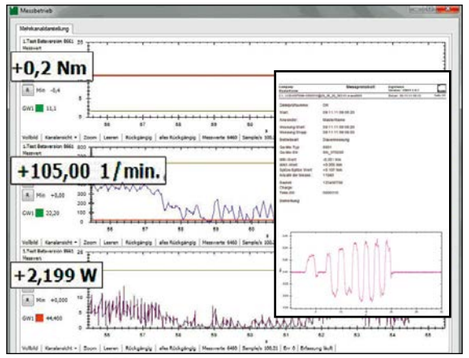
Configuration and evaluation software DigiVision with option for torque / speed / mechanical power up to 400 meas/s for up to 16 channels **8661-P100**

Configuration and evaluation software DigiVision with option for torque / speed / mechanical power / editable mathematical auxiliary channel, max. 1000 meas/s for up to 32 channels **8661-P200**

USB cable with screwing, 2 m length (included) **8661-Z010**

DigiVision is available in three versions:

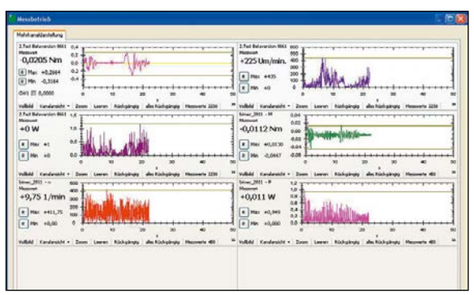
DigiVision, 8661-P001 (included)
- For a single sensor only
- Max. 200 measuring values per second



Screenshot P001: Multichannel display of a single sensor, below right: printed measuring record

DigiVision, 8661-P100, 8661-P200
- For more sensors, up to 16 channels (up to 32 channels*)
- Max. 1000 measuring values per second, per channel*
- Display per sensor (depending on the sensor type)
  - torque and / or angle or
  - torque / speed / mechanical power
  - editable mathematical auxiliary channel*

*for 8661-P200 only



Screenshot P100: Multichannel display of two sensors, torque / speed / mechanical power

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Torque sensor with integrated rotational speed / angular displacement measurement (option)

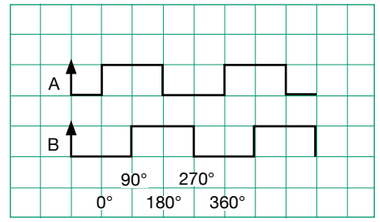
8661 torque sensors are optionally available with integrated rotational speed and angular displacement measurement. Two pulse channels – channel A and channel B – are always available.
For clockwise rotation (looking at the drive end), channel A leads channel B with a phase shift of 90°.
Only one pulse channel is needed for speed measurement.
For angular displacement measurement (or direction detection), both channels need to be evaluated. To achieve the maximum angular resolution, the rising and falling edges should be read out with four-edge evaluation.

Angular displacement measurement* (angular resolution with four-edge evaluation):

Encoder disk with	2000 increments:	0,045°
Encoder disk with	1024 increments:	0.088°
Encoder disk with	400 increments:	0.225°
Encoder disk with	240 increments:	0.375°

Speed measurement*:

Encoder disk with	2000 increments:	≤ 3 000 min^{-1}
Encoder disk with	1024 increments:	≤ 6 000 rpm
Encoder disk with	400 increments:	≤ 15 000 rpm
Encoder disk with	240 increments:	≤ 25 000 rpm



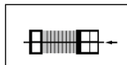
** Not all angular displacement / speed options are available for every measurement range.*

	0.02 Nm ... 2 Nm	5 Nm ... 200 Nm	500 Nm ... 1000 Nm	Versions
2000 incr.	-	yes	yes	-Vx4xx
1024 incr.	yes	yes	yes	-Vx2xx
400 incr.	yes	yes	-	-Vx1xx
240 incr.	yes	-	-	-Vx3xx

Accessory metal bellow coupling series 8690

Metal bellow couplings for optimum compensation of misalignments
For optimum compensation of misalignment we recommend torsionally free metal bellow couplings. They are characterized by their excellent torsional stiffness during torque load and their low restoring forces. Whenever a rotational movement has to be transmitted, these couplings should be used.

The compensation of misalignment is beside torque transmission the second essential function of a coupling. Generally, misalignments are classed in three categories.

	Axial misalignment This is change in length along the longitudinal axis of the drive shafts relative to each other.
	Angular misalignment This misalignment is caused by assembly related offsets of the drive shaft to the output shaft.
	Lateral misalignment This misalignment is a parallel offset of both shafts.

For further information please see accessories data sheet.

Accessory mounting block model 8661-Z00X

If the sensor is removed and refitted quite often it is recommendable to mount it permanently.
The mounting block has a central hole and special design allowing a range of options for reliable cable attachment. Two clips ensure the sensor is fixed securely.
For measuring ranges < 100 Nm (because of the load from its own weight) and at higher speeds of 10,000 rpm and above (because of resonance effects), the sensor housing should be mounted on the existing mechanical structure.
A mounting block is provided for this purpose.

For further information please see accessories data sheet.

Technical data

Electrical values

Rated supply voltage range U_b:	10 ... 30 V DC
DC power consumption (without option):	approx. 2 W
Output voltage at ± rated torque (sensitivity):	± 10 V
Output impedance:	1 kΩ
Insulation resistance:	> 5 MΩ
Sampling rate:	400 Hz*
Ripple:	< 50 mV
Calibration signal:	10.00 V DC
Drive signal (pin K):	10 ... 30 V DC
*Sampling rate 1000 Hz:	on request

Electrical connection

Standard sensor:	12 pins connector art. 9940
USB sensor (option):	Mini USB with screwing
Power pack:	Plug diameter 5.7 mm, center pin 2.0 mm (Supply and measuring channel are galvanically isolated)

Speed/angular displacement measurement (option)*

Output without external circuit:	TTL level
Output with external circuit:	Open Collector
Internal pull-up resistor:	2 kΩ (5 V level)
External circuit (Open Collector):	U_{max} = 30 V / I_{max} = 30 mA
Angular displacement measurement* (angular resolution with four-edge evaluation):	
Encoder disk with 2000 increments:	0.045°
Encoder disk with 1024 increments:	0.088°
Encoder disk with 400 increments:	0.225°
Encoder disk with 240 increments:	0.375°
Speed measurement*:	
For encoder disk with 2000 increments:	≤ 3 000 rpm
For encoder disk with 1024 increments:	≤ 6 000 rpm
For encoder disk with 400 increments:	≤ 15 000 rpm
For encoder disk with 240 increments:	≤ 25 000 rpm

** Please note: Not all angular displacement / speed options are available for every measurement range. For more information, see page 5.*

Environmental conditions

Nominal and operating temperature range: 0 °C ... 60 °C

	Standard sensor	2nd meas. range dual range sensor
Effect of temperature on the zero signal	± 0.015 % F.S./K	± 0.03 % F.S./K
Effect of temperature on the sensitivity	± 0.01 % F.S./K	± 0.02 % F.S./K

Mechanical values

	Standard sensor	dual range sensor
Relative linearity deviation:		
Measuring range 0.02 to 0.05 Nm	< ± 0.1 % F.S.	< ± 0.1 % F.S.
Measuring range 0.1 to 1000 Nm	< ± 0.05 % F.S.	
Relative reversal error:		
Measuring range 0.02 to 0.05 Nm	< 0.1 % F.S.	< 0.2 % F.S.
Measuring range 0.1 to 1000 Nm	< 0.1 % F.S.	
Relative tolerance of the sensitivity	± 0.1 % F.S.	± 0.2 % F.S.
Max. operating torque	200 % of rated torque	150 % of rated torque

Failure torque:	300 % of rated torque
Alternating load:	up to 70 % of rated torque
Material:	
Housing	anodized aluminium
shaft ≤ 0.2 Nm, aluminium measuring shaft,	shaft ends made of stainless steel 1.4542
shaft ≥ 0.5 Nm	measuring shaft made of stainless steel 1.4542
Degree of protection to EN 60529:	IP40
Weight:	see table 2/3
Fixing method:	see dimensional drawing page 2

Mounting Instructions

- Make sure that the connecting shaft is exactly aligned.
- Suitable couplings should be used to avoid strain resulting from parallel or angular offset between the shafts.
- Do not exceed permissible axial and radial forces (see table 2) during installation or operation.
- For detailed installation information, please refer to our operating manual (www.burster.com).

Accessories

12 pin mating connector (supplied with device)	**9940**
12 pin mating connector, 90°	**9900-V539**
Connecting cable, (torque and rotational angle/speed), length 3 m, one end open	**99540-000F-0520030**
Connecting cable, length 3 m, from 8661 without angle/speed measuring option to 9163 of housing	**99209-540E-0160030**
to 9206-V3xxxx and 9311	**99209-540J-0090030**
Connecting cable, length 3 m, 8661 to DIGIFORCE® 9307 combined cannel D (option channel)	**99163-540A-0150030**
Adapter cable to DIGIFORCE® 9307 standard channel A/B and C (usable only in connection with type 99163-540A-015xxxx)	**99209-215A-0090004**
Power pack for external supply	**8600-Z010**
Mounting block (see page 5)	
measurement range 0 ... ± 0,02 Nm up to 0 ... ± 2 Nm	**8661-Z001**
measurement range 0 ... ± 5 Nm up to 0 ... ± 20 Nm	**8661-Z002**
measurement range 0 ... ± 50 Nm up to 0 ... ± 200 Nm	**8661-Z003**
measurement range 0 ... ± 500 Nm up to 0 ... ± 1000 Nm	**8661-Z004**
Couplings	**Series 8690**
Display and evaluation instruments	
Torque	**e.g. SENSORMASTER 9163**
Torque and angle	**e.g. DIGIFORCE® 9307 see product section 9**

Order Code

Torque sensor 8661-XXXX-V

Standard sensor	0
Sensor with dual range 1:10	1
Sensor with dual range 1:5	2
Sensor with dual range 1:4	3
Without angle/speed measurement	0
Angle measurement 400 increments / Speed measurement	1
Angle measurement 1024 increments / Speed measurement	2
Angle measurement 240 increments / Speed measurement	3
Angle measurement 2000 increments / Speed measurement	4
Output voltage 0 ... ± 10 V	0
USB interface	1
Output voltage 0 ... ± 5 V	2
Round shaft ends	0
Shaft ends with keyway (Keyway to DIN 6885, Bl. 1)	2

Order Information

8661 with 100 Nm measuring range, with high-resolution angular displacement measurement, 1024 increments. Option: 2nd measuring range 0 ... 20 Nm with USB interface including measurement and evaluation software 8661-P001 **8661-5100-V2210**

Manufacturer Calibration Certificate (WKS)

Calibration of a sensor or a measuring chain, clockwise and/or counterclockwise torque in 20 % steps, increasing and decreasing.

2467-008661EN-5070-101526

Displacement Sensors

Model number 5...
Model number 7...
Model number 8...
Model number 9...

DISPLACEMENT SENSORS

8709 – 8719	Potentiometric displacement sensors
8738	Incremental displacement sensor
8739	LVDT - inductive displacement sensor with IN-LINE amplifier
8740 – 87350	DC/DC displacement/position sensors

Overview Displacement Sensors model numbers 87 ...

MODELS	8709	8710/8711	8712/8713	8718	8719
Figure					
Non-linearity (≤ % F.S.)	from 0.05	from 0.05	from 0.05	from 0.05	0.05
Description	**Potentiometric displacement sensor, miniature version**	**Potentiometric displacement sensor**	**Potentiometric displacement transducers**	**Potentiometric displacement sensor, without rod**	**Potentiometric displacement sensor**
Measuring Range smallest: largest:	0 ... 25 mm 0 ... 250 mm	0 ... 25 mm 0 ... 150 mm	0 ... 10 mm 0 ... 150 mm	0 ... 100 mm 0 ... 2000 mm	0 ... 50 mm 0 ... 900 mm
Special Features	Housing diameter 12.9 mm with integrated cable 1 m, free moveable fastening clamps, option cable 3 m	Positioning speed up to 10 m/s, coupling with no lateral forces through ball and socket coupling	100 million strokes are possible, available as connector or cable version, with internal or external spring rod	Compact construction (without rod), very easy assembly	High protection class, high-quality, lowplay front bearing for rod, option: IP65 or IP67, compressed air connection
Main Application Fields, Examples of Application	Measurement of strokes on riveting machines, spring travel measurements on axes, length measurements on pipe bending equipment, offset measurements on bearings	Measurement of feed, deformation and press-fit displacements, length tolerances, displacements on electromagnets	Measurement of bending, deformation, measurement of advance movements on pneumatic and hydraulic cylinders as well as manual presses	Measuring windup and unwinding lengths, measurements on undercarriages and dosing systems	Measurement of jointing and press-fit displacements, determining the movement on linear axes or electric spindles

MODELS	8738	8739	8740/8741	87240	87350
Figure					
Non-linearity (≤ % F.S.) *(Accuracy in µm)	from 1 µm*	from 0.1	from 0.1	0.5	0.5
Description	**Incremental displacement sensor**	**Inductive displacement sensor with IN-LINE amplifier**	**DC/DC displacement sensor without/with spring rod**	**DC/DC displacement sensor with sliding rod**	**DC/DC displacement sensor with spring rod**
Measuring Range smallest: largest:	0 ... 5 mm 0 ... 100 mm	0 ... 1 mm 0 ... 25 mm	0 ... 1 mm 0 ... 150 mm (8741: to 0 ... 50 mm)	– 1.27 ... + 1.27 mm – 76.20 ... + 76.20 mm	– 1.27 ... + 1.27 mm – 76.20 ... + 76.20 mm
Special Features	Very high resolution up to 0.1 µm, vibration-proof, housing diameter 8 mm with spring rod, protection class IP66, TTL signal	Standard output signal 0 ... 10 V, no wear, vibration-proof, housing diameter 8 mm, implementation 25 mm with rod Option: 4 ... 20 mA, 0 ... 5 V, ± 5 V, USB with software	Integrated measuring amplifier, output 0 ... 5 V, insusceptible to shock, model 8741 with spring rod Option: 4 ... 20 mA, 10 ... 0 V, 0 ... 10 V, 5 ... 0 V, ± 5 V	Large operating temperature range – 50 °C to 120 °C, can be used in hydraulic oil up to 3 bar, large output signal thanks to built-in measuring amplifier	External thread on sensor body provides excellent fastening means, galvanic isolation between power supply and measurement signal, polarity reversal protection
Main Application Fields, Examples of Application	Orientation and position direction in testing equipment, concentric running tests on motor shafts, use in assembly equipment and machine tools	Testing equipment for a very wide range of motor vehicle parts, spring travel measurements on plug contacts, height measurement on electronic components	Measuring the extension of heattreated plastic parts, measuring the advance displacements on painting plants	Length measurement in material testing machines, numerous applications in the wood and plastics industries and in medical biotechnology	Position measurement in servo-systems, punching machines, measuring the feed distance in bonding equipment for the semiconductor industry

Options:	■ Sensor housing with mounting nuts ■ High adjustment speed ■ High protection class ■ Venting holes ■ Higher output voltage ■ Higher accuracy ■ Further measurement ranges
Accessories:	Ball joint couplings, probe tip, mounting set, air lifter pump, mounting nuts
Services:	Connector mounting, manufacturer calibration certificate

2401-000089EN-5872-081524

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**

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.

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

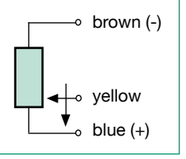
Environmental conditions

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

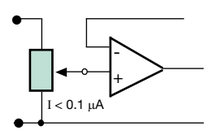
Mechanical values

Non-linearity: refer to table
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



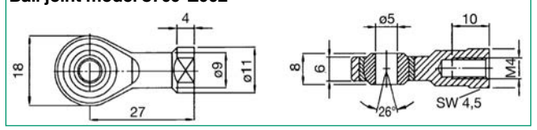
Recommended wiring



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).

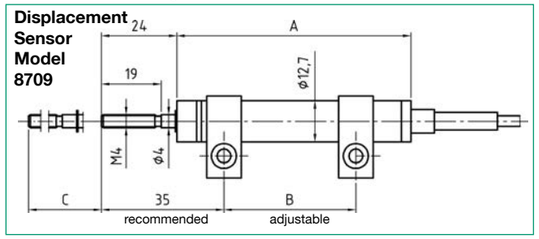
Assembly
Two fastening clamps for mounting purposes are included with the device, see dimensional drawing. The recommended spacings are given in the table.

Ball joint model 8709-Z002

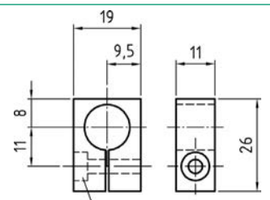


Dimensional drawings

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 Range 100 mm **Model 8709-5100**

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.

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**

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.

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

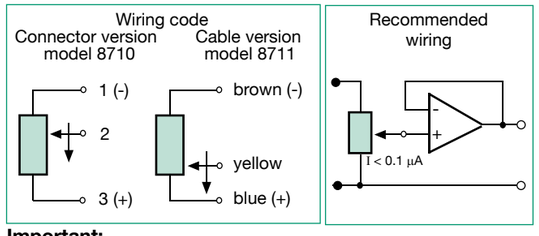
Shock resistance: 50 g, 11 ms

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

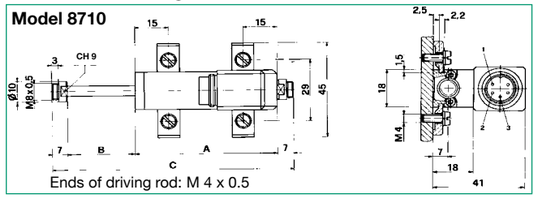


Important:
The excellent characteristics of the sensor are evident, if the slider load in the voltage divider is < 0.1 µA. If the measurement chain requires higher currents, an operational amplifier should be used, connected as a voltage follower (I < 0.1 µA) (see diagram above).

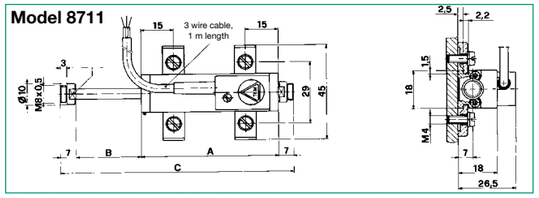
Mounting: with two 2 axial moveable clips, refer to diagram (in scope of delivery)

Dimensional drawings

Model 8710



Model 8711



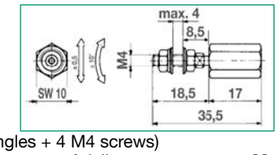
The CAD drawing (3D/2D) for this sensor can be imported online directly into your CAD system.
Download via www.burster.com or directly at www.traceparts.com. For further information about the burster traceparts cooperation refer to data sheet 80-CAD-EN.

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).

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**

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.

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

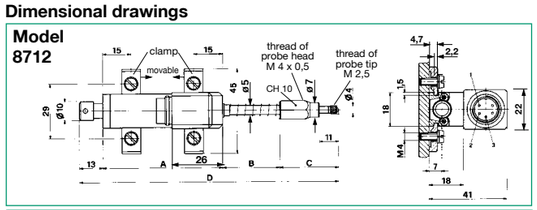
Electrical connection:
- model 8712: Plug-in connector 5 pin
- model 8713: connecting cable, length 1 m, ø 4 mm

Important:

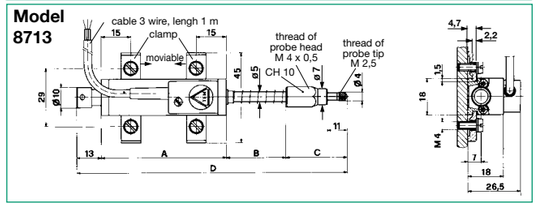
The excellent characteristics of these sensors are only evident when the slider current is < 0.1 µA. If the measuring chain requires higher currents, it is recommended to use an operational amplifier connected as a voltage follower (I < 0.1 µA).

Dimensional drawings

Model 8712

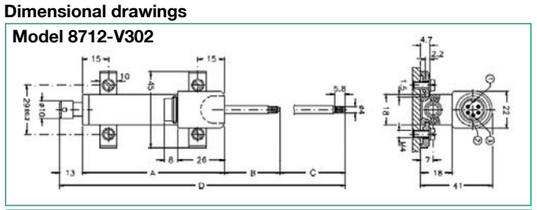


Model 8713

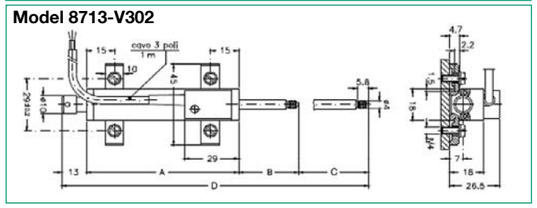


Dimensional drawings

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

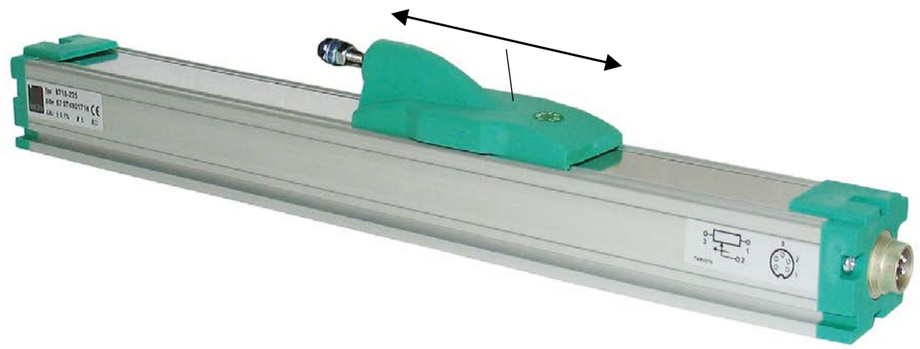
2404-008712EN-5672-081524

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**

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.

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

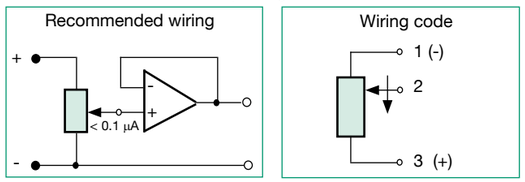
Environmental conditions

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)



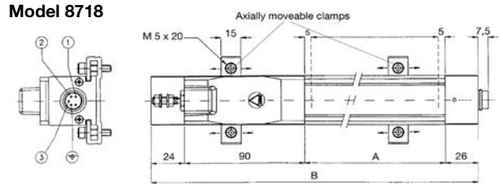
Important
The technical data stated are only evident, if the sensor is used properly. The sensor only shows its excellent characteristics when the slider current in the voltage divider is < 0.1 µA. If the measurement chain requires higher currents, it is advisable to connect an operational amplifier 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.

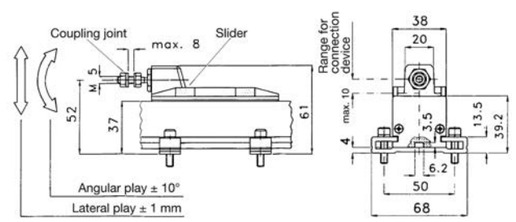
Mounting Advice
The clamps allow a fine adjustment of the sensor's mounting position. It may be an advantage to mount the sensors with the ball joint coupling in the lower position. This will bring the drainage areas on both sides of the slider into work and the masking band is better protected against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

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**

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.

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

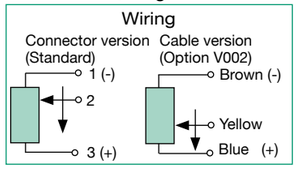
Environmental conditions

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

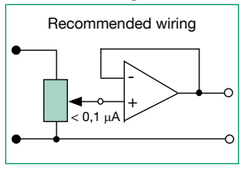
Mechanical values

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:

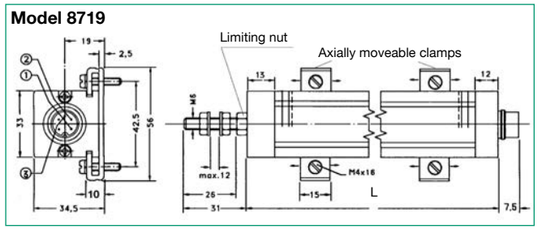
The technical data quoted can only be maintained if the sensors are used properly. Their outstanding properties are only available when the loading of the slider in the voltage divider is kept < 0.1 µA. If the measuring chain draws higher currents, the use of an operational amplifier as a voltage follower (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:

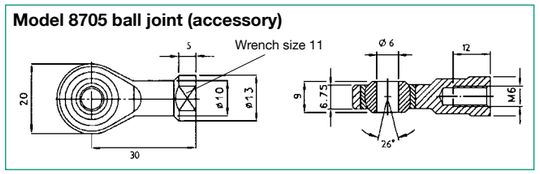
Clamps with adjustable clearance; sensor can be clipped into the fitted clamps.

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).

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**

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.

Technical Data

Order Code	Measuring Range	Dimensions [mm] L	L1	L2	L3	øD1	øD2	KA	øW	TS	Resolution [µm]	Accuracy [µm]	Mass of Sensor without Cabel [kg]	Pro-tection Class
8738-DK805R5	0 ... 5 mm	82	22.3	11	49.5	8	8	-	-	8.1	0.5	1.5	0.02	IP66
8738-DK812R5	0 ... 12 mm	109.7	33	19.5	57.2	8	8	-	-	8.1	0.5	1.5	0.03	IP66
8738-DK25PR5	0 ... 25 mm	179.5	38.5	33.8	107.2	20	20	20	6	12	0.5	2	0.3	IP64
8738-DK830R	0 ... 30 mm	195.2	39.6	45.7	109.9	8	12	17	4	8.1	0.1	1.3	0.07	IP53
8738-DK50PR5	0 ... 50 mm	286	63	44	179	20	20	20	6	12	0.5	2	0.36	IP64
8738-DK100PR5	0 ...100 mm	443.5	114	38.5	291	20	25	20	8	12	0.5	4	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
Influence of temperature: 0.012 µm/K

Mechanical values

Maximum speed of response: 1 m/s
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

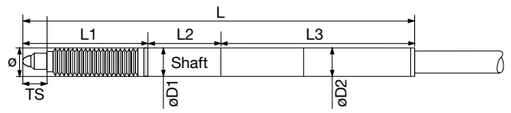
Mounting instructions
It is important to ensure that the sensor housing is not too tightly clamped when mounting. Although the shaft has been specially hardened, excessive tightening torques should be avoided (max. 0.06 Nm).
The accuracy of the measurement depends on the parallelism achieved during assembly; 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.

Note:
For measurements where the required precision is lower, the DT series offers a low-cost alternative; measuring ranges: 12 mm or 32 mm (5 µm resolution) on request.

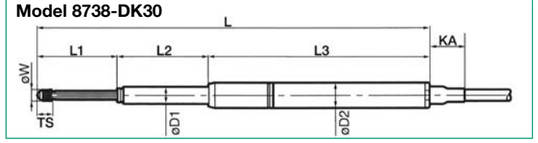
DT series
(Technical data on request)

Dimensional drawing

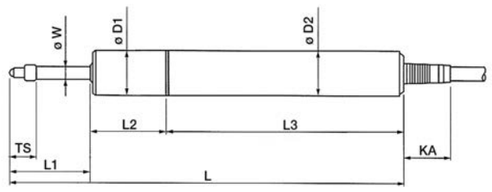
Model 8738-DK805/812



Model 8738-DK30



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 and flange **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

Vacuum lifting (Pull): **Model 8738-DK805LR**
The rod is pushed inside by spring forces and pulled outside by vacuum. minimum vacuum: 0.25 bar

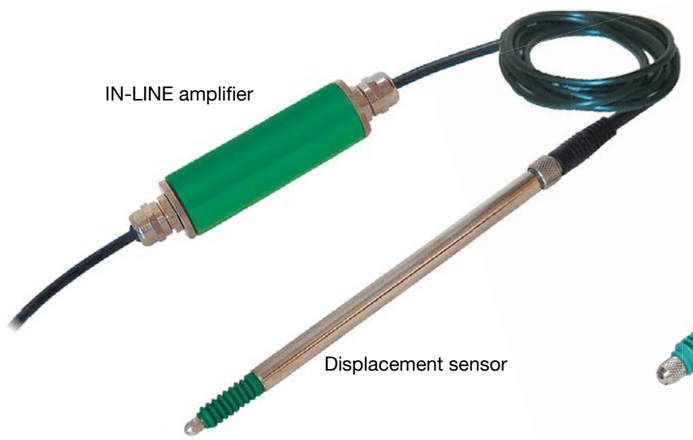
2409-008738EN-5672-081524

LVDT Displacement Sensor

With IN-LINE Amplifier

Model 8739

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



- **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, USB**
- **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.

Technical Data

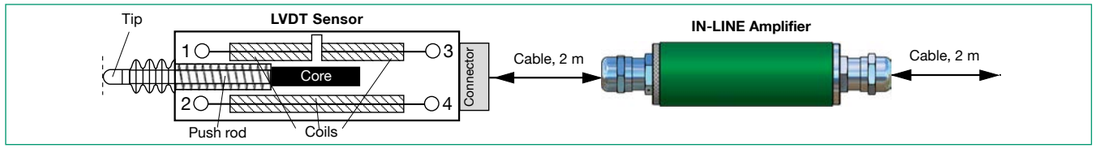
Model 8739

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]

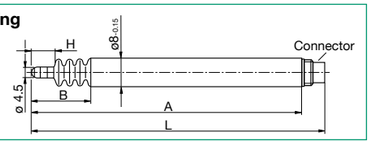
Electrical connection: shielded, PVC insulated wire, total length 4 m, the IN-LINE amplifier is centrically and inseparably mounted, bending radius ≥ 10 mm, with a 4 pin connector to sensor, other side open ends.

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

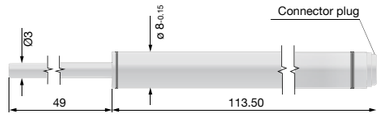
Manufacturer Calibration Certificate (WKS)

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
V515: Induvtive displacement sensor with USB interface and evaluation software (other technical data see data sheet 9206)

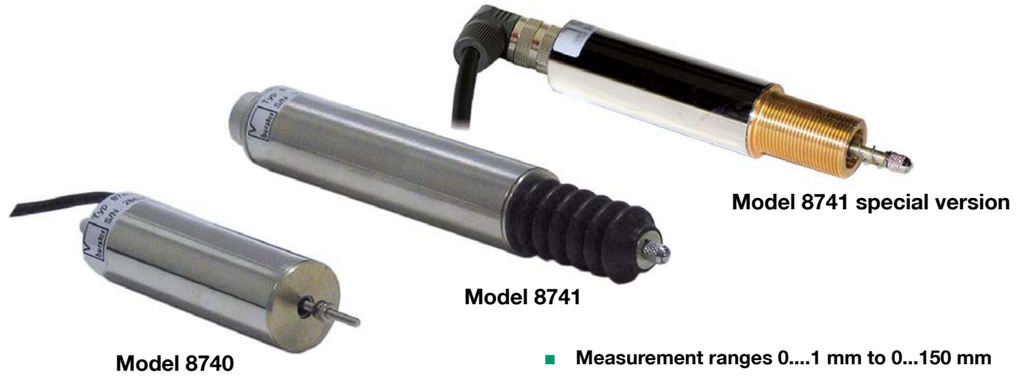
Dragchain cable	on request
Other cable lengths	on request
Comparsion in Inch	on request
Other adjustment of the amplifier, e. g. 0 ... 4 mm ≙ 0 ... 10 V	on request

2410-008739EN-5672-081524

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.

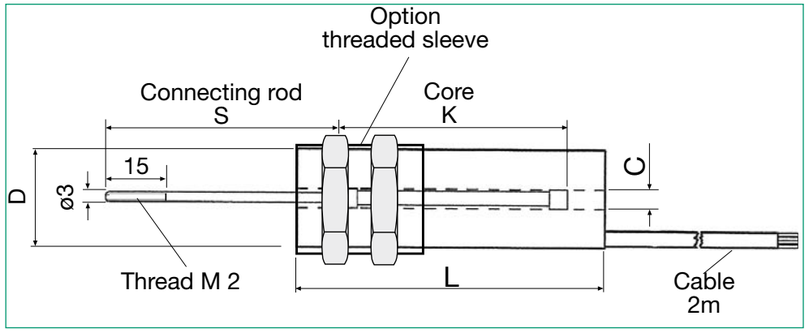
The moveable rod of **model 8741** is mounted on ball bearings. A spring holds the tip of the probe against the object being measured. This version is advantageous when it is difficult or entirely impractical to implement a mechanical coupling. Once again, lateral forces will shorten the service life.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

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)

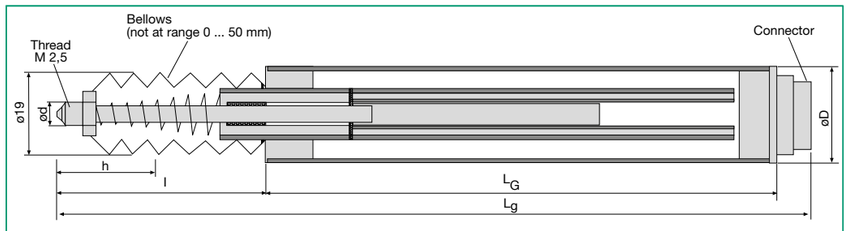


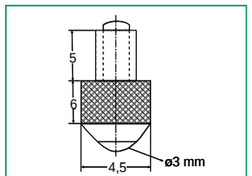
Model 8741

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.

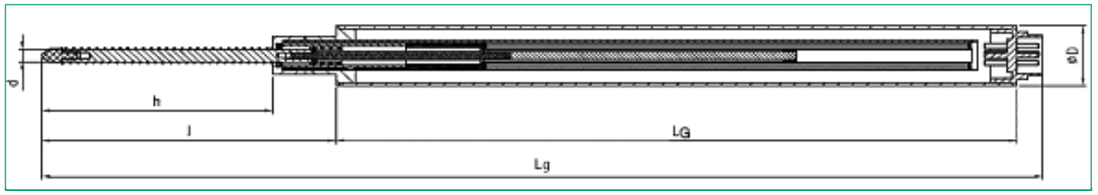
Dimensional drawing model 8741





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.
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.

2411-008740EN-5672-081524

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 IP64, model 8741 IP60
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

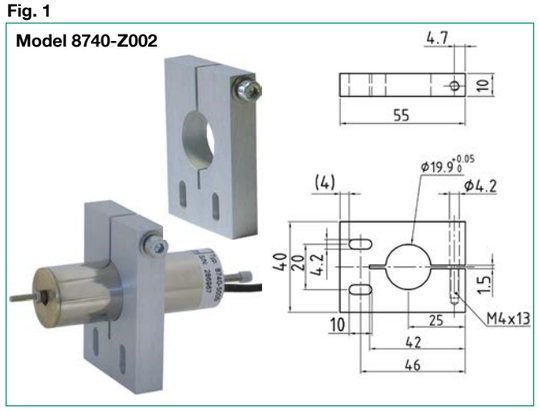


Fig. 2
Model 8740-Z003

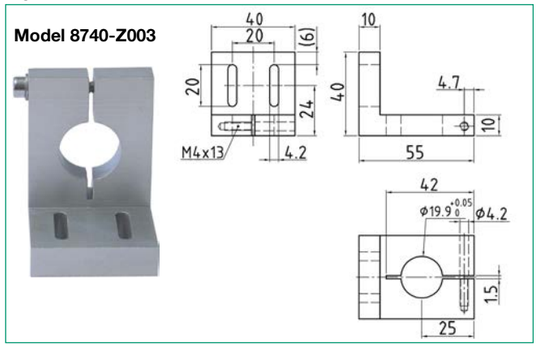
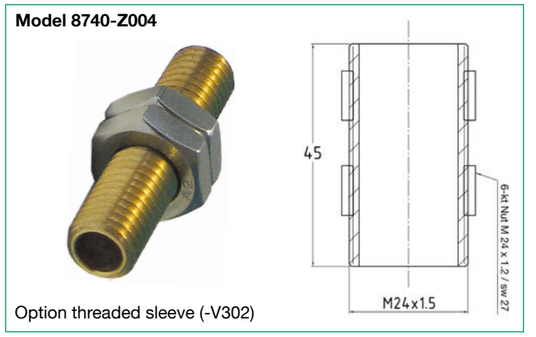


Fig. 3
Model 8740-Z004



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.
V515: Protection class IP65

Manufacturer Calibration Certificate (WKS)

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

Special versions (by request)

Sensor with **radial cable outlet**
Option V601
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.

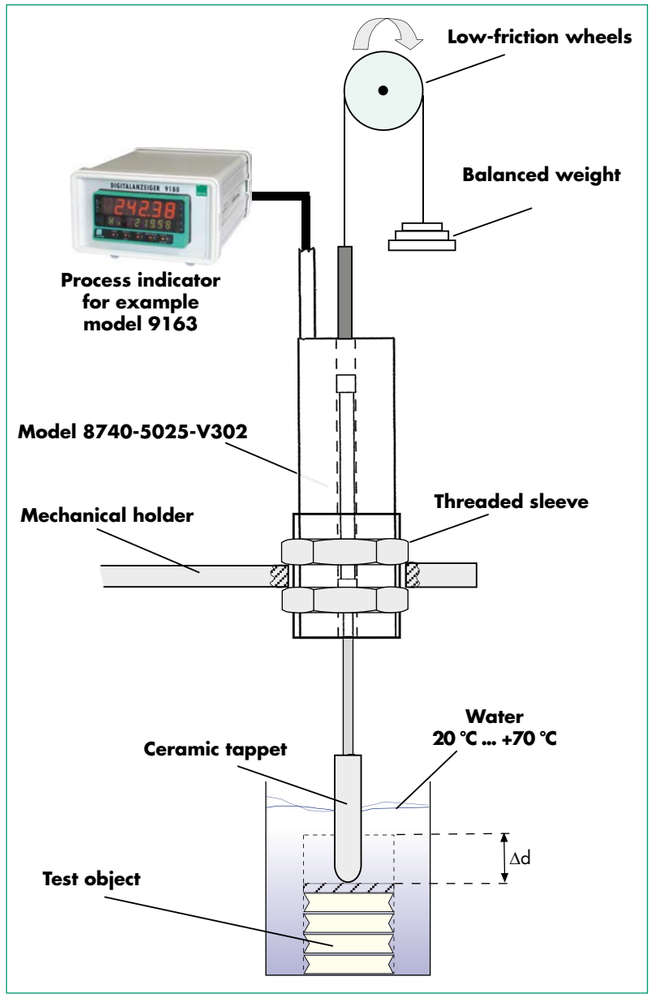


Fig. 4 Application example

2411-008740EN-5672-081524

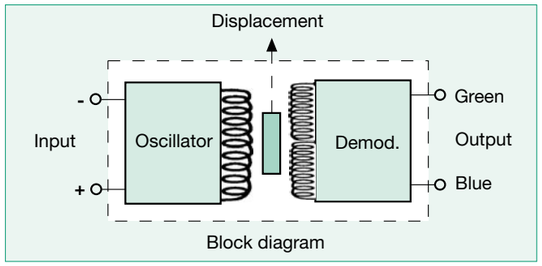
DC/DC Displacement Sensor

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**

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.

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

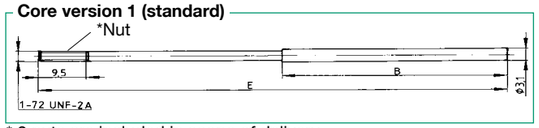
DC/DC displacement sensor range ± 1.27 mm **Model 87240-000**
DC/DC displacement sensor range ± 1.27 mm plug-in connector **Model 87240-000-V001**

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.**

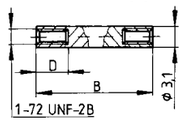
Dimensional drawings

Core version 1 (standard)



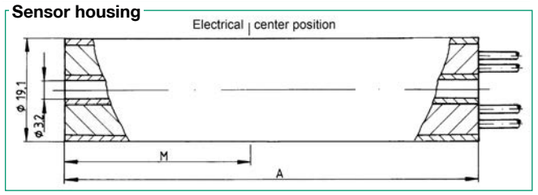
* 2 nuts are included in scope of delivery.

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.

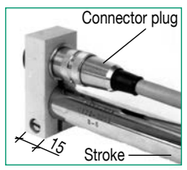
Sensor housing



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.

2407-087240EN-5672-081524

DC/DC Displacement Sensors

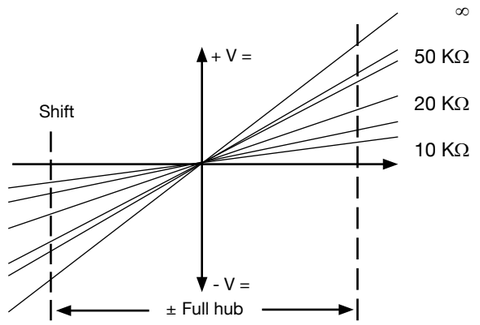
Series 87350

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**

Application

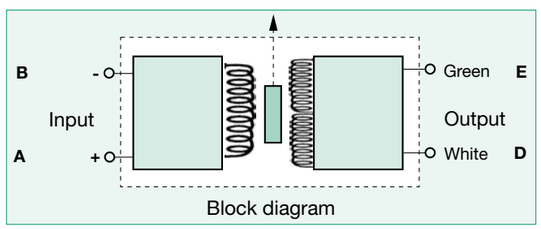
Linear displacements and mechanical values which can be converted to displacements (e.g. compressive and tensile force, strain, torque and vibration) may be measured by these DC/DC displacement sensors. The probe tip of these sensors is pushed onto the measuring object by a spring. This makes it possible 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

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

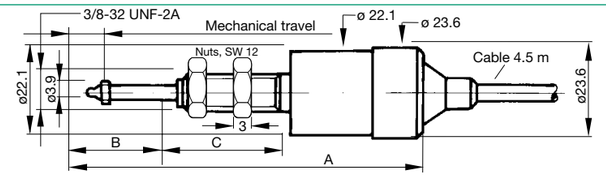
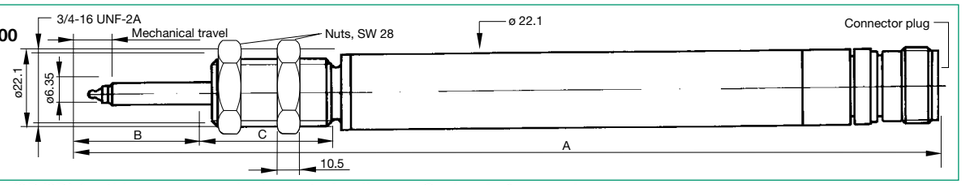


Figure 2
Models 87352-000 to 87356-000



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**

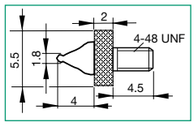
Mounting:
The installation of the sensor is realized with two nuts. These two nuts are included in scope of delivery. Mechanical tensions on the sensor housing caused either by the backmost nut or by any other surrounding parts have to be avoided.

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.

2408-087350EN-5672-081524

Angle of Rotation/Rotary Speed Sensors

Model number 5...
Model number 7...
Model number 8...
Model number 9...

ANGLE OF ROTATION/ ROTARY SPEED SENSORS

8820	Potentiometric angle of rotation sensor
8821	Incremental rotary speed/angle of rotation sensor
88600 – 88603	Capacitive precision angle of rotation sensors

Overview Angle of Rotation / Rotary Speed Sensors model numbers 88 ...

MODELS	8820	8821	88600
Figure			
Non-linearity (≤ % F.S.) *(Accuracy in Degree)	from 0.05	from 1*	from 0.05
Description	**Potentiometric angle of rotation sensor**	**Incremental rotary speed, angle of rotation sensor**	**Precision angle of rotation sensor, capacitive, without contact rings**
Measuring Range	0 ... 350 °	0 ... 360 °	0 ... ± 30 ° 0 ... ± 80 °
Special Features	Low non-linearity, long durability, low torque, continuous rotation possible, particularly economical, protection class up to IP65	Up to 3600 pulses/turn, robust construction with high resistance to interference, detection of rotating direction, long durability, HTL- or TTL output, protection class IP65	Low non-linearity, high linearity, non-contact transmission, integrated amplifier, robust and maintenance-free, very low moment of inertia, rotation possible
Main Application Fields	All kinds of analog angular measurement up to 350° such as position feedback on servo-systems, pendulum weighing machines, cam and butterfly flap positions, jockey roller controllers	Measuring distances, positions and speeds particularly in machine tools, textile, packaging and testing machines, in wood and plastics machining industries, in lifts and door system	Position feedback to servo-systems, zero detector, pendulum weighing machines, cam and butterfly flap positions, twist angles, angular actuators, optical angular measurements, jockey roller controllers

Options: ■ High accuracy ■ Higher protection class ■ Higher number of pulses/rotation ■ Other ranges of rotary speed ■ Different excitation voltages

Accessories: Assembly racks, connection cables, mating connectors, metal bellows coupling model 8690

2412-000089EN-5872-081524

Angle Displacement Sensor
Potentiometer

Model 8820

Code:	8820 EN
Delivery:	ex stock
Warranty:	24 months

- **Measuring range 0° ... 350°**
- **Non-linearity 0.5% F.S.**
- **Duration 100 x 10^6 movements**
- **Low torque**
- **Continuous rotation possible**
- **Exceptionally inexpensive**
- **Options: IP65, non-linearity 0.05% F.S.**

Application
As an angle sensor that is both accurate and economical, this rotary potentiometer is suitable for all types of analog angle measurement up to 350°.

Typical fields of application include:

- ► Position feedback in servo-systems
- ► Pendulum weighing machines
- ► Cam and butterfly flap positions
- ► Jockey roller controllers
- ► Measuring the tension of threads and tape
- ► Trigonometric measurements at joints

Description
The heart of the potentiometric angular displacement sensors is an extremely precise, low-wear resistor track made of plastic. Due to its high resistance to abrasion, the sensors are particularly suitable for measurements for the purpose of quality assurance in ongoing production, where a long service life and large numbers of rotations are required.
The potentiometric angular displacement sensor uses a multi-finger slider system with precious metal contacts. This ensures good contact even when moving at high speed and in the presence of vibrations.
The high-precision resistor tracks are pressed in a laser-controlled process and are therefore remarkably flat. This provides ideal conditions for a long service life.
The stainless steel shaft is supported by close-tolerance, low-friction, stainless steel ball bearings with double sealing discs.

Technical Data

Electrical values

Maximum operating voltage:	50 V
Resistance:	4.7 kΩ
Tolerance of resistance:	± 20 %
Recommended current in slider circuit (refer to drawing 1):	≤ 0.1 µA
Maximum current in slider circuit:	10 mA
Power consumption at 40 °C (0 W at 125 °C):	3 W
Insulation resistance:	> 100 MΩ at 500 V, 2 s
Voltage strength:	500 V AC, 50 Hz, 2 s

Environmental conditions

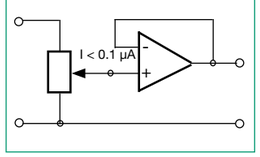
Range of temperature:	- 55 °C ... +100 °C
Temperature coefficient of resistance:	max. -200 ± 200 ppm/K
Temperature coefficient of output voltage:	< 1.5 ppm/K

Mechanical values

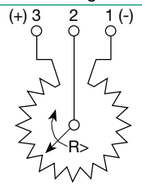
Measurement range:	350° ± 4°
Non-linearity:	< ± 0.5 % F.S.
Hysteresis:	≤ 15" angle measurement
Resolution:	0.01°
Area of rotating:	360° rotatable in clockwise direction, inside the measurement range rotatable in any direction.
Torque:	≤ 0.2 Ncm
Adjustment speed:	max. 600 RPM
Axial load of shaft:	max. 2.5 N
Radial load of shaft:	max. 2.5 N
Vibration:	5 Hz ... 2 kHz, max. 20 g / max. 0.75 mm
Shock resistance:	50 g, 11 ms
Durability:	> 100 x 10^6 movements at slider current < 0.1 µA in the range
Bearing:	precision bearing with double protection made of stainless steel
Material: Housing flange:	anodized aluminium,
Shaft:	stainless steel AISI 316
Electrical connection (see drawing):	3 pins for soldering, gold-plated
Protection class:	according to EN 60529 IP40
Weight:	90 g
Option -V500:	measuring range 345° ± 4°
	torque < 2 Ncm

Drawing 1

Recommended wiring



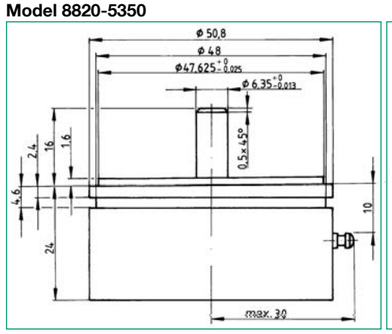
Drawing 2

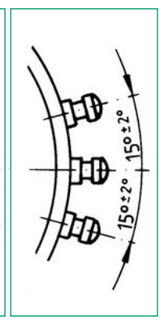


Clock rotation, seen from the shaft

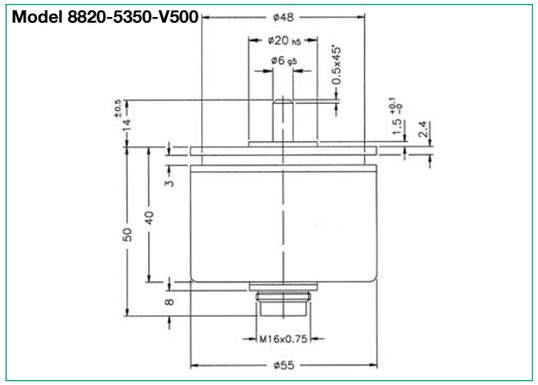
Note:
The technical data quoted are only evident if the sensors are used properly. Their outstanding properties are only available when the loading of the slider in the voltage divider is kept < 0.1 µA. If the measuring chain draws higher currents, the use of an operational amplifier as a voltage follower (I < 0.1 µA) is necessary (see drawing 1 above).

Dimensional drawing
Model 8820-5350





Model 8820-5350-V500



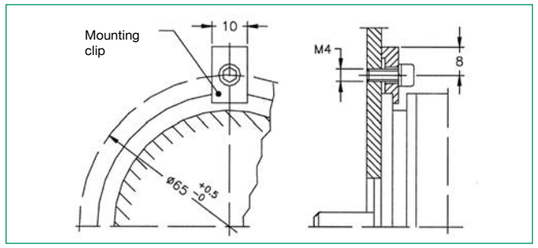
Order Information

Potentiometric angle displacement sensor, measurement range 350° **Model 8820-5350**

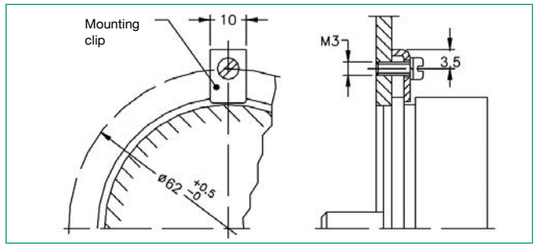
Potentiometric angle displacement sensor, measurement range 350°, IP65, with connector **Model 8820-5350-V500**

Accessories

1 set of mounting angles with screws (3 are part of delivery) for model 8820-5350-V500 and 8820-5350-V502 **Model 8820-Z001**



1 set of mounting angles with screws (3 are part of delivery) for model 8820-5350 and 8820-5350-V501 **Model 8820-Z002**



for model 8820-5350

Connection cable to burster desktop devices, length 3 m, with 12 pin connector **Model 99141-000F-0090030**

Connection cable to DIGIFORCE®, length 3 m, with 9 pin Mini D connector **Model 99209-000F-0090030**

Connection cable to panel devices (both ends open for soldering), length 3 m **Model 9900-000A-0090030**

Supply units, amplifiers and control units like modular amplifier model 9243, digital indicator model 9180 or profibus module 9221 **refer to section 9 of the catalog.**

Options

Accuracy ± 0.05 % F.S.	**Model 8820-5350-V501**
Connector and protection class IP65 (Mating connector model 9900-V554)	**Model 8820-5350-V500**
Combination of	V501 and V500 = **Model 8820-5350-V502**

2413-008820EN-5672-081524

Incremental Rotation Sensor

Rotary speed sensor, angle displacement sensor

Model 8821

Code:	8821 EN
Delivery:	ex stock/3 weeks
Warranty:	24 months

- **Supply voltage 10 ... 30 V DC**
- **Degree of protection IP65, all-around**
- **Robust**
- **High resistance to interference**

Rotary speed sensor

- **60 pulses/turn (standard)**
- **Max. 8000 rpm**

Angular displacement sensor

- **360 pulses/turn (standard)**
- **Detection of rotation direction (channels A and B)**
- **Reference pulse (channel N)**

Special versions on request (higher pulse rate, TTL output etc.)

Application

Incremental rotation sensors are used wherever displacement, positions or speeds have to be measured accurately. They are therefore important interfaces between the mechanical and electronic parts of a machine.

Mechanically robust, electrically reliable and resistant to extreme ambient conditions; these are the outstanding properties offered by this sensor.

Typical applications include:

- ► Machine tools
- ► Wood and plastic machining
- ► Textile machines
- ► Lifts
- ► Door systems
- ► Paper machines
- ► Drive equipment
- ► Assembly and handling equipment
- ► Packaging machines
- ► Scales
- ► Test machines
- ► Conveying equipment
- ► Doors and gates

Description

Model 8821 rotation sensor generates rectangular electrical pulses when the shaft is turned. An encoder disk is coupled to the shaft which is carried on 2 ball bearings. The light from an infrared diode passes through the encoder disk and the diaphragm disk (which is only present on the angle sensors). The signals picked up by light-sensitive sensors are processed to yield rectangular signals.
The aperture disk generates an offset in the pulse sequences (only on angle sensors).

Angle sensor

The rectangular pulses are output from channels A and B with a displacement of a quarter of a pulse (90°). This displacement allows the evaluation electronics to detect the direction of rotation. Electrical faults and vibrations do not lead to incorrect counts.
An early warning output indicates that the light intensity is weakening. After this, the sensor can still be operated for some thousands of hours before it fails.
A reference pulse, N, is also output. This is a single pulse for each rotation.

Technical Data

Electrical values

Range of excitation voltage U_B: standard 10 ... 30 V DC
(optional 5 V DC, refer to order code)

Current consumption: max. 100 mA

Outputs:
- Channel A : speed sensor pulse
- Channel A and B : angle displacement sensor pulse
- Channel N : reference pulse (angle displacement sensor)
- Max current : max. 40 mA
- Pulse level : H > U_B - 2.5 V DC
  : L < 2.5 V DC
- Pulse frequency : max. 200 kHz

Protection against polarity reversal.

Early-warning system:
The output is LOW, if the light source has lost approx. 90 % of its luminosity (NPN OC, max. 30 V, 10 mA).

Environmental conditions

Nominal temperature range: -10 °C ... +70 °C

Storage temperature range: -30 °C ... +80 °C

Mechanical values

Dimensions: see drawing

Shaft:
- material: stainless steel
- axial load: max. 120 N
- radial load: max. 220 N
- break away torque: 1 Ncm

Housing: clamping flange: aluminium; rear side: covered aluminium

Bearing:
- model: 2 precision ball bearings
- durability: 10^9 cycles at 100 % bearing load
  10^{10} cycles at 40 % bearing load
  11^{11} cycles at 20 % bearing load

Rotation speed: max. 8000 RPM

Weight: 250 g

Vibration: 50 m/s² (20 Hz .... 1000 Hz)

Shock: 1000 m/s² (11 ms)

Protection class: acc. to EN 60529 shaft side IP65, rear side IP67

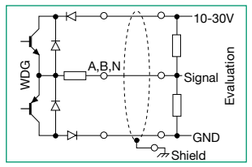
Electrical connection:
PG screw joint with shielded PVC cable, length 2 m, diameter approx. 6 mm, bending radius ≥ 20 mm, conductor cross section 0.14 mm².

Wiring code:

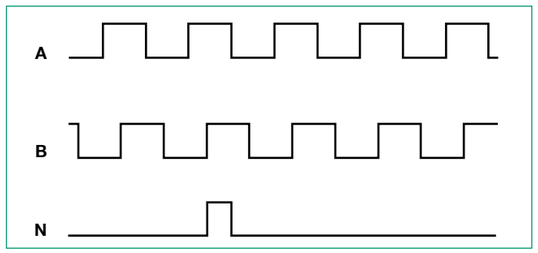
Excitation voltage (-)	white
Excitation voltage (+)	brown
A	green
B	yellow
N	grey
Output early warning	pink
Shield	strand

Shield open at sensor.

Standard wiring

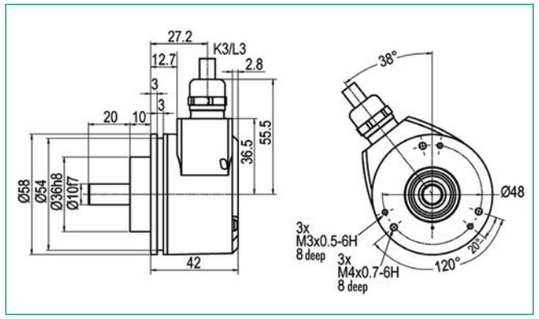


Pulse diagram (angle displacement sensor)



View to shaft, clockwise rotation

Dimensional drawing model 8821



Accuracy

1. Pitch error: Deviation of a flank to its exact geometrical position, max. 12 % of a pitch length
2. Relation of pulse and pause: Relation of pulse and pause error based on pitch max. ± 7 %
3. Displacement of phase: Fluctuation in the distance between two following flanks of channel A and B around nominal distance 90°; max. fluctuation: ± 7.5 % of a pitch

Pitch: Pulse + pause

Optics

Light source: infrared - LED
Durability: typically 100 000 hours
Sampling: differential

Order Information

Version with excitation voltage 10-30 V DC (standard)

Rotation speed sensor **model 8821-0060-V000**
- pulses / rotation
- channel A

Angle displ. sensor **model 8821-0360-V100**
- pulses / rotation
- channels A, B and N

Version with excitation voltage 5 V

Angle displ. sensor **model 8821-0360-V101**
- pulses / rotation
- channels A, B and N
- excitation voltage 5 V
- pulse level at 20 mA: H > 2.5 V DC, L < 0.5 V DC

Accessories

Evaluation electronics with indication of rotation speed or angle displacement, like indicator model 9180-V5000
(at rotational speed: minimum 1 pulse/s) on request

2414-008821EN-5672-081524

Technical changes reserved. All data sheets at www.burster.com

Model number 5...
Model number 7...
Model number 9...
Model 88600

Precision Angle Displacement Sensor

Capacitive, without contact rings

Series 88600

Code:	88600 EN
Delivery:	ex stock / 5 weeks
Warranty:	24 months

- **Measurement ranges up to 160°**
- **High linearity up to 0.05% F.S.**
- **Contact-free transmission**
- **Integrated amplifier**
- **Robust, maintenance-free**
- **Very low inertia moment**
- **Special versions by request**

Application

The 88600 series combines the precision of expensive optical angle encoders with high resolution and an analog output, without being subject to the restricted applications of potentiometric angle sensors.

Typical applications
- ► Position feedback in servo-systems
- ► Zero detectors
- ► Pendulum weighing machines
- ► Cam and butterfly flap positions
- ► Twist angles
- ► Angular actuators
- ► Optical angle measurements
- ► Jockey roller controllers

Description

This capacitive DC/DC angle displacement sensor with integrated amplifier only requires a DC voltage for a power supply and delivers an output voltage that is proportional to the angular position of the shaft. The shaft can be turned clockwise or counterclockwise with a permissible angular speed of up to 18,000 °/s (option).

A highly accurate differential rotary capacitor is used to convert the angle into an electrical voltage. The integrated electronics consists of an oscillator, demodulator and amplifier. It can display the measurement signal directly or can, for instance, pass it to process monitoring equipment.

Power supply and transmission of measured signals is without contact within the sensor. Operation is therefore maintenance-free. The precision roller bearings used give the sensor a long service life.

Parts that are important for the function are made from material with no internal stresses and protected against corrosion.

Mounting instructions

The three threaded holes on the front plate (shaft side) allow the sensor to be mounted in any position. To determine the angular position of the measuring range, the shaft has a reference groove and the front face a reference hole (see rear).

Technical Data

Model	Operating Measurement Range 1.	Non-Linearity (% F.S.)	Possible Measurement Range 1.	Non-Linearity in Possible Measurement Range	Position of Measurement Range 1.+2.	Output Voltage mV/°
88600-000	± 30 °	≤ ± 0.05 %	± 40 °	≤ ± 0.10 %	0° ± 3°	100
88601-000	+ 10 °... + 70 °	≤ ± 0.05 %	0 ... + 80 °	≤ ± 0.10 %	+ 40° ± 3°	100
88602-000	- 10 °... - 70 °	≤ ± 0.05 %	0 ... - 80 °	≤ ± 0.10 %	- 40° ± 3°	100
88603-000	± 60 °	≤ ± 0.10 %	± 80 °	≤ ± 0.15 %	0° ± 3°	100
88603-001	± 60 °	≤ ± 0.05 %	± 80 °	≤ ± 0.10 %	0° ± 3°	100
88603-002	+ 20 °... + 140 °	≤ ± 0.10 %	0 ... + 160 °	≤ ± 0.15 %	+ 80° ± 3°	50
88603-003	+ 20 °... + 140 °	≤ ± 0.05 %	0 ... + 160 °	≤ ± 0.10 %	+ 80° ± 3°	50
88603-004	- 20 °... - 140 °	≤ ± 0.10 %	0 ... - 160 °	≤ ± 0.15 %	- 80° ± 3°	50
88603-005	- 20 °... - 140 °	≤ ± 0.05 %	0 ... - 160 °	≤ ± 0.15 %	- 80° ± 3°	50

Electrical values

Excitation voltage: 15.00 V DC (other voltages, refer to options), with protection against polarity reversal
Excitation current: ≤ 30 mA
Output: short-circuit proof, best linearity at 1 kΩ load
ripple ≤ 20 mV_{pp}/400 kHz
impedance < 2 Ω
Repeatability: ≤ 0.01 %
Resolution: < 0.01 °
Electrical zero adjustment: ± 3 %
Internal carrier frequency: 400 kHz

Environmental conditions

Range of operation temperature: 0 °C ... + 75 °C
Range of storage temperature: - 55 °C ... + 125 °C
Thermal sensitivity shift: ≤ ± 0.027 % F.S./K

Mechanical values

Area of rotating: continuous rotation is possible, no mech. stoppers
Torque: breakaway torque 49 x 10^{-3} Ncm
slip torque 34 x 10^{-3} Ncm
Moment of inertia: 0.76 gcm^2
Max. shaft load: radial: 44 N
axial: 31 N
Durability of the ball bearing: ≈17 000 h at 10 RPM and 44 N axle load
Mounting position: irrespective of its position
Maximum angular speed: 1440 °/s, with ≤ 2 % output voltage drop
optionally: 18.000 °/s
Weight: approx. 400 g

Order Information

Angle sensor
Measuring range ± 30°C, with option V005 **Model 88600-000-V005**

Accessories

Mating connector (cable coupling), 5 pin **Model 9947**
Mating connector 5 pin, 90° outlet **Model 9900-V647**
Connecting cable, length 3 m, one end open **Model 99547-000A-0160030**
Connection cable, length 3 m, with connector 9941, 12 pin, for burster desktop devices **Model 9916**

Options

V001: Excitation voltage
The sensor may be adjusted to a fix excitation voltage in range between 12 V DC and 16 V DC (standard is 15 V DC). Please mention the desired voltage when ordering.

V005: Maximum angular speed 18 000 °/s with output voltage drop of maximum 2 %.

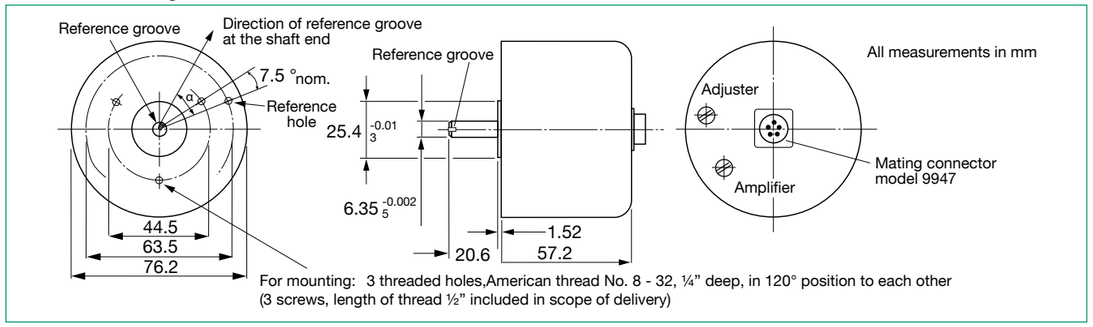
Explanations

1. Arithmetic sign: when quoting angles, "+" indicates clockwise rotation, while "-" indicates counterclockwise (looking at the shaft).

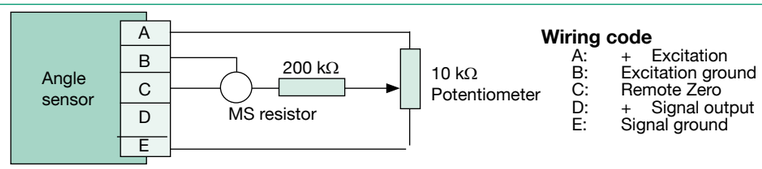
2. The shaft of the sensor is located at the center of the measuring range when the angle between the reference groove (in the shaft) and the reference hole (in the housing) correspond to the value given in the table (see drawing).

3. In addition to the zeroing potentiometer, external zeroing by approx. ± 4.5° or ± 9° (depending on type) is possible – see connection diagram.

Dimensional drawing



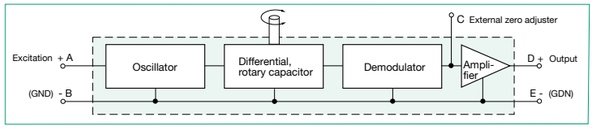
Wiring diagram for remote zero



Wiring code

A: + Excitation
B: Excitation ground
C: Remote Zero
D: + Signal output
E: Signal ground

Block diagram



2415-088600EN-5672-081524

Sensor Electronics

SENSOR ELECTRONICS

Panel meters for sensors (built-in and table-top)

9110 – 9186 Digital indicators and process monitoring displays for sensor signals

Amplifier and transmitter modules

9206 USB sensor interface

9221 Sensor Profibus module for strain gauge and potentiometric sensors, as well as analog standard signals

9235 IN-LINE amplifier for strain gauge sensors

9236 Multichannel amplifier for strain gauges

9243 Amplifier module for strain gauge, potentiometric and DC/DC sensors

Overview Panel-Mounted Measuring Devices and Desktop Devices for Sensors model numbers 91 ...

MODELS	9110	9163	9163-V03	9140	9180	9186
Figure						
Measurement Accuracy	< ± 2 % F.S.	0.1 % F.S.	0.1 % F.S.	0.1 µm	0.1 % F.S.	0.1 % F.S.
Sample Rate		500/s	500/s	20 MHz	16/s	25/s
Sensor Principles	Strain gauge, Potentiometer	Strain gauges, Potentiometer, Standard signals, DC/DC, Transmitter, Temperature sensor, Thermocouple	Strain gauges, Potentiometer, Standard signals, DC/DC, Transmitter, Temperature sensor, Thermocouple	Incremental position sensor	Strain gauge, Potentiometer, Standard signals, DC/DC, Transmitter	Strain gauge
Interfaces	USB, RS232	RS232, RS485, PROFIBUS	RS232, RS485, USB	RS232	RS232, RS485, BCD	
Protection Class	IP20	IP54	IP20	IP20	IP65	IP65
Measurement Channels	2	16	16	2	16	
Specific Characteristics	Excellent value "Plug & Work" complete system, easy auto-configuration, acoustic and optic error indication, data logging on USB stick (optional), PLC sequence control function (optional), analysis and configuration software included, automatic sensor identification	Optional multi-channel model, range of mathematical functions (e.g. differential measurement), OK/NOK feedback on multi color display and via 4 alarm limit outputs	Optional multi-channel model, range of mathematical functions (e.g. differential measurement), OK/NOK feedback on multi color display and via 4 alarm limit outputs	Display resolution from -999999 ... +999999, resolution to 0.1 µm, peak value memory for min, max and peak-to-peak, classifier comparator, mathematical functions	Up to 8 sensor parameters can be saved (optional), min. or max. peak values via an additional display, TARE and HOLD function, generation of up to 4 limit signals (optional), analog output (optional), scaling possible using teach-in procedure or by entering sensor data directly, convenient configuration and evaluation software DigiVision	Less expensive digital display, two limit alarms optionally available, extremely easy-to-read display with 20 mm digit height, TARE function
Main Application Fields	Simple monitoring of manual presses	Signal indicator in the control cabinet and the laboratory, signal processing via PROFIBUS or USB port	Signal indicator in the control cabinet and the laboratory, signal processing via PROFIBUS or USB port	Indicator for the 8738 incremental displacement sensor	Signal indication in the control cabinet with evaluation facility for the controller	Low-cost indicator for strain-gauge load cells

Overview Amplifier and Transmitter Modules model numbers 92 ...

MODELS	9206	9221	72-9206-REF	9235	9236	9243
Figure						
Measurement Accuracy	0.01 % F.S.	< 0.03 % F.S.		< 0.1 % F.S.	0.1 % F.S.	< 0.05 % F.S.
Sample Rate	1200/s	1 kHz	1200/s			
Sensor Principles	Strain gauge, Potentiometer, DC/DC, Pt100	Strain gauges, Potentiometer, Standard signals	Strain gauges, Potentiometer, DC/DC, Transmitter	Strain gauges	Strain gauges	Strain gauges, Potentiometer, DC/DC, Transmitter
Interfaces	USB	RS232, PROFIBUS	USB	Plug-in socket		Terminal connector,
Protection Class	IP67	IP20 / IP65	IP67	IP40	IP20 / IP67	IP20 / IP65
Measurement Channels			16		2 – 4	
Specific Characteristics	Simple connection via PC USB port, 24 bit resolution, high-speed measurement of up to 1200 readings/sec., convenient configuration and analysis software DigiVision, Pt100 as option, LabVIEW and DLL drivers free of charge, 6 wire technology for the highest precision	For force, pressure or torque measurement with strain gauge sensors, potentiometric displacement and angle sensors or standard signals ± 10 V, resolution 16 bit, 2 free configurable inputs e.g. reset, tare, etc., networking via PROFIBUS DP up to 12 MBaud, mean value, MIN/MAX memory, set point values, zero compensation via PROFIBUS, DPV1 mode for parameterizing and backup via PROFIBUS, potential-free input via differential amplifier	24-bit resolution, Pt100 as option, free LabView driver DLL for integrating in your own software environment, 6-wire connection technology	Particularly space-saving and lightweight, voltage output 0 ... ± 10 V, designed as in-line measuring amplifier, non-interchangeable and short circuit-proof	Voltage output 0 to ± 5 V / 0 to ±10 V, protected against reverse connection and short-circuit, also available as circuit board without housing, high degree of protection up to IP67	Outputs ± 5 V, ±10 V and 0 (4) ... - 20 mA, 6 wire technique, isolation between signal and power supply, cut-off frequency 1 kHz, optional 4 kHz, option IP 65
Main Application Fields	Measurement signals can be incorporated in custom programs, mobile measurements when used with a laptop, high-precision measurements in both laboratory and production	Automation, measurement signal processing in the controller	Reference measurements for calibrations in the field and in the lab	Measurements close to the sensor, with easy changeover thanks to plug-in connectors	Multi-channel measurements in the control cabinet, high degree of protection for measurements in harsh environments	High-precision measurements for every application, can handle rapidly changing measurements up to a rate of 4 kHz, high degree of protection for measurements in harsh environments

2416-000089EN-5872-081524

ForceMaster

Low-Cost Monitoring for Manual Presses

Model 9110

Code:	9110 EN
Delivery:	ex stock
Warranty:	24 months

NEW
Single-channel force monitoring

- **Excellent value "Plug & Work" complete system**
- **Easy auto-configuration with automatic setting of the evaluation tools**
- **Smart Card system for manipulation free configuration and storage of settings**
- **Acoustic and optic error indication**
- **Data logging on USB stick (optional)**
- **PLC sequence control function (optional)**
- **Analysis and configuration software included**
- **Automatic sensor identification**
- **Hub and other component counters**

Applications

Pressure on price and quality continue to rise. The need to monitor even the simplest manufacturing and assembly process is increasingly common. With 100% monitoring of force/time curves or force displacement/time curves, the ForceMaster satisfies all requirements for ensuring the reliability of even simple press-fit processes. Thanks to its ultra-simple, single-button operation and intelligent auto-configuration, even semi-skilled staff can set up the equipment safely and quickly. "Card & Go" is the smart system that uses master, tool and PLC smart cards to make equipment settings, inhibit unauthorized changes and to trigger actions in sequence with the production process.

The ForceMaster 9110 has been developed specifically for monitoring manual lever presses. Simple manual workstations can be monitored extremely efficiently using the ForceMaster. Easy control functions that used to require an additional PLC can now be performed reliably with the ForceMaster. Tools can be changed quickly and easily using tool cards.

The ForceMaster is used for example for

- ► Pressing ball bearings
- ► Compressing powders
- ► Press-fitting pinion gears

Description

The ForceMaster has a multi-voltage power supply. Excitation of the load cell and displacement sensor is provided by internal voltage-conditioning circuits. Sensor identification is built into the sensor plug, allowing sensors to be connected easily with no further configuration needed.

The integral auto-configuration tool uses a GOOD component to train the ForceMaster with the measurement curve and automatically set the evaluation elements. The user can make any further fine-tuning and adjustments to these settings manually if required.
Visual indicators such as a red and green indicator lamp signal "Good" or "Bad" parts. An audible sound is also output for "Bad" parts.
The built-in PLC function allows sequence control of up to 60 steps. This can be used, for instance, to control pneumatic cylinders, compressors for blowing out workpieces, and reject gates for OK/NOK parts.

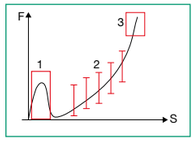
The PC software, which is included free of charge can be used for measurement-curve analysis and fine-tuning the evaluation elements. It also lets the user view and archive the measurement curves recorded on the USB stick.

Automatic sensor identification

The connected sensors are automatically detected by a special plug, so there is no need to configure each of the measurement channels. Faulty sensors or different measurement ranges can be changed in an instant, with no risk of mixing up sensors!

Auto-configuration

The auto-configuration function is an outstanding feature of the ForceMaster 9110.
This tool automatically predefines the start condition and position of the evaluation elements.
The basis for these settings is a GOOD production process in auto-configuration mode. The first stage in this process is to tare the force channel. This is necessary because the ForceMaster 9110 can only measure unipolar forces. Taring corrects any offset voltages and drift in the load cells. Then the ForceMaster 9110 waits for an upward movement of the press. Once the force exceeds a configurable force threshold, measurement recording begins.
If nothing else changes, the ForceMaster waits for a downward movement of the press. The teach-in training process is stopped once measurements pass below the start point. Then the measurements are analyzed and the configuration settings are made. Afterwards, in a second step, the user can choose whether to use force displacement limits (horizontal limits) or 2 gates (vertical limits) for the evaluation. There is also the option to monitor the 1 feed-in area for a maximum force. Another option is to enable monitoring of the 3 block force. As part of the block-force monitoring function, the user can also enable monitoring of the end deformation.
In addition, changes can be made to the internally calculated values and limits manually.



Main evaluation types

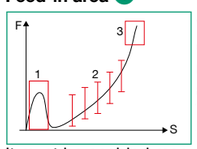
- Force displacement limits
- Gates (vertical force displacement)

The user can also enable:

- Feed-in force monitoring
- Block-force monitoring
- End-deformation monitoring
- Force alarm 1
- Force alarm 2

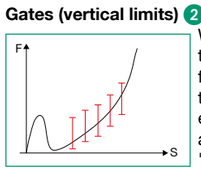
Description of evaluation types

Feed-in area 1



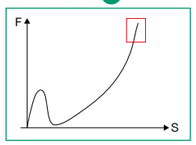
Within this area, the measurement process can be monitored for exceeding a maximum force (upper feed-in limit). Good parts are not allowed to exceed this limit.
The feed-in area is always disabled after the teach-in measurement process.
It must be enabled manually.

Gates (vertical limits) 2



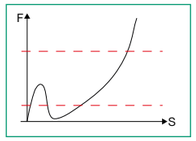
With force-displacement limits, the force in this area must always exceed a minimum force (lower force limit). The force must then not drop below this limit again over the entire area. For good parts, the force must also not exceed a second force limit, the "upper force limit".
In the measuring range, the horizontal force-displacement limits are replaced by vertical force-displacement limits. 5 gates are active. Each are defined by a displacement position and an upper and lower force. The measurement curve must pass through the gate between these two forces. The gates do not have to be placed in a specific order. Evaluation is not performed until the last gate has been passed in the displacement direction.

Block area 3



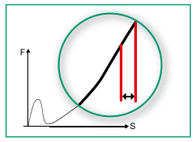
This area is usually where the end of the measurement lies, which a good part must always reach. The force limits "lower block limit" (which must be exceeded) and "upper block limit" (which the force must not drop below) are used to monitor the block force.
The measurement curve must end in this area. The curve must not go beyond the displacement point defining the block end (NOK). The measurement curve is allowed to have already exceeded the "lower block limit" when it enters this area. It is not allowed, however, to drop below the "lower block limit" again in this area.
The block area is always disabled after the teach-in measurement process. It must be enabled manually.

Force alarms



In addition to the evaluation areas 1 - 3 force alarms 1 and 2 are always available.
Force alarm 1 is used to monitor the load cell outside a started measurement. Since this is monitored over the displacement, this force monitoring is not enabled for the Y=f(t) function (no displacement measurement).
Force alarm 2 is used for continuous monitoring of the load cell - both outside and during a measurement.
CAUTION: The force alarms do not generate an NOK evaluation. They are simply used to set the "Alarm occurred" PLC output for information purposes. But only if sequence control is not enabled!

End deformation



This option is used for monitoring deformation of the workpiece around the maximum force. This is done by measuring the displacement when the force exceeds the "lower block limit".
The end deformation is obtained from the difference between the maximum displacement during the measurement process and the deformation value saved when the force exceeded the "lower block limit". The calculation starts once the force has dropped below the "lower block limit" again during the return stroke.
End-deformation monitoring is always disabled after the teach-in measurement process. It must be enabled manually.

Components

Following counter options are accessible via the menu

- Parts OK
- Parts NOK
- Total parts
- Down-counter
- D-set (set value for down-counter)
- T.stroke (total-stroke counter)

PLC sequence control function (optional)

Control is based on the principle of a sequencer. A built-in electronic cam switch is provided for this purpose. The combination of these two forms of control provides a very powerful range of functions.
In principle, one can visualize a cam as a displacement range, which is also linked to the direction of movement. This makes it possible to program certain actions that are active for as long as the press stays in this range.
A sequence is composed of a series of commands that are processed step by step. Each step contains a condition and an action. The controller waits at each step until the condition is met and then carries out the action. Only then it does move on to the next step.
There are 8 inputs and 8 outputs available. Depending on the safety requirements and risk levels of the application, additional measures must be taken to achieve the necessary "safety level".

Data logging on the USB stick

Curve data can be saved on an USB stick for subsequent analysis and assessment. This is possible for a press-insertion operation that has a cycle time of ≥ 1 second.

Display options

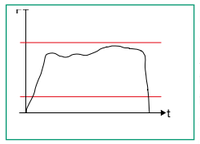
The display can show the following options: live sensor values, actual value for force/displacement or time, live evaluation, parts counter or maximum sensor values.

2417-009110EN-5672-081524

Special option force monitoring

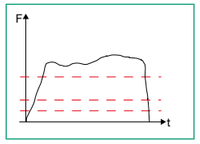
The force-time option is designed for straightforward force measurements requiring evaluation. For this application, just one load cell is connected to the ForceMaster 9110.

Force thresholds



Force thresholds can be used to monitor whether the force lies in a defined range.
A green light indicates that the force lies in the specified range. A force that exceeds the upper force threshold triggers a visual and acoustic alarm. Evaluation takes place online during measurement.

Limits



In addition, 3 limits are available for defining various switching results. With hysteresis settings, a limit buffer and customizable switching behaviour, these switching results can be tailored to customers' requirements. There is also a facility to delete the limit via a digital input.

Smart cards

Master card

Only the master card allows access to the configuration menu. Without this card, the user is only permitted to view the general equipment data. It is also possible to specify in the configuration settings that faulty parts can only be confirmed with a master card.

Tool card

The tool card can be used to save and then reload a parts-specific program configuration (ForceMaster 9110 settings for measuring and evaluating a particular device under test).

This is useful, because different parts (depending on calibration quality) can then be measured on the same equipment or in future also on different ForceMaster 9110 units, without needing to perform an auto-configuration.

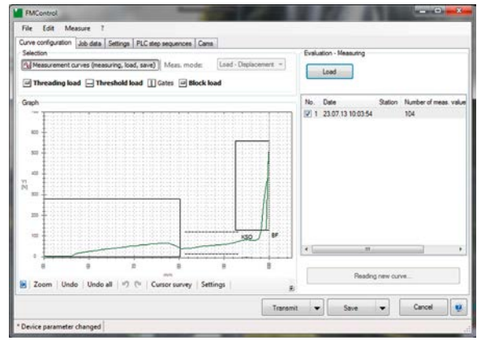
PLC card

A sequence-control program and the associated cam configuration can be stored on the PLC card and reloaded later.

PC software

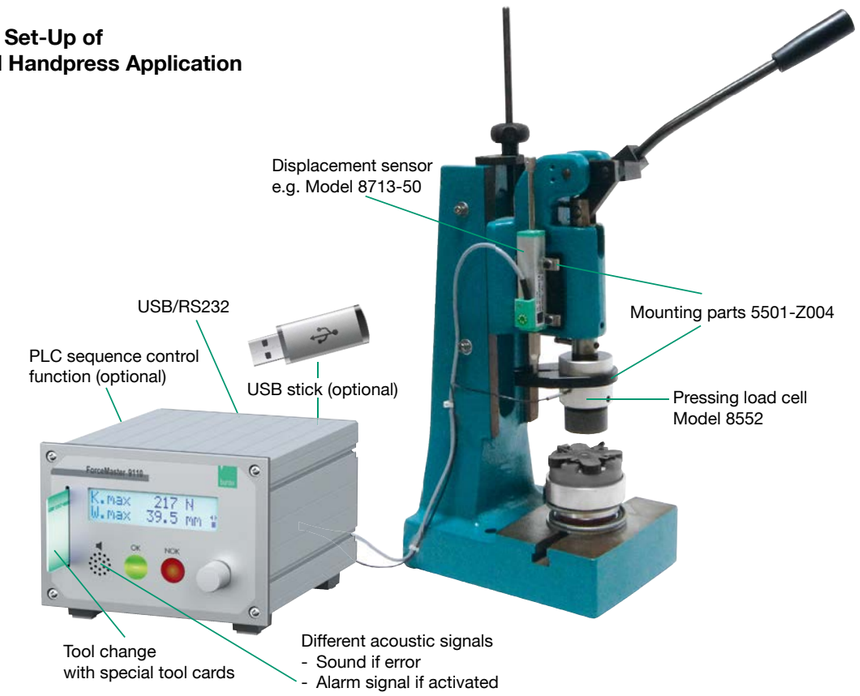
The free of charge configuration and analysis software FMControl offers following possibilities:

- Device parametrization
- Backup function
- Setting of evaluation elements according to auto configuration
- Programming the sequence
- Analysis of measurement curve
- Data storage and archiving
- Management and creation of tool smart cards



Application

Typical Set-Up of Manual Handpress Application



Load cell model 8552

The force is measured by a load cell, which is fitted on the press ram between sensor and tool. The load cell is equipped with mechanical overload protection.

Technical Data

Accuracy:	< ± 2 % F.S.
Measuring ranges:	from 0 ... 100 N to 0 ... 20 kN (50 kN ... 100 kN with model 8451)
Maximum force during use:	approx. 120% of rated force
Degree of protection:	IP54 to EN 60529
Diameter:	50 mm
Height without peg:	50 mm
Peg diameter:	10 mm
Sensor hole diameter x depth: (other pegs/holes optionally available)	standard 10^{H7} x 25 mm

When the sensor is used in the press, it is important to ensure that it is operated without transverse forces during the working stroke. Therefore the tool must be guided with the minimum possible play and the workpiece must be positioned securely.

Detailed technical data on the load cell is given in the 8552 data sheet.

Displacement sensor Model 8713 (optional)

The full working stroke of the press ram can be monitored by a model 8713 displacement sensor firmly mounted on the press head.

Technical Data

Linearity deviation:	< 0.1 % full scale
Resolution:	0.01 mm
Degree of protection:	IP40 to EN 60529

When the displacement sensor is retrofitted to an existing press, a sketch is available which identifies the positions of the mounting holes that need to be made on the press head. We recommend using our 5501-Z004 mounting kit for this purpose.

Detailed technical data on the displacement sensor is given in the 8712/8713 data sheet.

Technical Data

Sensors for the force channel

Bridge resistor:	350 Ω ... 5 kΩ
Connection type:	4-wire
Sensor excitation:	5 V
Excitation current:	20 mA
Power consumption: approx. 0.3 VA	
Input voltage:	1 mV ... 10 mV
Total error:	< 1 % F.S.

Sensors for the displacement channel

Sensor type:	potentiometric displacement sensor
Track resistance:	1 kΩ ... 5 kΩ
Total error:	< 1 % F.S.

General equipment data

Display:	2 line illuminated LCD display
Warning and confirmation sounds:	configurable signal type
Alarm signal volume:	up to 75 dB
Measurement channels:	force/displacement or force/time
Communication interfaces:	USB - Slaveport type B, on the back RS232 - D-SUB 9, 19.2 kbaud data rate
Mains power supply:	90 ... 240 V AC / 50 ... 60 Hz
Cut-off frequency:	1 kHz
Operating temperature range:	5°C ... 40°C
Storage:	- 10°C ... 60°C
Air humidity:	10 ... 80 %, non-condensing
Enclosure type:	aluminum section
Degree of protection:	IP20
Connections:	coded special plugs
Sampling interval:	10 kHz
Protection class:	1
Number of I/O:	8 inputs / 8 outputs
Response time relay:	1 ms
Total current of all outputs:	0.3 A internal excitation 1.5 A external excitation
Dimensions (W x H x D):	174 x 119 x 213 [mm]
Weight:	approx. 3 kg

Order Code

ForceMaster Standard		**9110 - V**	☐	☐	☐	☐
			0	**0**	**0**	**0**
Options	PLC sequence control function			1		
	USB stick data logging					1
Single-channel force only			1			

Order Information

ForceMaster with PLC function and USB data logging
Analysis and configuration software **Model 9110-V0101**

Accessories

In order to fit the displacement sensor securely and firmly on the press head or on the load cell itself while still allowing fine adjustment, assembly kits are available that include all necessary parts such as carriers, plates, screws and mounting diagram for correct positioning

for 8451 load cell, measurement range up to 0 ... 20 kN **5501-Z002**
for 8451 load cell, measurement range starting from 0 ... 50 kN **5501-Z003**
for 8552 load cell **5501-Z004**

For further information see accessories' data sheet.

Cables

Connecting cable for potentiometric displacement sensors including plug (e.g. 8712) **Model 99221-591A-0090030**
RS232 cable to PC **Model 9900-K333**
USB cable to PC **Model 9900-K349**

Smart carts

Master card for full configuration access **Model 9110-Z001**
PLC card for storing PLC sequences on the card **Model 9110-Z002**
Tool card for saving tool data and measurement programs **Model 9110-Z003**

Connectors

Connector plug for load cells, containing stored sensor calibration data **Model 9900-V245**
Connector plug for potentiometric displacement sensors, containing stored sensor calibration data **Model 9900-V221**
Connector assembly **Model 99005**

2417-009110EN-5672-081524

Digital Displays for Incremental Position Sensor

Series 9140

Code:	9140 EN
Delivery:	ex stock/4 weeks
Warranty:	24 months

- **Display resolution from -999999 ... 999999**
- **Resolution to 0.1 µm**
- **Peak value memory for min, max and peak-to-peak**
- **Classifier comparator**
- **Up to 2 measuring channels**
- **RS232 interface**
- **Mathematical functions**

Application

The incremental digital displays are used in combination with our high-precision displacement sensors 8738. The digital technology of these measuring systems satisfies high demands for precision and long service life, as is required more and more nowadays

- ► in measuring laboratories
- ► in production
- ► in testing laboratories
- ► in workshops

and many other areas.

Typical uses:

- ► Automatic assembly machines
- ► Semiconductor industry
- ► Keyboard tests
- ► Robot controllers
- ► Testing of shafts and planes
- ► Measurement of differential displacement

Description

With its phenomenal resolution of 0.1 µm and the high response frequency of 20 MHz, the 9140 is a powerful display unit with a compact design. The comparator function integrated as standard allows for direct evaluation of measurements almost in real-time; these can be processed further by a higher-level controller. A rather more comprehensive acquisition method is also integrated into the system. Device settings can be made either through the keypad on the front, or through the optionally available serial interface.

The two-channel version also offers simple mathematical functions such as addition and subtraction. These are particularly handy for differential displacement measurements.

Technical Data

Display resolution:		± 999 999
Resolution:		0.1 µm, 0.5 µm, 1 µm, 5 µm, 10 µm selectable
Cut-off frequency:		20 MHz
Power supply:		10.8 ... 26.4 VDC, max. 12 VA
Working temperature range:		0 °C ... 40 °C
Range of storage temperature:		10 °C ... 50 °C
Dimensions:		
Panel meter (W x H x D)	Front plate	72 x 72 x 104.5 [mm]
	cut-out	$68^{+0.4}_{+1}$ x $68^{+0.4}_{+1}$ [mm]
	Radius, corners of cut-out	4 R1 or less

Order Code

Displacement indicator	**9140 - V**	0	0	0	0
Standard					
Sensor model					
8738-DK			0		
8738-DG			1		
Interface					
without				0	
with RS232				1	
with BCD output				2	
Device type					
1 channel					0
2 channel					1

Functions

Reset (via reset button, control input or RS232C command):
The display is returned to zero or to a previously entered initial value.

Initial value:
Any desired display value can be assigned to any point in the range of measurement.

Comparator:
2 limit values for good/bad evaluation, results displayed by 3 LEDs, 3 NPN open collector outputs.

Extreme values:
Maximum value, minimum value, peak-to-peak value, start via reset button or RS232C command.

Hold function:
The START control input will store the current measured value in the "extreme value storage" mode.

Sum/difference:
The functions A + B, A - B and B - A can be executed by the 2 channel version.

Data transfer:
Started by a low level at the EXT.IN control input.

Serial interface RS232C, full duplex:

Baud rate:	600 ... 19200
Interface cables:	see accessories
Transmission rate	max. 10 measurements/s

Accessories

Interface cable, length 2 m, with 9 pole Sub D socket
Model 9140-K001

Adjustment,
for a measurement chain **Model 91ABG**

2418-009140EN-5672-081524

Digital Indicator

Single-channel or multi-channel model for strain gauges, potentiometers, standard signals

Model 9163

Code:	9163 EN
Delivery:	ex stock / 4 weeks
Warranty:	24 months

PROFI PROCESS FIELD BUS

- **For force, pressure or torque measurements using strain gauge sensors**
- **For position or angle measurement using potentiometric or DC/DC sensors**
- **Optional multi-channel model**
- **Optional Profibus or serial interface**
- **0.1 % measurement accuracy plus sensor-specific linearization**
- **Range of mathematical functions (e.g. differential measurement)**
- **OK/NOK feedback on multi color display and via 4 alarm limit outputs**
- **High sampling rate (500/sec.)**

New !
Evaluation optional via Ethernet

Application

The 9163 process value indicator covers a wide range of applications in which process values need to be measured, displayed, analyzed and transferred to higher-level control systems. Typical applications include measuring geometric values in production, for instance differential measurements, or testing material properties in the laboratory.
The measured values can be transferred via Profibus, RS232 interface or analog output.
The multi-channel version can be used with up to four sensors. These sensors can be combined using mathematical functions, so that even complex measurement tasks can be performed with just the one instrument.
Visual alarms on the display make it easier and more convenient to assess when values lie off-limits. Up to four configurable outputs are available as relay or logic outputs.
The excellent measurement accuracy of 0.1% also makes this instrument suitable for high-precision applications. Two digital inputs are provided for controlling various functions such as Reset or HOLD.
Strain gauges, potentiometric sensors, transmitters with process value output, Pt100 and thermocouples can be connected directly to the process value indicator. Thanks to its manual linearization facility, the instrument can handle sensors with a huge range of characteristic curves.

Description

The latest microprocessor technology has been used to pack a huge amount of engineering into the minimum space. Essential device settings can be made via the six-button keypad. Permanent settings such as the choice of excitation voltage are made using jumpers. The large 13 mm high, 7 segment display ensures that measurements and menu parameters can be read clearly.
The integral excitation voltage source supplies the sensors and provides the auxiliary power for any transmitters that are connected. The manual linearization facility with 32 data points means that even non-linear sensor curves can be input.
The indicator also supports memory functions for min, max and peak-to-peak values. The high measurement rate of 500 readings/s also ensures a rapid response by the four built-in alarm limit relays. TTL switched outputs can be provided as an alternative option. The device settings can be configured via the keypad or the optional RS232, RS485 or Profibus interface. A GSD file is supplied as standard with the Profibus option for Profibus integration.

A powerful software tool for data analysis and documentation is available on request for use with the RS232 and RS485 options.

Technical Data

Compatible sensors

Strain gauges (main channel)

Connection type:	4 wire technology
Bridge resistor:	350 Ω
Bridge voltage:	1.5 ... 4 mV/V
Sensor excitation:	5/10 V/ 60 mA

Potentiometer (main channel/auxiliary channel)

Track resistance:	> 100 Ω
Sensor excitation:	2.5 / 5 / 10 V

Standard signals, DC/DC sensors or transmitters (main channel/auxiliary channel)

Voltage input:	± 60 mV, ± 100 mV, ± 1V, ± 5 V, ± 10 V
Input impedance:	> 10 M Ω
Current input:	0/4 ... 20 mA
Load impedance:	50 Ω

Transmitters or DC/DC sensors (main channel/auxiliary channel)

Excitation:	15/24 V max. 150 mA

Temperature sensor (main channel)

Type:	Pt100 to DIN 43750
Max. wire resistance:	20 Ω

Thermocouples (main channel)

Type:	TC (thermocouple) (ITS90) J, K, R, S, T
Linearization:	64 steps
Compensation error:	0.1 °/°C

Standard functions

Digital inputs

Quantity:	2, opto-isolated
Logic:	choice of PNP/NPN
Response time:	60 ms
Function:	tare, display peak values, HOLD, Display HOLD

General data

Display:	5 digit, dual-color red/green
Height:	13 mm
Display range:	-19999 ... 99999
Decimal point:	user-programmable
Measuring error:	0.1 % of full scale ± 1 digit
Measurement rate:	main channel 500/sec. auxiliary channel 100/sec.
Supply voltage:	100 - 240 VAC / 50 - 60 Hz, 11 - 27 VAC/VDC
Dimensions (W x H x D):	96 x 48 x 150 mm
Front-panel cut-out (W x H):	92 x 45 mm
Gain drift:	150 ppm/K
Zero drift:	0.5 µV/K

Operating environment

Altitude:	up to 2000 m
Operating temperature:	0 ... 50 °C
Relative humidity:	20 ... 82 %, non-condensing
Protection class:	front panel IP54

Options

Limit switches

4 relay outputs:	250 VAC / 30 VDC 5 A
TTL outputs:	TTL 24 VDC / 20 mA open e. p-switching as direct or inverted alarm signal
Response time:	2 ms

Analog output

Ranges:	0 ... 10 V, ± 10 V max. 25 mA, 0/4 ... 20 mA
Load impedance:	max. 500 Ω
Resolution:	≤ 0.03 %
Signal response time:	2 ms
Signal referred to:	Input signal Peak value Limit value

Serial interface

Type of interface:	RS232 or RS485
Protocol:	MODBUS RTU
Baud rate:	1200 ... 115200 bit/s
Max. transmission rate:	30 measurements/s

Profibus

Baud rate:	up to 12 MBaud
Standard:	Profibus DP V0 Slave
Addressing:	1 ... 99 via rotary switch
Connection:	via screw terminals

Order Code

Process value indicator model 9163-V ☐ ☐ ☐ ☐ ☐

Standard: 0 0 0 0 0

Options:

Case and auxiliary supply
- Panel-mount unit 100 - 240 VAC — 0
- Panel-mount unit 20 - 27 VAC/VDC — 1

Analog output voltage
- None — 0
- 0 -10 V — 1
- 0 - 20 mA — 2
- 4 - 20 mA — 3
- ± 10 V — 4

Interface
- None — 0
- RS232 — 1
- RS485 — 2
- Profibus [1] — 3

Limit outputs
- 4 x relay — 0
- 4 x transistor (open e. p-switching) — 1

Version
- 1-main channel / 2 auxiliary channels — 0
- 2-main channels / 2 auxiliary channels — 1

[1] no analog output possible

Accessories

Instrument calibration for one sensor ordered with the instrument or using sensor data provided by the customer (e.g. sensitivity, display range for correct readings, instrument settings, excitation voltage or sensor test certificate). **Model 91ABG**

DigiVision configuration and analysis software for single-channel and multi-channel operation with the single-user license code for the 9163 equipment range **Model 9163-P100**

Data cable

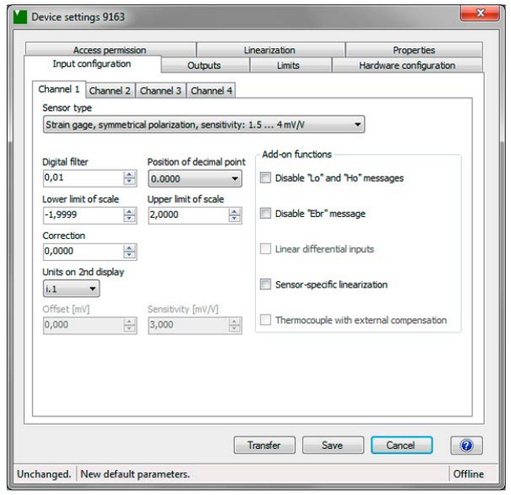
Networking via RS232/Ethernet converter **Model 9900-K453**
Networking via RS485 requires converter **Model 9180-Z001**

The CAD drawing (3D/2D) for this device 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.

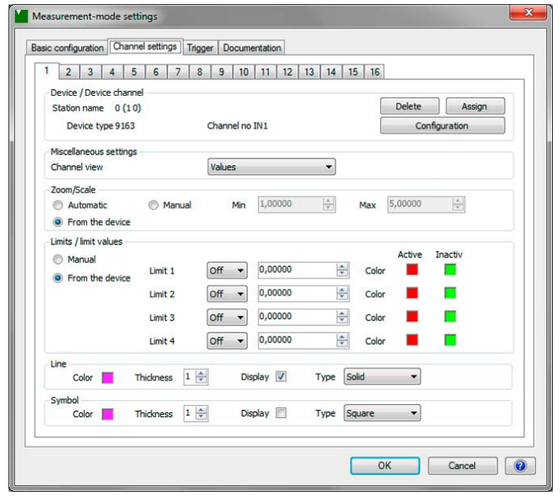
2419-009163EN-5672-081524

DigiVision 9163-P100 Configuration and Analysis Software

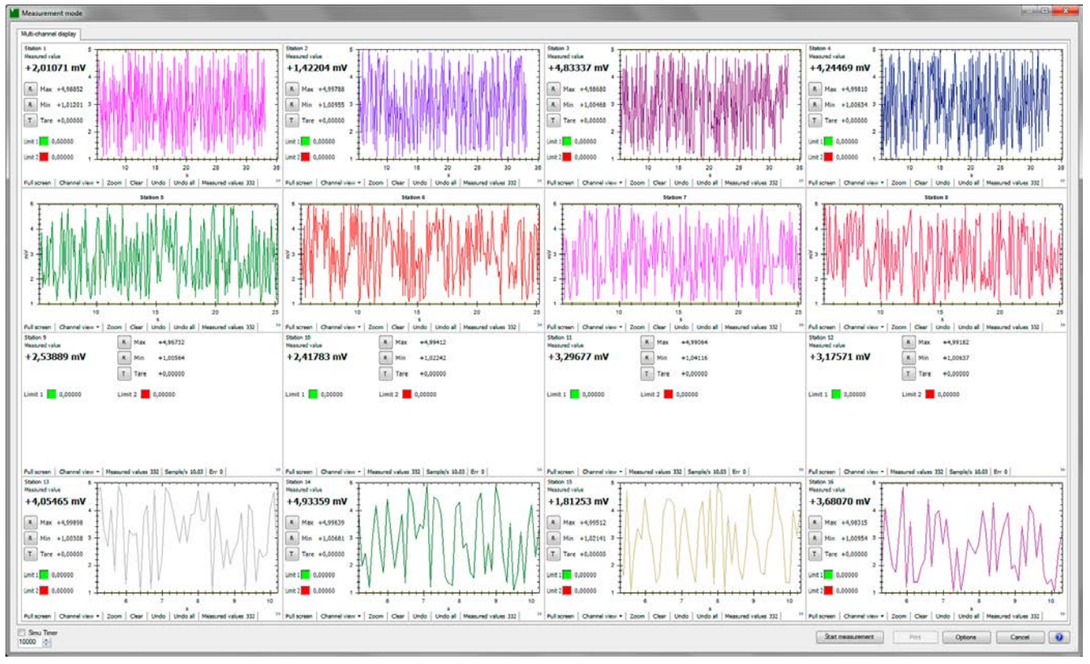
- Convenient device finder
- Instrument parameterization
- Instrument data adopted automatically, e.g. scaling, limit settings
- Back-up function for instrument data
- Simultaneous display of up to 16 measurement channels
- Different measurement rates can be combined
- Different triggers can be set: global or channel-specific
- Creation of instrument groups
- Report finder for locating group reports and individual reports
- Documenting individual measurement curves with various options e.g. serial number, batch counter, day counter
- Export function to Excel
- Communication with a controller unit (PLC etc.) via RS232 or Ethernet



Instrument parameterization



Managing several channels at once



Simultaneous display of up to 16 measurement channels different display options.

The measurement problem:
If the shaft of an electric motor is not circular, this will produce vibrations at high speeds and hence increased wear.

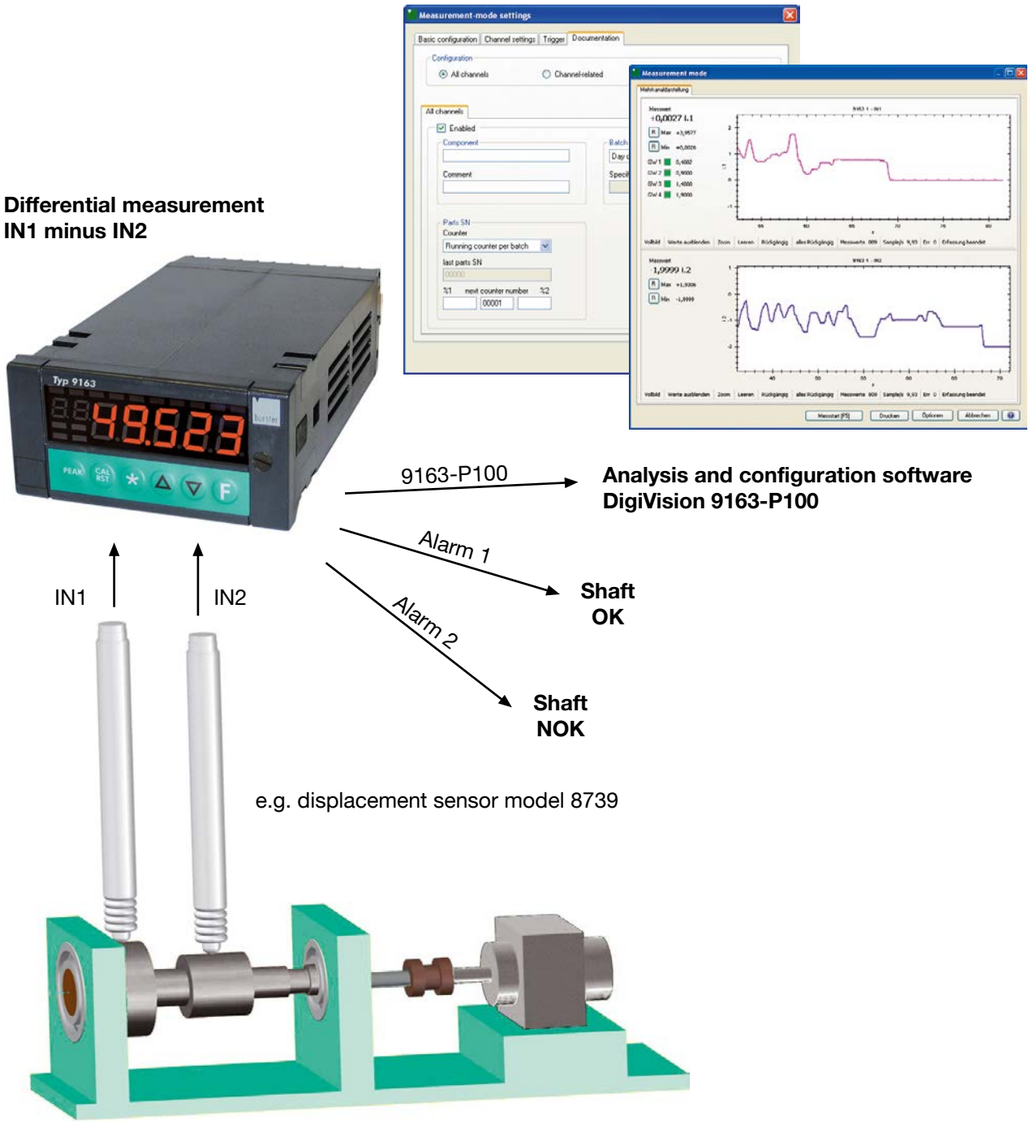
Irregular bearing surfaces may be one cause of a shaft running out of true. A bent shaft or a shaft without strict dimensional tolerances could also be the cause.

The solution:
As part of the quality assurance process, the shaft is tested for true running, bow and concentricity of the bearing surfaces. The test also includes measuring the diameter of the shaft bearings.

In the test, the shaft is clamped in a holder and turned by a motor while being measured by two position sensors. The instrument measures the difference between the signals from these two sensors; this difference is only allowed to vary within a specified tolerance band.

The 9163 performs the difference calculation and assesses the results.
As this process takes just a few seconds, both random sampling and 100% testing are possible. If the shaft does not lie within the tolerance band, the 9163 outputs an alarm signal.

When used for testing random samples, the 9163 color display provides additional support by changing from green to red if the shaft lies out of tolerance. The operator thus knows immediately whether the shaft is OK.



2419-009163EN-5672-081524

SENSORMASTER

Single-channel or multi-channel model for strain gauges, potentiometers, standard signals, Pt 100 and TC

Model 9163

Code:	9163-V3 EN
Delivery:	ex stock / 4 weeks
Warranty:	24 months

USB

New !
Evaluation optional via Ethernet

- **For force, pressure or torque measurement using strain gauge sensors**
- **For position or angle measurement using potentiometric or DC/DC sensors**
- **Optional multi-channel model**
- **Optional USB or serial interface**
- **0.1 % measurement accuracy plus sensor-specific linearization**
- **Range of mathematical functions (e.g. differential measurement)**
- **OK/NOK feedback on multi color display and via 4 alarm limit outputs**
- **High sampling rate (500/sec.)**

Application
The SENSORMASTER 9163 covers a wide range of applications in which process values need to be measured, displayed, analyzed and transferred to higher-level control systems. Typical applications include measuring geometric values in production, for instance differential measurements, or testing material properties in the laboratory.
The measured values can be transferred via USB, RS232 or analog output.
The multi-channel version can be used with up to four sensors. These sensors can be combined using mathematical functions, so that even complex measurement tasks can be performed with just the one instrument.
Visual alarms on the display make it easier and more convenient to assess when values lie off-limits. Up to four configurable outputs are available as relay or logic outputs.
The excellent measurement accuracy of 0.1% also makes this instrument suitable for high-precision applications. Two digital inputs are provided for controlling various functions such as Reset or HOLD.
Strain gauges, potentiometric sensors, transmitters with process value output, Pt100 and thermocouples can be connected directly to the SENSORMASTER. Thanks to its manual linearization facility, the instrument can handle sensors with a huge range of characteristic curves.

Description
The latest microprocessor technology has been used to pack a huge amount of engineering into the minimum space. Essential device settings can be made via the six-button keypad. Permanent settings such as the choice of excitation voltage are made using jumpers. The large 13 mm high, 7 segment display ensures that measurements and menu parameters can be read clearly.
The integral excitation voltage source supplies the sensors and provides the auxiliary power for any transmitters that are connected. The manual linearization facility with 32 data points means that even non-linear sensor curves can be input.
The indicator also supports memory functions for min, max and peak-to-peak values. The high measurement rate of 500 readings/s also ensures a rapid response by the four built-in alarm limit relays. TTL switched outputs can be provided as an alternative option. The device settings can be configured via the keypad or the optional RS232, RS485 or USB interface.

A powerful software tool for data analysis and documentation is available on request.

Technical Data

Compatible sensors

Strain gauges

Connection type:	4 wire technology
Bridge resistor:	350 Ω
Bridge voltage:	1.5 ... 4 mV/V
Sensor excitation:	5/10 V/ 60 mA

Potentiometer

Track resistance:	> 100 Ω
Sensor excitation:	2,5 / 5 / 10 V

Standard signals, DC/DC sensors or transmitters

Voltage input:	± 60 mV, ± 100 mV, ± 1V, ± 5 V, ± 10 V
Input impedance:	> 10 M Ω
Current input:	0/4 ... 20 mA
Load impedance:	50 Ω

Transmitters or DC/DC sensors

Excitation:	15/24 V max. 150 mA

Temperature sensor

Type:	Pt 100 to DIN 43750
Max. wire resistance:	20 Ω

Thermocouples

Type:	TC (thermocouple) (ITS90) J, K, R, S, T
Linearization:	64 steps
Compensation error:	0.1 °/°C

Standard functions

Digital inputs

Quantity:	2, opto-isolated
Logic:	choice of PNP/NPN
Response time:	60 ms
Function:	tare, display peak values, HOLD, Display HOLD

General data

Display:	5 digit, dual-color red/green
Height:	13 mm
Display range:	-19999 ... 99999
Decimal point:	user-programmable
Measuring error:	0.1 % of full scale ± 1 digit
Measurement rate:	main channel 500/sec. Auxiliary channel 100/sec.
Supply voltage:	100 - 240 VAC / 50 - 60 Hz
Dimensions (W x H x D):	150 x 95 x 260 mm

Operating environment

Altitude:	up to 2000 m
Operating temperature:	0 ... 50 °C
Relative humidity:	20 ... 82 %, non-condensing
Protection class:	IP20

Options

Limit switches

4 relay outputs:	250 VAC / 30 VDC 5 A
TTL outputs:	TTL 24 VDC / 20 mA open e. p-switching as direct or inverted alarm signal
Response time:	2 ms

Analog output

Ranges:	0/2 ... 10 V, ± 10 V max. 25 mA, 0/4 ... 20 mA
Load impedance:	max. 500 Ω
Resolution:	≤ 0.03 %
Signal response time:	2 ms
Signal referred to:	Input signal Peak value Limit value

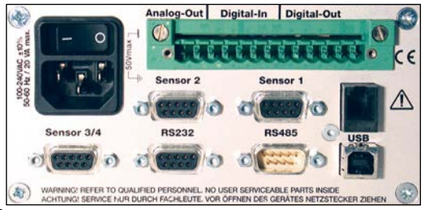
Serial interface

Type of interface:	RS232 or RS485
Protocol:	MODBUS RTU
Baud rate:	1200 ... 115200 bit/s
Max. transmission rate:	30 measurements/s

USB

Baud rate:	1200 ... 115200 bit/s
Max. transmission rate:	30 measurements/s

Rear side



Order Code

Process value indicator model 9163-V **3** ☐ ☐ ☐ ☐

Standard: **0 0 0 0**

Analog output voltage
- None — 0
- 0 -10 V — 1
- 0 - 20 mA — 2
- 4 - 20 mA — 3
- ± 10 V — 4

Interface
- None — 0
- RS232 — 1
- RS485 — 2
- USB — 4

Limit outputs
- 4 x relay — 0
- 4 x transistor (open e. p-switching) — 1

Version
- 1-main channel / 2 auxiliary channels — 0
- 2-main channels / 2 auxiliary channels — 1

Accessories

Instrument calibration for one sensor ordered with the instrument or using sensor data provided by the customer (e.g. sensitivity, display range for correct readings, instrument settings, excitation voltage or sensor test certificate). **Model 91ABG**

Configuration and analysis software for single-channel and multi-channel operation with the single-user license code for the 9163 equipment range **Model 9163-P100**
Fitting of plug **Model 99002**
Mating connector **Model 9900-V209**

Data cable
for connection of desktop version and PC **Model 9900-K333**
USB cable to PC **Model 9900-K349**
Networking via RS232/Ethernet converter **Model 9900-K453**
Networking via RS485 requires converter **Model 9180-Z001**

Adapter cable for bench-top unit model **9163, from sensor socket 1 or 2** to strain-gauge sensors with 5 VDC or 10 VDC excitation voltage with fitted plug 9900-V209 and to potentiometric position sensors with 5 VDC excitation voltage with fitted plug 9900-V209
99209-609A-0090002

Adapter cable for bench-top unit model **9163, from sensor socket 1 or 2** to transmitters with 15 VDC or 24 VDC excitation voltage and sensors with fitted plug 9900-V209 **99209-609B-0090002**

Adapter cable for bench-top unit model **9163, from sensor socket 3 or 4** to transmitters with 10 VDC excitation voltage or potentiometric position sensors with 5 VDC excitation voltage and fitted plug 9900-V209 plus sensor connecting cable with 99209-XXXX....
99208-609B-0090002

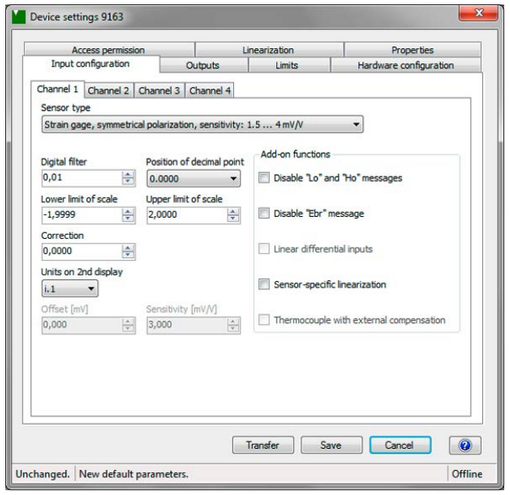
Adapter cable for bench-top unit model **9163, from sensor socket 3 or 4** to transmitters with 15 VDC or 24 VDC excitation voltage and fitted plug 9900-V209 **99208-609A-0090002**

The CAD drawing (3D/2D) for this device 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.

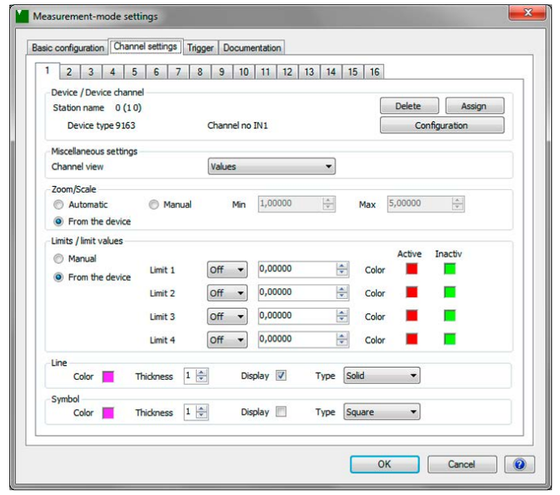
2420-9163V3EN-5672-081524

DigiVision 9163-P100 Configuration and Analysis Software

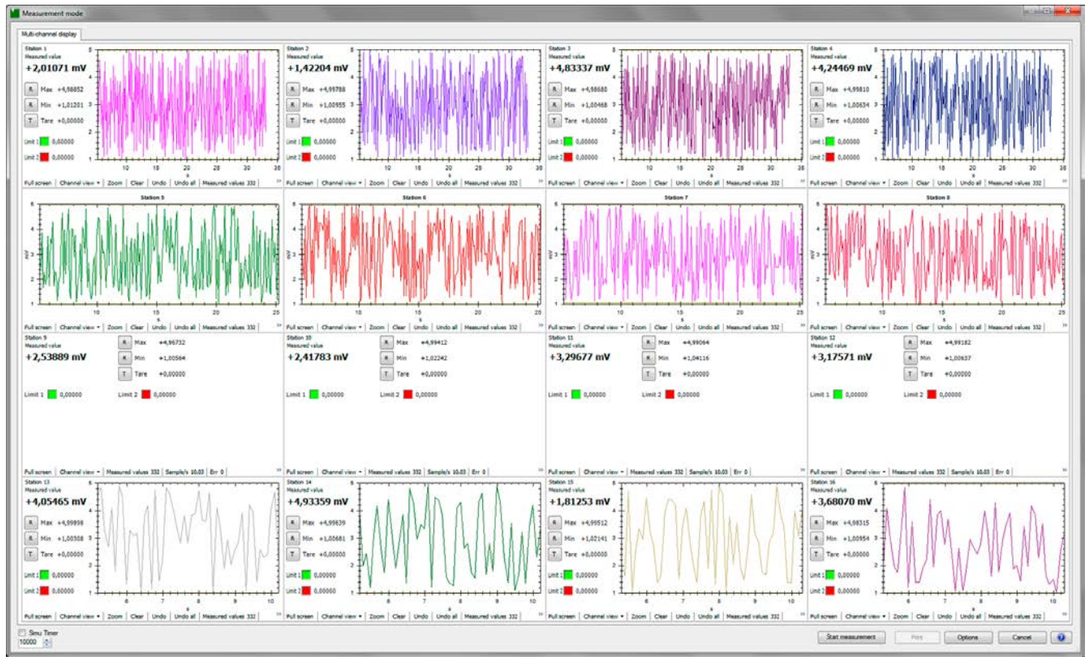
- Convenient device finder
- Instrument parameterization
- Instrument data adopted automatically, e.g. scaling, limit settings
- Back-up function for instrument data
- Simultaneous display of up to 16 measurement channels
- Different measurement rates can be combined
- Different triggers can be set: global or channel-specific
- Creation of instrument groups
- Report finder for locating group reports and individual reports
- Documenting individual measurement curves with various options e.g. serial number, batch counter, day counter
- Export function to Excel
- Communication with a controller unit (PLC etc.) via RS232 or Ethernet



Instrument parameterization



Managing several channels at once



Simultaneous display of up to 16 measurement channels different display options.

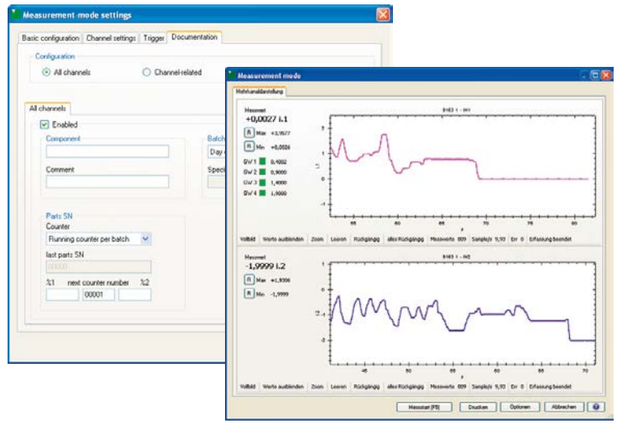
The measurement problem:
If the shaft of an electric motor is not circular, this will produce vibrations at high speeds and hence increased wear. Irregular bearing surfaces may be one cause of a shaft running out of true. A bent shaft or a shaft without strict dimensional tolerances could also be the cause.

The solution:
As part of the quality assurance process, the shaft is tested for true running, bow and concentricity of the bearing surfaces. The test also includes measuring the diameter of the shaft bearings.

In the test, the shaft is clamped in a holder and turned by a motor while being measured by two position sensors. The instrument measures the difference between the signals from these two sensors; this difference is only allowed to vary within a specified tolerance band.

The 9163 performs the difference calculation and assesses the results.
As this process takes just a few seconds, both random sampling and 100% testing are possible.

If the shaft does not lie within the tolerance band, the 9163 outputs an alarm signal.
When used for testing random samples, the 9163 color display provides additional support by changing from green to red if the shaft lies out of tolerance. The operator thus knows immediately whether the shaft is OK.



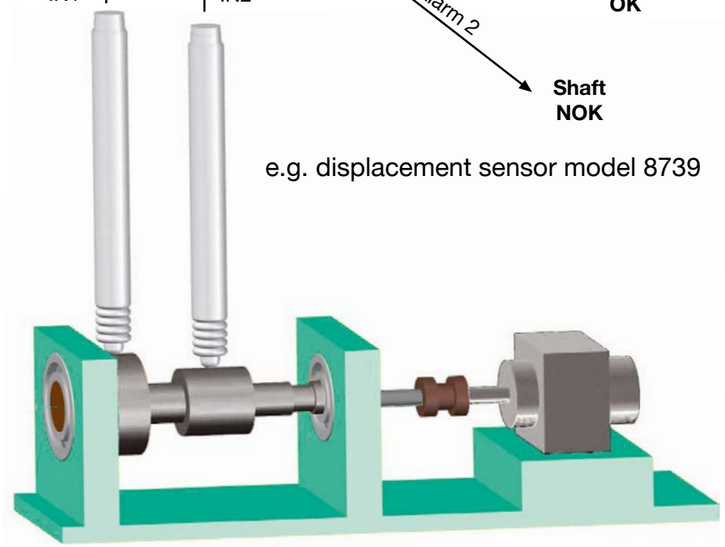
Differential measurement IN1 minus IN2

9163-P100 → **Analysis and configuration software DigiVision 9163-P100**

IN1 IN2

Alarm 1 → **Shaft OK**

Alarm 2 → **Shaft NOK**



e.g. displacement sensor model 8739

2420-9163V3EN-5672-081524

Digital Display

For strain gauge units, potentiometers, DC/DC sensors and standard signals

Model 9180

Code:	9180 EN
Delivery:	ex stock / 4 weeks
Warranty:	24 months

Desktop version

Panel-mounted version

New !
Evaluation optional via Ethernet

- **Up to 8 sensor parameters can be saved (optional)**
- **For force, pressure or torque measurements using strain gauge sensors**
- **For distance or angle measurements with potentiometer or DC/DC sensors**
- **Processing of standard signals ± 1 V/ 10 V/ 0 ... 1 mA, 0 (4) ... 20 mA**
- **Min. or max. peak values via an additional display**
- **TARE and HOLD function**
- **Generation of up to 4 limit signals (optional)**
- **RS232 or RS485 (optional)**
- **Analog output (optional)**
- **Measurement accuracy < 0.1 %**
- **Scaling possible using teach-in procedure or by entering sensor data directly**
- **Convenient configuration and evaluation software DigiVision**

Application

Model 9180 supports force, pressure and torque sensors operating on the strain gauge principle, as well as the connection of position and angle sensors in potentiometer or DC/DC configuration. It also allows the measurement of process signals ± 1 V/ 5 V/ 10 V or 0 ...1 mA, 0(4) ... 20 mA. The current measured value is indicated on the 14 mm high LED main display, while a second display located directly below provides a reading of the peak value.
The display is particularly suitable for highly accurate measurements due to the high accuracy of 0.1%. It is also possible to monitor up to 4 limit values and provide the results via relay or transistor outputs. Thus the process value display can be used for classification, process and control tasks. The current measured value is frozen on the display by activating an external HOLD signal. The TARE function is useful for balancing out previous loads for example. The optional serial interface can be used to transfer measured values and perform device settings. Powerful PC software is available for this on request.

Description

State-of-the-art microprocessor technology has allowed the realization of numerous special functions for practical use. Menu guidance of device setup is standard. Self-explanatory abbreviations greatly facilitate this process so that even inexperienced users can manage without operating instructions. First, the user specifies the type of input signal or sensor. Strain gauge, potentiometer or process signals 0 ...1 mA, 4 ...20 mA or ± 1 V, ± 10 V as well as DC/DC sensors can be selected. Then the calibration process is selected. Users can choose between teach-in or calibration depending on the sensor protocol. The decimal point can be moved as required. The sensor excitation stated in the technical specifications is set automatically upon selection of the sensor type except with process signals. A choice of three excitations is available for process signals. Complete electrical isolation of the measurement channel prevents measurement values from being falsified by ground loops.

Technical Data

Connectable sensors

Strain gauge

Connection system:		4 wire
Bridge resistance:		120 ... 1000 Ω
Bridge voltage:	15/ 30/ 60/ 300 mV,	selection via menu
Sensor excitation:	10 V/ 120 mA, 5 V/ 120 mA*	automatic

Potentiometer

Track resistance:		500 Ω ... 10 kΩ
Sensor excitation:	10 V/ 120 mA, 5 V/ 120 mA*	automatic

Standard signals, DC/DC sensors and transmitters

Voltage input:	± 1 V/ ±10 V
Resolution:	0.1 mV respectively 1 mV
Input resistance:	1 MΩ
Current input:	0 ... 1 mA, 0 (4) ... 20 mA
Resolution:	1 µA
Load:	15 Ω
Transmitters and DC/DC sensors:	10 V/ 120 mA
Excitation:	24 V/ 30 mA 5 V/ 120 mA*

Transmitters can be connected in 2, 3 or 4 wire configuration.

*) if the jumper is set (default setting)

Standard functions

Peak-value memory

Minimum or maximum value on an auxiliary display, cancellation with RESET via keyboard or digital control input.

HOLD function

Freezing of the measured value on the main display.
Active: via ext. HOLD signal

TARE function

Balancing out an offset.
The balanced-out value can also be shown on the auxiliary display.
Active: via button or ext. TARE signal

Digital control inputs

RESET, HOLD, TARE, MIN/MAX (opto-electrically)

Active:	24 V
Resonse time	≤ 10 ms

General specifications

Accuracy

Resolution:	15 Bit
Measurement error:	0.1 % v. E. ± 3 digits
Temperature coefficient:	50 ppm/K
Warm-up period:	10 minutes

LED display

Main display:	- 99999 ... + 99999,	height 14 mm
Auxiliary display:	- 99999 ... + 99999,	height 8 mm
Decimal point:		programmable

Measurement rate	16/sec.
Environmental conditions	
Operating temperature:	0 ... 50 °C
Relative humidity:	< 95 %
Protection class:	Front panel IP65

Dimensions/weight

Panel-mounted version:

Dimensions (W x H x D):	96 x 48 x 120 mm
Installation depth incl. connector:	approx. 150 mm
Cut-out in front panel:	92 x 44 mm
Weight:	600 g
Housing material:	plastic

Desktop version:

Dimensions (W x H x D):	155 x 90 x 210 mm
Weight:	1.2 kg
Housing material:	metal/plastic

Electrical connection

Panel-mounted version:	snap-in plug connection
Desktop version:	12 pole jacks for plug 9941

Power supply

Desktop version:		115/230[1)] V AC, 50/60 Hz
Panel-mounted version:		115/230[1)] V AC, 50/60 Hz
		or 24/48[1)] V AC, 50/60 Hz
Power consumption:	5 VA	without options
	10 VA	with all options

[1)]Switch over by means of a jumper

Options

Digital set point alarm outputs

2 relay contacts	250 VAC/ 150 VDC/ 8 A, for 2 limiting values or
4 relay contacts	50 VAC/ DC/ 0.2 A, for 4 limiting values or
4 transistors	open C. switching n or open E. switching P, 50 V/ 50 mA for 4 limits each, opto-decoupled
Response time:	250 ... 750 ms, depending on the filter setting

Analog output

Ranges:	Voltage	0 ... 10 V
	Load	> 50 Ω
	Drift	0,2 mV/K
or	Current	4 ... 20 mA
	Load	< 800 Ω
	Drift	0,5 µA/K

(Selection between 0 ... 10 V and 4 ... 20 mA via the menu)

Resolution:	12 Bit
Potential separation to signal input	
Accuracy:	0.1 % F.S.
Signal response time:	60 ms

Serial interface

RS232 (V.24) or RS485 (half duplex)

Baud rate:	1200 ... 19200
Data transmission rate:	10 values/sec. at 19200 baud

Networking via RS485 by means of a converter (model 9180-Z001)

BCD interface

Level:	24 V/ TTL

The BCD option excludes all other options.

The options analog output; RS232 or RS485 (only one) and 2 relays, 4 relays or 4 O.C. (only one); can be used simultaneously.

Calibration

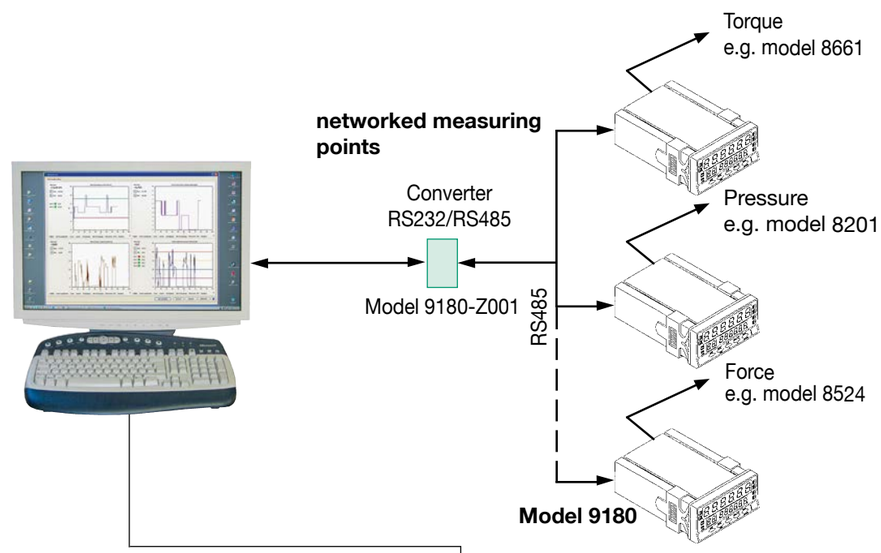
Two basic procedures are possible; in both cases, one display value is allocated to two input variables each (two-point calibration):

1. In the teach-in mode, the two input variables are applied physically as measurement signals to the input. These are assigned to the corresponding display values by pressing an enter key.
2. During calibration in accordance with the sensor protocol, the two signals are not applied physically, but read off from the sensor protocol and entered via the keyboard.

The CAD drawing (3D/2D) for this device 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.

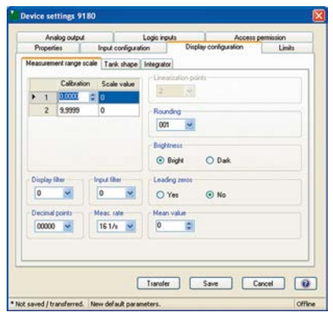
2421-009180EN-5672-081524

Measuring Data Acquisition and Evaluation



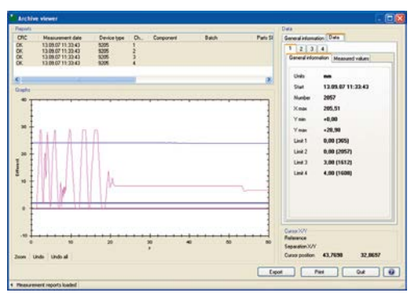
DigiVision 9180-P100 Configuration and Analysis Software

- Comfortable device finder
- Instrument parameterization
- Instrument data adopted automatically eg. scaling, limit settings
- Back-up function for instrument data
- Simultaneous display of up to 16 measurement channels
- Different measurement rates can be combined
- Different triggers can be set: global or channel-specific
- Creation of instrument groups
- Report finder for location group reports and individual reports
- Documenting individual measurement curves with various options e.g. serial number, batch counter, day counter
- Export function to Excel
- Communication with a controller unit (PLC, etc.) via RS232 or Ethernet



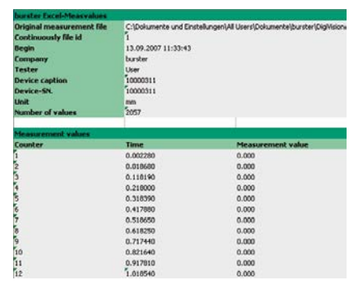
Parameterizing of devices

16 measurement channels



Archive viewer

Excel file

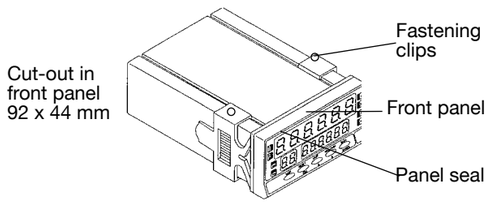


Burster Excel-Messwerte	
Original measurement file	C:\Dokumente und Einstellungen\All Users\Dokumente\burster\DigiVision
Continuously file id	1
Begin	13.09.2007 11:33:43
Company	burster
Tester	User
Device caption	10000311
Device-SN.	10000311
Unit	mm
Number of values	2057

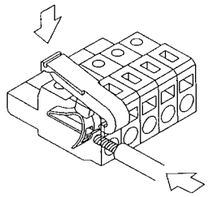
Measurement values		
Counter	Time	Measurement value
1	0.002280	0.000
2	0.018680	0.000
3	0.118190	0.000
4	0.218000	0.000
5	0.318090	0.000
6	0.417880	0.000
7	0.518650	0.000
8	0.618250	0.000
9	0.717440	0.000
10	0.821640	0.000
11	0.917810	0.000
12	1.018540	0.000

Displays and Operating Panel

Dimensions Mounting



Rear Connection

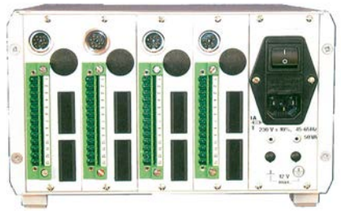


Clamping connection

Multichannel Measurement Systems for any Numbers of Channels in Desktop Housing (please enquire)

Front view:
Up to 16 panel-meters in one common housing possible.

Back view:
All sockets for sensors, control signals and serial interfaces are completely installed.



Order Code

Digital indicator

Version model 9180 - V	0	0	0	0
8 sensor parameters				-1
Options on extra charge:				
Housing and power supply				
Panel-mounted version 115/230V-50/60 Hz	0			
Panel-mounted version 24/48V-50/60 Hz	1			
Desktop version 115/230V-50/60 Hz	3			
Desktop version 24/48V-50/60 Hz	6			
Analog output				
without		0		
0 ... 10 V / 4 ... 20 mA		1		
Interface				
without			0	
RS232			1	
RS485			2	
BCD[1]			3	
Set point alarm outputs				
without				0
2 relays				1
4 relays				2
4 transistor open C. n-switched				3
4 transistor open E. p-switched				4

[1] - Important! The BCD option does not allow any additional options (limiting value or analog output) and is not available as desktop version either.

Accessories

Instrument calibration for one sensor ordered with the instrument or using sensor data provided by the costumer (e.g. sensitivity, display range of correct reading, excitation voltage or sensor test certificate) (Please specify the calibration data precisely!) **Model 91ABG**

If calibration data not communicated, it will be calibrated as standard sensor-specified.

Strain gauge simulator **Model 9405**
See data sheet 76-9405 in section 7 of the Sensors and Process Instruments catalog.

DigiVision 9180-P100 configuration and analysis software for device series 9180
Enables an easy storage of device data, graphical visualization, storage and logging of measurement data **Model 9180-P100**

Converter RS232/RS485
Cartridge with RS485 applications for maximum 32 participants
mains adapter included **Model 9180-Z001**

Indicator for angle, pulses or rotation **on request**

Data cable
for connection of desktop version and PC **Model 9900-K333**
for connection of panel version and PC **Model 9180-K001**
Interface adapter USB-RS232 **Model 9900-K361**
Networking via RS232 requires Ethernet **Model 9900-K453**

2421-009180EN-5672-081524

DIGILOW

Digital indicator for strain gauge sensors

Model 9186

Code:	9186 EN
Delivery:	ex stock
Warranty:	24 months

Desktop version

Panel-mounted version

- **Less expensive digital display**
- **For force, pressure or torque measurements using gauge sensors**
- **Two limit alarms optionally available**
- **Extremely easy-to-read display with 20 mm digit height**
- **Display range -1999 to + 9999**
- **TARE function**
- **Scaling possible using teach-in procedure or by entering sensor data directly**

Application

The DIGILOW digital display can be used with strain gauge sensors measuring force, pressure or torque.
The range of functions has been limited deliberately to ensure operation is simple and self-explanatory. With its unique, large and clear digit height of 20 mm, the digital display can be installed easily in process control panels and control cabinets. Thanks to the large choice of measurement signals that can be indicated, the display is ideal for use in a huge range of industry-based applications.
As a simple and compact digital display, it can also be used as a multi-channel solution in laboratory or test systems, where several different measurements may need to be taken and displayed simultaneously.
The front panel TARE function for the strain gauge sensor input makes it easy to zero the display for processes where an initial load may be applied (containers' own weight, pre-tensioning of sensor by tool adaptation and so on).
Production-oriented evaluation and control functions can be implemented using the limit generation option.

Description

The production of this excellent value digital display was possible by employing state-of-the-art microprocessor technology and keeping the complexity of the internal design to a minimum. The simple menu-driven instrument setup procedure with self-explanatory mnemonics ensures that even the novice can use the unit immediately without an operating manual. First, the user specifies the type of input signal or sensor. Then the user can select the relevant calibration procedure by either applying an input measurement or through teach-in (calibration taken from sensor documentation). The position of the decimal point can be set to suit, while the sensor supply voltage can be hardware-set to 5 VDC (default) or 10 VDC. There is also the option to use a digital low-pass filter to correct any display flicker caused by the particular application.

Technical Data

Connectable sensors

Strain gauge

Connection system:	4 wire
Bridge resistance:	120 Ω ... 1000 Ω
Bridge voltage:	30 mV / 300 mV / selection via menu
Sensor excitation:	5 VDC / 30 mA 10 VDC / 30 mA

Standard functions

TARE	Balancing-out an offset
Digital control input (9186-x1xx)	TARE

General specifications

Accuracy

Resolution:	16 bit
Measurement error:	0.1 % v. E. ± 4 digits
Temperature coefficient:	100 ppm/K
Warm-up period:	10 minutes

Display

Display:	- 1999 ... + 9999, height 20 mm
Display timing:	250 ms
Measurement range	25/sec.

Environmental conditions

Operating temperature:	- 10 ... + 60 °C
Relative humidity:	95 % at 40 °C
Protection class:	Front panel IP65

Dimensions and weight

Panel-mounted version

Dimensions (W x H x D):	96 x 48 x 60 [mm]
Installation depth with connector:	approx. 90 mm
Cut-out front panel:	92 x 44 [mm]
Weight:	250 g
Housing material:	plastic

Desktop version

Dimensions (W x H x D):	130 x 70 x 150 [mm]
Weight:	250 g
Housing material:	Plastic

The CAD drawing (3D/2D) for this device 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 connection

Panel-mounted version:	Snap-in plug connection
Desktop version:	12 pole jacks for plug 9941

Power supply

Panel-mounted version:	20-265 VAC 50-60 Hz/VDC
Desktop version:	20-265 VAC 50-60 Hz/VDC
Power consumption:	3 VA

Options

Digital set point alarm outputs

2 relay contacts:	250 VAC / 150 VAC / 8 A, for 2 set points
Response time:	≤ 10 ms (typ.)

Accessories

Strain gauge simulator **Model 9405**

See data sheet 76-9405 in section 7 of the Sensors and Process Instruments catalog.

Calibration **91ABG**
Two models are available. Two input values are put in relation to one display value each for both methods (two point calibration).
With the teach-in method the two input values are put physically and in sequence on the measurement signal. The corresponding display values are assigned via buttons.
With the calibration acc. to sensor protocol the two signals are not measured but taken from the protocol and entered via buttons. A mix of both methods, i.e. the measurement of the zero point and entering of the end value is also supported.
If no customer data is given, a sensor specific standard adjustment is made.

Order Information

DIGILOW **Model 9186-V** □ □ □ □

	1	2	3	4
Basic version	0	1	0	0
Housing and excitation				
Panel-mounted version	0			
Desktop version	3			
Set points alarm output				
without		0		
2 relay		1		

2422-009186EN-5672-081524

USB Sensor Interface

For strain gauge, potentiometric, DC/DC and Pt100 sensors

Model 9206

Code:	9206 EN
Delivery:	ex stock/1 week
Warranty:	24 months

NEW
Accuracy 0.01 % F.S. with DAkkS certificate for strain gauge input

NEW
Evaluation software DigiVision administrates up to 32 measuring channels with mathematical functions

1 channel In-Line IP67

USB multi sensor interface in housing

- **Inexpensive "Plug & Measure" design**
- **Simple connection via PC USB port**
- **24 bit resolution**
- **High-speed measurement of up to 1200 readings/sec.**
- **Convenient configuration and analysis software DigiVision**
- **Pt100 as option**
- **LabVIEW and DLL drivers free of charge**
- **Integration in customer-owned software**
- **6 wire technology for the highest precision**

Application

In the field there is a frequent need to measure sensor readings rapidly and easily right at the sensor and to transfer them directly to a PC without additional amplifiers or converters. The 9206 USB sensor interface can satisfy this requirement admirably, thanks to its „plug & measure“ design. The USB connection means installation could not be simpler.

Typical applications:

- ► Mobile test measurements via laptop
- ► Laboratory test set-ups
- ► Instrumentation and control
- ► Diagnostic measurements in the chemical industry
- ► PC-based recording of expansion figures in bio engineering

Description

The USB sensor interface takes its supply from the connected PC via the USB port, and uses it to generate the power supply for the sensors. The initial settings and sensor settings are made by burster in-house and saved in the USB sensor interface. These can then be fine-tuned by the customer.
Software provides display and archiving functions. But a license key enables an open-end expansion. 32 interfaces output curves may be displayed at the same time. One USB sensor interface can be connected as standard. Each sensor can be tared individually, and measurement curves can be displayed jointly or separately in a graph. We can configure the interface to suit a specific sensor, although customer-specific parameters can be changed using the free analysis software supplied.
The connection to LabVIEW or the integration into customers' software is enabled by a free driver package.

Technical Data

Connectable sensors

Strain gauge

Bridge resistance:	350 Ω ... 5 kΩ
Connection system:	6 wire
Sensitivity:	0 ... 50 mV/V
Sensor excitation:	2.5 V / 5 V
Excitation current:	max. 45 mA
Measurement:	± 0.05 % F.S.

Potentiometer

Connection system:	3 wire
Resistance:	1 kΩ ... 5 kΩ
Measurement signal:	5 V
Sensor excitation:	5 V
Excitation current:	max. 45 mA
Measurement error:	± 0.05 % F.S.

Transmitter and DC/DC sensors

Sensor excitation:	12 V
Excitation current:	80 mA
Measurement signal:	± 10 V
Measurement error:	± 0.05 % F.S.

Temperature Pt100

Sensors:	Pt100
Range:	- 200 ... + 600 °C
Accuracy:	0.1 K
Measuring rate:	max. 2 meas./s

General amplifier data

Resolution:		24 bit
Measuring rate ecxept Pt100:		
up to 1200 readings per second	only with	software 9206-P100 or 9206-P200
up to 200 readings per second	and 1 measuring channel	with 9206-P001
Input resistance:		> 1 GΩ
Temperature coefficient:		20 ppm/K
Environmental temperature range:		0 ... + 60 °C
Storage temperature:		- 40 ... + 70 °C
Zero drift:		< 0.1 µV/K

In-Line housing

Material:		Aluminium
Dimensions:		115 x 25 [mm]
Weight:		200 g
Protection class:		IP67
Mounting method:		screw clamp
Power supply:		via USB-plug 4 V ... 6 V
Cable length from sensor to 9206:		max. 3 m
Cable length from PC to 9205:		2.8 m
Sensor connection:	terminal block	PG 7 connection
USB connection on 9206:		PG 7 connection

Desktop housing

Material:	Aluminium
Dimensions:	210 x 150 x 90 mm
Protection class:	IP20
Power supply:	90 ... 230 VAC / 11 ... 30 VDC
Cable length from PC to 9205:	1 m
Sensor connection:	9 pole Sub min D
Isolation:	yes / rated voltage 50 V
Display:	status LED
Energy input:	max. 30 VA

Software DigiVision

System requirement: Windows XP, Vista, Win7

Order Code

USB-Sensor-Interface 9206-V X 0 0 X

IP67 tube housing	0
IP40 tube housing with 12 pin connector for sensors	2
Strain gauge, Poti, DC/DC	1
Pt100	2

including measurement and analysis software 9206-P001

USB multi sensor interface - in housing

9206-V3 Sensor1 Sensor2 Sensor3 Sensor4 – ☐

unoccupied	0
Strain gauge, Poti, DC/DC	1
Pt100	2

Option increased measurement accuracy for strain gauge input only 0.01 % F.S. incl. DAkkS certificate – H

9206-V3xxxx including measurement and analysis software 9206-P100

Order Information

An example for ordering a desktop case version
Desktop case version with 2 USB sensor interfaces for strain gauge sensors and 2 USB sensor interfaces for Pt100 sensors.
The software DigiVision 9206-P100 is included **Model 9206-V31122**

Adjustment of a measurement chain **Model 92-ABG**
Consisting of sensor and USB sensor interface

Accessories

Configuration and evaluation software DigiVision for 1 channel measurement and 200 measurements/sec.
(included in scope of delivery) **Model 9206-P001**

Configuration and evaluation software DigiVision for multi-channel measurement. The software can display up to 16 USB Sensor Interfaces parallely. Up to 1200 meas./sec. are possible, no mathematic functions or calculation **Model 9206-P100**

Configuration and evaluation software DigiVision for multi-channel (displays up to 32 measurement curves at the same time) and measurement, up to 1200 meas./sec. possible. Measurement results can be offset against each other via freely programmable mathematic measuring channels. **Model 9206-P200**

Connecting cable, 12 pin female connector
one end open for 9206-V000x **Model 99540-000A-0150002**

Connecting cable, 9 pin Sub-D female connector
one end open for 9206-V000x **Model 99609-000E-0150002**

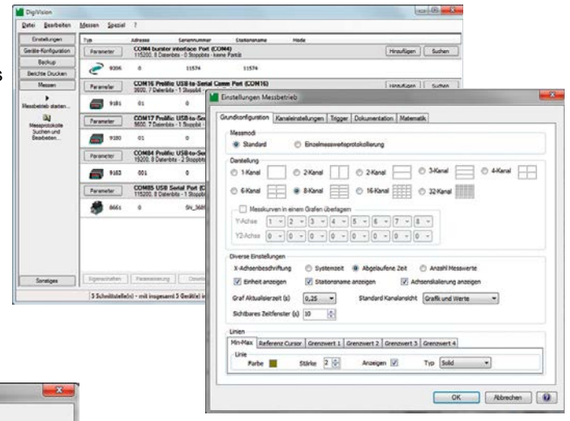
DAkkS certificate for the DMS measurement range of the 9206-V03xxxx-H, for 1 measuring channel, for the option of the accuracy of 0.01% F.S. **Model 92DKD-9206-V3H**

2423-009206EN-5672-081524

DigiVision Configuration and Analysis Software

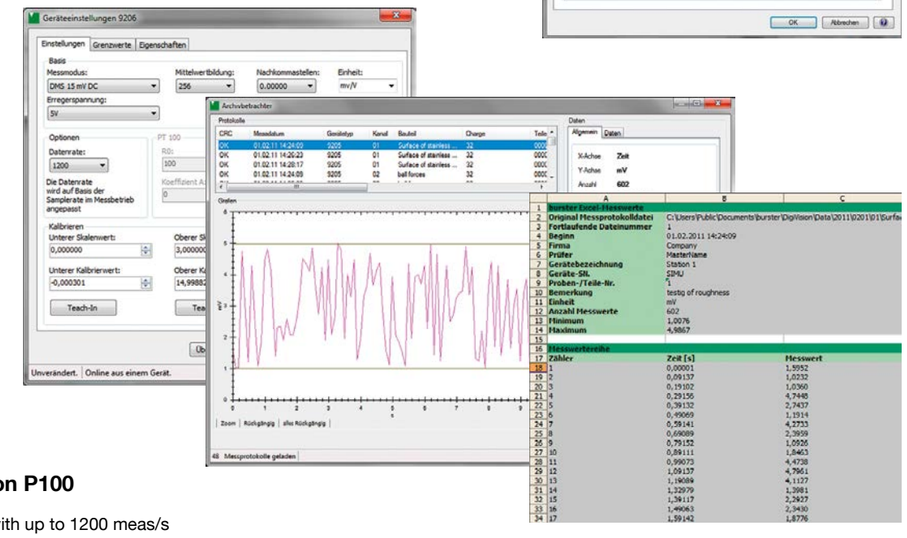
General Software Data

- Convenient device finder
- Instrument parameterization
- Instrument data adopted automatically, e.g. scaling, limit settings
- Back-up function for instrument data
- Simultaneous display of up to 16 measurement channels
- Different measurement rates can be combined
- Different triggers can be set: global or channel-specific
- Creation of instrument groups
- Report finder for locating group reports and individual reports
- Documenting individual measurement curves with various options e.g. serial number, batch counter, day counter
- Export function to Excel
- Communication with a controller unit (PLC etc.) via RS232 or Ethernet



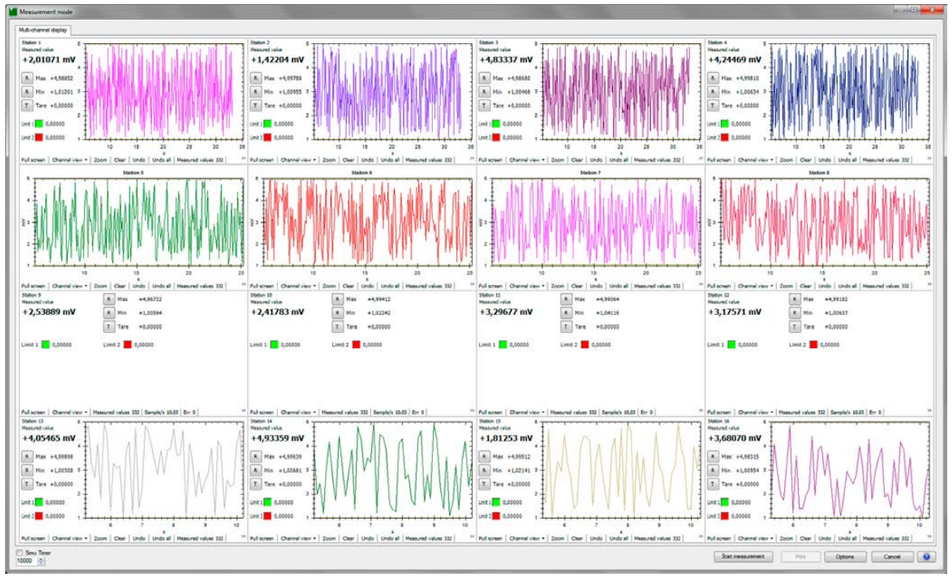
Software DigiVision P001

- 1 interface with up to 200 meas/s



Software DigiVision P100

- max. 16 channels with up to 1200 meas/s



Software DigiVision 9206-P200

- Intuitive operation
- Easy-going configuration the interfaces
- Measurement rate up to 1200 meas./sec. for every channel
- Up to 32 measurements at the same time
- Storage of measurement protocols
- Data export in Excel
- Free mathematical measuring channels

Typical Applications

- Differential measurements
- Averaging of the measurement results
- Determination of efficiency in engine test
- Determine mass moment of inertia
- Determine the frictional force
- Comparison of different measurement readings

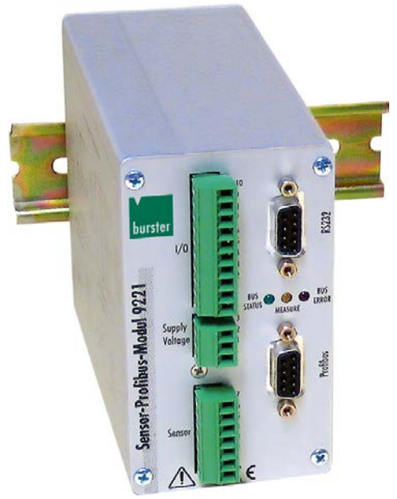
2423-009206EN-5672-081524

Sensor Profibus Module

For strain gauge and potentiometric sensors and analog standard signals

Model 9221

Code:	9221 EN
Delivery:	on request
Warranty:	24 months



- **For force, pressure or torque measurement with strain gauge sensors, potentiometric displacement and angle sensors or standard signals ± 10 V**
- **Resolution 16 bit, sample rate up to 1 kHz**
- **2 free configurable inputs e.g. reset, tare, etc.**
- **Simple configuration via RS232 interface**
- **Networking via Profibus DP up to 12 MBaud**
- **Mean value, MIN/MAX memory, set point values, zero compensation via Profibus**
- **DPV1 mode for parameterizing and backup via Profibus**
- **Potential-free input via differential amplifier**

Application

The newly developed sensor Profibus module model 9221 is predestined for the integration of various analog sensor output signals into complex, net worked and peripheral automation structures. This module finds its fields of application in the industrial automation technology as well as the test rig technology based on its secure and reliable transfer mode, the fast transfer speed and its simple construction.
The inputs (e.g. PLC signal gauge) and outputs in addition to the external control allow a zero compensation by trigger via proximity switch or fast alerting on passing of set point values. Industrial type connection and mounting techniques enable the user the adaption and integration in the existing mechanical and electrical environment.
The excellent quality of measurement together with the high grade capture of mean values also enable the application in research and development.
The use of standardized Profibus protocols makes the connection an easy task for the programmer.

Specific applications are found e.g. in:

- Complex gear and engine test rigs
- Weight definition in high-rack facilities
- Automotive industry
- Special equipment construction
- Packing industry
- Manufacturing technology
- Capture of various mechanical and physical values in test rigs

Description

The universal sensor Profibus module is well-suited for measurement of mechanical values such as e.g. force, torque, pressure, acceleration, displacement and angle. Strain gauge, potentiometric and standard signals may be captured and processed without problems. A powerful 16 bit A/D converter ensures a precise and fast processing of analog sensor signals.
The module itself features a stable and precise sensor excitation voltage. The calibration and configuration data are memorized on an EEPROM, protected against zero voltage.
The user friendly configuration software makes a simple conditioning of input signals and the setup of parameters on the module with regards to the PLC and Profibus parameters possible. The version DPV1 enables the parameterization and backup function via Profibus. Functions such as the arithmetical calculation of mean values, input signal filtering, zero adjustment, MIN/MAX memory and limits setpoint values can be realized with a speed of up to 12 MBaud via Profibus.
Two potential-free and freely configurable digital inputs are available for the external PLC control (e.g. erase MIN/MAX memory, tare function). Two digital outputs can be defined as local limits switches for alerting functions.
The bus-sided control of the sensor lines on fractures or short-circuits and the galvanic separation between the Profibus-ASIC and the Profibus connector belong to the standard features.
The visualization of operating conditions such as bus connection, sensor-sided errors or active state of module are realized by three LEDs.
The DIN standard mounting rail enables an easy installation into the control cabinet.

Technical Data

Connectable sensors

Strain gauge

Bridge resistance:	120 Ω - 5 kΩ
Connection system:	6 wire
Configurable characteristic, infinitely variable:	< 1 mV/V ... 3 mV/V
Semiconductor strain gauge sensitivity:	1 mV/V ... 4 000 mV/V
Excitation voltage:	2.5 V / 5V / 10 V
Excitation current:	max. 50 mA
Input impedance:	> approx. 1 GΩ

Voltage metering

Standard signal:	0 V ... ± 10 V
Input impedance:	> approx. 1 GΩ

Potentiometer

Resistance:	100 Ω - 100 kΩ
Excitation voltage:	2.5 V / 5 V / 10 V
Excitation current:	max. 50 mA

General amplifier data

Power excitation:	20 - 36 VDC or 14 - 26 VAC
Accuracy:	< 0.03 % F.S.
Temperature coefficient:	< 50 ppm/K
Capacity:	max. 6 VA
Frequency response:	approx. 2 kHz (- 3 dB)
Internal fuses:	Integrated reversible overload, overvoltage and pole protection
Galvanic separation to Profibus:	500 V
Operating temperature:	0 ... + 60 °C
Stocking temperature:	- 30 ... + 85 °C
Electromagnetic compatibility:	acc. to EMV guideline 89/336/EWG

Housing (IP20)

Material:	Aluminium
Dimensions [W x H x D]:	60 x 105 x 120 [mm]
Weight:	approx. 0.5 kg
Protection class:	IP20
Mounting method:	snap-on attachment
Mount rail:	35 mm acc. DIN EN 50022
Cable diameter:	max. 1.5 mm² (AWG 16), fine wire

Connections (IP20)

A/D transformation:	plugged screw clamps
Sensor connection:	plugged screw clamps
Input / Output:	plugged screw clamps
Configuration by serial interface:	Sub Min D 9 pin
Profibus:	Sub Min D 9 pin

Housing (IP65)

Material:	cast aluminium
Dimensions [W x H x D]:	160 x 120 x 80 [mm]
Weight:	approx. 1 kg
Protection class:	IP65
Mounting method:	screw mounting

Connections (IP65)

Supply voltage:	PG 7 connection
Sensor connection:	PG 7 connection
Input / Output:	PG 7/PG 9 connection
Configuration by serial:	Sub Min D 9 pin
Profibus:	M 12 connector 5 pin

Signal process

A/D transformation:	16 Bit
Measuring rate:	>1 kHz

Profibus

Baud rate:	automatic selection 9.6 kBaud … 12 MBaud
Number of devices at the Profibus:	up to 32 participants without repeater up to 127 participants with repeater
Potential:	potential-free
Functions	average value, filtering, tara, MIN/MAX memory, limit values, evaluation status, sensor test
Checking of the electrical measuring by shunt calibration:	59, 80, 100 kΩ - calibration

Analog output

Function:	process status
Monitor output:	approx. + 8 V

Digital outputs

Set point:	3 outputs, Open-E.p. switched, 24 VDC, potential-free, output up to I_{max} = 200 mA

Digital inputs

Input:	2 freely configurable inputs, potential-free
Logic:	SPS level DIN EN 61131-2, n-switched, p-switched

Filter adjustments

Adjustable frequency response:	0; 5; 10; 25; 50; 100; 200; 400 Hz
No filter:	1 kHz

Display

LED green:	Bus connection correct
LED yellow signaling:	sensor Profibus module active
LED red / red signaling:	Bus error / sensor-line-break indication

Order Information

Sensor Profibus module **Model 9221**
inclusive GSD file and configuration software

Sensor Profibus module **Model 9221-IP65**
in IP65 protection class

Calibration of entire measuring chain **Model 9221-ABG**
This service contains the alignment of the sensor Profibus module to the sensor ordered with the module or to customer sensor data (e.g. characteristic, excitation voltage, or sensor test certificate, Profibus Baud rate).

Accessories

Connecting plug **Model 9900-V181**
for connection to PLC, 9 pin, Min-D

Connecting plug **Model 9900-V225**
for connection to PLC for IP65 version, 5 pin, M 12

Mating connector **Model 9900-V525**
socket for connection of several modules to the PLC for IP65 version, 5 pin, M 12

Mount rail fixing kit for IP65 version **Model 9221-Z001**

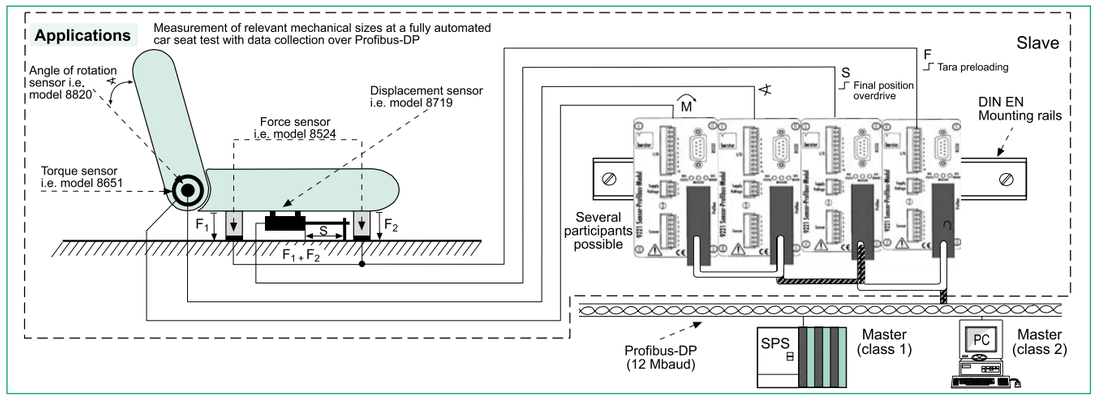
Configurations software **Model 9221-P001**
in scope of delivery contained

DMS simulator (see data sheet 76-9405) **Model 9405**

Module mains adapter **Model 9244-Z001**
230 VAC / 24 VDC 250 mA

Data cable **Model 9900-K333**
for the connection of sensor Profibus module 9221 and PC

The CAD drawing (3D/2D) for this device 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.

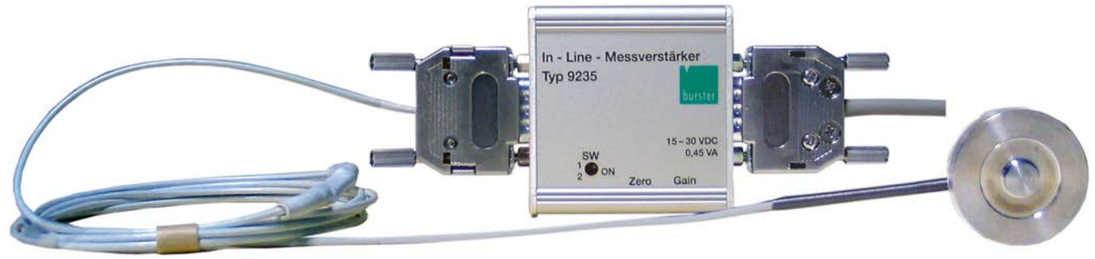


2359-009221EN-5672-081524

In-Line Amplifier
For strain gauge sensors

Model 9235

Code:	9235 EN
Delivery:	ex stock
Warranty:	24 months



- **Particularly space-saving and lightweight**
- **Voltage output 0 ... ± 10 V**
- **Designed as in-line measuring amplifier**
- **Non-interchangeable and short circuit-proof**

Application

In practice the requirement often arises to convert the measurement signals of a sensor into a standard signal in the simplest possible manner in the immediate proximity of the sensor. This permits trouble-free, low-loss transmission of measured values over longer distances to an instrument board or plant controls.
Ideally suited for this purpose is the in-line measuring amplifier, which is inserted in between in the connection cable by means of plug contacts. Owing to its compact, robust design and low weight, it finds use in almost any application. Even movable locations subject to forces of acceleration, for example manipulators, present no problems. It is intended mainly for use of control cabinets in just about any location and is matched to a specific sensor. The aluminium housing is extremely sturdy and affords the greatest possible protection even in harsh environments.

Description

The in-line amplifier module itself is operated at voltages between 15 V and 30 V, from which it generates a stable excitation voltage to supply the sensor with power. The measurement signals of the sensor, normally ranging between 0 ... 5 mV and 0 ... 10 mV for bridge-connected strain gauges, are amplified to analog 0 ... 10 V.
The sensor characteristics are first roughly preset by means of DIP switches, through an opening in the housing. The fine-tuning of the instrument zero and amplification settings is performed by means of a multiple trimmer, accessible by screwdriver through holes drilled in the side of the housing. The amplifier connections are realized with sub-D plug and socket; short circuit-proof sensor power excitation and polarity reversal protection for the amplifier power excitation afford additional safety for installation. If the amplifier has to be mounted to its environment, this is done by clamping the housing or affixing it with an adhesive. The amplifier's cut-off frequency is > 1 kHz, its weight is < 65 g.

Technical Data

Connectable sensors

Strain gauges

Bridge resistance (full bridge):	350 Ω ... 5 kΩ
Connection technology:	4 wire
Sensor excitation voltage:	2.5 V
Excitation current:	10 mA max.
Power consumption:	approx 0.3 VA
Adjustable input:	0.8 mV/V ... 2.5 mV/V

Analog output

Voltage output:	0 ... ± 10 V
Output impedance:	470 Ω

General amplifier characteristics

Accuracy:	< 0,1 %
Temperature coefficient:	< 100 ppm/K
Power supply:	15 ... 30 V DC
Frequency response:	1 kHz
Operating temperature:	0 ... 60 °C

Plug connection model 9235

"Excitation and output"	plug	pin 2	+ excitation voltage
		pin 3	shield
		pin 5	- excitation voltage
		pin 7	± output voltage
		pin 9	output ground
"Sensor"	socket	pin 1	+ sensor excitation
		pin 3	shield
		pin 5	– sensor excitation
		pin 6	+ signal input
		pin 9	– signal input

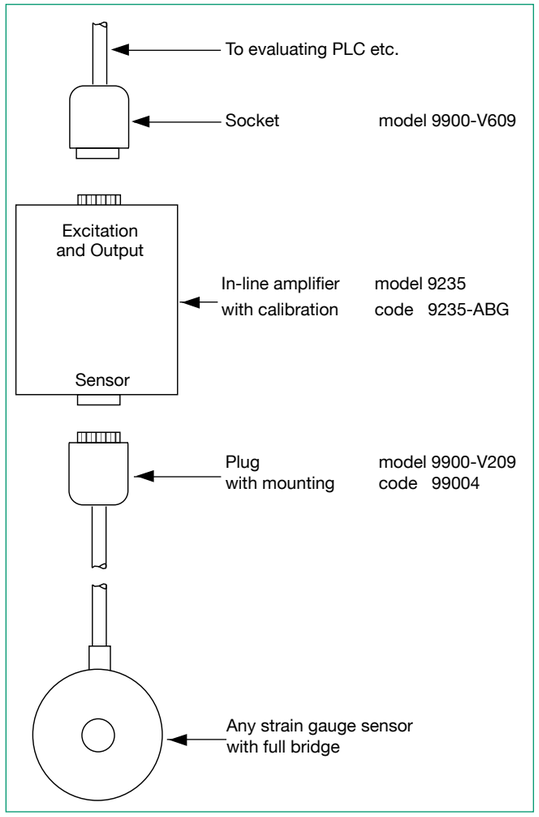
Housing

Connections:	Sub-D plug / mating connector
Dimensions (W x H x D):	62 x 55 x 16 [mm]
Material:	Aluminium
Mounting:	clamp or stick on
Protection class:	IP40
Weight:	< 65 g
Humidity:	10 ... 80 %, not dewing

Default setting

Sensor output: 1.5 mV/V

Example of a measuring chain



The CAD drawing (3D/2D) for this device 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

In-line amplifier with housing including cable tie bracket	**Model 9235**

Calibration of entire measuring chain
Consisting of sensor and amplifier model 9235

Order Code	**9235-ABG**

A sensor specific standard adjustment will be done, if no customer specific adjustment data are supplied.

Accessories

Connectors	socket	**Model 9900-V609**
	plug	**Model 9900-V209**

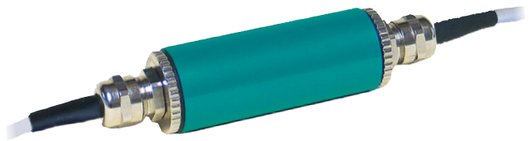
not part of scope of delivery

2424-009235EN-5672-081524

Multichannel Amplifier
For strain gauge sensors

Model 9236

Code:	9236 EN
Delivery:	ex stock
Warranty:	24 months



- **Operates with up to 4 measuring channels**
- **Voltage output 0 to ± 5 V / 0 to ±10 V**
- **Protected against reverse connection and short-circuit**
- **Also available as circuit board without housing**
- **Simple configuration using DIP switch**
- **High degree of protection up to IP67**

Applications

Situations often occur in practice in which it is necessary to place a measuring amplifier immediately in the neighborhood of the sensor in order to be able to access a standard signal there. In this way, long distances to the evaluating electronics can be covered.

This task can ideally be performed by the 9236 in-line measuring amplifier. With its high degree of protection (IP67) its single-channel version can be integrated into the application even in the tough environment outside the switch gear cabinet.

In the multichannel version, up to four measuring channels can be implemented in one housing for the DIN carrier rail. This means that it can be located either in the switch gear cabinet, or in the immediate neighborhood of the sensor.

Users who want to put the amplifier onto an existing circuit board or who wish to construct their own housing can also obtain the amplifier as an open circuit board. It can be integrated by means of screw terminals.

The 9236 measuring amplifier finds applications wherever the output signal from sensors based on wire strain gauges, such as force, pressure or torque sensors, must be converted into a voltage signal, e.g.

- ► Automatic production machinery
- ► Laboratory measurements
- ► Integration into customer‘s circuit boards
- ► Field measurements

Description

The measuring amplifier itself is powered by voltages between 15 V and 30 V. Internally, the highly accurate, short-circuit protected sensor excitation voltage is generated and used to supply the sensor‘s measuring bridge. The input range of the amplifier is appropriate for sensitivities between 0.5 and 30 mV/V and is also suitable for semiconductor strain gauge.

The analog output voltage can be set to a range from 0 to ± 5 V or 0 to ± 10 V. DIP switches are used to set the input range. Fine adjustments and zero point setting are performed by means of multi-turn potentiometers that are mounted on the circuit board. The sensors are connected, and the auxiliary power supplied, through user-friendly screw terminals.

The amplifier in the IP67 version can, if in fact necessary, be achieved by clamping, gluing, or with the aid of a cable tie. The open circuit board has mounting holes for easy assembly. The amplifier‘s limit frequency is 1 kHz.

Technical Data

Connectable sensors

Strain gauges

Bridge resistance:	350 Ω ... 5 kΩ
Connection technology:	4 wire
Excitation:	2.5 V
Excitation current:	10 mA
Power consumption:	approx. 0.3 VA
Configurable characteristic:	0,5 mV/V ... 30 mV/V
Default setting:	1.5 mV/V

Analog output

Output voltage selectable:
0 ... ± 5 V / 0 ... ± 10 V (standard) selectable

Output resistance:	440 Ω

General amplifier values

Measurement error:	0.1 % F.S.
Zero point: 25 % / 5 % (standard) of measurement range selectable	
Temperature coefficient:	< 100 ppm/K
Zero drift:	< 0.4 µV/K
Auxiliary power:	15 ... 30 V DC
Current consumption:	20 mA / 1 channel
Cut-off frequency:	1 kHz
Range of operating temperature:	0 ... 60 °C
Humidity:	10 ... 80 %, no condensation

Housing IP67

Kind of housing:	tube housing
Connection:	via PG7 at screw terminal
Dimensions (L x W):	120 x 25 [mm]
Material:	aluminium
Protection class:	IP67
Weight:	150 g

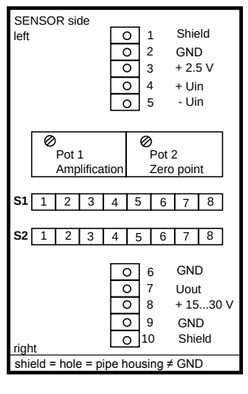
Housing IP20 2-4 channel

Kind of housing:		mounting rail housing
Connection:		at screw terminal
Dimensions (L x W x D):	3 - 4 channels	108 x 90 x 63 [mm]
	2 channels	72 x 90 x 63 [mm]
Material:		plastic
Protection class:		IP20
Weight:		150 g

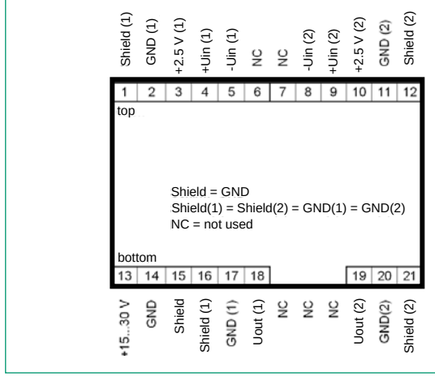
Open circuit board

Connection:	on screw terminal
Dimensions (L x W):	59 x 19 [mm]
Mounting:	4 holes for screws 2.5 in grid 14.6 x 53.6 [mm]
Weight:	50 g

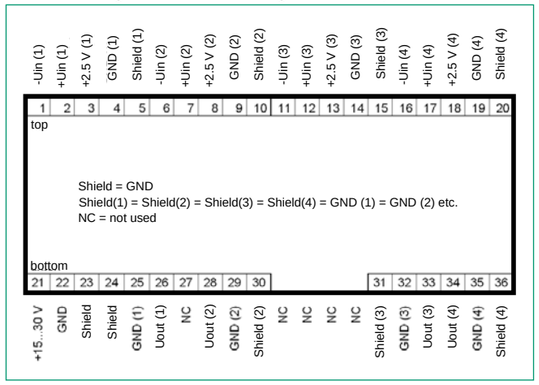
Terminal assignment for circuit board and version in tube housing



Terminal assignment for mounting rail version, 2 channel



Terminal assignment for mounting rail version, 3 or 4 channel



Order Code

Amplifier	9236 - V	X	0	0

IP67	0
Open circuit board	1
2 channel	2
3 channel	3
4 channel	4

Order Information

3 channel version in mounting rail housing **Model 9236-V300**

Calibration of a complete measuring chain
consisting of sensor and measuring amplifier 9236, per measuring channel, to the customer's trimming data. Otherwise, to standard settings typical for the sensor.
Order Code **9236-ABG**

Accessory

Strain gauge simulator
For an easy calibration of amplifiers to strain gauge sensors (please refer to data sheet 76-9405) **Model 9405**

The CAD drawing (3D/2D) for this device 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.

2425-009236EN-5672-081524

Amplifier

Module for strain gauge and potentiommetric sensors

Model 9243

Code:	9243 EN
Delivery:	ex stock
Warranty:	24 months

Rail mounting module

IP65 version

- **Accuracy < 0.05 %**
- **Outputs ± 5 V, ±10 V and 0 (4) - 20 mA**
- **6 wire technique**
- **Isolation between signal and power supply**
- **Cut-off frequency 1 kHz, optional 4 kHz**
- **Configuration via DIP switches**
- **Easy installation on DIN mounting rail**

Application

The amplifier module model 9243 is used wherever measurement signals from strain gauges, potentiometric sensors or DC/DC sensors have to be converted into standard signals. Simply by mounting on conventional DIN-mount rails, it is possible to position the amplifier module on location, in the proximity of the sensor. Especially for rough environments a IP65 version is available.
The broad auxiliary power range and the choice between AC or DC permits operation on standard power supplies used in switch gear cabinets. A highly precise reference voltage source is built-in for calibration purposes. A calibrating shunt can also be connected via two separate terminals. This permits deliberate detuning of a strain gauge sensor for calibration or merely to check the measuring chain.

Description

A highly accurate precision amplifier performs the amplification of the sensor signal being applied. The necessary gain factor is adjusted coarsely with DIP switches while fine-tuning is carried out by using a potentiometer. Current and voltage outputs are available simultaneously. The sensor excitation is performed by the amplifier module itself so that no additional voltage source is required. It can also be set in steps of 2.5 V, 5 V, 10 V using DIP switches. The maximum feed current of 35 mA permits parallel connection of several strain gages, e.g. for the addition of measurement variables. Measurement errors brought about by varying line lengths or due to temperature fluctuations effecting the sensor cable are avoided by having probe lines measuring the actual feed voltage directly on site at the sensor itself (6 wire technology). Fluctuations are immediately corrected electronically. The cut-off frequency of the amplifier can be switched between 10 Hz and 1 kHz. The DIP switches for configuring the entire device are found easily accessible, under a cover.

Technical Data

Connectable sensors

Strain gauges

Bridge resistances:	350 ...1000 Ω
Connection technology:	4 or 6 wire
Sensitivity:	from 0.1 mV/V
Excitation voltage:	2.5 V, 5 V, 10 V
Excitation current:	max. 35 mA

Potentiometer

Resistance:	1 kΩ ... 5 kΩ
Connection technology:	3 wire
Measurement signal:	0 V ... 5 V
Excitation voltage:	5 V
Excitation current:	max. 35 mA
Zero shift:	selectable via DIP switches

Transmitter i.e. DC/DC

Measurement signal:	2.5 mV ... 10 V
Excitation voltage:	2.5 V / 5 V / 10 V
Excitation current:	max. 35 mA

Sensor excitation

Voltage:	2.5 V, 5 V, 10 V via DIP switches
Current:	max. 35 mA

Analog output

Voltage output:	max. 11.5 V at open terminals	±10 V
Current output:		0 ... 20 mA or 4 ... 20 mA
Load:		200 ... 500 Ω
Input impedance:		1 GΩ
Output impedance:	with 10 V output: with monitor output:	470 Ω 10 kΩ

General amplifier data

Gain:	0.5 ... 50 000 (via DIP switches + potentiometer)
Shift zero point:	up to 100 % possible
Accuracy:	< 0.05%
Temperature coefficient:	< 50 ppm / K
Frequency response:	0 -10 Hz or 0 -1000 Hz (via DIP switches)
Electrical isolation:	input and output with respect to power supply 50 V continuous 500 V test voltage
Power supply:	20 - 36 V DC 14 - 26 V AC < 3 VA
Operating temperature:	0 ... 60 °C
Stocking temperature:	- 25 °C ... 70 °C

Rail mounting module

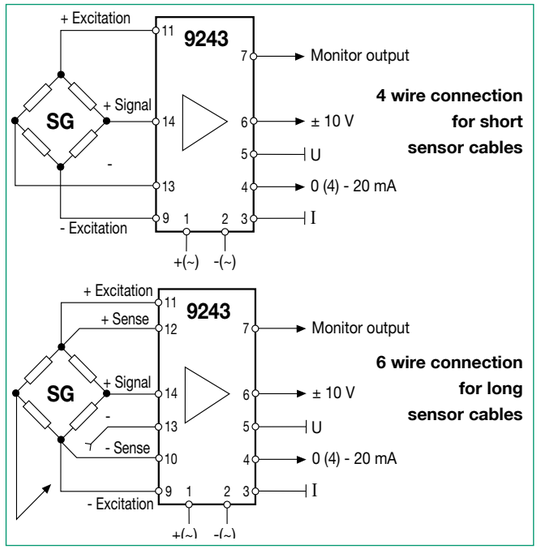
Connections:	terminal connector, 2 x 8 terminals
Dimensions [W x H x D]:	45 x 75 x 108 [mm]
Material:	polyamide 6.6, color: green
Assembly:	on DIN EN 50 022 mount rails
Protection class:	IP20
Weight:	approx. 250 g

IP65 version

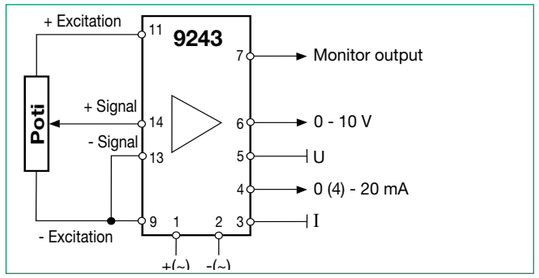
Connection:	terminal connector, 2 x 8 terminals
Dimensions [W x H x D]:	160 x 100 x 65 [mm]
Material:	cast-aluminium
Assembly:	screw mounting
Protection class:	IP65
Weight:	approx. 880 g
Screen distance:	143 x 63 [mm] shaft screw ø 4.7 mm; screw ø 8.5 mm

Connection Schematic

► **for strain gauge sensors, e.g. force, pressure or torque sensors**



► **for potentiometric sensors, e.g. displacement or angle sensors**



The CAD drawing (3D/2D) for this device 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.

Manufacturers default settings

Excitation:	5 V
Filter:	1 kHz
Gain (roughly):	1320 ≙ 1.5 mV/V
Integrated analog output:	10 V
Current output:	0 ... 20 mA

Order Code

Amplifier module (rail mounting version)	**Model 9243**
Amplifier module (IP65 housing)	**Model 9243-IP 65**
Amplifier module (cut-off frequency 4 kHz	**Model 9243-V001**

Calibration of entire measuring chain

Consisting of sensor and amplifier model 9243	**Model 9243-ABG**

Please specify the adjustment data
e.g. 0 N ≙ 0 V; 500 N ≙ 10 V; cut-off frequency 1 kHz

Accessories

Rail mounting transformer 230 V AC (115 V AC) / 24 V AC
12 VA for the power supply max. 4 amplifier modules
Dimensions (W x H x D): 60 x 50 x 50 mm

in 230 V version	**Model 9243-Z001**
in 115 V version	**Model 9243-Z002**
Plug-in socket; 8 pins	**Model 9900-V106**

DMS Simulator
for an easy adjustment of the amplifier to SG sensors
(refer to data sheet 76-9405) **Model 76-9405**

2426-009243EN-5672-081524

Press-fit Control

PRESS-FIT CONTROL

DIGIFORCE® press-fit, joining, torque and process monitoring series

9307 / 9311	DIGIFORCE® measurement system with DigiControl PC software
9110	ForceMaster, low-cost hand-lever press monitoring
5510	DIGIPILOT acknowledgement device for manual work

Overview Press-fit, Joining, Torque and Process Control model numbers 91 ... | 93 ...

MODELS	9307	9311	9110
Figure			
Measurement Channels	6	2	2
Max. Amount of Active Measurement Channels	3	2	2
Sensor Principles	Strain gauge, Potentiometer, Process signal analog, Incremental, SSI, EnDat, Torque, Angle of rotation, Piezo	Strain gauge, Potentiometer, Process signal analog, Piezo	Strain gauge, Potentiometer
Measurement Accuracy	0.05 % F.S.	< 0.2 % F.S.	< ± 2 % F.S.
Fieldbus Interfaces	PLC interface, PROFIBUS, PROFINET, EtherNet/IP, EtherCAT	PLC interface, PROFIBUS, PROFINET, EtherNet/IP	No
Interfaces	USB, RS232, Ethernet	USB slave (service interface on the front), Ethernet USB master	USB, RS232
Max. Amount of Measurement Programs	128	16	1
Specific Characteristics	Comprehensive process monitoring delivered by innovative evaluation elements, flexible process integration thanks to a range of fieldbus interfaces, simultaneous monitoring of two synchronous processes, ultrafast evaluation and data transfer for dynamic measurements, transfer of process, component and worker data, intelligent signal sampling using a combination of Δt, ΔX, ΔY, independent and variable start/stop logic, convenient configuration screens, DigiControl PC software with powerful data-logging function for process data	Flexible Fieldbus integration by PROFIBUS, PROFINET or EtherNet/IP, automatic sensor recognition from burster TEDS, 3.5" colour touchscreen display, 16 measurement programs, rapid data logging on USB flash drive, new evaluation elements (trapezoid window and thresholds), user-configurable I/Os and 6 real-time switching signals, smart autosetup for evaluation elements, handles worker, admin and identification data, up to 50 most recent measurements available for display and analysis, records and evaluates a forward and return curve, live sensor values provided at the Fieldbus interface, synchronous logging of measurement data using DigiControl PC software for multichannel applications	Excellent value „Plug & Work" complete system, easy autoconfiguration with automatic setting of the evaluation tools, smart Card system for manipulation free configuration and storage of settings, acoustic and optic error indication, data logging on USB stick (optional), PLC sequence control function (optional), analysis and configuration software included, automatic sensor identification, hub and other component counters
Main Application Fields	Press-fitting, joining, torque or torque monitoring, haptic testing, latching, universal signal testing	Press-fitting, joining, riveting, stamping, crimping	Hand pressing monitoring, press-fitting

2427-000089EN-5872-081524

Universal Process-Controller

For monitoring press-fit and joining operations, torque and process curves, plus spring and switch testing, including resistance measurement, signal testing and leak detection
DIGIFORCE®
Series 9307

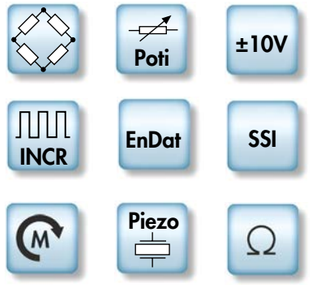
burster

Code:	9307 EN
Delivery:	ex stock/4 weeks
Warranty:	24 months

NEW

PROFINET® PROFIBUS® EtherNet/IP™ EtherCAT®

Compatible sensors

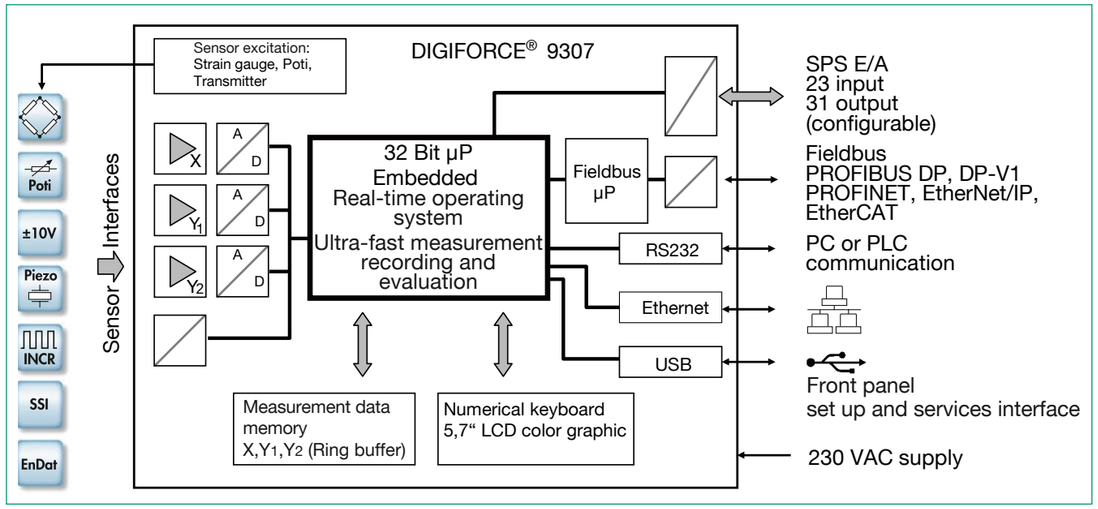


- **Comprehensive process monitoring delivered by innovative evaluation elements window, thresholds, trapeziums, envelopes and mathematical operations**
- **High measurement accuracy 0.05 % possible at 10 KHz sampling rate**
- **Flexible process integration thanks to a range of Fieldbus interfaces**
- **Simultaneous monitoring of two synchronous processes**
- **Ultra-fast evaluation and data transfer for dynamic measurements**
- **Ethernet, USB, RS232 as standard**
- **Up to 128 measurement programs for a large variety of parts**
- **Transfer of process, component and worker data**
- **Intelligent signal sampling using a combination of Δt, ΔX, ΔY**
- **Independent and variable start/stop logic**
- **Convenient configuration screens**
- **DigiControl PC software with powerful data-logging function for process data**

Application

The DIGIFORCE® 9307 monitors processes in which precisely defined functional relationships between two or more measured quantities need to be demonstrated. These measured quantities are recorded synchronously during the manufacturing process or subsequent functional testing to produce a measurement curve, which is then assessed using graphical and mathematical evaluation techniques. After internal evaluation, the measurement curve and computed evaluation results are visualized on the color display and are also output at the external control interfaces. The processes in the controller are optimized by a powerful real-time operating system to achieve an extremely fast evaluation cycle: it typically takes just 15 ms to deliver the global OK or NOK evaluation result, which can then be analyzed by the higher-level controller.
In addition to the traditional evaluation windows with defined entry and exit sides, the DIGIFORCE® 9307 also offers thresholds, trapeziums of type X or Y and envelopes as graphical evaluation elements. Individual evaluation results from the graphical tools can then be combined by mathematical operations to provide even more analysis flexibility for a huge range of signal curves.
DIGIFORCE® has a wide range of process control applications, including monitoring processes such as joining, riveting or caulking, or checking torque curves, for instance for hinges or high-quality rotary controls. Even complex signal/time curves (e.g. pressure curves, leaks etc.) can be monitored using the large choice of evaluation techniques.
Simultaneous recording of up to two Y variables (Y_1 and Y_2) with respect to a common X variable allows many applications to use one DIGIFORCE® controller to monitor two synchronous processes.
Alternatively, this feature can be used to evaluate an application with three process variables, for instance the force/displacement curve and associated current consumption of a lifting electromagnet. While DIGIFORCE® is used in many automated production areas, it is equally at home in the manual workstation, for instance to monitor force/displacement when using hand presses for assembly or for random spot-checking in goods inwards.

Block diagram



Measurement data acquisition

With an active measurement, which can be triggered by different events, the synchronously measured quantities X,Y_1 and optionally Y_2 are saved in the measurement data memory. Real-time signals can indicate whether measurements are exceeding set signal levels while the measurement is still in progress. The evaluation phase follows immediately after the measurement. In this phase, DIGIFORCE® checks whether the recorded measurement curve(s) satisfy the stored graphical and mathematical evaluation criteria. If any of these criteria has been infringed, the measurement is classified as BAD (NOK), otherwise it is rated as GOOD (OK). Once this evaluation is complete, the measurement curve, the global OK or NOK result and numerous process-related values are displayed in a suite of measurement windows and updated at the Fieldbus interface. The processing steps of the evaluation phase, which finishes when the equipment is ready for the next measurement, have been optimized so that even dynamic manufacturing processes can be monitored.

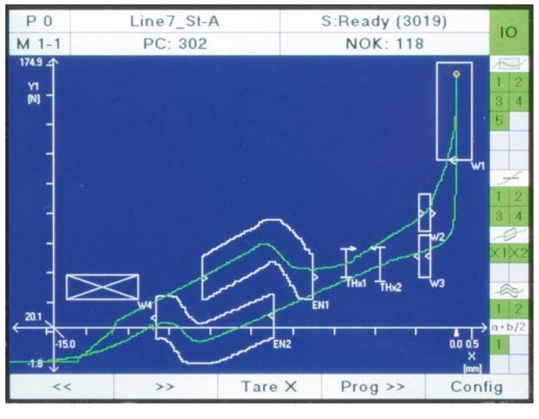


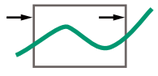
Figure: Measurement window M1-1 contains a graph of the measurement curve. Shows a curve containing a forward and return section and detailed evaluation using windows, envelopes, thresholds and mathematical operations.

Evaluation of a measurement curve

As a universal evaluation tool for a vast range of curve shapes, the DIGIFORCE® 9307 provides configurable evaluation elements, which can be used to classify a measurement curve as OK or NOK. In addition to the traditional evaluation windows with defined entry and exit sides, the DIGIFORCE® 9307 also uses thresholds, trapeziums of type X or Y and envelopes as graphical evaluation elements. Individual evaluation results from the graphical tools can then be combined by mathematical operations to provide even more analysis flexibility for a range of signal curves. The graphical evaluation elements can be configured both numerically and graphically in setup mode using one or more recorded measurement curves. They can be used in any combination, even overlapping in an X/Y graph.

Window evaluation

Symbol



Max. number: 10

The Window evaluation element tests whether the curve has passed through the defined entry side and exit side in the window area. The user can configure these entry/exit sides as required, and can even set multiple input/output sides. A live signal can be assigned to up to two windows, which is enabled immediately during recording if any infringement occurs. It is also possible to define windows of type NOT (no entry/exit) or BLOCK (curve ends inside the window) by suitable configuration of the entry/exit sides. This evaluation element also calculates the values listed below, which can optionally be displayed and also input to user-definable mathematical functions for further processing and evaluation:

- Entry and exit coordinates (measurement pairs)
- Local minimum/maximum
- Absolute minimum/maximum
- Mean value Y_{Mean}
- Integral (area below curve to Y_{MIN} limit inside window)
- Curve gradient
- Inflexion point

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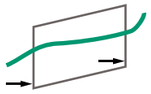
Trapezium evaluation element

Symbol



Max. number: 4

The DIGIFORCE® 9307 offers two different types of trapezium: the type-X trapezium window with fixed X_{MIN}, X_{MAX} limits and type-Y trapezium with fixed Y_{MIN}, Y_{MAX} limits. The trapezium evaluation element tests whether the curve has passed through the defined entry and exit sides; only one entry side can be configured for this element. The entry/exit values are calculated.

Threshold evaluation element

Symbol

Max. number: 4

The threshold evaluation element can be used to calculate and monitor where the measurement curve passes through a defined X-value or Y-value. The user can choose between threshold type X or Y. Threshold type Y provides the following extra results:

- Local minimum/maximum
- Absolute minimum/maximum
- Mean value Y_{Mean}
- Integral (area between curve and X-axis in the threshold region X_{MIN} to X_{MAX})
- Curve gradient
- Inflexion point

Envelope evaluation element

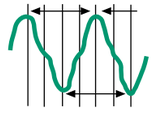
Symbol

Max. number: 2

The DIGIFORCE® 9307 can use one or more measurement curves to generate up to two envelopes. The user can then customize a generated envelope in the X-domain, and also set tolerances for the Y-domain. For a measurement curve comprising a forward and return curve section, the envelope cannot lie over the turning point.
When subsequently monitoring a measurement in measurement mode, DIGIFORCE® tests whether the measurement curve lies within the defined envelope band i.e. is classified OK, or whether the curve passes outside the valid envelope and hence must be classified NOK.

Rotary switch evaluation element

Symbol

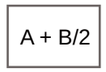


Max. number: 2

The Rotary switch evaluation element enables haptic testing of rotary switches and rotary or rotating controls comprising up to 32 control positions. This evaluation tests whether the number and level of force maxima and minima satisfy the saved criteria. In addition, the angular distance and Y-mean value of the extreme values will be monitored.

Mathematical operation

Symbol



Max. number: 10 of which 6 can be evaluation

Specific measurement curve variables and results from the graphical evaluation elements can be combined using basic mathematical operators (+, -, x, ÷) and evaluated. A result can be processed further in a subsequent operation. The evaluation is fed into the global evaluation result. The results of a mathematical operation can be displayed in a measurement window and retrieved via the Fieldbus and/or communication interfaces.

Flexible process integration

The DIGIFORCE® 9307 has the versatility to integrate into practically all process environments. A huge number of detailed requirements can be implemented using the numerous I/Os (23 inputs / 31 outputs), some of which can be assigned user-defined functions. A measurement can be started and terminated at variable times by different internal and external events.

Sampling and recording measurement signals

Signals can be sampled as a combination of time interval (Δt), X-interval and Y-interval (ΔX, ΔY) to provide a flexible yet also compressed measurement recording. Curve areas containing a constant or steadily changing signal can be reproduced with just a few stored measurement points, while steep signal slopes or alternating waveforms require many points.

Start/Stop conditions for measurement recording

The DIGIFORCE® 9307 lets the user define independent start/stop logic.
Start conditions: Ext. control signal, measurement above or below a definable X-value or Y-value.
Stop conditions: Ext. control signal, measurement above or below a definable X-value or Y-value, timeout, definable number of recorded measurements reached.

Recording and evaluating two synchronous processes

Two signal curves Y_1 and Y_2 can be recorded with respect to a common X-channel and evaluated in one measurement phase. For the evaluation, the user assigns the required graphical evaluation elements to each graph, and the evaluation is performed independently using separate process signals (OK-$Y_{1/2}$). Alternatively, it is possible to monitor an application that has three process variables.

Limit monitoring in real time

S1 ... S4 The user is able to assign the switching signals S1 ... S4 to the three measurement channels X, $Y_{1/2}$ as required, and can set their polarity. The associated PLC I/Os and Fieldbus signals are updated both in standby mode and also in real time during the measurement cycle (response time < 10 ms).

NOK ... ONLINE$_{1/2}$ Up to two live signals (NOK-ONLINE$_{1/2}$) can be used if the curve does not pass through the permitted region of the window evaluation element. This allows preemptive termination of a joining process in ultra-quick time if the two components get intertwined, protecting parts, tools or even the entire system from damage.

Technical changes reserved. All data sheets at www.burster.com

Process data

The DIGIFORCE® 9307 visualizes a comprehensive set of process data during measurement mode and automatic production mode. All relevant process data can be transferred to the controller or PC environment immediately after a measurement. The user can switch between the following process windows:

- ► M1-1/2 Graph of $Y_1(X)$ or $Y_2(X)$ measurement curve
- ► M1-3 Shared display of $Y_{1/2}(X)$ curves
- ► M2-1/2 General display of $Y_1(X)$ or $Y_2(X)$ curves
- ► M3 Full-screen PASS/FAIL or smiley
- ► M4 Entry/exit data for evaluation elements
- ► M5 List of user-specific process values (up to 24 values)
- ► M6 Statistics on all graphical evaluation elements (trend/histogram)
- ► M7 Job sheet containing process, worker and parts data

Each process window displays the global header containing information on the selected measurement program, the associated part quantities and NOK figures, and the global OK/NOK evaluation. The status field on the right shows the evaluation elements that are active in the measurement program and their individual results.

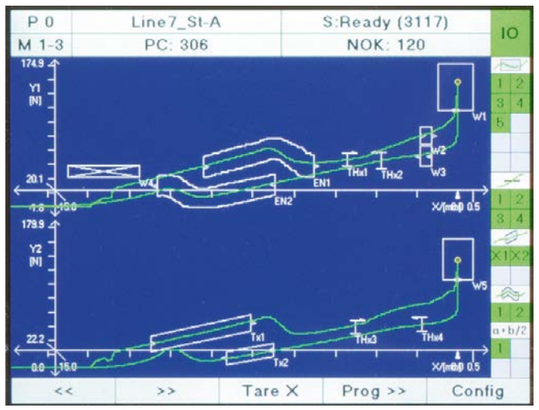


Figure: Display showing the two measurement curves $Y_1(X)$ and $Y_2(X)$

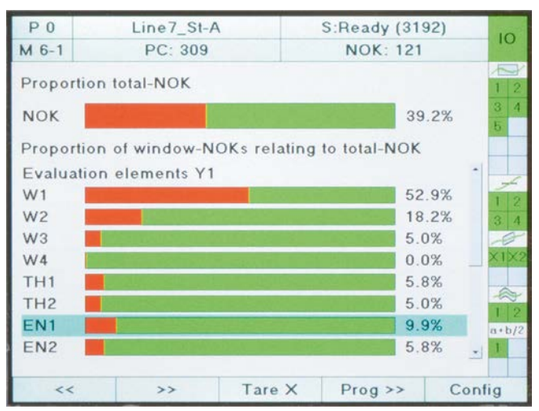


Figure: Statistics showing the frequency and distribution of NOK evaluations. It is also possible to display a trend diagram and histogram for the entry/exit data for each active graphical evaluation element.

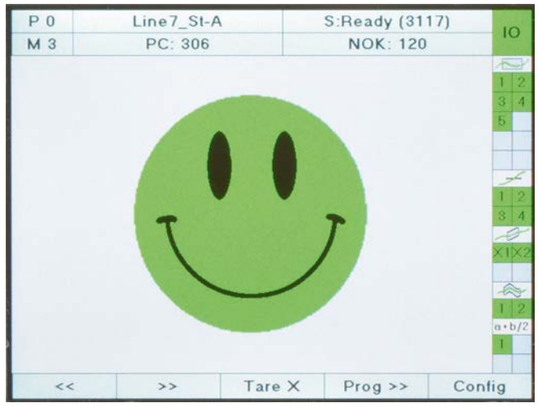


Figure: A full-screen smiley is an internationally understood symbol for the global OK/NOK evaluation (alternatively can display PASS/FAIL).

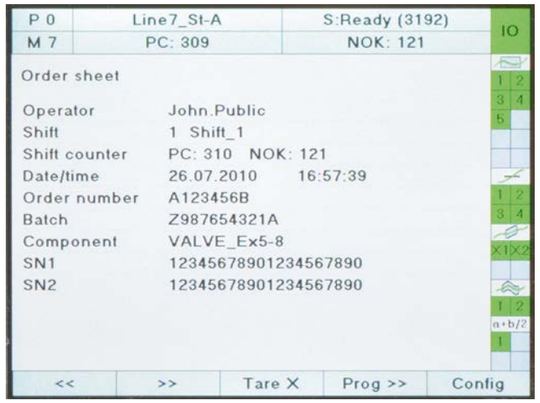


Figure: The job sheet is used to transfer administrative and component-related data from the PLC to the PC for process data logging.

Sensor configuration and calibration

The user can choose which physical channels A...F to assign to the measurement graphs (X, $Y_{1/2}$ coordinates) and set the graph scale. This gives the user the freedom, for instance, to use a preferred mounting for a displacement sensor, and then set the scale to display/evaluate a decreasing or increasing, positive or negative displacement. The sensor is calibrated either from the sensor certificate data or else by the teach-in process.

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Fieldbus interface

An independent communication processor provides the Fieldbus interface via PROFIBUS, PROFINET, EtherCAT or EtherNet/IP.

Cyclical realtime process data
- ► Process control
- ► Retrieval of specific measurement results
- ► Live values of the active sensors

Non cyclical parameter/ADMIN/result data
- ► Transfer of component/worker/job data for logging
- ► Complete device configuration
- ► Retrieval of large amounts of process and curve data

32/128 measurement programs

The DIGIFORCE® 9307 comes with the capability to manage up to 32 measurement programs, which can be rapidly selected via I/O, Fieldbus or keypad. Each measurement program contains the full configuration of sensors, measurement procedure and evaluations. The PC software DigiControl can be used to download alternative DIGIFORCE® 9307 firmware, which has the capability to handle up to 128 measurement programs. This firmware re-allocates the internal memory so that up to 400 measurement pairs/triplets can be recorded.

The intelligent sampling tool, with its facility to combine variables (Δt, ΔX and ΔY), ensures that these 400 value pairs are normally sufficient to reproduce and evaluate a measurement curve.

Internal measurement curve memory

In graphical setup mode, one or more imported measurement curves can be used to configure the evaluation elements. This is still possible even if the process requires a change in measurement program back at the setup stage. Up to ten measurement curves can be saved in each measurement program as a curve array, which then provides the basis for the evaluations to be defined. In measurement mode, this memory acts as a ring buffer, where the remaining 50 measurement curves are stored. The DigiControl PC software can be used to retrieve and analyze these measurements.

User-definable function keys

The function keys F1...F4 below the display can be assigned to various functions as required. The following functions are available for selection for example: browse measurement screens, tare, start/stop measurement, change program, confirm OK/NOK evaluations, sensor test.

DIGIFORCE® 9307 and PC software DigiControl – a high performance package

The DIGIFORCE® 9307 is a fully autonomous test controller that not only displays status information and evaluation results in its process environment but can also transmit this data to a controller. The high-performance DigiControl software package has additional functions to further increase process availability and reliability.
A **basic version**, which is available free of charge, includes applications for creating data backups (up/download) and for saving a comprehensive set of service data for optimum support by the burster service team.
The **config version** (9307-P101) supports full device configuration, creation of backups, and retrieval and display of measurement curves, including all evaluation results and statistics. An especially convenient feature is the definition of graphical evaluation elements such as envelopes, windows, trapeziums and thresholds based on a set of curves of measured master or reference parts. Alternatively, ready-archived measurements can also be used to create new evaluations. Clearly structured configuration windows enable convenient device setup. Changes can be made step-by-step either at the file level or directly using the DIGIFORCE® 9307.

The **Plus version** (9307-P100) of the PC software DigiControl provides, in addition to the standard functions, an automatic production mode, which, for example, logs production measurement data with clear parts references. The resultant measurement logs are not only available in the internal program format, but can also be imported into EXCEL data. Even for synchronous processes involving large amounts of data, logging of measurement data is optimized to achieve an ultra-short cycle time. In addition to the DIGIFORCE® device interface, it also supports an extra control interface for more complex tasks. This can be used, for instance, for reloading device configurations or transferring component references for measurement data logging.

Upgrade from DIGIFORCE® 9306 to DIGIFORCE® 9307

A DIGIFORCE® 9307 device configuration can be generated from a DIGIFORCE® 9306 backup file using DigiControl. The software imports the sensor and evaluation settings and selects as close a configuration as possible for the DIGIFORCE® 9307. Then just a few minor final adjustments and settings are needed to resume production under process control.

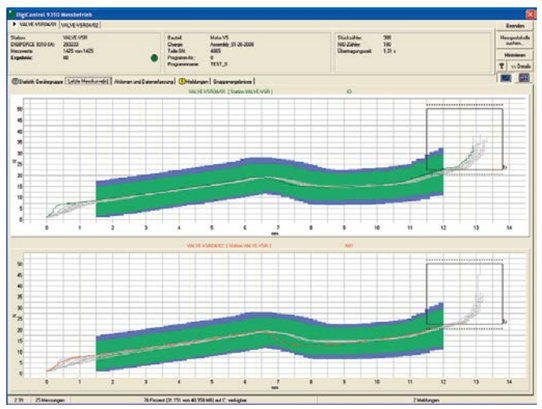


Figure: The „measurement mode“ function displays the curve and status information of the most recent measurement. A multi-channel view is also possible. The corresponding log is automatically saved in the background.

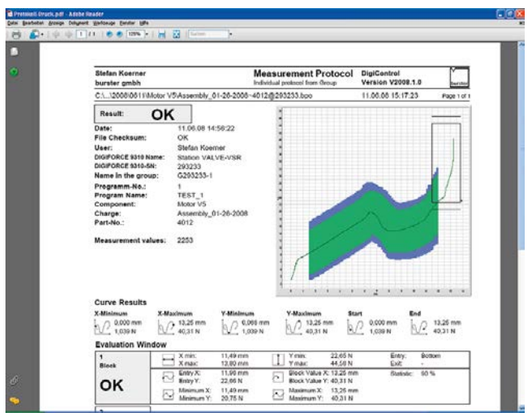


Figure: A Data-log wizard provides filters for selecting and displaying stored measurement logs. A log printout containing component data, curve information and all evaluation results can be generated for each individual measurement log.

Technical changes reserved. All data sheets at www.burster.com

General Technical Data

Sampling rate:	10 kHz
Signal sampling:	ΔX, ΔY, Δt in any combination
Measurement curves:	Y_1 (X) and Y_2 (X)
Digitalization:	16 bit
Evaluation time:	15 ms
Measurement programs:	32 (5,000 value pairs)* / 128 (400 value pairs)
Power supply:	90 ... 264 VAC / 47 ... 63 Hz / typically 30 VA
Delay in real-time limit signals S1 ... S4:	< 10 ms
Operating temperature range:	+ 5 ... + 23 ... + 40°C
Protection class:	IP30 / IP65 panel-mounted
Display:	5,7“ TFT LCD (640 x 480)
Keypad:	numerical, configurable function keys

* Factory-installed device firmware. Firmware can be changed via PC software DigiControl.

Compatible Sensors

Flexible assignment of physical channels A ... F to measurement graphs ($X/Y_{1/2}$ coordinates)

Channel A, B (strain gauge, potentiometer, process signals)

Strain gauge sensors

Measurement ranges:	± 1 ... 40 mV/V
Bridge resistance:	120 Ω ... 5 kΩ
Excitation voltage:	2.5 V, 5 V, 10 V
Excitation current:	35 mA or 70 mA @ 10 V
Cut-off frequency:	5 ... 5,000 Hz in discrete bands
Total error:	< 0.05% F.S. @ ≥ 1 mV/V < 0.1 % F.S. @ < 1 mV/V

Potentiometer, process signals

Excitation voltage:	5 V / 10 V
Transmitter excitation:	24 V, 150 mA
Measurement ranges:	± 5 V, ± 10 V
Excitation current:	100 mA max.
Cut-off frequency:	5 ... 5,000 Hz in discrete bands
Total error:	< 0,05 % F.S.

Channel C incremental sensors, EnDat 2.2, SSI

Signal:	TTL / RS422, sinusoidal voltage 1 V_{pp}, sinusoidal current 11 µA
Counter depth:	32 bit, ± 2EXP31
Cut-off frequency:	1 MHz
Reference mark:	single, multipoint, distance-coded
Absolute value:	EnDat 2.2, SSI, reference travel for distance encoding
Transmitter excitation:	5 V, 300 mA

Channel D combined channel analog/incremental (option)

Strain gauge or process signal:	± 1 ... 40 mV/V, ± 5 V, ± 10 V
Total error:	according to channels A, B
Incremental interface:	TTL/RS422, Sinus 1 V_{pp}, Sinus 11 µA
Transmitter excitation:	5 V, 300 mA / 15 V, 200 mA

Channel E resistance measurement (option)

Measurement ranges:	200 mΩ, 2 kΩ, 100 kΩ
Total error:	< 0.5 % F.S. @ 200 mΩ, 2 kΩ < 1 % F.S. @ 100 kΩ

Channel F Piezoelectric (option)

Measurement ranges:	1 nC ... 1 µC in discrete bands
Cut-off frequency:	5 ... 5,000 Hz in discrete bands
Total error:	< 1 % F.S.

Fieldbus Interfaces

I/O interface

Two parallel PLC ports to EN 61131-2, 24 VDC, opto-isolated
23 inputs D-SUB-37 (male)
31 outputs, of which 23 configurable, maximum load I_{MAX} 200 mA, D-SUB-37 (female)

PROFIBUS (option)

D-SUB9

Bau drate	max. 12 MBaud
Communication protocol	cyclic service **DP-V0** acyclic service **DP-V1**

PROFINET, EtherNet/IP, EtherCAT (option)

2 port western-socket (RJ45)

Communication protocol	cyclical realtime process data non cyclical parameter data

Communication Interfaces

Device parameterization, data backup (up/download), high-speed measurement data logging

USB	Slave port (model B) front panel Data rate ~ 1 Mbaud
RS232	D-SUB9 (PC connecting using 1 : 1 cable 9900-K333) Format 8.1 Data rate 9600 baud ... 115.2 Kbaud
Ethernet	10/100 Mbit, Western socket (RJ45)

Housing

Combined desktop/panel-mounted housing (W x H x D):
205 x 160 x 240 [mm]

Desktop version:	4 rubberized feet (fitted as standard)
Front panel (W x H):	220 x 175 [mm]
Front panel cut-out (W x H):	206 x 161 [mm]
Weight:	approx. 5 kg

Accessories

Fixing kit for panel mounting **Model 9300-Z003**

PC software

PC software DigiControl: basic version for creating a data backup (up/download) and saving a service record included with device delivery and can be downloaded free from www.burster.com

PC software DigiControl: configuration software for convenient device configuration including backup function, USB data cable
Model 9307-P101

PC software DigiControl: PLUS version including high-speed, in process logging of measurement data, Data-log wizard, EXCEL data export **Model 9307-P100**

Cables and connectors

Connecting cable for burster displacement sensors
8710 ... 8719 series, length 3 m **Model 99209-591A-0090030**

Connecting cable for torque sensor model 8651/8661 incl. angular measurement to option channel D, length 3 m
Model 99163-540A-0150030

Adapter cable (Y-type) for torque sensor model 8661 incl. angular measurement to standard channels A/B and C (only to use together with model 99163-540A-015xxxx) **Model 99209-215A-0090004**

Connecting plug for A, B and E channel, D-SUB-9
(pack of 2 included with device) **Model 9900-V209**

Connecting plug for C and D channel, D-SUB-15 **Model 9900-V163**

Adjustment of a complete measuring chain

Adjustment and scaling of up to 3 sensors including test certificate **93ABG**

Order Code

DIGIFORCE®	9307	- V	□	□	□	□
	Standard		0	0	0	0
Analog option						
Piezo interface			X	1	X	X
Combined channel analog / INCR (D) and resistance measurement (E)			X	2	X	X
Fieldbus option						
EtherCAT			X	X	X	1
PROFIBUS (DP-V0/DP-V1)			X	X	X	2
PROFINET			X	X	X	3
EtherNet/IP			X	X	X	4

Please request
our broschure

**"DIGIFORCE® -
because every hit counts".**

It contains numerous
applications,
a detailed
product specification and
a look
at a range
of compatible sensors.

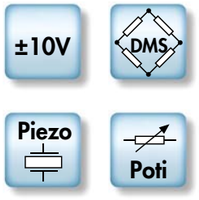
2428-009307EN-5672-081524

DIGIFORCE® X/Y monitoring

For monitoring press-fit, joining, rivet and caulking operations

Series 9311

Code:	9311 EN
Delivery:	ex stock/4 weeks
Warranty:	24 months



Compatible sensors

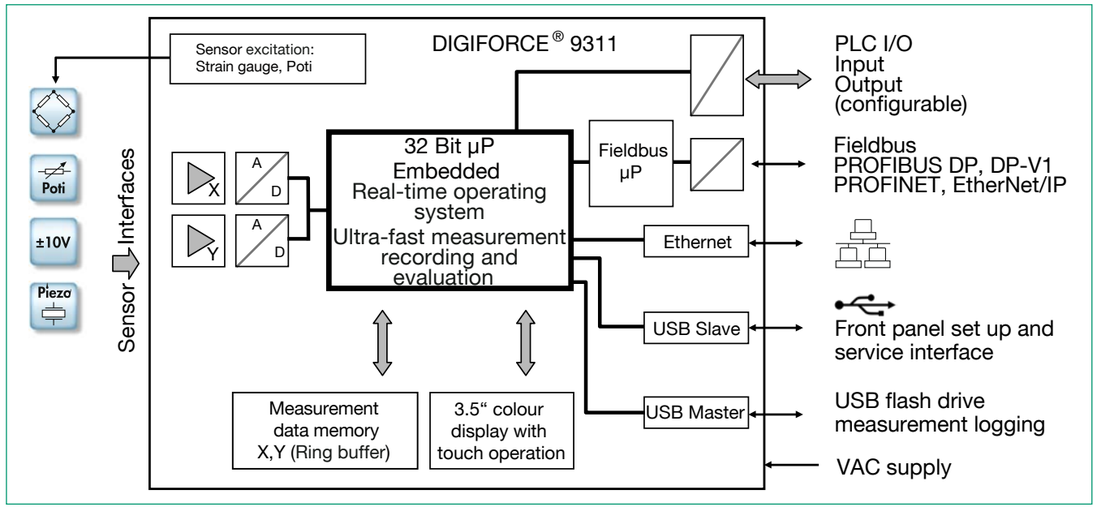
- **Flexible Fieldbus integration by PROFIBUS, PROFINET or EtherNet/IP**
- **Automatic sensor recognition from burster TEDS**
- **3.5" colour touchscreen display**
- **16 measurement programs**
- **Rapid data logging on USB flash drive**
- **New evaluation elements (trapezoid window and thresholds)**
- **User-configurable I/Os and 6 real-time switching signals**
- **Smart autosetup for evaluation elements**
- **Handles worker, admin and identification data**
- **Up to 50 most recent measurements available for display and analysis**
- **Records and evaluates a forward and return curve**
- **Live sensor values provided at the Fieldbus interface**
- **Synchronous logging of measurement data using DigiControl PC software for multichannel applications**

Application

DIGIFORCE® 9311 is the new standard in efficient quality control. The pioneering force/displacement controller delivers rapid, precise evaluation results for applications that demand both high quality and high productivity. The smart performance features and intelligent hardware make test equipment quicker to set up, easier to use and capable of automatic integration in modern production systems. This unrivalled product specification gives businesses the added security and dependability they need for increasingly complex production processes.
The DIGIFORCE® 9311 monitors processes in which precisely defined functional relationships need to be demonstrated between two measured quantities of the process. For instance when recording and monitoring processes such as press-insertion, joining, riveting, stamping or caulking, reliable quality control depends on synchronous and high-speed acquisition of measured values combined with analysis based on versatile evaluation elements. DIGIFORCE® 9311 provides the modern platform you need for this task, offering the widest choice of Fieldbus interfaces, including PROFINET, PROFIBUS and EtherNet/IP, to let you integrate the test setup in your particular control environment.

Even in fully manual workstations such as manual presses with force/displacement monitoring, DIGIFORCE® 9311 can be used for convenient and efficient process monitoring thanks to custom add-on functions like acknowledge and inhibit signals.
The DIGIFORCE® 9311 uses burster TEDS to provide automatic sensor recognition. This feature automatically reads an electronic datasheet stored in the sensor so that the relevant data can be used in the measurement-channel configuration. With no chance of operator error during setup or servicing, it's best to play safe with burster TEDS. DIGIFORCE® 9311 offers versatile solutions for processes that need not just an OK/NOK evaluation but also data logging capabilities for recorded measurements and curves. Data from semi-automated and fully automated systems can be logged via the available Fieldbuses without slowing down production or via the Ethernet port (included as standard) linked to a server, host or local PC. The DigiControl PC software provides support with an automatic data logging mode that runs in parallel with production. There is also the option for high-speed data acquisition on a USB flash drive.

Block diagram



Measurement data acquisition

With an active measurement, which can be triggered by different events, the synchronously measured quantities X,Y are saved in the measurement data memory. Real-time signals can indicate whether measurements are exceeding set signal levels while the measurement is still in progress. The evaluation phase follows immediately after the measurement. In this phase, DIGIFORCE® 9311 checks whether the recorded measurement curve satisfy the stored graphical evaluation criteria. If any of these criteria has been infringed, the measurement is classified as BAD (NOK), otherwise it is rated as GOOD (OK). Once this evaluation is complete, the measurement curve, the global OK or NOK result and numerous process-related values are displayed in a suite of measurement windows and updated at the Fieldbus interface. The processing steps of the evaluation phase, which finishes when the equipment is ready for the next measurement, have been optimized so that even dynamic manufacturing processes can be monitored.

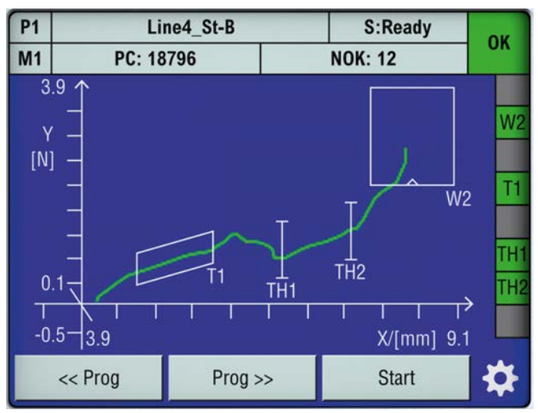


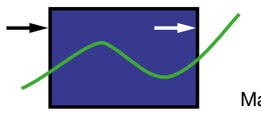
Figure: Measurement dialog M1: graphical display of measurement curve:
This screen shows the curve in a typical press-insertion process up to an end-point force YMAX. In this example, a trapezoid window and two threshold elements monitor the sliding-contact zone. The window (W2) ensures that the end-point force lies in the correct displacement range.

Evaluation of a measurement curve

As a universal evaluation tool for a vast range of measurement curves, the DIGIFORCE® 9311 provides configurable evaluation elements, which can be used to classify a measurement curve as OK or NOK. In addition to the traditional evaluation windows with defined entry and exit sides, the DIGIFORCE® 9311 also uses thresholds, trapeziums of type X or Y and envelopes as graphical evaluation elements. The graphical evaluation elements can be configured both numerically and graphically in setup mode using one or more recorded measurement curves. They can be used in any combination, even overlapping in an X/Y graph.

Window evaluation element

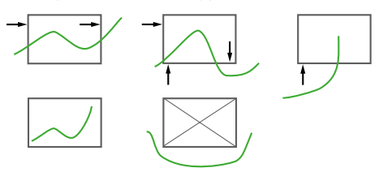
Symbol



Max. number: 3

The Window evaluation element tests whether the curve has passed through the defined entry side and exit side in the window area. The user can configure these entry/exit sides as required, and can even set multiple input/output sides. A live signal can be assigned to one window, which is enabled immediately during recording if any infringement occurs. It is also possible to define windows of type NOT (no entry/exit) or BLOCK (curve ends inside the window) by suitable configuration of the entry/exit sides. The path of the X/Y curve through the window area is always analysed both for entry and exit coordinates and the absolute minimum and maximum points.

Examples of window types:



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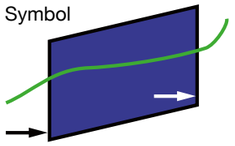
Trapezium evaluation element

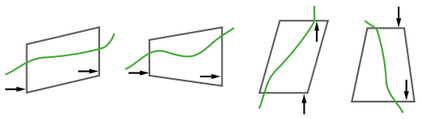
Symbol



Max. number: 2

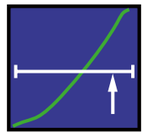
The DIGIFORCE® 9311 offers two different types of trapezium: the type-X trapezium window with fixed XMIN, XMAX limits and type-Y trapezium with fixed YMIN, YMAX limits. The trapezium evaluation element tests whether the curve has passed through the defined entry and exit sides; only one entry side can be configured for this element. The entry/exit values are calculated.

Examples of trapezium types:



Threshold evaluation element

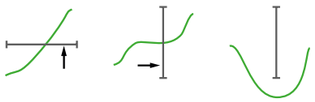
Symbol



Max. number: 2

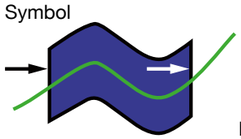
The threshold evaluation element can be used to calculate and monitor where the measurement curve passes through a defined X-value or Y-value. The user can choose between threshold type X or Y.

Examples of threshold types:



Envelope evaluation element

Symbol



Max. number: 1

The DIGIFORCE® 9311 can use one or more measurement curves to generate one envelope. The user can then customize a generated envelope in the X-domain, and also set tolerances for the Y-domain. For a measurement curve comprising a forward and return curve section, the envelope cannot lie over the turning point.
When subsequently monitoring a measurement in measurement mode, DIGIFORCE® tests whether the measurement curve lies within the defined envelope band i.e. is classified OK, or whether the curve passes outside the valid envelope and hence must be classified NOK.

Measuring programs

With the capability to handle 16 measuring programs, the DIGIFORCE® 9311 can switch quickly and flexibly between different component versions and/or joining parameters. The measuring programs can be selected via I/O, Fieldbus or even the Ethernet port. Sensors can be configured individually in each measuring program or using global settings.

Flexible process integration

The DIGIFORCE® 9311 has the versatility to integrate into practically all process environments. A huge number of detailed requirements can be implemented using the numerous I/Os (10 inputs / 13 outputs), some of which can be assigned user-defined functions. A measurement can be started and terminated at variable times by different internal or external events.

Fieldbus interface

An independent communications processor provides an optional Fieldbus interface via PROFIBUS, PROFINET or EtherNet/IP.

Cyclical real-time data
- ► Process control
- ► Retrieval of specific measurement results
- ► Live values from active sensors

Acyclical data for parameters, ADMIN and results
- ► Transfer of component/worker/job data for logging
- ► Complete device configuration
- ► Retrieval of large amounts of process and curve data

Sampling and recording measurement signals

Signals can be sampled as a combination of time interval (Δt), X-interval and Y-interval (ΔX, ΔY) to provide a flexible yet also compressed measurement recording. Curve areas containing a constant or steadily changing signal can be reproduced with just a few stored measurement points, while steep signal slopes or alternating waveforms require many points.

Start/Stop conditions for measurement recording

The DIGIFORCE® 9311 lets the user define independent start/stop logic.
- ► Start conditions: Ext. control signal, measurement above or below a definable X-value or Y-value.
- ► Stop conditions: Ext. control signal, measurement above or below a definable X-value or Y-value, timeout, definable number of recorded measurements reached.

Limit monitoring in real time

S1 ... S6 The user is able to assign the switching signals S1 ... S6 to the two measurement channels as required, and can set their polarity. The associated PLC I/Os and Fieldbus signals are updated both in standby mode and also in real time during the measurement cycle (typ. response time < 3 ms).

NOK-ONLINE The live signals OUT_NOK_ONL can be used if the curve does not pass through the permitted region of the window evaluation element. This allows pre-emptive termination of a joining process in ultra-quick time if the two components processed incorrect, protecting parts, tools or even the entire system from damage.

Process data

The DIGIFORCE® 9311 visualizes a comprehensive set of process data during measurement mode and automatic production mode. All relevant process data can be transferred to the controller or PC environment immediately after a measurement. The user can switch between the following process windows:

- ► M1 Graph of measurement curve
- ► M2 General display of Y(X) curves
- ► M3 Full-screen PASS/FAIL or smiley
- ► M4 Entry/exit data for evaluation elements
- ► M5 List of user-specific process values (up to 20 values)
- ► M6 Statistics on all graphical evaluation elements
- ► M7 Job sheet containing process, worker and parts data

Each process window displays the global header containing information on the selected measurement program, the associated part quantities and NOK figures, and the global OK/NOK evaluation. The status field on the right shows the evaluation elements that are active in the measurement program and their individual results. The user can customize the buttons at the bottom of the Process dialog touchscreens with particular device functions. Alternatively, the live values from the X/Y measurement channels can also be displayed here.

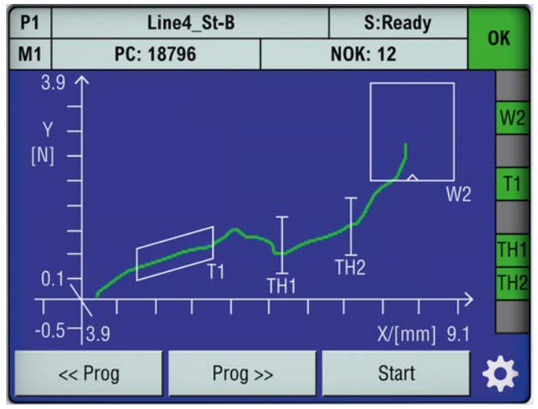


Figure: M1 – graphical display of measurement curve
The function keys can optionally be displayed at the bottom of the screen.

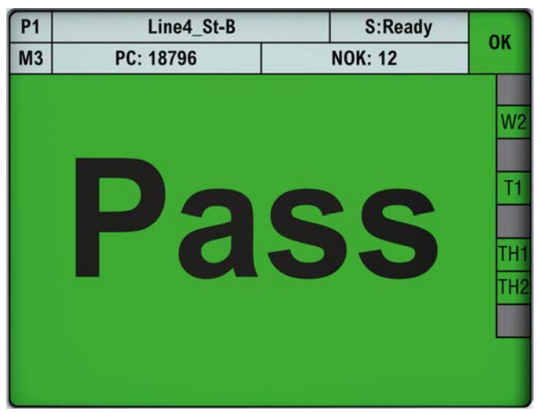


Figure: PASS/FAIL full-screen display
A large OK/NOK smiley can be used as an alternative indicator.

M5 – List of user-specific process values
Users can customize their own process values in each measurement program. They can personally enter numerous different result values, for instance a force maximum inside the window and/or tolerance limits for the window. The values in this list are transmitted to the Fieldbuses directly with the OK/NOK evaluation. In addition, the measured values are also issued for logging on USB flash drive and for the Excel statistics export in the DigiControl PC software.

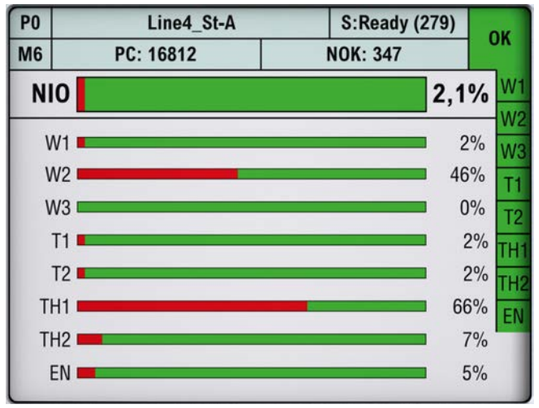


Figure: M6 – Statistics
Statistics showing the frequency and distribution of NOK evaluations. The percentage of NOK results is displayed for each active evaluation element. This information can be used to take suitable corrective action if the NOK reject level gets too high.

Device configuration

Device parameters can be fully configured either via the touchscreen display or using the DigiControl PC software (available free of charge). From any of the process screens M1 to M7, you can press the cog icon to access the main configuration level containing the following functions:

- ► Basic setup
- ► Measurement program selection
- ► Measurement program configuration
- ► Curve analysis
- ► Measurement program copy function

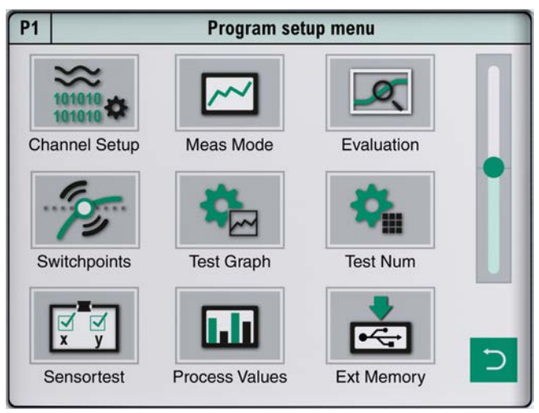


Figure: Parameterization level
Measurement program configuration

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burster TEDS

DIGIFORCE® 9311 uses the burster TEDS (Transducer Electronic Data Sheet) to provide automatic sensor recognition, i.e. the instrument reads the relevant sensor specification from an EEPROM, fitted in the sensor connector, and then uses this data to perform the necessary channel configuration automatically. The memory chip in the sensor connector is programmed as part of a service provided when the sensor is first ordered or subsequently calibrated. The burster TEDS feature is only available for sensors that have a permanently fitted connecting lead.

Logging data on USB flash drive

A USB flash drive can be plugged into the rear USB port (type A) for local logging of measurement data. This form of data logging can be custom-configured for each measurement program. At the end of the measurement cycle and the internal evaluation in the DIGIFORCE® 9311, a data-log entry is then written into the available *.csv-file in a time period of less than 250 msec. The log file contains a header that includes general data such as component name and batch ID, and a new line entry for each measurement, which includes the following data:

- ► Date / Time
- ► Overall result OK/NOK
- ► Serial number (SN from order sheet)
- ► Part counter
- ► “General curve data” dataset (2x7 floating point values)
- ► “User-defined values” dataset (up to 20 floating point values)

PC software DigiControl

The DIGIFORCE® 9311 is a fully autonomous test controller that not only displays status information and evaluation results in its process environment but can also transmit this data to a controller. The high-performance DigiControl software package has additional functions to further increase process availability and reliability.
The **basic version** (9311-P101), which is available free of charge, supports full device configuration, creation of backups, and retrieval and display of measurement curves, including all evaluation results and statistics. An especially convenient feature is the definition of graphical evaluation elements such as envelopes, windows, trapeziums and thresholds based on a set of curves of measured master or reference parts. Alternatively, ready-archived measurements can also be used to create new evaluations. Clearly structured configuration windows enable convenient device setup. Changes can be made step-by-step either at the file level or directly using the DIGIFORCE® 9311.

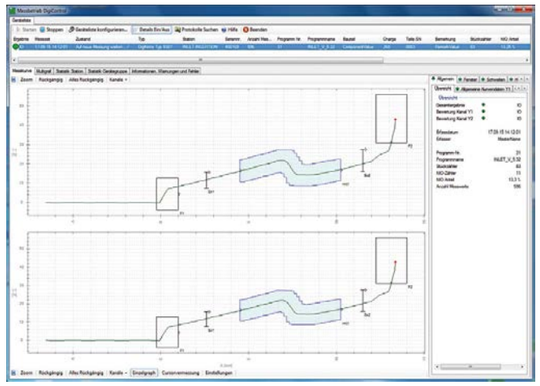
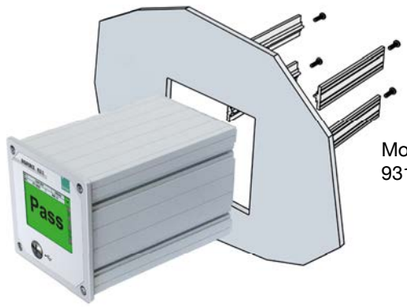


Figure: The „measurement mode“ function displays the curve and status information of the most recent measurement. A multi-channel view is also possible. The corresponding log is automatically saved in the background.

Curve analysis (Viewer)

You can use the “Viewer” tool to look at the most recent 50 measurement curves either as individual curves or as a curve array. In addition, you have detailed numeric data available for each measurement, such as individual results from the graphical evaluation elements and the associated window entry and exit coordinates. If you are getting occasional NOK measurements, you can then use this tool to look at the measurement curve even after the test, and take suitable corrective action to prevent NOK parts. The DigiControl PC software can be used to retrieve and analyse these sets of curves.

Panel mounting



Mounting rack
9310-Z001

The **Plus version** (9311-P100) of the PC software DigiControl provides, in addition to the standard functions, an automatic production mode, which, for example, logs production measurement data with clear parts references. The resultant measurement logs are not only available in the internal program format, but can also be imported into EXCEL data. Even for synchronous processes involving large amounts of data, logging of measurement data is optimized to achieve an ultra-short cycle time. In addition, the software supports an extra remote interface for more complex tasks. This can be used, for instance, for reloading device configurations or transferring component references for measurement data logging.

Porting from DIGIFORCE® 9310 to DIGIFORCE® 9311

A DIGIFORCE® 9311 device configuration can be generated from a DIGIFORCE® 9310 backup file using DigiControl. The software imports the sensor and evaluation settings and selects as close a configuration as possible for the DIGIFORCE® 9311.

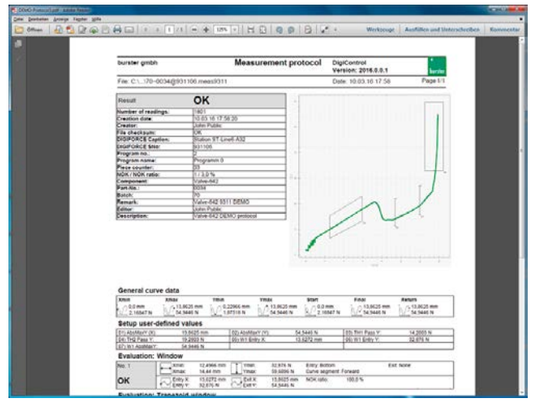


Figure: A Data-log wizard provides filters for selecting and displaying stored measurement logs. A log printout containing component data, curve information and all evaluation results can be generated for each individual measurement log.

General Technical Data

Sampling rate:	10 kHz
Signal sampling:	ΔX, ΔY, Δt in any combination
Digitalization:	16 bit
Evaluation time:	typ. 25 ms
Measurement programs:	16
Power supply:	100 ... 240 VAC ± 10 %, 50 ... 60 Hz ± 10 %
Power consumption:	< 15 VA
Delay in real-time limit signals S1 ... S6:	typ. ≤ 3 ms
Operating temperature range:	+ 5 ... + 23 ... + 40°C
Protection class:	IP40 / IP65 panel-mounted
Display:	3.5“ TFT colour LCD (320 x 240)
Operation:	touch operation
Operating language:	German, English, French, Italian, Spanish, Chinese (only process window)

Compatible Sensors

Flexible assignment of physical channels A ... B to measurement graphs (X/Y coordinates). The function burster TEDS is not available at the optional piezo channel.

Channel A (potentiometer, process signals)

Excitation voltage:	5 V
Excitation current:	10 mA max.
Signal range:	± 5 V, ± 10 V
Cut-off frequency:	5 ... 5000 Hz in discrete bands
Total error:	< 0.2 % F.S.

Channel B (strain gauge, process signals)

Strain gauge sensors

Measurement ranges:	2/4/10/20/40 mV/V
Bridge resistance:	120 Ω ... 5 kΩ
Excitation voltage:	5 V
Excitation current:	30 mA max.
Cut-off frequency:	5 ... 5000 Hz in discrete bands
Total error:	< 0.2 % F.S.

Process signals

Measurement ranges:	± 5 V, ± 10 V
Cut-off frequency:	5 ... 5000 Hz in discrete bands
Total error:	< 0.2 % F.S.

Channel B Piezoelectric (option)

Measurement ranges:	1 nC ... 1 µC in discrete bands
Cut-off frequency:	5 ... 5000 Hz in discrete bands
Total error:	< 1 % F.S.

This option replaces the channel for strain gauge and process signals.

I/O and Fieldbus Interfaces

I/O interface

Parallel PLC port according to EN 61131-2, 24 VDC, opto-isolated, positive logic
10 inputs, of which 3 are configurable
13 outputs, of which 6 are configurable, maximum load I_{MAX} 500 mA, $I_{MAX\ TOTAL}$ 800 mA (all outputs)
D-SUB-25 (model female)

PROFIBUS (option)

D-SUB9

Baud rate	max. 12 MBaud
Communication protocol	cyclic service **DP-V0** acyclic service **DP-V1**

PROFINET, EtherNet/IP (option)

2 port western-socket (RJ45)

Communication protocol	cyclical realtime process data acyclic parameter data

Communication Interfaces

Device parameterization, data backup (up/download), high-speed measurement data logging, USB data logging

USB	Slave port (Micro-B) Front panel Data rate ~ 1 MBaud
USB	Master port (type A) Rear side USB data logging Data format FAT16/32, max. 32 GB
Ethernet	10/100 MBit, western-socket (RJ45)

Housing

Combined desktop/panel-mounted housing (W x H x D): 110 x 110 x 183 [mm]

Desktop version:	4 rubberized feet (fitted as standard)
Front panel (W x H):	119 x 119 [mm]
Front panel cut-out (W x H):	111 x 111 [mm]
Weight:	ca. 1.5 kg
Panel mounting:	rubber feet are replaced by the mounting rack (order code 9310-Z001), device is inserted through the front-panel cut-off and is fixed by screws (see page 5).

Accessories

Fixing kit for panel mounting **Model 9310-Z001**

Connection outlines for mounting several DIGIFORCE® 9311 (2 outlines, 4 screws) **Model 9310-Z002**

PC software

PC software DigiControl for convenient instrument configuration including backup function (upload/download) and laboratory mode for manual reading and analysis of measurement curves, data-log wizard with print and export functions.
Supplied with the instrument and available free of charge from www.burster.com

PC software DigiControl including USB data cable 9900-K358 **Model 9311-P101**

PC software DigiControl: PLUS version plus highspeed, in-process logging of measurement data, data-log wizard and Excel data export **Model 9311-P100**

Cable and connectors

Connecting cable for burster displacement sensors 8710 ... 8719 series, length 3 m **Model 99209-591A-0090030**

Extension cable for sensors with 9900-V209 plug, length 3 m **Model 99209-609A-0150030**

Bridging cable for routing the displacement sensor signal from DIGIFORCE® 9311 to a following device, length 0.5 m **Model 9900-K340**

USB data cable for front-side service interface, length 2 m **Model 9900-K358**

Connecting plug for A, B channel (strain gauge, process signals, potentiometer) **Model 9900-V209**

Connecting plug for PLC-I/O port, 25 pin, Min-D **Model 9900-V160**

burster TEDS

Connector 9 pin, Min-D incl. memory chip for the electronic sensor data sheet **Model 9900-V229**

Fitting connector of the connecting plug incl. programming the electronic sensor data sheet **99011**

Adjustment of a complete measuring chain

Adjustment and scaling of channel X and Y including test certificate **93ABG**

Order Code

DIGIFORCE® **9311** **- V** □ □ □ □

Standard 0 0 0 0

Option card analog

Piezo (instead of strain gauge, process signals)	1

Fieldbus

PROFIBUS (DP-V0/DP-V1)	2
PROFINET	3
EtherNet/IP	4

2429-009311EN-5672-081524

ForceMaster

Low-Cost Monitoring for Manual Presses

Model 9110

Code:	9110 EN
Delivery:	ex stock
Warranty:	24 months

NEW
Single-channel force monitoring

- **Excellent value "Plug & Work" complete system**
- **Easy auto-configuration with automatic setting of the evaluation tools**
- **Smart Card system for manipulation free configuration and storage of settings**
- **Acoustic and optic error indication**
- **Data logging on USB stick (optional)**
- **PLC sequence control function (optional)**
- **Analysis and configuration software included**
- **Automatic sensor identification**
- **Hub and other component counters**

Applications

Pressure on price and quality continue to rise. The need to monitor even the simplest manufacturing and assembly process is increasingly common. With 100% monitoring of force/time curves or force displacement/time curves, the ForceMaster satisfies all requirements for ensuring the reliability of even simple press-fit processes. Thanks to its ultra-simple, single-button operation and intelligent auto-configuration, even semi-skilled staff can set up the equipment safely and quickly. "Card & Go" is the smart system that uses master, tool and PLC smart cards to make equipment settings, inhibit unauthorized changes and to trigger actions in sequence with the production process.

The ForceMaster 9110 has been developed specifically for monitoring manual lever presses. Simple manual workstations can be monitored extremely efficiently using the ForceMaster. Easy control functions that used to require an additional PLC can now be performed reliably with the ForceMaster. Tools can be changed quickly and easily using tool cards.

The ForceMaster is used for example for

- ► Pressing ball bearings
- ► Compressing powders
- ► Press-fitting pinion gears

Description

The ForceMaster has a multi-voltage power supply. Excitation of the load cell and displacement sensor is provided by internal voltage-conditioning circuits. Sensor identification is built into the sensor plug, allowing sensors to be connected easily with no further configuration needed.

The integral auto-configuration tool uses a GOOD component to train the ForceMaster with the measurement curve and automatically set the evaluation elements. The user can make any further fine-tuning and adjustments to these settings manually if required.
Visual indicators such as a red and green indicator lamp signal "Good" or "Bad" parts. An audible sound is also output for "Bad" parts.
The built-in PLC function allows sequence control of up to 60 steps. This can be used, for instance, to control pneumatic cylinders, compressors for blowing out workpieces, and reject gates for OK/NOK parts.

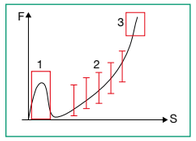
The PC software, which is included free of charge can be used for measurement-curve analysis and fine-tuning the evaluation elements. It also lets the user view and archive the measurement curves recorded on the USB stick.

Automatic sensor identification

The connected sensors are automatically detected by a special plug, so there is no need to configure each of the measurement channels. Faulty sensors or different measurement ranges can be changed in an instant, with no risk of mixing up sensors!

Auto-configuration

The auto-configuration function is an outstanding feature of the ForceMaster 9110.
This tool automatically predefines the start condition and position of the evaluation elements.
The basis for these settings is a GOOD production process in auto-configuration mode. The first stage in this process is to tare the force channel. This is necessary because the ForceMaster 9110 can only measure unipolar forces. Taring corrects any offset voltages and drift in the load cells. Then the ForceMaster 9110 waits for an upward movement of the press. Once the force exceeds a configurable force threshold, measurement recording begins.
If nothing else changes, the ForceMaster waits for a downward movement of the press. The teach-in training process is stopped once measurements pass below the start point. Then the measurements are analyzed and the configuration settings are made. Afterwards, in a second step, the user can choose whether to use force displacement limits (horizontal limits) or 2 gates (vertical limits) for the evaluation. There is also the option to monitor the 1 feed-in area for a maximum force. Another option is to enable monitoring of the 3 block force. As part of the block-force monitoring function, the user can also enable monitoring of the end deformation.
In addition, changes can be made to the internally calculated values and limits manually.



Main evaluation types

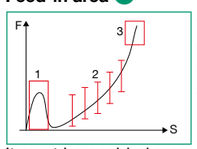
- Force displacement limits
- Gates (vertical force displacement)

The user can also enable:

- Feed-in force monitoring
- Block-force monitoring
- End-deformation monitoring
- Force alarm 1
- Force alarm 2

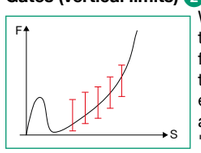
Description of evaluation types

Feed-in area 1



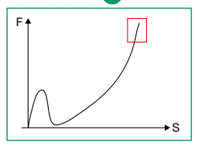
Within this area, the measurement process can be monitored for exceeding a maximum force (upper feed-in limit). Good parts are not allowed to exceed this limit.
The feed-in area is always disabled after the teach-in measurement process.
It must be enabled manually.

Gates (vertical limits) 2



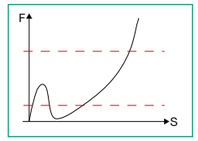
With force-displacement limits, the force in this area must always exceed a minimum force (lower force limit). The force must then not drop below this limit again over the entire area. For good parts, the force must also not exceed a second force limit, the "upper force limit".
In the measuring range, the horizontal force-displacement limits are replaced by vertical force-displacement limits. 5 gates are active. Each are defined by a displacement position and an upper and lower force. The measurement curve must pass through the gate between these two forces. The gates do not have to be placed in a specific order. Evaluation is not performed until the last gate has been passed in the displacement direction.

Block area 3



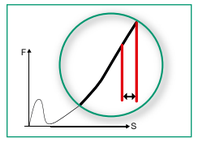
This area is usually where the end of the measurement lies, which a good part must always reach. The force limits "lower block limit" (which must be exceeded) and "upper block limit" (which the force must not drop below) are used to monitor the block force.
The measurement curve must end in this area. The curve must not go beyond the displacement point defining the block end (NOK). The measurement curve is allowed to have already exceeded the "lower block limit" when it enters this area. It is not allowed, however, to drop below the "lower block limit" again in this area.
The block area is always disabled after the teach-in measurement process. It must be enabled manually.

Force alarms



In addition to the evaluation areas 1 - 3 force alarms 1 and 2 are always available.
Force alarm 1 is used to monitor the load cell outside a started measurement. Since this is monitored over the displacement, this force monitoring is not enabled for the Y=f(t) function (no displacement measurement).
Force alarm 2 is used for continuous monitoring of the load cell - both outside and during a measurement.
CAUTION: The force alarms do not generate an NOK evaluation. They are simply used to set the "Alarm occurred" PLC output for information purposes. But only if sequence control is not enabled!

End deformation



This option is used for monitoring deformation of the workpiece around the maximum force. This is done by measuring the displacement when the force exceeds the "lower block limit".
The end deformation is obtained from the difference between the maximum displacement during the measurement process and the deformation value saved when the force exceeded the "lower block limit". The calculation starts once the force has dropped below the "lower block limit" again during the return stroke.
End-deformation monitoring is always disabled after the teach-in measurement process. It must be enabled manually.

Components

Following counter options are accessible via the menu

- Parts OK
- Parts NOK
- Total parts
- Down-counter
- D-set (set value for down-counter)
- T.stroke (total-stroke counter)

PLC sequence control function (optional)

Control is based on the principle of a sequencer. A built-in electronic cam switch is provided for this purpose. The combination of these two forms of control provides a very powerful range of functions.
In principle, one can visualize a cam as a displacement range, which is also linked to the direction of movement. This makes it possible to program certain actions that are active for as long as the press stays in this range.
A sequence is composed of a series of commands that are processed step by step. Each step contains a condition and an action. The controller waits at each step until the condition is met and then carries out the action. Only then it does move on to the next step.
There are 8 inputs and 8 outputs available. Depending on the safety requirements and risk levels of the application, additional measures must be taken to achieve the necessary "safety level".

Data logging on the USB stick

Curve data can be saved on an USB stick for subsequent analysis and assessment. This is possible for a press-insertion operation that has a cycle time of ≥ 1 second.

Display options

The display can show the following options: live sensor values, actual value for force/displacement or time, live evaluation, parts counter or maximum sensor values.

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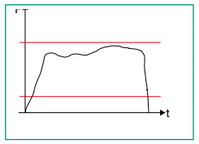
Special option force monitoring

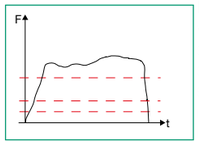
The force-time option is designed for straightforward force measurements requiring evaluation. For this application, just one load cell is connected to the ForceMaster 9110.

Force thresholds



Force thresholds can be used to monitor whether the force lies in a defined range.
A green light indicates that the force lies in the specified range. A force that exceeds the upper force threshold triggers a visual and acoustic alarm. Evaluation takes place online during measurement.

Limits



In addition, 3 limits are available for defining various switching results. With hysteresis settings, a limit buffer and customizable switching behaviour, these switching results can be tailored to customers' requirements. There is also a facility to delete the limit via a digital input.

Smart cards

Master card

Only the master card allows access to the configuration menu. Without this card, the user is only permitted to view the general equipment data. It is also possible to specify in the configuration settings that faulty parts can only be confirmed with a master card.

Tool card

The tool card can be used to save and then reload a parts-specific program configuration (ForceMaster 9110 settings for measuring and evaluating a particular device under test).
This is useful, because different parts (depending on calibration quality) can then be measured on the same equipment or in future also on different ForceMaster 9110 units, without needing to perform an auto-configuration.

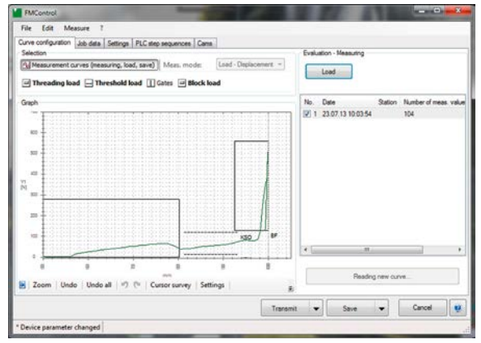
PLC card

A sequence-control program and the associated cam configuration can be stored on the PLC card and reloaded later.

PC software

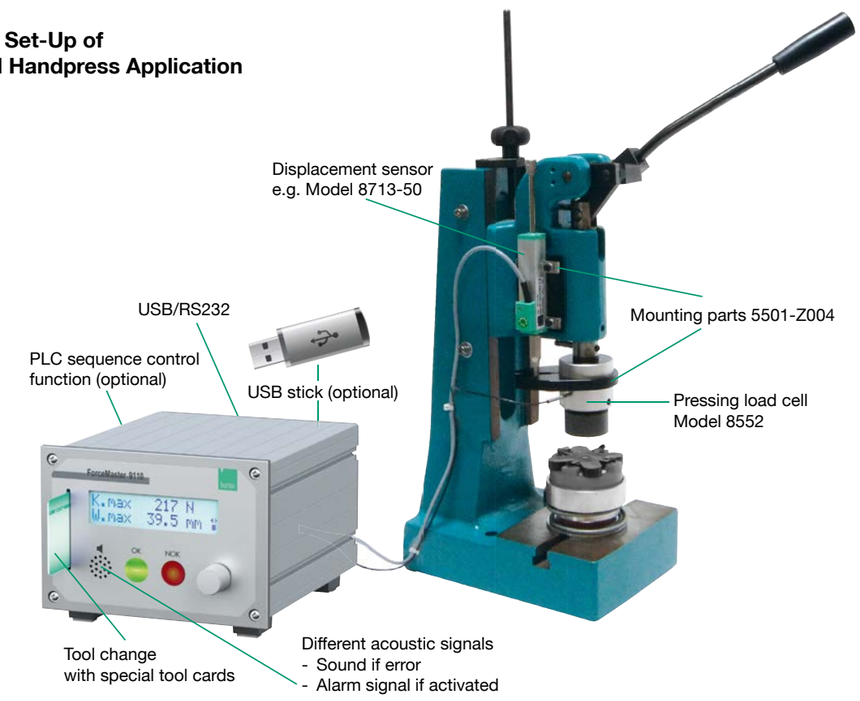
The free of charge configuration and analysis software FMControl offers following possibilities:

- Device parametrization
- Backup function
- Setting of evaluation elements according to auto configuration
- Programming the sequence
- Analysis of measurement curve
- Data storage and archiving
- Management and creation of tool smart cards



Application

Typical Set-Up of Manual Handpress Application



Load cell model 8552

The force is measured by a load cell, which is fitted on the press ram between sensor and tool. The load cell is equipped with mechanical overload protection.

Technical Data

Accuracy:	< ± 2 % F.S.
Measuring ranges:	from 0 ... 100 N to 0 ... 20 kN (50 kN ... 100 kN with model 8451)
Maximum force during use:	approx. 120% of rated force
Degree of protection:	IP54 to EN 60529
Diameter:	50 mm
Height without peg:	50 mm
Peg diameter:	10 mm
Sensor hole diameter x depth: (other pegs/holes optionally available)	standard 10^{H7} x 25 mm

When the sensor is used in the press, it is important to ensure that it is operated without transverse forces during the working stroke. Therefore the tool must be guided with the minimum possible play and the workpiece must be positioned securely.

Detailed technical data on the load cell is given in the 8552 data sheet.

Displacement sensor Model 8713 (optional)

The full working stroke of the press ram can be monitored by a model 8713 displacement sensor firmly mounted on the press head.

Technical Data

Linearity deviation:	< 0.1 % full scale
Resolution:	0.01 mm
Degree of protection:	IP40 to EN 60529

When the displacement sensor is retrofitted to an existing press, a sketch is available which identifies the positions of the mounting holes that need to be made on the press head. We recommend using our 5501-Z004 mounting kit for this purpose.

Detailed technical data on the displacement sensor is given in the 8712/8713 data sheet.

Technical Data

Sensors for the force channel

Bridge resistor:	350 Ω ... 5 kΩ
Connection type:	4-wire
Sensor excitation:	5 V
Excitation current:	20 mA
Power consumption: approx. 0.3 VA	
Input voltage:	1 mV ... 10 mV
Total error:	< 1 % F.S.

Sensors for the displacement channel

Sensor type:	potentiometric displacement sensor
Track resistance:	1 kΩ ... 5 kΩ
Total error:	< 1 % F.S.

General equipment data

Display:	2 line illuminated LCD display
Warning and confirmation sounds:	configurable signal type
Alarm signal volume:	up to 75 dB
Measurement channels:	force/displacement or force/time
Communication interfaces: USB RS232	- Slaveport type B, on the back - D-SUB 9, 19.2 kbaud data rate
Mains power supply:	90 ... 240 V AC / 50 ... 60 Hz
Cut-off frequency:	1 kHz
Operating temperature range:	5°C ... 40°C
Storage:	- 10°C ... 60°C
Air humidity:	10 ... 80 %, non-condensing
Enclosure type:	aluminum section
Degree of protection:	IP20
Connections:	coded special plugs
Sampling interval:	10 kHz
Protection class:	1
Number of I/O:	8 inputs / 8 outputs
Response time relay:	1 ms
Total current of all outputs:	0.3 A internal excitation 1.5 A external excitation
Dimensions (W x H x D):	174 x 119 x 213 [mm]
Weight:	approx. 3 kg

Order Code

ForceMaster Standard		**9110 - V**	☐	☐	☐ ☐
			0	**0**	**0 0**
Options	PLC sequence control function			1	
	USB stick data logging				1
Single-channel force only			1		

Order Information

ForceMaster with PLC function and USB data logging
Analysis and configuration software **Model 9110-V0101**

Accessories

In order to fit the displacement sensor securely and firmly on the press head or on the load cell itself while still allowing fine adjustment, assembly kits are available that include all necessary parts such as carriers, plates, screws and mounting diagram for correct positioning

for 8451 load cell, measurement range up to 0 ... 20 kN **5501-Z002**
for 8451 load cell, measurement range starting from 0 ... 50 kN **5501-Z003**
for 8552 load cell **5501-Z004**

For further information see accessories' data sheet.

Cables

Connecting cable for potentiometric displacement sensors including plug (e.g. 8712) **Model 99221-591A-0090030**
RS232 cable to PC **Model 9900-K333**
USB cable to PC **Model 9900-K349**

Smart carts

Master card for full configuration access **Model 9110-Z001**
PLC card for storing PLC sequences on the card **Model 9110-Z002**
Tool card for saving tool data and measurement programs **Model 9110-Z003**

Connectors

Connector plug for load cells, containing stored sensor calibration data **Model 9900-V245**
Connector plug for potentiometric displacement sensors, containing stored sensor calibration data **Model 9900-V221**
Connector assembly **Model 99005**

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DIGIPILOT

Acknowledgement device for manual work optical and acoustical notification

Model 5510

Code:	5510 EN
Delivery:	ex stock
Warranty:	24 months

- **Variably adjustable optical and acoustical signalling of OK/NOK parts**
- **Processor controlled device, up to 8 different operation modes selectable**
- **OK/NOK indicator lights on the front side**
- **External interlocking, operation and display**
- **Robust housing for industrial environment front plate IP65**
- **Usable on desktop or installed to panel meter**

Application

On production floor, the need for optical as well as acoustical notification of OK and NOK parts can be found oftentimes next to the evaluation done by measuring and evaluating instrumentation. Especially for manual work places with a certain allowed time/work piece ratio the additional notification related to the product is wanted, sometimes also the control of the previously identified OK and NOK parts. This function is fulfilled by DIGIPILOT 5510.
The control device regulates dependencies of work processes by necessary acknowledgement of OK- and/or NOK parts and informs the results visually via warning lamp and acoustically via buzzer. Moreover, the mechanical arrest of a press, storing area or part feeding can be effected until an unmistakable identification for the product is done.
The dependencies of acknowledgement, alarm and arrest are determined by the different operation modes which can be changed only by the fitter himself. The 24 V supply voltage for supplying the inputs "OK-" and "NOK acknowledgements" is available even without a connected PLC. The DIGIPILOT 5510 is designed for rough industrial environment. As a complete unit with different switching and notification possibilities the device is priced at good value compared to a collection of separate solutions.

Description

DIGIPILOT 5510 is optimized with DIGIFORCE® 9311, DIGIFORCE® 9310. The two devices are connected electrically 1:1 via the PLC interface of DIGIFORCE® 9311, DIGIFORCE® 9310 and a 25 pin cable model 9900-K331. If DIGIFORCE® 9311, DIGIFORCE® 9310 is controlled via PLC the connection must be done on the available second bushing on DIGIPILOT 5510. DIGIPILOT 5510 offers different operation modes that need to be activated by jumpers in the 15 pin Sub-min-D connector for both modes, active as well as passive, i.e. with or without acknowledgement.
This acknowledgement can be effected via the indicator lights on the front side of the instrument or via an external button (normally open). At the beginning of a new measurement, the present evaluation is erased. In the operation mode "Confirmation and evaluation NOK" the red light stays switched-on, even at a new measurement start. It will switch-off only after acknowledging the "NOK" result by pushing the green button.

Technical Data

Operational elements on front side

- green light for power excitation control
- green indicator light for OK notice and acknowledgement
- red indicator light for NOK notice and acknowledgement
- buzzer

Operational elements on back side

- On/Off and loudness controller for internal buzzer
- Power switch
- Security holder for power fuse
- Five LEDs for function control
- Two 25 pin D-sub-sockets
- One 15 pin D-sub-sockets
- Power supply

Acknowledgement

Configured functions by means of soldered bridges in 15 pin D-sub-connector

Function 1 No acknowledgement active
Purely passive operation, DIGIPILOT model 5510 only visualizes the evaluation of the connected measurement device

Function 2 External acknowledgement for OK-parts
Operator must acknowledge every OK part by pushing the button, NOK parts cannot be acknowledged

Function 3 External acknowledgement for NOK parts
Operator must acknowledge every NOK part by pushing the button, OK parts cannot be acknowledged

Function 4 External acknowledgement for OK and NOK parts
Operator must acknowledge every OK and NOK part by pushing the button.

Function 5 Internal acknowledgement for NOK parts
Operator must acknowledge every NOK part by pushing the button, OK parts cannot be acknowledged factory setting

Function 6 Internal acknowledgement for NOK parts and external acknowledgement of OK parts
Operator must acknowledge every OK and NOK part by pushing the button

Function 7 Internal or external acknowledgement for NOK parts.
Operator must acknowledge every NOK part by pushing the button OK parts cannot be acknoledged

Function 8 Internal or external acknowledgement for NOK parts
External acknowledgement for OK parts

Technical Data

Excitation voltage:	90 ... 264 V eff / 47 ... 63 Hz
Power consumption:	5 ... 15 VA
Power fuse:	5 x 20 mm, 0.25 AT
Power supply connector:	euro plug with security fuse and power switch
Protection class of device:	IP30
Protection class of front plate:	IP65
Housing:	aluminium housing with support
Dimensions (W x H x T):	ca. 111 x 111 x 183 mm
Recess for panel installation:	ca. 112 x 112 mm
Front plate of device:	119 x 119 mm
Weight:	approx. 1400 g
Operation temperature range:	5 ... 40 °C
Range of storage temperature:	- 10 ... 60 °C
Protection class:	1
Transient over voltage:	category 2
Grade of contamination:	2
Ground potentiale:	< = 50 V on ground

Air humidity: up to 31 °C 80 %, above that linear descending to 50 % at 60 °C, not dewing

Power rating of output:		
	PLC supply 24 V	100 mA
	Supply of OK and NOK button	50 mA
	OK output	100 mA
	NOK output	100 mA
	Alarm output	100 mA
	Locking device output	200 mA

Pin alignment of 15 pin D-sub-socket

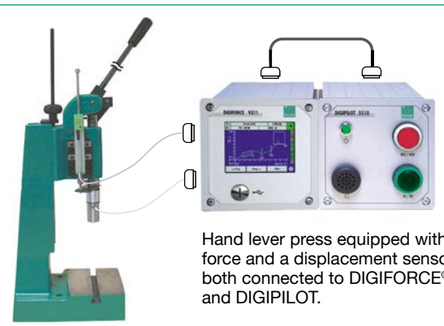
Pin	1:	Deactivate internal NOK key
Pin	2:	Deactivate internal lights
Pin	3:	Activate external NOK acknowledgement
Pin	4.	Output OK
Pin	5:	Output NOK
Pin	6:	Output locking device
Pin	7:	Output alarm
Pin	8:	24 V supply output for inputs OK and NOK acknowledgement activate
Pin	9:	Activate external OK acknowledgement
Pin	10:	Reference point for activation of functions, corresponds to PLC ground
Pin	11:	Activate 24 V supply
Pin	12:	Input OK acknowledgement
Pin	13:	Input NOK acknowledgement
Pin 14 and 15:		Reference ground of 24 V supply for the outputs OK, NOK, alarm and locking device

Accessories

Data cable to DIGIFORCE® model 9311	**Model 9900-K331**
Data cable to DIGIFORCE® model 9307	**Model 99160-165A-0090020**
Mounting kit for panel installation	**Model 9310-Z001**
Connecting profiles to a DIGIFORCE® model 9311	**Model 9310-Z002**
Mating connector 15 pin D-sub with soldering bridges	***Model 5510-Z001**
Mating connector 25 pin D-sub	***Model 9900-V160**

* one unit is included in scope of delivery

Application



Hand lever press equipped with force and a displacement sensor, both connected to DIGIFORCE® and DIGIPILOT.

The CAD drawing (3D/2D) for this device 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.

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Calibration Instruments

CALIBRATION INSTRUMENTS

Calibration of Mechanical Values

7281	TRANS CAL portable testing device for force, torque, displacement and pressure
72-REF	Reference measuring chain with DAkkS calibration certificate for compression loads from 500 N to 200 kN
72-9206-REF	Portable precision USB sensor interface for force, torque and pressure sensors
76-9405	Strain gauge simulator

Overview Calibration Devices for Mechanical Values model numbers 72 ...

MODELS	7281	72-9206-REF	72-REF
Figure			
Measurement Accuracy	< ± 0.001 % F.S.		< ± 0.001 % F.S.
Sample Rate	0.1 … 1200/s (DC) 0.1 … 2/s (AC)	1200/s	0.1 ... 1200/s (DC) 0.1 ... 2/s (AC)
Sensor Principles	Strain gauge, Potentiometer, Transmitter, Sensors and devices with voltage output	Strain gauge, Potentiometer, DC/DC, Pt100	Strain gauge, Potentiometer, Transmitter, Sensors and devices with voltage output
Interfaces	USB 2.0	USB	USB 2.0
Indicator	± 9.999 + 3 dig. unit	Status LED	± 9.999 + 3 dig. unit
Sensor Excitation	Strain gauge: DC: 2.5 V / 5 V (for 120 Ω only 2.5 V) AC: 2.5 Veff / 5 Veff (from 350 Ω) Potentiometer: 5 VDC Transmitter: 12 VDC ± 5 %	Strain gauge: 2,5 V / 5 V Potentiometer: 5 V Transmitter and DC/DC: 12 V	Strain gauge: DC: 2.5 V / 5 V (at 120 Ω only 2.5 V) Potentiometer: 5 VDC Transmitter: 12 VDC ± 5 %
Protection Class	IP40	IP67	IP40
Supply Voltage	10 ... 28 VDC	4 V … 6 V	10 ... 28 VDC
Measurement Channels * via software DigiVision	16	32*	16
Specific Characteristics	Device test: Strain gauge simulator up to ± 50 mV/V, import function for electronic sensor data sheet, storage of up to 16 measurement programs, data logger for up to 30.000 measurements, factory calibration certificate/ DakkS calibration certificate optionally available for the instrument/entire measurement chain, min/max peak values	Cost effective "Plug&Measure" concept, 24-bit resolution, practical and convenient DigiCal calibration and data acquisition software, Pt100 as option, free LabView driver DLL for integrating in your own software environment, multipurpose reference measurement chain with optional factory calibration certificate or German accredited DAkkS calibration certificate, 6-wire connection technology	Device test: Strain gauge simulator up to ± 50 mV/V, import function for electronic sensor data sheet, storage of up to 16 measurement programs, data logger for up to 30.000 measurements, factory calibration certificate/ DakkS calibration certificate optionally available for entire measurement chain, 10 force measurement ranges selectable from 100 N to 100 kN, Min/max peak values, sensor can easily be integrated into the flow of forces
Main Application Fields	Use as a reference measurement chain in combination with a load cell, calibrate presses, joining machines and other equipment with mechanical measurement values, calibrate display devices and instrumentation amplifiers with straingauge or standard-signal input, check strain-gauge sensors and produce test reports	Reference measurements for calibrations in the field and in the lab	Reference measurement chain for checking and calibrating presses, joining machines and other force-application equipment, up to 16 different load cells can be connected to one unit, generate test reports and export data for Microsoft Excel

Options:	■ Pt100 ■ Free DLL ■ LabVIEW driver ■ Software DigiCal for creation of measurement logs
Services:	Adjustment, factory calibration certificate, DAkkS calibration certificate, on-site calibration
Accessories:	Aluminium case

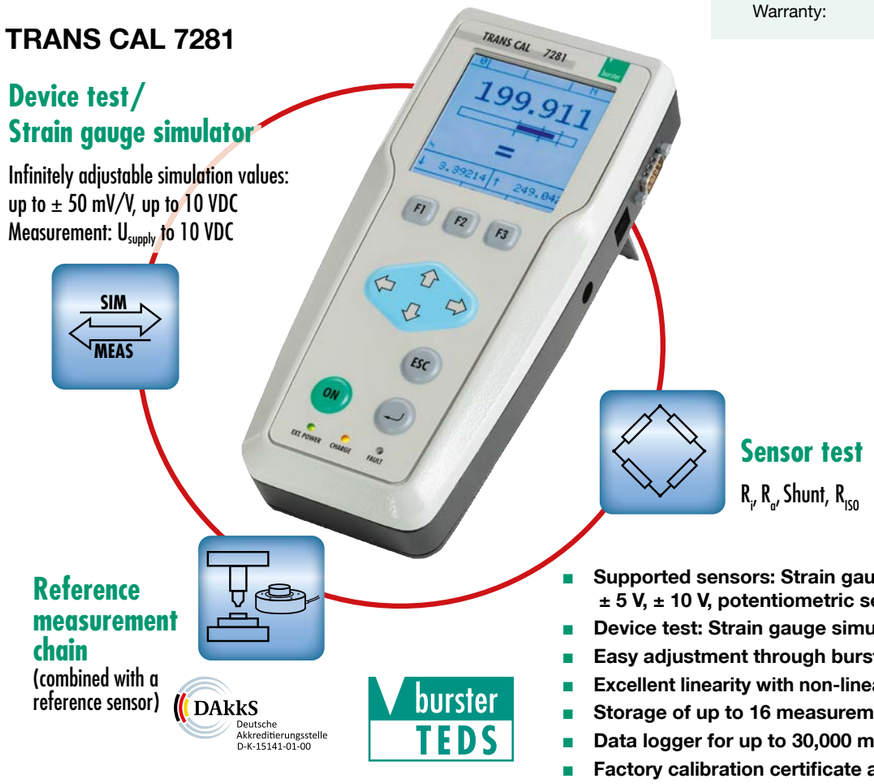
2431-000089EN-5872-081524

Mobile High-Precision Calibrator and Testing Device

For mechanical and electrical measurements

TRANS CAL 7281

Code:	7281 EN
Delivery:	ex stock
Warranty:	24 months



- **Supported sensors: Strain gauge/normalized signa ± 5 V, ± 10 V, potentiometric sensors**
- **Device test: Strain gauge simulator up to ± 50 mV/V**
- **Easy adjustment through burster TEDS**
- **Excellent linearity with non-linearity < ± 0.001 %**
- **Storage of up to 16 measurement programs**
- **Data logger for up to 30,000 measurements**
- **Factory calibration certificate and/or German accredited DAkkS calibration certificate optionally available for the instrument / entire measurement chain**

Application

The multipurpose digital indicator TRANS CAL 7281 can be used wherever there is a need to perform high-precision, on-site calibrations of sensing components used in equipment such as presses, torque tools or pressure-regulating systems. An optional factory calibration certificate or German-accredited DAkkS calibration certificate can be provided when the measurement device needs to be used as a reference. This provides a quick and cost-effective way of assessing a system with traceable documentation of measurement results.
If a reference measurement cannot be made because the sensor location is difficult to access, it is still possible to test the zero point, the input, output and isolation resistance as well as the calibrating offset of the fitted sensor. It is also possible to check the indicating device by measuring the excitation voltage and simulating the characteristic values (mV/V or V) of the sensor used.
The instrument is used in metrology institutes, calibration laboratories and in industry in the fields of quality assurance, facility commissioning and system monitoring.
Areas of use:

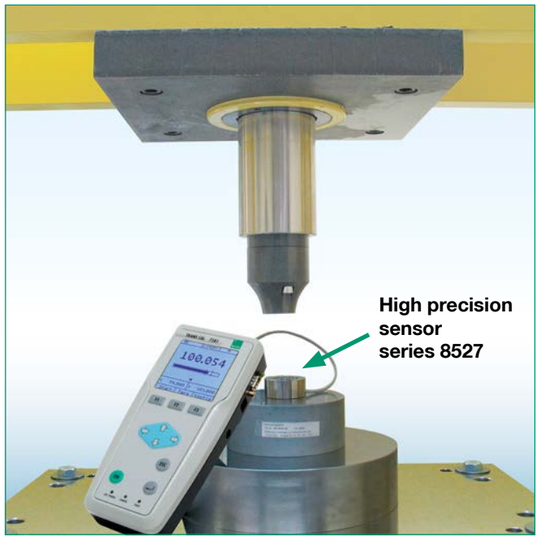
- ► Checking hydraulic presses
- ► Reference measurements in assembly lines
- ► Test of robotic pressing forces
- ► Calibrating test equipment
- ► Calibrating of high-precision measuring devices

Description

The TRANS CAL 7281 can be fitted with standard or rechargeable batteries for portable use or can run from an external power supply. Combined with a reference sensor the testing device provides a high-precision reference measurement chain e.g. for force measurements, but is also ideal for service engineers as a tool for locating faults in devices or sensors.
The choice of sensors includes strain gauge, normalized-signal ± 5 V / ± 10 V and potentiometric sensors. The LCD graphics display shows the live measurement value and the corresponding bar indicator. It also supports display functions such as data-logger, tared value in % and upper/lower limit for the comparator with simultaneous indicator (< = >) of the evaluation result.
For routine testing and also fault-locating tasks, the tester makes it really simple to measure isolation resistances and input/output resistances. The equipment test function is a quick and easy way to verify that the display device complies with the characteristic value, offering strain-gauge simulation of up to ± 50 mV/V or output of a normalized signal of up to 10 V. German-accredited DAkkS calibration certificates or factory calibration certificates are optionally available. The DigiCal configuration and data-acquisition software provides useful display and reporting functions.

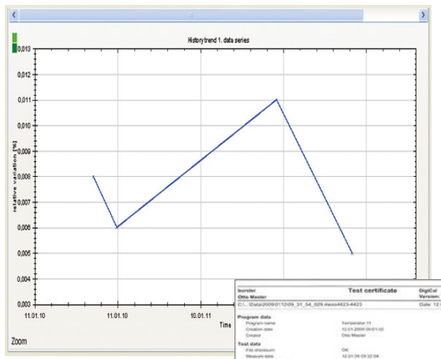
Precision force check of electrical, mechanical or hydraulic presses

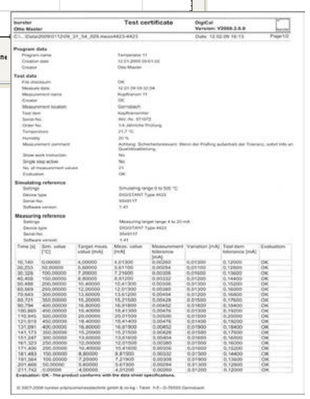
- Maximum precise and traceability even under on-site conditions
- Designed for industrial use also in harsh environments (excellent display backlighting, rugged case, battery-supplied amongst other features).
- OK/NOK evaluation of measurement values, data readout of actual values and evaluation results from the data logger using DigiCal software.
- Reference load cell in line with the flux of force ensures optimum comparative measurements in difficult-to-access locations. Sensor and device hardware can be checked separately.



DigiCal testing and calibration software: creating a own test certificate

Export to Excel for further processing		
Measurement actual value in N	Measurement tolerance in N	Evaluation
0.00	0.0011	OK
1667.10	0.1677	OK
3333.60	0.3345	OK
5000.20	0.5011	OK





Quality test of torque wrenches

- Regular testing involves measuring the release torque (click wrench). TRANS CAL 7281 also detects the release peak values at a measurement rate of ≤ 1200/s. Multiple measurements/evaluations easily possible for each set release torque.
- Stores logged measurement values or quality-relevant data, which can be read using the optional DigiCal calibration software (statistical analysis MIN/MAX – MEAN VALUE – STANDARD DEVIATION).
- Measurement values from up to four sets of manually recorded data can be displayed in parallel as a table and graph. This can be useful, for instance, as an easy way to compare and document release torques of torque wrenches.

2432-007281EN-5672-081524

Device test with strain gauge simulator

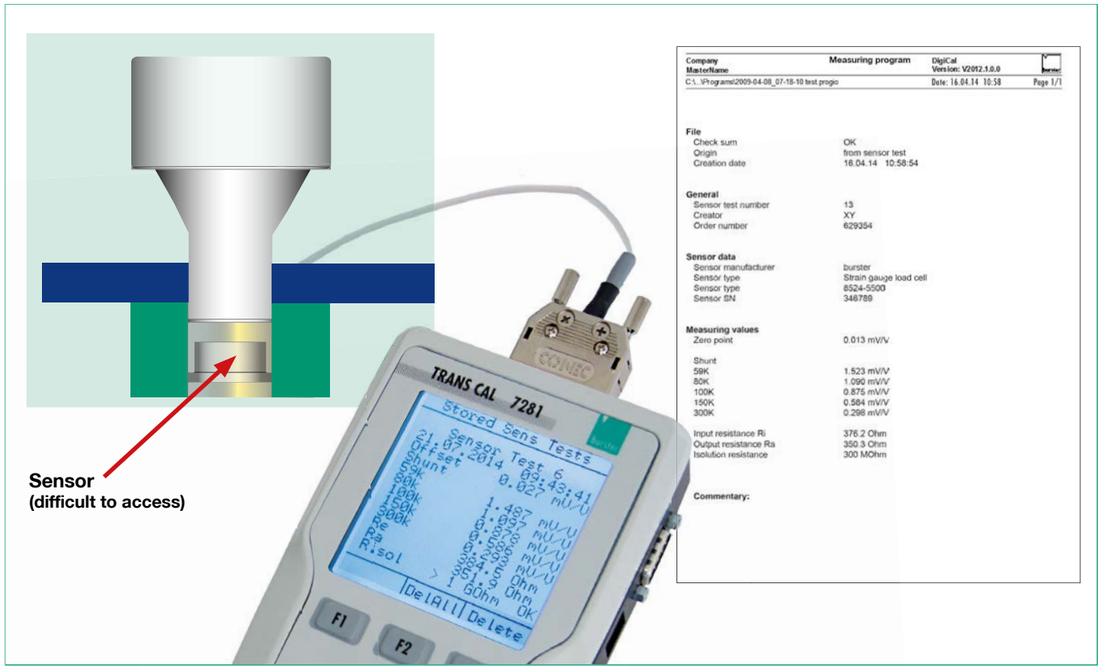
The high-precision calibrator and tester model 7281 is ideal for locating faults in measurement systems. For display devices based on strain gauge sensors, the stored characteristics values can be simulated in an infinitely adjustable range of ± 3 mV/V and ± 50 mV/V. In this case it is also important to measure the excitation voltage for strain gauge sensor in order to rule out any problems here.

Voltage source

It is also possible to verify the stored sensor data for display devices with an “active” input. Using the voltage source function, up to 10 V (infinitely adjustable) can be supplied to the device being tested.

Sensor test

When sensors are difficult to access and cannot be removed, the sensor test function can be used to measure the input and output resistances of the strain gauge full-bridge, their zero point, the isolation resistance and the shunt calibration factor in mV/V (generated by a built-in shunt resistor). This provides a fast and reliable way of electronically assessing the connected sensor. The optional DigiCal calibration software can be used to create a test certificate after completing the sensor test.



Technical Data

Operation mode: Reference measurement device

Non-linearity:	< ± 0.001 %
Measuring rates:	0.1 ... 1200/s (DC); 0.1 ... 2/s (AC) (reduced accuracy at 50/s)
TC gain:	± 0.001 %/K
TC zero point:	< 0.2 µV/K
Cut-off frequency:	10 kHz (-3db)

Supported sensors

Strain gauge

Error limit:	± 0.02 % F.S.
Bridge resistance (full bridge):	120 Ω ... 10 kΩ
Connection type:	4 / 6 wire technology
Input voltage ranges (DC):	± 15 mV; ± 30 mV; ± 250 mV
Input voltage ranges (AC):	± 15 mV; ± 30 mV
Sensor excitation voltage (DC):	2.5 V; 5 V (at 120 Ω only 2.5 V)
Sensor excitation voltage (AC):	2.5 Veff / 5 Veff (from 350 Ω)
Sensor excitation current:	max. 30 mA
Electronic data sheet (TEDS):	read from sensor EEPROMs

Potentiometric sensors

Error limit:	± 0.05 % F.S.
Track resistance:	500 Ω ... 10 kΩ
Connection type:	3 / 5 wire technology
Excitation voltage:	5 V DC
Excitation current:	< 30 mA
Measurement range:	± 5 V

Transmitter

Error limit:	± 0.02 % F.S.
Excitation voltage:	12 V DC ± 5 %
Excitation current:	< 100 mA
Input voltage range:	± 10 V
Units:	freely selectable

Sensors and devices with voltage output

Input voltage range:	± 10 V
Error limit:	± 0.02 % F.S.

Operation mode: Device test with strain gauge simulator (model 7281-V0001 only)

Strain gauge simulator

Error limit:	± 0.01 % F.S.
Excitation voltage:	≤ ± 10 V (AC/DC)
Characteristics (infinitely adjustable simulation values):	0 ... ± 3 mV/V to 0 ... ± 50 mV/V
Resolution:	± 16 Bit
Bridge resistance:	350 Ω
TC:	± 0.002 %/K
Cut of frequency:	5 kHz
Measurement of excitation voltage:	0 ... 10 V DC

Voltage source

Error limit:	± 0.02 % F.S.
Infinitely adjustable simulation values:	0 ... +10 V
Resolution:	1 mV
TC:	± 0.005 %/K

Operation mode: Sensor test (model 7281-V0001 only)

TC:	± 0.005 %/K

Shunt calibration step

Error limit:	± 0.25 %
Calibration shunt resistors:	59 kΩ; 80 kΩ; 100 kΩ; 150 kΩ; 300 kΩ

Input and output resistance of sensor

Error limit:	± 0.25 % F.S.
Measurement range:	120 Ω ... 10 kΩ

Insulation resistance

Error limit:	± 5 % Rdg.
Measurement range:	20 MΩ ... 1 GΩ
Resolution:	1 MΩ
TC:	± 0.1 %/K

General device data

A/D converter:	24 Bit
Real-time clock/date	
Interface:	USB 2.0, downwards compatible, opto-isolated
Nominal temperature range:	0 ... 40 °C
Storage temperature range:	- 20 ... 60 °C
Display:	LCD with white LED backlighting
Baud rate:	115200
Supply voltage:	4 x Mignon or 10 ... 28 VDC, integrated battery charging circuit

Terminals

Measuring, device test, sensor test:	SUB-D female connector, 9 pin
Strain gauge simulator:	SUB-D male connector, 9 pin
USB interface:	type B male connector

Housing

Material:	Aluminium (light gray, black)
Dimension (L x W x H):	220 x 100 x 52 [mm] with tilting foot and rubber feet
Weight:	approx. 850 g
Protection class:	IP40

Order Information

High-precision calibrator
for mechanical measurements TRANS CAL
- reference measurement device **Model 7281-V0000**

High-precision calibrator and testing device
for mechanical and electrical measurements TRANS CAL
- reference measurement device-sensor test-device test/DMS simulator **Model 7281-V0001**

Order Example

High-precision force measuring chain 100 kN with DAkkS calibration certificate:

High-precision load cell, 100 kN	**Model 8527-6100**
Testing device for force, torque, displacement and pressure	**Model 7281-V0000**
Connector	**Model 9900-V209**
Connector fitting	**Model 99004**
Adjustment of a measurement chain comprising sensor and display device	**Model 72ABG**
DAkkS Calibration Certificate for force measurement chains in the range 0 ... 200 kN	**Model 85DKD-85DX-6200**

Accessories

TRANS CAL 7281 PC software, Plus version:
- functions include editing device parameters, setting parameters via the configuration interface, recording and documenting data-logger values and sensor test data, data export, handling meta-data **Model 7281-P100**

TRANS CAL 7281 PC software, Basis version:
- functions include editing device parameters, setting parameters via the configuration interface, recording and documenting data-logger values, data export, handling metadata **Model 7281-P101**

Power pack, 100 - 240 VAC / 50/60 Hz / 12 VDC, 1.5 A **Model 7281-Z001**

Battery set 4 x Mignon AA **Model 7281-Z002**

Sub-D male connector, 9 pin **Model 9900-V209**

USB connector cable **Model 9900-K349**

Adapter cable, length 1 m for TRANS CAL 7281 and sensors with 12 pin male connector, model 9941 **Model 99209-540A-0110010**

Adapter cable (e.g. for device test 7281), length 1 m, 6 wire, one site 9 pin female connector model 9900-V609, other side open end **Model 99609-000E-0150010**

Six-core connection cable, for 7281 device test and strain gauge simulation, length 2 m, for indicator with 9 pin Min-D male connector, e.g. for DIGIFORCE® 9310/9307 **Model 99209-609E-0150020**

Adapter cabel, length 0.2 m for TRANS CAL 7281 and Sensors with 15 pin SUB-D male connector model 9900-V280 **Model 99209-580A-0110002**

Aluminium case for TRANS CAL 7281 and accessories **Model 7200-Case**

burster TEDS

9-pin male sub-D connector and memory chip for the electronic sensor datasheet, for connecting strain-gauge load cells to the TRANS CAL 7281 **Model 9900-V229**

Fitting connector 9900-V229 (7281) to a strain-gauge sensor and programming the electronic sensor datasheet **Model 99011**

DAkkS Calibration Certificate

The DAkkS calibration certificate per guideline DKD-R 6-1 contains a minimum of three measuring cycles, each with 21 measuring points in 10 % steps for rising and falling loads across the entire measuring range.

Manufacturer Calibration Certificate

The standard factory calibration certificate for a reference measurement chain consisting of the TRANS CAL 7281 instrument in conjunction with, for example, a force or pressure sensor, contains 11 points, starting at zero in 20 % steps across the entire measuring range for rising and falling loads.

2432-007281EN-5672-081524

Portable Reference Measuring Chain with DAkkS Calibration Certificate for Compression Load from 20 N to 100 kN

Code:	72-REF EN
Delivery:	3 - 4 weeks
Warranty:	24 months

DAkkS
Deutsche Akkreditierungsstelle
D-K-15141-01-00

- **Highest precision**
- **12 force measurement ranges selectable from 20 N to 100 kN**
- **DAkkS calibration certificate for the full measuring chain**
- **Min/max peak values**
- **burster TEDS, automatic reading of the sensor datas**
- **Sensor can easily be integrated into the flow of forces**

Application

The force measuring chain is an universal reference measuring chain for the calibration of press-fit force measuring equipment. It finds applications in the quality assurance, commissioning and equipment monitoring fields. A DAkkS calibration certificate is included so that the force measuring chain can be traced back. The calibration is traceable through accreditation at the German Accreditation Body. The calibration certificate records the displayed values for mounting positions at 0°, 120° and 240°.
During calibration in field, the reference load cell is inserted in line with the flux of the press-fit measuring equipment. The force application is of central significance here for the quality of the measurement. Special force application parts are required, so that the line of action of the force agrees as exactly as possible with the geometrical axis of the load cell that is to be measured (central loading). It is, furthermore, very important that neither transverse forces nor torques reach the load cell.
A sensor with the option “burster TEDS” allows easy configuration of the used measuring chain, without values have to be entered manually. Thus, fast and simple, different sensors can be operated on TRANS CAL 7281 and the respective configuration is not necessary.

Description

The TRANS CAL 7281 is a portable high-precision calibration and test instrument suitable for load cells based on strain-gauge technology. Thanks to the low error tolerance the display device is particularly suitable where high accuracy is required. The tare function allows any base load that may be present to be cancelled out. The force measuring chain consists of a model 7281 measuring instrument and the 8527/8416 load cell and can be used to measure compressive forces up to 100 kN (depending on the force range). With the help of the fastening holes located around the circumference and of the undulation on the engaging surface, the sensor can relatively easily be adapted to existing manufacturing and production systems. Depending on the existing compression force, the user can select a measuring range from 20 N up to 100 kN (in 12 stages).
The reference measuring chain is fully configured and calibrated. The DAkkS calibration accords with EN ISO 376.
The optionally available PC software DigiCal permits an easy compilation of test certificates.
Additionally measurement results can be exported in Microsoft Excel format for their further processing.
The communication between TRANS CAL and PC is handled through USB interface.

Technical Data 7281

Operation mode reference measurement device

Linearity error:	< ± 0.001 %
Measuring rates:	0.1 ... 1200/s (DC); 0.1 ... 2/s (AC) (reduced at 50/s accuracy)
TC gain:	± 0.002 %/K
TC zero point:	< 0.2 µV/K
Cut-off frequency:	10 kHz (-3db)

Strain gauge

Error limit:	± 0.02 % F.S.
Bridge resistance (full bridge):	120 Ω ... 10 kΩ
Connection type:	4- / 6 wire technology
Input voltage ranges (DC):	± 15 mV; ± 30 mV; ± 250 mV
Input voltage ranges (AC):	± 15 mV; ± 30 mV
Sensor excitation voltage (DC):	2.5 V; 5 V (at 120 Ω only 2.5 V)
Sensor excitation voltage (AC):	2.5 Veff / 5 Veff (from 350 Ω)
Sensor excitation current:	max. 30 mA
Electronic data sheet:	read from sensor EEPROMs

General device data

A/D converter:	24 Bit
Real-time clock/data Interface:	USB 2.0, downwards compatible, opto-isolated
Nominal temperature range:	0 ... 40 °C
Storage temperature range:	- 20 ... 60 °C
Display:	LCD with white LED backlighting
Baud rate:	115200
Supply voltage:	4 x Mignon or 10 ... 28 VDC, integrated battery charging circuit

Terminals

Measuring, equipment test, sensor test:	SUB-D female connector, 9 pin
Strain gauge simulator:	SUB-D male connector, 9 pin
USB interface:	type B male connector

Housing

Material:	Aluminium (light gray, black)
Dimension (L x W x H):	220 x 100 x 52 [mm] with tilting foot and rubber feet
Weight:	approx. 850 g
Protection class:	IP40

For further information, please refer to data sheet 7281.

Technical Data 8527/8416

Order Code	Measuring Range	ø D	H	Characteristics Linearity Error
8416-5020	0 ... 20 N	10.6	5	<±0.5 %
8416-5050	0 ... 50 N	10.6	5	<±0.5 %
8416-5100	0 ... 100 N	10.6	5	<±0.5 %
8416-5200	0 ... 200 N	10.6	5	<±0.5 %
8527-5500	0 ... 500 N	79	20	<±0.05 %
8527-6001	0 ... 1 kN	79	20	<±0.05 %
8527-6002	0 ... 2 kN	79	25	<±0.05 %
8527-6005	0 ... 5 kN	119	32	<±0.05 %
8527-6010	0 ... 10 kN	119	45	<±0.05 %
8527-6020	0 ... 20 kN	119	60	<±0.05 %
8527-6050	0 ... 50 kN	155	60	<±0.05 %
8527-6100	0 ... 100 kN	155	75	<±0.05 %

For further information, please refer to data sheet 8527 and 8416.

Electrical values

Bridge resistance (full bridge):	foil strain gauge 350 Ω, nominal
Excitation voltage:	max. 5 VDC (8416), max. 10 VDC (8527)
Characteristic:	0.8 mV/V nominal (8416), 1.5 mV/V + 0.2 % (8527)

DAkkS calibrations for force measuring chains

The DAkkS calibration of force measuring chains is carried out according to EN ISO 376. The load cells are calibrated over their full measuring range in steps of 10 %. A minimum of three measuring cycles are carried out in different mounting positions rotated by 0°, 120° and 240° around the sensor's axis of symmetry. The calibration certificate remains valid for a maximum of 26 months. Recalibration is required immediately if overload > 100 % of the nominal force occurs.

Example

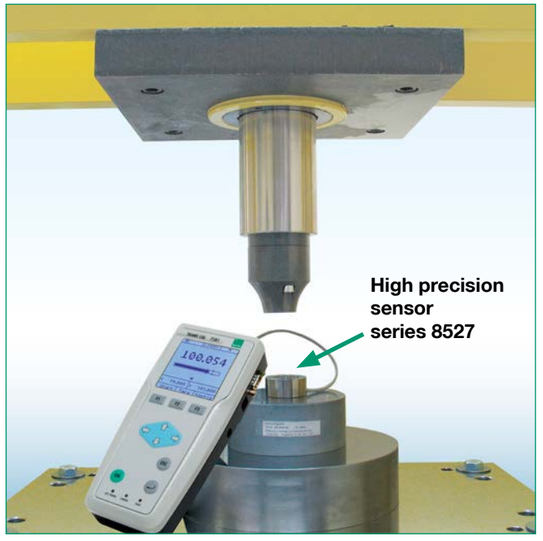
You will find the measurement results for the DAkkS calibration of a 50 kN reference measuring chain in the DAkkS calibration certificate shown below on page 4.

Page 4 of calibration certificate No

Table 4: Relative resolution at measurement points, relative error of the display in relation to the measurement value or final value. The errors are determined using the absolute values displayed.

Load in KN	Display in kN	Relative Resolution	Relative Error of Display in Relation to Measurement Value	Relative Error of Display in Relation to Final Value
15.0	14.98	0.07 %	- 0.16 %	- 0.06 %
20.0	19.97	0.05 %	- 0.17 %	- 0.07 %
25.0	24.97	0.04 %	- 0.12 %	- 0.06 %
30.0	29.97	0.03 %	- 0.10 %	- 0.06 %
35.0	34.98	0.03 %	- 0.07 %	- 0.05 %
40.0	39.98	0.03 %	- 0.06 %	- 0.05 %
45.0	44.99	0.02 %	- 0.02 %	- 0.02 %
50.0	50.01	0.02 %	- 0.02 %	- 0.02 %

Precision force check of press-in force measuring devices



Order Information

Range 20 kN with DAkkS calibration in compressive direction and "burster TEDS"

Compressive load cell, range 20 kN	**Model 8527-6020**
Connector	**Model 9900-V229**
Connector mounting	**Model 99011**
Portable test instrument	**Model 7281-V0000**
DAkkS calibration of measurement chain, Calibration with 10 % increments in compressive direction, raising and sinking, according to EN ISO 376	**85DKD-85DX-6200**
PC software DigiCal	**Model 7281-P101**

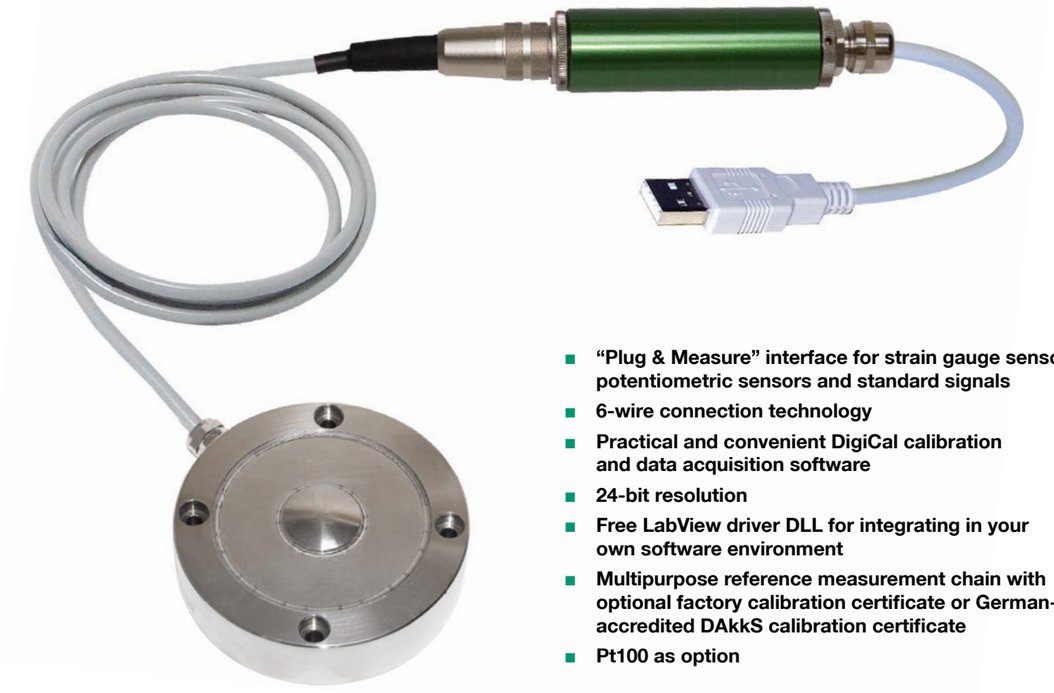
2434-072REFEN-5672-081524

Portable Precision USB Sensor Interface

for load cells, torque sensors and pressure sensors

Code:	72-9206-REF EN
Delivery:	ex stock
Warranty:	24 months

Series 9206



- **"Plug & Measure" interface for strain gauge sensors, potentiometric sensors and standard signals**
- **6-wire connection technology**
- **Practical and convenient DigiCal calibration and data acquisition software**
- **24-bit resolution**
- **Free LabView driver DLL for integrating in your own software environment**
- **Multipurpose reference measurement chain with optional factory calibration certificate or German-accredited DAkkS calibration certificate**
- **Pt100 as option**

Application

The 9206 USB sensor interface series is ideally suited to Notebook-based mobile use for high-precision, traceable calibration jobs that must be performed on-site for equipment such as presses, torque measurement facilities and pressure control systems.
A factory calibration certificate or German-accredited DAkkS calibration certificate can optionally be provided for the USB interface plus relevant sensors, ensuring compliance even with the stringent traceability requirements of quality assurance standards. This provides a quick, cost-effective way of assessing your system with traceable documentation of measurement results.
The device is intended for industrial use in sectors such as quality assurance, on-site service and equipment monitoring.

Further areas and examples of use:

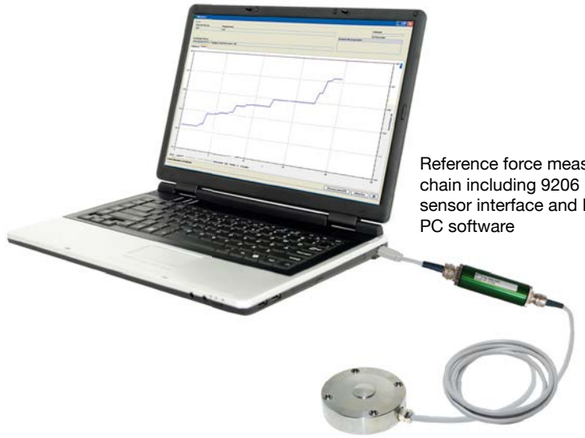
- ► Test-equipment calibration
- ► On-site calibration of high-precision measurement instruments
- ► Hydraulic-press testing
- ► Reference measurements on/in assembly lines
- ► Testing of robot contact forces
- ► Pneumatic pressure testing

Description

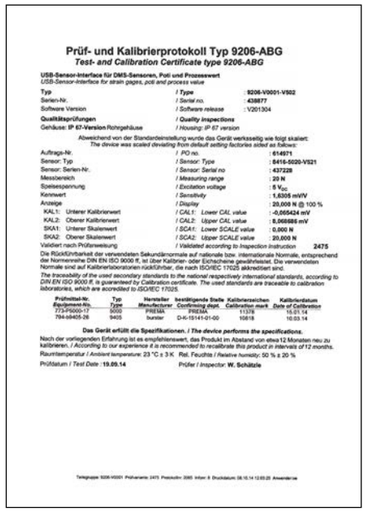
The USB sensor interface is powered from the connected PC via the USB port, and uses this power supply to generate the sensor excitation voltage. The initial settings and sensor settings are made by burster in-house and saved in the USB sensor interface. These can then be fine-tuned by the customer.
The DigiCal calibration software can display the measurement data in various forms and save it in a custom report file or Excel file. The software includes calibration-routine management for quick comparisons of existing measurement data plus rapid and reliable access to recurring calibration processes. In addition, a range of START/STOPP-triggers can be enabled.
burster can configure the interface to suit a specific sensor, although you can customize your own parameters using the basic software version supplied free of charge. The driver package, available free of charge, lets you integrate the device in LabVIEW or your own software.

Application

Precision force check of electrical, mechanical or hydraulic presses



Reference force measurement chain including 9206 USB sensor interface and DigiCal PC software



Prüf- und Kalibrierprotokoll Typ 9206-ABG
Test- and Calibration Certificate type 9206-ABG

USB-Sensor-Interface für DMS-Sensoren, Pott und Prozesswert
USB-Sensor-Interface for strain gages, pott and process value

Typ	/ *Type*	9206-V0001-V502
Serien-Nr.	/ *Serial no.*	439877
Software Version	/ *Software release*	V.201304
Qualitätsprüfungen	/ *Quality inspections*	
Gehäuse: IP 67-Version Rohrgehäuse	/ *Housing: IP 67 version*	

Abweichend von der Standardeinstellung wurde das Gerät werksseitig wie folgt skaliert:
The device was scaled deviating from default setting factories sided as follows:

Auftrags-Nr.	/ *PO no.*	614571
Sensor: Typ	/ *Sensor: Type*	8416-5020-V521
Sensor: Serien-Nr.	/ *Sensor: Serial no*	437228
Messbereich	/ *Measuring range*	20 N
Speisespannung	/ *Excitation voltage*	5 V_{DC}
Kennwert	/ *Sensitivity*	1,6305 mV/V
Anzeige	/ *Display*	20,000 N @ 100 %
KAL1: Unterer Kalibrierwert	/ *CAL1: Lower CAL value*	-0,005424 mV
KAL2: Oberer Kalibrierwert	/ *CAL2: Upper CAL value*	0,065888 mV
SKA1: Unterer Skalenwert	/ *SCA1: Lower SCALE value*	0,000 N
SKA2: Oberer Skalenwert	/ *SCA2: Upper SCALE value*	20,000 N
Validiert nach Prüfanweisung	/ *Validated according to Inspection Instruction*	2475

Die Rückführbarkeit der verwendeten Sekundärnormale auf nationale bzw. internationale Normale, entsprechend der Normenreihe DIN EN ISO 9000 ff, ist über Kalibrier- oder Eichscheine gewährleistet. Die verwendeten Normale sind auf Kalibrierlaboratorien-rückführbar, die nach ISO/IEC 17025 akkreditiert sind.

The traceability of the used secondary standards to the national respectively international standards, according to DIN EN ISO 9000 ff, is guaranteed by Calibration certificate. The used standards are traceable to calibration laboratories, which are accredited to ISO/IEC 17025.

Prüfmittel-Nr.	Typ	Hersteller	bestätigende Stelle	Kalibrierzeichen	Kalibrierdatum
Prüfmittel-Nr.	*Type*	*Manufacturer*	*Confirming dept.*	*Calibration mark*	*Date of Calibration*
573-79000-17	9206	PHIMA	PHIMA	11378	15.01.14
784-69405-26	9405	burster	D-76-15141-01-00	10818	16.03.14

Das Gerät erfüllt die Spezifikationen. */ The device performs the specifications.*

Nach der vorliegenden Erfahrung ist es empfehlenswert, das Produkt im Abstand von etwa 12 Monaten neu zu kalibrieren. */ According to our experience it is recommended to recalibrate this product in intervals of 12 months.*

Raumtemperatur / *Ambient temperature:* 23 °C ± 3 K Rel. Feuchte / *Relative humidity:* 50 % ± 20 %

Prüfdatum / *Test Date :* **15.05.14** Prüfer / *Inspector:* **W. Schäfele**

- Maximum precision and traceability even under on-site conditions
- System has high IP 67 degree of protection
- DigiCal software provides OK/NOK evaluation of measurement values, retrieval of measurement data, export of evaluation results plus report generation
- Reference load cell in line with the force path ensures optimum comparative measurements in difficult-to-access locations

Application

Torque wrench calibration using torque sensor and 9206 USB sensor interface

Torque sensors can be connected directly to a PC using the 9206 USB sensor interface. This measurement chain allows quick and easy measurement of torques typical in any tools used for screw-connection tasks. On-site calibration can include, for instance, checking that the torque wrench meets the set scale value or releases accurately at the correct torque. An optional factory calibration certificate or German-accredited DAkkS calibration certificate can be supplied to ensure traceability of the torque measurement chain.

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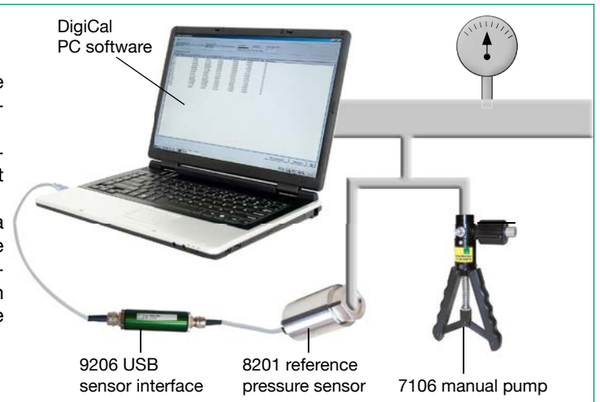
Pressure-line testing

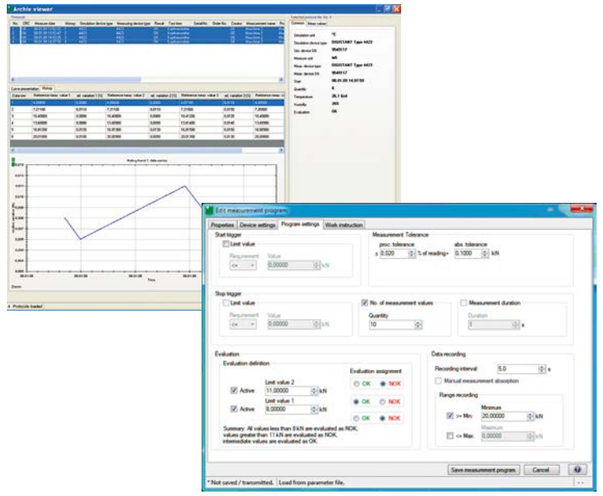
A pressure measurement chain comprising pressure sensor and USB sensor interface can be connected directly to the PC.
The DigiCal software can then be used to read the sensor data, which is then available for printing as a report or exporting into Excel.
On-site calibration uses a reference pressure sensor, a USB sensor interface and a manual pump to check the indicator on a pressure line. An optional factory calibration certificate or German-accredited DAkkS calibration certificate can be supplied to ensure traceability of the pressure measurement chain.



Range of functions offered by the DigiCal calibration and data acquisition software

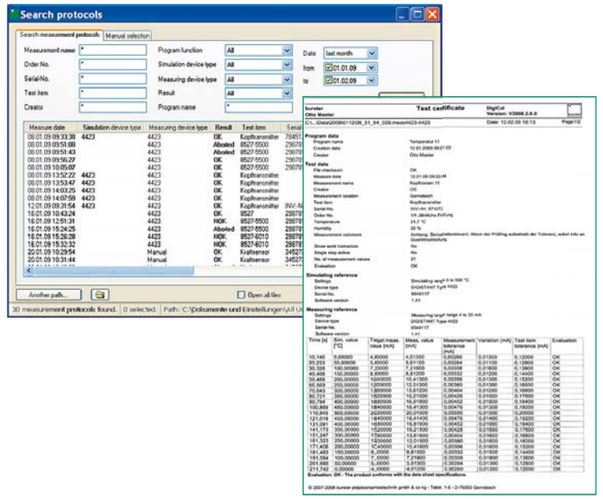
Easy, reliable creation of measurement programs and calibration routines

- DigiCal is a user-friendly tool for creating calibration routines and test reports
- Evaluation/checking functions check compliance of object under test with its technical specification
- A measurement program once created can be reused to save time
- Easy-to-select pop-ups provide fast access to relevant input parameters
- With up to four measurement values in view and under evaluation, DigiCal provides a quick overview of the tolerance-compliance of the object under test



Traceable measurement documentation

- In times when quality management is constantly growing in importance, it is vital to provide quality-relevant material in test reports. DigiCal meets this requirement
- With a straightforward report retrieval facility, a preview option plus print and save-as-PDF functions, the documentation tool represents excellent value for money



Technical Data

Connectable sensors

Strain gauge

Bridge resistance:	350 Ω ... 5 kΩ
Connection system:	6 wire
Sensitivity:	0 ... 50 mV/V
Sensor excitation::	2.5 V / 5 V
Excitation current:	max. 45 mA
Measurement error:	± 0.05 % F.S.

Transmitter and DC/DC sensors

Sensor excitation:	12 V
Excitation current:	80 mA
Measurement signal:	± 10 V
Measurement error:	± 0.05% F.S.

General amplifier data

Resolution:	24 Bit
Measuring rate ecxept Pt100: up to 1200 readings per second only with software 9206-P100-REF up to 200 readings per second and 1 measuring channel with 9206-P001-REF	
Input resistance:	> 1 GΩ
Temperature coefficient:	20 ppm/K
Range of operation temperature:	-20 ... + 60 °C
Storage temperature:	- 40 ... + 70 °C
Zero drift:	< 0,1 µV/K

In-Line housing

Material:	Aluminium
Dimensions (L x B):	115 x 25 mm
Weight:	200 g
Protection class:	IP67 tube housing IP40 tube housing with 12 pin connector
Mounting method:	screw clamp
Power supply:	via USB-plug 4 V ... 6 V
Cable length from sensor to 9206:	max. 3 m
Cable length from PC to 9206:	2.8 m
Sensor connection:	terminal block PG 7 connection
USB connection on 9206:	PG 7 connection

Ordering example

USB sensor interface with 8527 pressure sensor including factory calibration certificate and software

USB sensor interface for strain gauge sensors	**Model 9206-V2001**
High-precision load cell, 5 kN measurement range	**Model 8527-6005**
12-pin connecting plug	**Model 9941**
Connector fitting	**Model 99004**
Calibration of a measurement chain comprising one sensor and one USB sensor interface	**Model 92-ABG**
Factory calibration certificate for a complete measurement chain	**Model 85WKS-85DXM**
Configuration and analysis software for 9206	**Model 9206-P100-REF**

DigiCal software

Operating system requirements:
Windows XP, Vista, Win7, Win8

Order code

USB sensor interface 9206-V **X** **0** **0** **X**-REF

IP40 tube housing with 12 pin connector	2
Strain gauge, potentiometer, DC/DC	1
Pt100	2

(including measurement and analysis software **9206-P001-REF**)

Accessories

DigiCal calibration and data logging software (included with device, up to 200 measurements/s in data-logger mode) **Model 9206-P001-REF**

DigiCal calibration and data logging software (up to 1200 measurements/in data-logger mode, reporting and history management) **Model 9206-P100-REF**

Connecting lead, 12-pin female connector, one end open, for 9206-V000x **Model 99540-000A-0150002**

Mating connector 12 pins **Model 9941**

Aluminum case for USB sensor interface and accessories **Model 7200-Koffer**

German-accredited DAkkS calibration

DAkkS calibration certificate for max. force of 200 kN, max. pressure of 5000 bar and max. torque of 5 kNm

Factory calibration

Factory calibration for max. force of 200 kN, max. pressure of 5000 bar, max. torque of 5 kNm and max, displacement of 300 mm

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Strain Gauge Simulator

Model 9405

Code:	76-9405 EN
Delivery:	ex stock
Warranty:	24 months

Optional with DAkkS Calibration Certificate or Manufacturer Calibration Certificate

- **Simulator for pressure, load and torque sensors based on strain gauge principle**
- **Five characteristics selectable**
- **Reversible polarity of measurement signal**
- **Easy operation**
- **Sturdy and economical**

Application

The strain gauge (SG) simulators models 9405 allow rapid and easy calibration of measuring chains consisting of, for example, a load sensor, a connecting lead and indicator.

All measuring amplifiers and displays suitable for SG sensors can be connected, checked and calibrated. The supply voltage source is loaded realistically by the simulator. Deviations from the rated supply voltage as well as the influence of the connection leads are taken into account during calibration. Particularly in the case of long leads, this has a decisive influence on the accuracy which can be achieved with the entire measuring chain.

Because of the reversible polarity the SG simulator allows the examination of measuring chains, for tension and compression measurement or differential pressure.

Description

The most accurate method of calibrating a measuring chain is the comparison with a high-precision reference. This also applies to SG sensors. A mechanical variable, whose value is exactly known, loads the sensor. It yields, via a detuning in the bridge circuit, to a corresponding output signal. By these means, the measuring chain can be adjusted. This method is often unfeasible (for example, due to very large measuring ranges of several hundred tons or several hundred bars) or too complicated. In such cases, the measurement variable must be simulated electrically. This can be done very easy and with high precision using a simulator model 9405. Instead of the sensor, the simulator is connected to the measuring chain. It loads and thus tests the supply voltage source, and simulates the zero signal and the signal for a load, corresponding to the sensitivity of the sensor. As in the case of the SG sensor, this is achieved by a change in resistance.

Measuring chains with sensors, whose actual (not rated) sensitivity is slightly different than the simulator´s signal, can also be adjusted by means of a simple ratio calculation.

The internal circuit is not in accordance with a Wheatstone bridge. This is the reason why shunt calibration is not possible. But in most cases it is not required.

Technical Data

Bridge resistance:	350 Ω ± 1 %
Calibration steps:	(±) 0; 0.5; 1; 1.5; 2; 3 mV/V
Temperature error of the sensitivity (%/10 K):	typ. 0.01/max. 0.03
Max. zero error:	2 µV (plus any thermal e.m.f.s. in the measuring circuit)
Temperature coefficient:	≤ ± 0.03 %/K
Sensitivity error (%):	typ. 0.1/max. 0.2
Permissible supply voltage:	max. 20 V
Operating temperature range:	+ 5 ... ± 23 ... 40 °C
Weight:	approx. 0.5 kg
Dimensions [W x H x D]:	150 x 70 x 105 [mm]
Electrical connection:	4 mm laboratory plug connection, 12 pin connector male

Order Information

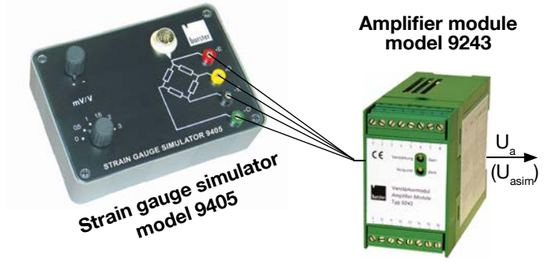
Strain gauge simulator	**Model 9405**
Manufacturer Calibration Certificate	**Model 94 WKS-9405**
DAkkS Calibration Certificate (German Calibration Service - DAkkS)	**Model 94 DKD-9405**

Accessories

Mating cable connection to burster units (12 pin sensor input socket) and 4 mm plugs	
length 0.7 m	**Model 9923**
length 3.0 m	**Model 9913**
Connector cable, length 0.2 m, coupling connector 9940, open end	**Model 99540-000A-0150002**
Adapter cable, length 1 m, for DIGIFORCE® 9310 to sensors with 12 pin connector model 9941 and SUB-D 9 pin	**Model 99209-540A-01100010**
Mating connector 12 pin	**Model 9940**
Adequate leather bag including strap used for protection and transport	**Model 4592**

Calibration certificate for the strain gauge simulator (refer to order code)
A test certificate is always part of the delivery. By this we confirm that the selectable nominal values (±0 / ±0.5 / ±1 / ±1.5 / ±2 / ± 3 mV/V) reside within the given tolerance range of < 0.2 %. Furthermore it is guaranteed that the values do not exceed the given tolerance range within one year.
The traceability of the used secondary standards is guaranteed by our certified calibration laboratory (D-K-15141-01-00).
If further data are required you can obtain manufacturer or DAkkS calibration. This calibration confirms the currently measured values and accuracies.

Example of calibrating a measuring amplifier by means of a strain gauge simulator



Given:	SG sensor load cell model 8438-100 kN. Sensitivity of the sensor (acc. to calibration certificate) 1.678 mV/V. Amplifier output signal at nominal load 100 kN: U_a = 10 V.
Problem:	Amplifier output voltage U_{asim} which must be adjusted with amplifier connected.
1st Step:	The simulator is set to the next lower characteristic value, in this case 1.5 mV/V
2st Step:	The amplifiers output voltage which can be adjusted is calculated. Instead of 1.678 mV/V by the sensor only 1.5 mV/V are fed by the simulator. Please note: The 1.678 mV/V of the sensor is to produce U_a=10 V at the amplifier output.

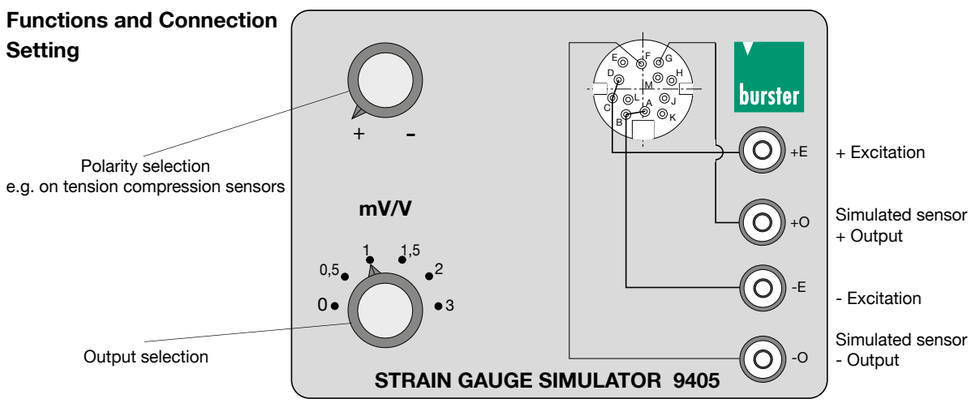
Where strain gauge sensors cannot be loaded purposefully, because for example no suitable weight exists, the appropriate measuring signal must be reproduced with a strain gauge simulator. Since strain gauge sensors often possess „bent“ characteristic values (that means nominal characteristic values) usually those cannot be adjusted accurately by a simulator. The simulator is then set to the next lower characteristic value. The appropriate amplifier output voltage computes itself after the following example:

$$U_{asim}\,[V] = \frac{U_a \times K_{sim}}{K_{sens}} = \frac{10\ V \times 1.5\ mV/V}{1.678\ mV/V} = 8.939\ V$$

U_{asim} = Output voltage if the simulator is connected
U_a = Desired amplifiers output voltage with nominal load of the sensor
K_{sim} = Adjusted characteristic value at the strain gauge simulator
K_{sens} = Characteristic value of the sensor which can be simulated

8.939 V are to be set at the analog output with the attached strain gauge simulator and an adjusted characteristic value of 1.5 mV/V.

Functions and Connection Setting



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IMPLEMENTATION

OPERATION

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→ SYSTEM SETUP / COMMISSIONING & TRAINING

We are at your service with one of our service engineers or service partners when you integrate our products mechanically and electrically into your facility. We train your staff how to use equipment and systems safely and can also provide this support worldwide.

→ DAkkS AND FACTORY CALIBRATION SERVICES

Our ISO 17025 accredited calibration laboratory offers you testing, adjustment and calibration services for your measurement and test equipment in accordance with applicable standards or your requirements.

DAkkS Deutsche Akkreditierungsstelle D-K-15141-01-00

→ ON-SITE CALIBRATION

To avoid production downtimes and after consultation with us also on-site calibration can be considered where applicable. Our specialty is calibrating 1 N to 200 kN load cells in your facility. We can also calibrate your burster displacement sensors, RESISTOMAT®s, DIGIFORCE® systems, digital indicators and measuring amplifiers on-site. Our experienced service engineers and service partners can provide support with detailed testing.

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Service & calibration

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Ask our experts. At your service – until everything is up and running, until you know how it works.

DAkkS
Deutsche
Akkreditierungsstelle
D-K-15141-01-00

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Together we can specify the scope of services and duration to meet your wishes – with transparent definition of the costs.

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We calibrate your sensors and measuring systems in accordance with your QMS or facility requirements, or those of your customers. As a result, you can always rely on up-to-date calibrations with documentation available at any time.

Service agreement for production
Save your resources by letting us take care of the measurement technology details in your production facility. We define maintenance intervals, perform calibrations, and train your employees.

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Service Phone: +49 7224 645 53

Summary of Calibration Services (as of 2016)	Test & Calibration Certificate	On-Site	Lab-based Factory Calibration	DAkkS Laboratory
Load cell & force measuring chain	■	■	■	■
Voltage DC current Resistance	■	■	■	■
Torque sensor & torque measuring chain	■	–	■	■ *
Pressure sensor & pressure measuring chain	■	–	■	■
Strain gauge simulator for strain gauge instruments	■	■	■	■
Displacement sensor & displacement measuring chain	■	■	■	–
Temperature simulator (Pt100, thermocouple)	■	–	■	■
Temperature sensor	■		■ *	■ *
Temperature measuring chain	■		■ *	■ *

* with partners

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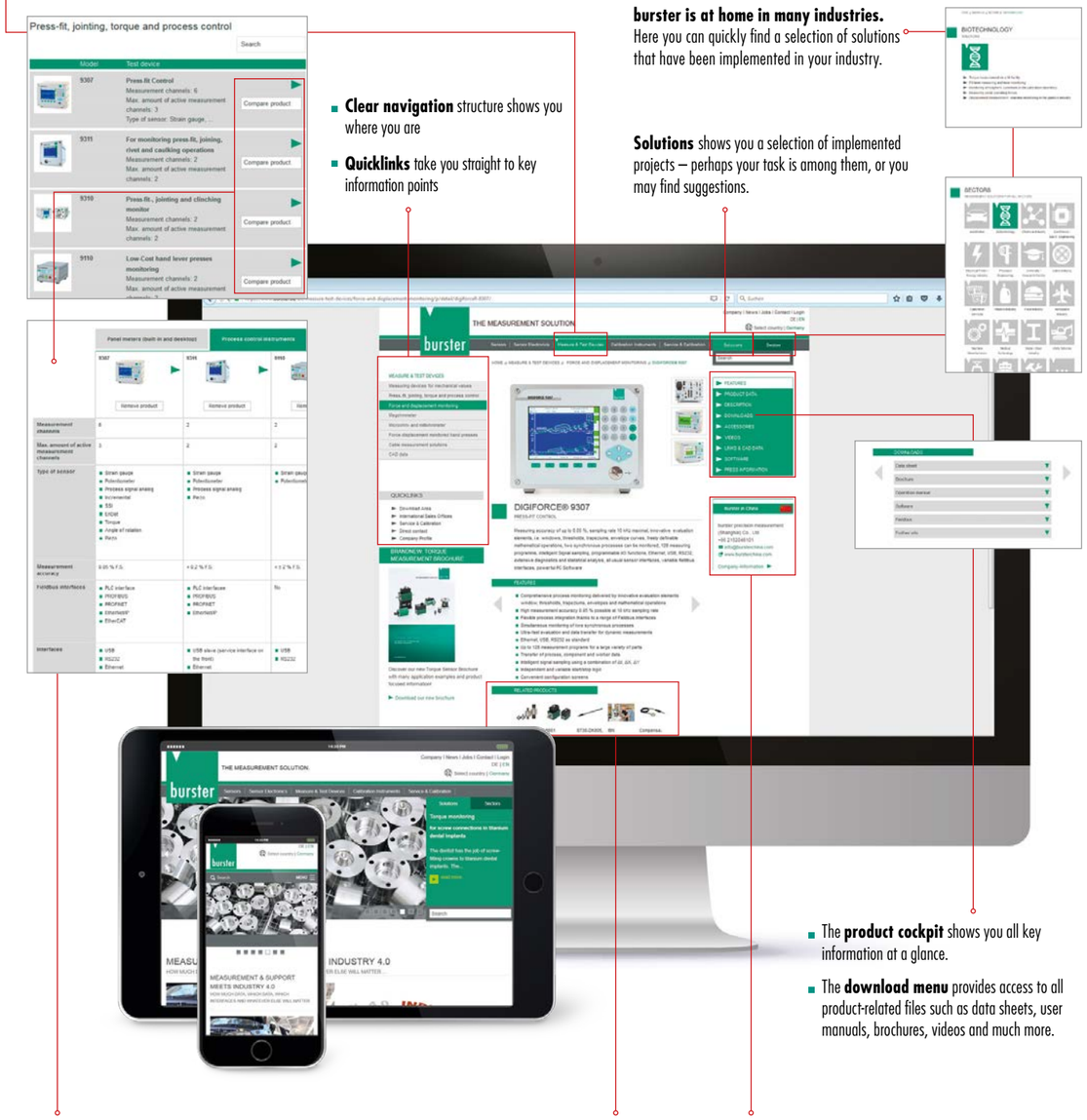

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- **Quicklinks** take you straight to key information points

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On-site

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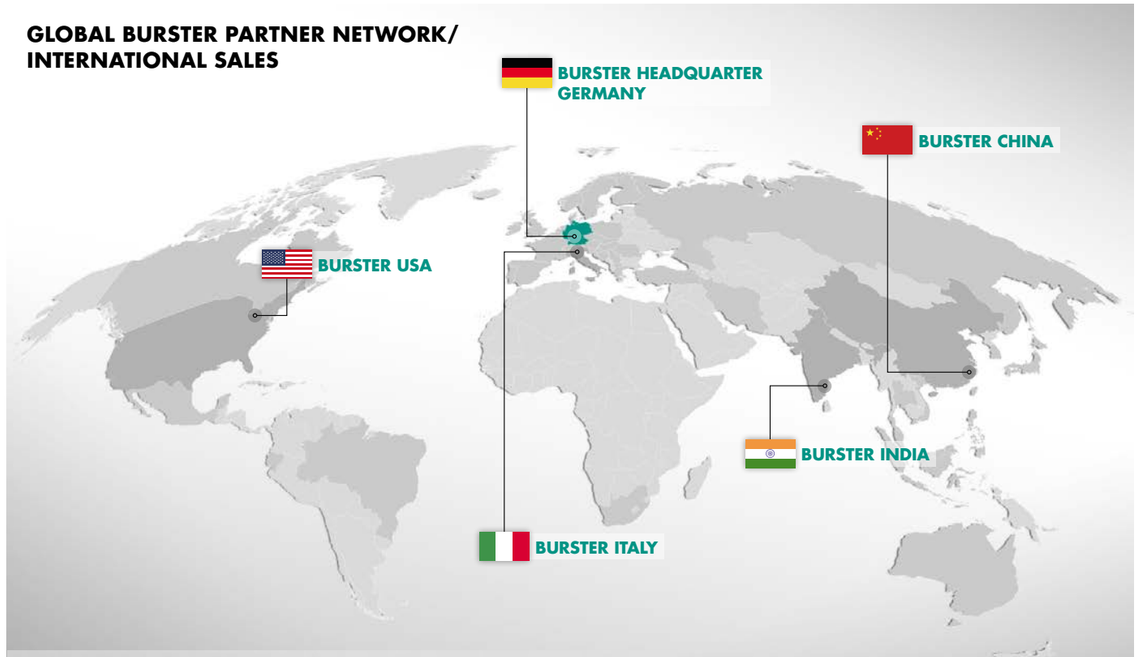

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