

# **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

#### 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

- Relative non-linearity from 0.15 % F.S.
- Measurement ranges from 0 ... 2.5 N to 0 ... 100 kN
- Model 8432 with overload protection for directions tension and compression

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

Model 8432 with bidirectional overload protection

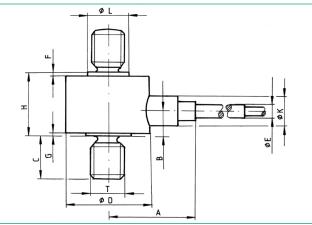
Order Code	Measurement	Dimensions [mm]								
	Range	ø D	н	Th	read T	С	А	F	G	В
8432-5002	0 2.5 N	25.4	21.9	М	4 x 0.7	6.4	25.4	2.8	0.2	9.6
8432-5005	0 5 N	25.4	21.9	М	4 x 0.7	6.4	25.4	2.8	0.2	9.6
8432-5010	0 10 N	25.4	21.9	М	4 x 0.7	6.4	25.4	2.8	0.2	9.6
8432-5020	0 20 N	25.4	21.9	М	4 x 0.7	6.4	25.4	2.8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

Electrical values Bridge resistance: (full bridge):

Bridge resistance: (full bridge):	anni anndustar atrain agusa
8431:measuring range $\leq 0 \dots 5 N$	semi conductor strain gauge 500 Ω, nominal
measuring range≥ 0 10 N foil	
	Strain gauge 550 sz, norminar
Reference excitation voltage:	
measuring range $\leq 0 \dots 50 \text{ N}$	5 V DC or AC
measuring range $\geq 0 \dots 100 \text{ N}$	10 V DC or AC
Nominal sensitivity:	
8431: measuring range 0 5 N	15 mV/V 40 mV/V, nominal
measuring range 0 10 N	0.4 mV/V, nominal
measuring range 0 20 N	0.8 mV/V, nominal
measuring range $\ge 0 \dots 50 \text{ N}$ 8432: measuring range $0 \dots 2.5 \text{ N}$	2 mV/V, nominal 15 mV/V, nominal
measuring range 0 5 N	0,.75 mV/V, nominal
measuring range 0 10 N	1.5 mV/V, nominal
measuring range $\ge 0$ 20 N	2 mV/V, nominal
Insulation resistance:	5000 MΩ at 50 V DC
Calibration resistor:	59 k $\Omega \pm 0.1$ %
The bridge output voltage caused in the calibration protocol.	by a shufft of this value is given
•	
Environmental condition	-
Range of operating temperature:	- 55 °C + 120 °C
Nominal temperature range:	+ 15 °C +  70 °C
Influence of temperature on zero:	
measuring range $\leq 0 \dots 5 N$	$\leq$ ± 0.05 % F.S./K
measuring range $\geq 0 \dots 10 \text{ N}$	$\leq$ ± 0.03 % F.S./K
Influence of temperature on sensitivity	:
measuring range $\leq 0 \dots 5 N$	$\leq$ ± 0.05 % F.S./K
measuring range $\geq 0 \dots 10 \text{ N}$	$\leq$ ± 0.03 % F.S./K
Mechanical Value	
Relative non-linearity:	
8431	< ±0.15 % F.S.
8432	< ±0.2 % F.S.
Relative hysteresis:	
measuring range 0 5 N	< 0.3 % F.S.
measuring range ≥ 0 10 N	< 0.2 % F.S.

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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.

Kind of measurement: Tensile and compressive forces. Calibration in pressure direction (8431-5005, 8432-5002, in tensile direction). In opposition to operation the preferred direction is to be expected with a changed nominal value Maximum static force in operation: model 8431 all measuring range bidirectional 150 % of nominal load model 8432 bidirectional 100 % of nominal load all measuring range Maximum static load to overload stop: model 8432 measuring range  $\leq$  0 ... 500 N bidirectional 500 % of nominal load 0 ... 1000 N bidirectional 250 % of nominal load measuring range 0 ... 2000 N bidirectional 200 % of nominal load measuring range refer to table and dimensional drawing Dimensions:

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#### **Technical Data**

#### Model 8431

Order Code	Me	asureme	nt	Dim	nensions [r	nm]	Resonance Frequency	Weight [g]		Thread Adapter*	
		Range		øΚ	øL	øΕ	[kHz]	with / witho	ut Cable	Model	
8431-5005	0	5	Ν	4.8	9.6	-	0.3	25 /	18	8431-Zx01	
8431-5010	0	10	Ν	4.8	5.9	2.5	0.3	25 /	18	8431-Zx01	
8431-5020	0	20	Ν	4.8	5.9	2.5	0.7	25 /	18	8431-Zx01	
8431-5050	0	50	Ν	4.8	5.9	2.5	0.9	25 /	18	8431-Zx01	
8431-5100	0	100	Ν	6.4	6.6	3.6	1.2	65 /	34	8431-Zx02	
8431-5200	0	200	Ν	6.4	6.6	3.6	2.7	65 /	34	8431-Zx02	
8431-5500	0	500	Ν	6.4	6.6	3.6	3.3	65 /	34	8431-Zx02	
8431-6001	0	1000	Ν	6.4	8.7	3.6	5.3	68 /	40	-	
8431-6002	0	2000	Ν	6.4	8.7	3.6	7.5	68 /	40	-	
8431-6005	0	5000	Ν	6.4	8.7	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	Me	easuremer	nt	Dim	nensions [r	nm]	Resonance Frequency	<b>U</b> .0.		Thread Adapter*	
		Range		øΚ	øL	øΕ	[kHz]	with / without	Cable	Model	
8432-5002	0	2.5	Ν	9.7	9.6	-	0.2	92 /	68	8432-Zx01	
8432-5005	0	5	Ν	9.7	9.6	-	0.2	92 /	68	8432-Zx01	
8432-5010	0	10	Ν	9.5	9.6	3.6	0.2	92 /	68	8432-Zx01	
8432-5020	0	20	Ν	9.5	9.6	3.6	0.35	92 /	68	8432-Zx01	
8432-5050	0	50	Ν	9.5	9.6	3.6	0.6	92 /	68	8432-Zx01	
8432-5100	0	100	Ν	6.4	9.6	3.6	1.2	92 /	68	8432-Zx02	
8432-5200	0	200	Ν	6.4	9.6	3.6	2.7	92 /	68	8431-Zx02	
8432-5500	0	500	Ν	6.4	9.6	3.6	3.3	92 /	68	8432-Zx02	
8432-6001	0	1000	Ν	9.5	10.8	3.6	3.4	142 /	125	8432-Zx03	
8432-6002	0	2000	Ν	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, cable length approx. 1.7 m with standardization in cable cable length approx. 2.0 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 High flexible, Teflon isolate	d strands,
	cable length app	
with standardization in cal	ble cable length app	rox. 2.0 m
	overall diameter	er 2.5 mm;
minimum bending radius	of the cable 20 mm, or 5 mm	1 for static
operations. There is no be	nd protection available. Cable	e port with
PG screwing mini M8.		•
Protection class:	acc. to EN 60529	IP65
	400.10 211 00020	11 00

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		

Technical changes reserved. All data sheets at www.burster.com

General tolerance of dimensioning:

**Order Information** 

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

#### 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  $\ge$  0 ... 100 N ...-VxGxxxxx Extension of the nominal temperature range

to 20 °C ... 200 °C, for measuring ranges ≥ 0 ... 100 N ...-VxHxxxxx

20 N

Extension of the nominal temperature range to -55 °C ... 120 °C for measuring ranges  $\geq 0$ 

to -55 °C 120 °C for measuring ranges $\ge 0$ 20 N	Vxlxxxxx
Submarine cable, up to 80 °C, pressure proof up to 35 length of cable 3 m, diameter of cable 7.3 mm, bending Please inform us, if you wish another cable length. Although the dimensions A and $\oslash$ K - see drawing are changing to A = 90 mm, $\oslash$ K = 12.7 mm.	gradius60mm
additional weight 200 g	Vxxxlxxx

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

Standardization of the characteristic in the sensors connection cable to 1.5 mV/V  $\pm$  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  $\geq 0 \dots 10 \text{ N}$ ...-V015

#### Longer Cable

acc. to ISO 2768-f

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.

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#### 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		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 compressive 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 tensile 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

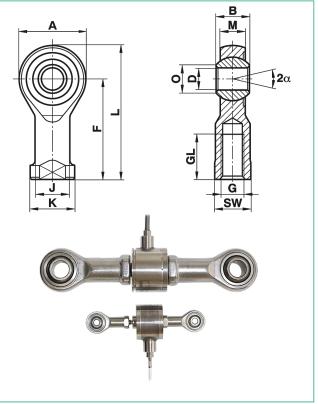
#### 5501-Z014

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...



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.