

# High 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

CAD data 2D/3D for this sensor:  
 Download directly at [www.traceparts.com](http://www.traceparts.com)  
 Info: refer to data sheet 80-CAD-EN

## Compressive forces



Model 85043 / Model 85073

## Tensile and compressive forces



Model 85041 / Model 85075

- Measuring ranges between 0 ... 20 N and 0 ... 2 MN
- For static and dynamic forces
- High linearity 0.1 % F.S.
- Very low sensitivity to lateral forces
- Models 85073 / 85075 suitable for extremely high dynamic stress
- 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. In addition, the high degree of protection (optionally IP68) and the low sensitivity to lateral forces mean that these types can be used for almost any applications in industry, laboratory and workshops.

Examples of applications would be the measurement of:

- ▶ Insertion forces
- ▶ Friction forces
- ▶ 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.

For extreme applications where the number of load cycles is particularly high (up to 10<sup>9</sup>) we recommend the 85070 series; it also features a high usable force of 200 % of the rated force.

## Description

Between the central piece to which the force is applied (force introduction) and the outer ring (with fastening holes) there is a force-sensitive element to which strain gauges are applied.

The sensors are sealed by membranes welded to the top and bottom. These membranes prevent the central part from being moved sideways when lateral forces or torques act on the device. Their effect on the measured signal is therefore minimal (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 85070 series (models 85073 and 85075) is designed for the highest possible dynamic stress and service life. This is > 10<sup>9</sup> cycles from zero up to the full value of the measuring range in the tensile or compressive direction.

## Dimensions

### Compressive load cell model 85043 - for static and dynamic operations

Order Code	Measurement Range	Dimensions [mm]													Natural Fre-
		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		
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		
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		
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		
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		
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	2	
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		
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		
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	4	
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		
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	4	
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	20	
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		
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		
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		
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		
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		

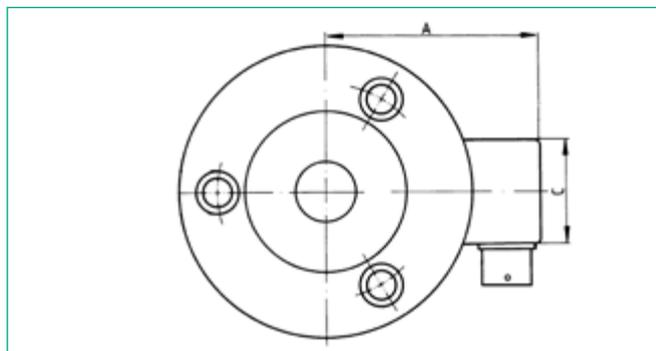
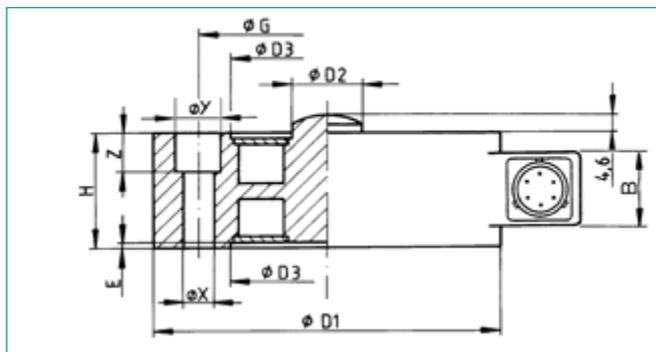
\* These values are nominal values

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

Order Code	Measurement Range	Dimensions [mm]													Natural Frequency [kHz]
		øD1	øD2*	øD3*	H	A	B	C	E*	øG	øX	øY	Z		
85073- 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	4.4	
85073- 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	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	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	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	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	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	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	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	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	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		
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		

\* These values are nominal values

### Dimensional drawings models 85043 and 85073



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

## Dimensions

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

Order Code	Measurement Range	Dimensions [mm]												Thread T	Number of Holes in $\varnothing$ G	Natural Frequency
		$\varnothing$ D1	$\varnothing$ D2*	$\varnothing$ D3*	H	A	B	C	E*	$\varnothing$ G	$\varnothing$ X	$\varnothing$ Y	Z			
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	

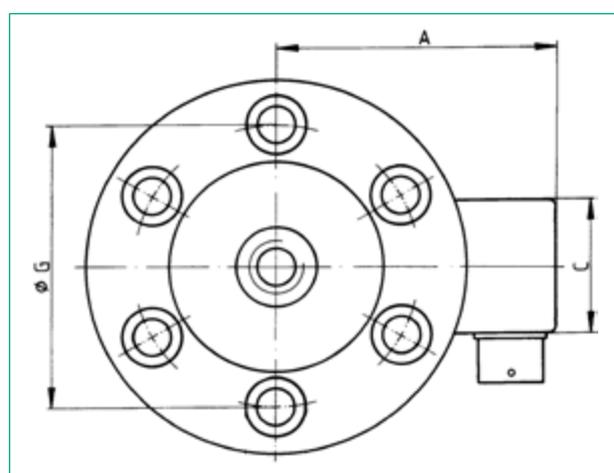
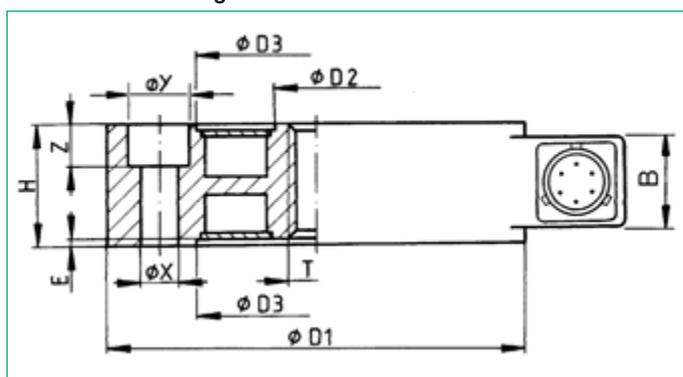
\* These values are nominal values

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

Order Code	Measurement Range	Dimensions [mm]												Thread T	Number of Holes in $\varnothing$ G	Natural Frequency [kHz]
		$\varnothing$ D1	$\varnothing$ D2*	$\varnothing$ D3*	H	A	B	C	E*	$\varnothing$ G	$\varnothing$ X	$\varnothing$ Y	Z			
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



#### 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  $\varnothing$ Y and Z).

**The CAD drawing (3D/2D) for this sensor can be imported online directly into your CAD system.**

Download via [www.burster.com](http://www.burster.com) or directly at [www.traceparts.com](http://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  $\Omega$ , nominal<sup>1</sup>  
 Calibration resistor: 59 k $\Omega$   $\pm$  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 DC or AC

Nominal value: 2 mV/V, nominal<sup>1</sup>

Models 85041/85043, > 100 N: 3 mV/V, nominal<sup>1</sup>

Isolation resistance: > 10<sup>9</sup>  $\Omega$  at 50 VDC

<sup>1</sup>) 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  $\pm$  0.004 % F.S./K  
 to characteristics + 0.004 % Rdg./K

### Mechanical values

#### Models 85041 and 85043

Non-linearity:  
 measurement range  $\leq$  0 ... 100 N <  $\pm$  0.2 % F.S.  
 measurement range  $\geq$  0 ... 200 N <  $\pm$  0.1 % F.S.

Hysteresis:  
 measurement range  $\leq$  0 ... 100 N <  $\pm$  0.1 % F.S.  
 measurement range  $\geq$  0 ... 200 N <  $\pm$  0.08 % F.S.

Spread at unchanged installation position:  
 measurement range  $\leq$  0 ... 100 N <  $\pm$  0.1 % F.S.  
 measurement range  $\geq$  0 ... 200 N <  $\pm$  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  $\mu$ m

Material:  
 stainless steel 17-4 PH (similar to material 1.4542)  
 only model 85041 range  $\geq$  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  $\leq$  20 kN: 6 pin bajonett plug-in connector  
 mating connector model 9945 in scope of delivery  
 range  $\geq$  50 kN: 6 pin screw connector  
 mating connector model 9946 in scope of delivery

#### Models 85073 and 85075

Non-linearity: <  $\pm$  0.1 % F.S.

Relative hysteresis: <  $\pm$  0.1 % F.S.

Relative spread at unchanged installation position: <  $\pm$  0.03 % F.S.

Operational force: 200 % of nominal force

Maximum dynamic load: 100 % of nominal force

Deflection full scale: approx. 50  $\mu$ m ... 100  $\mu$ m

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

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

Electrical connection:  
 Range  $\leq$  10 kN: 6 pin bajonett plug-in connector  
 mating connector model 9945 in scope of delivery  
 Range  $\geq$  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

High precision load cell for compressive loads,  
 measurement range 200 N **Model 85073-0,2 kN**

High precision load cell for tensile and compressive loads,  
 measurement range 100 kN **Model 85041-100 kN**  
 please state options with the short term.

## Accessories

Mating connector (cable coupling), in scope of delivery  
 6 pin bajonett connector (from 10 kN or 20 kN) **Model 9945**  
 6 pin screw connector (from 20 kN or 50 kN) **Model 9946**

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

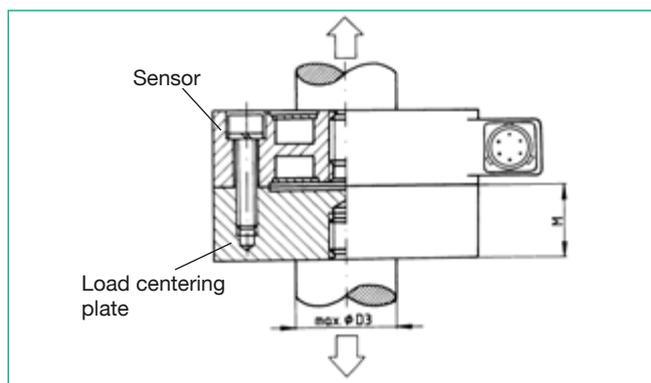
Connection cable for burster desktop units, length 3 m:  
 a) with coupling model 9945 and connector 9941 **Model 9911**  
 b) with coupling model 9946 and connector 9941 **Model 9912**

Connection cable for 9235 and 9310:  
 a) with coupling model 9945 and connector 9900-V209  
**Model 99209-545A-0160030**  
 b) 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

Amplifiers like model 9243, digital indicator like model 9181, process measuring and control units like DIGIFORCE® models 9306 / 9310  
**refer to section 9 of the catalog.**

#### Strain gauge simulator

As auxiliary material used for the creation of strain gauge sensor signals. These signals are used for the adjustment of amplifiers and indicators or for checking their settings. **Model 9405**  
**refer to data sheet 76-9405 in section 7 of the catalog.**

## Options

**Option - V000I000**  
 Hermetically closed version, IP68, with waterproofed cable connection, length 3 m, usable up to 80 °C.

**Option - V0I00000**  
 Range of nominal temperature (compensated range) extended to - 55 °C ... 120 °C

**Internal amplifier**  
 with voltage and current output **on request**

## Manufacturers Calibration Certificate (WKS)

Calibration of a force sensor or a measuring chain in 20 % steps of the measuring range.

- ▶ in tensile and / or compressive direction
- ▶ rising and falling force
- ▶ at unchanged mounting position.