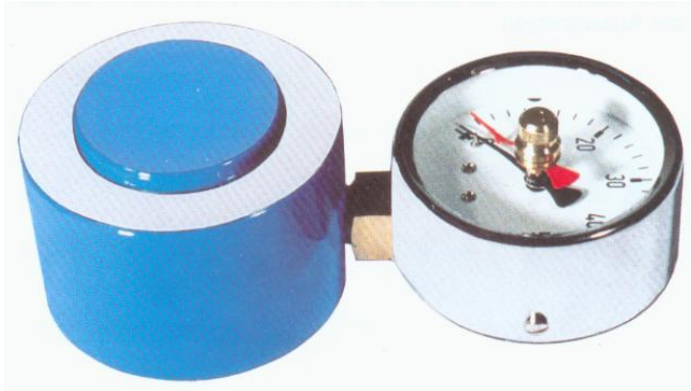


FORCE MEASURING SYSTEMS

hydraulic and hydraulic-electric precision load cell *)



General Description

a) Applications

Mechanical engineering: measuring static or dynamic loads on production machinery and equipment such as machine tools (1), rolling mill stands, paper calendering rolls (2), hobbing machines (3), hydraulic presses and press brakes (4), tensile testing machines (5), car brake testing stands, torque meters.

Civil engineering: measuring pressures exerted by heavy structures such as bridges, bunkers, dams, etc.

Mining: measuring the roof load acting on pit props (6).

Weighing systems: Weighing of tanks, bins, hoppers for totalising weight, controlling process and batching operations, monitoring minimum and maximum levels, etc. (7) and (8). Weighbridges for road and rail vehicles (9).

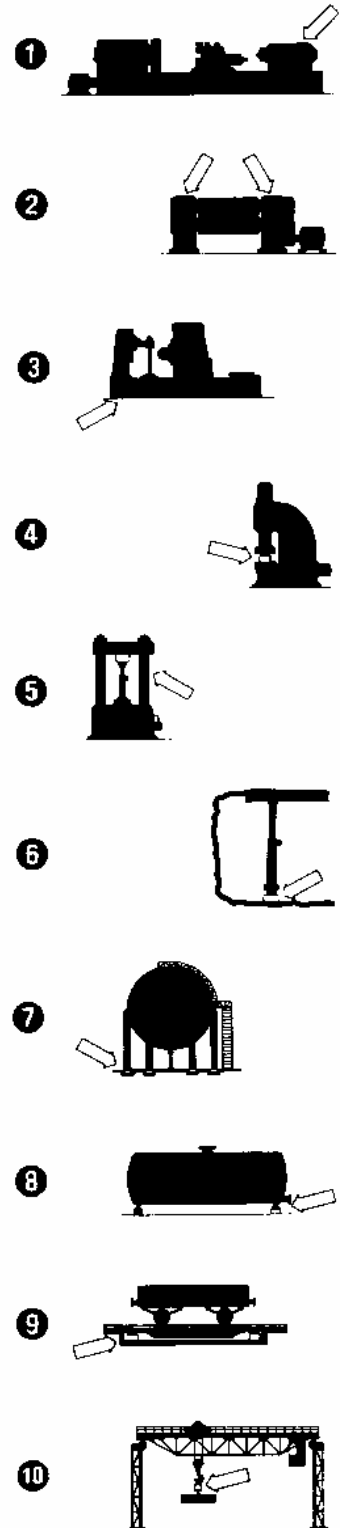
For further details, see leaflet WEIGHING SYSTEMS:

Tension load cells are used for measuring cable tension in lifting and hauling equipment or as crane weight indicators (10).

For further details, see leaflet WEIGHING SYSTEMS.

*) Low-price standard load cells giving accuracies of between 1% and 1,6% are available, but in fewer models.

Further details are given in leaflet D 38.



b) Design

Hydraulic load cells consist essentially of a cylindrical or ring-type capsule with piston and a specially developed oil- and acid-resistant diaphragm which hermetically seals the fluid system. On loading the piston, the pressure generated in the fluid is transmitted via the diaphragm to the indicator gauge. The stroke of the piston does not exceed 1 mm.

Indicators have scales calibrated in N, kN oder MN and are normally available in diameters of 100 or 160 mm, or in rectangular sizes of 72 x 72, 96 x 96, 144 x 144 and 144 x 72 mm.

Hydraulic load cells, owing to their simple and robust design, are insensitive to shock and vibration and yet provide high-accuracy readings; they can be used in ambient temperatures ranging from -20°C to +50°C. Higher temperature resistance is offered, on request.

c) Remote Indication

Capillary tubing of between 2 and 15 m length can be used to transmit the load cell output to the indicator or recorder. This 4 mm dia. tubing is available in copper or steel, provided with stainless steel covering, if necessary.

d) Electrical Contact Units

Indicators and certain types of recorders can be provided with electrical contact units designed to give visual or audible signals whenever the actual load exceeds or falls below a pre-set value.

For type selection, see leaflet EK 01.

Pressure Switch

The load cells may also be fitted with a special pressure switch.

For further details, see leaflet EK 02.

f) Hydraulic Line Coupling (Reg. Design)

Capillaries of greater length can be provided with a self-sealing coupling at any point between load cell and indicator (recorder) to facilitate the installation on machinery.

Further details are given in the Operating Instructions.

g) Accuracy

Indicator readings normally are accurate to $\pm 1\%$ of full scale or, in special cases, to $\pm 0,6\%$, always provided the load to be measured is acting centrally and normal to the piston face. To ensure this, the cell must be mounted in perfectly horizontal position and parallel to the upper and lower compression faces. The load must act on the full piston face and the piston must not be subjected to side loads or shear forces.

Additional instruments cause the accuracy to decrease. Detailed information is given on request.

h) Overload Capacity / Overload Protection / Shock Load Damping

To determine the correct measuring range and to prevent overloading, multiply the maximum service load by 1.2 if the load is static, or by 1.5 if the load is dynamic, and choose the next higher standard range. Normally, pressure gauges can be loaded to full scale. If desired, we supply pressure gauges that can be subjected to **short-cycle** overloads equal to 1.2 times the full scale.

A dual snubber can be incorporated to dampen out shock loads in both directions.

For further details, see leaflet MZ 02-01.

i Other Features

Pressure gauges are also available in outdoor design; they can be arranged in any position or can be fitted with a maximum pointer and any special scale or scale graduation. This publication covers our normal range of load cells. If other designs are required, please give detailed information on proposed application, location (outdoors?), service pressure, desired or permissible size, etc.-If load cell is to be installed on a machine, send drawing or detail drawing of the machine.

The load cells described herein are not suitable for measuring shock loads on high-speed presses.

This application requires the use of electrical output load cells with peak-load storage.

For further details, see leaflet D 81.

k) Special-Purpose Load Cells

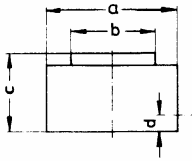
Clamping force sensors; see leaflet D 30.

l) Operating Instructions

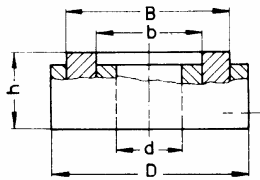
See leaflet BA-D 11.

Typical Designs

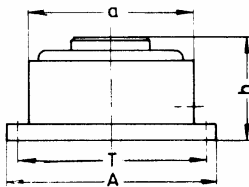
Load Cell



1. cylindrical type



2. ring type

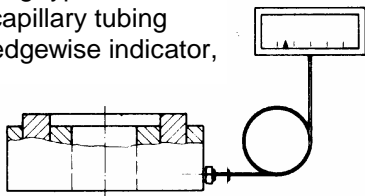


3. spezial typ for weighing systems

How to order:

Example: Type 5.2.4.7

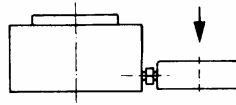
- 5 = load cell system
- 2 = ring-type load cell
- 4 = capillary tubing
- 7 = edgewise indicator,



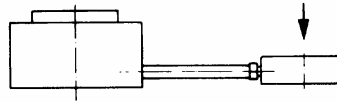
In addition, please specify:

- a) load cell with 1 or 2 carrying handles.
- b) self-sealing coupling, if desired
- c) size of gauge or indicator
- d) if gauge (items 1-5) shall be of corrosion-resistant standard type, 100 or 160 mm dia.
- e) if gauge indicator is to be fitted with electrical contacts or other devices

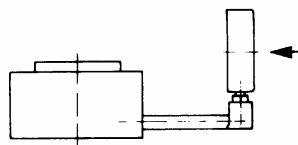
Gauge Connection



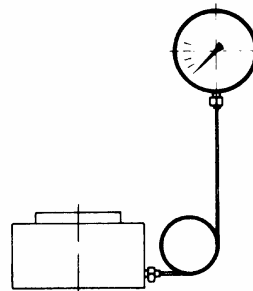
1. rigid



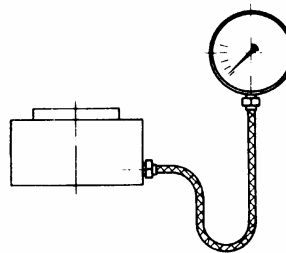
2. rigid, extended



3. rigid, with angular extension



4. cooper or steel capillary tubing as hydraulic line



5. high-pressure hose as hydraulic line

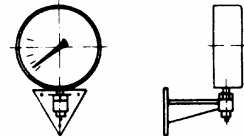
Gauge Type



1. circular gauge, 100, 160 mm dia. as standard



2. circular gauge for surface-mounting 100, 160 mm dia.



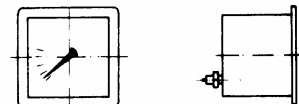
3. circular gauge with wall bracket



4. circular gauge for flush-mounting, with front ring A, 100, 160 mm dia.



5. circular gauge for flush-mounting, with rear rim and front ring B, 100, 160 mm dia.



6. square dial indicator, 144 x 144 mm



7. rectangular edgewise indicator 144 x 72 mm

Dimensions of Circular Gauges

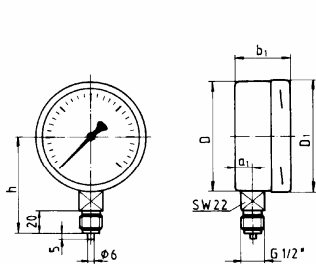


Fig. 101

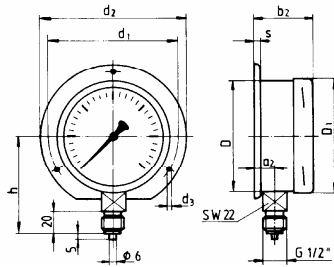


Fig. 102

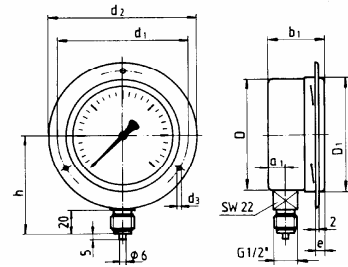


Fig. 103

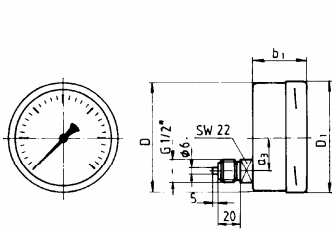


Fig. 104

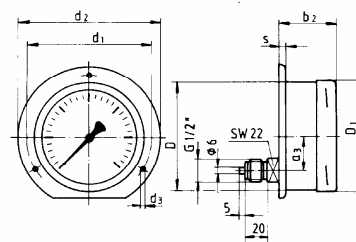


Fig. 105

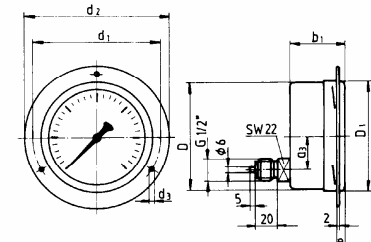


Fig. 106

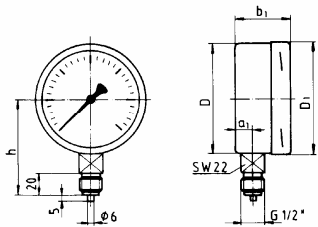


Fig. 107

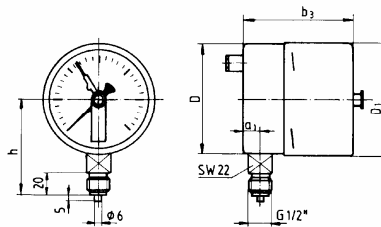


Fig. 108

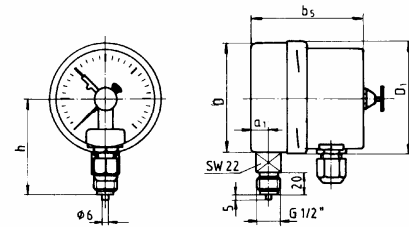


Fig. 109

Nom. Size D in mm	Dimensions in mm																
						b ₃		b ₅									
	a ₁	a ₂	a ₃	b ₁	b ₂	Single - Contact	Double- Contact	Single - Contact	Double- Contact	D	D ₁	d ₁	d ₂	d ₃	e	h	s
100	15,5	19	30	49,5	53	87	87	100	100	99	101	116	132	4,8	5,5	87	6
160	15,5	19	50	49,5	53	87	87	100	100	159	161	178	192	5,8	7	118	6

Fig. 101 = standard gauge to DIN 16 064, Style A, with bottom connection

Fig. 102 = same as Fig. 101, with back rim for surface-mounting, to DIN 16 064, style B

Fig. 103 = same as Fig. 101, with front ring for flush-mounting, to DIN 16 280, style A

Fig. 104 = with eccentric rear connection

Fig. 105 = same as Fig. 104, with back rim for surface-mounting, to DIN 16 064, style B

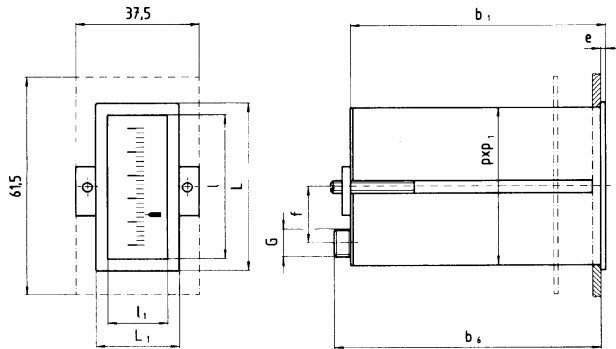
Fig. 106 = same as Fig. 104, with front ring for flush-mounting, to DIN 16 280, style A

Fig. 107 = stainless steel gauge, with bottom connection

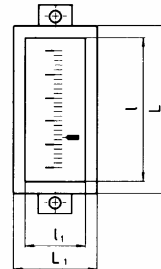
Fig. 108 = contact-making gauge (Fig. 101 with contacts, rear cable inlet)

Fig. 109 = contact-making gauge (Fig. 107 with contacts)

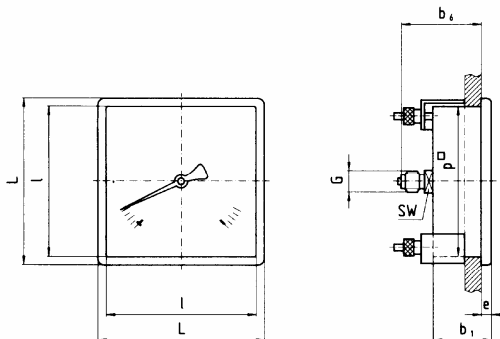
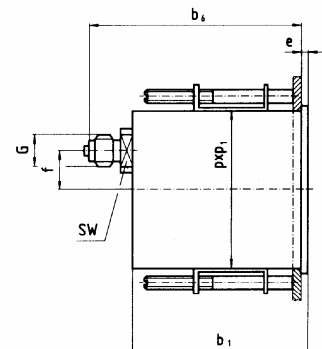
Dimensions of Square and Rectangular Indicators



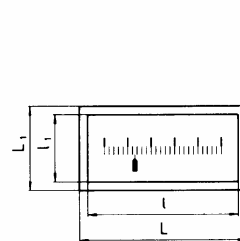
NS 48 x 24, with eccentric rear connection



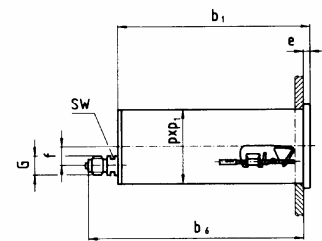
NS 72 x 36, with eccentric rear connection



NS 72 x 72, 96 x 96, 144 x 144,
with eccentric rear connection



NS 144 x 72, with eccentric rear connection



NS	Dimensions in mm												Weight in kg
	b ₁	b ₆	e	f	G	L	L ₁	l	l ₁	pxp ₁	p [?]	SW	
48 x 24	75,5	83,5	2	14	G 1/8 A	48	24	38	14	44,5x20,5	-	-	0,17
72 x 36	74,5	86,5	4	21	G ¼ A	72	36	56	20	66 x 29	-	14	0,25
72 x 72	29	42	6	-	G ¼ A	72	-	62	-	-	66	14	0,30
96 x 96	35	47	6	-	G ¼ A	96	-	79	-	-	88,5	14	0,40
144 x 72	168	197	8	18	G ½ A	144	72	134	62	134 x 63,5	-	17	1,50
144 x 144	46,5	72	8	30	G ½ A	144	-	134	-	-	136	22	1,50