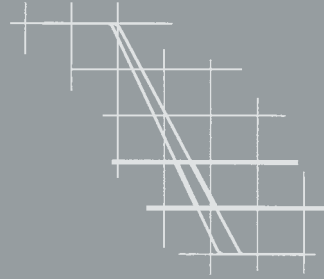
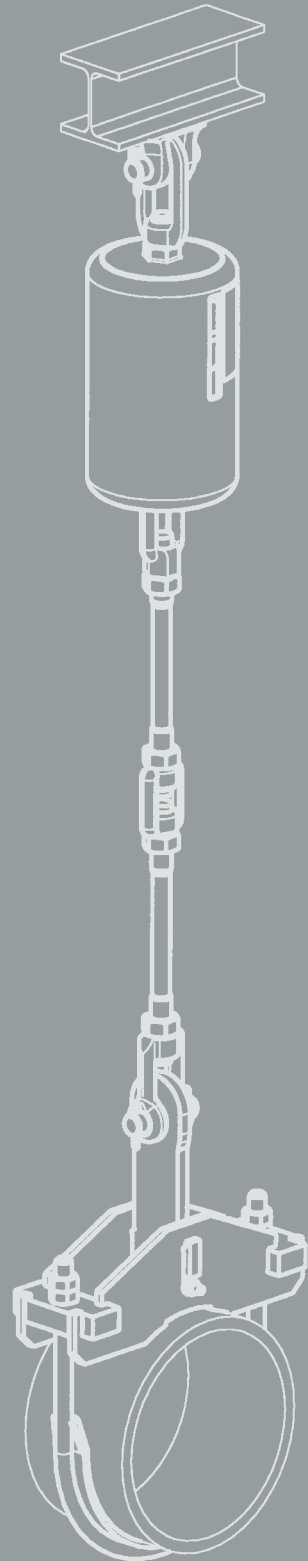


Spring hangers, spring supports

2

SPRING HANGERS,
SPRING SUPPORTS



PRODUCT
GROUP

2



Spring hangers, spring supports

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0

1

**PRODUCT
GROUP 2**

3

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Field of application

To avoid constraints in the system, thermal expansion in high-temperature piping must not be restricted. The piping must therefore be supported in a correspondingly elastic manner.



Spring components

To balance slight vertical displacement in the pipe systems, spring components are used as supports. These components function on the basis of preset helical coil springs which exert a variable supporting load over the range of movement in accordance with their specified spring characteristics. Load variations resulting from this are limited through the stress analysis calculations, depending on the sensitivity of the piping.

The relevant basis for the function of the spring components is specified in the current guidelines (see technical specifications p. 0.5).

LISEGA spring hangers and supports

A range of spring component designs are available for optimum adaptation to the **various structural requirements**. The ideal choice depends on the installation situation.

Spring hangers and supports are as a rule calibrated in such a way that the spring force and pipe load are the same in the cold position (see p. 0.5). The corresponding hot load position results from the theoretical pipe displacement (travel) and the spring rate.

The difference in force between hot and cold positions acts on the pipe system as a reaction force and is limited by the relevant design specifications. Further information can be found on p. 0.5.



As standard practice, the permissible force deviation between cold position (blocking position) and hot position should not exceed 25 % in relation to the hot load.

Moreover, as a rule constant **hangers/supports** are used that maintain a **constant hanger/support** force over the whole displacement range.

Selection of spring hangers

The reaction force depends on the spring rate (stiffness) of the respective coil springs. The change in force from cold to hot position results from the displacement. The greater the spring rate, the greater the change in load and accordingly the reaction force in the pipe system. For optimum selection of spring hangers and supports, LISEGA has divided the load ranges into 5 travel ranges.

Details of their application can be found in the **selection table** (see pp. 2.5 and 2.6), in the **installation and operating instructions** (p. 2.19) and the **technical specifications** (p. 0.3).

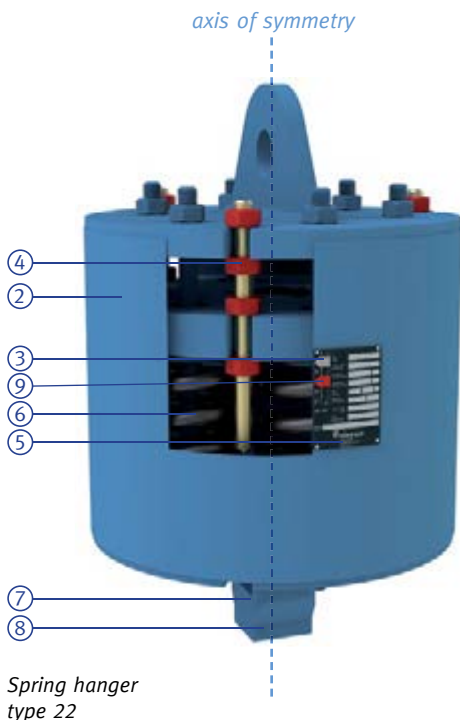
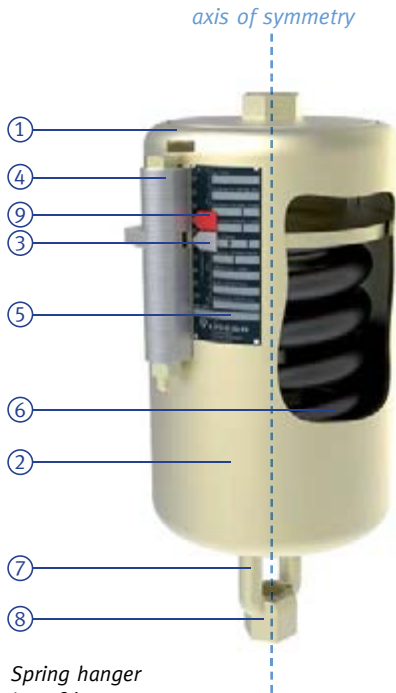
Load setting and blocking

Spring hangers and supports are preset at the factory to the cold or blocking load and blocked in both directions of movement. This enables installation of the support in the designated installation space without time-consuming later adjustments.

In addition, the supplementary loads arising through pickling, flushing or pressure testing are held by the blocking devices.

- cold and hot positions are shown on the travel scale by white and red marking respectively
- the blocking devices have continuously variable settings and can be applied again in any position

Special advantages of LISEGA spring hangers



The user can profit from a wide range of special benefits with LISEGA spring hangers.

Significant savings are possible, particularly with regard to ancillary labor-intensive support costs such as planning, installation and operation.

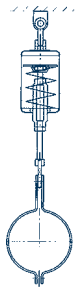
- ① No welding (types 20, 21, 27).
- ② Fully galvanized surfaces.
For heavy duty designs: coated surfaces.
- ③ The hot or cold position is marked on the travel scale (white and red arrow).
- ④ Fully adjustable blocking system.
- ⑤ On the spring hangers, the preset values are noted on the riveted name plate.
- ⑥ Special pre-relaxed springs with a CPP (cataphoretic painting process) finish prevent any significant loss in load capacity.
- ⑦ Integrated connecting elements.
- ⑧ Variable connection possibilities within the load group selected and the possibility of later adjustment for load setting.
- ⑨ The theoretical hot position (operating position) is marked on the travel scale (red arrow).
- ✓ Five travel ranges from 0 to 400mm, load group C to load group 9
Three travel ranges from 0 to 200mm, load group 10 to load group 50.
- ✓ Load application free of moments by covering the load and symmetry axis.
- ✓ Favorable power-to-weight-ratios for reduced assembly weights.
- ✓ Modular system simplifies selection (load groups and travel ranges).
- ✓ Flexible installation configurations using standardized components.
- ✓ Secure connection of load chains through the load and connection compatibility of system components.

Overview of types

Spring hangers and spring supports

0.04 – 100kN

Heavy duty design 53 – 400kN



Spring hanger type 21



Spring hanger type 21

This design is the most commonly used and is fitted with an upper connection for suspension. It is used where the surrounding structure offers a suitable connection point and sufficient installation space. The upper connections can be universally adapted to the existing conditions using standard components.

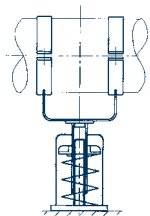


Spring hanger type 25



Spring hanger type 25

This version is used especially if the permissible deflection of a support chain when using type 21 was exceeded or if, due to shortage of space, a type 21 spring hanger cannot be installed. The connection is made by a rod fed through the hanger.



Spring support type 29



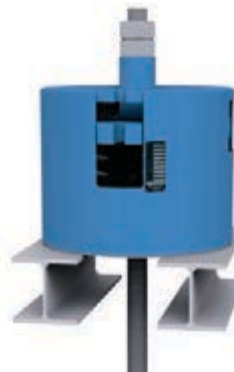
Spring support type 29

If the surrounding conditions do not permit suspensions, this design offers a suitable alternative as a support. For larger horizontal displacements of the support-bearing load and of steel/steel slide plate contact, under certain circumstances the functioning of the support can be adversely affected by any lateral forces generated. It is recommended to avoid this risk by using LISEGA slide plates. In this case the counter plate must have a stainless steel surface and if necessary be fitted with a twist restraint.



Spring hanger type 22

This design corresponds functionally to type 21 and is available for higher loads up to 400kN.



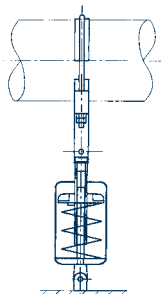
Spring hanger type 26

This design corresponds functionally to the seated spring hanger type 25 and is available for higher loads up to 400kN.



Spring support type 28

This design corresponds functionally to spring support type 29 and is available for higher loads up to 400kN. Here too, LISEGA sliding components can be used as an option.



Angulating spring support type 20



Angulating spring support type 20

In contrast to the type 29 spring supports, lateral displacements can be absorbed practically free of friction forces by this design. This way, resulting forces in all planes, both in vertical as well as horizontal directions of movement, are almost completely eliminated.

The angulating spring supports are fitted on one side with an adjustable load tube and a rotating ball bushing joint and on the other with a fixed ball bushing joint. The joints provide the appropriate connection to the type 35 weld-on brackets and the dynamic clamps in product group 3.

Sway braces type 27

These special components act in compression and tension directions and are used to stabilize the position of pipe systems and other plant equipment. The connection components correspond with those in product group 3 (dynamic components).

With the LISEGA sway braces type 27 the following settings can be made:

- load pre-tensioning
- installation dimensions
- free stroke



Spring hanger trapezes type 79

These commonly used components combine the advantages of the spring hanger with the easy-to-install, weld-free plug-in trapezes. For restricted spaces the spring hanger trapezes can be supplied as special welded designs.



Telescopic spring supports type 29 .. 2.

As a special design of type 29 these telescoping spring supports are used for lower E dimensions. They are fitted as standard with a PTFE slide plate.



Add-on components



Slide plate for spring supports type 29/28

To reduce friction between the load plate and mating component (e.g. clamp base), PTFE sliding materials (up to 180°C) or suitable material for higher temperatures are used. The counter component should in this case have a stainless steel sliding surface. The selection of slide plates can be found on p. 2.11.



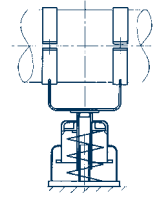
Extension for spring support type 29

To bridge larger installation heights, adapted extensions can be ordered (see p. 2.11).

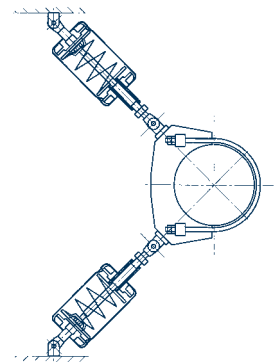


Base plate for spring hanger type 25

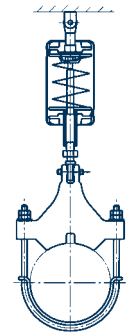
If required, type 25 can be supplied with the base plate type 27 for bolting or welding. A selection can be found on p. 2.9.



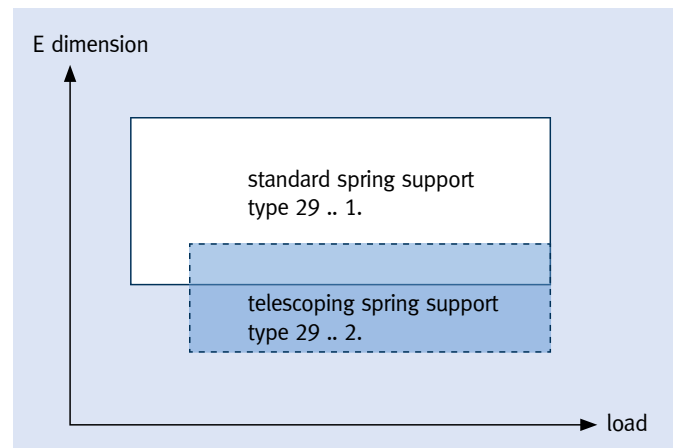
Spring support type 29 .. 2. (telescopic)



Sway brace type 27 angled arrangement



Sway brace type 27 simple arrangement



Extended field of application with telescopic spring support 29 .. 2.

Selection overview, spring components

Selection criteria for spring hangers and supports

Permissible force variation

The permissible force variation from cold load (installation load) to hot load (operating load) is limited internationally by the common specifications for pipe system calculations to **max 25% of the operating load**. In principle however, it is dependent on the pipe system calculations.

Maximum travel

To avoid functional variations through instability from springs with long travel, **maximum travel of 50mm** should not, as a rule, be exceeded.

Spring rates

In order to offer the largest possible field of application while at the same time complying with these specifications, LISEGA spring components are divided into 5 travel ranges with correspondingly different spring rates.

Extra-long springs

Travel ranges 4 and 5 belong to the 'extra-long spring travel' category and should only be used after careful consideration of the travel and variability, especially in sensitive, 'soft' pipe systems.

Design type

The choice of a suitable design type is dependent on the respective support configuration and/or installation conditions.

Economical size

The following selection procedures can be followed to determine the most economical component size:

Spring hangers type 21, spring hangers type 25 for seating, spring supports type 29, angulating spring supports type 20

travel range ①					type designation												
					21 C2 19	21 D. 19	21 1. 18	21 2. 18	21 3. 18	21 4. 18	21 5. 18	21 6. 18	21 7. 18	21 8. 18	21 9. 18		
						25 D. 19	25 1. 18	25 2. 18	25 3. 18	25 4. 18	25 5. 18	25 6. 18	25 7. 18	25 8. 18	25 9. 18		
					29 C2 19	29 D. 19	29 1. 18	29 2. 18	29 3. 18	29 4. 18	29 5. 18	29 6. 18	29 7. 18	29 8. 18	29 9. 18		
...1..	...2..	...3..	...4..	...5..	20 D. 19	20 1. 14	20 2. 14	20 3. 14	20 4. 14	20 5. 14	20 6. 14	20 7. 14	20 8. 14	20 9. 14			
spring travel [mm]					load [kN]												
0	0	0	0	0	0.04	0.12	0.41	0.83	1.66	3.33	6.66	13.33	20.00	26.66	33.33		
2.5	5	10	15	20	0.05	0.14	0.45	0.91	1.83	3.66	7.33	14.66	22.00	29.33	36.66		
5.0	10	20	30	40	0.06	0.16	0.50	1.00	2.00	4.00	8.00	16.00	24.00	32.00	40.00		
7.5	15	30	45	60	0.07	0.18	0.54	1.08	2.16	4.33	8.66	17.33	26.00	34.66	43.33		
10.0	20	40	60	80	0.08	0.20	0.58	1.16	2.33	4.66	9.33	18.66	28.00	37.33	46.66		
12.5	25	50	75	100	0.09	0.22	0.62	1.25	2.50	5.00	10.00	20.00	30.00	40.00	50.00		
15.0	30	60	90	120	0.10	0.24	0.66	1.33	2.66	5.33	10.66	21.33	32.00	42.66	53.33		
17.5	35	70	105	140	0.11	0.26	0.70	1.41	2.83	5.66	11.33	22.66	34.00	45.33	56.66		
20.0	40	80	120	160	0.12	0.28	0.75	1.50	3.00	6.00	12.00	24.00	36.00	48.00	60.00		
22.5	45	90	135	180	0.13	0.30	0.79	1.58	3.16	6.33	12.66	25.33	38.00	50.66	63.33		
25.0	50	100	150	200	0.14	0.32	0.83	1.66	3.33	6.66	13.33	26.66	40.00	53.33	66.66		
27.5	55	110	165	220	0.16	0.34	0.87	1.75	3.50	7.00	14.00	28.00	42.00	56.00	70.00		
30.0	60	120	180	240	0.17	0.36	0.91	1.83	3.66	7.33	14.66	29.33	44.00	58.66	73.33		
32.5	65	130	195	260	0.18	0.38	0.95	1.91	3.83	7.66	15.33	30.66	46.00	61.33	76.66		
35.0	70	140	210	280	0.19	0.40	1.00	2.00	4.00	8.00	16.00	32.00	48.00	64.00	80.00		
37.5	75	150	225	300	0.20	0.42	1.04	2.08	4.16	8.33	16.66	33.33	50.00	66.66	83.33		
40.0	80	160	240	320	0.21	0.44	1.08	2.16	4.33	8.66	17.33	34.66	52.00	69.33	86.66		
42.5	85	170	255	340	0.22	0.46	1.12	2.25	4.50	9.00	18.00	36.00	54.00	72.00	90.00		
45.0	90	180	270	360	0.23	0.48	1.16	2.33	4.66	9.33	18.66	37.33	56.00	74.66	93.33		
47.5	95	190	285	380	0.24	0.50	1.20	2.41	4.83	9.66	19.33	38.66	58.00	77.33	96.66		
50.0	100	200	300	400	0.25	0.52	1.25	2.50	5.00	10.00	20.00	40.00	60.00	80.00	100.00		
					spring rate c [N/mm]												
										33.3	66.6	100.0	133.3	166.6			
										11.1	22.2	44.4	88.9	133.3	177.8	222.2	
										2.1	4.1	8.3	16.6	33.3	66.6	133.3	
										2.1	4.1	8.3	16.6	33.3	66.6	133.3	
										8.3	16.6	33.3	66.6	133.3	266.6	533.3	
										8.3	16.6	33.3	66.6	133.3	266.6	533.3	

In cases where a smaller 'E' dimension than that of type 29 ..1. is required, we recommend the use of telescopic spring support type 29 .. 2. (see p. 2.17).

Determination of the most favorable size

1. Selection of the most favorable spring hanger/support

Example:

Operating load $F = 6000\text{N}$
 Permissible deviation $p < 25\%$
 Travel (upwards) $s = 15\text{mm}$

The max. permissible spring rate produces:

$$\text{Spring rate} \leq \frac{(\text{permissible deviation}) \cdot (\text{operating load})}{(\text{working travel})}$$

$$c \leq \frac{0.25 \cdot 6000\text{N}}{15\text{mm}} = 100\text{N/mm}$$

Selection type 25 42 18
 Spring rate $c = 66.6\text{N/mm}$
 Cold load $F_K = 7000\text{N}$

2. Determination force variation (percentage)

Example:

6000N operating load, working travel 15mm (upwards), a spring hanger type 25 42 18 with a spring rate of $c = 66.6\text{ N/mm}$ was selected:

$$\text{Change in force} = \frac{(\text{working travel}) \cdot (\text{spring rate})}{(\text{operating load})}$$

$$\Delta F = \frac{15\text{mm} \cdot 66.6\text{N/mm}}{6000\text{N}} = 0.1665$$

$$\Delta F [\%] = 16.65\%$$

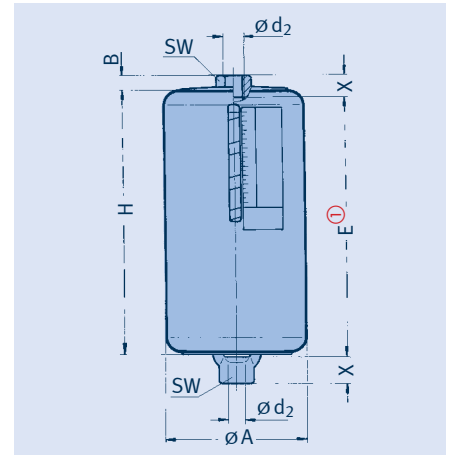
Spring hangers type 22, spring hangers type 26 for seating, spring supports type 28

travel range ①			type designation				
			22 1. 19	22 2. 19	22 3. 19	22 4. 19	22 5. 19
			26 1. 19	26 2. 19	26 3. 19	26 4. 19	26 5. 19
...1..	...2..	...3..	28 1. 19	28 2. 19	28 3. 19	28 4. 19	28 5. 19
spring travel [mm]			load [kN]				
0	0	0	53.33	66.66	80.00	100.00	133.33
2.5	5	10	58.66	73.33	88.00	110.00	146.66
5.0	10	20	64.00	80.00	96.00	120.00	160.00
7.5	15	30	69.33	86.66	104.00	130.00	173.33
10.0	20	40	74.66	93.33	112.00	140.00	186.66
12.5	25	50	80.00	100.00	120.00	150.00	200.00
15.0	30	60	85.33	106.66	128.00	160.00	213.33
17.5	35	70	90.66	113.33	136.00	170.00	226.66
20.0	40	80	96.00	120.00	144.00	180.00	240.00
22.5	45	90	101.33	126.66	152.00	190.00	253.33
25.0	50	100	106.66	133.33	160.00	200.00	266.66
27.5	55	110	112.00	140.00	168.00	210.00	280.00
30.0	60	120	117.33	146.66	176.00	220.00	293.33
32.5	65	130	122.66	153.33	184.00	230.00	306.66
35.0	70	140	128.00	160.00	192.00	240.00	320.00
37.5	75	150	133.33	166.66	200.00	250.00	333.33
40.0	80	160	138.66	173.33	208.00	260.00	346.66
42.5	85	170	144.00	180.00	216.00	270.00	360.00
45.0	90	180	149.33	186.66	224.00	280.00	373.33
47.5	95	190	154.66	193.33	232.00	290.00	386.66
50.0	100	200	160.00	200.00	240.00	300.00	400.00
			spring rate c [N/mm]				
			533.3	666.6	800	1000	1333.3
			1066.6	1333.3	1600	2000	2666.6
			2133.3	2666.6	3200	4000	5333.3

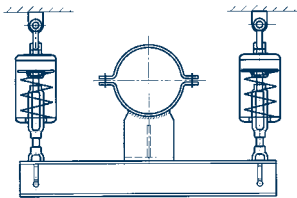
- ① Travel range = 4th digit of type designation. For the availability of the different travel ranges, see dimension tables on pp. 2.7 to 2.17.
- ② The use of springs with extra-long travel is to be treated with reservation due to the relatively large spring hysteresis.

Spring hangers Type 21

**Spring hanger
type 21 C2 19 to 21 95 18**
Standard design,
delivery from stock.



① Dimension 'E' increases on loading by the corresponding spring travel (see load table on p. 2.5).

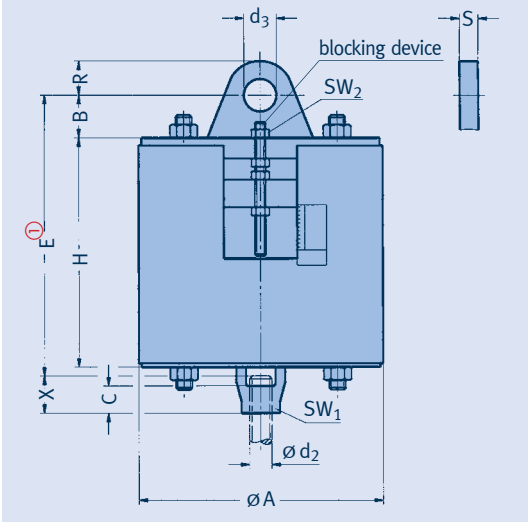


In restricted spaces the spring hangers can be used with type 79 trapezes (see p. 2.14).

type	$\varnothing A$	B	$\varnothing d_2$	E ①	H	SW	X	weight [kg]
21 C2 19	80	11	M10	205	205	19	15	1.9
21 D2 19	90	11	M10	250	245	19	15	3.0
21 D3 19	90	11	M10	475	470	19	15	5.0
21 11 18	90	11	M12	155	145	19	15	2.1
21 12 18	90	11	M12	250	245	19	15	3.1
21 13 18	90	11	M12	475	470	19	15	5.5
21 21 18	115	12	M12	155	150	19	15	3.8
21 22 18	115	12	M12	255	250	19	15	5.3
21 23 18	115	12	M12	475	460	19	15	8.6
21 31 18	115	13	M16	160	155	24	20	4.3
21 32 18	115	13	M16	255	250	24	20	6.0
21 33 18	115	13	M16	475	470	24	20	9.7
21 34 18	115	13	M16	840	725	24	20	14.0
21 41 18	155	17	M20	185	180	30	25	9.2
21 42 18	155	17	M20	290	290	30	25	12.8
21 43 18	155	17	M20	525	525	30	25	20.0
21 44 18	155	17	M20	920	800	30	25	29.0
21 51 18	180	21	M24	215	215	36	30	16.5
21 52 18	180	21	M24	305	305	36	30	20.5
21 53 18	180	21	M24	540	540	36	30	32.0
21 54 18	180	21	M24	1035	825	36	30	46.0
21 55 18	180	21	M24	1275	1065	36	30	57.0
21 61 18	220	24	M30	245	245	46	35	31.0
21 62 18	220	24	M30	360	360	46	35	40.0
21 63 18	220	24	M30	640	640	46	35	62.0
21 64 18	220	24	M30	1205	980	46	35	90.0
21 65 18	220	24	M30	1490	1265	46	35	114.0
21 71 18	245	30	M36	280	285	55	45	48.0
21 72 18	245	30	M36	405	410	55	45	63.0
21 73 18	245	30	M36	675	680	55	45	89.0
21 74 18	245	30	M36	1300	1070	55	45	133.0
21 75 18	245	30	M36	1575	1345	55	45	160.0
21 81 18	245	30	M42	305	320	65	50	58.0
21 82 18	245	30	M42	470	485	65	50	80.0
21 83 18	245	30	M42	845	860	65	50	126.0
21 84 18	245	30	M42	1430	1330	65	50	182.0
21 85 18	245	30	M42	1810	1710	65	50	228.0
21 91 18	275	36	M48	330	355	75	60	84.0
21 92 18	275	36	M48	505	530	75	60	111.0
21 93 18	275	36	M48	870	895	75	60	164.0
21 94 18	275	36	M48	1515	1395	75	60	243.0
21 95 18	275	36	M48	1885	1765	75	60	296.0

Order details:
spring hangers type 21 ...
marking: ...
set load: ...kN
travel: ...mm up/down

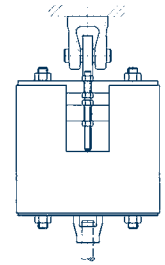
Heavy duty spring hangers Type 22



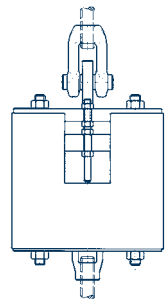
Spring hangers
type 22 11 19 to 22 53 19

type	øA	B	C	ød ₂	ød ₃	E ^①	H	R	S	SW ₁	SW ₂	X	weight [kg]
22 11 19	525	80	60	M56x4	62	440	350	90	30	85	46	65	240
22 12 19	525	80	60	M56x4	62	560	470	90	30	85	46	65	270
22 13 19	525	80	60	M56x4	62	840	750	90	30	85	46	65	340
22 21 19	545	95	70	M64x4	72	475	370	105	30	95	46	75	285
22 22 19	545	95	70	M64x4	72	595	490	105	30	95	46	75	320
22 23 19	545	95	70	M64x4	72	875	770	105	30	95	46	75	410
22 31 19	590	95	75	M68x4	72	490	385	105	30	100	46	80	360
22 32 19	590	95	75	M68x4	72	610	505	105	30	100	46	80	405
22 33 19	590	95	75	M68x4	72	890	785	105	30	100	46	80	510
22 41 19	625	115	80	M72x4	82	555	430	120	35	105	55	85	455
22 42 19	625	115	80	M72x4	82	685	560	120	35	105	55	85	515
22 43 19	625	115	80	M72x4	82	955	830	120	35	105	55	85	625
22 51 19	645	140	90	M80x4	92	630	480	135	35	115	65	95	550
22 52 19	645	140	90	M80x4	92	800	650	135	35	115	65	95	655
22 53 19	645	140	90	M80x4	92	1175	1025	135	35	115	65	95	865

① Dimension 'E' increases on loading by the corresponding spring travel (see load table on p. 2.6).

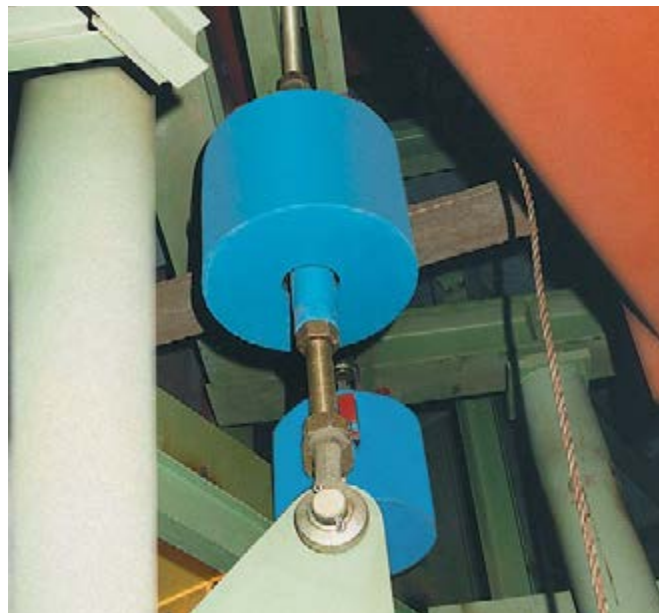


Spring hanger type 22 with weld-on clevis type 73 mounted



Spring hanger type 22 with threaded clevis type 61 mounted

◀ Typical installation situations



Order details:
spring hangers type 22 ...
marking: ...
set load: ...kN
travel: ...mm up/down

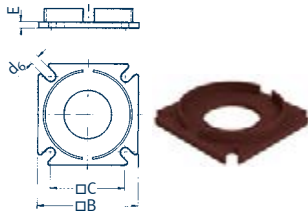
Spring hangers Type 25

Spring hangers for seating type 25 D2 19 to 25 93 18

Standard design,
delivery from stock.

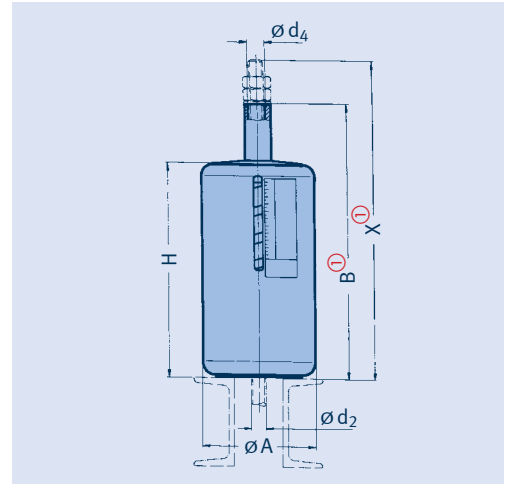


If required, the base plate
type 72 can be attached
to type 25.



type	B	C	d ₆	E	[kg]
72 D9 28	125	95	12	8	1.0
72 19 28	125	95	12	8	1.0
72 29 28	150	115	14	10	1.6
72 39 28	150	115	14	12	1.8
72 49 28	190	140	18	12	3.0
72 59 28	220	170	18	12	4.0
72 69 28	260	200	23	15	6.9
72 79 28	290	215	23	20	10.9
72 89 28	290	215	27	20	10.9
72 99 28	340	255	33	25	18.2

load group



type	øA	B ①	ød ₂	ød ₄	H	X _{max} ①	weight [kg]
25 D2 19	90	350	M10	13	245	380	2.8
25 D3 19	90	675	M10	13	470	705	4.9
25 11 18	90	200	M12	13	145	230	2.1
25 12 18	90	350	M12	13	245	380	3.1
25 13 18	90	675	M12	13	470	705	5.5
25 21 18	115	205	M12	13	150	235	3.5
25 22 18	115	355	M12	13	250	385	5.1
25 23 18	115	665	M12	13	460	695	8.4
25 31 18	115	210	M16	18	155	250	3.7
25 32 18	115	355	M16	18	250	395	5.3
25 33 18	115	675	M16	18	470	715	8.9
25 41 18	155	230	M20	25	180	280	8.0
25 42 18	155	395	M20	25	290	445	11.5
25 43 18	155	730	M20	25	525	780	18.6
25 51 18	180	265	M24	28	215	325	14.5
25 52 18	180	405	M24	28	305	465	18.0
25 53 18	180	740	M24	28	540	800	29.0
25 61 18	220	300	M30	34	245	375	26.0
25 62 18	220	465	M30	34	360	540	35.0
25 63 18	220	845	M30	34	640	920	56.0
25 71 18	245	350	M36	40	300	440	40.0
25 72 18	245	530	M36	40	430	620	53.0
25 73 18	245	900	M36	40	700	990	79.0
25 81 18	245	385	M42	47	335	495	44.0
25 82 18	245	605	M42	47	500	715	66.0
25 83 18	245	1075	M42	47	875	1185	111.0
25 91 18	275	415	M48	54	370	535	67.0
25 92 18	275	645	M48	54	545	765	92.0
25 93 18	275	1110	M48	54	910	1230	143.0

① Dimensions B and X are reduced on loading by the corresponding spring travel (see load table on p. 2.5).

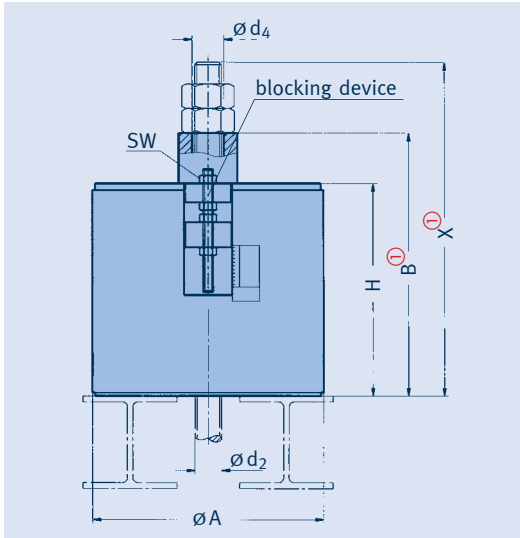


For special applications,
e.g. in extremely restricted
spaces, spring hangers
type 25 can be supplied
as a trapeze unit.

Order details:
spring hangers type 25 ...
marking: ...
set load: ...kN
travel: ...mm up/down

Heavy duty spring hangers

Type 26



Spring hangers for seating
type 26 11 19 to 26 53 19

type	$\varnothing A$	B ①	$\varnothing d_2$	$\varnothing d_4$	H	SW	X_{max} ①	weight [kg]
26 11 19	510	395	M56x4	60	345	46	530	205
26 12 19	510	565	M56x4	60	465	46	700	235
26 13 19	510	945	M56x4	60	745	46	1080	310
26 21 19	560	405	M64x4	70	355	46	560	265
26 22 19	560	575	M64x4	70	475	46	730	300
26 23 19	560	955	M64x4	70	755	46	1110	390
26 31 19	610	420	M68x4	70	370	46	585	345
26 32 19	610	590	M68x4	70	490	46	755	390
26 33 19	610	970	M68x4	70	770	46	1135	490
26 41 19	610	470	M72x4	80	420	55	645	395
26 42 19	610	650	M72x4	80	550	55	825	450
26 43 19	610	1025	M72x4	80	825	55	1200	555
26 51 19	610	530	M80x4	90	480	65	725	465
26 52 19	610	750	M80x4	90	650	65	945	545
26 53 19	610	1220	M80x4	90	1020	65	1415	725

① Dimensions B and X are reduced on loading by the corresponding spring travel (see load table on p. 2.6).

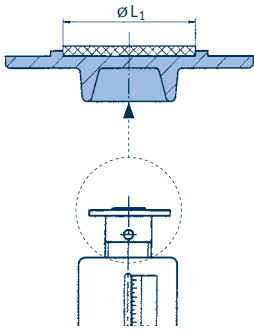


Spring assemblies as special design for use on a power station boiler.

Order details:
spring hangers type 26
marking: ...
set load: ...kN
travel: ...mm up/down

Spring supports Type 29

**Spring supports
type 29 C2 19 to 29 93 18**
Standard design,
delivery from stock.



Load plate with integrated
slide plate.

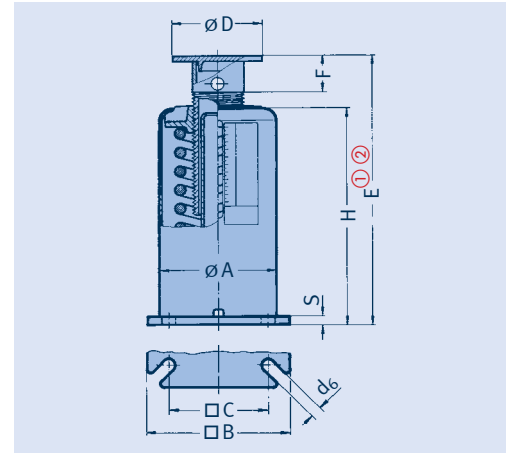
When using slide plates the
sliding surfaces of the counter
component used should be
fitted with stainless steel
plating. This is indicated by
the suffix 'SP' on the type
designation (e.g. clamp
base type 49 22 25-SP).

type 29* with slide plate		$\varnothing L_1$
up to 180°C	up to 350°C	
29 C2 17	29 C2 16	40
29 D. 17	29 D. 16	40
29 1. 17	29 1. 16	40
29 2. 17	29 2. 16	40
29 3. 17	29 3. 16	40
29 4. 17	29 4. 16	65
29 5. 17	29 5. 16	65
29 6. 17	29 6. 16	110
29 7. 17	29 7. 16	110
29 8. 17	29 8. 16	150
29 9. 17	29 9. 16	150

* friction values of the sliding
components, see table on p. 7.11.

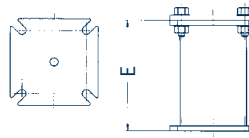
For large horizontal load
displacements, beside the
use of slide plates the
use of clamp bases with
twist-off restraints is also
recommended.

Order details:
spring supports type 29 ...
marking: ...
set load: ...kN
travel: ...mm up/down



type ②	$\varnothing A$	$\square B$	$\square C$	d_6	E ①②	F	H	$\varnothing D$	S	weight [kg]
29 C2 19	80	105	75	10	270	36	210	80	6	2.6
29 D1 19	90	125	95	12	195	36	145	80	8	3.2
29 D2 19	90	125	95	12	305	36	245	80	8	4.3
29 D3 19	90	125	95	12	550	36	470	80	8	6.6
29 11 18	90	125	95	12	195	36	145	80	8	3.4
29 12 18	90	125	95	12	305	36	245	80	8	4.6
29 13 18	90	125	95	12	550	36	470	80	8	7.2
29 21 18	115	150	115	14	200	36	150	100	10	5.6
29 22 18	115	150	115	14	310	36	250	100	10	7.6
29 23 18	115	150	115	14	540	36	460	100	10	11.1
29 31 18	115	150	115	14	205	36	155	100	12	6.3
29 32 18	115	150	115	14	310	36	250	100	12	8.4
29 33 18	115	150	115	14	550	36	470	100	12	13.0
29 41 18	155	190	140	18	240	48	180	120	12	11.9
29 42 18	155	190	140	18	360	48	290	120	12	16.0
29 43 18	155	190	140	18	615	48	525	120	12	25.0
29 51 18	180	220	170	18	270	50	210	150	12	20.0
29 52 18	180	220	170	18	370	50	300	150	12	24.3
29 53 18	180	220	170	18	625	50	535	150	12	37.0
29 61 18	220	260	200	23	305	50	245	170	15	34.0
29 62 18	220	260	200	23	430	50	360	170	15	44.0
29 63 18	220	260	200	23	730	50	640	170	15	68.0
29 71 18	245	290	215	23	360	52	300	200	20	53.0
29 72 18	245	290	215	23	500	52	425	200	20	68.0
29 73 18	245	290	215	23	790	52	695	200	20	97.0
29 81 18	245	290	215	27	400	55	335	200	20	60.0
29 82 18	245	290	215	27	575	55	500	200	20	84.0
29 83 18	245	290	215	27	965	55	870	200	20	133.0
29 91 18	275	340	255	33	440	60	370	240	25	91.0
29 92 18	275	340	255	33	625	60	545	240	25	118.0
29 93 18	275	340	255	33	1010	60	910	240	25	173.0

① Dimension 'E' is independent of
the load adjustment; it changes on
loading by the respective spring
travel (see load table on p. 2.5).
Adjustment possibility + 30mm.



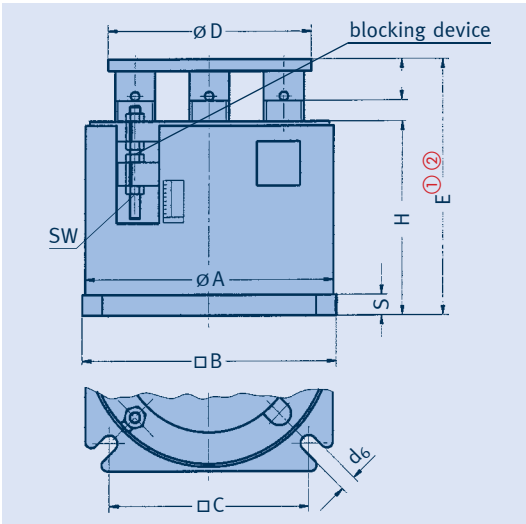
② Type 29 is supplied as standard
with a galvanized load plate with-
out a slide plate. If slide plates are
used, the 'E' dimension increases
by 2.5mm. Please note table
above. See also p. 7.12.

type 29 .9 15-E...
load group

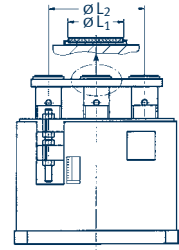


To bridge greater installation
heights, adapted extensions
can be ordered.

Heavy duty spring supports Type 28



Spring support type 28 11 19 to 28 53 19



When slide plates are used, the sliding surfaces of the clamp base used should be fitted with stainless steel plating. This is indicated by the suffix "SP" in the type designation (e.g. clamp base type 49 97 14-SP).

type ②	$\varnothing A$	$\square B$	$\square C$	$\varnothing D$	d_6	E ①②	F	H	S	SW	weight [kg]
28 11 19	510	530	440	420	33	405	60	330	25	46	230
28 12 19	510	530	440	420	33	535	60	450	25	46	260
28 13 19	510	530	440	420	33	835	60	730	25	46	360
28 21 19	560	580	490	420	33	450	65	370	25	46	310
28 22 19	560	580	490	420	33	585	65	500	25	46	350
28 23 19	560	580	490	420	33	880	65	775	25	46	460
28 31 19	610	630	530	450	33	460	65	380	25	46	380
28 32 19	610	630	530	450	33	595	65	510	25	46	430
28 33 19	610	630	530	450	33	890	65	785	25	46	555
28 41 19	610	630	530	450	39	505	70	425	30	55	440
28 42 19	610	630	530	450	39	685	70	595	30	55	520
28 43 19	610	630	530	450	39	1075	70	965	30	55	740
28 51 19	610	630	530	480	39	560	75	475	35	65	495
28 52 19	610	630	530	480	39	750	75	655	35	65	580
28 53 19	610	630	530	480	39	1135	75	1020	35	65	785

① Dimension 'E' is independent of the load adjustment; it changes on loading by the respective spring travel (see load table p. 2.6). Adjustment possibility + 30mm.

② Type 28 is supplied as standard with a coated load plate without slide plate. When slide plates are used, the 'E' dimension increases by 2mm. Please note following tables.

type 28* with slide plate up to 180°C	$\varnothing L_1$	$\varnothing L_2$
28 1. 17	80	300
28 2. 17	80	300
28 3. 17	110	310
28 4. 17	110	310
28 5. 17	150	300

type 28* with slide plate up to 350°C	$\varnothing L_1$	$\varnothing L_2$
28 1. 16	80	300
28 2. 16	80	300
28 3. 16	110	310
28 4. 16	110	310
28 5. 16	150	300

* friction values of slide plates, see table on p. 7.11.



Typical application



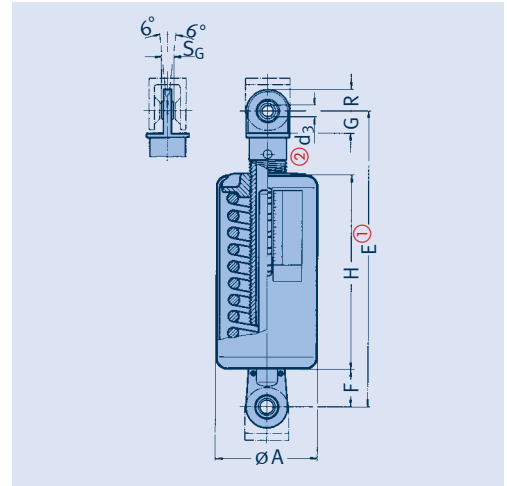
Order details:
spring supports type 28 ...
marking: ...
set load: ...kN
travel: ...mm up/down

Angulating spring supports Type 20

Angulating spring supports type 20 D2 19 to 20 93 14

Standard design,
delivery from stock.

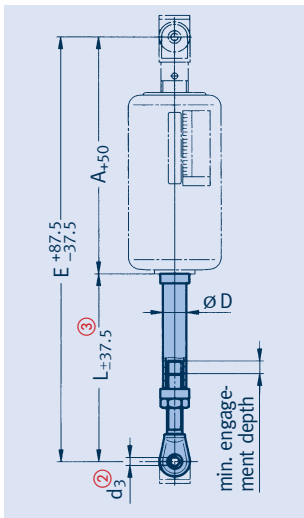
- ① Dimension 'E' is independent of the load adjustment and changes on loading by the respective spring travel (see load table p. 2.5). Adjustment possibility + 50mm.
- ② Connection possibilities: see bolt diameter of weld-on brackets type 35 or dynamic clamps in product group 3.



Order details:

angulating spring support
type 20 ...
marking: ...
set load: ...kN
travel: ...mm up/down

Installation extensions for angulating spring supports type 20 D9 19 to 20 99 14



- ③ Installation dimensions > E max with load reduction possible. Shorter L dimensions can be supplied, but then without adjustment possibility of ± 37.5 mm.

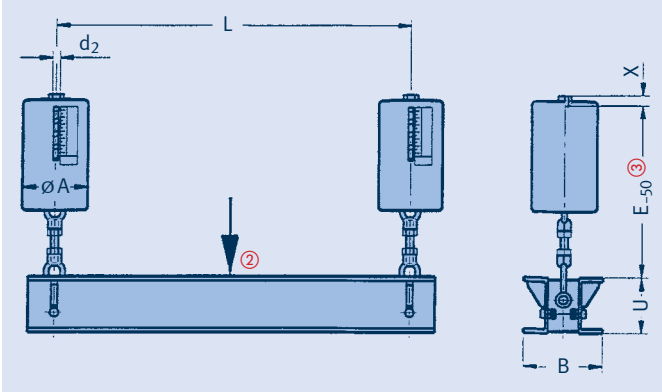
Order details:

extension for angulating
spring support type 20 .9 ..
'L' dimension: ...mm

type	$\odot A$	$\odot d_3$ ②	E ①	F	G	H	R	S_G	weight [kg]	weld-on bracket ②
20 D2 19	90	10	370	45	15	260	15	9	4	35 29 13
20 D3 19	90	10	615	45	15	485	15	9	7	35 29 13
20 12 14	90	10	370	45	15	260	15	9	4	35 29 13
20 13 14	90	10	615	45	15	485	15	9	8	35 29 13
20 22 14	115	12	380	50	19	260	20	10	7	35 39 13
20 23 14	115	12	615	50	19	475	20	10	11	35 39 13
20 32 14	115	15	390	58	21	260	23	12	7	35 49 13
20 33 14	115	15	645	58	21	495	23	12	12	35 49 13
20 42 14	155	15	440	58	21	300	23	12	15	35 49 13
20 43 14	155	15	700	58	21	540	23	12	25	35 49 13
20 52 14	180	20	470	65	31	315	30	16	24	35 59 19
20 53 14	180	20	730	65	31	555	30	16	37	35 59 19
20 62 14	220	20	535	65	31	370	30	16	45	35 59 19
20 63 14	220	20	835	65	31	655	30	16	69	35 59 19
20 72 14	245	30	650	100	50	430	45	22	70	35 69 19
20 73 14	245	30	940	100	50	700	45	22	101	35 69 19
20 82 14	245	30	735	100	52	505	45	22	87	35 69 19
20 83 14	245	30	1125	100	52	875	45	22	139	35 69 19
20 92 14	275	50	815	130	62	550	60	35	120	35 79 19
20 93 14	275	50	1200	130	62	910	60	35	182	35 79 19

type	for type	A_{+50}	$\odot D$	$\odot d_3$ ②	$E^{+87.5}_{-37.5}$ min	$E^{+87.5}_{-37.5}$ max	$L_{\pm 37.5}$ min ③	$L_{\pm 37.5}$ max	weight for L_{min} [kg]	pipe [kg/m]
20 D9 19	20 D2 19	325	42	10	525	1220	200	895	1.1	3.8
20 D9 19	20 D3 19	570	42	10	770	1220	200	650	1.1	3.8
20 19 14	20 12 14	325	42	10	525	1220	200	895	1.1	3.8
20 19 14	20 13 14	570	42	10	770	1220	200	650	1.1	3.8
20 29 14	20 22 14	330	48	12	535	1465	205	1135	1.3	4.4
20 29 14	20 23 14	565	48	12	770	1465	205	900	1.3	4.4
20 39 14	20 32 14	332	60	15	547	1460	215	1128	2.5	8.4
20 39 14	20 33 14	587	60	15	802	1460	215	873	2.5	8.4
20 49 14	20 42 14	382	60	15	597	1460	215	1078	2.5	8.4
20 49 14	20 43 14	642	60	15	857	1460	215	818	2.5	8.4
20 59 14	20 52 14	405	76	20	675	1950	270	1545	8.0	14.6
20 59 14	20 53 14	665	76	20	935	1950	270	1285	8.0	14.6
20 69 14	20 62 14	470	76	20	740	1950	270	1480	8.0	14.6
20 69 14	20 63 14	770	76	20	1040	1950	270	1180	8.0	14.6
20 79 14	20 72 14	550	89	30	835	1925	285	1375	10.6	21.1
20 79 14	20 73 14	840	89	30	1125	1925	285	1085	10.6	21.1
20 89 14	20 82 14	635	89	30	920	2425	285	1790	10.6	21.1
20 89 14	20 83 14	1025	89	30	1310	2425	285	1400	10.6	21.1
20 99 14	20 92 14	685	102	50	1015	2410	330	1725	16.5	30.6
20 99 14	20 93 14	1070	102	50	1400	2410	330	1340	16.5	30.6

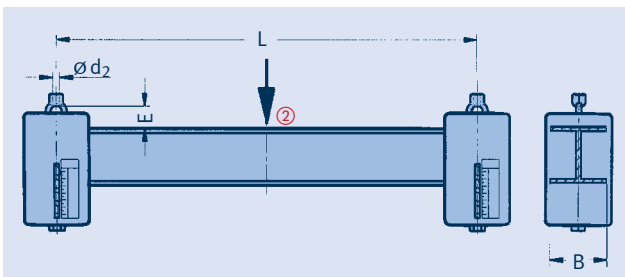
Spring hanger trapezes Type 79



Spring hanger trapezes (bolted version) type 79 D. 19 to 79 9. 19

- ① The 4th digit of the type designation refers to the travel range of the spring hanger 1=50mm, 2=100mm, 3=200mm.
- ② Permissible center loading of the other load cases, see table 4.4.1, p. 0.6 (nominal load 120kN, see load group 9).
- ③ The 'E' dimension increases on loading by the corresponding spring travel (see load table on p. 2.5).
- ④ The 'L'_{max} dimensions can be lengthened by up to 2400mm on reduction of the permissible center loading by 5% per 100mm extension.
- ⑤ When selecting the spring hanger trapeze the weight of the 'U' profiles and the clamp base weight must be added to the operating load.
- ⑥ When selecting the spring hanger trapeze, its total weight and the weight of the clamp bases must be added to the operating load.

type	nominal load [kN] ②	ø d ₂	L _{max}	E ③ for travel range			U	A	B	X	weight [kg] L=1000mm for travel range ⑤			± per 100mm [kg]
				1	2	3					1	2	3	
79 D. 19	1.04	M10	1700	-	385	610	80	90	140	15	-	26	30	1.7
79 1. 19	2.5	M12	1700	290	385	610	80	90	140	15	24	26	31	1.7
79 2. 19	5	M12	1700	290	390	610	80	115	140	15	28	31	37	1.7
79 3. 19	10	M16	900	315	410	630	80	115	140	20	29	32	39	1.7
79 3. 19	10	M16	1800	300	395	615	120	115	190	20	41	45	52	2.7
79 4. 19	20	M20	1400	345	450	685	120	155	190	25	53	60	74	2.7
79 4. 19	20	M20	1800	345	450	685	140	155	200	25	61	68	82	3.2
79 5. 19	40	M24	1250	405	495	730	140	180	200	30	77	85	108	3.2
79 5. 19	40	M24	1800	390	480	715	180	180	230	30	93	101	124	4.4
79 6. 19	80	M30	1250	445	560	840	200	220	250	35	138	156	200	5.1
79 6. 19	80	M30	2400	435	550	830	260	220	310	35	174	192	236	7.6
79 7. 19	120	M36	1800	505	630	900	260	245	310	45	214	244	296	7.6
79 7. 19	120	M36	2400	500	625	895	300	245	350	45	245	275	327	9.2
79 8. 19	160	M42	1200	560	725	1100	260	245	310	50	242	286	378	7.6
79 8. 19	160	M42	1800 ④	555	720	1095	300	245	350	50	273	317	410	9.2
79 9. 19	200	M48	1800 ④	610	785	1150	300	275	350	60	335	390	495	9.2



travel range ①	'E' dim. approx. ③
1	30
2	55
3	105

① ... ③ see above.

Order details:

spring hanger trapeze type 79 .. 19
L = ...mm, marking: ...,
set load: ...kN
travel: ...mm up/down

Spring hanger trapezes (welded version) type 79 D. 11 to 79 9. 11



In restricted spaces this version can be supplied as a special design.

Order details:

spring hanger trapeze type 79 .. 11
L = ...mm, marking: ...
set load: ...kN
travel: ...mm up/down

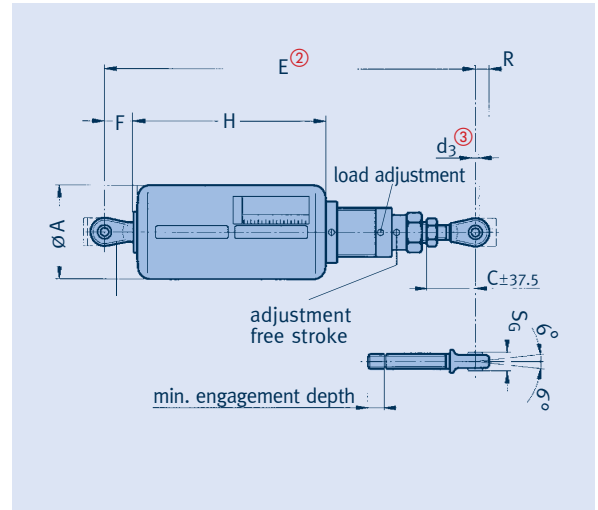
type	nominal load [kN] ②	ø d ₂	L _{max}	B	weight [kg] L=1000mm for travel range ⑤			± per 100mm [kg]
					1	2	3	
79 D. 11	1.04	M10	1400	80	-	16	20	1.1
79 1. 11	2.5	M12	1400	100	19	21	26	1.6
79 2. 11	5	M12	1600	100	26	29	35	2.0
79 3. 11	10	M16	1600	100	27	30	38	2.0
79 4. 11	20	M20	1750	120	41	48	63	2.7
79 5. 11	40	M24	2100	160	68	76	99	4.3
79 6. 11	80	M30	2100	200	110	128	172	6.1
79 7. 11	120	M36	2100	240	159	189	241	8.3
79 8. 11	160	M42	2150	260	186	230	322	9.3
79 9. 11	200	M48	2200	280	243	297	403	10.3

Sway braces Type 27

Sway braces type 27 D2 19 to 27 62 19

The maximum working travel including free stroke amounts to $\pm 25\text{mm}$

- ① Load adjustment is made ex works acc. to customer specifications.
- ② The 'E' dimension is independent of the load adjustment; adjustment possibility $\pm 37.5\text{mm}$
- ③ Connection possibilities: see bolt diameter of weld-on brackets type 35 or dynamic clamps in Product Group 3.



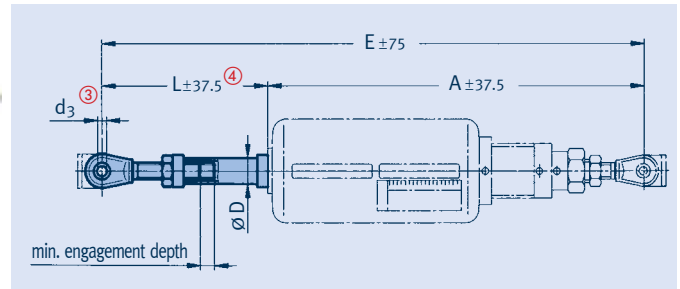
type	nominal load [kN]	set load ① [kN] min	set load ① [kN] max	spring rate [N/mm]	$\varnothing A$	$C_{\pm 37.5}$	$\varnothing d_3$ ③	E ②	F	H	R	S_G	weld-on bracket type ③	weight [kg]
27 D2 19	0.52	0.12	0.42	4.1	90	90	10	640	50	295	15	9	35 29 13	5.5
27 12 19	1.25	0.41	1.04	8.3	90	90	10	640	50	295	15	9	35 29 13	5.8
27 22 19	2.50	0.83	2.08	16.6	115	90	12	650	50	300	19	10	35 39 13	10.0
27 32 19	5.00	1.66	4.16	33.3	115	90	15	665	55	305	21	12	35 49 13	11.0
27 42 19	10.00	3.33	8.33	66.6	155	90	15	730	55	355	21	12	35 49 13	23.0
27 52 19	20.00	6.66	16.66	133.3	180	100	20	810	75	380	30	16	35 59 19	39.0
27 62 19	40.00	13.33	33.33	266.6	220	100	20	875	75	445	30	16	35 59 19	62.0

Order details:

sway brace type 27 .2 19
marking: ...
set load: ...kN
travel: ...mm up/down

Extension for sway brace type 27 D9 19 to 27 69 19

If required, sway braces can be supplied with installation extensions mounted at the factory.

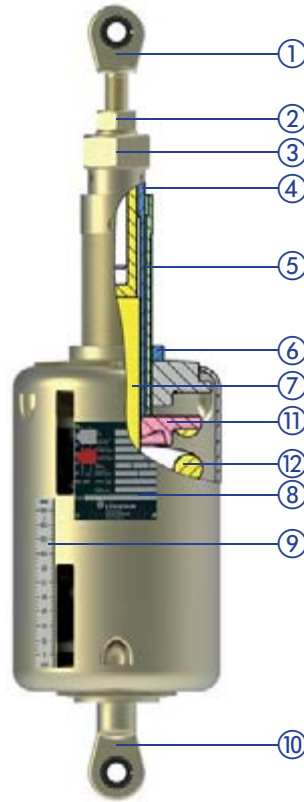
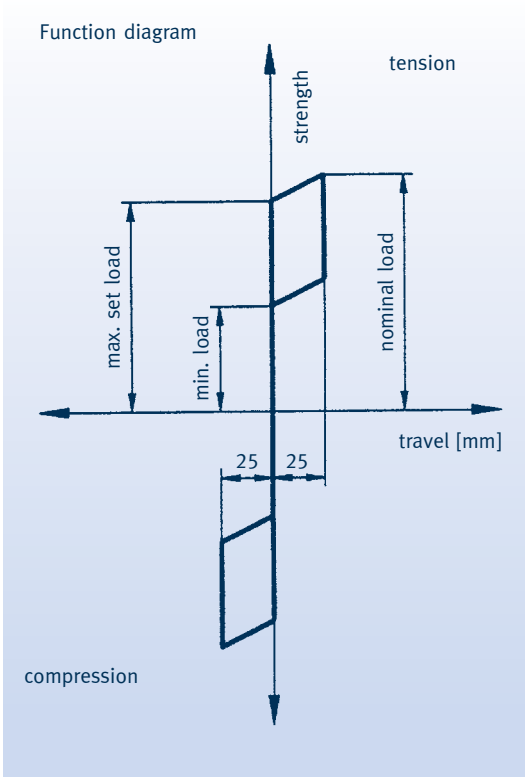


- ④ Installation dimensions > Emax on load reduction possible. Shorter L dimensions can be supplied, but then without adjustment possibility of $\pm 37.5\text{mm}$.

type	$A_{\pm 37.5}$	$\varnothing D$	$\varnothing d_3$ ③	$E_{\pm 75}$		$L_{\pm 37.5}$ ④		weight for L_{\min} [kg]	pipe [kg/m]
				min	max	min	max		
27 D9 19	590	42	10	790	1600	200	1010	1.1	3.8
27 19 19	590	42	10	790	1600	200	1010	1.1	3.8
27 29 19	600	48	12	805	2000	205	1400	1.3	4.4
27 39 19	610	60	15	825	2000	215	1390	2.5	8.4
27 49 19	675	60	15	890	2000	215	1325	2.5	8.4
27 59 19	735	76	20	1005	2400	270	1665	8.0	14.6
27 69 19	800	76	20	1070	2400	270	1600	8.0	14.6

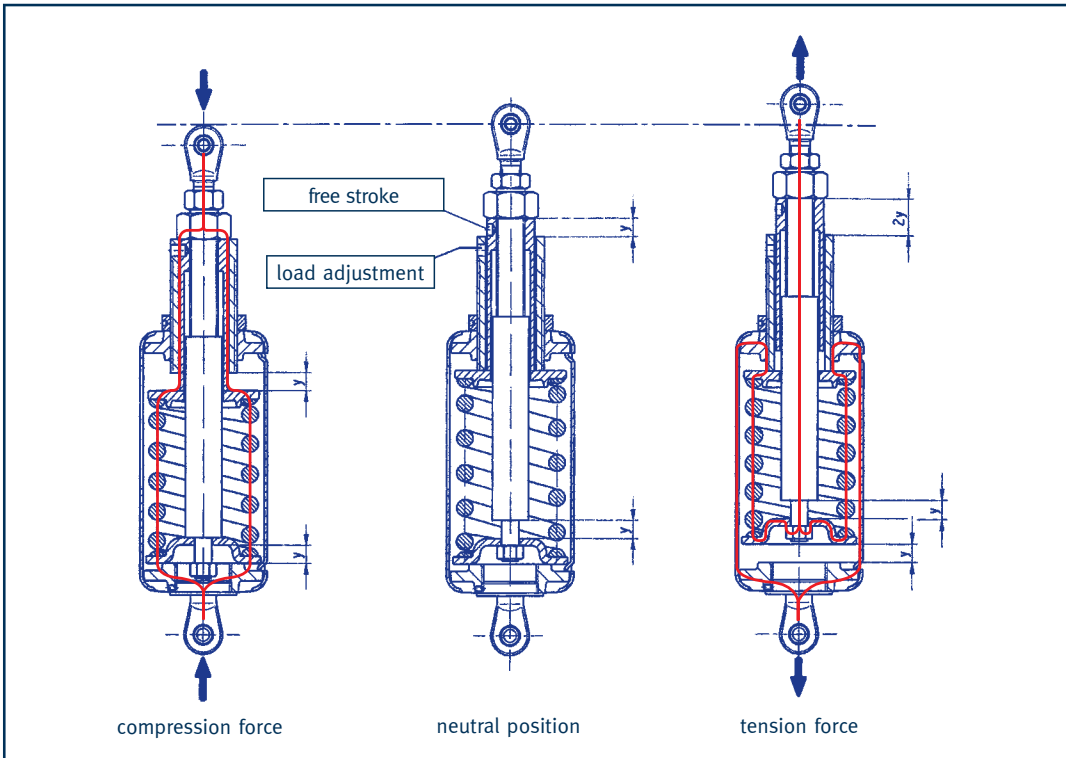
Order details:

extension for sway brace
type 27 .9 19
L dimension: ...mm



- ① upper ball bushing joint
- ② lock nut
- ③ lock nut
- ④ guide pipe
- ⑤ threaded pipe
- ⑥ lock nut
- ⑦ guide rod
- ⑧ type plate with travel scale
- ⑨ travel scale
- ⑩ lower ball bushing joint
- ⑪ spring plate
- ⑫ spring

Load and installation length are adjustable for the respective requirements (see installation and operating instructions).



For LISEGA sway braces a free stroke of 0 – 25mm can be set. The travel is reduced in compression and tension directions in accordance with the free stroke selected.

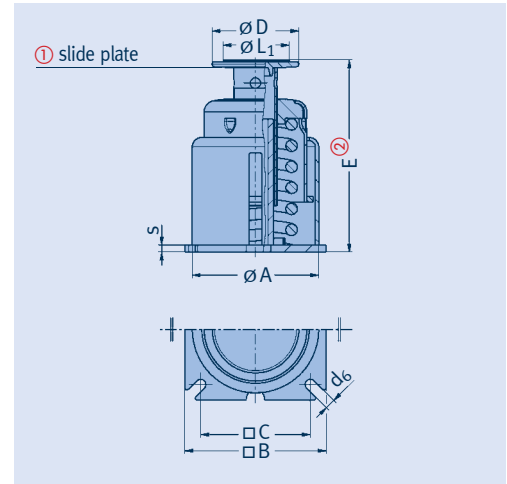
Load transmission on alternating force direction

Telescopic spring supports Type 29

Spring supports, telescopic type 29 D1 27 to 29 93 27

As a special design of type 29 the telescopic spring supports are used for **small E dimensions**.

The sliding surfaces of the clamp bases used should be fitted with stainless steel plating. This is indicated by the suffix 'SP' in the type designation (e.g. clamp base type 49 22 25-SP).



① The telescopic spring support is fitted as standard with a load plate with a PTFE slide plate. If required, this type can also be supplied with a high-temperature slide plate.

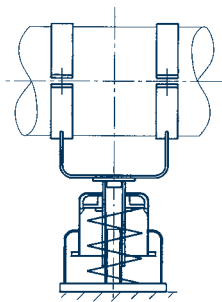
The 6th digit of the type designation denotes the design:
7 for standard design with PTFE slide plate (up to 180°C)
6 for design with high-temperature slide plate (up to 350°C).

For friction values of sliding components see table on p. 7.11.

② The 'E' dimension depends on the load setting; it changes on loading by the respective spring travel. Adjustment possibility + 20mm.

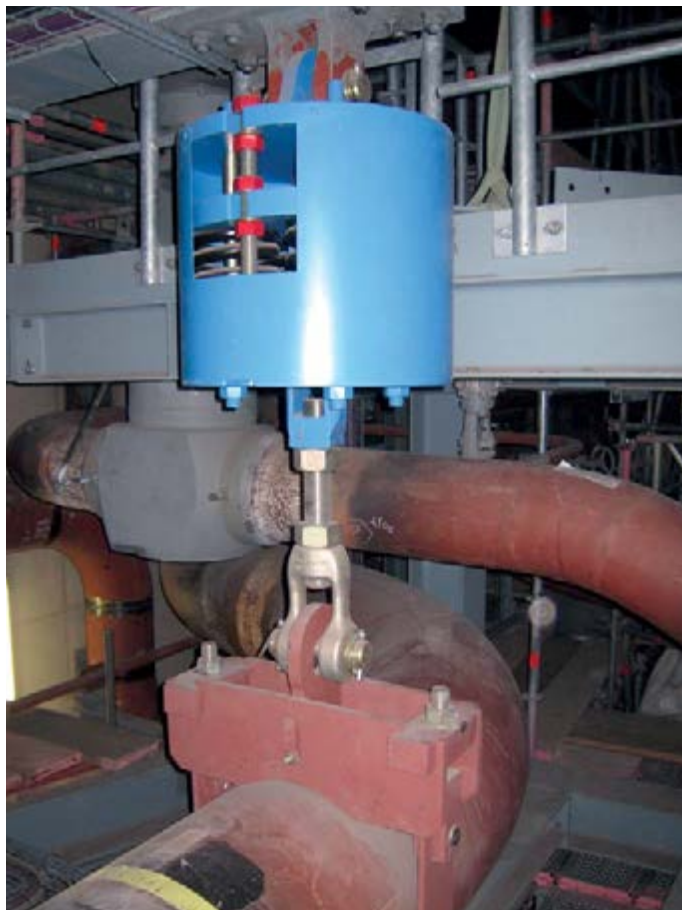
$$E \text{ [mm]} = E \text{ on min. load [mm]} - \frac{\text{adjustment load [kN]} - \text{min. load [kN]}}{\text{spring rate [N/mm]}} \times 1000$$

type ①	ØA	B	C	ØD	d ₆	ØL ₁	s	E on min. load ②	E on max. load ②	min. load [kN]	max. load [kN]	spring rate [N/mm]	weight [kg]
29 D1 2.	130	155	125	80	12	40	8	210	170	0.20	0.52	8.3	5.0
29 D2 2.	130	155	125	80	12	40	8	310	230	0.20	0.52	4.1	6.5
29 D3 2.	130	155	125	80	12	40	8	535	375	0.20	0.52	2.1	9.5
29 11 2.	130	155	125	80	12	40	8	210	170	0.58	1.25	16.6	5.5
29 12 2.	130	155	125	80	12	40	8	310	230	0.58	1.25	8.3	7.0
29 13 2.	130	155	125	80	12	40	8	530	370	0.58	1.25	4.1	10.0
29 21 2.	155	180	145	100	14	40	10	215	175	1.16	2.5	33.3	8.0
29 22 2.	155	180	145	100	14	40	10	315	235	1.16	2.5	16.6	10.5
29 23 2.	155	180	145	100	14	40	10	525	365	1.16	2.5	8.3	15.0
29 31 2.	155	180	145	100	14	40	12	220	180	2.33	5	66.6	8.5
29 32 2.	155	180	145	100	14	40	12	320	240	2.33	5	33.3	11.0
29 33 2.	155	180	145	100	14	40	12	540	380	2.33	5	16.6	16.5
29 41 2.	195	220	180	120	18	65	12	235	195	4.66	10	133.3	15.0
29 42 2.	195	220	180	120	18	65	12	335	255	4.66	10	66.6	20.0
29 43 2.	195	220	180	120	18	65	12	560	400	4.66	10	33.3	29.0
29 51 2.	220	245	200	150	18	65	12	260	220	9.33	20	266.6	24.0
29 52 2.	220	245	200	150	18	65	12	370	290	9.33	20	133.3	30.0
29 53 2.	220	245	200	150	18	65	12	590	430	9.33	20	66.6	43.0
29 61 2.	275	305	245	170	23	110	18	300	260	18.66	40	533.3	44.0
29 62 2.	275	305	245	170	23	110	18	410	330	18.66	40	266.6	53.0
29 63 2.	275	305	245	170	23	110	18	675	515	18.66	40	133.3	80.0
29 71 2.	300	330	265	200	23	110	20	325	295	36.00	60	800	63.0
29 72 2.	300	330	265	200	23	110	20	435	375	36.00	60	400	76.0
29 73 2.	300	330	265	200	23	110	20	675	555	36.00	60	200	105.0
29 81 2.	300	330	270	200	27	150	22	360	335	53.33	80	1066.6	71.0
29 82 2.	300	330	270	200	27	150	22	500	450	53.33	80	533.3	91.0
29 83 2.	300	330	270	200	27	150	22	835	735	53.33	80	266.6	142.0
29 91 2.	325	370	295	245	33	150	25	400	375	66.66	100	1333.3	96.0
29 92 2.	325	370	295	245	33	150	25	555	505	66.66	100	666.6	124.0
29 93 2.	325	370	295	245	33	150	25	875	775	66.66	100	333.3	181.0



Order details:

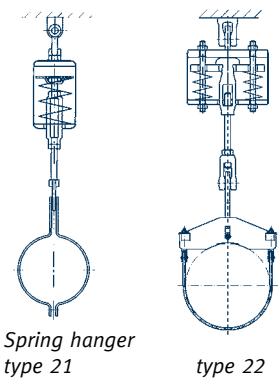
spring support type 29 .. 2.
marking: ...
set load: ...kN
travel: ...mm up/down



Installation and operating instructions

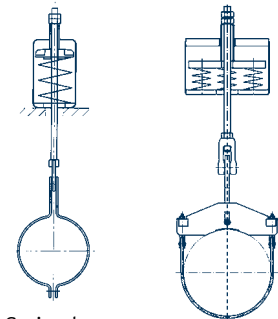
Types 21, 22, 25, 26, 29, 28, 20, 27

- ① upper connection
- ② travel scale
- ③ blocking device
- ④ name plate
- ⑤ lower connection
- ⑥ spring plate
- ⑦ cover plate
- ⑧ securing strap
- ⑨ support tube



Spring hanger
type 21

type 22



Spring hanger
type 25

type 26



Name plate for spring hangers

1 Transport and storage

When transporting, care must be taken that connecting threads and blocking devices are not damaged. When storing in the open air the hangers must be protected from water and dirt.

2 Delivery condition

If not agreed otherwise, LISEGA spring hangers are set and blocked at the desired cold position (installation condition). Special blocking devices fix the spring plates in both directions. The adjustment values can be read off the travel scale or name plate.

Stamped on the name plate are:

- type number and if required serial number
- set load and spring rate
- operating load and travel
- marking and commission number
- inspector

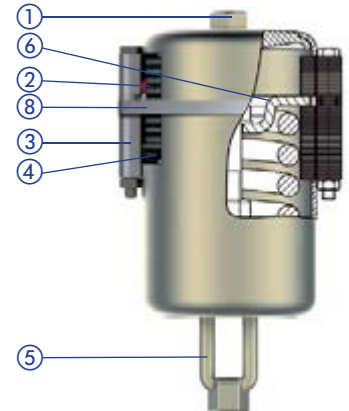
On the travel scale the theoretical hot position is marked with a red sticker and the theoretical cold one with a white one. In addition the position of the spring plate on the travel scale is stamped with an "X". The reading is made at the lower edge of the spring plate (at the upper edge for trapezes type 79 .. 11). The production number is stamped on the body of the spring hanger.

Depending on the connection the spring hangers are fitted at the top with an inner right-hand thread, a lug for connecting bolts or a fixed support tube. The threads are greased and sealed with plastic caps. Depending on the design, the lower connection is fitted with a right-hand thread (turnbuckle) or, as with type 25/26, consists of a support tube for the connecting rod.

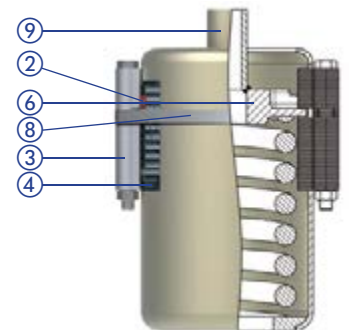
The spring supports types 28/29 are equipped with an adjustable support tube with a loosely seated but guided load plate. In delivery condition the support tube is screwed in and the thread greased.

3 Installation

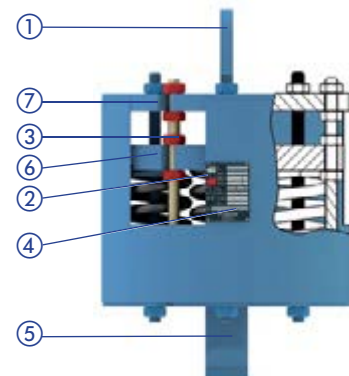
On installation, the specifications in the **installation instructions for the piping systems** should also be observed, especially the desired installation position of the connecting rods over the whole load chain. There are two possibilities:



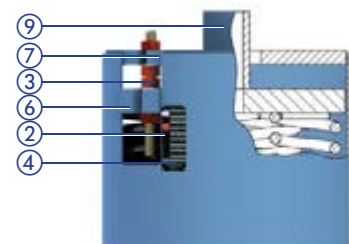
Spring hanger type 21
(blocked)



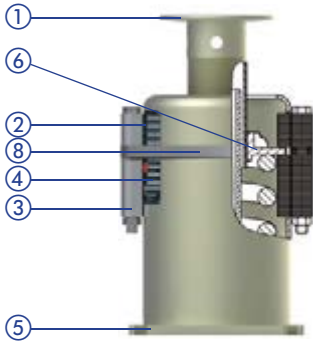
Spring hanger type 25
(blocked)



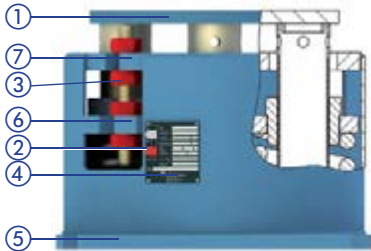
Spring hanger type 22
(blocked)



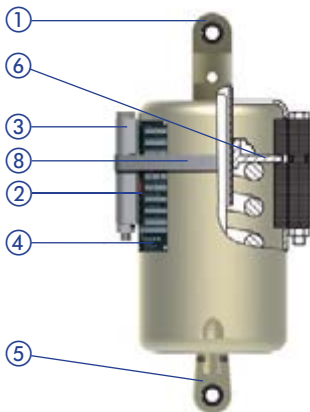
Spring hanger type 26
(blocked)



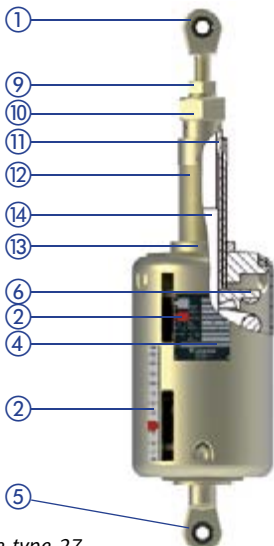
Spring support type 29 (blocked)



Spring support type 28 (blocked)

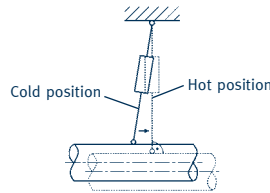


Angulating spring support type 20 (blocked)



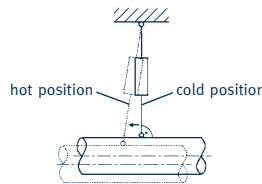
Sway brace type 27

A) The connecting rods are to be installed at an angle to correspond to the expected horizontal displacement of the pipe systems. A perpendicular position in operating condition is to be hereby expected.



Rods vertical during plant operation

B) The connecting rods are to be installed vertically for better controllability. A controlled angled position is thereby permitted in operating conditions.



Rods vertical in installation condition

Uniform specifications should at all events apply for the whole plant.

The connecting rods and points must be connected by force-fitting. Attention must be paid to the minimum engagement depth of the threaded components.

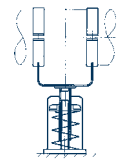
Installation of types 21, 22

The force-fit connection for type 21 is produced by screwing the connecting rods into the upper and lower connection threads. The lower connection thread is designed as a turnbuckle. Type 22 has a bolt-lug upper connection. For tightening and length regulation the turnbuckle length available in the spring hanger in each case can be used.

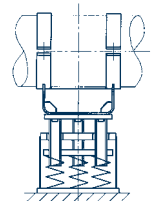
Installation types 25, 26

Spring hangers types 25 and 26 are placed on the existing steelwork and correspondingly aligned. The position aligned is to be fixed against horizontal displacement. The force-fit connection is produced via the connecting rod, which is fed through the support tube and tightened and locked with two nuts.

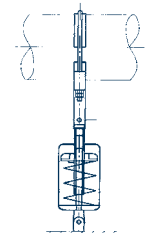
- ① load plate or ball bushing joint at top
- ② travel scale
- ③ stop
- ④ name plate
- ⑤ base plate or ball bushing joint at bottom
- ⑥ spring plate
- ⑦ cover plate
- ⑧ securing strap
- ⑨ lock nut
- ⑩ lock nut
- ⑪ guide tube
- ⑫ threaded tube
- ⑬ lock nut
- ⑭ guide rod



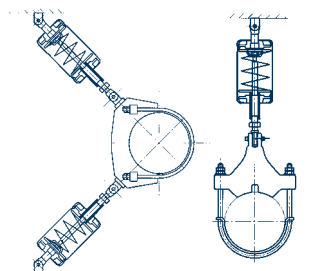
Spring support type 29



Spring support type 28

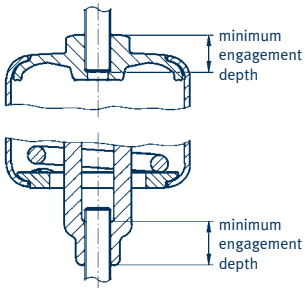


Angulating spring support type 20



Sway brace type 27 angled arrangement

Sway brace type 27 simple arrangement



Minimum engagement depth of threaded rods by example of type 21



The blocking for spring hangers and spring supports types 21, 25, 29 and 20 consist of sheet metal lamellas adjustable to any desired load position. Up to 3 blocking devices can be inserted into a spring hanger.

Installation of types 28, 29

The spring supports 28 and 29, after corresponding alignment, are attached by welding or bolting the base plate to the building structure. The load distribution is applied through the load plate and an adjustable support tube (type 29), or several adjustable ones (type 28). To balance installation tolerances the support tubes may be further screwed out only to a maximum of 30mm. The instructions on p. 7.12 are to be followed for the correct installation of the slide plates.

Installation of type 20

The angulating spring supports are fitted at the top with an adjustable ball bushing joint and at the bottom with a fixed ball bushing joint or an extension – suitable for connection to a weld-on bracket type 35 or to the dynamic clamps type 36 or 37. After alignment of the angulating spring support the lower weld-on bracket is attached to the surrounding structure (see installation instructions for weld-on brackets type 35). The load distribution is applied through the upper bolt connection (weld-on bracket or dynamic clamp) to the height-adjustable support tube. To balance installation length tolerances the support tube may be further screwed out only by a maximum of 50mm.

Installation of type 27

The sway braces are fitted at the top with an adjustable ball bushing joint and at the bottom with a fixed ball bushing joint or an extension – suitable for connection to a weld-on bracket type 35 or to the dynamic clamp type 36 or 37. The load presetting, and if necessary the free stroke, are adjusted at works according to customer specifications. After alignment of the connection points the welding of the weld-on brackets and the connection of the connection bolts of the brackets or dynamic clamps types 36/37 are carried out. The adjustable ball bushing joints permit regulation of the installation height by ± 37.5 mm.

4 Deblocking

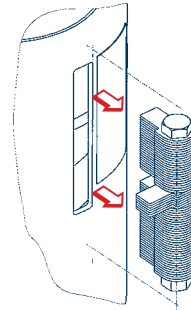
The spring hangers/supports may only be deblocked when the set load is fully applied on all the supports making up a support system. If this is the case the blocking devices can be easily removed. If the devices are jammed, the load actually applied does not agree with the theoretical setting (see point 5, load correction).

Procedures for types 21, 25, 29, 20

Removal of the securing strap:

The securing strap is removed with an appropriate tool. Great care must be taken that the free ends of the metal strap do not snap upwards in an uncontrolled way.

Removal of the blocking devices:



The device is removed from the casing.

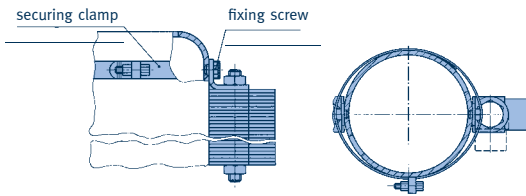
When removing the blocking devices, proceed as a matter of principle in a systematic way, step by step, beginning with a fixed point or connection point. Never remove the devices by force!

Storage of blocking devices:



Type 29 with blocking devices attached

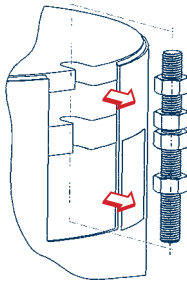
Removed blocking devices must either be stored separately or, for really safe keeping, placed in the optional LISEGA storage racks on the hanger.



If the blocking devices are found to be missing, e.g. at revisions, they can be supplied by LISEGA at short notice.

Procedure for types 22, 26, 28

Removal of blocking devices:



The blocking devices are removed from the casing.

Storage of blocking devices:

Removed blocking devices must either be stored separately or, insofar as sufficient space is available and freedom of movement for the spring plate is allowed, screwed to the cover plate.



5 Load correction

Before every load adjustment, under all circumstances the technical department responsible must be consulted.

Type 21, 22

Load adjustment can be carried out by loosening or tightening the turnbuckle.

Type 25, 26

Load adjustment can be made by loosening or tightening the load nut.

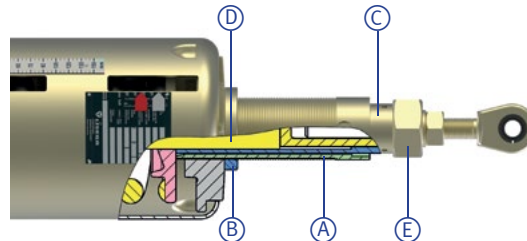
Type 20, 28, 29

Load adjustment can be made by adjusting the support tube of the spring supports.

Load correction and adjustment of the free stroke, type 27

Load adjustment is made by rotating the outer threaded tube (A). For this, loosen the large lock nut (B). To maintain the E dimension the play thereby created must be balanced by readjusting the guide tube (C).

A free stroke can be set for the LISEGA sway braces. For this, the guide tube (C) opposite the inner guide rod (D) must be correspondingly screwed out (loosen middle lock nut (E)). The working travel is reduced in the direction of compression according to the free stroke selected.



6 Auxiliary devices

To facilitate load adjustment or deblocking, an auxiliary installation device can be supplied for the higher load groups. The load transfer is then taken up by means of a hydraulic pump. This is operated by LISEGA technicians.

7 Inspection and maintenance

The flawless functioning of the spring hangers can be checked in every operating situation by noting the position of the spring plate.

Under normal operating conditions no maintenance is required.



The blocking devices of types 22, 26 and 28 consist of threaded studs and nuts by means of which any load setting desired can be carried out.

