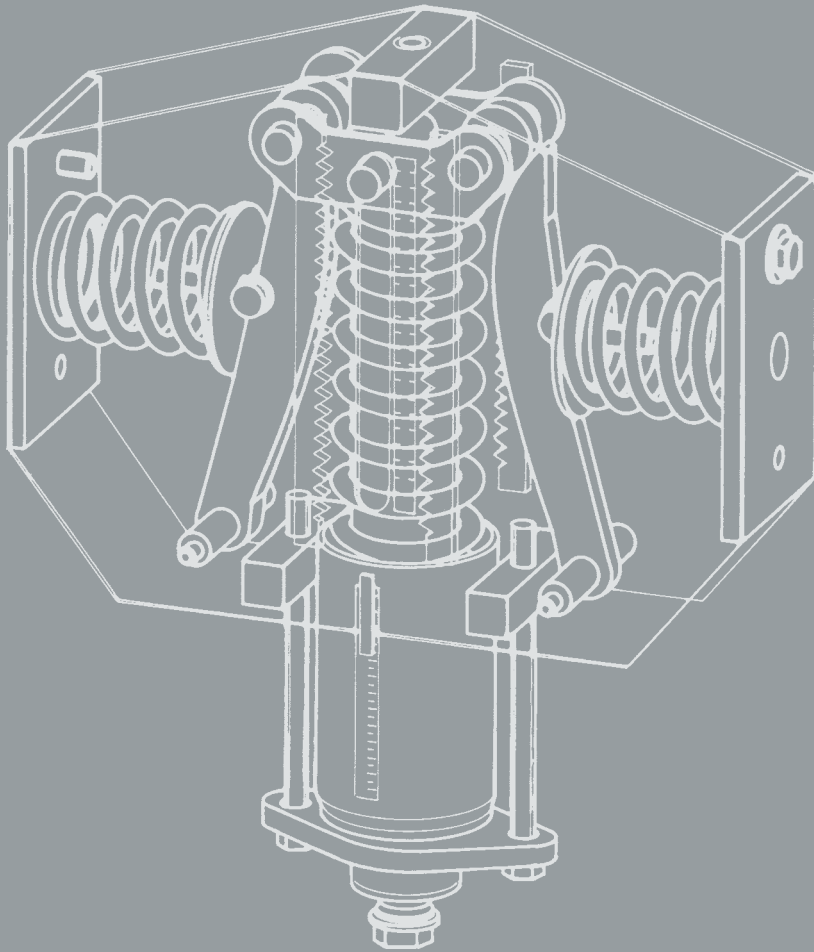
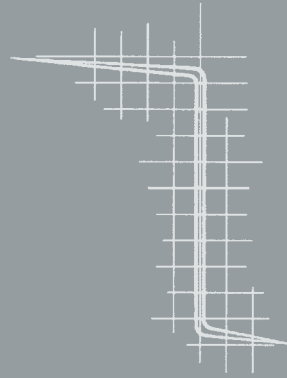


# Constant hangers, constant supports



# 1

CONSTANT HANGERS,  
CONSTANT SUPPORTS

PRODUCT  
GROUP

1



# Constant hangers, constant supports

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0

PRODUCT GROUP 1

2

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# Field of application

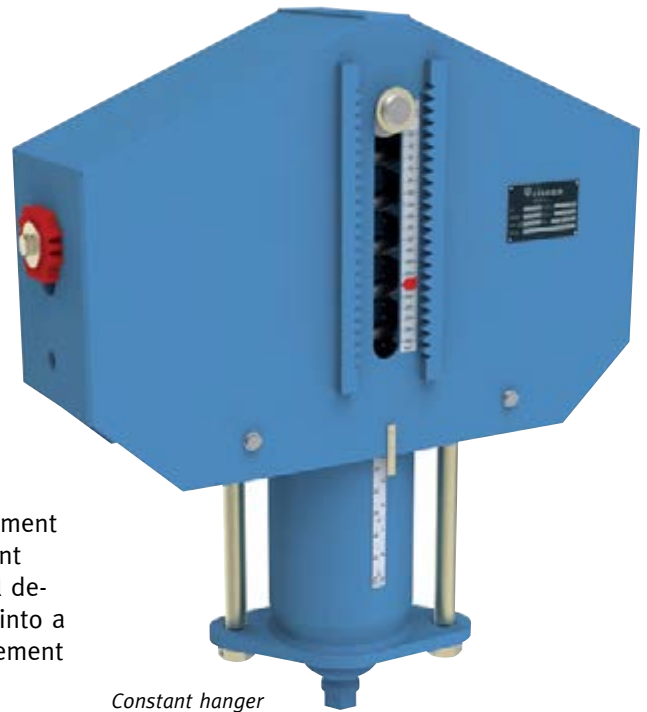
To avoid unacceptable forces and moments in pipe systems, the thermal expansion of the piping must not be restricted.

## Constant hangers types 11-14, Constant supports type 16

Minor thermal displacement in the pipe systems in the vertical direction can be compensated by spring supports or spring hangers. Due to the resulting proportionally increasing force deviation corresponding to the spring rate, their use is limited to a displacement range specified by the designer (see Product Group 2, pp 2.5 and 2.6).

In the case of greater vertical displacement the use of constant hangers or constant supports is required. For these special designs, the spring force is transformed into a constant force throughout the displacement range (see function principle, p. 1.5).

The proportional loads of the pipe system can in this way be constantly distributed over the whole displacement range without significant deviations. As a rule, for LISEGA constant hangers the use of type 11, tried and tested over 100,000 times, provides the standard solution.



Constant hanger type 11

The function principle is based on the arrangement of three springs resulting in the parallelogram of forces. The design is distinguished by highly functional accuracy along with wide load adjustment ranges. The favorable power-to-weight ratios and symmetrical designs enable easy installation. For further typical advantages, see p. 1.3.



Constant hanger in a coal-fired power station



Final assembly of a constant hanger

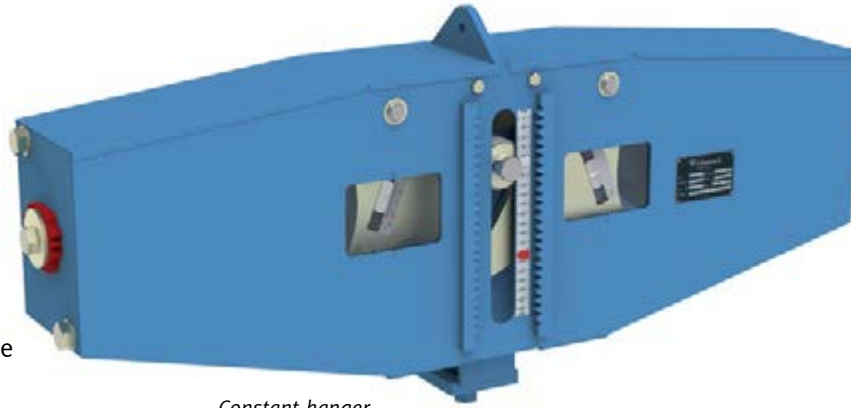


Installation inspection of a constant hanger



## Constant hanger type 18

As a rule, the pipe support engineer allows for sufficient installation space for the supports required. However, due to limitations of space the installation height can be too small for the typical standard solution with type 11.



Constant hanger type 18

This sometimes occurs, especially when replacing existing installations. To provide the optimum solution in such cases, type 18, a low profile design, is available from the LISEGA hanger range, beside the main type 11 series.

The function principle of this design is based on the lever principle. Unlike the usual lever-arm type hangers, the load displacement here is linear and is constant, following the LISEGA principle (see function principle, p. 1.6).

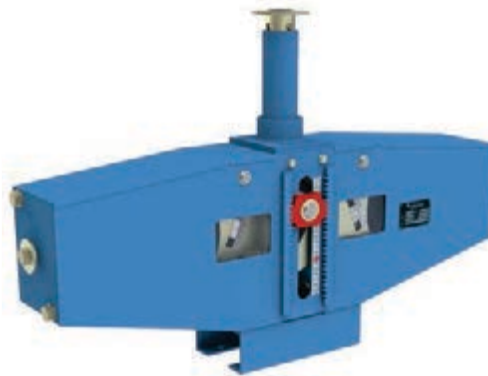
In the case of constant hangers, the pipe systems are suspended from roof constructions or the steelwork. If the piping is laid out near ground level it may be appropriate to take up the loads from below with constant supports.

## Constant support type 19

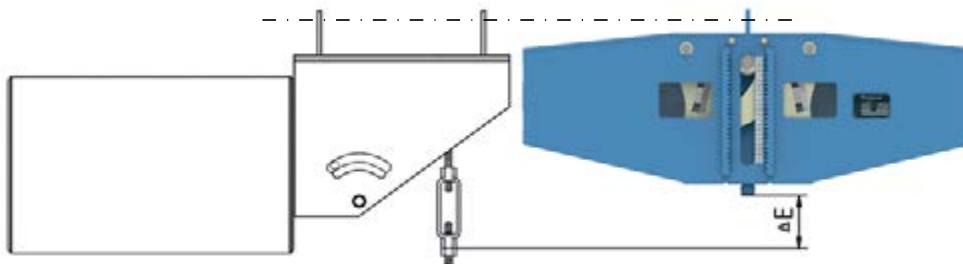
Due to its compact design, constant support type 19 thereby replaces its predecessor, type 16, as standard. Type 16 continues to be standard only in the heavy-duty range (load range 100 – 400kN) for its coupling capacity.

On the basis of their special function principles and modes of design, LISEGA constant hangers and supports have, for the past five decades, proven their outstanding operational safety and reliability many thousands of times. Further descriptions of their mode of operation and function are set out on p. 1.6 and their design features from p. 1.7.

**For the operational safety and long life of the pipe systems and hence of the plant itself, the consistent functional accuracy of the constant hangers is of utmost importance.**



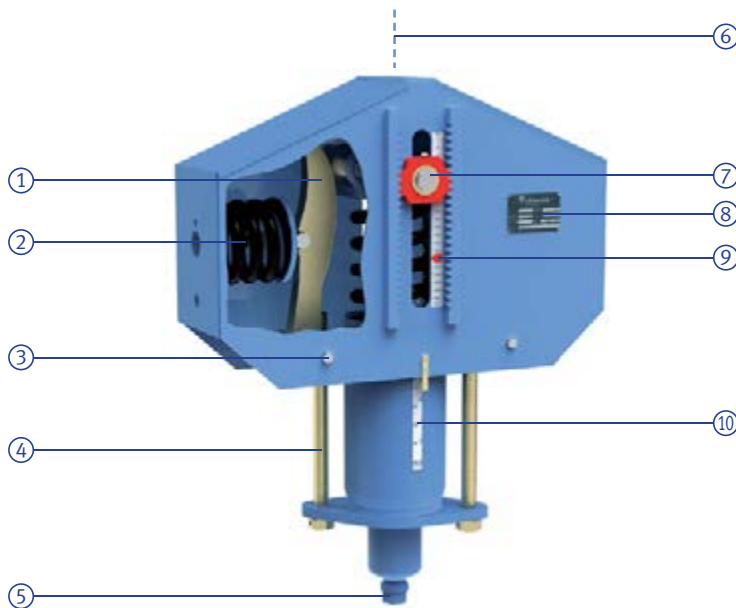
Constant support type 19



Space-saving design of type 18 compared to a conventional lever-arm hanger

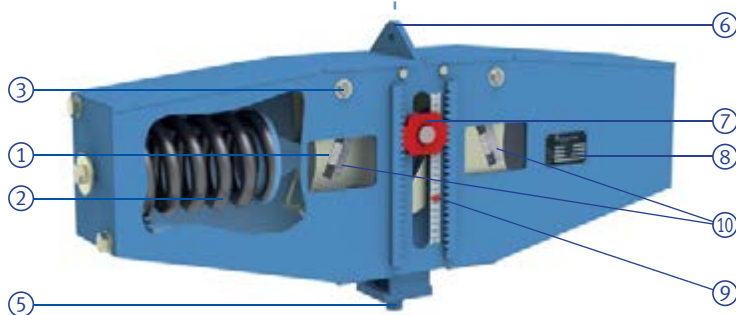
**In comparison with conventional lever-arm type hangers the new LISEGA type 18 is lower profile and enables the creation of support chains in the smallest of spaces.**

# Special benefits of LISEGA constant hangers and supports

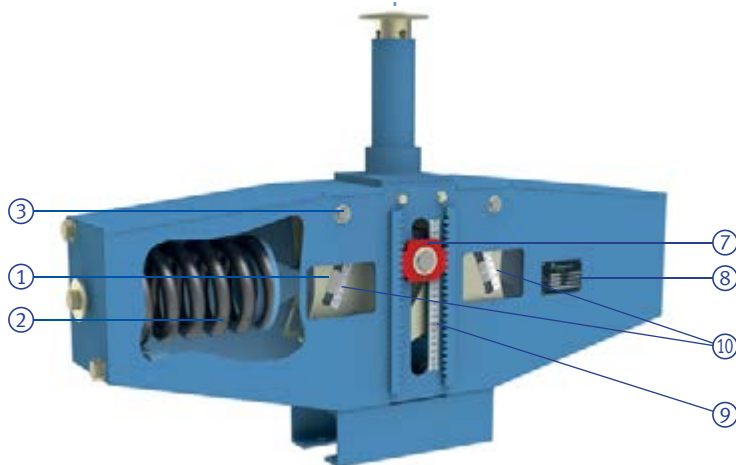


Constant hanger  
type 11

axis of symmetry



Constant hanger  
type 18



Constant support  
type 19

The user can profit from a variety of special benefits where LISEGA constant hangers are concerned.

Significant savings are possible, especially regarding labor-intensive ancillary support costs such as planning, installation and operation.

- ① Principle-based constancy by way of a special function principle.
  - ② Pre-relaxed springs eliminate any significant loss of load-bearing capacity.
  - ③ Reduced friction due to minimized number of bearing points.
  - ④ Especially wide load adjustment range avoids hanger replacement when operational loads change.
  - ⑤ Turnbuckle function allows greater adjustment of pipe installation position.
  - ⑥ Load application free of moments due to a single suspension point.
  - ⑦ Blocking is adjustable to practically any travel position through fine-tooth notching.
  - ⑧ Name plate contains complete technical specifications.
  - ⑨ Directly readable travel scale with marking for hot/cold load positions.
  - ⑩ Load scale with permanent marking of adjustment load.
- ✓ Symmetrical design ensures direct flow of forces through axis of symmetry.
  - ✓ Favorable power-weight ratios for reduced installation loads.
  - ✓ Arranged by load groups and travel ranges to simplify selection (modular system).
  - ✓ Consistent functional behavior due to high-quality corrosion protection and maintenance-free chemically nickelized finishes.
  - ✓ Readily adaptable to installation situation via corresponding designs and standardized accessories.
  - ✓ Double load-tube guiding of constant supports for transmission of side loads.
  - ✓ Secure connection of load chains due to load- and connection-compatible modular components.

## LISEGA constant hanger and support types

As fixed elements in the pipe system concept, the pipe supports must operate smoothly as functional connections between the pipe system and the surrounding structure.

Pipe systems are usually very complex layouts with restricted space. To allow for optimum use of the different spatial conditions, various designs are available as standard for the different application situations. All components are available either from stock or at short notice.



Type 11



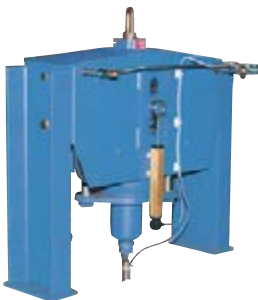
Type 11 with support brackets



Type 18



Type 19



Type 17 with support brackets

### Constant hanger type 11 C3 19 to 11 96 15

Standard design for use as suspension for loads up to load group 9 (100kN) and travel range 6 (750mm). Travel range 7 (900mm) is available on request. If no space restrictions or other specifications are to be considered, this is the preferred product.

### Constant hanger type 11 with support brackets type 71 C3 .1 to 71 97 .4

Standard design with support brackets bolted at the LISEGA factory for use as seated versions.

### Constant hanger type 18 D3 17 to 18 93 17

Serial standard design in special low profile version as alternative suspension instead of type 11, if the installation height is limited.

### Constant support type 19 D3 17 to 19 93 17

Serial standard design for use as support if constant support from below is required.

**Note:** This version replaces the taller single-cell constant hanger type 16 (see Standard Supports Catalog 2010) and is especially suitable in restricted spaces. Type 16 can still be supplied if required.

### Heavy constant support type 16

Special design as multi-cell constant support type 16, if heavy loads have to be distributed.

### Servohanger type 17 52 15 to 17 93 15

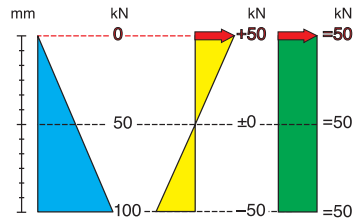
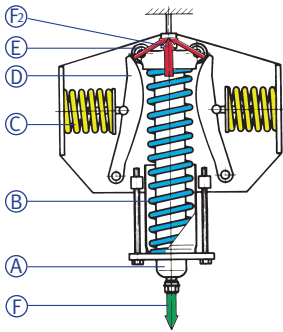
Servohangers are equipped with additional active load regulation and can reduce overloading in the piping system to a permissible harmless level.



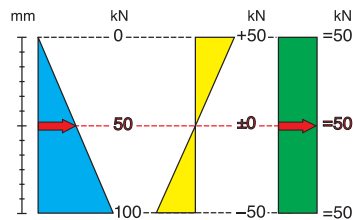
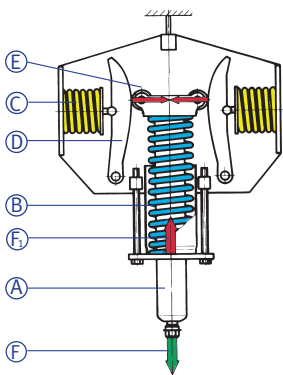
Type 16

# Mode of operation and function

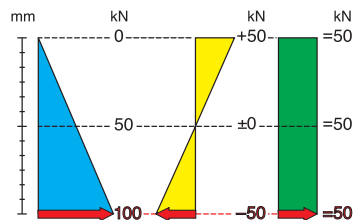
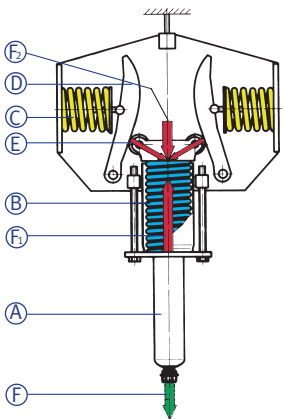
## Types 11, 12, 13, 14, 16, 79



Upper position



Middle position



Lower position

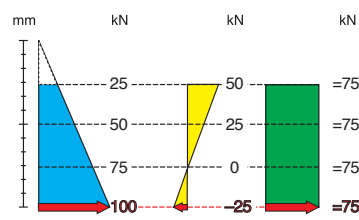
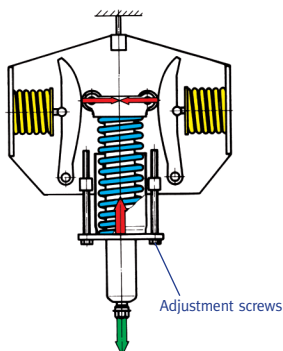
### The LISEGA Function Principle

The LISEGA Function Principle is based on the interaction of the force from a mainspring and the resulting force of two connected balance springs. The force directions of the pre-loaded compensating springs are thereby angled against each other in the shape of a parallelogram of forces.

The suspended load (F) acts directly on the mainspring (B) via the load tube (A). The pre-loaded compensating springs (C) act additionally on the load tube as the resulting force (F) via pivoting cams (D) and roller supports (E). The mainspring force (F) and the resulting force (F) change on the shifting of the load over the displacement range in accordance with the specified spring constants, the cam path, and the angular position of the cam components.

The course of the resulting force corresponds to the characteristics of the mainspring. In this way the mainspring force is balanced out, without deviations, to a constant support force.

- The LISEGA function principle leads to absolute constancy which by theory can easily be proven.
- The LISEGA function principle permits an especially wide load adjustment range of 40% – 100% of the nominal load.



$$F_1 + F_2 = F_{75\%}$$

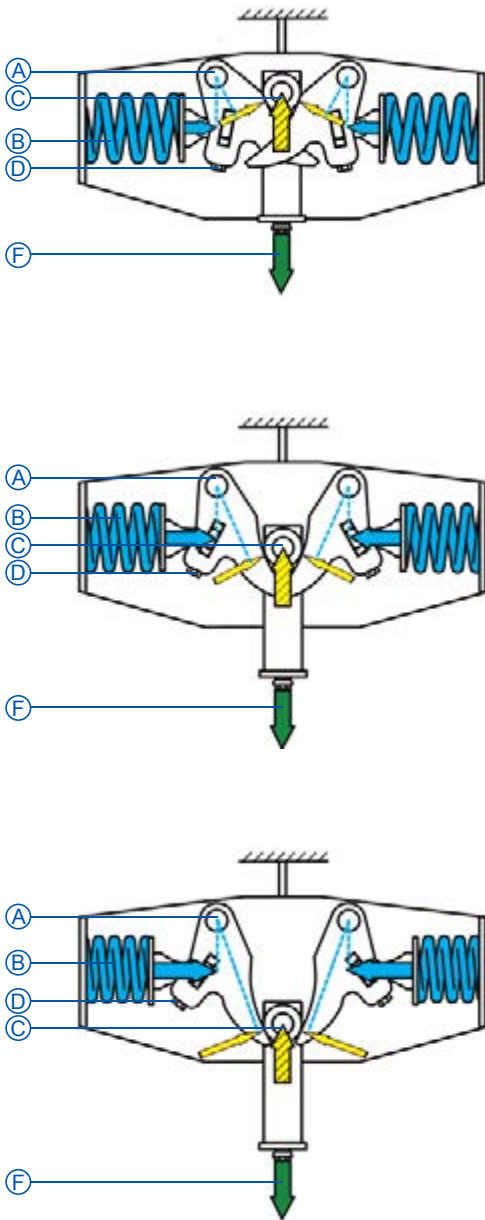
### Load adjustment

The load adjustment is carried out by a pre-loading of the mainspring. As the characteristics of the resulting balancing force and the mainspring are the same, only a linear shifting of the initial force thereby occurs (F). This way, the change in force is the same at every point of the movement and the ultimate load remains constant at each load setting.

The remaining travel range changes proportionally to the load alterations.



## Mode of operation and function Types 18, 19



### Function principle for LISEGA constant hangers type 18 and constant supports

The function principle is based on the lever principle, by which variable spring forces are transformed into a constant support force by way of lever mechanics.

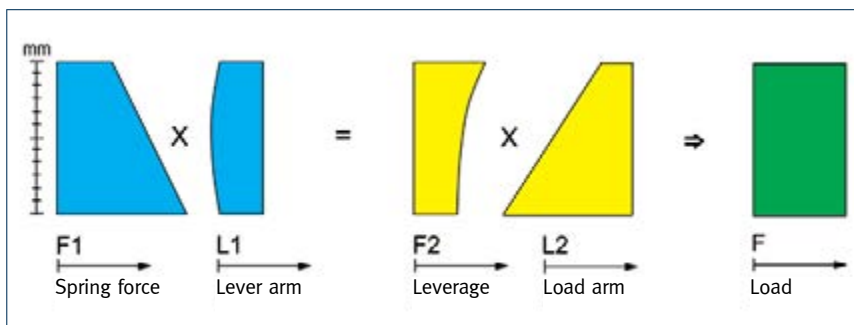
Two lever arms (A), symmetrically arranged at an angle to each other, thereby act as one system with pre-loaded springs (B). On a vertical change in position of the load (F) to be taken up, the displacement is distributed over rollers (C) and defined bearing surfaces onto the lever systems. Through the pairing arrangement of the levers the displacement runs linearly in the axis of symmetry, whereby the lever conditions that thereby change do so proportionally to the correspondingly changing spring preloading. In this way the load stays in balance with the adjusted load in every travel position.

Sinus-shaped load deviations from the lever movement in the form of an arc are balanced by correspondingly machined cam profiles. This way the load distribution is held constant with mathematical accuracy in every position.

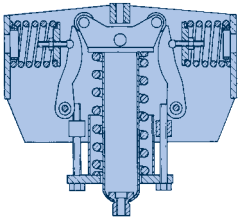
### Load adjustment

The calibration load is adjustable within a range of approx. 50% to 100% of the maximum hanger force. By way of an adjusting screw (D) the length of the lever arm force is continuously variable.

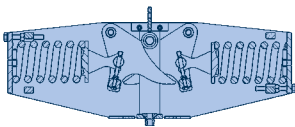
**On all load settings the available travel range remains unchanged. The whole working travel range is always available.**



# Design features



LISEGA constant hanger  
type 11 standard design



LISEGA constant hanger  
type 18 compact design

## Design Structure

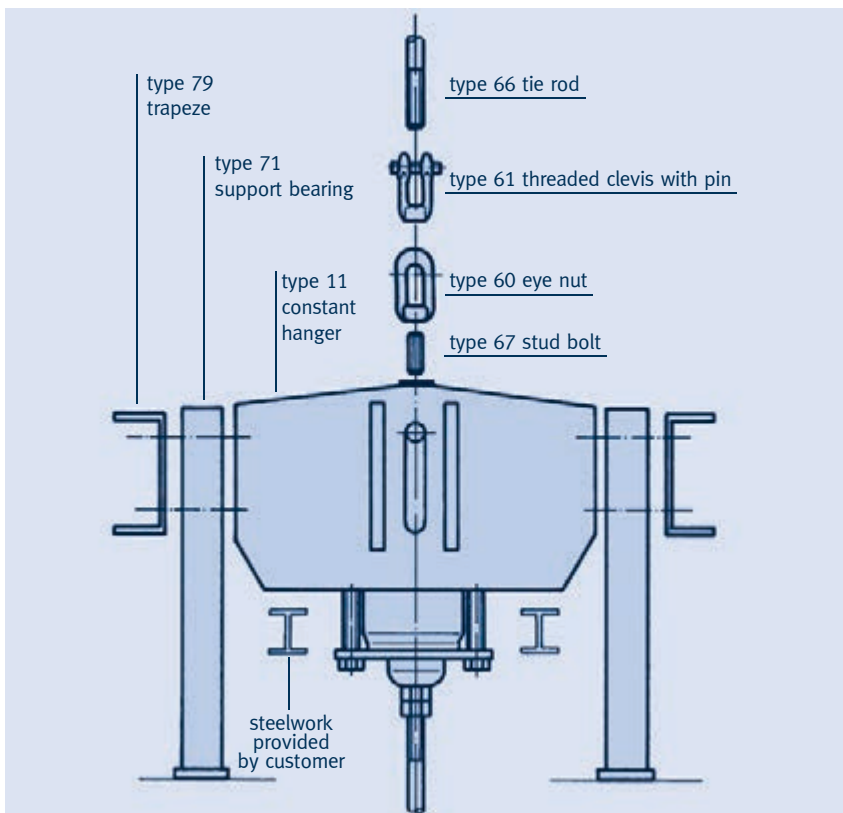
A steel body encases the moving parts such as springs and cam lever. The compact arrangement of the individual components enables small external dimensions. The body is designed to bear loads and is mass-produced for the attachment of standardized connections.

## Connection possibilities

The connection threads correspond to the respective LISEGA load group, whereby the upper connection thread (type 11) has a defined engagement depth and the lower one is designed as a load nut for length compensation.

Due to their design, type 11 constant hangers can also be seated directly on suitable connecting components without the need for accessories. In addition, special support brackets can be bolted on using the standard tapped holes provided. Type 11 constant hangers above load group 9 (heavy duty) and type 18 constant hangers are fitted with yoke plates (only on top) for a bolted connection, instead of connection threads.

## ▼ Serial connection types



## Performance range

Constant hangers and supports are produced as standardized single-cell hangers in load groups C to 9. In addition, type 11 constant hangers in sizes 8 and 9 are coupled to form hangers for higher loads (heavy duty). In this way a standard performance range from 0.13kN to 500kN is covered. Constant hangers are manufactured in the seven standard travel ranges 75 / 150 / 300 / 450 / 600 / 750 / 900 mm and constant supports up to 300mm.

## Standards and calculations

Component design and layout correspond to the applicable national and international standards and recognized technical specifications with regard to load capacity, function and lifespan. This applies equally to the materials used, the welding technology and other processes. The relevant details are clearly defined in the technical specifications, p. 0.9.

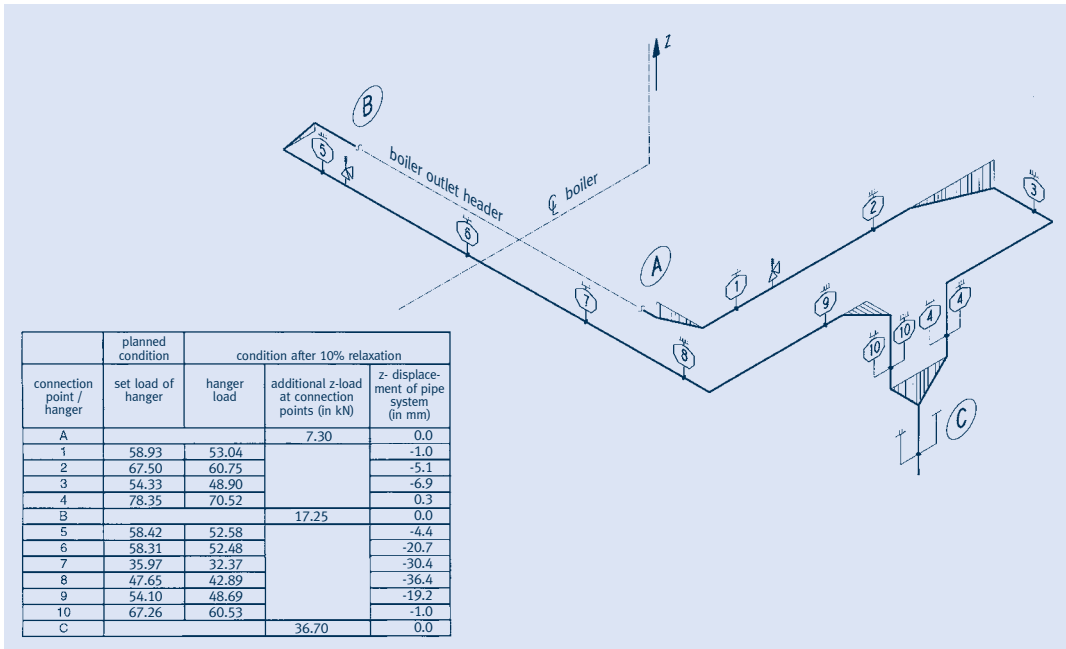
## Springs

The springs are crucial components for the smooth functioning of constant hangers and supports – their long-term functional efficiency is vital for the operational safety of hangers and supports. The relevant standards are the basis for the design of LISEGA helical coil springs. Details can be found in the **technical specifications**, section 0.

## Spring relaxation

When subjected to loads and temperature over a period of time, conventional helical coil springs lose part of their reset force through relaxation (settling loss). In constant and spring hangers this can, in the long term, lead to a reduction in the set ultimate load of more than 10% (see calculation example).

LISEGA exclusively uses springs that, through an artificial aging process, show no appreciable settling loss. The spring relaxation normally to be expected is anticipated by producing preplastification in a hot setting process with greater coil lengths.



**Calculation example of cumulative additional loads due to hanger relaxation**

A pipe system was observed (dia = 525mm, s = 27mm, temperature = 540°C, pressure = 50 bar). The effect of a 10% loss of force in the hangers was assumed. Due to this loss, the pipe system is displaced by 36.4mm.

The maximum primary stresses were calculated in the vicinity of the boiler connection. They stand 93% above the planned stress condition.

The permissible stresses for the boiler connection are exceeded by 9% (calculations acc. to Regulation B31.1).

**Corrosion protection**

The constant hangers are finished with a LISEGA standard coating which, together with a metallicly pure treated surface, offers superior corrosion protection with high mechanical stability. Bearings and bearing bolts for the constant hangers are plated or made of non-rusting materials. All threaded components and cams are electro-galvanized. The surface of the spring is given a special finish (**technical specifications** p. 0.11).

Constant hangers with standard corrosion protection need no maintenance if installed in buildings or in locations protected from the weather. For operation in the open or in special situations, corresponding extra corrosion protection can be arranged – see the corrosion protection section in **technical specifications**, p. 0.10.



Paintshop



Spring testing at material reception



# Function testing



## Functional performance

The special functional principle of LISEGA constant hangers guarantees constancy across the entire travel range. This is also unaffected by shifts in load. Only a minor adjustment force produced by tolerances and bearing friction is to be taken into account. The hysteresis so produced is kept within strict limits due to the design principle and modern production processes.

In effect, the deviation in the set load of LISEGA constant hangers on the serial average can, on normal load setting, be kept to  $\pm 3\%$ .

Applying a selection process, with limited load and travel ranges, it is possible to reduce this even further.

The typical permissible deviations are set out in the following international codes:

- **MSS SP-58 (USA), max.  $\pm 6\%$  in relation to the operating load**
- **VGB-R510L and KTA 3205.3, Germany, max.  $\pm 5\%$  in relation to the operating load. The deviation in load adjustment (medium load) is limited to  $\pm 2\%$**
- **DIN EN 13480-T3 max.  $\pm 5\%$  in relation to the operating load**

## Function testing

Before shipment, all constant hangers and supports are tested for flawless functioning and set to the load ordered. The test results are recorded.

The calibration values are stamped onto a riveted name plate. The calibration load is also marked permanently on the load scale. Hot and cold positions are noted on the travel scale in red and white respectively.

The respective travel positions can be read directly off the travel scale in mm or inches.



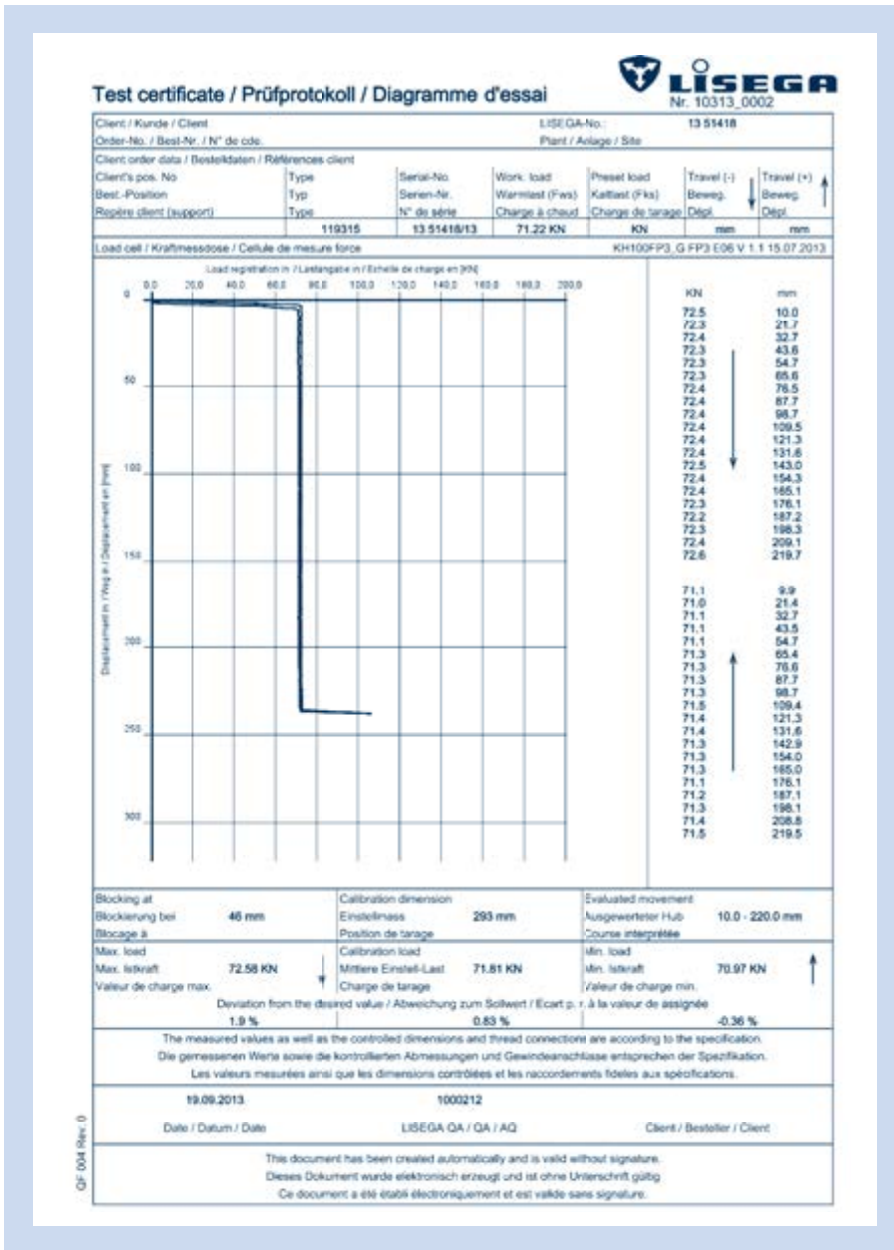
Calibration and testing of type 12



Acceptance testing of a constant hanger

The calibration load in each case can be read directly off a load scale in kN or lbs. For the functional tests, test benches operating quasi-statically with capacities up to 1,000 kN are on hand. The test benches are checked regularly by an independent supervisory body.





LISEGA testing technology is constantly under improvement and represents state-of-the-art technology. These improvements cover test benches for constant hangers and supports, spring hangers and supports, as well as snubbers.

The testing facilities are in operation at all production sites within the LISEGA group, while mobile units are available for use at customer locations.

32 test benches are on hand for constant and spring hangers or constant and spring supports in the load range from 1kN to 1000kN. All LISEGA test benches are tested at regular intervals according to DIN EN ISO 7500 with calibrated load cells and measurement amplifiers.

All components are tested in installation condition and adjustment.

Example of a test certificate in a standard delivery inspection



Testing a constant hanger on a LISEGA 120kN test bench

Mobile LISEGA 50kN snubber test bench PR50

Testing a spring hanger on a LISEGA 120kN test bench

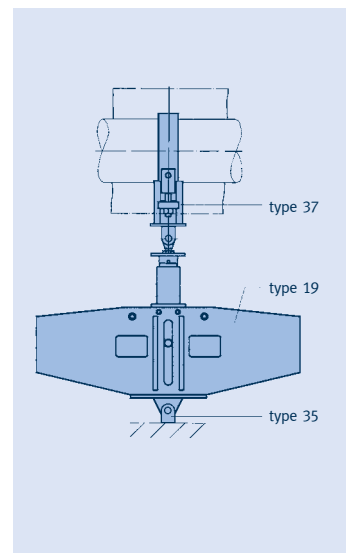
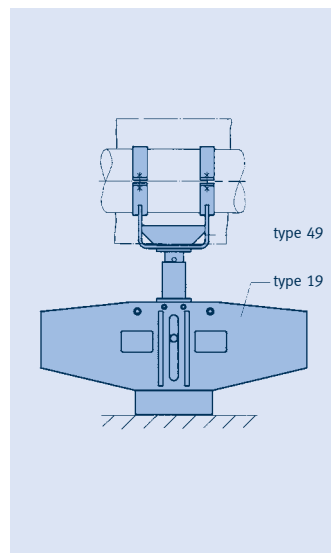
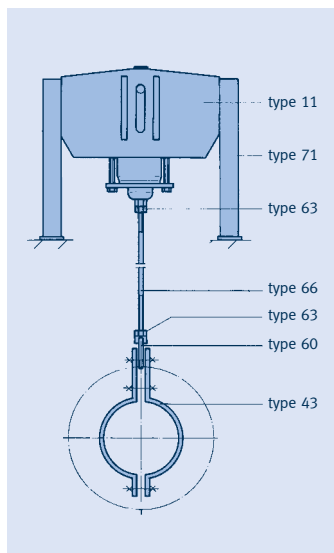
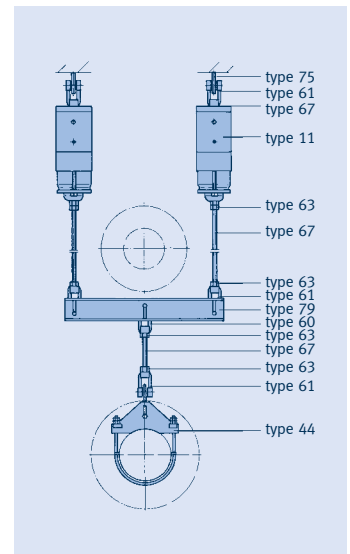
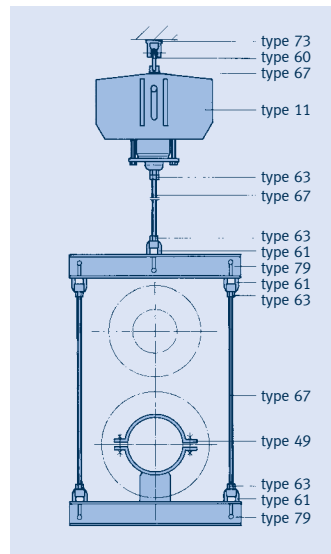
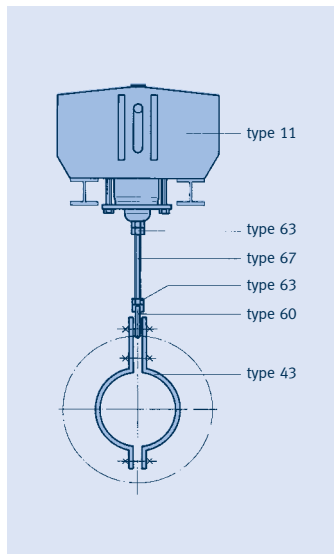
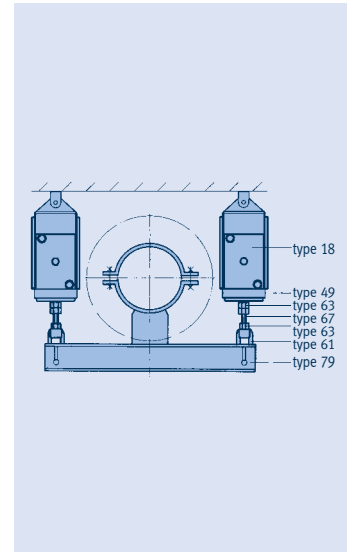
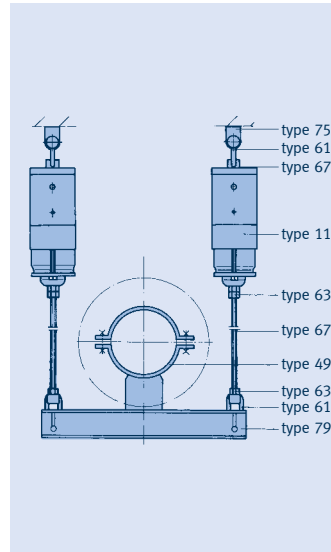
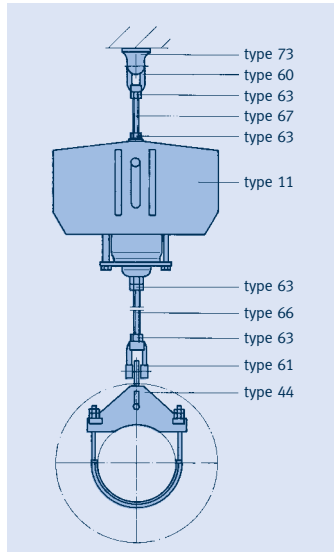
# Installation overview

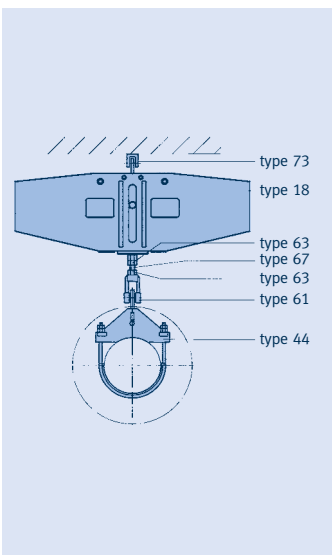
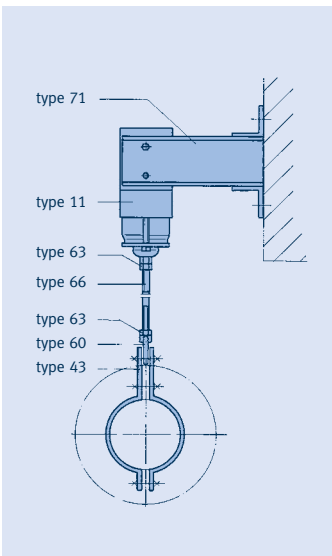
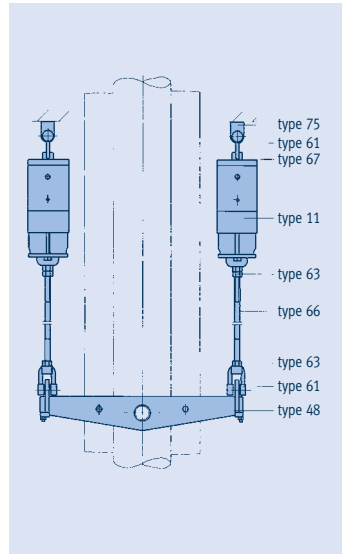
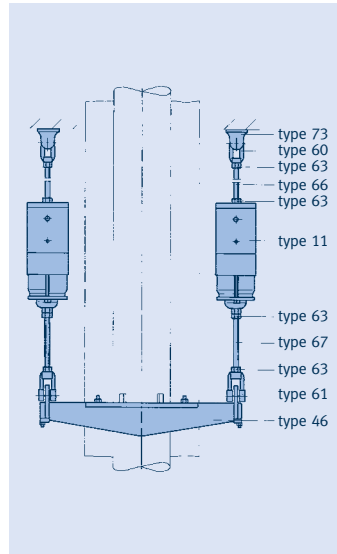
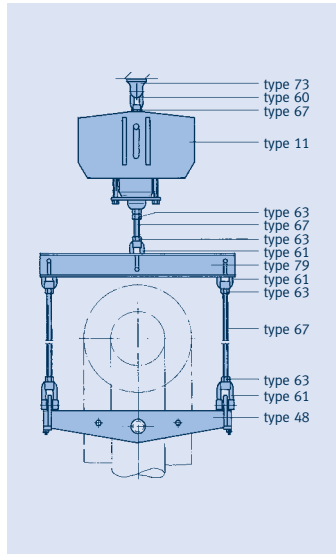
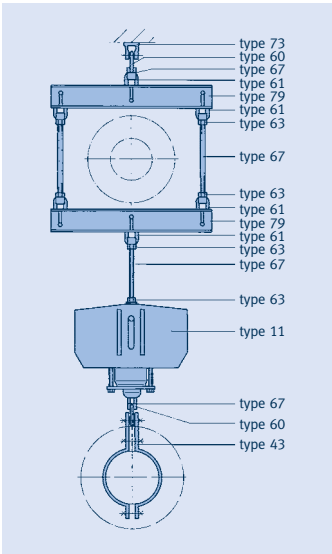
## Universal adaption to existing installation spaces

The installation of the constant hangers can be adapted to any situation in the plant through the use of universal accessory components from the modular system.

## Automatic designing

All configurations can be created in just a few steps via the LICAD design software in the shortest of time with the input of 6 parameters – with parts lists and drawings.

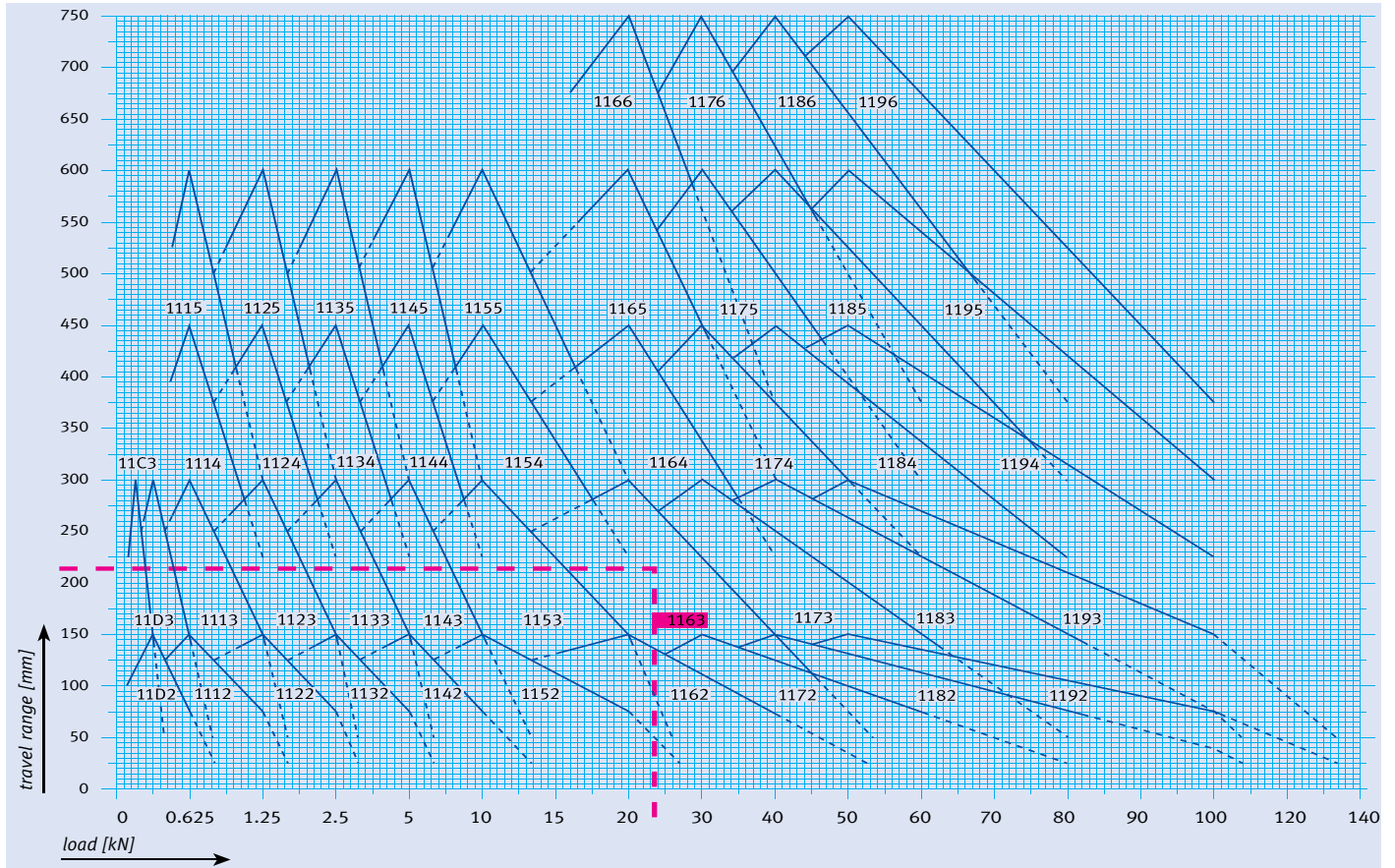




# Selection overview

## Types 11, 12, 13, 14, 16, 79

Constant hangers, heavy-duty constant supports ①



Selection example:  
24kN/210mm

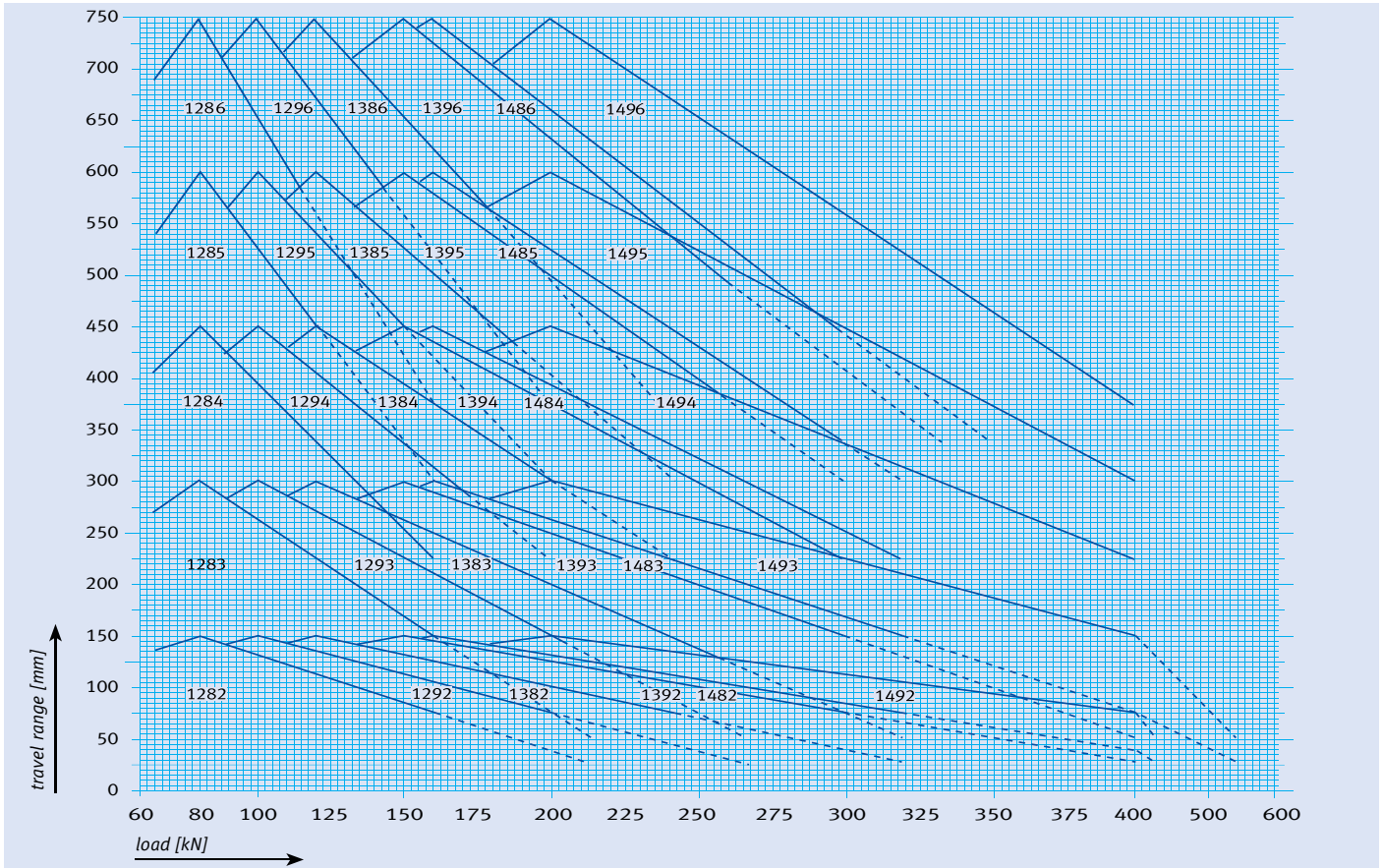
type designation					load [kN]									
			11 C3	-	0.13 ②	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22
			11 D3	11 D2	0.25 ②	0.27	0.29	0.31	0.33	0.35	0.38	0.40	0.42	0.44
	11 15	11 14	11 13	11 12	0.50	0.54	0.58	0.63	0.67	0.71	0.75	0.79	0.83	0.88
	11 25	11 24	11 23	11 22	1.00	1.08	1.17	1.25	1.33	1.42	1.50	1.58	1.66	1.75
	11 35	11 34	11 33	11 32	2.00	2.17	2.33	2.50	2.67	2.83	3.00	3.17	3.33	3.50
	11 45	11 44	11 43	11 42	4.00	4.33	4.66	5.00	5.33	5.66	6.00	6.33	6.66	7.00
	11 55	11 54	11 53	11 52	8.00	8.67	9.33	10.00	10.67	11.33	12.00	12.67	13.33	14.00
11 66	11 65	11 64	<b>11 63</b>	11 62	16.00	17.33	18.66	20.00	21.33	22.66	<b>24.00</b>	25.33	26.66	28.00
11 76	11 75	11 74	11 73	11 72	24.00	26.00	28.00	30.00	32.00	34.00	36.00	38.00	40.00	42.00
11 86	11 85	11 84	11 83	11 82	32.00	34.66	37.33	40.00	42.66	45.33	48.00	50.66	53.33	56.00
11 96	11 95	11 94	11 93	11 92	40.00	43.33	46.66	50.00	53.33	56.66	60.00	63.33	66.66	70.00
12 86	12 85	12 84	12 83 ⑤	12 82 ⑤	64.00	69.33	74.66	80.00	85.33	90.66	96.00	101.30	106.66	112.00
12 96	12 95	12 94	12 93 ⑤	12 92 ⑤	80.00	86.66	93.30	100.00	106.70	113.30	120.00	126.70	133.30	140.00
13 86	13 85	13 84	13 83 ⑤	13 82 ⑤	96.00	104.00	112.00	120.00	128.00	136.00	144.00	152.00	160.00	168.00
13 96	13 95	13 94	13 93 ⑤	13 92 ⑤	120.00	130.00	140.00	150.00	160.00	170.00	180.00	190.00	200.00	210.00
14 86	14 85	14 84	14 83 ⑤	14 82 ⑤	128.00	138.70	149.30	160.00	170.70	181.30	192.00	202.70	213.30	224.00
14 96	14 95	14 94	14 93 ⑤	14 92 ⑤	160.00	173.30	186.70	200.00	213.30	226.70	240.00	253.30	266.70	280.00
...2...(150mm) ④					135	140	145	150	145	140	135	130	125	120
...3...(300mm) ④					270	280	290	300	290	280	<b>270</b>	260	250	240
...4...(450mm) ④					405	420	435	450	435	420	405	390	375	360
...5...(600mm) ④					540	560	580	600	580	560	540	520	500	480
...6...(750mm) ④					675	700	725	750	725	700	675	650	625	600

Intermediate values can be interpolated.





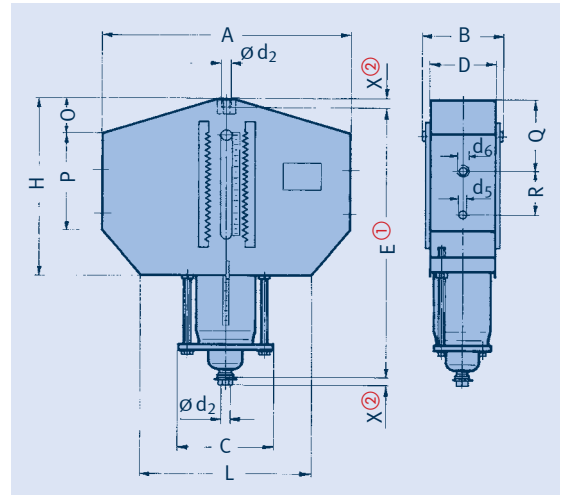
- ① For the selection of constant supports and constant rigid struts type 16, the load group and travel range of the corresponding constant hanger type 11 apply.
- ② Loads < 0.25kN or 0.13kN on request.
- ③ This range is only adjustable ex works.
- ④ Total travel, travel range 7 (900mm) supplied on request.
- ⑤ Selection also applies to heavy-duty constant support type 16.



load [kN]												type designation						
0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.31		③	③	-	11 C3					
0.46	0.48	0.50	0.52	0.54	0.56	0.58	0.60	0.63		0.73	0.83	11 D2	11 D3					
0.92	0.96	1.00	1.04	1.08	1.13	1.17	1.21	1.25		1.45	1.66	11 12	11 13	11 14	11 15			
1.83	1.92	2.00	2.08	2.16	2.25	2.33	2.42	2.50		2.91	3.33	11 22	11 23	11 24	11 25			
3.67	3.83	4.00	4.17	4.33	4.50	4.67	4.83	5.00		5.83	6.66	11 32	11 33	11 34	11 35			
7.33	7.66	8.00	8.33	8.66	9.00	9.33	9.66	10.00		11.66	13.33	11 42	11 43	11 44	11 45			
14.67	15.33	16.00	16.67	17.33	18.00	18.67	19.33	20.00		23.33	26.66	11 52	11 53	11 54	11 55			
29.33	30.66	32.00	33.33	34.66	36.00	37.33	38.66	40.00		46.66	53.33	11 62	11 63	11 64	11 65	11 66		
44.00	46.00	48.00	50.00	52.00	54.00	56.00	58.00	60.00		70.00	80.00	11 72	11 73	11 74	11 75	11 76		
58.66	61.33	64.00	66.66	69.33	72.00	74.66	77.33	80.00		93.33	106.66	11 82	11 83	11 84	11 85	11 86		
73.33	76.66	80.00	83.33	86.66	90.00	93.33	96.66	100.00		116.66	133.33	11 92	11 93	11 94	11 95	11 96		
117.30	122.66	128.00	133.30	138.66	144.00	149.30	154.66	160.00		186.66	213.33	12 82	12 83	12 84	12 85	12 86		
146.70	153.30	160.00	166.70	173.30	180.00	186.70	193.30	200.00		233.33	266.66	12 92	12 93	12 94	12 95	12 96		
176.00	184.00	192.00	200.00	208.00	216.00	224.00	232.00	240.00		280.00	320.00	13 82	13 83	13 84	13 85	13 86		
220.00	230.00	240.00	250.00	260.00	270.00	280.00	290.00	300.00		350.00	400.00	13 92	13 93	13 94	13 95	13 96		
234.70	245.30	256.00	266.70	277.30	288.00	298.70	309.30	320.00		373.35	426.70	14 82	14 83	14 84	14 85	14 86		
293.30	306.70	320.00	333.30	346.70	360.00	373.30	386.60	400.00		466.65	533.30	14 92	14 93	14 94	14 95	14 96		
115	110	105	100	95	90	85	80	75		50	25	mm	④					
230	220	210	200	190	180	170	160	150		100	50	mm	④					
345	330	315	300	285	270	255	240	225		mm	④							
460	440	420	400	380	360	340	320	300		mm	④							
575	550	525	500	475	450	425	400	375		mm	④							

# Constant hangers Type 11

**Constant hangers  
type 11 C3 19 to 11 96 15**  
Serialized standard design,  
delivery from stock.



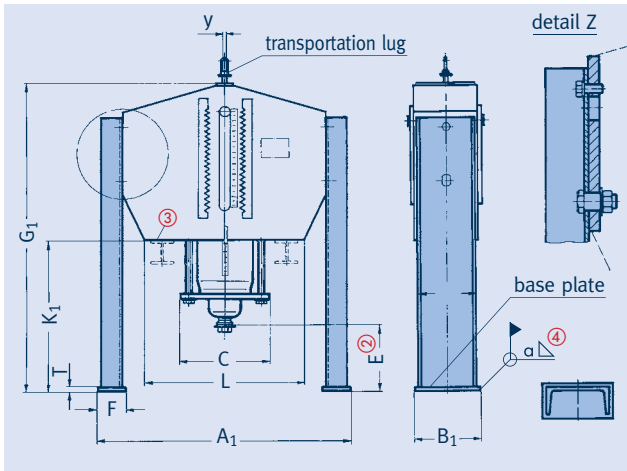
① Dimension E for upper blocking position, in other blocking positions dimension E lengthens accordingly.

② X = minimum engagement depth. At the lower connection, maximum engagement depth = X + 300mm.

type	A	B	C	D	d <sub>2</sub>	d <sub>5</sub>	d <sub>6</sub>	E <sup>①</sup>	H	L	O	P	Q	R	X <sup>②</sup>	weight [kg]
11 C3 19	350	130	150	105	M10	9	∅ 9	530	455	250	40	265	240	43	15	14
11 D2 19	300	110	155	86	M10	11	∅11	350	250	230	0	195	125	43	15	10
11 D3 19	410	130	170	106	M10	11	∅11	545	445	260	45	280	255	43	15	19
11 12 15	385	130	140	106	M12	12	M10	375	265	285	25	135	40	86	15	15
11 13 15	415	130	140	106	M12	12	M10	645	445	285	20	270	165	86	15	25
11 14 15	435	130	140	106	M12	12	M10	935	615	285	25	325	225	86	15	34
11 15 15	465	135	150	108	M12	12	M10	1225	795	295	25	450	350	86	15	52
11 22 15	445	160	180	132	M12	12	M10	385	270	350	20	140	45	86	15	21
11 23 15	460	160	185	132	M12	12	M10	650	455	360	45	270	195	86	15	35
11 24 15	480	160	185	132	M12	12	M10	945	635	360	45	320	245	86	15	48
11 25 15	530	165	195	136	M12	12	M10	1215	810	370	25	460	365	86	15	75
11 32 15	445	170	190	132	M16	12	M10	390	275	360	10	165	30	112	20	27
11 33 15	490	170	190	132	M16	12	M10	675	470	360	70	260	180	110	20	43
11 34 13	545	185	210	150	M16	12	M10	960	645	370	40	370	260	110	20	66
11 35 13	615	190	220	155	M16	12	M10	1240	820	370	40	465	360	110	20	105
11 42 15	500	185	220	150	M20	16	M12	440	315	400	25	260	135	105	25	44
11 43 15	570	185	220	150	M20	16	M12	740	495	410	110	250	210	105	25	66
11 44 13	610	185	220	150	M20	16	M12	1040	675	410	55	370	275	105	25	86
11 45 13	665	190	240	155	M20	16	M12	1285	855	420	65	540	455	105	25	145
11 52 15	590	230	270	190	M24	20	M16	470	345	490	30	210	70	115	30	73
11 53 15	710	230	270	190	M24	20	M16	770	515	490	105	285	215	126	30	115
11 54 15	745	230	285	190	M24	20	M16	1105	705	490	75	410	310	126	30	159
11 55 15	845	230	285	190	M24	20	M16	1405	880	490	60	530	415	135	30	212
11 62 15	725	275	335	230	M30	25	M16	555	420	580	40	240	85	145	35	134
11 63 15	815	275	335	230	M30	25	M16	900	565	580	160	300	260	145	35	183
11 64 15	845	275	345	230	M30	25	M16	1285	750	600	150	355	310	149	35	264
11 65 15	885	275	345	230	M30	25	M16	1630	925	600	120	460	380	149	35	337
11 66 15	1145	280	345	232	M30	25	M16	2030	1330	600	155	650	600	149	35	495
11 72 15	780	300	380	252	M36	35	M20	610	455	650	50	285	110	170	45	195
11 73 15	850	300	380	252	M36	35	M20	945	635	650	140	300	205	170	45	262
11 74 15	1000	300	400	252	M36	35	M20	1375	785	650	195	400	360	179	45	378
11 75 15	1160	305	400	256	M36	35	M20	1710	975	660	65	665	490	184	45	550
11 76 15	1275	305	400	256	M36	35	M20	2150	1425	660	210	710	675	184	45	690
11 82 15	815	320	390	256	M42	35	M20	705	585	650	50	330	115	200	50	263
11 83 15	945	320	390	256	M42	35	M20	1140	715	650	215	340	280	200	50	364
11 84 15	1110	320	400	256	M42	35	M20	1645	925	670	305	390	420	200	50	509
11 85 15	1200	320	420	256	M42	35	M20	2085	1115	690	125	740	595	200	50	731
11 86 15	1260	325	420	260	M42	35	M20	2585	1625	690	250	850	825	200	50	965
11 92 15	865	350	435	276	M48	35	M24	760	630	750	50	350	135	195	60	336
11 93 15	1095	350	435	276	M48	35	M24	1190	785	750	250	355	325	195	60	475
11 94 15	1240	350	455	276	M48	35	M24	1735	960	770	380	380	480	195	60	677
11 95 15	1255	355	455	280	M48	35	M24	2160	1090	770	250	585	570	195	60	862
11 96 15	1305	355	455	280	M48	35	M24	2700	1620	770	290	800	820	195	60	1130

**Order details:**  
constant hanger  
type 11 ...  
marking: ...  
calibration load: ...kN  
travel: ...mm up/down  
blocking position  
(as required): ...mm

## Support brackets Type 71 for constant hanger Type 11



**Support brackets for  
constant hanger type 11  
type 71 C3 .1 to 71 96 .1**  
Serialized standard design,  
delivery from stock.

constant h. type	bracket type ①	A <sub>1</sub>	B <sub>1</sub>	C	E ②	F	G <sub>1</sub>	K <sub>1</sub>	L	T	U	y	α ④	weight [kg]
11 C3 19	71 C3 .1	420	70	150	265	40	810	355	250	6	60	13	3	5
11 D2 19	71 D2 .1	370	70	155	145	40	510	260	230	6	60	13	3	5
11 D3 19	71 D3 .1	480	70	170	265	40	825	380	260	6	60	13	3	8
11 12 15	71 12 .1	495	115	140	145	60	535	270	285	8	100	17	3	12
11 13 15	71 13 .1	525	115	140	265	60	925	480	285	8	100	17	3	17
11 14 15	71 14 .1	545	115	140	385	60	1335	720	285	8	100	17	3	25
11 15 15	71 15 .1	575	115	150	505	60	1745	950	295	8	100	17	3	31
11 22 15	71 22 .1	575	140	180	145	75	545	275	350	8	120	17	3	15
11 23 15	71 23 .1	590	140	185	265	75	930	475	360	8	120	17	3	21
11 24 15	71 24 .1	610	140	185	385	75	1345	710	360	8	120	17	3	31
11 25 15	71 25 .1	660	140	195	505	75	1735	925	370	8	120	17	3	38
11 32 15	71 32 .1	575	140	190	150	75	560	285	360	10	120	25	3	16
11 33 15	71 33 .1	620	140	190	270	75	965	495	360	10	120	25	3	23
11 34 13	71 34 .1	655	140	210	400	75	1380	735	370	10	120	25	3	32
11 35 13	71 35 .1	725	140	220	520	75	1780	960	370	10	120	25	3	40
11 42 15	71 42 .1	640	160	220	155	80	620	305	400	10	140	25	3	18
11 43 15	71 43 .1	710	160	220	275	80	1040	545	410	10	140	25	3	29
11 44 13	71 44 .1	750	160	220	425	80	1490	815	410	10	140	25	3	41
11 45 13	71 45 .1	805	160	240	600	80	1910	1055	420	10	140	25	3	49
11 52 15	71 52 .1	750	200	270	160	90	660	315	490	12	180	25	3	30
11 53 15	71 53 .1	870	200	270	280	90	1080	565	490	12	180	25	3	42
11 54 15	71 54 .1	905	200	285	400	90	1535	830	490	12	180	25	3	58
11 55 15	71 55 .1	1005	200	285	520	90	1955	1075	490	12	180	25	3	72
11 62 15	71 62 .1	915	250	335	165	110	755	335	580	12	220	25	4	45
11 63 15	71 63 .1	1005	250	335	285	110	1220	655	580	12	220	25	4	62
11 64 15	71 64 .1	1035	250	345	405	110	1725	975	600	12	220	25	4	90
11 65 15	71 65 .1	1075	250	345	525	110	2190	1265	600	12	220	25	4	112
11 66 15	71 66 .1	1335	250	345	345	110	2410	1080	600	12	220	25	4	112
11 72 15	71 72 .1	980	270	380	175	115	830	375	650	15	240	25	4	56
11 73 15	71 73 .1	1050	270	380	295	115	1285	650	650	15	240	25	4	80
11 74 15	71 74 .1	1200	270	400	415	115	1835	1050	650	15	240	25	4	106
11 75 15	71 75 .1	1360	270	400	535	115	2290	1315	660	15	240	25	4	128
11 76 15	71 76 .1	1475	270	400	280	115	2475	1050	660	15	240	25	4	128
11 82 15	71 82 .1	1025	280	390	180	120	935	350	650	15	240	40	5	65
11 83 15	71 83 .1	1155	280	390	300	120	1490	775	650	15	240	40	5	91
11 84 15	71 84 .1	1320	300	400	420	120	2115	1190	670	15	260	40	5	139
11 85 15	71 85 .1	1410	320	420	540	120	2675	1560	690	15	280	40	5	184
11 86 15	71 86 .1	1470	320	420	270	120	2905	1280	690	15	280	40	5	184
11 92 15	71 92 .1	1105	300	435	190	140	1010	380	750	20	260	40	5	82
11 93 15	71 93 .1	1335	300	435	310	140	1560	775	750	20	260	40	5	109
11 94 15	71 94 .1	1480	320	455	430	140	2225	1265	770	20	280	40	5	162
11 95 15	71 95 .1	1495	340	455	550	140	2770	1680	770	20	320	40	5	273
11 96 15	71 96 .1	1545	340	455	260	140	3020	1400	770	20	320	40	5	273

① The 5th digit in the type designation denotes the design:  
6 for support brackets, bolted, standard design,  
8 for support brackets, bolted, for increased requirements.

② Dimension E for upper blocking position, in other positions E changes accordingly.

③ The constant hangers can in principle be directly seated and welded to the structure. Care must be taken to allow access to adjusting screws and lock nuts. If this is not possible, supports type 71 are appropriate.

④ Minimum weld seam.

Longer support brackets are available on request.

**Order details:**  
constant hangers  
type 11 ...  
with support bracket  
type 71 ...  
marking: ...  
calibration load: ...kN  
travel: ...mm up/down  
blocking position  
(as required): ...mm

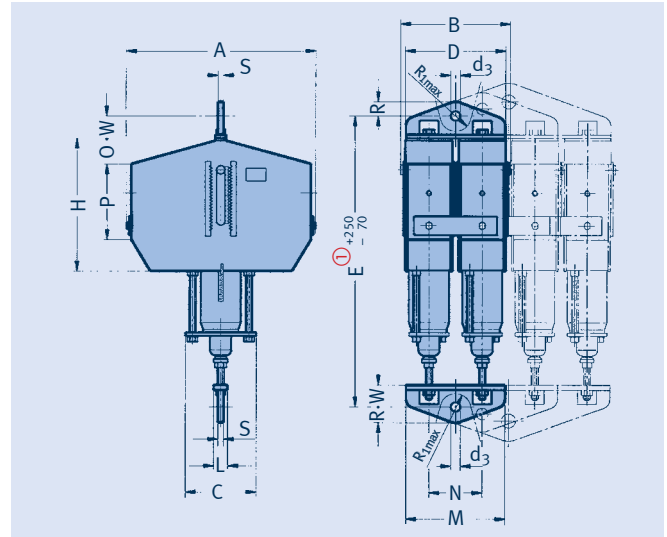
# Constant hangers

## Types 12-14

### Constant hangers

#### type 12 82 35 to 14 96 35

Standard design, multi-cell arrangement, delivery from stock.



① Dimension E applies to upper blocking position, in other blocking positions E changes accordingly.

type	A	B	C	D	d <sub>3</sub>	E①	H	L	M	N	O	P	R	R <sub>1max</sub>	S	W	weight [kg]
12 82 35	860	635	390	555	60	1205	585	80	540	300	50	330	90	95	30	160	615
12 83 35	990	635	390	555	60	1640	715	80	540	300	215	340	90	95	30	160	820
12 84 35	1155	635	400	555	60	2145	925	80	540	300	305	390	90	95	30	160	1110
12 85 35	1245	635	420	555	60	2585	1115	80	540	300	125	740	90	95	30	160	1555
12 86 35	1305	645	420	565	60	3085	1625	80	545	304	250	850	90	95	30	160	2020
12 92 35	910	695	435	605	70	1310	630	90	590	330	50	350	105	110	35	175	785
12 93 35	1140	695	435	605	70	1740	785	90	590	330	250	355	105	110	35	175	1070
12 94 35	1285	695	455	605	70	2285	960	90	590	330	380	380	105	110	35	175	1475
12 95 35	1300	705	455	615	70	2710	1090	90	595	334	250	585	105	110	35	175	1845
12 96 35	1350	705	455	615	70	3250	1620	90	595	334	290	800	105	110	35	175	2380
13 82 35	860	935	390	855	70	1305	585	80	840	2x300	50	330	105	125	35	210	955
13 83 35	990	935	390	855	70	1740	715	80	840	2x300	215	340	105	125	35	210	1265
13 84 35	1155	935	400	855	70	2245	925	80	840	2x300	305	390	105	125	35	210	1700
13 85 35	1245	935	420	855	70	2685	1115	80	840	2x300	125	740	105	125	35	210	2370
13 86 35	1305	950	420	870	70	3185	1625	80	850	2x304	250	850	105	125	35	210	3070
13 92 35	910	1025	435	935	80	1420	630	90	920	2x330	50	350	120	140	35	230	1215
13 93 35	1140	1025	435	935	80	1850	785	90	920	2x330	250	355	120	140	35	230	1640
13 94 35	1285	1025	455	935	80	2395	960	90	920	2x330	380	380	120	140	35	230	2245
13 95 35	1300	1040	455	950	80	2820	1090	90	930	2x334	250	585	120	140	35	230	2810
13 96 35	1350	1040	455	950	80	3360	1620	90	930	2x334	290	800	120	140	35	230	3615
14 82 35	860	1235	390	1155	80	1385	585	80	1140	3x300	50	330	120	180	35	250	1305
14 83 35	990	1235	390	1155	80	1820	715	80	1140	3x300	215	340	120	180	35	250	1715
14 84 35	1155	1235	400	1155	80	2325	925	80	1140	3x300	305	390	120	180	35	250	2300
14 85 35	1245	1235	420	1155	80	2765	1115	80	1140	3x300	125	740	120	180	35	250	3190
14 86 35	1305	1250	420	1170	80	3265	1625	80	1150	3x304	250	850	120	180	35	250	4125
14 92 35	910	1355	435	1265	90	1460	630	90	1250	3x330	50	350	135	180	40	250	1665
14 93 35	1140	1355	435	1265	90	1890	785	90	1250	3x330	250	355	135	180	40	250	2230
14 94 35	1285	1355	455	1265	90	2435	960	90	1250	3x330	380	380	135	180	40	250	3040
14 95 35	1300	1375	455	1280	90	2860	1090	90	1260	3x334	250	585	135	180	40	250	3790
14 96 35	1350	1375	455	1280	90	3400	1620	90	1260	3x334	290	800	135	180	40	250	4870

### Order details:

constant hangers

type 1. ... 35

marking: ...

calibration load: ...kN

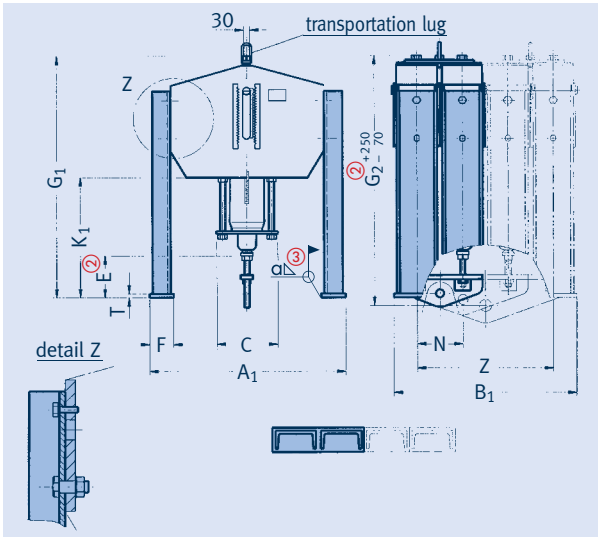
travel: ...mm up/down

blocking position

(as required): ...mm



## Support brackets Type 71 for constant hangers Type 12-14



**Support brackets for  
constant hangers  
type 12-14  
type 71 82 .2 to 71 96 .4**  
Standard design,  
delivery from stock.

constant h. type	bracket type ①	A <sub>1</sub>	B <sub>1</sub>	C	E ②	F	G <sub>1</sub>	G <sub>2</sub> ②	K <sub>1</sub>	N	T	U	Z	α ③	weight [kg]
12 82 35	71 82 .2	1025	580	390	180	120	985	1095	350	300	15	240	300	4	142
12 83 35	71 83 .2	1155	580	390	300	120	1540	1530	775	300	15	240	300	4	194
12 84 35	71 84 .2	1320	600	400	420	120	2175	2040	1190	300	15	260	300	4	292
12 85 35	71 85 .2	1410	620	420	540	120	2730	2480	1560	300	15	280	300	4	383
12 86 35	71 86 .2	1470	620	420	270	120	2960	2980	1280	304	15	280	304	4	383
12 92 35	71 92 .2	1105	630	435	190	140	1070	1190	380	330	20	260	330	5	181
12 93 35	71 93 .2	1335	630	435	310	140	1615	1620	775	330	20	260	330	5	235
12 94 35	71 94 .2	1480	650	455	430	140	2285	2170	1265	330	20	280	330	5	341
12 95 35	71 95 .2	1495	675	455	550	140	2830	2595	1680	334	20	320	334	5	574
12 96 35	71 96 .2	1545	675	455	260	140	3080	3135	1400	334	20	320	334	5	574
13 82 35	71 82 .3	1025	880	390	180	120	985	1145	350	300	15	240	600	4	216
13 83 35	71 83 .3	1155	880	390	300	120	1550	1585	775	300	15	240	600	4	294
13 84 35	71 84 .3	1320	900	400	420	120	2175	2090	1190	300	15	260	600	4	440
13 85 35	71 85 .3	1410	920	420	540	120	2730	2530	1560	300	15	280	600	4	576
13 86 35	71 86 .3	1470	920	420	270	120	2960	3030	1280	304	15	280	608	4	576
13 92 35	71 92 .3	1105	960	435	190	140	1070	1245	380	330	20	260	660	5	276
13 93 35	71 93 .3	1335	960	435	310	140	1620	1680	775	330	20	260	660	5	357
13 94 35	71 94 .3	1480	980	455	430	140	2285	2225	1265	330	20	280	660	5	515
13 95 35	71 95 .3	1495	1010	455	550	140	2830	2650	1680	334	20	320	668	5	864
13 96 35	71 96 .3	1545	1010	455	260	140	3080	3190	1400	334	20	320	668	5	864
14 82 35	71 82 .4	1025	1180	390	180	120	990	1190	350	300	15	240	900	4	289
14 83 35	71 83 .4	1155	1180	390	300	120	1550	1625	775	300	15	240	900	4	392
14 84 35	71 84 .4	1320	1200	400	420	120	2175	2130	1190	300	15	260	900	4	587
14 85 35	71 85 .4	1410	1220	420	540	120	2730	2570	1560	300	15	280	900	4	769
14 86 35	71 86 .4	1470	1230	420	270	120	2960	3070	1280	304	15	280	912	4	770
14 92 35	71 92 .4	1105	1290	435	190	140	1075	1270	380	330	20	260	990	5	369
14 93 35	71 93 .4	1335	1290	435	310	140	1620	1700	775	330	20	260	990	5	477
14 94 35	71 94 .4	1480	1310	455	430	140	2285	2245	1265	330	20	280	990	5	687
14 95 35	71 95 .4	1495	1340	455	550	140	2830	2670	1680	334	20	320	1002	5	1153
14 96 35	71 96 .4	1545	1340	455	260	140	3080	3210	1400	334	20	320	1002	5	1155

① The 5th digit in the type designation denotes the design:  
6 for support brackets, bolted, standard design,  
8 for support brackets, bolted, for increased requirements.

② Dimensions E and G<sub>2</sub> apply to upper blocking position, in other blocking positions E and G<sub>2</sub> change accordingly.

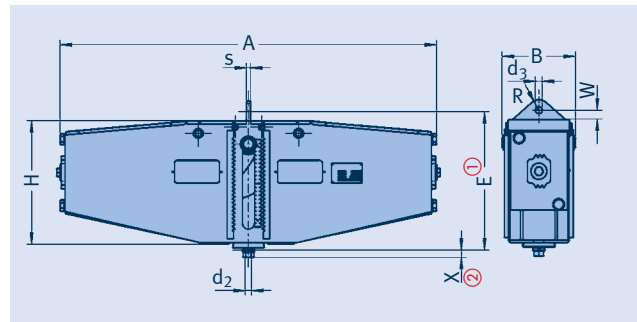
③ Minimum weld size.

Other lengths are also available on request.

**Order details:**  
constant hangers  
type 1. ...  
with support bracket  
type 71 ...  
marking: ...  
calibration load: ...kN  
travel: ...mm up/down  
blocking position  
(as required): ...mm

# Constant hangers Type 18

**Constant hangers  
type 18 D3 17 to 18 93 17**  
Standard design,  
delivery from stock.



① Dimension E in blocking position right at top – in other blocking positions E lengthens accordingly.

② X = minimum engagement depth. At lower connection max. engagement depth = X + 150mm.

Max. permissible stresses:

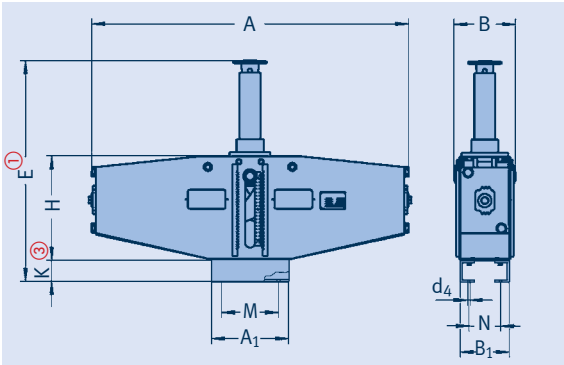
- Emergency (HZ) at 80°C = Calibration load x 1.33
- Faulted condition (HS) at 150°C = Calibration load x 1.66

type	min. load [kN]	max. load [kN]	travel	A	B	d <sub>2</sub>	d <sub>3</sub>	E <sup>①</sup>	H	R	s	W	X <sup>②</sup>	weight [kg]
18 D3 17	0.21	0.51	300	973	205	M10	17	464	430	25	10	24	15	52
18 D1 27	0.21	0.72	75	610	205	M10	17	267	234	25	10	24	15	30
18 D2 27	0.21	0.72	150	664	205	M10	17	304	270	25	10	24	15	34
18 D3 27	0.37	0.72	300	973	205	M10	17	464	430	25	10	24	15	52
18 11 27	0.54	1.71	75	610	205	M12	17	267	234	25	10	24	15	31
18 12 27	0.54	1.71	150	664	205	M12	17	304	270	25	10	24	15	35
18 13 27	0.54	1.71	300	973	205	M12	17	464	430	25	10	24	15	57
18 21 17	1.25	3.0	75	610	205	M12	17	267	234	25	10	24	15	32
18 22 17	1.25	3.0	150	664	205	M12	17	304	270	25	10	24	15	39
18 23 17	1.25	3.0	300	973	205	M12	17	464	430	25	10	24	15	57
18 21 27	2.2	4.0	75	610	205	M12	17	267	234	25	10	24	15	32
18 22 27	2.2	4.0	150	664	205	M12	17	304	270	25	10	24	15	39
18 23 27	2.2	4.0	300	973	205	M12	17	464	430	25	10	24	15	58
18 31 17	2.8	5.15	75	652	205	M16	21	282	244	30	10	36	20	36
18 32 17	2.8	5.15	150	837	233	M16	21	336	293	30	10	36	20	74
18 33 17	2.8	5.15	300	1099	233	M16	21	483	440	30	10	36	20	97
18 31 27	3.8	6.8	75	652	205	M16	21	282	244	30	10	36	20	36
18 32 27	3.8	6.8	150	837	233	M16	21	336	293	30	10	36	20	74
18 33 27	3.8	6.8	300	1099	233	M16	21	483	440	30	10	36	20	98
18 41 17	5.0	9.3	75	755	233	M20	21	328	286	30	10	36	25	69
18 42 17	5.0	9.3	150	934	261	M20	21	351	302	30	10	36	25	102
18 43 17	5.0	9.3	300	1099	233	M20	21	482	440	30	10	36	25	104
18 41 27	6.9	12.4	75	755	233	M20	25	331	286	40	15	32	25	70
18 42 27	6.9	12.4	150	934	261	M20	25	354	302	40	15	32	25	113
18 43 27	6.9	12.4	300	1288	261	M20	25	500	455	40	15	32	25	152
18 51 17	9.2	16.2	75	755	233	M24	25	330	286	40	15	32	30	71
18 52 17	9.2	16.2	150	934	261	M24	25	353	302	40	15	32	30	114
18 53 17	9.2	16.2	300	1288	261	M24	25	499	455	40	15	32	30	153
18 51 27	11.9	21.9	75	812	261	M24	25	334	290	40	15	32	30	96
18 52 27	11.9	21.9	150	1055	276	M24	25	372	315	40	15	34	30	159
18 53 27	11.9	21.9	300	1426	276	M24	25	508	460	40	15	34	30	210
18 61 17	16.15	29.9	75	878	261	M30	34	358	315	50	18	34	35	115
18 62 17	16.15	29.9	150	1140	291	M30	34	380	333	50	18	34	35	190
18 63 17	16.15	29.9	300	1592	291	M30	34	514	467	50	18	34	35	261
18 61 27	22.1	40.5	75	878	261	M30	41	368	315	65	20	44	35	118
18 62 27	22.1	40.5	150	1302	278	M30	41	392	335	65	20	44	35	194
18 63 27	22.1	40.5	300	1720	302	M30	41	527	472	65	20	44	35	326
18 71 17	29.8	47.0	75	976	276	M36	41	395	340	65	20	44	45	158
18 72 17	29.8	47.0	150	1446	291	M36	41	398	343	65	20	44	45	230
18 73 17	29.8	47.0	300	1720	302	M36	41	578	472	65	20	44	45	341
18 71 27	35.0	60.0	75	1072	291	M36	41	417	362	65	22	44	45	190
18 72 27	35.0	60.0	150	1570	302	M36	41	425	370	65	22	44	45	296
18 73 27	35.0	60.0	300	1935	362	M36	41	571	513	65	22	44	45	498
18 81 17	44.2	80.0	75	1251	302	M42	51	462	390	80	25	64	50	269
18 82 17	44.2	80.0	150	1805	362	M42	51	486	413	80	25	64	50	482
18 83 17	44.2	80.0	300	1965	347	M42	51	621	547	80	25	64	50	691
18 91 17	59.0	100.0	75	1520	302	M48	51	457	385	80	25	64	60	316
18 92 17	59.0	100.0	150	1805	362	M48	51	486	413	80	25	64	60	484
18 93 17	59.0	100.0	300	1965	347	M48	51	621	547	80	25	64	60	719

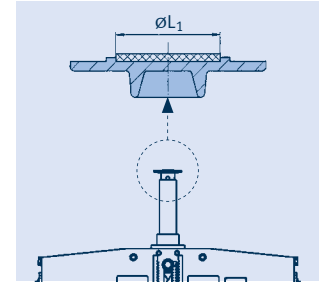
## Order details:

constant hangers  
type 18 ...  
marking: ...  
calibration load: ...kN  
travel: ...mm up/down  
blocking position  
(as required): ...mm

## Constant supports Type 19



**Constant supports  
type 19 D3 17 to 19 93 17**  
Standard design,  
delivery from stock.



Load plate with integrated slide plate. This must be considered in the selection of clamp bases.

type <sup>②</sup>	min. load [kN]	max. load [kN]	travel	A	A <sub>1</sub>	B	B <sub>1</sub>	d <sub>4</sub>	E <sup>①</sup>	H	K <sup>③</sup>	M	N	weight [kg]
19 D3 17	0.21	0.51	300	973	245	205	163	14.5	913	430	80	185	103	60
19 D1 27	0.21	0.72	75	610	245	205	163	14.5	490	234	80	185	103	36
19 D2 27	0.21	0.72	150	664	245	205	163	14.5	600	270	80	185	103	41
19 D3 27	0.37	0.72	300	973	245	205	163	14.5	913	430	80	185	103	60
19 11 27	0.54	1.71	75	610	245	205	163	14.5	490	234	80	185	103	37
19 12 27	0.54	1.71	150	664	245	205	163	14.5	600	270	80	185	103	42
19 13 27	0.54	1.71	300	973	245	205	163	14.5	913	430	80	185	103	65
19 21 17	1.25	3.0	75	610	245	205	163	14.5	490	234	80	185	103	37
19 22 17	1.25	3.0	150	664	245	205	163	14.5	600	270	80	185	103	46
19 23 17	1.25	3.0	300	973	245	205	163	14.5	913	430	80	185	103	65
19 21 27	2.2	4.0	75	610	245	205	163	14.5	490	234	80	185	103	38
19 22 27	2.2	4.0	150	664	245	205	163	14.5	600	270	80	185	103	46
19 23 27	2.2	4.0	300	973	245	205	163	14.5	913	430	80	185	103	66
19 31 17	2.8	5.15	75	652	245	205	163	14.5	499	244	80	185	103	42
19 32 17	2.8	5.15	150	837	300	233	189	18.5	639	293	100	210	124	83
19 33 17	2.8	5.15	300	1099	300	233	189	18.5	969	440	100	210	124	110
19 31 27	3.8	6.8	75	652	245	205	163	14.5	499	244	80	185	103	43
19 32 27	3.8	6.8	150	837	300	233	189	18.5	639	293	100	210	124	83
19 33 27	3.8	6.8	300	1099	300	233	189	18.5	969	440	100	210	124	111
19 41 17	5.0	9.3	75	755	300	233	189	18.5	565	286	100	210	124	78
19 42 17	5.0	9.3	150	934	300	261	205	18.5	667	302	100	210	140	113
19 43 17	5.0	9.3	300	1099	300	233	189	18.5	969	440	100	210	124	116
19 41 27	6.9	12.4	75	755	300	233	189	18.5	565	286	100	210	124	78
19 42 27	6.9	12.4	150	934	300	261	205	18.5	667	302	100	210	140	123
19 43 27	6.9	12.4	300	1288	300	261	205	18.5	987	455	100	210	140	171
19 51 17	9.2	16.2	75	755	300	233	189	18.5	577	286	100	210	124	82
19 52 17	9.2	16.2	150	934	300	261	205	18.5	668	302	100	210	140	128
19 53 17	9.2	16.2	300	1288	300	261	205	18.5	987	455	100	210	140	171
19 51 27	11.9	21.9	75	812	300	261	205	18.5	581	290	100	210	140	107
19 52 27	11.9	21.9	150	1055	400	276	220	22.5	713	315	120	280	150	176
19 53 27	11.9	21.9	300	1426	400	276	220	22.5	1016	460	120	280	150	231
19 61 17	16.15	29.9	75	878	300	261	205	18.5	607	315	100	210	140	127
19 62 17	16.15	29.9	150	1140	400	291	233	22.5	718	333	120	280	163	208
19 63 17	16.15	29.9	300	1592	400	291	233	22.5	1021	467	120	280	163	282
19 61 27	22.1	40.5	75	878	300	261	205	18.5	607	315	100	210	140	129
19 62 27	22.1	40.5	150	1302	400	278	220	22.5	717	335	120	280	150	211
19 63 27	22.1	40.5	300	1720	400	302	240	22.5	1041	472	120	280	170	354
19 71 17	29.8	47.0	75	976	400	276	220	22.5	655	340	120	280	150	176
19 72 17	29.8	47.0	150	1446	400	291	233	22.5	728	343	120	280	163	251
19 73 17	29.8	47.0	300	1720	380	302	240	22.5	1041	472	120	260	170	368
19 71 27	35.0	60.0	75	1072	398	291	233	22.5	672	362	120	278	163	208
19 72 27	35.0	60.0	150	1570	400	302	240	22.5	757	370	120	280	170	316
19 73 27	35.0	60.0	300	1935	400	362	300	22.5	1111	513	120	280	230	524
19 81 17	44.2	80.0	75	1251	400	302	240	22.5	744	390	120	280	170	290
19 82 17	44.2	80.0	150	1805	400	362	300	22.5	829	413	120	280	230	515
19 83 17	44.2	80.0	300	1965	400	347	285	22.5	1186	547	120	280	215	740
19 91 17	59.0	100.0	75	1520	400	302	240	22.5	739	385	120	280	170	336
19 92 17	59.0	100.0	150	1805	400	362	300	22.5	829	413	120	280	230	516
19 93 17	59.0	100.0	300	1965	400	347	285	22.5	1186	547	120	280	215	767

① Dimension E in blocking position right at top – in other blocking positions E shortens accordingly and allows adjustment of + 60mm.

② Type 19 .. .7 is fitted with a load plate with PTFE slide plate as standard. If needed, this type can also be supplied with a high temperature slide plate, type 19 .. .6 (see table below).

③ Under certain circumstances the support bracket with the height K can be dispensed with. It should however be ensured that the load adjustment screws are accessible.

type 19* with slide plate		ØL <sub>1</sub>
up to 180°C	up to 350°C	
19 D. .7	19 D. .6	40
19 1. .7	19 1. .6	40
19 2. .7	19 2. .6	40
19 3. .7	19 3. .6	65
19 4. .7	19 4. .6	65
19 5. .7	19 5. .6	65
19 6. .7	19 6. .6	110
19 7. .7	19 7. .6	150
19 8. .7	19 8. .6	150
19 9. .7	19 9. .6	150

\* friction value of the slide plates see table p. 7.11

Max. permissible stresses:

- Emergency (HZ) at 80°C = calibration load x 1.33
- Faulted condition (HS) at 150°C = calibration load x 1.66.
- Max. blocking load at 80°C = calibration load x 1.5.

**Order details:** constant support type 19 .. ..., marking: ..., calibration load: ...kN, travel: ...mm up/down, blocking position (as required): ...mm

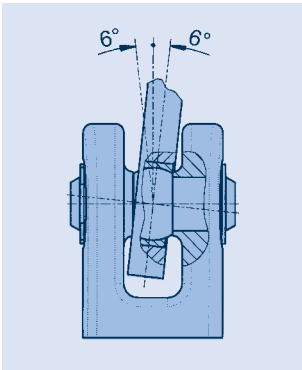
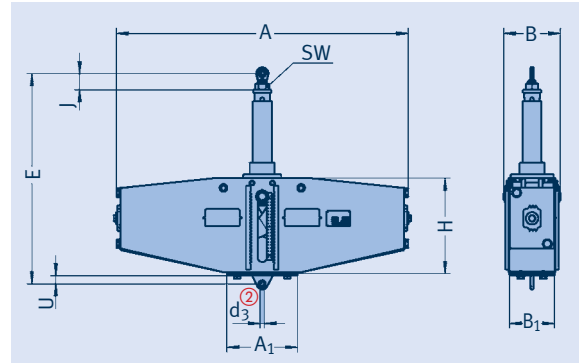
# Angulating constant supports

## Type 19

### Angulating constant supports type 19 D3 37 to 19 93 37

Standard design, delivery from stock.

For large horizontal displacements in the pipe systems the constant supports can be fitted with ball bushing joints.



The ball bushing joints for the connection are designed to fit weld-on bracket type 35.

① Dimension E on blocking position right at top, in other blocking positions E shortens accordingly and allows adjustment of +200mm.

② Connection possibilities: See bolt diameter of weld-on brackets type 35 or dynamic clamps (Product Group 3).

Max. permissible stresses:

- Emergency (HZ) at 80°C = Calibration load x 1.33
- Faulted condition (HS) at 150°C = Calibration load x 1.66
- Max. blocking load at 80°C = Calibration load x 1.5.

#### Order details:

angulating constant support type 19 ...  
 marking: ...  
 calibration load: ...kN  
 travel: ...mm up/down  
 blocking position (as required): ...mm

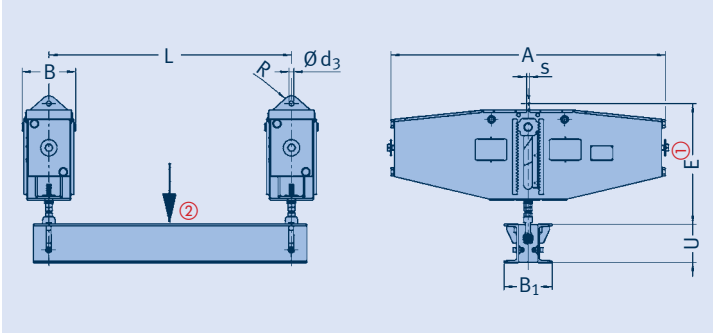
type	min. load [kN]	max. load [kN]	travel	A	A <sub>1</sub>	B	B <sub>1</sub>	d <sub>3</sub> ②	E ①	J	H	SW	U	weight [kg]
19 D3 37	0.21	0.51	300	973	245	205	163	10	903	45	430	27	23	58
19 D1 47	0.21	0.72	75	610	245	205	163	10	480	45	234	27	23	35
19 D2 47	0.21	0.72	150	664	245	205	163	10	590	45	270	27	23	40
19 D3 47	0.37	0.72	300	973	245	205	163	10	903	45	430	27	23	58
19 11 47	0.54	1.71	75	610	245	205	163	10	480	45	234	27	23	35
19 12 47	0.54	1.71	150	664	245	205	163	10	590	45	270	27	23	40
19 13 47	0.54	1.71	300	973	245	205	163	10	903	45	430	27	23	63
19 21 37	1.25	3.0	75	610	245	205	163	12	490	53	234	34	25	36
19 22 37	1.25	3.0	150	664	245	205	163	12	600	53	270	34	25	44
19 23 37	1.25	3.0	300	973	245	205	163	12	913	53	430	34	25	64
19 21 47	2.2	4.0	75	610	245	205	163	12	490	53	234	34	25	36
19 22 47	2.2	4.0	150	664	245	205	163	12	600	53	270	34	25	44
19 23 47	2.2	4.0	300	973	245	205	163	12	913	53	430	34	25	64
19 31 37	2.8	5.15	75	652	245	205	163	15	512	59	244	36	30	41
19 32 37	2.8	5.15	150	837	300	233	189	15	632	59	293	36	30	81
19 33 37	2.8	5.15	300	1099	300	233	189	15	965	59	440	36	30	108
19 31 47	3.8	6.8	75	652	245	205	163	15	512	59	244	36	30	41
19 32 47	3.8	6.8	150	837	300	233	189	15	632	59	293	36	30	81
19 33 47	3.8	6.8	300	1099	300	233	189	15	965	59	440	36	30	108
19 41 37	5.0	9.3	75	755	300	233	189	15	561	59	286	36	30	76
19 42 37	5.0	9.3	150	934	290	261	205	15	663	59	302	36	30	111
19 43 37	5.0	9.3	300	1099	300	233	189	15	965	59	440	36	30	114
19 41 47	6.9	12.4	75	755	300	233	189	15	561	59	286	36	30	76
19 42 47	6.9	12.4	150	934	290	261	205	15	663	59	302	36	30	122
19 43 47	6.9	12.4	300	1288	290	261	205	15	982	59	455	36	30	169
19 51 37	9.2	16.2	75	755	300	233	189	20	609	80	286	60	40	83
19 52 37	9.2	16.2	150	934	290	261	205	20	700	80	302	60	40	129
19 53 37	9.2	16.2	300	1288	290	261	205	20	1020	80	455	60	40	172
19 51 47	11.9	21.9	75	812	290	261	205	20	613	80	290	60	40	109
19 52 47	11.9	21.9	150	1055	400	276	220	20	727	80	315	60	40	178
19 53 47	11.9	21.9	300	1426	400	276	220	20	1030	80	460	60	40	232
19 61 37	16.15	29.9	75	878	300	261	205	20	641	80	315	60	40	129
19 62 37	16.15	29.9	150	1140	400	291	220	20	732	80	333	60	40	209
19 63 37	16.15	29.9	300	1592	400	291	220	20	1035	80	467	60	40	283
19 61 47	22.1	40.5	75	878	300	261	205	20	641	80	315	60	40	132
19 62 47	22.1	40.5	150	1302	400	278	220	20	731	80	335	60	40	212
19 63 47	22.1	40.5	300	1720	400	302	220	20	1058	80	472	60	40	355
19 71 37	29.8	47.0	75	976	400	276	220	30	708	93	340	60	60	179
19 72 37	29.8	47.0	150	1446	400	291	233	30	781	93	343	60	60	255
19 73 37	29.8	47.0	300	1720	380	302	240	30	1094	93	472	60	60	374
19 71 47	35.0	60.0	75	1072	398	291	233	30	725	93	362	60	60	212
19 72 47	35.0	60.0	150	1570	400	302	240	30	810	93	370	60	60	320
19 73 47	35.0	60.0	300	1935	400	362	300	30	1156	93	513	60	60	534
19 81 37	44.2	80.0	75	1251	400	302	240	30	789	93	390	60	60	291
19 82 37	44.2	80.0	150	1805	400	362	300	30	881	93	413	60	60	523
19 83 37	44.2	80.0	300	1965	400	347	285	30	1238	93	547	60	60	747
19 91 37	59.0	100.0	75	1520	400	302	240	50	812	106	385	70	70	341
19 92 37	59.0	100.0	150	1805	400	362	300	50	904	106	413	70	70	528
19 93 37	59.0	100.0	300	1965	400	347	285	50	1261	106	547	70	70	778





# Constant hanger trapezes

## Type 79



type	④ min. load [kN]	④ max. load [kN]	travel	L <sub>max</sub>	A	B	d <sub>3</sub>	E①	R	s	U	B <sub>1</sub>	weight for ③ L=1000 ± per 100mm [kg]	[kg]
79 D3 17	0.42	1.02	300	1700	973	205	17	569	25	10	80	140	121	1.7
79 D1 27	0.42	1.44	75	1700	610	205	17	372	25	10	80	140	79	1.7
79 D2 27	0.42	1.44	150	1700	664	205	17	409	25	10	80	140	87	1.7
79 D3 27	0.74	1.44	300	1700	973	205	17	569	25	10	80	140	121	1.7
79 11 27	1.08	3.42	75	1700	610	205	17	393	25	10	80	140	79	1.7
79 12 27	1.08	3.42	150	1700	664	205	17	430	25	10	80	140	87	1.7
79 13 27	1.08	3.42	300	1700	973	205	17	590	25	10	80	140	131	1.7
79 21 17	2.5	6.0	75	1700	610	205	17	393	25	10	80	140	79	1.7
79 22 17	2.5	6.0	150	1700	664	205	17	430	25	10	80	140	93	1.7
79 23 17	2.5	6.0	300	1700	973	205	17	590	25	10	80	140	131	1.7
79 21 27	4.4	8.0	75	1700	610	205	17	393	25	10	80	140	79	1.7
79 22 27	4.4	8.0	150	1700	664	205	17	430	25	10	80	140	93	1.7
79 23 27	4.4	8.0	300	1700	973	205	17	590	25	10	80	140	133	1.7
79 31 17	5.6	10.3	75	1800	652	205	21	410	30	10	120	190	100	2.7
79 32 17	5.6	10.3	150	1800	837	233	21	464	30	10	120	190	176	2.7
79 33 17	5.6	10.3	300	1800	1099	233	21	611	30	10	120	190	222	2.7
79 31 27	7.6	13.6	75	1800	652	205	21	410	30	10	120	190	100	2.7
79 32 27	7.6	13.6	150	1800	837	233	21	464	30	10	120	190	176	2.7
79 33 27	7.6	13.6	300	1800	1099	233	21	611	30	10	120	190	224	2.7
79 41 17	10	18.6	75	1800	755	233	21	472	30	10	140	200	172	3.2
79 42 17	10	18.6	150	1800	934	261	21	488	30	10	140	200	238	3.2
79 43 17	10	18.6	300	1800	1099	233	21	626	30	10	140	200	242	3.2
79 41 27	13.8	24.8	75	1800	755	233	25	475	40	15	140	200	174	3.2
79 42 27	13.8	24.8	150	1800	934	261	25	491	40	15	140	200	260	3.2
79 43 27	13.8	24.8	300	1800	1288	261	25	644	40	15	140	200	338	3.2
79 51 17	18.4	32.4	75	1800	755	233	25	489	40	15	180	230	190	4.4
79 52 17	18.4	32.4	150	1800	934	261	25	512	40	15	180	230	276	4.4
79 53 17	18.4	32.4	300	1800	1288	261	25	658	40	15	180	230	354	4.4
79 51 27	23.8	43.8	75	1800	812	261	25	493	40	15	180	230	240	4.4
79 52 27	23.8	43.8	150	1800	1055	276	25	521	40	15	180	230	366	4.4
79 53 27	23.8	43.8	300	1800	1426	276	25	667	40	15	180	230	468	4.4
79 61 17	32.3	59.8	75	2400	878	261	34	521	50	18	260	310	312	7.6
79 62 17	32.3	59.8	150	2400	1140	291	34	544	50	18	260	310	460	7.6
79 63 17	32.3	59.8	300	2400	1592	291	34	678	50	18	260	310	604	7.6
79 61 27	44.2	81	75	2400	878	261	41	531	65	20	260	310	318	7.6
79 62 27	44.2	81	150	2400	1302	278	41	556	65	20	260	310	470	7.6
79 63 27	44.2	81	300	2400	1720	302	41	690	65	20	260	310	736	7.6
79 71 17	59.6	94	75	2400	976	276	41	586	65	20	300	350	418	9.2
79 72 17	59.6	94	150	2400	1446	291	41	589	65	20	300	350	562	9.2
79 73 17	59.6	94	300	2400	1720	302	41	769	65	20	300	350	780	9.2
79 71 27	70	120	75	2400	1072	291	41	607	65	22	300	350	482	9.2
79 72 27	70	120	150	2400	1570	302	41	617	65	22	300	350	694	9.2
79 73 27	70	120	300	2400	1935	362	41	762	65	22	300	350	1098	9.2
79 81 17	88.4	160	75	1800	② 1251	302	51	677	80	25	300	350	644	9.2
79 82 17	88.4	160	150	1800	② 1805	362	51	702	80	25	300	350	1070	9.2
79 83 17	88.4	160	300	1800	② 1965	347	51	836	80	25	300	350	1486	9.2
79 91 17	118	200	75	1800	② 1520	302	51	694	80	25	300	350	730	9.2
79 92 17	118	200	150	1800	② 1805	362	51	725	80	25	300	350	1066	9.2
79 93 17	118	200	300	1800	② 1965	347	51	859	80	25	300	350	1538	9.2

### Constant hanger trapezes type 79 D3 17 to 79 93 17

- ① Dimension E right at top in blocking position, for other blocking positions, dim. E lengthens accordingly.
- ② The L<sub>max</sub> dimensions can be lengthened to 2400mm, on reduction of the permissible center load by 5% per 100mm extension.
- ③ When selecting the constant hanger trapeze the weight of the U-profiles and the clamp base weight must be added to the operating load.
- ④ Max. permissible loads:
  - Emergency (HZ) at 80°C = Calibration load x 1.33
  - Faulted condition (HS) at 150°C = Calibration load x 1.66
  - Max. blocking load at 80°C = Calibration load x 1.5

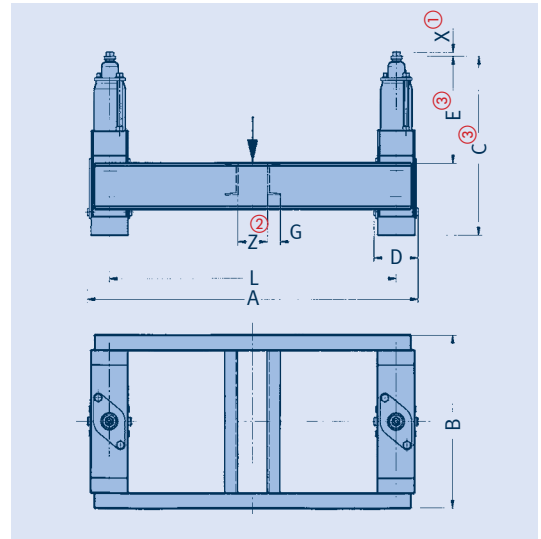
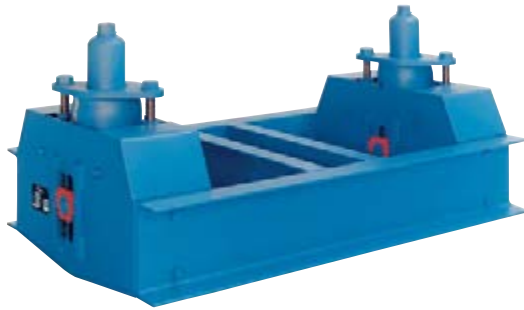
**Order details:**  
 trapeze type 79 ... ..  
 L = ...mm  
 marking: ...  
 calibration load: ...kN  
 of the support point  
 trape: ...mm up/down  
 blocking position  
 (as required): ...mm

# Constant hanger trapezes

## Type 79

### Constant hanger trapezes types 79 D2 15 to 79 96 15

This design of trapeze is used if the standard design type 79 .2 34 does not fit due to extremely restricted installation space. The trapezes are supplied bolted ex works.



① X = min. engagement depth + 300mm engagement possibility.

② Dimension L and dimension Z are to be stated when ordering.

③ Dimension E and dimension C 0mm in blocking position, in other blocking positions E and C lengthen accordingly.

④ When selecting the constant hanger trapeze its total weight and the clamp base weight must be added to the operating load.

⑤ The  $L_{max}$  dimensions can be lengthened to 2400mm on load reduction by 5% per 100mm extension.

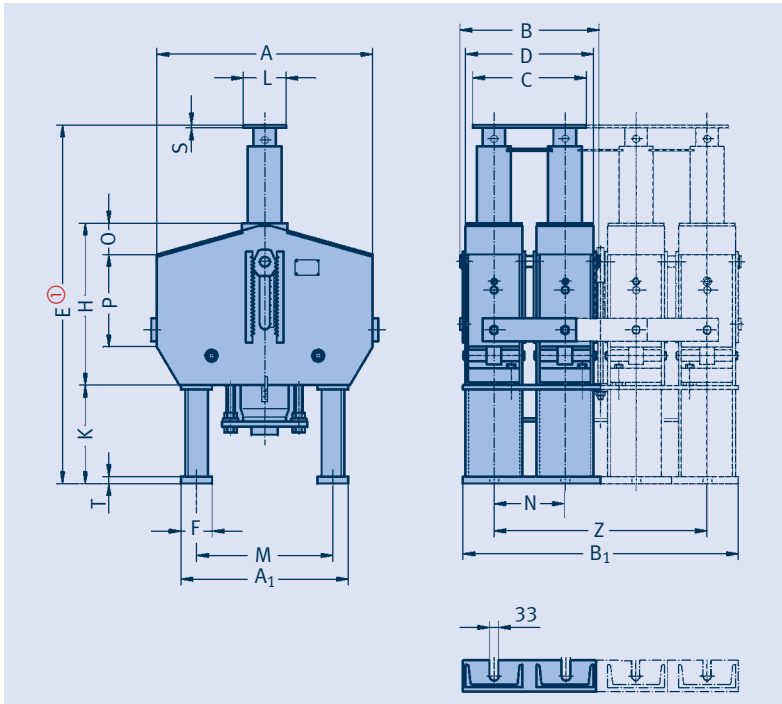
type	$A_{max}$	B	C③	D	E③	G	$L_{max}$ ⑤	X①	total weight [kg] L=1000④	weight change [kg/m]④
79 D2 15	1210	325	365	110	180	15	1100	15	30	6.6
79 D3 15	1230	435	560	130	245	15	1100	15	48	6.6
79 12 15	1930	515	390	130	235	30	1800	15	61	23.8
79 13 15	1930	545	660	130	380	30	1800	15	81	23.8
79 22 15	1960	575	400	160	240	30	1800	15	74	23.8
79 23 15	1960	590	665	160	355	30	1800	15	103	23.8
79 32 15	2170	605	410	170	235	45	2000	20	104	36.4
79 33 15	2170	650	695	170	370	45	2000	20	137	36.4
79 34 13	2170	700	960	185	560	45	2000	20	174	36.4
79 35 13	2170	775	1240	190	735	45	2000	20	255	36.4
79 42 15	2185	640	465	185	190	55	2000	25	153	44.0
79 43 15	2185	710	765	185	415	55	2000	25	199	44.0
79 44 13	2185	750	1040	185	625	55	2000	25	253	44.0
79 45 13	2190	805	1285	190	685	55	2000	25	370	44.0
79 52 15	2330	740	500	230	275	65	2100	30	230	50.6
79 53 15	2330	860	800	230	420	65	2100	30	318	50.6
79 54 15	2330	895	1135	230	660	65	2100	30	408	50.6
79 55 15	2330	1005	1435	230	845	65	2100	30	528	58.8
79 62 15	2375	895	590	275	315	70	2100	35	384	66.4
79 63 15	2375	985	935	275	480	70	2100	35	486	66.4
79 64 15	2375	1015	1320	275	815	70	2100	35	650	66.4
79 65 15	2375	1055	1665	275	1085	70	2100	35	798	66.4
79 66 15	2380	1315	2065	280	1265	70	2100	35	1120	66.4
79 72 15	2400	970	655	300	320	85	2100	45	549	83.6
79 73 15	2400	1040	990	300	560	85	2100	45	688	83.6
79 74 15	2400	1200	1420	300	820	85	2100	45	941	92.4
79 75 15	2405	1360	1755	305	1020	85	2100	45	1296	92.4
79 76 15	2405	1475	2195	305	1275	85	2100	45	1600	92.4
79 82 15	2420	1015	755	320	380	95	2100	50	746	119.0
79 83 15	2420	1145	1190	320	650	95	2100	50	959	119.0
79 84 15	2420	1310	1695	320	1015	95	2100	50	1263	119.0
79 85 15	2420	1400	2135	320	1275	95	2100	50	1715	119.0
79 86 15	2425	1460	2635	325	1545	95	2100	50	2190	119.0
79 92 15	2450	1065	820	350	430	100	2100	60	908	119.0
79 93 15	2450	1295	1250	350	665	100	2100	60	1207	119.0
79 94 15	2450	1440	1795	350	1055	100	2100	60	1625	119.0
79 95 15	2455	1455	2220	355	1395	100	2100	60	1997	119.0
79 96 15	2455	1505	2760	355	1680	100	2100	60	2530	119.0

#### Order details:

trapeze type 79 ...  
 L = ...mm  
 Z = ...mm  
 marking: ...  
 calibration load: ...kN  
 of the support point  
 travel: ...mm up/down  
 blocking position  
 (as required): ...mm

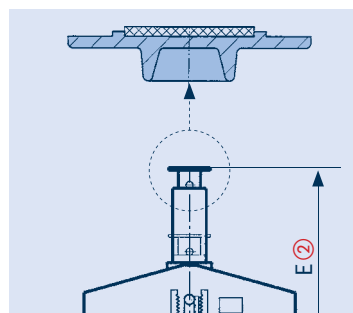
## Heavy duty constant supports Type 16

Heavy duty constant support  
types 16 82 29 to 16 93 49



type <sup>③</sup>	A	A <sub>1</sub>	B	B <sub>1</sub>	C	D	E <sup>①</sup>	E <sup>②</sup>	F	H	K	L	M	N	O	P	S	T	Z	weight [kg]
16 82 29	860	640	635	580	500	555	1120	1132	120	585	300	200	490	300	50	330	15	15	300	635
16 83 29	990	640	635	580	500	555	1855	1867	120	715	755	200	490	300	215	340	15	15	300	920
16 92 29	910	740	695	630	570	605	1190	1202	140	630	320	240	570	330	50	350	20	20	330	805
16 93 29	1140	740	695	630	570	605	1915	1927	140	785	745	240	570	330	250	355	20	20	330	1165
16 82 39	860	640	935	880	800	855	1120	1132	120	585	300	200	490	300	50	330	15	15	600	965
16 83 39	990	640	935	880	800	855	1855	1867	120	715	755	200	490	300	215	340	15	15	600	1395
16 92 39	910	740	1025	960	900	935	1190	1202	140	630	320	240	570	330	50	350	20	20	660	1220
16 93 39	1140	740	1025	960	900	935	1915	1927	140	785	745	240	570	330	250	355	20	20	660	1765
16 82 49	860	640	1235	1180	1100	1155	1120	1132	120	585	300	200	490	300	50	330	15	15	900	1295
16 83 49	990	640	1235	1180	1100	1155	1855	1867	120	715	755	200	490	300	215	340	15	15	900	1865
16 92 49	910	740	1355	1290	1230	1265	1190	1202	140	630	320	240	570	330	50	350	20	20	990	1635
16 93 49	1140	740	1355	1290	1230	1265	1915	1927	140	785	745	240	570	330	250	355	20	20	990	2365

- ① Dimension E in blocking position right at top – in other blocking positions E shortens accordingly and allows for adjustment of + 60mm.
- ② Dimension E for constant supports according to E ①, which are additionally fitted with a slide plate (friction value of the slide plates see p. 7.11).
- ③ Type 16 is supplied with a corrosion-protected load plate as standard. When using a slide plate up to 180°C operating temperature, the type number in the 6th digit is to be replaced by a 7 (e.g. 16 82 27), or up to 350°C by a 6 (e.g. 16 82 26).



Load plate with integrated slide plate

**Order details:**  
 constant support  
 type 16 ...  
 marking: ...  
 calibration load: ...kN  
 travel: ...mm up/down  
 blocking position  
 (as required): ...mm  
 slide plate (as required): ...

# Servohangers Type 17

Under certain conditions, pipe systems or other components are restricted in their thermal displacement through friction or other influences, despite the use of spring and constant hangers or constant supports. In such cases servohangers can actively overcome the restriction.

## Application

In standard cases, the weight of the pipe systems is practically in equilibrium with the calibration load of the constant hangers and constant supports. The sum of the deviations occurring and the additional stresses in the piping due to this then remain within the permissible harmless range.

In certain cases, the sum of the deviations occurring can also exceed a permissible level and considerably reduce the life of the piping systems or their connections (in the creep strength range) in the form of additional secondary stresses.

Deviations can arise through:

- wall thickness tolerances of the piping, if these are not weighed extra and the weight differences taken into account
- insulation weights not determinable in advance
- mechanical friction and production tolerances for constant hangers (permissible +/- 5%)
- spring relaxation

- pipe statics that are not always readily determinable
- practical deviations from the theoretically planned load distribution

A combination of deviations can cumulatively reach significant levels. These deviations have a particularly negative effect in flexible, 'soft' pipe systems. Vertical expansion can be obstructed or even completely suppressed here, even with relatively slight individual deviations.

Apart from the additional loads caused, impermissible sagging can result, due to spring hysteresis in the pressure-stressed system, with a reversed incline. In addition to possible creep rupture, in the event of an incorrectly positioned incline, dangerous water hammer can occur.

In such cases it would be advisable to supplement the passively reacting constant hangers with the active LISEGA servohangers.

Typical cases of application for LISEGA servohangers

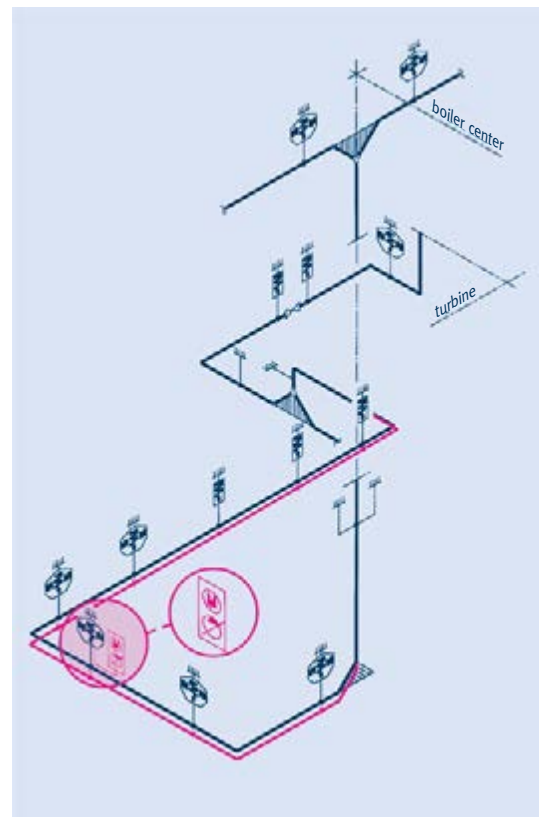
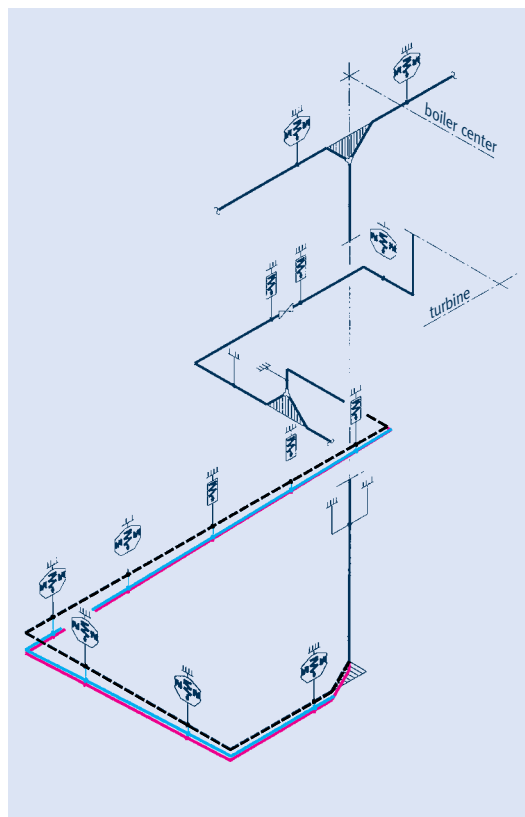
-----  
original cold position

-----  
hot position

-----  
new cold position

without servohangers (diagram on left) the pipe system remains in the hot position

with servohangers (diagram on right) the pipe system shifts to its specified positions



Through use of the hydraulic servo support the pipe system can now be repositioned to the specified elevation.

### Design and mode of operation

The type 11 constant hanger forms the basis for the servohanger. To overcome load differences it is additionally fitted with an auxiliary hydraulic device that can exert an active supplementary force in both directions (servo support).



In standard cases, the temperature of the pipe system to be supported is used as a control parameter. The temperature in each case is transformed electronically into the corresponding travel position. In the theoretical / actual comparison procedure, the control ensures a regulated approach to the actual vertical elevation position.

### Electrohydraulic control

The hydraulic unit and the control are located separately from each other in a separate switch cabinet situated near the servohanger (max. distance 16m).

The hydraulic pistons for control of the movement are located in the load tube of the constant hanger.

### Safety switch

The electrohydraulic control is so designed that in the event of an operational breakdown (e.g. power loss) only the servo support is lost, but the unit will continue to function effectively as a constant hanger.

For theoretical (temp.) / actual (travel) deviations a tolerance range can be set. If the deviation is outside these values, the control switches off automatically.

### Manual switch-off

For any maintenance work required on the system or the boiler, the servo support can be switched on or off manually.

### Design sizes

Load Groups 5 ( $F_N$  20kN) to 9 ( $F_N$  100kN) with travel ranges 2 (150mm) and 3 (300mm) are considered standard. For other cases, special designs can be supplied.

### Operating instructions

Installation and commissioning instructions, as well as servicing recommendations, are included in the scope of supply.

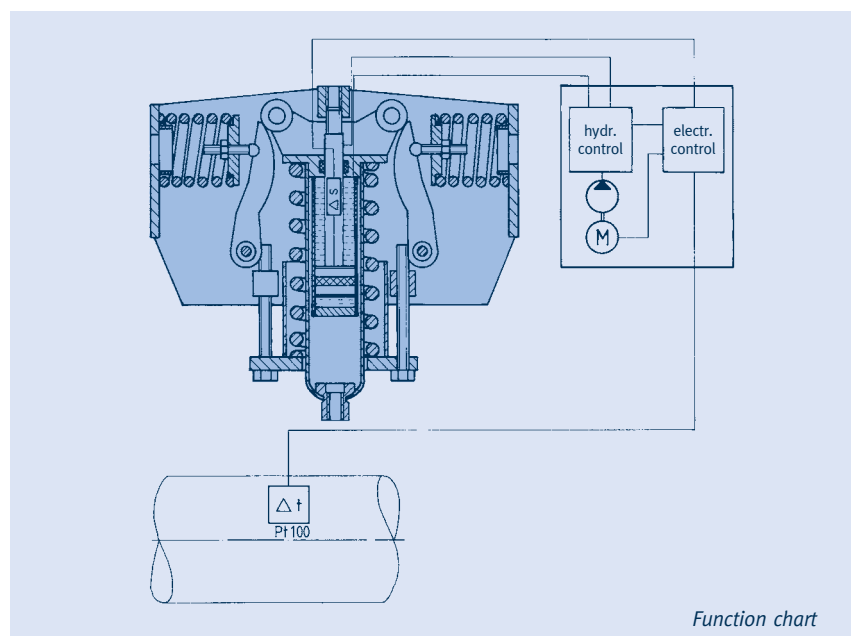


Servohanger switch cabinet

① For this, see also selection table constant hangers, pp. 1.13 and 1.14.

② 2 = travel range 2  
3 = travel range 3

servohanger type ②	nom. load $F_N$ [kN]	set load ① [kN]	load-dependent travel ①	travel range 2 [mm]	travel range 3 [mm]	supplementary servo power [kN]
17 5. 15	20	8 – 20	75 – 150	150 – 300	± 8	
17 6. 15	40	16 – 40	75 – 150	150 – 300	± 20	
17 7. 15	60	24 – 60	75 – 150	150 – 300	± 20	
17 8. 15	80	32 – 80	75 – 150	150 – 300	± 20	
17 9. 15	100	40 – 100	75 – 150	150 – 300	± 20	



Function chart



# Installation and operating instructions

## Types 11, 12-14, 18, 19

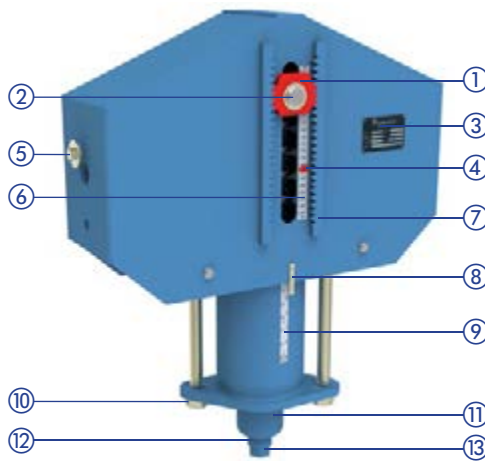
### 1 Transport and storage

During transport, care must be taken that connecting threads, stops and load adjustment bolts are not damaged. When storing in the open air, the supports must be protected from dirt and water.

### 2 Delivery condition

If not otherwise agreed, LISEGA constant hangers are set to the desired cold load position

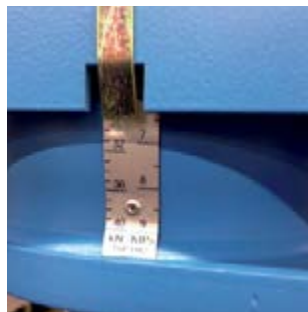
- ① stop
- ② guide bolt
- ③ name plate
- ④ red marking for hot position
- ⑤ retaining screw with washer for stop (after deblocking)
- ⑥ travel scale
- ⑦ blocking strip
- ⑧ indicator for calibration load
- ⑨ load scale
- ⑩ load adjustment screw
- ⑪ load tube
- ⑫ inspection hole for min. engagement depth
- ⑬ lock nut



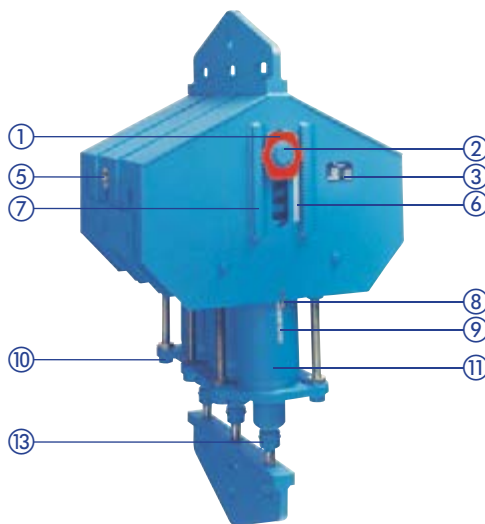
Constant hanger type 11



Travel scale with cold/warm marking



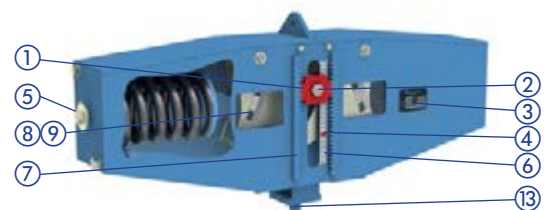
Load scale with indicator



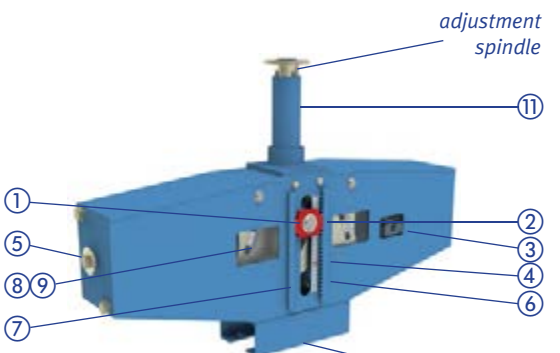
Coupled constant hanger type 12-14

(installation condition) and blocked. The adjustment values can be read off the load and travel scale as well as the name plate.

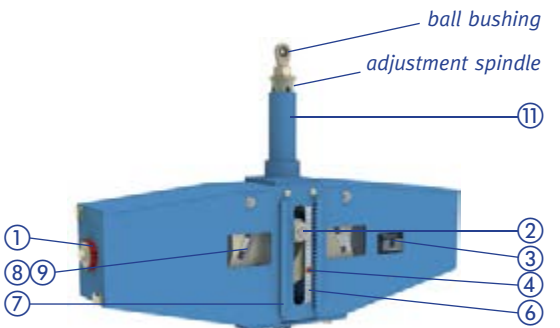
On the travel scale the theoretical hot position is marked with a red sticker and the theoretical cold position with a white one. The order load set at the delivery inspection is permanently marked on the load scale with an "X".



Low profile constant hanger type 18



Constant support type 19



Angulating constant support type 19



Name plate with stamped operating data

Stamped on the plate are:

- type
- serial number
- LISEGA order number
- calibration load
- inspector
- travel
- ident. number

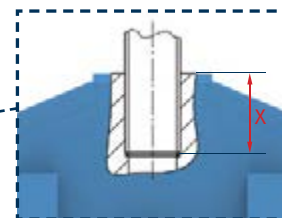
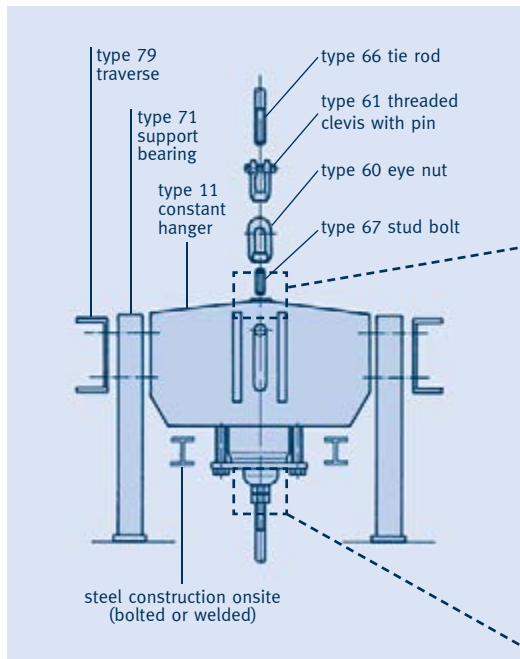
### Connections type 11 C3 .. - 11 96 .. (single cell hangers)

The upper connection is designed as an inner thread with limited engagement depth. The lower connection is designed as a spherical lock nut pivotable in all directions by min. 4°. The connection threads are greased and sealed with plastic caps.

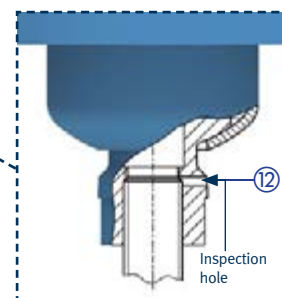
When connecting to the connecting rods, care must be taken that the lower rod is screwed into the lock nut **at least to the inspection hole**. A further engagement depth of at least 300mm is available.

### Connections type 12 82 ..- 14 96 .. (heavy duty)

The upper connection is designed as a yoke plate. The lower connection is also designed as a yoke plate and fastened to the spherical lock nuts of the individual constant hanger cells, whereby pivoting of min. 4° is possible. The connection threads are greased and sealed with plastic caps.



Min. engagement depth „X“ of upper connection (see selection table type 11, p. 1.15)



Min. engagement depth of connection rod in load tube

### Constant hanger type 11 (seated)

These constant hangers for all load sizes can be directly seated. They can also be supplied with serial support brackets type 71 which, depending on the order specifications, can be connected and bolted via precision-fit boreholes at works or on site. The base plates of the support brackets can be welded to the contact surface. On request, support brackets with slot holes for bolting can be supplied.

### Connections type 18

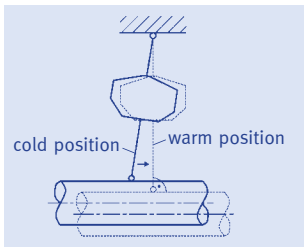
The upper connection is designed as a yoke plate and the lower one as a spherical lock nut, pivotable in all directions by min. 4°. The connection threads are greased and sealed with plastic caps.

### Connections type 19

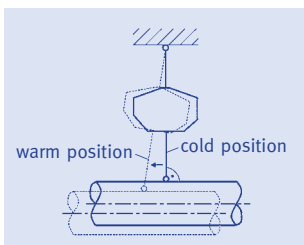
The upper connections of the constant supports are fitted either with a load plate or slide plate to reduce friction from lateral displacement, or with a ball-joint lug for angulating constant supports. The lower connections are therefore either a pedestal or a lug. During welding work at the pedestal the components inside constant supports must be protected.

### Transport lock type 12 82 .. – 14 96 .. (heavy duty)

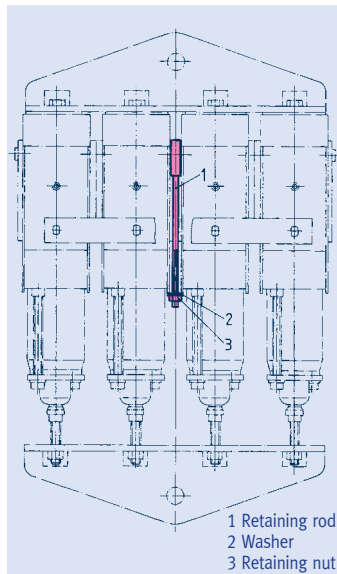
Coupled constant hangers are supplied with a transport locking device (retaining rod, washer, retaining nut).



Rods vertical during plant operation



Rods vertical in installation condition



Transport lock  
type 12 82 .. – 14 96 ..

**The transport lock is loosened only on completion of hanger installation and at the same time as the removal of the blocking plates.**

For this, the retaining nut marked in red is removed at the lower end with a socket wrench. Both parts (retaining rod and nut) are to be stored in the same place as the stops. When making the force-fit connection, care must be taken that the lower yoke plate is screwed into the lock nuts at least up to the inspection hole. The installation dimension of the lower yoke plate can be lengthened with the lock nuts by 250mm or shortened by 70mm.

### 3 Installation of the constant hangers

When installing, the specifications of the **installation instructions for pipe systems** must be followed. Special attention must thereby be paid to the desired installation position of the suspension rods throughout the whole support chain. There are two possibilities here:

**A)** The connecting rods are to be installed at an angle according to the expected horizontal displacement in the pipe system. A perpendicular position is hereby anticipated in operating condition.

**B)** The connecting rods are to be installed vertically for the purpose of better inspection. A controlled angled position in operating condition is thereby permitted.

**At all events, uniform specifications for the whole installation should exist.**

The connecting rods and points are to be force-fitted.

### Type 11 C3 .. – 11 96 .. (single cell hanger)

For installation of the constant hangers, transport lugs or other assembly devices can be screwed into the threaded holes on the sides. After deblocking of the hanger (see point 4) the stops are to be screwed on here for safe keeping. For constant hangers with support brackets type 71 the hangers are fitted with transport lugs instead of the upper connection – these can also store the stops.

### Constant hangers

#### types 12 82 .. – 14 96 ..

For installation of the hangers, the side openings of the upper yoke plate can be used for hooking on. For hangers with support brackets, the upper yoke plate is replaced by a transport lug.

### 4 Deblocking

#### Requirements

**The correct deblocking of the constant hangers in accordance with the following instructions is crucial for the subsequent faultless functioning of the pipe systems.**

The stops are to be removed, as far as possible, immediately before commissioning.

**The stops must be removed as a matter of principle in a systematic way, one after the other, beginning at a fixed point or connection point.**

The whole system should be inspected beforehand according to point 3 of these installation instructions.

#### Actual and theoretical condition

When it has been ensured that all connections are firmly force-fitted, the suspended weight is completely taken up by the constant hangers or supports.

If the weight load agrees with the calibration load and the piping system shows no sign of stress, then the planned equilibrium has been achieved. The blocking plates can be easily removed.

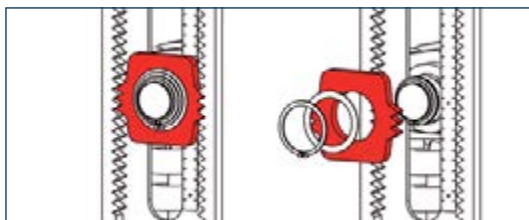
In practice however, slight stresses in the piping systems and hence resulting load shifting can hardly be avoided.

In the same way, the loads, which are usually determined theoretically, can show larger tolerances. As a result, the deviations can lead (according to under- or over-load) to corresponding jamming of the blocking bolt in the lower or upper section of the blocking plate.

**Procedure**

The blocking devices are removed when the guide bolt is free. The calibration load is made up of the old load and the extra weight of the hanger components suspended. If the guide bolt is lying at the top or the bottom, the load adjustment must be adapted before deblocking (see point 5, load correction):

When removing the stops, care must be taken that only the outer lock ring is loosened.



Blocked condition ① Dismantling of the outer lock ring and blocking device



② Assembly of the outer lock ring ③ Completed: deblocked condition

In cases of requirement, e.g. for revisions, the hangers or supports can be blocked again in any position. For this, the stops are placed on the guide bolts and secured. The devices are firmly screwed to the side of the constant hanger body in types 11 to 14.

**Load distribution**  
**Under no circumstances should the stops be removed by force!**

By loosening or tightening the connecting rods with a few turns of the lock nut in the case of constant hangers, or corresponding adjustment of the support tube for constant supports, stresses in the pipe system can be compensated for and the guide bolt is then free.

**The geometrical position of the pipe system must not be altered when balancing stresses!**

As later adjustment at one point can cause a renewed slight shift at another, the procedure must be repeated if necessary at different points. For clear control it is recommended that, as a matter of principle, the stops should only be removed when all the guide bolts are free.

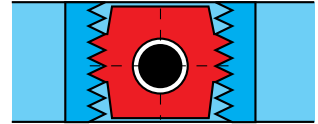
**5 Load correction type 11, 12-14**

Load correction is necessary if the calibration load (set at the LISEGA facility) deviates from the weight actually applied. In this case, with LISEGA hangers the calibration load can also be adjusted in the installed condition.

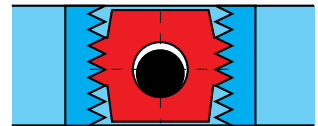
It should thereby be taken into account that for load increases the remaining travel is shorter. In most cases this is not critical, due to the travel and load reserves available. For safety reasons this should be checked with the catalog data. Any changes in the installation dimension caused by load corrections must be compensated for within the load chain.

**Procedure:**

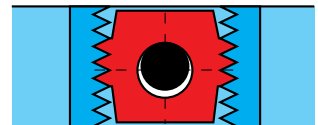
- 1) Loosen of both load adjustment screws.



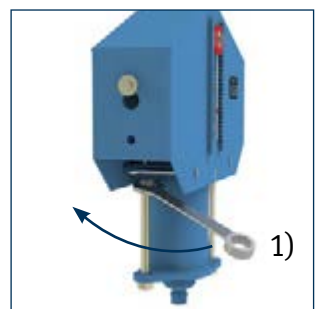
a) Bolt is free: Calibration load of the constant hangers agrees with the weight applied. Blocking plate can be removed.



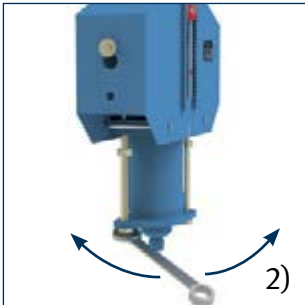
b) Bolt lies at bottom: Calibration load of constant hanger is smaller than weight applied. Loosen connecting rod or increase calibration load.



c) Bolt lies on top: Calibration load of constant hanger is larger than weight applied. Tighten connecting rod or decrease calibration load.

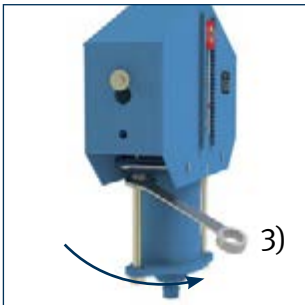






- 2) Screw in or screw out alternately the two load adjustment screws, by a turn in each case. The base plate of the load tube and the lower edge of the constant hanger body must thereby remain parallel.

The procedure is completed as soon as the guide bolt no longer lies at the top or the bottom of the stop. If, for constant hangers of higher load groups, the necessary adjustment forces are too big and manual adjustment is not possible, auxiliary devices must be used (see point 6, auxiliary devices).

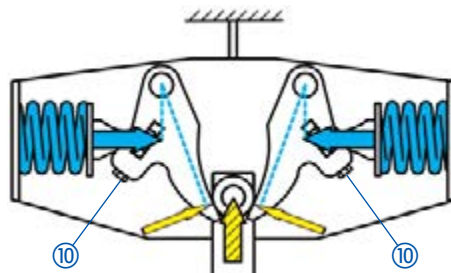


- 3) Tighten the lock nuts of the load adjustment screws. Now deblocking can continue.

### Load correction types 18, 19

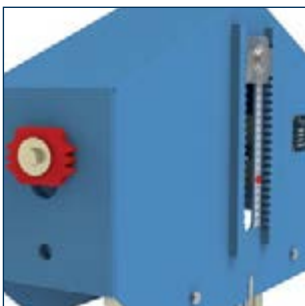
By way of the adjusting screws ⑩ the length of the lever of the leverage arm is altered on the left and right respectively.

**On load adjustment the working travel remains unaltered.**



#### Procedure:

- 1) Unlock tab washer.
- 2) Turn adjusting screws equally on both sides until the guide bolt is free.
- 3) Secure adjusting screws against twisting by locking the tab washers.

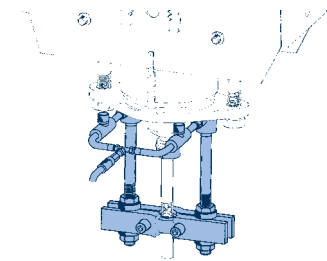


*Blocking device bolted to front side*

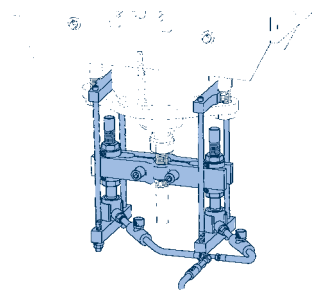
## 6 Auxiliary devices

Tightening or loosening of the connecting rods, as well as load calibration, can be performed manually on all hangers. For hangers in the higher load groups this work can require a great deal of effort due to the higher load calibration.

To facilitate the work, an auxiliary device can be made available with which a hydraulic load take-up using a handpump can be effected. It is operated by LISEGA personnel.



*Installation device, used to relieve the adjustment screws*



*Installation device, used to relieve the blocking*

## 7 Inspection and maintenance

The flawless functioning of the constant hangers and supports can be checked in every operating situation by examining the position of the guide bolt.

Under normal operating conditions, maintenance is not required.