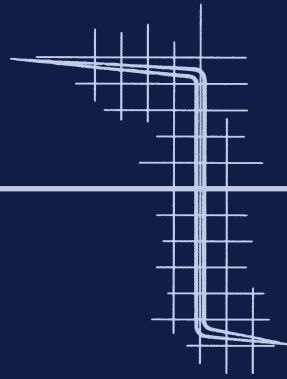
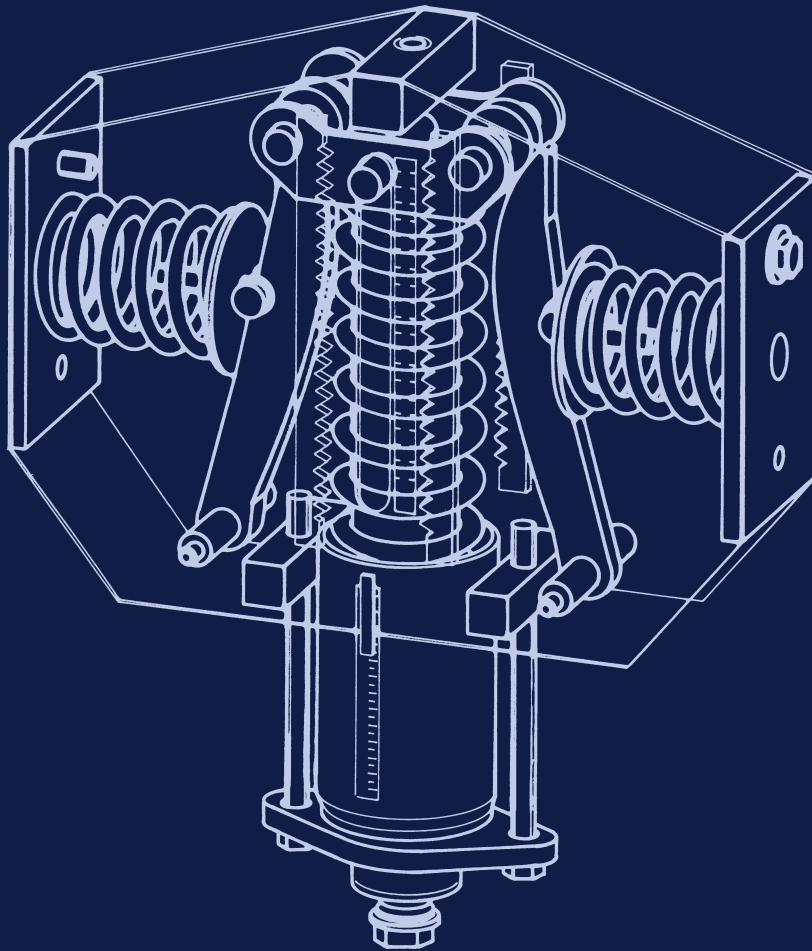


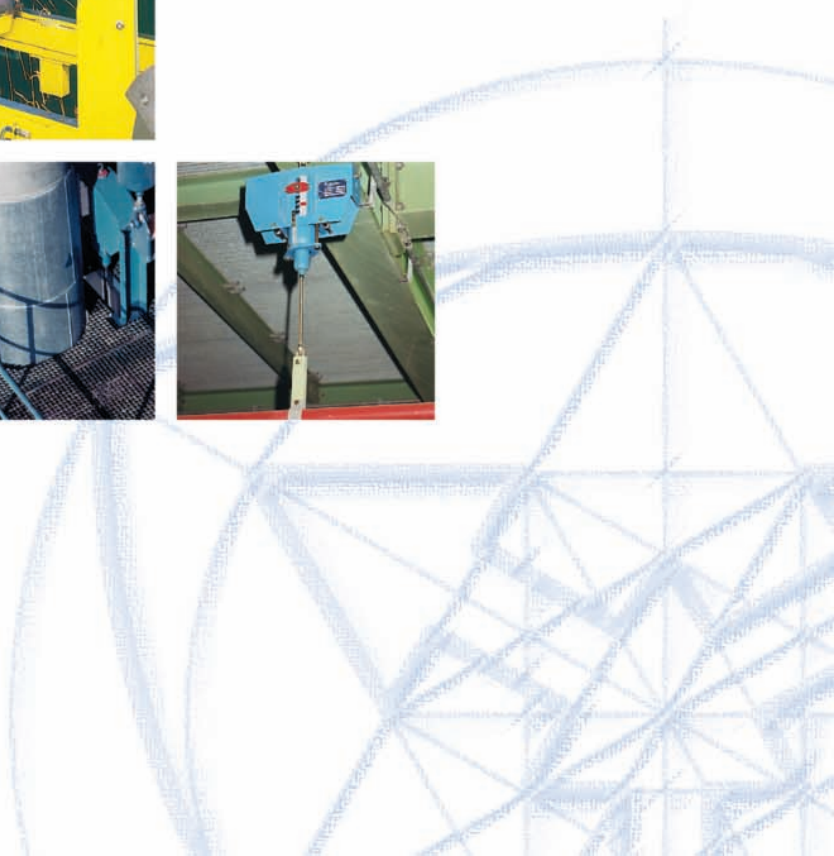
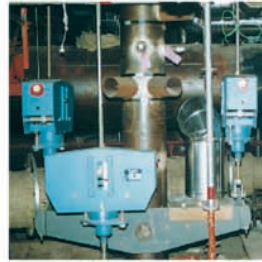
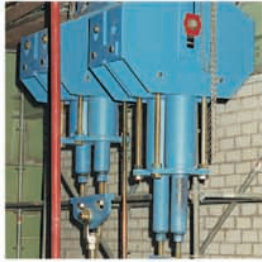
CONSTANT HANGERS, CONSTANT SUPPORTS

1



PRODUCT
GROUP





CONSTANT HANGERS CONSTANT SUPPORTS

1

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CONSTANT HANGERS, CONSTANT SUPPORTS, PRODUCT GROUP 1



To avoid detrimental constraints in the system, thermal expansion in piping and other plant components must not be prevented.

Constant hangers

Constant hangers compensate for vertical movement caused by thermal expansion. Via constant hangers, the respective piping loads are constantly absorbed and transferred with no significant deviation over the whole range of movement.

Significant deviations would act as harmful and uncontrolled extra loads in the system.

In this case, connection points are especially at risk because of unacceptable forces and moments.

It is vital that the constant hangers work reliably and efficiently, as this is decisive for the operational safety and long life of the piping system.

Constant hangers - the LISEGA system

For nearly forty years LISEGA constant hangers have proven themselves convincingly in all kinds of operating conditions. The special functional principle, based on the parallelogram of forces, is patented worldwide and has fundamental significance in this respect.

Continued development of LISEGA constant hangers on this foundation has led to matured products of superior quality with worldwide recognition.

See the sections “Operational Function”, page 1.13 and “Design Features”, page 1.15, in this regard.



LISEGA constant hangers installed



▲ *Constant hanger type 11 52 15*

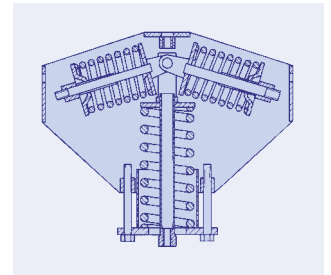
For the user, the following features of LISEGA constant hangers provide special benefits:

1. Simple planning

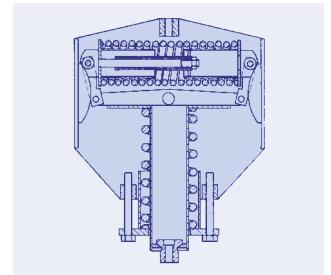
- **standard cover for the respective load spectrum 0.05 - 500kN, travel range up to 900mm**
- **easy selection via load groups and travel ranges**
- **clearly arranged type identification system facilitates orientation**
- **symmetric and particularly compact designs of low installed weight**
- **user-friendly planning documentation, such as informative catalogs, technical manuals and special publications**
- **efficient LICAD design software, the special planning system for LISEGA standard supports**
- **optimum fit within installation environment via standard variants and accessories (e.g. constant hangers suspended, seated, as supports or trapezes)**
- **only one load connection point for the steel structure is needed**



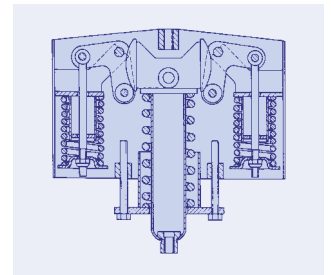
LISEGA constant hangers are available at short notice



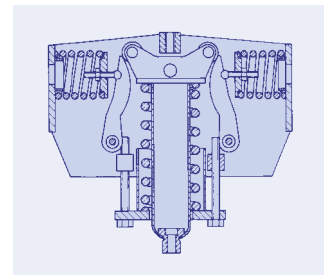
Construction series '64



Construction series '72



Construction series '76



Construction series '85

The 4 development stages of LISEGA constant hangers

2. Easy installation

- compact, symmetric designs with only one suspension point and practical installation aids
- favorable weight performance ratios of the units reduce skeleton weight
- precision fit attachment devices by way of standardized elements
- "intelligent" travel stop enables easy conformity checks of set load and operating load
- extra wide load adjustment ranges (40 - 100% of nominal load) permit later adjustment in the event of deviation in piping weights

3. Reliable operational safety

- due to the fundamental principle, absolute constancy over total set load range
- reduced frictional forces through a minimum of bearing points - the load is transferred vertically via the main spring (no friction through high lever bearing loads)

- operational travel runs straight through the symmetrical axis of the hanger, no load variations from radial deflection of the load distribution point (lever arm hanger)

- attachment point and load point always lie in the symmetrical axis (no moment of force exertion on the connection structures through radial deflection)

- lasting loadbearing performance through the use of specially treated prerelaxed springs

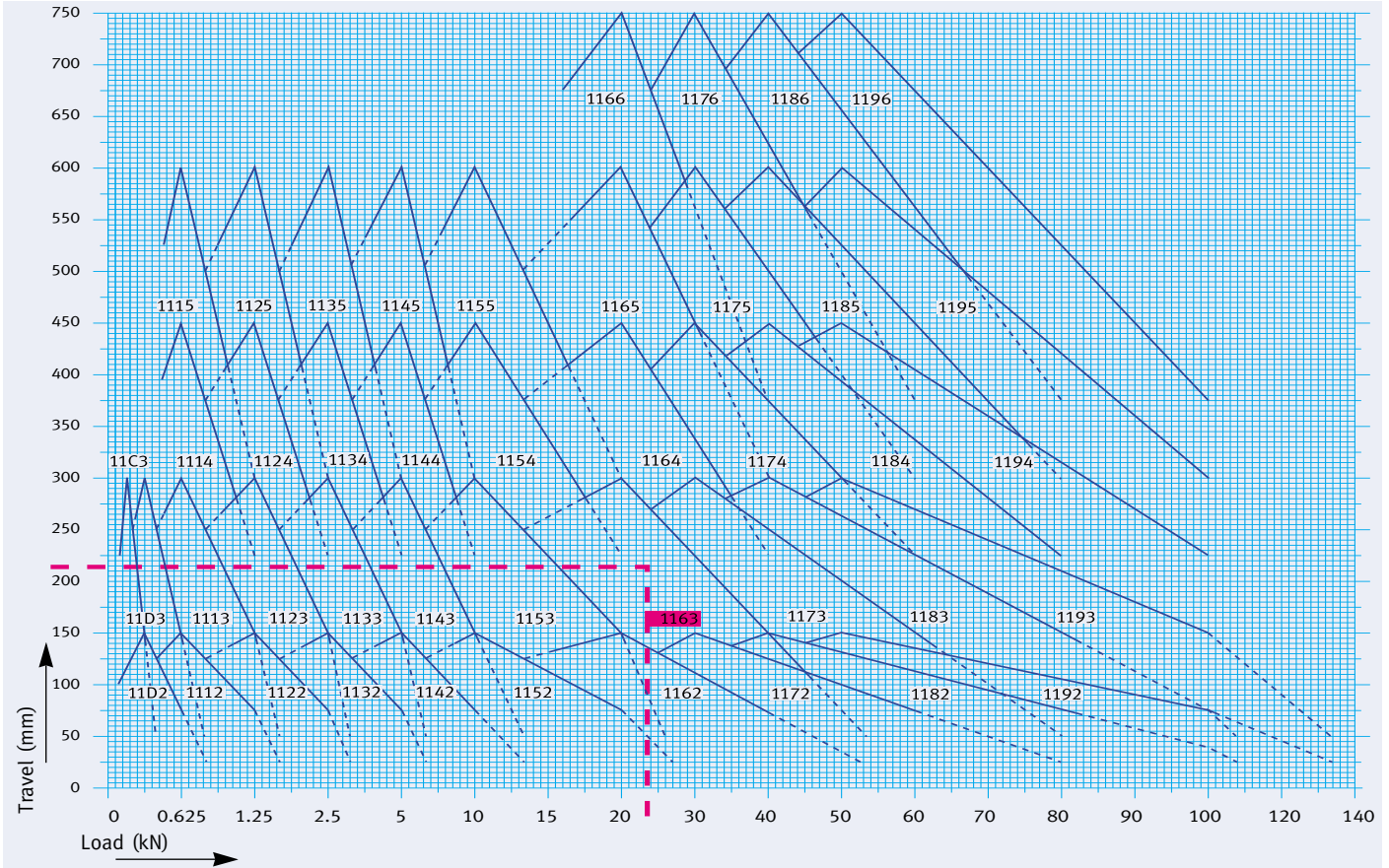
- lasting operating performance through corrosion protection and maintenance-free special steel bearings

4. Easy monitoring

- directly readable scales for travel position and operating load
- permanent marking for cold/hot positions and set load
- controlled subsequent load adjustment possible after installation
- simple reinstallation of blocking devices for inspection work

SELECTION TABLE

Constant hangers, constant supports ①

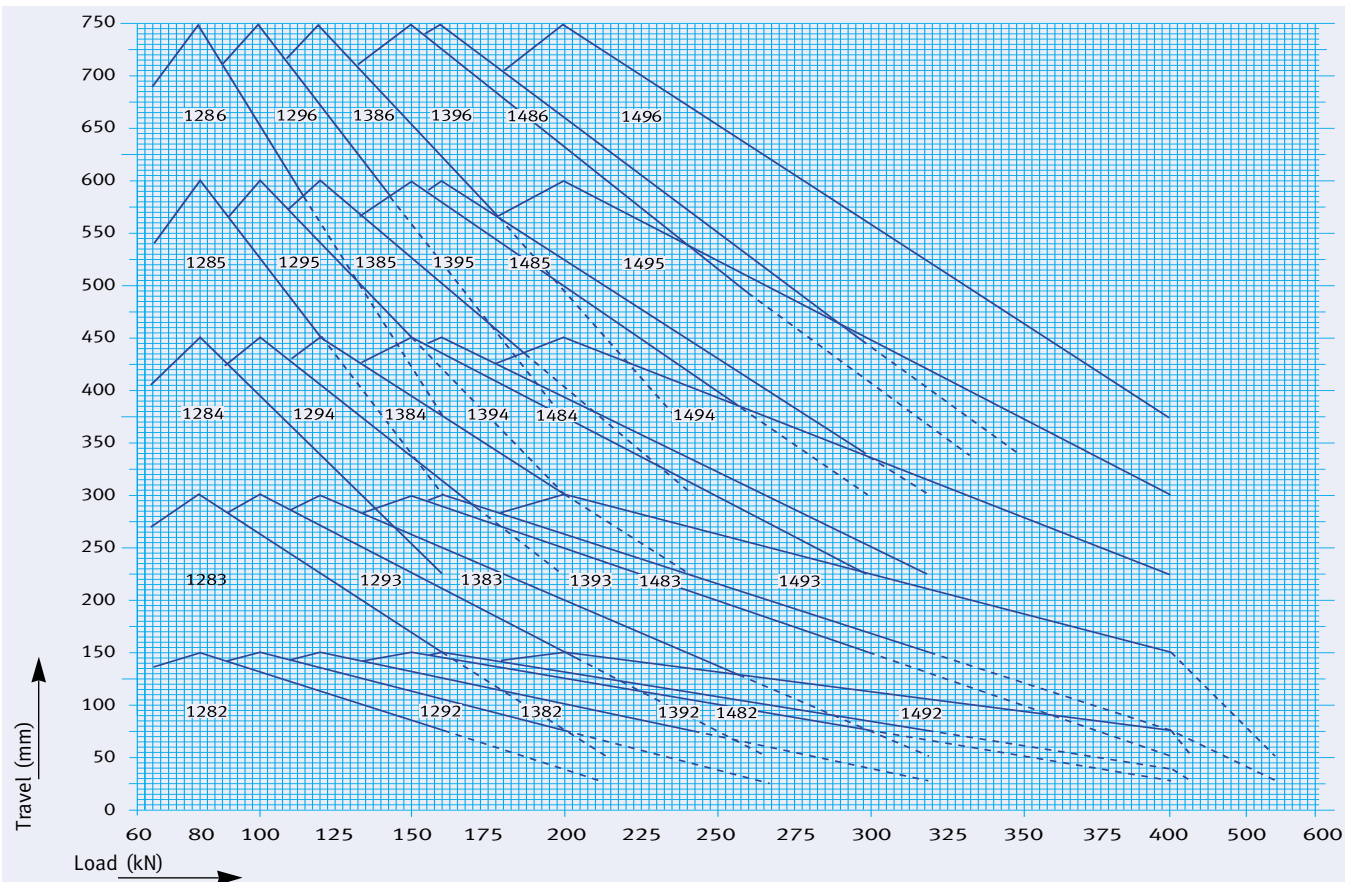


Selection example:
24 kN / 210mm

Type description					Load (kN)									
			11 C3	-	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22
			11 D3	11 D2	0.25	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	11 63	11 62	16.00	17.33	18.66	20.00	21.33	22.66	24.00	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	12 82	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	12 92	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	13 82	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	13 92	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	14 82	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	14 92	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	270	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



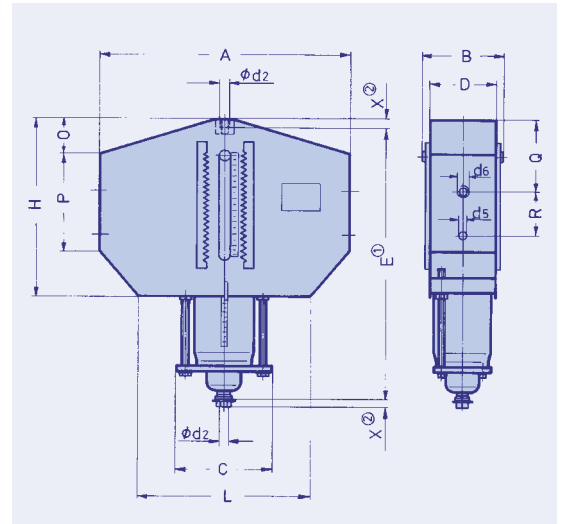
- ① For the selection of constant supports type 16 (see 1.9 and 1.10), the load group and travel range of the corresponding hanger type 11 apply.
- ② Loads < 0.25kN or 0.13kN on request.
- ③ This range can only be set at the factory.
- ④ Total travel. Travel range 7 (900mm) can be provided on request.



Load (kN)											Type description				
0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.31	③ 0.37	③ 0.42	-	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	mm④				
230	220	210	200	190	180	170	160	150	100	50	mm④				
345	330	315	300	285	270	255	240	225	mm④						
460	440	420	400	380	360	340	320	300	mm④						
575	550	525	500	475	450	425	400	375	mm④						

CONSTANT HANGER TYPE 11

Constant hanger
Type 11 C3 19 to 11 96 15
Series-made standard
design, available from stock.



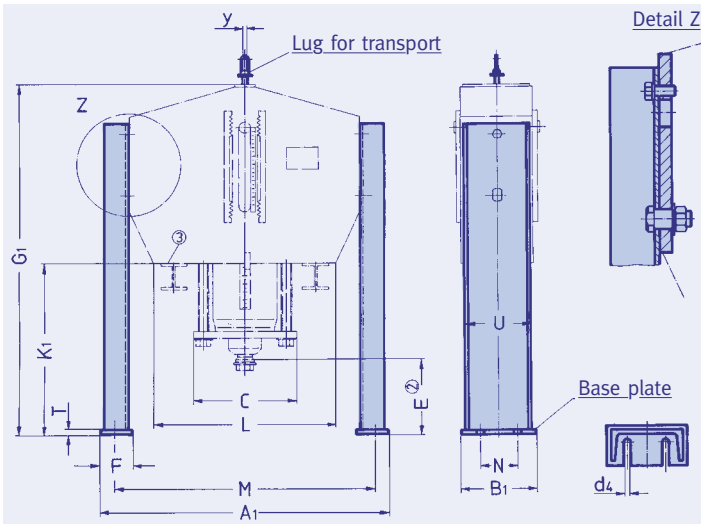
① Installation dimension E
applies to the uppermost blocking
position.
In other positions, E increases
accordingly.

② X = minimum thread
engagement.
On lower connection
max thread engagement =
X + 300mm.

Type	A	B	C	D	d ₂	d ₅	d ₆	E ^①	H	L	O	P	Q	R	X ^②	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 15	525	170	190	132	M16	12	M10	970	650	360	50	365	265	110	20	61
11 35 15	595	170	200	136	M16	12	M10	1255	830	370	50	465	370	110	20	101
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 15	610	185	220	150	M20	16	M12	1070	675	410	55	370	275	105	25	92
11 45 15	665	190	240	154	M20	16	M12	1370	855	420	65	540	455	105	25	150
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: ...
Operating load: ...kN
Travel: ...mm up/down
Blocking position
(if required):

BRACKETS FOR CONSTANT HANGER TYPE 11



Brackets for constant hanger type 11 type 71 C3 .9 to 71 96 .5

Series-made standard
design available from
stock.

The brackets can
be supplied ac-
cording to require-
ments, either shop
fitted or supplied
separately for sub-
sequent fitting on
site.

Const h. Brackets																Weight
Type	Type①	A ₁	B ₁	C	d ₄	E②	F	G ₁	K ₁	L	M	N	T	U	y	(kg)
11 C3 19	71 C3 .9	420	70	150	12	265	40	810	355	250	395	-	6	60	14	5
11 D2 19	71 D2 .9	370	70	155	12	145	40	510	260	230	345	-	6	60	14	5
11 D3 19	71 D3 .9	480	70	170	12	265	40	825	380	260	455	-	6	60	14	8
11 12 15	71 12 .5	495	115	140	12	145	60	535	270	285	440	50	8	100	14	12
11 13 15	71 13 .5	525	115	140	12	265	60	925	480	285	470	50	8	100	14	17
11 22 15	71 22 .5	575	140	180	12	145	75	545	275	350	505	65	8	120	14	15
11 23 15	71 23 .5	590	140	185	12	265	75	930	475	360	520	65	8	120	14	21
11 32 15	71 32 .5	575	140	190	12	150	75	560	285	360	505	70	10	120	18	16
11 33 15	71 33 .5	620	140	190	12	270	75	965	495	360	550	70	10	120	18	23
11 34 15	71 34 .5	655	140	190	12	390	75	1380	730	360	585	70	10	120	18	32
11 35 15	71 35 .5	725	140	200	12	510	75	1785	955	370	655	70	10	120	18	40
11 42 15	71 42 .5	640	160	220	14	155	80	620	305	400	570	80	10	140	18	18
11 43 15	71 43 .5	710	160	220	14	275	80	1040	545	410	640	80	10	140	18	29
11 44 15	71 44 .5	750	160	220	14	395	80	1490	815	410	680	80	10	140	18	41
11 45 15	71 45 .5	805	160	240	14	515	80	1910	1055	420	735	80	10	140	18	49
11 52 15	71 52 .5	750	200	270	18	160	90	660	315	490	670	110	12	180	18	30
11 53 15	71 53 .5	870	200	270	18	280	90	1080	565	490	790	110	12	180	18	42
11 54 15	71 54 .5	905	200	285	18	400	90	1535	830	490	825	110	12	180	18	58
11 55 15	71 55 .5	1005	200	285	18	520	90	1955	1075	490	925	110	12	180	18	72
11 62 15	71 62 .5	915	250	335	23	165	110	755	335	580	815	135	12	220	18	45
11 63 15	71 63 .5	1005	250	335	23	285	110	1220	655	580	905	135	12	220	18	62
11 64 15	71 64 .5	1035	250	345	23	405	110	1725	975	600	935	135	12	220	18	90
11 65 15	71 65 .5	1075	250	345	23	525	110	2190	1265	600	975	135	12	220	18	112
11 66 15	71 66 .5	1335	250	345	23	345	110	2410	1080	600	1235	135	12	220	18	112
11 72 15	71 72 .5	980	270	380	27	115	115	830	375	650	875	135	15	240	18	56
11 73 15	71 73 .5	1050	270	380	27	295	115	1285	650	650	945	135	15	240	18	80
11 74 15	71 74 .5	1200	270	400	27	415	115	1835	1050	650	1095	135	15	240	18	106
11 75 15	71 75 .5	1360	270	400	27	535	115	2290	1315	660	1255	135	15	240	18	128
11 76 15	71 76 .5	1475	270	400	27	280	115	2475	1050	660	1370	135	15	240	18	128
11 82 15	71 82 .5	1025	280	390	33	180	120	935	350	650	935	140	15	240	18	65
11 83 15	71 83 .5	1155	280	390	33	300	120	1490	775	650	1065	140	15	240	18	91
11 84 15	71 84 .5	1320	300	400	33	420	120	2115	1190	670	1230	140	15	260	18	139
11 85 15	71 85 .5	1410	320	420	33	540	120	2675	1560	690	1320	140	15	280	18	184
11 86 15	71 86 .5	1470	320	420	33	270	120	2905	1280	690	1380	140	15	280	18	184
11 92 15	71 92 .5	1105	300	435	33	190	140	1010	380	750	995	140	20	260	18	82
11 93 15	71 93 .5	1335	300	435	33	310	140	1560	775	750	1225	140	20	260	18	109
11 94 15	71 94 .5	1480	320	455	33	430	140	2225	1265	770	1370	140	20	280	18	162
11 95 15	71 95 .5	1495	340	455	33	550	140	2770	1680	770	1385	140	20	320	18	273
11 96 15	71 96 .5	1545	340	455	33	260	140	3020	1400	770	1435	140	20	320	18	273

① The 5th digit of the type description indicates the design:

- 6 for brackets bolted on, standard specification.
- 7 for loose brackets, standard specification.
- 8 for brackets bolted on, nuclear specification.
- 9 for loose brackets, nuclear specification.

② E in the uppermost blocking position. In other positions, E decreases accordingly.

③ Constant hangers can be seated directly on the structure and welded in place. When doing this, care must be taken to provide access to the adjusting screws and lock nut. If this access cannot be provided, type 71 brackets should be used.

Order details:

Constant hanger
type 11 ... with bracket
type 71 ...

Marking:

Operating load: ...kN,
Travel: ...mm up/down
Blocking position
(if required):

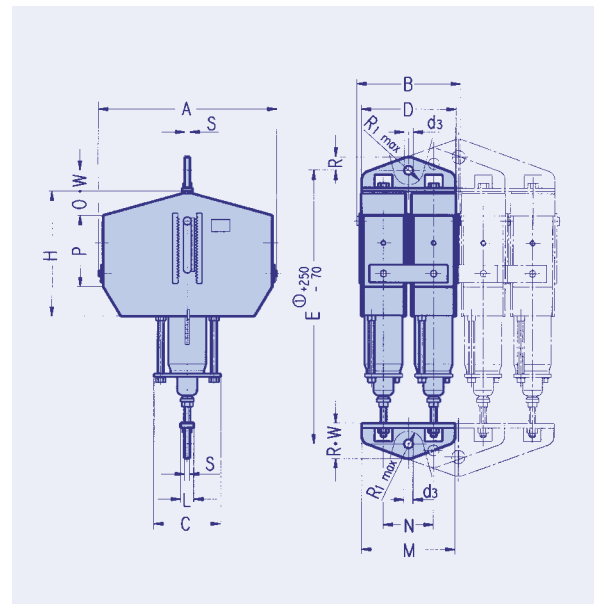
CONSTANT HANGER TYPE 12-14

Constant hangers

type 12 82 35 to 14 96 35

Standard design, multi-cell hanger.

Assembly possible at short notice from stock units.



① Dimension E applies to uppermost blocking position. For other positions E increases accordingly.

Type	A	B	C	D	d ₃	E①	H	L	M	N	O	P	R	R1max.	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 hanger

type 1. .. 35

Marking:...

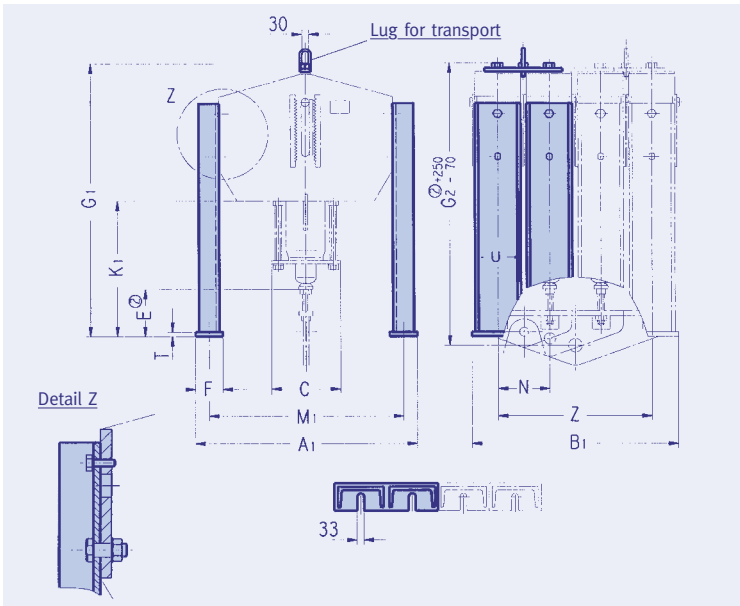
Operating load: ...kN

Travel: ...mm up/down

Blocking position

(if required):

BRACKETS FOR CONSTANT HANGER TYPE 12-14



Brackets Type 71 82 .6 - 71 96 .8 for constant hanger type 12 - 14

Standard design.

The brackets are normally shop assembled. On request they can be supplied loose for assembly on site.

Const. h.	Brackets															Weight
Type	Type ^①	A ₁	B ₁	C	E ^②	F	G ₁	G ₂ ^②	K ₁	M ₁	N	T	U	Z	(kg)	
12 82 35	71 82 .6	1025	580	390	180	120	985	1095	350	935	300	15	240	300	142	
12 83 35	71 83 .6	1155	580	390	300	120	1540	1530	775	1065	300	15	240	300	194	
12 84 35	71 84 .6	1320	600	400	420	120	2165	2035	1190	1230	300	15	260	300	292	
12 85 35	71 85 .6	1410	620	420	540	120	2725	2475	1560	1320	300	15	280	300	383	
12 86 35	71 86 .6	1470	620	420	270	120	2955	2975	1280	1380	304	15	280	304	383	
12 92 35	71 92 .6	1105	630	435	190	140	1065	1190	380	995	330	20	260	330	181	
12 93 35	71 93 .6	1335	630	435	310	140	1615	1620	775	1225	330	20	260	330	235	
12 94 35	71 94 .6	1480	650	455	430	140	2280	2165	1265	1370	330	20	280	330	341	
12 95 35	71 95 .6	1495	675	455	550	140	2825	2590	1680	1385	334	20	320	334	574	
12 96 35	71 96 .6	1545	675	455	260	140	3075	3130	1400	1435	334	20	320	334	574	
13 82 35	71 82 .7	1025	880	390	180	120	985	1145	350	935	300	15	240	600	216	
13 83 35	71 83 .7	1155	880	390	300	120	1540	1580	775	1065	300	15	240	600	294	
13 84 35	71 84 .7	1320	900	400	420	120	2165	2085	1190	1230	300	15	260	600	440	
13 85 35	71 85 .7	1410	920	420	540	120	2725	2525	1560	1320	300	15	280	600	576	
13 86 35	71 86 .7	1470	920	420	270	120	2955	3025	1280	1380	304	15	280	608	576	
13 92 35	71 92 .7	1105	960	435	190	140	1065	1245	380	995	330	20	260	660	276	
13 93 35	71 93 .7	1335	960	435	310	140	1615	1675	775	1225	330	20	260	660	357	
13 94 35	71 94 .7	1480	980	455	430	140	2280	2220	1265	1370	330	20	280	660	515	
13 95 35	71 95 .7	1495	1010	455	550	140	2825	2645	1680	1385	334	20	320	668	864	
13 96 35	71 96 .7	1545	1010	455	260	140	3075	3185	1400	1435	334	20	320	668	864	
14 82 35	71 82 .8	1025	1180	390	180	120	985	1185	350	935	300	15	240	900	289	
14 83 35	71 83 .8	1155	1180	390	300	120	1540	1620	775	1065	300	15	240	900	392	
14 84 35	71 84 .8	1320	1200	400	420	120	2165	2125	1190	1230	300	15	260	900	587	
14 85 35	71 85 .8	1410	1220	420	540	120	2725	2565	1560	1320	300	15	280	900	769	
14 86 35	71 86 .8	1470	1230	420	270	120	2955	3065	1280	1380	304	15	280	912	770	
14 92 35	71 92 .8	1105	1290	435	190	140	1065	1265	380	995	330	20	260	990	369	
14 93 35	71 93 .8	1335	1290	435	310	140	1615	1695	775	1225	330	20	260	990	477	
14 94 35	71 94 .8	1480	1310	455	430	140	2280	2240	1265	1370	330	20	280	990	687	
14 95 35	71 95 .8	1495	1340	455	550	140	2825	2665	1680	1385	334	20	320	1002	1153	
14 96 35	71 96 .8	1545	1340	455	260	140	3075	3205	1400	1435	334	20	320	1002	1155	

① The 5th digit of the type description indicates the specification:

- 6 for brackets bolted on, standard specification.
- 7 for brackets loose, standard specification.
- 8 for brackets bolted on, nuclear specification.
- 9 for brackets loose, nuclear specification.

② Dimensions E and G₂ apply to the uppermost position. In other positions E and G₂ change accordingly.

Order details:

Constant hanger type 1.
with bracket type 71
bolted on.

Marking:...

Operating load: ...kN

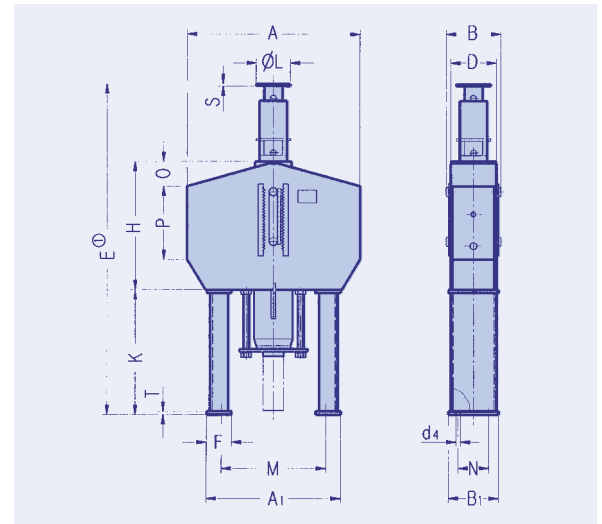
Travel: ...mm up/down

Blocking position

(if required):

CONSTANT SUPPORT TYPE 16

**Constant support
type 16 D2 19 to 16 93 15**
Standard design



① Dimension E applies to the uppermost blocking position and permits an adjustment tolerance of +60mm.

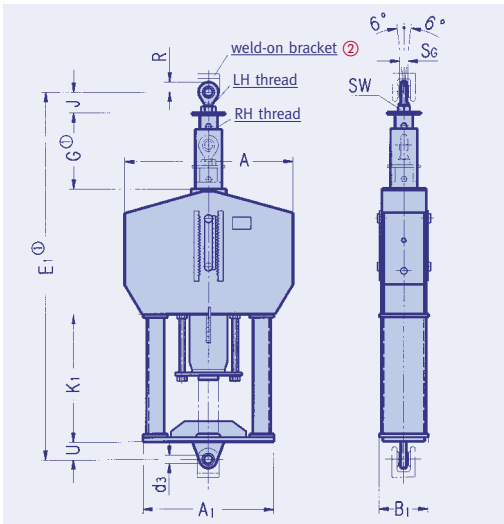
Type	A	A1	B	B1	D	d4	E ①	F	H	K	L	M	N	O	P	S	T	Weight (kg)
16 D2 19	300	240	110	70	86	12	710	45	250	265	80	175	-	-	195	6	6	15
16 D3 19	410	260	130	70	106	12	1205	45	445	415	80	195	-	45	280	6	6	25
16 12 15	385	275	130	115	106	12	730	60	265	270	80	210	50	25	135	6	8	23
16 13 15	415	275	130	115	106	12	1300	60	445	515	80	210	50	20	270	6	8	39
16 22 15	445	340	160	140	132	12	735	75	270	270	100	260	65	20	140	6	8	33
16 23 15	460	340	160	140	132	12	1300	75	455	500	100	260	65	45	270	6	8	56
16 32 15	445	350	170	140	132	12	745	75	275	275	100	270	70	10	165	6	10	39
16 33 15	490	350	170	140	132	12	1330	75	470	515	100	270	70	70	260	6	10	64
16 42 15	500	390	185	160	150	14	805	80	315	280	120	300	80	25	260	8	10	59
16 43 15	570	390	185	160	150	14	1405	80	495	550	120	300	80	110	250	8	10	93
16 52 15	590	480	230	200	190	18	835	90	345	280	150	380	110	30	210	10	12	96
16 53 15	710	480	230	200	190	18	1435	90	515	555	150	380	110	105	285	10	12	155
16 62 15	725	570	275	250	230	23	920	110	420	285	170	450	135	40	240	10	12	164
16 63 15	815	570	275	250	230	23	1560	110	565	640	170	450	135	160	300	10	12	239
16 72 15	780	640	300	270	252	27	990	115	455	320	200	515	135	50	285	12	15	236
16 73 15	850	640	300	270	252	27	1625	115	635	625	200	515	135	140	300	12	15	334
16 82 15	815	640	320	280	256	33	1100	120	585	300	200	490	140	50	330	15	15	306
16 83 15	945	640	320	280	256	33	1835	120	715	755	200	490	140	215	340	15	15	449
16 92 15	865	740	350	300	276	33	1170	140	630	320	240	570	140	50	350	20	20	388
16 93 15	1095	740	350	300	276	33	1895	140	785	745	240	570	140	250	355	20	20	570

Order details:
Constant support
type 16
Marking: ...
Operating load: ...kN
Travel: ...mm up/down
Blocking position
(if required):

For considerable horizontal load movement
PTFE slide plates are recommended.
(See also p. 2.1, type 29) ►

Type	Loadgroup	øL1
70 19 16	D, 1	40
70 39 16	2, 3	40
70 49 16	4	65
70 59 16	5	65
70 69 16	6	110
70 79 16	7	110
70 89 16	8	150
70 99 16	9	150

ANGULATING CONSTANT SUPPORTS TYPE 16

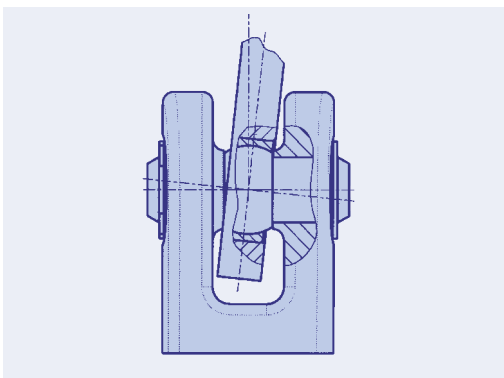


Angulating constant supports type 16 D2 29 to 16 93 25 equipped with ball bush connections. For use where lateral forces from horizontal travel are to be avoided.

Type	A	A1	B1	d3	E1 ①	G+60 ①	J+140	K1	R	S _G	SW	U	Weld-on bracket ②	Weight (kg)
16 D2 29	300	240	70	10	785	195	40	275	15	9	27	25	35 19 13	16
16 D3 29	410	260	70	10	1280	345	40	425	15	9	27	25	35 19 13	26
16 12 25	385	275	115	10	810	195	45	280	15	9	27	25	35 19 13	26
16 13 25	415	275	115	10	1385	345	45	525	15	9	27	25	35 19 13	42
16 22 25	445	340	140	12	825	195	50	285	19	10	32	25	35 39 13	38
16 23 25	460	340	140	12	1390	345	50	515	19	10	32	25	35 39 13	61
16 32 25	445	350	140	15	845	195	50	295	21	12	36	30	35 49 13	46
16 33 25	490	350	140	15	1430	345	50	535	21	12	36	30	35 49 13	71
16 42 25	500	390	160	15	910	210	55	300	21	12	36	30	35 49 13	69
16 43 25	570	390	160	15	1510	360	55	570	21	12	36	30	35 49 13	103
16 52 25	590	480	200	20	980	215	80	300	30	16	60	40	35 59 19	113
16 53 25	710	480	200	20	1575	365	80	575	30	16	60	40	35 59 19	172
16 62 25	725	570	250	20	1065	215	80	310	30	16	60	40	35 59 19	190
16 63 25	815	570	250	20	1710	365	80	660	30	16	60	40	35 59 19	265
16 72 25	780	640	270	30	1170	220	95	340	41	22	60	60	35 69 19	272
16 73 25	850	640	270	30	1805	370	95	645	41	22	60	60	35 69 19	370
16 82 25	815	640	280	30	1280	220	95	320	41	22	60	60	35 69 19	342
16 83 25	945	640	280	30	2015	370	95	775	41	22	60	60	35 69 19	485
16 92 25	865	740	300	50	1375	225	110	340	60	35	70	70	35 79 19	435
16 93 25	1095	740	300	50	2100	375	110	765	60	35	70	70	35 79 19	617

① Dimensions E1 and G apply to the uppermost blocking position. E1 permits an adjustment of + 200mm.

② Connection possibility



◀ The ball bushes to be connected fit weld-on bracket type 35.

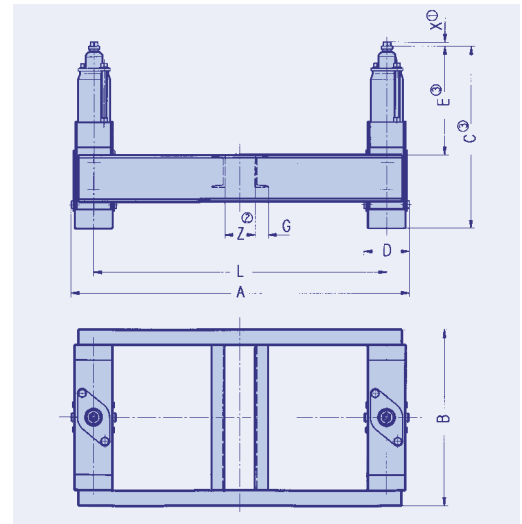
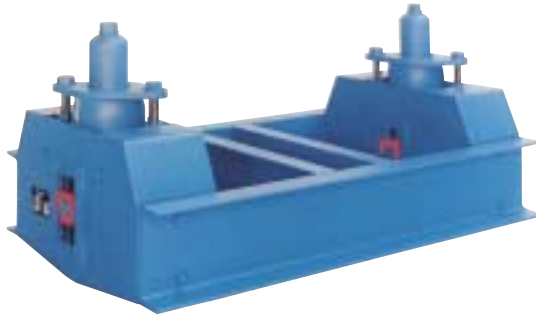
Order details:
Angulating constant support type 16 ...
Marking: ...
Operating load: ...kN
Travel: ...mm up/down
Blocking position (if required):

CONSTANT HANGER TRAPEZE TYPE 79

Constant hanger trapeze type 79 D2 15 to 79 96 15

This type of trapeze is used in case of limited installation length where the standard trapeze type 79 .2 34 does not fit due to restricted installation height.

The trapezes are normally shop assembled.



① X = minimum thread engagement, 300mm thread engagement possible.

② L and Z to be stated when ordering

③ E and C apply to uppermost position. In other positions E and C increase accordingly.

④ When selecting constant hanger trapezes, their total weight must be added to the operational load.

⑤ The permissible load reduces by 5% per 100mm of extended length.

Type	A max.	B	C③	D	E③	G	L max.⑤	X①	Tot. wght. (kg) L=1000 ④	Wght. chang. (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 15	2170	685	990	170	585	45	2000	20	174	36.4
79 35 15	2170	755	1275	170	765	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 15	2185	750	1095	185	680	55	2000	25	253	44.0
79 45 15	2190	805	1395	190	800	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 ... with
2 constant hangers

type 11 ...

L= ...mm

Z= ...mm

Marking: ...

Operating load: ...kN at
the supporting point.

Travel: ...mm up/down

Blocking position
(if required):

FUNCTION TESTS



Functional performance

The specific functional principle of LISEGA constant hangers guarantees absolute constancy across the entire travel range. This is not even affected by load adjustment. Only a minor friction force resulting from tolerances and bearings has to be taken into account as a slight deviation. The hysteresis produced by this is kept within very narrow limits by the design principle and by state-of-the-art manufacturing procedures.

For normal load settings, deviations in the operating load for LISEGA constant hangers in series production is kept in practice at $\pm 3\%$ on average. Using a selection process, supply of hangers with a maximum deviation of $\pm 2\%$ is possible.

The generally permissible deviations are laid down in the following international standards:

- **MSS-SP 58, USA, max. $\pm 6\%$ referring to operating load.**
- **VGB R 510 L and KTA 3205.3, Germany, max. $\pm 5\%$ referring to operating load.**
- **EN Europa Normenentwurf, max $\pm 5\%$, referring to operating load. The mean load deviation is limited to max $\pm 2\%$.**

Function tests

Before delivery, each constant hanger is tested for correct function and set to the required load.

The test results are both graphically and digitally plotted and recorded. They can be supplied on request.

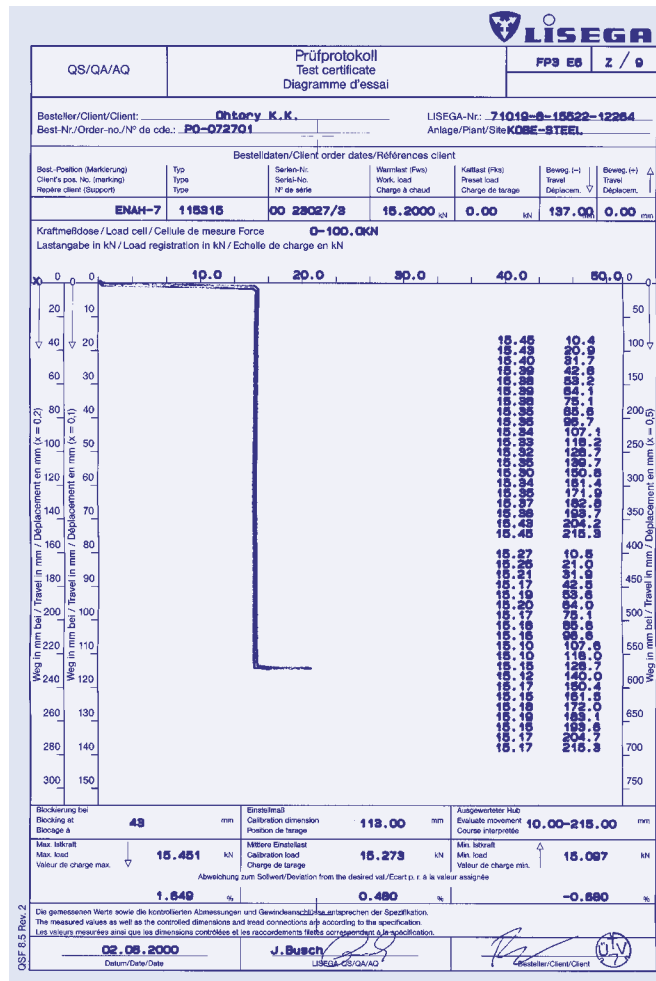
The load setting values are stamped on a riveted aluminum name plate. In addition, the set load is permanently marked on the load scale. Cold and hot positions are marked on the travel scale in white and red respectively.

The relevant travel position is directly readable on the travel scale in mm and inches. The relevant set load can be read from the load scale in kN or lbs.



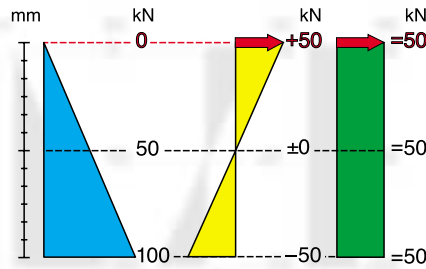
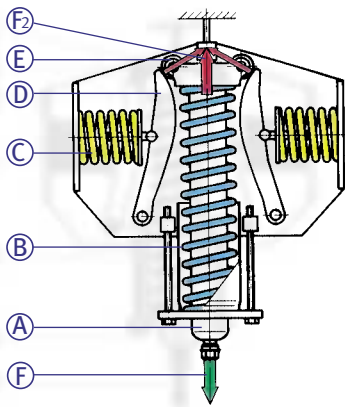
Acceptance test of a constant hanger

For function testing, quasistatically acting test benches with a capacity of up to 1000kN are available in all the factories. The test benches are inspected at regular intervals by an independent authority.



Specimen of a test certificate from a normal delivery test

OPERATIONAL FUNCTION



Upper position

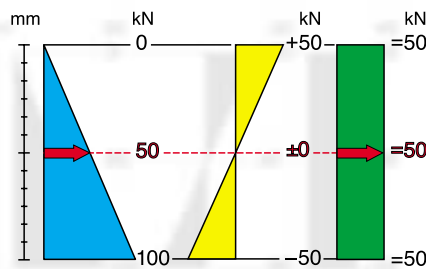
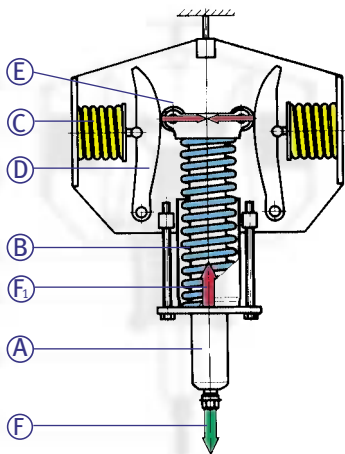
Special requirements

Strict demands are placed on constant hangers to ensure reliable function:

- absolute constancy for all load settings
- minimum mechanical friction

Likewise, particular requirements are to be fulfilled for the continuous monitoring of the piping system performance:

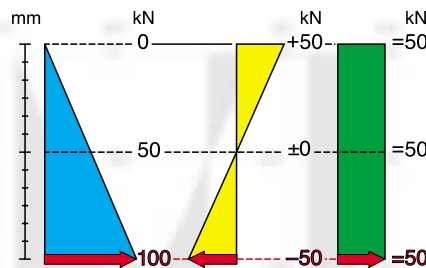
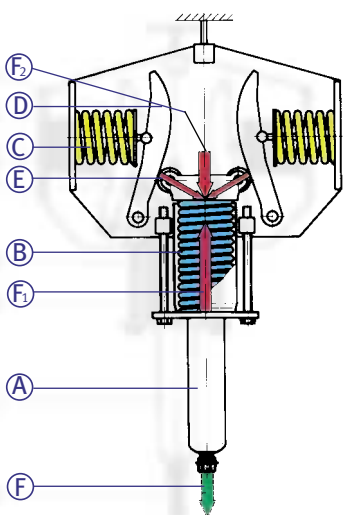
- reliable indicators for set load and travel
- adequate and precise subsequent load adjustment if required



Midposition

The LISEGA functional principle

LISEGA's patented functional principle for constant hangers provides the ideal conditions for fulfilling all requirements. The principle is based on the interplay of force from one main spring and the resultant force from two hooked up compensating springs. The directions of force of the two pre-stressed compensating springs are opposed to each other in the form of a parallelogram of forces.



Lower position

The suspended load (F) acts directly on the main spring (B) via a central load tube (A). The force of the compensating springs (C) operates as resultant force (F), via cams (D) and rollers (E). This force acts additionally on the load tube. The main spring force (F) and resultant force (F) change when the load is moved over the travel range (S). This is in accordance with the characteristics of the spring, and the angle and shape of the cams. The individual components are arranged in such a way that any changes in the resultant spring constancy correspond exactly with the characteristic curve of the main spring. In this way the force of the main spring is evenly compensated for, providing constant supporting force.

▲ Operating function of LISEGA constant hanger

Down towards the apex of the cams the resultant force diminishes in proportion to the increase in the relatively low starting force of the main spring.

At the apex of the cams the forces of the compensating springs are cancelled out. The resultant is zero. At this point only the main spring carries the load. Beyond the apex, the direction of the proportionally increasing resultant force of the compensating springs is reversed. It now reduces the relatively strong main spring force in the same way.

The sum of, or the difference between the forces F_1 and F_2 at each point in the travel range = F .

- Only the LISEGA functional principle guarantees absolute constancy right from a theoretical basis.
- Only the LISEGA functional principle allows a particularly wide load adjustment range of 40 - 100% of the nominal load.

Load adjustment

Load adjustment is carried out by adjusting the pre-tension of the main spring. Because the characteristic curves of the resultant compensating force and those of the main spring are identical, only a linear displacement of the starting load F_1 occurs. The force variation achieved by altering the main spring pre-tension is the same at every point in the movement cycle. Therefore, the ultimate load remains constant at each load setting. The

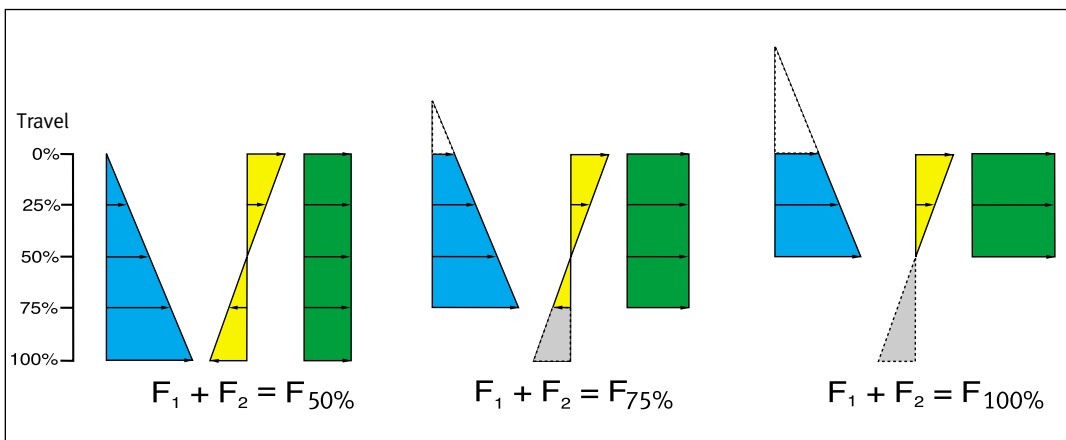
usable travel changes in proportion to the load alterations.

The extremely wide load adjustment range enables us to cover a broad range of applications with a compact number of unit sizes. This special advantage is the prerequisite for the formation of load groups as the basis of the LISEGA modular system. In this way, rational series production and warehousing control are made possible.



Examples of practical function

▼ Effect of load adjustment in LISEGA constant hangers



LISEGA functional principle for constant hangers



Large load adjustment range



Small number of unit sizes (load groups, modular system)



Serial production (favorable manufacturing costs)



Warehousing (short term availability)

DESIGN FEATURES



Mounted constant hanger

Design shape

LISEGA constant hangers are made to a compact and symmetrical design. This facilitates space saving installation dimensions and the use of standard accessories. When installing on site, much time and effort is saved by low unit weight and simple positioning at connection points. Only one hanging point is needed for fitting. The load transfer passes through the axis of symmetry. Space for radial deflection (lever arm hanger) need not be considered. Additional moments posed on the supporting structure by lever arm units are therefore avoided. The design enables a direct reading of the travel position on a scale of 1:1.

Design construction

A steel housing encases the internal working parts such as springs and cams. The compact arrangement of these individual parts inside the housing leads to small external dimensions. The housing is designed to be load bearing and to accommodate LISEGA standard connecting components.

Connection types

The connection threads correspond to the standardized diameter of the relevant LISEGA load group. At the upper connection the thread depth is limited. At the lower end, the nut is used as a turnbuckle for adjusting rod length.

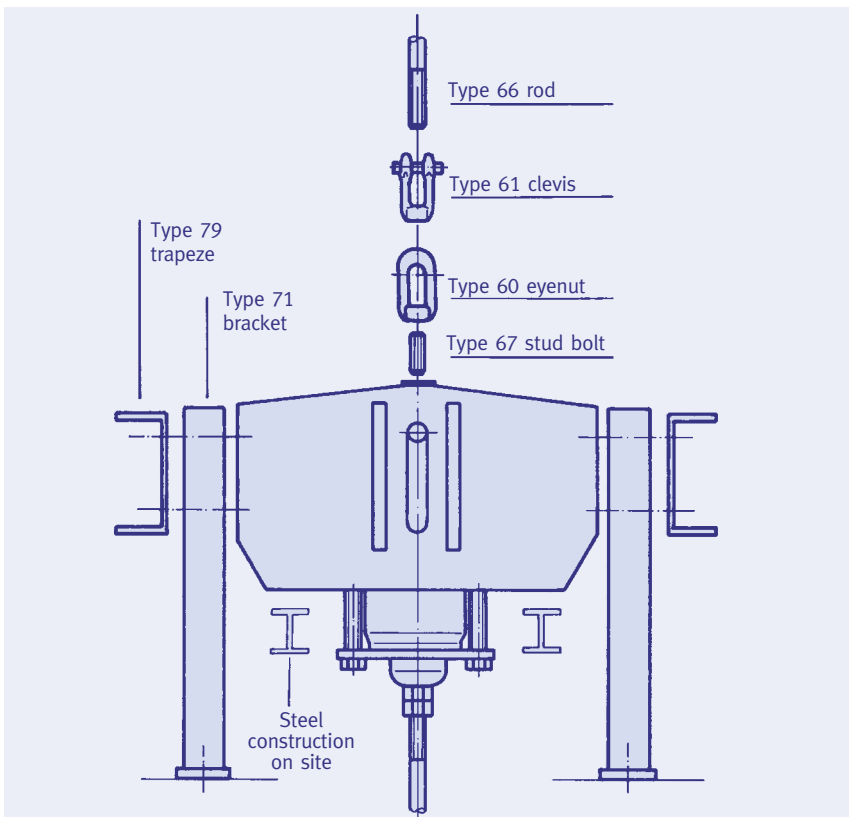
The shape of the hanger housing allows direct seating on existing connection structures without extra accessories. In addition, special brackets can be attached using the standard tapped holes provided. Constant hangers above load group 9 (heavy duty) have yoke plates for bolted connections instead of connection threads.

Performance range

Constant hangers and supports are manufactured in load groups C - 9 as serialized single-cell units. They can also be coupled together for load groups 8 or 9 as multi-cell hangers with heavier loads.

In this way a standardized range of 0.1 kN to 500 kN can be covered. Constant hangers are manufactured in 6 standard travel ranges: 150/ 300/ 450/ 600/ 750/900mm - constant supports up to 300mm.

▼ Serial connection types



Standards and calculations

Component design and layout fully comply as regards load capacity, dynamic function and lifespan with the relevant national and international standards and codes. This applies equally to the materials used, welding technology and other processes. Relevant details can be found in the **Technical Specifications** (page 0.9).

Springs

The springs are decisive for the flawless functioning of constant hangers – the long term operational safety of these components depends on them. DIN standards form the basis of the LISEGA coil spring specifications. Details can be found in the **Technical Specifications** in section 0.

Spring relaxation

Conventional helical coil springs subjected to load and temperature over a period of time lose part of their force (spring relaxation). In the long term, it can cause a reduction in the adjusted support loads of more than 10% in constant and variable spring supports (see calculation example).

LISEGA only uses prerelaxed springs which by an artificial aging process allow no significant settling loss. In a hot setting procedure with extended coil lengths a corresponding preplastification is attained. The settling loss normally to be expected is thereby prevented.



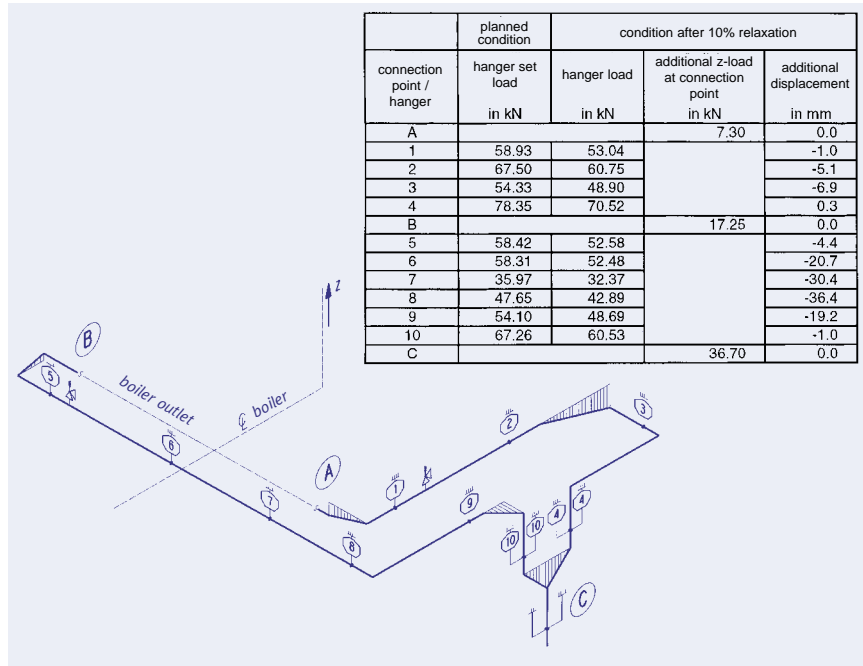
Modern welding robots and CNC machines ensure constant product quality

Corrosion protection

Constant hangers are finished with a LISEGA standard coating system which in conjunction with a metallurgically pure treated surface offers superior corrosion protection with high mechanical stability. Bearings and pins are made from stainless steel. All threaded parts and cams are electro-galvanized and yellow chromated.

The spring coil surfaces are given special finishing treatment (see **Technical Specifications**, page 0.10).

The standard corrosion protection for constant hangers needs no maintenance inside buildings, or in areas protected from the weather. For components in the open and in special cases of operation, a more comprehensive corrosion protection can be agreed on.



Example of cumulative additional loads due to hanger relaxation

The effect of a 10% loss in hanger power was observed in a pipeline (Dia = 525mm, s = 27mm, temperature = 540°C, pressure = 50bar). Due to this loss, the piping displaced at a maximum of 36.4mm.

The maximum primary stresses were calculated in the safety valves near the boiler connection. They were 93% higher than the planned condition. The permissible stresses for the connection were exceeded by 9%. (Calculations in accordance with regulations B31.1).



Handling area in paint booth

(See the section on corrosion protection in the **Technical Specifications**, page 0.10.)

INSTALLATION EXAMPLES

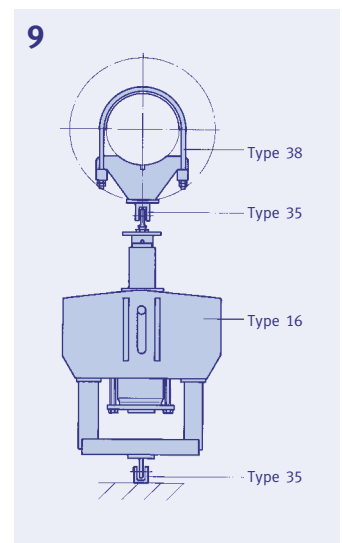
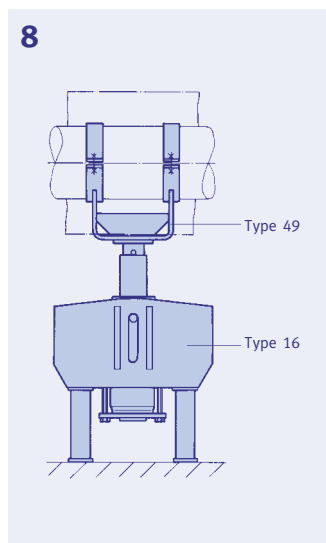
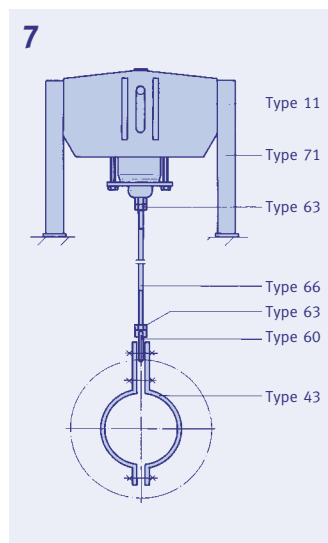
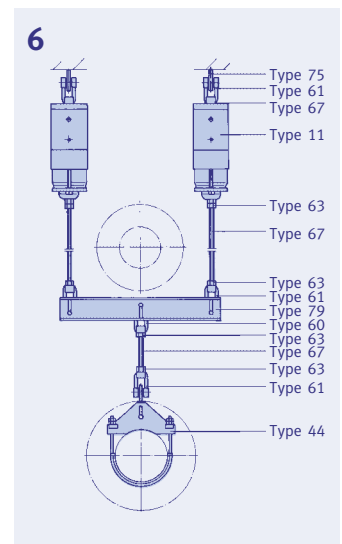
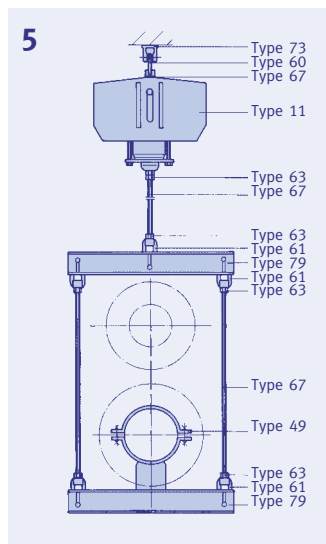
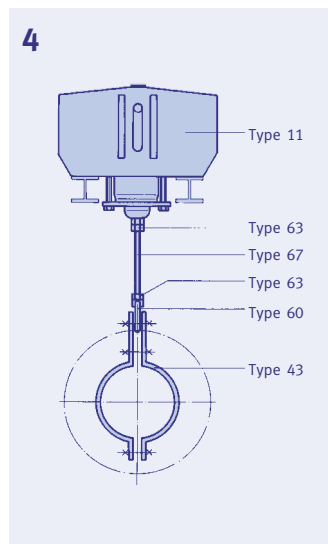
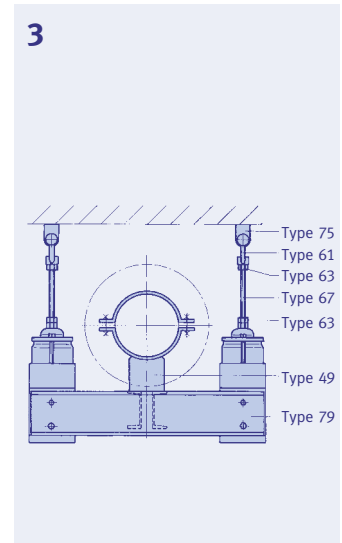
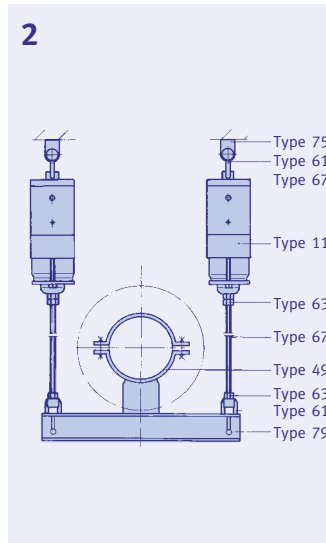
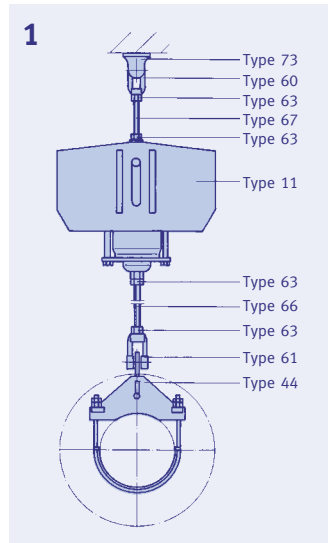
Universal fitting with accessories

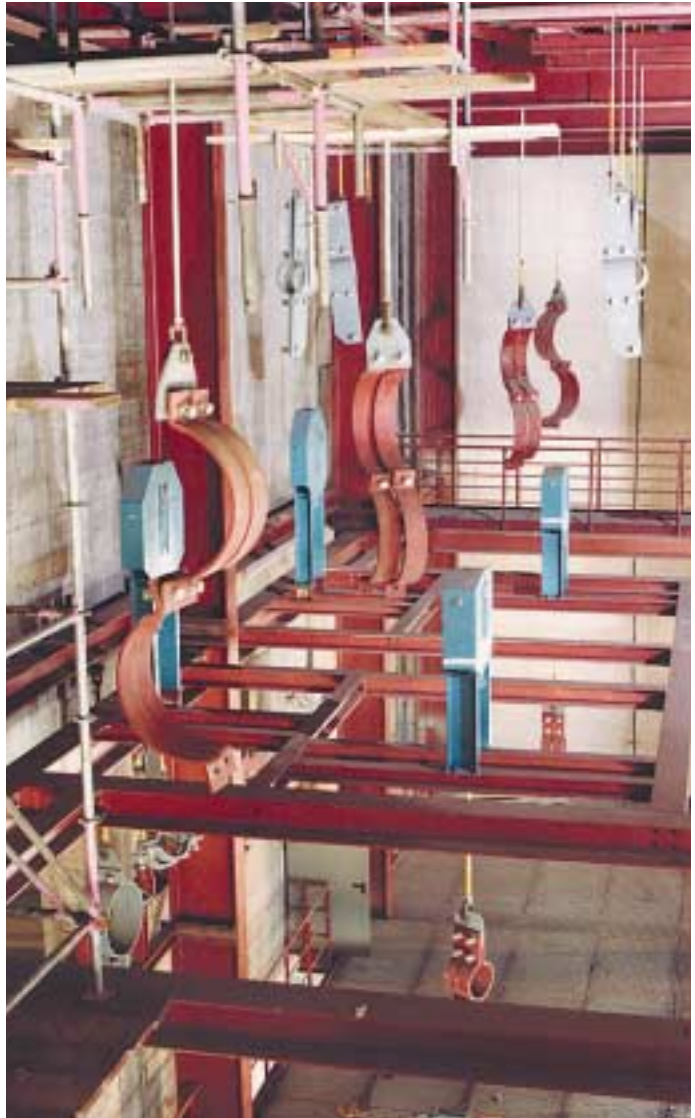
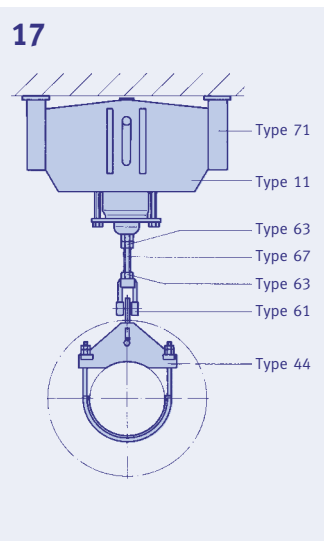
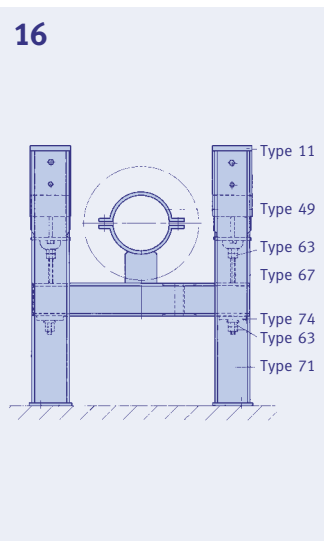
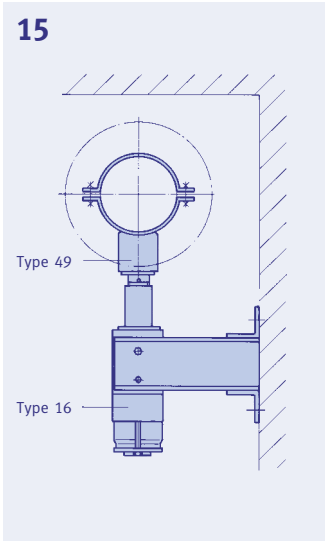
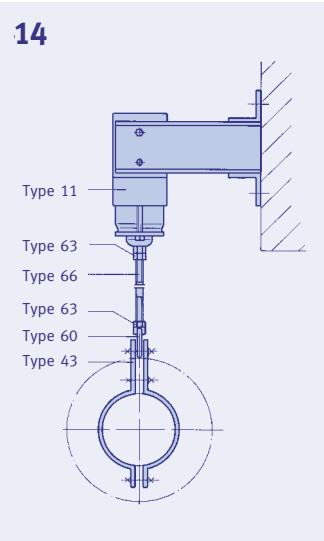
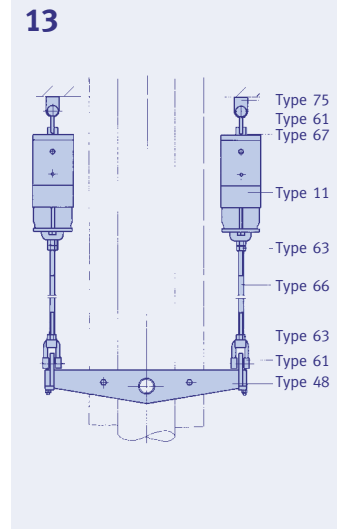
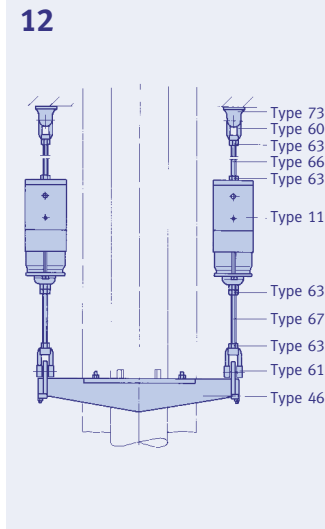
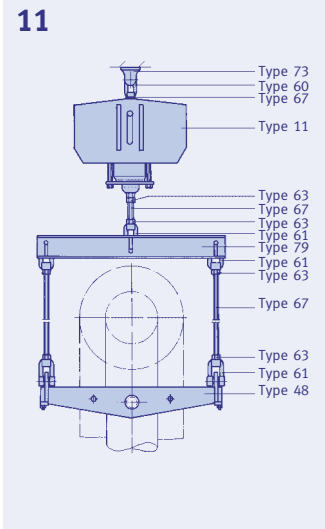
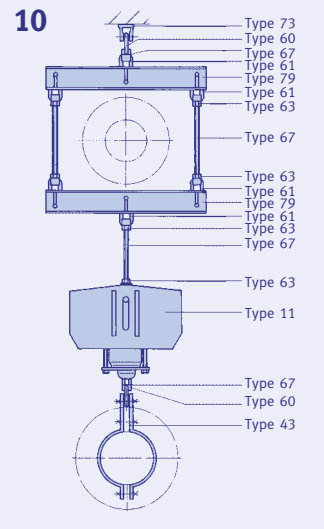
Constant hangers can be adapted to practically any situation in the plant by the use of universal-fit accessories as part of the LISEGA modular system.

Automatic through LICAD

Configurations 1 - 13 can be produced automatically in 2D and transferred to 3D systems via the LICAD design system.

Examples 14 - 17 show easily-designed special applications.





THE LISEGA SERVO HANGER

Despite the use of variable spring and constant hangers, piping systems and other components are, under certain conditions, obstructed in their thermal movement by friction or other influences. In such cases servo hangers can be usefully employed.

Application

In the ideal situation the weight of the piping is almost balanced out with the set load of the constant hangers. The sum of deviations present and the additional stresses in the piping system thereby caused then remain within the permissible harmless range.

In certain cases, total deviation can exceed permissible levels. In the form of secondary stresses it can considerably reduce the life span of the piping or its connections in the area of creep strength depending on time.

Deviations can occur due to:

- wall thickness tolerances of the pipes, if these are not weighed individually and weight differences are not taken into consideration
- insulation weights not exactly determinable in advance
- mechanical friction and manufacturing tolerances within constant hangers (permissible $\pm 5\%$)
- relaxed springs in constant hangers

→ unpredictable random influences on pipe statics

→ differences between theoretical and actual values of load distribution

A combination of deviations can normally be expected, which cumulatively can amount to considerably high values. This is especially unfavorable with long-legged (soft) piping systems. Vertical movements can be obstructed here, even on relatively minor individual deviations, and partially or even totally suppressed. Apart from the extra load caused, unacceptable sagging can occur with a reversed slope, supported by spring hysteresis from the pressure-loaded system. In addition to possible time yield damage, this would favor dangerous water hammer effects due to a false incline.

In such cases, a sensible solution would be to complement the “passively” reacting constant hangers with the “actively” working LISEGA servo hanger.

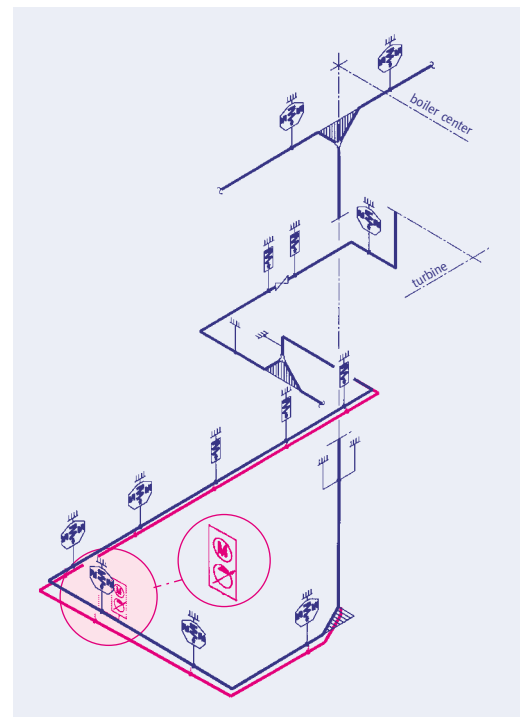
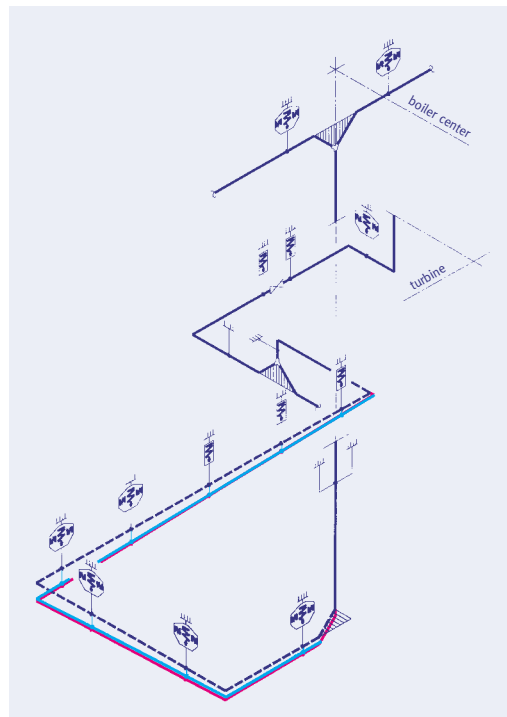
Via the hydraulic servo assistance, the piping is now actively supported in its movement at every predetermined height.

Original cold setting

Hot setting

New cold setting

Without servo hanger (figure left)
With servo hanger (figure right)



Typical example of use of LISEGA servo hanger

Design and function

The basis for the servo hanger is a standard Type 11 constant hanger. To overcome load differences, it is additionally fitted with a hydraulic auxiliary device providing additional active force in both directions (servo assistance).

As a control parameter, the temperature of the piping to be supported is normally used. The relevant temperature is converted electronically into the corresponding position. In the actual / theoretical value comparison procedure, the control provides for a regulated advance towards the vertical theoretical position.

Electro-hydraulic control

The hydraulic unit and the electronic control are housed separately from each other in a switchgear cabinet mounted near the servo hanger (max distance 16m).

The hydraulic piston controlling the movement is located in the load tube of the constant hanger.

Automatic safety switch

The electrohydraulic control is designed in such a way that only the servo assistance is lost if there is an operational breakdown, e.g. a power failure. The unit itself would carry on operating in the normal way as a constant hanger.

For deviations in theoretical (temp.) / actual (travel) a tolerance range can be adjusted. The control shuts off automatically if the deviation lies outside these values.

Manual shut off

For possible maintenance work in the system or at the boiler, the servo assistance can be shut on or off by hand.

Unit sizes

Units are available from series construction for load groups 5 (FN 20kN) to 9 (FN 100kN) with travel range 2 (150mm) and 3 (300mm). In special cases non-standard designs can be manufactured.

Operating instructions

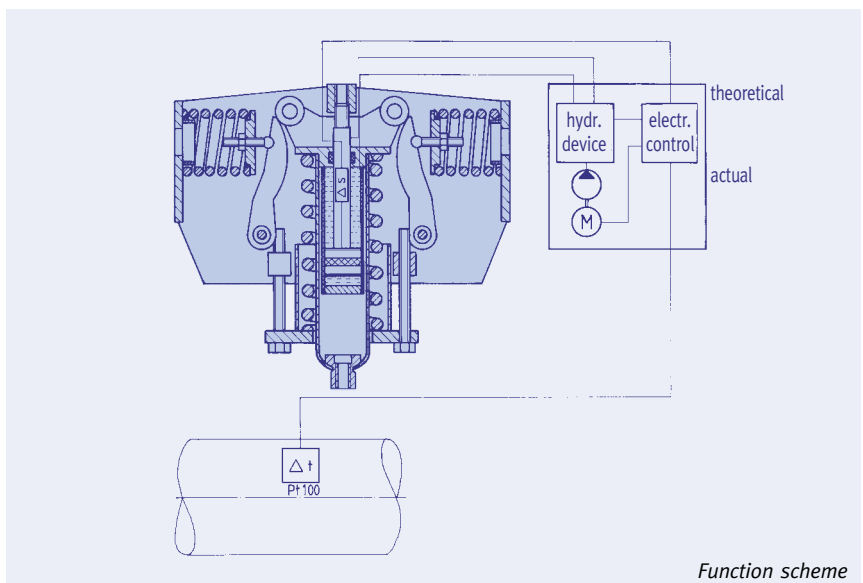
Installation and commissioning instructions and maintenance recommendations are supplied on delivery.



① See page 1.3 and 1.4 also

② 2 = Travel range 2
3 = Travel range 3

Servo-hanger Type ②	Nominal load FN kN	Calibration ① load kN	Load dependent travel ①		Additional Servo force kN
			Travel range 2 mm	Travel range 3 mm	
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 scheme

INSTALLATION AND OPERATING INSTRUCTIONS

Constant hangers are mechanically acting devices. Their trouble free operation is vitally important for the safety of piping systems and connected components. Careful attention must be paid to the following instructions to ensure trouble free operation.

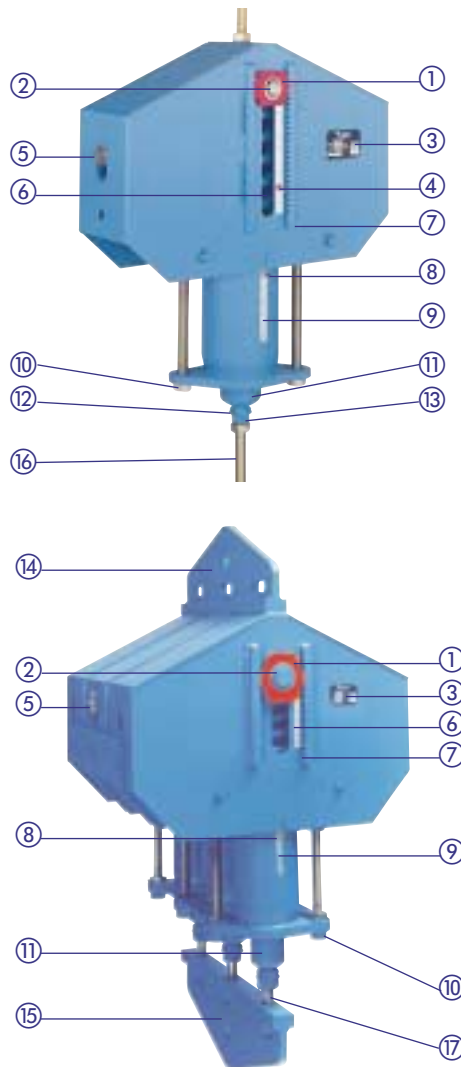
1. Transport and storage

Transport must be carried out carefully in order to avoid damage. It is particularly important that load adjustment screws and connection threads remain intact. If stored in the open, care must be taken to protect components from dirt and moisture.

2. Delivery condition

LISEGA constant hangers are supplied set to the load specified in the order, and blocked in the required installation position. All hangers are supplied with a riveted aluminum name plate, as well as travel and load scale.

- ① travel stop
- ② guide bolt
- ③ name plate
- ④ red marking for hot position
- ⑤ fixing bolt with washer for travel stop after deblocking
- ⑥ travel scale
- ⑦ serrated travel stop strip
- ⑧ adjustment load indicator
- ⑨ load scale
- ⑩ adjustment bolt
- ⑪ load tube
- ⑫ control bore for min. screw-in depth
- ⑬ load nut
- ⑭ upper yoke plate
- ⑮ lower yoke plate
- ⑯ connecting rod
- ⑰ tensioning bolt



On the name plate are stamped:

- type
- serial number
- order number (if required)
- set load
- theoretical travel
- marking (position number)
- test stamp (if required)

On the travel scale, the theoretical hot position is marked with a red sticker, the theoretical cold position with a white one. The load adjustment ordered is permanently stamped on the load scale with an X during final inspection.



Name plate with stamped operating data



Travel scale with cold/hot markings



Load scale with indicator

2.1 Constant hanger types 11 C3 .. - 11 96 .. (single cell)

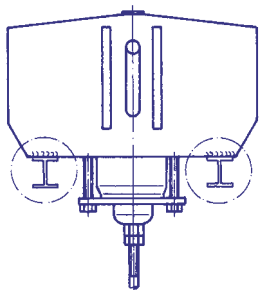
The upper connection is supplied as internal thread with limited screw engagement. The lower connection is a spherical load nut which can angulate through a minimum of 4° in all directions. The connection threads are filled with grease and sealed with plastic caps.

2.2 Constant hanger types 12 82 - 14 96 (multi cells)

The upper connection is provided as standard in the form of a lug for a connecting pin. The lower attachment exists of several tensioning bolts connected by a yoke plate.

2.3 Constant hangers (seated)

Constant hangers of all sizes can be directly seated. They can also be supplied with serialized brackets type 71. The brackets can be bolted on at works or on site according to order using the precision fit holes provided. The base plates of the mountings can be either welded or bolted to the mounting surface.



2.4 Constant supports type 16

Constant supports follow the same design principle as the constant hanger. Instead of the lower connection, they have an upper support tube with a screwed-in adjusting spindle and load plate.

3. Installation

When installing, the rules for the Installation Instructions for Piping are to be adhered to. Special attention must be paid to the desired installed position of the hanger rods in the whole support chain. Two possibilities are usual practice:

1. The hanger rods are to be installed at an angle in accordance with expected horizontal displacement of the piping. It is expected that the rods become vertical during operating conditions.
2. The hanger rods are to be installed vertically for better control. A controlled angled position during operating conditions is then permitted.

In all cases there should be a unified set of rules for the whole plant.

Attachment rods and points must be connected under actuation of load.

3.1 Constant hanger type 11 C3 - 11 96 (single cell)

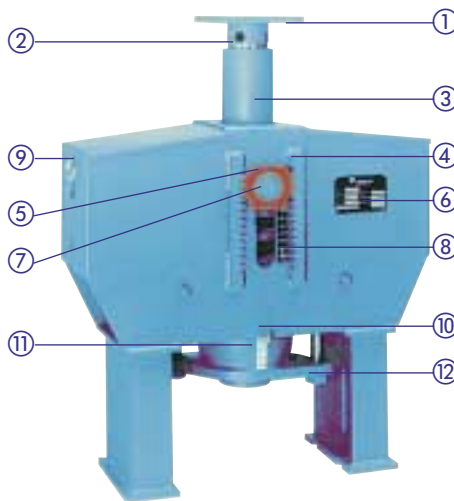
Transport lugs or other installation aids can be screwed into the threaded holes provided on the sides. After deblocking the hangers (see Point 4), the blocking plates should be bolted on here for storage. For constant hangers with type 71 brackets, the hangers are supplied with transport lugs instead of the upper connection. The lugs can also accommodate the blocking plates. When removing the blocking plates from constant hanger types 11 82 to 11 96, care must be taken that only the larger circlip is removed. For connection to the connecting rod, care must be taken that the lower rod is screwed into the load nut at least up to the control bore. A further screw engagement of 300mm is provided.



Blocking plate bolted laterally



Blocking pin with circlips



Constant support type 16

- ① load plate
- ② adjusting spindle
- ③ support tube
- ④ serrated travel stop strip
- ⑤ blocking plate
- ⑥ name plate
- ⑦ guide pin
- ⑧ travel scale
- ⑨ securing screw & washer for blocking plate after deblocking
- ⑩ indicator for adjustment load
- ⑪ load scale
- ⑫ adjustment bolt



Transport lug and correct connection



Safe storage of travel stop plates on constant hangers with brackets

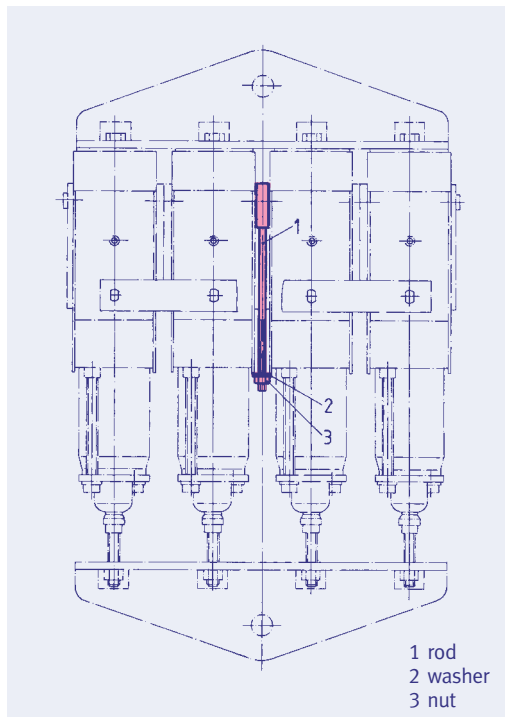
3.2 Constant hanger types 12 82 - 14 96

To install the hangers, the side openings of the upper yoke plate can be used for lifting. On hangers fitted with brackets, the upper yoke plate is substituted by a transport lug.

Constant hangers types 14 82 - 14 96 (4 - cell design) are supplied with a **transport safety device marked in red** along the center axis. This serves to provide additional mid-blocking to the blocking pin on an unloaded hanger.

The transport safety device must not be loosened until after the complete installation of the hanger simultaneously with the removal of the blocking plates.

For this purpose the red locknut is removed at the lower end using a box spanner. Both parts are to be stored in the same place as the blocking plates. When making the load-actuating connection, care must be taken that the lower load anchors are screwed into the lower load nuts at least up to the control bore. The installation dimension of the lower yoke plate can be extended with the load nuts by up to 250mm or shortened by up to 70mm.



4. Removing the blocking devices

4.1 Requirements

The correct deblocking of the constant hangers as per the following instructions is decisive for the subsequent flawless functioning of the piping system.

The blocking devices should only be removed immediately before commissioning.

The blocking devices must be removed systematically, i.e. from fixed point to connection or from connection to connection.

Prior to this the whole system should be checked as per Item 3 in these installation instructions.

4.2 Theoretical and actual condition

If it has been ensured that all connections are actuated by load, the load suspended is completely taken over by the constant hangers or supports.

If the actual load corresponds to the installed load and the piping system shows no signs of constraints, the planned equilibrium has been achieved. The travel stop plates can now be removed.

In practice, however, slight constraints and hence certain load displacements in the piping system can hardly be avoided. The theoretically determined loads can also show considerable tolerances. Deviations resulting from this can lead, according to increased or diminished loading, to a corresponding jamming of the blocking pin in the upper or lower part of the blocking plates.

4.3 Load distribution

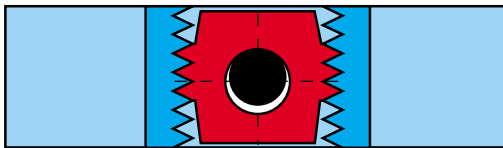
The travel stop plates must never be removed by force!

By loosening or tightening the connecting rods with a few turns of the load nut for constant hangers, or adjustment of the support tube for constant supports, the locked-up stress in the piping can be compensated so that the blocking pin is free.

However, the geometrical layout of the piping must not be altered when balancing these stresses.

Because the adjustment of one position can lead to stressing at another location, this procedure must be repeated if necessary at different points.

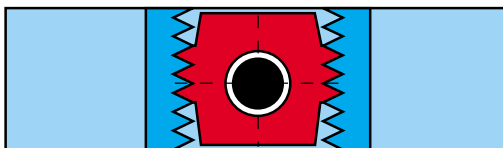
For thorough control, we recommend as a matter of principle removing the travel stop plates only after all the blocking pins are free.



Load pin forced upwards:

Applied load is lower than set load.

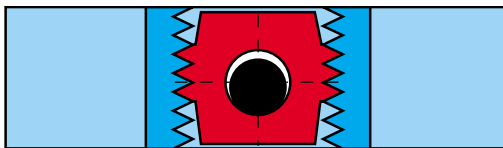
Tighten connecting rod or reduce set load



Load pin is free:

Applied load conforms with set load.

Blocking plate can be removed



Load pin forced downwards:

Applied load is higher than set load.

Loosen connecting rod or increase set load

4.4 Load correction

If the blocking pins jam, and cannot be freed without displacement of the piping, significant deviations in the piping load can be assumed.

The adjustment bolts of the constant hangers and supports can then be correspondingly set. Once more, this should be done from position to position, as described in point 4.3. If this is done correctly, load differences can be practically balanced out by this method. Any load adjustments must as a matter of principle be agreed on with the technical department responsible for the piping system. Any new load setting values should be indicated on the load scales and recorded.

4.5 Installation devices

With all hangers, tightening or loosening the connecting rods, as well as load adjustment, can be done by hand. With hangers and supports for higher load groups, however, this operation may need considerable force. To make this easier, an installation aid can be provided which takes on the load hydraulically with the aid of a hand pump.

4.6 Commissioning

Before commissioning it must be checked that each hanger allows the expected piping movement.

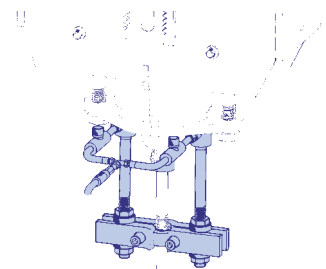
The hanger travel can be read directly from the position of the blocking pin in the guide slots on the travel scale.

If required, for example when carrying out revisions, hangers and supports can be blocked again in any travel position. This is done by mounting and securing the blocking plates onto the blocking bolt.

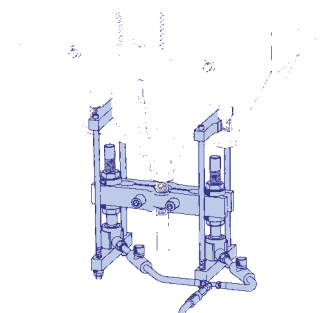
5. Control and maintenance

The correct performance of the constant hangers and supports can be checked in all operating situations by noting the position of the blocking bolt.

Under normal operating conditions no maintenance is required.



Installation device for relieving adjustment bolts



Installation device for relieving blocking device