We will serve the customers with the highest quality products

KARAJET® INDUSTRIAL Co.

COMMITTED TO THE HIGHEST EFFICINCY

TEL : 05135413212 FAX : 05135413211

Mashhad, Iran

No. 870, 15 St., Andisheh Blvd., Toos Industrial Estate

Commercial@karajet.com

www.karajet.com

SPRING HANGER & PIPE SUPPORT

KARAJET® INDUSTRIAL Co,ltd

www.karajet.com

2020 EDITION

SPRING HANGER & PIPE SUPPORT

KARAJET® INDUSTRIAL Co.

COMMITTED TO THE HIGHEST EFFICINCY

Contents

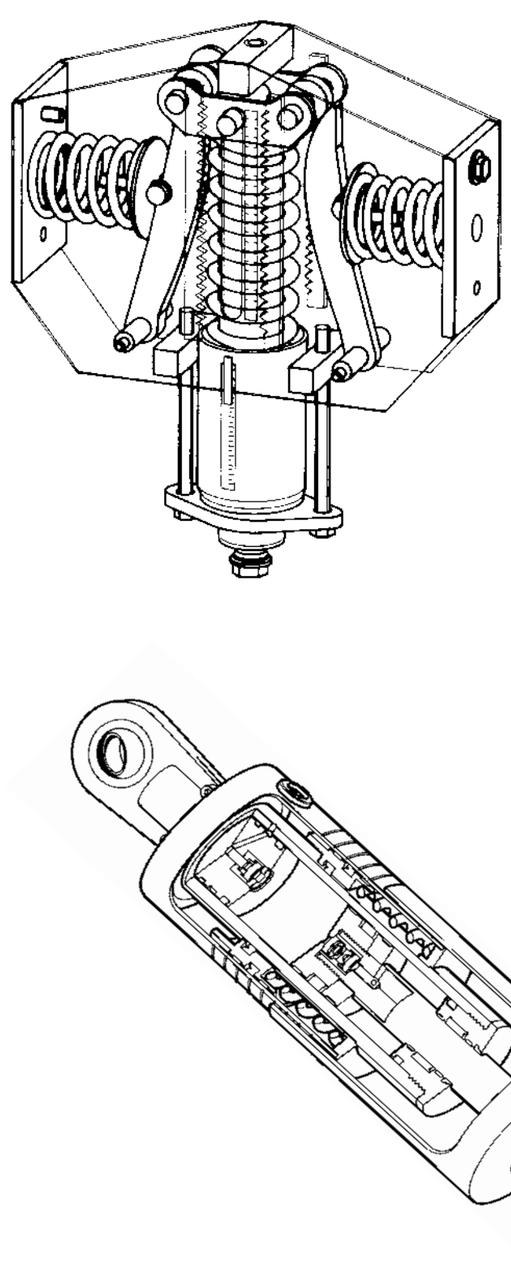
01. Variable Springs ..... 5 ~ 10

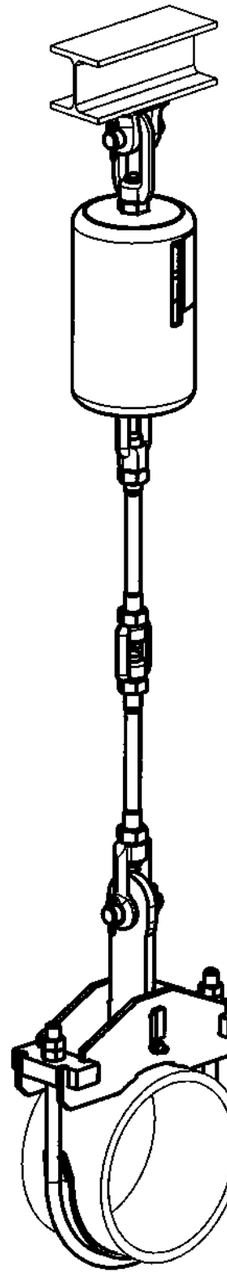
02. Constant Springs ..... 11 ~ 34

03. Rigid Sway Strut ..... 35 ~ 36

04. Snubber ..... 37~ 46

05. INSTALLATION MANUAL ..... 47 ~52





Pictorial Guide

Variable Spring Hanger

Type A
page 7

Type B
page 8

Type C
page 9

Constant Spring Hanger (Horizontal Type)

Type A
page 15

Type B
page 17

Type C
page 19

Type D
page 21

Type F
page 23

Constant Spring Hanger (Vertical Type)

Type B
page 25

Type C
page 27

Type D
page 29

Type F
page 30

Constant Triple Spring Hanger

Type A
page 33

Type B
page 34

PICTORIAL GUIDE

Pictorial Guide

Rigid Sway Strut

Rigid Sway Strut A&C
page 36

Rigid Sway Strut B&D
page 36

Snubber

Snubber-SNA
page 45

Snubber-DA
page 41

Service

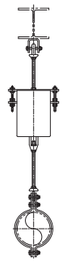
Whenever piping moves vertically, there is a need for a pipe hanger which will support the piping while accommodating the vertical movement. A spring type hanger fills this function. If the movement dose not exceed the allowable spring deflection, and if the inherent change in supporting force caused by the spring deflection is allowable, a variable spring fills this function. Simply enough, as the piping moves in a vertical direction, it causes the variable spring to deflect an equal distance. As the spring deflects, the supporting force it is exerting on the pipe changes by an amount equal to the vertical movement times the spring rate. That spring rate is a constant, unique for each size of a particular series. Spring rates are shown at the bottom of the variable spring load chart.

Adjustment

After the piping or equipment is erected and after all testing which might cause a temporary change in loading conditions is completed, the variable spring should be adjusted to its cold position. This is accomplished by turning the turnbuckle on Types A, B and the load adjusting nut on types C until the position indicator is properly is located. If travel stops have been furnished they should be removed prior to equipment operation. After the piping or equipment reaches its full operating conditions, a check and, if necessary, a final adjustment to the hot position should be made at the variable spring.

Selection of a Variable Spring

When choosing a variable spring, a determination of size, model and type must be made. Size and model are chosen jointly based on movement and load considerations as tabulated. The type of spring to be used is normally determined by the physical characteristics of the structure to which the hanger assembly will be attached.

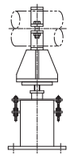


TYPE A

For use where extensive headroom is available and where it may be desirable locate the spring at a specific elevation in the hanger assembly

TYPE B

For use where the spring is to be located on top of a pair of channels and adjustment of the spring is desirable from above the supporting steel



TYPE C

For use when he spring is to be located underneath the piping

Size and Model Selection

The key criteria in selection the size and series of a variable is a factor known as variability. This is a measurement of the percentage change in supporting force between the hot and cold positions of a spring and is calculated from the formula:

$$\text{Variability} = \frac{\text{Movement x Spring Constant}}{\text{Hot Load}}$$

The cold load is calculated by adding (for up movement) or subtracting (for down movement) the product of spring rate time movement to or from the hot load. If an allowable variability is not specified, good practice would be to use 25% for non-critical piping and 10% for critical piping.
Ordering : Specify model name, type and size.

To Size a Spring, then:

1. Calculate the maximum allowable spring rate from the formula : $\text{Spring Constant} = \frac{\text{Variability x Hot Load}}{\text{Movement}}$
2. Determine the size by finding the hot load in the chart.
3. Stay in that size column and choose the series with a spring rate equal or less than the value calculated adove.
4. Calculate the cold load and check that both hot and cold loads fall with in working range.

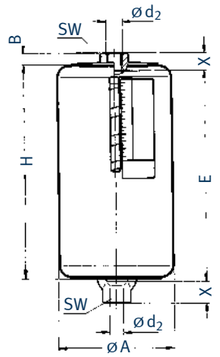
$$\text{Cold Load} = \text{Hot Load} \pm \text{Spring Rate x Movement}$$
$$(+ : \text{Moving Up}, \; - : \text{Moving Down})$$

5. If this condition is not met, move to an adjacent size and rework.

If load, movement, variability, or available space prohibit the use of a variable spring the use of a constant support should be considered.

Variable Springs

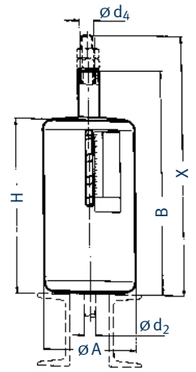
TYPE-A



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

Variable Springs

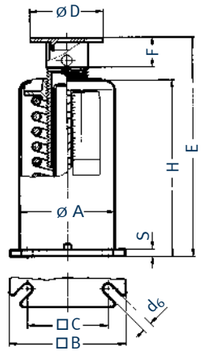
TYPE-B



type	ø A	B ①	ø d_2	ø d_4	H	X_{max} ①	weight [kg]
25 D2 19	90	350	M10	13	245	380	2.8
25 D3 19	90	675	M10	13	470	705	4.9
25 11 18	90	200	M12	13	145	230	2.1
25 12 18	90	350	M12	13	245	380	3.1
25 13 18	90	675	M12	13	470	705	5.5
25 21 18	115	205	M12	13	150	235	3.5
25 22 18	115	355	M12	13	250	385	5.1
25 23 18	115	665	M12	13	460	695	8.4
25 31 18	115	210	M16	18	155	250	3.7
25 32 18	115	355	M16	18	250	395	5.3
25 33 18	115	675	M16	18	470	715	8.9
25 41 18	155	230	M20	25	180	280	8.0
25 42 18	155	395	M20	25	290	445	11.5
25 43 18	155	730	M20	25	525	780	18.6
25 51 18	180	265	M24	28	215	325	14.5
25 52 18	180	405	M24	28	305	465	18.0
25 53 18	180	740	M24	28	540	800	29.0
25 61 18	220	300	M30	34	245	375	26.0
25 62 18	220	465	M30	34	360	540	35.0
25 63 18	220	845	M30	34	640	920	56.0
25 71 18	245	350	M36	40	300	440	40.0
25 72 18	245	530	M36	40	430	620	53.0
25 73 18	245	900	M36	40	700	990	79.0
25 81 18	245	385	M42	47	335	495	44.0
25 82 18	245	605	M42	47	500	715	66.0
25 83 18	245	1075	M42	47	875	1185	111.0
25 91 18	275	415	M48	54	370	535	67.0
25 92 18	275	645	M48	54	545	765	92.0
25 93 18	275	1110	M48	54	910	1230	143.0

Variable Springs

TYPE-C



type ②	øA	□B	□C	d_6	E①②	F	H	øD	S	weight [kg]
29 C2 19	80	105	75	10	270	36	210	80	6	2.6
29 D1 19	90	125	95	12	195	36	145	80	8	3.2
29 D2 19	90	125	95	12	305	36	245	80	8	4.3
29 D3 19	90	125	95	12	550	36	470	80	8	6.6
29 11 18	90	125	95	12	195	36	145	80	8	3.4
29 12 18	90	125	95	12	305	36	245	80	8	4.6
29 13 18	90	125	95	12	550	36	470	80	8	7.2
29 21 18	115	150	115	14	200	36	150	100	10	5.6
29 22 18	115	150	115	14	310	36	250	100	10	7.6
29 23 18	115	150	115	14	540	36	460	100	10	11.1
29 31 18	115	150	115	14	205	36	155	100	12	6.3
29 32 18	115	150	115	14	310	36	250	100	12	8.4
29 33 18	115	150	115	14	550	36	470	100	12	13.0
29 41 18	155	190	140	18	240	48	180	120	12	11.9
29 42 18	155	190	140	18	360	48	290	120	12	16.0
29 43 18	155	190	140	18	615	48	525	120	12	25.0
29 51 18	180	220	170	18	270	50	210	150	12	20.0
29 52 18	180	220	170	18	370	50	300	150	12	24.3
29 53 18	180	220	170	18	625	50	535	150	12	37.0
29 61 18	220	260	200	23	305	50	245	170	15	34.0
29 62 18	220	260	200	23	430	50	360	170	15	44.0
29 63 18	220	260	200	23	730	50	640	170	15	68.0
29 71 18	245	290	215	23	360	52	300	200	20	53.0
29 72 18	245	290	215	23	500	52	425	200	20	68.0
29 73 18	245	290	215	23	790	52	695	200	20	97.0
29 81 18	245	290	215	27	400	55	335	200	20	60.0
29 82 18	245	290	215	27	575	55	500	200	20	84.0
29 83 18	245	290	215	27	965	55	870	200	20	133.0
29 91 18	275	340	255	33	440	60	370	240	25	91.0
29 92 18	275	340	255	33	625	60	545	240	25	118.0
29 93 18	275	340	255	33	1010	60	910	240	25	173.0

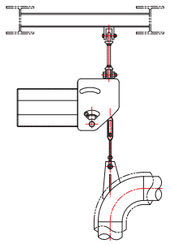
Model : CHH (Horizontal), CHV (Vertical)

Constant springs are used where vertical movements should not be restricted by rigid hangers and where variable spring can not be used due to the high deviation between installation load and operating load. The less the load variability factor of a hanger is, the less the reaction effects on equipment or pipe systems due to thermal expansion.
In case variability factor is variable according to vertical movement and acting load. Therefore, it is called “Variable” spring. it is often the case that the vertical movement or reaction force is so large that variable springs can not be used.
The load variability of constant spring is the orectically zero and, therefore, this type of spring hanger is capable of supporting a pipe with a constant load at any time, in spite of the position of vertical movement during operation or shutdown condition. Therefore , it is called “Constant” spring.
KARAJET’s constant spring assures perfectly support through the entire deflection of the pipe load. This counter-balancing of the load and spring moments about the main pivot is obtained by the use of carefully designed compression type load springs, lever and spring tension rods.

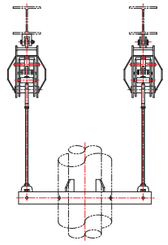
✲ Selection of a Constant Spring

When choosing a constant spring, a determination of size, model and type must be made.
To select the size, determine the total to be supported by the constant spring as well as actual vertical movement of the pipe at the point of supporting location.
Total travel should be equal to actual travel plus 20% plus 20mm.(Total Travel=Actual Travel x 1.2+20mm)
Total travel is the maximum vertical movement the constant spring can accommodate.
Select a size which will accommodate the and actual from Load-Travel chart on pages 22 and 23.
To determine constant spring model and type, consideration of available room for suspending the pipe and spring will indicate which model and type of constant spring is desirable.

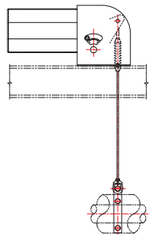
✲ CHH (Horizontal)



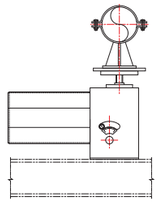
TYPE A



Type B & Type C



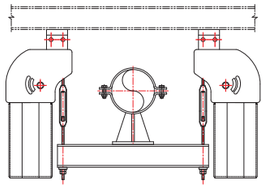
Type D



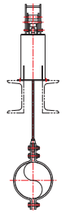
Type F

✲ CHV (Vertical)

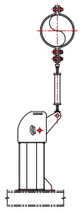
Type B



Type C



Type D



Type F

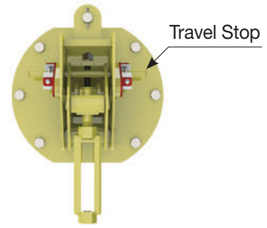
The type of spring to be used is normally determined by the physical characteristics of the structure to which the hanger assembly will be attached. The usage of each type is the same as variable springs.

✲ Field Adjustment

When the hanger is installed, its supporting force should be in balance with the portion of the piping weight assigned to it. Each hanger is individually calibrated before shipment to support to exact load specified.
Therefore, there is no need to adjust the springs at erection field in general. In spite of that, special instructions for this field recalibration of spring may be obtained from KARAKET engineer.
No less than 10% of this adjustability is provided either side of the calibrated load for field adjustment.
The load adjustment is made by turing the single load adjustment bolt.

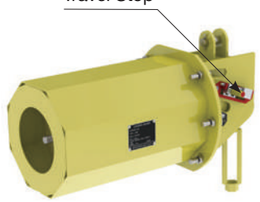
✲ Travel Stop

The functional design of the constant spring permits the incorporation of a travel stop that will lock the hanger against upward or downward movement for temporary conditions of under load or overload, such as may exist during erection, hydrostatic test or chemical clean-out.
The travel stop is inserted through the opening made on the side frame and inside load arm.
This travel stop is designed to bear two times of calculated load in consideration of overloads due to hydrostatic test condition.
Assure not to remove travel stop unless hydrostatic test is completed.



✲ Universal Locking Type

In order to reset constant springs different from original setting in accordance with special condition, KARAJET also provides Universal locking type constant springs equipped with special travel stop. This travel stop consists of two plates, with matched serrations, attached to the hanger side frame with two or more cap screws and with a socketed piece which engages the position indicator. A series of serrations can be engaged to lock the hanger at any position along the total travel range. The travel stop must be removed before the piping system is put into operation, but not before the hanger is fully loaded. The travel stop is released by removing the cap screws.



✲ Corrosion - Resistant Type

KARAJET also can provide Corrosion - Resistant type of constant spring or protection against severe or corrosive condition like variable springs.
These springs are provided with neoprene or CIP coated spring coils and hot-dipped galvanized metal parts except threaded load column for type F which is electro-galvanized.

Constant Spring model CHH and CHV

Load - Travel Chart

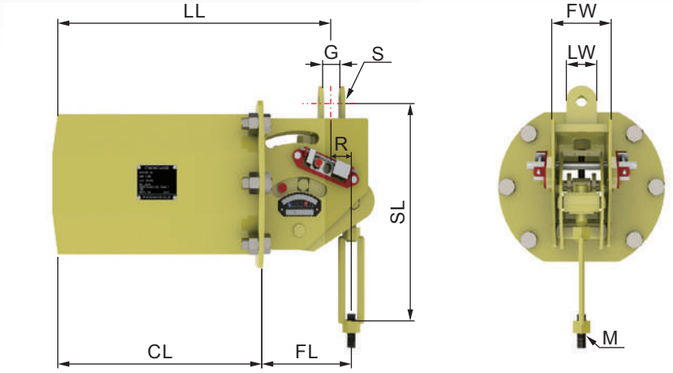
Size	Total travel (mm) / Selection (kg)											
	50	60	70	80	90	100	110	120	130	140	150	160
1	47.5	39.5	34	29.8	26.4	23.8	21.7	19.8	18.3	17	15.9	14.9
	59.5	46	39.5	34.5	31.5	27.5	25	23	21	19.5	18	17
2	80.5	69	59	51.5	46	39	37.5	34.5	32	29.5	27.5	26
3	108	92.5	79	69.5	61.5	55.5	50.5	46	42.5	39.5	36.5	34.5
4	150	127	109	95	85	76	69	63	58	54	51	47
5	205	173	148	130	115	104	94	86	80	74	69	65
6	277	236	202	177	156	141	129	118	109	101	94	88
7	348	295	253	222	197	175	161	148	136	126	118	111
8	417	352	302	264	235	210	192	176	163	151	141	132
9	502	420	360	315	280	251	229	210	194	180	169	157
10	604	508	436	360	339	302	277	254	234	218	203	190
11	675	566	484	424	377	339	308	283	261	242	226	212
12	747	623	534	467	416	373	340	312	288	267	249	234
13		698	598	524	465	417	380	349	322	299	279	262
14		774	663	580	516	463	422	387	357	332	309	290
15		865	741	649	577	516	472	433	399	371	346	324
16		950	815	713	634	572	519	476	439	408	380	357
17		1070	914	800	710	638	581	533	492	457	426	399
18		1180	1010	881	784	705	641	587	542	504	470	440
19		1310	1120	980	871	770	713	653	603	560	523	490
20		1440	1230	1080	956	862	783	718	661	615	574	538
21		1580	1360	1190	1050	950	863	780	730	678	634	594
22		1730	1480	1300	1130	1037	944	865	798	741	692	649
23		1806	1630	1430	1270	1143	1040	951	880	816	761	714
24		2080	1780	1560	1380	1240	1130	1040	958	889	830	778
25		2280	1960	1710	1520	1370	1250	1140	1050	979	913	856
26		2490	2140	1870	1660	1490	1360	1250	1150	1070	996	934
27		2750	2360	2060	1830	1650	1500	1370	1270	1180	1100	1030
28		3000	2570	2250	2000	1800	1640	1500	1380	1280	1200	1130
29				2480	2200	1970	1800	1650	1520	1450	1320	1240
30				2760	2450	2200	2010	1840	1700	1580	1470	1380
31				3130	2780	2490	2260	2070	1920	1780	1660	1560
32				3410	3035	2730	2480	2280	2100	1950	1820	1710
33				3790	3365	3030	2760	2520	2330	2140	2020	1890
34				4170	3710	3330	3030	2780	2560	2380	2220	2080
35				4620	4110	3700	3360	3070	2840	2640	2460	2310
36				5080	4520	4070	3700	3390	3130	2910	2710	2540
37						4510	4100	3760	3470	3220	3010	2820
38						4960	4510	4140	3820	3540	3310	3100
39						5530	5040	4620	4260	3960	3690	3460
40						6090	5540	5080	4680	4350	4060	3810
41						6680	6060	5560	5140	4760	4450	4170
42						7260	6600	6050	5590	5190	4840	4540
43						7720	7010	6430	5930	5510	5140	4820
44						8170	7430	6810	6290	5840	5450	5110
45						8780	8000	7340	6760	6290	5860	5500
46						9390	8540	7810	7210	6700	6260	5860
47							9360	8580	7920	7350	6860	6430
48							10200	9320	8600	7790	7460	6990
49							10980	10070	9280	8620	8050	7500
50							11800	10800	9980	9260	8640	8100
51							12800	11750	10850	10100	9400	8810
52							13900	12750	11770	10920	10200	9560
53							15000	13750	12690	11780	11000	10310
54	RED : application range for CHH-A, B, C						16220	14900	13730	12750	11900	11160
55							17320	15880	14650	13600	12700	11910
56	BLUE : application range for CHH-D						18550	17000	15700	14580	13600	12740
57							19780	18120	16720	15520	14500	13580
58	VIOLET : application range for CHH-F						21040	19300	17820	16540	15440	14470
59							22500	20620	19040	17680	16500	15450
60	GREEN : application range for CHV-B, C						23960	21960	20250	18800	17570	16450
61									22120	20540	19150	17980
62	YELLOW : application range for CHV-F								24250	22510	20970	19700
63									26590	24680	23050	21600
64									29290	27200	25350	23800
65												
66												
67												
68												

Constant Springs

Size	Total travel (mm) / Selection (kg)												Size
	170	180	190	200	220	240	260	280	300	330	360	400	
1	14	13.2	12.5	11.9									1
	16	15	14.5	13.5									
2	24	23	21.5	20.5									2
3	32.5	30.5	29	27.5									3
4	45	42	40	37									4
5	61	58	55	51									5
6	83	78	74	69									6
7	104	98	93	87	79	72.5							7
8	129	117	111	106	96	88							8
9	148	140	133	127	115	105							9
10	179	169	160	152	138	127							10
11	200	188	179	168	154	141							11
12	220	208	197	187	170	156	144	134	125				12
13	246	232	220	210	190	174	161	149	141				13
14	273	258	244	231	211	193	178	166	154				14
15	305	288	263	258	236	216	200	185	173				15
16	338	317	300	286	259	238	219	204	187				16
17	376	355	336	320	291	260	246	228	212				17
18	414	391	371	353	320	296	271	252	235				18
19	461	436	412	392	356	326	302	280	260				19
20	506	478	453	431	391	358	331	308	288				20
21	568	527	500	475	431	395	365	338	316				21
22	611	576	540	519	472	432	395	370	344				22
23	672	635	601	572	519	476	440	408	380				23
24	732	691	655	622	565	518	478	444	415				24
25	806	761	721	685	623	571	527	487	456				25
26	880	831	787	747	680	623	579	534	498				26
27	970	916	868	823	750	688	635	589	549				27
28	1060	1000	946	897	817	750	691	643	597				28
29	1160	1100	1040	987	900	824	761	706	657	600	550	495	29
30	1300	1230	1160	1100	1000	918	848	788	735	668	612	550	30
31	1460	1380	1310	1250	1130	1040	956	889	830	754	685	625	31
32	1610	1520	1440	1360	1240	1140	1050	974	908	826	758	682	32
33	1780	1680	1600	1510	1380	1260	1160	1080	1010	918	840	755	33
34	1960	1850	1750	1660	1510	1390	1280	1190	1110	1010	925	834	34
35	2170	2050	1940	1850	1680	1540	1420	1320	1230	1120	1050	924	35
36	2390	2260	2140	2030	1850	1690	1560	1450	1360	1230	1130	1015	36
37	2660	2510	2380	2260	2050	1880	1740	1610	1510	1370	1255	1130	37
38	2920	2760	2610	2480	2260	2070	1910	1770	1650	1500	1380	1240	38
39	3260	3080	2920	2760	2520	2310	2130	1980	1840	1680	1540	1385	39
40	3580	3380	3210	3040	2770	2540	2340	2170	2030	1850	1690	1520	40
41	3920	3700	3510	3340	3030	2780	2540	2380	2220	2020	1855	1670	41
42	4270	4030	3820	3630	3300	3020	2790	2590	2420	2200	2020	1815	42
43	4540	4280	4060	3860	3500	3210	2960	2750	2570	2340	2140	1930	43
44	4810	4540	4300	4080	3710	3400	3140	2940	2720	2480	2270	2040	44
45	5180	4890	4630	4390	4000	3670	3380	3140	2930	2600	2440	2200	45
46	5520	5210	4940	4700	4270	3910	3610	3350	3130	2840	2610	2350	46
47	6060	5720	5320	5140	4680	4290	3960	3680	3430	3120	2860	2570	47
48	6580	6210	5890	5600	5090	4660	4310	4000	3730	3390	3110	2800	48
49	7100	6700	6350	6040	5490	5030	4640	4310	4030	3660	3350	3020	49
50	7620	7200	6820	6490	5800	5400	4990	4630	4320	3930	3600	3240	50
51	8300	7840	7420	7050	6310	5880	5430	5040	4700	4270	3920	3525	51
52	9000	8500	8050	7620	6950	6380	5880	5460	5080	4630	4250	3820	52
53	9700	9160	8680	8280	7500	6880	6340	5890	5520	5000	4580	4120	53
54	10500	9910	9300	8930	8120	7440	6870	6380	5950	5380	4955	4460	54
55	11210	10590	10030	9550	8660	7940	7330	6810	6360	5770	5290	4760	55
56	12000	11320	10730	10200	9280	8500	7850	7290	6780	6180	5660	5100	56
57	12790	12080	11440	10870	9880	9060	8360	7760	7250	6580	6040	5430	57
58	13620	12880	12200	11580	10520	9650	8910	8270	7720	7020	6440	5790	58
59	14550	13750	13030	12400	11350	10310	9520	8840	8250	7500	6870	6200	59
60	15500	14600	13850	13200	11960	10980	10100	9400	8780	7970	7310	6580	60
61	16920	15980	15140	14380	13070	11980	11060	10270	9590	8710	7990	7190	61
62	18540	17510	16590	15760	14330	13130	12120	11260	10510	9550	8750	7880	62
63	20330	19200	18190	17280	15710	14400	13290	12340	11520	10470	9600	8640	63
64	22400	21160	20040	19040	17310	15870	14650	13600	12670	11540	10580	9520	64
65		23870	22640	21480	19530	17900	16520	15340	14320	13020	11930	10740	65
66		26620	25220	23960	21780	19960	18430	17110	15970	14520	13010	11980	66
67		30140	28550	27130	24660	22600	20870	19370	18080	16440	15070	13560	67
68		33590	31820	30240	27490	25190	23260	21600	20160	18320	16800	15120	68

Horizontal Type

Model : CHH-A



Type A

✲ Rod Table

Rod Size M	M16	M20	M24	M30	M36	M42	M48	M56	M64	*M56	*M64	*M72
Load(kg)	788	789 ~ 1180	1181 ~ 1930	1931 ~ 3100	3101 ~ 4520	4521 ~ 6210	6211 ~ 8170	8171 ~ 11260	11261 ~ 14400	14401 ~ 22640	22641 ~ 30140	30141 ~ 33590

*High tension bolt (chrome molybdenum steel)

✲ Dimensions Controlled by Size No.

(mm)

SIZE NO / SYMBOL	1~3	4~7	8~12	13~20	21~28	29~32	33~36	37~40	41~46	47~50	51~54	55~56	57~60	61~64	65~66	67~68
CL	250	300	330	440	510	650	750	830	920	950	1040	1110	1150	1600	1850	2000
FW	98	98	98	116	124	146	146	192	192	216	242	242	254	292	292	292
LW	50	50	50	65	70	90	90	120	120	180	180	180	180	200	200	200
G	18	18	18	25	25	25	25	30	30	45	45	45	45	55	55	55
S	M16	M16	M16	M24	M24	M30	M30	M42	M42	M64	M64	M64	M64	Ø70	Ø80	Ø80

✲ R, FL, LL, SL (at travel 0 point)

(mm)

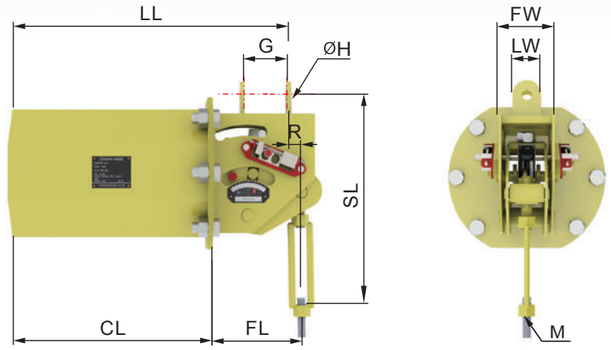
SIZE		TOTAL TRAVEL																						
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
1~3	FL	108	117	126	134	143	152	160	169	178	186	195	204	212	221	230	238								
	LL	343	349	354	357	362	367	372	376	380	383	387	390	392	396	399	402								
	SL	350	345	340	335	330	325	320	315	310	305	300	295	290	285	280	275								
	R	15	18	22	27	31	35	38	43	48	53	58	64	70	75	81	86								
4~7	FL	108	117	126	134	143	152	160	169	178	186	195	204	212	221	230	238								
	LL	396	402	408	413	419	424	430	435	440	444	449	454	458	463	467	470								
	SL	350	345	340	335	330	325	320	315	310	305	300	295	290	285	280	275								
	R	12	15	18	21	24	28	30	34	38	42	46	50	54	58	63	68								
8~12	FL	118	127	136	144	153	162	170	179	188	196	205	214	222	231	240	248	266	283						
	LL	440	446	453	459	466	472	479	485	491	496	502	508	513	518	524	528	544	555						
	SL	405	400	395	390	385	380	375	370	365	360	355	350	345	340	335	330	320	310						
	R	8	11	13	15	17	20	21	24	27	30	33	36	39	43	46	50	52	58						
13~20	FL		137	146	154	163	172	180	189	198	206	215	224	232	241	250	258	276	293	310	327	345			
	LL		568	575	581	588	594	599	606	613	619	625	632	637	643	649	654	667	672	688	698	708			
	SL		465	460	455	450	445	440	435	430	425	420	415	410	405	400	395	385	375	365	355	345			
	R		9	11	13	15	18	21	23	25	27	30	32	35	38	41	44	49	61	62	69	77			
21~28	FL		137	146	154	163	172	180	189	198	206	215	224	232	241	250	258	276	293	310	327	345			
	LL		639	646	653	660	667	673	680	687	693	700	707	713	720	727	732	746	757	769	780	792			
	SL		465	460	455	450	445	440	435	430	425	420	415	410	405	400	395	385	375	365	355	345			
	R		8	10	11	13	15	17	19	21	23	25	27	29	31	33	36	40	46	51	57	63			

(mm)

SIZE		TOTAL TRAVEL																							
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
29~32	FL				169	178	187	195	204	213	221	230	239	247	256	265	273	291	308	325	342	360	386	412	446
	LL				805	812	819	825	832	839	845	852	858	864	870	877	882	895	907	918	929	941	958	975	995
	SL				580	575	570	565	560	555	550	545	540	535	530	525	520	510	500	490	480	470	455	440	420
	R				14	16	18	20	22	24	26	28	31	33	36	38	41	46	51	57	63	69	78	87	101
33~36	FL				169	178	187	195	204	213	221	230	239	247	256	265	273	291	308	325	342	360	386	412	446
	LL				905	912	919	925	932	939	945	952	958	964	970	977	982	995	1007	1018	1029	1041	1058	1075	1095
	SL				580	575	570	565	560	555	550	545	540	535	530	525	520	510	500	490	480	470	455	440	420
	R				14	16	18	20	22	24	26	28	31	33	36	38	41	46	51	57	63	69	78	87	101
37~40	FL						212	220	229	238	246	255	264	272	281	290	298	316	333	350	367	385	411	437	471
	LL						1020	1026	1032	1039	1044	1050	1056	1062	1068	1074	1079	1092	1103	1113	1124	1134	1152	1167	1186
	SL						710	705	700	695	690	685	680	675	670	665	660	650	640	630	620	610	595	580	560
	R						22	24	27	29	32	35	38	40	43	46	49	54	60	67	73	81	89	100	115
41~46	FL						212	220	229	238	246	255	264	272	281	290	298	316	333	350	367	385	411	437	471
	LL						1110	1116	1122	1129	1134	1140	1146	1152	1158	1164	1169	1182	1193	1203	1214	1224	1242	1257	1276
	SL						710	705	700	695	690	685	680	675	670	665	660	650	640	630	620	610	595	580	560
	R						22	24	27	29	32	35	38	40	43	46	49	54	60	67	73	81	89	100	115
47~50	FL							305	313	321	330	338	346	354	362	371	379	395	412	428	444	461	485	510	543
	LL							1255	1265	1270	1280	1290	1295	1305	1315	1320	1330	1345	1360	1380	1395	1410	1435	1460	1495
	SL							905	900	895	890	885	880	870	865	860	855	845	830	820	810	800	780	765	740
	R							0	-2	1	0	-2	1	-1	-3	1	-1	0	2	-2	-1	1	0	0	-2
51~54	FL							305	313	321	330	338	346	354	362	371	379	395	412	428	444	461	485	510	543
	LL							1345	1355	1360	1370	1380	1385	1395	1405	1410	1420	1435	1450	1470	1485	1500	1525	1550	1585
	SL							905	900	895	890	885	880	870	865	860	855	845	830	820	810	800	780	765	740
	R							0	-2	1	0	-2	1	-1	-3	1	-1	0	2	-2	-1	1	0	0	-2
55~56	FL							305	313	321	330	338	346	354	362	371	379	395	412	428	444	461	485	510	543
	LL							1412	1425	1430	1440	1450	1455	1465	1475	1480	1490	1505	1520	1540	1555	1570	1595	1660	1655
	SL							905	900	895	890	885	880	870	865	860	855	845	830	820	810	800	780	765	740
	R							0	-2	1	0	-2	1	-1	-3	1	-1	0	2	-2	-1	1	0	0	-2
57~60	FL							305	313	321	330	338	346	354	362	371	379	395	412	428	444	461	485	525	543
	LL							1455	1465	1470	1480	1490	1495	1505	1515	1520	1530	1545	1560	1580	1595	1570	1635	2125	1695
	SL							905	900	895	890	885	880	870	865	860	855	845	830	820	810	800	780	900	740
	R							0	-2	1	0	-2	1	-1	-3	1	-1	0	2	-2	-1	1	0	0	-2
61~64	FL									336	345	353	361	369	377	386	394	410	427	443	459	461	500	575	558
	LL									1935	1945	1955	1960	1970	1980	1985	1995	2010	2025	2045	2060	2075	2100	2425	2160
	SL									1030	1025	1020	1015	1005	1000	995	990	980	965	955	945	935	915	980	875
	R									1	0	-2	1	-1	-3	1	-1	0	2	-2	-1	1	0	0	-2
65~66	FL														427	436	444	460	477	493	509	526	550	575	608
	LL														2280	2285	2295	2310	2325	2345	2360	2375	2400	2425	2460
	SL														1080	1075	1070	1060	1045	1035	1025	1015	995	980	955
	R														-3	1	-1	0	2	-2	-1	1	0	0	-2
67~68	FL														427	436	444	460	477	493	509	526	550	575	608
	LL														2430	2435	2445	2460	2475	2495	2510	2525	2550	2575	2610
	SL														1080	1075	1070	1060	1045	1035	1025	1015	995	980	955
	R														-3	1	-1	0	2	-2	-1	1	0	0	-2

Horizontal Type

Model : CHH-B



Type B

✲ Rod Table

Rod Size M	M16	M20	M24	M30	M36	M42	M48	M56	M64	*M56	*M64	*M72
Load(kg)	788	789 ~ 1180	1181 ~ 1930	1931 ~ 3100	3101 ~ 4520	4521 ~ 6210	6211 ~ 8170	8171 ~ 11260	11261 ~ 14400	14401 ~ 22640	22641 ~ 30140	30141 ~ 33590

*High tension bolt (chrome molybdenum steel)

✲ Dimensions Controlled by Size No.

(mm)

SIZE NO / SYMBOL	1~3	4~7	8~12	13~20	21~28	29~32	33~36	37~40	41~46	47~50	51~54	55~56	57~60	61~64	65~66	67~68
CL	250	300	330	440	510	650	750	830	920	950	1040	1110	1150	1600	1850	2000
FW	98	98	98	116	124	146	146	192	192	216	242	242	254	292	292	292
LW	50	50	50	65	70	90	90	120	120	180	180	180	180	200	200	200
G	80	130	130	160	160	200	200	250	250	360	360	360	360	400	400	400
ØH	18	18	18	27	27	34	34	47	47	70	70	70	70	78	86	86

✲ R, FL, LL, SL (at travel 0 point)

(mm)

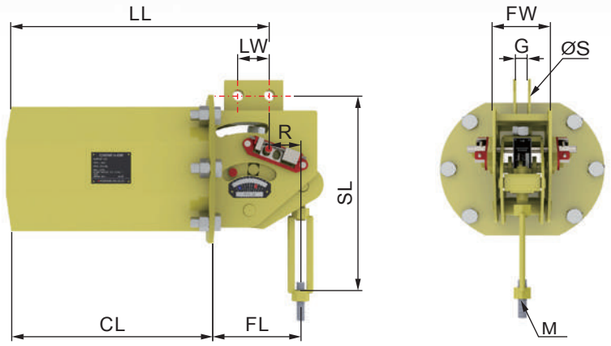
SIZE		TOTAL TRAVEL																						
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
1~3	FL	108	117	126	134	143	152	160	169	178	186	195	204	212	221	230	238								
	LL	358	367	376	384	393	402	410	419	428	436	445	454	462	471	480	488								
	SL	350	345	340	335	330	325	320	315	310	305	300	295	290	285	280	275								
	R	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
4~7	FL	108	117	126	134	143	152	160	169	178	186	195	204	212	221	230	238								
	LL	465	465	465	465	465	465	465	469	478	486	495	504	512	521	530	538								
	SL	350	345	340	335	330	325	320	315	310	305	300	295	290	285	280	275								
	R	-57	-48	-39	-31	-22	-13	-5	0	0	0	0	0	0	0	0	0								
8~12	FL	118	127	136	144	153	162	170	179	188	196	205	214	222	231	240	248	266	283						
	LL	505	505	505	505	505	505	505	509	518	526	535	544	552	561	570	578	596	613						
	SL	405	400	395	390	385	380	375	370	365	360	355	350	345	340	335	330	320	310						
	R	-57	-48	-39	-31	-22	-13	-5	0	0	0	0	0	0	0	0	0	0	0						
13~20	FL		137	146	154	163	172	180	189	198	206	215	224	232	241	250	258	276	293	310	327	345			
	LL		645	645	645	645	645	645	645	645	645	655	665	670	680	690	700	715	735	750	765	785			
	SL		465	460	455	450	445	440	435	430	425	420	415	410	405	400	395	385	375	365	355	345			
	R		-68	-59	-51	-42	-33	-25	-16	-7	1	0	-1	2	1	0	-2	1	-2	0	2	0			
21~28	FL		137	146	154	163	172	180	189	198	206	215	224	232	241	250	258	276	293	310	327	345			
	LL		715	715	715	715	715	715	715	715	715	725	735	740	750	760	770	785	805	820	835	855			
	SL		465	460	455	450	445	440	435	430	425	420	415	410	405	400	395	385	375	365	355	345			
	R		-68	-59	-51	-42	-33	-25	-16	-7	1	0	-1	2	1	0	-2	1	-2	0	2	0			

(mm)

SIZE		TOTAL TRAVEL																							
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
29~32	FL				169	178	187	195	204	213	221	230	239	247	256	265	273	291	308	325	342	360	386	412	446
	LL				890	890	890	890	890	890	890	890	890	895	905	915	925	940	960	975	990	1010	1035	1060	1095
	SL				580	575	570	565	560	555	550	545	540	535	530	525	520	510	500	490	480	470	455	440	420
	R				-71	-62	-53	-45	-36	-27	-19	-10	-1	2	1	0	-2	1	-2	0	2	0	1	2	1
33~36	FL				169	178	187	195	204	213	221	230	239	247	256	265	273	291	308	325	342	360	386	412	446
	LL				990	990	990	990	990	990	990	990	990	995	1005	1015	1025	1040	1060	1075	1090	1110	1135	1160	1195
	SL				580	575	570	565	560	555	550	545	540	535	530	525	520	510	500	490	480	470	455	440	420
	R				-71	-62	-53	-45	-36	-27	-19	-10	-1	2	1	0	-2	1	-2	0	2	0	1	2	1
37~40	FL						212	220	229	238	246	255	264	272	281	290	298	316	333	350	367	385	411	437	471
	LL						1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1145	1165	1180	1195	1215	1240	1265	1300
	SL						710	705	700	695	690	685	680	675	670	665	660	650	640	630	620	610	595	580	560
	R						-98	-90	-81	-72	-64	-55	-46	-38	-29	-20	-12	1	-2	0	2	0	1	2	1
41~46	FL						212	220	229	238	246	255	264	272	281	290	298	316	333	350	367	385	411	437	471
	LL						1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230	1235	1255	1270	1285	1305	1330	1355	1390
	SL						710	705	700	695	690	685	680	675	670	665	660	650	640	630	620	610	595	580	560
	R						-98	-90	-81	-72	-64	-55	-46	-38	-29	-20	-12	1	-2	0	2	0	1	2	1
47~50	FL							305	313	321	330	338	346	354	362	371	379	395	412	428	444	461	485	510	543
	LL							1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1411	1435	1460	1495
	SL							905	900	895	890	885	880	870	865	860	855	845	830	820	810	800	780	765	740
	R							-140	-132	-124	-115	-107	-99	-91	-83	-74	-66	-50	-33	-17	-1	1	0	0	-2
51~54	FL							305	313	321	330	338	346	354	362	371	379	395	412	428	444	461	485	510	543
	LL							1485	1485	1485	1485	1485	1485	1485	1485	1485	1485	1485	1485	1485	1485	1500	1525	1550	1585
	SL							905	900	895	890	885	880	870	865	860	855	845	830	820	810	800	780	765	740
	R							-140	-132	-124	-115	-107	-99	-91	-83	-74	-66	-50	-33	-17	-1	1	0	0	-2
55~56	FL							305	313	321	330	338	346	354	362	371	379	395	412	428	444	461	485	510	543
	LL							1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1570	1595	1620	1655
	SL							905	900	895	890	885	880	870	865	860	855	845	830	820	810	800	780	765	740
	R							-140	-132	-124	-115	-107	-99	-91	-83	-74	-66	-50	-33	-17	-1	1	0	0	-2
57~60	FL							305	313	321	330	338	346	354	362	371	379	395	412	428	444	461	485	510	543
	LL							1595	1595	1595	1595	1595	1595	1595	1595	1595	1595	1595	1595	1595	1595	1610	1635	1660	1695
	SL							905	900	895	890	885	880	870	865	860	855	845	830	820	810	800	780	765	740
	R							-140	-132	-124	-115	-107	-99	-91	-83	-74	-66	-50	-33	-17	-1	1	0	0	-2
61~64	FL									336	345	353	361	369	377	386	394	410	427	443	459	476	500	525	558
	LL									2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2125	2160
	SL									1030	1025	1020	1015	1005	1000	995	990	980	965	955	945	935	915	900	875
	R									-164	-155	-147	-139	-131	-123	-114	-106	-90	-73	-57	-41	-24	0	0	-2
65~66	FL														427	436	444	460	477	493	509	526	550	575	608
	LL														2400	2400	2400	2400	2400	2400	2400	2400	2400	2425	2460
	SL														1080	1075	1070	1060	1045	1035	1025	1015	995	980	955
	R														-123	-114	-106	-90	-73	-57	-41	-24	0	0	-2
67~68	FL														427	436	444	460	477	493	509	526	550	575	608
	LL														2550	2550	2550	2550	2550	2550	2550	2550	2550	2575	2610
	SL														1080	1075	1070	1060	1045	1035	1025	1015	995	980	955
	R														-123	-114	-106	-90	-73	-57	-41	-24	0	0	-2

Horizontal Type

Model : CHH-C



Type C

✲ Rod Table

Rod Size M	M16	M20	M24	M30	M36	M42	M48	M56	M64	*M56	*M64	*M72
Load(kg)	788	789 ~ 1180	1181 ~ 1930	1931 ~ 3100	3101 ~ 4520	4521 ~ 6210	6211 ~ 8170	8171 ~ 11260	11261 ~ 14400	14401 ~ 22640	22641 ~ 30140	30141 ~ 33590

*High tension bolt (chrome molybdenum steel)

✲ Dimensions Controlled by Size No.

(mm)

SIZE NO / SYMBOL	1~3	4~7	8~12	13~20	21~28	29~36	37~46	47~50	51~52	53~56	57~60	61~64	65~66	67~68
CL	286	316	346	451	481	599	762	999	999	1019	1052	1225	1850	2000
FW	98	98	98	116	124	146	192	216	248	248	254	292	254	292
LW	65	65	75	75	75	100	125	150	150	150	150	200	150	200
G	18	18	18	25	25	25	30	45	45	45	45	55	45	55
ØS	16	16	16	24	24	30	42	64	64	64	64	75	75	75

✲ R, FL, LL, SL (at travel 0 point)

(mm)

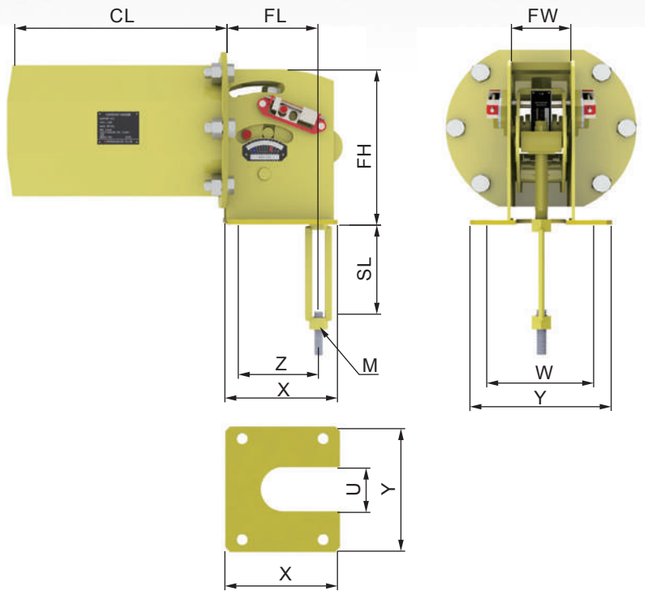
SIZE		TOTAL TRAVEL																							
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
1~3	FL	108	117	126	134	143	152	160	169	178	186	195	204	212	221	230	238								
	LL	394	403	412	420	429	438	446	455	464	472	481	490	498	507	516	524								
	SL	350	345	340	335	330	325	320	315	310	305	300	295	290	285	280	275								
	R	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
4~7	FL	108	117	126	134	143	152	160	169	178	186	195	204	212	221	230	238								
	LL	424	433	442	450	459	468	476	485	494	502	511	520	528	537	546	554								
	SL	350	345	340	335	330	325	320	315	310	305	300	295	290	285	280	275								
	R	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
8~12	FL	118	127	136	144	153	162	170	179	188	196	205	214	222	231	240	248	266	283						
	LL	464	473	482	490	499	508	516	525	534	542	551	560	568	577	586	594	612	629						
	SL	405	400	395	390	385	380	375	370	365	360	355	350	345	340	335	330	320	310						
	R	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
13~20	FL		137	146	154	163	172	180	189	198	206	215	224	232	241	250	258	276	293	310	327	345			
	LL		588	597	605	614	623	631	640	649	657	666	675	683	692	701	709	727	744	761	778	796			
	SL		465	460	455	450	445	440	435	430	425	420	415	410	405	400	395	385	375	365	355	345			
	R		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			

(mm)

SIZE		MAX.TRAVEL																							
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
21~28	FL		137	146	154	163	172	180	189	198	206	215	224	232	241	250	258	276	293	310	327	345			
	LL		618	627	635	644	653	661	670	679	687	696	705	713	722	731	739	757	774	791	808	826			
	SL		465	460	455	450	445	440	435	430	425	420	415	410	405	400	395	385	375	365	355	345			
	R		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
29~36	FL				159	168	177	185	194	203	211	220	229	237	246	255	263	281	298	315	332	350	376	402	436
	LL				758	767	776	784	793	802	810	819	828	836	845	854	862	880	897	914	931	949	975	1001	1035
	SL				580	575	570	565	560	555	550	545	540	535	530	525	520	510	500	490	480	470	455	440	420
	R				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37~46	FL						202	210	219	228	236	245	254	262	271	280	288	306	323	340	357	375	401	427	461
	LL						964	972	981	990	998	1007	1016	1024	1033	1042	1050	1068	1085	1102	1119	1137	1163	1189	1223
	SL						710	705	700	695	690	685	680	675	670	665	660	650	640	630	620	610	595	580	560
	R						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47~50	FL							320	328	336	345	353	361	369	377	386	394	410	427	443	459	476	500	525	558
	LL							1319	1327	1335	1344	1352	1360	1368	1376	1385	1393	1409	1426	1442	1458	1475	1499	1524	1544
	SL							905	900	895	890	885	880	870	865	860	855	845	830	820	810	800	780	765	740
	R							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51~52	FL							320	328	336	345	353	361	369	377	386	394	410	427	443	459	476	500	525	558
	LL							1319	1327	1335	1344	1352	1360	1368	1376	1385	1393	1409	1426	1442	1458	1475	1499	1524	1544
	SL							905	900	895	890	885	880	870	865	860	855	845	830	820	810	800	780	765	740
	R							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53~56	FL							320	328	336	345	353	361	369	377	386	394	410	427	443	459	476	500	525	558
	LL							1339	1347	1355	1364	1372	1380	1388	1396	1405	1413	1429	1446	1462	1478	1495	1519	1544	1577
	SL							905	900	895	890	885	880	870	865	860	855	845	830	820	810	800	780	765	740
	R							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57~60	FL							320	328	336	345	353	361	369	377	386	394	410	427	443	459	476	500	525	558
	LL							1372	1380	1388	1397	1405	1413	1421	1429	1438	1446	1462	1479	1495	1511	1528	1552	1577	1610
	SL							905	900	895	890	885	880	870	865	860	855	845	830	820	810	800	780	765	740
	R							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61~64	FL									336	345	353	361	369	377	386	394	410	427	443	459	476	500	525	558
	LL									1561	1570	1578	1586	1594	1602	1611	1619	1635	1652	1668	1684	1701	1725	1750	1785
	SL									1025	1020	1015	1010	1000	995	990	985	975	960	950	940	930	910	895	870
	R									0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65~66	FL														427	436	444	460	477	493	509	526	550	575	608
	LL														2352	2361	2369	2385	2402	2418	2434	2451	2475	2500	2533
	SL														1080	1075	1070	1060	1045	1035	1025	1015	995	980	955
	R														0	0	0	0	0	0	0	0	0	0	0
67~68	FL														427	436	444	460	477	493	509	526	550	575	608
	LL														2502	2511	2519	2535	2552	2568	2584	2601	2625	2650	2683
	SL														1080	1075	1070	1060	1045	1035	1025	1015	995	980	955
	R														0	0	0	0	0	0	0	0	0	0	0

Horizontal Type

Model : CHH-D



Type D

Rod Table

Rod Size M	M16	M20	M24	M30	M36	M42	M48	M56	M64	*M56	*M64	*M72
Load(kg)	788	789 ~ 1180	1181 ~ 1930	1931 ~ 3100	3101 ~ 4520	4521 ~ 6210	6211 ~ 8170	8171 ~ 11260	11261 ~ 14400	14401 ~ 22640	22641 ~ 30140	30141 ~ 33590

*High tension bolt (chrome molybdenum steel)

Dimensions Controlled by Size No.

(mm)

SYMBOL \ SIZE NO	1~3	4~7	8~12	13~20	21~28	29~36	37~46	47~50	51~52	53~56	57~60	61~64
CL	286	316	346	451	481	599	762	999	1040	1110	1052	1150
FW	98	98	98	116	124	146	192	216	242	242	254	292
Y	170	170	190	240	240	270	320	390	430	430	430	480
W	140	140	150	190	190	210	260	310	350	350	350	390
U	76	76	76	92	100	120	130	170	202	202	140	220

FH, X, Z, FL,SL (at travel 0 point)

(mm)

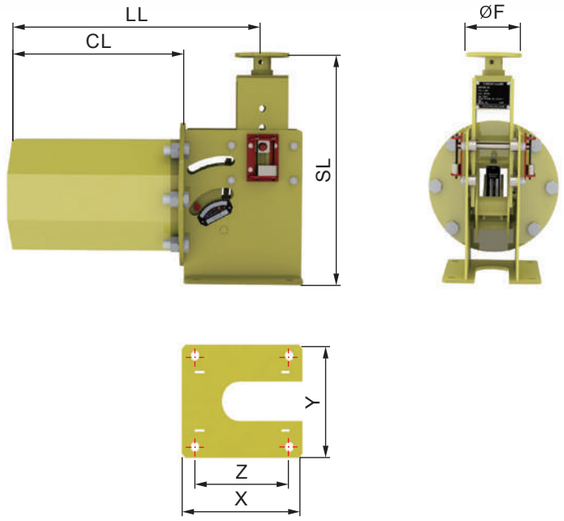
SIZE		TOTAL TRAVEL																							
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
1~3	FH	216	216	216	231	231	231	256	256	256	256	256	281	281	281	281	281								
	X	160	160	160	185	185	185	230	230	230	230	230	270	270	270	270	270								
	Z	110	110	110	135	135	135	180	180	180	180	180	220	220	220	220	220								
	FL	108	117	126	134	143	152	160	169	178	186	195	204	212	221	230	238								
	SL	169	164	159	139	134	129	99	94	89	84	79	49	44	39	34	29								
4~7	FH	216	216	216	231	231	231	256	256	256	256	256	281	281	281	281	281								
	X	160	160	160	185	185	185	230	230	230	230	230	270	270	270	270	270								
	Z	110	110	110	135	135	135	180	180	180	180	180	220	220	220	220	220								
	FL	108	117	126	134	143	152	160	169	178	186	195	204	212	221	230	238								
	SL	169	164	159	139	134	129	99	94	89	84	79	49	44	39	34	29								

(mm)

SIZE		TOTAL TRAVEL																							
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
8~12	FH	280	280	280	280	280	280	300	300	300	300	300	330	330	330	330	330	340	340						
	X	200	200	200	200	200	200	245	245	245	245	245	290	290	290	290	290	290	290						
	Z	130	130	130	130	130	130	175	175	175	175	175	220	220	220	220	220	220	220						
	FL	118	127	136	144	153	162	170	179	188	196	205	214	222	231	240	248	266	283						
	SL	90	85	80	75	70	65	40	35	30	25	20	-15	-20	-25	-30	-35	-55	-65						
13~20	FH		340	340	340	340	340	360	360	360	360	360	385	385	385	385	385	405	405	435	435	435			
	X		235	235	235	235	235	270	270	270	270	270	310	310	310	310	310	340	340	390	390	390			
	Z		171	171	171	171	171	206	206	206	206	206	246	246	246	246	246	276	276	326	326	326			
	FL		137	146	154	163	172	180	189	198	206	215	224	232	241	250	258	276	293	310	327	345			
	SL		85	80	75	70	65	40	35	30	25	20	-10	-15	-20	-25	-30	-60	-70	-110	-120	-130			
21~28	FH		340	340	340	340	340	360	360	360	360	360	385	385	385	385	385	405	405	435	435	435			
	X		235	235	235	235	235	270	270	270	270	270	310	310	310	310	310	340	340	390	390	390			
	Z		171	171	171	171	171	206	206	206	206	206	246	246	246	246	246	276	276	326	326	326			
	FL		137	146	154	163	172	180	189	198	206	215	224	232	241	250	258	276	293	310	327	345			
	SL		85	80	75	70	65	40	35	30	25	20	-10	-15	-20	-25	-30	-60	-70	-110	-120	-130			
29~36	FH				440	440	440	440	440	440	440	440	465	465	465	465	465	485	485	515	515	515	540	555	575
	X				290	290	290	290	290	290	290	290	350	350	350	350	350	280	280	440	440	440	480	480	480
	Z				210	210	210	210	210	210	210	210	270	270	270	270	270	300	300	360	360	360	400	400	400
	FL				159	168	177	185	194	203	211	220	229	237	246	255	263	281	298	315	332	350	376	402	436
	SL				80	75	70	65	60	55	50	45	15	10	5	0	-5	-35	-45	-85	-95	-105	-145	-175	-215
37~46	FH						525	525	525	525	525	525	550	550	550	550	550	570	570	605	605	605	620	635	655
	X						340	340	340	340	340	340	380	380	380	380	380	410	410	480	480	480	500	500	500
	Z						260	260	260	260	260	260	300	300	300	300	300	330	330	400	400	400	420	420	420
	FL						202	210	219	228	236	245	254	262	271	280	288	306	323	340	357	375	401	427	461
	SL						85	80	75	70	65	60	30	25	20	15	10	-20	-30	-75	-85	-95	-125	-155	-195
47~50	FH							694	694	694	694	694	714	714	714	714	714	719	719	739	739	739	759	764	779
	X							530	530	530	530	530	530	530	530	530	530	560	560	605	605	605	625	625	685
	Z							450	450	450	450	450	450	450	450	450	450	480	480	525	525	525	545	545	545
	FL							320	328	336	345	353	361	369	377	386	394	410	427	443	459	476	500	525	558
	SL							76	71	66	61	56	31	21	16	11	6	-9	-24	-54	-64	-74	-114	-134	-174
51~52	FH							800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
	X							530	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
	Z							450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450
	FL							305	313	321	330	338	346	354	362	371	379	395	412	428	444	461	485	510	543
	SL							395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
53~56	FH							800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
	X							530	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
	Z							450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450
	FL							305	313	321	330	338	346	354	362	371	379	395	412	428	444	461	485	510	543
	SL							395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
57~60	FH							704	704	704	704	704	714	714	714	714	714	724	724	754	754	754	764	774	794
	X							560	560	560	560	560	560	560	560	560	560	560	560	605	605	605	625	625	685
	Z							480	480	480	480	480	480	480	480	480	480	480	480	525	525	525	545	545	545
	FL							320	328	336	345	353	361	369	377	386	394	410	427	443	459	476	500	525	558
	SL							76	71	66	61	56	41	31	26	21	16	-4	-19	-59	-69	-79	-109	-134	-179
61~64	FH									760	760	760	760	760	760	760	760	800	800	800	800	800	840	840	840
	X									620	620	620	620	620	620	620	620	650	650	650	650	650	685	685	685
	Z									530	530	530	530	530	530	530	530	560	560	560	560	560	595	595	595
	FL									336	345	353	361	369	377	386	394	410	427	443	459	476	500	525	558
	SL									100	95	90	85	75	70	65	60	10	-5	-15	-25	-35	-95	-110	-135

Horizontal Type

Model : CHH-F



Type F

※ Dimensions Controlled by Size No.

(mm)

SIZE NO / SYMBOL	1~3	4~7	8~12	13~20	21~28	29~36	37~46	47~50	51~52	53~56	57~60	61~64	65~66	67~68
CL	286	316	346	451	481	599	762	999	1040	1019	1052	1600	1850	2000
ØF	130	150	150	190	190	200	250	250	250	250	250			
Y	190	190	220	260	290	300	360	440	470	470	470			

※ LL, SL, X, Z (at travel 0 point)

(mm)

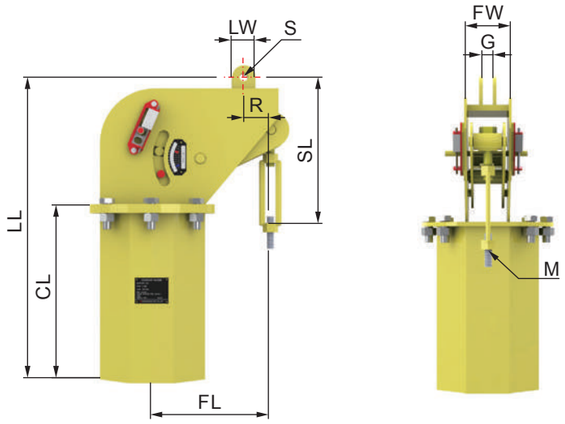
SIZE		TOTAL TRAVEL																							
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
1~3	SL			395	400	405	455	460	465	515	520	525	575	580	585	620	625								
	LL			419	419	419	444	444	444	474	474	474	499	499	499	524	524								
	X			200	200	200	225	225	225	255	255	255	280	280	280	305	305								
	Z			150	150	150	175	175	175	205	205	205	230	230	230	255	255								
4~7	SL			400	405	410	460	465	470	520	525	530	580	585	590	625	630		713	750		835		934	
	LL			449	449	449	474	474	474	504	504	504	529	529	529	554	554		594	614		649		714	
	X			200	200	200	225	225	225	255	255	255	280	280	280	305	305		345	365		400		455	
	Z			150	150	150	175	175	175	205	205	205	230	230	230	255	255		295	315		350		405	
8~12	SL			430	435	475	480	485	550	555	560	565	645	650	655	660	665								
	LL			509	509	509	509	509	534	534	534	534	584	584	584	584	584								
	X			250	250	250	250	250	275	275	275	275	325	325	325	325	325								
	Z			180	180	180	180	180	205	205	205	205	255	255	255	255	255								

(mm)

SIZE		TOTAL TRAVEL																							
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
13~20	SL							610	615	620	625	630	710	715	720	725	730	800	810	900	910	920			
	LL							574	574	574	574	574	614	614	614	614	614	664	664	701	701	701			
	X							320	320	320	320	320	360	360	360	360	360	410	410	447	447	447			
	Z							256	256	256	256	256	296	296	296	296	296	346	346	383	383	383			
21~28	SL							610	615	620	625	630	710	715	720	725	730	800	810	905	915	925			
	LL							689	689	689	689	689	729	729	729	729	729	779	779	816	816	816			
	X							320	320	320	320	320	360	360	360	360	360	410	410	447	447	447			
	Z							256	256	256	256	256	296	296	296	296	296	346	346	383	383	383			
29~36	SL								720	725	730	735	785	790	795	800	805	855	865	965	975	985	1030	1095	1195
	LL								844	844	844	844	864	864	864	864	864	894	894	949	949	949	979	1009	1049
	X								360	360	360	360	380	380	380	380	380	410	410	465	465	465	495	525	565
	Z								280	280	280	280	300	300	300	300	300	330	330	385	385	385	415	445	485
37~46	SL										785	790	840	845	850	855	860	915	915	1000	1010	1020	1085	1135	1225
	LL										1052	1052	1072	1072	1072	1072	1072	1102	1102	1132	1132	1132	1182	1202	1252
	X										410	410	430	430	430	430	430	460	460	490	490	490	540	560	610
	Z										330	330	350	350	350	350	350	380	380	410	410	410	460	480	530
47~50	SL							996	1002	1008	1014	1020	1066	1072	1078	1084	1090	1123	1135	1191	1203	1215	1250	1300	1340
	LL							1379	1379	1379	1379	1379	1379	1379	1379	1379	1379	1419	1419	1469	1469	1469	1529	1529	1569
	X							550	550	550	550	550	550	550	550	550	550	590	590	640	640	640	700	700	740
	Z							470	470	470	470	470	470	470	470	470	470	510	510	560	560	560	620	620	660
51	SL							1230	1230	1230	1230	1230	1280	1280	1280	1280	1280	1315	1335	1395	1395	1395	1440	1470	1510
	LL							1462	1462	1462	1462	1462	1508	1508	1508	1508	1508	1544	1563	1602	1602	1602	1647	1675	1712
	X							520	520	520	520	520	570	570	570	570	570	590	611	671	671	671	701	731	771
	Z							440	440	440	440	440	490	490	490	490	490	510	531	591	591	591	621	651	691
52~56	SL							1020	1026	1032	1038	1044	1089	1095	1101	1107	1113	1164	1175	1227	1239	1250	1307	1324	1387
	LL							1399	1399	1399	1399	1399	1399	1399	1399	1399	1399	1439	1439	1499	1499	1499	1529	1559	1599
	X							560	560	560	560	560	560	560	560	560	560	600	600	660	660	660	690	720	760
	Z							480	480	480	480	480	480	480	480	480	480	520	520	580	580	580	610	640	680
57~60	SL							1078	1084	1090	1096	1102	1126	1132	1138	1144	1150	1191	1202	1264	1276	1287	1334	1381	1434
	LL							1432	1432	1432	1432	1432	1432	1432	1432	1432	1432	1472	1472	1532	1532	1532	1562	1592	1632
	X							560	560	560	560	560	560	560	560	560	560	600	600	660	660	660	690	720	760
	Z							480	480	480	480	480	480	480	480	480	480	520	520	580	580	580	610	640	680
61~64	SL																								
	LL									1986	1986	1986	2024	2024	2024	2024	2024	2060	2079	2118	2118	2118	2163	2191	2228
	X																								
	Z									560	560	560	610	610	610	610	610	630	651	711	711	711	741	771	781
65~66	SL																								
	LL														2483	2483	2483	2510	2529	2568	2568	2568	2613	2641	2678
	X																								
	Z														678	678	678	698	719	779	779	779	809	839	879
67~68	SL																								
	LL														2483	2483	2483	2510	2529	2568	2568	2568	2613	2641	2678
	X																								
	Z														678	678	678	698	719	779	779	779	809	839	879

Vertical Type

Model : CHV-B



Type B

✲ Rod Table

Rod Size M	M16	M20	M24	M30	M36	M42	M48	M56	M64	*M56	*M64	*M72
Load(kg)	788	789 ~ 1180	1181 ~ 1930	1931 ~ 3100	3101 ~ 4520	4521 ~ 6210	6211 ~ 8170	8171 ~ 11260	11261 ~ 14400	14401 ~ 22640	22641 ~ 30140	30141 ~ 33590

*High tension bolt (chrome molybdenum steel)

✲ Dimensions Controlled by Size No.

(mm)

SIZE NO / SYMBOL	8~12	13~20	21~28	29~32	33~36	37~40	41~46	47~50	51~54	55~56	57~60	61~64
CL	330	440	510	650	750	830	920	950	1040	1110	1150	1600
LL	575	725	795	1035	1135	1330	1420	1625	1715	1785	1825	2310
FW	98	116	124	146	146	192	192	216	242	242	254	292
LW	50	65	65	90	90	120	120	180	180	180	180	200
G	18	25	25	25	25	30	30	45	45	45	45	55
S	M16	M24	M24	M30	M30	M42	M42	M64	M64	M64	M64	Ø70

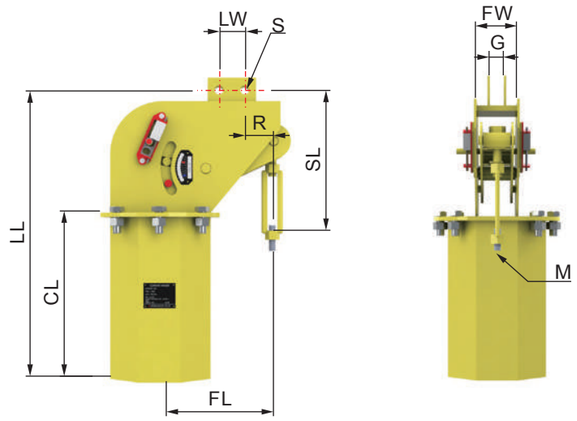
✲ FL,SL,R (at travel 0 point)

(mm)

SIZE		TOTAL TRAVEL																									
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
8~12	FL		112	121	129	138	147	155	164	173															
	SL		390	385	380	375	370	365	360	355															
	R		5	6	7	9	11	13	15	17															
13~20	FL				164	173	182	190	199	208	216	225													
	SL				425	420	415	410	405	400	395	390													
	R				8	10	12	13	15	17	18	20													
21~28	FL				164	173	182	190	199	208	216	225													
	SL				425	420	415	410	405	400	395	390													
	R				6	7	8	8	10	12	13	15													
29~32	FL							220	229	238	246	255	264	272	281	290									
	SL							545	540	535	530	525	520	515	510	505									
	R							10	11	12	14	15	16	18	19	21									
33~36	FL							220	229	238	246	255	264	272	281	290									
	SL							545	540	535	530	525	520	515	510	505									
	R							10	11	12	14	15	16	18	19	21									
37~40	FL										271	280	289	297	306	315	323	341	358	375	392	410	436	462	496
	SL										680	675	670	665	660	655	650	640	630	620	610	600	585	570	550
	R										14	16	18	20	21	23	25	29	33	37	42	46	54	62	73
41~46	FL										271	280	289	297	306	315	323	341	358	375	392	410	436	462	496
	SL										680	675	670	665	660	655	650	640	630	620	610	600	585	570	550
	R										14	16	18	20	21	23	25	29	33	37	42	46	54	62	73
47~50	FL											353	361	369	377	386	394	410	427	443	459	476	500	525	558
	SL											810	805	795	790	785	780	770	755	745	735	725	705	690	665
	R											19	21	23	25	26	29	33	37	41	46	50	59	67	79
51~54	FL											353	361	369	377	386	394	410	427	443	459	476	500	525	558
	SL											810	805	795	790	785	780	770	755	745	735	725	705	690	665
	R											17	18	20	21	22	24	29	32	36	40	44	51	58	68
55~56	FL											353	361	369	377	386	394	410	427	443	459	476	500	525	558
	SL											810	805	795	790	785	780	770	755	745	735	725	705	690	665
	R											17	18	20	21	22	24	29	32	36	40	44	51	58	68
57~60	FL											353	361	369	377	386	394	410	427	443	459	476	500	525	558
	SL											810	805	795	790	785	780	770	755	745	735	725	705	690	665
	R											15	17	18	19	21	23	25	29	32	36	40	46	51	52
61~64	FL												388	396	404	413	421	437	454	470	486	503	527	552	585
	SL												890	880	875	870	865	855	840	830	820	810	790	775	750
	R												18	20	21	22	24	29	32	36	40	44	51	58	68

Vertical Type

Model : CHV-C



Type C

※ Rod Table

Rod Size M	M16	M20	M24	M30	M36	M42	M48	M56	M64	*M56	*M64	*M72
Load(kg)	788	789 ~ 1180	1181 ~ 1930	1931 ~ 3100	3101 ~ 4520	4521 ~ 6210	6211 ~ 8170	8171 ~ 11260	11261 ~ 14400	14401 ~ 22640	22641 ~ 30140	30141 ~ 33590

*High tension bolt (chrome molybdenum steel)

※ Dimensions Controlled by Size No.

(mm)

SIZE NO / SYMBOL	8~12	13~20	21~28	29~32	33~36	37~40	41~46	47~50	51~54	55~56	57~60	61~64
CL	330	440	510	650	750	830	920	950	1040	1110	1150	1600
LL	575	725	795	1035	1135	1330	1420	1625	1715	1785	1825	2310
FW	98	116	124	146	146	192	192	216	242	242	254	292
LW	75	75	75	100	100	125	125	150	150	150	150	200
G	18	25	25	25	25	30	30	45	45	45	45	55
S	M16	M24	M24	M30	M30	M42	M42	M64	M64	M64	M64	Ø70

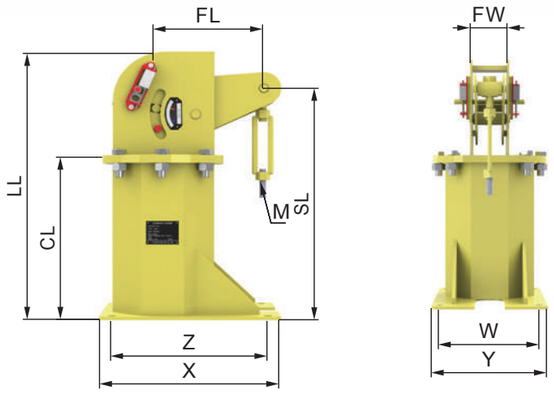
※ FL,SL,R (at travel 0 point)

(mm)

SIZE NO		TOTAL TRAVEL																									
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
8~12	FL		112	121	129	138	147	155	164	173															
	SL		390	385	380	375	370	365	360	355															
	R		5	6	7	9	11	13	15	17															
13~20	FL				164	173	182	190	199	208	216	225													
	SL				425	420	415	410	405	400	395	390													
	R				8	10	12	13	15	17	18	20													
21~28	FL				164	173	182	190	199	208	216	225													
	SL				425	420	415	410	405	400	395	390													
	R				6	7	8	8	10	12	13	15													
29~32	FL							220	229	238	246	255	264	272	281	290									
	SL							545	540	535	530	525	520	515	510	505									
	R							10	11	12	14	15	16	18	19	21									
33~36	FL							220	229	238	246	255	264	272	281	290									
	SL							545	540	535	530	525	520	515	510	505									
	R							10	11	12	14	15	16	18	19	21									
37~40	FL										271	280	289	297	306	315	323	341	358	375	392	410	436	462	496
	SL										680	675	670	665	660	655	650	640	630	620	610	600	585	570	550
	R										14	16	18	20	21	23	25	29	33	37	42	46	54	62	73
41~46	FL										271	280	289	297	306	315	323	341	358	375	392	410	436	462	496
	SL										680	675	670	665	660	655	650	640	630	620	610	600	585	570	550
	R										14	16	18	20	21	23	25	29	33	37	42	46	54	62	73
47~50	FL											353	361	369	377	386	394	410	427	443	459	476	500	525	558
	SL											810	805	795	790	785	780	770	755	745	735	725	705	690	665
	R											19	21	23	25	26	29	33	37	41	46	50	59	67	79
51~54	FL											353	361	369	377	386	394	410	427	443	459	476	500	525	558
	SL											810	805	795	790	785	780	770	755	745	735	725	705	690	665
	R											17	18	20	21	22	24	29	32	36	40	44	51	58	68
55~56	FL											353	361	369	377	386	394	410	427	443	459	476	500	525	558
	SL											810	805	795	790	785	780	770	755	745	735	725	705	690	665
	R											17	18	20	21	22	24	29	32	36	40	44	51	58	68
57~60	FL											353	361	369	377	386	394	410	427	443	459	476	500	525	558
	SL											810	805	795	790	785	780	770	755	745	735	725	705	690	665
	R											15	17	18	19	21	23	25	29	32	36	40	46	51	52
61~64	FL												388	396	404	413	421	437	454	470	486	503	527	552	585
	SL												890	880	875	870	865	855	840	830	820	810	790	775	750
	R												18	20	21	22	24	29	32	36	40	44	51	58	68

Vertical Type

Model : CHV-D



Type D

Rod Table

Rod Size M	M16	M20	M24	M30	M36	M42	M48	M56	M64	*M56	*M64	*M72
Load(kg)	788	789 ~ 1180	1181 ~ 1930	1931 ~ 3100	3101 ~ 4520	4521 ~ 6210	6211 ~ 8170	8171 ~ 11260	11261 ~ 14400	14401 ~ 22640	22641 ~ 30140	30141 ~ 33590

*High tension bolt (chrome molybdenum steel)

Dimensions Controlled by Size No.

(mm)

SYMBOL \ SIZE NO	8~12	13~20	21~28	29~32	33~36	37~38	39~40	41~46
CL	350	490	560	700	800	820	880	970
LL	560	790	860	1070	1170	1250	1310	1400
FW	98	116	124	146	146	192	192	192
X	280	380	380	450	450	560	560	560
Y	260	300	300	330	330	450	450	450
Z	240	330	330	390	390	500	500	500
W	220	250	250	270	270	390	390	390

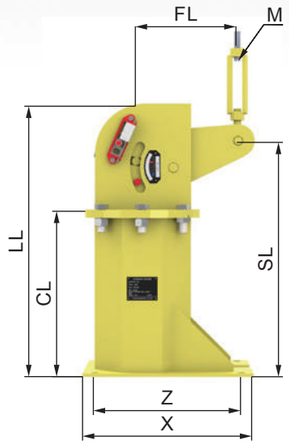
FL,SL (at travel 0 point)

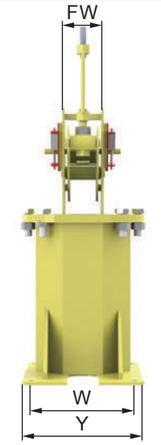
(mm)

SIZE		TOTAL TRAVEL																							
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
8~12	FL							155	164	173	181	190	199	207	216	225	233	251	268						
	SL							480	485	490	495	500	505	510	515	520	525	535	545						
13~20	FL									208	216	225	234	242	251	260	268	286	303	320	337	355			
	SL									640	645	650	655	660	665	670	675	685	695	705	715	725			
21~28	FL									208	216	225	234	242	251	260	268	286	303	320	337	355			
	SL									710	715	720	725	730	735	740	745	755	765	775	785	795			
29~32	FL									238	246	255	264	272	281	290	298	316	333	350	367	385	411	437	471
	SL									865	870	875	880	885	890	895	900	910	920	930	940	950	965	980	1000
33~36	FL									238	246	255	264	272	281	290	298	316	333	350	367	385	411	437	471
	SL									965	970	975	980	985	990	995	1000	1010	1020	1030	1040	1050	1065	1080	1100
37~38	FL												294	302	311	320	328	346	363	380	397	415	441	467	501
	SL												1025	1030	1035	1040	1045	1055	1065	1075	1085	1095	1110	1125	1145
39~40	FL												294	302	311	320	328	346	363	380	397	415	441	467	501
	SL												1085	1090	1095	1100	1105	1115	1125	1135	1145	1155	1170	1185	1205
41~46	FL												294	302	311	320	328	346	363	380	397	415	441	467	501
	SL												1175	1180	1185	1190	1195	1205	1215	1225	1235	1245	1260	1275	1295

Vertical Type

Model : CHV-F





Type F

Rod Table

Rod Size M	M16	M20	M24	M30	M36	M42	M48	M56	M64	*M56	*M64	*M72
Load(kg)	788	789 ~ 1180	1181 ~ 1930	1931 ~ 3100	3101 ~ 4520	4521 ~ 6210	6211 ~ 8170	8171 ~ 11260	11261 ~ 14400	14401 ~ 22640	22641 ~ 30140	30141 ~ 33590

*High tension bolt (chrome molybdenum steel)

Dimensions Controlled by Size No.

(mm)

SYMBOL \ SIZE NO	8~12	13~20	21~28	29~32	33~36	37~38	39~40	41~46
CL	350	490	560	700	800	820	880	970
LL	560	790	860	1070	1170	1250	1310	1400
FW	98	116	124	146	146	192	192	192
X	280	380	380	450	450	560	560	560
Y	260	300	300	330	330	450	450	450
Z	240	330	330	390	390	500	500	500
W	220	250	250	270	270	390	390	390

FL,SL (at travel 0 point)

(mm)

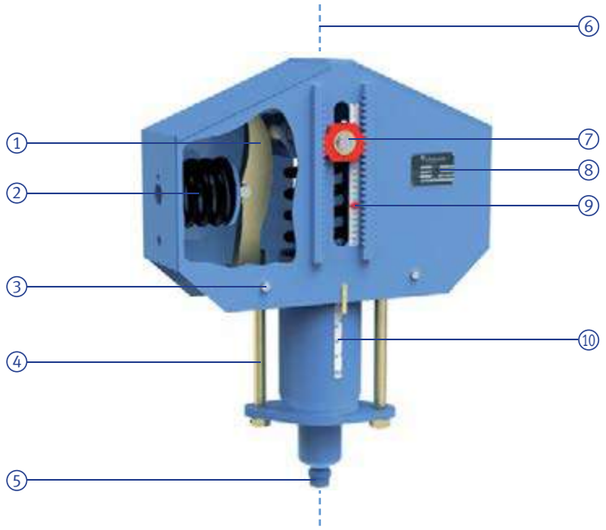
SIZE		TOTAL TRAVEL																							
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	330	360	400
8~12	FL	103	112	121	129	138	147	155	164	173	181	190	199	207	216	225	233	251	268						
	SL	450	455	460	465	470	475	480	485	490	495	500	505	510	515	520	525	535	545						
13~20	FL		147	156	164	173	182	190	199	208	216	225	234	242	251	260	268	286	303	320	337	355			
	SL		605	610	615	620	625	630	635	640	645	650	655	660	665	670	675	685	695	705	715	725			
21~28	FL		147	156	164	173	182	190	199	208	216	225	234	242	251	260	268	286	303	320	337	355			
	SL		675	680	685	690	695	700	705	710	715	720	725	730	735	740	745	755	765	775	785	795			
29~32	FL				194	203	212	220	229	238	246	255	264	272	281	290	298	316	333	350	367	385	411	437	471
	SL				840	845	850	855	860	865	870	875	880	885	890	895	900	910	920	930	940	950	965	980	1000
33~36	FL				194	203	212	220	229	238	246	255	264	272	281	290	298	316	333	350	367	385	411	437	471
	SL				940	945	950	955	960	965	970	975	980	985	990	995	1000	1010	1020	1030	1040	1050	1065	1080	1100
37~38	FL						242	250	259	268	276	285	294	302	311	320	328	346	363	380	397	415	441	467	501
	SL						995	1000	1005	1010	1015	1020	1025	1030	1035	1040	1045	1055	1065	1075	1085	1095	1110	1125	1145
39~40	FL						242	250	259	268	276	285	294	302	311	320	328	346	363	380	397	415	441	467	501
	SL						1055	1060	1065	1070	1075	1080	1085	1090	1095	1100	1105	1115	1125	1135	1145	1155	1170	1185	1205
41~46	FL						242	250	259	268	276	285	294	302	311	320	328	346	363	380	397	415	441	467	501
	SL						1145	1150	1155	1160	1165	1170	1175	1180	1185	1190	1195	1205	1215	1225	1235	1245	1260	1275	1295

Constant Springs

Triple Type

Service

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.
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.
The proportional loads of the pipe system can in this way be constantly distributed over the whole displacement range without significant deviations.
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 performance-to-weight ratios and symmetrical designs enable easy installation.



Feature

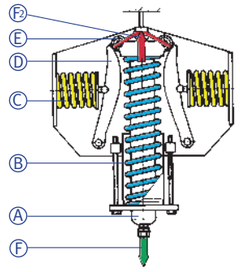
1) Principle-based constancy by way of a special function principle.
2) Pre-relaxed springs eliminate any significant loss of load-bearing capacity.
3) Reduced friction due to minimized number of bearing points.
4) Especially wide load adjustment range avoids hanger replacement when operational loads change.
5) Turnbuckle and swivel joint function allows greater adjustment of pipe installation position.
6) Load application free of moments due to a single suspension point.
7) Blocking device through fine rasterization nearly infinitely variable.
8) Name plate contains complete technical specifications.
9) Directly readable travel scale with marking for hot/cold positions.
10) Load scale with permanent marking of set load.

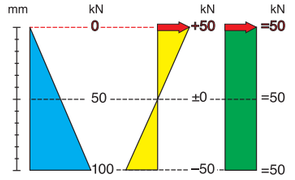
✔ Symmetrical design ensures direct flow of forces through axis of symmetry.
✔ Favorable performance-weight ratios for reduced installation loads.
✔ Arranged by load groups and travel ranges to simplify selection (modular system).
✔ Consistent functional behavior due to highquality corrosion protection 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.

Constant Springs

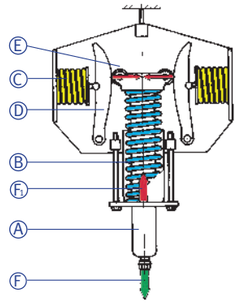
Constant Springs

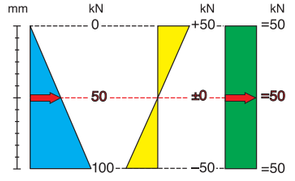
Triple Type



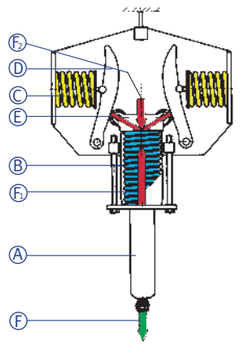


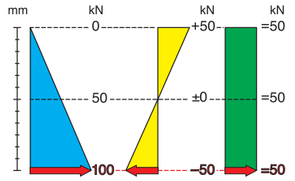
Upper position





Middle position





Lower position

The KARAJET 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.

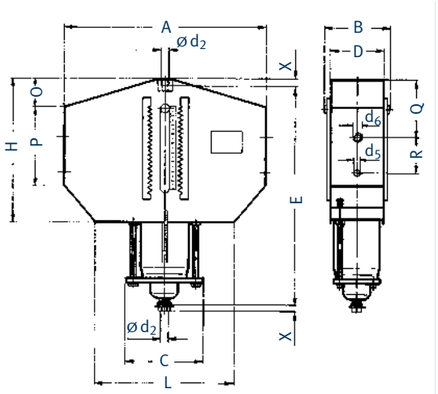
The suspended load Ⓕ acts directly on the mainspring Ⓑ via the load tube Ⓐ. The pre-loaded compensating springs Ⓒ act additionally on the load tube as the resulting force F_2 via pivoting cams Ⓓ and roller supports Ⓔ. The mainspring force F_1 and the resulting force F_2 change on the shifting of the 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 KARAJET function principle leads to absolute constancy which by theory can easily be proven.
- The KARAJET function principle permits an especially wide load adjustment range of 40% – 100% of the nominal load.

Triple Type

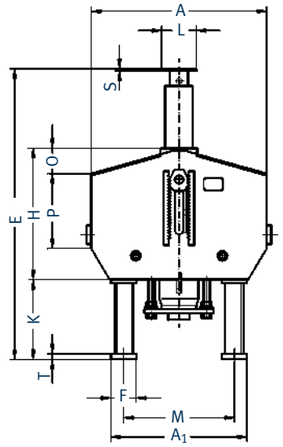
Model : CHT

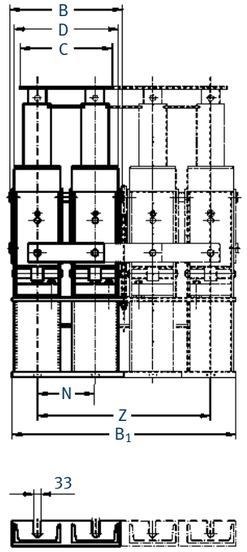


type	A	B	C	D	d_2	d_5	d_6	E	H	L	O	P	Q	R	X	weight [kg]
11 C3 19	350	130	150	105	M10	9	Ø 9	530	455	250	40	265	240	43	15	14
11 D2 19	300	110	155	86	M10	11	Ø11	350	250	230	0	195	125	43	15	10
11 D3 19	410	130	170	106	M10	11	Ø11	545	445	260	45	280	255	43	15	19
11 12 15	385	130	140	106	M12	12	M10	375	265	285	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

Triple Type

Model : CST





type	A	A_1	B	B_1	C	D	E	E	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

Rigid Sway Strut

Model : RSS-A, RSS-B, RSS-C, RSS-D

Service

Sway struts are used to restrain movement of piping in one direction while providing for movement due to thermal expansion or contraction in another direction.

How to select

Select size consistent with max. recommend. load to be restrained. The load indicated in the table represents the value under normal operation condition.
Determine “L” dimension and check to be within limits of min. and max. “L” dimension listed for size selected.
For restraint parallel to the pipe axis using two sway strut assemblies, a riser clamp is available. However, if a riser clamp is required, consult KARAJET engineer for information about this clamp.

Installation

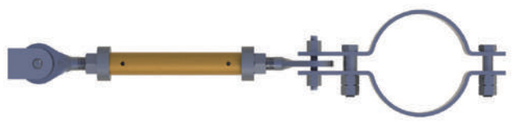
Shipped assembled. Securely fasten bracket to structure, make necessary adjustment in overall length and fasten clamp to pipe.

Feature

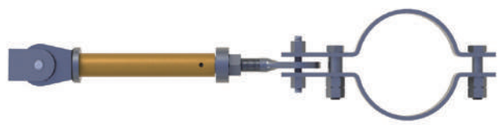
- Effective under either or compressive force.
- Provides 90mm(Type A&C) or 50(Type B&D) of field adjustment in either direction.
- Self-aligning bushings permit ±5° misalignment or angular motion. Bushings are coated with a dry lubricant.
- Almost no mechanical gap.

Ordering

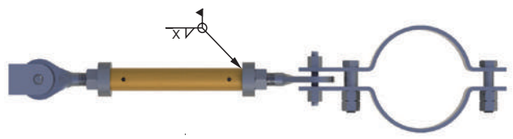
Specify model name, type, size and pin-to-pin length(L).
Alloy or stainless steel pipe clamps are available as a special order.
The rear bracket assembly can be ordered separately.
ex) **RSS - A - 5 x 1500L**



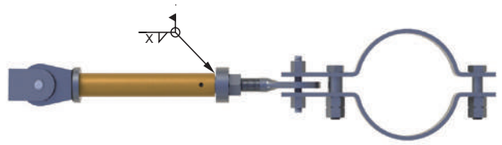
RSS Type A



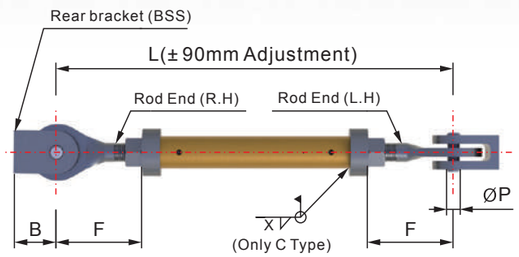
RSS Type B



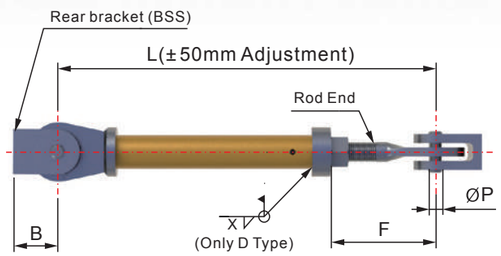
RSS Type C



RSS Type D



RSS A & C Type



RSS B & D Type

Size	Rod End	Extension Pipe	B	F	ØP (nom.)	Min. L		X
						A & C	B & D	
1	M20	25A(Sch.80)	45	165	12.5	590	354	6
2	M24	50A(Sch.40)	55	170	19	630	377	6
3	M30	50A(Sch.160)	65	195	25	710	423	9
4	M36	65A(Sch.160)	65	200	25	720	431	9
5	M42	65A(Sch.160)	80	245	31.5	810	495	9
6	M56	80A(Sch.160)	125	270	38	870	543	13
7	M64	100A(Sch.160)	145	300	44	960	602	13
8	M72	100A(Sch.160)	160	340	50.5	1080	695	16
9	M80	100A(Sch.160)	160	345	50.5	1090	700	19
10	M100	150A(Sch.160)	205	460	69.5	1380	898	25

Loads must not be applied outside a 10° included angle cone of action to the pipe clamp axis without special authorization.

Max. Recommended Load (kg)

Size	“L” Dimension																	
	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	5500	6000
1	1220	1220	1220	1220	1220	1180	900	720	-	-	-	-	-	-	-	-	-	-
2	2250	2250	2250	2250	2250	2250	2100	1630	1350	1100	900	-	-	-	-	-	-	-
3	3600	3600	3600	3600	3600	3600	3270	2630	2130	1770	1450	1220	-	-	-	-	-	-
4	5250	5250	5250	5250	5000	4750	4750	4250	4000	3750	3500	3250	-	-	-	-	-	-
5	7100	7100	7100	7100	7100	7100	7100	6800	6000	5000	4000	3500	2600	2000	-	-	-	-
6	12300	12300	12300	12300	12300	12300	12300	12300	12300	12300	12300	11000	9300	7000	-	-	-	-
7	-	15200	15200	15200	15200	15200	15200	15200	15200	15200	15200	14200	11600	9000	7200	5850	4800	4000
8	-	23000	23000	23000	23000	23000	23000	23000	23000	23000	23000	23000	23000	20000	17500	14500	12000	10000
9	-	-	31000	31000	31000	31000	31000	31000	31000	31000	31000	31000	31000	31000	31000	31000	28000	25000
10	-	-	55000	55000	55000	55000	55000	55000	55000	55000	55000	55000	55000	55000	55000	55000	50000	45000

Hydraulic Snubber

Model : DA

The snubbers are linear supports designed to limit unwanted sudden movements of components such as :

- Pipes
- Tanks
- Control valves
- Steam generators
- Safety valves
- Pumps, motors etc.

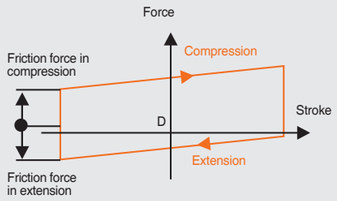
The snubbers enable slow movements due to thermal dilatation in both directions and oppose only low resistance to such movements.
But when the movement speed leads to dynamic displacement that are harmful to the installation, the snubbers are immediately locked at the desired speed and support the dynamic force by transferring it to the fixed structure.
Once the disturbance has passed, the device returns to its initial state and enables slow movements once again.

In that way, the snubbers provide temporary additional support to the installation in order to prevent if from entering into resonance, thereby minimising the risk of breaking due to vibrations.

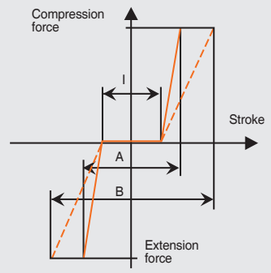
The snubbers therefore prevent damage due to:

- Earthquakes
- Water hammer effects
- Violent thrusts due to safety valve discharge of breaks in piping
- Wind
- Other similar disturbances

Free movement below the locking speed



Force after locking



Legend

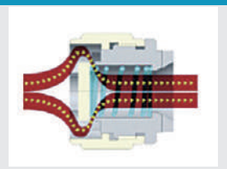
I : Mechanical clearance
A : Peak to peak under high frequency
B : Peak to peak under low frequency

Valve

Lockup valve defining the lockup velocity are tested one by one in our factory. Nozzles are designed and sized to be independent from the fluid viscosity and temperature. KARAJET is using a Self Cleaning Lockup Valve.
The self cleaning lockup valve (SCLV) ensures 2 functions : blocking and drift. The integration of both function is made by machining a «V» shape slit on the working area of the valve so that :

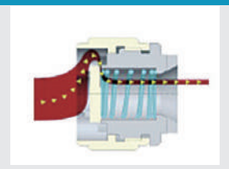
- The SCLV is never totally closed to assure the decompression
- After drift trough the «V» shape slit, the pressure will decrease and allows the opening of the valve. This process ensures the self cleaning of the valve comparing to a classic nozzle which would be definitively stopped in case of impurity contains in the oil With this technology, we can realize very low drift speed without risk to plug the nozzle.

Lockup Valve open



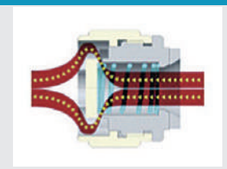
Free motion under traction

Lockup Valve open



Snubber under drift speed by calibrated nozzle[N]

Lockup Valve open



Free motion under Compression

Snubber selection criteria

Dynamic load :

At the nominal load FN, Check that the snubber is capable of handling dynamic forces during normal operation and/or operating basis earthquake conditions (level A/B). In the upset situation, check that the snubber is capable of handling the forces expected at level D, safe shutdown earthquakes.

Stroke :

The selected snubber must be able to make the fixing points cover the maximum travel between the assembly position and extreme operating position. Users should select the snubber with a minimum margin of 10 mm is available in the assembly position

▶▶A travel indicator on the body's snubber allows to verify the good operation position.

Available space :

Make sure that when the snubber is in place, the expected movements are possible with the minimum margins. Add an extension if the space available is larger than travel capability of the snubber.

▶▶The snubber may be assembled in either direction. Make sure that the spherical bearings can move freely, in the assembly position and in the operating position.

Raw materials

Tempered stainless steel rod with chemical nickel coating
Tempered stainless steel eye ends
Body an internal parts in high quality carbon steel

Dynamic characteristics at ambient temperature,15℃ to 20℃

Operating from 0.5 up to 100 Hz with symmetrical compensation system and internal pressurising.

Hydraulic Snubber

Model : DA

✲ Locking speed :

2 mm/s to 6 mm/s or as requested

✲ Friction force at slow speeds,before locking

f < 500N FN if FN ≤ 30 kN
f < 2 % FN if FN < 200 kN
f < 1 % FN if FN ≥ 200 kN

✲ Drift speed after locking,

at FN : 0.1 mm/s to 2.0 mm/s or as requested

✲ Peak-to-peak movement under sinus alternating load FN from 3 to 33 Hz

< 4 mm if FN ≤ 100 kN
< 5 mm if FN ≤ 600 kN
< 6 mm up to FN = 600 kN

✲ Environment conditions

Temperature :
Normal service temperature : - 20°C to + 80°C
Minimum storage temperature : - 30°C

Humidity : 100 %

External pressure :
Service pressure : 1 bar
Accidental pressure : 5 bar

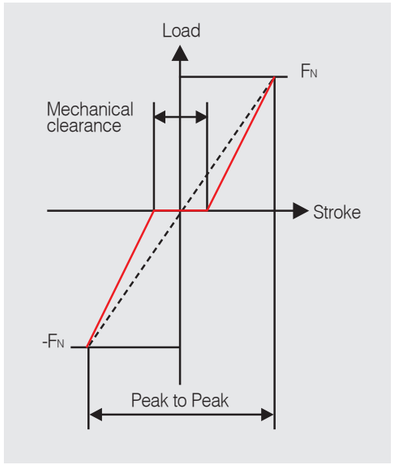
Total dose of Y rays and neutrons : 60 Mrad

✲ Stiffness

Snubber stiffness is defined according to the following diagram where : FN is the Nominal load of the snubber **Peak to Peak** the Total stroke under alternative load, and **Snubber Stiffness** is : $K = \frac{2 \times FN}{Peak}$

Model	Nominal load (kN)	Stroke (mm)	Stiffness* (kN/mm)
DA1	14	100	13
		200	11
DA2	30	150	23
		300	16
DA3	47	150	33
		300	25
DA4	100	150	69
		300	47
DA5	200	150	124
		300	76

*Tolerance on stiffness value : ± 25%



✲ Permissible load in kN

The permissible load in terms of dynamic stress in the table below has been calculated in accordance with cod RCCM vol. H level S1 and is valid for snubbers and fastening accessories –weld-on bracket, pins, extensions.

Model	Total stroke (mm)	FN load level A/B/80°C (kN)	Emergency load Level C/80°C (kN)	Faulted load Level D/150°C (kN)
DA1	100, 200	14	18	24
DA2	150, 300	30	39	49
DA3	150, 300	47	62	77
DA4	150, 300	100	133	140
DA5	150, 300	200	266	280
DA6	150, 300	320	425	545
DA7	150, 300	600	798	1020
DA8	150, 300	1100	1463	2000
DA9	120	-	-	3500
DA10	100	-	-	4500
DA11	100	-	-	6500
DA12	100	-	-	8500

✲ Load definition :

Normal/Disturbed - Level A/B : Nominal load (FN) including dynamic stress due to normal operation and operating basis earthquakes.

Emergency - Level C : Dynamic loads except normal functioning as well as the safety earthquakes.

Faulted - Level D : Dynamic loads in accidental situations, including safe shutdown earthquakes (SSE). The snubbers should undergo verification as a minimum after such an event.

✲ Life under dynamic stress

The snubbers may be subject to the total dynamic loads below, without any adverse effect on operating, at atemperature ≤ 80° C.

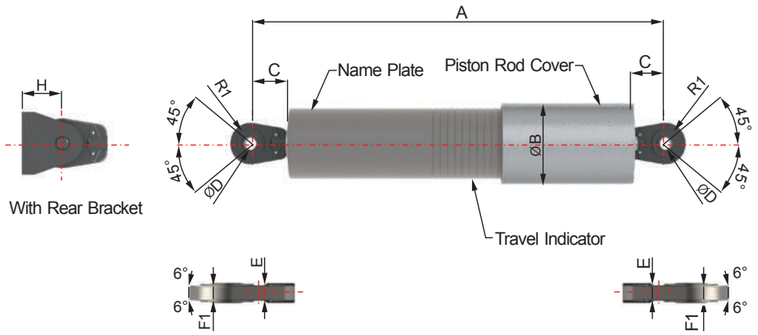
Load (in % FN)	Number of cycles
10%	5×10^6
50%	10^6
100 % (level A/B)	10^5
133 % (level C)	10^3
(level D)	10^2

✲ Large Bore - Technical characteristics

- drag force : < 15 kN (DA12)
- lockup velocity : 6 mm/min < LV < 60 mm/min
- drift speed : < 10 mm/min under maximal load
- lost motion : < 1 mm
- theoretic stiffness in traction : > 1200 kN/mm under maximum load (DA12)
- theoretic stiffness in compression : > 1500 kN/mm under maximum load (DA12)
- fluid : Silicon Oil
- functional temperature : 10°C to 60°C

Hydraulic Snubber

Model : DA

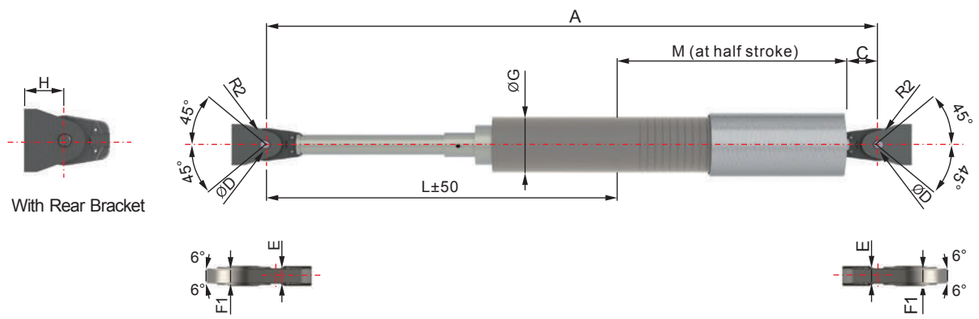


Type : Small Bore Snubber

Type	Nominal load Level B (kN)	Faulted load Level D (kN)	Stroke (mm)	A min (mm)	A half stroke (mm)	A max (mm)	Ø B (mm)	C (mm)	Ø D (mm)	E (mm)	F1° (mm)	H (mm)	R1 (mm)	Weight (kg)
DA1-100	14	24	100	435	485	535	102	50	17	20	19	44	28	12
DA1-200	14	24	200	618	718	818	102	50	17	20	19	44	28	16
DA2-150	30	49	150	555	630	705	115	50	20	25	23	44	28	21
DA2-300	30	49	300	845	995	1145	115	50	20	25	23	44	28	30
DA3-150	47	77	150	545	620	695	154	60	25	28	28	50	32	33
DA3-300	47	77	300	795	945	1095	154	60	25	28	28	50	32	46
DA4-150	100	140	150	590	665	740	170	70	30	32	30	62	39	49
DA4-300	100	140	300	850	1000	1150	170	70	30	32	30	62	39	66
DA5-150	200	280	150	710	785	860	220	105	45	43	40	85	58	82
DA5-300	200	280	300	980	1130	1280	220	105	45	43	40	85	58	106
DA6-150	320	545	150	700	775	850	-	68	45	43	40	90	75	120
DA6-300	320	545	300	986	1136	1286	-	68	45	43	40	90	75	160

▶ Technical Characteristics : see pages 50~53

▶ Other load, or stroke or characteristic on demand - Bracket & clamps with axis on demand.



Type : Extension With adjustable Snubber

Type	Nominal load Level B (kN)	Faulted load Level D (kN)	Stroke (mm)	A maxi at half stroke (mm)	M at half stroke (mm)	Ø G (mm)	L mini (mm)	L maxi (mm)	C (mm)	Ø D (mm)	E (mm)	F1 (mm)	F2 (mm)	H (mm)	R1 (mm)	R2 (mm)	Weight	
																	L mini (kg)	+ per 50mm (kg)
DA1-100	14	24	100	1000	432	40	190	540	50	17	20	19	13	44	28	26.5	2	0.22
DA1-200	14	24	200	1000	665	40	190	340	50	17	20	19	13	44	28	26.5	2	0.22
DA2-150	30	49	150	1400	577	60	200	800	50	20	25	23	17	44	28	32	2.5	0.34
DA2-300	30	49	300	1400	942	60	200	450	50	20	25	23	17	44	28	32	2.5	0.34
DA3-150	47	77	150	1700	557	80	220	1120	60	25	28	28	19	50	32	36.5	4	0.46
DA3-300	47	77	300	1700	882	80	220	820	60	25	28	28	19	50	32	36.5	4	0.46
DA4-150	100	140	150	2100	592	100	250	1500	70	30	32	30	21	62	39	41	10	1.1
DA4-300	100	140	300	2100	927	100	250	1150	70	30	32	30	21	62	39	41	10	1.1
DA5-150	200	280	150	2100	667	120	260	1410	105	45	43	40	30	85	58	56	15	1.4
DA5-300	200	280	300	2100	1022	120	260	1060	105	45	43	40	30	85	58	56	15	1.4

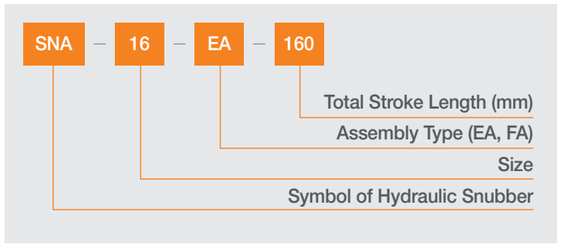
▶ Length of extension available every 50 mm from L min.

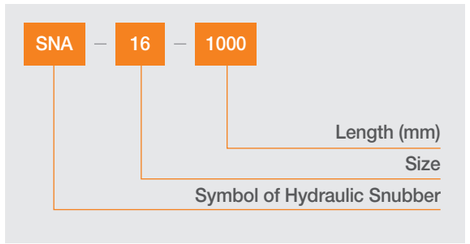
▶ Adjustment ± 50mm

▶ Rigid strut on demand

Hydraulic Snubber

Model : SNA





Total Stroke for Snubber(mm)

100(mm), 160(mm), 250(mm) - Standard Type

310(mm), 400(mm), 460(mm) and 510(mm) - Extra stroke ; available on request

Combination of total stroke and design displacement

Design displacement	Total stroke (mm) 100	160	250
50 or less	O	△	△
51 - 110	X	O	△
111 - 200	X	X	O

O : Optimum
△ : Usable
X : Not Usable

Assembly Type for Snubber

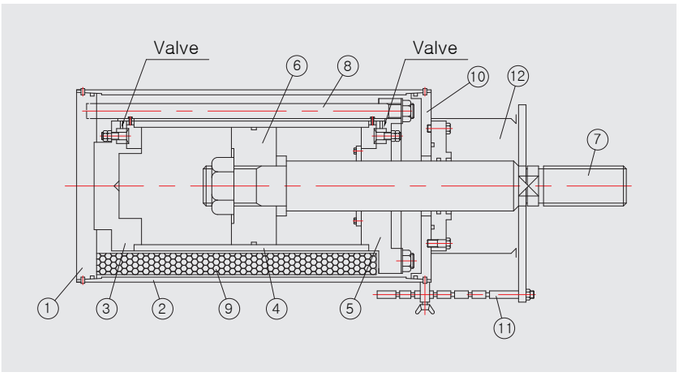
Type FA : with shortest attachment for a limited installation length
Type EA : with extension attachment for a long installation length
For Type EA, snubber extension will be required to enlarge the C-C dimension

Feature

Show the schematic diagram main items of the Snubber
Several features are described as follows;
(1) Reliable hydraulic system including precise valve mechanism assures stable and symmetrical performance in both loading directions.
(2) Self-contained oil reservoir eliminates fluid leakage from sealed connections.
(3) High durability of seal materials longer service duration without frequent maintenance work.
(4) Well-engineered construction simplifies disassembling and re-assembling of the unit, assuring easier maintenance works.
(5) Installable in a limited space because of a plain cylinder contour.
(6) Filled with throughly verified genuine hydraulic fluid.
(7) Easy-to-read stroke indicator.

Caution : Without special comments of the Customer, the snubber will be preset at the shop as follows;
- Preset at 25(mm) if snubber were extended during hot state.
- Preset at [total stroke-25](mm) if snubber were retracted during hot state.

Part NO.	Item Name
1	Holder
2	Casing
3	Cylinder Cover
4	Cylinder Tube
5	Rod Cover
6	Piston
7	Piston Rod
8	Tie Rod
9	Accumulator
10	Casing Cover
11	Travel Indicator
12	Canvas Cover



Assembly Type for Snubber

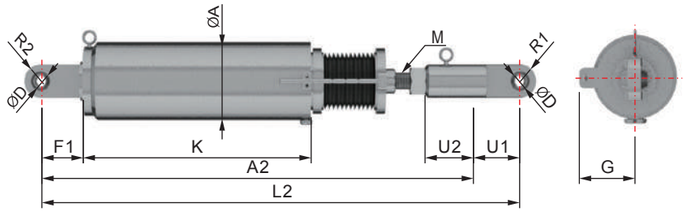
Minimum spring rate (kg/mm) per load stroke

Type \ Stroke(mm)	100	160/250
SNA-03	250	150
SNA-06	450	300
SNA-1	650	450
SNA-3	1500	1000
SNA-6	3000	2000
SNA-10	5000	3000
SNA-16	7000	4500
SNA-25	8000	6500

Design Parameters

Design Parameter	Criteria
Drag Force	2% of the rated load, or 50(kg) whichever is greater
Bleed Rate	0.5 (mm/sec)
Lock-up Rate	1~4 (mm/sec)
Frequency Range	1~33 (Hz)
Pressure Capacity	1.5 time of the rated load
Perm. Cycle under rated load	20000 (cycles)
Temperature	-15~60(℃)
Radiant Limit	1*10 (TEKOHR 200 Fluid)
Recommended Maintenance	Once every 10 years
Angular Offset	Max.153°

Model : SNA-FA

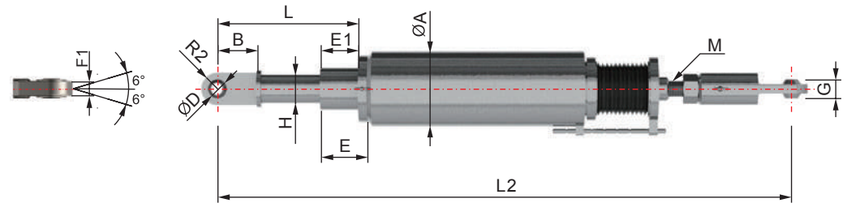


Type FA

TYPE	Permissible Load (kg)	L2		ØA	ØD	F1	G	R1	R2	U1	K	A2	U2	Weight (kg)
		Min	Max											
SNA-03-FA-100	300	513	613	76.3	12	50	55.5	18	19	62	255	451	44	8
SNA-03-FA-160	300	573	733	76.3	12	50	55.5	18	19	62	315	511	44	9
SNA-03-FA-250	300	663	913	76.3	12	50	55.5	18	19	62	405	601	44	11
SNA-06-FA-100	600	523	623	89.1	12	50	61.5	20	19	62	255	461	48	10
SNA-06-FA-160	600	583	743	89.1	12	50	61.5	20	19	62	315	521	48	12
SNA-06-FA-250	600	673	923	89.1	12	50	61.5	20	19	62	405	611	48	14
SNA-1-FA-100	1000	530	630	102	15	55	68.5	24	25	69	250	461	48	13
SNA-1-FA-160	1000	590	750	102	15	55	68.5	24	25	69	310	521	48	15
SNA-1-FA-250	1000	680	930	120	15	55	68.5	24	25	69	400	611	48	18
SNA-3-FA-100	3000	621	721	140	17	74	87.5	31.5	32.5	80	293	541	58	27
SNA-3-FA-160	3000	681	841	140	17	74	87.5	31.5	32.5	80	353	601	58	30
SNA-3-FA-250	3000	771	1021	140	17	74	87.5	31.5	32.5	80	443	691	58	34
SNA-6-FA-100	6000	699	799	165	25	87	101	41.5	37.5	85	338	614	64	45
SNA-6-FA-160	6000	759	919	165	25	87	101	41.5	37.5	85	398	674	64	49
SNA-6-FA-250	6000	849	1099	165	25	87	101	41.5	37.5	85	488	764	64	55
SNA-10-FA-100	10000	767	867	191	30	108	114	54	50	98	360	669	70	67
SNA-10-FA-160	10000	827	987	191	30	108	114	54	50	98	420	729	70	72
SNA-10-FA-250	10000	917	1167	191	30	108	114	54	50	98	510	819	70	81
SNA-16-FA-100	16000	855	955	216	40	130	127	63	62.5	117	393	738	76	99
SNA-16-FA-160	16000	915	1075	216	40	130	127	63	62.5	117	453	798	76	106
SNA-16-FA-250	16000	1005	1255	216	40	130	127	63	62.5	117	543	888	76	116
SNA-25-FA-100	25000	941	1041	267	50	160	153	73	75	133	418	808	84	160
SNA-25-FA-160	25000	1001	1611	267	50	160	153	73	75	133	478	868	84	170
SNA-25-FA-250	25000	1091	1341	267	50	160	153	73	75	133	568	958	84	185

NOTES : A2 : Fully contracted length

MODEL : SNA-EA



Type EA

TYPE	Permissible Load (kg)	L2		ØA	M	ØD	E	E1	ØH	R2	B	G	A1 min	U1	Weight (kg)
		Min	Max												
SNA-03-EA-100	300	642	1340	76.3	M16	12	49	28	27.2	19	47	22	450	62	8
SNA-03-EA-160	300	732	1340	76.3	M16	12	49	28	27.2	19	47	22	510	62	9
SNA-03-EA-250	300	867	1340	76.3	M16	12	49	28	27.2	19	47	22	600	62	11
SNA-06-EA-100	600	659	1567	89.1	M20	12	56	35	34	19	47	22	467	62	10
SNA-06-EA-160	600	749	1567	89.1	M20	12	56	35	34	19	47	22	527	62	12
SNA-06-EA-250	600	884	1567	89.1	M20	12	56	35	34	19	47	22	617	62	14
SNA-1-EA-100	1000	683	1861	102	M20	15	68	44	42.7	25	52	26	474	69	13
SNA-1-EA-160	1000	773	1861	102	M20	15	68	44	42.7	25	52	26	534	69	15
SNA-1-EA-250	1000	908	1861	102	M20	15	68	44	42.7	25	52	26	624	69	18
SNA-3-EA-100	3000	811	2187	140	M30	17	94	62	60.5	33	73.5	31.5	561	80	27
SNA-3-EA-160	3000	901	2187	140	M30	17	94	62	60.5	33	73.5	31.5	621	80	30
SNA-3-EA-250	3000	1036	2187	140	M30	17	94	62	60.5	33	73.5	31.5	711	80	34
SNA-6-EA-100	6000	906	2441	165	M36	25	114	78	76.3	38	80	34	641	85	45
SNA-6-EA-160	6000	996	2441	165	M36	25	114	78	76.3	38	80	34	701	85	49
SNA-6-EA-250	6000	1131	2441	165	M36	25	114	78	76.3	38	80	34	791	85	55
SNA-10-EA-100	10000	1002	2784	191	M42	30	133	91	89.1	50	97	38	694	98	67
SNA-10-EA-160	10000	1092	2784	191	M42	30	133	91	89.1	50	97	38	754	98	72
SNA-10-EA-250	10000	1227	2784	191	M42	30	133	91	89.1	50	97	38	844	98	81
SNA-16-EA-100	16000	1130	3418	216	M48	40	165	116	114.3	63	116	47	773	117	99
SNA-16-EA-160	16000	1220	3418	216	M48	40	165	116	114.3	63	116	47	833	117	106
SNA-16-EA-250	16000	1355	3418	216	M48	40	165	116	114.3	63	116	47	923	117	116
SNA-25-EA-100	25000	1256	3950	267	M56	50	195	142	139.8	75	139	68	843	133	160
SNA-25-EA-160	25000	1346	3950	267	M56	50	195	142	139.8	75	139	68	903	133	170
SNA-25-EA-250	25000	1481	3950	267	M56	50	195	142	139.8	75	139	68	993	133	185

NOTES : Length at middle position

TYPE	Permissible Load (kg)	L		ØD	R2	B	Weight (kg) Min	Max
		Min	Max					
SNA-03	300	108	716	12	19	47	1	2.4
SNA-06	600	115	933	12	19	47	1.4	4.4
SNA-1	1000	134	1222	15	25	52	2.6	7.5
SNA-3	3000	182	1468	17	33	73.5	4.3	10.8
SNA-6	6000	208	1653	25	38	80	7.6	21.9
SNA-10	10000	251	1943	30	50	97	12	30.3
SNA-16	16000	306	2504	40	63	116	21.6	53.2
SNA-25	25000	372	2976	50	75	139	37.8	79.6

VARIABLE SPRING

✲ Installation

1. In order to avoid a wrong installation, an identification check must be performed by confirming the Hanger Identification No., Hanger Type and Size carved on the Name Plate attached on the Hanger's side.

2. Weld the structural attachments, such as Beam Attachment, Lug Plate or Washer Plate to the steel structure as indicated on the hanger drawings approved by customer.

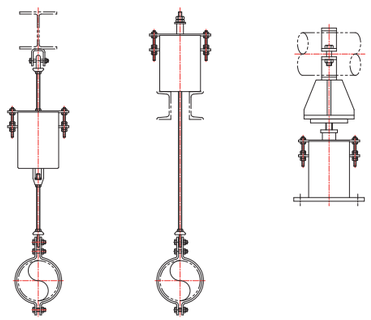
3. Connect the pipe attachments(Pipe Clamp) to the pipe in accordance with the approved hanger drawings.

4. Assemble the hanger rods and other components to the pipe attachment and Turn buckle of Variable Spring Hanger in accordance with the hanger drawing.

✲ Attachment of Variable Spring

1. Type A, B
   Connect the Variable Spring Hanger to the structural attachment using wire or chain block in order to connect it easily.

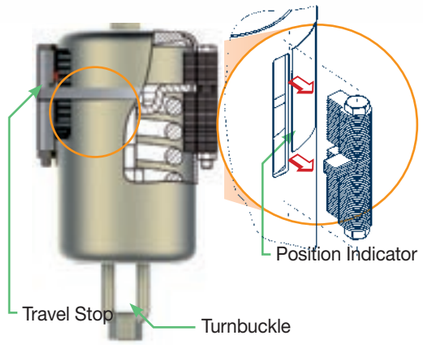
2. Type C
   Locate the Variable Spring Hanger at the correct position and weld or bolt it in accordance with the instructions specified on the hanger drawings.



Type A Type B Type C

✲ Travel Stop-Locking Device

1. The Variable Support Hangers are normally furnished with travel stops either at near the top or bottom position.
   Therefore, at this stage the travel indicator points to the blue("COLD" mark) scale.
   These travel stops are provided for making the installation work easy and to lock the hanger against upward and/or downward deflection during installation or hydrostatic test of piping system.
   It is normally installed at the factory to hold the hanger in the "COLD" position.
   With travel stops in place, the hanger can be used as a rigid support during pipe erection.
   Turn the turnbuckle to raise or lower the pipe to the proper elevation.

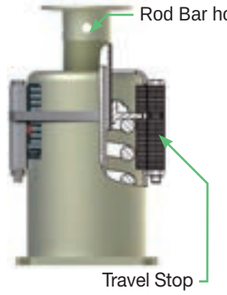


✲ Travel Stop-Unblocking-Hanging Type

1. When finished Hydro-test or steam blowing test, remove the upper and lower straps which move to wanted position.
2. After removing Blocking, confirm that Travel Indicator indicates the Cold Marking position. If not, turn the Turnbuckle until the Travel Indicator is on the Cold Marking position.
3. When operation, the Position Indicator move to "HOT" position.

✲ Travel Stop-Unblocking-Support Type

1. When finished Hydro-test or steam blowing test, remove the upper and lower Straps which move to wanted position.
2. After removing Stop Nut, confirm that Travel Indicator indicates the Cold Marking position.
3. When operation, the Position Indicator move to "HOT" position.
4. If the Position indicator is not located at the designed position "COLD" or "HOT" it should be adjusted by turning the Load Flange. (By use of the appropriate "Rod bar")



CONSTANT SPRING

✲ Installation

1. In order to avoid a wrong installation, an identification check must be performed by confirming the Hanger Identification No., Hanger Type and Size carved on the Name Plate attached on the Hanger's side.

2. Weld the structural attachments, such as Beam Attachment, Lug Plate or Washer Plate to the steel structure as indicated on the hanger drawings approved by customer.

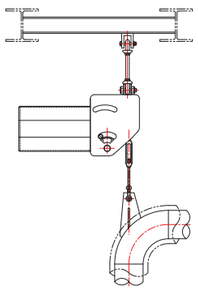
3. Connect the pipe attachments(Pipe Clamp) to the pipe in accordance with the approved hanger drawings.

4. Assemble the hanger rods and other components to the pipe attachment and Turn buckle of Constant Spring Hanger in accordance with the hanger drawing.

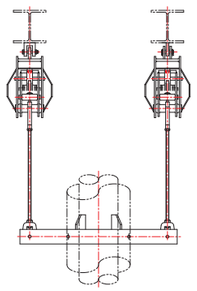
✲ Attachment of Variable Spring

1. Type A, B & C
   Connect the Constant Spring Hanger to the structural attachment using wire or chain block in order to connect it easily.

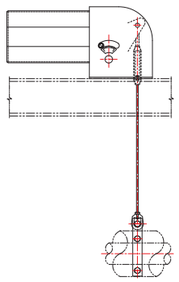
2. Type D & F
   Locate the Constant Spring Hanger at the correct position and weld or bolt it in accordance with the instructions specified on the hanger drawings.



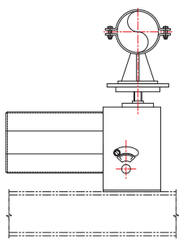
Type A



Type B & C



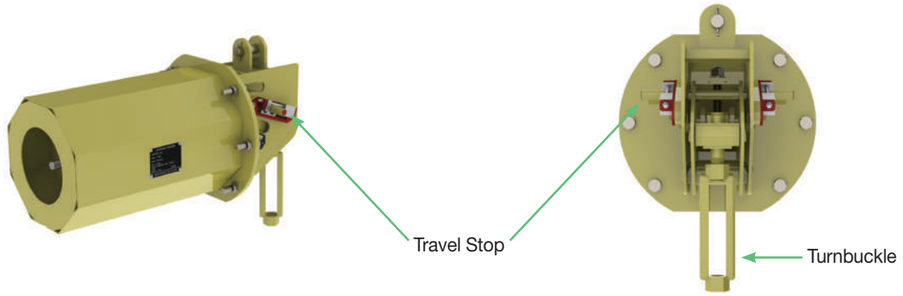
Type D



Type F

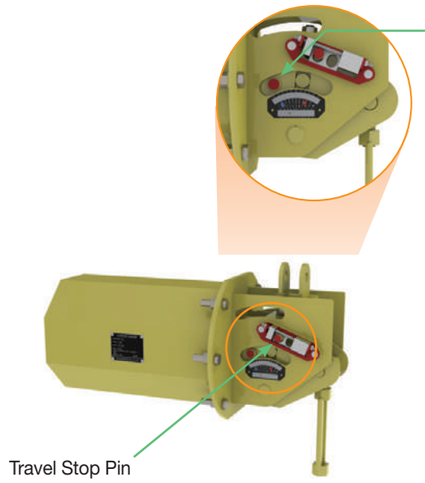
✲ Travel Stop-Locking Device - Standard Type

1. The Constant Support Hangers are normally furnished with travel stops either at near the top or bottom position.
   Therefore, at this stage the travel indicator points to the blue marker .
   These travel stops are provided for making the installation work easy and to lock the hanger against upward and/or downward deflection during installation or hydrostatic test of piping system. It is normally installed at the factory to hold the hanger in the "COLD" position.
   With travel stops in place, the hanger can be used as a rigid support during pipe erection.
   Turn the turn buckle to raise or lower the pipe to the proper elevation.

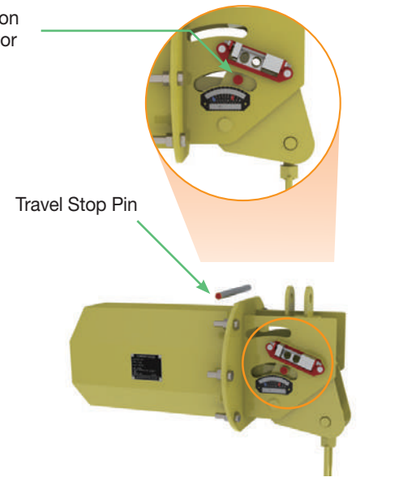


✲ Travel Stop-Unblocking-Standard Type

1. Before operation, remove the Travel Stop Pin and release the Travel Stop Nut then Position Indicator move to "HOT" position when operation.



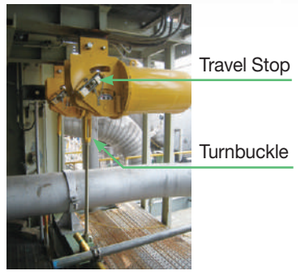
COLD



HOT

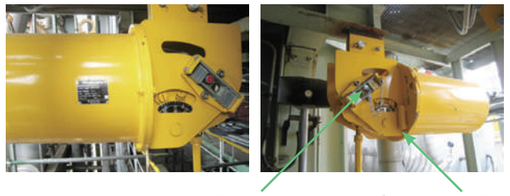
✲ Travel Stop-Locking Device-Universal Type

1. The Constant Support Hangers are specially furnished with travel stops either at near the top or bottom position.
   Therefore, at this stage the travel indicator points to the blue marker.
   These travel stops are provided for making the installation work easy and to lock the hanger against upward and/or downward deflection during installation or hydrostatic test of piping system. It is normally installed at the factory to hold the hanger in the "COLD" position.
   With travel stops in place, the hanger can be used as a rigid support during pipe erection.
   Turn the turn buckle to raise or lower the pipe to the proper elevation.



✲ Travel Stop-Locking Device-Universal Type

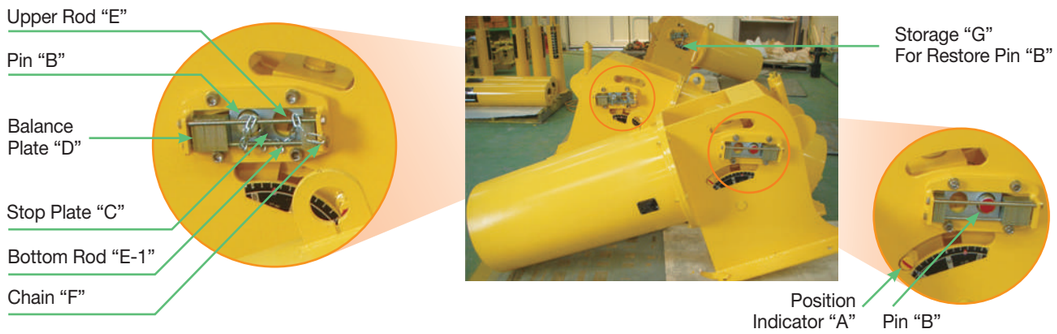
<Notice>
Remove(Pulling) the Pin which connected the Chain.
Removed the Pin store the Pin Storage for future use



✲ Travel Stop-Unblocking-Universal Type

1. Before operation, remove the Travel Stop Pin and release the Travel Stop Nut then Position Indicator move to "HOT" position when operation.

<Sequence>
1. Release the Upper Rod "E" (Not release the Bottom Rod "E-1").
2. Remove(Pulling) the Pin "B"
3. Restore the removed The Pin "B" in the Storage "G"
4. Reassembly the Upper Rod "E"



✲ from Installation to Operation

COLD

HOT

MAINTENANCE & RESETTING MANUAL

✲ Maintenance

1. Each Spring hanger should be periodically inspected visually to verify the correct setting of the position indicator during operation.
2. Inspection frequency may be at each scheduled plant shut-down and annual inspection, at least recommended.
3. All dust, soot and foreign objects which may impair hanger operation shall be removed.
4. Observe and record the position of the position indicator once a year in hot and cold states and when unexpected movement has been detected, the cause must be investigated.
5. Loose or fallen nuts should be tightened.
6. Damaged parts are to be repaired or replaced.