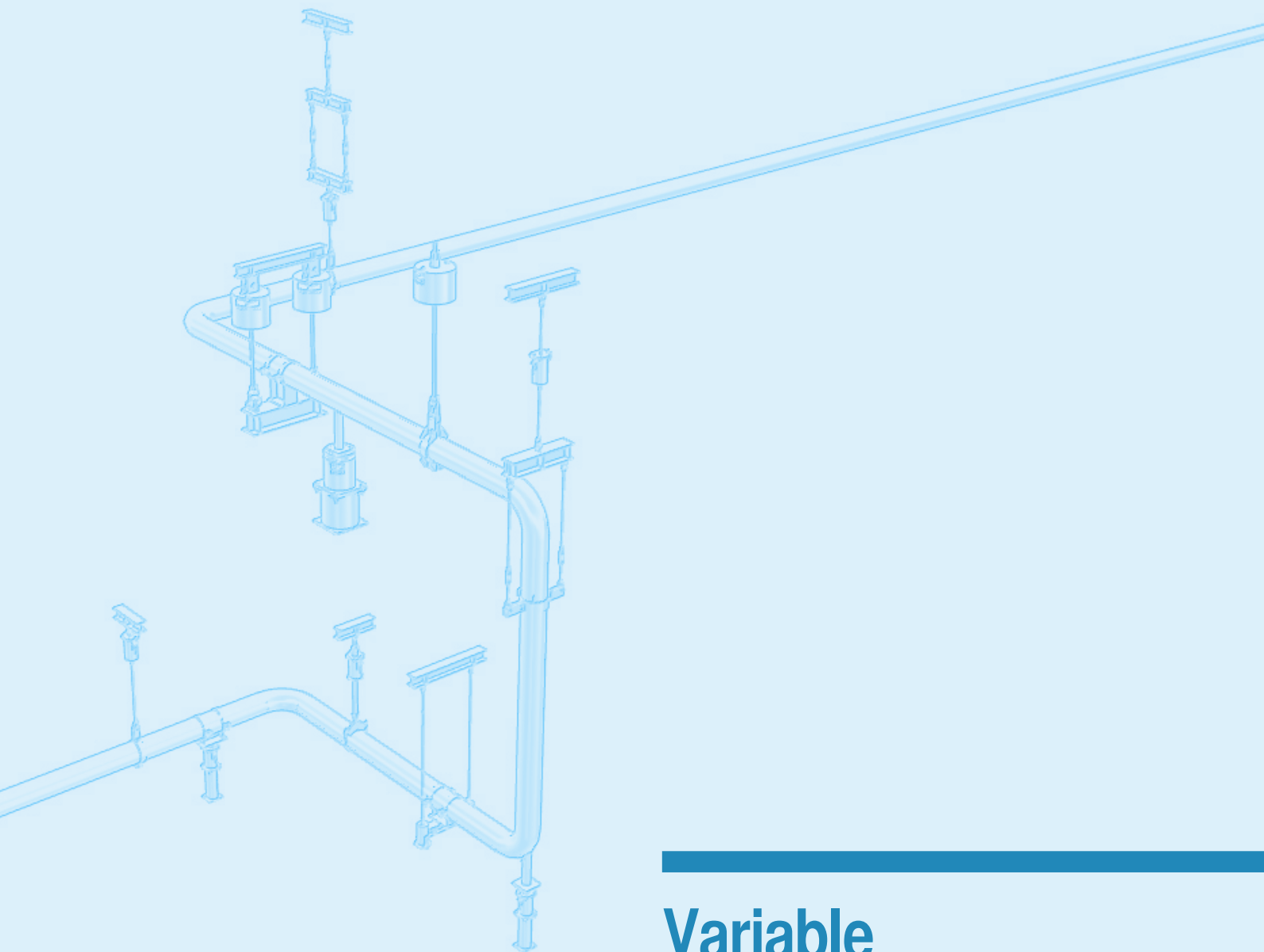




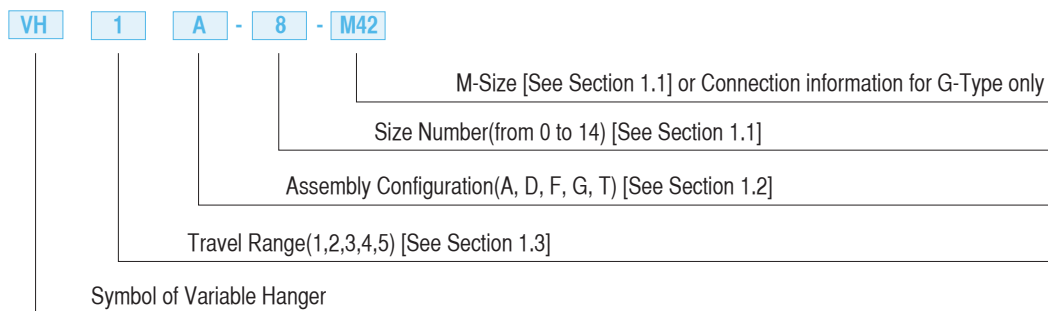
Variable Hangers and Supports

- 1.0 Type Designation and Usage
- 2.0 Features
- 3.0 Selection Method and Table
- 4.0 Dimensions
- 5.0 Additional Variable Hangers and Supports

Variable Hangers and Supports

To compensate for the slight vertical displacements in the piping system, spring components are used as supports. The function of these components is based on preset helical coil springs which exert a variable supporting load over the whole range of movement corresponding to the given spring characteristics. Load variations resulting from this are limited through corresponding specifications based on piping stress analysis.

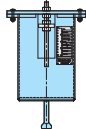
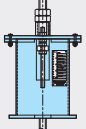
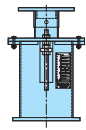
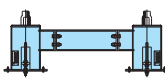
1.0 Type Designation and Usage



1.1 Size Number vs. M-Size

Size Number	M-Size
0	M12
1	M12
2	M12
3	M16
4	M20
5	M24
6	M30
7	M36
8	M42
9	M48
10	M56
11	M64
12	M68
13	M72
14	M80

1.2 Assembly Configuration and Usage

Assembly Configuration	Appearance	Usage
A (Hanging type)		• Most frequently used • Fitted with both upper/lower connection for suspension
D (Seated Type)		• Frequently used for simple installation • Just seating it on the steel • Connected by a rod passing through the unit
F (Support Type)		• Suitable alternative as a column support, if suspension were impossible • Considerable horizontal movement can effect on the operation of the support system → Teflon plate(PTFE) or stainless steel plate/graphite recommendable for this case
G (Angulated Type)		• Pin to pin connection • Infrequently used as support placed on the tilt or for eliminating the frictional force instead of supporting type(Type F)
T (Trapeze Type)		• Infrequently used, if sufficient gap between structure and pipe were not permitted

1.3 Travel Range

Travel Group	1	2	3	4	5
Travel Range(mm)	50	100	200	300	400

2.0 Features

Fig. 2.1 show the schematic diagram and main items of the variable hanger.

Several features are described as follows;

- 1) Use the pre-relaxed spring coil in order to guarantee spring characteristics for plant life.
- 2) All components are strong enough to withstand the external impact during erection.
- 3) Universal locking device used.
- 4) Turnbuckle placed to adjust the pipe elevation.
- 5) Welding works excluded to the maximum extent.

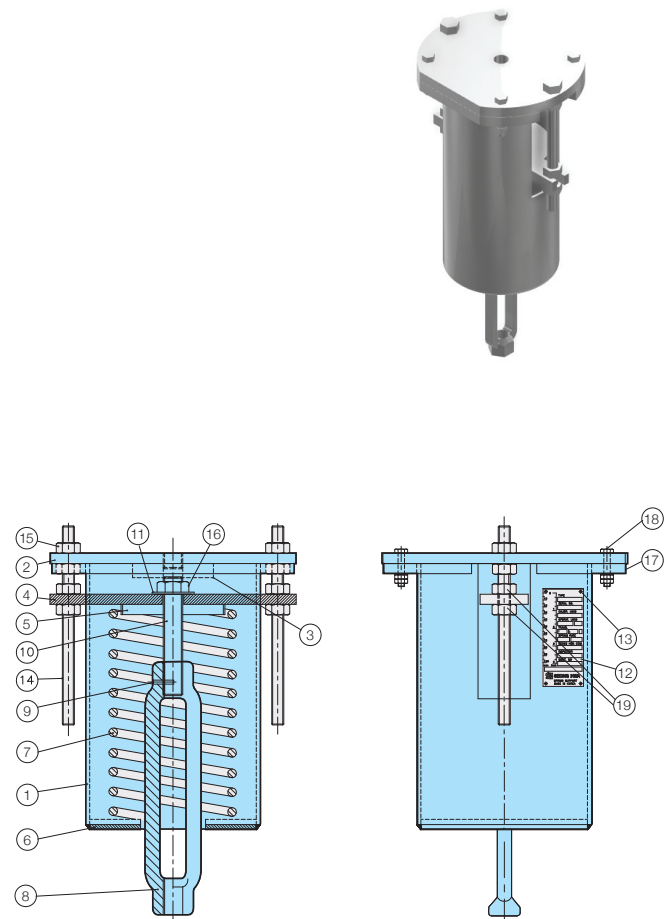
Fig. 2.1 Schematic Diagram and Main Items

No.	Item Name
①	Outer Casing Pipe
②	Upper Plate
③	Round Bar
④	Spring Plate
⑤	Stopper Pipe
⑥	Lower Plate
⑦	Spring
⑧	Turnbuckle
⑨	Split Taper Sleeve
⑩	Threaded Rod
⑪	Washer
⑫	Name Plate
⑬	Pop Rivet
⑭	Threaded Rod
⑮	Hex. Nut
⑯	Hex. Jam Nut
⑰	Weld Base Plate
⑱	Hex. Bolt/Nut
⑲	Locking Nut

Caution :

Variable hangers and supports are preset at the shop to the installation load and blocked in both directions of movement by way of locking nuts(item ⑲).

This blocking is necessary to take up additional loads during pickling, flushing, or hydrostatic test. Nuts should be unthreaded to the maximum extent after then.



Variable Hangers and Supports

3.0 Selection Method and Table

3.1 Selection Criteria

Permissible Load Variation

The permissible load variation between cold load(installation load) and hot load(operation load), is limited internationally by common specifications for piping stress analysis to 25(%) of operating load, i.e,

$$VA = \frac{abs(H.L.-C.L.)}{H.L.} = \frac{abs(k\Delta)}{H.L.} \text{ --- eq.(1)}$$

However, the customers can request the smaller limitation considering importance of piping system.

Extra Long Spring Hanger and Support

Extra long spring hanger((travel group 4 and group 5) should be only used after technical evaluation of the whole situation, especially in sensitive piping systems.

Travel Group					Size									
1	2	3	4	5	0	1	2	3	4	5	6	7	8	9
Working Travel(mm)					Load(kN)									
0	0	0	0	0	0.12	0.41	0.83	1.66	3.33	6.66	13.33	20.00	26.66	33.33
2.5	5	10	15	20	0.14	0.45	0.91	1.83	3.66	7.33	14.66	22.00	29.33	36.66
5.0	10	20	30	40	0.16	0.50	1.00	2.00	4.00	8.00	16.00	24.00	32.00	40.00
7.5	15	30	45	60	0.18	0.54	1.08	2.16	4.33	8.66	17.33	26.00	34.66	43.33
10.0	20	40	60	80	0.20	0.58	1.16	2.33	4.66	9.33	18.66	28.00	37.33	46.66
12.5	25	50	75	100	0.22	0.62	1.25	2.50	5.00	10.00	20.00	30.00	40.00	50.00
15.0	30	60	90	120	0.24	0.66	1.33	2.66	5.33	10.66	21.33	32.00	42.66	53.33
17.5	35	70	105	140	0.26	0.70	1.41	2.83	5.66	11.33	22.66	34.00	45.33	56.66
20.0	40	80	120	160	0.28	0.75	1.50	3.00	6.00	12.00	24.00	36.00	48.00	60.00
22.5	45	90	135	180	0.30	0.79	1.58	3.16	6.33	12.66	25.33	38.00	50.66	63.33
25.0	50	100	150	200	0.32	0.83	1.66	3.33	6.66	13.33	26.66	40.00	53.33	66.66
27.5	55	110	165	220	0.34	0.87	1.75	3.50	7.00	14.00	28.00	42.00	56.00	70.00
30.0	60	120	180	240	0.36	0.91	1.83	3.66	7.33	14.66	29.33	44.00	58.66	73.33
32.5	65	130	195	260	0.38	0.95	1.91	3.83	7.66	15.33	30.66	46.00	61.33	76.66
35.0	70	140	210	280	0.40	1.00	2.00	4.00	8.00	16.00	32.00	48.00	64.00	80.00
37.5	75	150	225	300	0.42	1.04	2.08	4.16	8.33	16.66	33.33	50.00	66.66	83.33
40.0	80	160	240	320	0.44	1.08	2.16	4.33	8.66	17.33	34.66	52.00	69.33	86.66
42.5	85	170	255	340	0.46	1.12	2.25	4.50	9.00	18.00	36.00	54.00	72.00	90.00
45.0	90	180	270	360	0.48	1.16	2.33	4.66	9.33	18.66	37.33	56.00	74.66	93.33
47.5	95	190	285	380	0.50	1.20	2.41	4.83	9.66	19.33	38.66	58.00	77.33	96.66
50.0	100	200	300	400	0.52	1.25	2.50	5.00	10.00	20.00	40.00	60.00	80.00	100.00
					Spring Rate(N/mm)									
					N/A	N/A	N/A	N/A	N/A	33.3	66.6	100.0	133.3	166.6
					N/A	N/A	N/A	11.1	22.2	44.4	88.9	133.3	177.8	222.2
					2.1	4.1	8.3	16.6	33.3	66.6	133.3	200.0	266.6	333.3
					4.1	8.3	16.6	33.3	66.6	133.3	266.6	400.0	533.3	666.6
					8.3	16.6	33.3	66.6	133.3	266.6	533.3	800.0	1066.6	1333.3

3.2 Selection Example

Step 1. Input Data

Operating Load : H.L.= 10,000(N)
 Actual Travel : $\Delta = 15(\text{mm})$ (upward)
 Type VH-A to be applicable
 Required variability : $VA \leq 25\%$

Step 2. Determination of Hanger Size

From selection table for a given load(10,000 N), Size 5 selected.

Step 3. Check the Variability

From eq.(1), $k < \frac{25\%(H.L.)}{\text{abs}(\Delta)} = \frac{(25\%)(10,000N)}{15(\text{mm})} = 166.7(N/\text{mm})$

$k = 133.3(N/\text{mm}) < 166.7(N/\text{mm})$, if VH2A-5-M24 selected.

Step 4. Check Cold Load

$$C.L. = H.L. + k\Delta = 10,000 + 133.3 \times 15 = 12,000(N)$$

Step 5. Determining Variability

$$VA = \frac{\text{abs}(H.L. - C.L.)}{H.L.} = \frac{(133.3)(15)}{10,000} \times 100 = 20.0(\%) \leq 25(\%)$$

Step 6. Blocking Position

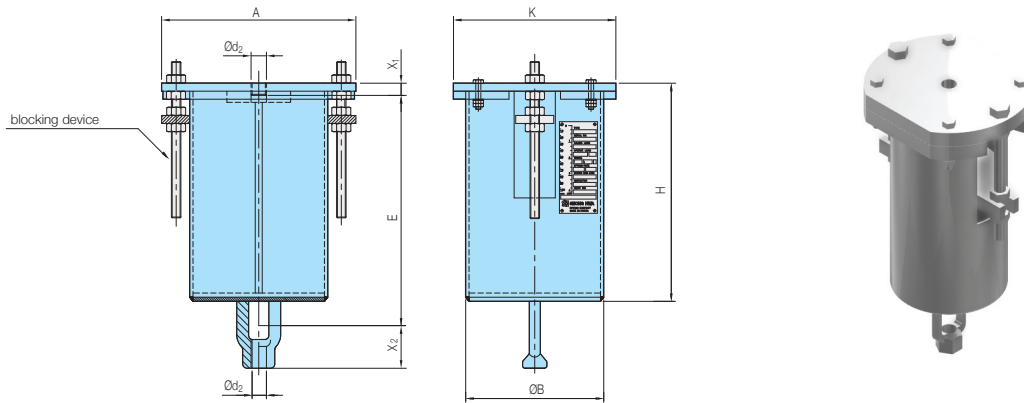
Theoretically, this hanger to be blocked at 40(mm) lower from top position per selection table.

Travel Group			Size				
1	2	3	10	11	12	13	14
Working Travel(mm)			Load(kN)				
0	0	0	53.33	66.66	80.00	100.00	133.33
2.5	5	10	58.66	73.33	88.00	110.00	146.66
5.0	10	20	64.00	80.00	96.00	120.00	160.00
7.5	15	30	69.33	86.66	104.00	130.00	173.33
10.0	20	40	74.66	93.33	112.00	140.00	186.66
12.5	25	50	80.00	100.00	120.00	150.00	200.00
15.0	30	60	85.33	106.66	128.00	160.00	213.33
17.5	35	70	90.66	113.33	136.00	170.00	226.66
20.0	40	80	96.00	120.00	144.00	180.00	240.00
22.5	45	90	101.33	126.66	152.00	190.00	253.33
25.0	50	100	106.66	133.33	160.00	200.00	266.66
27.5	55	110	112.00	140.00	168.00	210.00	280.00
30.0	60	120	117.33	146.66	176.00	220.00	293.33
32.5	65	130	122.66	153.33	184.00	230.00	306.66
35.0	70	140	128.00	160.00	192.00	240.00	320.00
37.5	75	150	133.33	166.66	200.00	250.00	333.33
40.0	80	160	138.66	173.33	208.00	260.00	346.66
42.5	85	170	144.00	180.00	216.00	270.00	360.00
45.0	90	180	149.33	186.66	224.00	280.00	373.33
47.5	95	190	154.66	193.33	232.00	290.00	386.66
50.0	100	200	160.00	200.00	240.00	300.00	400.00
			Spring Rate(N/mm)				
			533.3	666.6	800.0	1000.0	1333.3
			1066.6	1333.3	1600.0	2000.0	2666.6
			2133.3	2666.6	3200.0	4000.0	5333.3

Variable Hangers and Supports

4.0 Dimensions

4.1 Type A

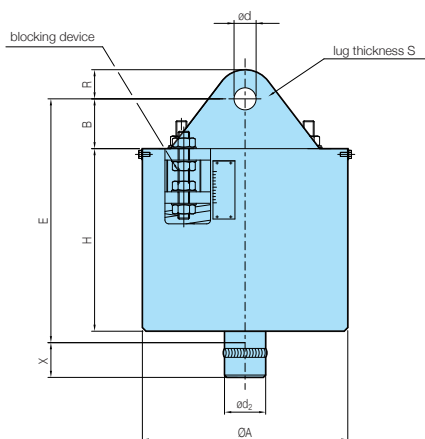


Dimension : mm

Type	A	ØB	K	E	Ød ₂	H	X ₁	X ₂	Weight(kg)
VH1A-0-M12	140	89	120	190	M12	170	15	40	3.70
VH2A-0-M12	140	89	120	265	M12	270	15	40	4.00
VH3A-0-M12	140	89	120	485	M12	495	15	40	7.00
VH1A-1-M12	140	89	120	195	M12	170	15	40	4.00
VH2A-1-M12	140	89	120	260	M12	270	15	40	5.00
VH3A-1-M12	140	89	120	485	M12	495	15	40	8.00
VH1A-2-M12	170	114	145	195	M12	177	15	40	5.00
VH2A-2-M12	170	114	145	265	M12	294	15	40	8.00
VH3A-2-M12	170	114	145	485	M12	484	15	40	12.00
VH1A-3-M16	170	114	145	195	M16	183	20	40	7.00
VH2A-3-M16	170	114	145	275	M16	278	20	40	8.00
VH3A-3-M16	170	114	145	480	M16	498	20	40	13.00
VH4A-3-M16	170	114	145	718	M16	726	20	40	18.00
VH1A-4-M20	220	152	190	225	M20	214	25	40	12.00
VH2A-4-M20	220	152	190	310	M20	326	25	40	15.00
VH3A-4-M20	220	152	190	540	M20	560	25	40	23.00
VH4A-4-M20	220	152	190	795	M20	814	25	40	32.00
VH1A-5-M24	257	178	217	243	M24	265	30	50	22.00
VH2A-5-M24	257	178	217	310	M24	356	30	50	26.00
VH3A-5-M24	257	178	217	560	M24	590	30	50	37.00
VH4A-5-M24	257	178	217	820	M24	848	30	50	52.00
VH5A-5-M24	257	178	217	1070	M24	1094	30	50	63.00
VH1A-6-M30	310	219	265	265	M30	290	35	50	39.00
VH2A-6-M30	310	219	265	350	M30	407	35	50	47.00
VH3A-6-M30	310	219	265	635	M30	685	35	50	67.00
VH4A-6-M30	310	219	265	945	M30	995	35	50	96.00
VH5A-6-M30	310	219	265	1225	M30	1285	35	50	116.00
VH1A-7-M36	347	245	297	265	M36	337	45	60	65.00
VH2A-7-M36	347	245	297	385	M36	464	45	60	78.00
VH3A-7-M36	347	245	297	665	M36	734	45	60	103.00
VH4A-7-M36	347	245	297	1015	M36	1084	45	60	148.00
VH5A-7-M36	347	245	297	1300	M36	1366	45	60	172.00
VH1A-8-M42	368	245	303	295	M42	380	50	70	78.00
VH2A-8-M42	368	245	303	455	M42	545	50	70	98.00
VH3A-8-M42	368	245	303	845	M42	917	50	70	143.00
VH4A-8-M42	368	245	303	1260	M42	1332	50	70	201.00
VH5A-8-M42	368	245	303	1650	M42	1722	50	70	245.00
VH1A-9-M48	402	273	332	315	M48	419	60	80	119.00
VH2A-9-M48	402	273	332	505	M48	594	60	80	141.00
VH3A-9-M48	402	273	332	865	M48	856	60	80	195.00
VH4A-9-M48	402	273	332	1315	M48	1406	60	80	269.00
VH5A-9-M48	402	273	332	1695	M48	1786	60	80	323.00

note 1) Dimension E incleases according to spring travel.

4.2 Type A(Heavy Duty)



Dimension : mm

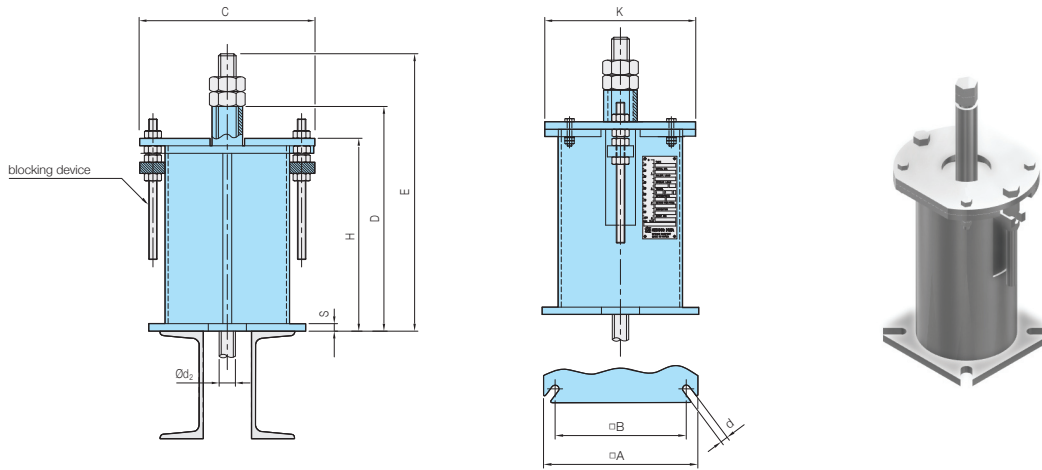
Type	ϕA	E	ϕd_2	R	B	H	X	S	ϕd	Weight(kg)
VH1A-10-M56	508	454	M56x4P	90	120	329	85	30	64	240.00
VH2A-10-M56	508	570	M56x4P	90	120	445	85	30	64	270.00
VH3A-10-M56	508	848	M56x4P	90	120	723	85	30	64	340.00
VH1A-11-M64	559	475	M64x4P	105	135	335	103	30	76	285.00
VH2A-11-M64	559	592	M64x4P	105	135	452	103	30	76	320.00
VH3A-11-M64	559	870	M64x4P	105	135	730	103	30	76	410.00
VH1A-12-M68	610	493	M68x4P	105	135	348	100	30	76	360.00
VH2A-12-M68	610	610	M68x4P	105	135	465	100	30	76	405.00
VH3A-12-M68	610	888	M68x4P	105	135	743	100	30	76	510.00
VH1A-13-M72	610	563	M72x4P	120	150	403	110	30	86	455.00
VH2A-13-M72	610	690	M72x4P	120	150	530	110	30	86	515.00
VH3A-13-M72	610	960	M72x4P	120	150	800	110	30	86	625.00
VH1A-14-M80	610	630	M80x4P	135	165	455	120	30	91	550.00
VH2A-14-M80	610	795	M80x4P	135	165	620	120	30	91	655.00
VH3A-14-M80	610	1167	M80x4P	135	165	992	120	30	91	865.00

note 1) Dimension E increases according to spring travel.

2) Extra long spring hanger available on special request.

Variable Hangers and Supports

4.3 Type D

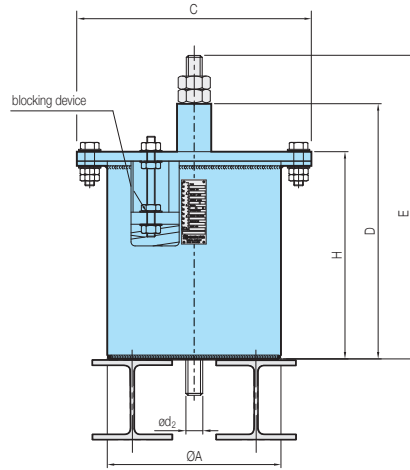


Dimension : mm

Type	□ A	□ B	C	K	E _{max}	Ød ₂	D _{Max}	H	S	d	Weight(kg)
VH1D-0-M12	125	90	140	120	250	M12	215	156	8	12	4.20
VH2D-0-M12	125	90	140	120	400	M12	365	256	8	12	4.00
VH3D-0-M12	125	90	140	120	730	M12	690	483	8	12	7.00
VH1D-1-M12	125	90	140	120	250	M12	215	160	8	12	4.00
VH2D-1-M12	125	90	140	120	400	M12	365	260	8	12	5.00
VH3D-1-M12	125	90	140	120	730	M12	690	485	8	12	8.00
VH1D-2-M12	150	105	170	145	250	M12	215	165	10	14	5.00
VH2D-2-M12	150	105	170	145	400	M12	365	273	10	14	8.00
VH3D-2-M12	150	105	170	145	730	M12	690	483	10	14	12.00
VH1D-3-M16	150	105	170	145	280	M16	230	185	12	14	6.00
VH2D-3-M16	150	105	170	145	430	M16	380	263	12	14	8.00
VH3D-3-M16	150	105	170	145	750	M16	700	483	12	14	12.00
VH4D-3-M16	150	105	170	145	1080	M16	1030	715	12	14	18.00
VH1D-4-M20	190	140	220	190	320	M20	260	201	12	18	12.00
VH2D-4-M20	190	140	220	190	490	M20	430	313	12	18	15.00
VH3D-4-M20	190	140	220	190	830	M20	770	547	12	18	23.00
VH4D-4-M20	190	140	220	190	1190	M20	1125	802	12	18	32.00
VH1D-5-M24	220	160	257	217	370	M24	300	245	12	18	22.00
VH2D-5-M24	220	160	257	217	520	M24	450	341	12	18	26.00
VH3D-5-M24	220	160	257	217	870	M24	795	558	12	18	38.00
VH4D-5-M24	220	160	257	217	1230	M24	1155	816	12	18	53.00
VH5D-5-M24	220	160	257	217	1575	M24	1500	1064	12	18	62.50
VH1D-6-M30	260	190	310	265	440	M30	350	281	15	23	38.00
VH2D-6-M30	260	190	310	265	610	M30	520	398	15	23	46.00
VH3D-6-M30	260	190	310	265	990	M30	900	676	15	23	66.00
VH4D-6-M30	260	190	310	265	1400	M30	1310	989	15	23	93.00
VH5D-6-M30	260	190	310	265	1785	M30	1695	1284	15	23	107.70
VH1D-7-M36	290	205	347	297	500	M36	390	326	20	23	58.00
VH2D-7-M36	290	205	347	297	680	M36	570	458	20	23	71.00
VH3D-7-M36	290	205	347	297	1050	M36	940	715	20	23	95.00
VH4D-7-M36	290	205	347	297	1500	M36	1390	1065	20	23	137.00
VH5D-7-M36	290	205	347	297	1885	M36	1775	1347	20	23	142.50
VH1D-8-M42	290	205	368	303	550	M42	425	361	20	27	66.00
VH2D-8-M42	290	205	368	303	780	M42	655	531	20	27	86.00
VH3D-8-M42	290	205	368	303	1240	M42	1115	903	20	27	127.00
VH4D-8-M42	290	205	368	303	1760	M42	1630	1323	20	27	181.00
VH5D-8-M42	290	205	368	303	2250	M42	2120	1700	20	27	191.50
VH1D-9-M48	340	245	402	332	610	M48	470	391	25	33	102.00
VH2D-9-M48	340	245	402	332	840	M48	700	569	25	33	121.00
VH3D-9-M48	340	245	402	332	1310	M48	1170	936	25	33	172.00
VH4D-9-M48	340	245	402	332	1860	M48	1720	1386	25	33	241.00
VH5D-9-M48	340	245	402	332	2360	M48	2220	1771	25	33	264.50

note 1) Dimension E and D decrease according to spring travel.

4.4 Type D(Heavy Duty)



Dimension : mm

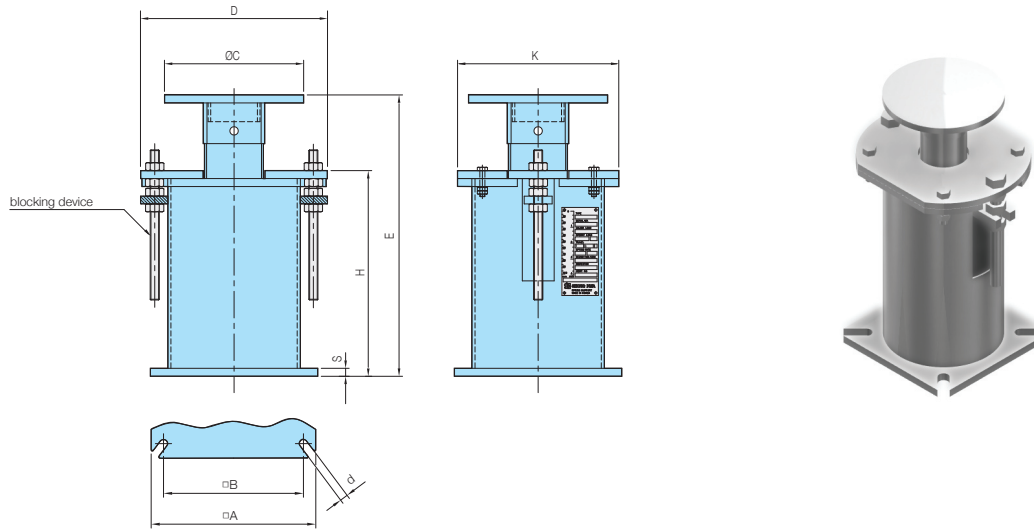
Type	ØA	C	E _{max}	Ød ₂	D _{Max}	H	Weight(kg)
VH1D-10-M56	508	674	585	M56x4P	393	338	205.00
VH2D-10-M56	508	674	755	M56x4P	560	455	235.00
VH3D-10-M56	508	674	1135	M56x4P	938	733	310.00
VH1D-11-M64	559	725	630	M64x4P	430	375	265.00
VH2D-11-M64	559	725	800	M64x4P	577	472	300.00
VH3D-11-M64	559	725	1180	M64x4P	955	750	390.00
VH1D-12-M68	610	776	645	M68x4P	408	353	345.00
VH2D-12-M68	610	776	815	M68x4P	575	470	390.00
VH3D-12-M68	610	776	1195	M68x4P	953	748	490.00
VH1D-13-M72	610	776	730	M72x4P	463	408	395.00
VH2D-13-M72	610	776	910	M72x4P	640	535	450.00
VH3D-13-M72	610	776	1280	M72x4P	1010	805	555.00
VH1D-14-M80	610	776	800	M80x4P	505	450	465.00
VH2D-14-M80	610	776	1020	M80x4P	720	615	545.00
VH3D-14-M80	610	776	1490	M80x4P	1192	987	725.00

note 1) Dimension E and D decrease according to spring travel.

2) Extra long spring hanger available on special request.

Variable Hangers and Supports

4.5 Type F



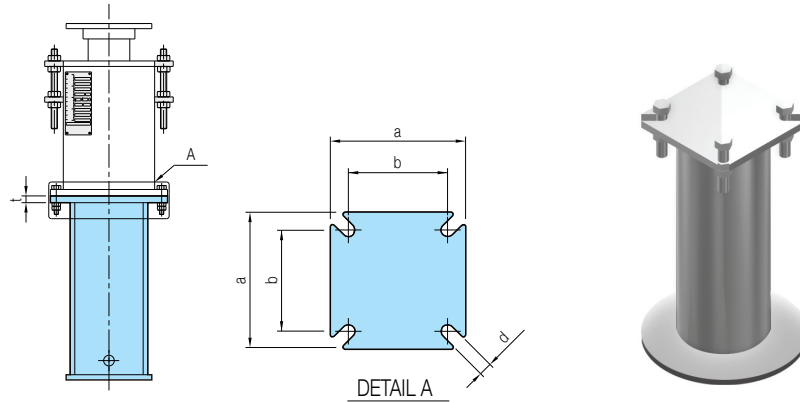
Dimension : mm

Type	ØA	ØB	ØC	D	K	E	H	S	d	Weight(kg)
VH1F-0	125	90	90	140	120	215	156	8	12	5.00
VH2F-0	125	90	90	140	120	345	256	8	12	7.00
VH3F-0	125	90	90	140	120	585	481	8	12	10.00
VH1F-1	125	90	90	140	120	215	156	8	12	5.00
VH2F-1	125	90	90	140	120	345	256	8	12	7.00
VH3F-1	125	90	90	140	120	585	481	8	12	10.00
VH1F-2	150	105	110	170	145	215	163	10	14	8.00
VH2F-2	150	105	110	170	145	345	263	10	14	12.00
VH3F-2	150	105	110	170	145	585	473	10	14	17.00
VH1F-3	150	105	110	170	145	225	172	12	14	10.00
VH2F-3	150	105	110	170	145	345	267	12	14	12.00
VH3F-3	150	105	110	170	145	585	487	12	14	17.00
VH4F-3	150	105	110	170	145	840	717	12	14	23.00
VH1F-4	190	140	150	220	190	270	201	12	18	17.00
VH2F-4	190	140	150	220	190	415	313	12	18	22.00
VH3F-4	190	140	150	220	190	670	547	12	18	31.00
VH4F-4	190	140	150	220	190	940	799	12	18	41.00
VH1F-5	220	160	180	257	217	310	237	12	18	29.00
VH2F-5	220	160	180	257	217	440	333	12	18	34.00
VH3F-5	220	160	180	257	217	690	567	12	18	46.00
VH4F-5	220	160	180	257	217	970	825	12	18	63.00
VH1F-6	260	190	220	310	265	350	279	15	23	47.00
VH2F-6	260	190	220	310	265	515	396	15	23	57.00
VH3F-6	260	190	220	310	265	790	674	15	23	74.00
VH4F-6	260	190	220	310	265	1120	984	15	23	111.00
VH1F-7	290	205	250	347	297	410	316	20	23	73.00
VH2F-7	290	205	250	347	297	560	453	20	23	88.00
VH3F-7	290	205	250	347	297	870	723	20	23	115.00
VH4F-7	290	205	250	347	297	1240	1073	20	23	152.00
VH1F-8	290	205	250	368	303	440	356	20	27	83.00
VH2F-8	290	205	250	368	303	635	531	20	27	105.00
VH3F-8	290	205	250	368	303	1045	903	20	27	151.00
VH4F-8	290	205	250	368	303	1500	1318	20	27	202.00
VH1F-9	340	245	300	402	332	500	404	25	33	132.00
VH2F-9	340	245	300	402	332	705	579	25	33	156.00
VH3F-9	340	245	300	402	332	1100	941	25	33	214.00
VH4F-9	340	245	300	402	332	1570	1391	25	33	269.00

note 1) Dimension E is independent of the load setting, but varies under load by the corresponding spring travel, and adjustable up to +30(mm).

4.5.1 Extension Pipe

► Material : Carbon Steel

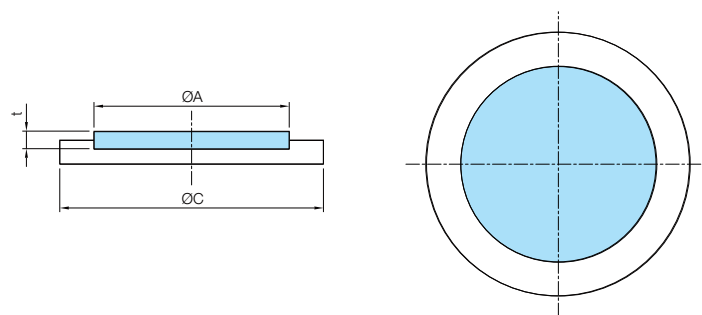


Dimension : mm

Hanger Size	Pipe		Plate (A)				Hex. Bolt/2Nuts	
	Size	Weight (kg/m)	Size (PLt x a x a)	b	d	Weight(kg)	Size	U-Weight (kg)
0	3" x STD	11.28	PL8 x 125 x 125	90	12	0.98	M10x50	0.04
1	3" x STD	11.28	PL8 x 125 x 125	90	12	0.98	M10x50	0.04
2	4" x STD	16.06	PL10 x 150 x 150	105	14	1.77	M12x65	0.11
3	4" x STD	16.06	PL12 x 150 x 150	105	14	2.12	M12x65	0.11
4	5" x STD	21.76	PL12 x 190 x 190	140	18	3.40	M16x70	0.20
5	6" x STD	28.23	PL12 x 220 x 220	160	18	4.56	M16x70	0.20
6	8" x STD	42.49	PL15 x 260 x 260	190	23	7.96	M20x100	0.43
7	8" x STD	42.49	PL20 x 290 x 290	205	23	13.20	M20x100	0.43
8	8" x STD	42.49	PL20 x 290 x 290	205	27	13.20	M24x120	0.73
9	10" x STD	60.24	PL25 x 340 x 340	245	33	22.69	M30x130	1.39

4.5.2 Sliding Plate

► Material : Teflon/Graphite



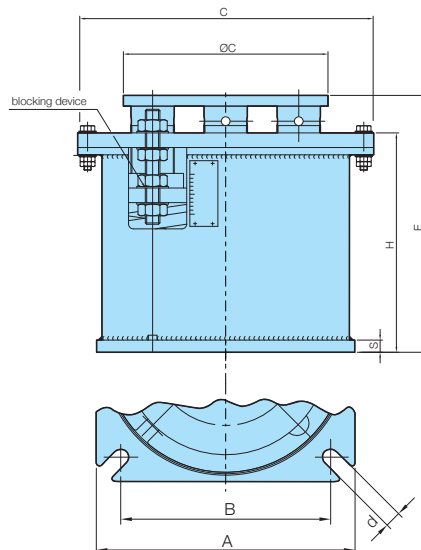
Dimension : mm

Type	Size (ØAxt)	ØC	Applicable Hanger Size	Weight(kg)
CP-XP-V-50	Ø50x6t	90	VHXF-0~1	0.03
CP-XP-V-80	Ø80x6t	110	VHXF-2~3	
CP-XP-V-120	Ø120x6t	150	VHXF-4	0.07
		180	VHXF-5	
CP-XP-V-150	Ø150x6t	220	VHXF-6	0.15
		250	VHXF-7~8	
CP-XP-V-180	Ø180x6t	300	VHXF-9	0.23
				0.34

note 1) For letter X, T stands for Teflon, and G for Graphite

Variable Hangers and Supports

4.6 Type F(Heavy Duty)



Dimension : mm

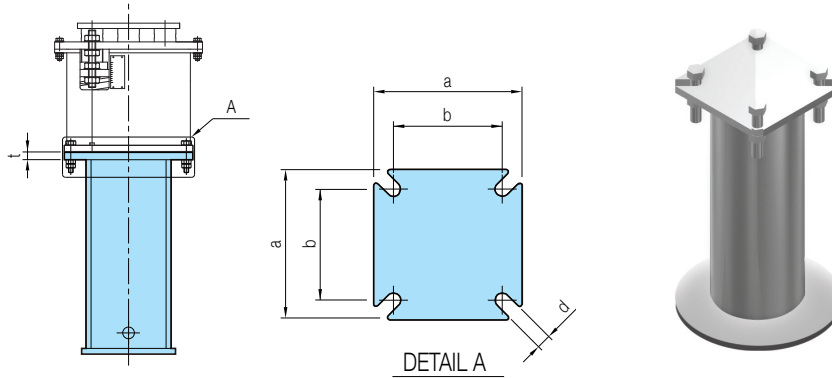
Type	□ A	□ B	ØC	C	E	H	S	d	Weight(kg)
VH1F-10	530	430	420	674	403	331	25	33	230.00
VH2F-10	530	430	420	674	532	450	25	33	260.00
VH3F-10	530	430	420	674	833	731	25	33	360.00
VH1F-11	580	480	420	725	446	371	25	33	310.00
VH2F-11	580	480	420	725	585	500	25	33	350.00
VH3F-11	580	480	420	725	878	773	25	33	460.00
VH1F-12	630	520	450	776	456	381	25	33	380.00
VH2F-12	630	520	450	776	595	510	25	33	430.00
VH3F-12	630	520	450	776	888	783	25	33	555.00
VH1F-13	630	520	450	776	505	425	30	39	440.00
VH2F-13	630	520	450	776	683	593	30	39	520.00
VH3F-13	630	520	450	776	1075	965	30	39	740.00
VH1F-14	630	520	480	776	560	475	35	39	495.00
VH2F-14	630	520	480	776	748	653	35	39	580.00
VH3F-14	630	520	480	776	1132	1013	35	39	785.00

note 1) Dimension E is independent of the load setting, but varies under load by the corresponding spring travel, and adjustable up to +30(mm).

2) Extra long spring hanger available on special request.

4.6.1 Extension Pipe

► Material : Carbon Steel

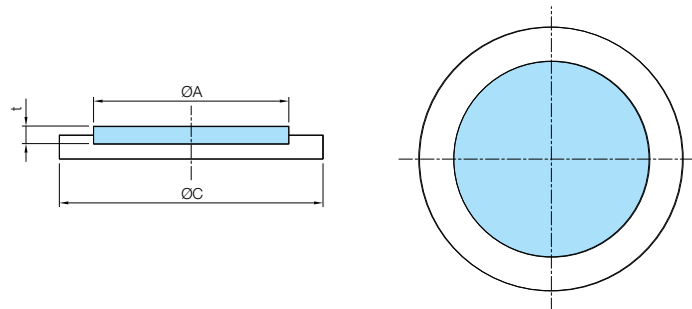


Dimension : mm

Hanger Size	Pipe		Plate (A)				Hex. Bolt/2Nuts	
	Size	Weight (kg/m)	Size (PLt x a x a)	b	d	Weight(kg)	Size	U-Weight (kg)
10	20" x STD	117.00	PL25 x 530 x 530	430	33	55.13	M30x130	1.39
11	20" x STD	117.00	PL25 x 580 x 580	480	33	66.02	M30x130	1.39
12	20" x STD	117.00	PL25 x 630 x 630	520	33	77.89	M30x130	1.39
13	20" x STD	117.00	PL30 x 630 x 630	520	39	93.47	M36x140	2.23
14	20" x STD	117.00	PL35 x 630 x 630	520	39	109.05	M36x140	2.23

4.6.2 Sliding Plate

► Material : Teflon/Graphite



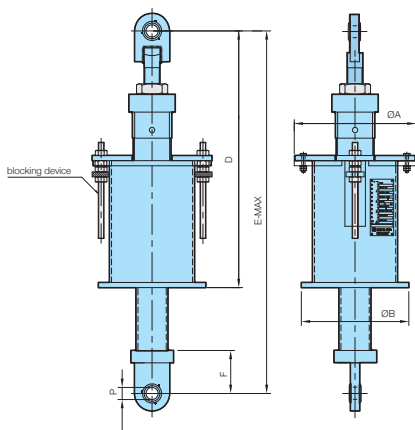
Dimension : mm

Type	Size (ØAxt)	ØC	Applicable Hanger Size	Weight(kg)
CP-XP-V-280	Ø280x6t	420	VHXF-10~11	0.81
CP-XP-V-300	Ø300x6t	450	VHXF-12~13	0.93
CP-XP-V-320	Ø320x6t	480	VHXF-14	1.06

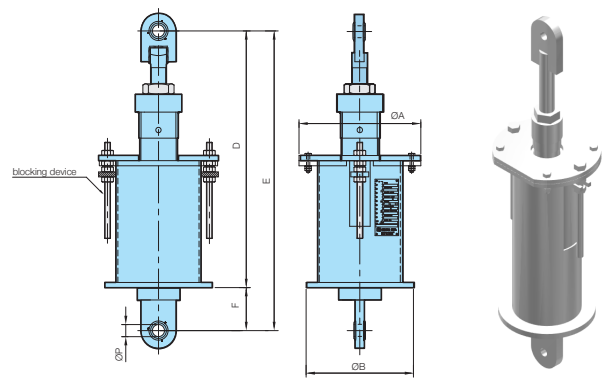
note 1) For letter X, T stands for Teflon, and G for Graphite

Variable Hangers and Supports

4.7 Type G



With extension pipe



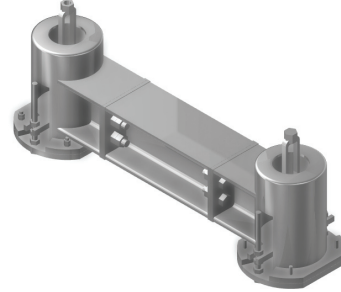
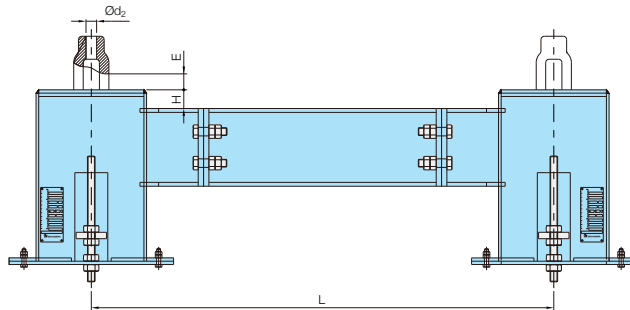
Without extension pipe

Dimension : mm

Type	A	ØB	K	E	E-MAX	D	F	ØP	Weight(kg)	Ext. Weight(kg/m)
VH1G-0-06	140	125	120	431	1123	369	62	12	5.00	3.24
VH2G-0-06	140	125	120	561	1253	499	62	12	7.00	3.24
VH3G-0-06	140	125	120	801	1493	739	62	12	10.00	3.24
VH1G-1-06	140	125	120	431	1123	369	62	12	5.00	3.24
VH2G-1-06	140	125	120	561	1253	499	62	12	7.00	5.41
VH3G-1-06	140	125	120	801	1493	739	62	12	10.00	7.48
VH1G-2-06	170	150	145	431	1123	369	62	12	8.00	11.40
VH2G-2-06	170	150	145	561	1253	499	62	12	12.00	11.40
VH3G-2-06	170	150	145	801	1493	739	62	12	17.00	15.27
VH1G-3-06	170	150	145	441	1133	379	62	12	10.00	15.27
VH2G-3-06	170	150	145	561	1253	499	62	12	12.00	3.24
VH3G-3-06	170	150	145	801	1493	739	62	12	17.00	3.24
VH1G-4-1	220	190	190	493	1184	427	66	15	17.00	3.24
VH2G-4-1	220	190	190	638	1329	572	66	15	22.00	3.24
VH3G-4-1	220	190	190	893	1584	827	66	15	31.00	5.41
VH1G-5-3	257	220	217	576	1310	510	66	17	29.00	7.48
VH2G-5-3	257	220	217	706	1440	640	66	17	34.00	11.40
VH3G-5-3	257	220	217	956	1690	890	66	17	46.00	11.40
VH1G-6-6	310	260	265	662	1430	585	77	25	47.00	15.27
VH2G-6-6	310	260	265	827	1595	750	77	25	57.00	15.27
VH3G-6-6	310	260	265	1102	1870	1025	77	25	74.00	3.24
VH1G-7-6	347	290	297	720	1486	643	77	25	73.00	3.24
VH2G-7-6	347	290	297	870	1636	793	77	25	88.00	3.24
VH3G-7-6	347	290	297	1180	1946	1103	77	25	115.00	3.24
VH1G-8-10	368	290	303	802	1620	710	92	30	83.00	5.41
VH2G-8-10	368	290	303	997	1815	905	92	30	105.00	7.48
VH3G-8-10	368	290	303	1407	2225	1315	92	30	151.00	11.40
VH1G-9-10	402	340	332	857	1670	765	92	30	132.00	11.40
VH2G-9-10	402	340	332	1062	1875	970	92	30	156.00	15.27
VH3G-9-10	402	340	332	1457	2270	1365	92	30	214.00	15.27

note 1) The last digit stands for the Size No. for dynamic duty components(See the upper Table of DE-1.).

4.8 Type T



Dimension : mm

Type	E	H	L _{min}	L _{max}	Ød2	Var. Hanger Weight(kg)	Trapeze Weight(kg/m)
VH1T-0-M12	75	40	280	1350	M12	7.40	11.00
VH2T-0-M12	85	75	280	1350	M12	8.00	11.00
VH3T-0-M12	105	100	280	1350	M12	14.00	11.00
VH1T-1-M12	80	40	280	1350	M12	8.00	16.00
VH2T-1-M12	80	75	280	1350	M12	10.00	16.00
VH3T-1-M12	105	100	280	1350	M12	16.00	16.00
VH1T-2-M12	73	40	350	1600	M12	10.00	20.00
VH2T-2-M12	61	75	350	1600	M12	16.00	20.00
VH3T-2-M12	116	100	350	1600	M12	24.00	20.00
VH1T-3-M16	72	40	367	1600	M16	14.00	20.00
VH2T-3-M16	92	75	367	1600	M16	16.00	20.00
VH3T-3-M16	102	100	367	1600	M16	26.00	20.00
VH4T-3-M16	162	150	367	1600	M16	36.00	20.00
VH1T-4-M20	76	40	503	1750	M20	24.00	27.00
VH2T-4-M20	84	75	503	1750	M20	30.00	27.00
VH3T-4-M20	105	100	503	1750	M20	46.00	27.00
VH4T-4-M20	156	150	503	1750	M20	64.00	27.00
VH1T-5-M24	48	50	550	2100	M24	44.00	43.00
VH2T-5-M24	59	75	550	2100	M24	52.00	43.00
VH3T-5-M24	100	100	550	2100	M24	74.00	43.00
VH4T-5-M24	152	150	550	2100	M24	104.00	43.00
VH5T-5-M24	206	200	550	2100	M24	126.00	61.00
VH1T-6-M30	60	50	626	2100	M30	78.00	61.00
VH2T-6-M30	53	75	626	2100	M30	94.00	61.00
VH3T-6-M30	85	100	626	2100	M30	134.00	61.00
VH4T-6-M30	135	150	626	2100	M30	192.00	61.00
VH5T-6-M30	175	200	626	2100	M30	232.00	61.00
VH1T-7-M36	23	50	715	2100	M36	130.00	83.00
VH2T-7-M36	41	75	715	2100	M36	156.00	83.00
VH3T-7-M36	76	100	715	2100	M36	206.00	83.00
VH4T-7-M36	126	150	715	2100	M36	296.00	83.00
VH5T-7-M36	179	200	715	2100	M36	344.00	83.00
VH1T-8-M42	15	50	736	2150	M42	156.00	93.00
VH2T-8-M42	35	75	736	2150	M42	196.00	93.00
VH3T-8-M42	78	100	736	2150	M42	286.00	93.00
VH4T-8-M42	128	150	736	2150	M42	402.00	93.00
VH5T-8-M42	178	200	736	2150	M42	490.00	93.00
VH1T-9-M48	6	50	788	2200	M48	238.00	103.00
VH2T-9-M48	46	75	788	2200	M48	282.00	103.00
VH3T-9-M48	169	100	788	2200	M48	390.00	103.00
VH4T-9-M48	119	150	788	2200	M48	538.00	103.00
VH5T-9-M48	169	200	788	2200	M48	646.00	103.00

note 1) For restricted spaces, the configuration can be modified.

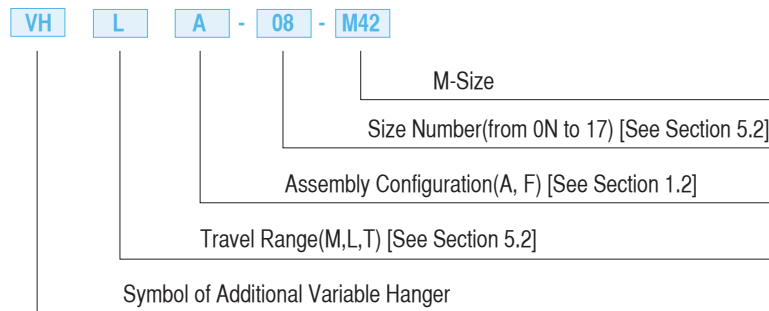
note 2) The permissible load of type T is double that of indicated M-size, because of two parallel connected springs.

Variable Hangers and Supports

5.0 Additional Variable Hangers and Supports

Sometimes, additional variable hangers and supports will be supplied due to limited headroom or as per the customer requirement with other spring rate than the standardized one in Section 3 and 4.

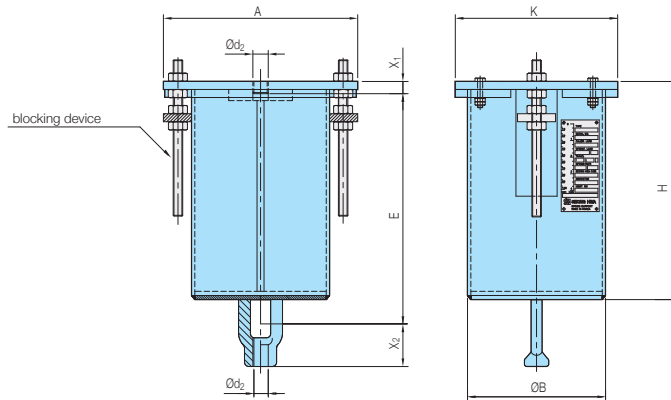
5.1 Type Designation



5.2 Selection Table for Additional Variable Hangers and Supports

Travel Group			Size																		
M	L	T	0N	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
Working Travel(mm)			Load(kN)																		
0	0	0	0.03	0.24	0.33	0.42	0.55	0.74	0.98	1.30	1.75	2.33	3.11	4.05	5.30	7.00	9.34	12.46	16.81	23.36	31.15
5.0	10	15	0.05	0.25	0.34	0.44	0.58	0.77	1.04	1.38	1.84	2.46	3.29	4.28	5.59	7.40	9.87	13.16	17.76	24.67	32.90
10.0	20	30	0.06	0.26	0.36	0.47	0.61	0.81	1.09	1.46	1.94	2.60	3.46	4.50	5.89	7.79	10.39	13.86	18.71	25.99	34.65
15.0	30	45	0.07	0.27	0.38	0.49	0.64	0.85	1.15	1.53	2.04	2.73	3.64	4.73	6.19	8.18	10.92	14.56	19.65	27.30	36.40
20.0	40	60	0.09	0.28	0.40	0.52	0.67	0.89	1.21	1.60	2.14	2.86	3.82	4.96	6.48	8.58	10.95	15.26	20.60	28.62	38.15
25.0	50	75	0.10	0.30	0.42	0.54	0.70	0.94	1.26	1.68	2.24	2.99	3.99	5.19	6.78	8.98	11.97	15.96	21.54	29.93	39.91
30.0	60	90	0.11	0.31	0.44	0.56	0.73	0.98	1.31	1.75	2.33	3.12	4.16	5.42	7.08	9.37	12.50	16.67	22.49	31.24	41.65
35.0	70	105	0.12	0.32	0.46	0.59	0.77	1.02	1.36	1.82	2.43	3.26	4.34	5.64	7.38	9.76	13.02	17.36	23.44	32.56	43.41
40.0	80	120	0.14	0.34	0.47	0.61	0.79	1.06	1.42	1.89	2.53	3.38	4.51	5.87	7.67	10.15	13.55	18.06	24.39	33.86	45.16
45.0	90	135	0.16	0.35	0.49	0.64	0.82	1.10	1.48	1.97	2.63	3.52	4.69	6.10	7.98	10.55	14.08	18.77	25.33	35.18	46.91
50.0	100	150	0.17	0.36	0.51	0.66	0.85	1.15	1.53	2.04	2.73	3.65	4.87	6.33	8.27	10.94	14.60	19.46	26.28	36.49	48.66
55.0	110	165	0.18	0.38	0.53	0.68	0.88	1.19	1.59	2.12	2.83	3.78	5.04	6.55	8.57	11.34	15.13	20.19	27.22	37.81	50.41
60.0	120	180	0.19	0.39	0.55	0.71	0.91	1.23	1.64	2.19	2.92	3.91	5.21	6.78	8.87	11.73	15.65	20.87	28.16	39.13	52.16
65.0	130	195	0.20	0.40	0.57	0.73	0.94	1.27	1.70	2.27	3.02	4.04	5.40	7.01	9.16	12.13	16.18	21.57	29.12	40.44	53.93
70.0	140	210	0.22	0.42	0.59	0.76	0.97	1.30	1.76	2.33	3.12	4.18	5.57	7.24	9.47	12.53	16.71	22.27	30.07	41.75	55.67
75.0	150	225	0.23	0.43	0.61	0.77	1.00	1.35	1.81	2.41	3.22	4.31	5.74	7.47	9.76	12.92	17.23	22.98	31.01	43.07	57.43
80.0	160	240	0.25	0.44	0.62	0.79	1.04	1.39	1.86	2.48	3.32	4.43	5.92	7.69	10.07	13.31	17.76	23.67	31.95	44.38	59.17
			Spring Rate(N/mm)																		
			0.9	0.9	1.3	1.6	2.1	2.8	3.7	4.9	6.5	8.7	11.8	15.3	19.8	26.3	35.1	46.9	63.2	87.8	117.1
			1.3	1.3	1.8	2.3	2.9	4.0	5.4	7.4	9.8	13.1	17.6	22.86	29.8	39.5	52.7	70.2	94.8	131.7	175.6
			2.6	2.6	3.6	4.7	6.1	8.2	11.1	14.7	19.6	26.3	35.0	45.62	59.6	79.0	105.4	140.5	189.6	263.3	351.1

5.3 Dimensions for Additional Type A



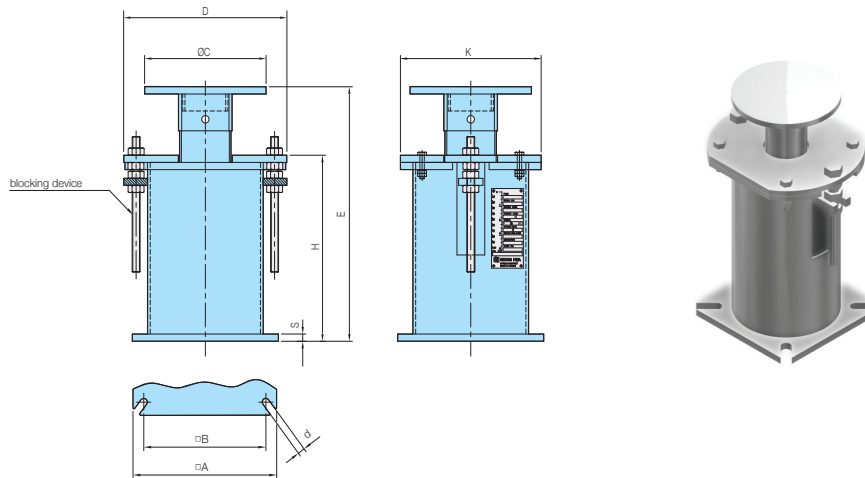
Dimension : mm

Type	A	ØB	K	E	Ød ₂	H	X ₁	X ₂	Weight(kg)
VHMA-0N-M12	170	114	145	250	M12	255	20	40	8.00
VHLA-0N-M12	170	114	145	445	M12	470	20	40	13.00
VHTA-0N-M12	170	114	145	660	M12	685	20	40	17.00
VHMA-00-M12	170	114	145	190	M12	177	20	40	7.00
VHLA-00-M12	170	114	145	295	M12	314	20	40	11.00
VHTA-00-M12	170	114	145	430	M12	451	20	40	14.00
VHMA-01-M12	170	114	145	180	M12	176	20	40	7.00
VHLA-01-M12	170	114	145	285	M12	312	20	40	11.00
VHTA-01-M12	170	114	145	445	M12	448	20	40	14.00
VHMA-02-M12	170	114	145	200	M12	192	20	40	7.00
VHLA-02-M12	170	114	145	310	M12	344	20	40	11.00
VHTA-02-M12	170	114	145	470	M12	496	20	40	15.00
VHMA-03-M12	220	152	190	200	M12	196	20	40	12.00
VHLA-03-M12	220	152	190	325	M12	341	20	40	16.00
VHTA-03-M12	220	152	190	455	M12	486	20	40	20.00
VHMA-04-M12	220	152	190	200	M12	201	20	40	12.00
VHLA-04-M12	220	152	190	320	M12	351	20	40	16.00
VHTA-04-M12	220	152	190	495	M12	501	20	40	21.00
VHMA-05-M12	220	152	190	210	M12	210	20	40	12.00
VHLA-05-M12	220	152	190	340	M12	369	20	40	17.00
VHTA-05-M12	220	152	190	510	M12	528	20	40	22.00
VHMA-06-M16	257	178	217	240	M16	236	20	50	20.00
VHLA-06-M16	257	178	217	365	M16	403	20	50	28.00
VHTA-06-M16	257	178	217	530	M16	570	20	50	37.00
VHMA-07-M16	257	178	217	245	M16	241	20	50	20.00
VHLA-07-M16	257	178	217	370	M16	413	20	50	28.00
VHTA-07-M16	257	178	217	550	M16	585	20	50	37.00
VHMA-08-M16	257	178	217	245	M16	263	20	50	21.00
VHLA-08-M16	257	178	217	410	M16	457	20	50	31.00
VHTA-08-M16	257	178	217	610	M16	651	20	50	41.00
VHMA-09-M20	347	245	297	245	M20	255	25	50	38.00
VHLA-09-M20	347	245	297	405	M20	448	25	50	54.00
VHTA-09-M20	347	245	297	595	M20	641	25	50	70.00
VHMA-10-M20	347	245	297	265	M20	274	25	50	40.00
VHLA-10-M20	347	245	297	445	M20	486	25	50	58.00
VHTA-10-M20	347	245	297	675	M20	698	25	50	75.00
VHMA-11-M20	347	245	297	270	M20	272	25	50	40.00
VHLA-11-M20	347	245	297	450	M20	482	25	50	58.00
VHTA-11-M20	347	245	297	650	M20	692	25	50	76.00
VHMA-12-M24	347	245	297	280	M24	287	30	50	44.00
VHLA-12-M24	347	245	297	470	M24	505	30	50	65.00
VHTA-12-M24	347	245	297	680	M24	723	30	50	85.00
VHMA-13-M24	347	245	297	300	M24	319	30	50	47.00
VHLA-13-M24	347	245	297	530	M24	569	30	50	72.00
VHTA-13-M24	347	245	297	785	M24	819	30	50	96.00
VHMA-14-M30	347	245	297	340	M30	361	35	50	55.00
VHLA-14-M30	347	245	297	615	M30	645	35	50	86.00
VHTA-14-M30	347	245	297	900	M30	929	35	50	116.00
VHMA-15-M30	347	245	297	345	M30	368	35	50	57.00
VHLA-15-M30	347	245	297	620	M30	659	35	50	89.00
VHTA-15-M30	347	245	297	905	M30	950	35	50	121.00
VHMA-16-M36	347	245	297	405	M36	445	45	60	75.00
VHLA-16-M36	347	245	297	750	M36	789	45	60	118.00
VHTA-16-M36	347	245	297	1090	M36	1133	45	60	161.00
VHMA-17-M42	368	245	303	475	M42	521	50	70	92.00
VHLA-17-M42	368	245	303	870	M42	929	50	70	149.00
VHTA-17-M42	368	245	303	1280	M42	1337	50	70	196.00

note 1) Dimension E increases under load by the corresponding spring travel.

Variable Hangers and Supports

5.4 Dimensions for Additional Type F



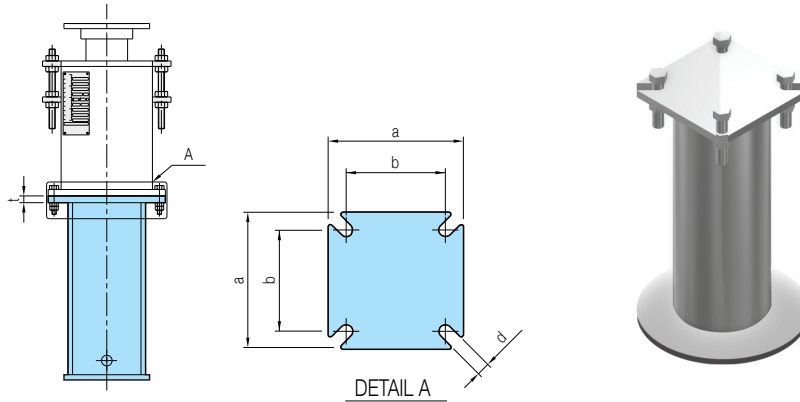
Dimension : mm

Type	□A	□B	ØC	D	K	E	H	S	d	Weight(kg)
VHMF-0N	150	105	110	170	145	330	249	12	14	10.00
VHMF-0N	150	105	110	170	145	575	464	12	14	14.00
VHMF-0N	150	105	110	170	145	824	679	12	14	24.00
VHMF-00	150	105	110	170	145	245	171	12	14	9.00
VHMF-00	150	105	110	170	145	415	308	12	14	12.00
VHMF-00	150	105	110	170	145	584	445	12	14	20.00
VHMF-01	150	105	110	170	145	255	170	12	14	9.00
VHMF-01	150	105	110	170	145	425	306	12	14	12.00
VHMF-01	150	105	110	170	145	590	442	12	14	20.00
VHMF-02	150	105	110	170	145	260	186	12	14	9.00
VHMF-02	150	105	110	170	145	445	338	12	14	12.00
VHMF-02	150	105	110	170	145	629	490	12	14	20.00
VHMF-03	190	140	150	220	190	265	188	12	18	19.00
VHMF-03	190	140	150	220	190	460	333	12	18	25.00
VHMF-03	190	140	150	220	190	653	478	12	18	31.00
VHMF-04	190	140	150	220	190	270	193	12	18	19.00
VHMF-04	190	140	150	220	190	455	343	12	18	26.00
VHMF-04	190	140	150	220	190	643	493	12	18	31.00
VHMF-05	190	140	150	220	190	280	202	12	18	20.00
VHMF-05	190	140	150	220	190	470	361	12	18	26.00
VHMF-05	190	140	150	220	190	658	520	12	18	31.00
VHMF-06	220	160	180	257	217	300	212	12	18	27.00
VHMF-06	220	160	180	257	217	500	379	12	18	41.00
VHMF-06	220	160	180	257	217	697	546	12	18	52.00
VHMF-07	220	160	180	257	217	305	217	12	18	27.00
VHMF-07	220	160	180	257	217	510	389	12	18	41.00
VHMF-07	220	160	180	257	217	712	561	12	18	52.00
VHMF-08	220	160	180	257	217	330	239	12	18	30.00
VHMF-08	220	160	180	257	217	550	433	12	18	44.00
VHMF-08	220	160	180	257	217	772	627	12	18	55.00
VHMF-09	290	205	220	347	297	345	257	20	23	52.00
VHMF-09	290	205	220	347	297	565	450	20	23	74.00
VHMF-09	290	205	220	347	297	801	643	20	23	94.00
VHMF-10	290	205	220	347	297	365	276	20	23	55.00
VHMF-10	290	205	220	347	297	600	488	20	23	78.00
VHMF-10	290	205	220	347	297	856	700	20	23	99.00
VHMF-11	290	205	220	347	297	370	274	20	23	55.00
VHMF-11	290	205	220	347	297	610	484	20	23	78.00
VHMF-11	290	205	220	347	297	866	694	20	23	100.00
VHMF-12	290	205	220	347	297	385	290	20	23	57.00
VHMF-12	290	205	220	347	297	620	508	20	23	85.00
VHMF-12	290	205	220	347	297	871	726	20	23	110.00
VHMF-13	290	205	220	347	297	420	322	20	23	63.00
VHMF-13	290	205	220	347	297	690	572	20	23	92.00
VHMF-13	290	205	220	347	297	976	822	20	23	121.00
VHMF-14	290	205	220	347	297	460	364	20	23	69.00
VHMF-14	290	205	220	347	297	755	648	20	23	108.00
VHMF-14	290	205	220	347	297	1071	932	20	23	142.00
VHMF-15	290	205	220	347	297	465	371	20	23	71.00
VHMF-15	290	205	220	347	297	775	662	20	23	111.00
VHMF-15	290	205	220	347	297	1140	953	20	23	147.00
VHMF-16	290	205	220	347	297	540	445	20	23	88.00
VHMF-16	290	205	220	347	297	900	789	20	23	138.00
VHMF-16	290	205	220	347	297	1285	1133	20	23	185.00
VHMF-17	290	205	220	368	303	625	521	20	23	104.00
VHMF-17	290	205	220	368	303	1040	929	20	23	167.00
VHMF-17	290	205	220	368	303	1485	1337	20	23	227.00

note 1) Dimension E is independent of the load setting, but varies according to spring travel, and adjustable up to +30(mm).

5.4.1 Extension Pipe

► Material : Carbon Steel

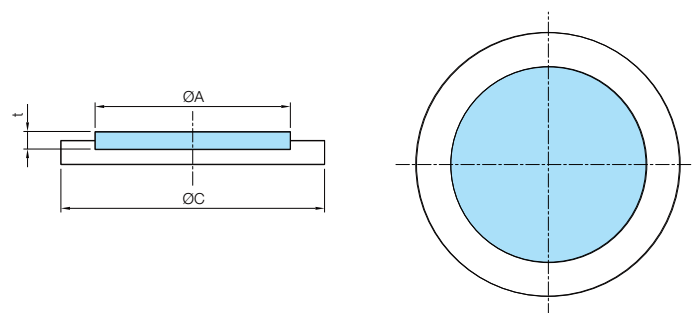


Dimension : mm

Hanger Size	Pipe		Plate (A)				Hex. Bolt/2Nuts	
	Size	Weight (kg/m)	Size (PLt x a x a)	b	d	Weight(kg)	Size	U-Weight (kg)
0N~02	4" x STD	16.06	PL12 x 150 x 150	105	14	2.12	M12x65	0.11
03~05	5" x STD	21.76	PL12 x 190 x 190	140	18	3.40	M16x70	0.20
06~08	6" x STD	28.23	PL12 x 220 x 220	160	18	4.56	M16x70	0.20
09~17	8" x STD	42.49	PL20 x 290 x 290	205	23	13.20	M20x100	0.43

5.4.2 Sliding Plate

► Material : Teflon/Graphite



Dimension : mm

Type	Size (ØAxt)	ØC	Applicable Hanger Size	Weight(kg)
CP-XP-V-50	Ø50x6t	110	VHXF-0N~02	0.03
CP-XP-V-80	Ø80x6t	150	VHXF-03~05	0.07
CP-XP-V-120	Ø120x6t	180	VHXF-06~08	0.15
		220	VHXF-09~17	

note 1) For letter X, T stands for Teflon, and G for Graphite