SECTION D

VARIABLE LOAD SPRING SUPPORTS

VARIABLE LOAD SPRINGS

SPRING SWAY BRACES (APV)

SMALL SPRINGS

SPRING ANTI-VIBRATING CLAMPS

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CONTENTS

VARIABLE LOAD SPRING SUPPORTS

Variable load spring supports are installed in a piping system when relatively small (up to 80 mm) vertical movements need to be absorbed. They are generally related to thermal expansions or contractions. The springs always work under compression.

They are made up of a helical spring, inserted into a cylindrical housing with a welded or bolted down construction. Riveted to the support is a scaleplate indicating the model, type, size, loads and movement.

Springs are classified according to the MODEL-SIZE-TYPE combination.

MODEL

There are four models: CVC, CV, CVL and CVLL. They support the same loads, but they are differentiated by the vertical travels that they accept.

In order to select the suitable model, it should be taken into account that the variation in load from the cold position of the spring to the hot position must be equal to or less than 25%. This value is accepted by the majority of the national and international standards, but however, it is the project engineer who should set this variability or an even lower threshold, conducting an individualized study for each specific case.

According to this latter criterion, the result is approximately as follows:

- MODEL CVC → $\Delta y \leq 12$ mm.
- MODEL CV → 12 mm < $\Delta y \leq 25$ mm.
- MODEL CVL → 25 mm < $\Delta y \leq 50$ mm.
- MODEL CVLL → 50 mm < $\Delta y \leq 80$ mm.

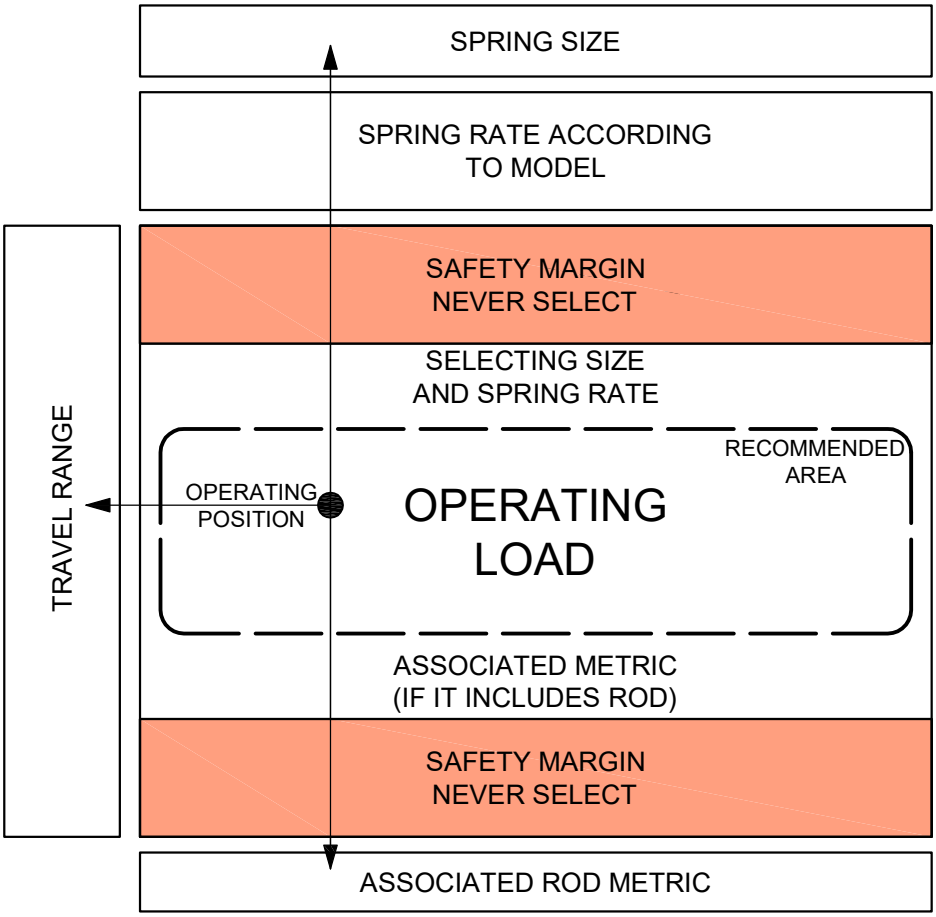
Where Δy is vertical movement.

$$(*)\ \text{Variability} = \frac{\text{ABS (CL - HL)}}{\text{HL}}$$

Where ABS (CL - HL) is the absolute value resulting from deducting the cold load (CL) from the hot load (HL).

SIZE

Spring size is indicated by a number, from 1 to 21, and determines the load range that the spring can support. This is selected using the loads table and in terms of the characteristics of the variable load supports (page 19). In this table, there are two zones (upper and lower) indicated as “safety margins”. These zones should never be considered as operating positions. The selection criterion is as follows: depending on the specified operating load (also known as “hot load”), a load is chosen from the table, either equal to or greater than the required load. It is recommended to select a load in the central zone of the table, so that the operating position of the spring is as centred as possible on the total travel of the spring (life span will be greater and there will be more margin for readjusting the load or for absorbing variations in the design). It can be noted that, depending on the model of the spring, the total travel varies, the CVLL model being the one that accepts a longer travel, as indicated in the section MODEL. This is related to the spring rate (kg/mm), a value indicated below the size of the spring. The greater the movements, the lower the value of the spring rate.



VARIABLE LOAD SPRING SUPPORTS

SECTION D
3

OPERATING LOAD TABLE AND CHARACTERISTICS OF THE VARIABLE LOAD SPRING SUPPORTS

MOD. CVC	CV	CVL	CVLL	MODEL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
CORRESPONDING TYPE: A B C D E F G* H	A B C D E F G* H	A B C D E F G* H	A B C D E F G* H		SUPPORT SIZE																				
					SPRING RATE IN Kg/mm																				
				CVC	0,75	1	1,25	1,75	2,3	3	4	5,5	7,25	9,5	12,5	16,5	22	29	39	52	70	94	125	170	250
				CV	0,375	0,5	0,625	0,875	1,15	1,5	2	2,75	3,625	4,75	6,25	8,25	11	14,5	19,5	26	35	47	62,5	85	125
				CVL	0,188	0,25	0,313	0,438	0,575	0,75	1	1,375	1,813	2,375	3,125	4,125	5,5	7,25	9,75	13	17,5	23,5	31,25	42,5	62,5
				CVLL	0,125	0,167	0,208	0,292	0,383	0,5	0,667	0,917	1,208	1,583	2,083	2,75	3,667	4,833	6,5	8,667	11,67	15,67	20,83	28,33	41,67
SAFETY MARGIN					15	20	25	35	46	60	80	110	145	190	250	330	440	580	780	1040	1400	1880	2500	3400	3750
SAFETY MARGIN					17	23	28	39	52	68	90	124	163	214	281	371	495	652	878	1170	1575	2115	2812	3825	4375
0	0	0	0		19	25	31	44	58	75	100	138	181	238	313	413	550	725	975	1300	1750	2350	3125	4250	5000
2,5	5	10	15		21	28	34	48	63	83	110	151	200	261	344	454	605	797	1072	1430	1925	2585	3437	4675	5625
5	10	20	30		23	30	38	53	69	90	120	165	218	285	375	495	660	870	1170	1560	2100	2820	3750	5100	6250
7,5	15	30	45		24	33	41	57	75	98	130	179	236	309	406	536	715	942	1267	1690	2275	3055	4062	5525	6875
10	20	40	60		26	35	44	61	81	105	140	193	254	333	438	578	770	1015	1365	1820	2450	3290	4375	5950	7500
12,5	25	50	75		28	38	47	66	86	113	150	206	272	356	469	619	825	1087	1462	1950	2625	3525	4687	6375	8125
15	30	60	90		30	40	50	70	92	120	160	220	290	380	500	660	880	1160	1560	2080	2800	3760	5000	6800	8750
17,5	35	70	105		32	43	53	74	98	128	170	234	308	404	531	701	935	1232	1657	2210	2975	3995	5312	7225	9375
20	40	80	120		34	45	56	79	103	135	180	248	326	428	562	742	990	1305	1755	2340	3150	4230	5625	7650	10000
22,5	45	90	135		36	48	59	83	109	143	190	261	345	451	593	784	1045	1377	1852	2470	3325	4465	5937	8075	10625
25	50	100	150		38	50	62	88	115	150	200	275	363	475	625	825	1100	1450	1950	2600	3500	4700	6250	8500	11250
27,5	55	110	165		39	53	66	92	121	158	210	289	381	499	656	866	1155	1522	2047	2730	3675	4935	6562	8925	11875
30	60	120	180		41	55	69	96	127	165	220	303	399	523	687	908	1210	1595	2145	2860	3850	5170	6875	9350	12500
32,5	65	130	195		43	58	72	100	132	173	230	316	417	547	719	949	1265	1667	2242	2990	4025	5405	7187	9775	13125
35	70	140	210		45	60	75	105	138	180	240	330	435	570	750	990	1320	1740	2340	3120	4200	5640	7500	10200	13750
37,5	75	150	225		47	63	78	109	144	188	250	344	453	594	781	1030	1375	1812	2437	3250	4375	5875	7812	10620	14375
40	80	160	240		49	65	81	114	150	195	260	358	471	618	813	1070	1430	1885	2535	3380	4550	6110	8125	11050	15000
42,5	85	170	255		51	68	84	118	155	203	270	371	490	641	844	1113	1485	1957	2632	3510	4725	6345	8437	11470	15625
45	90	180	270		53	70	88	123	161	210	280	385	508	665	875	1155	1540	2030	2730	3640	4900	6580	8750	11900	16250
SAFETY MARGIN					54	73	91	127	167	218	290	399	526	689	906	1196	1595	2102	2827	3770	5075	6815	9062	12325	16875
SAFETY MARGIN					56	75	94	131	173	225	300	413	544	713	938	1237	1650	2175	2925	3900	5250	7050	9375	12750	17500
CVC	CV	CVL	CVLL	MODEL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
					SUPPORT SIZE - LOADS IN Kg.																				
ROD SIZE					M-12						M-16			M-20		M-24		M-30		M-36		M-42	M-48	M-56	M-64

TOTAL TRAVEL AND LOAD OF EACH SUPPORT (travel values in the CVC, CV, CVL and CVLL columns)

* Please, Note that G-type is double and the information data shown below corresponds to each one. The maximun size for a G-type will be 20.

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VARIABLE LOAD SPRING SUPPORTS

SECTION D
3-BIS

OPERATING LOAD TABLE AND CHARACTERISTICS OF THE VARIABLE LOAD SPRING SUPPORTS

MOD. CVC	CV	CVL	CVLL	MODEL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
CORRESPONDING TYPE: A B C D E F G* H	A B C D E F G* H	A B C D E F G* H	A B C D E F G* H		SPRING RATE IN N/mm																				
				CVC	7,36	9,81	12,26	17,16	22,56	29,42	39,23	53,94	71,10	93,17	122,6	161,8	215,8	284,4	382,5	510,0	686,5	921,9	1226	1667	2452
				CV	3,68	4,90	6,13	8,58	11,28	14,71	19,61	26,97	35,55	46,58	61,29	80,91	107,9	142,2	191,2	255,0	343,3	461,0	613,0	833,6	1226
				CVL	1,84	2,45	3,07	4,30	5,64	7,36	9,81	13,48	17,78	23,30	30,65	40,45	53,94	71,10	95,62	127,5	171,6	230,5	306,5	416,8	612,9
				CVLL	1,23	1,64	2,04	2,86	3,76	4,90	6,54	8,99	11,85	15,52	20,43	26,97	35,96	47,40	63,75	85,01	114,5	153,7	204,3	277,8	408,7
SAFETY MARGIN					0,15	0,20	0,25	0,34	0,45	0,59	0,78	1,08	1,42	1,86	2,45	3,24	4,32	5,69	7,65	10,20	13,73	18,44	24,52	33,34	36,78
SAFETY MARGIN					0,17	0,23	0,27	0,38	0,51	0,67	0,88	1,22	1,60	2,10	2,76	3,64	4,85	6,39	8,61	11,47	15,45	20,74	27,58	37,51	42,91
0	0	0	0		0,19	0,25	0,30	0,43	0,57	0,74	0,98	1,35	1,78	2,33	3,07	4,05	5,39	7,11	9,56	12,75	17,16	23,05	30,65	41,68	49,04
2,5	5	10	15		0,21	0,27	0,33	0,47	0,62	0,81	1,08	1,48	1,96	2,56	3,37	4,45	5,93	7,82	10,51	14,02	18,88	25,35	33,71	45,85	55,16
5	10	20	30		0,23	0,29	0,37	0,52	0,68	0,88	1,18	1,62	2,14	2,79	3,68	4,85	6,47	8,53	11,47	15,30	20,59	27,66	36,78	50,02	61,29
7,5	15	30	45		0,24	0,32	0,40	0,56	0,74	0,96	1,27	1,76	2,31	3,03	3,98	5,26	7,01	9,24	12,43	16,57	22,31	29,96	39,84	54,18	67,42
10	20	40	60		0,25	0,34	0,43	0,60	0,79	1,03	1,37	1,89	2,49	3,27	4,30	5,67	7,55	9,95	13,39	17,85	24,03	32,27	42,91	58,35	73,55
12,5	25	50	75		0,27	0,37	0,46	0,65	0,84	1,11	1,47	2,02	2,67	3,49	4,60	6,07	8,09	10,66	14,34	19,12	25,74	34,57	45,97	62,52	79,68
15	30	60	90		0,29	0,39	0,49	0,69	0,90	1,18	1,57	2,16	2,84	3,73	4,90	6,47	8,63	11,38	15,30	20,40	27,46	36,87	49,04	66,69	85,81
17,5	35	70	105		0,31	0,42	0,52	0,73	0,96	1,26	1,67	2,29	3,02	3,96	5,21	6,87	9,17	12,08	16,25	21,67	29,18	39,18	52,09	70,86	91,94
20	40	80	120		0,33	0,44	0,55	0,77	1,01	1,32	1,77	2,43	3,20	4,20	5,51	7,28	9,71	12,80	17,21	22,95	30,89	41,48	55,16	75,02	98,07
22,5	45	90	135		0,35	0,47	0,58	0,81	1,07	1,40	1,86	2,56	3,38	4,42	5,82	7,69	10,25	13,50	18,16	24,22	32,61	43,79	58,22	79,19	104,2
25	50	100	150		0,37	0,49	0,61	0,86	1,13	1,47	1,96	2,70	3,56	4,66	6,13	8,09	10,79	14,22	19,12	25,50	34,32	46,09	61,29	83,36	110,3
27,5	55	110	165		0,38	0,52	0,65	0,90	1,19	1,55	2,06	2,83	3,74	4,89	6,43	8,49	11,33	14,93	20,07	26,77	36,04	48,40	64,35	87,53	116,5
30	60	120	180		0,40	0,54	0,68	0,94	1,25	1,62	2,16	2,97	3,91	5,13	6,74	8,90	11,87	15,64	21,04	28,05	37,76	50,70	67,42	91,70	122,6
32,5	65	130	195		0,42	0,57	0,71	0,98	1,29	1,70	2,26	3,10	4,09	5,36	7,05	9,31	12,41	16,35	21,99	29,32	39,47	53,01	70,48	95,86	128,7
35	70	140	210		0,44	0,59	0,74	1,03	1,36	1,77	2,35	3,24	4,27	5,59	7,36	9,71	12,95	17,06	22,95	30,60	41,19	55,31	73,55	100,0	134,9
37,5	75	150	225		0,46	0,62	0,76	1,07	1,41	1,84	2,45	3,37	4,44	5,83	7,66	10,10	13,48	17,77	23,90	31,87	42,91	57,62	76,61	104,2	141,0
40	80	160	240		0,48	0,64	0,79	1,12	1,47	1,91	2,55	3,51	4,62	6,06	7,97	10,49	14,02	18,49	24,86	33,15	44,62	59,92	79,68	108,4	147,1
42,5	85	170	255		0,50	0,67	0,82	1,16	1,52	1,99	2,65	3,64	4,81	6,29	8,28	10,92	14,56	19,19	25,81	34,42	46,34	62,23	82,74	112,5	153,2
45	90	180	270		0,52	0,69	0,86	1,21	1,58	2,06	2,75	3,78	4,98	6,52	8,58	11,33	15,10	19,91	26,77	35,70	48,05	64,53	85,81	116,7	159,4
SAFETY MARGIN					0,53	0,72	0,89	1,25	1,64	2,14	2,84	3,91	5,16	6,76	8,89	11,73	15,64	20,61	27,72	36,97	49,77	66,83	88,87	120,9	165,5
SAFETY MARGIN					0,55	0,74	0,92	1,28	1,70	2,21	2,94	4,05	5,34	6,99	9,20	12,13	16,18	21,33	28,69	38,25	51,49	69,14	91,94	125,0	171,6
CVC	CV	CVL	CVLL	MODEL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
					SUPPORT SIZE - LOADS IN kN.																				
ROD SIZE					M-12						M-16			M-20		M-24		M-30		M-36		M-42	M-48	M-56	M-64

The first column block, under "TOTAL TRAVEL AND LOAD OF EACH SUPPORT", gives the total travel for each model (CVC, CV, CVL, CVLL).

** Please note that the Type G is a double spring unit and the data shown below corresponds to each half. The maximun size for a Type G is 20.*

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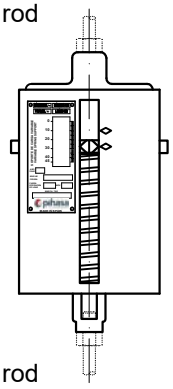
VARIABLE LOAD SPRING SUPPORTS

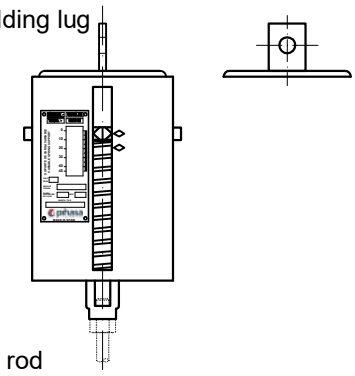
TYPE

The different types of support are classified by a letter - from A to H - and are differentiated by the assembly conditions regarding connection to the structure.

TYPE A



TYPE B



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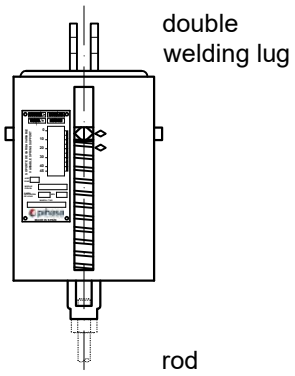
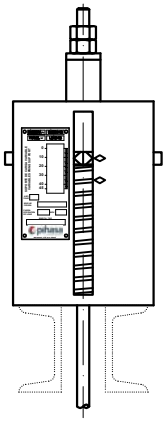
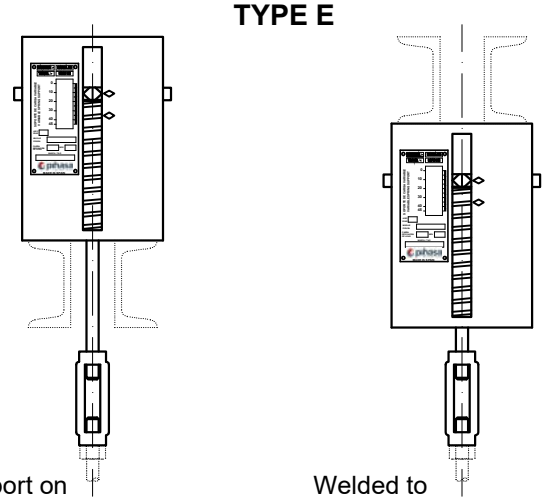


TYPE D



Support on
structure - hanging

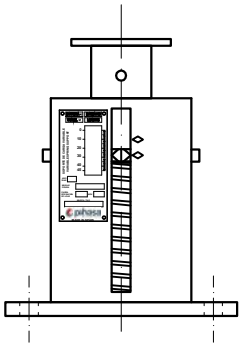
TYPE E



Support on
structure - hanging

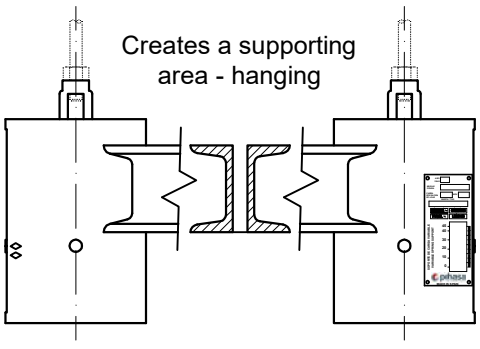
Welded to
structure - hanging

TYPE F

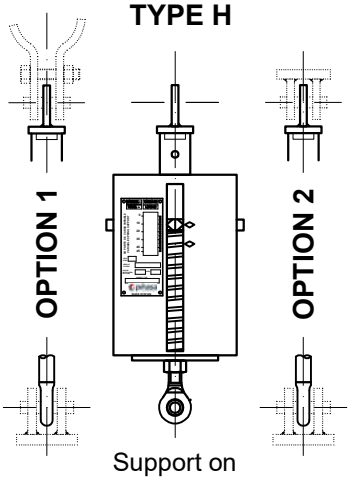


Support on
structure - support

TYPE G



TYPE H



Support on
structure - support

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ORDER

To place an order, the following details must be indicated:

- Model, size and type.
- Hot and/or cold load.
- Vertical movement (“travel”) of the pipe from the cold position to the hot position. If movement is upwards, indicate so with the positive sign (+), and with the sign (-) if movement is downwards.
- Identification mark (“tag number”).
- Options: corrosion resistant / continuous blocking.

Note that on a variable load spring, the following condition is always met:

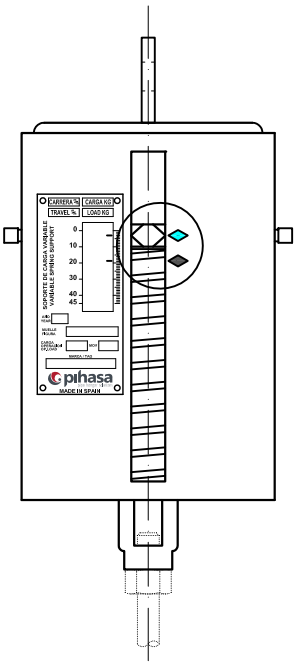
$$CL = HL + \Delta y \cdot k$$

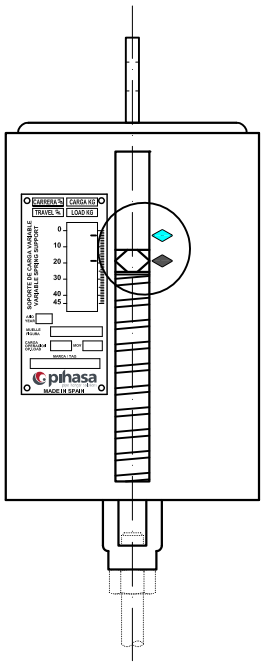
Where “k” is the spring rate (depending on the model selected). For this reason, different combinations of cold load, hot load and movement are given for each spring manufacturer.

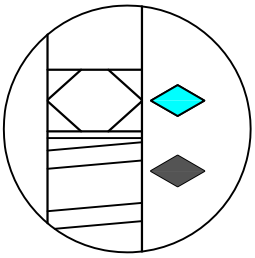
TRAVEL STOPS

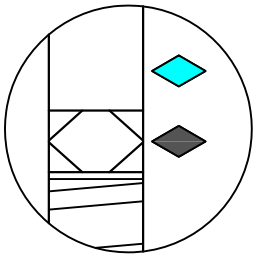
Unless required otherwise, the support will be preset on the cold or installation load, by two travel stops. These stops should not be removed until the installation stages and hydraulic testing are completed. Once removed (with the plant still “cold”), the indicator should coincide with the peak of the cold load / installation load indicator. When the plant starts up, the indicator will tend to shift until it coincides with the position of the hot load / operating load indicator.

The operating position for the spring is theoretical, i.e., it is designed for “ideal” work conditions; in real life conditions, certain factors can come into play that affect the actual operationg position of the spring. For instance, a spring located on a draining line will normally be in the cold position, and will only move when draining really causes change of load and temperature on the piping.









GENERAL INSTALLATION AND OPERATION CONSIDERATIONS:

In this section, we set out to indicate the general aspects to be considered in order to carry out a correct installation of the variable load spring supports, as well as explaining precautions to take for correct working order and subsequent maintenance of said elements.

Firstly, in order to avoid the thermal movements of the piping being restrained, it should be taken into account that the installed accessories may cause interference with other elements that have nothing to do with supporting the piping.

This possibility often occurs when the supports are fitted with rods of a certain length, since throughout their length, they may approach the beams, other piping or accessories which, due to their proximity, may cause said interference.

To make identification of the supports easy, it is advisable to position the spring support in such a manner that the scaleplate is on the side with the best visibility.

When welding to install the support, they must be coated with the appropriate paint in order to avoid any oxidation that may spread to the housing, leading to undesirable damage.

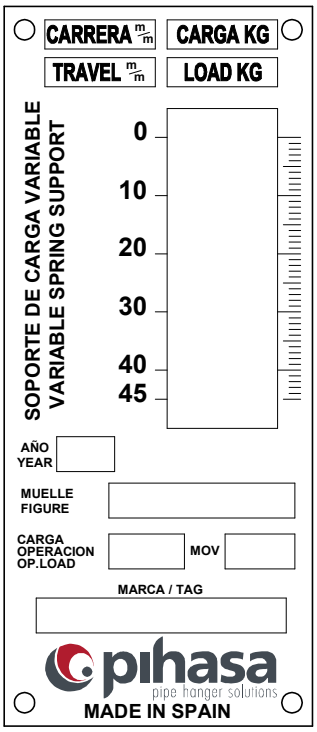
It is appropriate that, in the threaded zones, grease is applied in order to avoid deterioration due to oxidation, that may make subsequent adjustment or dismantling operations difficult.

We recommend that once the spring support is finally installed, the travel stops should be kept so that they can be used in the event of having to dismount the support for inspection, recalibrating, etc., or to carry out changes of piping accessories. However, if not available, temporary blocking may be achieved with plates and profiles that may be tack welded to the spring casing.

Since during plant maintenance operations, touching up paintwork of the supporting elements is part of these activities, special care should be taken not to paint the sliding surfaces, threaded zones and scaleplates.

As a final recommendation, it should be remembered that it is appropriate to conduct a visual inspection of all the spring supports installed on the pipeline before starting up, in order to ensure that all the travel stops have been removed, that the springs are correctly positioned and that all the lock nuts are tightened.

IDENTIFICATION CARD
MODEL CVC



INSTALLATION INSTRUCTIONS FOR VARIABLE LOAD SPRING SUPPORTS

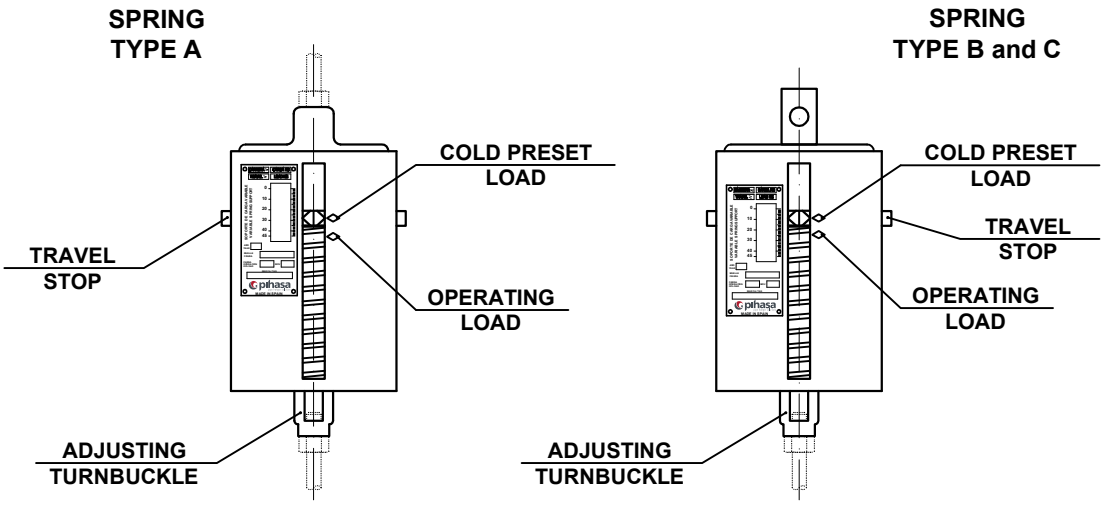
Before installing a variable load support, there must be a provisional, rigid support able to sustain the piping in its correct position so that no deformities occur on the same nor overstresses occur at any of its points.

Once the point has been located where the variable load support should be fitted, install all the accessories, both on the piping and on the supporting structure, according to the design drawings for the support.

Depending on the type of spring support selected, certain manoeuvres will have to be carried out, until the supporting element can take the required load.

INSTALLATION INSTRUCTIONS

SPRINGS TYPE A, B and C.



For these types of springs, once the relevant accessories have been installed (clamp, lug, rods, eye nuts, beam attachments, etc.), locate them in the position of COLD PRESET LOAD. To do so, act on the adjustment turnbuckles until the travel stops are loose and can be removed by hand or, at the most, with the help of pliers.

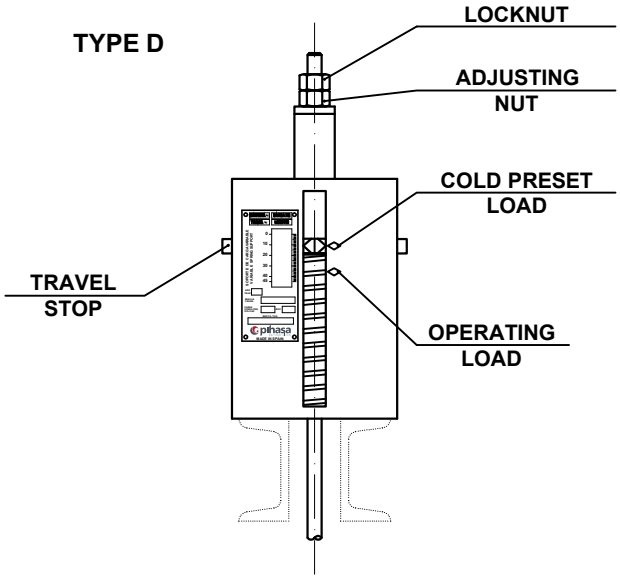
The operation of removing the travel stops must be carried out once the hydraulic test is completed, and on the condition that no other manoeuvres are going to be carried out on the piping that may leave the spring out of its position in COLD PRESET LOAD.

When the piping reaches the temperature considered in the stress analysis, the spring position indicator should indicate OPERATING LOAD, which will be located above or below that of COLD PRESET LOAD, depending on the vertical displacement at that point.

INSTALLATION INSTRUCTIONS

TYPE D SPRINGS

To install this type of spring, once the corresponding accessories have been fitted (clamp, lug, rods, etc.), some welding may have to be carried out to join the spring housing to the supporting structure in order to ensure the position of the element in terms of any incident caused by manoeuvres close to the supporting point, or any transitional vibration in the piping.



In order to ensure that the spring takes the COLD PRESET LOAD, act on the nut located in the upper part of the rod, until the travel stops can be released by hand or, at the most, with the help of a hand tool such as pliers.

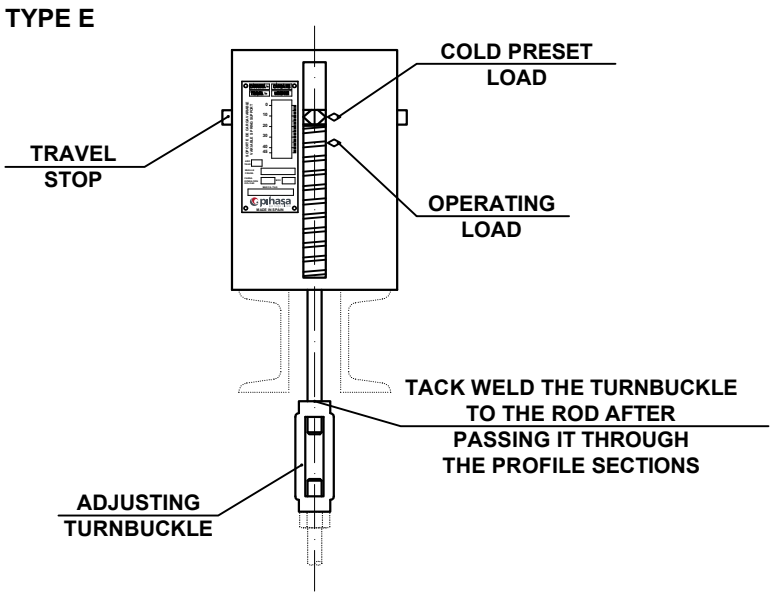
The operation of removing the travel stops must be carried out once the hydraulic test is completed, and on the condition that no other manoeuvres are going to be carried out on the piping that may leave the spring out of its position in COLD PRESET LOAD.

When the piping reaches the temperature considered in the stress analysis, the spring position indicator should indicate OPERATING LOAD, which will be located above or below that of COLD PRESET LOAD, depending on the vertical displacement at that point.

INSTALLATION INSTRUCTIONS

SPRINGS TYPE E

As in the case of Type D springs, to install this type of spring, once the corresponding accessories have been fitted (clamp, lug, rods, etc.), some welding may have to be carried out to join the spring housing to the supporting structure in order to ensure the position of the element in terms of any incident caused by manoeuvres close to the supporting point, or any transitional vibration in the piping.



In order to ensure that the spring takes the COLD PRESET LOAD, act on the adjustment turnbuckle located on the rod, until the travel stops can be released by hand or, at the most, with the help of a hand tool such as pliers.

The operation of removing the travel stops must be carried out once the hydraulic test is completed, and on the condition that no other manoeuvres are going to be carried out on the piping that may leave the spring out of its position in COLD PRESET LOAD.

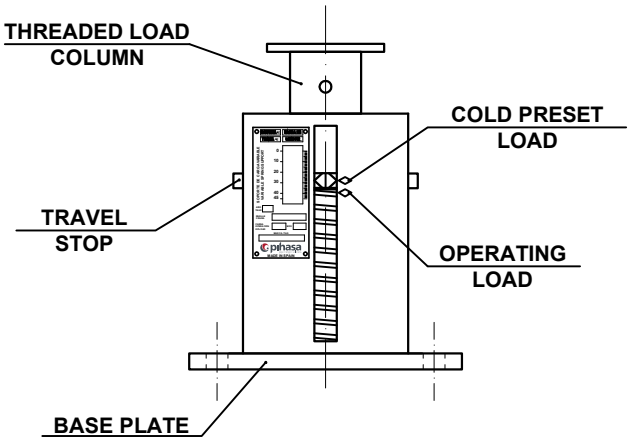
When the piping reaches the temperature considered in the stress analysis, the spring position indicator should indicate OPERATING LOAD, which will be located above or below that of COLD PRESET LOAD, depending on the vertical displacement at that point.

INSTALLATION INSTRUCTIONS

SPRINGS TYPE F

Installation of this type of spring on the supporting structure is made by means of bolts located in the holes in the base plate, although if the structural arrangement does not allow for this, or if it is preferred, said spring base plate can also be welded to the supporting structure, in order to ensure that the unit does not turn over or move from its position in the case of movements, in the horizontal plane, of the pipe.

TYPE F



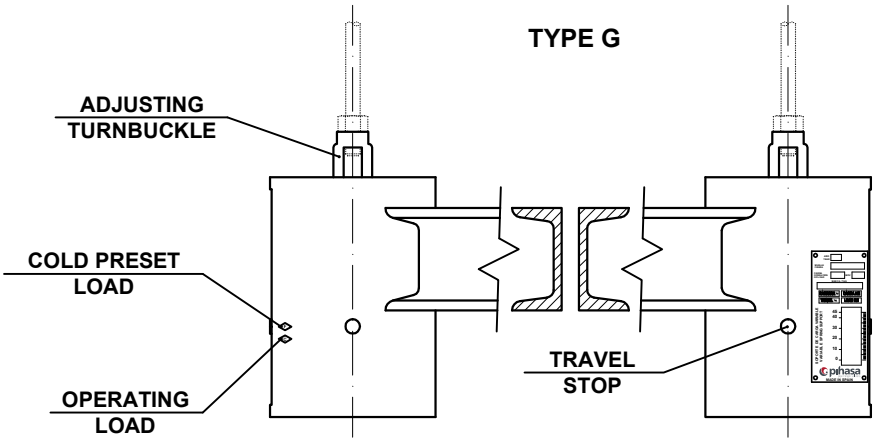
To ensure that the spring takes the COLD PRESET LOAD, act on the threaded load column located in the upper part of the housing, until the travel stops can be released by hand or, at the most, with the help of a hand tool such as pliers.

The operation of removing the travel stops must be carried out once the hydraulic test is completed, and on the condition that no other manoeuvres are going to be carried out on the piping that may leave the spring out of its position in COLD PRESET LOAD.

When the piping reaches the temperature considered in the stress analysis, the spring position indicator should indicate OPERATING LOAD, which will be located above or below that of COLD PRESET LOAD, depending on the vertical displacement at that point.

INSTALLATION INSTRUCTIONS

SPRINGS TYPE G



For these types of springs, once the relevant accessories have been installed (clamp, lug, rods, eye nut, beam attachment, etc.), locate them in the position of COLD PRESET LOAD.

To ensure that the springs take the COLD PRESET LOAD, act on the adjustment turnbuckles until the travel stops are loose and can be removed by hand or, at the most, with the help of pliers. It is advisable that the adjustment operation is carried out alternating between the two springs, or simultaneously on both, if possible.

The operation of removing the travel stops must be carried out once the hydraulic test is completed, and on the condition that no other manoeuvres are going to be carried out on the piping that may leave the spring out of its position in COLD PRESET LOAD.

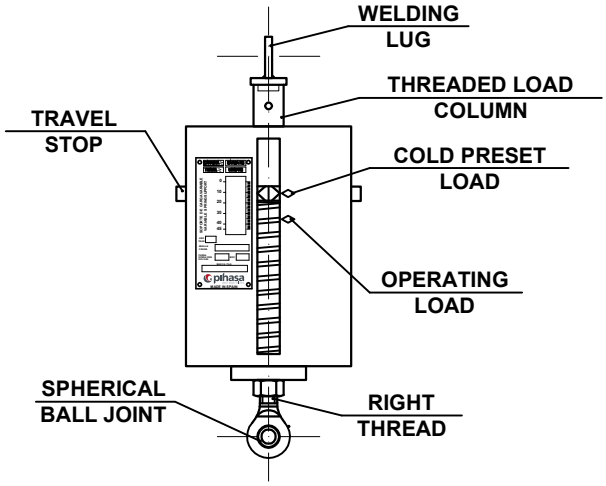
When the piping reaches the temperature considered in the stress analysis, the spring position indicator should indicate OPERATING LOAD, which will be located above or below that of COLD PRESET LOAD, depending on the vertical displacement at that point.

It is advisable to apply some welding points to join the pipe shoe (if there is one) to the center of the beams which connect the springs, if the movements occurring in the horizontal plane justify it. In this way, it will avoid the piping displacement towards one of the springs and thus ensure that both are subject to the same load.

INSTALLATION INSTRUCTIONS

SPRINGS TYPE H

TYPE H



As in the case of Type F springs, the installation of this type of spring is by means of welding the lower element, the rear bracket, to the support structure. At the upper end, a clamp can be installed (Option 1) or another rear bracket (Option 2).

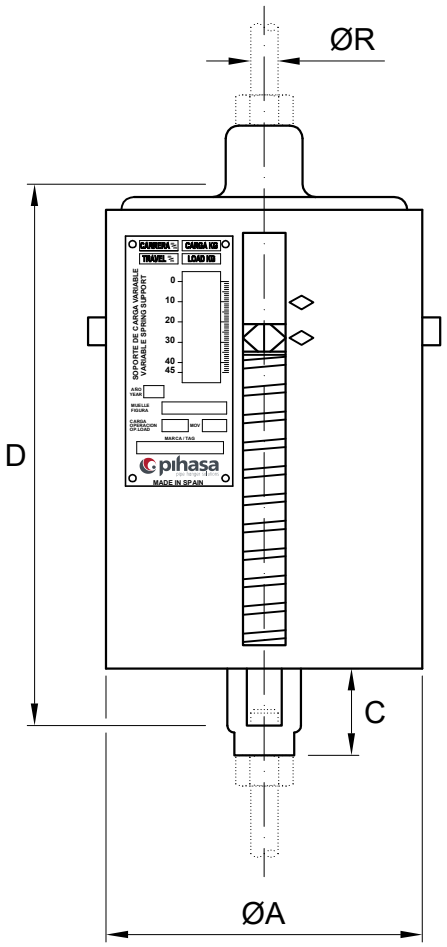
In order to ensure that the spring reaches the COLD PRESET LOAD, it is essential to act on the upper threaded load column until the travel stops can be released by hand, or at the most, with the help of a hand tool such as pliers.

The operation of removing the travel stops must be carried out once the hydraulic test is completed, and on the condition that no other manoeuvres are going to be carried out on the piping that may leave the spring out of its position in COLD PRESET LOAD.

When the piping reaches the temperature considered in the stress analysis, the spring position indicator should indicate OPERATING LOAD, which will be located above or below that of COLD PRESET LOAD, depending on the vertical displacement at that point.

VARIABLE LOAD SPRING SUPPORT
TYPE A

SECTION D
14



SIZE	MOD.	ØA	C*	D*	ØR	WEIGHT (Kg.)
1	CVC	98	45	177	M12x1,75	3,5
	CV		10	236		5
	CVL		10	401		7
	CVLL		10	588		8,5
2	CVC	98	45	177	M12x1,75	3,5
	CV		10	241		5
	CVL		10	415		7
	CVLL		10	609		8,5
3	CVC	98	45	182	M12x1,75	3,5
	CV		10	246		5
	CVL		10	435		7,5
	CVLL		10	639		9,5
4	CVC	98	45	182	M12x1,75	4
	CV		10	246		5
	CVL		10	439		7,5
	CVLL		10	645		9,5
5	CVC	98	45	187	M12x1,75	4
	CV		10	251		5
	CVL		10	451		7,5
	CVLL		10	663		9,5
6	CVC	134	50	204	M12x1,75	7
	CV		15	268		9
	CVL		15	485		14
	CVLL		15	696		18
7	CVC	134	50	209	M16x2	7
	CV		15	278		10
	CVL		15	508		15
	CVLL		15	738		19
8	CVC	134	50	214	M16x2	7,5
	CV		15	298		11
	CVL		15	543		17
	CVLL		15	788		22
9	CVC	134	50	230	M16x2	8
	CV		25	330		11
	CVL		25	595		18
	CVLL		25	850		23
10	CVC	134	55	245	M20x2,5	8
	CV		25	340		12
	CVL		25	605		19
	CVLL		25	870		24
11	CVC	168	55	247	M20x2,5	18
	CV		25	342		23
	CVL		25	622		35
	CVLL		25	902		44
12	CVC	168	55	257	M24x3	19
	CV		25	357		25
	CVL		25	652		38
	CVLL		25	947		49
13	CVC	168	50	282	M24x3	21
	CV		25	377		27
	CVL		25	680		43
	CVLL		25	987		57
14	CVC	168	70	312	M30x3,5	23
	CV		30	415		30
	CVL		30	750		50
	CVLL		30	1085		68
15	CVC	236	80	325	M30x3,5	46
	CV		30	415		59
	CVL		30	750		89
	CVLL		30	1085		113
16	CVC	236	80	340	M36x4	52
	CV		40	450		67
	CVL		40	810		106
	CVLL		40	1170		139
17	CVC	236	80	350	M36x4	59
	CV		40	510		79
	CVL		40	900		130
	CVLL		40	1290		172
18	CVC	304	60	370	M42x4,5	106
	CV		40	510		134
	CVL		40	900		204
	CVLL		40	1290		264
19	CVC	304	60	380	M48x5	120
	CV		40	525		152
	CVL		40	955		243
	CVLL		40	1385		323
20	CVC	304	60	390	M56x5,5	138
	CV		40	550		176
	CVL		40	1005		291
	CVLL		40	1460		390
21	CVC	304	60	420	M64x6	160
	CV		70	680		219
	CVL		70	1240		373
	CVLL		70	1790		520

N.B.:

* C and D are approximate dimensions which correspond to the vertical position at the lowest load value of the working range. Therefore, the actual dimensions will vary depending on the load applied.

REV.	DATE	EDITED FOR :	DRAW.	REV.
3	21/07/10	GENERAL REVISION	DDG	EAR
2	12/07/91	INFORMATION	JMD	EAR
1	17/01/85	INFORMATION	JRS	EAR

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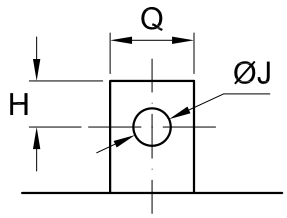
VARIABLE LOAD SPRING SUPPORT
TYPE B

SECTION D
15



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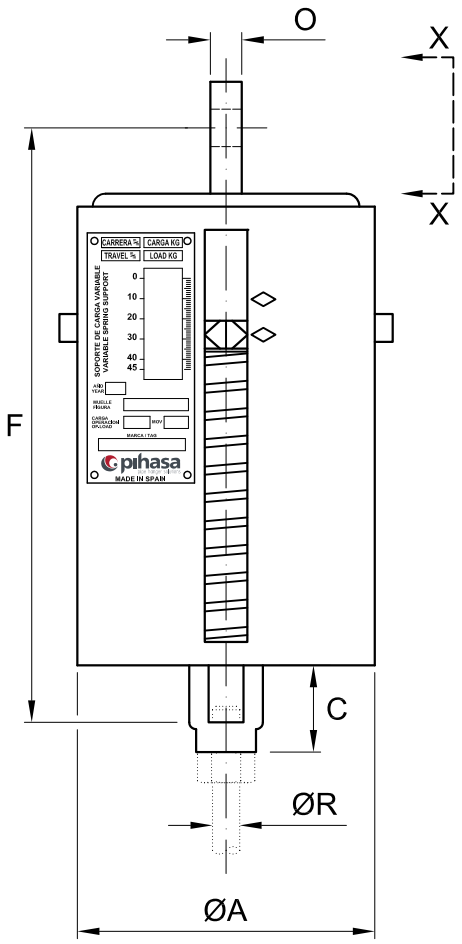

SIZE	MOD.	ØA	C*	F*	H	ØJ	O	Q	ØR	WEIGHT (Kg.)
1	CVC	98	45	217	20	13,5	6	65	M12x1,75	3,5
	CV		10	277						5
	CVL		10	442						7
	CVLL		10	629						8,5
2	CVC	98	45	217	20	13,5	6	65	M12x1,75	3,5
	CV		10	282						5
	CVL		10	456						7
	CVLL		10	650						8,5
3	CVC	98	45	222	20	13,5	6	65	M12x1,75	3,5
	CV		10	289						5
	CVL		10	476						7,5
	CVLL		10	678						9,5
4	CVC	98	45	222	20	13,5	6	65	M12x1,75	4
	CV		10	289						5
	CVL		10	480						7,5
	CVLL		10	684						9,5
5	CVC	98	45	227	20	13,5	6	65	M12x1,75	4
	CV		10	292						5
	CVL		10	492						7,5
	CVLL		10	704						9,5
6	CVC	134	50	244	20	13,5	6	65	M12x1,75	7
	CV		15	309						9
	CVL		15	509						14
	CVLL		15	737						18
7	CVC	134	50	254	25	17,5	8	65	M16x2	7
	CV		15	324						10
	CVL		15	554						15
	CVLL		15	784						19
8	CVC	134	50	259	25	17,5	8	65	M16x2	7,5
	CV		15	344						11
	CVL		15	589						17
	CVLL		15	834						22
9	CVC	134	50	275	25	17,5	8	65	M16x2	8
	CV		25	365						11
	CVL		25	649						18
	CVLL		25	905						23
10	CVC	134	55	290	35	21,5	8	65	M20x2,5	8
	CV		25	375						12
	CVL		25	650						19
	CVLL		25	925						24
11	CVC	168	55	280	35	21,5	8	65	M20x2,5	18
	CV		25	389						23
	CVL		25	669						35
	CVLL		25	949						44
12	CVC	168	55	307	40	26,5	10	75	M24x3	19
	CV		25	412						25
	CVL		25	707						38
	CVLL		25	1002						49
13	CVC	168	50	322	40	26,5	10	75	M24x3	21
	CV		25	427						27
	CVL		25	730						43
	CVLL		25	1037						57
14	CVC	168	70	372	50	33	12	75	M30x3,5	23
	CV		30	480						30
	CVL		30	815						50
	CVLL		30	1140						68
15	CVC	236	80	375	50	33	12	75	M30x3,5	46
	CV		30	470						59
	CVL		30	805						89
	CVLL		30	1130						113
16	CVC	236	80	410	55	38	15	100	M36x4	52
	CV		40	520						67
	CVL		40	890						106
	CVLL		40	1240						139
17	CVC	236	80	390	55	38	15	100	M36x4	59
	CV		40	570						79
	CVL		40	960						130
	CVLL		40	1360						172
18	CVC	304	60	415	75	43	20	125	M42x4,5	106
	CV		40	575						134
	CVL		40	965						204
	CVLL		40	1365						264
19	CVC	304	60	450	75	48	25	150	M48x5	120
	CV		40	625						152
	CVL		40	1070						243
	CVLL		40	1485						323
20	CVC	304	60	480	90	53	25	150	M56x5,5	138
	CV		40	665						176
	CVL		40	1115						291
	CVLL		40	1575						390
21	CVC	304	60	555	115	58	30	170	M64x6	160
	CV		70	815						219
	CVL		70	1375						373
	CVLL		70	1935						520

N.B.:

* C and F are approximate dimensions which correspond to the vertical position at the lowest load value of the working range. Therefore, the actual dimensions will vary depending on the load applied.

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2	12/07/91	INFORMATION	JMD	EAR
1	17/01/85	INFORMATION	JRS	EAR

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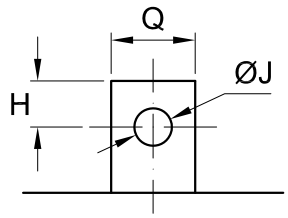
VARIABLE LOAD SPRING SUPPORT
TYPE C

SECTION D
16



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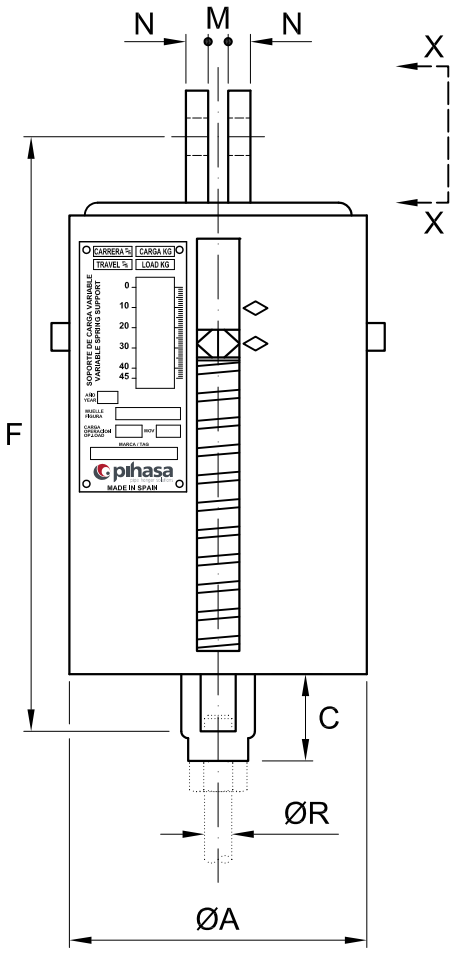

SIZE	MOD.	ØA	C*	F*	H	ØJ	M	N	Q	ØR	WEIGHT (Kg.)
1	CVC	98	45	217	20	13,5	18	6	65	M12x1,75	3,5
	CV		10	277							5
	CVL		10	442							7
	CVLL		10	629							8,5
2	CVC	98	45	217	20	13,5	18	6	65	M12x1,75	3,5
	CV		10	282							5
	CVL		10	456							7
	CVLL		10	650							8,5
3	CVC	98	45	222	20	13,5	18	6	65	M12x1,75	3,5
	CV		10	289							5
	CVL		10	476							7,5
	CVLL		10	678							9,5
4	CVC	98	45	222	20	13,5	18	6	65	M12x1,75	4
	CV		10	289							5
	CVL		10	480							7,5
	CVLL		10	684							9,5
5	CVC	98	45	227	20	13,5	18	6	65	M12x1,75	4
	CV		10	292							5
	CVL		10	492							7,5
	CVLL		10	704							9,5
6	CVC	134	50	244	20	13,5	18	6	65	M12x1,75	7
	CV		15	309							9
	CVL		15	509							14
	CVLL		15	737							18
7	CVC	134	50	254	25	17,5	22	6	65	M16x2	7
	CV		15	324							10
	CVL		15	554							15
	CVLL		15	784							19
8	CVC	134	50	259	25	17,5	22	6	65	M16x2	7,5
	CV		15	344							11
	CVL		15	589							17
	CVLL		15	834							22
9	CVC	134	50	275	25	17,5	22	6	65	M16x2	8
	CV		25	365							11
	CVL		25	649							18
	CVLL		25	905							23
10	CVC	134	55	290	35	21,5	22	6	65	M20x2,5	8
	CV		25	375							12
	CVL		25	650							19
	CVLL		25	925							24
11	CVC	168	55	280	35	21,5	22	6	65	M20x2,5	18
	CV		25	389							23
	CVL		25	669							35
	CVLL		25	949							44
12	CVC	168	55	307	40	26,5	24	6	75	M24x3	19
	CV		25	412							25
	CVL		25	707							38
	CVLL		25	1002							49
13	CVC	168	50	322	40	26,5	24	6	75	M24x3	21
	CV		25	427							27
	CVL		25	730							43
	CVLL		25	1037							57
14	CVC	168	70	372	50	33	32	8	75	M30x3,5	23
	CV		30	480							30
	CVL		30	815							50
	CVLL		30	1140							68
15	CVC	236	80	375	50	33	32	8	75	M30x3,5	46
	CV		30	470							59
	CVL		30	805							89
	CVLL		30	1130							113
16	CVC	236	80	410	55	38	38	12	100	M36x4	52
	CV		40	520							67
	CVL		40	890							106
	CVLL		40	1240							139
17	CVC	236	80	390	55	38	38	12	100	M36x4	59
	CV		40	570							79
	CVL		40	960							130
	CVLL		40	1360							172
18	CVC	304	60	415	75	43	44	15	125	M42x4,5	106
	CV		40	575							134
	CVL		40	965							204
	CVLL		40	1365							264
19	CVC	304	60	450	75	48	50	20	150	M48x5	120
	CV		40	625							152
	CVL		40	1070							243
	CVLL		40	1485							323
20	CVC	304	60	480	90	53	57	20	150	M56x5,5	138
	CV		40	665							176
	CVL		40	1115							291
	CVLL		40	1575							390
21	CVC	304	60	555	115	58	57	25	170	M64x6	160
	CV		70	815							219
	CVL		70	1375							373
	CVLL		70	1935							520

N.B.:

* C and F are approximate dimensions which correspond to the vertical position at the lowest load value of the working range. Therefore, the actual dimensions will vary depending on the load applied.

REV.	DATE	EDITED FOR :	DRAW.	REV.
3	21/07/10	GENERAL REVISION	DDG	EAR
2	12/07/91	INFORMATION	JMD	EAR
1	17/01/85	INFORMATION	JRS	EAR

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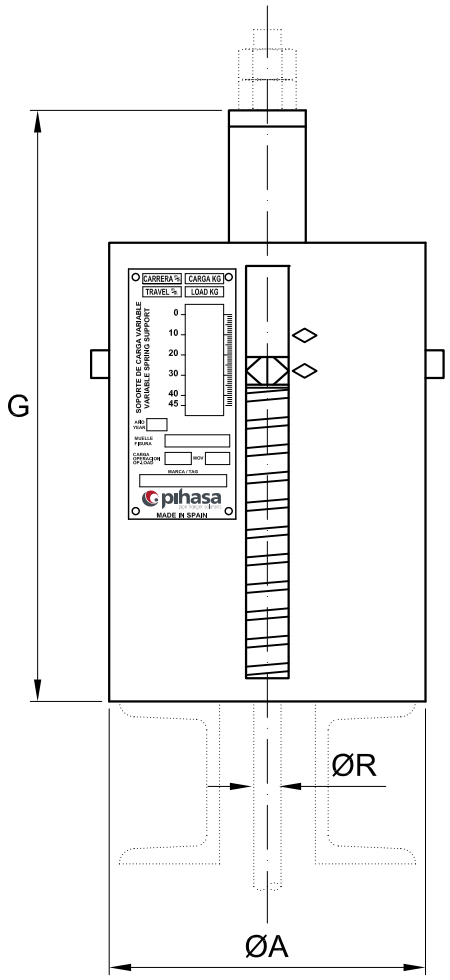
VARIABLE LOAD SPRING SUPPORT
TYPE D

SECTION D
17



SIZE	MOD.	ØA	G*	ØR	WEIGHT (Kg.)
1	CVC	98	205	M12x1,75	3,5
	CV		355		5
	CVL		630		7
	CVLL		927		8,5
2	CVC	98	205	M12x1,75	3,5
	CV		360		5
	CVL		645		7
	CVLL		948		8,5
3	CVC	98	210	M12x1,75	3,5
	CV		365		5
	CVL		665		7,5
	CVLL		978		9,5
4	CVC	98	210	M12x1,75	4
	CV		365		5
	CVL		670		7,5
	CVLL		984		9,5
5	CVC	98	215	M12x1,75	4
	CV		370		5
	CVL		680		7,5
	CVLL		1002		9,5
6	CVC	134	225	M12x1,75	7
	CV		380		9
	CVL		700		14
	CVLL		1028		18
7	CVC	134	230	M16x2	7
	CV		390		10
	CVL		730		15
	CVLL		1070		19
8	CVC	134	240	M16x2	7,5
	CV		410		11
	CVL		765		17
	CVLL		1120		22
9	CVC	134	250	M16x2	8
	CV		420		11
	CVL		790		18
	CVLL		1160		23
10	CVC	134	255	M20x2,5	8
	CV		430		12
	CVL		805		19
	CVLL		1180		24
11	CVC	168	280	M20x2,5	18
	CV		460		23
	CVL		850		35
	CVLL		1240		45
12	CVC	168	290	M24x3	19
	CV		475		25
	CVL		880		38
	CVLL		1285		47
13	CVC	168	295	M24x3	21
	CV		490		27
	CVL		905		43
	CVLL		1320		50
14	CVC	168	315	M30x3,5	23
	CV		520		30
	CVL		975		50
	CVLL		1430		55
15	CVC	236	325	M30x3,5	46
	CV		520		59
	CVL		960		89
	CVLL		1400		114
16	CVC	236	340	M36x4	52
	CV		550		67
	CVL		1020		106
	CVLL		1490		138
17	CVC	236	365	M36x4	59
	CV		595		79
	CVL		1115		130
	CVLL		1625		172
18	CVC	304	385	M42x4,5	106
	CV		600		134
	CVL		1095		204
	CVLL		1585		262
19	CVC	304	415	M48x5	120
	CV		645		152
	CVL		1185		243
	CVLL		1720		323
20	CVC	304	430	M56x5,5	138
	CV		670		176
	CVL		1235		291
	CVLL		1790		390
21	CVC	304	455	M64x6	160
	CV		770		219
	CVL		1440		373
	CVLL		2110		520

N.B.:

* G is an approximate dimension which corresponds to the vertical position at the lowest load value of the working range. Therefore, the actual dimension will vary depending on the load applied.

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3	21/07/10	GENERAL REVISION	DDG	EAR
2	12/07/91	INFORMATION	JMD	EAR
1	17/01/85	INFORMATION	JRS	EAR

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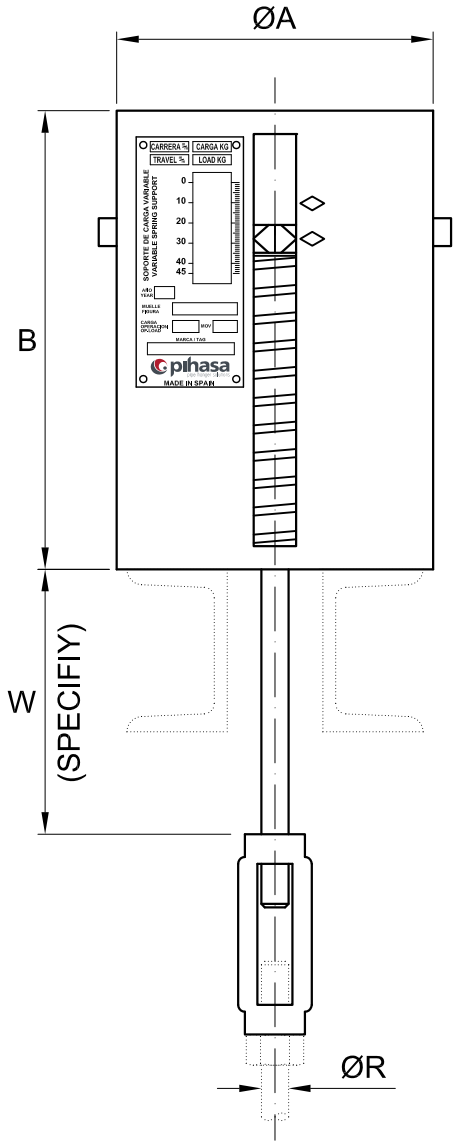
VARIABLE LOAD SPRING SUPPORT
TYPE E

SECTION D
18



SIZE	MOD.	ØA	B	ØR	WEIGHT (Kg.)
1	CVC	98	145	M12x1,75	3,5
	CV		240		5
	CVL		405		7
	CVLL		592		8,5
2	CVC	98	145	M12x1,75	3,5
	CV		245		5
	CVL		419		7
	CVLL		613		8,5
3	CVC	98	150	M12x1,75	3,5
	CV		250		5
	CVL		439		7,5
	CVLL		643		9,5
4	CVC	98	150	M12x1,75	4
	CV		250		5
	CVL		442		7,5
	CVLL		649		9
5	CVC	98	155	M12x1,75	4
	CV		255		5
	CVL		455		7,5
	CVLL		667		9
6	CVC	134	165	M12x1,75	7
	CV		265		9
	CVL		477		14
	CVLL		693		18
7	CVC	134	170	M16x2	7
	CV		275		10
	CVL		505		15
	CVLL		735		19
8	CVC	134	180	M16x2	7,5
	CV		295		11
	CVL		540		17
	CVLL		785		20
9	CVC	134	190	M16x2	8
	CV		305		11
	CVL		565		18
	CVLL		825		22
10	CVC	134	195	M20x2,5	8
	CV		315		12
	CVL		580		19
	CVLL		845		24
11	CVC	168	220	M20x2,5	18
	CV		345		23
	CVL		625		35
	CVLL		905		45
12	CVC	168	230	M24x3	19
	CV		360		25
	CVL		655		38
	CVLL		950		47
13	CVC	168	235	M24x3	21
	CV		375		27
	CVL		680		43
	CVLL		985		50
14	CVC	168	255	M30x3,5	23
	CV		410		30
	CVL		750		50
	CVLL		1090		55
15	CVC	236	265	M30x3,5	46
	CV		405		59
	CVL		735		89
	CVLL		1065		114
16	CVC	236	280	M36x4	52
	CV		435		67
	CVL		795		106
	CVLL		1155		138
17	CVC	236	305	M36x4	59
	CV		480		79
	CVL		890		130
	CVLL		1290		172
18	CVC	304	325	M42x4,5	106
	CV		485		134
	CVL		870		204
	CVLL		1250		262
19	CVC	304	355	M48x5	120
	CV		530		152
	CVL		960		243
	CVLL		1385		323
20	CVC	304	370	M56x5,5	138
	CV		555		176
	CVL		1010		291
	CVLL		1455		390
21	CVC	304	395	M64x6	160
	CV		655		219
	CVL		1215		373
	CVLL		1765		520

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3	21/07/10	GENERAL REVISION	DDG	EAR
2	12/07/91	INFORMATION	JMD	EAR
1	17/01/85	INFORMATION	JRS	EAR

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VARIABLE LOAD SPRING SUPPORT
TYPE F

SECTION D
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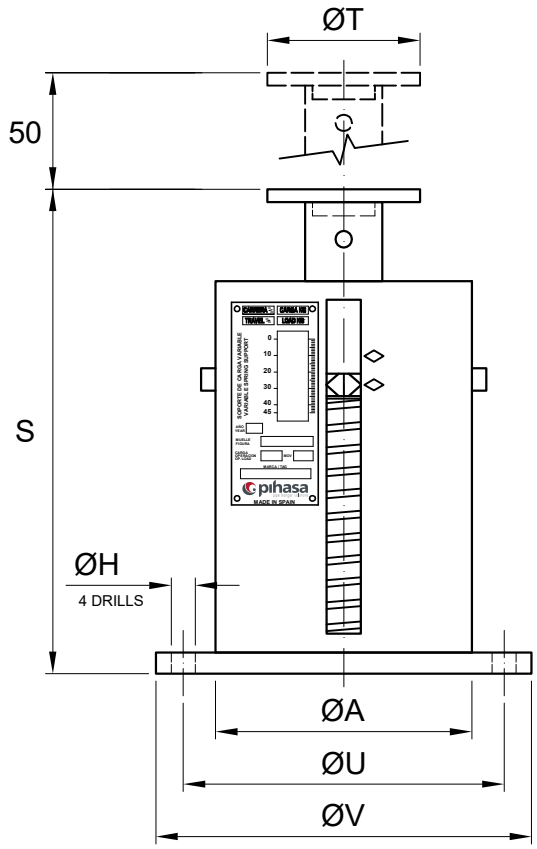
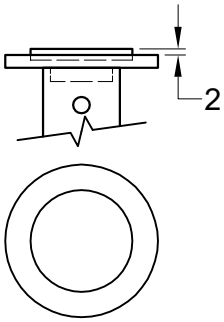


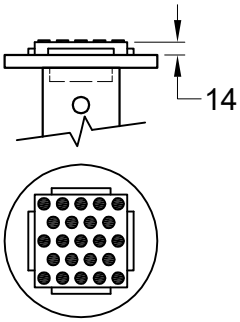
N.B.:

For this type of spring, a PTFE plate or bronze-graphite plate can optionally be installed on the load plate.

PTFE



BRONZE - GRAPHITE



SIZE	MOD.	S MIN.	S MAX.	ØA	ØH	ØU	ØV	ØT	WEIGHT (Kg.)
1	CVC	192	242	98	17,5	155	195	95	5
	CV	287	337						6,5
	CVL	452	502						9
	CVLL	665	715						11
2	CVC	192	242	98	17,5	155	195	95	5
	CV	292	342						6,5
	CVL	466	516						9
	CVLL	686	736						11
3	CVC	197	247	98	17,5	155	195	95	5
	CV	297	347						6,5
	CVL	486	536						9,5
	CVLL	716	766						12
4	CVC	197	247	98	17,5	155	195	95	6
	CV	297	347						7
	CVL	490	540						9,5
	CVLL	722	772						12
5	CVC	202	252	98	17,5	155	195	95	6
	CV	307	357						7
	CVL	502	552						9,5
	CVLL	740	790						12
6	CVC	227	277	134	17,5	190	230	120	9
	CV	327	377						11
	CVL	539	589						16
	CVLL	770	820						20
7	CVC	232	282	134	17,5	190	230	120	9
	CV	337	387						12
	CVL	567	617						17
	CVLL	813	863						21
8	CVC	242	292	134	17,5	190	230	120	10
	CV	357	407						13
	CVL	602	652						19
	CVLL	863	913						23
9	CVC	252	302	134	17,5	190	230	120	10
	CV	367	417						13
	CVL	627	677						20
	CVLL	903	953						24
10	CVC	257	307	134	17,5	190	230	120	11
	CV	377	427						15
	CVL	642	692						21
	CVLL	923	973						26
11	CVC	291	341	168	21,5	225	265	150	22
	CV	416	466						28
	CVL	695	745						40
	CVLL	990	1040						49
12	CVC	301	351	168	21,5	225	265	150	23
	CV	431	481						30
	CVL	725	775						44
	CVLL	1035	1085						53
13	CVC	306	356	168	21,5	225	265	150	25
	CV	446	496						32
	CVL	750	800						47
	CVLL	1070	1120						56
14	CVC	326	376	168	21,5	225	265	150	26
	CV	481	531						34
	CVL	820	870						54
	CVLL	1175	1225						64
15	CVC	363	413	236	21,5	295	335	220	55
	CV	503	553						68
	CVL	835	885						98
	CVLL	1160	1210						123
16	CVC	378	428	236	21,5	295	335	220	59
	CV	533	583						76
	CVL	895	945						114
	CVLL	1250	1300						144
17	CVC	403	453	236	21,5	295	335	220	66
	CV	578	628						86
	CVL	990	1040						134
	CVLL	1385	1435						174
18	CVC	433	483	304	21,5	365	405	275	114
	CV	593	643						141
	CVL	980	1030						208
	CVLL	1355	1405						266
19	CVC	463	513	304	21,5	365	405	275	125
	CV	638	688						157
	CVL	1070	1120						250
	CVLL	1490	1540						332
20	CVC	478	528	304	21,5	365	405	275	145
	CV	663	713						173
	CVL	1120	1170						300
	CVLL	1550	1600						410
21	CVC	535	585	304	21,5	365	405	275	166
	CV	795	845						215
	CVL	1355	1405						387
	CVLL	1915	1965						537

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2	12/07/91	INFORMATION	JMD	EAR
1	17/01/85	INFORMATION	JRS	EAR

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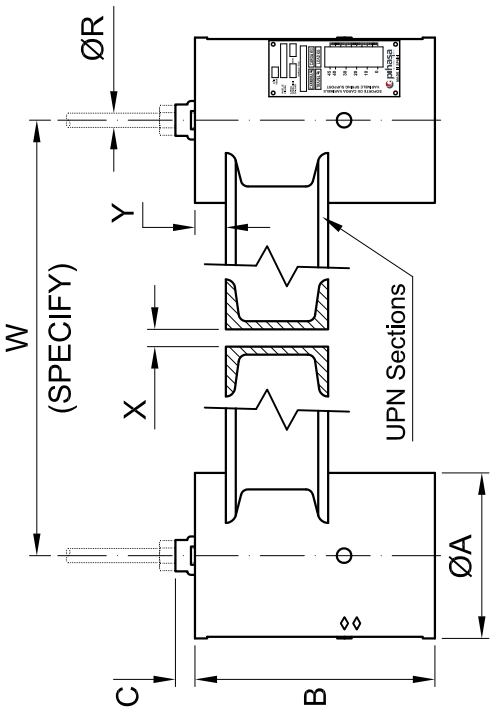
VARIABLE LOAD SPRING SUPPORT
TYPE G

SECTION D
20



SIZE	MOD.	B	C	Y	ØA	ØR	X	2 UPN	W (MAX.)
1	CVC	145	45	20	98	M12x1,75	20	80	2500
	CV	240	10	30					
	CVL	405	10	50					
	CVLL	592	10	70					
2	CVC	145	45	20	98	M12x1,75	20	80	2500
	CV	245	10	30					
	CVL	419	10	50					
	CVLL	613	10	70					
3	CVC	150	45	20	98	M12x1,75	20	80	2500
	CV	250	10	30					
	CVL	439	10	50					
	CVLL	643	10	70					
4	CVC	150	45	20	98	M12x1,75	20	80	2500
	CV	250	10	30					
	CVL	442	10	50					
	CVLL	649	10	70					
5	CVC	155	45	20	98	M12x1,75	20	80	2500
	CV	255	10	30					
	CVL	455	10	50					
	CVLL	667	10	70					
6	CVC	165	50	20	134	M12x1,75	28	100	2500
	CV	265	15	30					
	CVL	477	15	50					
	CVLL	693	15	70					
7	CVC	170	50	20	134	M16x2	28	100	2500
	CV	275	15	30					
	CVL	505	15	50					
	CVLL	735	15	70					
8	CVC	180	50	20	134	M16x2	28	100	2500
	CV	295	15	30					
	CVL	540	15	50					
	CVLL	785	15	70					
9	CVC	190	50	20	134	M16x2	28	100	2500
	CV	305	25	30					
	CVL	565	25	50					
	CVLL	825	25	70					
10	CVC	195	55	20	134	M20x2,5	28	100	2500
	CV	315	25	30					
	CVL	580	25	50					
	CVLL	845	25	70					
11	CVC	220	55	20	168	M20x2,5	36	140	2500
	CV	345	25	40					
	CVL	625	25	60					
	CVLL	905	25	80					
12	CVC	230	55	20	168	M24x3	36	140	2500
	CV	360	25	40					
	CVL	655	25	60					
	CVLL	950	25	80					
13	CVC	235	50	20	168	M24x3	36	140	2500
	CV	375	25	40					
	CVL	680	25	60					
	CVLL	985	25	80					
14	CVC	255	70	20	168	M30x3,5	36	140	2500
	CV	410	30	40					
	CVL	750	30	60					
	CVLL	1090	30	80					
15	CVC	265	80	20	236	M30x3,5	50	220	2500
	CV	405	30	40					
	CVL	735	30	60					
	CVLL	1065	30	80					
16	CVC	280	80	20	236	M36x4	50	220	2500
	CV	435	40	40					
	CVL	795	40	60					
	CVLL	1155	40	80					
17	CVC	305	80	20	236	M36x4	50	220	2500
	CV	480	40	40					
	CVL	890	40	60					
	CVLL	1290	40	80					
18	CVC	325	60	15	304	M42x4,5	66	220	1400
	CV	485	40	50					
	CVL	870	40	80				300	2500
	CVLL	1250	40	110					
19	CVC	355	60	15	304	M48x5	66	220	1400
	CV	530	40	50					
	CVL	960	40	80				300	2500
	CVLL	1385	40	110					
20	CVC	370	60	15	304	M56x5,5	66	220	1400
	CV	555	40	50					
	CVL	1010	40	80				300	2500
	CVLL	1455	40	110					

N.B.:

The weight of the unit will be double the corresponding "E" type spring, plus the weight of the sections with length= W-A.

* C is an approximate dimension which corresponds to the vertical position at the lowest load value of the working range. Therefore, the actual dimension will vary depending on the load applied.

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3	21/07/10	GENERAL REVISION	DDG	EAR
2	12/07/91	INFORMATION	JMD	EAR
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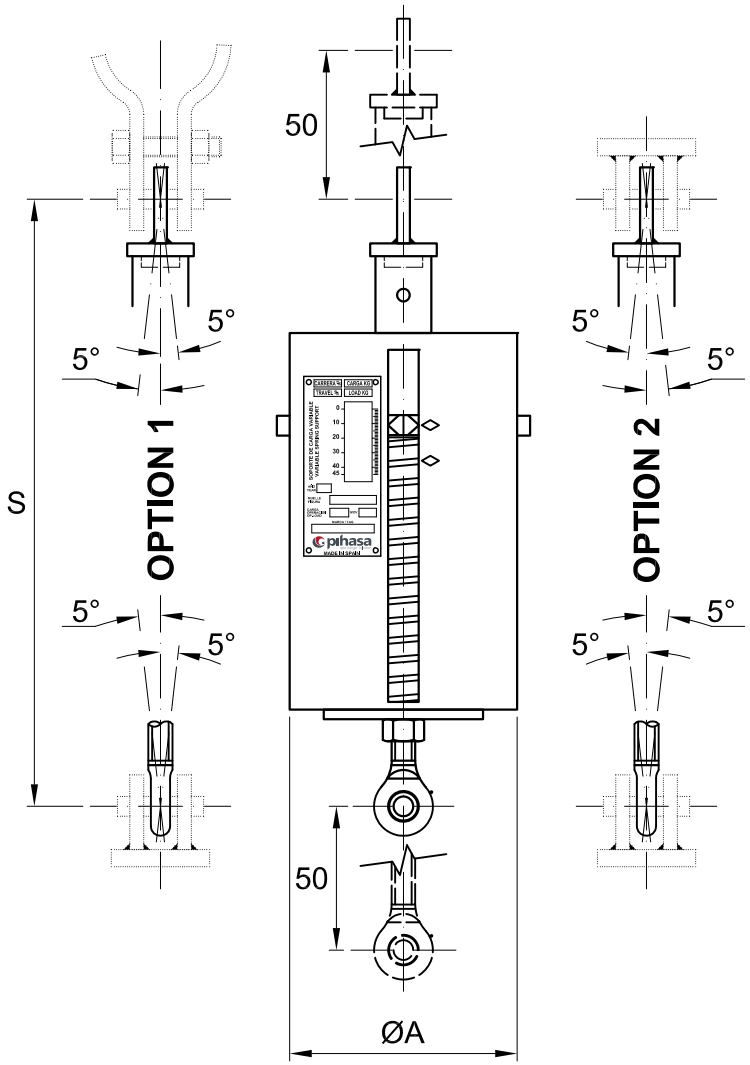
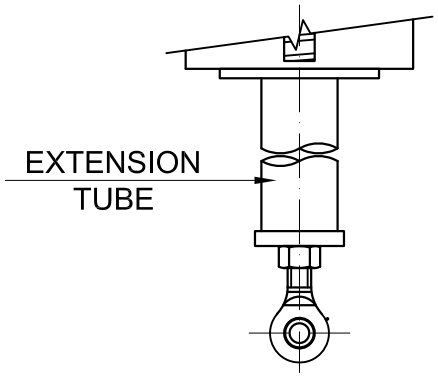
VARIABLE LOAD SPRING SUPPORT
TYPE H

SECTION D
21



N.B.: The "S" dimension can be increased by using an extension tube.



SIZE	MOD.	S mín	ØA	STRUCTURE CONNECTION FIG. 2400
1	CVC	286	98	00
	CV	381		00
	CVL	546		00
	CVLL	759		00
2	CVC	286	98	00
	CV	386		00
	CVL	560		00
	CVLL	780		00
3	CVC	291	98	00
	CV	391		00
	CVL	580		00
	CVLL	810		00
4	CVC	291	98	00
	CV	391		00
	CVL	584		00
	CVLL	816		00
5	CVC	296	98	00
	CV	401		00
	CVL	596		00
	CVLL	834		00
6	CVC	319	134	00
	CV	419		00
	CVL	631		00
	CVLL	862		00
7	CVC	324	134	00
	CV	429		00
	CVL	659		00
	CVLL	905		00
8	CVC	334	134	00
	CV	449		00
	CVL	694		00
	CVLL	955		00
9	CVC	369	134	0
	CV	484		0
	CVL	744		0
	CVLL	1020		0
10	CVC	374	134	0
	CV	494		0
	CVL	759		0
	CVLL	1040		0
11	CVC	404	168	0
	CV	529		0
	CVL	808		0
	CVLL	1103		0
12	CVC	414	168	0
	CV	544		0
	CVL	838		0
	CVLL	1148		0
13	CVC	464	168	1
	CV	604		1
	CVL	908		1
	CVLL	1228		1
14	CVC	484	168	1
	CV	639		1
	CVL	978		1
	CVLL	1333		1
15	CVC	548	236	2
	CV	688		2
	CVL	1020		2
	CVLL	1345		2
16	CVC	563	236	2
	CV	718		2
	CVL	1080		2
	CVLL	1435		2
17	CVC	588	236	2
	CV	763		2
	CVL	1175		2
	CVLL	1570		2
18	CVC	653	304	3
	CV	813		3
	CVL	1200		3
	CVLL	1575		3
19	CVC	683	304	3
	CV	858		3
	CVL	1290		3
	CVLL	1710		3
20	CVC	763	304	4
	CV	948		4
	CVL	1405		4
	CVLL	1835		4
21	CVC	1035	304	4
	CV	1295		4
	CVL	1855		4
	CVLL	2415		4

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0	20/10/98	INFORMATION	JMD	EAR

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SPECIAL CORROSION RESISTANT VARIABLE SPRINGS WITH CONTINUOUS BLOCKING SYSTEM

The standard surface finish is a two-coat epoxy-polyurethane paint system, with a total dry film thickness of approximately 100 µm.

However, when environmental conditions are particularly severe, we are ready to apply special surface treatments that further protect the spring support against corrosion, either by the application of more complex paint systems (three or even four coats up to 200-300 µm DFT) or by hot dip galvanizing the spring casing, once specified and agreed with the client.

Special corrosion resistant variable springs with hot dip galvanized casing use a hybrid welded/bolted construction, while standard variable springs are all welded.

In addition, special corrosion resistant variable springs with hot dip galvanized casing include the continuous blocking system, so the spring can be blocked at any working position, while standard variable springs use travel stops that are also valid for blocking at the unique cold preset load that is specified for each individual unit.

The continuous blocking system can also be used to establish a limited travel range or specific load stops.

Selection of spring model, size and type for special corrosion resistant supports with continuous blocking system is the same as with standard supports.

DESCRIPTION OF THE CONTINUOUS BLOCKING SYSTEM

The purpose of the continuous blocking system in the variable load spring supports manufactured at PIHASA is the capacity to block the spring in any working position, with the following requirements:

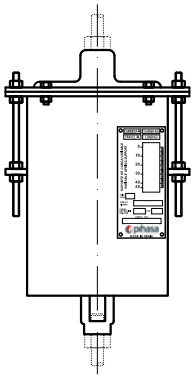
- Block the support by absorbing the expansion strength of the spring itself, in each position.
- At the same time, the purpose is to block the spring in terms of compression (downwards), being able to support loads during the inspection and assembly stage. The value achieved in these stages is up to two and a half times the operating load.
- Blocking should act on all the travel range of the spring.
- The system will continue to be available in the support housing throughout the life cycle of the spring, so that it allows for blocking whenever required.

VARIABLE LOAD SPRING SUPPORTS

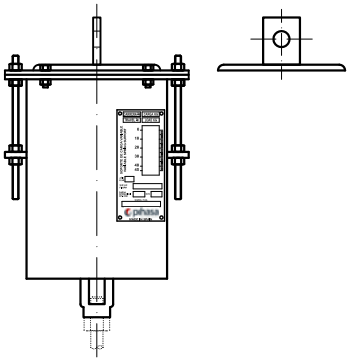
SECTION D
23

SPECIAL CORROSION RESISTANT VARIABLE SPRINGS WITH CONTINUOUS BLOCKING SYSTEM

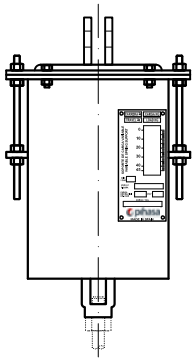
TYPE A



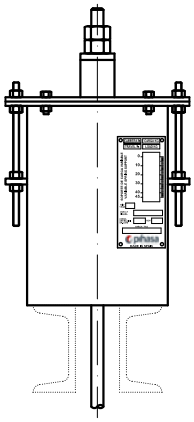
TYPE B



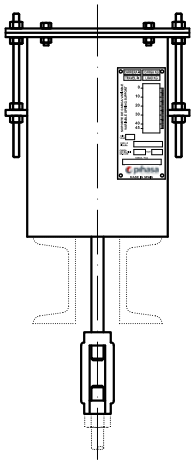
TYPE C



TYPE D



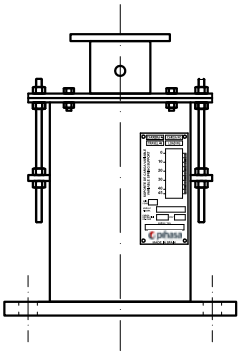
TYPE E



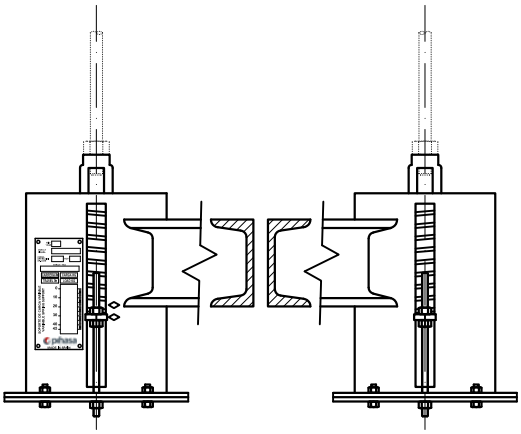
N.B.:

The welded assembly for type E is not considered.

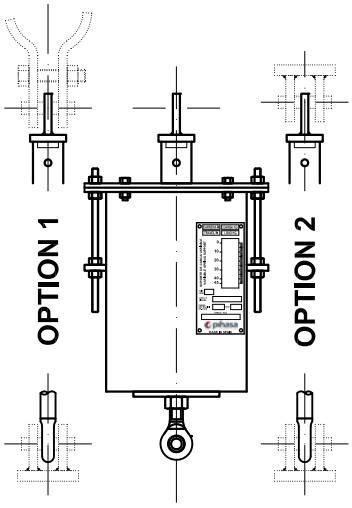
TYPE F



TYPE G



TYPE H



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1.- BLOCKING PROCESS:

1.1 Having completed the surface finish operations (PIHASA standards or any specified by the client), proceed to blocking the support. The rods and nuts are electro-galvanized to ensure protection against corrosion.

1.2 Once the spring has been calibrated to its cold preset load/position, tighten up the lower and upper nuts on the guides against the load plate.

1.3 The upper side of the load plate should coincide with the installation load mark or cold mark of the scaleplate.

2.- INSTALLATION INSTRUCTIONS - UNBLOCKING THE SYSTEM:

Please first read sheets D7-D13 for a description of the different types. The blocking system does not affect the way of installing the support, but only affects the way of blocking and unblocking it.

The upper and lower blocking nuts should be in permanent contact with the load plate until such time as it is decided to proceed with the unblocking manoeuvres, which should be carried out once known that no loads other than operational loads are going to occur, such as in the hydraulic test, during cleaning operations or in the course of other situations.

The unblocking process involves following these steps:

- First, loosen the lower blocking nuts and turn them (on both sides) till they reach the end of the spring travel, as indicated on the support scaleplate.

- Then, tighten up the support to reach the installation or cold load (weight of the piping at the point where the support is installed). This operation involves:

  - Acting on the adjusting turnbuckles (types A-B-C-E or G).
  - Acting on the upper nuts on the hanging rod on supports installed on the structure (Type D).
  - Acting on the threaded load column on supports installed on the ground (Type F).

- The installation load is reached when the load plate starts to move downwards.

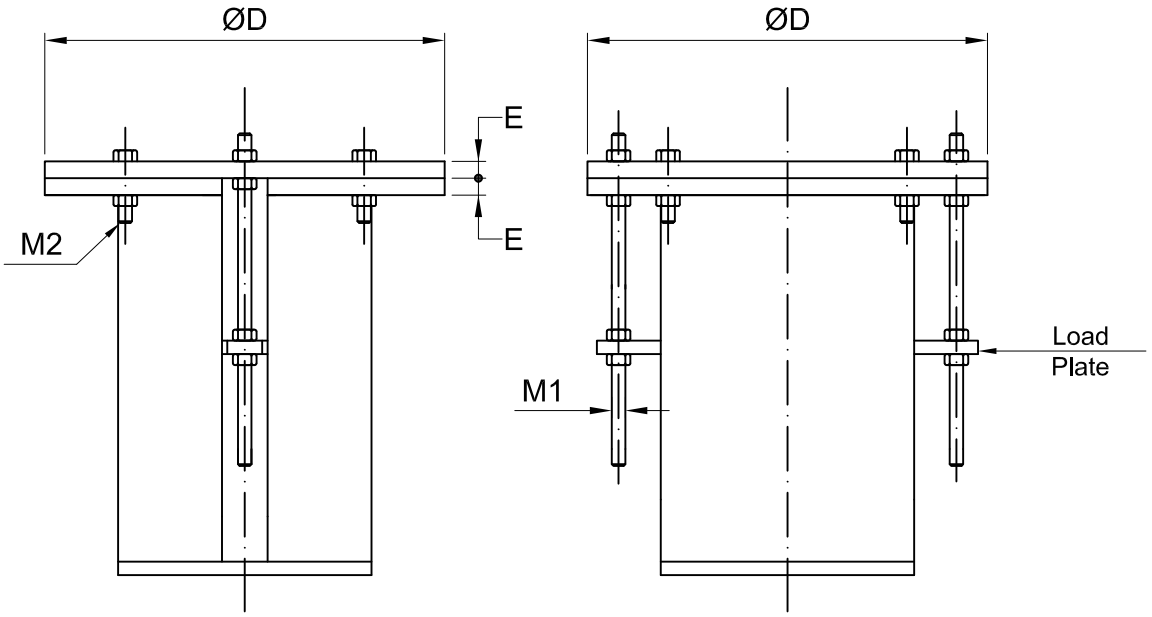
- The final step is to loosen the upper blocking nuts until reaching the start of the spring travel: point “O” indicated on the label.

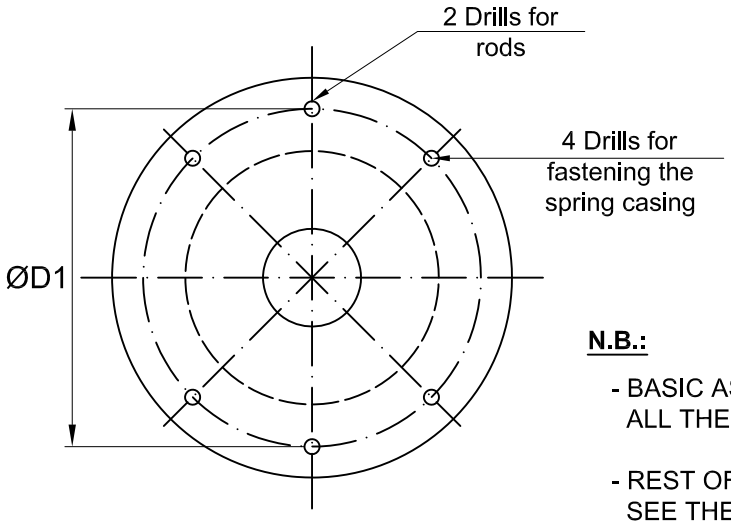
SUPPLEMENTARY NOTES:

- For any subsequent operation on the piping system, it is essential to first block the support in order to prevent modifications in the work conditions of the support. This is achieved by tightening the upper and lower blocking nuts until they come into contact with the load plate. Then, unblock by following the steps in point 2 of these instructions.

- The continuous blocking system on PIHASA's variable load supports makes it possible to insert travel limits. These limits can be set to avoid the spring going past certain points (upwards or downwards) if this is required by the engineering company. Quite simply, this is achieved by setting the upper and/or lower blocking nuts in the required position.

CORROSION RESISTANT VARIABLE LOAD SUPPORTS WITH CONTINUOUS BLOCKING SYSTEM





N.B.:

- BASIC ASSEMBLY APPLIES FOR ALL THE DIFFERENT MODELS.

- REST OF DIMENSIONS: SEE THE CORRESPONDING TYPE IN PREVIOUS PAGES D-14 TO D-21.

SIZE	ØD	ØD1	E	M1	M2
1 / 5	145	124	8	M10	M8
6 / 10	205	174	10	M16	M12
11 / 14	260	216	15	M20	M16
15 / 17	360	300	20	M27	M22
18 / 21	455	385	25	M36	M27

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OPERATION AND MAINTENANCE RECOMMENDATIONS FOR SPRING SUPPORTS:

In the course of the normal operation of elastic supports (variable load or constant load spring supports), there is no need for a direct action on the same during service or operation in the plant. But on the other hand, preventive maintenance tasks are recommended to be performed on a regular basis. These involve a regular visual inspection (this can often be done using binoculars) to evaluate the general status of cleanness, rust, as well as to detect any potential important anomalies such as deformed components, the presence of external interferences limiting movement, loose and unthreaded parts, etc.

In the event of detecting anomalies in the course of the visual inspection, or as a recommended practice once every 5-10 years, and more frequently in corrosive conditions more prone to rusting or environmental fouling, or in the case of significant vibrations, or pressure shocks, we suggest acting physically on each spring support during plant shutdowns ("cold inspection"), performing the following activities:

- Cleaning, removing grease and fouling.
- Retouch painting.
- Greasing threaded parts.
- Replacing scaleplates (if lost or deteriorated).
- Check tags and markings.
- Check the position of the load indicator and compare with the theoretical position (cold or installation position) and adjust using the spring adjustment elements to reach the theoretical position if appropriate (evaluated by the technical department).
- Any other incident, such as: interferences, degrees of rust, etc.

After these inspections, it is advisable to draft historical reports. In the course of visual inspections or direct checks, when noting a notable deterioration or highly significant or recurrent deviations from the work positions on the load indicator, consideration should be given to replacing the support with a new one or, alternatively, carry out a more thorough revision of the supports.

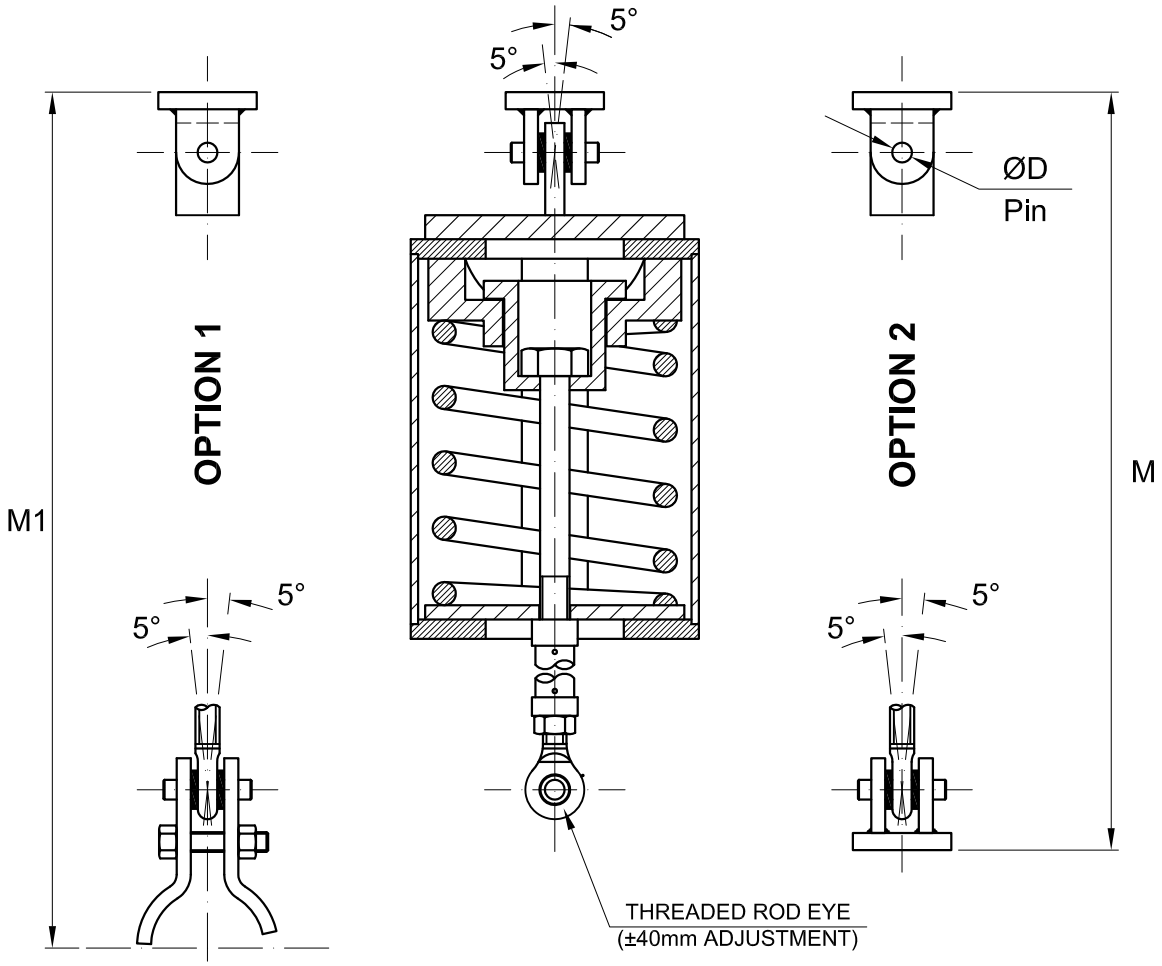
Revisions are more complete inspections, with the following characteristics:

* Carried out by specialised companies during the programmed maintenance stops.
* In addition to the regular periodic inspection activities, the following operations are performed:
  - Disassemble variable or constant load supports in order to proceed to internal and external cleaning.
  - Full calibration of variable and constant spring supports obtaining load-displacement functional graphs.
  - These graphs show the "k" spring rate for the variable supports and the variability of load in the constants, apart from the operating load deviation for both supports.
  - All the information compiled is included in a final revision Dossier, where all the comments and recommendations that the company specializing in inspections considers essential are noted, based on objective data (relevant regulations) and acceptance criteria arising from the experience itself.

SPRING SWAY BRACES

FIG.: APV

SECTION D 28



SIZE No.	LOAD (Kg)		M (mm)		ØD (mm)	MAX. MOVEMENTS (mm)	STRUCTURE CONNECTION (Fig. 2400)
	MIN.	MAX.	MIN.	MAX.			
1	22	70	560	3000	12	±50	00
2	50	150	570	3000	12	±50	00
3	125	350	660	3000	15	±50	0
4	280	850	800	3000	25	±50	1
5	650	1900	925	3000	25	±50	1
6	1500	4500	1100	3000	25	±50	2

APPLICATION: As an element for mitigating vibrations in pipelines and equipment.

MANUFACTURE: According to the dimensions indicated in the table. Can be manufactured for load capacities of up to 10000 kg, on special order. Likewise, they can be manufactured for other assembly arrangements, with or without ball joints.

ORDER FORM:

- Name.
- Figure y size.
- Estimated operating load.
- Option.
- Dimension "M" or "M1".
- Pipe size, quality, operating temperature and insulation thickness, for option 1.

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1	20/10/98	INFORMATION	JMD	EAR
0	12/01/85	INFORMATION	JRS	EAR

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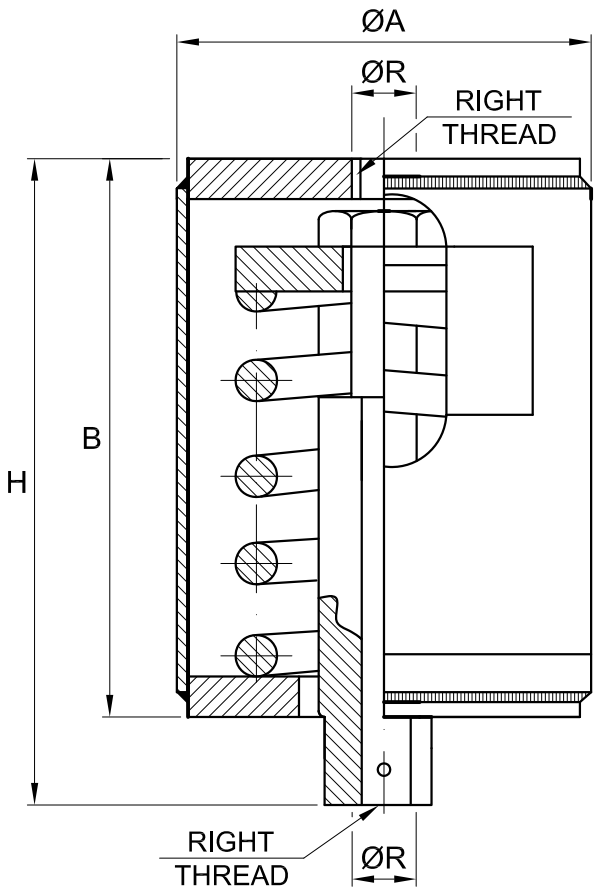
SMALL SPRING

FIG.: 2500

SECTION D 29



SIZE	SPRING RATE (Kg/mm)	ØA (mm)	B (mm)	H (mm)	ØR (mm)	MAX. REC. LOAD (Kg)
1	0,72	42	102	118	M10	22
2	1,28	42	129	142	M10	38
3	2,31	60	130	170	M12	68
4	3,83	60	171	184	M12	122

APPLICATION: To support light loads, with a maximum travel of 32 mm.

ORDER FORM:

- Name.
- Figure.
- Size.

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0	21/09/81	INFORMATION	JMD	EAR

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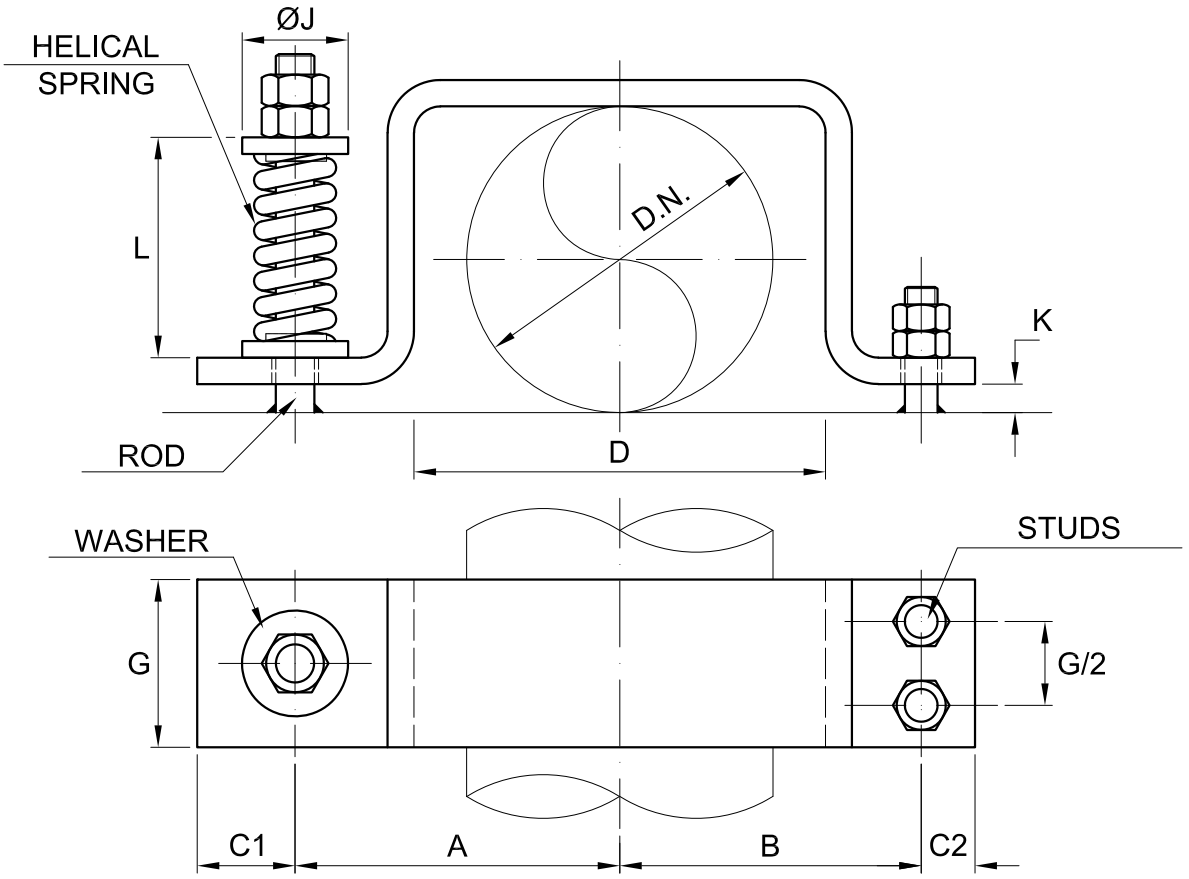
SPRING ANTI-VIBRATING CLAMP | FIG.: 2260 | SECTION D 30



D.N.	A (mm)	B (mm)	C1 (mm)	C2 (mm)	D (mm)	G (mm)	ØJ (mm)	K (mm)	SPRING	SPRING RATE (Kg/mm)	ROD / STUD	LOAD (Kg) MIN.	LOAD (Kg) MAX.	L (mm) MIN.	L (mm) MAX.	WEIGHT (Kg)
2"	110	90	35	15	100	60	58	10	Nº 1	3.7	M12 / M10	30	110	132	154	2,75
2 1/2"	115	100	35	15	120	60	58	12	Nº 1	3.7	M12 / M10	30	110	132	154	3,1
3"	125	110	35	15	140	60	58	12	Nº 1	3.7	M12 / M10	30	110	132	154	3,5
4"	160	120	50	24	160	100	95	15	Nº 2	10.7	M16 / M12	70	285	140	161	7,5
5"	180	140	50	24	190	100	95	15	Nº 2	10.7	M16 / M12	70	285	140	161	8,5
6"	195	155	50	24	225	100	95	15	Nº 2	10.7	M16 / M12	70	285	140	161	9,5
8"	225	185	50	24	275	100	95	15	Nº 2	10.7	M16 / M12	70	285	140	161	11,5
10"	265	230	50	30	340	100	90	20	Nº 3	21.2	M20 / M16	160	640	132	155	17
12"	280	250	50	30	385	100	90	20	Nº 3	21.2	M20 / M16	160	640	132	155	20,5
14"	300	265	50	30	415	100	90	20	Nº 3	21.2	M20 / M16	160	640	132	155	23
16"	330	305	50	30	470	100	90	25	Nº 3	21.2	M20 / M16	160	640	132	155	29
18"	360	335	50	30	525	120	90	25	Nº 3	21.2	M20 / M16	160	640	132	155	35
20"	385	360	50	30	575	120	90	25	Nº 3	21.2	M20 / M16	160	640	132	155	37

APLICATION: As an element for mitigating vibrations in pipelines. The load level, adjusted by tightening nuts on the spring, should be set by the engineering company, within the specified range.

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.

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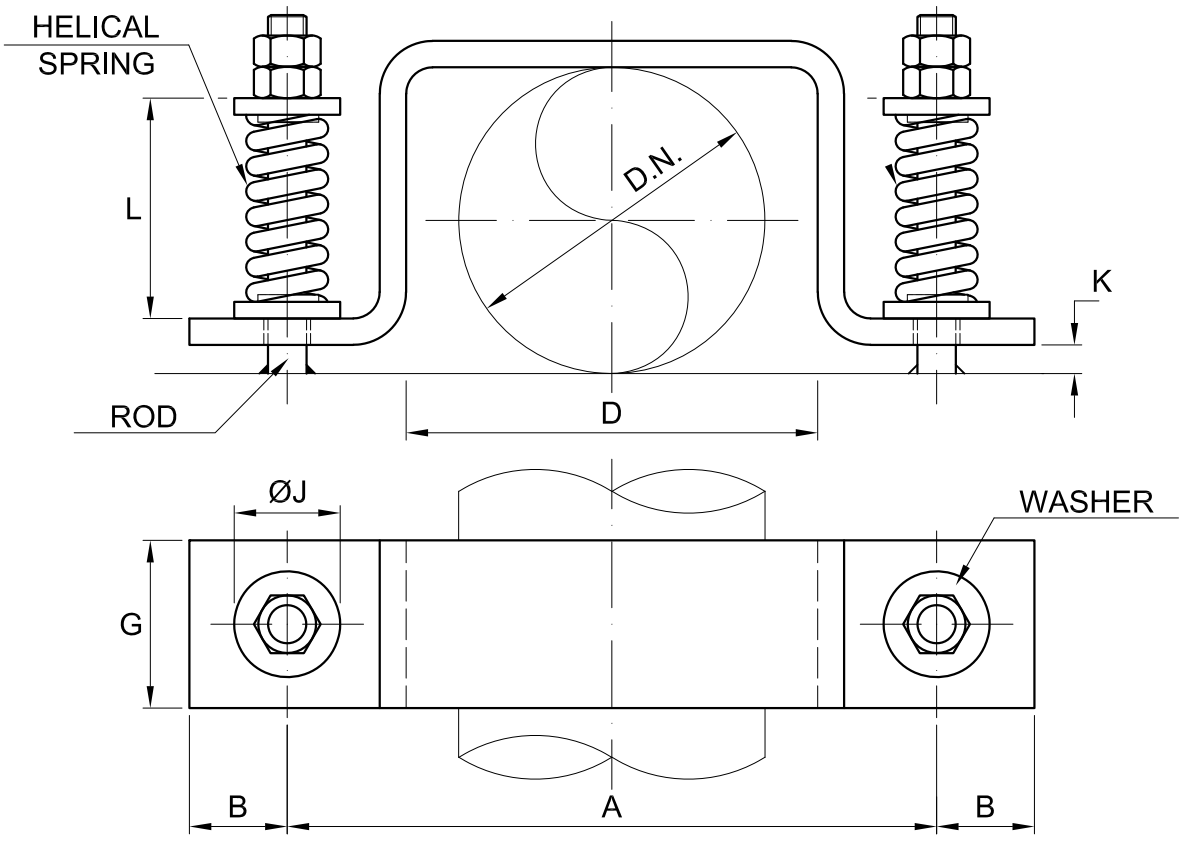
DOUBLE-SPRING ANTI-VIBRATING CLAMP

FIG.: 2261

SECTION D 31



D.N.	A (mm)	B (mm)	D (mm)	G (mm)	ØJ (mm)	K (mm)	SPRING	SPRING RATE (kg/mm)	ROD	LOAD PER SPRING (Kg)		L (mm)		WEIGHT (Kg)
										MIN.	MAX.	MIN.	MAX.	
2"	220	35	100	60	58	10	Nº 1	3.7	M12	30	110	132	154	4,1
2 1/2"	230	35	120	60	58	12	Nº 1	3.7	M12	30	110	132	154	4,4
3"	250	35	140	60	58	12	Nº 1	3.7	M12	30	110	132	154	4,9
4"	280	35	160	60	58	15	Nº 1	3.7	M12	30	110	132	154	8,4
5"	360	50	190	100	95	15	Nº 2	10.7	M16	70	285	140	161	11,5
6"	390	50	225	100	95	15	Nº 2	10.7	M16	70	285	140	161	12,5
8"	450	50	275	100	95	15	Nº 2	10.7	M16	70	285	140	161	14,5
10"	530	50	340	100	95	20	Nº 2	10.7	M16	70	285	140	161	20
12"	560	50	385	100	95	20	Nº 2	10.7	M16	70	285	140	161	22
14"	595	50	415	100	95	20	Nº 2	10.7	M16	70	285	140	161	23
16"	660	50	470	100	90	25	Nº 3	21.2	M20	160	640	132	155	33,5
18"	720	50	525	120	90	25	Nº 3	21.2	M20	160	640	132	155	39
20"	770	50	575	120	90	25	Nº 3	21.2	M20	160	640	132	155	41

APPLICATION: As an element for mitigating vibrations in pipelines. The load level, adjusted by tightening nuts on the spring, should be set by the engineering company, within the specified range.

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.

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