SECTION F

SWAY STRUTS AND HYDRAULIC SNUBBERS

					pihasa pipe hanger solutions
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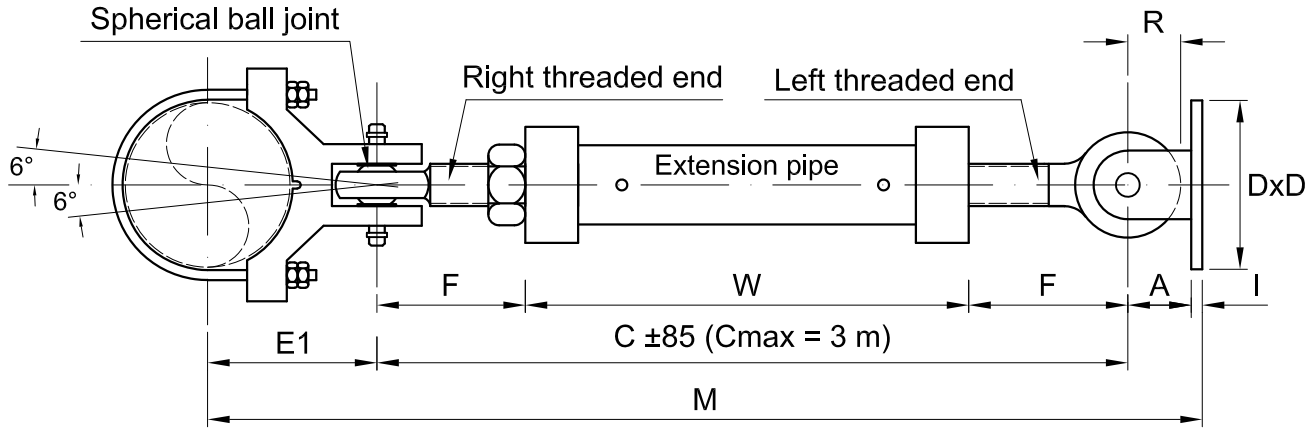
SWAY STRUT

FIG.: 2400

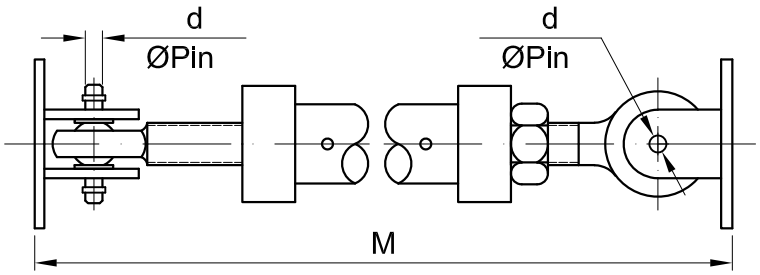
SECTION F 1

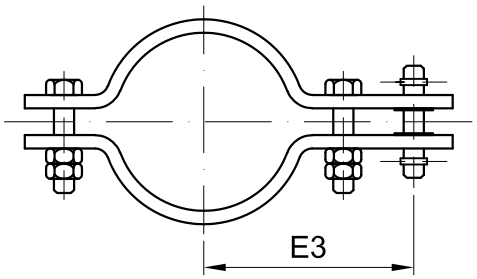
OPTIONS 1 AND 1-A



OPTION 2

(SYMMETRICAL)





- Recommended when the highest rigidity is not required.
- Not recommended for size 4.

APPLICATION: Restricts the movement of the piping in the axial direction of the support, allowing for movements in the transversal direction, guaranteeing high rigidity in the unit.

DESIGN:

1º: Determine the "M" total installation lenght.

2º: Determine the distance "C" between axes:

C= M-(E+I+A) o C= M-2(I+A)

3º: Determine the distance "W":

W= C-2·F

Where W > Wmin

MAINTENANCE: No maintenance required, since we use maintenance-free ball joints.

ASSEMBLY: Allows for regulating the distance "C" up to ± 85 mm.

ORDER FORM: Name, Figure No., Option, Size No., Load, Distance "M", Pipe size, quality and operating temperature for options 1, 1-A and 3, insulation thickness.

N.B.: For loads greater than those indicated here, please contact us.

No.	Associated ROD	I (mm)	A (mm)	F (mm)	R (mm)	D (mm)	W min (mm)	d (mm)	EXTENSION PIPE	LOAD (Kg)
00	M16	10	30	90	20	50	230	12	1" SCH 40	600
0	M20	12	35	100	27	60	255	15	2" SCH 40	1500
1	M30	20	60	122	43	80	275	25	2" SCH 160	3850
2	M39	25	75	137	58	100	275	25	2 1/2" SCH 160	6350
3	M48	25	95	161	78	125	295	30	3" SCH 160	12000
4	M64	30	125	201	106	150	345	45	4" SCH 120	24500

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DYNAMIC CLAMP

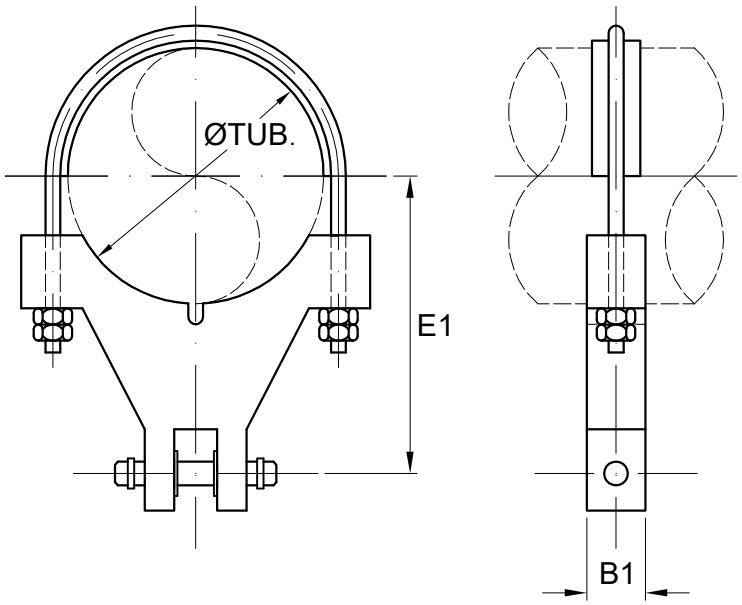
FIG.: 2400

SECTION F
2

TYPE OPTION 1

(TEMP. < 400ºC)

MATERIAL: Carbon steel for temperatures lower than 400ºC.



DIMENSIONS B1 AND E1 FOR CLAMPS TYPE 1 (mm)

Nº / Ø TUB.	00		0		1		2		3		4	
	B1	E1	B1	E1	B1	E1	B1	E1	B1	E1	B1	E1
1"	30	110	30	120	-	-	-	-	-	-	-	-
1 1/2 "	30	120	30	130	-	-	-	-	-	-	-	-
2"	30	130	30	145	-	-	-	-	-	-	-	-
2 1/2 "	30	140	45	155	-	-	-	-	-	-	-	-
3"	30	155	45	175	60	196	-	-	-	-	-	-
4"	30	171	45	189	60	210	-	-	-	-	-	-
5"	30	185	45	203	60	224	-	-	-	-	-	-
6"	30	198	45	215	60	236	90	249	-	-	-	-
8"	30	234	45	241	60	262	90	275	90	295	-	-
10"	30	261	45	267	60	288	90	301	90	321	120	356
12"	30	286	45	293	60	314	90	327	90	347	120	382
14"	30	302	45	309	60	330	90	343	90	363	120	398
16"	30	327	45	335	60	356	90	369	90	389	120	424
18"	-	-	45	361	60	380	90	393	90	413	120	448
20"	-	-	45	386	60	406	90	419	90	439	120	474
22"	-	-	45	412	60	432	90	445	90	465	120	500
24"	-	-	45	436	60	457	90	470	90	490	120	526
26"	-	-	45	461	60	482	90	495	90	515	120	550
28"	-	-	-	-	60	508	90	521	90	541	120	576
30"	-	-	-	-	60	533	90	547	90	567	120	602
32"	-	-	-	-	60	558	90	572	90	592	120	626
34"	-	-	-	-	60	584	90	597	90	617	120	652
36"	-	-	-	-	60	609	90	622	90	642	120	677

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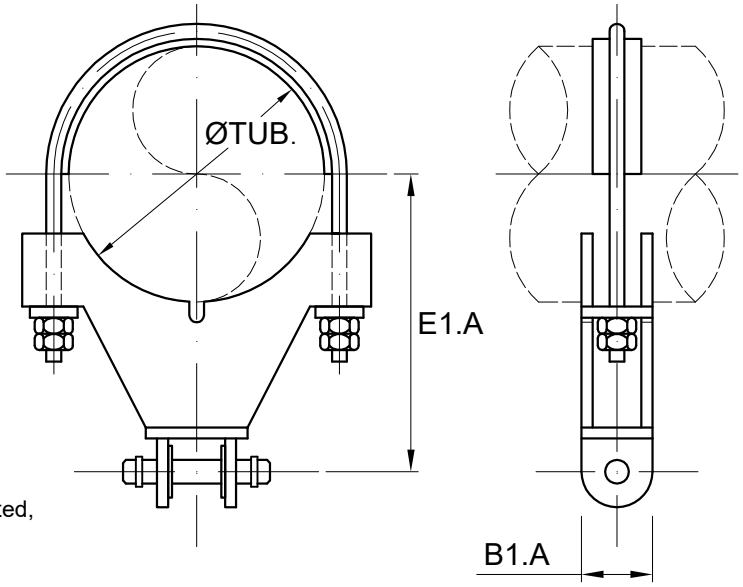
TYPE OPTION 1-A

(TEMP. > 350ºC)

APPLICACIÓN: support for insulated alloy steel piping.

MATERIAL:
For temperatures of up to 500ºC, alloy steel 16Mo3 (0.5 Mo).
For temperatures of up to 550ºC, alloy steel 13CrMo4.5 / A182F11-A387Gr12 (1Cr-0.5 Mo).
For temperatures of up to 600ºC, alloy steel 10CrMo9.10/ A182F22-A387Gr22 (2.25Cr-1Mo).

N.B.: This can be manufactured with values of "E1A" other than those indicated, according to the requirements for pipe insulation (Section F-3).



DIMENSIONS B1.A AND E1.A FOR CLAMPS TYPE 1-A (mm)

Nº / Ø TUB.	00		0		1		2		3		4	
	B1.A	E1.A	B1.A	E1.A	B1.A	E1.A	B1.A	E1.A	B1.A	E1.A	B1.A	E1.A
1"	30	157	30	164	-	-	-	-	-	-	-	-
1 1/2 "	30	164	30	171	-	-	-	-	-	-	-	-
2"	30	170	30	177	-	-	-	-	-	-	-	-
2 1/2 "	30	177	45	184	-	-	-	-	-	-	-	-
3"	30	184	45	191	60	224	-	-	-	-	-	-
4"	30	222	45	229	60	262	-	-	-	-	-	-
5"	30	236	45	243	60	276	-	-	-	-	-	-
6"	30	249	45	256	60	289	90	309	-	-	-	-
8"	30	275	45	282	60	315	90	335	90	355	-	-
10"	30	302	45	309	60	342	90	362	90	382	120	422
12"	30	352	45	359	60	392	90	412	90	432	120	472
14"	30	368	45	375	60	408	90	428	90	448	120	488
16"	30	393	45	400	60	433	90	453	90	473	120	513
18"	-	-	45	426	60	459	90	479	90	499	120	539
20"	-	-	45	451	60	484	90	504	90	524	120	564
22"	-	-	45	477	60	539	90	559	90	579	120	619
24"	-	-	45	502	60	565	90	585	90	605	120	645
26"	-	-	45	527	60	590	90	610	90	630	120	670
28"	-	-	-	-	60	616	90	636	90	656	120	696
30"	-	-	-	-	60	641	90	661	90	681	120	721
32"	-	-	-	-	60	666	90	686	90	706	120	746
34"	-	-	-	-	60	692	90	712	90	732	120	772
36"	-	-	-	-	60	717	90	737	90	757	120	797

FLATBAR CLAMP FOR STRUT

FIG.: 2400

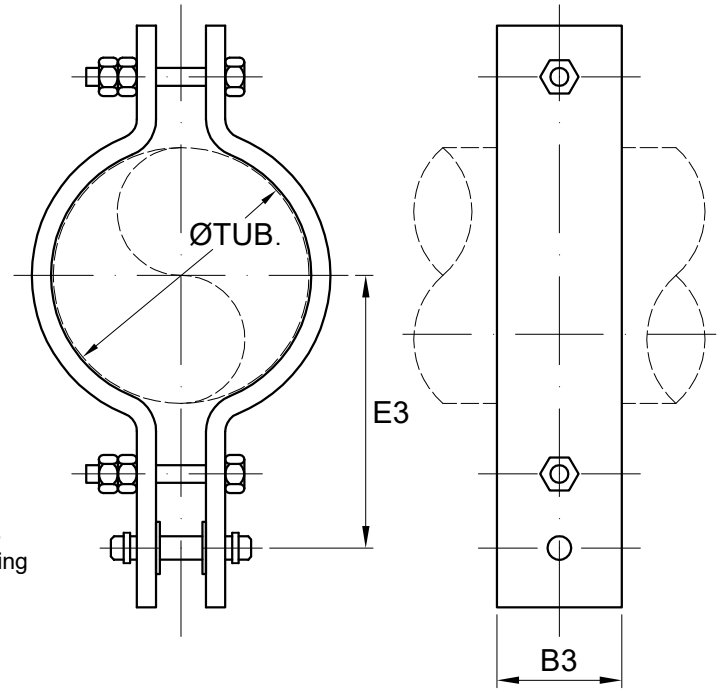
SECTION F 4

TYPE OPTION 3

APPLICATION: support for carbon steel or alloy steel piping, with no conditioning for high rigidity.

MATERIAL: carbon steel for temperatures of up to 380ºC. Alloy steel type 16Mo3 for temperatures of up to 500ºC. Alloy steel type 13CrMo4.5 for temperatures of up to 540ºC. Alloy steel type 10CrMo9.10 for temperatures of up to 600ºC.

N.B.: This can be manufactured with values of "E3" other than those indicated, according to the requirements for pipe insulation (Section F-4).



DIMENSIONS B3 AND E3 FOR CLAMPS TYPE 3 (mm)

Nº / Ø TUB.	00		0		1		2		3	
	B3	E3	B3	E3	B3	E3	B3	E3	B3	E3
1"	40	110	50	120	-	-	-	-	-	-
1 1/2 "	40	120	60	130	-	-	-	-	-	-
2"	50	130	60	145	-	-	-	-	-	-
2 1/2 "	50	140	60	155	-	-	-	-	-	-
3"	50	155	60	175	80	196	-	-	-	-
4"	50	160	60	189	80	210	-	-	-	-
5"	50	174	60	203	80	224	-	-	-	-
6"	60	185	80	215	100	236	100	249	-	-
8"	60	210	80	241	100	262	100	275	120	320
10"	60	245	80	267	100	288	120	301	150	358
12"	60	275	80	293	100	314	120	327	150	378
14"	60	291	80	309	120	330	150	343	150	402
16"	60	316	80	335	120	356	150	381	180	425
18"	-	-	80	357	150	380	150	408	180	450
20"	-	-	100	385	150	406	150	440	180	485
22"	-	-	100	420	150	432	150	475	180	522
24"	-	-	100	450	150	463	150	500	180	561
26"	-	-	100	475	150	490	180	539	180	585
28"	-	-	-	-	150	525	180	565	180	615
30"	-	-	-	-	150	567	180	588	200	636
32"	-	-	-	-	150	600	200	640	200	710
34"	-	-	-	-	150	625	200	665	200	735
36"	-	-	-	-	150	650	200	687	200	757

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HYDRAULIC SNUBBERS

Supplementing the scope of this support catalogue, Pihasa makes this type of basic element in the advanced design of piping systems available to the market.

These hydraulic snubbers are components that protect pipe systems from unwanted dynamic efforts, such as: earthquakes, pressure shock, effects of wind, physical impacts, breakages, explosions, sudden pressure increases due to the release of safety valves, water hammers, etc.

Furthermore, the hydraulic snubbers that we supply have an added function of dampening vibrations when they comply with the following conditions:
* Amplitude greater than 0.5 mm.
* Frequency in the range of 1 to 33 Hz.

The use of snubbers makes it possible to reduce the amplitude of unwanted dynamic movements. At the same time, snubbers make it possible to shift the piping due to thermal dilation, giving a very small friction load (free flow condition).

When the speed of the piston increases above the nominal blocking speed value (standard 2 mm/sec., adjustable to 6 mm/sec.), the block valve shuts off, preventing movement and absorbing the forces built up (blocking condition).

In alternative movements (vibrating waves), the two blocking valves open and shut off, alternating, opposing resistance in each direction in which there is an equal load capacity.

In order to ensure piston movement under load at a controlled speed and also to alleviate the pressure on the control valve, the snubbers are fitted with the same number of needle valves or relief valves that allow the flow to make a controlled bypass. The needle valves are calibrated to limit piston speed to below 2 mm/sec.
The snubbers incorporate a hydraulic fluid reserve tank, pressurized by loading a spring. This internal pressure ensures that no air enters during the operating process and that the tank can be installed in any position and orientation.

CHARACTERISTICS AND ASSEMBLY:

The hydraulic snubbers can be fitted into any installation position. Thermal displacement of the piping should be taken into account, either in terms of extension or in terms of compression, in order to ensure the maximum margin between the nominal and the actual travel. This amounts to assembling them when the travel is greater than 25% of the nominal travel, with the piston compressed or extended at a value equal to the half thermal displacement expected with extension or compression, respectively.

	UNIT	HYDRAULIC FLUID FOR NUCLEAR SERVICE	STANDARD HYDRAULIC FLUID
CONTINUOUS OPERATION TEMPERATURE	°C	-20 to 80	-50 to 80
MAXIMUM SHORT-TERM TEMPERATURE (*)	°C	150	150
MAXIMUM RADIATION DOSE	Megarad	100	20
AMBIENT PRESSURE, CONTINUOUS OPERATION	bar	1	1
AMBIENT PRESSURE, SHORT-TERM	bar	10	10
SOLIDIFICATION POINT	°C	-40	-67
FLASH POINT	°C	>550	600

N.B. (*): Maximum 40h per year and 1h maximum per cicle.

CHARACTERISTICS AND ASSEMBLY:

Rolling resistance / Friction ..... max. 2% of nominal load.
Response speed ..... 2-6 mm/sec.
Post-reaction speed ..... 0,2-2 mm/sec.
Frequency range ..... 1-33 Hz..

STANDARD FINISH:

The elements in the exterior housing are manufactured in high quality electro-galvanized treated carbon steel (15 µm thickness). Additionally, the piston is coated with a 40 µm nickel base electrolytic layer. On special order, they can be manufactured in stainless steel.

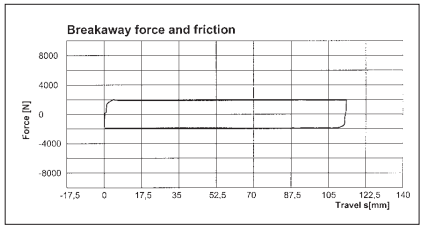
MAINTENANCE:

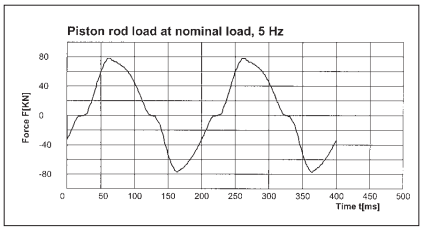
Metal parts are designed to have a life cycle of 40 years, but however, the organic parts, such as fluid and joints, are subject to a greater ageing process, the more unfavourable the operating conditions are. Depending on where they are located and their use, joints and fluid may have to be replaced after 20 years of operation. The following is advisable:

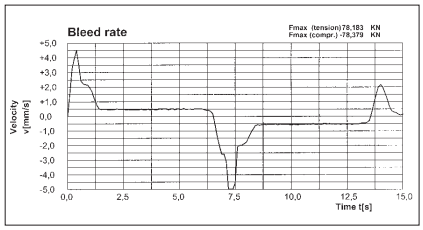
* Annual inspection to check on the piston level in the reserve tank.
* After 10-15 years, a functional test on the test bench.
* After 20 years, replace hydraulic fluid and joints.

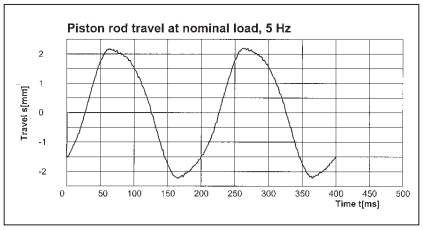
TEST PRIOR TO SUPPLY:

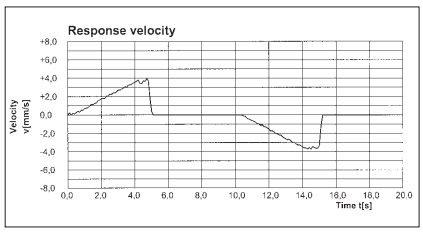
All snubbers are subjected to functional tests prior to dispatch, in order to obtain the standard operational values.

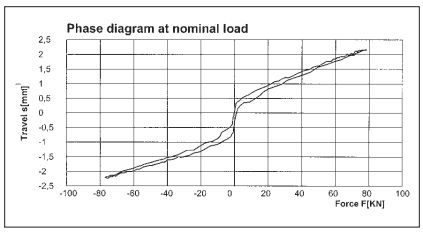






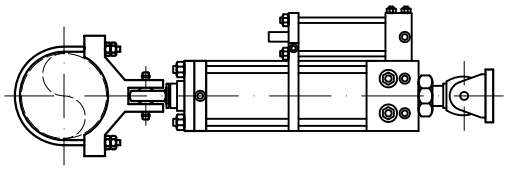




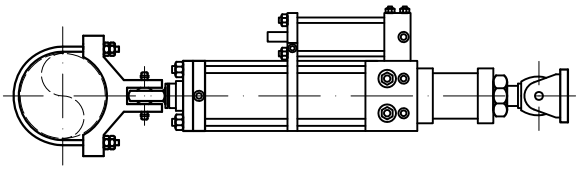


ASSEMBLY OPTIONS:

* OPTION 1

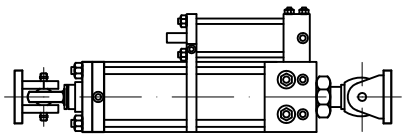


- Dynamic clamp Fig. 2400 Option 1 or 1A
- hydraulic snubber
- Rear bracket

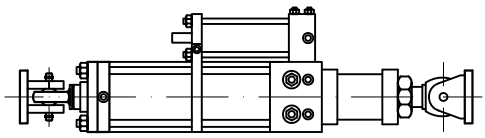


- Dynamic clamp Fig. 2400 Option 1 or 1A
- Hydraulic snubber
- Extension piece
- Rear bracket

* OPTION 2

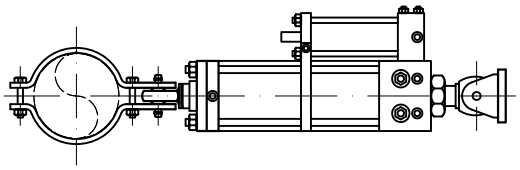


- Joint to beam
- Hydraulic snubber
- Rear bracket

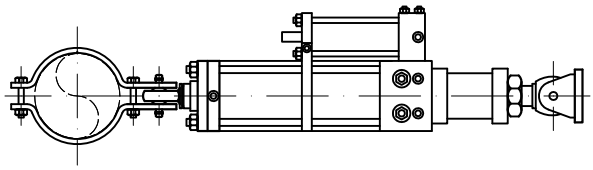


- Joint to beam
- Hydraulic snubber
- Extension piece
- Rear bracket

* OPTION 3



- Flatbar clamp Fig. 2400 Option 3
- Hydraulic snubber
- Rear bracket



- Flatbar clamp Fig. 2400 Option 3
- Hydraulic snubber
- Extension piece
- Rear bracket

FIGURE 200B:

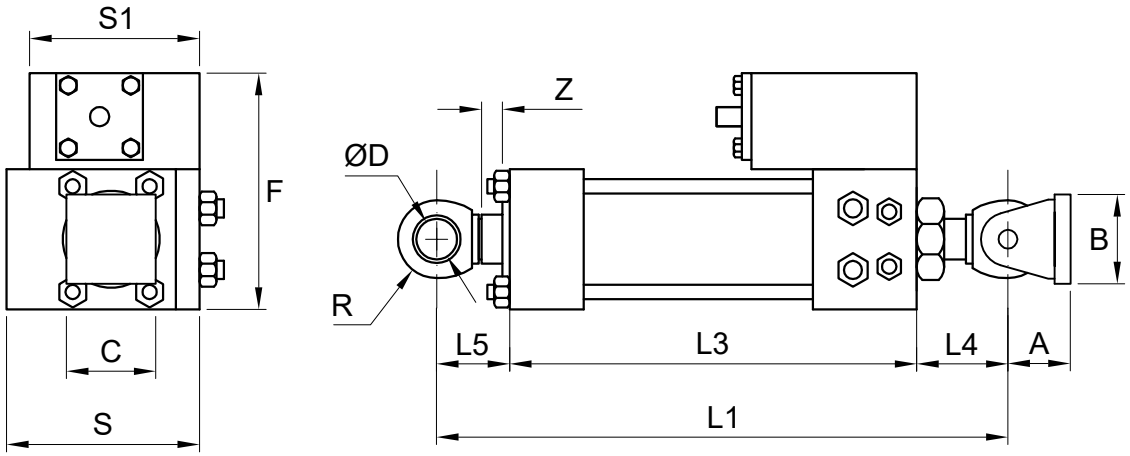


FIGURE 201B:

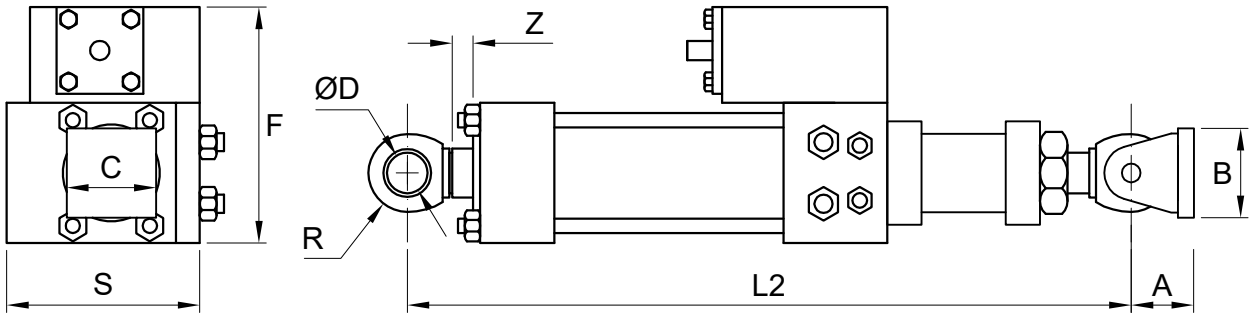


FIG. 200B/201B					A	B	C	L1	L1	L2	L2	L3	ØD	L4	L5	R	F	S	S1	Z	Weight
Size	Nominal Load		Stroke					min	max	min	max										
	kg	kN	Pulg.	mm	mm															mm	Kg
1/4"	305	3	5"	127	35	55	65	364	491	384	1000	287	10	28	49	15	120	87	81	7	10
1/2"	509	5	5"	127	35	55	65	364	491	384	1000	287	10	28	49	15	120	87	81	7	10
1"	815	8	5"	127	35	55	65	364	491	384	1000	287	10	28	49	15	120	87	81	7	10
1 1/2"	1325	13	5"	127	40	65	80	393	520	413	1500	310	15	45	38	22	135	103	96	9	13,5
			10"	254				520	774	540		437									15
			15"	381				647	1028	667		564									19,2
2 1/2"	4588	45	5"	127	60	120	120	442	569	477	2000	334	25	50	58	32	200	115	105	17	26,5
			10"	254				569	823	604		461									28,6
			15"	381				696	1077	731		588									30,7
			20"	508				823	1331	858		715									32,8
3 1/4"	7953	78	5"	127	75	140	140	495	622	536	2500	355	35	68	72	41	240	135	130	20	37,1
			10"	254				622	876	663		482									41,6
			15"	381				749	1130	790		609									47,7
			20"	508				876	1384	917		736									52,3

FIGURE 200A:

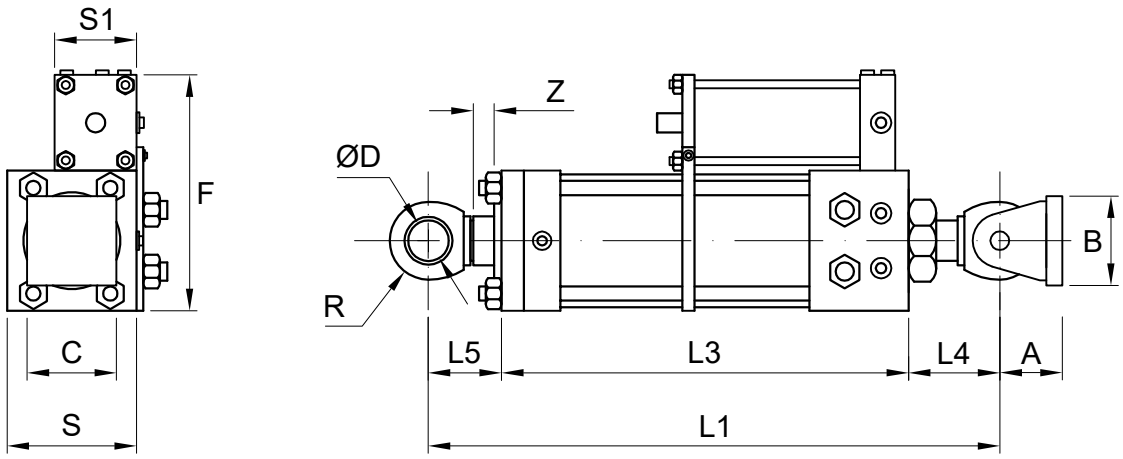


FIGURE 201A:

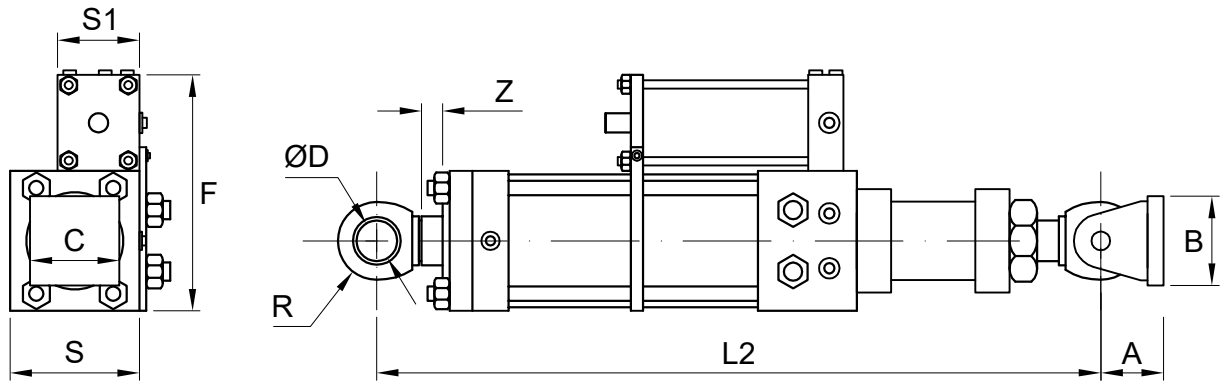


FIG. 200A/201A					A	B	C	L1	L1	L2	L2	L3	ØD	L4	L5	R	F	S	S1	Z	Weight
Size	Nominal Load		Stroke					min	max	min	max										
	kg	kN	Pulg.	mm	mm															mm	Kg
4"	12338	121	5"	127	90	180	180	545	672	603	3000	362	45	90	93	51	260	145	105	25	59
			10"	254				672	926	730		489									73
			15"	381				799	1180	857		616									83
			20"	508				926	1434	984		743									93,4
5"	20597	202	5"	127	120	260	240	625	752	695	3000	381	60	119	125	68	295	180	105	30	77
			10"	254				752	1006	822		508									93
			15"	381				879	1260	949		635					325		134		106,3
			20"	508				1006	1514	1076		762									119,6
6"	30896	303	5"	127	140	340	280	697	824	779	3000	420	70	137	140	80	355	210	134	30	106
			10"	254				824	1078	906		547									126
			15"	381				951	1332	1033		674									145,2
			20"	508				1078	1586	1160		801									164,4

REV.	DATE	EDITED FOR :	DRAW.	REV.
1	19/05/14	GENERAL REVISION	DDG	EAR
0	20/10/98	INFORMATION	JMD	EAR

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FIGURE 202A:

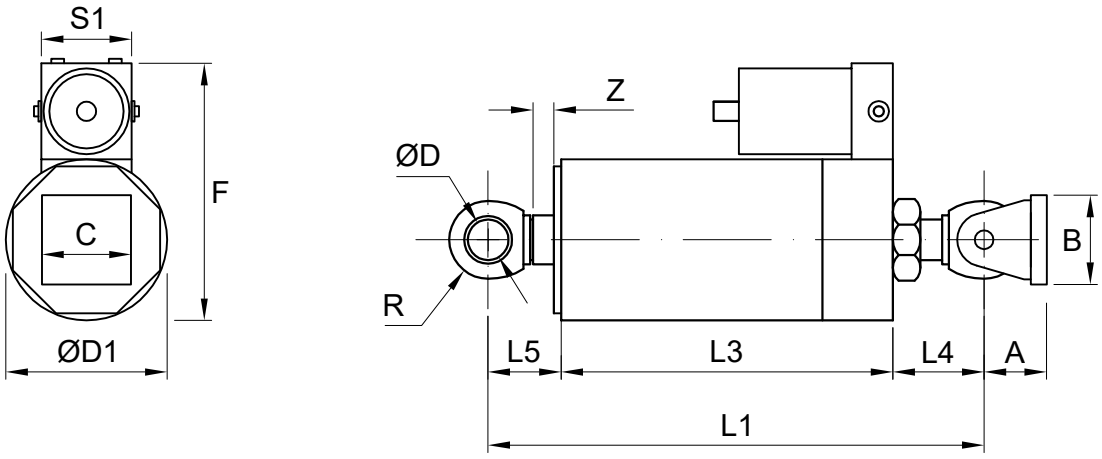

FIGURE 203A:

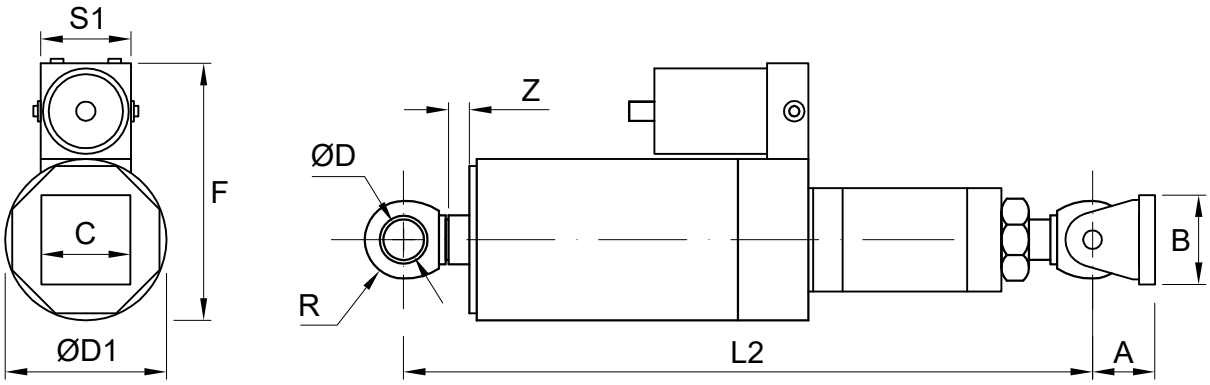

FIG. 202A/203A				A	B	C	L1	L1	L2	L2	L3	L4	L5	ØD	S1	R	F	ØD1	Z	Weight
Size	Nominal Load		Stroke				min	max	min	max										
	kg	kN	mm	mm																Kg
8 1/2"	60161	590	127	155	420	300	689	816	770	3100	399	157	133	80	145	90	428	268	3	161
			254				816	1070	897	3100	526									192
10"	85143	835	127	170	350	288	735	862	825	3400	443	157	135	90	170	100	488	310	5	250
			254				862	1116	952	3400	570									288
12"	127459	1250	127	200	460	315	829	956	927	3800	487	182	160	110	170	123	538	360	5	350
			254				956	1210	1054	3800	614									408
14"	176404	1730	127	225	470	330	908	1035	1024	4200	536	197	175	120	220	138	648	420	5	515
			254				1035	1289	1151	4200	663									587