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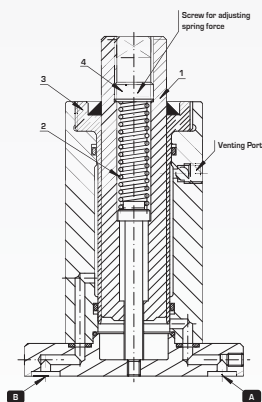
All American Hydraulic Workholding Systems gives you the uniquely designed and top quality products that you have always depended on to get the job done. Along with Quiri Hydromecanique of France, we put our combined years of experience in workholding into the development of this line of products. This line of products are used the world over for automobile production, aerospace fabrication among others and has saved many companies that use them, time and money due to their reliability and longevity. This product line has a wide range of products for you to choose from and each has benefits that will make your workflow more efficient. Just remember that whether your need is hydraulic, mechanical or pneumatic, **All American Products Group** has a solution for you.

General points

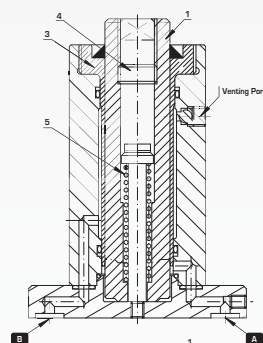
- Swing clamps with Several choices of movement:
 - Swing clamps with a reinforced standard helical movement, see page 43.
 - Swing clamps with an exclusive system call **"Rotation in the Plane,"** see page 13.
 - A special range of **"Rotation in the Plane"** swing clamps with medium pressure. See page 36.
 - A wide range of Position Detection Systems from Mechanical, Electronic, Air and Hydraulic methods, see page 57.
 - All Swing Clamps have venting ports
- Work Supports with several different choices of functionality:
 - Spring action with hydraulic locking. See page 77.
 - Air pressure action with hydraulic locking.
 - Air pressure advance and spring retraction , hydraulic locking.
 - Hydraulic advance and spring retraction, hydraulic locking.
 - All work supports with improved design that includes brass or stainless steel locking sleeves , there is no risk of plastic melting.
 - All work supports have vent ports.
- Unique, patented Positive Clamps Systems:
 - Linear translatable auto locking cylinder, T-Lock®. See page 98.
 - Pivoting auto locking cylinders, R-Lock®, see page 99.
- A wide range of Linear Cylinders to choose from. See page 5

Work Supports

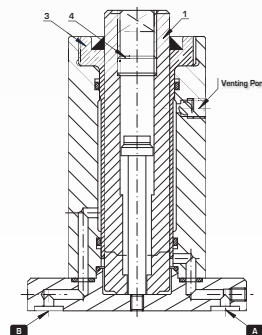
Spring advance and retraction



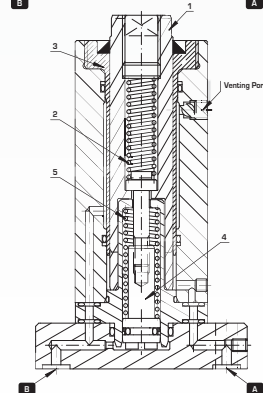
Air pressure advance, spring retraction



Air Pressure advance and retraction



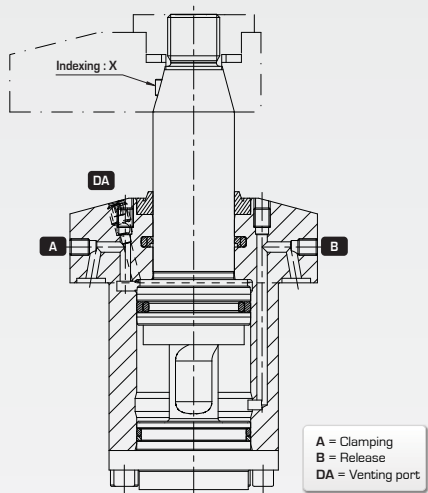
Hydraulic and spring advance, spring retraction



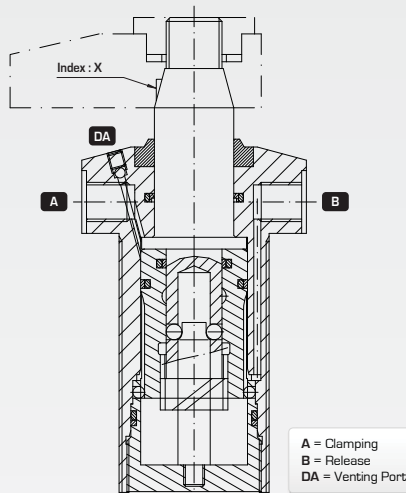
Important Information

Features and Benefits

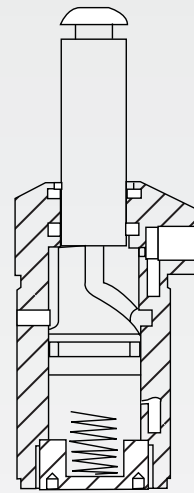
Swing Clamp



Swing Clamp with
Helical Movement

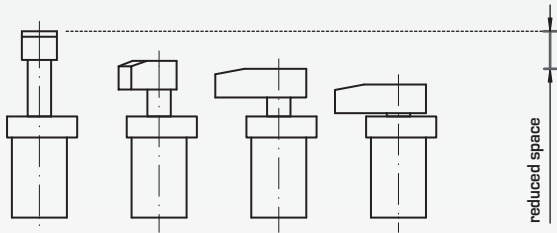


Swing Clamp with
Rotation in a Plane.

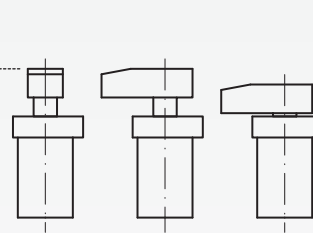


Competitors
Swing Clamp

Cylinder with Helical Pivoting



Cylinder with Rotation in the Plane



Benefits of All American Swing Clamps made by Quiri.

	All American Swing Clamp	Competitors	Advantages
1	Swing movement without vertical stroke	Helical swing movement with vertical stroke	With a smaller total stroke, the swing arm can operate in a smaller area. The life of the seals is dramatically improved as a result.
2	Clamp arm with indexing	No Indexing Available	The arm can't move from its angular position because of the indexing.
3	Swing system with very strong and solid swing action	Uses helical groove and beads	Because of the absence of a ball that could damage the system, the work life is increased.
4	No torque limitation system	Use of ball bearings in the swing system needs a torque limitation	There is no chance that the clamping arms in the wrong place.
5	Swing clamps and Work Supports with built in drainage	No drain available	All the clamps move in Synchronized movement, There is no need to add drainage in the workholding device
6	Nitrided Piston rod	Cemented steel	There is better resistance against corrosion and seizing with a roughness of RA=8 to improve life of the seals
7	Arm fixture with a 15° cone angle	Cone at 5°	Disassembly is easier with no need for the use of a hammer to remove the arm. With a 5° angle the arm will be blocked.
8	Includes a special Nord-lock washer	No washer is available	Our clamp can not be unscrewed by itself.
9	Urethane Seals	Standard nitrile seals	Longer life and less maintenance

ACS	Cartridge mount cylinders - Single acting - Spring return	004
ACSH	Cartridge mount cylinders - Single acting - Hexagonal head	005
ACD	Cartridge mount cylinders - Double acting - Threaded bottom	006
ACDD	Cartridge mount cylinders - Double acting - Threaded head	007
AFS	Threaded cylinders - Single acting	008
AFSG	Threaded cylinders - Single acting - Long stroke	009
AFD	Threaded cylinders - Double acting	010
AFDG	Threaded cylinders - Double acting - Long stroke	011
AFDGF	Threaded cylinders - Double acting - Long stroke - Flanged	012
AEMF	Nuts for threaded cylinders	013
ARS	Positive clamping spring cylinders	014
APCS	Hollow piston cylinders - Single acting	015
APCD	Hollow piston cylinders - Double acting	016

Cartridge mount cylinder : ACS

Single acting - Spring return

Max force at 5000 psi : 650 to 24500 lbs

Characteristics

- threaded assembly (C-wrench)
- supplied in oil directly through the drilled block
- spring return
- domed or threaded rod end with flats
- supplied with o-ring and anti-extrusion ring

Design

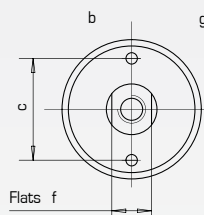
- steel body with anti-corrosion treatment
- piston made of heat treated steel

Note

Single acting cylinders should not be used in the presence of cutting fluid.



Dimensions

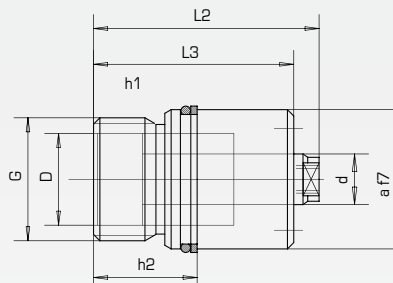


Type ACS__T

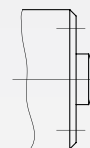
Tapped rod end

Type ACS__B

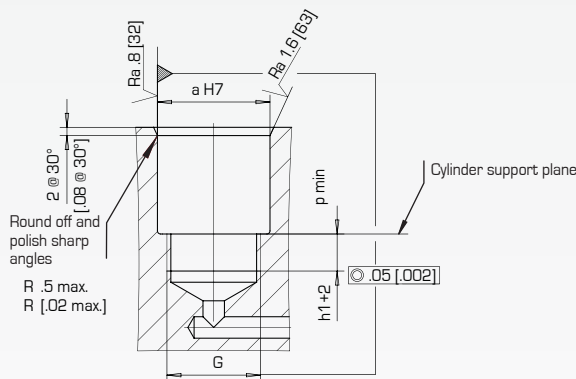
Spherical rod end



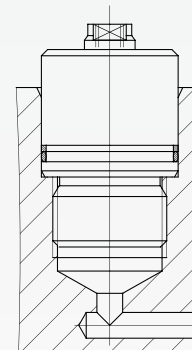
L1



Housing machining dimensions



Example of assembly



F max at 5000 psi	Stroke	Effective Area	Piston øD	Rod ød	Type	Dimensions												p min
						L1	L2	L3	h1	h2	a	b	c	f	G	g		
kN lbs	mm in	cm² in²	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in			mm in	
2.7 600	10 .39	.78 .12	10 .39	5 .20	ACS 5 B ACS 5 T	37 1.46	40 1.57	35.0 1.38	12 .47	17 .67	16. 630	2 .08	12.5 .49	-	M15 x 1.5	M3 depth 6	8.0 .31	
7.0 1900	12 .47	2.00 .31	16 .63	8 .31	ACS 10 B ACS 10 T	47 1.85	50 1.97	44.0 1.73	13 .51	18.5 .73	24 .945	3 .11	18.0 .71	-	M22 x 1.5	M5 depth 10	8.5 .33	
11.0 2000	12 .47	3.14 .49	20 .79	10 .39	ACS 15 B ACS 15 T	51 2.01	54 2.13	47.0 1.85	14 .55	21 .83	28 1.102	4 .16	22.0 .87	8 .31	M26 x 1.5	M6 depth 12	10.0 .39	
17.1 3500	16 .63	4.90 .76	25 .98	14 .55	ACS 25 B ACS 25 T	59 232	62 2.44	55.0 2.17	15 .59	22 .87	34 1.339	4 .16	28.0 1.10	11 .43	M32 x 1.5	M8 depth 12	10.0 .39	
28.0 6000	16 .63	8.00 1.24	32 1.26	16 .63	ACS 40 B ACS 40 T	64 2.52	67 2.64	59.0 2.32	17 .67	24 .94	42 1.654	5 .20	32.0 1.26	13 .51	M40 x 1.5	M10 depth 15	10.0 .39	
44.0 9500	20 .79	12.56 1.95	40 1.57	20 .79	ACS 65 B ACS 65 T	86 3.39	89 3.50	80.5 3.17	22 .87	30 1.18	52 2.047	6 .24	40.0 1.57	17 .67	M50 x 1.5	M12 depth 20	11.0 .43	
68.7 15000	20 .79	19.62 3.04	50 1.97	25 .98	ACS 100 B ACS 100 T	89 3.50	92 3.62	81.0 3.19	28 1.10	37 1.41	64 2.520	8 .31	48.0 1.89	19 .75	M62 x 1.5	M16 depth 22	12.0 .47	
109.0 24500	25 .98	31.15 4.83	63 2.48	32 1.26	ACS 160 B ACS 160 T	104 4.09	108 4.25	95.0 3.74	30 1.18	41 1.46	80 3.150	10 .39	62.0 2.44	24 .94	M78 x 1.5	M20 depth 30	14.0 .55	

Cartridge mount cylinder : ACSH

Single acting - Hexagonal head

Max force at 5000 psi : 650 to 24500 lbs

Characteristics

- threaded assembly (standard spanner)
- supplied in oil directly through the drilled block
- spring return
- domed or threaded rod end with flats
- supplied with o-ring and anti-extrusion ring

Design

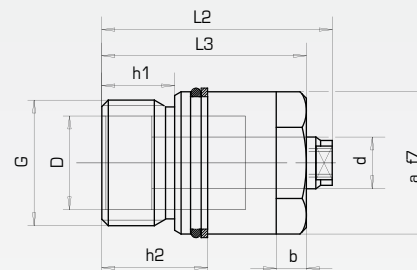
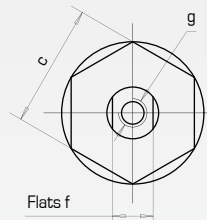
- steel body with anti-corrosion treatment
- piston made of heat treated steel

Note

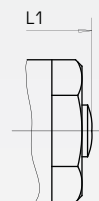
Single acting cylinders should not be used in the presence of cutting fluid.



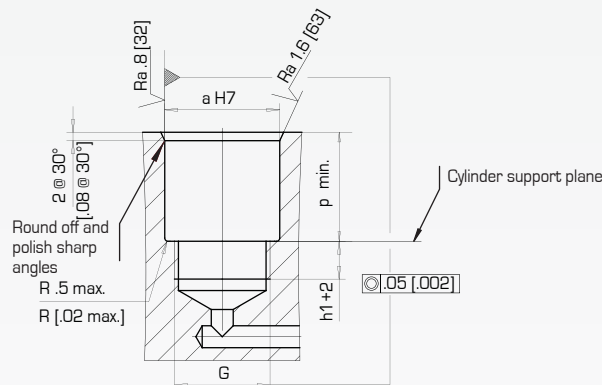
Dimensions



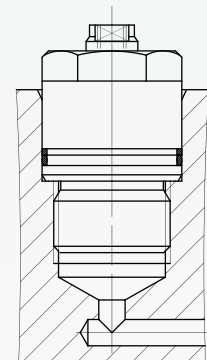
Type ACSH_T
Tapped rod end



Housing machining dimensions



Example of assembly



F max at 5000 psi	Stroke	Effective Area	Piston øD	Rod ød	Type	Dimensions												
						L1	L2	L3	h1	h2	a	b	c	f	G	g	p min	
kN lbs	mm in	cm² in²	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in			mm in	
2.7 600	10 .39	.78 .12	10 .39	5 .20	ACSH 5 B ACSH 5 T	37 1.46	40 1.57	35.0 1.38	12 .47	17 .67	16 .630	2 .08	12.5 .49	-	M15 x 1.5	M3 depth 6	8.0 .31	
7.0 1900	12 .47	2.00 .31	16 .63	8 .31	ACSH 10 B ACSH 10 T	47 1.85	50 1.97	44.0 1.73	13 .51	18.5 .73	24 .945	3 .11	18.0 .71	-	M22 x 1.5	M5 depth 10	8.5 .33	
11.0 2000	12 .47	3.14 .49	20 .79	10 .39	ACSH 15 B ACSH 15 T	51 2.01	54 2.13	47.0 1.85	14 .55	21 .83	28 1.102	4 .16	22.0 .87	8 .31	M26 x 1.5	M6 depth 12	10.0 .39	
17.1 3500	16 .63	4.90 .76	25 .98	14 .55	ACSH 25 B ACSH 25 T	59 2.32	62 2.44	55.0 2.17	15 .59	22 .87	34 1.339	4 .16	28.0 1.10	11 .43	M32 x 1.5	M8 depth 12	10.0 .39	
28.0 6000	16 .63	8.00 1.24	32 1.26	16 .63	ACSH 40 B ACSH 40 T	64 2.52	67 2.64	59.0 2.32	17 .67	24 .94	42 1.654	5 .20	32.0 1.26	13 .51	M40 x 1.5	M10 depth 15	10.0 .39	
44.0 9500	20 .79	12.56 1.95	40 1.57	20 .79	ACSH 65 B ACSH 65 T	86 3.39	89 3.50	80.5 3.17	22 .87	30 1.18	52 2.047	6 .24	40.0 1.57	17 .67	M50 x 1.5	M12 depth 20	11.0 .43	
68.7 15000	20 .79	19.62 3.04	50 1.97	25 .98	ACSH 100 B ACSH 100 T	89 3.50	92 3.62	81.0 3.19	28 1.10	37 1.46	64 2.520	8 .31	48.0 1.89	19 .75	M62 x 1.5	M16 depth 22	12.0 .47	
109.0 24500	25 .98	31.15 4.83	63 2.48	32 1.26	ACSH 160 B ACSH 160 T	104 4.09	108 4.25	95.0 3.74	30 1.18	41 1.61	80 3.150	10 .39	62.0 2.44	24 .94	M78 x 1.5	M20 depth 30	14.0 .55	

Cartridge mount cylinder : ACD

Double acting - Threaded bottom

Max force at 5000 psi : 2500 to 25500 lbs

Characteristics

- threaded assembly (C-wrench)
- supplied in oil directly through the drilled block
- domed or threaded rod end with flats
- supplied with o-ring and anti-extrusion ring

Design

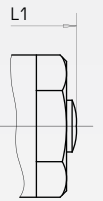
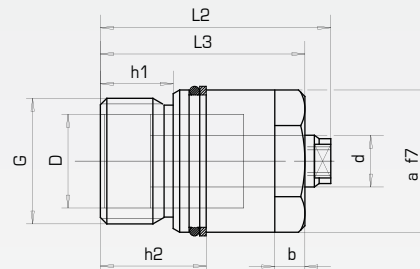
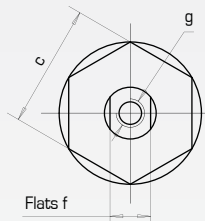
- steel body with anti-corrosion treatment
- piston made of heat treated steel
- double sealing on rod

Note

These cylinders should not be use in the presence of cutting fluid.



Dimensions



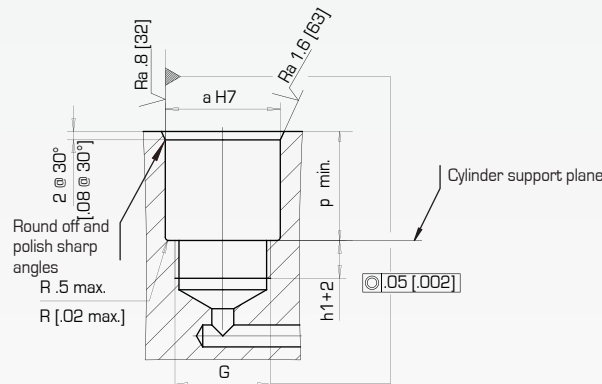
Type ACD__T

Tapped rod end

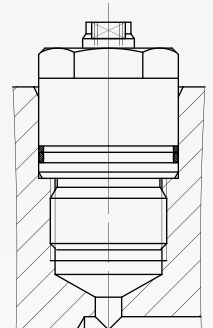
Type ACD__B

Spherical rod end

Housing machining dimensions



Example of assembly



F max at 5000 psi Pushing	F max at 5000 psi Pulling	Stroke	Effective Area Push	Effective Area Pull	Piston aD	Rod ed	Type	Dimensions																
kN lbs	kN lbs	mm in	cm² in²	cm² in²	mm in	mm in		L1	L2	L3	h1	a	b	c	r e2	f	G	g	k max	p +1 0	q	m	n	s
10.8 2000	8.0 1500	20 .79	3.14 .49	2.35 .36	20 .79	10 .39	ACD 15 B ACD 15 T	48 1.89	51 2.01	44 1.73	17 .67	28 1.102	4 .16	22 .87	29.0 1.142 5.0 .197	8 .31	M26 x 1.5	M6 depth 12	3 .11	28 1.102	3 .11	41 1.61	14 .55	15 .59
17.1 3500	11.9 2500	25 .98	4.90 .76	3.40 .53	25 .98	14 .55	ACD 25 B ACD 25 T	56 2.20	59 2.32	52 2.05	19 .75	34 1.339	4 .16	28 1.10	35.0 1.378 5.0 .197	11 .43	M32 x 1.5	M8 depth 12	4 .16	34 1.339	3 .11	48 1.89	16 .63	20 .79
26.0 6000	21.0 4500	25 .98	8.00 1.24	6.00 .93	32 1.26	16 .63	ACD 40 B ACD 40 T	61 2.40	64 2.52	56 2.20	22 .87	42 1.654	5 2.0	32 1.26	43.6 1.717 7.0 .276	13 .51	M40 x 1.5	M10 depth 15	4 .16	35 1.378	4 .16	52 2.05	19 .75	27 1.06
43.7 9500	32.9 7000	40 1.57	12.50 1.94	9.40 1.46	40 1.57	20 .79	ACD 65 B ACD 65 T	82 3.23	85 3.35	76.5 3.01	30 1.18	52 2.047	6 2.4	40 1.57	54.0 2.126 10.0 .394	17 .67	M50 x 1.5	M12 depth 20	5 2.0	47 1.850	6 2.4	71.5 2.81	21.5 .85	35 1.38
68.5 15000	51.4 11500	40 1.57	19.60 3.04	14.70 2.28	50 1.97	25 .98	ACD 100 B ACD 100 T	85 3.35	88 3.46	77 3.03	33 1.30	64 2.520	8 3.1	48 1.89	66.0 2.598 10.0 .394	19 .75	M62 x 1.5	M16 depth 22	6 2.4	45 1.772	6 2.4	71 2.80	22 .87	45 1.77
109.2 24500	80.8 18000	50 1.97	31.20 4.94	23.10 3.58	63 2.48	32 1.16	ACD 160 B ACD 160 T	99 3.90	103 4.06	90 3.54	40 1.57	80 3.150	10 3.9	62 2.44	82.0 3.228 10.0 .394	24 .94	M78 x 1.5	M20 depth 30	6 2.4	51 2.008	6 2.4	84 3.31	25 .98	58 2.28

Max force at 5000 psi : 1500 to 6000 lbs

Threaded cylinder : AFS

Single acting
Max force at 5000 psi : 600 to 24500 lbs

Characteristics

- spring return
- domed or threaded rod end with flats

Accessories

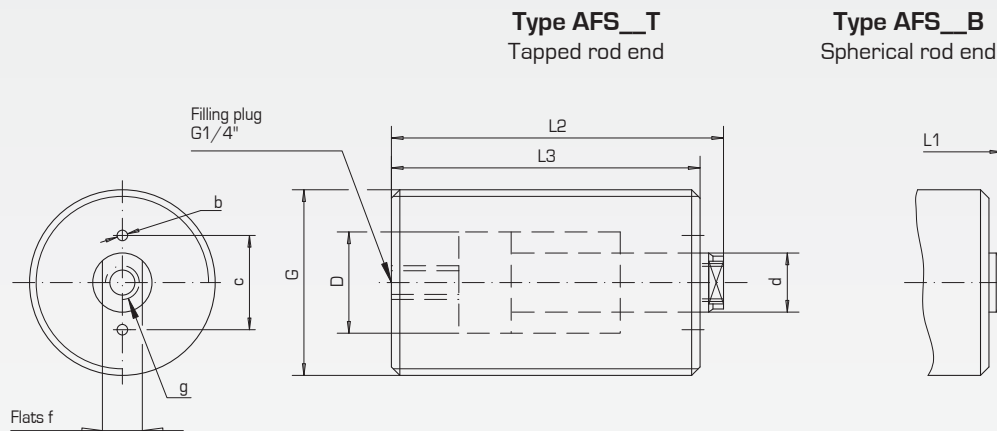
- fixing nut, see page 13

Design

- steel body with anti-corrosion treatment
- piston made of heat treated steel

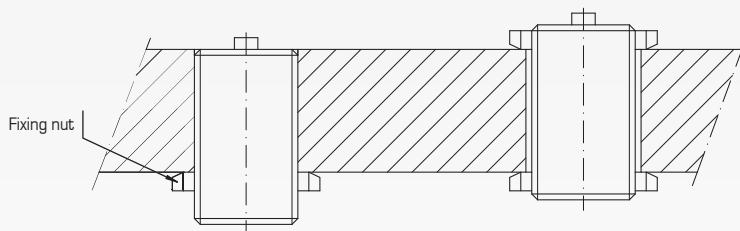
Note

Single acting cylinders should not be used in presence of cutting fluid.



Assembly into a tapped plate

Assembly into a drilled plate



F max at 5000 psi	Stroke	Effective Area	Piston øD	Rod ød	Type	Dimensions								
						L1	L2	L3	b	c	f	G	g	
kN lbs	mm in	cm² in²	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in			
2.7 600	10 .39	.78 .12	10 .39	5 .20	AFS 5 B AFS 5 T	49.5 1.95	52.5 2.07	48.5 1.91	2 .08	12.5 .49	-	M22 x 1.5	M3 depth 6	
7.0 1900	12 .47	2.00 .31	16 .63	8 .31		AFS 10 B AFS 10 T	58.5 2.30	61.5 2.42	57.5 2.26	3 .11	18.0 .71	-	M30 x 1.5	M5 depth 10
11.0 200	12 .47	3.14 .49	20 .79	10 .39	AFS 15 B AFS 15 T		63.5 2.50	66.5 2.62	61.0 2.40	4 .16	22.0 .87	8 .31	M36 x 1.5	M6 depth 12
17.1 3500	16 .63	4.90 .76	25 .98	14 .55		AFS 25 B AFS 25 T	71.5 2.81	74.5 2.93	69.0 2.72	4 .16	28.0 1.10	11 .43	M42 x 1.5	M8 depth 12
28.0 6000	16 .63	8.00 1.24	32 1.26	16 .63	AFS 40 B AFS 40 T		76.5 3.01	79.5 3.13	73.0 2.87	5 .20	32.0 1.26	13 .51	M50 x 1.5	M10 depth 15
44.0 9500	20 .79	12.56 1.95	40 1.57	20 .79		AFS 65 B AFS 65 T	98.5 3.88	101.5 4.00	94.5 3.72	6 .24	40.0 1.57	17 .67	M60 x 1.5	M12 depth 20
68.7 15000	20 .79	19.62 3.04	50 1.97	25 .98	AFS 100 B AFS 100 T		101.5 4.00	104.5 4.11	95.0 3.74	8 .31	48.0 1.89	19 .75	M75 x 1.5	M16 depth 22
109.0 24500	25 .98	31.15 4.83	63 2.48	32 1.26		AFS 160 B AFS 160 T	117.5 4.63	120.5 4.74	109.5 4.31	10 .39	62.0 2.44	24 .94	M95 x 2.0	M20 depth 30

Threaded cylinder : AFSG

Single acting - Long stroke

Max force at 5000 psi : 3500 to 24500 lbs

Characteristics

- return using rectangular cross-section spring

Accessories

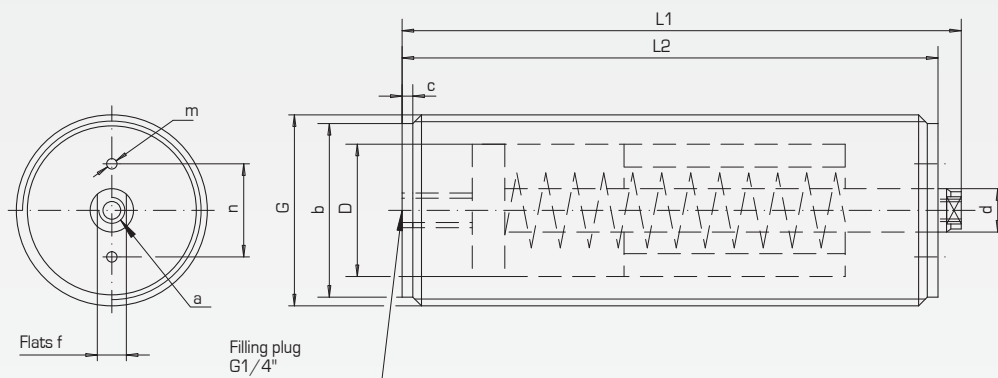
- fixing nut, see page 13

Design

- steel body with anti-corrosion treatment
- piston made of heat treated steel

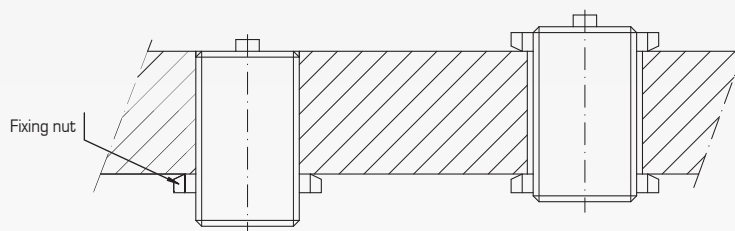
Note

The spring is only designed for the return of the rod. If a return force is required, use the AFDG type double acting cylinder. Single acting cylinders should not be used in presence of cutting fluid.



Assembly into a tapped plate

Assembly into a drilled plate



F max at 5000 psi	Stroke	Effective Area	Piston øD	Rod ød	Type	Dimensions								
						L1	L2	a	b	c	f	m	n	G
kN lbs	mm in	cm² in²	mm in	mm in		mm in	mm in		mm in	mm in	mm in	mm in	mm in	
17.1 3500	25 .98	4.90 .79	25 .98	10 .39	AFSG 25	128 5.04	122 4.80	M6 depth 12	34.0 1.34	3 .11	8 .31	4 .16	28 1.10	M36 x 1.5
28.0 6000	35 1.38	8.00 1.24	32 1.26	12 .47	AFSG 40	161 6.34	155 6.10	M6 depth 15	42.5 1.67	4 .16	10 .39	5 .20	32 1.26	M45 x 1.5
44.0 9500	45 1.77	12.56 1.95	40 1.57	16 .63	AFSG 65	202 7.95	195 7.68	M10 depth 15	49.0 1.93	5 .20	13 .51	6 .24	40 1.57	M52 x 1.5
68.7 15000	60 2.36	19.62 3.04	50 1.97	20 .79	AFSG 100	241 9.49	234 9.21	M12 depth 20	77.0 3.03	6 .24	17 .67	8 .31	48 1.89	M70 x 1.5
109.0 24500	80 3.15	31.15 4.83	63 2.48	25 .98	AFSG 160	306 12.05	296 11.65	M16 depth 22	81.0 3.19	8 .31	19 .75	10 .39	62 2.44	M85 x 2

Threaded cylinder : AFD

Double acting Maxi force at 5000 psi : 2000 to 25000 lbs

Characteristics

- domed or threaded rod end with flats

Design

- steel body with anti-corrosion treatment
- piston made of heat treated steel

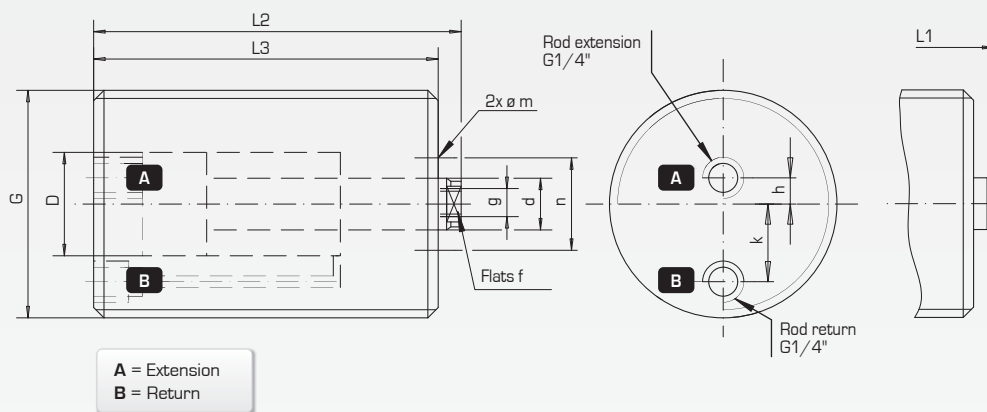
Accessories

- fixing nut, see page 13



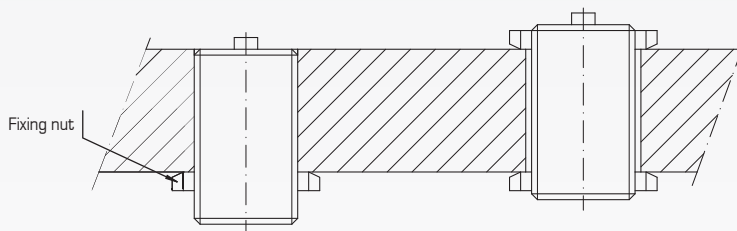
Type AFD__T
Tapped rod end

Type AFD__B
Spherical rod end



Assembly into a tapped plate

Assembly into a drilled plate



F max at 5000 psi Push	F max at 5000 psi Pull	Stroke	Effective Area Push	Effective Area Pull	Piston øD	Rod ød	Type	Dimensions									
								L1	L2	L3	f	G	g	h	k	m	n
kN lbs	kN lbs	mm in	cm² in²	cm² in²	mm in	mm in		mm in	mm in	mm in	mm in			mm in	mm in	mm in	mm in
11.0 2000	8.0 1500	20 .79	3.14 .49	2.35 .36	20 .79	10 .39	AFD 15 B AFD 15 T	71.5 2.81	74.5 2.93	68 2.68	8 .31	M45 x 1.5	M6 depth 12	9 .35	13.0 .51	4 .16	22 .87
17.1 3500	12.0 2500	25 .98	4.90 .76	2.37 .37	25 .98	14 .55	AFD 25 B AFD 25 T	78.5 3.09	81.5 3.21	75 2.95	11 .43	M52 x 1.5	M8 depth 12	6 .64	16.0 .63	4 .16	28 1.10
28.0 6000	21.7 4500	25 .98	8.04 1.25	6.03 .93	32 1.26	16 .63	AFD 40 B AFD 40 T	84.5 3.33	87.5 3.44	80 3.15	13 .51	M60 x 1.5	M10 depth 15	3 .11	20.0 .79	5 .20	32 1.16
44.0 9500	33.6 7500	40 1.57	12.56 1.95	9.42 1.46	40 1.57	20 .79	AFD 65 B AFD 65 T	105.0 4.13	108.0 4.25	100 3.94	17 .67	M70 x 1.5	M12 depth 20	0	25.5 1.00	6 .24	40 1.57
68.7 11500	52.9 11500	40 1.57	19.63 3.04	4.72 2.28	50 1.97	25 .98	AFD 100 B AFD 100 T	110.5 4.35	113.5 4.47	103 4.06	19 .75	M85 x 2	M16 depth 22	0	23.5 .93	8 .32	48 1.88
109.0 24500	83.3 18500	50 1.97	31.17 4.83	23.13 3.59	63 2.48	32 1.26	AFD 160 B AFD 160 T	125.5 4.94	129.5 5.10	117 4.61	24 .94	M105 x 2	M20 depth 30	0	41.0 1.61	10 .39	62 2.44

Threaded cylinder : AFDG

Double acting - Long stroke

Max force at 5000 psi : 2000 to 25000 lbs

Characteristics

- domed or threaded rod end with flats

Design

- steel body with anti-corrosion treatment
- piston made of heat treated steel

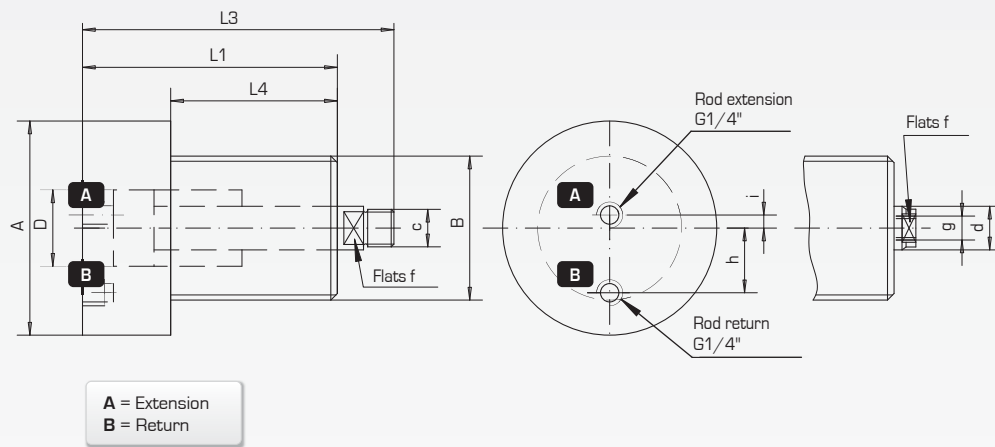
Accessories

- fixing nut, see page 13



Type AFDG_F
Threaded rod end

Type AFDG_T
Spherical rod end



F max at 5000 psi Push	F max at 5000 psi Push	Stroke	Effective Area Push	Effective Area Pull	Piston øD	Rod ød	Type	Dimensions										
A	B	g	c	i	h	f		L1	L2	L3	L4							
kN lbs	kN lbs	mm in	cm² in²	cm² in²	mm in	mm in		mm in				mm in	mm in	mm in	mm in	mm in	mm in	
11.0 3800	5.6 1200	40 1.57	3.14 .49	1.6 .25	20 .79	14 .55	AFDG 15 F AFDG 15 T	58 2.28	M36 x 1.5	M8 depth 12	M10 depth 14	13 .51	17 .67	11 .43	90.5 3.56	97 3.82	111 4.37	40.5 1.59
17.5 3900	10.1 2200	60 2.36	4.9 .76	2.9 .45	25 .98	16 .63	AFDG 25 F AFDG 25 T	62 2.44	M42 x 1.5	M10 depth 15	M12 depth 16	11 .43	19 .75	13 .51	112.5 4.43	120 4.72	136 5.35	60.5 2.38
28.7 6400	17.1 3500	60 2.36	8.0 1.24	4.9 .76	32 1.26	20 .79	AFDG 40 F AFDG 40 T	80 3.15	M52 x 1.5	M12 depth 20	M16 depth 22	4 .16	26 1.02	17 .67	116.5 4.59	125 4.92	147 5.79	61.5 2.42
44.8 10000	27.0 6000	80 3.15	12.5 1.94	7.6 1.18	40 1.57	25 .98	AFDG 65 F AFDG 65 T	90 3.54	M60 x 1.5	M16 depth 22	M20x1.5 depth 28	0	30 1.18	19 .75	146.0 5.75	155 6.10	183 7.20	86.0 3.39
70.0 15500	40.6 9000	80 3.15	19.3 3.04	11.6 1.80	50 1.97	32 1.26	AFDG 100 F AFDG 100 T	100 3.94	M70 x 1.5	M20 depth 30	M24x2.0 depth 34	0	35 1.38	24 .94	150.0 5.91	160 6.30	194 7.64	88.0 3.46
111.3 25000	65.1 14500	100 3.94	18.6 2.88	18.6 2.88	63 2.48	40 1.57	AFDG 160 F AFDG 160 T	120 4.72	M85 x 1.5	M27 depth 40	M30x2.0 depth 42	0	45 1.77	27 1.06	173.0 6.81	184 7.24	226 8.90	103.0 4.06

Threaded cylinder : AFDGF

Double acting - Long stroke - Flanged

Max force at : 2000 to 24000 lbs

Characteristics

- domed or threaded rod end with flats

Design

- steel body with anti-corrosion treatment
- piston made of heat treated steel

Accessories

- bottom with 6 smooth holes or 6 tapped holes
- fixing nut, see page 13



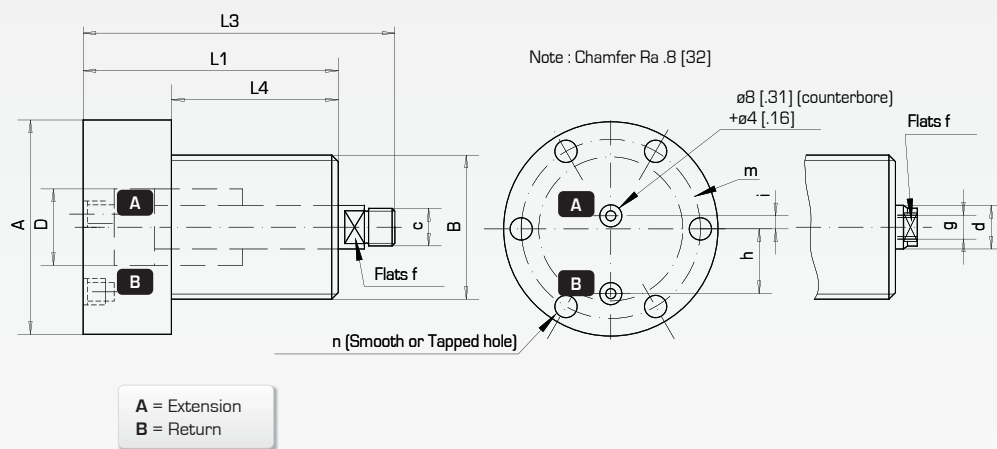
Type AFDGF_F L6

Threaded rod
Smooth holes

AFDGF_L6 or T6

Type AFDGF_T T6

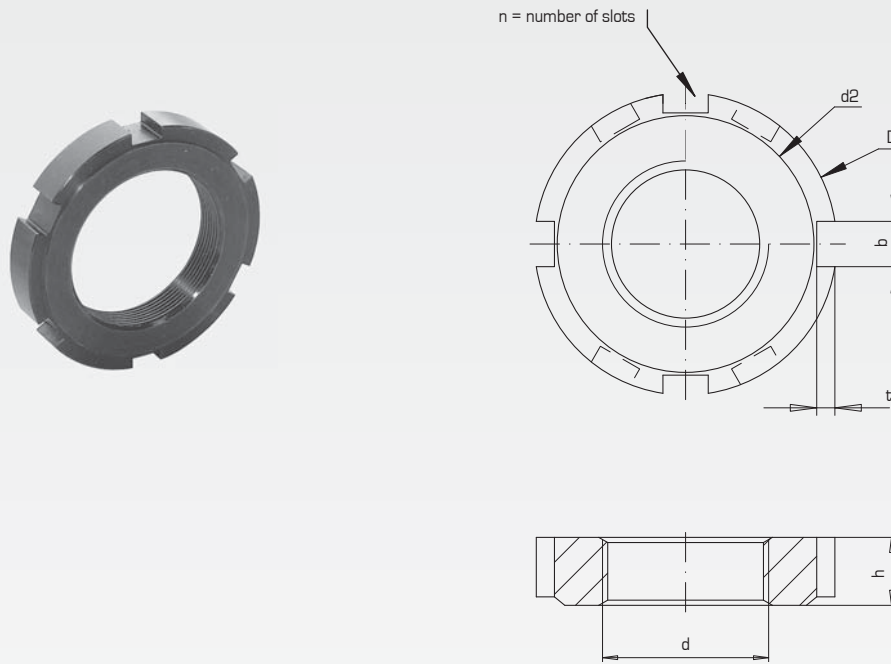
Tapped rod
Tapped holes



F max at 5000 psi Push	F max at 5000 psi Pull	Stroke	Effective Area Push	Effective Area Pull	Piston øD	Rod ød	Type	Dimensions													
A	B	g	c	i	h	f		m	n smooth or tapped	L1	L2	L3	L4								
KN lbs	KN lbs	mm in	cm² in²	cm² in²	mm in	mm in		mm in					mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	
11.0 2000	5.6 1000	40 1.57	3.14 .49	1.6 .25	20 .79	14 .55	AFDGF 15 F AFDGF 15 T	58 2.28	M36 x 1.5	M8 depth 12	M10 depth 14	13 .51	17 .67	11 .43	48 1.89	6.3 .25 M6 depth 10	90.5 3.56	97 3.82	111 4.37	40.5 1.59	
17.5 3500	10.1 2.36	60 2.36	4.90 .76	2.9 .45	25 .98	16 .63	AFDGF 25 F AFDGF 25 T	62 2.44	M42 x 1.5	M10 depth 15	M12 depth 16	11 .43	19 .75	13 .51	52 2.05	6.3 .25 M6 depth 10	112.5 4.43	120 4.72	136 5.35	60.5 2.38	
28.7 6000	17.1 3500	60 2.36	8.00 1.24	4.9 .76	32 1.26	20 .79	AFDGF 40 F AFDGF 40 T	80 3.15	M52 x 1.5	M12 depth 20	M16 depth 22	4 .16	26 1.02	17 .67	67 2.64	8.4 .33 M8 depth 12	116.5 4.59	125 4.92	147 5.79	61.5 2.42	
44.8 10000	27.0 6000	80 3.15	12.50 1.94	7.6 1.18	40 1.57	25 .98	AFDGF 65 F AFDGF 65 T	90 3.54	M60 x 1.5	M16 depth 22	M20x1.5 depth 28	0	30 1.18	19 .75	76 2.99	10.5 .41 M10 depth 15	146.0 5.75	155 6.10	183 7.20	86.0 3.39	
70.0 15000	40.6 9000	80 3.15	19.60 3.04	11.6 1.80	50 1.97	32 1.26	AFDGF 100 F AFDGF 100 T	100 3.94	M70 x 1.5	M20 depth 30	M24x2.0 depth 34	0	35 1.38	24 .94	86 3.39	10.5 .41 M10 depth 15	150.0 5.91	160 6.30	194 7.64	88.0 3.46	
111.3 25000	65.1 14500	100 3.94	31.10 4.82	18.6 2.88	63 2.48	40 1.57	AFDGF 160 F AFDGF 160 T	120 4.72	M85 x 1.5	M27 depth 40	M30x2.0 depth 42	0	45 1.77	27 1.06	103 4.06	12.5 .49 M12 depth 18	173.0 6.81	184 7.24	226 8.90	103.0 4.06	

Locking nut for threaded cylinders :

Fine pitch metric thread
M22 x 1.5 to M105 x 2.0



Type	Thread d	Dimensions					
		D	d2	h	b	t	n
		mm in	mm in	mm in	mm in	mm in	mm in
AEMF 2215	M22 x 1.5	40 1.57	34 1.34	9 .35	6 .24	2.5 .10	4.0 .16
AEMF 3015	M30 x 1.5	50 1.97	43 1.69	10 .39	7 .28	3.0 .11	4.0 .16
AEMF 3615	M36 x 1.5	58 2.28	50 1.97	11 .43	8 .31	3.5 .14	4.0 .16
AEMF 4215	M42 x 1.5	62 2.44	54 2.12	12 .47	8 .31	3.5 .14	4.0 .16
AEMF 4515	M45 x 1.5	68 2.68	60 2.36	12 .47	8 .31	3.5 .14	6.0 .24
AEMF 5015	M50 x 1.5	75 2.95	67 2.64	13 .51	8 .31	3.5 .14	6.0 .24
AEMF 5215	M52 x 1.5	80 3.15	70 2.76	13 .51	10 .39	4.0 .16	6.0 .24
AEMF 6015	M60 x 1.5	90 3.54	80 3.15	13 .51	10 .39	4.0 .16	6.0 .24
AEMF 7015	M70 x 1.5	100 2.94	90 3.54	14 .55	10 .39	4.0 .16	6.0 .24
AEMF 7220	M72 x 2.0	110 4.33	100 3.94	14 .55	10 .39	4.0 .16	6.0 .24
AEMF 7515	M75 x 1.5	110 4.33	100 3.94	14 .55	10 .39	4.0 .16	6.0 .24
AEMF 8020	M80 x 2.0	115 4.53	105 4.13	16 .63	10 .39	4.0 .16	6.0 .24
AEMF 8520	M85 x 2.0	120 4.72	110 4.33	16 .63	10 .39	4.0 .16	6.0 .24
AEMF 9520	M95 x 2.0	135 5.31	120 4.72	16 .63	12 .47	5.0 .20	6.0 .24
AEMF 10020	M100 x 2.0	145 5.71	130 5.12	16 .63	12 .47	5.0 .20	6.0 .24
AEMF 10520	M105 x 2	155 6.10	140 5.51	16 .63	12 .47	5.0 .20	6.0 .24

Positive clamping spring cylinder : ARS

Thrust or traction

Max force : 5500 to 29000 lbs

Characteristics

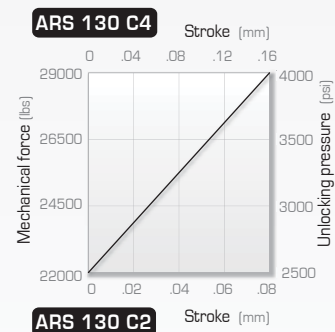
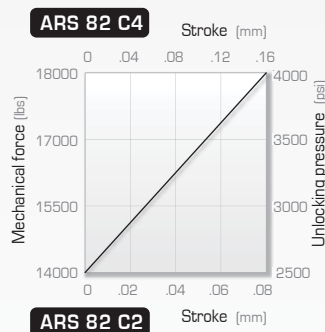
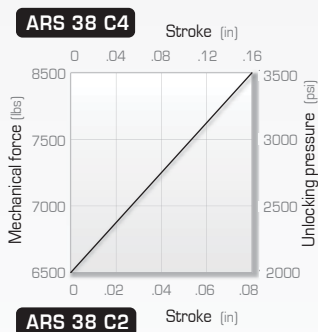
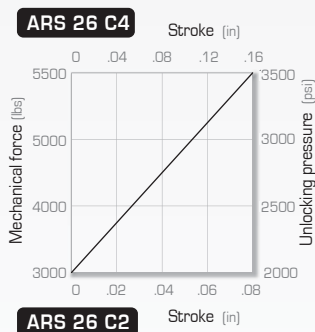
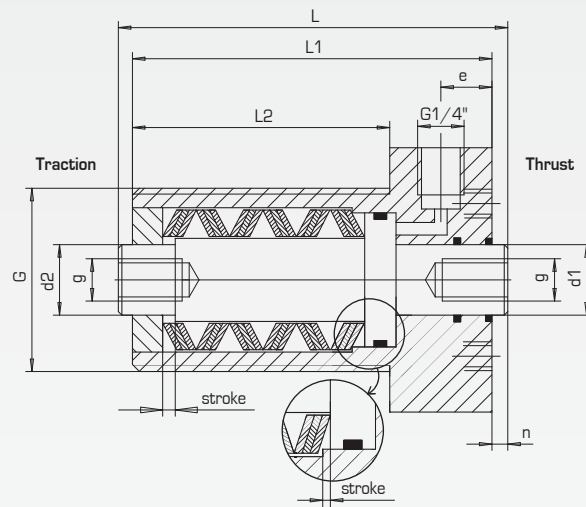
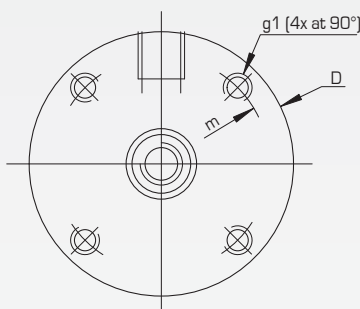
- disk spring maintain the clamping force
- force released by hydraulic pressure
- used to push or pull
- threaded body allowing numerous positioning options
- threaded holes on the head

Design

- steel body with anti-corrosion treatment
- piston made of heat treated steel

Options

- special models on request



F max	Stroke	Type	Dimensions														
			D	d1	d2	e	G	g	g1 (4x at 90°)	L	L1	L2	m	n			
kN	lbs	mm	in	mm	in	mm	in				mm	in	mm	in	mm	in	
26	5500	2 .08	ARS 26 C2 ARS 26 C4	75	2.95	20 .79	18 .71	13 .51	M52 x 1.5	M12 depth 20	M6 depth 15	104	4.09	98	3.86	73	2.87
		4 .16										168	6.61	162	6.38	137	5.39
38	8500	2 .08	ARS 38 C2 ARS 38 C4	90	3.54	30 1.18	25 .98	14 .55	M75 x 1.5	M16 depth 25	M10 depth 20	111	4.37	105	4.13	80	3.15
		4 .16										170	6.69	164	6.46	139	5.47
82	18000	2 .08	ARS 82 C2 ARS 82 C4	105	4.13	30 1.18	30 1.18	18 .71	M85 x 2.0	M 16 depth 30	M12 depth 25	145	5.71	139	5.47	109	4.29
		4 .16										230	9.06	224	8.82	194	7.64
130	29000	2 .08	ARS 130 C2 ARS 130 C4	130	5.12	50 1.97	40 1.57	23 .91	M115 x 2.0	M24 depth 30	M41 depth 25	163	6.42	154	6.06	119	4.69
		4 .16										249	9.80	240	9.45	205	8.07

Hollow piston cylinder : APCS

Single acting - Spring return

Max force at 5000 psi : 2500 to 29000 lbs

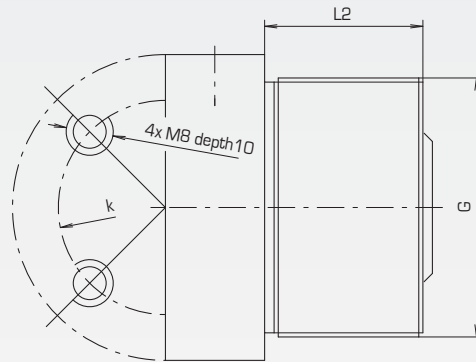
Characteristics

- threaded holes at the base (standard)
- piston which includes an optional Heli-Coil ring,

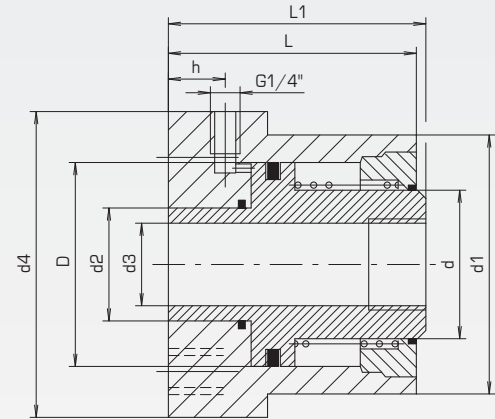
Design

- steel body with anti-corrosion treatment
- piston made of heat treated steel
- thread for 8.8 standard quality screws

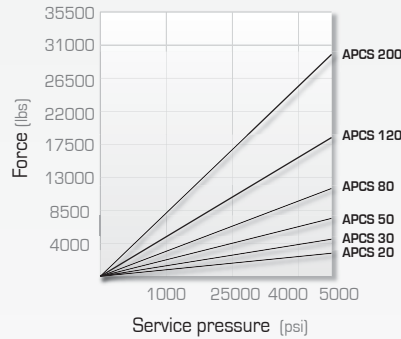
Type APCSF__
Threaded body



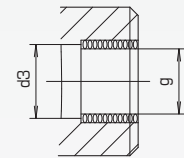
Type APCS__
Smooth body



Force



Type APCS(F)__HC
With Heli-Coil ring



For Helicoil ring on piston, add suffix HC

F max at 5000 psi		Stroke	Effective Area		Piston øD	Rod ød	Type	Dimensions																						
								d1	d2	d3	d4	g HC	G	k	L	L1	L2	h												
kN	lbs	mm	in	cm²	in²	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in													
13	2500	10	.39	3.77	.58	25	.98	16	.63	APCS 20 APCS 20 HC APCSF 20 APCSF 20 HC	40	1.57	12	.47	8.2	.32	50	1.97	M8	M40 x 1.5	35	1.38	59	2.32	60	2.36	36	1.42	12	.47
20	4000	10	.39	6.03	.93	32	1.26	20	.79	APCS 30 APCS 30 HC APCSF 30 APCSF 30 HC	45	1.77	16	.63	10.2	.40	55	2.17	M10	M45 x 1.5	40	1.57	64	2.52	65	2.56	41	1.61	12	.47
32	7000	12	.47	9.42	1.46	40	1.57	25	.98	APCS 50 APCS 50 HC APCSF 50 APCSF 50 HC	55	2.17	20	.79	12.2	.48	65	2.56	M12	M55 x 1.5	45	1.77	71	2.80	72	2.83	45	1.77	15	.59
51	11000	12	.47	14.72	2.28	50	1.97	32	1.26	APCS 80 APCS 80 HC APCSF 80 APCSF 80 HC	65	2.56	25	.98	16.2	.64	70	2.76	M16	M65 x 1.5	50	1.97	77	3.03	78	3.07	50	1.97	15	.59
80	17500	16	.63	23.12	3.58	63	2.48	40	1.57	APCS 120 APCS 120 HC APCSF 120 APCSF 120 HC	80	3.15	32	1.26	20.2	.80	80	3.15	M20	M80 x 2.0	60	2.36	95	3.74	96	3.78	95	3.74	19	.75
131	29000	16	.63	37.70	5.84	80	3.15	50	1.97	APCS 200 APCS 200 HC APCSF 200 APCSF 200 HC	100	3.94	40	1.57	28.2	1.11	100	3.94	M27	M100 x 2.0	75	2.95	109	4.29	110	4.33	109	4.29	21	.83

Hollow piston cylinder : APCD

Double acting

Max force at 5000 psi : 2500 to 29000 lbs

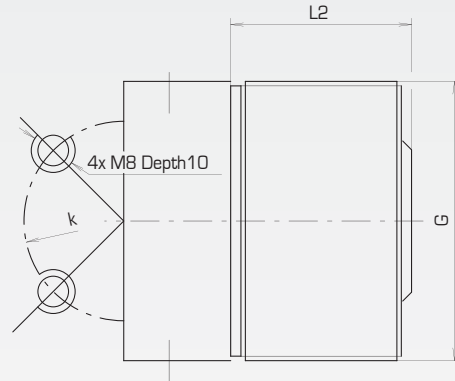
Characteristics

- threaded holes at the base (standard)
- piston which includes an optional Heli-Coil ring

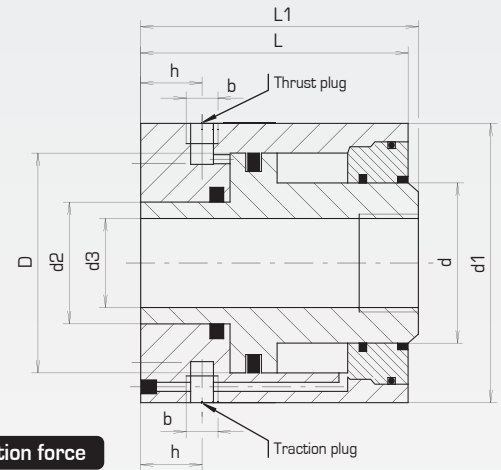
Design

- steel body with anti-corrosion treatment
- piston made of heat treated steel
- thread for 8.8 standard quality screws

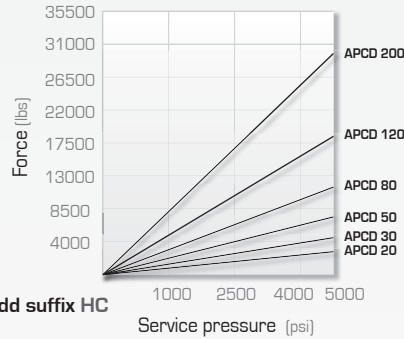
Type APCDF__
Threaded body



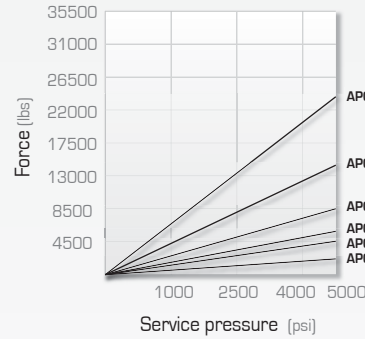
Type APCD__
Smooth body



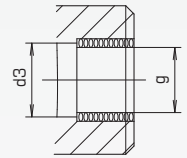
Thrust force



Traction force



Type APCD(F)_HC
With Heli-Coil ring



For Helicoil ring on piston, add suffix HC

F max at 5000 psi Push	F max at 5000 psi Pull	Stroke	Bore Area Push	Bore Area Pull	Piston øD	Rod ød	Type	d1	d2	d3	b	g HC	G	k	L	L1	L2	h
kN lbs	kN lbs	mm in	cm² in²	cm² in²	mm in	mm in		mm in	mm in	mm in	mm in			mm in	mm in	mm in	mm in	mm in
13 2500	10 2000	10 .39	3.77 .58	2.89 .45	25 .98	16 .63	APCD 20 APCD 20 HC APCDF 20 APCDF 20 HC	50 1.97	12 .47	8.2 .32	G1/8"	M8	M50 x 1.5	35 1.38	59 2.32	60 2.36	36 1.42	11 .43
20 4000	17 3500	10 .39	6.03 .93	4.90 .76	32 1.26	20 .79	APCD 30 APCD 30 HC APCDF 30 APCDF 30 HC	55 2.17	16 .63	10.2 .40	G1/4"	M10	M55 x 1.5	40 1.57	64 2.52	65 2.56	41 1.61	12 .47
32 7000	26 5500	16 .63	9.42 1.46	7.65 1.19	40 1.57	25 .98	APCD 50 APCD 50 HC APCDF 50 APCDF 50 HC	65 2.56	20 .79	12.2 .48	G1/4"	M12	M65 x 1.5	45 1.77	72 2.83	73 2.87	45 1.77	14 .56
51 11000	40 8500	16 .63	14.72 2.28	11.59 1.80	50 1.97	32 1.16	APCD 80 APCD 80 HC APCDF 80 APCDF 80 HC	70 2.76	25 .98	16.2 .64	G1/4"	M16	M70 x 1.5	50 1.97	78 3.07	79 3.11	50 1.97	14 .56
80 17500	65 14500	20 .79	23.12 3.58	18.60 2.88	63 2.48	40 1.57	APCD 120 APCD 120 HC APCDF 120 APCDF 120 HC	80 3.15	32 1.26	20.2 .80	G1/4"	M20	M80 x 2	60 2.36	95 3.74	96 3.78	60 2.36	18 .70
131 29500	107 24000	25 .98	37.68 5.84	30.63 4.75	80 3.15	50 1.97	APCD 200 APCD 200 HC APCDF 200 APCDF 200 HC	100 3.94	40 1.57	28.2 1.11	G1/4"	M27	M100 x 2	75 2.96	109 4.29	110 4.33	65 2.56	22 .87

Swing clamp with planar rotation

Table of content

AP	Double acting swing clamp - Threaded - Oil supplied by threaded ports	023
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APL	Double acting swing clamp - flanged top - Oil supplied by manifold ports	027
APLF	Double acting swing clamp - Flanged bottom - Oil supplied by manifold ports	028
APBF	Double acting swing clamp - Block body - Oil supplied by manifold ports	029
APCB	Double acting swing clamp - Cartridge type body - Screw mounting	030
APCV	Double acting swing clamp - Cartridge type body - Threaded body	032
APL26	Double acting swing clamp - Flanged top - Oil supplied by manifold ports	035
APT26	Double acting swing clamp - Flanged top - Oil Supplied by threaded ports	036
APF26	Double acting swing clamp - Flanged bottom - Oil supplied by manifold ports	037
APS26	Double acting swing clamp - flanged bottom - Oil Supplied by threaded ports	039
APLS26X	Double acting swing clamp - Flanged top - Oil supplied by manifold ports	035

General points

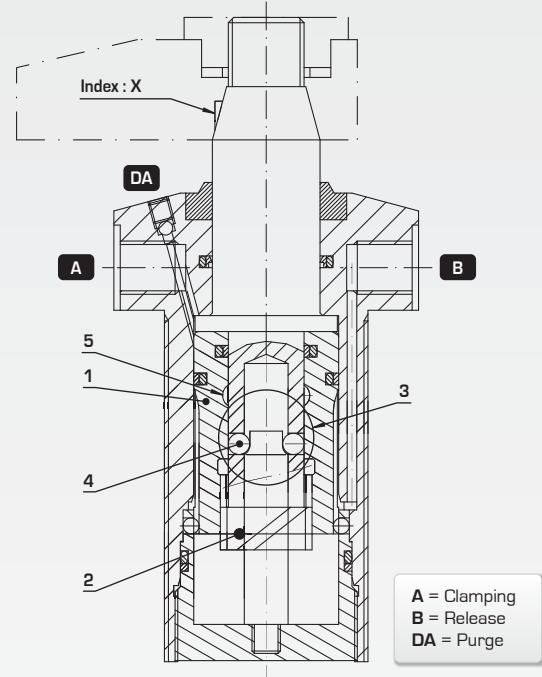
This series of clamps use an exclusive system, **rotation in the plane**, to reduce the space required for the movement of the clamping arm.

The design of this series of cylinders ensures optimum distribution of internal force, increasing longevity and reliability.

These swing clamps can clear the working area to facilitate loading and unloading operations of components. They are designed for automated systems and can reduce non-productive time.

Construction

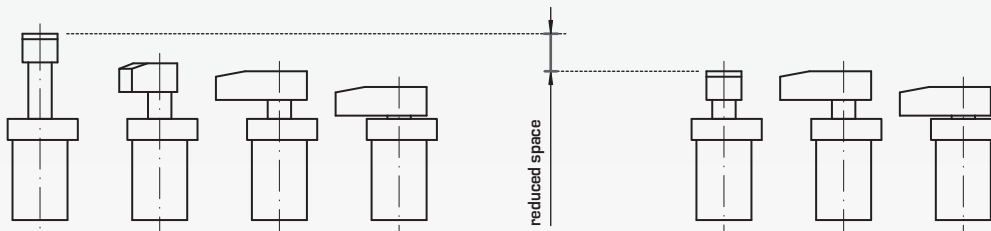
- all parts are of high-strength steel.
- the rod is treated for anti-seizure and anti-corrosion.
- the body is protected by an anti-corrosion treatment.
- **all our swing clamps include a venting port.**
- clamp damage is avoided in the event of impeded rotation.
- no uniform movement up or down reduces rod seal wear during pivoting.
- easy clamping arm removable.
- **all cylinders include an index on the rod.**



Special features of the system

Cylinder with Helical Pivoting

Cylinder with Rotation in the Plane



The swing clamp rod rotates in a plane, thus allowing the clamping arm to move in restricted space. This rotation phase is followed by uniform movement for clamping.

Both chambers of the double acting cylinder are continually full of oil, which means that the system is unaffected by external contamination.

Operations

Clamping phase : Oil supplied through A

During the pressurization of the cylinder, the piston [item 1], which has helical splines, performs a uniform movement downwards, forcing the rod [item 2] to rotate : This is the spinning top principle.

During this rotation, the rod [item 2] pivots on ball bearings, [item 4] (by rotation in the plane).

Once the rotation is completed, the balls [item 4] retract into the groove [item 5] and release the lock on the uniform movement, allowing the rod to freely move through its downwards travel : **the balls are not subject to any forces during clamping.**

Release phase : Oil supplied through B

Supplying the return port B causes a uniform movement of the rod [item 2] upwards, followed by a rotation movement in a plane in order to return to its initial position.

Swing clamps characteristics

Direction and angle of rotation

Determination of cylinder characteristics

Direction and angle of rotation

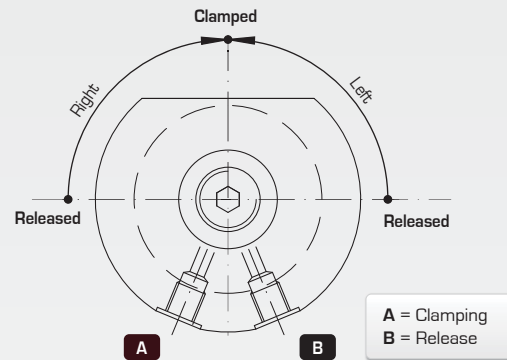
The direction of rotation is indicated from the initial «unclamped» position with the rod extended to the «clamped» position with the rod retracted, rod viewed from top.

Right = clockwise direction

Left = counter-clockwise direction

Standard angle of rotation : $90^\circ \pm 2^\circ$.

All angle of rotation values between 0° and 90° are available on request.



Determination of cylinder characteristics

The maximum forces are given for a pressure of 3500 psi. This pressure is only available if the shortest of the three available standard arms is used.

The max force (therefore the max pressure) decreases proportionally with the length of the arm : please see graphs on page 21.

The max flow also decreases with the inertia of the arm ; refer to the values indicated in the graphs for standard arms. Please contact us if you need special arms.

Maximum pressure / Standard clamping arm	
Maximum pressure	Type of arm
psi	
3500	Short arm ABC
2500	Medium arm ABM
1800	Long arm ABL

■ **Minimum active pressure : 400 psi**

The use of a double symmetric arm allows operation at 3626 psi, **but you must use the following formula :**

$$\text{Force (lbs)} / 2 = \text{Pressure (psi)} \times \text{Section (in}^2) \div 2$$

(**A** in table on page 20)

Examples :

$$\text{AP11 : } F/2 = P \times .37 \div 2 \quad \text{AP31 : } F/2 = P \times 1.46 \div 2$$

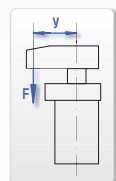
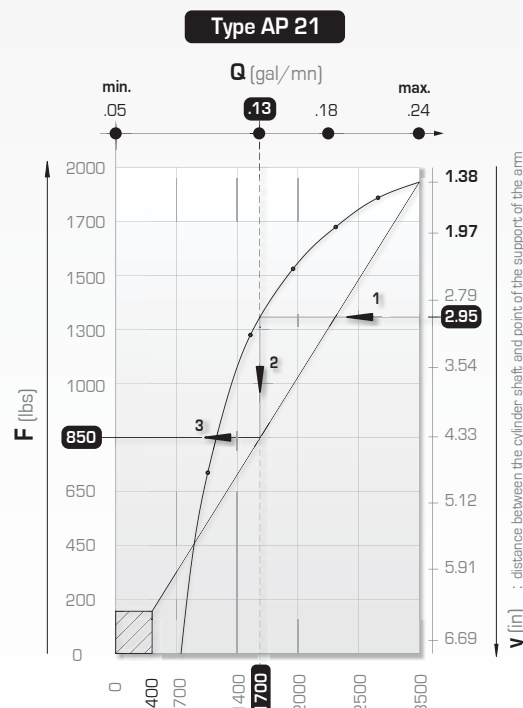
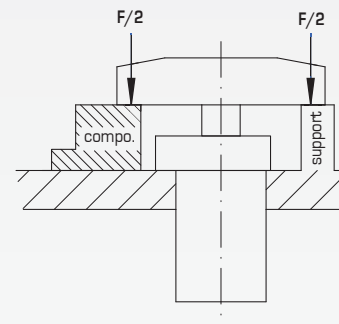
$$\text{AP21 : } F/2 = P \times .73 \div 2 \quad \text{AP41 : } F/2 = P \times 2.24 \div 2$$

Example of using diagrams

The diagram on the right indicates the maximum force developed by the cylinder and the max pressure for the type of arm used : **ABC**, **ABM**, or **ABL**. They also indicate the limit values of Q flow.

The **maximum force** developed by an **AP21** type cylinder with an **ABL 21 2.95 inch** long arm is **850 lbs** at **1700 psi** with **maximum Q flow of .13 gal/mn** per cylinder.

For the determination of special arm characteristics, please use the graphs on page 21



Active pressure

- minimum : **400 psi**
- maximum : **3500 psi** with short arms (see graphs)

Maximum temperature

- **158°F**
- for temperatures higher than 158°F please contact us

Important recommendations

F max at 5000 psi	Rod ød	Stroke	Max flow A	Swept volume A B	Direction of rotation	Type
lbs	in	in	gal/in	in ³		
8.50	.71	.31	2.69	.32 .45	right left	AP 11 DX AP 11 GX
A	B	C	D	E	F	

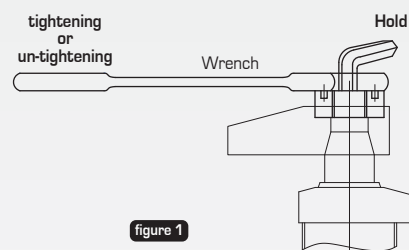


figure 1

A This value allows an initial approach to be made in selecting cylinder. Always ensure that you refer to the diagram of forces present on the cylinder page to specify the max force and pressure as a function of length «y» for the arm.

B The rod has a conical end and is threaded for fixing the clamping arm with braking. When locking the nut, **the rod must be prevented from rotating** in order to keep the internal mechanism from tightening.

There are two way of doing this :

- restrain the rod using a hex wrench (see **figure 1**)
- maintain the rod in a vice

C The indicated value corresponds to the max stroke of the cylinder. For clamping a component, the useful stroke is between the minimum and the maximum values indicated in the table of characteristics below.

D The max recommended flow will vary with the type of cylinder and inertia of the clamping arm. Refer to the table and if possible provide a nozzle or flow control valve in the distribution circuit. The flow must be multiplied by the number of cylinders operating at the same time : **Ensure that minimum flows are observed.**

E This is the volume of oil displaced during total stroke.

F Direction of rotation of the rod from the unclamped position to the clamped one. Rod viewed from above.

Characteristics

Please see opposite table.

WARNING

Opposite table is given for information purpose.

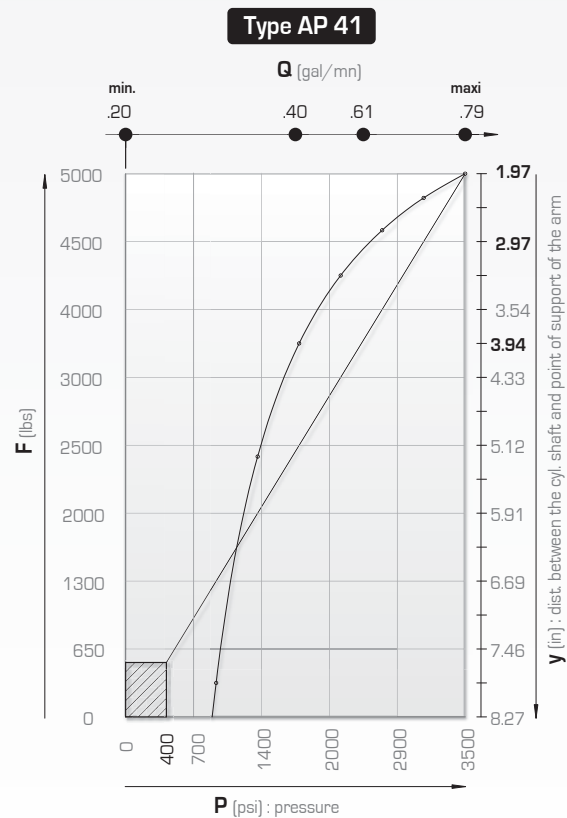
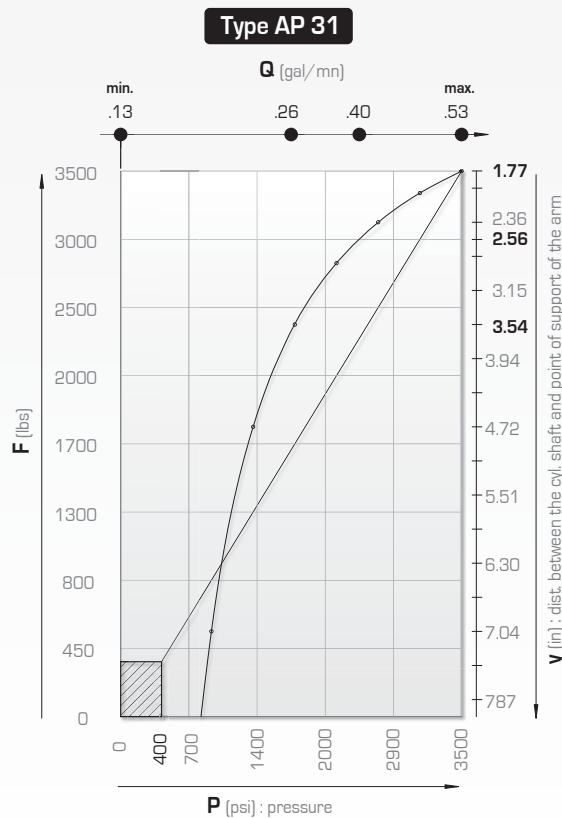
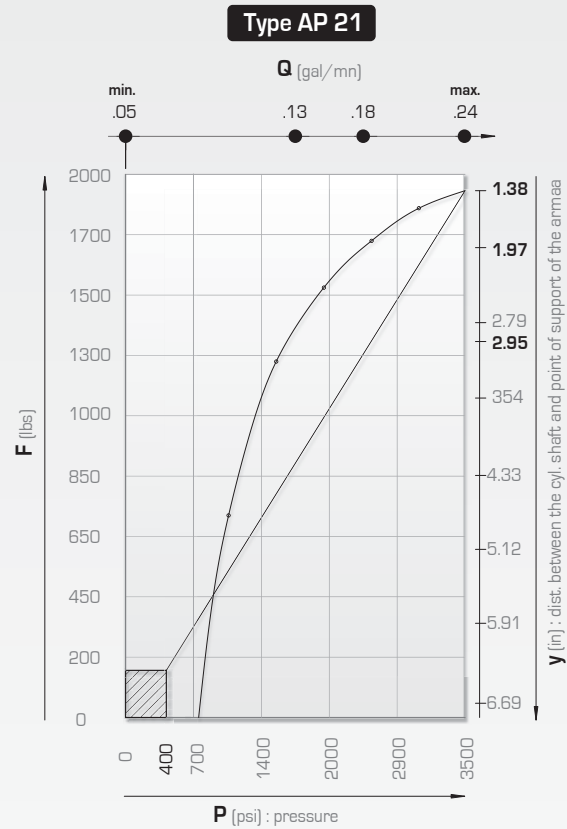
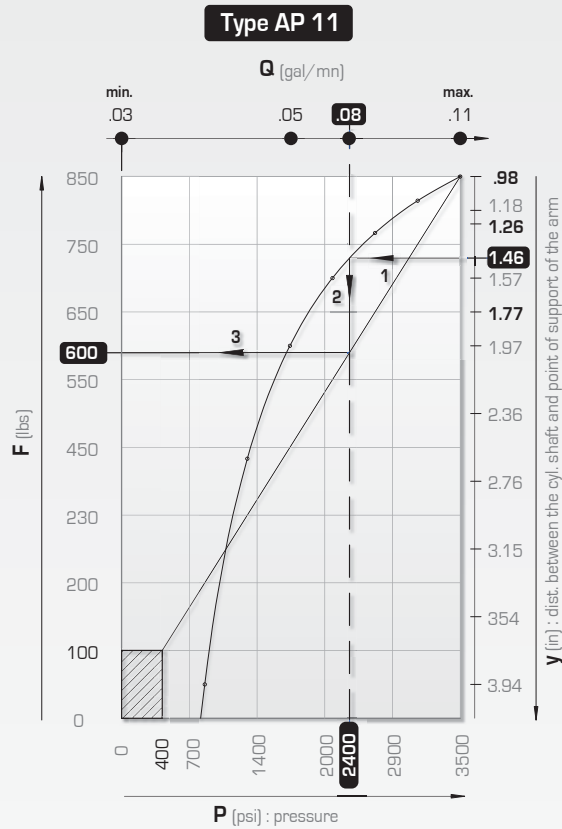
To determine actual forces, please use the graphs located on page 21 which **take the yield into account.**

A = clamping B = release		Unit	P11	P21	P31	P41
Section	A	in ²	.37	.73	1.46	2.24
	B		.76	1.49	3.04	4.39
Oil volume	A	in ³	.32	.92	2.50	4.52
	B		.45	1.29	3.23	5.31
Flow	A	gal/ mn	.11	.24	.53	.79
	B		.03	.05	.13	.20
Cycle period	A	s	0.75	1	1.2	1.5
	B		1.1	1.4	1.6	1.8
Stroke	max.	in	.24	.39	.39	.39
	min.		.08	.12	.12	.12

Swing clamps characteristics

Definition of the special arms

Graphs



These graphs take the cylinder yield into account

Swing clamps
with planar rotation

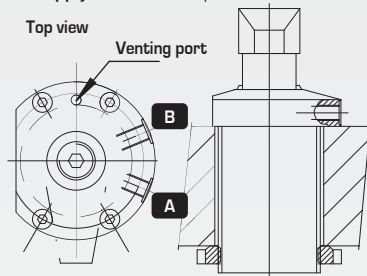
Examples of mounting

Double acting swing clamp - 3500 psi

Types AP, APT, APBF, APF, APL, APS, APLF, APBF, APCB and APCV

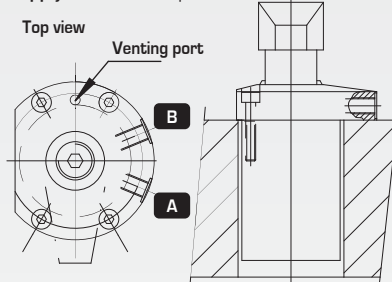
Type AP

Mounting : threaded body
Oil supply : threaded port



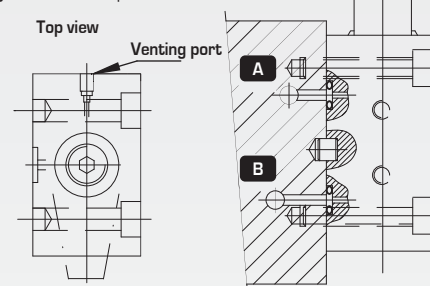
Type APT

Mounting : 4 bolts on top flange
Oil supply : threaded ports



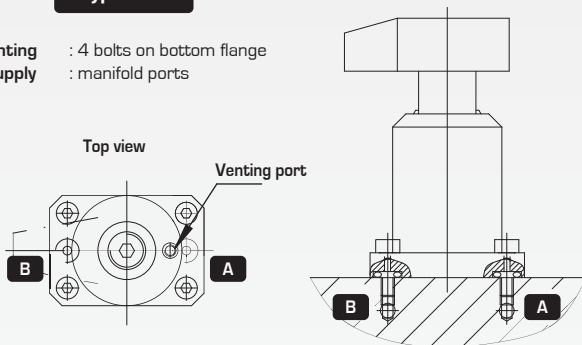
Type APBF

Mounting : 4 bolts on body
Oil supply : manifold ports



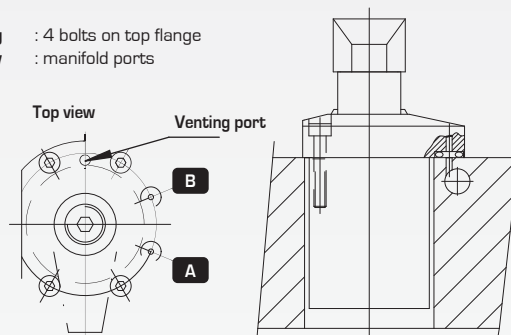
Type APF

Mounting : 4 bolts on bottom flange
Oil supply : manifold ports



Type APL

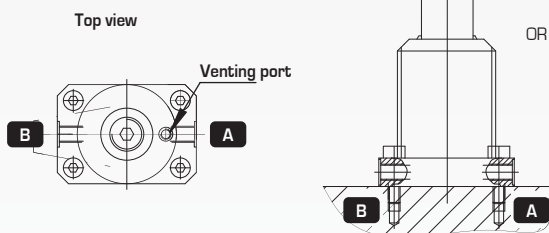
Mounting : 4 bolts on top flange
Oil supply : manifold ports



Type APS

Mounting : threaded body or 4 bolts on bottom flange
Oil supply : threaded ports

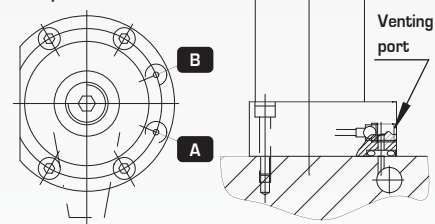
Top view



Type APLF

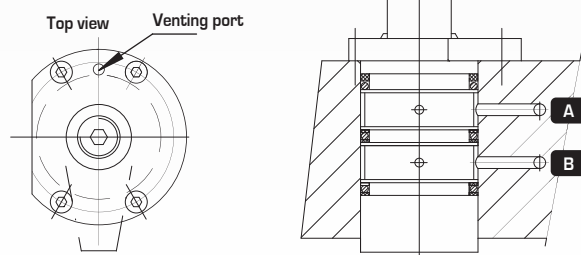
Mounting : 4 bolts on bottom flange
Oil supply : manifold ports

Top view



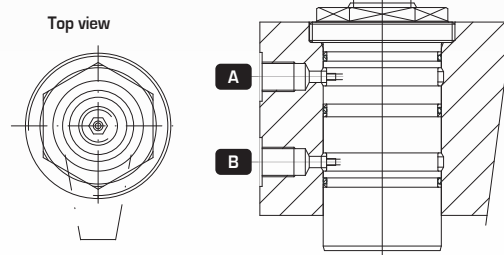
Type APCB

Mounting : 4 bolts on top flange
Oil supply : cartridge type manifold mount



Type APCV

Mounting : threaded body
Oil supply : cartridge type manifold mount



Swing clamp : AP

Double acting - Rotation in a plane
Max force at 3500 : 850 to 5000 lbs

Oil supplied by threaded ports

Mounted between locking nut on the threaded body and top flange

Characteristics

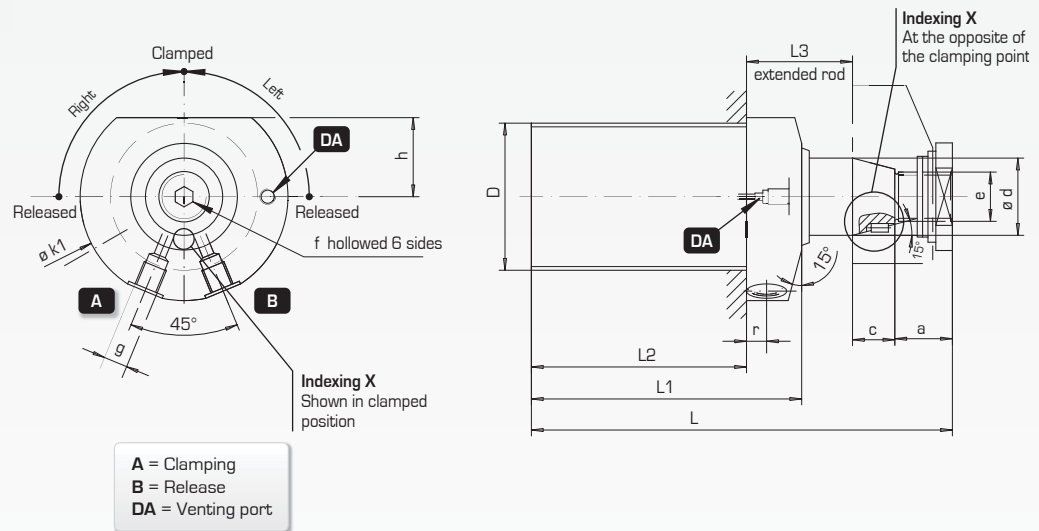
- rotation in a plane left or right $90^\circ \pm 2^\circ$
- index on the rod
- venting ports
- for machining of indexing on the clamping arm see pages 69 to 71

Options

- clamping arm : see accessories heading
- rotation 60° , 45° or 0° on request

Note

Cylinders are supplied with locking nut and lock washer [dimensions and torques : see page 72].



Definition of forces as function of clamping arm : see page 21

Important recommendations : see page 20

NON-INDEXED : the pin may be removed using a pin punch

F max at 3500 psi	Rod ød	Stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions												
							a	c	D	e	f key	g	h	øk1	L	L1	L2	L3	r
kN lbs	mm in	mm in	l/min gal/min	cm² in²			mm in	mm in			mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm
4 850	18 .71	8 .31	0.4 .11	5.3 .32 7.4 .45	right left	AP 11 DX AP 11 GX	13 .51	10 .39	M36 x 1.5	M12 x 1.5	5 .20	G1/8"	20 .79	58 2.28	121 4.76	88 3.46	66 2.60	32 1.26	8 .31
8 1750	25 .98	12 .47	0.9 .24	15 .92 21 1.28	right left	AP 21 DX AP 21 GX	16 .63	14 .55	M52 x 1.5	M16 x 1.5	6 .24	G1/4"	28 1.10	76 2.99	152 5.98	107 4.21	81 3.19	41 1.61	11 .43
16 3500	36 1.42	12 .47	2.0 .53	41 2.50 53 3.23	right left	AP 31 DX AP 31 GX	18 .71	20 .79	M72 x 2	M24 x 1.5	10 .39	G1/4"	38 1.50	110 4.33	195 7.68	142 5.59	114 4.49	43 1.69	11 .43
24 5000	42 1.65	12 .47	3.0 .79	74 4.52 88 5.37	right left	AP 41 DX AP 41 GX	20 .79	22 .87	M85 x 2	M30 x 1.5	12 .47	G1/4"	45 1.77	125 4.92	218 8.58	161 6.34	131 5.16	45 1.77	12 .47

Swing clamp : APT

Double acting - Rotation in a plane
Max force at 3500 : 850 to 5000 lbs

Oil supplied by BSPP threaded ports
Mounted by 4 bolts on top flange

Characteristics

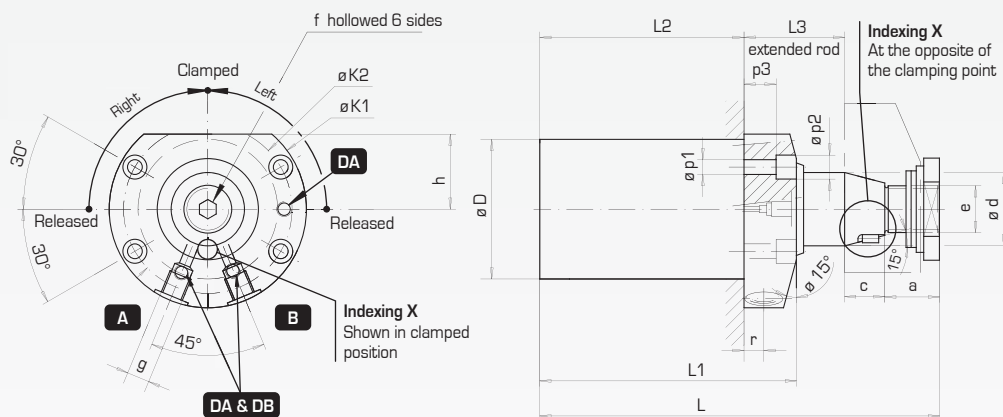
- rotation in a plane left or right $90^\circ \pm 2^\circ$
- index on the rod
- venting ports
- for machining of indexing on the clamping arm
see pages 69 to 71

Options

- clamping arm : see accessories heading
- rotation 60° , 45° or 0° on request

Note

Cylinders are supplied with locking nut and lock washer
[dimensions and torques : see page 72].



A = Clamping
B = Release
DA = Clamping venting ports for **APT11** & **APT21**
DA & DB = Venting ports for **APT31** & **APT41**

Definition of forces as function of clamping arm : see page 21

Important recommendations : see page 20

NON-INDEXED : the pin may be removed using a pin punch

F max at 3500 psi	Rod ød	Stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions															
							a	c	øD 0 -0.2	e	f	g	h	øk1 øk2	L	L1	L2	L3	p1	p2	p3	r
kN lbs	mm in	mm in	l/min gal/min	cm ² in ²			mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in
4 850	18 .71	8 .31	0.4 .11	5.3 .32 7.4 .45	right left	APT 11 DX APT 11 GX	13 .51	10 .39	36 1.42	M12 x 1.5	5 .20	G1/8"	20 .79	58 2.28 47 1.85	121 4.76	88 3.46	66 2.60	32 1.26	5.5 22	9.0 .35	13 .51	8 .31
8 1700	25 .98	12 .47	0.9 .24	15 .92 21 1.28	right left	APT 21 DX APT 21 GX	16 .63	14 .55	52 2.05	M16 x 1.5	6 .24	G1/4"	28 1.10	76 2.99 63 2.48	152 5.98	107 4.21	81 3.19	41 1.61	6.5 26	10.5 41	16 .63	11 .43
16 3500	36 1.42	12 .47	2.0 .53	41 2.50 53 3.23	right left	APT 31 DX APT 31 GX	18 .71	20 .79	72 2.83	M24 x 1.5	10 .39	G1/4"	38 1.50	110 4.33 90 3.54	195 7.68	142 5.59	114 4.49	43 1.69	10.5 41	17.0 67	11 .43	11 .43
24 5000	42 1.65	12 .47	3.0 .79	74 4.52 88 5.37	right left	APT 41 DX APT 41 GX	20 .79	22 .87	85 3.35	M30 x 1.5	12 .47	G1/4"	45 1.77	125 4.92 105 4.13	218 8.58	161 6.34	131 5.16	45 1.77	10.5 41	17.0 67	12 .47	12 .47

Swing clamp : APF

Double acting - Rotation in a plane
Max force at 3500 : 850 to 5000 lbs

Oil supplied by manifold ports
Mounted by 4 bolts on bottom flange

Characteristics

- rotation in a plane left or right $90^\circ \pm 2^\circ$
- index on the rod
- venting ports
- standard and long strokes
- for machining of indexing on the clamping arm
see pages 69 to 71

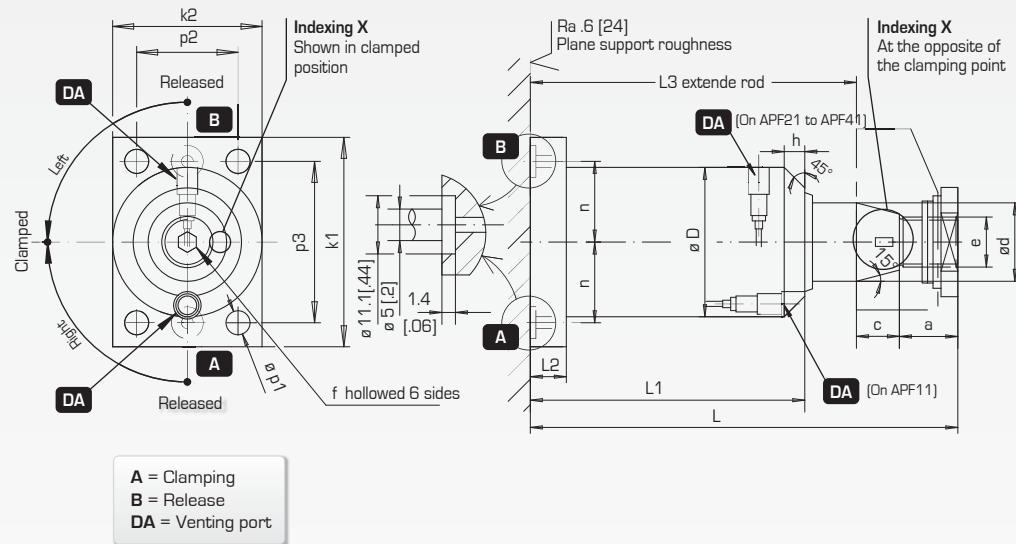
Options

- nozzle on counter-bores port
- clamping arm : see accessories heading
- rotation 60° , 45° or 0° on request

Note

Cylinders are supplied with locking nut and lock washer
(dimensions and torques : see page 72).

Seals : O-ring 7.65 x 1.78 - 90 NBR



Definition of forces as function of clamping arm : see page 21

Important recommendations : see page 20

NON-INDEXED : the pin may be removed using a pin punch

F max at 3500 psi	Rod ød	Stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions														
							a	c	aD	e	f	h	k1 k2	L	L1	L2	L3	n	p1	p2	p3
							key														
kN lbs	mm in	mm in	l/mm gal/min	cm ² in ²			mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	
4 850	18 .71	8 .31	0.4 .11	5.3 .32	right	APF 11 DX	13 .51	10 .39	45 1.77	M12 x 1.5	5 .20	6 .24	65 2.56	121 4.76	88 3.46	22 .87	98 3.86	24 .94	6.5 .26	30 1.18	50 1.97
				7.4 .45	right	APF 11 GX															
				7.3 .45	right	APF 11 DX C15															
				10.9 .67	left	APF 11 GX C15															
8 1700	25 .98	12 .47	0.9 .24	15 .92	right	APF 21 DX	16 .63	14 .55	60 2.36	M16 x 1.5	6 .24	8 .31	85 3.35	152 5.98	107 4.21	22 .87	122 4.80	32 1.26	8.5 .33	44 1.73	65 2.56
				21 1.28	right	APF 21 GX															
				20.2 1.23	right	APF 21 DX C25															
				32.5 1.98	left	APF 21 GX C25															
16 3500	36 1.42	12 .47	2.0 .53	41 2.50	right	APF 31 DX	18 .71	20 .79	80 3.15	M24 x 1.5	10 .39	12 .47	110 4.33	195 7.68	142 5.59	25 .98	157 6.18	43 1.69	13.0 51	60 2.36	86 3.39
				53 3.23	right	APF 31 GX															
				52.3 3.19	right	APF 31 DX C25															
				77.7 4.74	left	APF 31 GX C25															
24 5000	42 1.65	12 .47	3.0 .79	74 4.52	right	APF 41 DX	20 .79	22 .87	95 3.74	M30 x 1.5	12 .47	16 .63	120 4.72	218 8.58	161 6.34	25 .98	176 6.93	50 1.97	15 59	70 2.76	96 3.78
				88 5.37	left	APF 41 GX															

Swing clamp : APS

Double acting - Rotation in a plane
Max force at 3500 : 850 to 5000 lbs

Oil supplied through BSPP threaded ports
Mounted by either locking nut on the threaded body and lower flange or 4 bolts on bottom flange

Characteristics

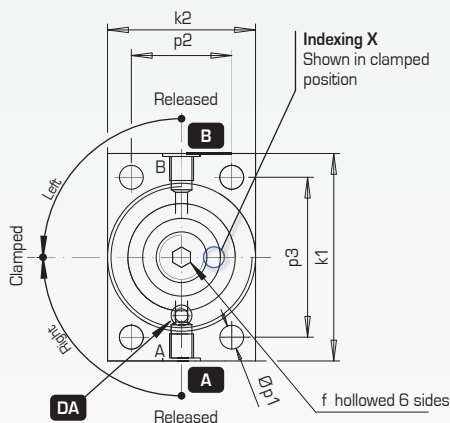
- rotation in a plane left or right $90^\circ \pm 2^\circ$
- index on the rod
- venting ports
- for machining of indexing on the clamping arm see pages 69 to 71

Options

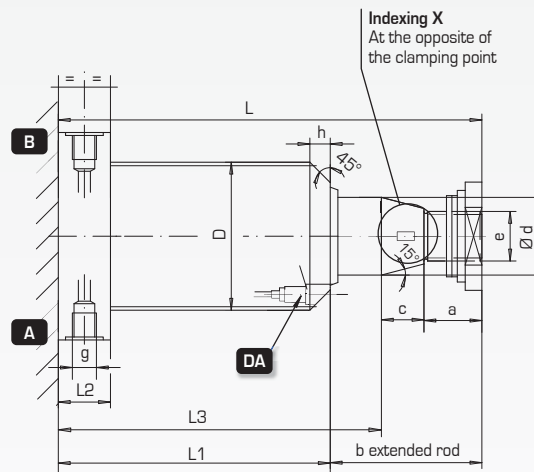
- clamping arm : see accessories heading
- rotation 60° , 45° or 0° on request

Note

Cylinders are supplied with locking nut and lock washer [dimensions and torques : see page 72].



A = Clamping
B = Released
DA = Venting port



Definition of forces as function of clamping arm : see page 21

Important recommendations : see page 20

NON-INDEXED : the pin may be removed using a pin punch

F max at 3626 psi	Rod ød	Stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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kN	lbs	mm	in	l/min	gal/min	cm²	in²																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		

Swing clamp : APL

Double acting - Rotation in a plane
Max force at 3500 : 850 to 5000 lbs

Oil supplied by manifold ports
Mounted by 4 bolts on top flange

Characteristics

- rotation in a plane left or right $90^\circ \pm 2^\circ$
- index on the rod
- venting ports
- standard and long strokes
- for machining of indexing on the clamping arm see pages 69 to 71

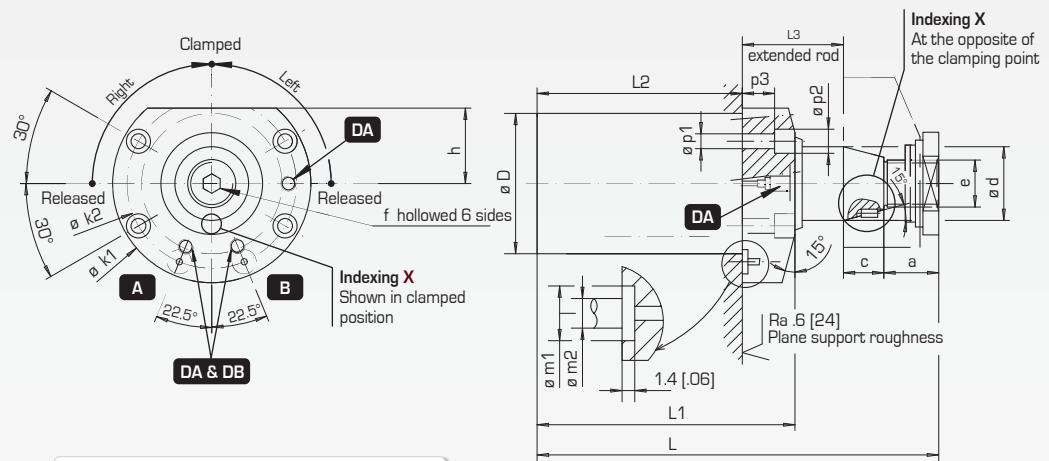
Options

- nozzle on counter-bores port
- clamping arm : see accessories heading
- rotation 60° , 45° or 0° on request

Note

Cylinders are supplied with O-ring seals, locking nut and lock-washer (dimensions and torques : see page 72).

Seals : O-ring 5.28 x 1.78 for APL11 and APL21 90 NBR
O-ring 7.65 x 1.78 for APL31 and APL41 90 NBR



A = Clamping
B = Release
DA = Clamping venting port for APL11 & APL21
DA & DB = Venting port for APL31 & APL41

Definition of forces as function of clamping arm : see page 21

Important recommendations : see page 20

NON-INDEXED : the pin may be removed using a pin punch

F max at 3500 psi	Rod ød	Stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions															
a	c	øD 0 -0.2	e	f	h	øk1 øk2	L	L1	L2	L3	m1 m2	p1	p2	p3								
kN lbs	mm in	mm in	l/min gal/min	cm² in²			mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in			
4 850	18 .71	8 .31	0.4 .11	5.3 .32	right	APL 11 DX	13 .51	10 .39	36 1.417	M12 x 1.5	5 2.0	20 .79	58 2.28	121 4.76	88 3.46	66 2.60	32 1.26	8.8 .35	5.5 .22	9.0 .35	13 .51	
		7.4 .45		right	APL 11 GX	47 1.85							142 5.59	102 4.02	80 3.15	39 1.54	4.0 .16					
		7.3 .45		right	APL 11 DX C15																	
		10.9 .67		left	APL 11 GX C15																	
8 1700	25 .98	12 .47	0.9 .24	15 .92	right	APL 21 DX	16 .63	14 .55	52 2.047	M16 x 1.5	6 2.4	28 1.10	76 2.99	152 5.98	107 4.21	81 3.19	41 1.61	8.8 .35	6.5 .26	10.5 .41	16 .63	
		21 1.28		right	APL 21 GX	63 2.48							189 7.44	133 5.24	107 4.21	54 2.13	4.0 .16					
		20.2 1.23		right	APL 21 DX C25																	
		32.5 1.98		left	APL 21 GX C25																	
16 3500	36 1.42	12 .47	2 .53	41 2.50	right	APL 31 DX	18 .71	20 .79	72 2.835	M24 x 1.5	10 .39	38 1.50	110 4.33	195 7.68	142 5.59	114 4.49	43 1.69	11.1 .44	10.5 .41	17.0 .67	11 .43	
		53 3.23		right	APL 31 GX	90 3.54							234 9.21	168 6.61	140 5.51	141 5.55	5.0 .20					
		52.3 3.19		right	APL 31 DX C25																	
		77.7 4.74		left	APL 31 GX C25																	
24 5000	42 1.65	12 .47	3 .79	74 4.52	right	APL 41 DX	20 .79	22 .87	85 3.346	M30 x 1.5	12 .47	45 1.77	125 4.92	218 8.58	161 6.34	131 5.18	45 1.77	11.1 .44	10.5 .41	17.0 .67	12 .47	
		88 5.37		right	APL 41 GX	105 4.13							257 10.12	187 7.36	157 6.18	58 2.28	5.0 .20					
		74 4.52		right	APL 41 DX C25																	
		88 4.52		left	APL 41 GX C25																	

Swing clamp : APLF

Double acting - Rotation in a plane
Max force at 3500 : 850 to 5000 lbs

Oil supplied by manifold ports
Mounted by 4 bolts on bottom flange

Characteristics

- rotation in a plane left or right $90^\circ \pm 2^\circ$
- index on the rod
- venting ports
- for machining of indexing on the clamping arm
see pages 69 to 71

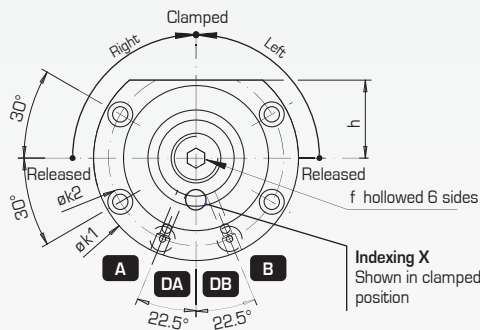
Options

- nozzle on counter-bores port
- clamping arm : see accessories heading
- rotation 60° , 45° or 0° on request

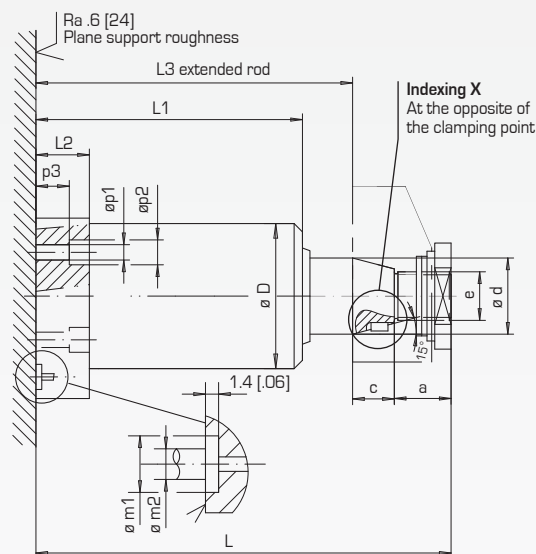
Note

Cylinders are supplied with o-ring seals, locking nut and lock-washer (dimensions and torques : see page 72).

Seals : O-ring 5.28 x 1.78 for
APLF11 and APLF21 - 90 NBR
O-ring 7.65 x 1.78 for
APLF31 and APLF41 - 90 NBR



A = Clamping
B = Release
DA = Clamping venting port
DB = Release venting port



Definition of forces as function of clamping arm : see page 21

Important recommendations : see page 20

NON-INDEXED : the pin may be removed using a pin punch

F max at 3500 psi	Rod ød	Stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions															
							a	c	øD 0 0.2	e	f key	h	øk1 øk2	L	L1	L2	L3	m1	m2	p1	p2	p3
							mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in
4 850	18 .71	8 .31	0.4 .11	5.3 .32 7.4 .45	right left	APLF 11 DX APLF 11 GX	13 .51	10 .39	36 1.42	M12 x 1.5	5 20	20 .79	58 2.28 47 1.85	121 4.76	88 3.46	40 1.57	98 3.86	8.8 .35	4 .16	5.5 22	9.0 .35	35 1.38
8 1700	25 .98	12 .47	0.9 .24	15 .92 21 1.28	right left	APLF 21 DX APLF 21 GX	16 .63	14 .55	52 2.05	M16 x 1.5	6 24	28 1.10	76 2.99 63 2.48	152 5.98	107 4.21	50 1.97	122 4.80	8.8 .35	4 .16	6.5 26	10.5 41	44 1.73
16 3500	36 1.42	12 .47	2.0 .53	41 2.50 53 3.23	right left	APLF 31 DX APLF 31 GX	18 .71	20 .79	72 2.83	M24 x 1.5	10 .39	38 1.50	110 4.33 90 3.54	195 7.68	142 5.59	58 2.28	157 6.18	11.1 .44	5 20	10.5 41	17.0 67	48 1.89
24 5000	42 1.65	12 .47	3.0 .79	74 4.52 88 5.37	right left	APLF 41 DX APLF 41 GX	20 .79	22 .87	85 3.35	M30 x 1.5	12 47	45 1.77	125 4.92 105 4.13	218 8.58	161 6.34	65 2.56	176 6.93	11.1 .44	5 20	10.5 41	17.0 67	55 2.17

Swing clamp : APBF

Double acting - Rotation in a plane

Max force at 3500 : 850 to 5000 lbs

Oil supplied by manifold port
Mounted by 4 bolts on the body

Characteristics

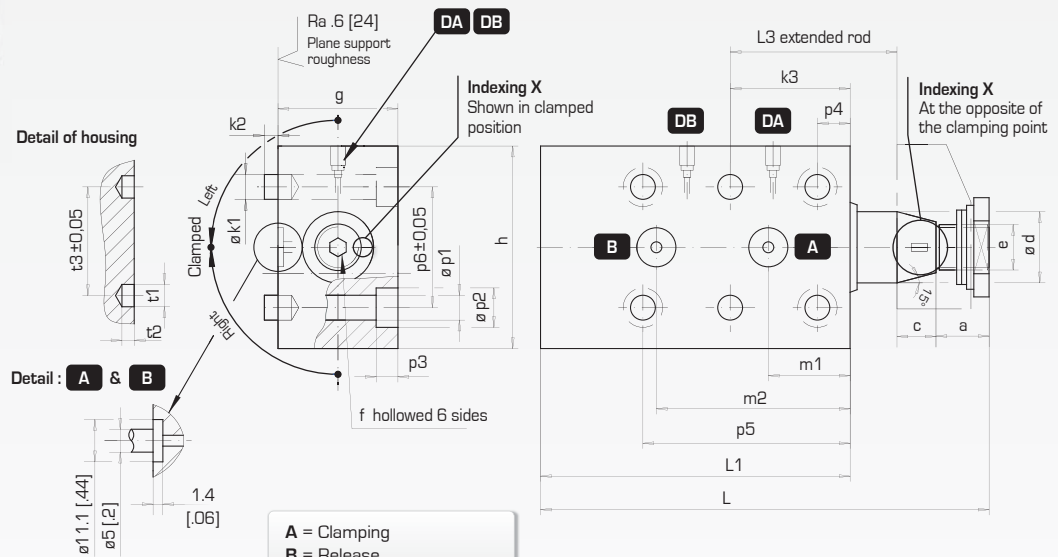
- rotation in a plane left or right $90^\circ \pm 2^\circ$
- index on the rod
- venting ports
- for machining of indexing on the clamping arm see pages 69 to 71

Options

- nozzle on counterbored manifold port
- clamping arm : see accessories heading
- rotation 60° , 45° or 0° on request

Note

Cylinders are supplied with o-ring seals, locking nut and lock-washer (dimensions and torques : see page 72).
Seals : O-ring 7.65 x 1.78 90 NBR



A = Clamping
B = Release
DA = Clamping venting port
DB = Release venting port

Definition of forces as function of clamping arm : see page 21

Important recommendations : see page 20

NON-INDEXED : the pin may be removed using a pin punch

F max at 3500 psi	Rod ød	Stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions														
							a	c	e	f	g	h	øk1 øk2 k3	L	L1	L3	m1	m2	p1 p2 p3	p4 p5 p6	t1 t2 t3
kN lbs	mm in	mm in	l/min gal/min	cm² in²			mm in	mm in		mm in	mm in	mm in	mm	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm
4 850	18 .71	8 .31	0.4 .11	5.3 .32	right	APBF 11 DX	13 .51	10 .39	M12 x 1.5	5 20	36 1.42	60 2.36	8.0 .315	121 4.76	88 3.46	48.5 1.91	24.5 .96	59.0 2.32	6.5 .26	10 .394	8 .315
					left	APBF 11 GX							4.0 .157						11.0 .43	67 2.638	4 .157
8 1700	25 .79	12 .47	0.9 .24	15 .92	right	APBF 21 DX	16 .63	14 .55	M16 x 1.5	6 .24	52 2.05	75 2.95	10.0 .394	152 5.98	107 4.21	59.5 2.34	28.0 1.10	68.5 2.70	8.5 .33	12 .472	10 .394
					left	APBF 21 GX							5.0 .197						14.0 .55	77 3.031	5 .197
16 3500	36 1.42	12 .47	2.0 .53	41 2.50	right	APBF 31 DX	18 .71	20 .79	M24 x 1.5	10 .39	72 2.83	96 3.78	14.0 .551	195 7.68	142 5.59	75 2.95	34.0 1.34	94.0 3.70	10.5 .41	15 .591	14 .551
					left	APBF 31 GX							7.0 .276						17.0 .67	105 4.134	7 .276
24 5000	42 1.65	12 .47	3.0 .79	74 4.52	right	APBF 41 DX	20 .79	22 .87	M30 x 1.5	12 .47	85 3.35	116 4.57	16.0 .630	218 8.58	161 6.34	85 3.35	40.0 1.57	107.0 4.21	13.0 .51	20 .787	16 .63
					left	APBF 41 GX							8.0 .315						20.0 .79	120 4.724	8 .315
													7.0 .276						13.0 .51	92 3.622	92 3.622

Swing clamp : APCB

Double acting - Rotation in a plane
Max force at 3500 : 850 to 5000 lbs

Oil supplied by Cartridge type manifold mount
Mounted by 4 bolts on top flange

Options

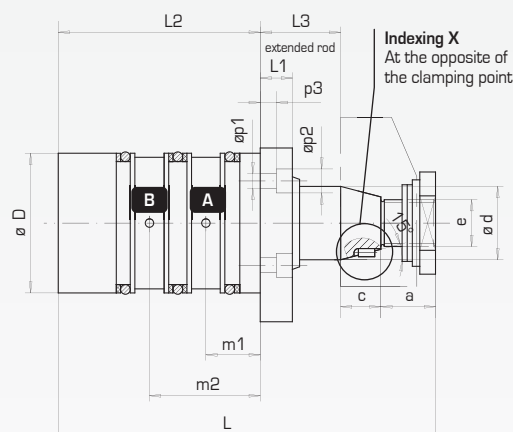
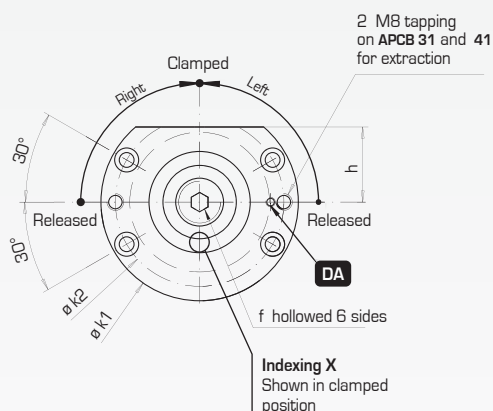
- clamping arm : see accessories heading
- rotation 60°, 45° or 0° on request

Characteristics

- rotation in a plane left or right 90°±2°
- index on the rod
- venting ports
- for machining of indexing on the clamping arm
see pages 69 to 71

Note

Cylinders are supplied with seals, locking nut and lock-washer
(dimensions and torques : see page 72).



A = Clamping
B = Release
DA = Clamping venting port only for APCB 31 and APCB 41 cylinders

■ Housing machining dimensions : see page 31

■ Definition of forces as function of clamping arm : see page 21

■ Important recommendations : see page 20

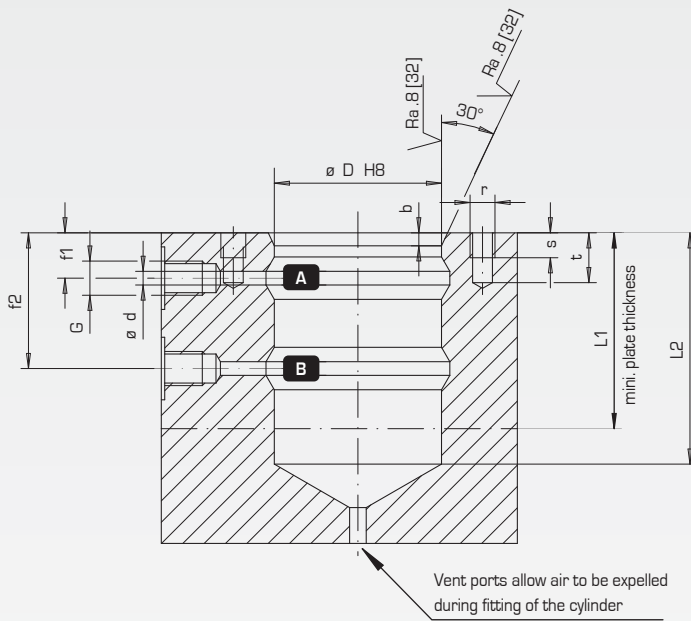
■ NON-INDEXED : the pin may be removed using a pin punch

F max at 3500 psi	Rod ød	Stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions															
							a	c	øD	e	f key	h	ak1 ak2	L	L1	L2	L3	m1	m2	p1	p2	p3
kN lbs	mm in	mm in	l/m gal/mm	cm ² in ²			mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	
4 850	18.71	8.31	0.4.11	53.32 74.45	right left	APCB 11 DX APCB 11 GX	13.51	10.39	36.142	M12 x 1.5	5.20	20.79	58.228 47.185	121.476	105.41	77.5.305	20.5.81	14.55	49.193	5.5.22	9.0.35	5.5.22
8 1700	25.98	12.47	0.9.24	15.92 21.128	right left	APCB 21 DX APCB 21 GX	16.63	14.55	52.205	M16 x 1.5	6.24	28.110	76.299 63.248	152.598	120.47	95.0.374	27.0.106	16.63	56.220	6.5.26	10.5.41	6.0.24
16 3500	36.142	12.47	2.0.53	41.250 53.323	right left	APCB 31 DX APCB 31 GX	18.71	20.79	72.283	M24 x 1.5	10.39	38.150	110.433 90.354	195.768	180.71	124.0.488	33.0.130	17.67	77.303	10.5.41	17.0.67	8.0.31
24 5000	42.165	12.47	3.0.79	74.452 88.537	right left	APCB 41 DX APCB 41 GX	20.79	22.87	85.335	M30 x 1.5	12.47	45.177	125.492 105.413	218.858	180.71	143.0.563	33.0.130	22.87	88.346	10.5.41	17.0.67	8.0.31

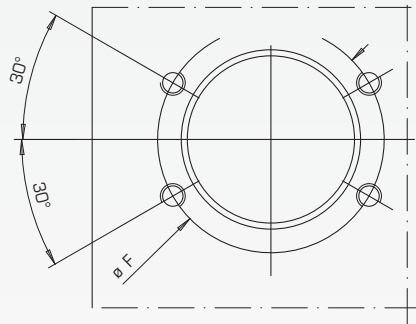
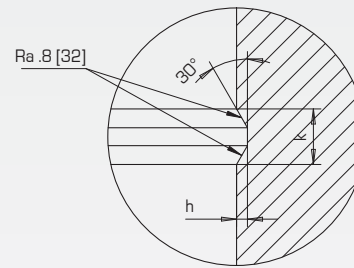
Housing : APCB

For PCB swing clamp cartridges
Machining dimensions - Example

Housing machining dimensions



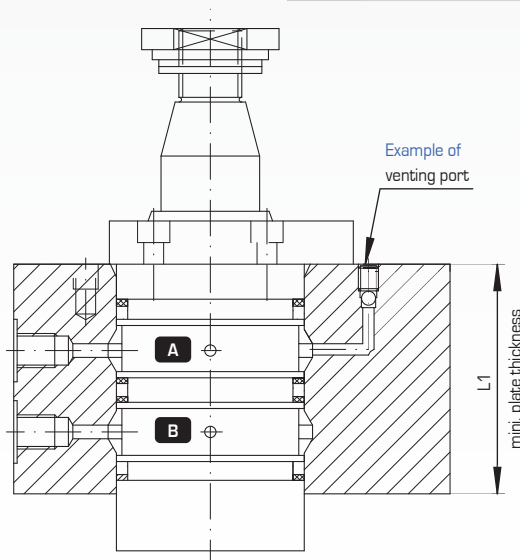
Detail of groove



IMPORTANT :

Allow for venting ports at highest points of assemblies
General tolerances Js13, please see reference on page 121
Round off and polish sharp angles

Example : Fitting through a plate



Type	Dimensions													
	øD H8	b	L1 min.	L2 min.	ød	øF	f1	f2	G	h min.	k	r	s	t
PCB 11	36	2	62	79	3	47	14	48.75	G1/4"	0.50	4	M5	8	10
	1.417	.08	2.44	3.11	.11	1.85	.55	1.92		.02	.16		.31	.39
PCB 21	52	3	70	97	4	63	16	56.00	G1/4"	1.00	6	M6	10	12
	2.047	.11	2.76	3.82	.16	2.48	.63	2.20		.04	.24		.39	.47
PCB 31	72	3	95	126	5	90	17	77.00	G1/4"	1.00	8	M10	14	17
	2.835	.11	3.74	4.96	.20	3.54	.67	3.03		.04	.31		.55	.67
PCB 41	85	4	106	145	5	105	22	88.00	G1/4"	1.25	10	M10	14	17
	3.346	.16	4.17	5.71	.20	4.13	.87	3.46		.05	.39		.55	.67

Swing clamp : APCV

Double acting - Rotation in a plane
Max force at 3500 : 850 to 1700 lbs

Oil supplied by cartridge type manifold mounting
Mounted by threaded body

Characteristics

- rotation in a plane left or right $90^\circ \pm 2^\circ$

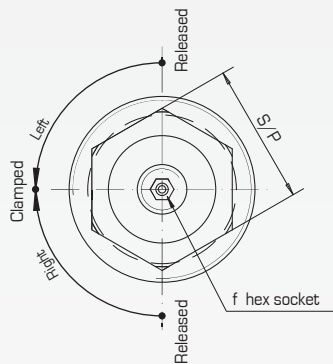
Options

- clamping arm : see accessories heading
- rotation 60° , 45° or 0° on request

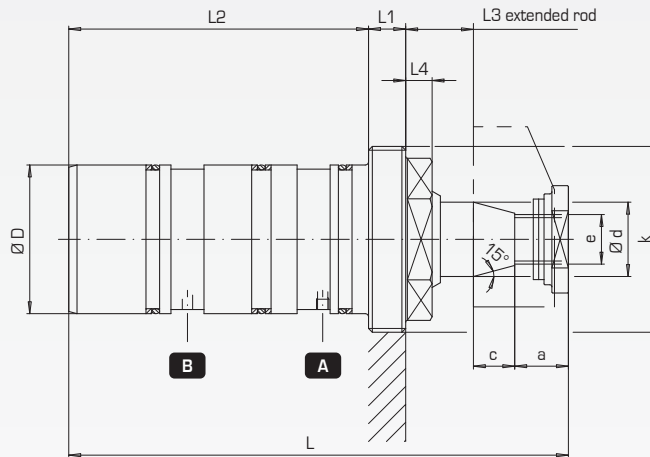
Note

Cylinders are supplied with seals, locking nut and lock-washer (dimensions and torques : see page 72).

■ Indexing of the arm on the rod is not possible.



A = Clamping
B = Release



■ Housing machining dimensions : see page 33

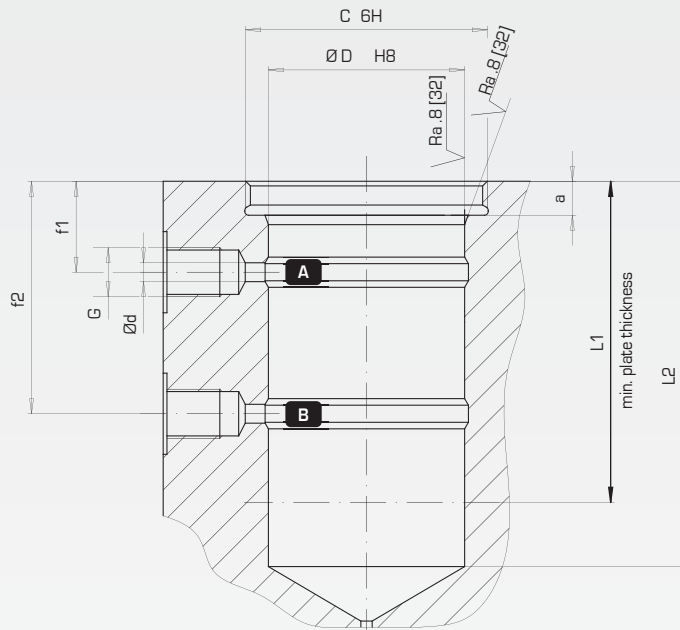
■ Definition of forces as function of clamping arm : see page 21
■ Important recommendations : see page 20

F max at 3500 psi	Rod ød	Stroke	Max flow A	Effective Area A B	Dir. of rota- tion	Type	Dimensions												
							a	c	øD	e	f	k	L	L1	L2	L3	L4	S/P	
							key												
kN lbs	mm in	mm in	l/mn gal/mn	cm ² in ³			mm in	mm in	mm in		mm in		mm in	mm in	mm in	mm in	mm in	mm in	
4 850	18 .71	8 .31	0.4 .11	5.3 .32 7.4 .45	right left	APCV 11 D APCV 11 G	13 .51	10 .39	36 1.42	M12 x 1.5	5 .20	M45 x 1.5-6g	121 4.76	9 .35	72.6 2.86	16.4 .65	6.4 .25	34 1.34	
8 1700	25 .98	12 .47	0.9 .24	15 .92 21 1.28	right left	APCV 21 D APCV 21 G	16 .63	14 .55	52 2.05	M16 x 1.5	6 .24	M64 x 2-6g	152 5.98	9 .35	91.6 3.61	21.4 .84	6.4 .25	50 1.97	

Housing : APCV

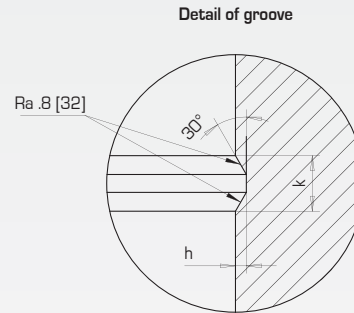
For APCV swing clamp cartridges
Machining dimensions - Example

Housing machining dimensions



Vent ports allow air to be expelled during fitting of the cylinder

A = Clamping
B = Release

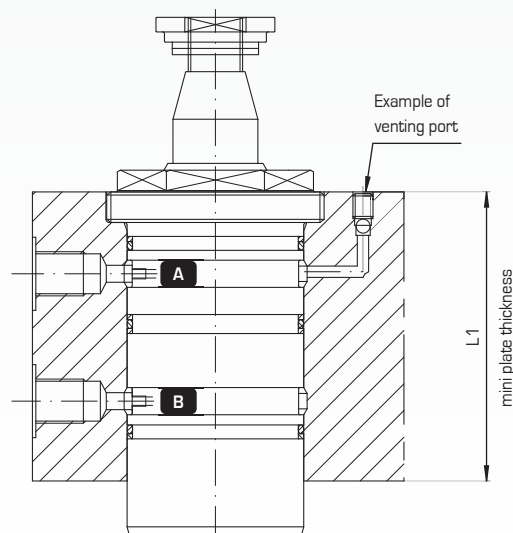


IMPORTANT :

Allow for venting ports at highest points of assemblies
General tolerances Js13, please see reference on page 121.
Round off and polish sharp angles

Type	Dimensions										
	øD H8	C H6	L1 min.	L2 min.	ød	a	f1	f2	G	h min.	k
	mm in		mm in	mm in	mm in	mm in	mm in	mm in		mm in	mm in
APCB 11	36 1.417	M45 x1.5	66 2.60	83 3.27	3 .12	9 .35	20.1 .79	52.85 2.08	G1/4"	1 .04	8 .31
APCB 21	52 2.047	M64 x 2	78 3.07	102 4.02	5 .20	9 .35	23.1 .91	61.60 2.43	G1/4"	1 .04	8 .31

Example : Fitting through a plate

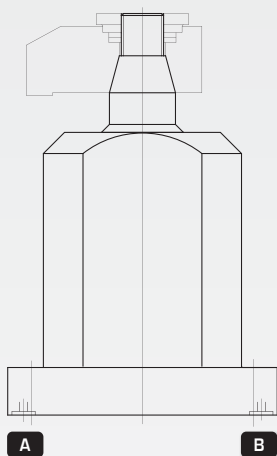


Examples of assembly : AP_26

Double acting swing clamps - 1450 psi

Types PS, PL, PF, PT and PLS

Type APF 26

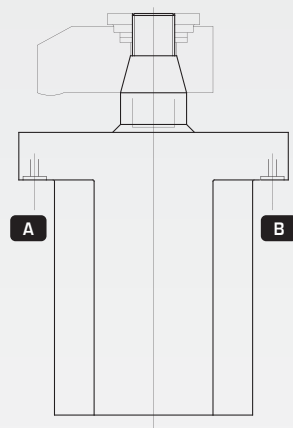


Mounting :
4 bolts on bottom flange

Supply :
manifold ports

See page : 37

Type APL 26

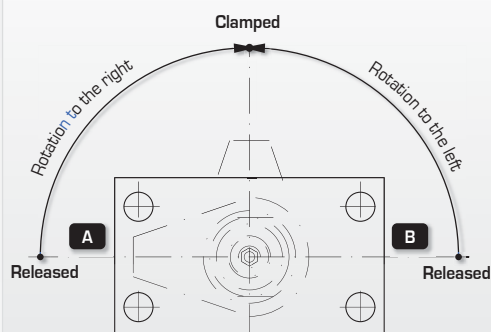


Mounting :
4 bolts on top flange

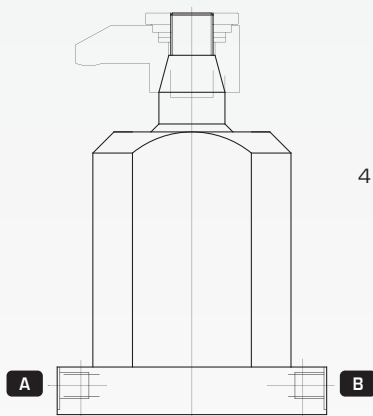
Supply :
manifold ports

See page : 35

**Layout drawing
common to models AP_26**



Type APS 26

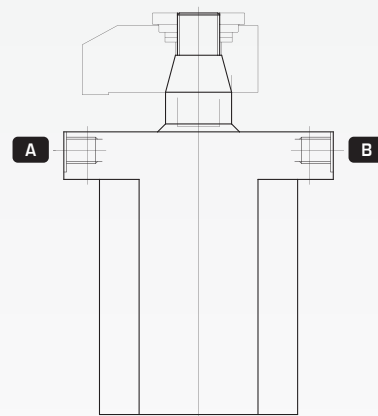


Mounting :
4 bolts on bottom flange

Supply :
Threaded ports

See page : 38

Type APT 26

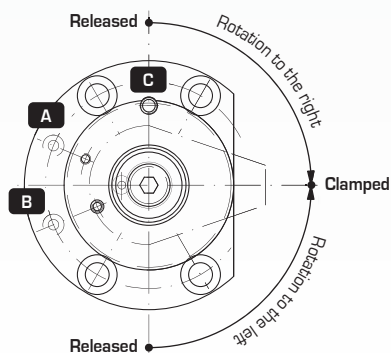
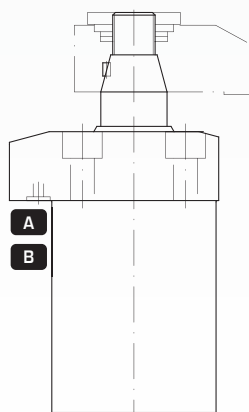


Mounting :
4 bolts
on top flange

Supply :
Threaded ports

See page : 36

Type APLS 26



Mounting :
4 bolts on top flange

Supply :
manifold ports

See page : 39

Max force at 1450 psi : 1700 lbs

Swing clamp : APT 26

Double acting - Rotation in a plane

Max force at 1450 psi : 1700 lbs

Oil supplied by BSPP threaded ports
Mounted by 4 bolts on top flange

Definition

These cylinders are used when pressure available is limited to 1450 psi and for restricted dimensions.

At 1450 psi, the APT26 develops 1700 lbs that is more than the AP31 (1300 lbs) which is of larger volume.

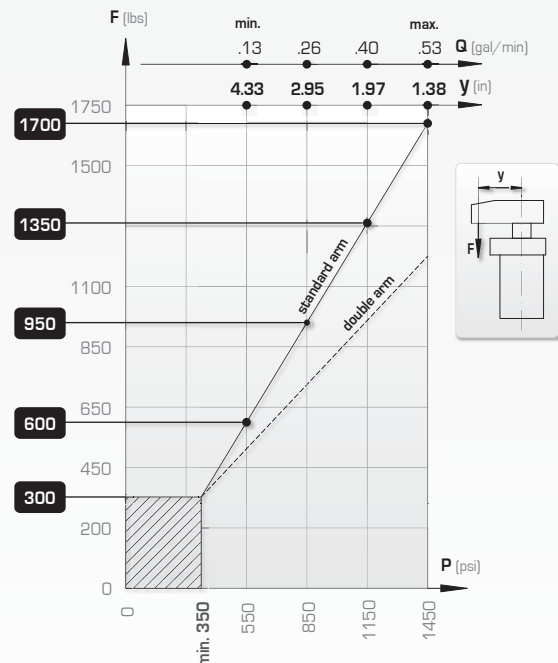
Options

- custom clamping arm
- rotation 60°, 45° or 0° on request
- X indexing of the rod (see page 73)



GRAPHS :

For recommendations : see page 18



Direction of rotation	Type	Indexing
right	APT 26 D	NO
left	APT 26 G	
right	APT 26 D X	YES
left	APT 26 G X	

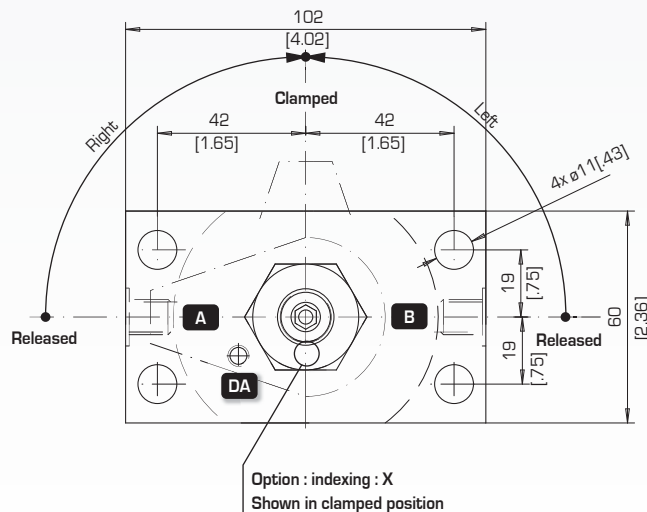
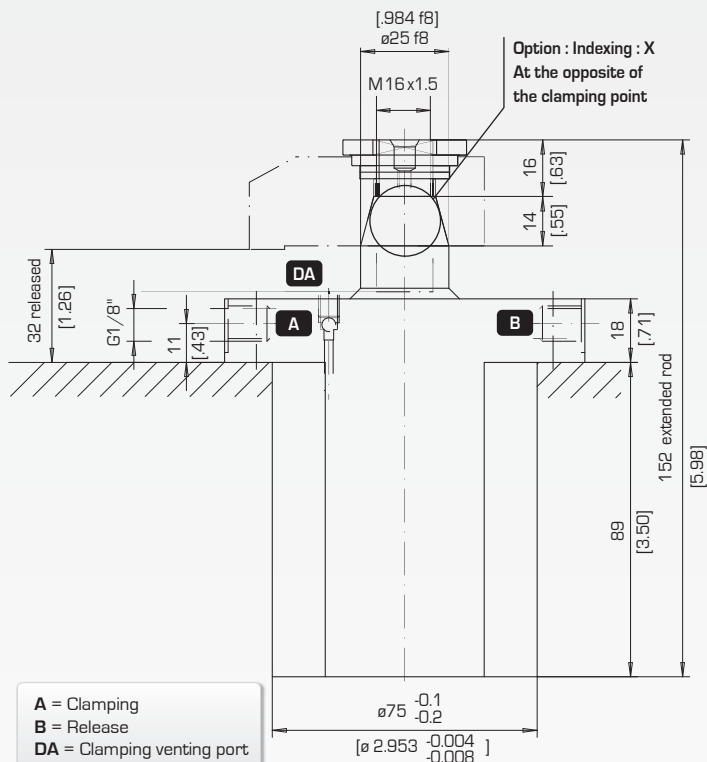
Characteristics

- rod treated to prevent seizure and corrosion
- rotation in plane left or right 90°±2°
- stroke .47 in
- **Body and base are treated against corrosion. Cylinders may be immersed in water for example for cast components pressurization applications.**

Note

Cylinders are supplied with seals, locking nut and lock-washer [dimensions and torques : see page 72].

Seals : O-ring 5.28 x 1.78



Swing clamp : APF 26

Double acting - Rotation in a plane

Max force at 1450 psi : 1700 lbs

Oil supplied by manifold ports

Mounted by 4 bolts on bottom flange

Definition

These cylinders are used when pressure available is limited to 1450 psi and for restricted dimensions.

At 1450 psi, the APF26 develops 1700 lbs that is more than the AP31 (1300 lbs) which is of larger volume.

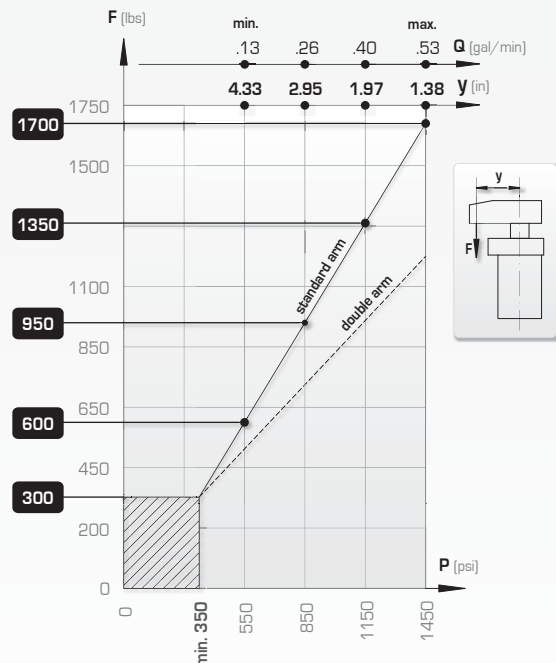
Options

- custom clamping arm
- rotation 60°, 45° or 0° on request
- **X** indexing of the rod (see page 73)



GRAPHS :

For recommendations : see page 18



Direction of rotation	Type	Indexing
right	APF 26 D	NO
left	APF 26 G	
right	APF 26 D X	YES
left	APF 26 G X	

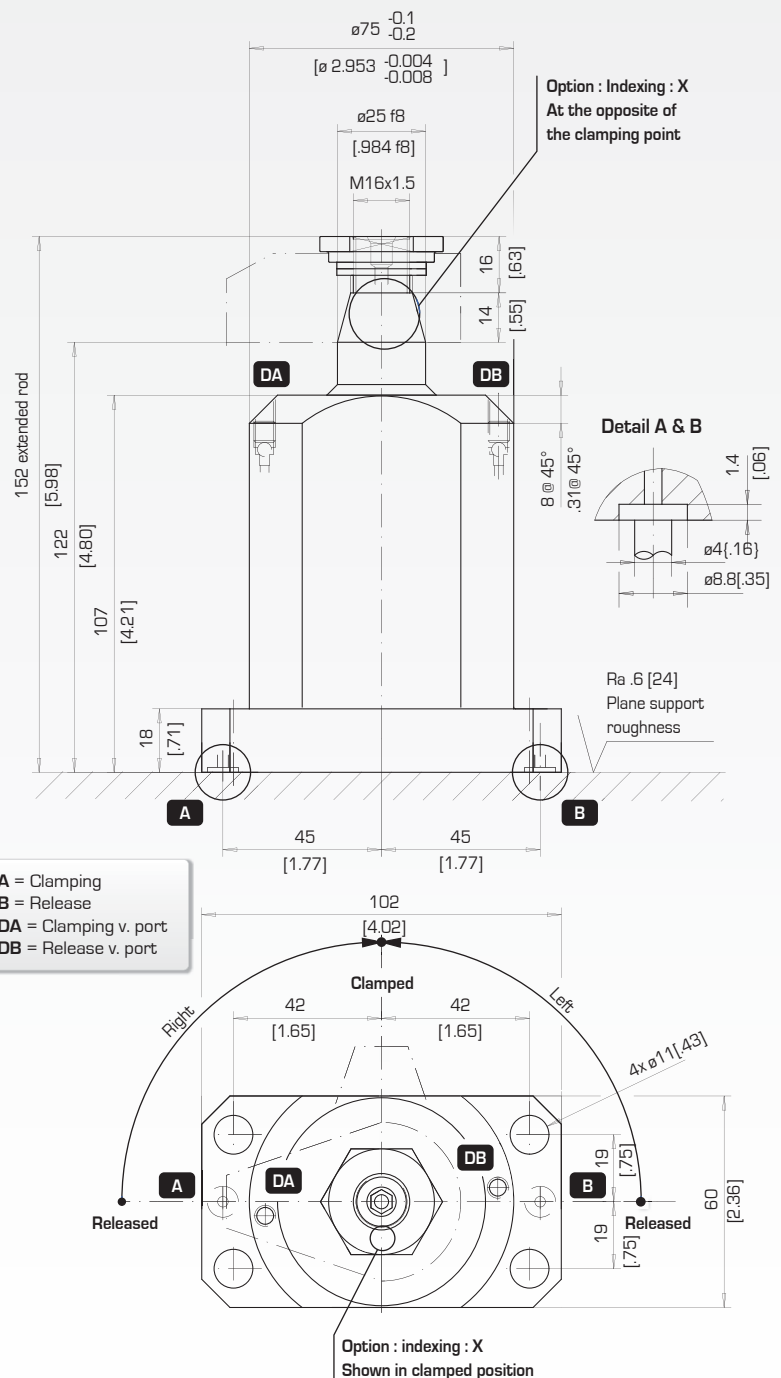
Characteristics

- rod treated to prevent seizure and corrosion
- rotation in plane left or right 90°±2°
- stroke .47 in
- **Body and base are treated against corrosion. Cylinders may be immersed in water for example for cast components pressurization applications.**

Note

Cylinders are supplied with seals, locking nut and lock-washer (dimensions and torques : see page 72).

Seals : O-ring 5.28 x 1.78



Swing clamp : APLS 26 X

Double acting - Rotation in a plane

Max force at 1450 psi : 1700 lbs

Oil supplied by manifold ports

Mounted by 4 bolts on top flange

Definition

These cylinders are used when pressure available is limited to 1450 psi and for restricted dimensions.

At 1450 psi, the APL26 develops 1700 lbs that is more than the AP31 (1300 lbs) which is of larger volume.

Options

- custom clamping arm
- rotation 60°, 45° or 0° on request
- **version for immersion is treated against corrosion**
- **X** indexing of the rod (see page 73)

Characteristics

- rod treated to prevent seizure and corrosion
- rotation in plane left or right 90°±2°
- stroke .47 inches
- **Body and base are treated against corrosion. Cylinders may be immersed in water for example for cast components pressurisation applications.**

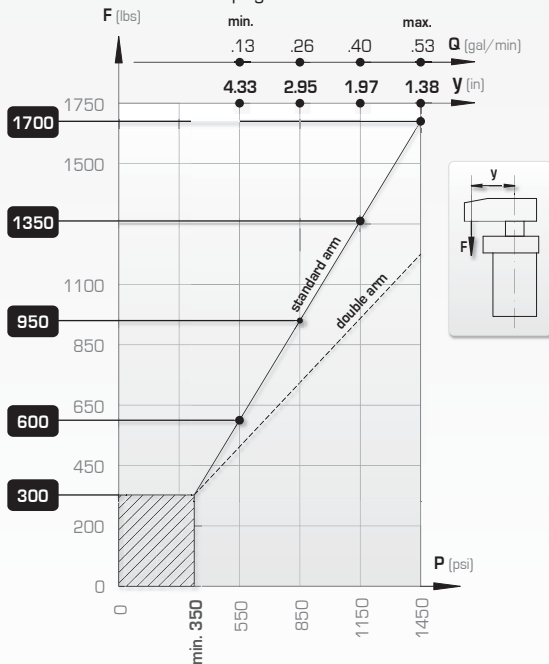
Note

Cylinders are supplied with seals, locking nut and lock-washer (dimensions and torques : see page 72).

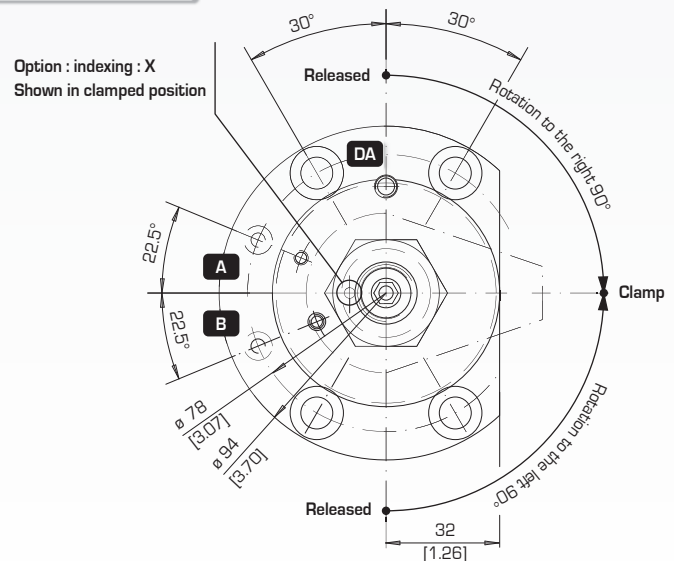
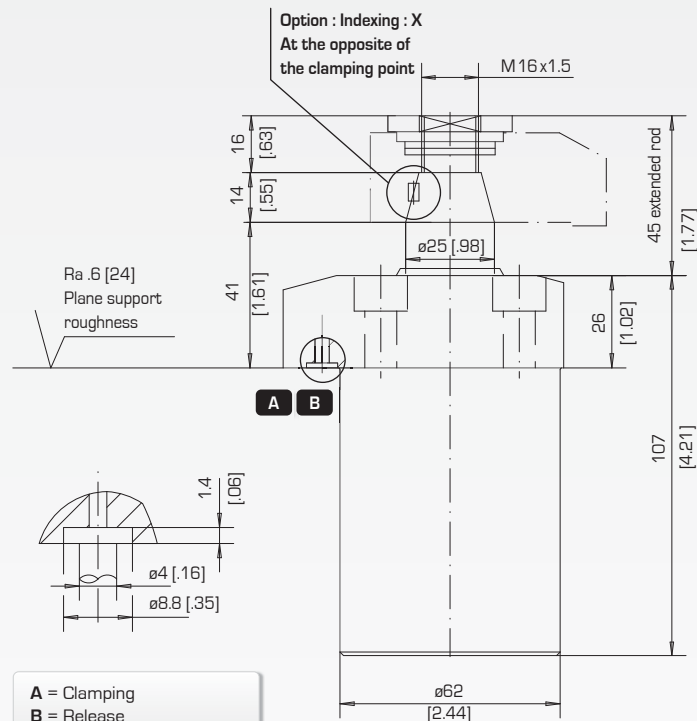
Seals : O-ring 5.28 x 1.78

GRAPHS :

For recommendations : see page 18



Direction of rotation	Type	Indexing
right	APLS 26 D X	YES
left	APLS 26 G X	



Swing clamps with helical rotation

Table of content

APL5	Double acting swing clamp - Flanged top - Oil supplied by manifold ports	047
APT5	Double acting swing clamp - Flanged top - Oil supplied by threaded ports	048
APF5	Double acting swing clamp - Flanged bottom - Oil supplied by manifold ports	049
APS5	Double acting swing clamp - Flanged bottom - Oil supplied by threaded ports	050
APCV5	Cartridge type swing clamp - Helical rotation - Flanged top - Oil supplied by manifold mount	051
AHL21	Double acting swing clamp - Flanged top - Oil supplied by manifold ports	053
AHL31	Double acting swing clamp - Flanged top - Oil supplied by manifold ports	053
AHLF21	Double acting swing clamp - Flanged bottom - Oil supplied by manifold ports	054
HLF31	Double acting swing clamp - Flanged bottom - Oil supplied by manifold ports	054

Swing clamp characteristics

Double acting
Helical rotation

General points

These swing clamps are designed to clear the working area to facilitate components loading and unloading operations. Designed for automated systems, they reduce non-productive time.

Construction

- all parts are in high-strength steel.
- rod protected anti-seizure and anti-corrosion treatment.
- the body is protected by an anti-corrosion treatment.

Advantages

- all our swing clamps include venting ports.
- easy removal of clamping arm.
- all cylinders include an index on the rod.

Operations

Clamping phase : Oil supplied from A

During the pressurization of the cylinder, the piston rod pivots downward along a helical path followed by a linear clamping movement. The total stroke and the linear clamping stroke are indicated on technical data sheet specific to each type of cylinder.

Release phase : Oil supplied from B

Supply through the release port item B causes upward movement of the piston rod, followed by a helical pivoting movement to find the original position.

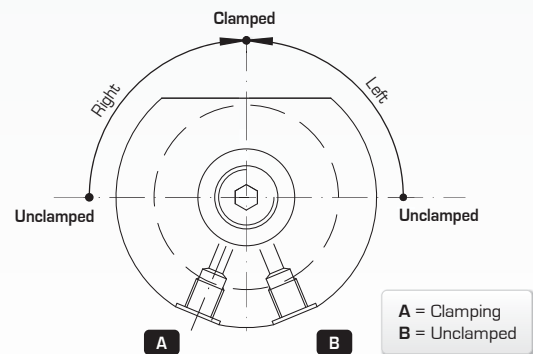
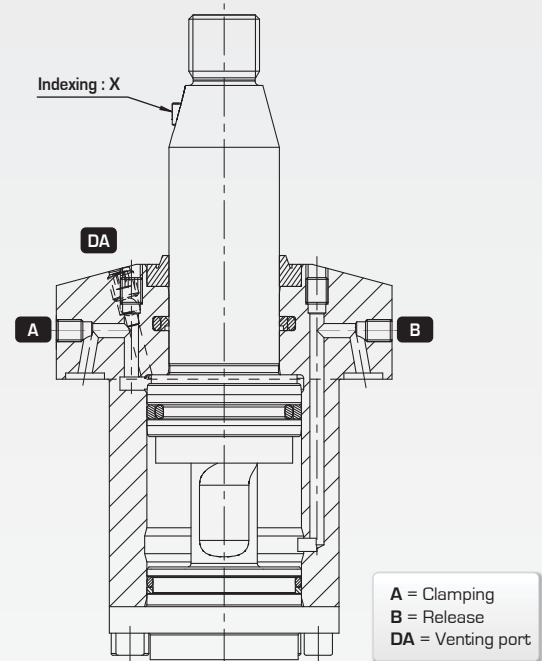
Direction and angle of rotation

The direction of rotation is indicated from the initial «unclamped» position with the rod extended to the «clamped» position with the rod retracted, rod viewed from top.

Right = clockwise

Left = counterclockwise

Standard angle of rotation : $90^\circ \pm 2^\circ$.



Swing clamp characteristics

Determination of cylinder characteristics

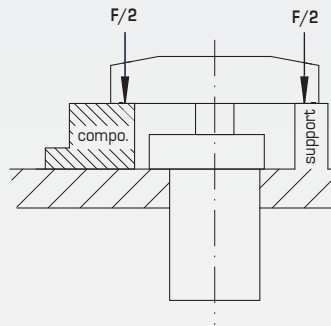
Examples

Determination of cylinder characteristics

The maximum forces are given for a pressure of 3626 psi. This pressure is only authorized if the shortest of the three available standard arms is used.

The max force (therefore the max pressure) decreases proportionally with the length of the arm : please see graphs.

The max flow also decreases with the inertia of the arm ; refer to the values indicated in the graphs for standard arms. Please contact if you need special arms.



Swing clamps
with helical rotation

Maximum pressure / Standard clamping arm	
Maximum pressure	Type of arm
PSI	
3500	Short arm ABC
2500	Medium arm ABM
1800	Long arm ABL

■ Minimum pressure : 400 psi

The use of a double symmetric arm allows operation at 3626 psi, **but you must use the following formula :**

$$\text{Force (lbs)} / 2 = \text{Pressure (psi)} \times \text{Section (in}^2\text{)} \div 2$$

(**A** in table on page 44)

Examples :

For a double symmetric arm and the max force of HL 21 :

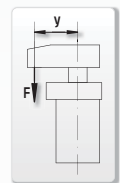
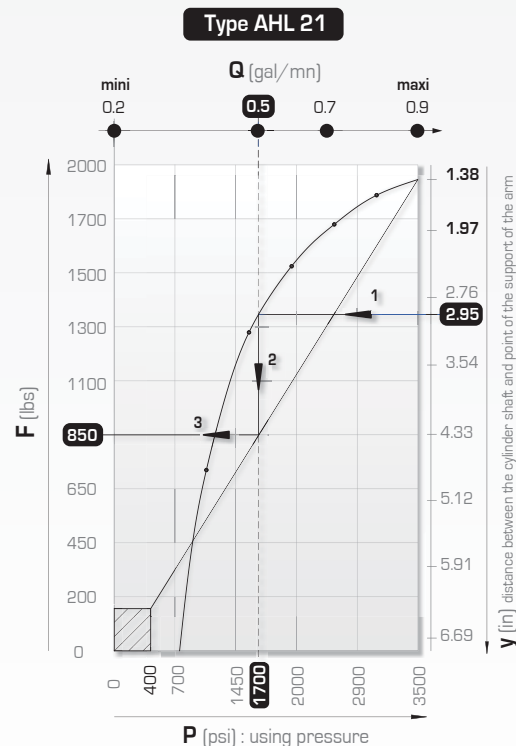
$$F/2 = P \times S \div 2 = 3626 \times .73 \div 2 = 1304 \text{ lbs}$$

Example of using diagrams

The diagram on the right allows the maximum force developed by the cylinder and the max pressure to be determined for the type of arm used : **ABC**, **ABM**, or **ABL**. They also indicate the limiting values at Q flow.

The **maximum force** developed by a **AHL21** type cylinder with a **BL 21 2.95** in long arm is **850 lbs** at **1700 lbs** with **maximum Q flow of 0.13a gal/mn** per cylinder.

For the determination of special arm characteristics, please use the graphs on page 45



Using pressure

- minimum : **435 psi**
- maximum : **3626 psi** with short arms (see graphs)

Maximum temperature

- **158°F**
- for temperatures higher than 158°F please contact us

Important recommendations

F max at 5000 psi	Rod ed	Stroke	Max flow A	Swept volume A B	Dir. of rotation	P/N
lbs	in	in	gal/mn	in ³		
1700	2.01	.08	.24	.67 1.38	right left	AHL 21 DX AHL 21 GX
A	B	C	D	E	F	

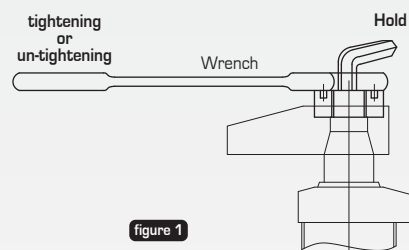


figure 1

- A** This value allows an initial approach to be made in selecting cylinder. Always ensure that you refer to the diagram of forces present on the AP5 cylinder drawings or on page 45 for the **AHL21** and **AHL31** models to specify the max force and pressure as a function of length «y» for the arm.
- B** The rod has a conical end and is threaded for mounting the clamping arm with braking. When locking the nut, **the rod must be prevented from rotating** in order to keep the internal mechanism from tightening.
- There are two way of doing this :
- restrain the rod using a hex wrench (see **figure 1**)
 - maintain the rod in a vice
- C** The indicated value corresponds to the maximum stroke of the cylinder. For clamping a component, the useful stroke is between the minimum and the maximum values indicated in the table of characteristics below.
- D** The maximum recommended flow will vary with the type of cylinder and inertia of the clamping arm. Refer to the table and if possible provide a nozzle or adjustable braking device in the distribution circuit. The flow must be multiplied by the number of cylinders operating at the same time : **ensure that minimum flows are observed**.
- E** This is the volume of oil displaced during total stroke.
- F** Direction of rotation of the rod from the unclamped position to the clamped one. Rod viewed from above.

Characteristics

Please see opposite table.

WARNING

Opposite table is given for information purpose.

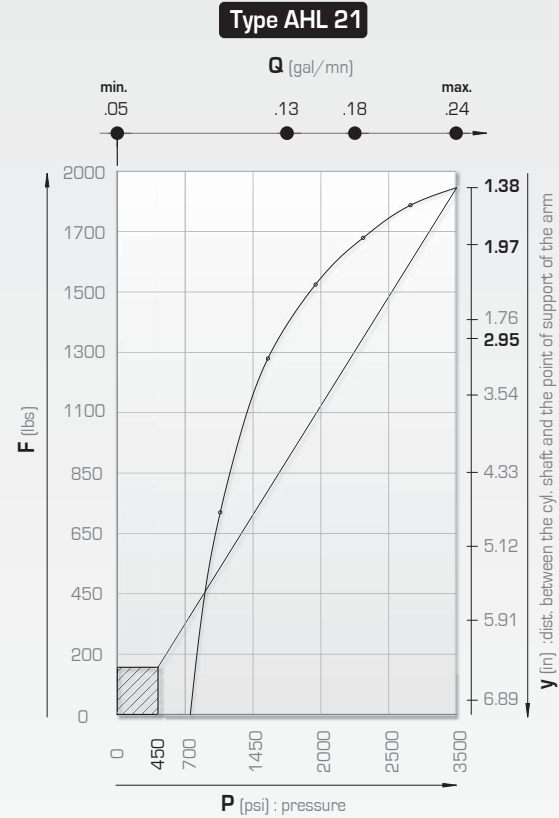
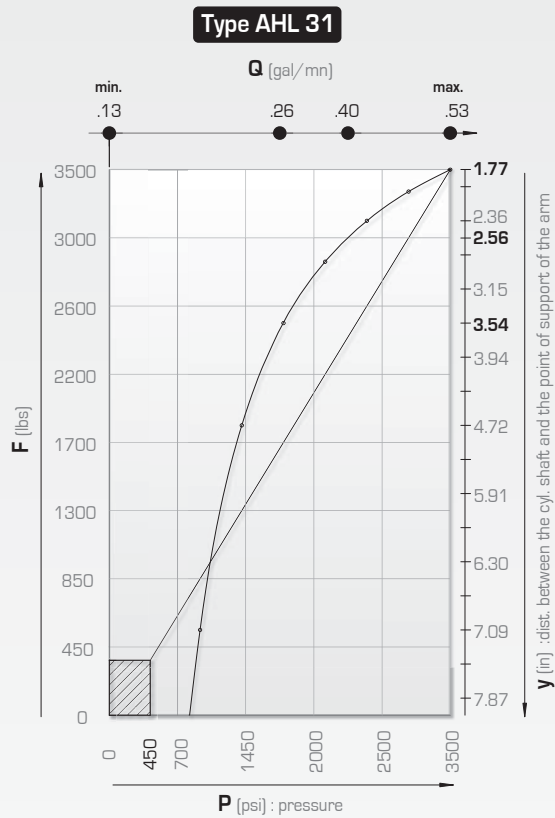
To determine actual forces, please use the graphs located on page 45 which **take the yield into account**.

A = clamping B = release		Unit	AP5	AHL 21	AHL 31
Section	A	in ²	.15	.73	1.46
	B		.27	1.49	3.04
Area extend	A	in ²	.10	.67	1.64
	B		.18	1.38	3.41
Flow	A	gal/ mn	.05	.24	.53
	B		.03	.05	.13
Cycle period	A	s	0.5	0.74	0.8
	B		1.1	1.5	1.6
Clamping stroke	max.	in	.16	.39	.51
	min.		.04	.12	.12
Total stroke		in	.67	.93	1.12

Swing clamp characteristics

Definition of the special arms

Graphs



These graphs take the cylinder yield into account

Swing clamps
with helical rotation

Swing clamps
with helical rotation

Swing clamp : APL5

Double acting - Helical rotation
Max force at 3500 psi : 400 lbs

Oil supplied by manifold port
Mounted by 3 bolts on top flange

Characteristics

- cylinder body in treated burnished steel
- total stroke : .67 in
- clamping stroke : .24 in
- helical rotation left or right $90^\circ \pm 2^\circ$
- countersink in the arm extension

Options

- custom clamping arm
- rotation 60° , 45° or 0°
- position check
- special dimension
- nozzle on counterbored ports

Note

Cylinder are supplied with o-ring seals, plugs (depending on version) and ring.

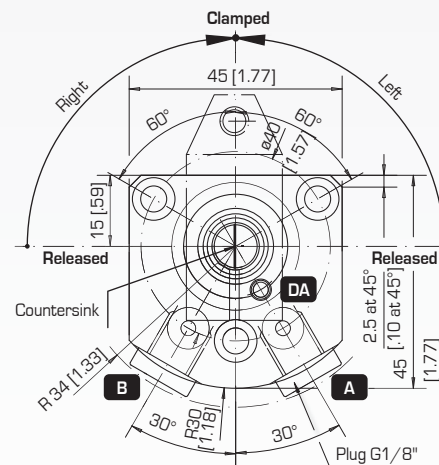
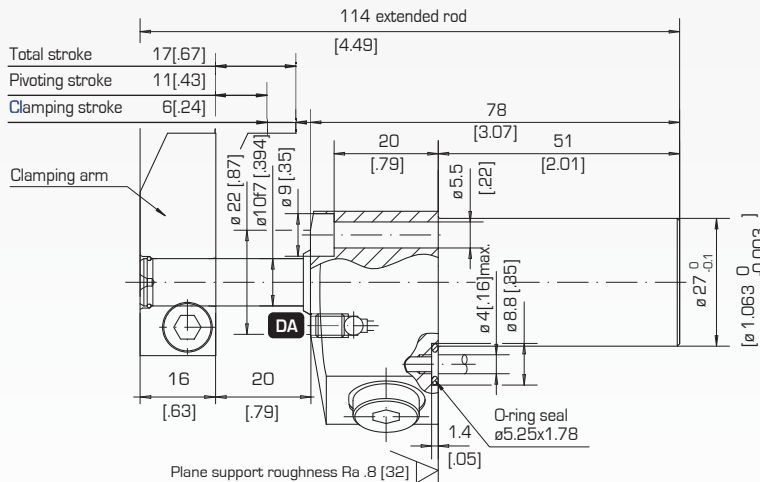
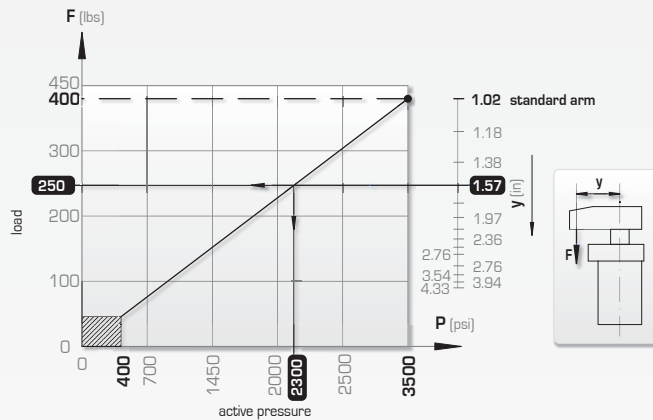
Seals : O-ring 5.25 x 1.78 NBR



Graphs :

Actual force applied at clamping point taking input/output yield into account.

Example : If $y = 1.57$ in, $F_{max} = 277$ lbs at 2350 psi



A = Clamping
B = Release
DA = Venting port

F max at 3500 psi	Max flow A	Max flow B	Effective Area A B	Section A B	Direction of rotation	Type
kN lbs	l/mn gal/mn	l/mn gal/mn	cm² in²	cm² in²		
1.9 400	.20 .05	.36 .10	1.67 .10 3.00 .18	.98 .15 1.77 .27	right left	APL 5 D APL 5 G

Swing clamp : APF5

Double acting - Helical rotation

Max force at 3500 psi : 400 lbs

Oil supplied by manifold ports
Mounted by 4 bolts on bottom flange

Characteristics

- cylinder body in treated burnished steel
- total stroke : .67 in
- clamping stroke : .24 in
- helical rotation left or right $90^\circ \pm 2^\circ$
- countersink in the arm extension

Options

- custom clamping arm
- rotation 60° , 45° or 0°
- position check
- special dimension
- nozzle on counter-bore ports

Note

Cylinder are supplied with o-ring seals, plugs (depending on version) and ring.

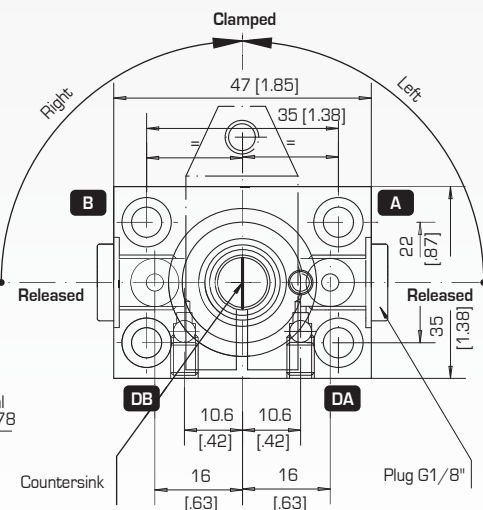
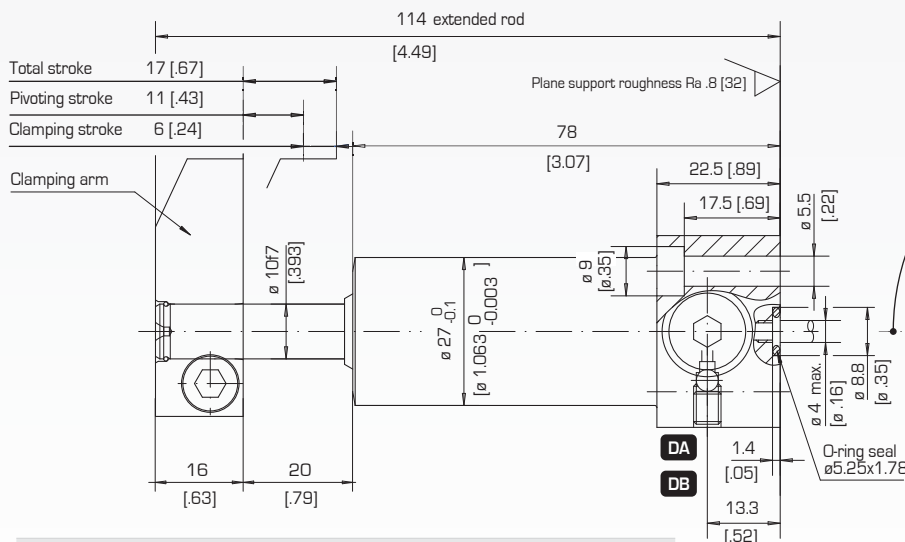
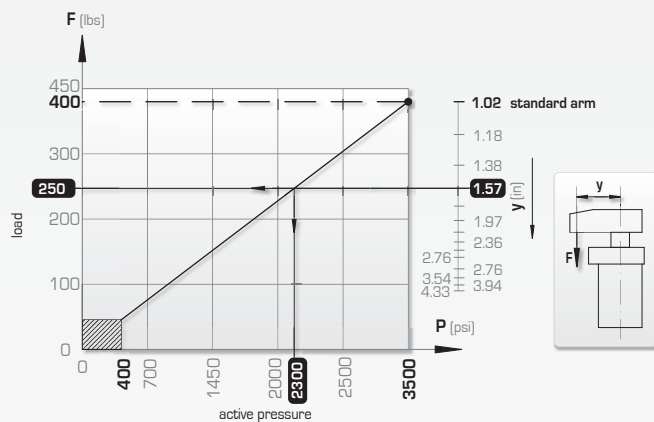
Seal : O-ring 5.25 x 1.78 NBR and plug G 1/8"



Graphs :

Actual force applied at clamping point taking input/output yield into account.

Example : If $y = 1.57$ in, $F_{max} = 277$ lbs at 162 psi



A = Clamping
B = Release
DA = Clamping venting port
DB = Release venting port

F max at 3500 psi	Max flow A	Max flow B	Effective Area A B	Section A B	Direction of rotation	Type
kN lbs	l/min gal/min	l/min gal/min	cm² in²	cm² in²		
1.9 400	.20 .05	.36 .10	1.67 .10 3.00 .18	.98 .15 1.77 .27	right left	APF 5 D APF 5 G

Swing clamp : APS5

Double acting - Helical rotation
Max force at 3500 psi : 400 lbs

Oil supplied by BSPP threaded ports
Mounted by 4 bolts on bottom flange

Characteristics

- cylinder body in treated burnished steel
- total stroke : .67
- clamping stroke : .24 in
- helical rotation left or right $90^\circ \pm 2^\circ$
- countersink in the arm extension

Options

- custom clamping arm
- rotation 60° , 45° or 0°
- position check
- special dimension
- nozzle on counter-bore ports

Note

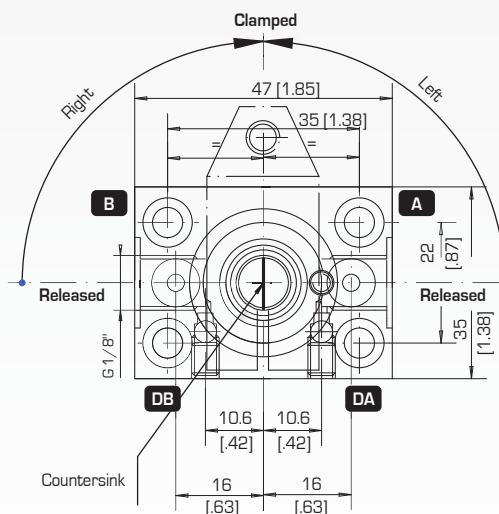
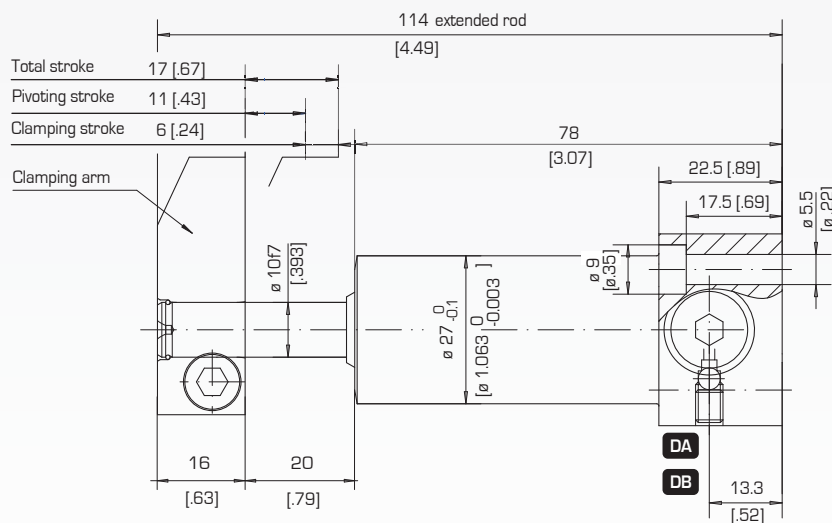
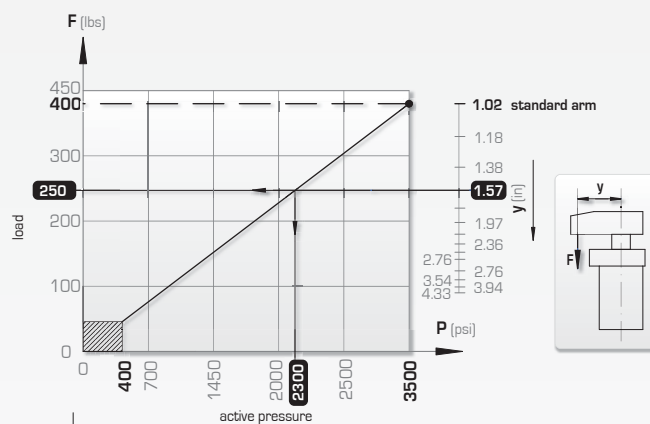
Cylinder are supplied with o-ring seals, plugs (depending on version) and ring.

Seal : O-ring 5.25 x 1.78 NBR and plug G 1/8"

Graphs :

Actual force applied at clamping point taking input/output yield into account.

Example : If $y = 1.57$ in, $F_{max} = 277$ lbs at 162 psi



A = Clamping
B = Release
DA = Clamping venting port
DB = Release venting port

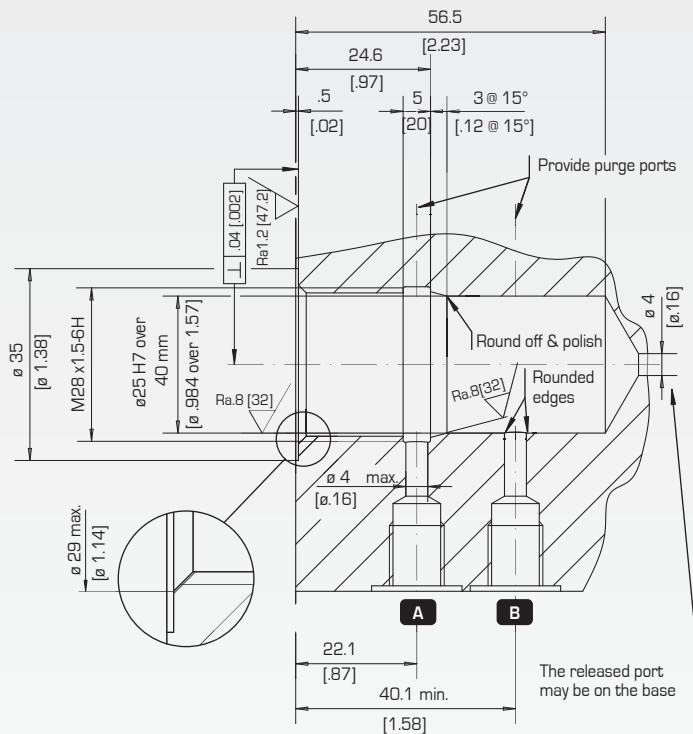
F max at 3500 psi	Max flow A	Max flow B	Effective Area A B	Section A B	Direction of rotation	Type
kN lbs	l/mn gal/mn	l/mn gal/mn	cm ³ in ³	cm ² in ²		
1.9 400	.20 .05	.36 .10	1.67 .10 3.00 .18	.98 .15 1.77 .27	right left	APS 5 D APS 5 G

Max force at 3500 psi : 400 lbs

Housing : APCV5

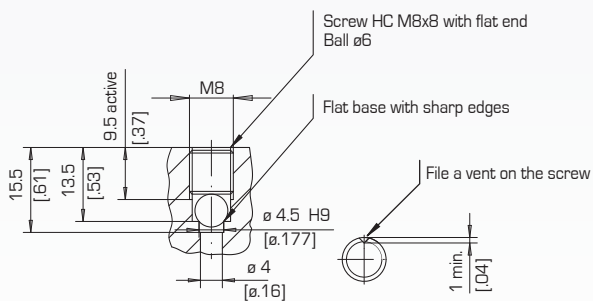
For swing clamp type PCV5
Machining dimensions

Housing machining dimensions



A = Clamping port
B = Release port

Detail of a venting port



Swing clamp : AHL 21 & AHL 31

Double acting with helical groove

Oil supplied by manifold ports
Mounted by 4 bolts on top flange

Characteristics

- total stroke = rot. stroke + linear clamping stroke
- helical groove left or right rotation $90^\circ \pm 2^\circ$
- venting port on the clamping side (AHL 21 & AHL 31)
- venting port on the release side (AHL 31)
- indexing of the rod
- maximum active pressure : 3500 psi

Options

- clamping arms : see accessories heading
- rotation 60° , 45° or 0° on request

Note

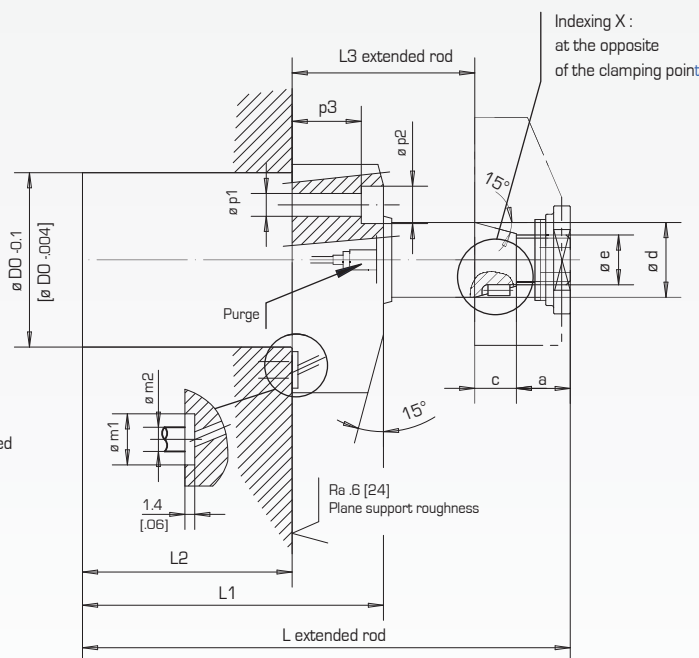
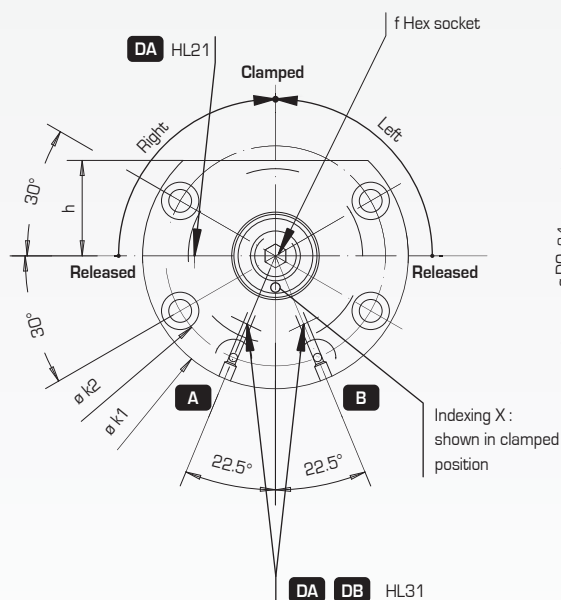
Cylinders supplied with o-ring seals, locking nut and lock-washer

(dimensions and tightening torques : see page 72).

Seals on base : 5.28 x 1.78 (AHL 21) 90 NBR
7.65 x 1.78 (AHL 31) 90 NBR



A = Clamping port
B = Release port
DA = Clamping venting port
DB = Release venting port



Definition of forces as function of clamping arms : see page 45

Important recommendations : see page 44

F max at 3500 psi	Rod ød	Clamping stroke	Total stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions																		
								a	c	øD	e	f	h	øk1 øk2	L	L1	L2	L3	m1	m2	p1	p2	p3			
								key																		
kN	lbs	mm	in	mm	in	l/mm gal/mm	cm ²	in ²			mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
8	1700	25 .98	12 .47	235 .93	9 .24	11.06 .67 22.61 1.38	right left	AHL 21 DX	16 .63	14 .55	52 .2047	M16 x 1.5	6 .24	28 1.10	76 2.99	146.0 5.75	89.5 3.52	63.5 2.50	52.5 2.07	8.8 .35	4 .16	6.5 .26	10.5 .41	16 .63		
								AHL 21 GX							63 2.48											
16	3500	36 1.42	15 .59	285 1.12	2.0 .53	26.95 1.64	right left	AHL 31 DX	18 .71	20 .79	72 2.835	M24 x 1.5	10 .39	38 1.50	110 4.33	175.5 6.91	106.0 4.17	78.0 3.07	59.5 2.34	11.1 .44	5 .20	10.5 .41	17.0 .67	11 .43		
						55.94 3.41		AHL 31 GX							90 3.54											

Oil supplied by manifold ports

Mounted by 4 bolts on bottom flange

Characteristics

- total stroke = rot. stroke + linear clamping stroke
- helical groove left or right rotation $90^{\circ} \pm 2^{\circ}$
- venting port on the clamping side (AHLF 21 & AHLF 31)
- venting port on the release side (AHLF 31)
- indexing of the rod
- maximum using pressure : 3500 psi

Options

- clamping arms : see accessories heading
- rotation 60°, 45° or 0° on request

Note

Cylinders supplied with o-ring seals, locking nut and lock-washer

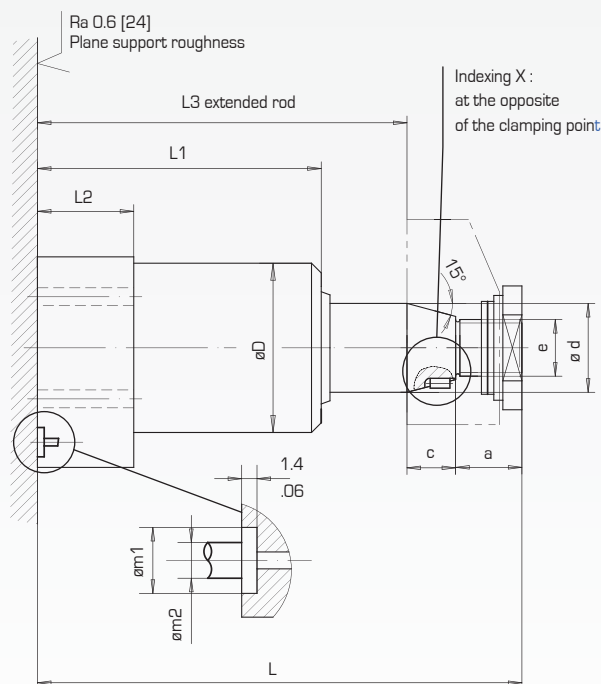
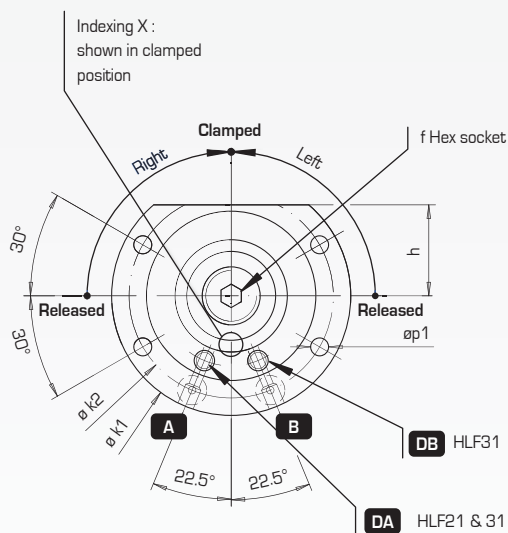
(dimensions and tightening torques : see page 72).

Seals on base : 5.28 x 1.78 (AHLF 21) 90 NBR

7.65 x 1.78 (AHLF 31) 90 NBR



A = Clamping port
B = Release port
DA = Clamping venting port
DB = Release venting port



Definition of forces as function of clamping arms : see page 45

Important recommendations : see page 44

F max at 3500 psi	Rod ød	Clamping stroke	Total stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions													
								a	c	øD	e	f	h	øk1 øk2	L	L1	L2	L3	m1	m2	p1
								mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in
kN lbs	mm in	mm in	mm in	l/mn gal/mn	cm² in²			mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	
8 1700	25 .98	12 .47	23.5 .93	.9 .24	11.06 .67	right left	AHLF 21 DX	16 .63	14 .55	52 .205	M16 x 1.5	6 .24	28 1.10	76 2.99	146.5 5.77	90.0 3.54	32.5 1.28	116.5 4.59	8.8 .35	4 .16	6.5 .26
					22.61 1.38		63 2.48														
16 3500	36 1.42	15 .58	28.5 1.12	2.0 .53	26.95 1.64	right left	AHLF 31 DX	18 .71	20 .79	72 2.83	M24 x 1.5	10 .39	38 1.50	110 4.33	176.0 6.93	106.5 4.19	42.0 1.65	138.0 5.43	11.1 .44	5 .20	10.5 .41
					55.94 3.41		90 3.54														

AHL * * XA	Swing clamp with helical rotation - Sensor terminal	056
AHLF * * XA	Swing clamp with helical rotation - Sensor terminal	057
AHL * * XB12	Swing clamp with helical rotation - Pneumatic detection of clamped and released positions	058
AHLF * * XB12	Swing clamp with helical rotation - Pneumatic detection of clamped and released positions	059
APL * * XA	Swing clamp with planar rotation - Sensor rod	060
APL * * XB1	Swing clamp with planar rotation - Pneumatic detection of the released position	061
APL * * XB12	Swing clamp with planar rotation - Pneumatic detection of clamped and released positions	062
APL * * D/GXE	Swing clamp with planar rotation - Electrical detection	063
APL21D/GXH	Swing clamp with planar rotation - Hydraulic detection	064

Swing clamp : AHL * * X A

Double acting with helical groove
With sensor terminal

Oil supplied by manifold ports
Mounted by 4 bolts on top flange

Characteristics

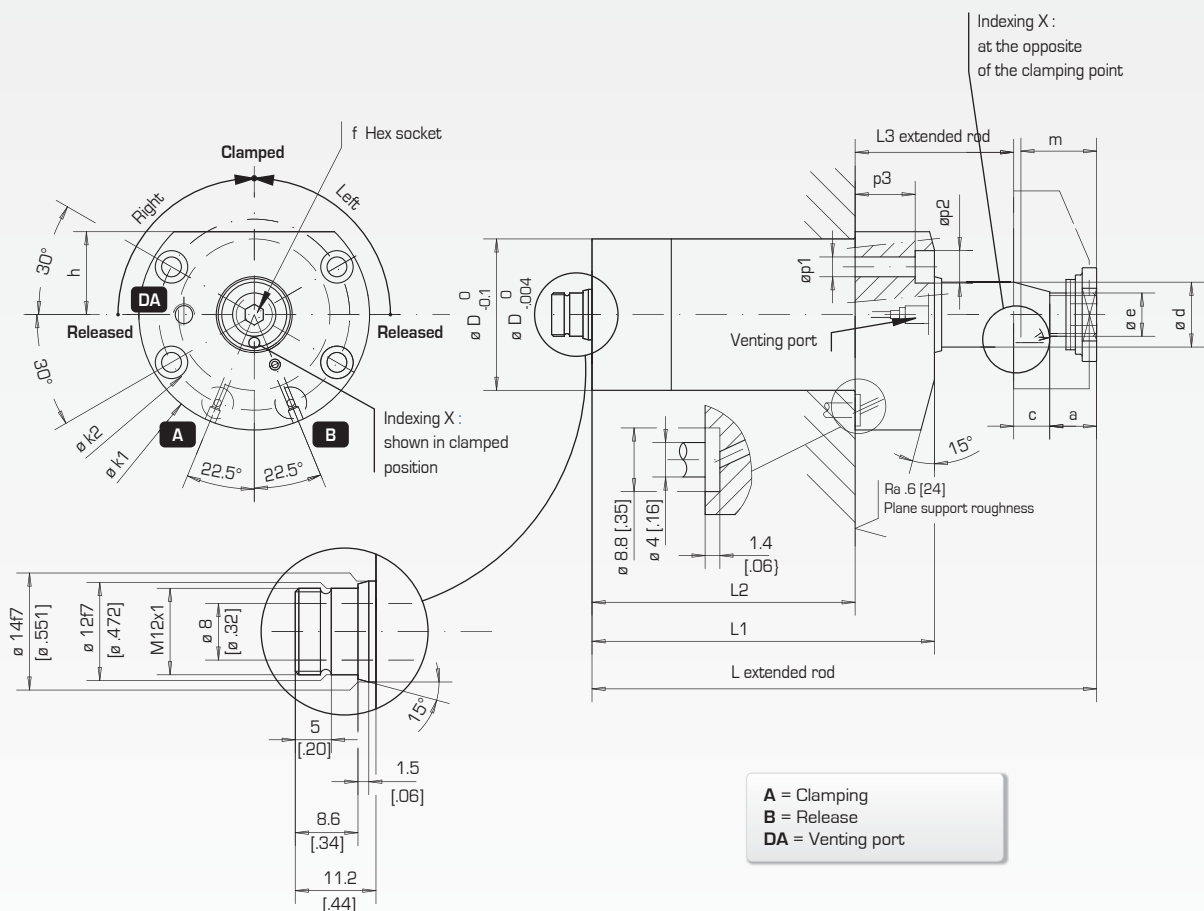
- stroke from .32 to .47 in
- helical groove right and left rotation $90^\circ \pm 2^\circ$
- clamping venting port
- indexing on the rod
- maximum using pressure : 3500 psi

Options

- clamping arms : see accessories heading
- rotation 60° , 45° or 0° on request

Note

Cylinders supplied with o-ring seals, locking nut and lock-washer (dimensions : see page 72).
Seals : 5.28 x 1.78 mm 90 NBR



A = Clamping
B = Release
DA = Venting port

Definition of forces as function of clamping arms : see pages 21 and 45
Important recommendations : see page 44

F max at 3500 PSI	Rod ød	Clamping stroke	Total stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions														
								a	c	øD	e	f	h	øk1 øk2	L	L1	L2	L3	m	p1	p2	p3
kN	mm in	mm in	mm in	l/mn gal/mn	cm ² in ²			mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in
4 850	18 .71	8 .32	19 .75	0.4 .11	4.48 .27 6.40 .39	right left	AHL 11 DX A AHL 11 GX A	13 .51	10 .39	42 1.654	M12 x 1.5	5 20	23 .91	64 2.52 53 2.09	140 5.51	95 3.74	73 2.87	44 1.73	21 .83	5.5 .22	9.0 .35	13 .51
8 1700	25 .98	12 .47	23 .91	0.9 .24	10.83 .66 18.58 1.13	right left	AHL 21 DX A AHL 21 GX A	16 .63	14 .55	52 2.047	M16 x 1.5	6 24	28 1.10	76 2.99 63 2.48	163 6.42	107 4.21	81 3.19	52 2.05	24 .94	6.5 .26	10.5 .41	16 .63

Swing clamp : AHLF * * X A

Double acting with helical groove

With sensor terminal

Oil supplied by manifold ports

Mounted by 4 bolts on bottom flange

Characteristics

- stroke from .32 to .47 in
- helical groove right and left rotation $90^\circ \pm 2^\circ$
- clamping venting port
- indexing on the rod
- maximum using pressure : 3500 psi

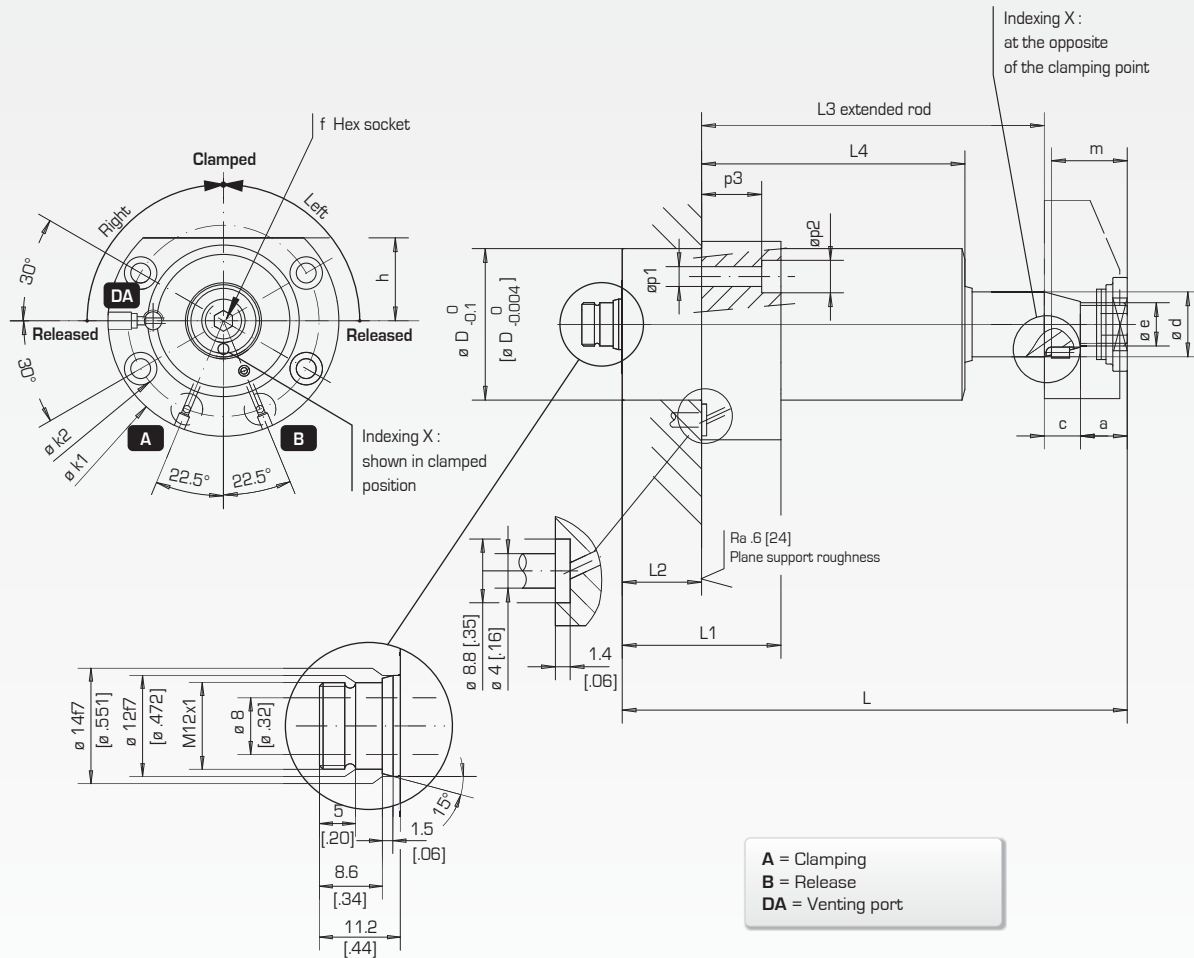
Options

- clamping arms : see accessories heading
- rotation 60° , 45° or 0° on request

Note

Cylinders supplied with o-ring seals, locking nut and lock-washer (dimensions : see page 72).

Seals : 5.28 x 1.78 mm 90 NBR



Definition of forces as function of clamping arms : see pages 21 and 45

Important recommendations : see page 45

F max at 3500 psi	Rod ad	Clamping stroke	Total stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions																																				
								a	c	øD	e	f	h	øk1 øk2	L	L1	L2	L3	L4	m	p1	p2	p3																					
								key																																				
kN	lbs	mm	in	mm	in	l/min	gal/min	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in					
4	850	18	.71	8	.32	19	.75	4	.11	4.48 6.40	.27 .39	right left	AHLF 11 DX A AHLF 11 GX A	13	.51	10	.39	42	1.654	M12 x 1.5	5	20	23	.91	64 53	2.52 2.09	140	5.51	46	1.81	22	.87	95	3.74	73	2.87	21	.83	5.5	22	9.0	.35	13	.51
8	1700	25	.98	12	.47	23	.91	9	.24	10.83 18.58	.86 1.13	right left	AHLF 21 DX A AHLF 21 GX A	16	.63	14	.55	52	2.047	M16 x 1.5	6	24	28	1.10	76 63	2.99 2.43	163	6.42	53	2.09	23	.91	110	4.33	84	3.31	30	1.18	6.5	26	10.5	.41	16	.63

Swing clamp : AHL * * X B12

Double acting with helical groove
With pneumatic detection of clamped and released positions

Oil supplied by manifold ports
Mounted by 4 bolts on top flange

Characteristics

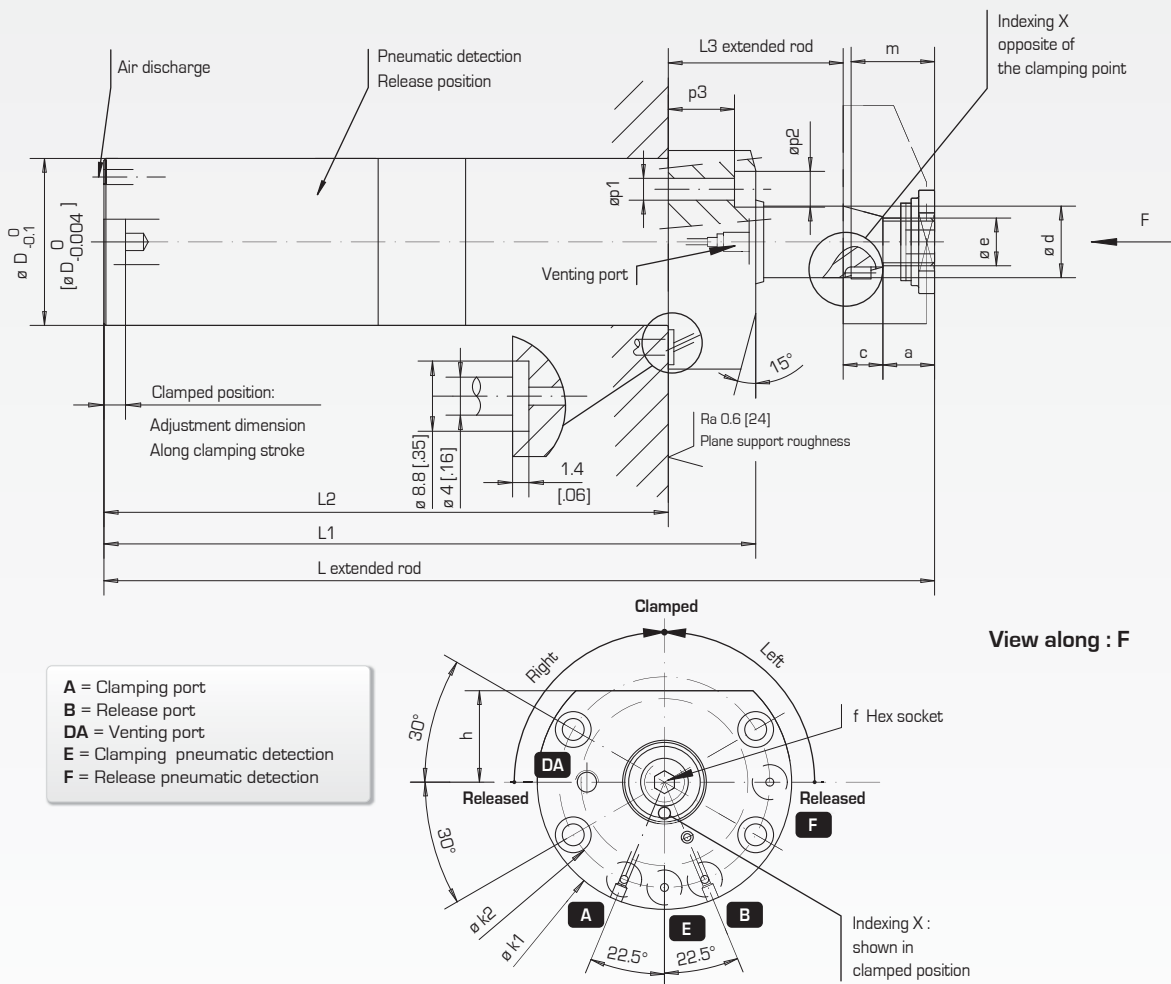
- stroke from .32 to .47 in
 - helical groove right and left rotation $90^\circ \pm 2^\circ$
 - clamping venting port
 - indexing on the rod
 - maximum using pressure : 3500 psi
 - detection by valves with no leaks.
- Clamped and released positions on base of cylinder adjusted by a screw

Options

- clamping arms : see accessories heading
- rotation 60° , 45° or 0° on request

Note

Cylinders supplied with o-ring seals, locking nut and lock-washer (dimensions : see page 72).
Seals : 5.28 x 1.78 mm 90 NBR



Definition of forces as function of clamping arms : see pages 21 and 45
Important recommendations : see page 44

F max at 3500 psit	Rod ød	Clamping stroke	Total stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions														
								a	c	øD	e	f	h	øk1 øk2	L	L1	L2	L3	m	p1	p2	p3
kN lbs	mm in	mm in	mm in	l/min gal/min	cm² in³			mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in
4 850	18 .71	8 .32	19 .75	4 .11	448 .27 640 .39	right left	AHL 11 DX B12 AHL 11 GX B12	13 .51	10 .39	42 1.654	M12 x 1.5	5 20	23 .91	64 2.52 53 2.06	209 8.23	164 6.46	142 5.59	44 1.73	21 .83	5.5 22	9.0 35	13 .51
8 1700	25 .98	12 .47	23 .91	9 .24	1083 .86 1858 1.13	right left	AHL 21 DX B12 AHL 21 GX B12	16 .63	14 .55	52 2.047	M16 x 1.5	6 24	28 1.10	76 2.99 63 2.43	248 9.76	192 7.56	166 6.54	52 2.05	24 .95	6.5 26	10.5 41	16 .63

Swing clamp : AHLF * * X B12

Double acting with helical groove

With pneumatic detection of clamped and released positions

Oil supplied by manifold ports

Mounted by 4 bolts on bottom flange

Characteristics

- stroke from .32 to .47 in
- helical groove right and left rotation $90^\circ \pm 2^\circ$
- clamping venting port
- indexing on the rod
- maximum using pressure : 3500 psi
- detection by valves with no leaks.
- Clamped and released positions on base of cylinder adjusted by a screw

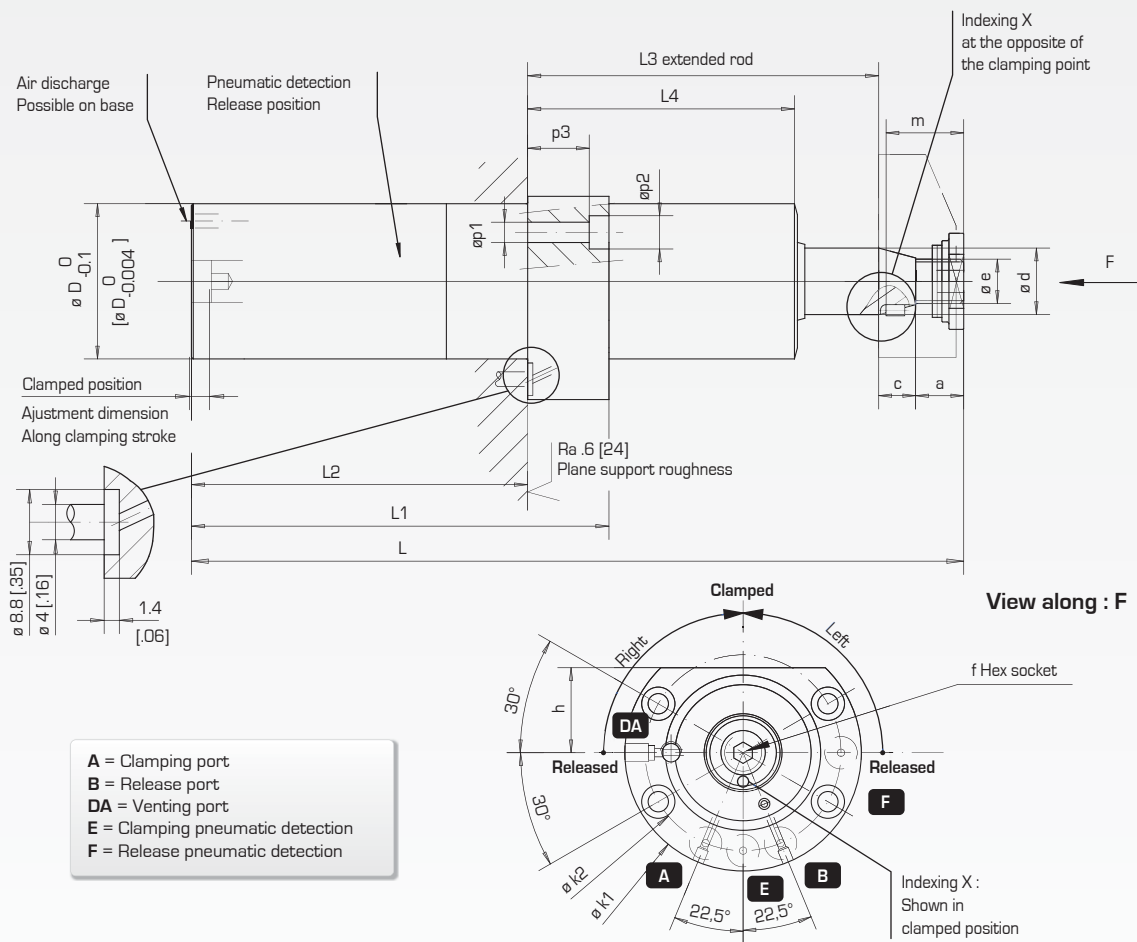
Options

- clamping arms : see accessories heading
- rotation 60° , 45° or 0° on request

Note

Cylinders supplied with o-ring seals, locking nut and lock-washer (dimensions : see page 72).

Seals : 5.28 x 1.78 mm 90 NBR



Definition of forces as function of clamping arms : see pages 21 and 45

Important recommendations : see page 44

F max at 3500 PSI	Rod ad	Clamping stroke	Total stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions															
								a	c	aD	e	f	h	ak1 ak2	L	L1	L2	L3	L3	m	p1	p2	p3
								mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in
kN lbs	mm in	mm in	mm in	l/min gal/min	cm ² in ²			mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	
4 850	18 .71	8 .32	19 .75	4 .11	448 .27 640 .39	right left	AHLF 11 DX B12 AHLF 11 GX B12	13 .51	10 .39	42 1.654	M12x1.5	5 20	23 .91	64 2.52 53 2.06	209 8.22	115 4.53	91 3.58	95 3.74	73 2.87	21 .83	5.5 22	90 .35	13 .51
8 1700	25 .98	12 .47	23 .91	9 .24	10.83 .86 18.58 1.13	right left	AHLF 21 DX B12 AHLF 21 GX B12	16 .63	14 .55	52 2.047	M16x1.5	6 24	28 1.10	76 2.99 63 2.43	248 9.76	138 5.43	108 4.25	110 4.33	84 3.31	24 .95	6.5 26	10.5 41	16 .63

Swing clamp : APL * * X B1

Double acting - Rotation in a plane

Pneumatic detection of the released position

Oil supplied by manifold ports

Mounted by 4 bolts on top flange

Characteristics

- detection by valves with no leaks, released position
- rotation in plane left or right $90^\circ \pm 2^\circ$
- released and clamping side venting port
- indexing of the rod
- maximum using pressure : 2300 psi

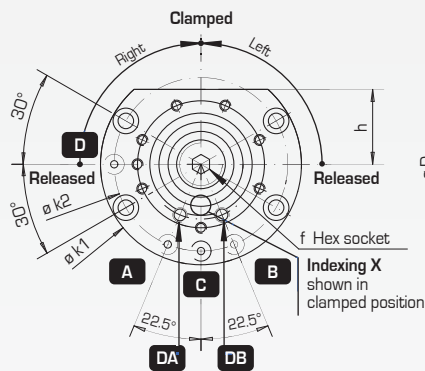
Options

- clamping arms : see accessories heading
- rotation 60° , 45° or 0° on request

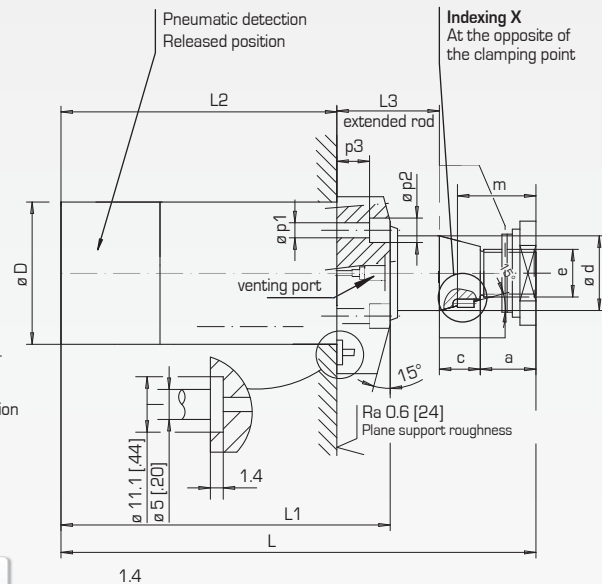
Note

Cylinders supplied with o-ring seals, locking nut and lock-washer [dimensions : see page 72].

Seals : 7.65 x 1.78 mm 90 NBR



A = Clamping
B = Release
DA = Clamping venting port
DB = Release venting port
C = Pneumatic detection of the released position
D = Air vent



Swing clamps with
position detection

Definition of forces as function of clamping arms : see page 21

Important recommendations : see page 20

F max at 2300 psi	Rod ød	Stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions														
							a	c	øD	e	f	h	øk1 øk2	L	L1	L2	L3	m	p1	p2	p3
							key														
kN lbs	mm in	mm in	l/min gal/min	cm² in²			mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	
10 2200	36 1.42	12 47	2 53	41 2.50 53 3.23	right left	APL 31 DX B1 APL 31 GX B1	18 71	20 79	80 3.15	M24 x 1.5	10 39	41 1.61	110 4.33 95 3.74	242.5 9.55	189.5 7.46	161.5 6.36	43 1.69	29 1.14	8.5 33	14 55	11 43
15 3300	42 1.65	12 47	3 79	74 4.52 88 5.37	right left	APL 41 DX B1 APL 41 GX B1	20 79	22 87	93 3.66	M30 x 1.5	12 47	48 1.89	130 5.12 112 4.41	261.0 10.28	204.0 8.03	174.0 6.85	45 1.77	31 1.22	10.5 41	17 67	12 47

Swing clamp : APL * * X B12

Double acting - Rotation in a plane
Pneumatic detection of clamped and released positions

Oil supplied by manifold port
Mounted by 4 bolts on top flange

Characteristics

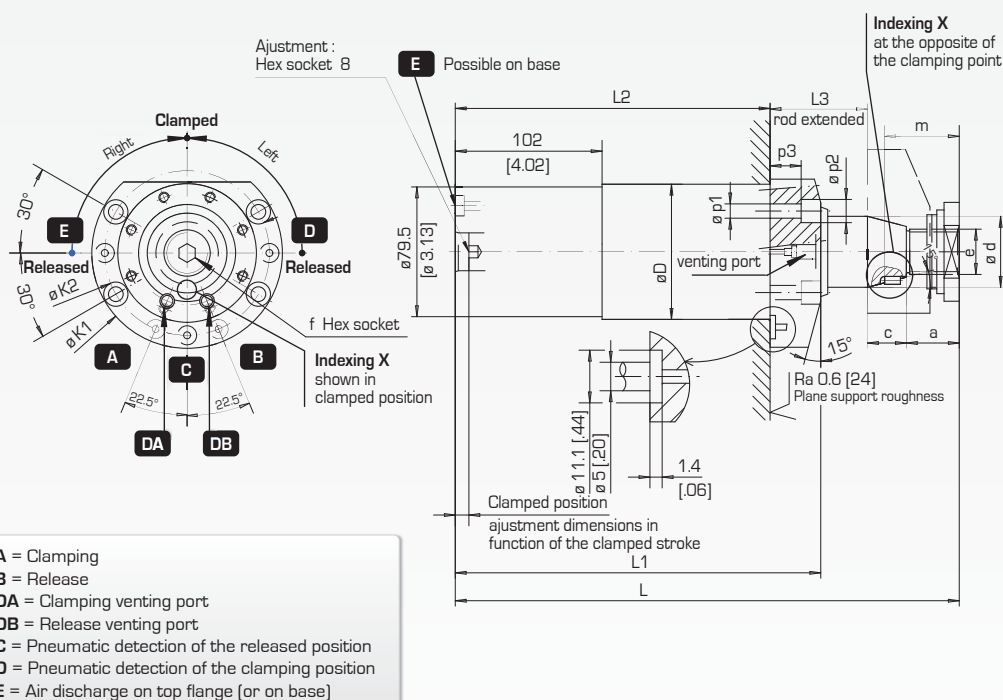
- detection by valves with no leaks.
- clamped and released positions on base of cylinder adjusted by a screw
- rotation in plane left or right $90^\circ \pm 2^\circ$
- released and clamping side venting port
- indexing of the rod
- maximum using pressure : 2300 psi

Options

- clamping arms : see accessories heading
- rotation 60° , 45° or 0° on request

Note

Cylinders supplied with o-ring seals, locking nut and lock-washer [dimensions : see page 72].
Seals : 7.65 x 1.78 mm 90 NBR



Definition of forces as function of clamping arms : see page 21

Important recommendations : see page 20

F max at 2300 psi	Rod ød	Stroke	Max flow A	Effective Area A B	Dir. of rotation	Type	Dimensions														
							a	c	øD	e	f	h	øk1 øk2	L	L1	L2	L3	m	p1	p2	p3
kN lbs	mm in	mm in	l/min gal/min	cm ² in ²			mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in
10 2200	36 1.42	12 47	2 53	41 2.50 53 3.23	right left	APL 31 DX B12 APL 31 GX B12	18 71	20 79	80 3.15	M24 x 1.5	10 39	41 1.61	110 4.33 95 3.74	311.5 12.36	248.5 9.78	258.5 10.18	43 1.69	29 1.14	8.5 33	14 55	11 43
15 3300	42 1.65	12 47	3 79	74 4.52 88 5.37	right left	APL 41 DX B12 APL 41 GX B12	20 79	22 87	93 3.66	M30 x 1.5	12 47	48 1.89	130 5.11 112 4.41	330.0 12.99	273.0 10.75	243.0 9.57	45 1.77	31 1.22	10.5 41	17 67	12 47

Electrical position check

Swing clamp : APL 21 D/G XH

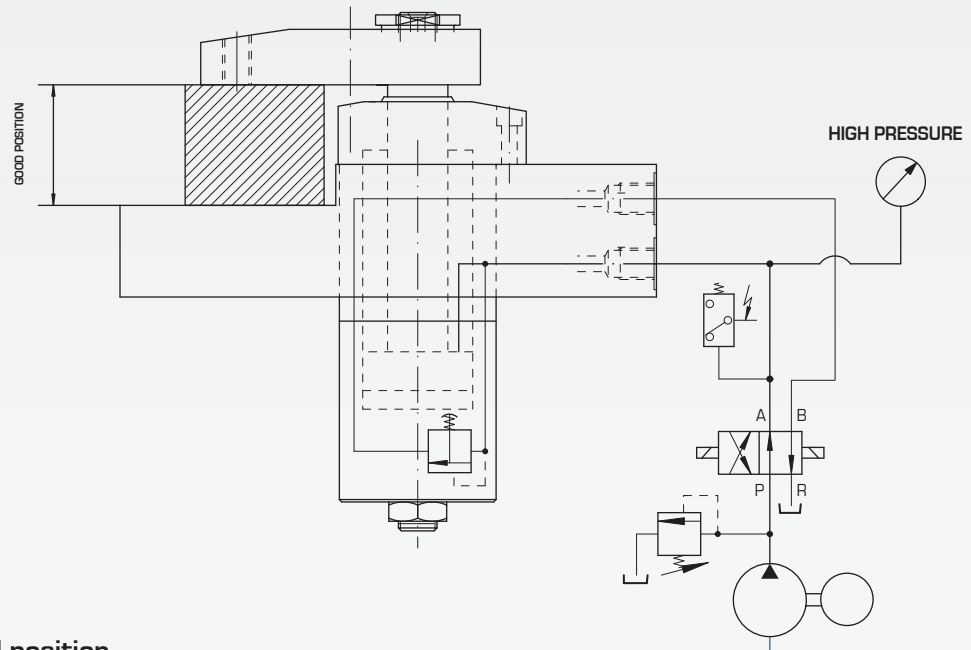
Functioning of the
hydraulic control position

Swing clamps with hydraulically controlled positioning, allow for the checking of the correct position of the clamp before the machining cycle starts.

This check is carried out without any additional circuits.

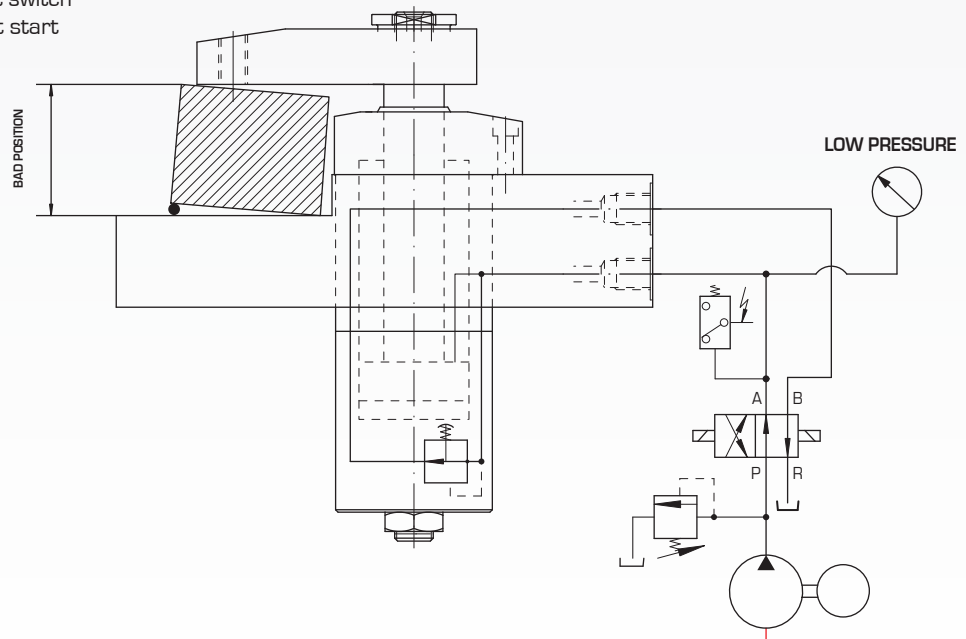
■ The component is in the good position

- the cylinder clamps the component in the pre-defined position
- the circuit raises the normal clamping pressure
- the pressure valve switches
- the machining cycle can start



■ The component is in bad position

- the cylinder clamps the component in a different position as the pre-defined one
- the circuit stays in low pressure
- the pressure valve does not switch
- the machining cycle can not start



Swing clamps with
position detection

AP5	Clamping arms for AP5 swing clamps	068
ABC	Short clamping arms	069
ABM	Medium clamping arms	070
ABL	Long clamping arms	071
AE et AR	Clamping arm fixing accessories	072
AEMB	Fixing accessories - Ends of rod details	073

Description

The arms for AP5 swing clamps are available as standard in one length : short with indexing. We make special arms on request.

Clamping force decreases as the length of arms increase : for details see graphs in sheets for the various versions of the AP5 swing clamps (pages 47 to 51).

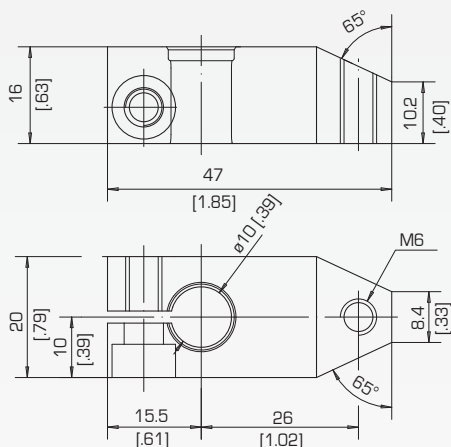
These arms are treated against corrosion and can be oriented through 360°.

STANDARD SHORT ARM

Max using pressure for cylinder with arm AB5 : 3600 psi.

Description

Standard short arm 26 mm : **AB5 26**

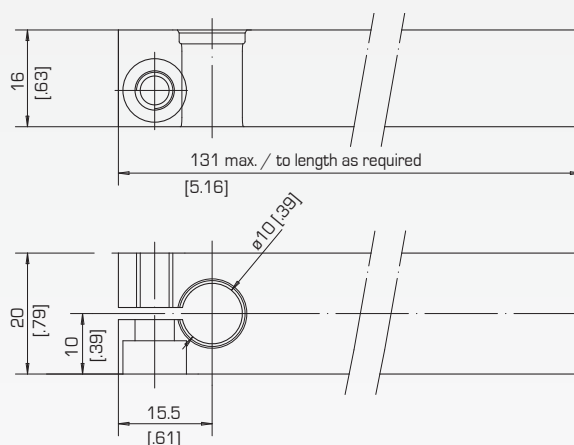


CUSTOM ARMS

Max using pressure for cylinder as shown in graphs

Description

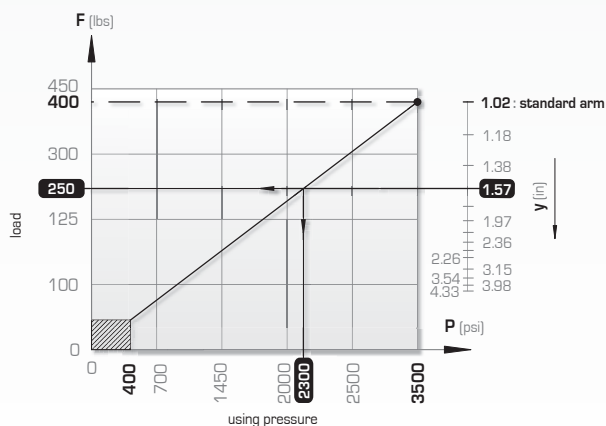
Long arm on request: **AB5** _____



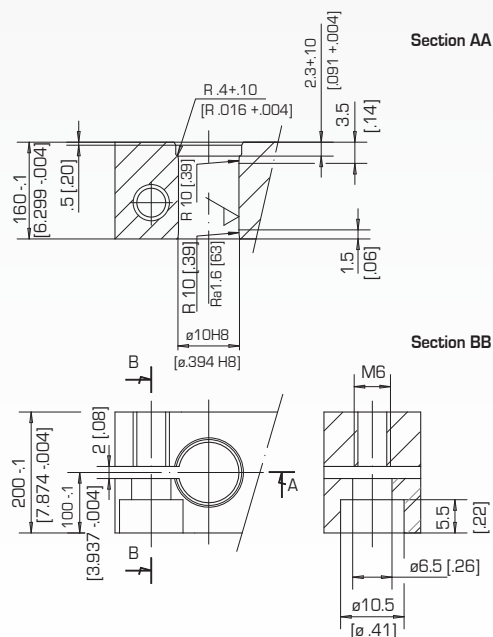
Graph :

Actual force applied at clamping point taking input/output yield into account.

Example : If $y = 1.57$ in, $F_{max.} = 276$ lbs at 2350 psi



Details of the special arm machining



Short clamping arm : ABC

For swing clamp size : 11 - 21 - 31 - 41

Description

Available as standard in three different versions :

- with chamfers
- with chamfers and indexing
- without chamfer, with indexing.

Characteristics

- can be oriented through 360°
- treated against corrosion
- material : 1046
- maximum using pressure : 3500 psi

Note

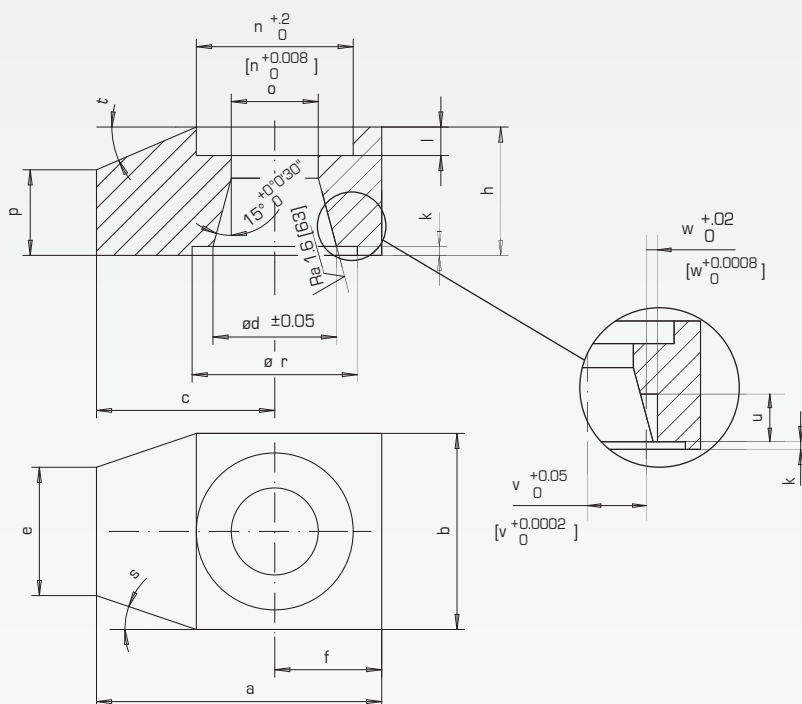
The clamping force decreases as the length of arms increases [for details, see tables page 21].

Option

Special arms made on request.

■ Restrain the rod when tightening the screw .

(see **figure 1** page 44)



Tapping	Chamfer	Indexing	Type	Dimensions																		
				a	b	c	d	e	f	h	k	l	n	o	p	r	s	t	u	v	w	
				mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	deg	deg	mm in	mm in	mm in	
NO	YES	NO	ABC 11	40 1.57	30 1.18	25.0 .98	17.46 .687	18 .71	15.0 .59	17 .67	1 .04	3 .12	23 .906	122 .48	120 .47	26 1.02	25°	25°	-	-	-	
NO	YES	YES	ABC 11 X	40 1.57	30 1.18	25.0 .98	17.46 .687	18 .71	15.0 .59	17 .67	1 .04	3 .12	23 .906	122 .48	120 .47	26 1.02	25°	25°	6.3 .25	7.80 .307	r1.5 .059	
NO	NO	YES	ABC 11 X N	40 1.57	30 1.18	25.0 .98	17.46 .687	-	15.0 .59	17 .67	1 .04	3 .12	23 .906	122 .48	-	26 1.02	-	-	6.3 .25	7.80 .307	r1.5 .059	
NO	YES	NO	ABC 21	55 2.17	40 1.57	35.0 1.38	24.46 .963	23 .91	20.0 .79	23 .91	1 .04	4 .16	31 1.220	162 .64	165 .65	34 1.34	30°	30°	-	-	-	
NO	YES	YES	ABC 21 X	55 2.17	40 1.57	35.0 1.38	24.46 .963	23 .91	20.0 .79	23 .91	1 .04	4 .16	31 1.220	162 .64	165 .65	34 1.34	30°	30°	10.4 .41	10.25 .404	r1.5 .059	
NO	NO	YES	ABC 21 X N	55 2.17	40 1.57	35.0 1.38	24.46 .963	-	20.0 .79	23 .91	1 .04	4 .16	31 1.220	162 .64	-	34 1.34	-	-	10.4 .41	10.25 .404	r1.5 .059	
NO	YES	NO	ABC 31	72 2.83	55 2.16	44.5 1.75	35.46 1.396	30 1.18	27.5 1.08	30 1.18	1 .04	5 .20	41 1.614	245 .96	20.0 .79	45 1.77	30°	30°	-	-	-	
NO	YES	YES	ABC 31 X	72 2.83	55 2.16	44.5 1.75	35.46 1.396	30 1.18	27.5 1.08	30 1.18	1 .04	5 .20	41 1.614	245 .96	20.0 .79	45 1.77	30°	30°	17.0 .67	14.50 .571	r2.0 .079	
NO	NO	YES	ABC 31 X N	72 2.83	55 2.16	44.5 1.75	35.46 1.396	-	27.5 1.08	30 1.18	1 .04	5 .20	41 1.614	245 .96	-	45 1.77	-	-	17.0 .67	14.50 .571	r2.0 .079	
NO	YES	NO	ABC 41	85 3.35	70 2.76	50.0 1.97	40.93 1.611	36 1.42	35.0 1.38	33 1.30	2 .08	6 .24	51 2.008	305 1.20	20.0 .79	52 2.05	45°	45°	-	-	-	
NO	YES	YES	ABC 41 X	85 3.35	70 2.76	50.0 1.97	40.93 1.611	36 1.42	35.0 1.38	33 1.30	2 .08	6 .24	51 2.008	305 1.20	20.0 .79	52 2.05	45°	45°	18.0 .71	17.50 .689	r2.0 .079	
NO	NO	YES	ABC 41 X N	85 3.35	70 2.76	50.0 1.97	40.93 1.611	-	35.0 1.38	33 1.30	2 .08	6 .24	51 2.008	305 1.20	-	52 2.05	-	-	18.0 .71	17.50 .689	r2.0 .079	

Description

Available as standard in three different versions :

- with tappings and chamfers, without indexing
- with tappings, chamfers and indexing
- with indexing, without tapping or chamfer

Note

The clamping force decreases as the length of arms increases (for details, see tables page 21).

Restrain the rod when tightening the screw .

(see **figure 1** page 44)

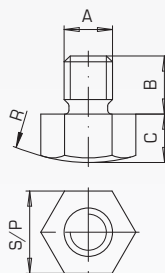
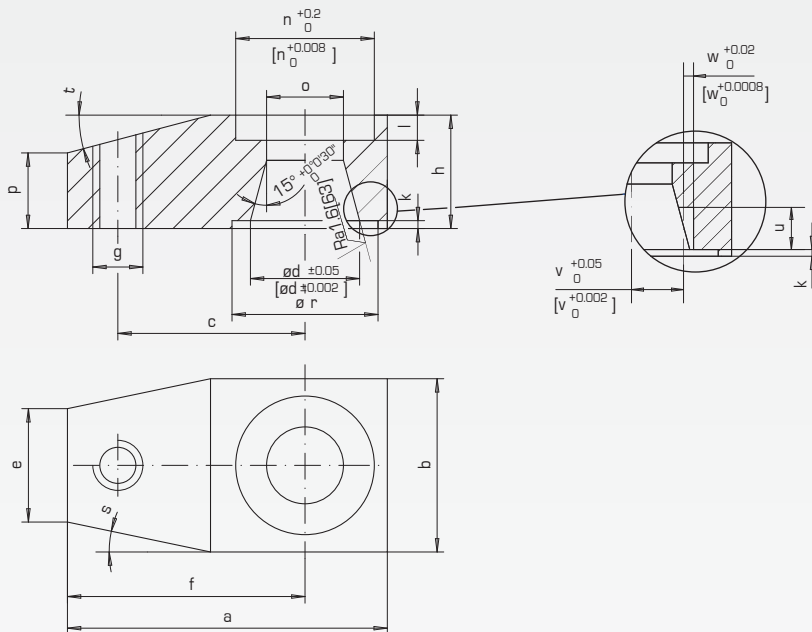


Characteristics

- can be oriented through 360°
- treated against corrosion
- material : 1046
- maximum using pressure : 3500 psi

Option

Special arms made on request.



Type	Dimensions								
	A	B		C	R	S/P			
		mm	in	mm	in	mm	in		
AVB 15.8	M8	10	.39	10	.39	20	.79	13	.51
AVB 40.12	M12	12	.47	10	.39	45	1.77	19	.75
AVB 65.16	M16	20	.79	10	.39	60	2.36	24	.94
AVB 100.20	M20	25	.98	10	.39	60	2.36	30	1.18

Tapping	Chamfer	Indexing	Type	Dimensions																		
				a	b	c	d	e	f	g	h	k	l	n	o	p	r	s	t	u	v	w
				mm in	mm in	mm in	mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	deg	deg	mm in	mm in	mm in	
YES	YES	NO	ABM 11	55 2.17	30 1.18	32 1.26	17.46 .687	20 .79	40.0 1.57	M8	17 .67	1 .04	3 .12	23 .906	12.2 .48	15.5 .61	26 1.02	12.5°	6°	-	-	-
YES	YES	YES	ABM 11 X	55 2.17	30 1.18	32 1.26	17.46 .687	20 .79	40.0 1.57	M8	17 .67	1 .04	3 .12	23 .906	12.2 .48	15.5 .61	26 1.02	12.5°	6°	6.3 .25	7.80 .307	r1.5 .059
NO	NO	YES	ABM 11 X N	55 2.17	30 1.18	-	17.46 .687	-	40.0 1.57	-	17 .67	1 .04	3 .12	23 .906	12.2 .48	-	26 1.02	-	-	6.3 .25	7.80 .307	r1.5 .059
YES	YES	NO	ABM 21	85 3.35	40 1.57	50 1.97	24.46 .963	21 .83	65.0 2.56	M12	23 .91	1 .04	4 .16	31 1.220	16.2 .64	21.5 .85	34 1.34	25°	10°	-	-	-
YES	YES	YES	ABM 21 X	85 3.35	40 1.57	50 1.97	24.46 .963	21 .83	65.0 2.56	M12	23 .91	1 .04	4 .16	31 1.220	16.2 .64	21.5 .84	34 1.34	25°	10°	10.4 .41	10.25 .403	r1.5 .059
NO	NO	YES	ABM 21 X N	85 3.35	40 1.57	-	24.46 .963	-	65.0 2.56	-	23 .91	1 .04	4 .16	31 1.220	16.2 .64	-	34 1.34	-	-	10.4 .41	10.25 .403	r1.5 .059
YES	YES	NO	ABM 31	108 4.25	55 2.16	65 2.56	35.46 1.396	35 1.38	80.5 3.17	M16	30 1.18	1 .04	5 20	41 1.614	24.5 .96	25.0 .98	45 1.77	15°	12.5°	-	-	-
YES	YES	YES	ABM 31 X	108 4.25	55 2.16	65 2.56	35.46 1.396	35 1.38	80.5 3.17	M16	30 1.18	1 .04	5 20	41 1.614	24.5 .96	25.0 .98	45 1.77	15°	12.5°	17.0 .67	14.50 .571	r2.0 .079
NO	NO	YES	ABM 31 X N	108 4.25	55 2.16	-	35.46 1.396	-	80.5 3.17	-	30 1.18	1 .04	5 20	41 1.614	24.5 .96	-	45 1.77	-	-	17.0 .67	14.50 .571	r2.0 .079
YES	YES	NO	ABM 41	125 4.92	70 2.76	70 2.76	40.93 1.611	43 1.69	90.0 3.54	M20	33 1.30	2 .08	6 24	51 2.008	30.5 1.20	30.5 1.20	52 2.05	20°	10°	-	-	-
YES	YES	YES	ABM 41 X	125 4.92	70 2.76	70 2.76	40.93 1.611	43 1.69	90.0 3.54	M20	33 1.30	2 .08	6 24	51 2.008	30.5 1.20	30.5 1.20	52 2.05	20°	10°	18.0 .71	17.50 .689	r2.0 .079
NO	NO	YES	ABM 41 X N	125 4.92	70 2.76	-	40.93 1.611	-	90.0 3.54	-	33 1.30	2 .08	6 24	51 2.008	30.5 1.20	-	52 2.05	-	-	18.0 .71	17.50 .689	r2.0 .079

Long clamping arm : ABL

For swing clamp size : 11 - 21 - 31 - 41

Description

Available as standard in three different versions :

- with tappings and chamfers, without indexing
- with tappings, chamfers and indexing
- with indexing, without tapping or chamfer

Characteristics

- can be oriented through 360°
- treated against corrosion
- material : 1046
- maximum using pressure : 3500 psi

Note

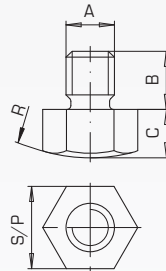
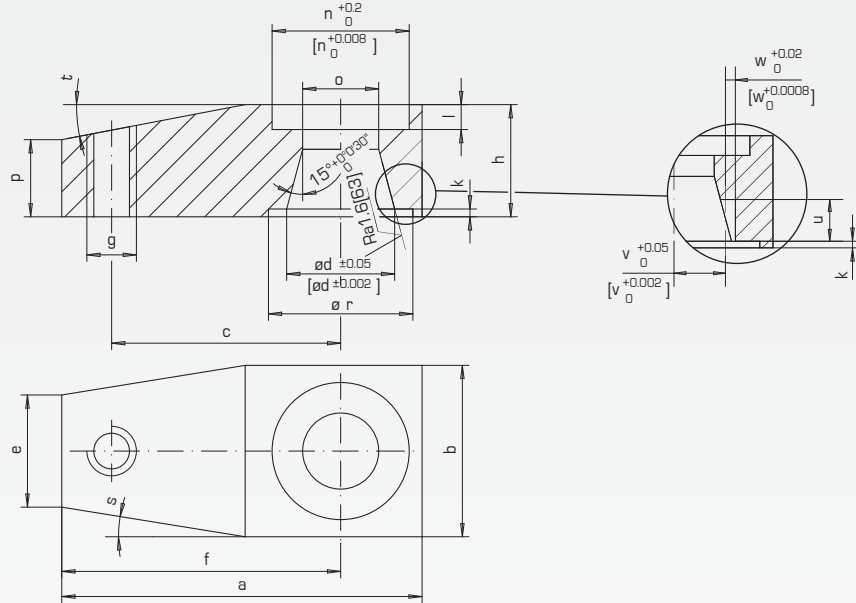
The clamping force decreases as the length of arms increases [for details, see tables page 21].

Option

Special arms made on request.

■ Restrain the rod when tightening the screw.

(see figure 1 page 44)



Type	Dimensions				
	A	B	C	R	S/P
		mm in	mm in	mm in	mm in
AVB 15.8	M8	10 .39	10 .39	20 .79	13 .51
AVB 40.12	M12	12 .47	10 .39	45 1.77	19 .75
AVB 65.16	M16	20 .79	10 .39	60 2.36	24 .94
AVB 100.20	M20	25 .98	10 .39	60 2.36	30 1.18

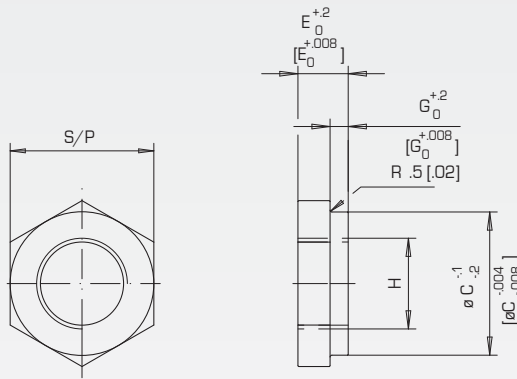
Tapping	Chamfer	Indexing	Type	Dimensions																		
				a	b	c	d	e	f	g	h	k	l	n	o	p	r	s	t	u	v	w
				mm in	mm in	mm in	mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	deg	deg	mm in	mm in
				68 2.68	30 1.18	45 1.77	17.46 .687	21 .83	53.0 2.09	M8	17 .67	1 .04	3 .12	23 .906	122 .48	135 .53	26 1.02	75°	75°	-	-	-
YES	YES	YES	ABL 11 X	68 2.68	30 1.18	45 1.77	17.46 .687	21 .83	53.0 2.09	M8	17 .67	1 .04	3 .12	23 .906	122 .48	135 .53	26 1.02	75°	75°	6.3 25	7.80 .307	r1.5 .059
NO	NO	YES	ABL 11 X N	68 2.68	30 1.18	-	17.46 .687	-	53.0 2.09	-	17 .67	1 .04	3 .12	23 .906	122 .48	-	26 1.02	-	-	6.3 25	7.80 .307	r1.5 .059
YES	YES	NO	ABL 21	110 4.33	40 1.57	75 2.95	24.46 .963	24 .94	90.0 3.54	M12	23 .91	1 .04	4 .16	31 1.220	162 .64	170 .67	34 1.34	10°	10°	-	-	-
YES	YES	YES	ABL 21 X	110 4.33	40 1.57	75 2.95	24.46 .963	24 .94	90.0 3.54	M12	23 .91	1 .04	4 .16	31 1.220	162 .64	170 .67	34 1.34	10°	10°	10.4 41	10.25 .404	r1.5 .059
NO	NO	YES	ABL 21 X N	110 4.33	40 1.57	-	24.46 .963	-	90.0 3.54	-	23 .91	1 .04	4 .16	31 1.220	162 .64	-	34 1.34	-	-	10.4 41	10.25 .404	r1.5 .059
YES	YES	NO	ABL 31	134 5.28	55 2.17	90 3.54	35.46 1.396	40 1.57	106.5 4.19	M16	30 1.18	1 .04	5 .20	41 1.614	245 .96	220 .87	45 1.77	7°	10°	-	-	-
YES	YES	YES	ABL 31 X	134 5.28	55 2.17	90 3.54	35.46 1.396	40 1.57	106.5 4.19	M16	30 1.18	1 .04	5 .20	41 1.614	245 .96	220 .87	45 1.77	7°	10°	17.0 67	14.50 .571	r2.0 .079
NO	NO	YES	ABL 31 X N	134 5.28	55 2.17	-	35.46 1.396	-	106.5 4.19	-	30 1.18	1 .04	5 .20	41 1.614	245 .96	-	45 1.77	-	-	17.0 67	14.50 .571	r2.0 .079
YES	YES	NO	ABL 41	155 6.10	70 2.76	100 3.94	40.93 1.611	50 1.97	120.0 4.72	M20	33 1.30	2 .08	6 24	51 2.008	305 1.20	270 1.06	52 2.05	8.5°	8.5°	-	-	-
YES	YES	YES	ABL 41 X	155 6.10	70 2.76	100 3.94	40.93 1.611	50 1.97	120.0 4.72	M20	33 1.30	2 .08	6 24	51 2.008	305 1.20	270 1.06	52 2.05	8.5°	8.5°	18.0 71	17.50 .689	r2.0 .079
NO	NO	YES	A BL 41 X N	155 6.10	70 2.76	-	40.93 1.611	-	120.0 4.72	-	33 1.30	2 .08	6 24	51 2.008	305 1.20	-	52 2.05	-	-	18.0 71	17.50 .689	r2.0 .079

Mounting accessories : AE and AR

Rod nuts and lock-washer
for mounting of arm onto the rod

■ The arm lock nut and lock-washer are supplied with the swing clamp. ■

■ Nut for swing clamp type AP11, AP21 and AP26



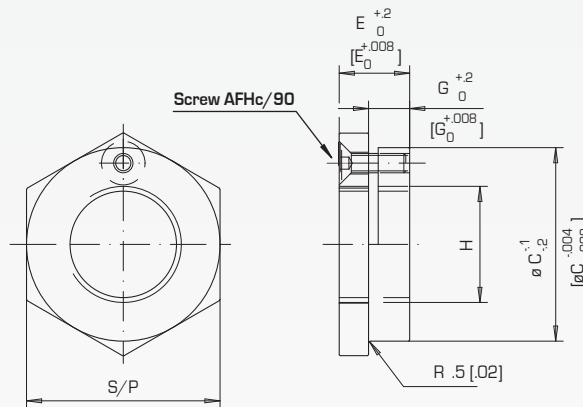
Type	Dimensions						N median torque	Flathead Screw AFHc/90
	S/P	C	E	G	H			
AE 11	22 .87	22 .866	5.9 .232	1.9 .075	M12 x 1.5	15 11.06	-	-
AE 21	30 1.18	30 1.181	7.3 .287	2.8 .110	M16 x 1.5	40 29.50	-	-

IMPORTANT NOTE :

Restrain the rod when tightening the screw.

See **figure 1** pages 20 and 44

■ Nut for cylinder type AP31 and AP41



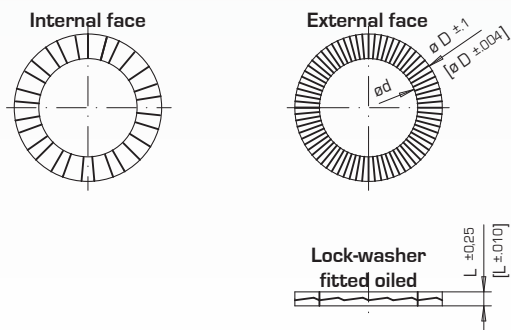
Type	Dimensions						N Median torque	Flathead Screw FHc/90
	S/P	C	E	G	H			
AE 31	40 1.57	40 1.575	12.5 .492	9.0 .354	M24 x 1.5	125 92.50	M4 x 12	
AE 41	46 1.81	50 1.969	15.0 .591	10.5 .413	M30 x 1.5	230 169.64	M5 x 12	

IMPORTANT NOTE :

Restrain the rod when tightening the screw.

See **figure 1** pages 20 and 44

■ Lock-washer for cylinder type AP11, AP21 and AP26



Type	Dimensions		
	D	d	L
	mm	mm	mm
AR 11	19.5 .768	13 .51	2.6 .102
AR 21	24.5 .965	17 .67	3.7 .146

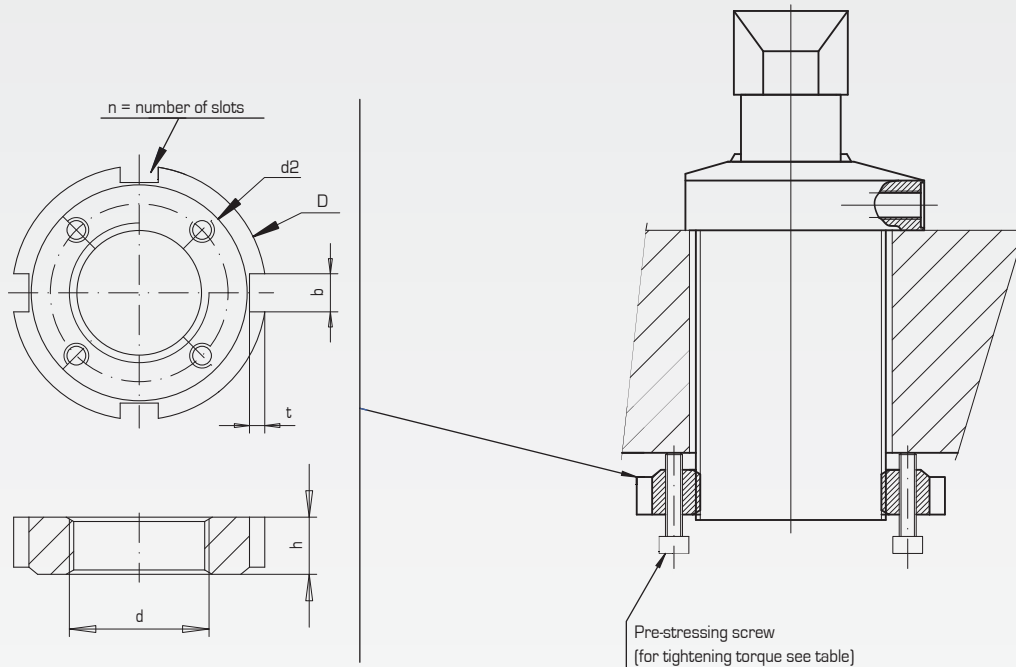
Mounting accessories : EMB

Nut for threaded swing clamps

AP11 - AP21 - AP31 - AP41

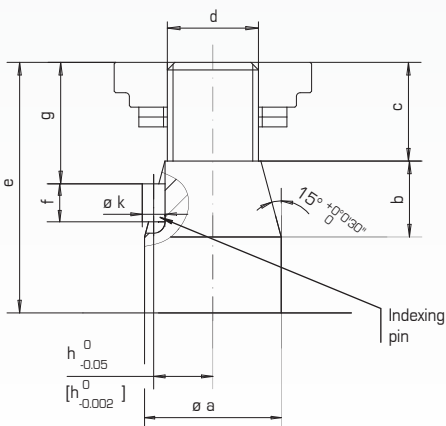
Special nut for threader swing clamps

Recommended fitting to prevent loosening of nut



Type	Type of cylinder	Tapping d	D	d2	h	Dimensions		t	n	Screw	median torque
						b					
AEMB 3615	AP11	M36 x 1.5	68 268	60 2.36	11 .43	8 .32		3.5 .14	4 .16	M6	5 3
AEMB 5215	AP21	M52 x 1.5	92 3.62	82 3.23	13 .51	10 .39		4.0 .16	4 .16	M8	13 9
AEMB 7220	AP31	M72 x 2.0	122 4.80	112 4.41	14 .55	10 .39		4.0 .16	4 .16	M12	34 25
AEMB 8520	AP41	M85 x 2.0	142 5.59	132 5.20	16 .63	10 .39		4.0 .16	4 .16	M14	62 45

Details of ends of rod for swing clamps



Type	Dimensions								
	a	b	c	d	e	f	g	h	k
AP11 028	18 .71	10 .39	13 .51	M12 x 1.5	33 1.30	5 .20	16 .63	7.80 .307	3 .11
AP21/AP26 028	25 .98	14 .55	16 .63	M16 x 1.5	45 1.77	5 .20	19 .75	10.25 .404	3 .11
AP31 028	36 1.42	20 .79	18 .71	M24 x 1.5	53 2.09	8 .32	21 .83	14.50 .571	4 .16
AP41 028	42 1.65	22 .87	20 .79	M30 x 1.5	57 2.24	8 .32	23 .91	17.50 .689	4 .16

AAVV_ 11	Work supports - Threaded body	079
AAVV_ 12	Work supports - Threaded body	080
AAVC	Work supports - Cartridge	081
AAVB	Work supports - Block	083
AAVL	Work supports - Manifold ports on top flange	084
AAVF	Work supports - Manifold ports on bottom flange	085
AAVCH	Work supports - Cartridge 1 Hydraulic port	086
AAVBH	Work supports - Block 1 Hydraulic port	088
AAVLH	Work supports - Manifold ports on top flange 1 Hydraulic port	089
AAVLHT	Work supports - Threaded ports on top flange 1 Hydraulic port	090
AAVFH	Work supports - Manifold ports on bottom flange 1 Hydraulic port	091
AAVFHT	Work supports - Threaded ports on bottom flange 1 Hydraulic port	092

Type

**Contact force exerted by spring.
The rod is extended at rest.**

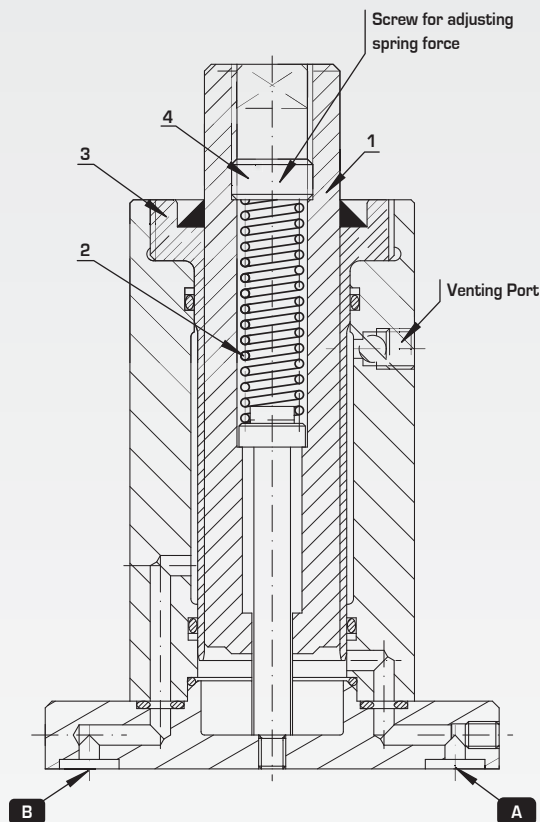
The component to be machined contacts the end of the rod [1] and compresses spring [2].

The rod is locked in position by the locking ring [3] through the pressure from the oil at port [B].

The contact force on the component is adjustable with screw [4].

Port [A] : Vent

To be piped to a location that is dry and contamination free.



Type

**Contact force exerted by air pressure.
The rod may be in any position.**

This type allows precise adjustment of the contact force to be obtained.

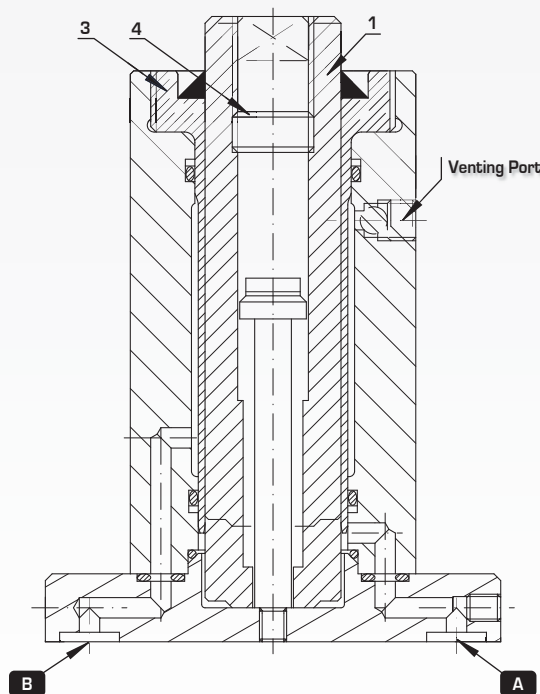
The rod emerges by supplying air to port [A].

The rod is locked in position by the locking ring [3] through the pressure from the oil at port [B].

In this version, the spring [2] is absent and the screw [4] is sealed.

This model does not require a vent

Use dry filtered air.



Work supports

Principle of operation

Locking force at 4351 psi : 1124 to 4946 lbs

Type : AAVF__AR

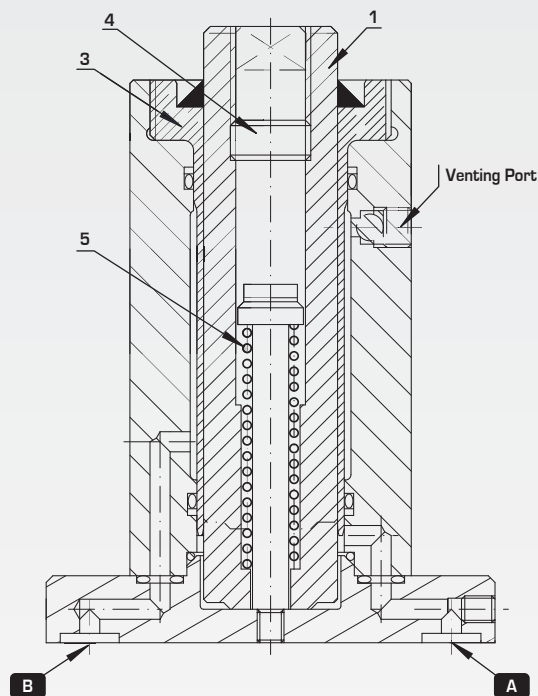
**Contact force exerted by air pressure.
The rod is retracted at rest**

This model allows lateral loading of the component.

The rod emerges by supplying air to port **A**.

The rod is locked in position by the locking ring **[3]** through the pressure from the oil at port **B**.

The rod is retracted through the use of the spring **[5]**.



Type : AAVFH__

**Hydraulic Advancement of Rod
Contact force exerted by spring
The rod is retracted at rest.**

This model has the advantage of using a single port for hydraulic supply for extension and locking of the rod.

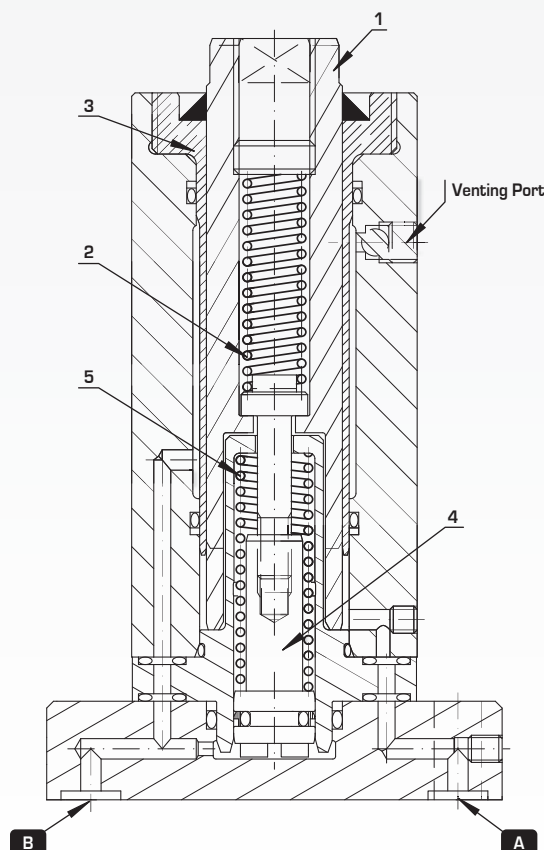
The rod extends through oil pressure at port **B** until it comes into contact with the component through the spring **[2]**.

After the piston **[4]** reaches its internal movement end position, the pressure increases and the locking ring **[3]** locks the rod.

The rod is retracted through the use of the spring **[5]**.

Port **A** : Vent

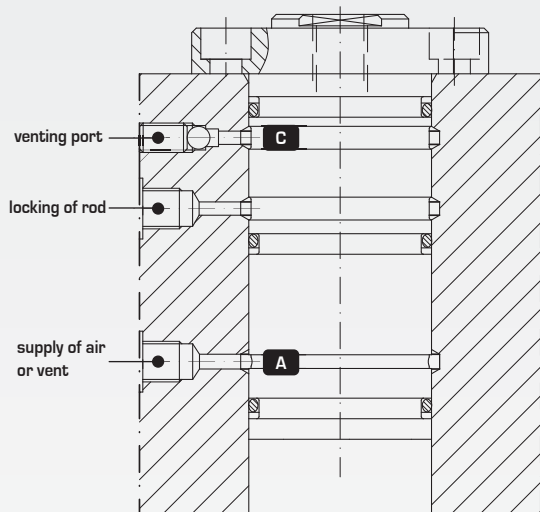
To be piped to a location that is dry and contamination free.



Work supports

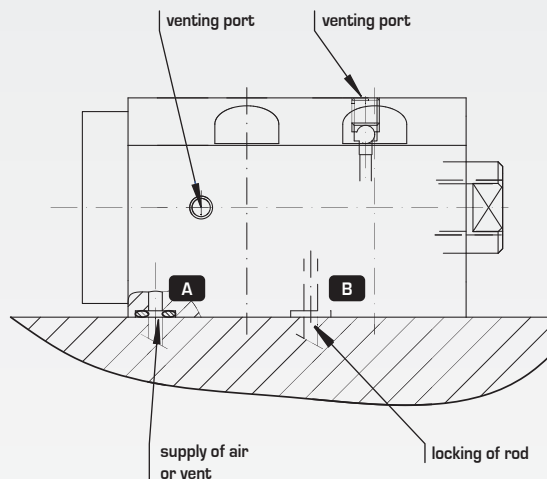
Examples of assembly
Type AAVC, AAVB, AAVF and AAVL

Type : AAVC



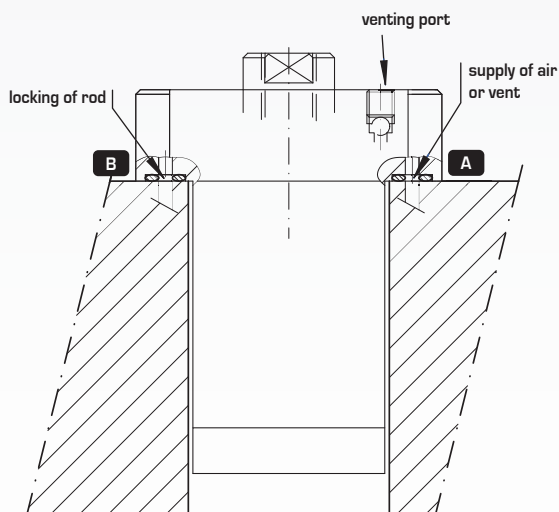
Technical characteristics, see pages 81, 82, 86, 87

Type : AAVB



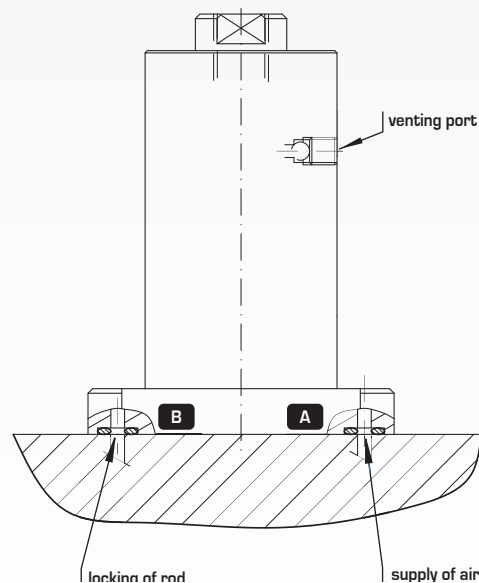
Technical characteristics, see pages 83, 88

Type : AAVL



Technical characteristics, see pages 84, 89

Type : AAVF



Technical characteristics, see pages 85, 91

Work supports : AAVV_11

Type : Threaded body

Locking force at 5000 : 850 lbs

Description

Hydraulic mountings are intended to support components being machined in a precise plane and to eliminate vibration during machining.

Note

IMPORTANT for AAVVH

To allow spring to retract the rod, the counter-pressure must be less than 25 psi.

Characteristics

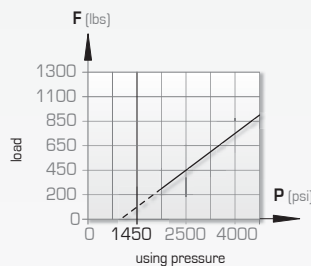
- anticorrosion treated threaded steel body
- piston made from treated steel
- very compact design
- strokes : .31 in and .59 in
- hydraulic extension and locking

Option

Special models on request.

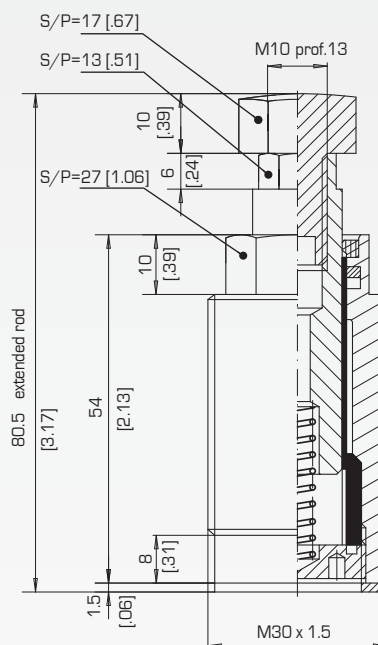


Locking force graph



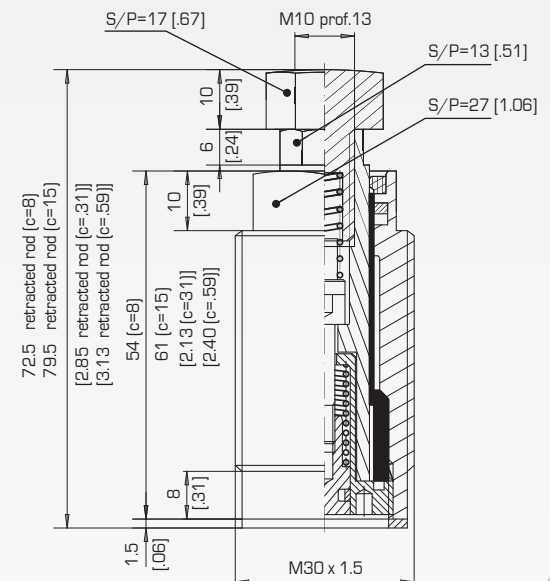
Type AAVVR

Contact by spring

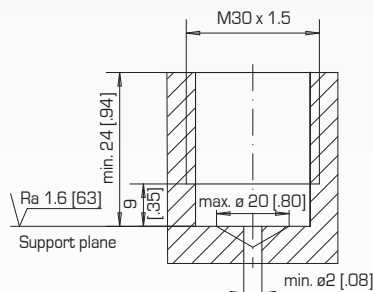


Type AAVVH

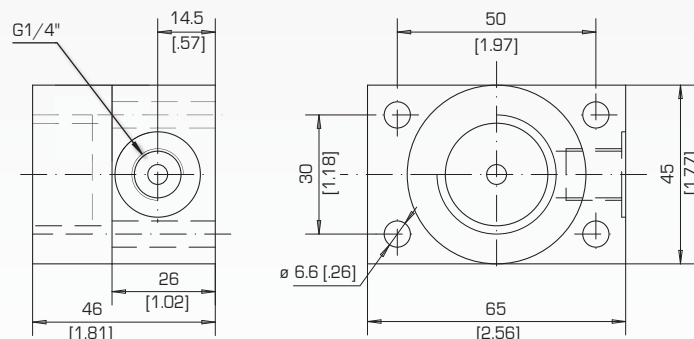
Extension by hydraulic pressure
contact by spring



Housing machining dimensions



Connection block



Minimum spring force	Maximum spring force	Maximum load at 5000 psi	Stroke	Radius of the rod	Type	Maximum flow rate	Minimum recommended oil pressure	Tightening torque	Weight
kN lbs	N lbs	kN lbs	mm in	mm in		cm ³ /s in ³ /s	bar psi	Nm lbs/ft	kg lbs
8 1.80	13 2.92	4 850	8 .31	16 .63	AAVVR 11	-	160 2321	60 44.25	.22 .49
10 2.25	23 5.17	4 850	8 .31	16 .63	AAVVH 11	25 1.53	160 2321	60 44.25	.22 .49
10 2.25	23 5.17	4 850	15 .59	16 .63	AAVVH 11 C15	25 1.53	160 2321	60 44.25	.25 .55

Work supports : AAVV_12

Type : Threaded body

Locking force at 5000 : 1300 lbs

Description

Hydraulic mountings are intended to support components being machined in a precise plane and to eliminate vibration during machining.

Note

IMPORTANT for AAVVH

To allow spring to retract the rod, the counter-pressure must be less than 25 psi.

Characteristics

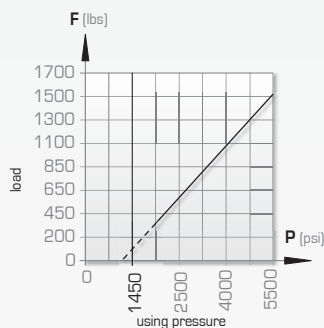
- anticorrosion treated threaded steel body
- piston made from treated steel
- very compact design
- stroke : .31 in
- hydraulic extension and locking

Option

Special models on request.

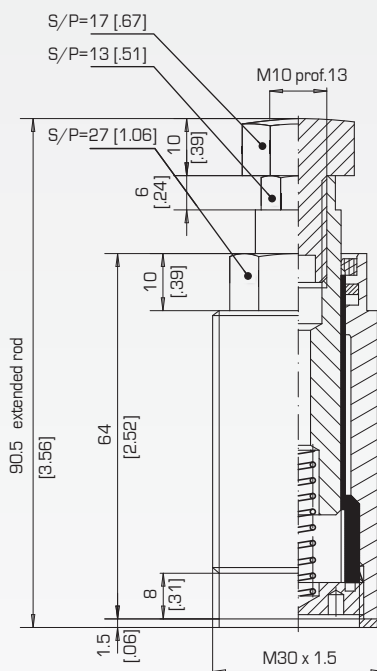


Locking force graph



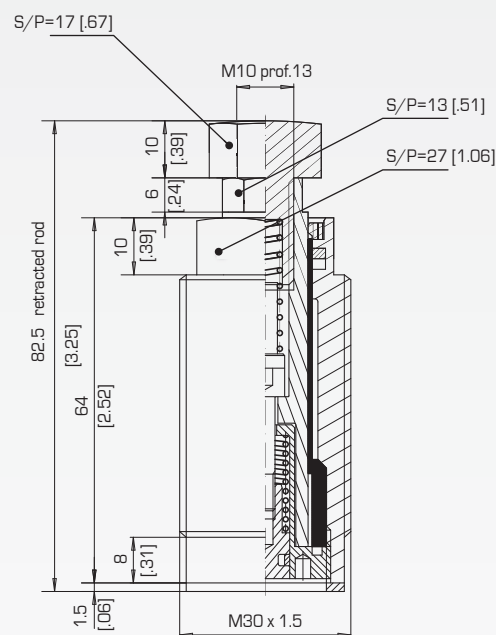
Type AAVVR

Contact by spring

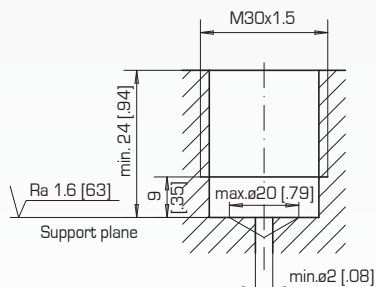


Type AAVVH

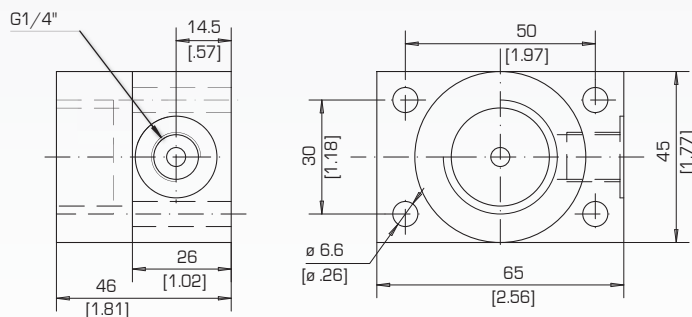
Extension by hydraulic pressure contact by spring



Housing machining dimensions



Connection block



Minimum spring force	Maximum spring force	Median load at 5000 psi	Stroke	Radius of the rod	Type	Median flow rate	Minimum recommended oil pressure	Tightening torque	Weight
N lbs	N lbs	kN lbs	mm in	mm in		cm ³ /s in ³ /s	bar psi	Nm lbs/ft	kg lbs
8 1.80	13 2.92	6 1300	8 .31	16 .63	AAVVR 12	-	160 2321	60 44.25	.26 .57
10 2.25	23 5.17	6 1300	8 .31	16 .63	AAVVH 12	25 1.53	160 2321	60 44.25	.26 .57

Work supports : AAVC

Type : Cartridge

Locking force at 4000 psi : 1100 to 4000 lbs

Description

Hydraulic mounting are intended to support components being machined in a precise plane and to eliminate vibration during machining. The cartridge type mountings allow particularly compact assemblies to be made and allow direct supply through the drilled block.

Supply using compress air provides precise adjustment of the contact force.

Example of assembly see page 82

Principle of operation see pages 76, 77.

Characteristics

- fixing using front clamp
- direct supply through the drilled block
- contact force generated by the spring, air pressure, or air pressure with retraction of rod by spring
- rod treated to prevent seizure and corrosion
- stainless steel spring
- supplied with o-rings and anti-extrusion rings

Note

IMPORTANT

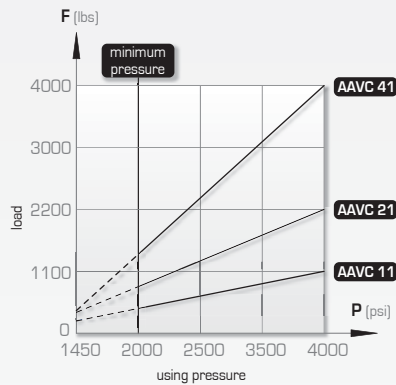
The venting port point must always be located at the highest point of the assembly.

Option

For clamping pressure less than 2000 psi, please contact us.

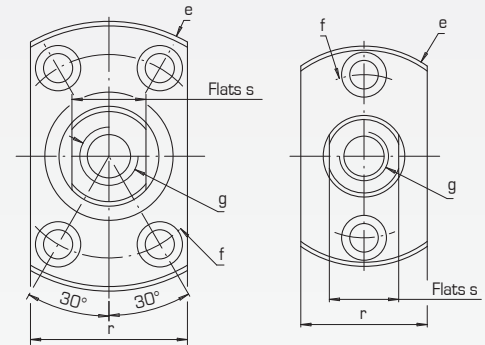


Locking force graph

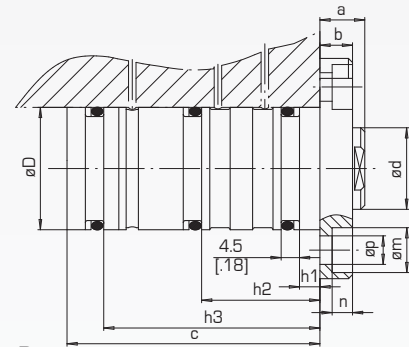


Type AAVC 41

Type AAVC 11/21



Supply ports, see page 82



Type	Contact force by spring	
	Retracted rod Max.	Extended rod Min.
	N lbs	N lbs
AAVC 11 R	36 8.09	8 1.80
AAVC 21 R	52 11.69	8 1.80
AAVC 41 R	100 22.48	45 10.12

DESCRIPTION :

Rod extended at rest = Contact force exerted by spring
Free rod = Contact force exerted by compressed air
Retracted rod at rest = Contact force exerted by compressed air and return by spring

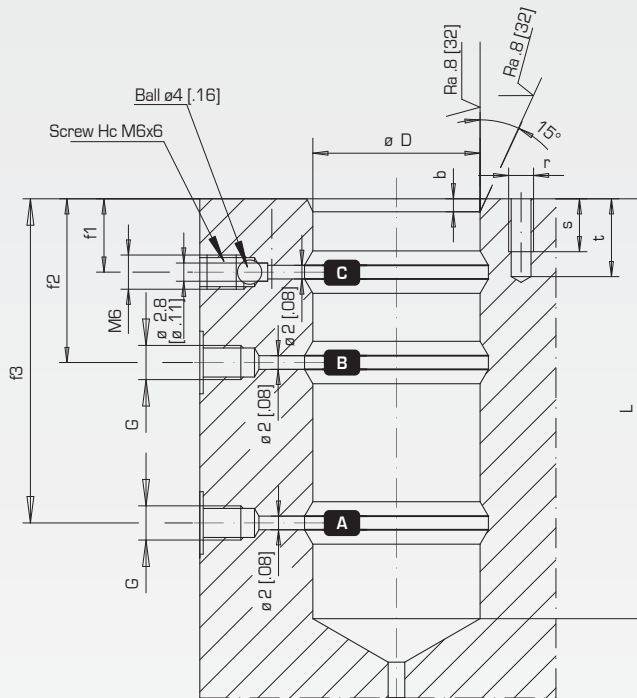
: AAVC_R
: AAVC_A
: AAVC_AR

Force at 2000 psi	Min locking force at 4000 psi	Stroke	Radius of the rod	Type	Dimensions														
					D	g	a	b	c	e	f	h1	h2	h3	p	m	n	r	s
kN lbs	kN lbs	mm in	mm in		mm in		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
2.0 450	5 1100	12 .47	20 .79	AAVC 11 R AAVC 11 A AAVC 11 AR	30 1.18	M12 depth 20	11 .43	8 .31	62 2.44	54 2.13	40 1.57	5 20	29 1.14	53.0 2.09	7 .28	11 .43	5.0 .20	31 1.22	17 .67
3.7 800	10 2200	18 .71	30 1.18	AAVC 21 R AAVC 21 A AAVC 21 AR	40 1.57	M12 depth 25	13 .51	10 .39	80 3.15	65 2.56	50 1.97	5 20	35 1.38	71.0 2.80	7 .28	11 .43	6.8 .27	42 1.65	24 .94
6.3 1400	20 4000	20 .79	40 1.57	AAVC 41 R AAVC 41 A AAVC 41 AR	50 1.97	M12 depth 25	14 .55	10 .39	90 3.54	75 2.95	60 2.36	5 20	42 1.65	79.5 3.13	7 .28	11 .43	6.8 .27	52 2.05	32 1.26

Housing : AAVC

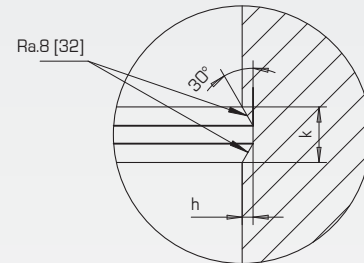
For anti-vibration mounting type AAVC
Machining dimensions - Example

Housing machining dimensions

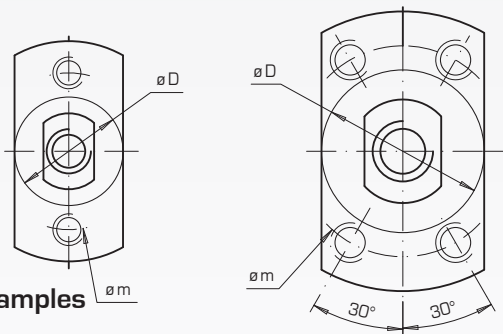


ø3 mini
Vent ports allow air to be expelled during fitting of the mounting

Detail of groove



A = Air supply or vent
B = Oil supply for locking sleeve
C = venting port



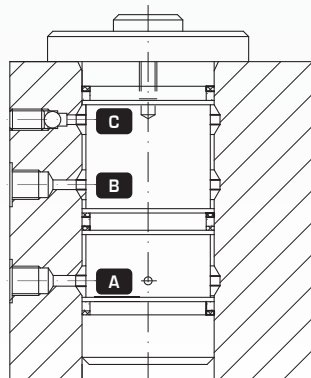
Examples

IMPORTANT :

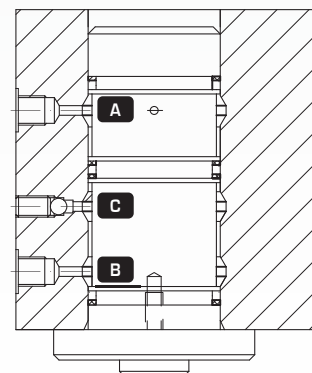
Venting port must be located at the highest point in the assembly
Venting port must be made at low pressure (< 280 psi)
General tolerances Js13, please see the reference on page 121
Round off and polish sharp angles

Type	Dimensions													
	øD H7	b	L min.	f1	f2	f3	G	h min.	k	m	r	s	t	
AAVC 11	30 1.181	3 .12	64 2.52	13.0 .51	24 .94	46 1.81	G1/4"	0.5 .02	3 .12	40 1.57	M6	10 .39	12 .47	
AAVC 21	40 1.575	3 .12	82 3.23	14.0 .55	30 1.18	63 2.48	G1/4"	1.0 .039	4 .16	50 1.97	M6	10 .39	12 .47	
AAVC 41	50 1.969	3 .12	92 3.62	13.5 .53	30 1.18	75 2.95	G1/4"	1.0 .039	5 .20	60 2.36	M6	10 .39	12 .47	

Mounting with rod upwards



Mounting with rod downwards



**all
american®** Bushing and Workholding Solutions

Work supports : AAVL

Type : Manifold ports on top flange
Locking force at 4000 psi: 1500 to 2800 lbs

Description

Hydraulic mountings are intended to support components being machined in a precise plane and to eliminate vibration during machining. Supply using compressed air provides precise adjustment of the contact force.
Locking is achieved by maintenance of the oil pressure.
Operating principle see pages 76, 77

Option

For clamping pressures less than 2000 psi, please contact us.

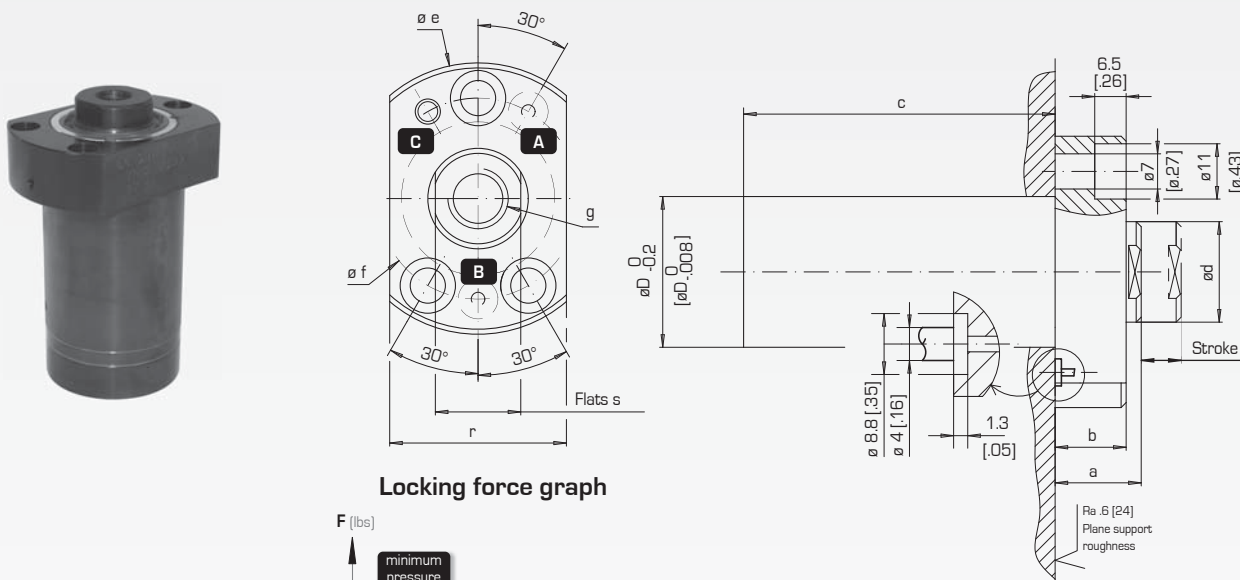
Characteristics

- fixing using flange
- supply through counter-bores
- contact force generated by the spring, air pressure, or air pressure with retraction of rod by spring
- rod treated to prevent seizure and corrosion
- stainless steel spring
- supplied with O-rings 5.28 x 1.78 mm - 90 NBR

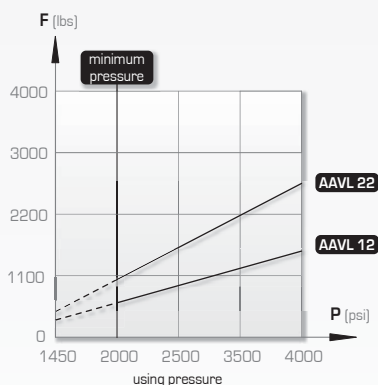
Note

IMPORTANT

The venting port point must always be located at the highest point of the assembly.



Locking force graph



Type	Contact force by spring	
	Retracted rod Max.	Extended rod Min.
	N lbs	N lbs
AAVL 12 R	28 6.29	10 2.23
AAVL 22 R	48 10.79	15 3.37

DESCRIPTIONS :

Rod extended at rest = Contact force exerted by spring
Free rod = Contact force exerted by compressed air
Rod retracted at rest = Contact force exerted by compressed air and return by spring

: AAVL__R
: AAVL__A
: AAVL__AR

A = Air supply or vent
B = Oil supply for locking sleeve
C = venting port

Force at 2000 psi	Min locking force at 4000 psi	Stroke	Rod ø d	Type	Dimensions									
					D	a	b	c	øe	øf	g	r	s	
kN lbs	kN lbs	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in		mm in	mm in	
2.8 600	7.0 1500	12 .47	20 .79	AAVL 12 R AAVL 12 A AAVL 12 AR	42 1.654	28 1.10	20 .79	64 2.52	67 2.64	54 2.13	M12 depth 12	42 1.65	17 .67	
4.7 1000	12.5 2500	12 .47	30 1.18	AAVL 22 R AAVL 22 A AAVL 22 AR	54 2.126	32 1.26	22 .87	68 2.68	79 3.11	66 2.60	M12 depth 12	54 2.13	26 1.02	

Work supports : AAVF

Type :Manifold ports on bottom flange

Locking force at 4000 psi : 1500 to 2800 lbs

Description

Hydraulic mountings are intended to support components being machined in a precise plane and to eliminate vibration during machining. Supply using compressed air provides precise adjustment of the contact force

Locking is achieved by maintenance of the oil pressure.

Operating principle see pages 76, 77

Characteristics

- fixing using flange
- supply through counter-bores
- contact force generated by the spring, air pressure, or air pressure with retraction of rod by spring
- rod treated to prevent seizure and corrosion
- stainless steel spring
- supplied with O-rings 5.28 x 1.78 mm - 90 NBR

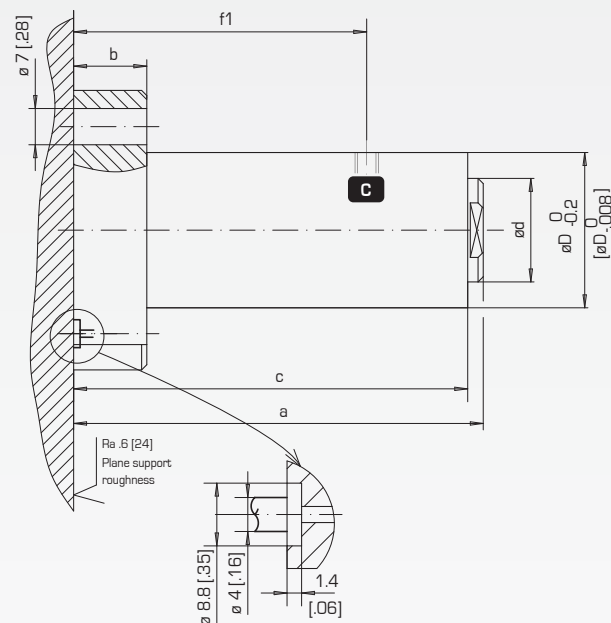
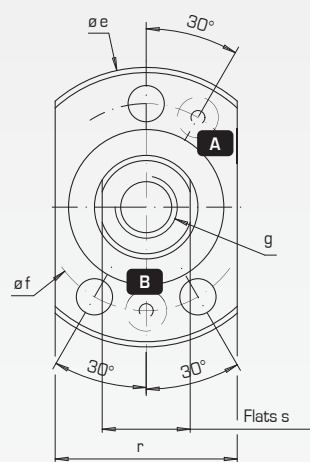
Option

For clamping pressures less than 2000 psi, please contact us.

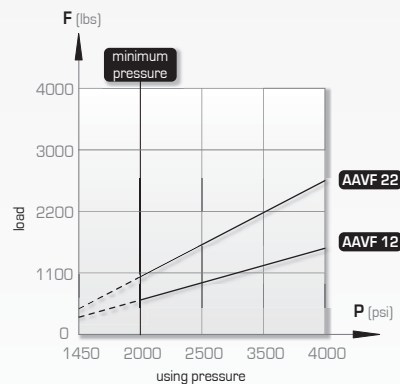
Note

IMPORTANT

The venting port point must always be located at the highest point of the assembly.



Locking force graph



Type	Contact force by spring	
	Retracted rod Max.	Extended rod Min.
	N lbs	N lbs
AAVF 12 R	28 6.29	10 2.23
AAVF 22 R	48 10.79	15 3.37

DESCRIPTIONS :

Rod extended at rest = Contact force exerted by spring

Free rod = Contact force exerted by compressed air

Rod retracted at rest = Contact force exerted by compressed air and return by spring

: AAVF_R
: AAVF_A
: AAVF_AR

A = Air supply or vent
B = Oil supply for locking sleeve
C = venting port

Force at 2000 psi	Min locking force at 4000 psi	Stroke	Rod ϕd	Type	Dimensions									
kN lbs	kN lbs	mm in	mm in		D	a	b	c	ϕe	g	ϕf	f1	r	s
					mm in	mm in	mm in	mm in	mm in	mm	mm in	mm in	mm in	mm in
2.8 600	7.0 1500	12 .47	20 .79	AAVF 12 R AAVF 12 A AAVF 12 AR	42 1.654	92 3.62	10 .39	84 3.31	67 2.64	M12 depth 12	54 2.13	62 2.44	42 1.65	17 .67
4.7 1000	12.5 2500	12 .47	30 1.18	AAVF 22 R AAVF 22 A AAVF 22 AR	54 2.126	100 3.94	10 .39	90 3.54	79 3.11	M12 depth 12	66 2.60	68 2.67	54 2.13	26 1.02

ONE SINGLE HYDRAULIC PORT

Description

Hydraulic mountings are intended to support components being machined in a precise plane and to eliminate vibration during machining.

Mounting with one single hydraulic supply port for extension and locking of the rod.

Operating principle se page 77

Supply ports see page 87

Option

For clamping pressures less than 2000 psi, please contact us.

Characteristics

- fixing using front flange
- direct supply through the drilled block
- rod treated to prevent seizure and corrosion
- stainless steel spring
- supply with o-ring and anti-extrusion ring

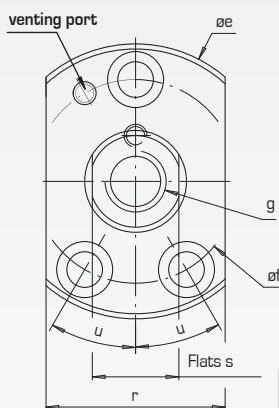
Note

IMPORTANT

The venting port point must always be located at the highest point in the assembly.

In order to allow the rod to be retracted by springs the counter pressure must not exceed 29 psi.

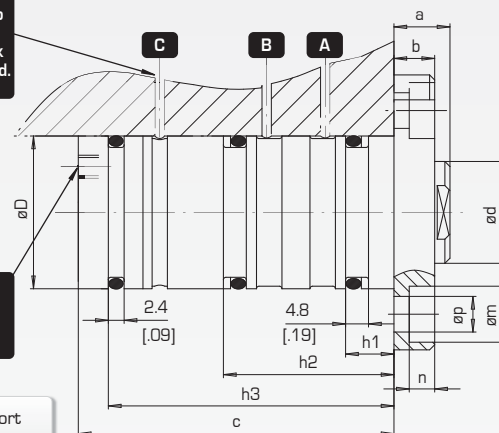
Maximum flow : .40 gal/mn



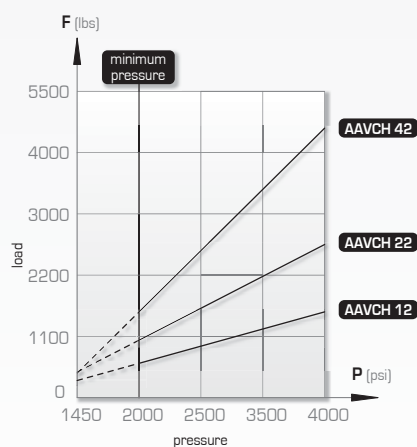
Possible to lead vent to a clean area of the assembly if there a risk of liquid being aspirated.

Vent filter + plug
Remove the plug if the vent is not led inside the assembly

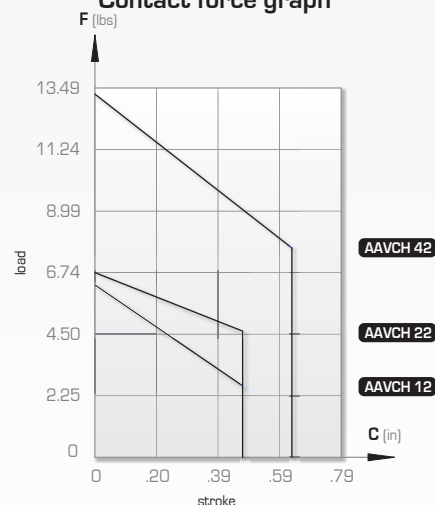
A = Oil supply/venting port
B = Oil supply/venting port
C = Vent



Locking force graph



Contact force graph



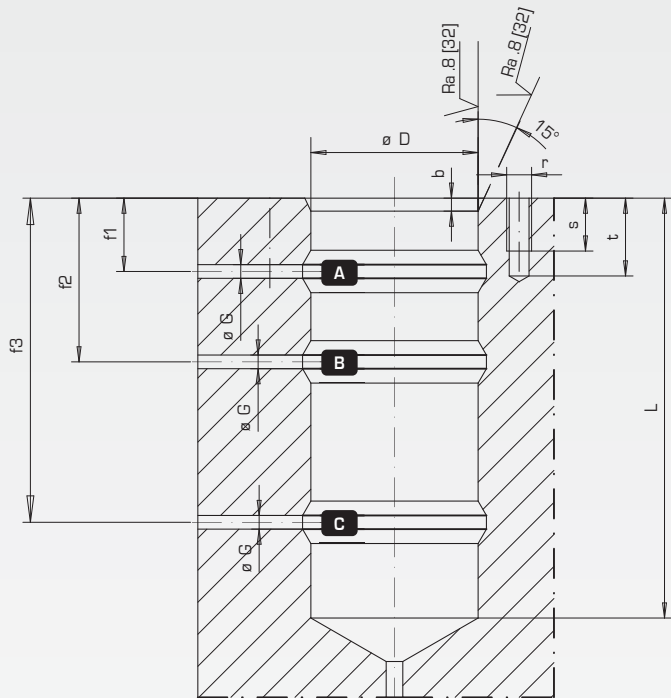
Force at 2000 psi	Min locking force at 4000 psi	Stroke	ø of the rod	Type	Dimensions															
					D	a	b	c	øe	øf	g	h1	h2	h3	m	n	p	r	s	u
kN lbs	kN lbs	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	deg
2.8 600	7.0 1500	12 .47	20 .79	AAVCH 12	42 1.65	28 1.10	20 .79	84 2.31	67 2.64	54 2.13	M12 depth 15	10 .39	44.0 1.73	58 2.28	11 .43	6.5 .26	7 .28	42 1.65	17 .67	30°
4.7 1000	12.5 2500	12 .47	30 1.18	AAVCH 22	54 2.13	32 1.26	22 .87	82 3.23	79 3.11	66 2.59	M12 depth 18	10 .39	44.0 1.73	58 2.28	11 .43	6.5 .26	7 .28	54 2.13	26 1.02	30°
7.0 1500	22.0 4500	16 .63	40 1.57	AAVCH 42	67 2.64	40 1.57	28 1.10	110 4.33	98 3.86	82 3.23	M16 depth 16	10 .39	57.5 2.26	76 2.99	14 .55	9.0 .35	9 .35	67 2.64	34 1.34	35°

Housing : AAVCH

For anti-vibration mounting type AAVCH

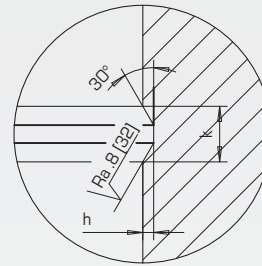
Machining dimensions - Example

Housing machining dimensions



ø3 mini
Vent ports allow air to be expelled during fitting of the mounting

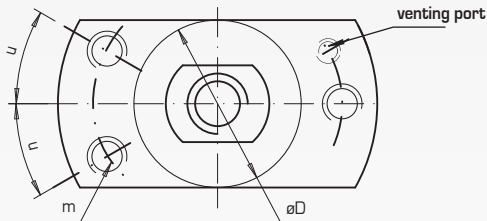
Detail of groove



A = Oil supply/venting port
B = Oil supply/venting port
C = Vent

IMPORTANT :

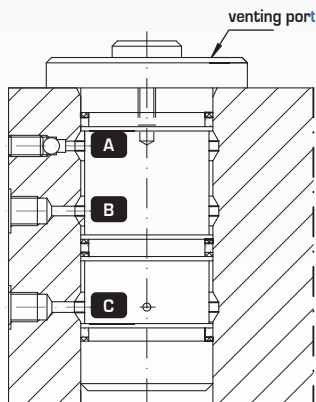
Venting port must be located at the highest point in the assembly
Venting port must be made at low pressure (< 290 psi)
General tolerances Js13, please see reference on page 121
Round off and polish sharp angles



Type	Dimensions														
	øD H7	b	L min.	f1	f2	f3	G max.	h min.	k	m	r	s	t	u	
AAVCH 12	42	1.654	3 .12	86	3.39	16 .63	33.0	1.30	50	1.97	5 .20	7 .03	8 .31	54	2.13
AAVCH 22	54	2.126	3 .12	84	3.31	16 .63	33.0	1.30	49	1.93	5 .20	7 .03	8 .31	66	2.60
AAVCH 42	67	2.638	3 .12	112	4.41	16 .63	46.5	1.83	68	2.68	6 .24	1.0 .04	10 .39	82	3.23

Example

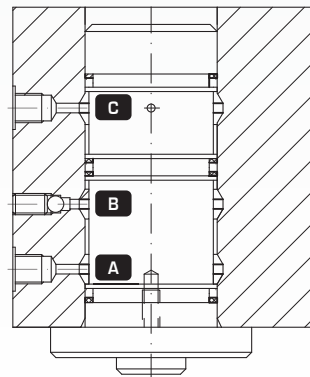
Mounting with rod upwards



Venting port at **A** if the mounting venting port is inaccessible.

Mounting with rod downwards

(Reverse **B** and **C**)



Work supports : AAVBH

Type : Block

Locking force at 4351 psi : 1574 to 4946 lbs

ONE SINGLE HYDRAULIC PORT

Description

Hydraulic mountings are intended to support components being machined in a precise plane and to eliminate vibration during machining.

Mounting with one single hydraulic supply port for extension and locking of the rod.

Operating principle see page 77

Option

For clamping pressures less than 2176 psi, please contact us.

Characteristics

- fixing using screws
- rod treated to prevent seizure and corrosion
- stainless steel spring
- initial force generated by spring
- supplied with O-rings :
5.28 x 1.78 mm - 90 NBR for AAVBH 12 and AAVBH 22
7.65 x 1.78 mm - 90 NBR for AAVBH 42

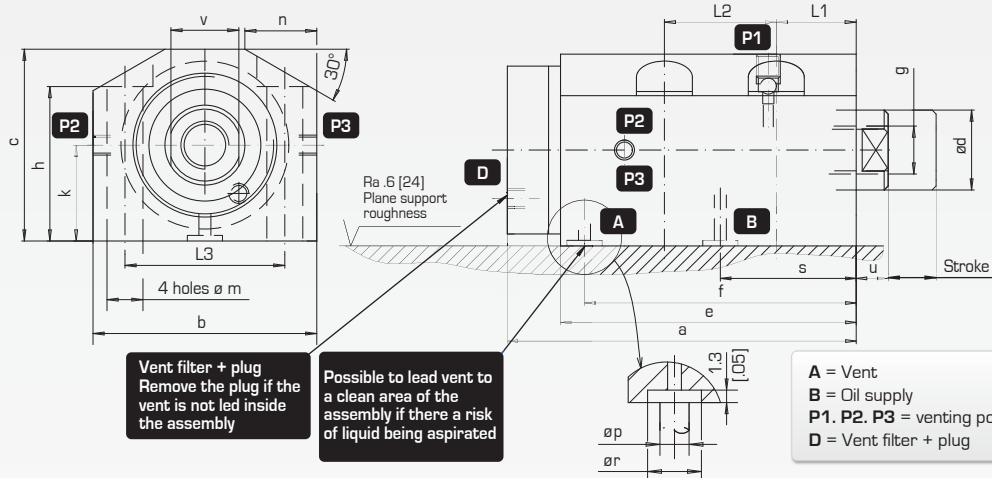
Note

IMPORTANT

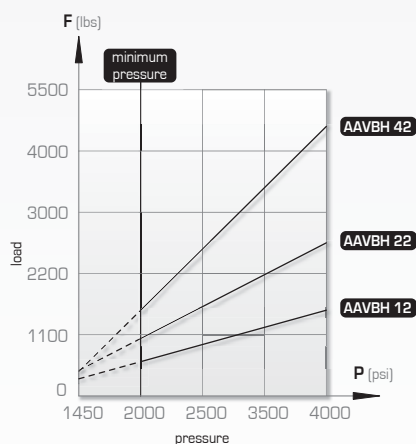
The venting port point must always be located at the highest point in the assembly.

In order to allow the rod to be retracted by springs the counter pressure must not exceed 29 psi.

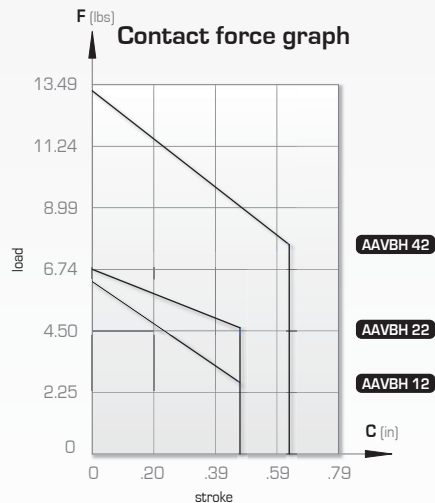
Maximum flow : .40 gal/mn



Locking force graph



Contact force graph



Force at 2000 psi	Min locking force at 4000 psi	Stroke	ø of the rod	Type	Dimensions																	
					a	b	c	e	f	g	h	k	m	n	p	r	s	u	v	L1	L2	L3
				kN lbs	kN lbs	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in
2.8 600	7.0 1500	12 47	20 .79	AAVBH 12	104 4.09	56 2.20	48 1.89	83 3.27	68 2.68	M12 depth 15	38 1.50	24 .94	9 .35	18 .71	4 .16	8.8 .35	34 1.34	8 .31	17 .67	20 .79	28 1.10	40 1.57
4.7 1000	12.5 2500	12 47	30 1.18	AAVBH 22	104 4.09	70 2.76	58 2.28	83 3.27	72 2.83	M12 depth 18	44 1.73	29 1.14	11 .43	25 .98	4 .16	8.8 .35	34 1.34	10 .39	26 1.02	20 .79	28 1.10	52 2.05
7.0 1500	22.0 4500	16 63	40 1.57	AAVBH 42	138 5.43	96 3.78	70 2.76	109 4.29	98 3.86	M16 depth 16	55 2.17	35 1.38	15 .59	25 .98	5 .20	11.0 .43	42 1.65	12 .47	34 1.34	23 .91	38 1.50	74 2.91

Work supports : AAVLH

Type : Manifold ports on top flange

Locking force at 4000 psi : 1500 to 4500 lbs

ONE SINGLE HYDRAULIC PORT

Description

Hydraulic mountings are intended to support components being machined in a precise plane and to eliminate vibration during machining.
Mounting with one single hydraulic supply port for extension and locking of the rod.
Operating principle see page 77

Option

Special models available on request.
For clamping pressures less than 2000 psi, please contact us.

Characteristics

- fixing using screws
- rod treated to prevent seizure and corrosion
- stainless steel spring
- initial force generated by spring
- supplied with o-rings :
5.28 x 1.78 mm - 90 NBR for AAVLH 12 and AAVLH 22
7.65 x 1.78 mm - 90 NBR for AAVLH 42

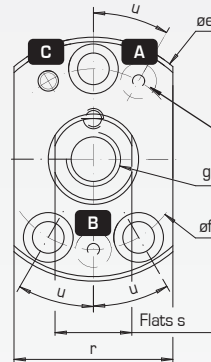
Note

IMPORTANT

The venting port point must always be located at the highest point in the assembly.

In order to allow the rod to be retracted by springs the counter pressure must not exceed 29 psi.

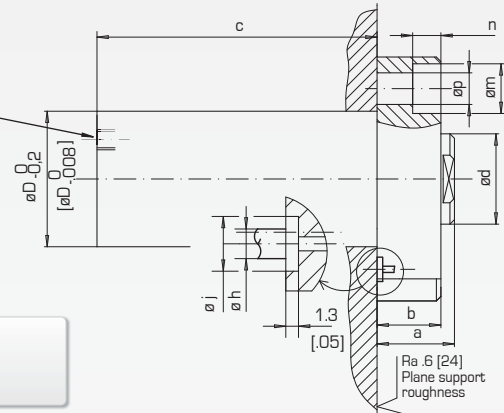
Maximum flow : .40 gal/mn



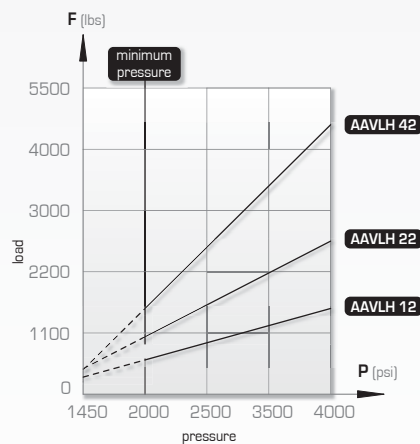
Vent filter + plug
Remove the plug if the vent is not led inside the assembly

Possible to lead vent to a clean area of the assembly if there a risk of liquid being aspirated

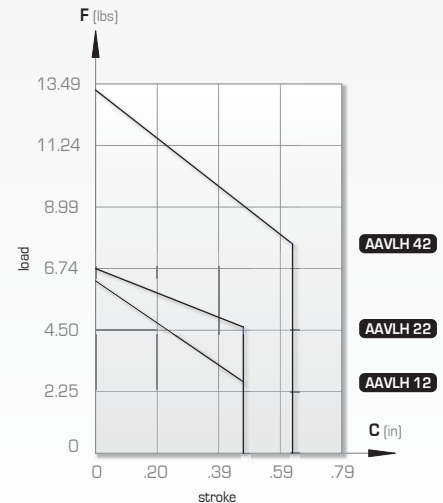
A = Vent
B = Oil supply
C = venting port



Locking force graph



Contact force graph



Force at 2000 psi	Min locking force at 4000 psi	Stroke	ø of the rod	Type	Dimensions														
					D	a	b	c	e	f	g	h	j	p	m	n	r	s	u
kN lbs	kN lbs	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in	mm in	deg
2.8 600	7.0 1500	12 .47	20 .79	AAVLH 12	42 1.654	28 1.10	20 .79	84 3.31	67 2.64	54 2.13	M12 depth 15	4 .16	8.8 .35	7 .28	11 .43	6.5 .26	42 1.65	17 .67	30°
4.7 1000	12.5 2500	12 .47	30 1.18	AAVLH 22	54 2.126	32 1.26	22 .87	82 3.23	79 3.11	66 2.59	M12 depth 18	4 .16	8.8 .35	7 .28	11 .43	6.5 .26	54 2.13	26 1.02	30°
7.0 1500	22.0 4500	16 .63	40 1.57	AAVLH 42	67 2.638	40 1.57	28 1.10	110 4.33	98 3.86	82 3.23	M16 depth 16	5 .20	11.0 .43	9 .35	14 .55	9.0 .35	67 2.64	34 1.34v	35°

Work supports : AAVLHT

Type : Threaded ports on top flange
Locking force at 4000 psi : 1500 to 4500 lbs

ONE SINGLE HYDRAULIC PORT

Description

Hydraulic mountings are intended to support components being machined in a precise plane and to eliminate vibration during machining.

Mounting with one single hydraulic supply port for extension and locking of the rod.

Operating principle see page 77

Option

Special models available on request.

For clamping pressures less than 2000 psi, please contact us.

Characteristics

- fixing using screws
- rod treated to prevent seizure and corrosion
- stainless steel spring
- initial force generated by spring

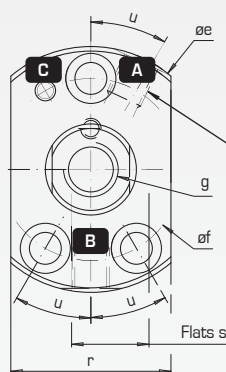
Note

IMPORTANT

The venting port point must always be located at the highest point in the assembly.

In order to allow the rod to be retracted by springs the counter pressure must not exceed 29 psi.

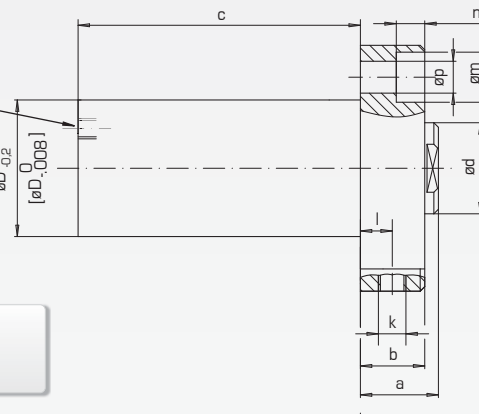
Maximum flow : .40 gal/mn



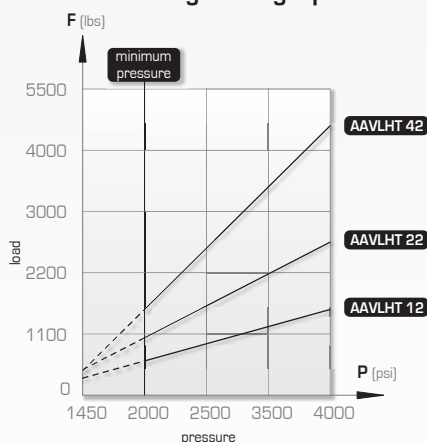
Vent filter + plug
Remove the plug if the vent is not led inside the assembly

Possible to lead vent to a clean area of the assembly if there is a risk of liquid being aspirated
ø G 1/8"

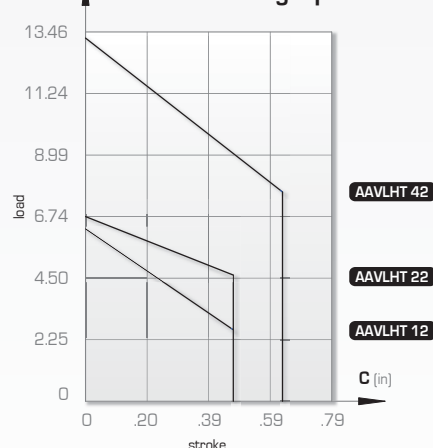
A = Vent
B = Oil supply
C = venting port



Locking force graph



Contact force graph



Force at 2000 psi	Min locking force at 4000 psi	Stroke	ø of the rod	Type	Dimensions														
					D	a	b	c	e	f	g	k	l	m	n	p	r	s	u
kN lbs	kN lbs	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in			mm in	mm in	mm in	mm in	mm in	mm in	deg
2.8 600	7.0 1500	12 .47	20 .79	AAVLHT 12	42 1.654	28 1.10	20 .79	84 3.31	67 2.64	54 2.13	M12 depth 15	G 1/8"	9 .35	11 .43	6.5 .27	7 .28	42 1.65	17 .67	30°
4.7 1000	12.5 2500	12 .47	30 1.18	AAVLHT 22	54 2.126	32 1.26	22 .87	82 3.23	79 3.11	66 2.59	M12 depth 18	G 1/8"	9 .35	11 .43	6.5 .27	7 .28	54 2.13	26 1.02	30°
7.0 1500	22.0 4500	16 .63	40 1.57	AAVLHT 42	67 2.638	40 1.57	28 1.10	110 4.33	98 3.86	82 3.23	M16 depth 16	G 1/4"	12 .83	14 .55	9.0 .35	9 .35	67 2.64	34 1.34	35°

Work supports : AAVFH

Type : Manifold ports on bottom flange

Locking force at 4000 psi : 1500 to 4500 lbs

ONE SINGLE HYDRAULIC PORT

Description

Hydraulic mountings are intended to support components being machined in a precise plane and to eliminate vibration during machining.
Mounting with one single hydraulic supply port for extension and locking of the rod.
Operating principle see page 77

Option

Special models available on request.
For clamping pressures less than 2000 psi, please contact us.

Characteristics

- fixing using screws
- rod treated to prevent seizure and corrosion
- stainless steel spring
- initial force generated by spring
- supplied with o-rings :
5.28 x 1.78 mm - 90 NBR for AAVFH 12 and AAVFH 22
7.65 x 1.78 mm - 90 NBR for AAVFH 42

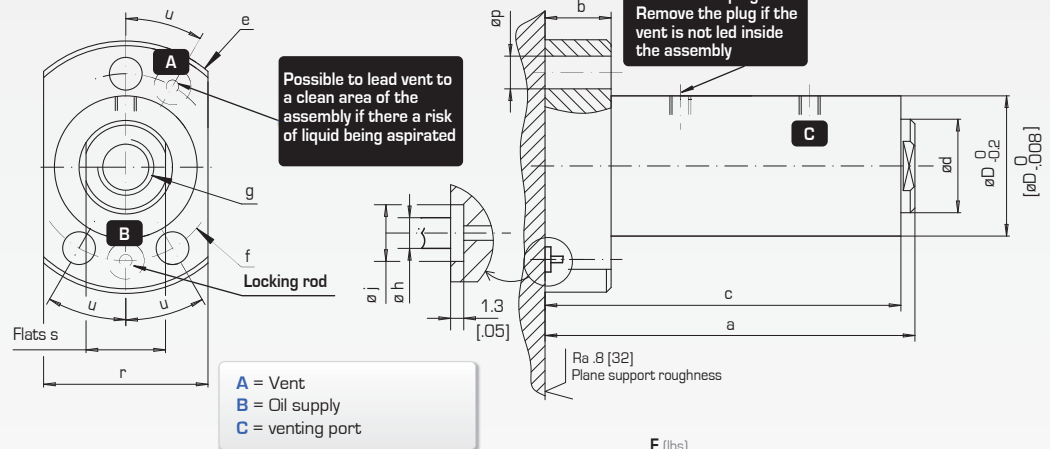
Note

IMPORTANT

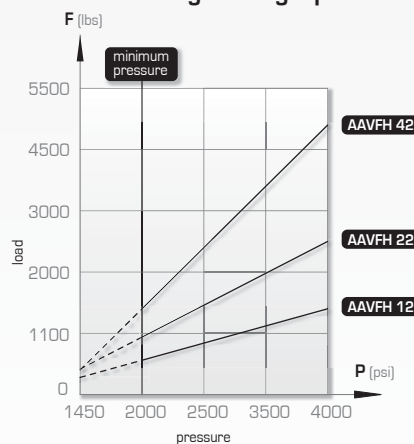
The venting port point must always be located at the highest point in the assembly.

In order to allow the rod to be retracted by springs the counter pressure must not exceed 29 psi.

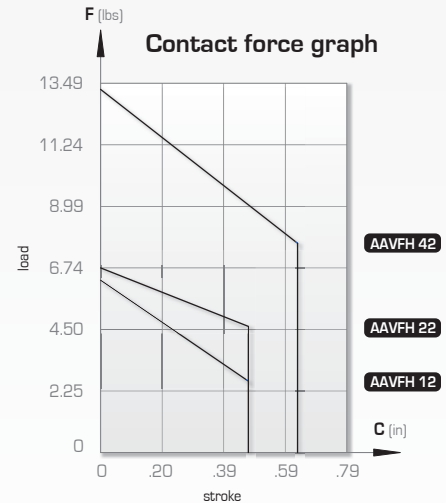
Maximum flow : .40 gal/mn



Locking force graph



Contact force graph



Force at 2000 psi		Min locking force at 4000 psi		Stroke		ø of the rod		Type	Dimensions																								
									D	a		b		c		e		f		g		h		j		p		r		s		u	
kN		kN		mm		mm			mm	mm		mm		mm		mm		mm		mm		mm		mm		mm		mm		°			
2.8 600		7.0 1500		12 .47		20 .79		AAVFH 12	42 1.654	112 4.41		14.5 .57		104 4.09		67 2.64		54 2.13		M12 dpeth 15		4 .16		8.8 .35		7 .28		42 1.65		17 .67		30	
4.7 1000		12.5 2500		12 .47		30 1.18		AAVFH 22	54 2.126	114 4.49		14.5 .57		104 4.09		79 3.11		66 2.60		M12 depth 18		4 .16		8.8 .35		7 .28		54 2.13		26 1.02		30	
7.0 1500		22.0 4500		16 .63		40 1.57		AAVFH 42	67 2.638	150 5.91		18.0 .71		138 5.43		98 3.86		82 3.23		M16 depth 16		5 .20		11.0 .43		9 .35		67 2.64		34 1.34		35	

Work supports : AAVFHT

Type : Threaded ports on bottom flange
Locking force at 4000 psi : 1500 to 4500 lbs

ONE SINGLE HYDRAULIC PORT

Description

Hydraulic mountings are intended to support components being machined in a precise plane and to eliminate vibration during machining.

Mounting with one single hydraulic supply port for extension and locking of the rod.

Operating principle see page 77

Option

Special models available on request.

For clamping pressures less than 2000 psi, please contact us.

Characteristics

- fixing using screws
- rod treated to prevent seizure and corrosion
- stainless steel spring
- initial force generated by spring

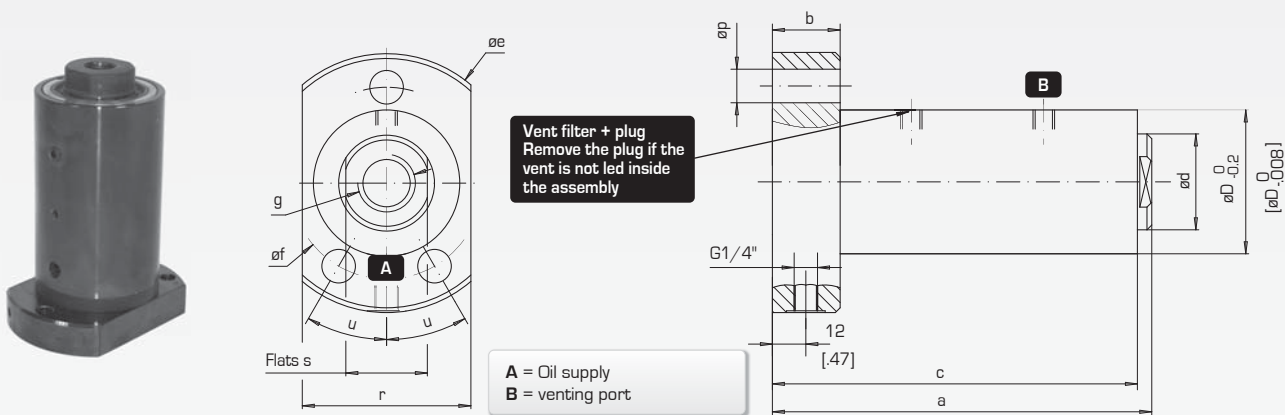
Note

IMPORTANT

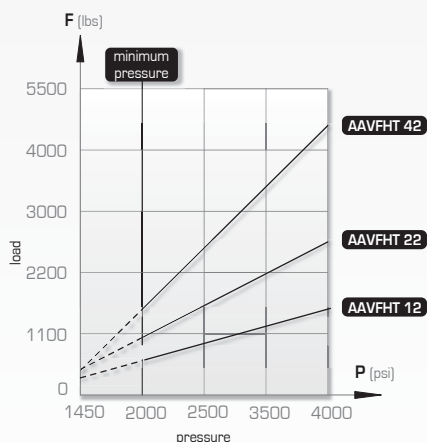
The venting port point must always be located at the highest point in the assembly.

In order to allow the rod to be retracted by springs the counter pressure must not exceed 29 psi.

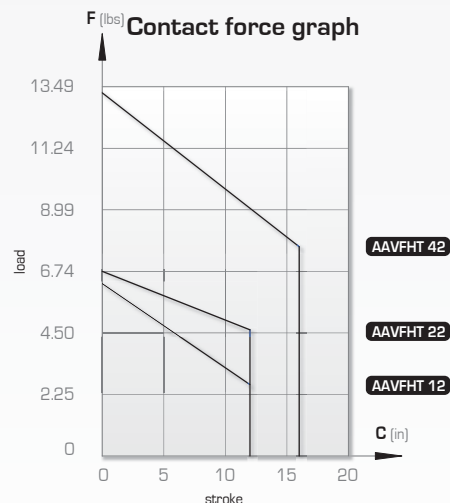
Maximum flow : .40 gal/mn



Locking force graph



Contact force graph



Force at 2000 psi	Min locking force at 4000 psi	Stroke	ø of the rod	Type	Dimensions											
					D	a	b	c	e	f	g	p	r	s	u	
kN lbs	kN lbs	mm in	mm in		mm in	mm in	mm in	mm in	mm in	mm in		mm in	mm in	mm in	deg	
2.8 600	7.0 1500	12 .47	20 .79	AAVFHT 12	42 1.654	121.0 4.76	23.5 .93	104.0 4.09	79 3.11	54 2.13	M12 depth 15	7 .28	42 1.65	17 .67	30°	
4.7 1000	12.5 2500	12 .47	30 1.18	AAVFHT 22	54 2.126	123.0 4.86	23.5 .93	104.0 4.09	79 3.11	66 2.60	M12 depth 18	7 .28	54 2.13	26 1.02	30°	
7.0 1500	22.0 4500	16 .63	40 1.57	AAVFHT 42	67 2.638	155.5 6.12	23.5 .93	143.5 5.65	98 3.86	82 3.23	M16 depth 16	9 .35	67 2.64	34 1.34	35°	

Positive locking cylinders

Table of content

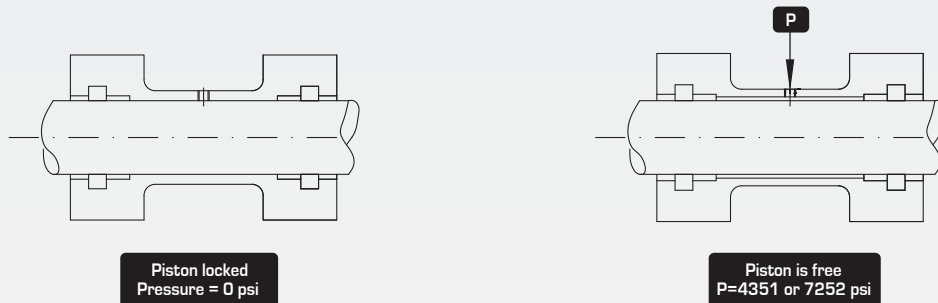
ATL	Linear translatable autolock cylinder T-Lock ® - Threaded	096
ARL	Pivoting autolock cylinder R-Lock ® - Threaded	097
ATLF & ARLF	Autolock cylinders T-Lock ® and R-Lock ® - Flanged	098
ARLC	Pivoting autolock cylinder R-Lock ® - Compact	099
AAVTL	Work supports T-Lock ®	100

Description

T-Lock® (translation) and **R-Lock®** (rotation) cylinders, developed and patented by QUIRI, incorporate a system base on the principle of locking through the absence of pressure. Unlocking is achieved by the use of a pressurised fluid.

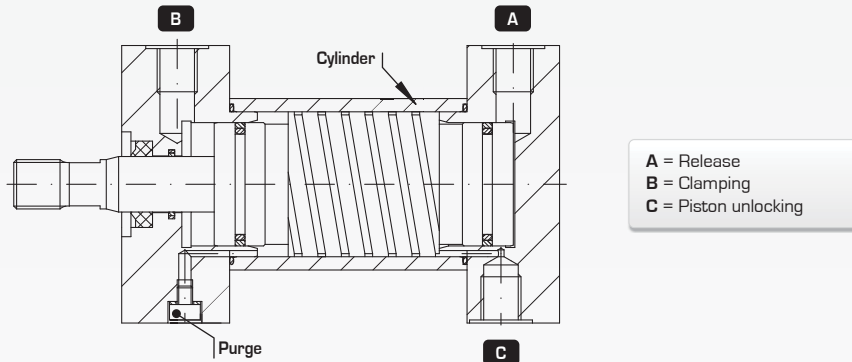
Principle of operation of the Lock®

The **Lock®** cylinder has a diameter which is less than the piston one, thus creating a connection through adhesion due to the deformation of the materials present. Unlocking is achieved by means of hydraulic pressure applied uniformly between the surfaces in contact.

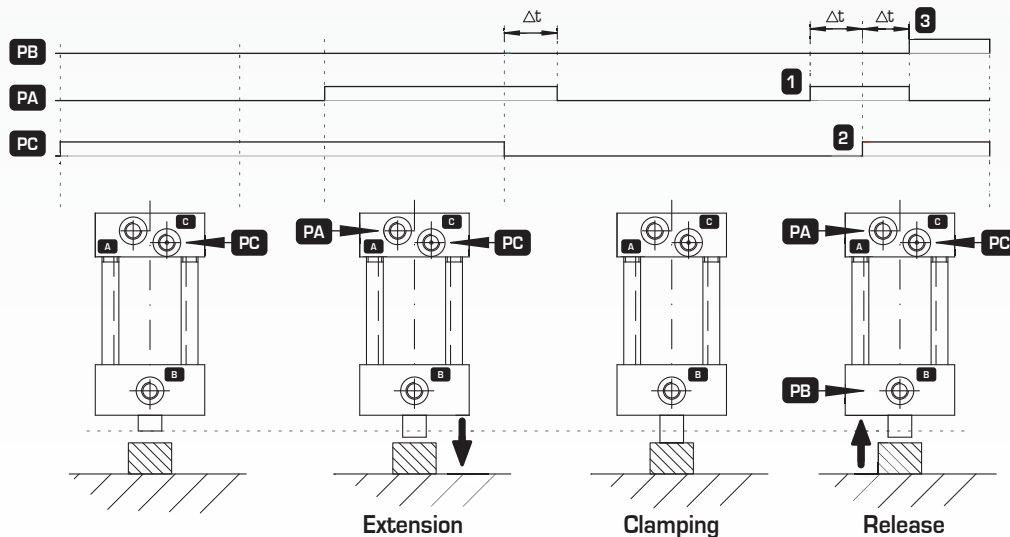


Principle of operation of the T-Lock® cylinder

- The piston is fitted with an adjustment locked in the cylinder.
- Supplying the unlocking port **(C)** makes the cylinder deform, allowing the piston to move freely.
- The cylinder then functions as a standard double acting cylinder in traction **(PB)** or in thrust **(PA)**.
- When the unlocking pressure is removed, the piston is held in place by being 'gripped' within the lock cylinder.
- The clamping force is thus maintained in the absence of pressure.



Phases diagrams : During the clamping phase the cylinder is unpressurized



T-Lock® & R-Lock® cylinders

Description
Principle of operation

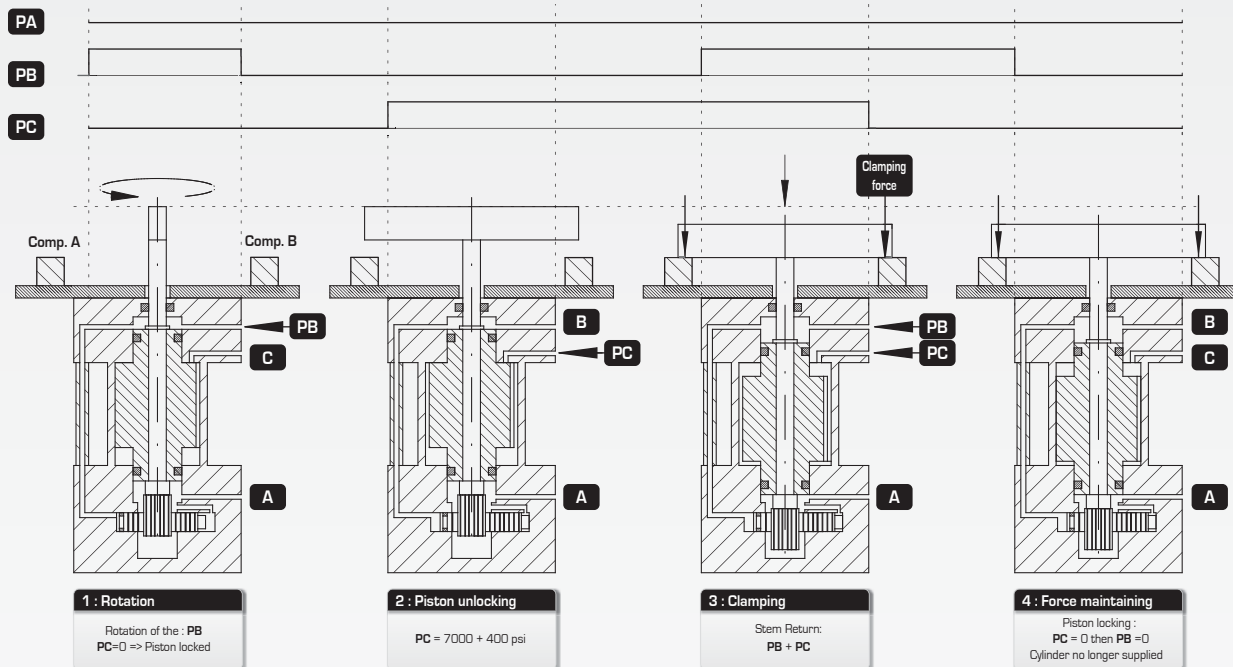
Principle of operation of the R-Lock® cylinder

The **R-Lock®** cylinders use the same principle as the **T-Lock®** v with the addition of a system for planar rotation of the arm. This pivoting system is a derivative of the hydraulic rack and pinion system.

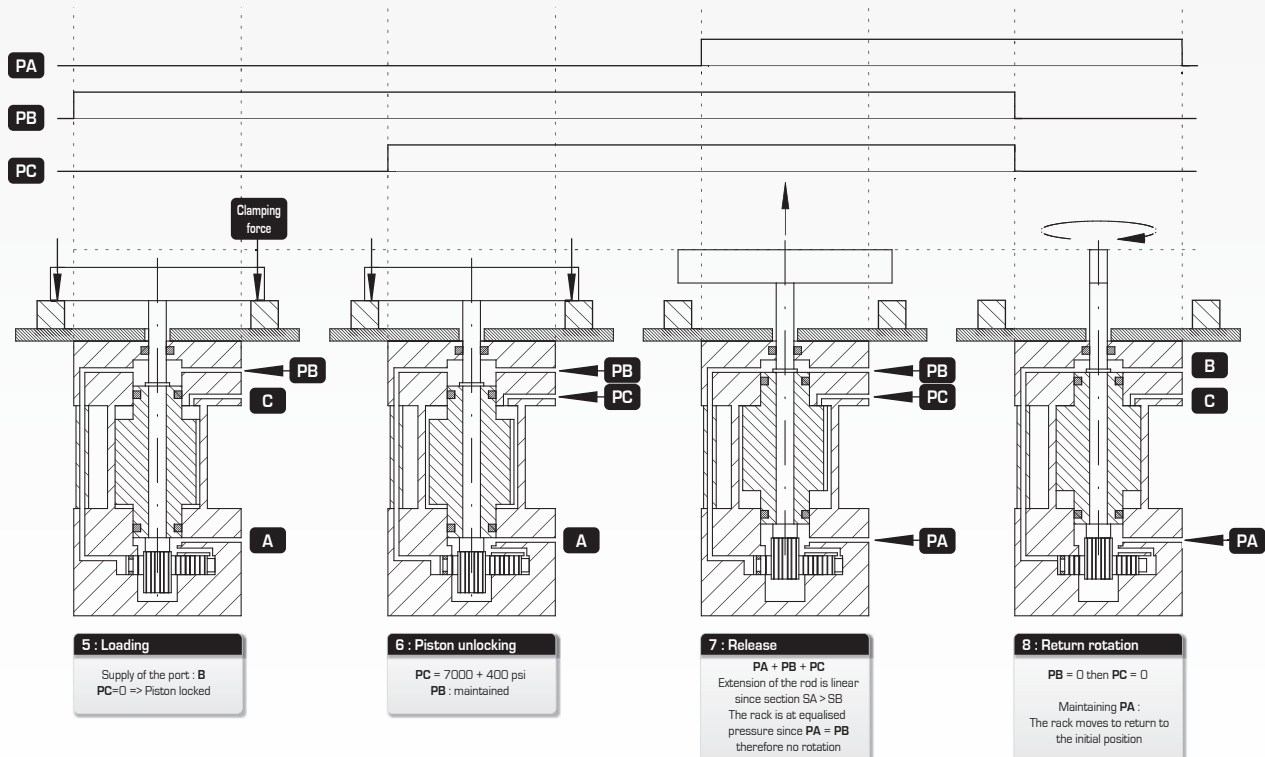
The various phases - pivoting in a plane, clamping, release and unlocking of the **Lock®** - are achieved using only three supply ports, which considerably simplifies the hydraulic supply system.

Phases diagram

During clamping



During release



T-Lock[®] cylinder : ATL

Double acting - Threaded ports

Force : 3000 to 11000 lbs

Description

This system of locking by absence of pressure is used to maintain a fully controlled clamping force when the cylinder is not connected to its source. In addition, it is completely unaffected by the vibrations.

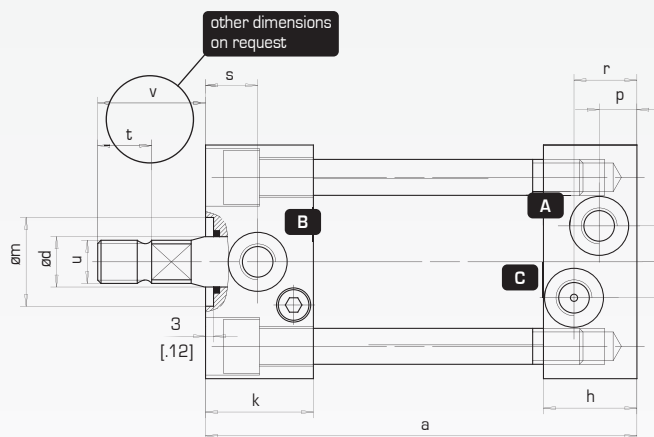
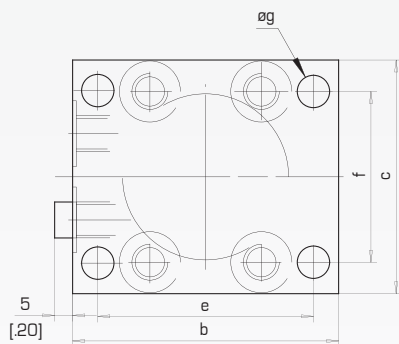
In all applications for palletization, transfer, rapid tool changes for presses, mould closure, test benches, these cylinders provide secure clamping.

Characteristics

- supply through gas tappings
- locked by absence of pressure
- **Lock[®]** unlocking pressure : 4351 to 7252 psi

Options

- custom double clamping arm supplied on request.
- pressure multipliers - see pages 112 and 113.



Type	Dimensions		
	A Rod extension	B Rod retraction	C Unlocking
ATL 15	G 1/8"	G 1/8"	G 1/4"
ATL 30	G 1/4"★	G 1/4"★	G 1/4"
ATL 50	G 1/4"★	G 1/4"★	G 1/4"

★ G 3/8" on request

★★ The length «a» of the cylinder is a function of the unlocking pressure and the clamping force required.
Special models made on request.

Thrust force	Traction force	Stroke +0.020 0	Active Area Push	Active Area Pull	Piston øD	Rod ød	Locking force	Unlocking pressure +435 0	Type	Dimensions																
										a ★★	b	c	e	f	g ø	h	k	m ø	n1	n2	p	r	s	t	u	v
lbs	lbs	mm in	cm² in²	cm² in²	mm in	mm in	kN lbs	psi		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	
3000 at 2500 psi	3000 at 3000 psi	10 .394	8.04 1.23	6.50 1.01	32 1.26	14 .55	15 3000 min.	7000	ATL 15/5	120 4.72	74 2.91	65 2.36	60 2.56	48 1.89	9 .35	26 1.02	30 1.18	30 1.18	100 .39	10 .39	10.5 .41	15 .59	14.5 .57	16 .63	M12x1.5	30 1.18
								4000	ATL 15/3	193 7.60																
6500 at 3000 psi	6500 at 4000 psi	10 .394	12.56 1.95	10.02 1.55	40 1.57	18 .71	30 6500 min.	7000	ATL 30/5	142 5.60	90 3.54	78 3.07	72 2.83	56 2.20	11 .43	30 1.18	35 1.38	34 1.34	125 .49	11 .43	13.0 .51	19 .75	18.0 .71	18 .71	M16x1.5	35 1.38
								4000	ATL 30/3	215 8.46																
11000 at 3000 psi	11000 at 3500 psi	10 .394	23.75 3.68	19.95 3.09	55 2.47	22 .87	50 11000 min.	7000	ATL 50/5	160 6.30	108 4.25	96 3.78	87 3.43	60 2.36	13 .51	32 1.26	37 1.46	42 1.65	140 .55	12 .47	16.0 .63	21 .83	21.0 .83	28 1.10	M20x1.5	44 1.73
								4000	ATL 50/3	238 8.31																

R-Lock® cylinder : ARL

Double acting - Threaded ports

Force : 3000 to 11000 lbs

Description

This system of locking by absence of pressure is used to maintain a fully controlled clamping force when the cylinder is not connected to its source. In addition, it is completely unaffected by the vibrations.

In all applications for palletization, transfer, rapid tool changes for presses, mould closure, test benches, these cylinders provide secure clamping.

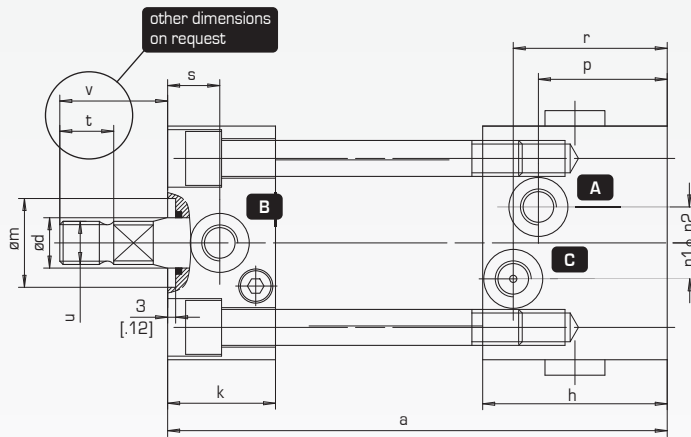
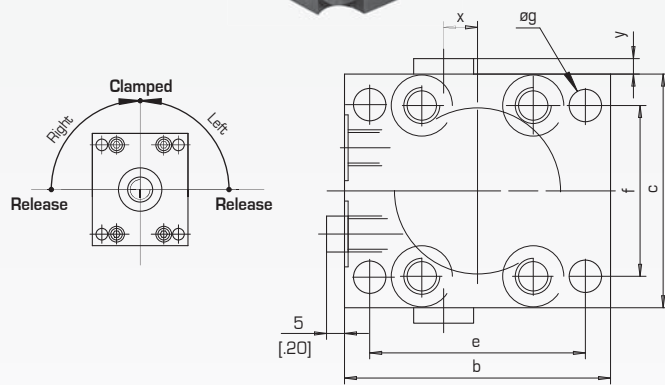
The clamping arm pivots in a plane then translate. The component is clamped. Pressure may be removed.

Characteristics

- supply through gas tappings
- locked by absence of pressure
- **Lock®** unlocking pressure : 4351 to 7252 psi

Options

- angles of pivoting 60°, 45°, or 30° on request
- custom double clamping arm supplied on request.
- pressure multipliers - see pages 112 and 113.



★ G 3/8" on request

★★ The length «a» of the cylinder is a function of the unlocking pressure and the clamping force required.
Special models made on request.

Traction force	Stroke +0.020 0	Active Area Push	Active Area Pull	Piston øD	Rod ød	Locking force	Unlocking pressure +435 0	Type	Dimensions																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
									a ★★	b	c	e	f	g ø	h	k	m ø	n1	n2	p	r	s	t	u	v	x	y																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
kN	mm in	cm² in²	cm² in²	mm in	mm in	kN lbs	bar		mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in

T-Lock® & R-Lock® : ATLF & ARLF

Flanged

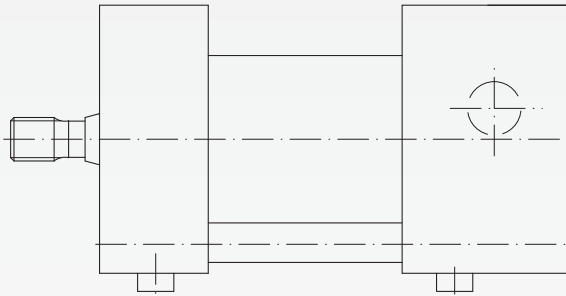
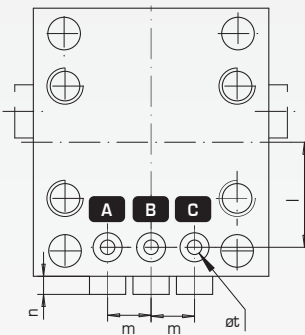
Front manifold ports : __AV - Rear manifold ports : __AR

Description

These cylinders are designed to be mounted directly onto a fixture or block. Oil is supplied through manifold ports drilled directly into the body of the clamp thus eliminating the need for fittings or tubing.

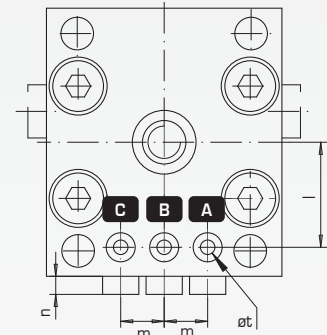
Rear face flanged

Model :
ATLF__AR
ARLF__AR



Front face flanged

Model :
ATLF__AV
ARLF__AV



A = Rod extension
B = Rod retraction
C = Piston unlocking

Other dimensions shown on the drawings for T-Lock® cylinders
See page 96.

Type T-Lock®	Dimensions			
	l	m	n	t
	mm in	mm in	mm in	mm in
ATLF 15 AV	29.0 1.14	12.0 .47	5 .20	4 .16
ATLF 15 AR				
ATLF 30 AV	35.0 1.38	12.5 .49	5 .20	4 .16
ATLF 30 AR				
ATLF 50 AV	43.5 1.71	12.5 .49	5 .20	4 .16
ATLF 50 AR				

Other dimensions shown on the drawings for R-Lock® cylinders
See page 97.

Type R-Lock®	Dimensions			
	l	m	n	t
	mm in	mm in	mm in	mm in
ARLF 15 AV	29.0 1.14	12.0 .47	5 .20	4 .16
ARLF 15 AR				
ARLF 30 AV	35.0 1.38	12.5 .49	5 .20	4 .16
ARLF 30 AR				
ARLF 50 AV	43.5 1.71	12.5 .49	5 .20	4 .16
ARLF 50 AR				

R-Lock® cylinder : ARLC

Double acting - Cylindrical body with top flange
Force : 3000 lbs - Compact version

Description

This system of locking by absence of pressure is used to maintain a fully controlled clamping force when the cylinder is not connected to its source. In addition, it is completely unaffected by the vibrations.

In all applications for palletization, transfer, rapid tool changes for presses, mould closure, test benches, these cylinders provide secure clamping.

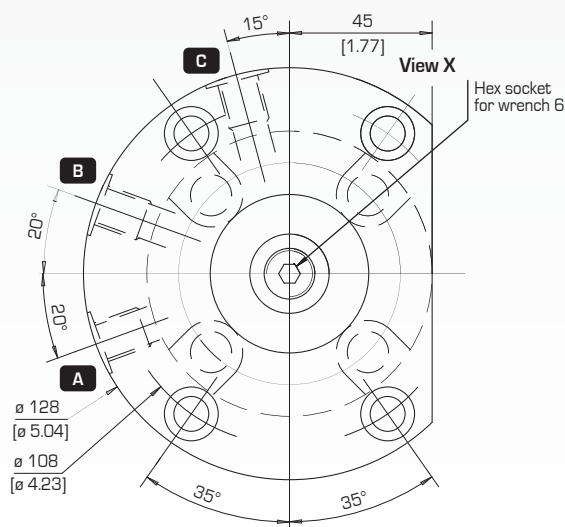
The clamping arm pivots in a plane then translate. The component is clamped. Pressure may be removed.

Options

- supply through counter-bores under ring
- angles of pivoting 60°, 45°, or 30° on request
- custom double clamping arm supplied on request
- pressure multipliers - see page 112 and 113



A = Rotation rod forward + return
B = Rotation return + forward
C = Lock® unlocking
A. B. C : size **G 1/8"** or
manifold ports beneath top flange



General characteristics

- oil supplied through threaded ports on top flange
- locking through absence of pressure

Technical characteristics

- section at rod extension : **12.56 cm² [1.95 in²]**
- section at rod retraction : **7.65 cm² [1.19 in²]**
- cylinder using pressure : **160 bar [2000 psi max.]**
- cylinder proof pressure : **240 bar [3000 psi]**
- unlocking pressure : **300 ≤ P ≤ 330 bar [4000 ≤ P ≤ 4500 psi]**
- Lock® locking force : **1500 daN [3000 lbs]**
- stroke : **12 mm [.47 in]**
- rotation left / right : **90°**

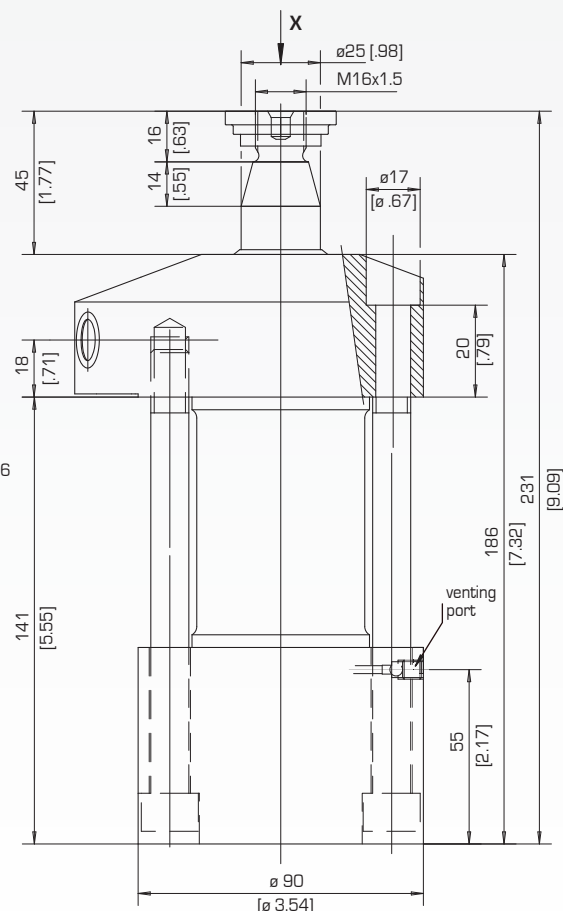
Description :

ARLC 15/3 D90 T

- cylinder type : **R-Lock® 15 kN [3000 lbs]**
- unlocking : **300 bar [4000 psi]**
- supply : **threaded ports**
- rotation : **to right 90°**

ARLC 15/3 G90 L

- cylinder type : **R-Lock® 15 kN [3000 lbs]**
- unlocking : **300 bar [4000 psi]**
- supply : **manifold ports on top flange**
- rotation : **at left 90°**



T-Lock® mounting : AAVTL

Double acting - threaded ports

Force : 3000 to 4000 lbs

Description

This mounting uses the same principle of locking as the **T-Lock®** cylinder and allows a precise support position to be maintained after hydraulic disconnection. It is completely unaffected by vibrations

Options

- custom double clamping arm supplied on request
- pressure multipliers - see page 112 and 113

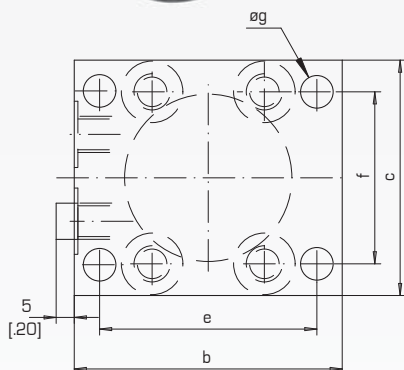
Note

For information on contact forces, residual support forces and using pressure, please contact us.

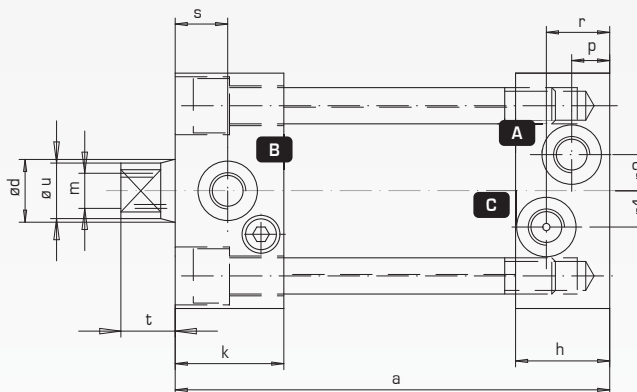
Principle of operation

These mountings use the principle of elasticity of materials. Their operation involves 4 phases :

- 1) **Unlocking of the mounting piston :**
PC = 4000 psi
- 2) **Contact with the component :**
Simultaneous pressure PA + PB = elastic deformation of the clamped component
- 3) **Removal of pressure :**
PA + PB = 0
The component then pushes against the rod due to elasticity. The residual support force is provided by seal friction
- 4) **Piston locking PC = 0 :**
The position is maintained without pressure.



Type	Dimensions		
	A Rod extension	B Rod retraction	C Unlocking
AAVTL 5	G 1/8"	G 1/8"	G 1/4"
AAVTL 10	G 1/4"	G 1/4"	G 1/4"
AAVTL 20	G 1/4"	G 1/4"	G 1/4"



★ Active area with differential supply = Rod section.

To know contact forces, residual support forces and pressure, please contact us.

Max force	Stroke	Active Area ★	Piston øD	Rod ød	Locking force	Unlocking pressure	Type	Dimensions															
	+020 0							a	b	c	e	f	g ø	h	k	m	n1	n2	p	r	s	t	u
lbs	mm in	cm² in²	mm in	mm in	kN lbs	psi		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	
1100 at 2500 psi	10 .394	2.54 .39	32 1.26	18 .71	5 1100 min.	4000	AAVTL 5	120 4.72	74 2.91	65 2.56	60 2.36	48 1.89	9 .35	26 1.02	30 1.18	M6	100 .39	10 .39	10.5 .41	15 .59	14.5 .57	8 .31	16 .63
2200 at 3500 psi	10 .394	3.80 .59	40 1.57	22 .87	10 2200 min.	4000	AAVTL 10	142 5.59	90 3.54	78 3.07	72 2.83	56 2.20	11 .43	30 1.18	35 1.38	M8	125 .49	11 .43	13.0 .51	19 .75	18.0 .71	8 .31	20 .79
4000 at 4500 psi	10 .394	6.16 .96	55 2.17	28 1.10	20 4000 min.	4000	AAVTL 20	160 6.30	108 4.25	96 3.78	87 3.43	60 2.36	13 .51	32 1.26	37 1.46	M10	140 .55	12 .47	16.0 .63	21 .83	21.0 .83	8 .31	26 1.02

AAA - 4V - H	Auto-coupler cylinder 4 channels	103
AAA - 5V - H	Auto-coupler cylinder 5 channels	104
AAA - 6V - H	Auto-coupler cylinder 6 channels	105

Description

The automatic coupling system allows automatic connection and disconnection to the pressure source of cylinders on board a pallet. These coupling are in particular found in palletized systems using **T-Lock®** or **R-Lock®** type cylinders.

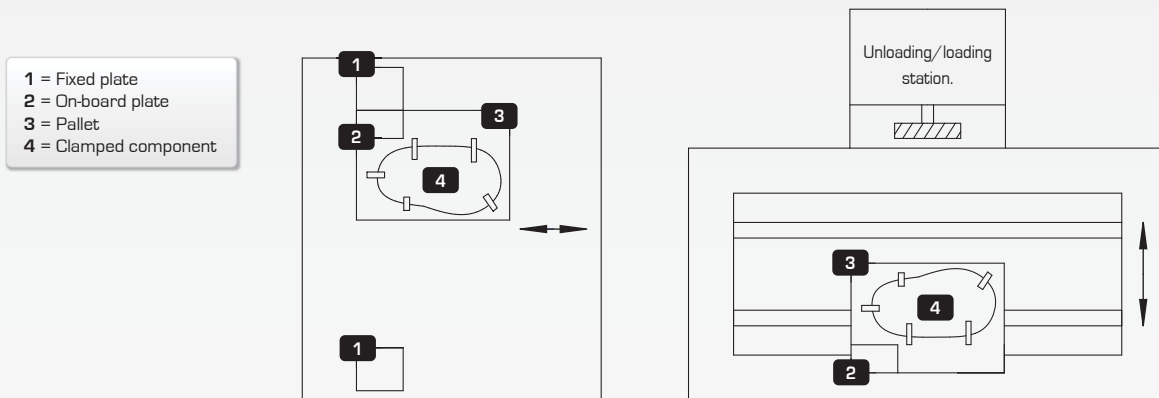
Application

Example : The pendular assembly

Component is fixed onto the pallet by **T-Lock®** and **R-Lock®** cylinders : Clamping is maintain without pressure.

Once the component is machined, the pallet returns to the loading/unloading station :

- lateral coupling : the pallet is connected to the hydraulic station
- clamps are released for component exchange
- unfinished (or semi-finished) component is placed on pallet
- component is clamped and check
- pallet is uncoupled and return to work area



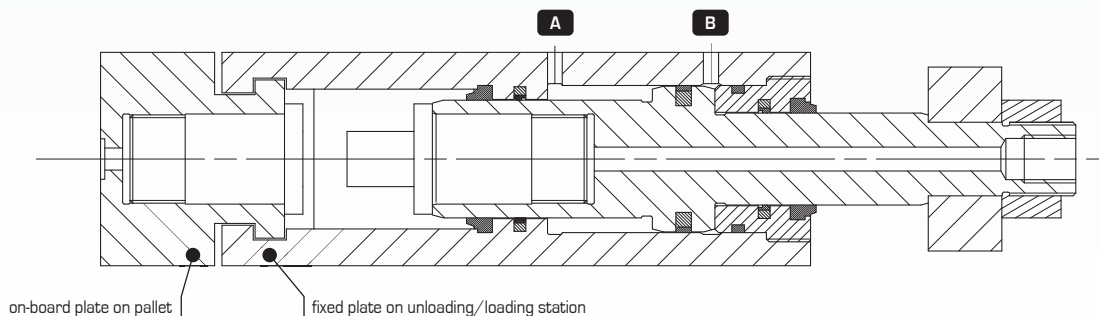
Principle of operation

Coupling

- The on-board, see figure below, engages laterally into the fixed : position detection.
- **Supply to B** : Male couplings are connected to female couplings
- Cylinders are connected to the pressure source.

Uncoupling

- **Supply to A** : Male couplings return to their initial position.



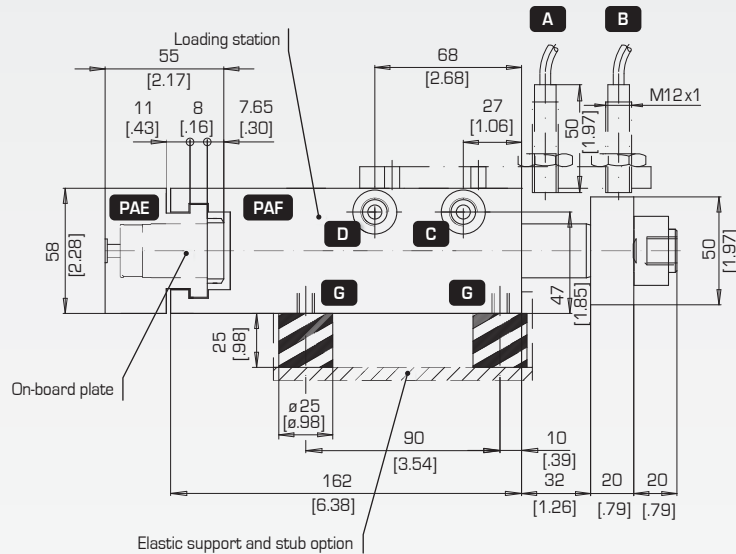
Auto-coupler cylinder : AAA - 4V - H

Automatic - 4 channels

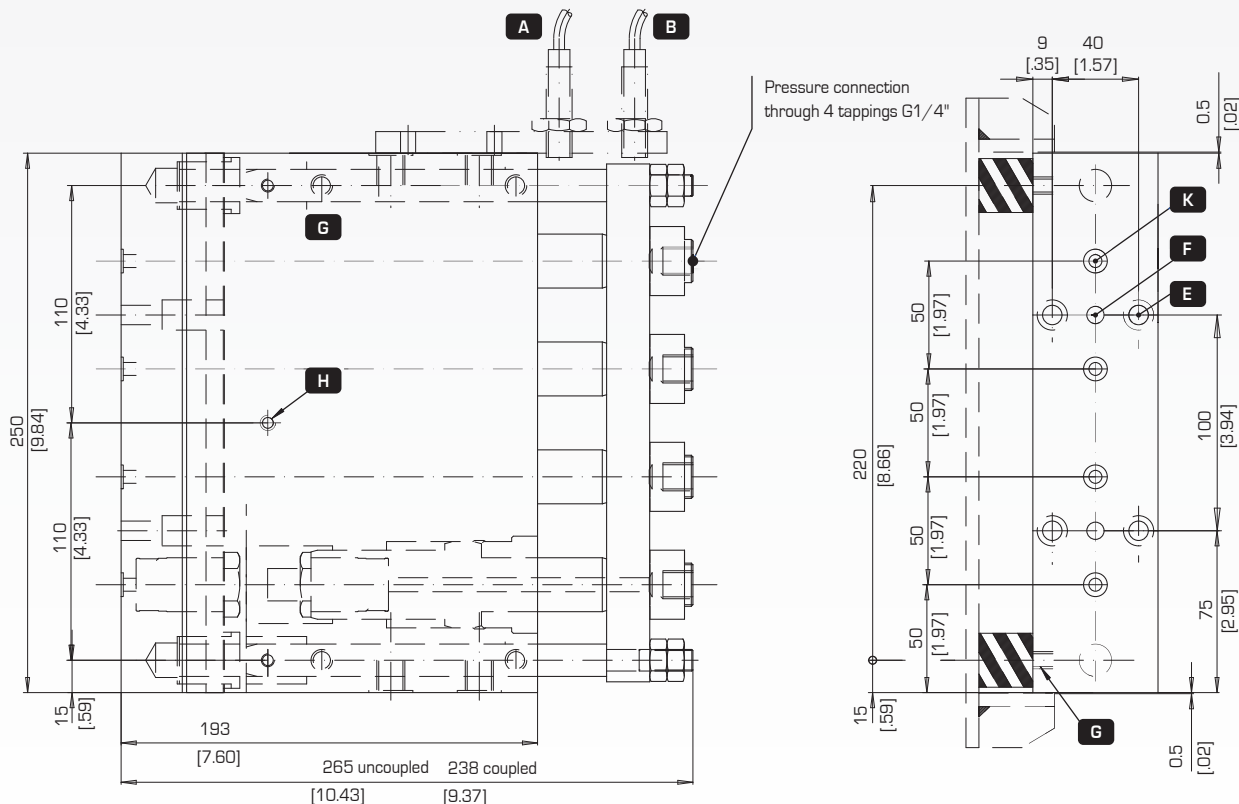
Dimensions

Options

- swivelling protective cover
- all options on request
- elastic support and stub



Dimension	Description
A B	Inductive position sensors A : coupled B : uncoupled
C D	Two fixing options : - lateral - above
E	Coupling supply port G 1/4"
F	Uncoupling supply port G 1/4"
G	4 holes @ 9 mm [.35]
H	2 centring device @ 8 H7 depth 10 mm
K	4 x M8 depth 12 mm - plate mounting
	3 x M6 depth 10 mm - swivel slope
	Pallet supply : O-ring @ 8 mm x 1.5



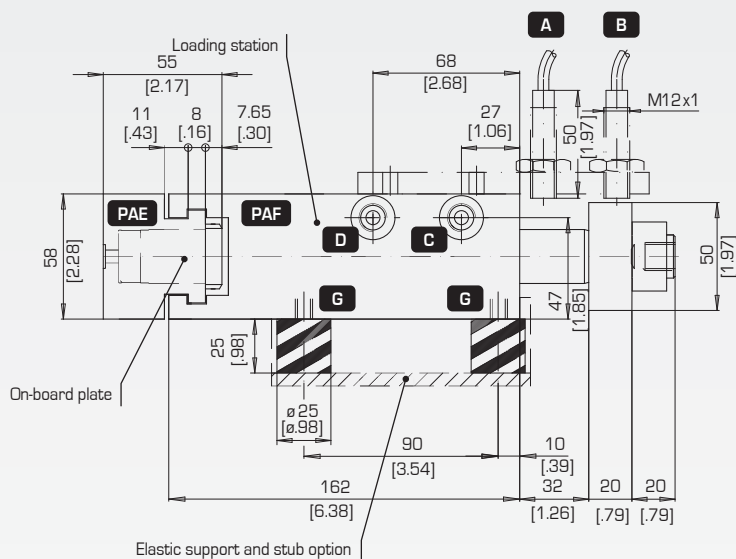
Auto-coupler cylinder : AAA - 5V - H

Automatic - 5 channels

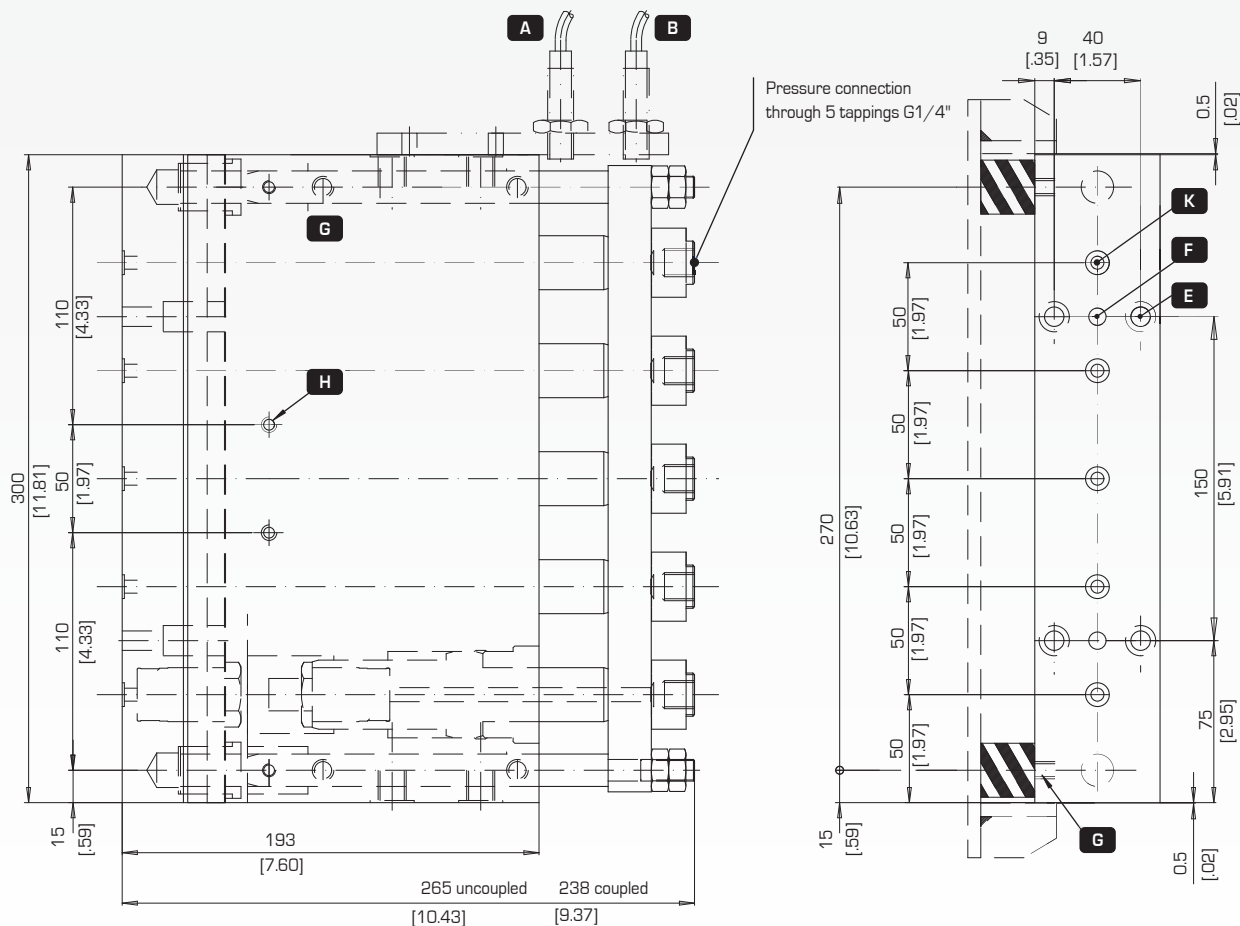
Dimensions

Options

- swivelling protective cover
- all options on request
- elastic support and stub



Dimension	Description
A B	Inductive position sensors A : coupled B : uncoupled
C	Two fixing options : - lateral - above
D	Coupling supply port G 1/4"
E	Uncoupling supply port G 1/4"
F	4 holes @ 9 mm [.35]
G	2 centring device @ 8 H7 depth 10 mm
H	4 x M8 depth 12 mm - plate mounting
K	4 x M6 depth 10 mm - Swivel slope
	Pallet supply : O-ring A 8 mm x 1.5



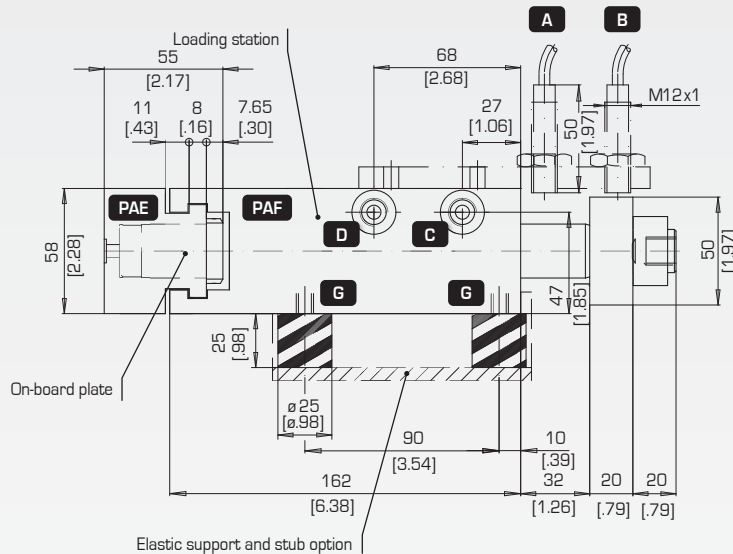
Auto-coupler cylinder : AAA - 6V - H

Automatic - 6 channels

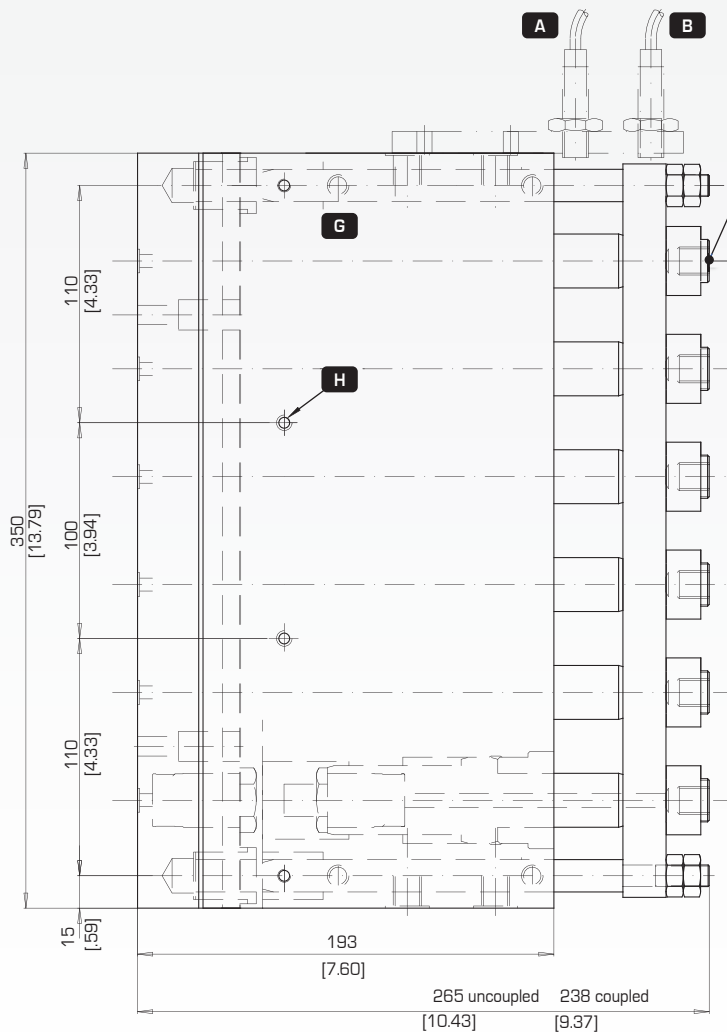
Dimensions

Options

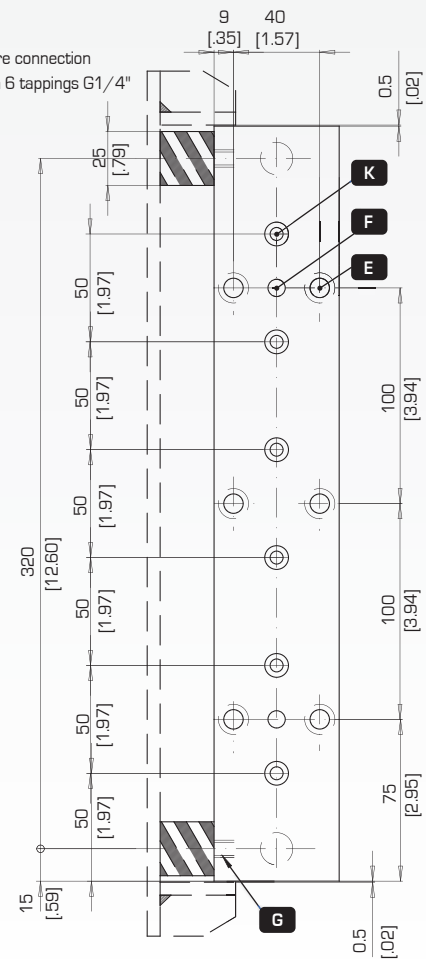
- swivelling protective cover
- all options on request
- elastic support and stub



Dimension	Description
A	Inductive position sensors
B	A : coupled B : uncoupled
C	Two fixing options : - lateral - above
D	Coupling supply port G 1/4"
E	Uncoupling supply port G 1/4"
F	6 holes @ 9 mm [0.35]
G	2 centring device @ 8 H7 depth 10 mm
H	4 x M8 depth 12 mm - plate fixing
K	4 x M6 depth 10 mm - swivel slope
	Pallet supply : O-ring @ 8 mm x 1.5



Pressure connection
through 6 tappings G1/4"



ACHB	Hydraulic power units	108
AACHB	Accessories for hydraulic power units	110
AAC & AAS	Spherical accumulators	111
AMDP__L	Pressure multipliers in line	112
AMDP__M	Modular pressure multipliers	113
AFLTM	Filters for pressure multipliers	114
ABMP	Pressure maintenance block	115
AVDS	Sequence valve	116
ARPH & ARH	Check valve	117
ARDP	Pressure reducer	118
ACDIST	Distribution components	119

Characteristics

Motor-pump set :

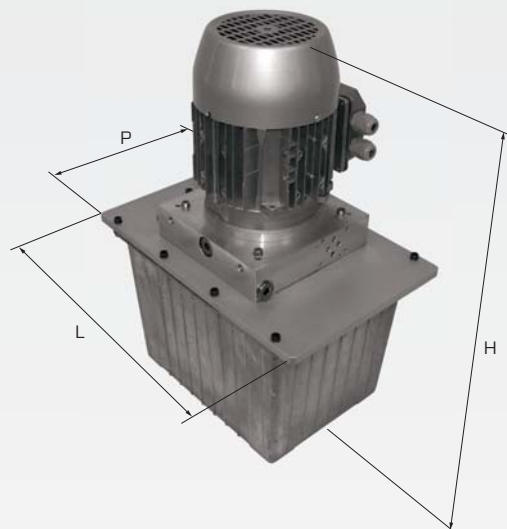
Gear pump

- peak pressure : **300 bar [4000 psi]**
- optimum pressure : **250 bar [3500 psi]**

Electric motor

- supply voltage : **220 - 240V - 50 Hz**
380 - 420V - 50 Hz
- speed of rotation : **1450 rpm**
- protection : **IP54**

Duty ratio : **S3**



Tank :

- total capacity : **12 and 20 liters [3.17 and 5.28 gallons]**
- optimum capacity : **8 and 14 liters [2.11 and 3.70 gallons]**

Equipment :

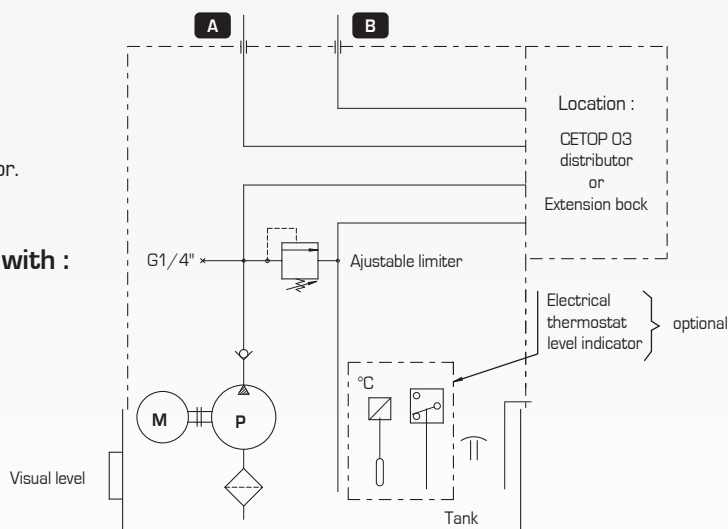
- suction strainer size 150 microns
- filling port
- visual oil level indicator
- breather with air filter

Options :

Electrical minimum oil level indicator with thermostatic sensor.

Connection flange for motor-pump unit equipped with :

- 1 adjustable pressure limiter from 0 to 4000 psi
- 1 check valve
- 1 pattern for CETOP O3 distribution
- 1 tapped G1/4" port
- 1 pressure switch, gauge or pressure supply point
- 1 outlet and tapping G3/8"
- 1 direct return tapped port G 3/8"



Type	Pump flow	Motor power	Maximum pressure	Tank capacity		H	Dimensions		P
				Total	Optimum		L		
	l/mn gal/mn	kW	bar psi	liters gallons	liters gallons	mm in	mm in		mm in
ACHB 1.3 - 0.55 - 12	1.3 .34	0.55	250 3500	12 3.17	8 2.11	493 19.41	362 14.25		242 9.53
ACHB 1.3 - 0.55 - 20				20 5.28	14 3.70	523 20.59	419 16.50		291 12.11
ACHB 3.7 - 1.50 - 12	3.7 .98	1.50	250 3500	12 3.17	8 2.11	552 21.73	362 14.25		242 9.53
ACHB 3.7 - 1.50 - 20				20 5.28	14 3.70	582 22.91	419 16.50		291 12.11
ACHB 5 - 2.20 - 12	5.3 1.40	2.20	250 3500	12 3.17	8 2.11	552 21.73	362 14.25		242 9.53
ACHB 5 - 2.20 - 20				20 5.28	14 3.70	582 22.91	419 16.50		291 12.11

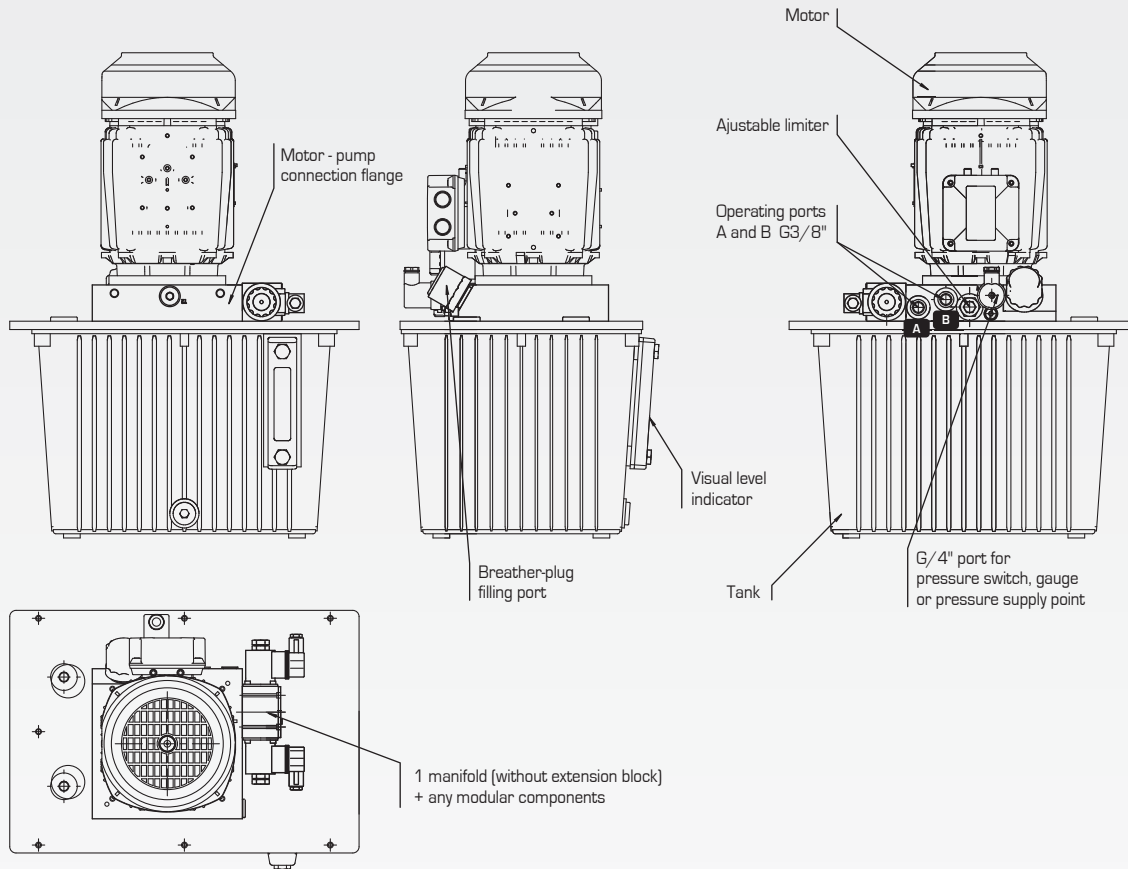
Clamping hydraulic power unit : ACHB

Electric motor

0.55 to 2.2 kW - .34 to 1.32 gal/mn - 3500 psi

Hydraulic distribution

The basic plant allows CETOP O3 standard modular components and manifold to fitted.

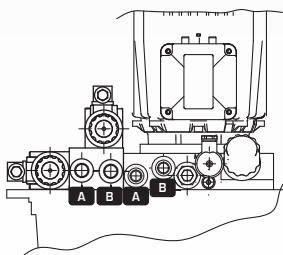


Extension block

Fitting of extension blocks allows additional manifolds to be added.

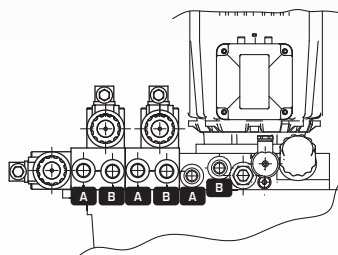
1 Extension block

2 manifolds with or without modular components



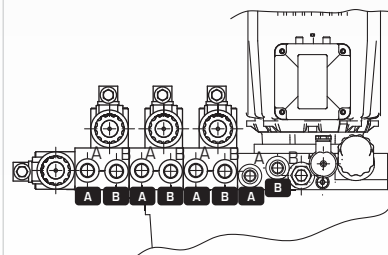
2 Extension blocks

3 manifolds with or without modular components

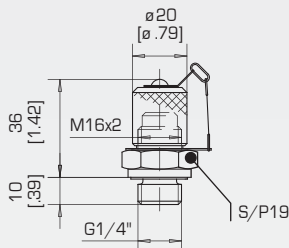


3 Extension blocks

4 manifolds with or without modular components

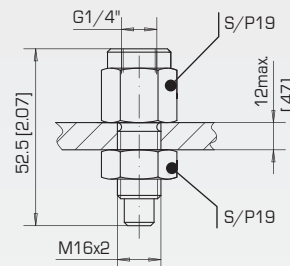


- Complete screw-in supply plug with cap.
(with built in seals)
Order code : **AA 65 035**

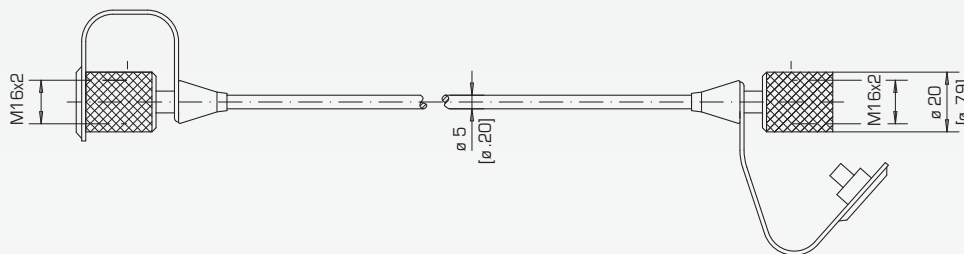


- Gauge plug.

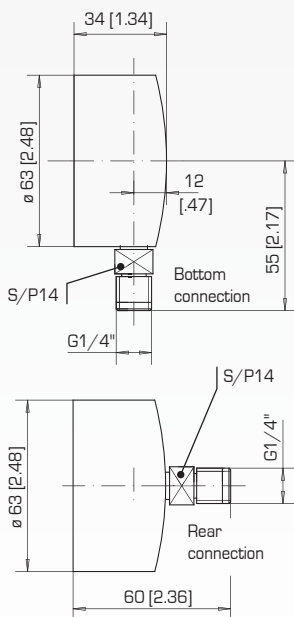
Order code : **AA 65 038**



- High pressure capillary hose ALG.630

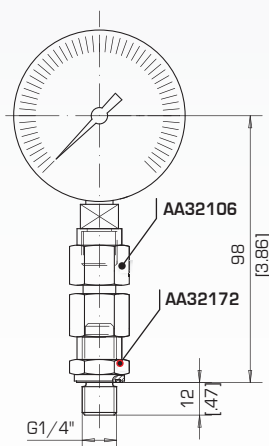


- Glycerine filled gauge.



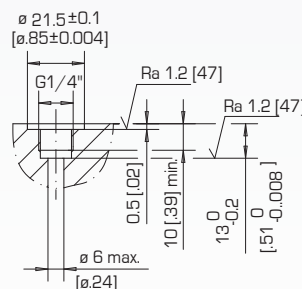
Adjustable

With connections for
mounting onto the block
(standard G1/4 inch port)



Not adjustable

To be screwed directly into the block
with aluminium seal **AA 51 088**
(Housing machining dimensions,
see the sketch below)



Graduation	Order code	Connection type
0 to 250 bar [3500 psi]	AA 69 033	Bottom
0 to 400 bar [5500 psi]	AA 69 030	Bottom
0 to 250 bar [3500 psi]	AA 69 251	Rear
0 to 400 bar [5500 psi]	AA 69 252	Rear

Spherical accumulators : AAC & AAS

pressure : 3000 psi - 3500 psi - 5500 psi

Principle of operation

The hydro-pneumatic accumulator is a reservoir of power which is called on if needed.

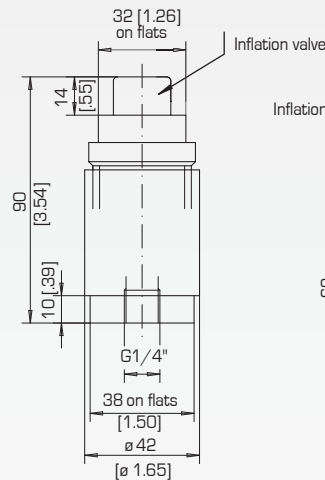
Characteristics

- membrane accumulator
- recommended pre-pressurization with nitrogen : **.8 x service pressure**

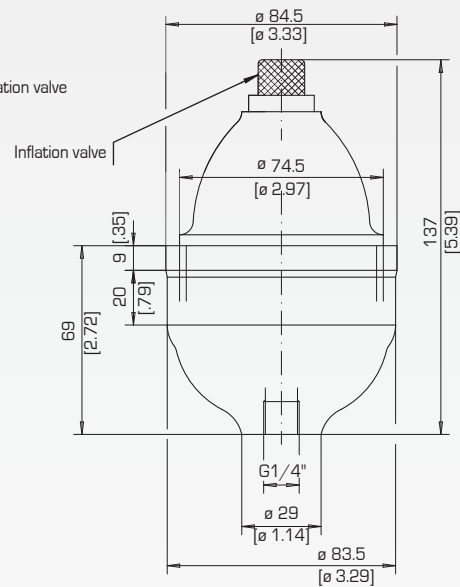
5500 psi accumulators



Type AAC 020



Type AAC 200

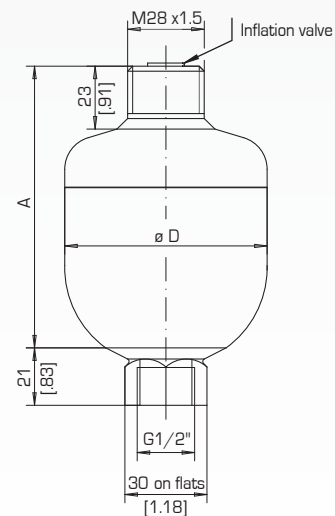


Type	Max. pressure		Capacity		Weight	
	bar	psi	cm ³	in ³	Kg	lbs
AAC 020	400	5500	20	1.22	.64	1.41
AAC 200	400	5500	200	12.20	1.20	2.65

3046 - 3626 psi accumulators



Type AAS 075 - AAS 160



Type	Max. pressure		Capacity		A		øD		Weight	
	bar	psi	cm ³	in ³	mm	in	mm	in	Kg	lbs
AAS 075	250	3626	75	4.58	91	3.58	64	2.52	0.7	1.54
AAS 160	210	3046	160	9.76	103	4.06	74	2.91	0.8	1.76

Description

The AMDP is a oscillating hydraulic pressure multiplier which increases the output pressure. It maintains this pressure whilst automatically compensating for the consumption in any receivers that may be mounted on the high pressure side.

The AMDP operates within a supply pressure range of from 250 to 2500 lbs and delivers an output pressure which is proportional to the supply pressure (11500 psi max). The outlet pressure is adjusted by adjusting the input pressure.

The AMDP includes a controlled check valve 'CAR' which maintains the pressure in the system and allows decompression by reversing the distributor.

Characteristics

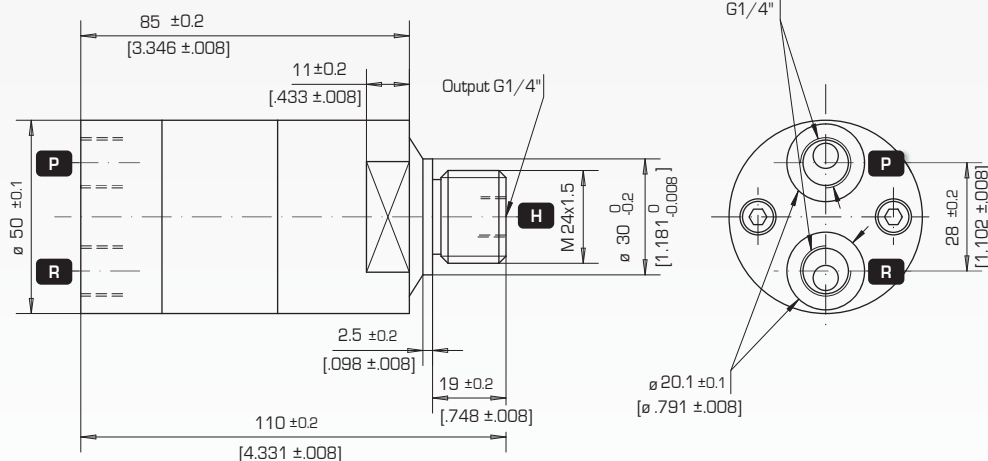
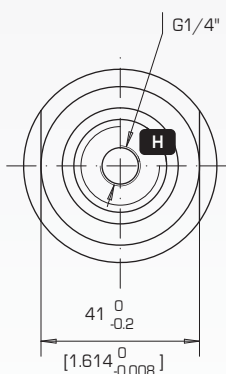
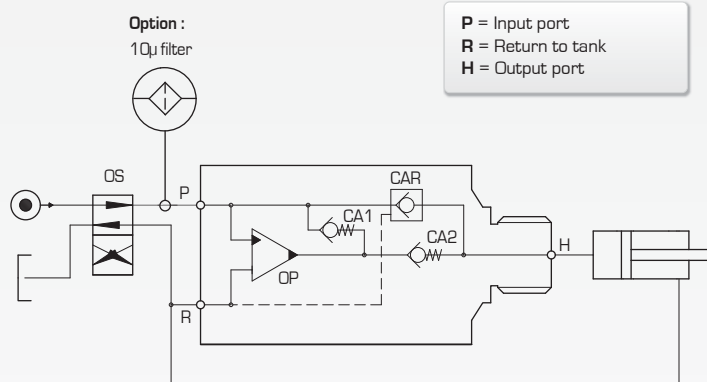
- supply pressure from 20 to 200 bar [250 to 2500 psi]
- maximum output pressure 500 bar [7000 psi]
- temperature from -40°C to +120°C [-40°F to +248°F]
- filtration 10 µ max. 19/16 as per ISO 4406
- zinc plated body
- the AMDP contains no hydraulic seal

Options

In order to prevent leaks due to contamination by metallic particles, we recommend that **a filter** is fitted to the inlet P. To choose the filter, see page 114.

Recommendations

The assembly design study must take into account the fact that the multiplier represents an internal loss between P and R.



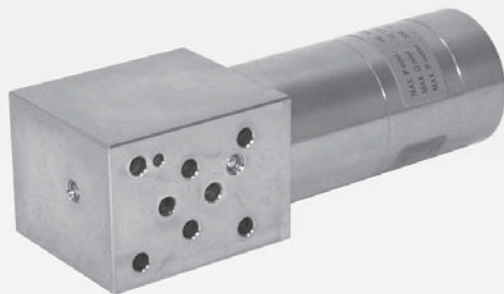
Type	Multiplication ratio or gain	Maximum input flow		Maximum output flow		Weight	
		l/mn	gal/mn	l/mn	gal/mn	Kg	lbs
AMDP 2.0 L	2.0	8.0	2.11	0.8	.21	1	2.20
AMDP 3.2 L	3.2	15.0	3.96	2.5	.66	1	2.20
AMDP 4.0 L	4.0	14.0	3.70	2.0	.53	1	2.20
AMDP 5.0 L	5.0	14.0	3.70	1.6	.42	1	2.20

Description

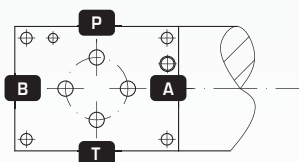
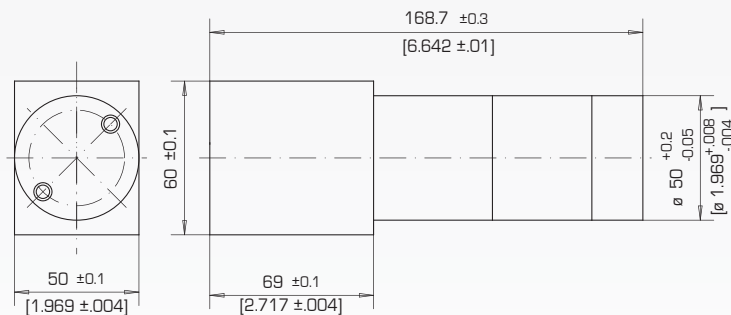
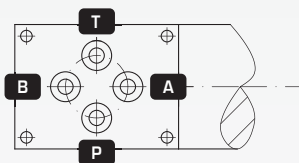
The AMDP is a oscillating hydraulic pressure multiplier which increases the output pressure. It maintains this pressure whilst automatically compensating for the consumption in any receivers that may be mounted on the high pressure side.

The AMDP operates within a supply pressure range of from 250 to 2500 lbs and delivers an output pressure which is proportional to the supply pressure [11500 psi max]. The outlet pressure is adjusted by adjusting the input pressure.

The AMDP includes a controlled check valve 'CAR' which maintains the pressure in the system and allows decompression by reversing the distributor.



Pattern location CETOP



Type	Multiplication ratio or gain	Maximum input flow		Maximum output flow		Weight	
		l/mn	gal/mn	l/mn	gal/mn	Kg	lbs
AMDP 2.0 M	2.0	8.0	2.11	0.8	.21	2.5	5.51
AMDP 3.2 M	3.2	15.0	3.96	2.5	.66	2.5	5.51
AMDP 4.0 M	4.0	14.0	3.70	2.0	.53	2.5	5.51
AMDP 5.0 M	5.0	14.0	3.70	1.6	.42	2.5	5.51

Characteristics

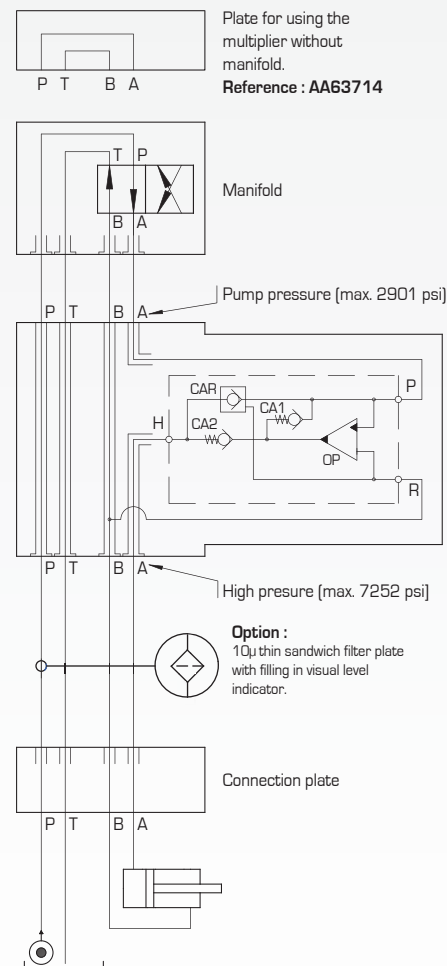
- supply pressure from 20 to 200 bar [250 to 2500 psi]
- maximum output pressure 500 bar [7000 psi]
- temperature from -40°C to +120°C [-40°F to +248°F]
- filtration 10 µ maxi. 19/16 as per ISO 4406
- zinc plated body
- the AMDP contains no internal hydraulic seal
- base fitted with o-rings

Options

- 10 µ thin **sandwich filter plate** with filling in visual level indicator. To choose the filter, see page 114.

Recommendations

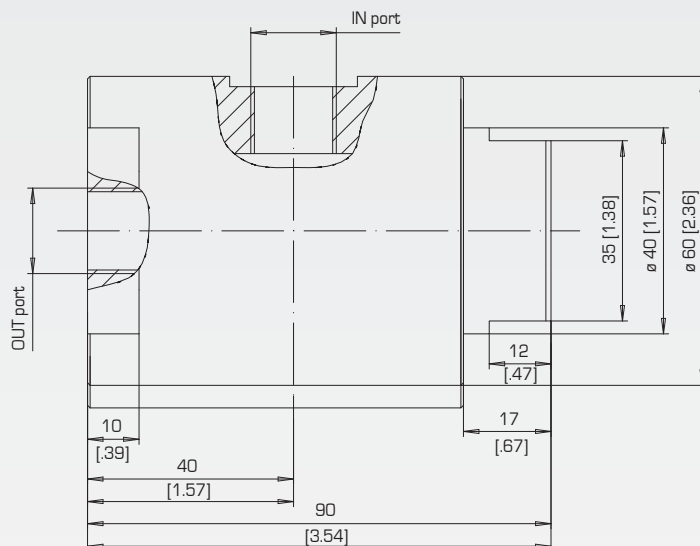
The assembly design study must take into account the fact that the multiplier represents an internal loss between P and R.



■ T 10μ filter - R 1/4" or R 3/8"

Max pressure : 350 bar [5000 psi]

The filter cartridge is detachable
and cleanable.

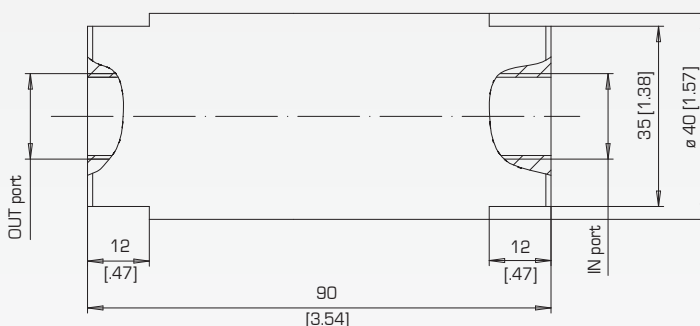


■ In-line 10μ filter

Max pressure : 350 bar [5000 psi]

R 1/4" - Order code : **AA 68 457**

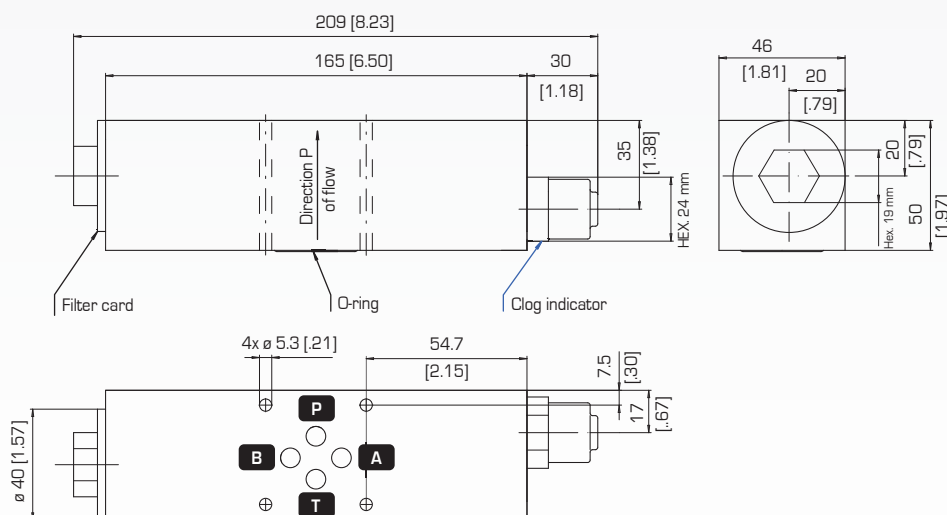
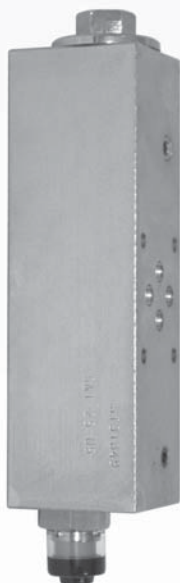
R 3/8" - Order code : **AA 68 458**



■ NG6 filter

Max pressure : 200 bar [2500 psi]
(with filling in visual level indicator)

Order code : **AA 63 715**



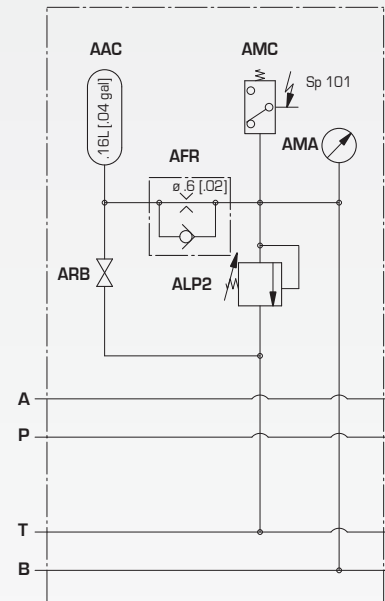
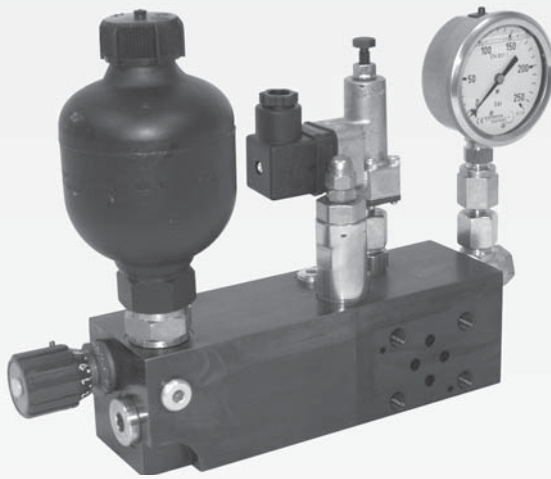
Pressure maintenance block : ABMP

Sandwich assembly
Pattern location NG6

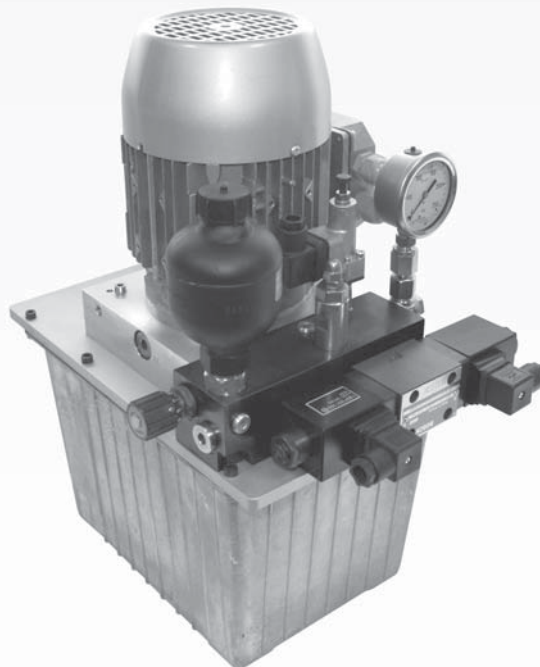
■ Pressure maintenance block with accumulator

Includes :

- 1 gauge allowing the pressure to be visually checked (**AMA**)
- 1 pressure switch (**AMC**) to :
 - Stop the motor when the using pressure is reached
 - Restart if the pressure falls by about 10%
- 1 accumulator to maintain the pressure and prevents over-frequent start-up of the motor during a long clamping period (**AAC**)
- 1 safety pressure limiter (**ALP2**)
- 1 decompression valve with nozzle (**ARB**)
- 1 brake on the discharge from the accumulator (**AFR**)



Example of assembly :



Sequence valve : AVDS

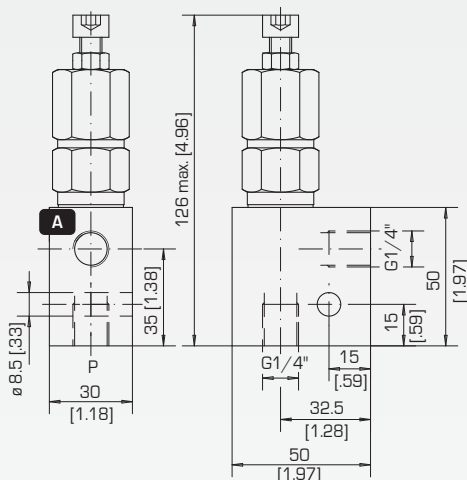
With check valve

Maximum service pressure : 5000 psi

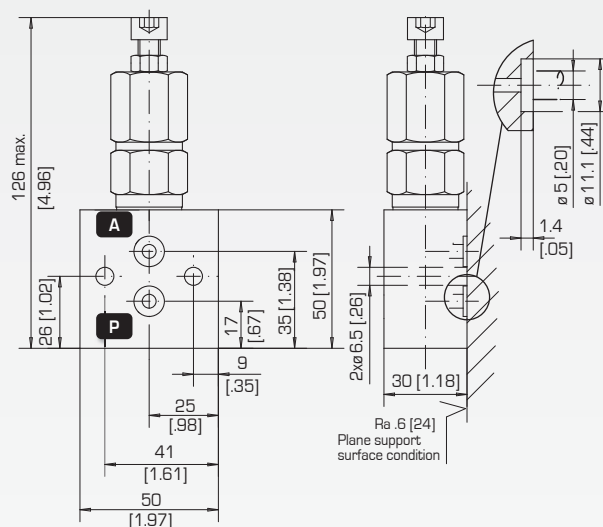
Principle of operation

The sequence valve allows a secondary circuit to be supplied when the pre-set pressure is reached in the primary circuit. It is used to sequence the movement of cylinders, or, for example, to clamp a component before anti-vibration mounting provide support. At the end of the cycle the pressure in the secondary circuit is equal to the pressure in the primary one.

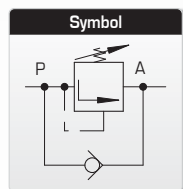
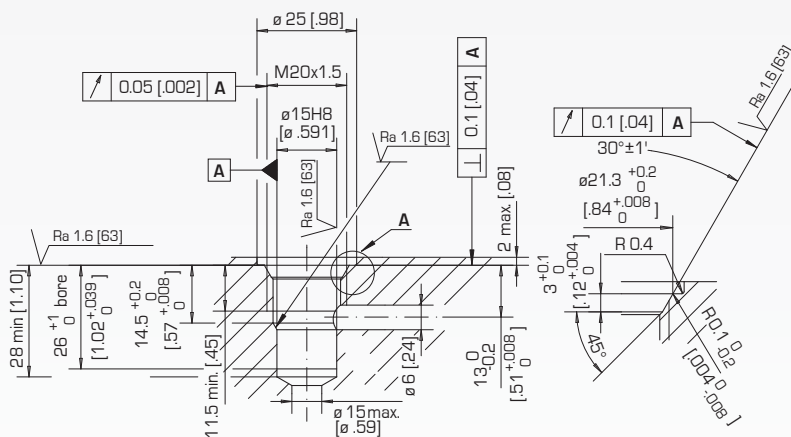
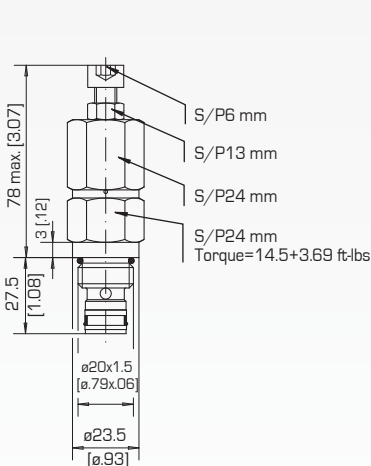
Type AVDS 5_T



Type AVDS 5_P



Type AVDS 5_C



Type			Pressure range		Max flow	
			bar	psi	l/min	gal/min
AVDS 5	1	T	10 to 100	140 to 1400	12	3.17
	2	T	50 to 250	700 to 3500		
AVDS 5	1	P	10 to 100	10 to 1400	12	3.17
	2	P	50 to 250	700 to 3500		
AVDS 5	1	C	10 to 100	140 to 1400	12	3.17
	2	C	50 to 250	700 to 3500		

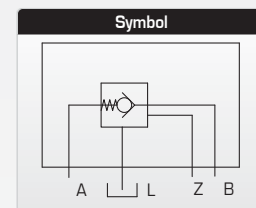
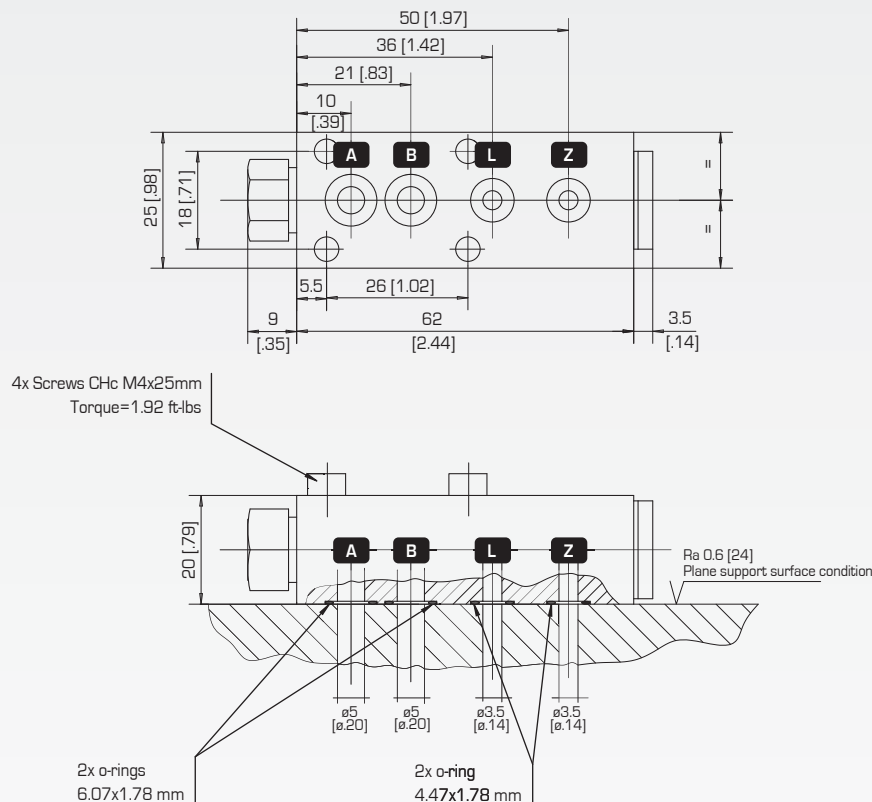
Controlled check valve : AHRP & ARH

On a plate or in-line assembly

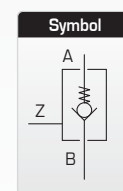
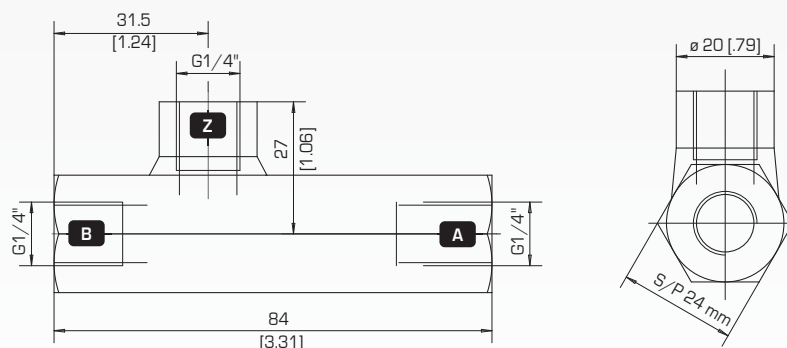
Principle of operation

The check allows free flow in the B to A direction, and prevents passage from A to B. Opening of A to B occurs under the hydraulic control Z. The pipe L is provided for decompression of the valve and must be connected to the return circuit (no pressure).

Check valve AHRP1



Check valve ARH1



Type	Port pressure				Max flow	Weight	Pressure ratio : (Control / A)
	A	B	Z	L			
	bar psi	bar psi	bar psi	bar psi	l/min gal/min	Kg	
AHRP 1	700 10100	700 10100	700 10100	0	20 5.28	.25 .55	1/3
ARH 1	700 10100	700 10100	700 10100	-	15 3.96	.40 .88	1/2

Pressure reducer : ARDP

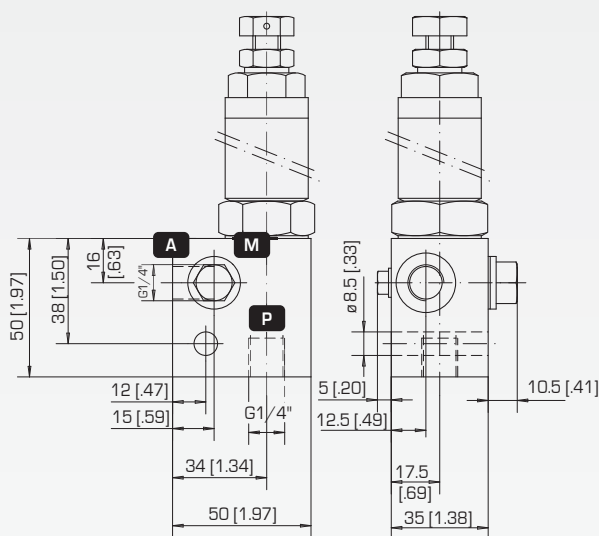
Sealed with check valves

Max using pressure : 5500 psi

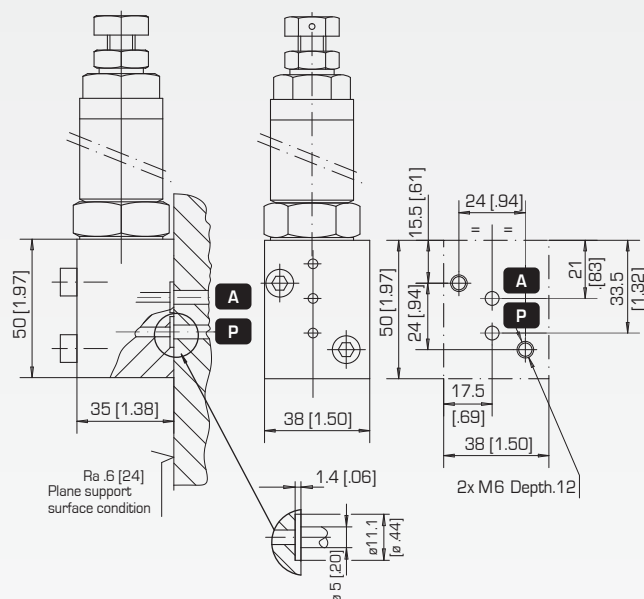
Principle of operation

The function of the pressure reducer is to maintain a constant receiver side pressure (secondary circuit) in spite of there being a higher variable inlet pressure (primary circuit). This model is made up of a check valve with no leak in close state (does not require any drainage oil port). When the primary pressure level at P is less than the secondary pressure at A, reversed circulation A to P for the valve (which is then open) is possible.

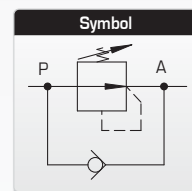
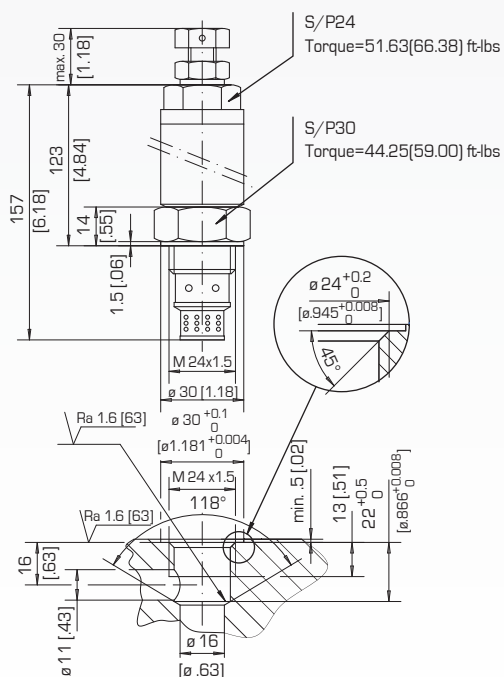
Type ARDP 3_T



Type ARDP 3_P



Type ARDP 3_C



Type		Pressure range		Max flow		
		bar	psi	l/mn	gal/mn	
ARDP 3	1	T	15 to 130	200to 1500	12	3.17
	2		20 to 200	250 to 2500		
	3		30 to 300	400 to 4000		
ARDP 3	1	P	15 to 130	200 to 1500	12	3.17
	2		20 to 200	250 to 2500		
	3		30 to 300	400 to 4000		
ARDP 3	1	C	15 to 130	200to 1500	12	3.17
	2		20 to 200	250 to 2500		
	3		30 to 300	400 to 4000		

Distribution components : ACDIST

Modular check valve and pressure reducer

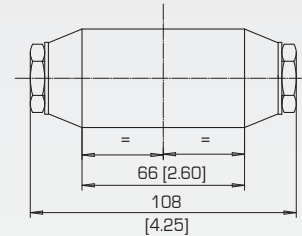
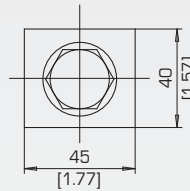
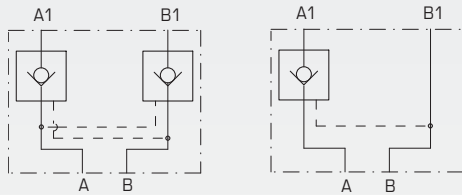
Pressure switch - Intermediate block

Modular check valve - CETOP 03

Valve reference on A and B : **AA 64 463**

Valve reference on A : **AA 64 464**

Valve reference on B : **AA 64 471**



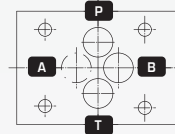
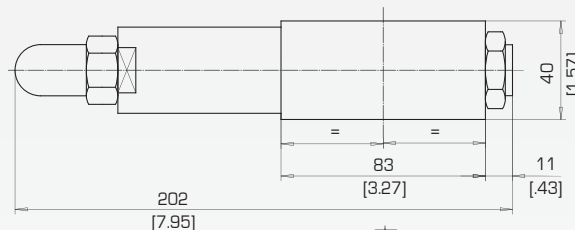
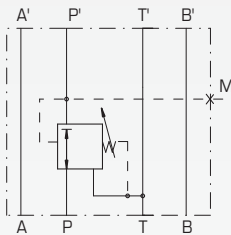
Modular pressure reducer - CETOP 03

For adjustable pressure from 20 to 100 bar [250 to 1400 psi] :

AA 66 327

For adjustable pressure from 50 to 210 bar [700 to 2000 psi] :

AA 66 326



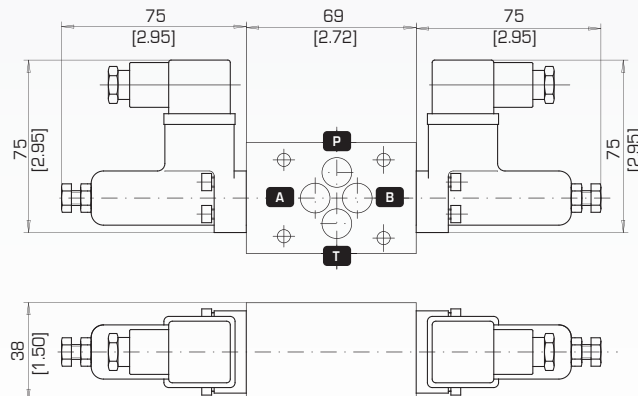
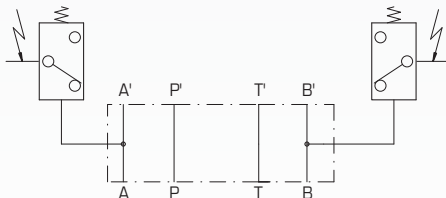
Pressure switch

For adjustable pressure from 20 to 250 bar [250 to 3500 psi] :

AA 63 528

For adjustable pressure from 100 to 400 bar [1400 to 5500 psi] :

AA 63 362

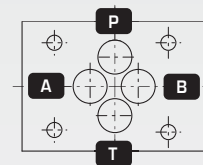


Intermediate block A834 A95

Characteristics

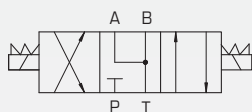
- maximum pressure : **315 bar [4500 psi]**
- maximum flow : **60 l/mn [1585 gal/mn]**
- fluid : **hydraulic mineral oil**
- control voltage : **24 V**
- electrical power : **33 W**

P = Pressure
A, B = Services
B = Tank

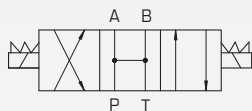


■ Solenoid block assembly DN6 - CETOP 03

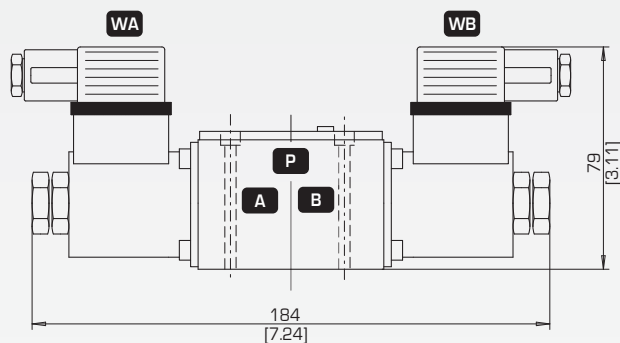
2 solenoids - 3 positions - centred by spring.



Part Number : **AA 63 699**

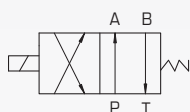


Part Number : **AA 66 702**

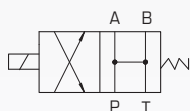


■ Solenoid block assembly DN6 - CETOP 03

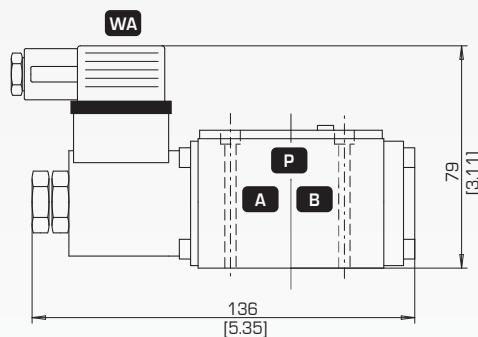
1 solenoid - 2 positions - return by spring.



Part Number : **AA 63 703**

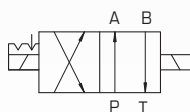


Part Number : **AA 63 698**

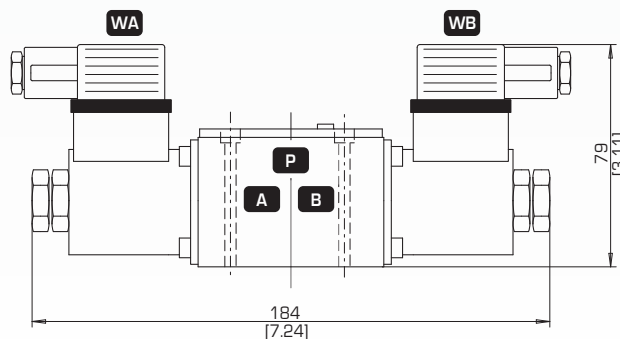


■ Solenoid block assembly DN6 - CETOP 03

2 solenoids - 2 end positions with slots.



Part Number : **AA 63 704**



Js13 tolerances

These are the tolerances for the vents on the cartridge cylinders.

	Dimensions												
MM Inch	1 - 2 .04 - .10	3 - 5 .11 - .22	6 - 10 .23 - .38	10 - 17 .39 - .66	18 - 29 .70 - 1.17	30 - 49 1.18 - 1.95	50 - 79 1.96 - 3.13	80 - 119 3.14 - 4.71	120 - 179 4.72 - 7.07	180 - 249 7.08 - 9.83	250 - 314 9.84 - 12.39	315 - 399 12.40 - 15.73	400 - 500 15.74 - 19.68
mm	±.09	±.10	±.11	±.135	±.165	±.195	±.23	±.27	±.315	±.36	±.405	±.445	±.485
Inches	±.0035	±.0039	±.0043	±.0053	±.0064	±.0076	±.0090	±.0106	±.0124	±.0141	±.0159	±.0175	±.0190

A large rectangular area filled with a light gray grid pattern, intended for handwritten notes.