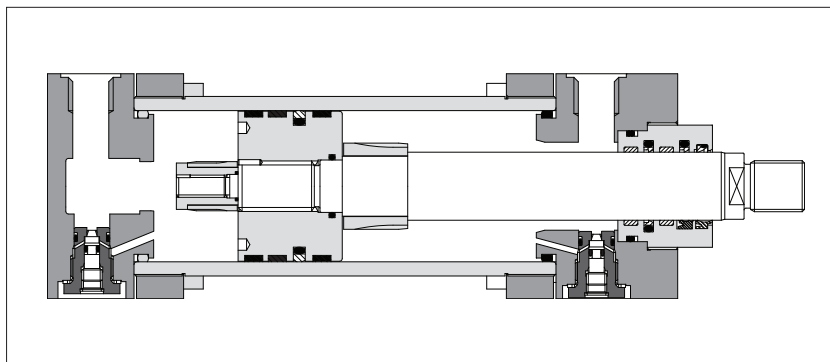


# Hydraulic cylinders type **CC** - round heads with counterflanges

to ISO 6022 - nominal pressure 25 MPa (250 bar) - max 32 MPa (320 bar)



CC cylinders have engineered double acting construction, designed to suit the requirements of industrial heavy duty applications: top reliability, high performances and long working life.

- Bore sizes from **50 to 320 mm**
- Rods with **rolled threads**
- **6** standard mounting styles
- **3** seals options
- Adjustable cushioning
- Rod guide rings for low wear
- Optional built-in position transducer, **see tab. B310**
- Attachments for rods and mounting styles, **see tab. B500**

For cylinder's choice and sizing criteria **see tab. B015**

### SWC Cylinders Designer

Software for assisted selection of Atos cylinders & servocylinders codes, including cylinder's sizing, full technical information, 2D & 3D drawings in several CAD formats.

Available for download at [www.atos.com](http://www.atos.com)

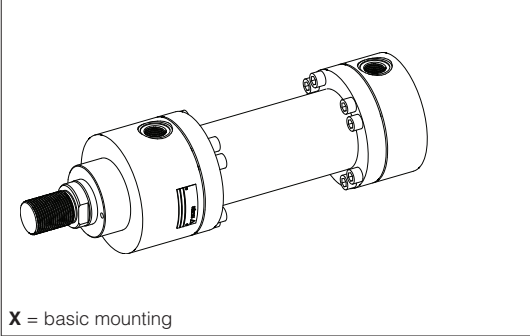
1 MODEL CODE		**	
<b>CC</b>	<b>P</b> - <b>50</b> / <b>36</b> * <b>0500</b> - <b>S</b>	<b>3</b>	<b>0</b>
<b>1</b>	<b>0</b>	<b>1</b>	<b>A</b> - <b>B1E3X1Z3</b>
<p><b>Cylinder series</b> CC to ISO 6022</p> <p><b>Rod position transducer</b> - = omit if not requested F = magnetosonic M = magnetosonic programmable N = magnetostrictive P = potentiometric V = inductive Transducer available on request, contact our technical office</p> <p><b>Bore size</b>, see section [3] from <b>50 to 320 mm</b></p> <p><b>Rod diameter</b>, see sections [7] and [9] from <b>36 to 220 mm</b></p> <p><b>Stroke</b>, see section [4] up to <b>5000 mm</b></p> <p><b>Mounting style</b>, see sections [2] and [3]</p>		<p><b>Series number (1)</b></p> <p><b>Heads' configuration (2)</b>, see section [1] Oil ports positions <b>B1</b> = front head <b>X1</b> = rear head Cushioning adjustments positions <b>E3</b> = front head <b>Z3</b> = rear head</p> <p><b>Options (2):</b> Oversized oil ports, see section [3] <b>D</b> = front oversized oil port <b>Y</b> = rear oversized oil port Flange oil ports, see section [6] <b>M</b> = front and rear SAE 6000 flange oil ports Rod treatment, see section [9] <b>K</b> = nickel and chrome plating <b>T</b> = induction surface hardening and chrome plating Air bleeds, see section [13] <b>A</b> = front air bleed <b>W</b> = rear air bleed Draining, see section [14] <b>L</b> = rod side draining</p> <p><b>Sealing system</b>, see section [12] <b>1</b> = (NBR + PTFE + POLYURETHANE) high static and dynamic sealing <b>2</b> = (FKM + PTFE) very low friction and high temperatures <b>4</b> = (NBR + PTFE) very low friction and high speeds</p> <p><b>Spacer</b>, see section [5] <b>0</b> = none <b>2</b> = 50 mm <b>4</b> = 100 mm <b>6</b> = 150 mm <b>8</b> = 200 mm</p> <p><b>Cushionings</b>, see section [10] <b>0</b> = none <b>Slow adjustable</b> <b>1</b> = rear only <b>2</b> = front only <b>3</b> = front and rear</p>	
<p><b>REF. ISO</b></p> <p><b>A</b> = front flange MF3 <b>B</b> = rear flange MF4 <b>L</b> = intermediate trunnion MT4 (3) <b>S</b> = fixed eye with spherical bearing MP5 <b>X</b> = basic execution - <b>Z</b> = front threaded holes MX5</p>			

(1) For spare parts request indicate the series number printed on the nameplate only for series < 20

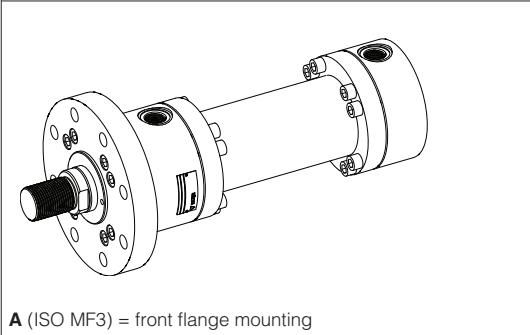
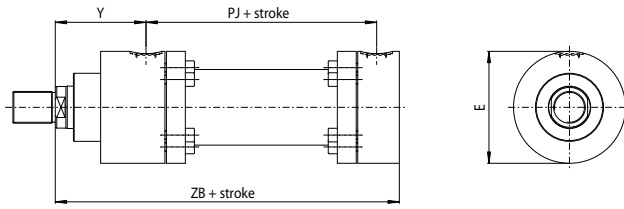
(2) To be entered in alphabetical order

(3) XV dimension must be indicated in the model code, see section [3]

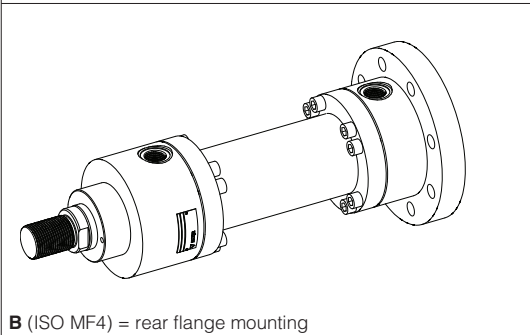
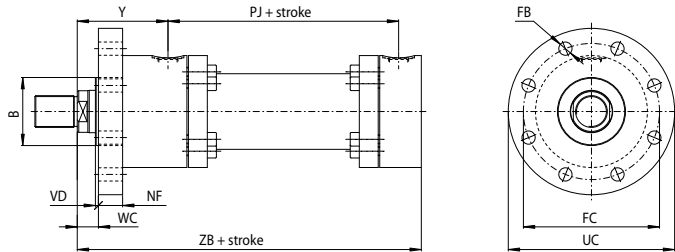
**2 MOUNTING STYLE** - for dimensions see section **3**



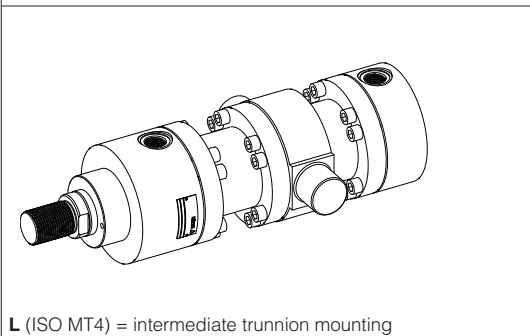
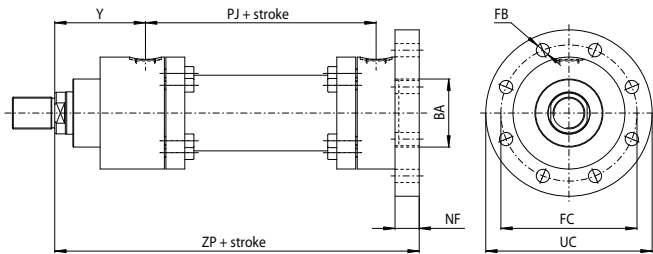
**X** = basic mounting



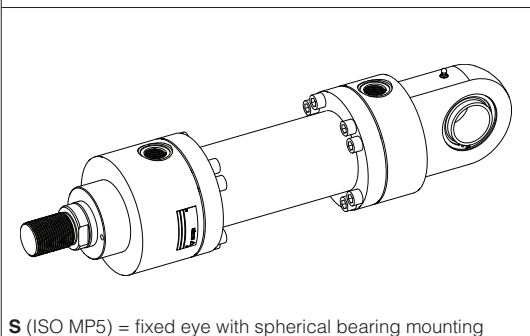
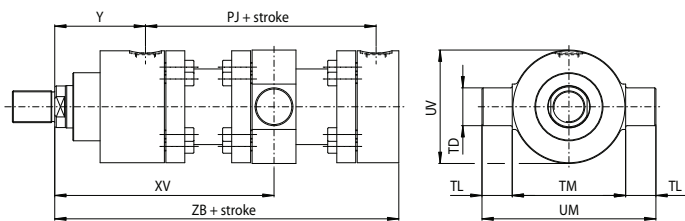
**A** (ISO MF3) = front flange mounting



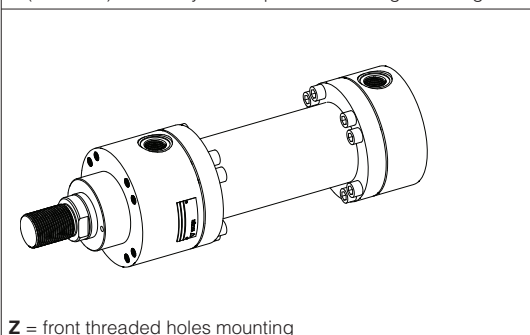
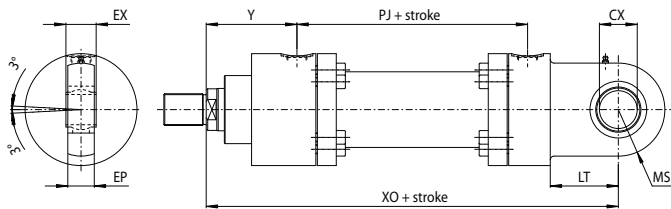
**B** (ISO MF4) = rear flange mounting



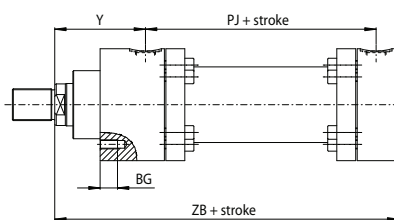
**L** (ISO MT4) = intermediate trunnion mounting



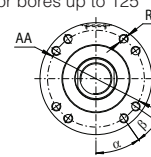
**S** (ISO MP5) = fixed eye with spherical bearing mounting



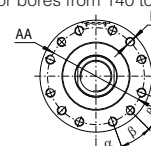
**Z** = front threaded holes mounting



For bores up to 125



For bores from 140 to 320

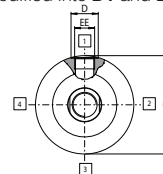


**3** INSTALLATION DIMENSIONS [mm] - see figures in section [2]

Ø Bore	50	63	80	100	125	140	160	180	200	250	320	
Ø Rod	36	45	56	70	90	90	110	110	140	180	220	
α, β	32,5°, 25°	32°, 26°	35°, 20°	35°, 20°	35°, 20°	27,5°, 17,5°	25°, 20°	25°, 20°	25°, 20°	27°, 18°	25°, 20°	
AA	90	105	128	152	188	215	241	275	295	365	458	
B / BA f8/H8 (4)	63	75	90	110	132	145	160	185	200	250	320	
BG min	20	23	23	30	33	33	43	40	40	58	70	
CX H7	32	40	50	63	80	90	100	110	125	160	200	
D (1)	29	36	36	42	42	52	52	52	52	58	58	
D1 (1)	36	42	42	52	52	58	58	58	58	69	69	
E max (2)	108	124	148	175	214	255	270	315	330	412	510	
EE (1) 6g	G 1/2	G 3/4	G 3/4	G 1	G 1	G 1 1/4	G 1 1/4	G 1 1/4	G 1 1/4	G 1 1/2	G 1 1/2	
EE1 (1) 6g	G 3/4	G 1	G 1	G 1 1/4	G 1 1/4	G 1 1/2	G 1 1/2	G 1 1/2	G 1 1/2	G 2	G 2	
EP	27	35	40	52	66	65	84	88	102	130	162	
EX h12	32	40	50	63	80	90	100	110	125	160	200	
FB H13	13,5	13,5	17,5	22	22	26	26	33	33	39	45	
FC js13	132	150	180	212	250	300 (7)	315	365 (7)	385	475	600	
LT min	40	50	63	71	90	113	112	135	160	200	250	
MS max	40	50	63	71	90	113	112	118	160	200	250	
MT [Nm] (3)	30	50	85	152	255	255	304	370	490	950	1750	
NF js13	25	28	32	36	40	40	45	50	56	63	80	
PJ (6)	120	133	155	171	205	208	235	250	278	325	350	
RT	n°8 holes M8	n°8 holes M10	n°8 holes M12	n°8 holes M14	n°8 holes M16	n°12 holes M16	n°12 holes M18	n°12 holes M20	n°12 holes M22	n°12 holes M27	n°12 holes M33	
TD f8	32	40	50	63	80	90	100	110	125	160	200	
TL js13	25	32	40	50	63	70	80	90	100	125	160	
TM h12	112	125	150	180	224	265	280	320	335	425	530	
UC max	160	180	215	260	300	340	370	425	455	545	680	
UM	162	189	230	280	350	405	440	500	535	675	850	
UV max	108	124	150	180	219	260	280	315	333	412	510	
VD	4	4	4	5	5	5	5	5	5	8	8	
VE max (4)	29	32	36	41	45	45	50	55	61	71	88	
WC (6)	22	25	28	32	36	36	40	45	45	50	56	
WF (4) (6)	47	53	60	68	76	76	85	95	101	113	136	
XO (6)	305	348	395	442	520	580	617	690	756	903	1080	
XV (5)	minimum stroke for style L	175	185	150	160	245	250	260	350	390	460	560
	min	260	285	290	320	410	440	465	540	590	690	820
	max	85 + stroke	100 + stroke	140 + stroke	160 + stroke	165 + stroke	190 + stroke	205 + stroke	190 + stroke	200 + stroke	230 + stroke	260 + stroke
Y ±2	98	112	120	134	153	181	185	205	220	260	310	
ZB max	244	274	305	340	396	430	467	505	550	652	764	
ZP (6)	265	298	332	371	430	465	505	550	596	703	830	

**NOTES TO TABLE [3]**

(1) **D, EE** - Oil ports and drain are threaded according to GAS standard with counter-bore dimension **D** according to ISO 1179-1 (see figure below).  
When oversized oil ports are selected (**D** = front oversized oil ports, **Y** = rear oversized oil ports) dimensions **D** and **EE** are respectively modified into **D1** and **EE1**



(2) **E** - If not otherwise specified in the figures in section [2] this value is the front and rear round heads dimension for all the mounting styles (see figure above)

(3) **MT** - Screws tightening torque. Mounting screws must be to a minimum strength of ISO 898/2 grade 12.9

(4) **B, VE, WF** - See figure in section [7]

(5) **XV** - For cylinders with mounting style **L** the stroke must always exceed the minimum values reported in the table. The requested **XV** value must be included between **XV min** and **XV max** and it must be always indicated, with dimension in millimeters, together with the cylinder code. See the following example:

CC - 50 / 36 \* 0500 - L308 - A - B1E3X1Z3  
**XV = 300**

(6) The tolerance is according to the table below

Mounting dimensions	PJ, ZP, XO	WF, WC, XV
stroke < 1250	±1,5	±2
1250 > stroke < 3150	±3	±4
stroke > 3150	±5	±8

(7) The dimension is not according to ISO 6022

**4 STROKE SELECTION**

Stroke has to be selected a few mm longer than the working stroke, to prevent to use the cylinder heads as mechanical stroke-end. The table below shows the minimum stroke depending to the bore.

**Minimum stroke [mm]**

Ø Bore	50	63	80	100	125	140
Minimum stroke	70	70	20	25	50	50
Ø Bore	160	180	200	250	320	
Minimum stroke	50	70	70	80	120	

Maximum stroke:

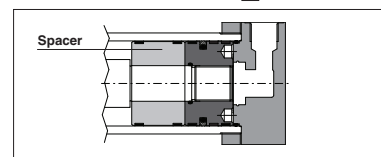
- 5000 mm

Stroke tolerances:

- 0 +2 mm for strokes up to 1250 mm
- 0 +5 mm for strokes from 1250 to 3150 mm
- 0 +8 mm for strokes over 3150 mm

**5 SPACER**

For strokes longer than 1000 mm, proper spacers have to be introduced in the cylinder's construction to increase the rod and piston guide and to protect them from overloads and premature wear. Spacers can be omitted for cylinders working in traction mode. The introduction of spacers increases the overall cylinder's dimensions: spacers' length has to be added to all stroke dependent dimensions in section [3].



**RECOMMENDED SPACERS [mm]**

Stroke	1001 ÷ 1500	1501 ÷ 2000	2001 ÷ 2500	2501 ÷ 5000
Spacer code	<b>2</b>	<b>4</b>	<b>6</b>	<b>8</b>
Length	50	100	150	200

**6 SAE 6000 FLANGE OIL PORTS - DIMENSIONS TO ISO 6162-2 [mm]**

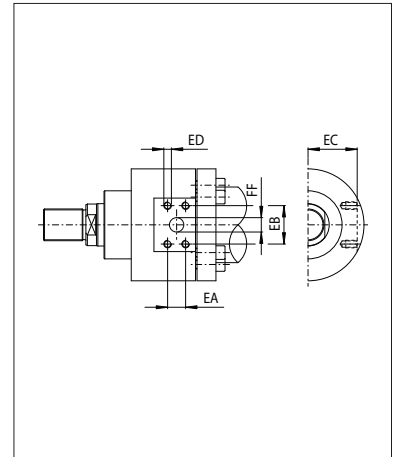
Ø Bore	DN	EC	EA ±0,25	EB ±0,25	ED 6g	FF 0 / -1,5
50 (*)	13	46	18,2	40,5	M8x1,25	13
63 (*)	19	51	23,8	50,8	M10x1,5	19
80		65				
100	25	77	27,8	57,2	M12x1,75	25
125		99				
140	32	118	31,6	66,6	M14x2 (**)	32
160		126				
180		150				
200		158				
250	38	195	36,7	79,3	M16x2	38
320	51	245	44,5	96,8	M20x2,5	51

(\*) SAE flange not available for style B (ISO MF4)

(\*\*) Not compliance to ISO 6162-2

CODE: **M** = Front and rear SAE 6000 flange oil ports

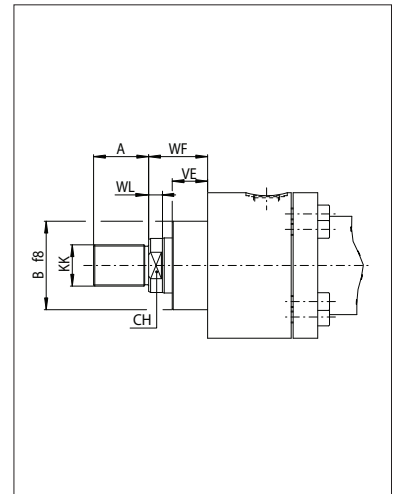
Flange oil port allows an easy cylinder's connection to the piping system and it can work up to the maximum pressure 32 MPa (320 bar).



**7 ROD END DIMENSIONS [mm]**

Ø Bore	50	63	80	100	125	140	160	180	200	250	320
Ø Rod	36	45	56	70	90	90	110	110	140	180	220
A max	36	45	56	63	85	90	95	105	112	125	160
CH	30	39	48	62	80	75	100	100	128	15 (*)	20 (*)
KK 6g	M27x2	M33x2	M42x2	M48x2	M64x3	M72x3	M80x3	M90x3	M100x3	M125x4	M160x4
WL min	8	10	10	10	15	15	15	15	15	-	-

(\*) n° 2 holes per key



**8 CYLINDER'S HOUSING FEATURES**

The cylinder's housings are made in different materials depending to the bore; the internal surfaces are lapped: diameter tolerance H8, roughness Ra ≤ 0,25 µm.

Ø Bore	Material	Rs min [N/mm²]
50÷200	Cold drawn and stressed steel	450
250-320	Hot rolled steel	355

**9 RODS FEATURES and options**

The rods materials have high strength, which provide safety coefficients higher than 4 in static stress conditions, at maximum working pressure.

The rod surface is chrome plated: diameter tolerances f7, roughness Ra ≤ 0,25 µm. Corrosion resistance of 200h in neutral spray to ISO 9227 NSS.

Ø Rod	Material	Rs min [N/mm²]	Chrome	
			min thickness [mm]	hardness [HV]
36÷110	Hardened and tempered alloy-steel	700	0,020	850-1150
140	Alloy steel	450		
180÷220	Carbon steel	360	0,045	850-1150

Rod diameters from 36 to 70 mm have rolled threads; in rolling process the component material is stressed beyond its yield point, being deformed plastically. This offers many technical advantages: higher profile accuracy, improved fatigue working life and high wear resistance. See **tab. B015** for the calculation of the expected rod fatigue life.

**Contact our technical office** in case of heavy duty applications.

Rod corrosion resistance and hardness can be improved selecting the options **K** and **T** (option **K** affects the strength of standard rod, see **tab. B015** for the calculation of the expected rod fatigue life):

**K** = Nickel and chrome-plating (for rods from 36 to 110 mm)

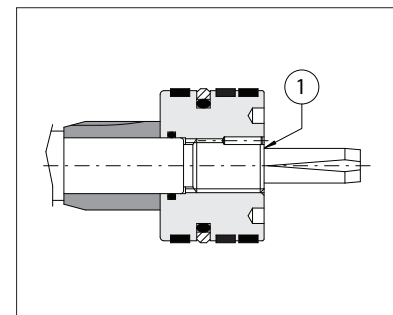
Corrosion resistance (rating 10 to ISO 10289):

- 350 h in acetic acid salt spray to ISO 9227 AASS
- 1000 h in neutral spray to ISO 9227 NSS

**T** = Induction surface hardening and chrome plating (for rods up to 140 mm)

- 56-60 HRC (613-697 HV) hardness

**ROD-PISTON COUPLING**



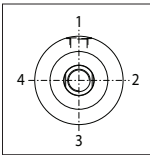
The rod and piston are mechanically coupled by a threaded connection in which the thread on the rod is at least equal to the external thread **KK**, indicated in the table [7]. The piston is screwed to the rod by a pre-fixed tightening torque in order to improve the fatigue resistance. The stop pin ① avoids the piston unscrewing.

## 10 CUSHIONINGS

Cushionings are recommended for applications where: • the piston makes a full stroke with speed over than 0,05 m/s; • it is necessary to reduce undesirable noise and mechanical shocks; • vertical application with heavy loads. The stroke-end cushionings are hydraulic dampers specifically designed to dissipate the energy of the mass connected to the cylinder rod, by progressively increasing the pressure in the cushioning chamber and thus reducing the rod speed before the cylinder's mechanical stroke-end (see the graphics at side). See the **tab. B015** for the max damping energy. The cylinder is provided with needle valve to optimize cushioning performances in different applications. The regulating screws are supplied fully screwed in (max cushioning effect). In case of high masses and/or very high operating speeds it is recommended to back them off to optimize the cushioning effect. The adjustment screw has a special design to prevent unlocking and expulsion. The cushioning effect is highly ensured even in case of variation of the fluid viscosity.

Ø Bore		50	63	80	100	125	140	160	180	200	250	320
Ø Rod		36	45	56	70	90	90	110	110	140	180	220
Cushioning length [mm]	Lf front	29	40	45	50	60	60	64	64	64	80	100
	Lf rear	35	38	45	50	60	60	64	64	64	64	64

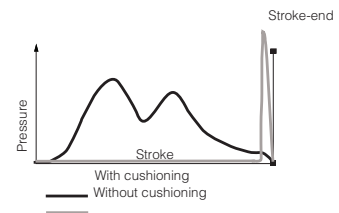
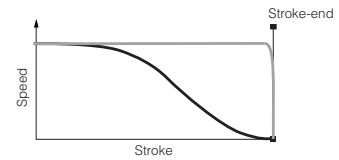
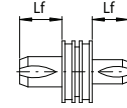
## 11 POSITION OF THE OIL PORTS AND CUSHIONING ADJUSTMENTS



FRONT HEAD: **B1** = oil port position; **E3** = cushioning adjustment position  
 REAR HEAD: **X1** = oil port position; **Z3** = cushioning adjustment position.  
 The oil ports and cushioning adjustment positions are only available, respectively, on sides 1 and 3 (see figure at side).

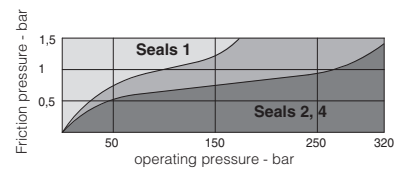
Example of model code: CC-200/140 \*0100-S301 - A - **B1E3X1Z3**

Lf is the total cushioning length. When the stroke-end cushionings are used as safety devices, to mechanically preserve the cylinder and the system, it is advisable to select the cylinder's stroke longer than the operating one by an amount equal to the cushioning length Lf; in this way the cushioning effect does not influence the movement during the operating stroke.



## 12 SEALING SYSTEM FEATURES

The sealing system must be chosen according to the working conditions of the system: speed, operating frequencies, fluid type and temperature. Additional verifications about minimum in/out rod speed is warmly suggested, see **tab. B015**. Special sealing system for low temperature, high frequencies (up to 20 Hz), long working life and heavy duty are available, see **tab. TB020**. All the seals, static and dynamic, must be periodically replaced: proper spare kits are available, see section 18. Contact our technical office for the compatibility with other fluids not mentioned below and specify type and composition. See section 15 for fluid requirements.



compatibility with other fluids not mentioned below and specify type and composition. See section 15 for fluid requirements.

Sealing system	Material	Features	Max speed [m/s]	Fluid temperature range	Fluids compatibility	ISO Standards for seals	
						Piston	Rod
1	NBR + PTFE + POLYURETHANE	high static and dynamic sealing	0,5	-20°C to 85°C	Mineral oils HH, HL, HLP, HLP-D, HM, HV, MIL-H-5606	ISO 7425/1	ISO 5597/1
2	FKM + PTFE	very low friction and high temperatures	4	-20°C to 120°C	Mineral oils HH, HL, HLP, HLP-D, HM, HV, MIL-H-5606 fire resistance fluids HFA, HFB, HFC (water max 45%), HFD-U, HFD-R	ISO 7425/1	ISO 7425/2
4	NBR + PTFE	very low friction and high speeds	4	-20°C to 85°C	Mineral oils HH, HL, HLP, HLP-D, HM, HV, MIL-H-5606 fire resistance fluids HFA, HFC (water max 45%), HFD-U	ISO 7425/1	ISO 7425/2

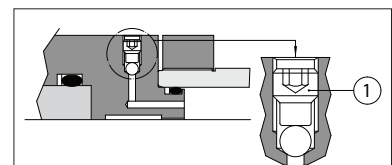
## 13 AIR BLEEDS

CODES: **A** = front air bleed; **W** = rear air bleed

The air in the hydraulic circuit must be removed to avoid noise, vibrations and irregular cylinder's motion: air bleed valves are recommended to realize this operation easily and safely.

Air bleeds are positioned on side 3, see section 11.

For a proper use of the air-bleed (see figure on side) unlock the grub screw ① with a wrench for hexagonal head screws, bleed-off the air and retighten as indicated in table at side.



Ø Bore	Screwing	Tightening torque
50÷200	M8 x 10	20 Nm
250÷320	M12 x 20	30 Nm

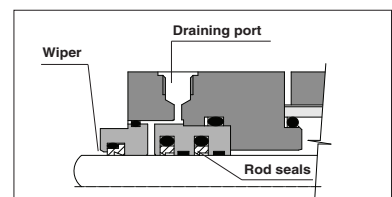
## 14 DRAINING

CODE: **L** = rod side draining

The rod side draining reduces the seals friction and increases their reliability; it is mandatory for cylinders with strokes longer than 2000 mm, with rod side chamber constantly pressurized and for servocylinders.

The draining is positioned on the same side of the oil port, between the wiper and the rod seals (see figure at side). It is recommended to connect the draining port to the tank without backpressure.

Draining port is G1/8.



## 15 FLUID REQUIREMENTS

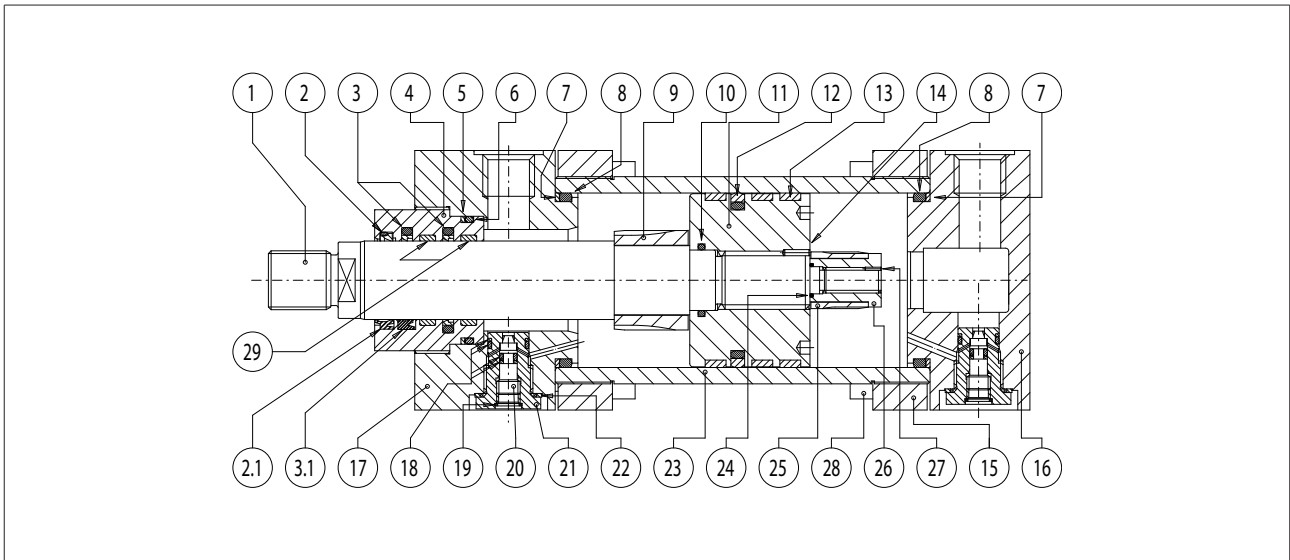
Cylinders and servocylinders are suitable for operation with mineral oils with or without additives (**HH, HL, HLP, HLP-D, HM, HV**), fire resistant fluids (**HFA** oil in water emulsion - 90-95% water and 5-10% oil, **HFB** water in oil emulsion - 40% water, **HFC** water glycol - max 45% water) and synthetic fluids (**HFD-U** organic esters, **HFD-R** phosphate esters). The fluid must have a viscosity within 15 and 100 mm<sup>2</sup>/s, a temperature within 0 and 70°C and fluid contamination class ISO 19/16 according to ISO 4406, achieved with in-line filters at 25 µm.

**16 CYLINDERS MASSES [kg] (tolerance ± 5%)**

Ø Bore [mm]	Ø Rod [mm]	MASS FOR STYLE X for single rod		ADDITIONAL MASSES depending on mounting styles and options					
		for 100 mm stroke	each 100 mm more	Styles A, B	Style L	Style S	front cushioning	rear cushioning	each 50 mm spacer
50	36	18	1,9	2,77	3,15	1	0,2	1	1,3
63	45	20,1	2,75	3,96	4,64	2,58	0,3	1	2
80	56	35,5	4,15	7,17	7,81	4,54	0,5	1	3,08
100	70	58	6,5	11,14	13,38	7,18	0,8	1,5	4,81
125	90	100	10,17	16	23,68	14,02	1,2	2	7,40
140	90	144	10,73	22,5	41,09	23	1,2	2	8,90
160	110	189	15,12	29,92	47,92	27,5	1,7	5	11,72
180	110	262	17,32	41,66	70,16	45,9	2,5	5	14,92
200	140	335	22,94	54,22	81,12	69	2,5	5	17,75
250	180	660	42,62	86,01	167	116	2,5	5	30,58
320	220	1230	65,35	166	304	250	2,8	5	49,32

**Note:** the masses related to the other options, not indicated in the table, don't have a relevant influence on the cylinder's mass

**17 CYLINDER SECTION**



POS.	DESCRIPTION	MATERIAL	POS.	DESCRIPTION	MATERIAL	POS.	DESCRIPTION	MATERIAL
1	Rod	Chrome plated steel	10	O-ring	NBR / FKM	21	Cushioning adjustment plug	Steel
2	Wiper	NBR / FKM and PTFE	11	Piston	Steel	22	Seal	FKM
2.1	Wiper	Polyurethane	12	Piston seal	NBR / FKM and PTFE	23	Cylinder housing	Steel
3	Rod seal	NBR / FKM and PTFE	13	Piston guide ring	PTFE	24	O-ring	NBR / FKM
3.1	Rod seal	Polyurethane	14	Screw stop pin	Steel	25	Rear cushioning piston	Steel
4	Rod bearing	Bronze / Steel	15	Counterflange	Steel	26	Cushioning piston locking	Steel
5	Anti-extrusion ring	PTFE	16	Rear head	Steel / Cast iron	27	Screw stop pin	Steel
6	O-ring	NBR / FKM	17	Front head	Steel / Cast iron	28	Screw	Steel class 12.9
7	Anti-extrusion ring	PTFE	18	O-ring and anti-extrusion ring	FKM and PTFE	29	Rod guide	PTFE
8	O-ring	NBR / FKM	19	Seeger	Steel			
9	Front cushioning piston	Steel	20	Cushioning adjustment screw	Steel			

**18 SPARE PARTS - SEE TABLE SP-B241**

Example for seals spare parts code

<b>G 1</b>	-	<b>CC</b>	-	<b>50</b>	/	<b>36</b>	-	<b>10</b>
Sealing system		Cylinder series		Bore size [mm]		Rod diameter [mm]		Serial number (indicate only for series <20)