



Stocchetta Cilindri s.r.l.



ISO 6020/2 Hydraulic cylinders

IHM Series

Use and maintenance manual APP 0002-4.2014 REV.00

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1 Product information

1.1 Description

A hydraulic cylinder converts hydraulic energy into a linear movement. The driving force is determined by the hydraulic pressure inside the cylinder chamber on the piston surfaces and cylinder ring.

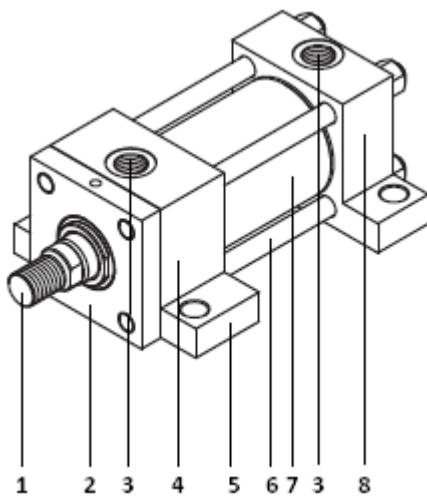


Fig.1 Cylinder IHM – ISO 6020/2 main components:

- 1 Rod
- 2 Front flange
- 3 Oil connections
- 4 Cylinder front head
- 5 Mounting elements (ex. supporting feet)
- 6 Tie rod
- 7 Cylinder barrel
- 8 Cylinder rear head (or cylinder end cap)

The Stocchetta Cilindri IHM series of cylinders and hydraulic double acting servo-cylinders has been conceived to meet the most demanding actuation requirements in the industrial sector, in compliance with ISO 6020/2 (edition 1991) and DIN 24554 construction standards.

The compact square-headed design with tie rods and the careful choice of materials and seals used, added to the rigorous final testing procedures reproducing normal cylinder operating conditions, make these hydraulic actuators a valid choice for all types of industrial applications requiring highest reliability and repeatability with high dynamic operating characteristics.

1.2 Technical specifications

Interchangeability dimensions	According to ISO 6020/2 standard (edition 1991) and DIN 24554 standard
Nominal operating pressure (non-stop operation)	210 bar (21 MPa)
Max. operating pressure	250 bar (25 MPa)
Rod diameters	<p>According to bore type, 2-3 diameters from 12 mm to 140 mm are available, so to obtain the following section ratios:</p> <ul style="list-style-type: none"> a) 1:1.25 reduced rod b) 1:1.4 intermediate rod c) 1:2 enlarged rod
Stroke	Upon customer's request, with dimensional tolerances from 0 to 1 mm for values up to 1000mm and from 0 to 4 mm up to 6000 mm
Max. standard speed	0.5 m/s
Standard temperature	From -20°C to +100°C
Standard hydraulic fluid	Mineral oil in compliance with ISO 6743/4 – 1982 standards and purity degree in compliance with ISO 4406 standard
Mounting pieces and accessories	12 different kinds of standard fixings in compliance with ISO standards, completed with a large range of accessories capable of meeting any kind of operational requirement

Tab. 1

1.3 General product description

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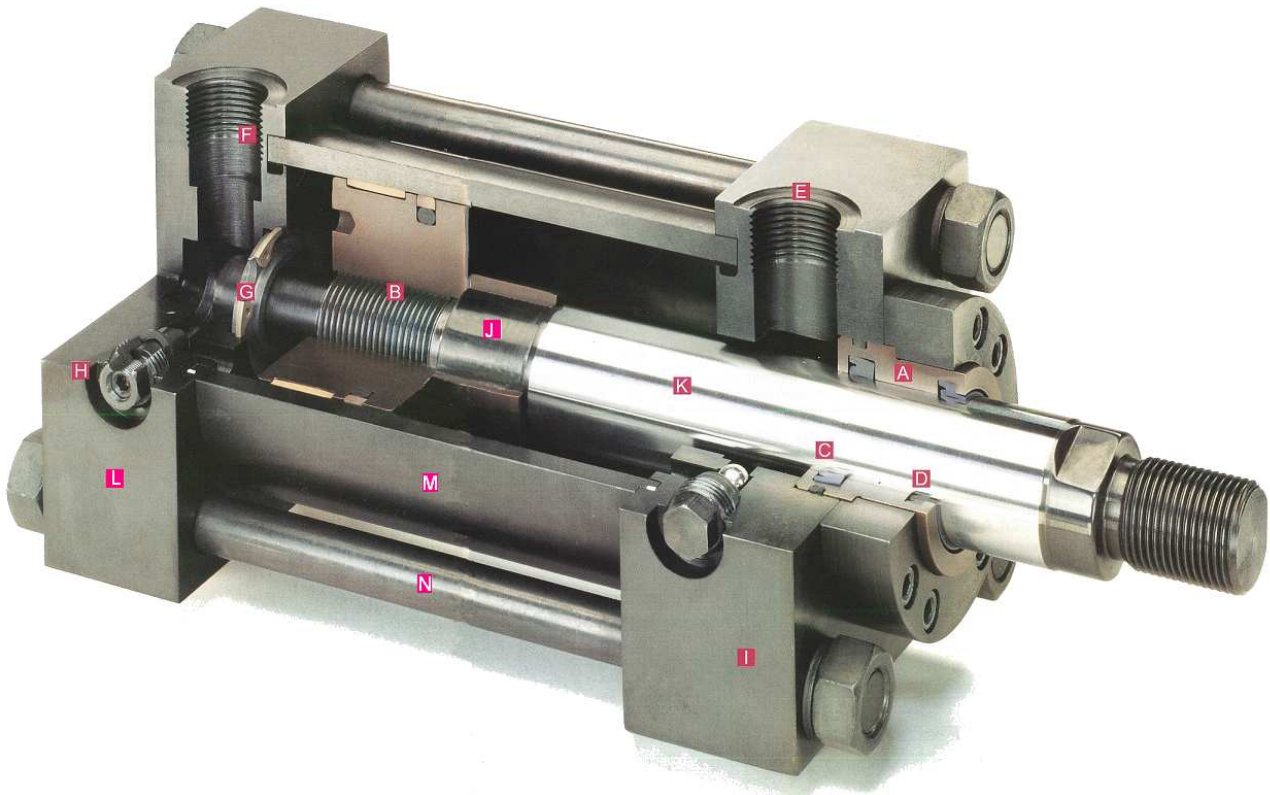


Fig. 2

The **rod (K)** has been obtained from bars of hardened, tempered and thick-chromed alloy steel. Basis material of the rod ensures the mechanical characteristics, while the surface treatment grants highest impact resistance and ensures longer service life to the seals. Upon request, it is available also in stainless steel or with ceramic coating.

The **piston (B)**, necessary for force transmission, is made of GS 400 cast iron, it is screwed on the rod and blocked with a security dowel. The piston, together with the relevant seals in polyurethane, guarantees the separation between the two cylinder chambers, front and rear respectively.



Fig. 3

As optional, a low friction piston can be used (see Fig.3). This solution may allow for slight leakages. The large guide shoe prevents any metallic contact between piston and barrel. The design of the guide shoe and of the seal in bronze reinforced Teflon, reduces breakout and translational friction, prevents any stick-slip effect, thus reducing wear and increasing the service life.

The cylinder **front head (I)** is made of steel and it is precision-machined, in order to guarantee actually flat and parallel mounting surfaces. Equipped with a bushing, the cylinder front head acts as guide for the rod, its seals ensure external tightness and it is the seat to the polyurethane or metal **double-lip scraper (D)**, which prevents impurities from entering the cylinder front chamber. When the rod extends, the piston can lean against the head, in this case, the cylinder compressive forces and possible external loads are absorbed by the head. Power supply connection has been positioned on the head and, upon request, vents and braking valves are also available. In some cases, (e.g. feet/flange fastening) the head can be used as fastening element to the remaining part of the machine or the installation.

The steel **barrel (M)** is internally lapped to improve sliding and ensure long life to seals. The barrel has been dimensioned in compliance with the reference standards, with a suitable safety factor assuring its reliability. The dimensioning is such that the barrel expansion, due to internal pressure, remains within the limits ensuring the proper working and a suitable service life of piston seals, guide rings and cushioning.

The **end cap (L)** is made of steel. When the rod retracts, the piston can abut against the end cap; in this case, the tensile forces and possible external loads are absorbed by the end cap. Power supply connection is located on the end cap and, upon request, vents and braking valves are also available. In some cases, (e.g. feet/flange fastening) the end cap, as well as the head, can be used as fastening element to the remaining part of the machine or of the installation.



The **bushing (A)**, in GS 400 cast iron is highly resistant to wear and its surface acts as support to the rod when it slides. The non-threaded integral bushing houses all the seals in one single assembly and it has a defined seat in the head in order to ensure highest concentricity. In most cases, the closing flange enables the removal of the bushing by means of the screws, with no need to unloose the tie rods. A specific groove has been pre-arranged to facilitate this operation on the bushings.

Fig. 4

The table below illustrates the type of assembled flange and the removal system according to bore, rod diameter and type of fastening.

ALESAGGIO	DIAM. STELO mm.	IHMA	IHMC	IHMCE	IHMCS	IHMG	IHML	IHMM	IHMN	IHMP	IHMU	IHMTT	IHMW
25	12	RS	NS	RS	RS	NS	NS	NS	RS	NS	RS	NS	RS
	18	RS	NS	RS	RS	NS	NS	NS	RS	NS	RS	NS	RS
32	14	RS	NS	RS	RS	NS	NS	NS	RS	NS	RS	NS	RS
	22	RS	NS	RS	RS	NS	NS	NS	RS	NS	RS	NS	RS
40	18	RS	NS	RS	RS	RC	NS	NS	RS	NS	RS	NS	RS
	28	RS	NS	RS	RS	RC	NS	NS	RS	NS	RS	NS	RS
50	22	RS	NS	RS	RS	RC	NS	NS	RS	NS	RS	NS	RS
	36	RS	NS	RS	RS	RC	NS	NS	RS	NS	RS	NS	RS
63	28	RS	NS	RS	RS	RC	NS	NS	RS	NS	RS	NS	RS
	45	RS	NS	RS	RS	RC	NS	NS	RS	NS	RS	NS	RS
80	36	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC
	56	RS	NS	RS	RS	RC	NS	NS	RS	NS	RS	NS	RS
100	45	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC
	70	RS	NS	RS	RS	RC	NS	NS	RS	NS	RS	NS	RS
125	56	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC
	90	RS	NS	RS	RS	RC	NS	NS	RS	NS	RS	NS	RS
160	70	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC
	110	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC
200	90	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC
	140	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC

Tab. 2

RC= Removable circular flange enabling bushing pull-out without cylinder disassembling

RS= Removable rectangular flange enabling bushing pull-out without cylinder disassembling

NS= Rectangular flange design requiring the removal of screw nuts in the tie rods to enable bushing replacement

If a removable circular flange is present (**RC**), apply the torque stated in the following table to tighten the corresponding screws:

BORE (mm)	40		50		63		80		100		125		160		200	
ROD	18 *	28 *	22 *	36 *	28 *	45 *	36 *	56 *	45 *	70 *	56 *	90 *	70	110	90	140
SCREWS	M4	M4	M4	M4	M6	M6	M6	M6	M6	M6	M6	M8	M6	M8	M8	M8
TIGHTENING TORQUE (Nm)	5	5	5	5	15	15	15	15	15	15	15	40	15	40	40	40

Tab. 3 * Only for Cylinders with type "G" fastening.

The **tie rods (N)** are made of hardened and tempered steel. The threads are rolled to increase their fatigue life. The tie rods are screwed on the (front and rear) heads or fixed by means of screw nuts by applying pre-set tightening torques. As concerns the tightening of the relative screw nuts, apply the torque specified in this table:

BORE (mm)	25	32	40	50	63	80	100	125	160	200
SCREWS	M5 x 0,8	M6 x 1	M8 x 1	M12 x 1,25	M12 x 1,25	M16 x 1,5	M16 x 1,5	M22 x 1,5	M27 x 2	M30 x 2
TIGHTENING TORQUE (Nm)	5	9	20	70	70	160	160	450	820	1150

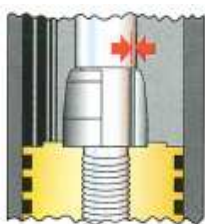
Tab. 4

The **rod seal (C)**, in polyurethane, ensures longer life in comparison with conventional seals, better abrasion, tearing and extrusion resistance. The special profile ensures excellent tightness to pressures.

The **barrel-head static seals (F)** consist of an O-ring (up to bore 125) or O-ring plus backup ring (from bore 125 upwards) which ensure a perfect seal.

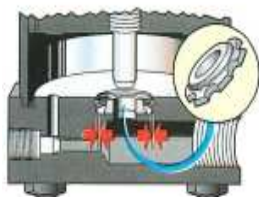
The following seal-kits are available for supply: **Polyurethane, Viton and Low Friction**.

The **connections (E)** can be standard gas parallel (according to ISO 228/1), metric connections or with holes for SAE flanges.



Cushioning (G-J) consists of self-centring bushes to enable a gradual absorption of cylinder thrust force and load kinetic energy, maintaining a nearly constant pressure over the whole length.

IMPORTANT: cushioning adjustment shall be carried out exclusively by operating on the internal dowel, **do not unscrew** the cartridge. For further details on cushioning see paragraph 5.1.



The floating cushion design allows stricter tolerances and, therefore, better braking effect and lower consumption. Rear cushion with floating threaded flange replaces the non-return valve thus assuring a larger surface for oil flow and quicker starting.

Fig. 5

Standard cushioning lengths are given in the following table.



ALES. Ø	STELO (mm)	LUNGHEZZA		AREA EFFETTIVA	
		ANT. (mm ²)	POST. (mm ²)	ANT. (mm ²)	POST. (mm ²)
25	12	20,0	17,0	291	441
	18	20,0	17,0	176	441
32	14	20,0	17,0	519	755
	22	20,0	17,0	351	755
40	18	28,4	30,0	868	1166
	28	28,4	30,0	549	1166
50	22	28,4	30,0	1249	1873
	36	28,4	30,0	829	1873
63	28	28,4	30,0	1977	2903
	45	28,4	30,0	1307	2903
80	36	35,0	34,0	3688	4638
	56	35,0	34,0	2199	4638
100	45	35,0	34,0	5827	7465
	70	35,0	34,0	3668	7465
125	56	35,0	34,0	9413	11480
	90	34,0	34,0	5624	11480
160	70	33,8	38,0	14333	18554
	110	35,0	38,0	8029	18554
200	90	50,8	51,0	23806	29864
	140	50,8	51,0	14674	29864

Tab. 5








The **mounting elements** enable the insertion of the cylinder in the machine or in the system.

2 Use of manual

This use and maintenance manual describes the cylinder ISO 6020/2, its components and its relevant operations. Before starting any operation implying use, general maintenance of the cylinder (see chapter no. 11 of **basic manual STC001-2.2013**), including handling and storage (see chapters no. 6 and 7 of **basic manual STC001-2.2013**), read this manual and **basic manual STC001-2.2013** carefully.

The handbook contains 22 pages.

2.1 Safety symbols

	DANGER	Identifies a dangerous situation which, if not avoided, may cause death or serious body injuries.
	CAUTION	Identifies a dangerous situation which, if not avoided, may cause slight, up to medium-serious, body injuries.
	NOTICE	Information which, if used, protects the product and/or the environment from material damages
	IMPORTANT	Instructions for a better use of the cylinder when in operation or adjustment and/or maintenance instructions.
	GLOVES	The use of protective gloves is compulsory
	LUBRICATION	Proper lubrication of the components.
	MAINTENANCE	Instructions for a correct disassembly/re-assembly of cylinder components during routine and/or extraordinary maintenance.

2.2 General information

The original cylinder configuration **shall not** be modified for any reason whatever without the explicit consent of **Stocchetta Cilindri S.r.l.** .

Before starting any operation, carefully read all the directions stated in the chapter “**Safety warnings**” of the **basic manual STC001-2.2013**.



The opening of the hydraulic cylinder will result in the cancellation of any warranty right.



This manual and the information therein contained have been conceived for skilled technical staff. **Stocchetta Cilindri S.r.l.** disclaims all liability for damages due to misuse of the information contained in this manual. The content of this manual can be modified without any notice. Due to technological developments, the illustrations and descriptions contained in this manual may differ, in the details, from the actually supplied cylinder. In case of problems or for any information, contact the after-sales service.


Upon goods receipt verify that:



- The packaging is unimpaired and not damaged. In case of damages immediately inform **Stocchetta Cilindri S.r.l.**
- The delivery corresponds to order specifications

3 Decommissioning

3.1 Preparation to decommissioning

 DANGER
HIGH OPERATING PRESSURE IN THE HYDRAULIC CYLINDER AND IN THE SYSTEM
Danger of injuries or damages to people and things due to mobile parts or oil leakage during operation!
<ul style="list-style-type: none"> • Disable all power transmission components and all connections (electrical, pneumatic, hydraulic) according to the manufacturer's indications; secure the installation against restart. If possible, remove the main safety element of the installation • Release the cylinder from external forces, if any. • Depressurize the accumulators on the oil side - if any

Upon decommissioning and disassembly of the hydraulic cylinder from the system, do as follows:

- Due to safety reasons, lines, ports and components cannot be disconnected as long as the system is under pressure. First of all, lower the loads, depressurize the pressure accumulator, switch off the pumps and ensure the system against re-start.
- Provide for sufficiently capacious collection tanks to contain the whole oil volume.

3.2 How to carry out the decommissioning

In order to carry out the decommissioning follow these steps:

- Let the oil flow into the prearranged collection tanks
- Verify that all lines and services are completely empty
- Carry out venting, if necessary



3.3 Disassembly preliminary operations

Before carrying out any operation on the hydraulic cylinder, take the following measures:

- Get a sufficiently intelligible installation layout and/or list of spare parts
- Make use of clean and professional tools. Make sure that the workstation is clean.
- Upon cylinder disassembly, avoid any penetration of impurities inside of it. Seal the ports with suitable plugs or flanged covers.
- Make sure that the cylinder and, in particular, the rod are not damaged.
- Position the hydraulic cylinder and its components on a stable working table.

As concerns cylinder lifting and handling during its disassembly from the system (or machinery), the same directions set forth in chapter 6 “**Handling**” of the **basic manual STC0001-2.2013** shall apply.

4 Repair and spare parts

Please always report to the personnel of **Stocchetta Cilindri S.r.l.** for any question or explanation you may need.



The opening of the hydraulic cylinder will result in the cancellation of any warranty right.

4.1 Repair

Stocchetta Cilindri S.r.l. offers complete assistance for hydraulic cylinder repairs. Submit your requests to our headquarters to the following e-mail address: info@stocchettacilindri.com

4.2 Spare parts



NOTICE

MACHINE MALFUNCTION DUE TO THE USE OF UNSUITABLE SPARE PARTS!

Damages to property!

- Exclusively use components listed in the specific product documentation (list of components)
- Exclusively use new seals and verify their compatibility with the fluid used. Despite their identical aspect, seal materials may differ; therefore check the product code.

Send spare parts orders directly to the headquarters to the e-mail address: info@stocchettacilindri.com

When ordering the spare parts, provide the product code and the cylinder work-order no. stated on the identification plate. Besides specify, if known, the position of the corresponding component according to the list of components.

5 Maintenance/ replacement of parts subject to wear

5.1 Maintenance of cushioning adjustment cartridges

ISO 6022 cylinders are provided with a cushioning adjuster with needle valve. If the adjustment cartridge leaks, this means that the seal must be replaced. The parts making up the brake cartridges are:

- 1- BRAKE CARTRIDGE
- 2- BRAKE NEEDLE
- 3- SEAL

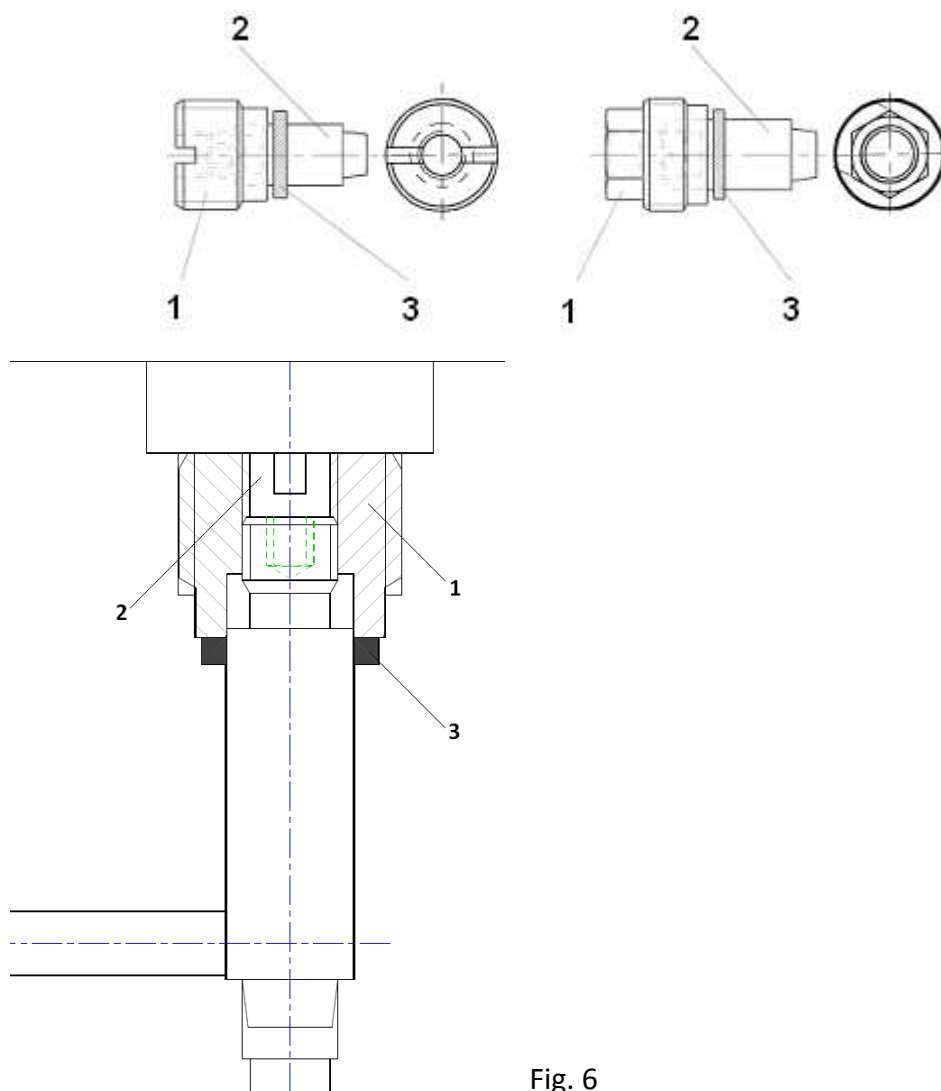


Fig. 6



Disassembly: Unscrew the brake cartridge (Pos.1) by making use of the suitable wrench (or screwdriver, according to the diameters). Carefully clean the seat of the sealing O-ring and pay utmost care that no dirt or foreign bodies enter the cylinder through the seat of the adjustment needle cartridge.



Assembly: replace the seal (Pos. 3) and lubricate before assembling it. Reassemble the brake cartridge in the corresponding housing.

5.2 Replacement of seals of the rod guide bushing

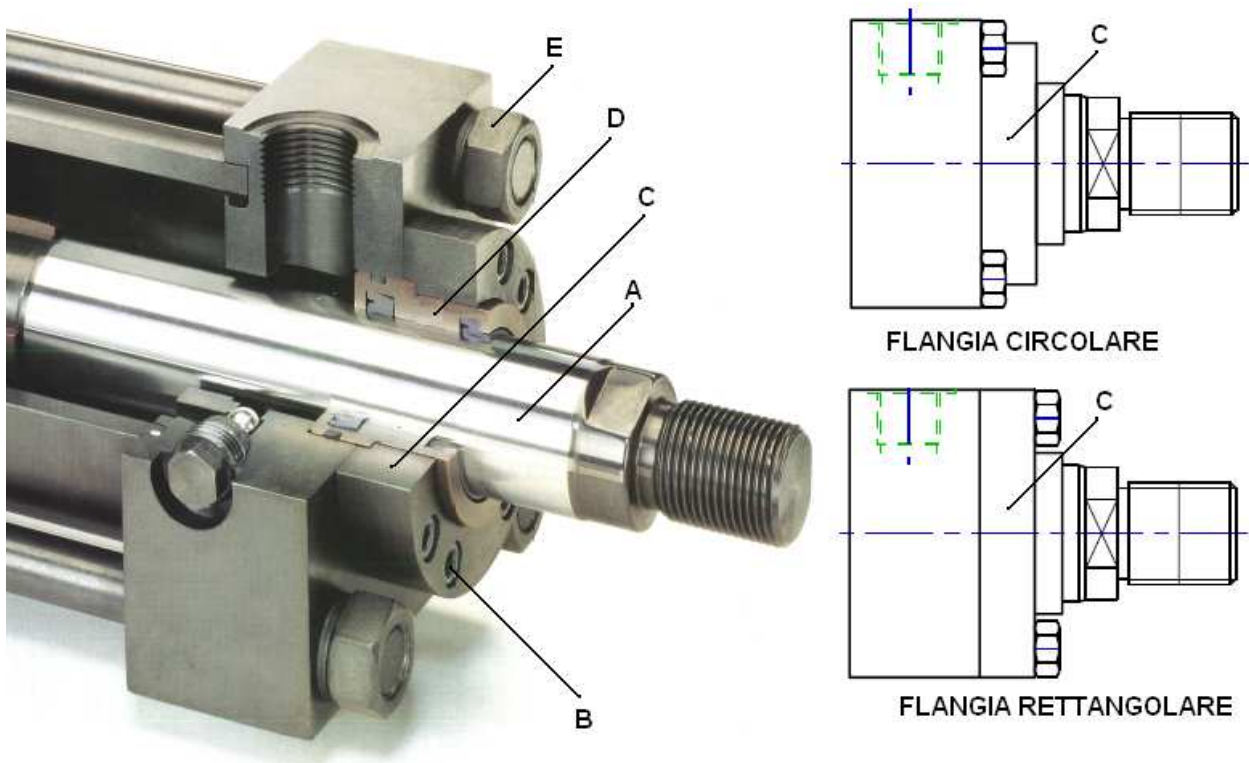


Fig. 7



Check that the surface of the rod (A) is free from damages that may affect the service life of the seals.

CIRCULAR FLANGE: unscrew the fastening screws (B) of the clamping flange (C) and pull it out. Disassemble the rod guide bushing (D) by making it slide along the rod, using the suitable groove as extraction point.



RECTANGULAR FLANGE: unscrew the locking nuts (E) and pull out the clamping flange (C). Disassemble the rod guide bushing (D) by making it slide along the rod, using the suitable groove as extraction point.



After having removed the worn out seals, carry out a thorough washing of the bushing in order that it is clean and free from metallic particles, scorings or surface faults of any kind; otherwise, provide also for the replacement of the bushing, by asking **Stocchetta Cilindri S.r.l.** for a spare bushing.



Lubricate the new seals to be fitted and their seats in the bushing by making use of specific grease type **Polymer 400\0** (to be supplied upon request). The specific feature of grease is to improve the sensitivity, accuracy, tightness and service life of the seals, thus avoiding sticking and jerky movements (stick-slip effect), besides facilitating the motions at low speeds by decreasing the frictions.



Check the correct orientation of the seals with respect to the thrust direction of the hydraulic fluid as illustrated in the following figure.

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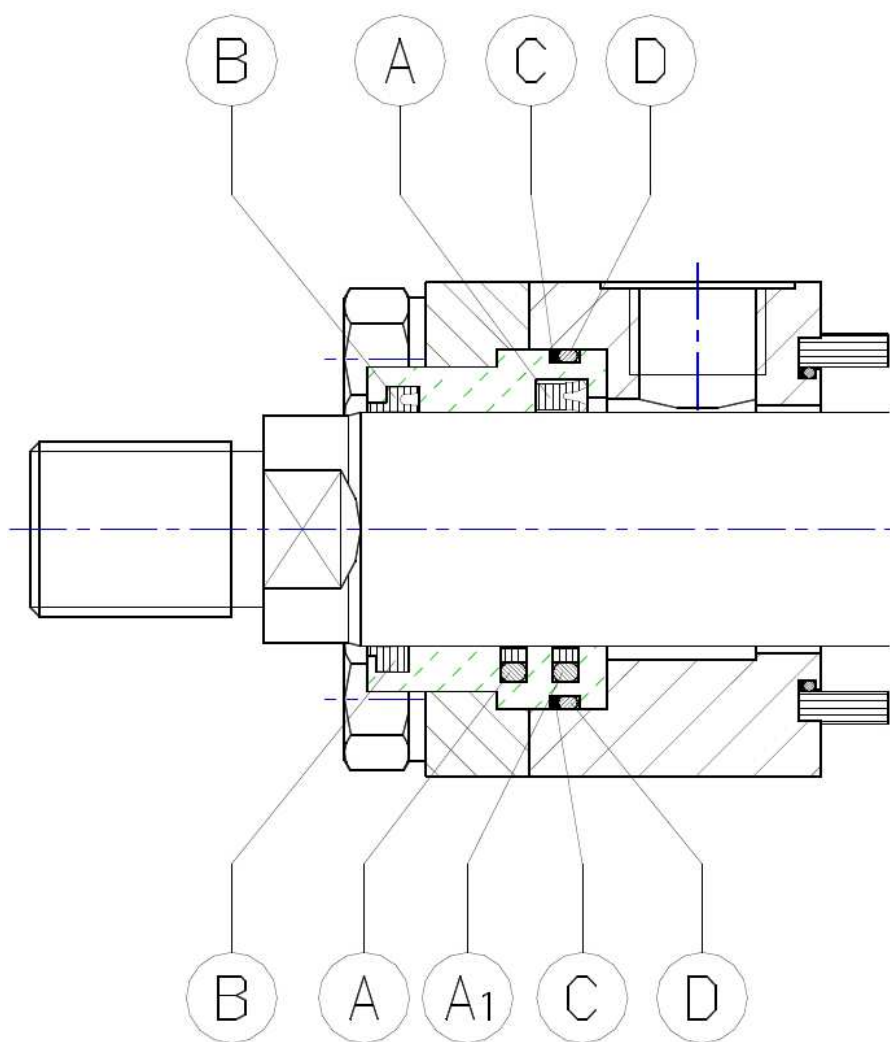


Fig. 8

BUSHING KIT (POLYURETHANE/VITON)	
A	<i>Lip seal</i>
B	<i>Wiper ring</i>
C	<i>Back-up ring</i>
D	<i>External sealing O-ring</i>

Tab. 6

BUSHING KIT (LOW FRICTION)	
A	<i>STEPSEAL gasket</i>
A1	<i>STEPSEAL gasket</i>
B	<i>Wiper ring</i>
C	<i>Backup ring</i>
D	<i>External sealing O-ring</i>

Tab. 7



Install the seals in the bushing by operating evenly and avoiding any use of metallic, sharp-edged tools, being extremely careful not to cause any long-term deformation to the seals.

16

Position the O-ring, if any present, into the groove

Insert the seal into the groove by pressing it together by hand as illustrated in Fig. 9 or by making use of special tools as illustrated in Fig. 10. The seal shall be given a “kidney” shape and shall be free from any edges in its bends.

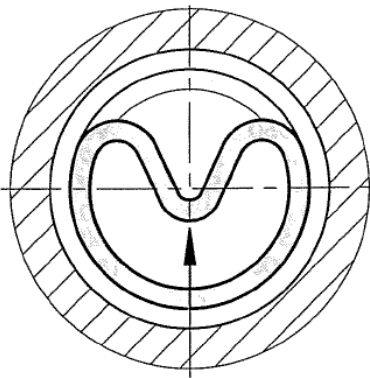


Fig. 9

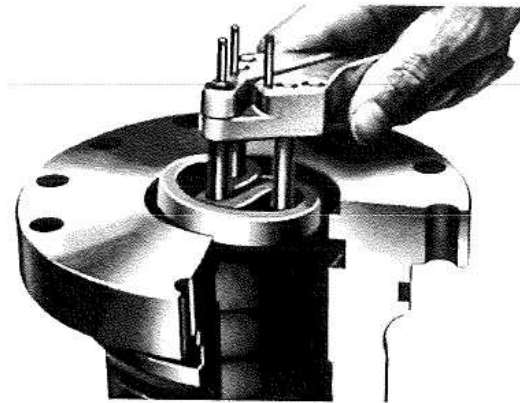


Fig. 10

Once the seal has been positioned into the groove, shape it into a *ring*, by hand and by pushing in the direction of the arrow (see Fig. 9).



Calibrate the seal directly on the rod only if the latter is provided with a lead-in chamfer. Otherwise, calibrated gauges may also be used, provided they have a specific chamfer (see Fig. 11).

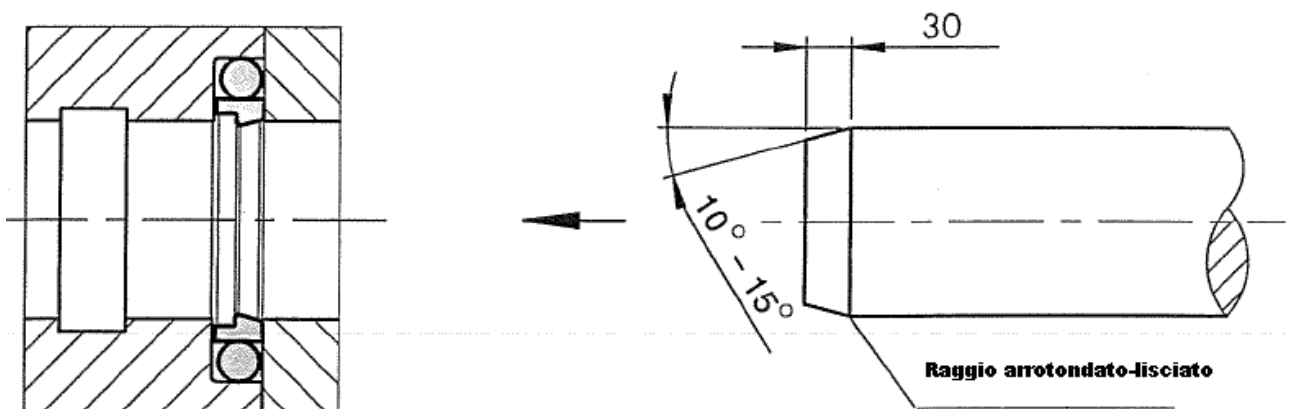


Fig. 11



When installing the bushing, be extremely careful not to damage the newly fitted seals upon contact with rod thread. Carry out a rotary movement in order to facilitate the coupling of the rod guide bushing.

Make the bushing slide along the rod and position it in the cylinder head housing.



CIRCULAR FLANGE: re-assemble the clamping flange and tighten the corresponding fastening screws by applying suitable torques (see Table 3 at page 5).

RECTANGULAR: reposition the clamping flange, screw the nuts on the tie rods by applying the suitable tightening torque (see Table 4 at page 6).

5.3 Replacement of piston seals

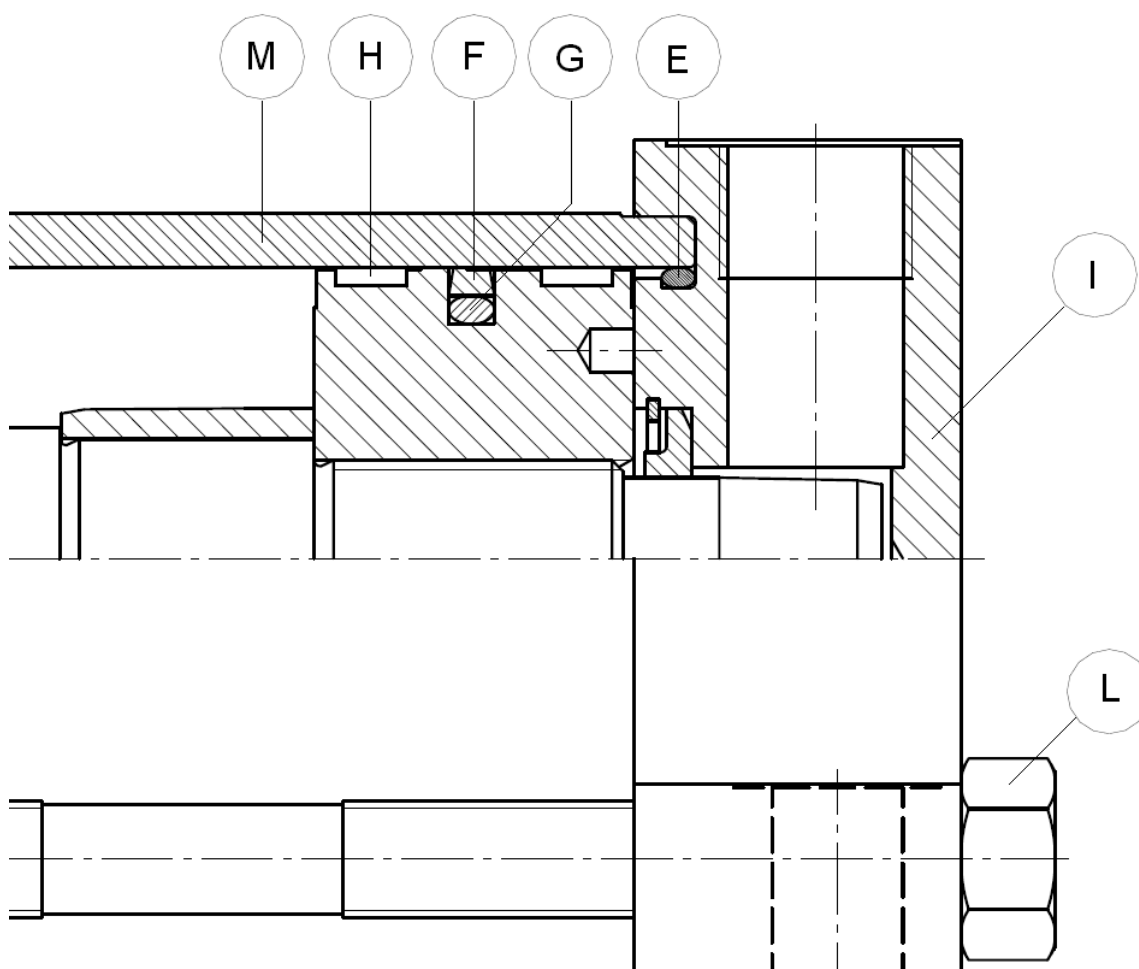


Fig. 12

Tab. 8

PISTON KIT (POLYURETHANE/VITON/ LOW FRICTION)	
E	<i>Cylinder head - barrel sealing O-ring</i>
F	<i>Energized bi-directional seal</i>
G	<i>Energizing O-ring</i>
H	<i>Guide shoes</i>

Hereunder a list of directives to be observed for a correct replacement of piston seals. Use the drawing of Fig. 12 as reference.



Remove the locknuts of the tie rods (I). Disassemble the cylinder by drawing off, in succession, the end cap (L), the barrel (M) and by pulling out the rod/piston unit.



Be extremely careful not to damage the seals of the bushing due to possible contact with the thread at rod end.



After having removed the worn-out seals, carry out a thorough washing of all parts with accurate examination of the barrel, rod and piston in order to ascertain that no scorings, burrs or any other kind of damages have been caused to the surface. In case of damage, ask **Stocchetta Cilindri S.r.l.** for spare parts in order to provide for the replacement.



If the cylinder is provided with cushioning, check (after having disassembled the rod-piston unit from the cylinder body) that the cushioning components (bushings and threaded flanges) are not damaged or worn out.



Lubricate the new seals to be fitted and their seats in the bushing by making use of specific grease type **Polymer 400\0** (to be supplied upon request). The specific feature of grease is to improve the sensitivity, accuracy, tightness and service life of the seals, thus avoiding sticking and jerky motions (stick-slip effect), besides facilitating the motions at low speeds by decreasing the frictions.



Install the seals of the piston by operating evenly and avoiding any use of metallic, sharp-edged tools, being extremely careful not to cause any long-term deformation to the seals.

Install the O-ring in its seat by expanding it as much as necessary. Place the sealing ring into the groove, over the O-ring (see Fig. 13) and enlarge it by hand until it correctly fits (see Fig. 14).

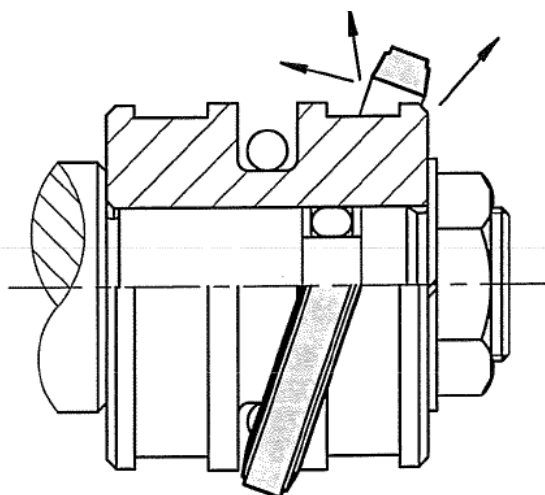


Fig. 13



Fig. 14

The same operation can be carried out by means of a special device consisting of an expansion cone and an expanding sleeve (see Fig. 15) .

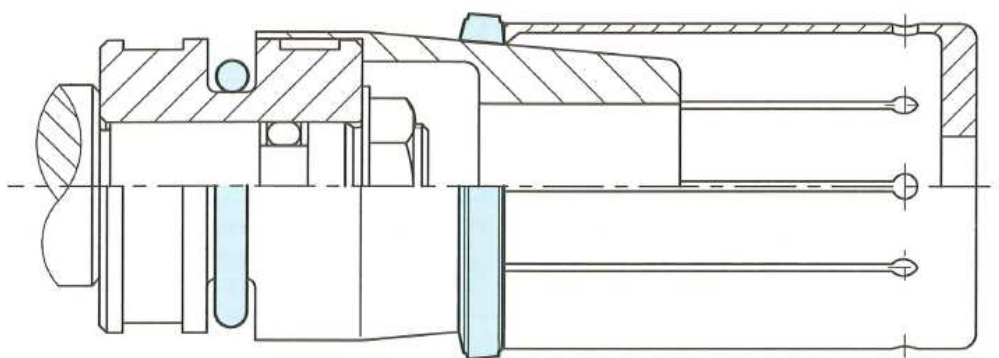


Fig. 15

The seal can be calibrated by making use of the corresponding cylinder barrel, on condition that it is provided with a suitably long lead-in chamfer, or by means of a calibrating tool (see Fig. 16).

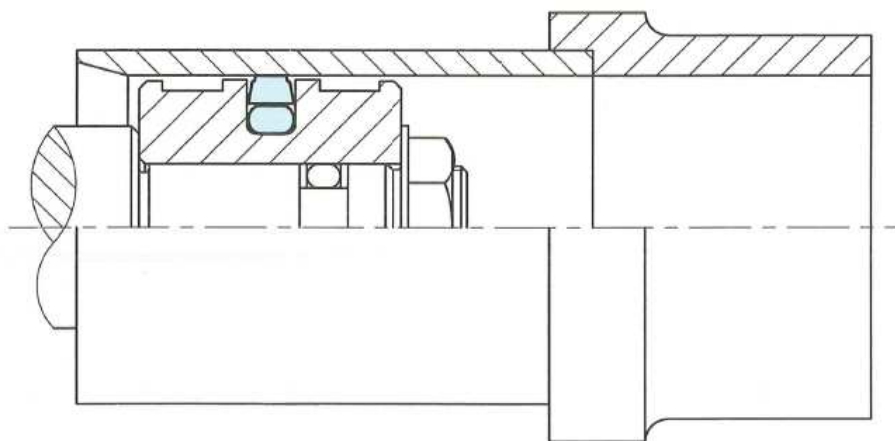


Fig. 16

Make the rod slide through the bushing until it abuts against the assembled unit head/flange/tie rods which had been previously dismantled.



Lubricate the cylinder barrel with oil or grease, then insert the rod/piston unit.



Reassemble the end-cap and tighten the screw nuts of the tie rods crosswise, by applying a gradual tightening torque up to the max. value stated in Table 4 at page 6.



The kits of seals supplied by **Stocchetta Cilindri S.r.l.** as spare parts shall be stored in moisture-free areas, avoiding any direct contact with heat sources and the exposure to direct sunlight.