



HYDRAULIC CYLINDERS

USE AND MAINTENANCE MANUAL

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MANUFACTURER'S DECLARATION

Concerning hydraulic cylinder to be incorporated in a machine, according to directive 2006/42/EC.

RIMA S.P.A.

Via Sigalina a Mattina, 32 – 25018 MONTICHIARI (BS) ITALIA,
in the person Legal Representative, Mr. Romeo Faganelli,

DECLARES

under his responsibility, in accordance with directive 2006/42/EC, that no cylinders manufactured by RIMA S.P.A. may be used until incorporated into the machine it is intended for and until the same machine is declared to conform to directive 2006/42/EC and successive additions by the manufacturer, importer or installer of the machine.

AND FURTHER DECLARES THAT:

- all the cylinders are designed and manufactured applying the safety rules stated in directive 2006/42/EC.
- all the cylinders must operate at a temperature range suitable to the material used (see point 3, components features)
- if not otherwise indicated, all the cylinders must not be used at a pressure higher than 210 Bar;

RIMA S.P.A. DECLINES ALL RESPONSIBILITY FOR IMPROPER USE OF CYLINDER

Any arising dispute shall be governed by the court of Brescia.

Rima SpA is the owner of this manual and no part of this can be reproduced or copied.

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1 INTRODUCTION

Introduction

This manual has been prepared by **RIMA S.p.A.** to provide the users of its cylinders with information about the safety standards connected to using, maintaining and overhauling the cylinders.

With the purpose of ensuring maximum operating reliability of its cylinders **RIMA S.P.A.** has carefully selected the materials and components used to manufacture the cylinders. All the components have been designed and manufactured to safely resist any stresses foreseen in their use.

Cylinder users

Trained person = a technician who knows about the equipment and rules relevant to the cylinders and to the machine on which they are fitted.

Informed person = operator who knows about his duties and who has basic information relevant to the specific risks and correct use of the cylinder.

Final user = synonym of informed person

Symbols used in the manual



This symbol indicates behaviour that is important also as far as safety is concerned. In case users do not respect these rules, any kind of manufacturer's liability will automatically cease.



This symbol indicates that all possible operations have been made on the cylinder to eliminate or reduce risks, but there are residual risks which users must be aware of.

Residual risks and cylinder use information



- Cylinders must not be used or worked on before reading and completely understanding all parts of this manual.
- The safety standards established for the machines or the equipment the cylinders are installed in are also valid for the cylinders.
- The machine operator is responsible for the correct use of the machine and the equipment. He must therefore know and apply the cylinder use instructions described here.
The cylinder must be used exclusively to lift objects, any use to lift animals or people is strictly forbidden. In any case the cylinder can only be used when it is fitted on a machine or an equipment according to the rules provided for in this manual. When using the cylinder the utmost attention must be paid in the following cases:
- Sudden starts can be dangerous to people or things, please make sure that the cylinder control plant works well and is appropriate to use.
- In order to avoid injuries, do not pull up or grab the rod or parts of the cylinder while it is working.
- Never overcharge the cylinder beyond the charge allowed.
- Do not use the cylinder as a support or as a grip to get into the machine or to rest objects on.



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2 USE AND PRESERVATION OF THE “USE AND MAINTENANCE MANUAL”

This use and maintenance manual is intended for **RIMA S.P.A.** customers and in particular for the people in charge of: installation, maintenance, overhauling, repair and for all operators involved in the cylinder operation.

The parts of the manual to concentrate most on concern the operations with the highest degree of risk. These operations are regulated by labour safety laws.

The information contained in this manual is useful to indicate correct use of the cylinder according to the established design and construction purposes.

Moreover, information is supplied about handling, installation, maintenance, overhauling and problem solving, all respecting the limits established by the manufacturer and detailed in this manual.

The use and maintenance manual is an integral part of the cylinder and must be kept until its disposal.

It must be kept in a safe place, always close to the equipment so that it is available for consultation at any time.

If the manual becomes damaged, the user must request a copy from the manufacturer who is obliged to supply one.

The Rima S.p.A. customer is strictly responsible for following and keeping the instructions in this manual and for passing them to the final user.

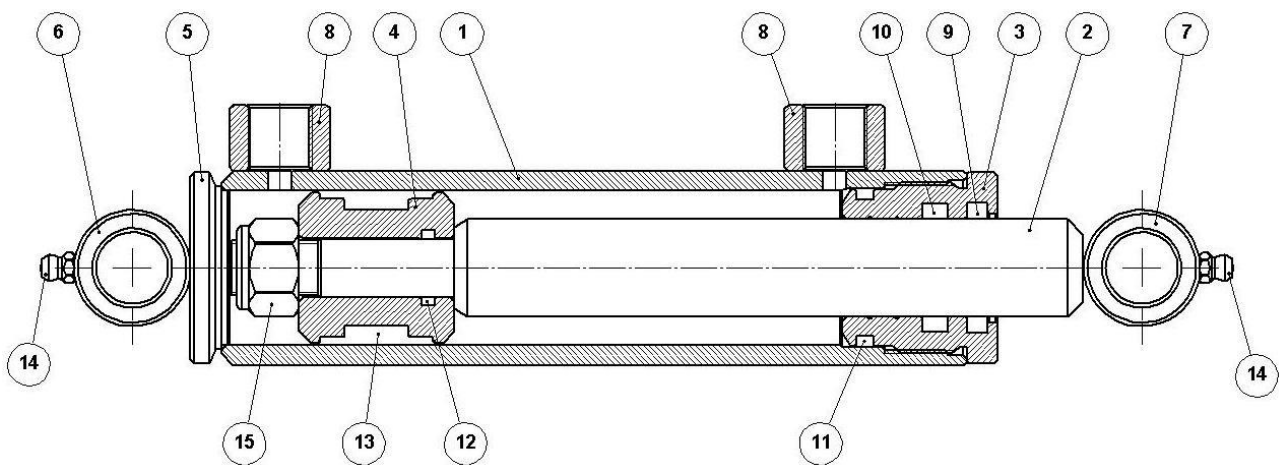


Circumstances that release the manufacturer from any liability

- Improper use of the cylinder or use by persons not trained for professional use
- Use contrary to the specific national standards
- Incorrect installation
- Serious failure to carry out the prescribed maintenance
- Unauthorised changes or interventions
- Use of non original spare parts or ones not specific to the model
- Total or partial failure to comply with these instructions
- Lack of documentation concerning possible maintenance and repair done
- Exceptional events (e.g. floods, earthquakes, fire, car accidents or similar)

3 HYDRAULIC CYLINDER COMPONENTS IN THE BASIC VERSION

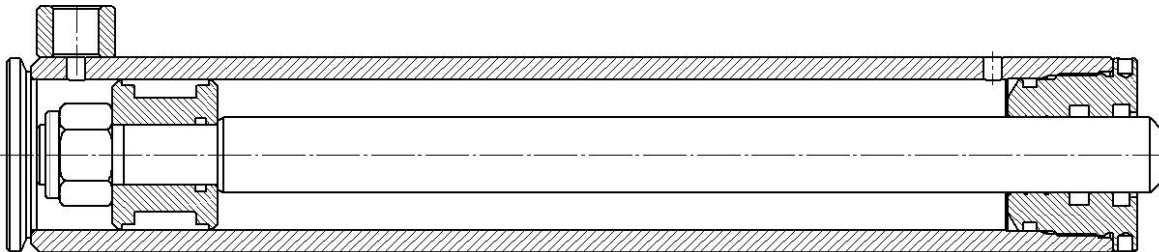
Diagram of double-acting hydraulic cylinder:



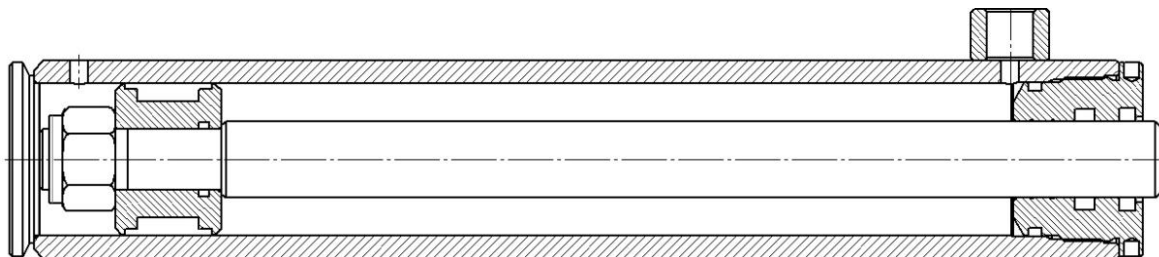
- | | | | |
|---|--------------|----|------------------|
| 1 | BODY | 9 | SCRAPER |
| 2 | ROD | 10 | ROD SEAL |
| 3 | HEAD | 11 | “OR” HEAD |
| 4 | PISTON | 12 | “OR” PISTON |
| 5 | BASE | 13 | PISTON SEAL |
| 6 | BASE FITTING | 14 | GREASE NIPPLES |
| 7 | ROD FITTING | 15 | SELF-LOCKING NUT |
| 8 | FITTINGS | | |



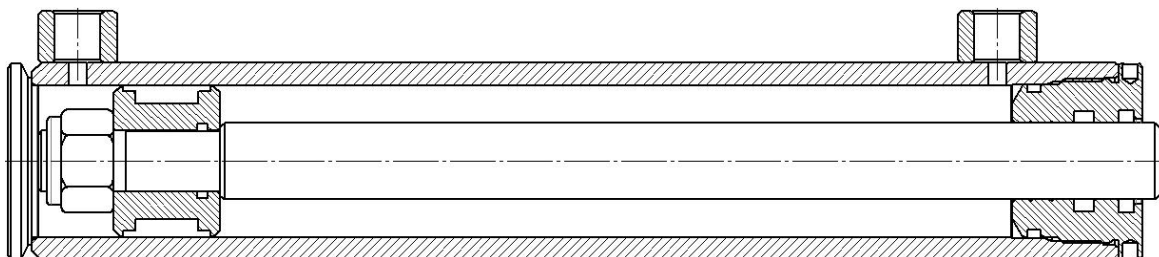
Main types:



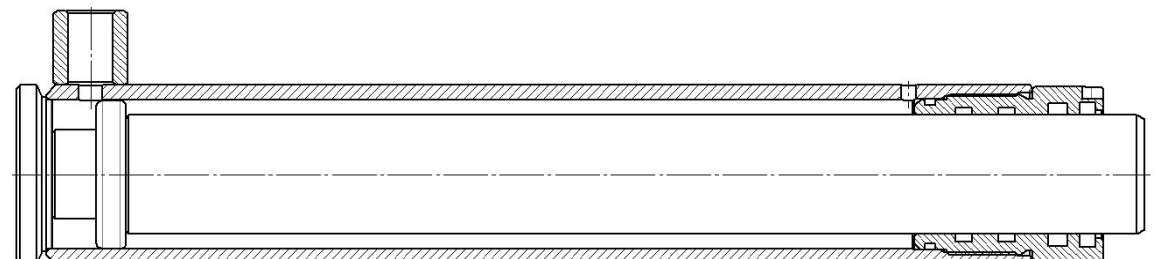
Single-acting push cylinder



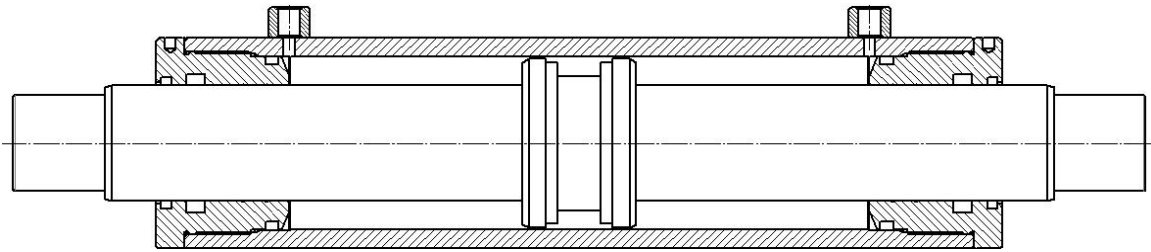
Single-acting pull cylinder



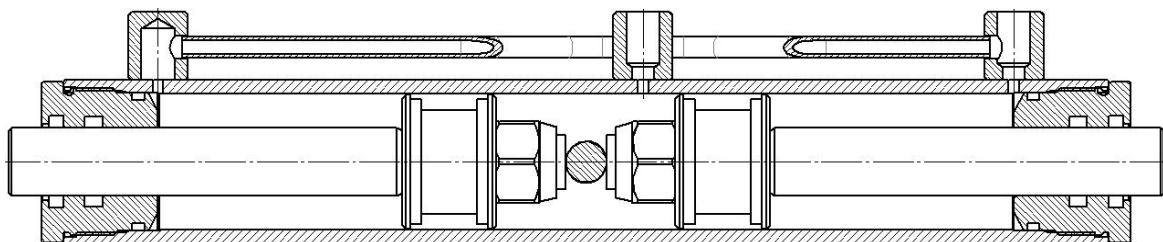
Double-acting cylinder



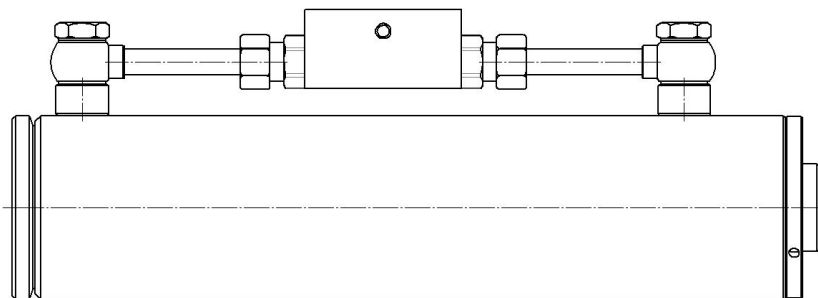
Single-acting plunger cylinder



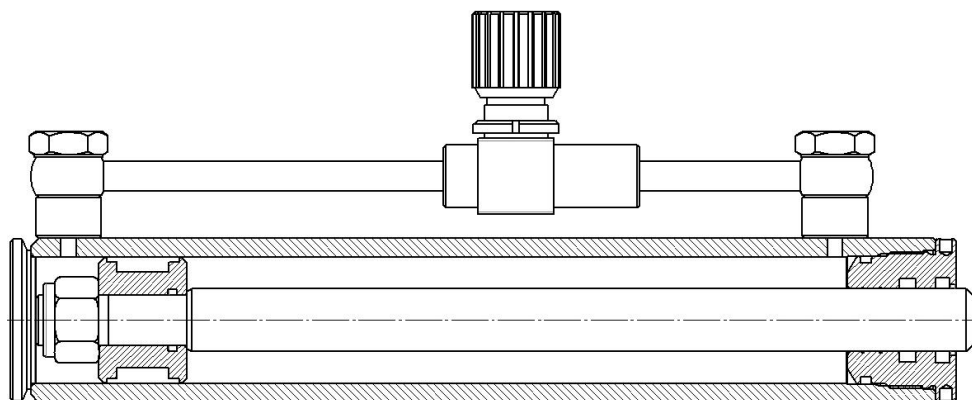
Two-way rod and double-acting cylinder (simple stroke)



Two-way rod and double-acting cylinder (mixed stroke)



Double-acting cylinder with double-acting safety valve



Shock absorber cylinder (with one-way flow control valve)



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Component features

Materials normally used for the different components:

Body: bright H9 drawn steel pipe E355 UNI EN 10305-3:2003, diameters from 40x5 to 120x10.

Rod: chromed bar in C45E UNI EN 10083-1:2006, diameters from 20 to 80 if there is a hollow drawn rod E355 UNI EN 10305-1:2003.

Footplate: S355 UNI EN 10277-2:2000, different dimensions and sizes according to cylinder features.

Head: cast iron EN GJL-250 UNI EN 1561:1998, external diameters from 30 to 120.

Piston: steel bar 9SMnPb28 (AVP)10087:2000, diameters from 30mm to 100mm.

Fittings: cold-drawn bar S235JR UNI EN 10277-2:2000

Coupling bushing: laminated pipe for S235JR UNI EN 10025-1:2005.

Base: plate for S235JR UNI EN 10025-1:2005.

Oil pipes : SS pipe for hydraulic oil circuits S235JR UNI EN 10277-2:2000, diameters from 8x1.5 to 14x2.



Rima S.p.A reserves the right to change the above listed materials without notice, while guaranteeing the same functioning. Except in the case of specific customer requests, the cylinders are constructed using structural steel that can be normally used from -10/+80°C, but that are guaranteed from +20/+80°C as JR type.

If the customer needs a warranty for lower temperatures he must request the appropriate material.

4 IDENTIFICATION OF THE HYDRAULIC CYLINDER AND MANUFACTURING DATE

Each cylinder has an internal code, the name of the company, the manufacturing month and year printed on the outside of the body.

As an alternative, this information can be written on a non-removable adhesive label.

Example of hydraulic cylinder stamping: RIMA 001ABC 01/11



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5 PRELIMINARY PRECAUTIONS ON ASSEMBLING

Do not use the cylinders before reading all the instructions in this manual.

The **RIMA S.P.A.** company forbids that its cylinders are put into service until the machine into which they are incorporated conforms to the directive 2006/42/EC; consequently **RIMA S.P.A.** declines all responsibility for the improper use of its cylinders.

Changing or transforming the cylinder or its components without specific authorisation from **RIMA S.P.A.** is forbidden.

Before being fitted on machines or equipment, the cylinders must be painted or galvanized to protect them from aggressive agents and rust. During the paint preparation process, pay attention and cover the cylinder parts that must not be covered with paint (the machine fitting holes, the grease nipples, the oil incoming holes, etc). During the painting process the temperature must be no greater than 70°. If the temperature should exceed this value, the cylinder inner seals could be damaged.

The supports and the movement devices of the machine and of the equipment to which the cylinders are connected as well as the accessible parts of the structures in which the cylinders are positioned must not have any sharp edges or burrs to avoid injury when fitting or removing cylinders.

The cylinder opening and closing movement must never be stopped by fixed or movable parts of the machine on which it is fitted; those parts could interfere with the cylinder movement or damage the oil connecting pipes.

To operate the cylinder only use appropriate oil for hydraulic control that complies with the following specifications:

ISO 11158 type HM - DIN 51524 part 2nd category HLP

6 TRANSPORT OR HANDLING INSTRUCTIONS

RIMA's standard packaging can be handled with standard lifting devices.

On receipt of the goods is essential to open the package and keep it in a protected area (not subject to weather conditions)



If the cylinder is so heavy that it cannot be safely moved by hand, it must be lifted with means suitable for its mass. As a lifting sling, it is necessary to use at least two fabric belts which comply with directive 2006/42/EC, having the same length, hung around both ends of the cylinder correctly and safely (do not use steel cables or chains in contact with the cylinder, because the surfaces could be damaged).

Make sure that the lifting operation is performed safely by checking that both the lifting equipment and the slinging belts are capable of lifting the weight of the cylinder in safety.

7 INSTRUCTIONS FOR FITTING THE CYLINDERS ON MACHINES AND/OR EQUIPMENT

The operations for fitting the cylinders on machines and equipment must be performed by qualified personnel who have read and understood this instruction manual in all its parts.



It is necessary to pay attention that the supports and the moving devices of the machines and of the equipment to which the cylinders are connected are in a centred position with respect to the cylinder axis. In this way, there will be no transverse forces on the pipes, thus avoiding the premature wear of all the sliding parts of the cylinder or the actual breaking of the cylinder itself.

The connection of the cylinders to the supports and the moving devices of the machines and equipment must be performed by means of mechanical fixing systems compatible with the coupling set by the design, manufactured using material and tolerances suitable for safely supporting the maximum thrust of the cylinder.

After the fitting on the machine, it is necessary to check the correct coupling and the cylinders must be tested to check their correct functioning.

It is forbidden to do any welding on the cylinders, because this action can damage the seals and make the cylinders unserviceable.

8 INSTRUCTIONS FOR USE

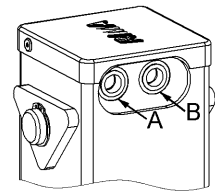
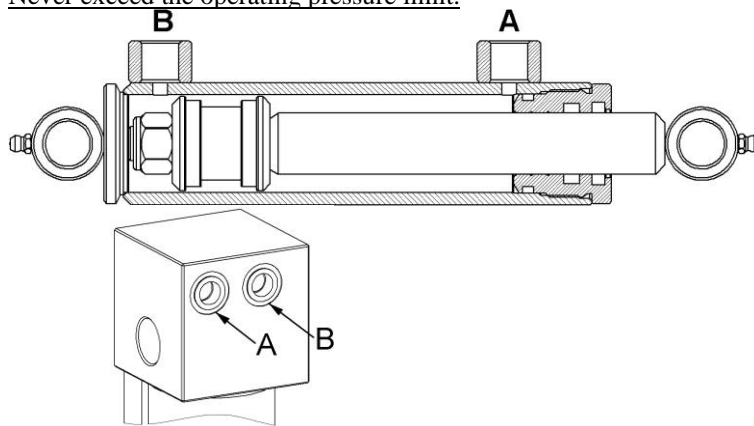


Make sure that the position of the machine on which the cylinder is fitted is stable and that the cylinder operation does not cause overbalancing or is dangerous for people and objects. If the cylinder is used as a stabilizer, we recommend using it on flat and stable surfaces.

In case of weak surfaces (e.g. hot asphalt, gritty soils, soft or recently ploughed/milled soils, damp clay, etc.) place a metal or wood panel under the cylinder centre; its thickness and dimension should be appropriate to the carried weight and to type of ground.

To open the cylinder, send oil under pressure in the “B” fitting (see drawings here under), send oil under pressure in the “A” fitting to close it.

Never exceed the operating pressure limit.



9 INSTRUCTIONS FOR MAINTENANCE AND CHECKS

Read this instruction manual before starting the operations of maintenance and checking.

Any operation of maintenance or checking of the cylinders installed on the machines must be performed by properly trained staff using suitable accident prevention equipment. These operations must be performed with the machine at a standstill, set in a stable position.

MAINTENANCE OPERATIONS. (To be performed every 50 working hours of the cylinder or at least twice a year). This operation consists of cleaning the outside of the cylinders and, if there are any, greasing the bushings.



CHECKING OPERATIONS. (To be performed every 50 working hours of the cylinder or at least twice a year). Check that the rod slides easily without stopping and that there are no oil leaks/pouring. Also check that there are no damaged or deformed parts either in the cylinder, supports or in the machine movement devices to which the cylinder is connected.

10 CYLINDER OVERHAULING

Every overhauling operation carried out during the warranty period must be done at Rima S.p.A. or at workshops expressly authorized by Rima S.p.A.

This operation is necessary when difficult to use or damaged components are discovered after the checks have been made. In these conditions, the machine or the equipment cannot be used and it is therefore necessary to disassemble the damaged cylinder for overhauling. Trained staff must carry out the operation of removing the cylinder from the machine and overhauling.

Instructions for disassembling the cylinder from the machine or equipment

The operation of disassembling the cylinder from the machine or the equipment must be performed with the machine at a standstill, set in a stable position, with the engine switched off and with the key removed.



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Before starting the disassembly, use suitable means to securely anchor the parts of the machine or the equipment where the cylinder is connected, so that these parts cannot move during and after cylinder disassembly.

Before unscrewing the piping connecting the cylinder to the hydraulic system make certain that there is no pressure in the system, and if there is, release it.

When supporting the cylinder during disassembly, use means suitable for its mass. If the cylinder is so heavy that it cannot be handled manually in safety, it is necessary to sling it using fabric bands of a suitable capacity, as described in point 6. This operation must be performed in safe conditions.

Check how the cylinder is fixed and go on with disassembly as described depending on the situation:

- Cylinder fixed using screws or nuts; remove them using appropriate wrenches or devices.
- Cylinders fixed using pins; remove any Seeger ring or other similar devices that block the pin and subsequently remove the pin.

Instructions for disassembling the cylinder

A bench with a vice and a cylinder support are indispensable for the cylinder disassembly operations. This support must be adjustable in height and robust, to safely support the weight of the cylinder. In addition, if the cylinder is so heavy that it cannot be lifted by hand, it must be lifted with a sling, as described in point 6, using means suitable for its mass.

To disassemble, proceed in the following way: fix the rear coupling of the cylinder body in the vice and rest the front part on a support.

Use a spanner to unscrew the head. If this is difficult to unscrew, hit lightly with a rubber or plastic mallet onto the spanner to loosen it and then proceed to unscrew completely.

Place an oil container under the cylinder so that it does not leak onto the ground. Then slide the rod complete with head and piston out.

Next, fix the rod in the vice using some rags or similar material so as not to damage the chromium-plated surface and support it from the piston side with an adjustable support, always taking care to place rags or other material between the support and the rod.

As far as the piston disassembling operation is concerned, it is necessary to check if it is threaded directly onto the rod and fixed with a grub screw or if it is fixed using Loctite glue or if it is blocked by a nut. In the first case it is necessary to remove the grub screw and then unscrew with a suitable spanner, in the second case it is necessary to warm the thread and unscrew; in the third case it is necessary to unscrew the nut. Then, after removing the piston, slide the head out of the rod.

Proceed to disassemble all the sealing parts of both the head and the piston, using tools that do not cut.

Completely wash all the components of the cylinder, preferably using naphtha, kerosene or another degreasing agent that is not aggressive and blow with compressed air, until the pieces are completely clean.

Scrupulously check all the components to identify any possibly worn parts. In particular, check the rod surface and the inside of the body to make sure that there are no scores or seizures. If you find components worn to the extent that they can no longer be used, contact the **RIMA S.P.A.** company asking for spare parts (do not replace components with pieces that are not original).

The seals and any rod guide must be all replaced with new ones. These are easy to find as they have standardised sizes and profiles. If you experience problems in finding them, contact the **RIMA S.P.A.** company.

Instructions for reassembling the cylinder

Prepare the new sealing kit, checking that they are the same as the original ones. Check that the sealing parts, the components they are fitted to and the assembly tools are perfectly clean. The assembly of the sealing parts does not present any particular difficulty, given the good elasticity of the material used.

To fit the head seals, lubricate them with hydraulic oil and insert them into the hollows provided. Act on them uniformly using a non-cutting tool, until fully inserted.

To fit the seals on the piston, lubricate them with hydraulic oil, fit the O-Ring into the specific piston hole seat. The main seal, composed of five parts, must be fitted outside the piston, using a non-cutting tool to fit the rubber part without deforming it. The other parts can be fitted with or without using a tool.

Place the welded coupling part of the rod into the vice and support it on the other side with an adjustable support, taking care to place rags or other material between the support and the rod so as not to damage the rod.



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Fit the piston by pressure fitting it onto the turned rod and then tighten the self-locking nut using a manual or automatic tool. Apply the correct tightening torque as set in the standard tables.

For the version with the threaded hole piston, screw it using an appropriate spanner, tighten well and then fit the suitable anti-unscrewing device provided.

Place the welded coupling part of the cylinder body into the vice and support the front part with an adjustable support, in such a way that the cylinder body remains horizontal.

Before sliding in the rod complete with components, it is necessary to lubricate the seal on the piston and the inside of the cylinder body with hydraulic oil or Teflon grease. Then slide it into the pipe, holding it in axis and keeping the piston seal centred in the first threaded part of the bore until it passes the chamfer of the thread end. Then push on the rod until the piston is fully inserted. If the piston is heavy, for this operation it is advisable to keep it raised using means suitable for its mass, slinging on the centre of the rod with a belt as described in point 6.

Screw the head onto the cylinder body using the appropriate spanner until fully screwed on and hit lightly with a rubber mallet onto the spanner to block the head.

Carry out a sliding test to check that the rod slides freely in the bore without sticking. Warning: if the cylinder is not fitted immediately on the machine, it is necessary to place special plastic plugs into the threaded holes to prevent any dirt entering.

11 REPAIR AND SPARE PARTS

For any repair operation and/or the replacement of the various spare parts of the cylinder, not due to normal maintenance or overhaul, as indicated in the previous chapters, please contact **RIMA S.P.A.**, which will supply or give information on the subject.

12 DISPOSAL

Cylinder disposal must be carried out in conformity with the laws in force; therefore, the parts made of metal should be scrapped while those made of plastic or rubber should be disposed of in appropriate containers. When possible, grease and oil should be recycled and taken to the obligatory used mineral oil Cooperative deposits, (www.coou.it).