

**TECHNICAL SERVICE**  
**+39 0522 869832**

## **AIR OPERATED PISTON PUMPS**

### **PAR Series**



**INSTRUCTIONS FOR INSTALLATION,  
OPERATION AND MAINTENANCE**

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## FOREWORD

- Read the instructions carefully and keep them for future consultation.
- C.S.F. Inox S.p.A. reserves the right to make any changes to the documentation it deems necessary without being obliged to update publications that have already been issued.
- When requesting information, spare parts or assistance, always specify the pump type (\*) and serial number (\*\*) in order to ensure fast and efficient service: the complete code is given on the plate and in the purchase documents.

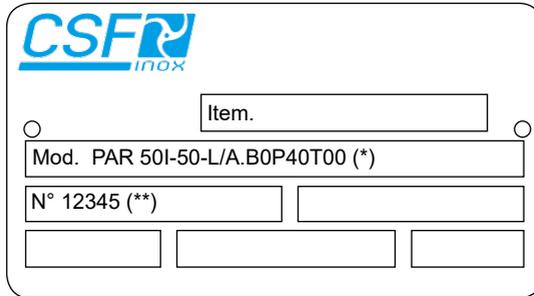


Plate example

## 1 SYMBOLS

<b>WARNING</b>	<i>Pay great attention to the text parts indicated by this symbol.</i>
	<b><i>Danger:</i></b> <i>the non-observance of instructions can cause serious damages to persons and/or objects.</i>

## 2 SAFETY WARNINGS

When the pump is working the following occurs:



- Mechanical parts are moving.
- Pump body, pipelines and articulations are under internal pressure.
- Do not loosen or remove guards, fasteners or screws during operation since this may result in serious injury to personnel or damage to property.
- Watch out for leaks from the seal, the suction port or above all the discharge port when pumping hazardous or toxic liquids. Install adequate monitoring and liquid recovery systems and provide a suitable hazard notice.
- It is the user's responsibility to mark the pump as an "overheated area" or to use suitable guarding when used to pump liquids at a temperature higher than 60°C.
- The pump must not be moved during operation.
- Installation must ensure an adequate space for maintenance operations.

Before carrying out any operation which requires to disassemble the pump (inspection, cleaning, seal replacement, etc.), the following preliminary operations have to be carried out:

- close the compressed air inlet tap and disconnect the supply pipe to the motor;
  - close valves on suction and outlet pipelines, in order to avoid the risk of inundation;
  - use adequate protections for hands and face, if the pump contains liquids which are injurious to health (for example acids, solvents, etc.);
- consider if the liquid which flows out of the pump when disassembling is dangerous and arrange for adequate safety measures.

### 3 GUARANTEE

All products manufactured by C.S.F. Inox are guaranteed to the purchaser, for one year from the date of purchase, against hidden defects in materials or manufacture, providing that they are installed and used according to instructions and recommendations of the manufacturer. Excluded from the guarantee other than distinctive wear and tear are repairs to damage caused by improper use, abrasion, corrosion, negligence, defect of installation, non-observance of inspection and maintenance, use of non-genuine spare parts, cause of accident or fortuity and from any action carried out by the purchaser not according to the normal instructions of the manufacturer.

**WARNING** Before returning to C.S.F. Inox S.p.A. any item to be substituted or repaired under guarantee, inform about the problem the Customer Assistance Office and follow instructions of the manufacturer. Any item must be properly packed in order to avoid damages during the transferring and **a technical report explaining the fault occurred, must accompany the returned item/s.**

Any item with a presumed fault should be returned to C.S.F. Inox S.p.A. with shipment costs at purchaser's charge, unless different agreements are given.

C.S.F. Inox S.p.A. will examine, repair and/or replace the returned piece and then send it back to the purchaser on ex-works basis. Should the piece be found under warranty, no further costs will be debit the purchaser. If, on the contrary, the fault is not found under warranty, all necessary reparations and replacements will be charged at normal cost to the purchaser. Commercial parts incorporated in C.S.F. products are guaranteed by their corresponding manufacturers.

### 4 GOODS TRANSPORTATION, RECEIVING AND TRANSFERRING

#### 4.1 TRANSPORTATION

The packings of all pumps manufactured by C.S.F. Inox - S.p.A. are defined when placing the order. Unless prior arrangements are given, goods will be packed only for transit conditions and not for long-term storage; in case it should be necessary to store the pumps outside, you are requested to cover the pumps appropriately in order to protect the air-motor parts from rain, dust, humidity etc.

#### 4.2 RECEIVING

**WARNING** By goods receiving, the wholeness of packing must be verified, in order to identify possible damages to the content occurred during transferring and to claim them immediately to the carrier. Should any damage be ascertained, the following procedure must be observed:

- collect the goods with reservation;
- take the necessary pictures showing the damages;
- notify the suffered damages, by registered airmail, to the carrier by sending at the same time the pictures taken to show the damaged pieces.

#### 4.3 TRANSFERRING



Carry the packed pumps as close as possible to the place of installation by means of appropriate lifting devices and unpack them.

During this operation take care, as unsteady parts could fall down.

**The material used for packing (wood, paper, cellophane, etc.) should be properly got rid, according to the corresponding rules in force in receiver's country.**

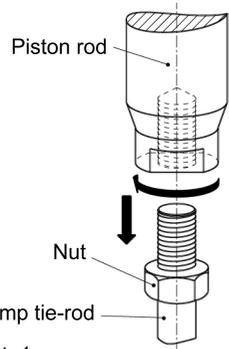
After unpacking the pump, use special lifting belts and move the pump-motor-set to the place of installation.

## 5 DESCRIPTION

The PAR series pumps are operated by compressed air with a single-acting piston. They are intended for professional use, are of light construction and are ideal for transferring liquids.

The pumps consist of a compressed air motor, a connecting support that holds the pump body, a cylinder that contains the pumping piston and the valves. The suction port is located in the bottom section of the cylinder while the discharge port is situated on the side of the pump body.

The pump and the motor are coupled by a threaded connection (Pict.1).



Pict. 1

### 5.1 SEALS

Various types of seal can be fitted on air operated pumps.

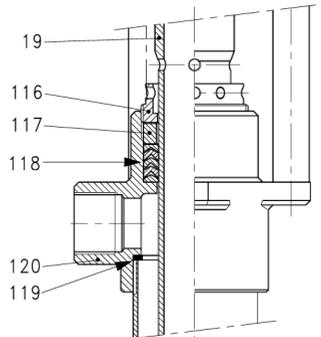
The choice of design and material will depend on the type of liquid being pumped, the operating conditions, temperatures, pressures, etc.

#### 5.1.1 CHEVRON SEALS

The CHEVRON SEALS consist of a number of inverted V-section rings enclosed between the bottom and top ring (Pict.2). Screw down the pressure ring to obtain the pressure needed to seal the rings against the shaft.

WHEN FIRST STARTING, ADJUST THE PRESSURE RING TO OBTAIN OPTIMAL CONDITIONS.

If, during operation, to happen a leakage of liquid, to stop the pump in order to check the tightening of the nut, and, in case, to provide with the nut registration. If it is too tight, it can slow down the operation of the pump and lead to overheating and rapid wear of the rings and the shaft. DO NOT OVERTIGHTEN THE SEAL.



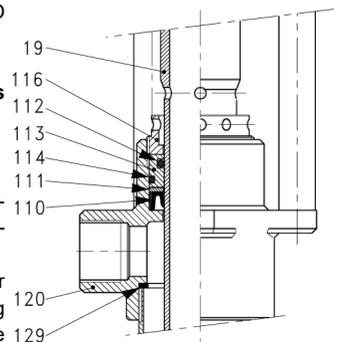
Pict. 2

#### 5.1.2 "DI" SEALS

The DI SEALS consist of lipseal rings and O-rings enclosed in the housings created in the DI holding rings (Pict.3).

The fit of the rings to the shaft and the seal chamber is determined by the working tolerances, so these seals REQUIRE NO ADJUSTMENTS.

**WARNING** All seal types are produced in different materials depending on the liquid to be pumped.



Pict. 3

## 6 APPLICATIONS

These pumps are designed to meet the widest range of requirements for the handling of liquids, including those with high viscosity.

They are principally used to transfer liquids from one container to another, but are also suitable for feeding and transporting where adjustable flow is required and for all light uses. With the compressed air motor they are also suitable for dangerous and hazardous environments (explosion proof).

## 7 NON-PERMITTED USES

If the air operated pumps are used for flammable and/or explosive products, always check that the pressure to be generated by the pump is lower than the product's self-combustion level.

## 8 INSTALLATION AND STARTING

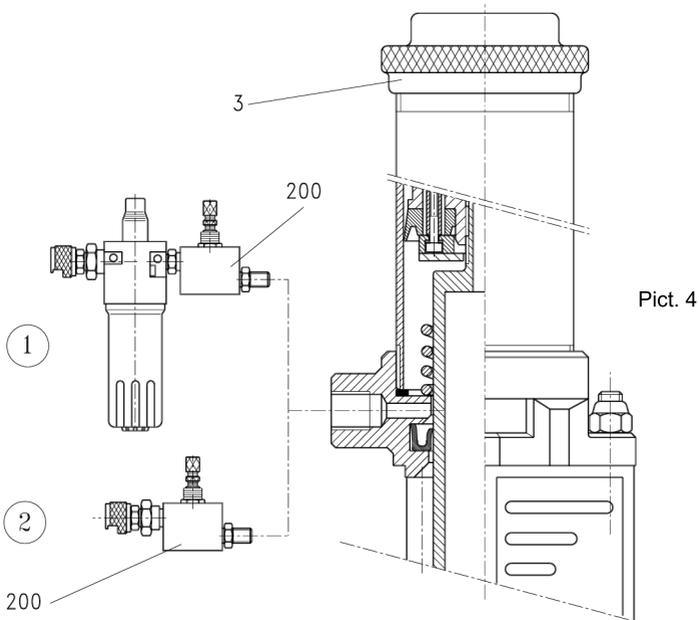
### 8.1 CONNECTING TO THE COMPRESSED AIR SUPPLY

Connect the compressed air supply to the pneumatic motor input using a  $\varnothing 1/2"$  gas pipe.

If the compressed air from the supply is not lubricated, install an oil filter nebulizer (Pict.4-1) unit between the pump and the air supply in order to ensure maximum durability of the motor unit seals.

The lubrication oil in the nebulizer must be suitable for pneumatic cylinders, it should be extremely fluid (density about 10 SAE) and in compliance with regulations regarding accidental contact with food (e.g. approved in accordance with NSF H1 certification). The quantity of oil to be vaporized into the air should be regulated by means of the screw located on the nebulizer so that a drop can be seen to fall approximately once a minute. The PAR series pumps are fitted with a flow regulator (art.200). Mount it on the pneumatic motor using the threaded hole (Pict.4-2).

**WARNING** The supply pressure must be between 3 and 8 bar depending on the back pressure.



### 8.2 HYDRAULIC CONNECTION

Connect the suction and discharge pipes, inserting suitable seals for the type of fitting and the type of product to be pumped. Run the pump briefly to check that there is a perfect seal.

Take great care because the pneumatic pumps are capable of generating pressures of up to 40 bar. Always use discharge pipes of an appropriate size for the pump model.

### 8.3 FLOW ADJUSTMENT

Use the regulator (art.200) to adjust the flow rate of the pump, closing the air supply to a certain degree. This changes the number of pumping cycles and consequently varies the flow rate. Since this is a piston pump, the product flow pulsates.

If necessary it can be made linear by using an air-cushion damper on the discharge (art.52). The discharge pipe can be throttled using a control valve and can even be closed completely. In this case the pump will be in a state of equilibrium and hence stop.

### 8.4 MOUNTING THE PUMP

The short type pump can be fitted to a wall bracket (art.55) or mounted on a fixed or movable trolley (art.53), connecting the suction port to the pipe or hose immersed in the liquid.

With the standard long type pump, the pump itself must be immersed in the liquid through the drum or tank lid and held in place by a clamp (art.50 and 51) or installed on a fixed or trolley-mounted column (art.54) so that it can be raised or lowered when changing the tanks.

Other customized applications are possible depending on the type of installation required.

## 9 MAINTENANCE AND INSPECTION

1) Drain the water frequently from the filter separator to prevent water from entering the motor cylinder chamber, as it would freeze due to the frequent compression and expansion cycles during operation locking the pneumatic motor.

2) Avoid immersing the drive head in solvents since air could enter and enable the solvent to dissolve the synthetic rubber parts of the motor piston and the O-rings.

3) Ensure that the pump is thoroughly washed before being put back, especially if pumped products are prone to hardening, such as plaster, resin, paint, etc., as the solidified product could lock the pump shaft to its seal or the piston ring to the cylinder.

4) Fill the packing nut with solvents, in presence of sticking products, to avoid seal wear. Check the level periodically and top up if necessary.

### 9.1 EXTENDED STOP

When stopping the pump for a longer time, empty the pump completely and wash it accurately in order to avoid the formation of scales and/or encrustations. When starting the pump again, please follow the above-mentioned instructions.

### 9.2 CLEANING THE PUMP

Wash the pump carefully after pumping particularly viscous or corrosive products in order to prevent vital parts from locking:

1) push on the bottom valve (with a tool) to drain the lower section of the pump.

2) Turn the pump upside down and drain out the rest of the liquid through the discharge port.

3) Place the pump in a tank containing a suitable solvent or cleaning liquid and operate the pump.

Allow the washing liquid to flow until you are sure that the pump is perfectly clean.

4) For more thorough cleaning, take off the cylinder port and wash the entire unit.

## 10 DISASSEMBLY AND ASSEMBLY

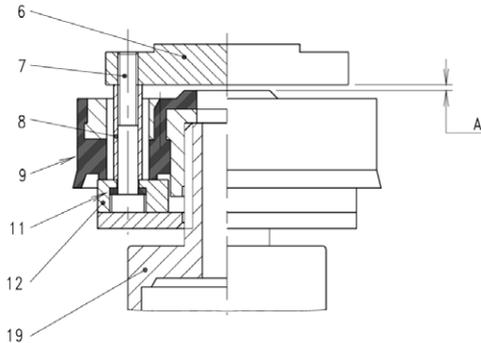
### 10.1 MOTOR

The simplicity of these motors makes it extremely easy to carry out work on them.

Proceed as follows: close the air supply tap and disconnect it, then uncouple the motor from the pump; unscrew the top cap (3) and the cylinder (4). The rod and the piston are free; pull to extract them simultaneously from the bottom section of the motor.

Check that seal on the piston (9) is still in good condition. If not, replace the piston (9) on which the seal ring has melted. Unscrew the piston (9) from the rod (19), then separate the upper shutter (6) from the piston by unscrewing the screws (7). Remove the piston and replace with the new one. Reassembling, observe the required clearances (Pict.5). The rod (19) which works on the seal rings must also have smooth, clean surfaces, otherwise it must be grounded or replaced. Refitting the screws (7) and the rod (19), apply Loctite or similar product. Before inserting the rod in the bottom section of the motor, check that the seal ring is still satisfactory, (i.e. no air leaks). Replace if necessary.

The same applies to the PVC seals (2) located at the ends of the cylinder.



Pict. 5

NOMENCLATURE							
Pos.	Denomination	Material	Q.ty	Pos.	Denomination	Material	Q.ty
6	UPPER SHUTTER	Aluminium	1	11	PISTON SCREW SEAL	PVC	3
7	SCREW, SOCKET HEAD M5x35	Steel	3	12	LOWER SHUTTER	Aluminium	1
8	MOTOR PISTON SPACER	Brass	3	19	MOTOR ROD		1
9	MOTOR PISTON	Steel/Rubber	1				

The PAR series pneumatic motors are reciprocating single-action and spring-loaded return. Make sure the correct clearances are observed when mounting the piston in order to ensure smooth operation (Pict.5). The clearance (A) between the shutter (6) and the piston (9) must be as follows:

Motor PAR 50 : 0,8 m/m

Motor PAR 65 : 1,2 m/m

This is done by sizing the spacers (8) according to the thickness of the piston (9) in the shutter support areas (6 and 12).

### 10.2 PUMP

If you have to carry out work on the pump check, feeding air, if the rod (19) is blocked. If the rod and the piston are blocked due to solidification of the pumped products, introduce solvent through the suction port and shake the pump, waiting for the solvent effect.

Dismantle the suction port (136/150, 146), unscrew the cylinder (126), unlock the lock nuts (124-127) that clamp piston, stud bolt (125) and rod (19) and separate them.

Remove the upper cap (3) and the cylinder (4), then separate the motor from the pump and take out the rod. Remove the connection studs (121) from the body (120) and wash everything carefully.

Now inspect the various components:

**Seal:** unscrew the pressure ring (116) and remove the seal. Check its condition and if necessary replace.

**Piston:** check whether the lipseal ring (131) and the guide ring (155) are worn and if necessary replace. The same applies to the ball (138) and the piston plug (129).

**Suction port:** the ball (145) or the mushroom-head valve (134) also work on the suction port. It is therefore necessary to check for worn parts and if necessary replace.

Once the various components have been inspected, reassemble them, fitting the seal (118), the ring nut (116), which should be tightened with light pressure, and the connecting studs (121) onto the body (120). Place the rod (19) inside the body, lubricating the rod with neutral oil so that it slides freely on the seal. Carry out the procedure in reverse to assemble the pump.

**WARNING N.B. Before tightening the lock nut (127), ensure that the tie rod does not protrude more than 1-2 mm inside the piston (with the short type pump the lock nut is replaced by a split pin).**

## 11 WORKING IRREGULARITIES

### 11.1 THE PUMP DOES NOT START

- 1) Check that there is an adequate air supply to the pneumatic motor.
- 2) Check that the air flow regulator at the inlet is not obstructed, as this would prevent the supply of air to the motor.
- 3) Check that the pipe has no closed valves and that it is not obstructed by hardened product.
- 4) Check whether the fault is caused by the motor or the pump. (Disconnect the motor and try running it on its own).
- 5) Check the pump if it has locked.

### 11.2 THE PUMP RECIPROCATES BUT THERE IS NO FLOW:

- 1) Short type pump: the flexible suction hose has a hole or is not immersed in the product and the pump sucks air.
- 2) If a filter is fitted on the suction port, it is clogged.
- 3) Some foreign matter has come in between the valve (129-138) and its seat and this prevents it from closing properly. Remove the material.
- 4) The piston rings (131) are very worn, preventing the pump from generating the pressure drop required for suction. Replace the piston rings with new ones.
- 5) The upper part of the piston (128-139) has come unscrewed, leaving the piston blocked at the bottom and the stud bolt (125) moves freely without pumping. Screw it back on as it was originally, tightening it properly and applying Loctite or a similar semi-locking product onto the thread to prevent it from coming unscrewed again.

## 12 DISPOSAL OF THE PUMP

For disposing the pump please observe the following instructions:

- close the compressed air inlet tap and disconnect the supply pipe to the motor; according to technical rules and laws in force.
- Disassemble all components of the pump for separate dismantling; wash the components and clean the structure accurately.

The main components of the pump are made from the following materials:

- Pump casing, cylinder, stud bolt, rod, piston S.S. Aisi 304 - S.S. Aisi 316
- Elastomers NBR - EPDM - FLUOROCARBON FPM - TEFLON
- Motor Aluminium - Brass

Components made from amianthus or lead are not used in our production.

**WARNING** The components of the pump should be properly got rid, according to the corresponding rules in force in receiver's country.







**C.S.F. Inox S.p.A.** Strada per Bibbiano, 7 - 42027 Montecchio E. (RE) - ITALY EU  
Ph +39.0522.869911 r.a. - Fx +39.0522.865454 / 866758 - [csfitalia@csf.it](mailto:csfitalia@csf.it) - [www.csf.it](http://www.csf.it)

**Export Department • Commercial Étranger • Comercial Extranjero**  
Ph +39.0522.869922 - Fx +39.0522.869841 - [csfexport@csf.it](mailto:csfexport@csf.it) - [www.csf.it](http://www.csf.it)

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