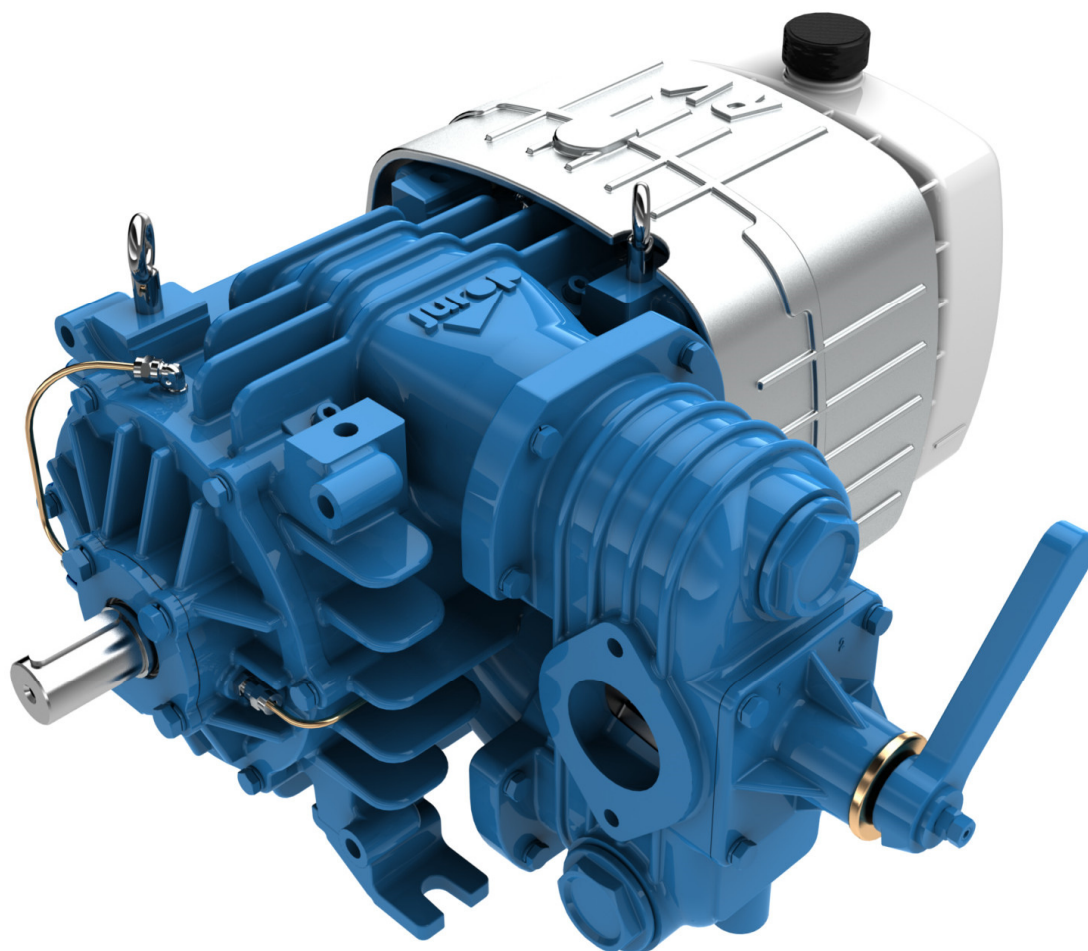


EN

RVC210 - RVC360



ORIGINAL INSTRUCTIONS



INSTALLATION, USE AND  
MAINTENANCE MANUAL



Rev. 07  
08-04-2019

COMPANY WITH  
QUALITY SYSTEM  
CERTIFIED BY DNV GL  
= ISO 9001 =

2019 – **Juop** – Azzano Decimo (PN)

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## 1. General warnings

### 1.1. Introduction

- This booklet contains the necessary instructions for a correct installation, running, use and maintenance of the pump, as well as some practical suggestions for a safe operating.
- The knowledge of the following pages will grant a long and trouble-free operation of the pump.
- Following the instructions below contributes to limiting pump repair expenses by extending its duration, as well as preventing hazardous situations, thereby increasing its reliability.
- If the pump is driven by an hydraulic motor please refer to manufacturer's specific manual.
- It is recommended to:
  - Read, understand and apply carefully the instructions before running the pump.
  - Keep the booklet at hand and have it known to all operators.
- Below is a brief description of the symbols used in this manual.



If these safety rules are not respected, operators can be injured and the pump or oilers damaged remarkably.



If these safety rules are not respected, the pump or system can be damaged.





Suggestions for an environment friendly use of the pump.



Useful information for an easy usage and maintenance of the pump.

- The graphic representations and photographs contained in this manual are there to illustrate the product in the parts that make it up and in specific operating phases. Though the model shown in the manual may differ from the one purchased, the operating principle at the base of the illustrated operating phase is the same.

- Pump has to be fitted with its own tag reporting the following data: Model, Serial number, Year, Max speed, Max pressure.

 <b>MADE IN ITALY</b> <small>Jurop S.p.A. - Via Crosera, 50 - 33082 Azzano Decimo - PN (ITALY)</small>		
MOD.		
SERIAL No.		
YEAR		
MAX PRESSURE	(bar)	
MAX SPEED	(r.p.m.)	

Pic. 1.1

### 1.2. Spare part request

- Use only **genuine spare parts** for maintenance and repairs. To order spare parts, provide the following details:

EXAMPLE:

a) The model of the pump (see pump tag):	RVC 360
b) The serial number of the pump (see pump tag):	K90001
c) A description of the parts (see parts list):	VANE
d) The quantity (see parts list):	n°5 pz
e) The code number of the part (see parts list):	16016 059 00

### 1.3. Warranty terms and conditions

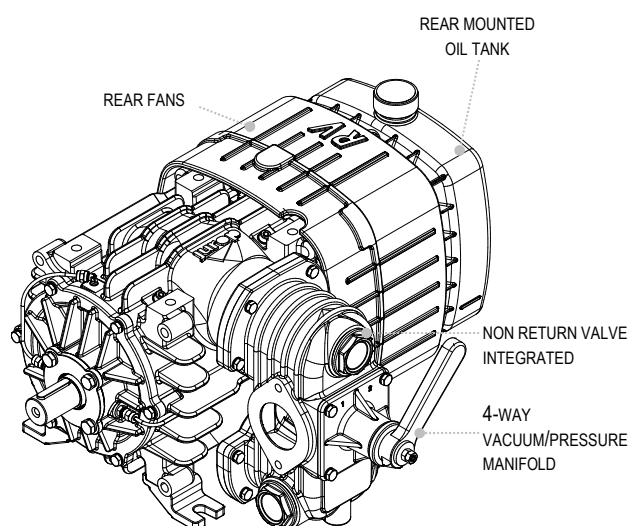
- Compliance with the installation, use and maintenance instructions provided by this manual **is crucial for the recognition of warranty** against defective parts.



## 2. Technical data

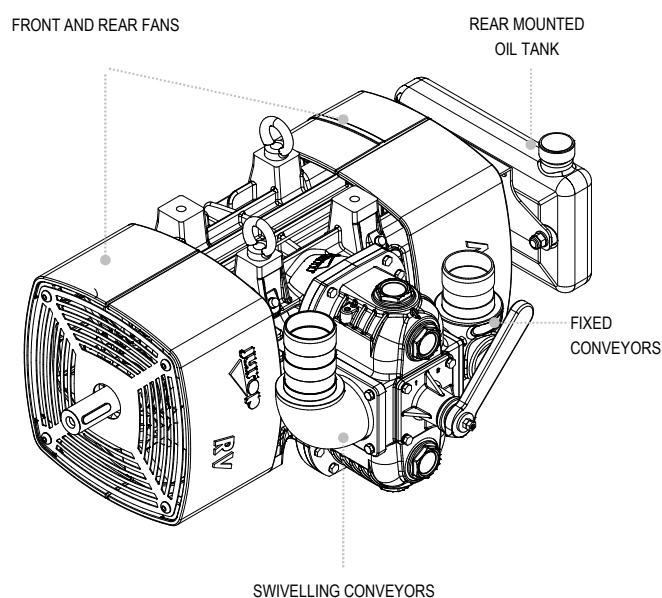
- Rotary vacuum pump cooled by high efficiency contraposed fans. High resistance tangential vanes. Suitable for heavy duty operation.
- The airflow reduces the temperature of the internal parts normally subjected to wear like bearings, vanes and sealings.
- Internal inlet and outlet ports specifically designed to reduce the noise level, the power absorption and the exhaust working temperature.
- Automatic lubrication with positive displacement pump. Rear mounted oil tank. Copper oil piping.
- N°2 vane inspection ports.
- Built-in 4-way vacuum/pressure manifold, side installed. Pneumatic actuator available on request.
- Non-return valve (clapet) integrated in the pump manifold.
- Aluminum conveyors and filter suction unit.
- Available in flanged version (FL).
- Drive system:
  - Direct with smooth shaft;
  - With hydraulic motor (excluded RVC360 V1).

**RVC 210**



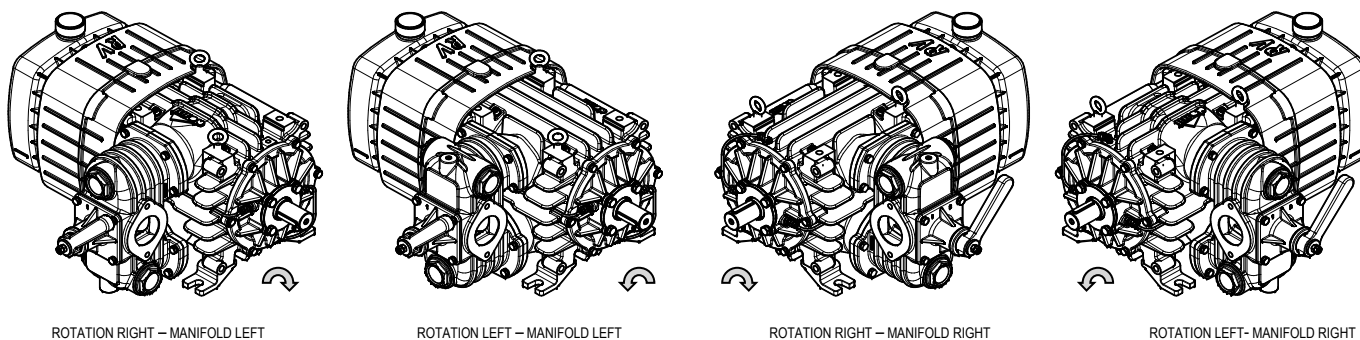
MANIFOLD RIGHT

**RVC 360**

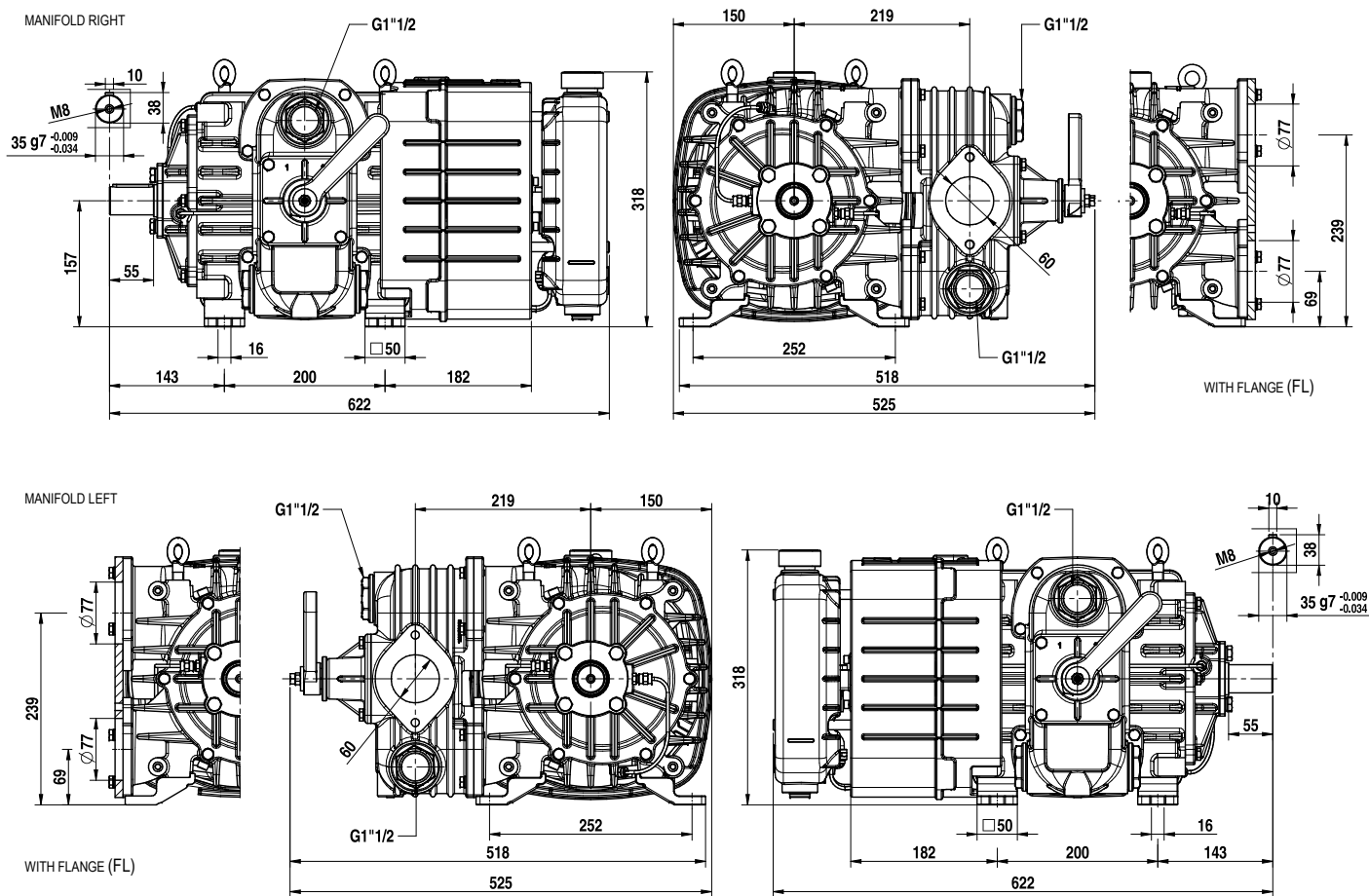


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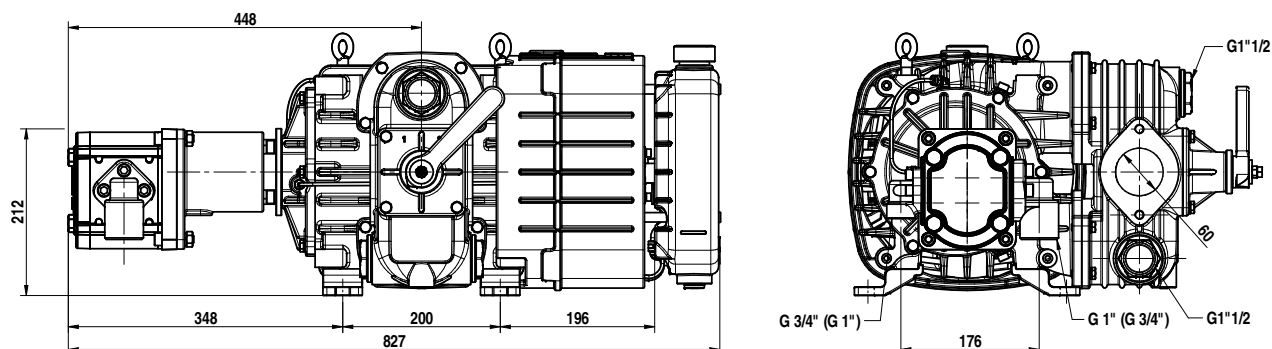
## 2.1. Dimensions and arrangement RVC 210



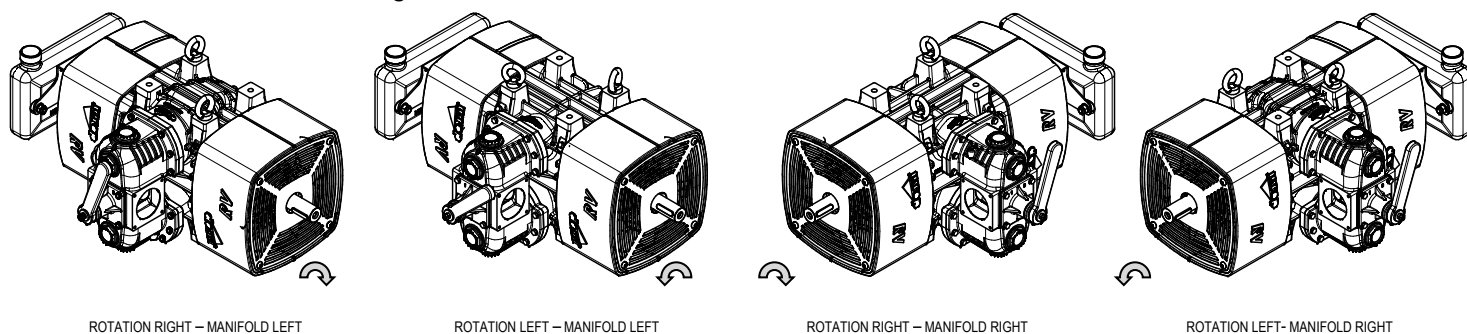
## RVC210



## RVC210 HDR

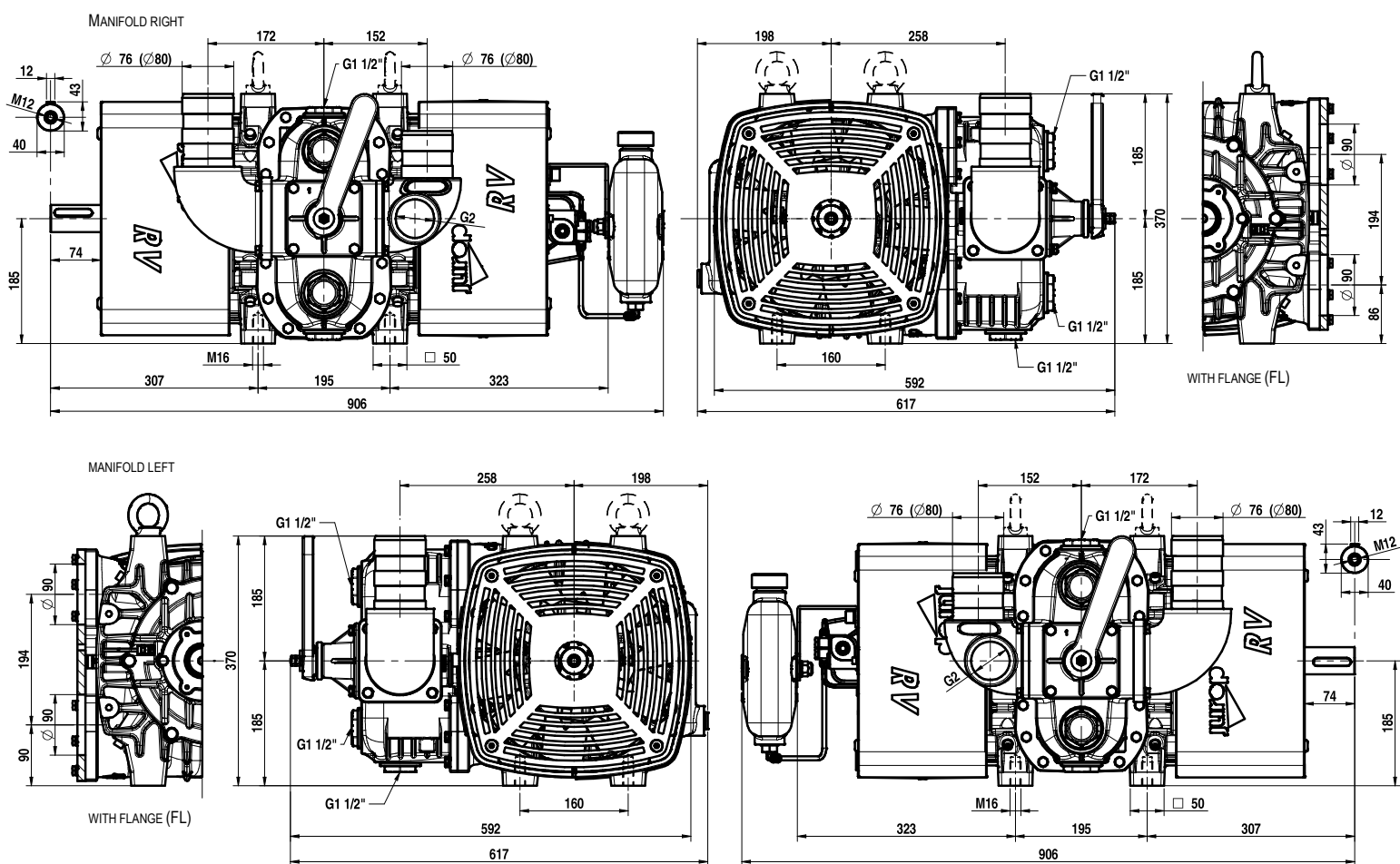


## 2.2. Dimensions and arrangement RVC 360

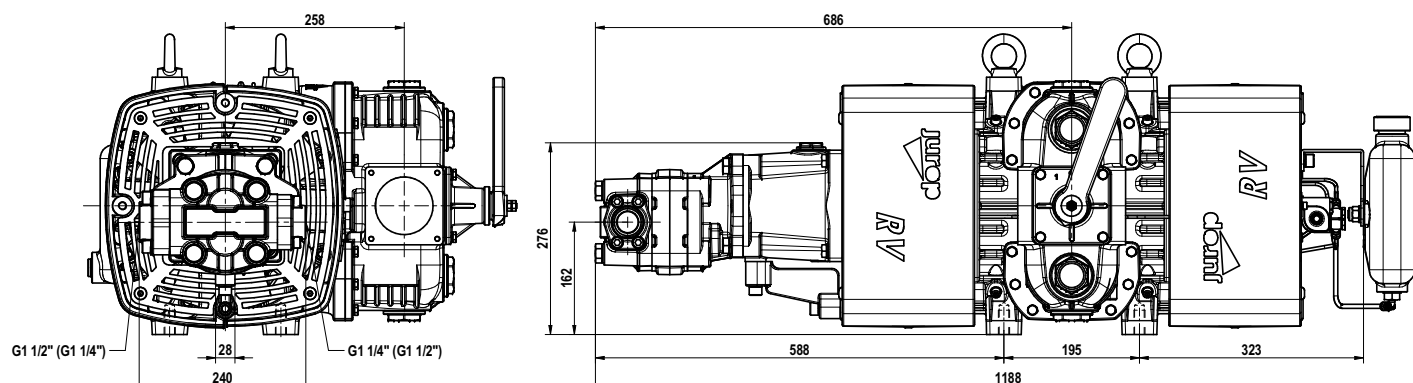


- Position of the fuel tank's cap, always on the side manifold/flange.

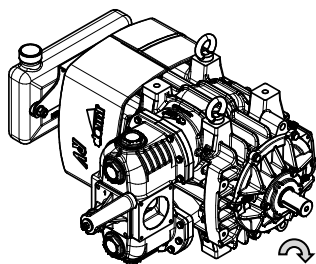
### RVC360



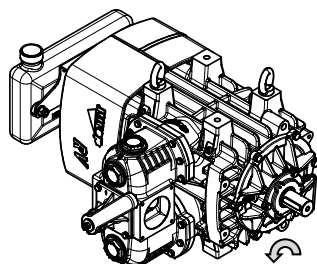
### RVC360 HDR



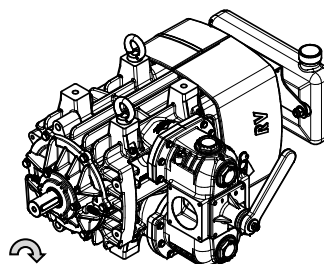
### 2.3. Dimensions and arrangement RVC 360 V1



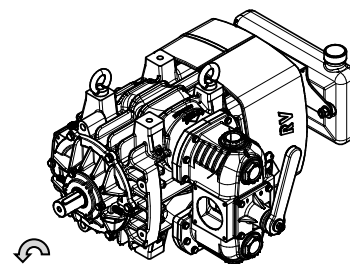
ROTATION RIGHT – MANIFOLD LEFT



ROTATION LEFT – MANIFOLD LEFT



ROTATION RIGHT – MANIFOLD RIGHT

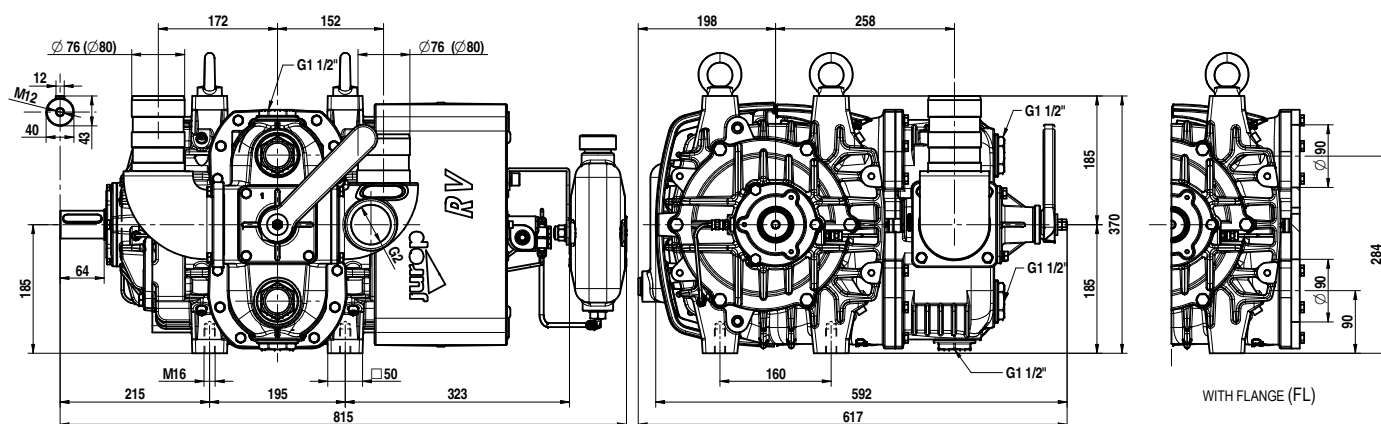


ROTATION LEFT- MANIFOLD RIGHT

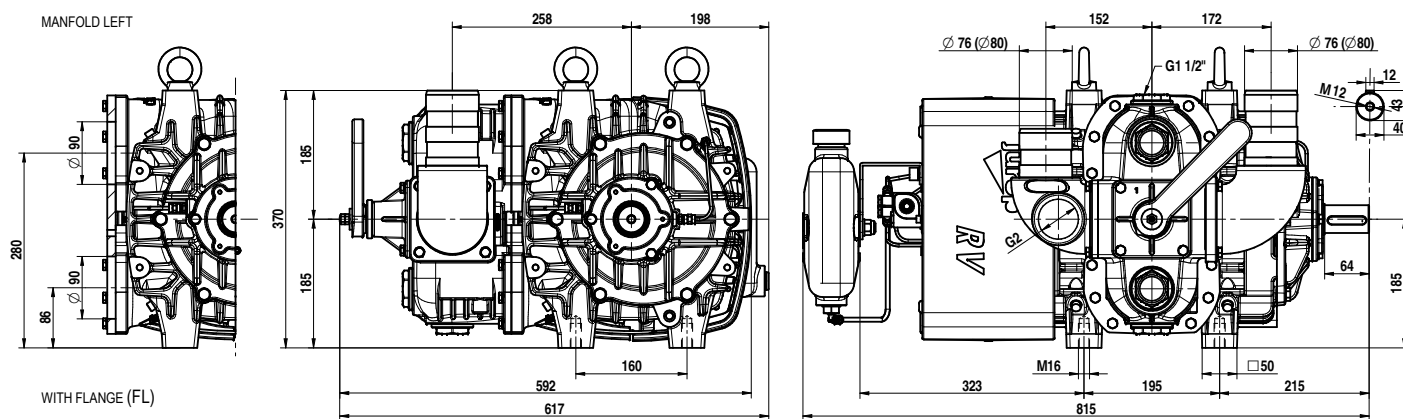
- Position of the fuel tank's cap, always on the side manifold/flange.

## RVC360 V1

MANFOLD RIGHT



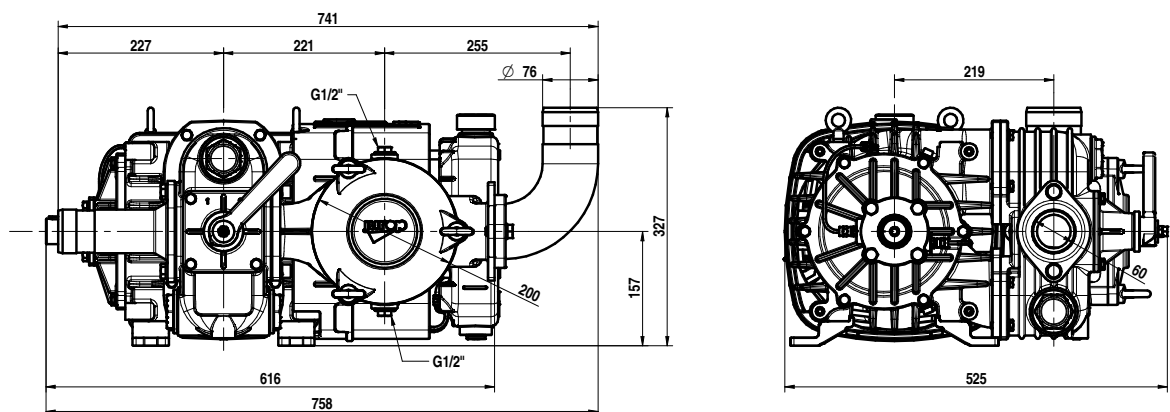
MANFOLD LEFT



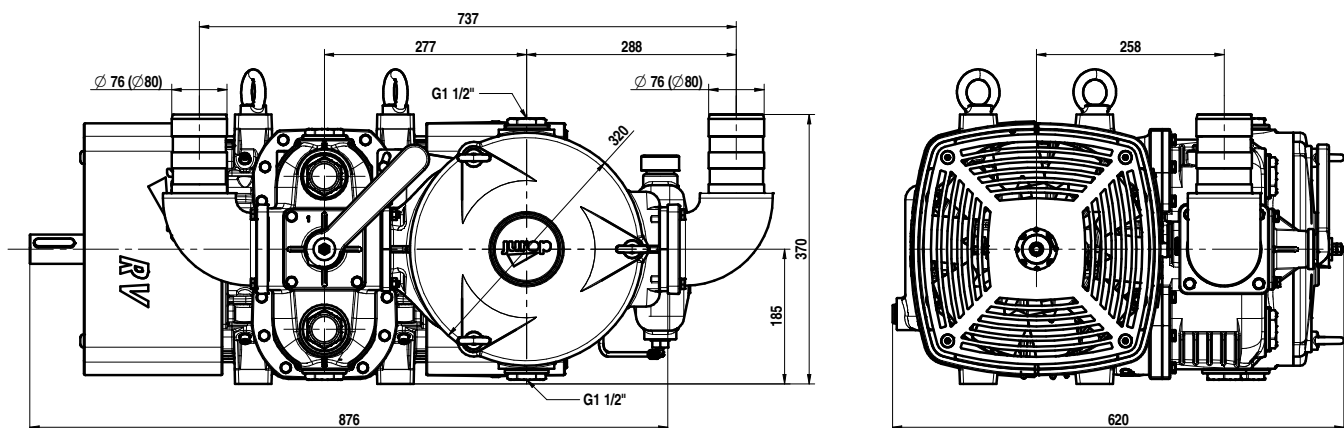


## 2.4. Dimensions and arrangement - Accessories

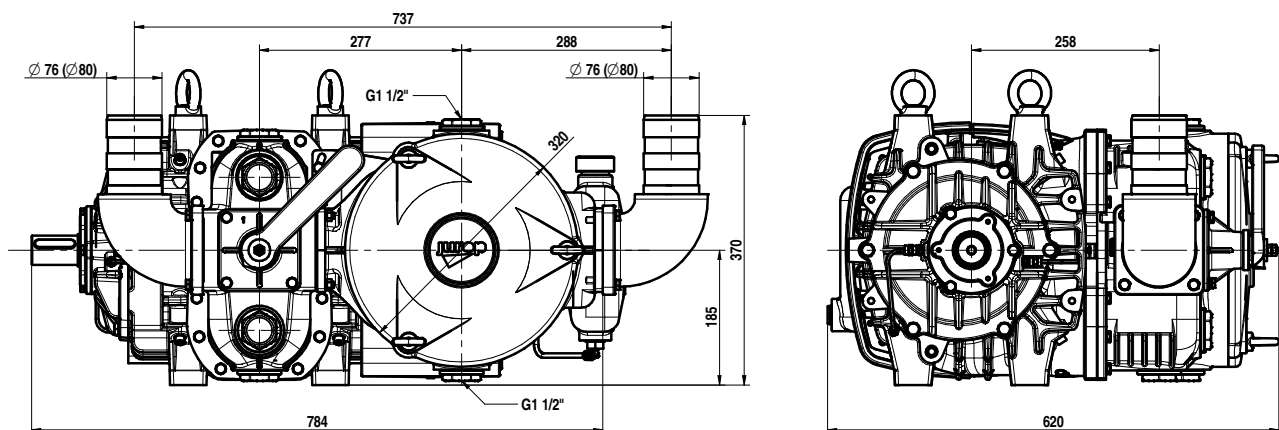
### RVC 210



### RVC 360



### RVC 360 V1



## 2.5. Performances

Performances			RVC 210	RVC 360	RVC 360 V1
Air flow under free air condition		l/min	6000	10200	10200
		m³/h	360	612	612
Air flow 60% vacuum rate		l/min	5300	9400	9400
		m³/h	318	564	564
Max. vacuum at continuous duty		%	75	80	70
Max. vacuum		%	93	95	95
Power required at free port		kW	7	14	14
Power required at max. vacuum		kW	6	11	11
Air flow at 0.5 relative bar (1.5 abs.)		kW	9	18	18
Air flow at 1.0 relative bar (2.0 abs.)		kW	11	22	22
Max. relative pressure (abs.)		bar	1,5 (2,5)	1,0 (2,0)	1,5 (2,5)
Noise Lp(A) – pump with exhaust silencer; distance: 7m in open field.	Vac. 60%	dB(A)	72	74	74
Oil consumption		g/h	120	140	140
Oil tank capacity		l	2,5	4	4
Weight	D	kg	86	176	185
	D (FL)	kg	77	166	175
	HDR	kg	102	206	-
	HDR (FL)	kg	90	196	-

### REFERENCE CONDITIONS

Conveyed gas: air

Ambient reference temperature: 20°C

Vacuum pump operating at max. speed

Functioning: free air

Vacuum functioning: free outlet

Actual performance may vary of +/- 5%.

Absolute reference pressure: 1013mbar

Pressure condition: free suction.

### Flow - power

Model		Free port	Vacuum						Pressure (abs)			
			20%	40%	60%	70%	80%	90%	1,5 bar	1,8 bar	2,0 bar	2,5 bar
RVC 210	m³/h	360	355,8	346,2	306	250,2	162	42	331,8	318,6	310,2	288,6
	l/min	6000	5930	5770	5100	4170	2700	700	5530	5310	5170	4810
	kW	7	6,8	6,6	6,4	6,3	6,2	6,1	9	10,5	11,5	13,5
RVC 360 RVC 360 V1	m³/h	612	605	595	564	453	310	106	570	550	540	-
	l/min	10200	10080	9913	9400	7550	5166	1766	9496	9163	8997	-
	kW	14	13,5	13	12,6	12,3	11,9	11,2	18	20,5	22	-

Vacuum pump operating at nominal speed

Actual performance may vary of +/- 5%.

## 2.6. Sound pressure level

Lw (A)		[dB(A)]	
Noise power of the only pump, without drive transmission suction group, mufflers.			
RPM	VACUUM/PRESSURE	RVC 210	RVC 360 – 360 V1
NOMINAL SPEED	vac 80%	87	89
	Δ press 0,6 bar	98	100

## 2.7. Usage limitations

Pump	Max. Speed – Operating speed (RPM)			P <sub>2</sub> (bar ABS)	T <sub>2</sub> (°C)	T <sub>2</sub> - T <sub>1</sub> (°C)	Environmental temperature
	Minimum	Ordinary	Max				
RVC 210	1000 rpm	1300 rpm	1450 rpm	2,5 bar	180°C	150°C	-20 / +40°C
RVC 360	800 rpm	1100 rpm	1300 rpm	2,0 bar	180°C	150°C	-20 / +40°C
RVC 360 V1	800 rpm	1100 rpm	1300 rpm	2,5 bar	180°C	150°C	-20 / +40°C

P<sub>1</sub>: absolute pressure during suction

P<sub>2</sub>: absolute pressure during delivery

T<sub>1</sub>: temperature during suction

T<sub>2</sub>: temperature during delivery

## 2.8. Lubrication

Recommended oils and greases: *Mineral Oil*

Room Temp	Viscosity	ENI	ESSO	SHELL	TOTAL	MOBIL	BP	TEXACO	Q8
Under 10°C	ISO VG 46	Acer 46	Nuto 46	Morlina oil 46	Drosera MS 46	Nuto H 46	Bartran HV 46	Rando HD 46	SHUBERT 46
Over 10°C	ISO VG 150	Acer 150	Nuto 150	Morlina oil 150	Drosera MS 150	Nuto H 150	Bartran HV 150	Rando HD 150	SHUBERT 150

## 3. Safety and accident prevention



**Attention:**  
Carefully apply these prescriptions.

### 3.1. General recommendations

- When transporting the compressor use proper slinging. Store the compressor in stable places.
- Installation and maintenance must be carried out with the unit totally disengaged from its drive system and must be performed by qualified personnel.
- Use adequate clothing (avoid ties, loose sleeves, necklaces and so on) and suitable protection equipment (gloves, protection glasses, boots...).
- Before each maintenance operation, stop the pump and restore the atmospheric pressure.
- Make sure that all the parts of the unit are idle and cool, before performing any maintenance operation.
- To prevent errors and hazardous situations, establish what each operator is responsible for in the different maintenance operations.
- Do not start the machine if the protection devices provided for transmissions are removed. Replace damaged part.
- Final manufacturer must make the transmission inaccessible by means of a fixed guard or interlocked movable guard.
- Operators working nearby must avoid prolonged exposure to the noise emitted by the aspirator, if not equipped with the proper ear-protection devices (IPDs recommended: ear protectors).
- When the pump is running, some parts may reach very high temperatures (above 70°C). Use all necessary precautions to avoid contact.
- Avoid accidental suction of solids: solids may be projected at high speed through the exhaust manifold and cause injuries. A filter must be mounted on the suction line (Mesh 55).
- Pressure relief valve: point the air flux away from the operators.
- Do not use the aspirator over its designed limits: the machine may be damaged and the operator may be injured.



**Do not exceed the speed and the power supply parameters indicated in the technical tables (see par. 2.5 - 2.7).**

- Based on the final use of the decompressor, the insertion in the housing machine and the typology of the same, the designer of the housing machine must apply safety signals (pictograms) to warn the operator on the risk still present. These pictograms essentially refer to three categories:

- Signals prescribing the use of Individual Protection Devices (IPDs) such as, in this case, the use of gloves and ear protectors.
- Signals indicating to pay particular attention to the dangers related to the machine's components, such as: risk of dragging in the transmission equipment and contact with hot surfaces.
- Signals indicating specific parts of the machine for an easier identification, such as: greasing points, oil tanks, etc.

### 3.2. Intended use

- The vacuum pumps RVC are designed to convey filtered air into systems for the vacuum production or for the suction of powders or liquid wastes. Any other usage shall be considered improper.
- Do not suck toxic substances and inflammable or explosive gasses, since the internal components of the pump may reach high temperatures.



**Avoid suction of toxic (poisonous) explosive or flammable gasses because internal components may reach high temperatures.**

- Liquids or solids infiltrations can seriously damage the pump.



**Attention: liquids or solids infiltrations can seriously damage the pump.**

- Do not run the pump over its designed operating limits (see par. 2.6): it may break and transmission can be damaged.

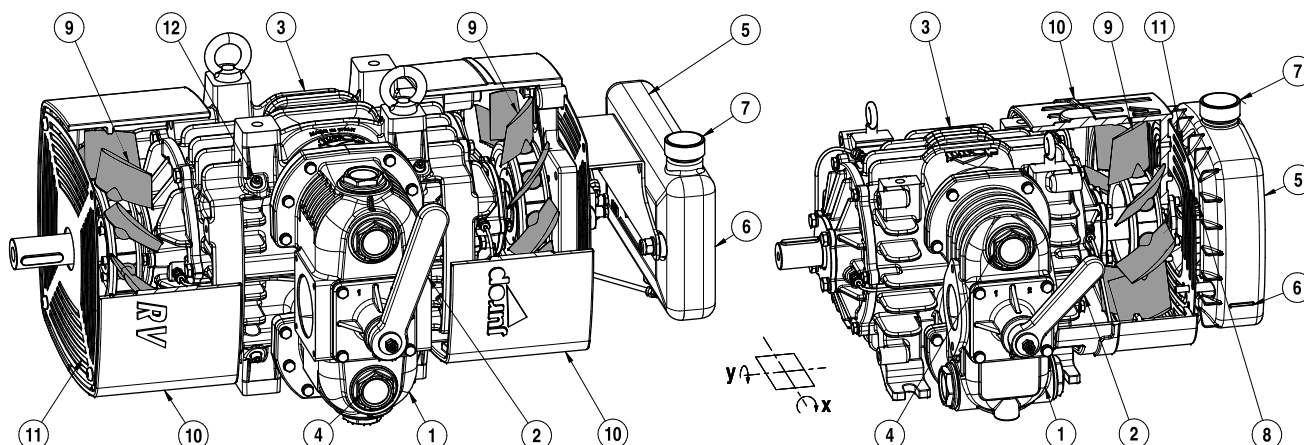
### 3.3. Conveyed fluids

- RVC vacuum pumps are suitable for conveying filtered air. Before conveying other kind of gases, verify compatibility with pump's characteristics.
- The machine was not designed and built to operate in environments with potentially explosive atmosphere (outdoor or indoor).
- Please contact JUROP's Technical dept. if necessary.

## 4. Installation

### Legend of main components

- |                                     |                         |                            |
|-------------------------------------|-------------------------|----------------------------|
| 1. Manifold (with not-return valve) | 5. Lubricating oil tank | 9. Cooling fan             |
| 2. Vacuum-pressure manifold         | 6. Tank oil stand       | 10. Air cooling conveyors  |
| 3. Housing pump                     | 7. Oil filling port     | 11. Fan protection         |
| 4. Vacuum relief valve connection   | 8. Lubrication pump     | 12. Vanes inspection ports |



Pic. 4.1

### 4.1. Checking upon receipt

- When the goods are delivered, make sure that all parts in perfect condition and have suffered no damage during shipping.
- Make sure the vacuum pump has its identification plate affixed on the front cover. Pumps without such identification are to be considered anonymous and potentially dangerous: in such an event, they must not be used, otherwise the manufacturer will be deemed free from any liability whatsoever.

### 4.2. Storing in the warehouse

- If the compressor will not be installed inside a short time after delivery:
  - Remove the guards from the ports and spray a film of protective oil over the inner surfaces of the body, rotors and sides. Then attach again the guards;
  - Store in a closed and dry place. Renew the preserving oil periodically.
- To temporarily store a used pump, follow the instructions below:
  - Thoroughly clean the pump.
  - Equip the pump with suitable anti-corrosion protection.

### 4.3. Handling and installation

- Before each movement, verify that the lifting equipment has a suitable capacity (check the weight of the decompressor, possibly showed in this manual, in the paragraph 2.5).
- Do not lift the packaging or the machine when moving more than 50 cm from the ground. Proceed with the final lifting only near the installation point.

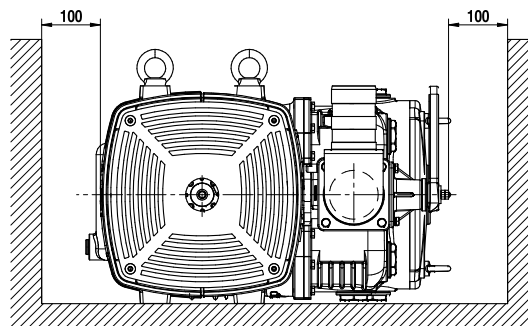
- Harness the machine with suitable straps / chains near the main body, paying attention to the position of the mass centre of gravity to ensure the load stability.



**Warning: do not stand under the machine when it is lifted during the installation.**

### 4.4. Mounting

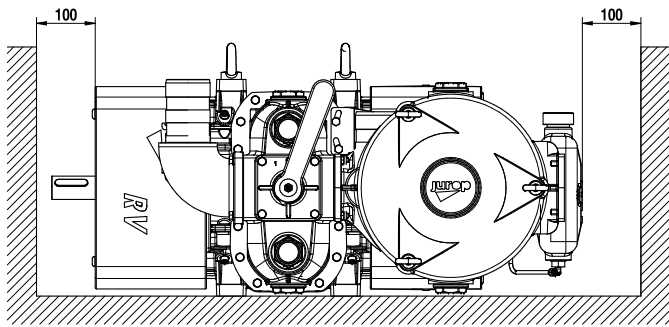
- The mounted aspirator must be accessible for maintenance and firmly fixed on a frame or angled base with a 3° max inclination on X and Y axes (see Fig. 4.1). The structure must be fit to avoid flexions or vibrations.
- Provide enough space for air ventilation and disposal of heat when pump is running. See Fig. 4.2 and 4.3 for indication of the distance to be respected.



Pic. 4.2

- Provide the necessary space to reach all points of lubrication control (oil level), and the oil tank filler cap, the lever of the 4-way switch, vanes inspection ports.





Pic. 4.3

- In case of RVC with hydraulic motor, provide the necessary space to disassemble the motor itself and proceed with joint lubrication.
- In the event that the decompressor is electrically isolated, connect it to the ground or make it equipotential with the housing machine. Check that the paint does not prevent its passage.

#### 4.5. Vacuum - pressure line

- See Fig. 4.4.

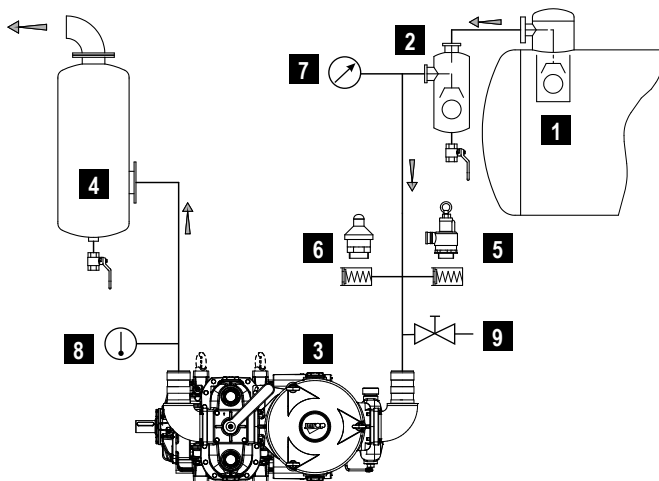


Fig. 4.4

##### Vacuum line components

- |    |                           |
|----|---------------------------|
| 1. | Primary shutoff           |
| 2. | Secondary shutoff         |
| 3. | Suction filter            |
| 4. | Silencer – oil separator  |
| 5. | Overpressure safety valve |
| 6. | Vacuum relief valve       |
| 7. | Manometerer -1 +3 bar     |
| 8. | Thermometer 200°C         |
| 9. | Venting shutter           |

- In order to avoid the suction of liquids, a primary flow shutoff valve (Pos. 1) and a secondary shutoff (Pos. 2) are to be mounted on the suction line. If necessary, also apply a suction filter (Pos. 3) to prevent solids from entering.

- The silencer (Pos. 4) applied to the pump exhaust - besides reducing the noise level - is designed to separate the oil mist expelled from the pump outlet port. The separator must be easily drained from oil and condensate accumulated at regular intervals.



**Do not dispose of in the environment. Dispose of in compliance with the standards in force.**

- The diameter of the vacuum or pressure line pipes must be properly dimensioned to the pump flow and, in any case, it must be larger than the diameter of the ports.
- The pipes weight or their dilatations must not solicit the pump housing. Use high temperature resistant rubber connections.
- Before mounting, remove the port protections. All pipes and line components must be clean.
- Avoid restrictions and tight curves as much as possible, if not strictly necessary.
- Exhaust pipe can reach high temperatures. Hence, they must be properly isolated.
- An over-pressure safety relief valve (Pos. 5) should be mounted in order to prevent the overloading of the vacuum pump. Mount the valve near the pump without applying any gate valves on the line.
- A vacuum relief valve (Pos. 6) should be applied to limit the maximum vacuum rate at 75% (RVC 210) and at 80% (RVC 360) in order to prevent the pump running at continuous duty from overheating.
- Venting shutter (Pos. 9): it is also useful to cool down the overheated pumps as well as for their internal wash-up. Direct the air flow away from the operators.
- Thermometer (Pos. 8): it must be installed at maximum 150 mm from the exhaust port. The sensitive element must reach the pipe centre. Safety thermostat on manifold is supplied on request.
- An oil-separator must be installed in correspondence of the discharge line of RVC. Besides reducing the noise produced by the air flow along the vacuum line, the silencer also traps the oil vapour at the outlet due to decompressor lubrication.

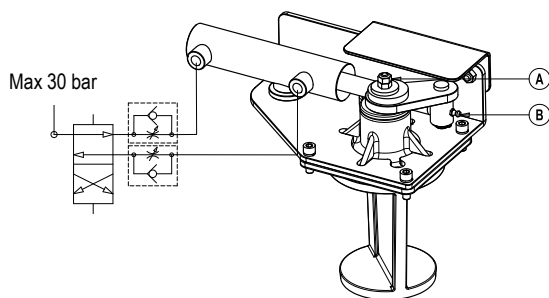


**Attention: an oil-separator must be installed in correspondence of the discharge line.**

#### 4.6. Inverter hydraulic actuator

- Extraordinary maintenance operations can require the upper cover (and that of the actuator, either manual or pneumatic) to be removed. We recommend ensuring enough space to carry out such operations.
- If the cock blocks or it moves with friction, screw up the clearance regulation nut (A). Screw up ¼ of turn each time. Block the nut rotation with the safety nut.
- The lubrication points (B) and the clearance regulation bolt (A) must be accessible. See Pic. 4.5.
- Lubricate with grease every 1000 cycles. Grease type NLGI 2.
- It is suggested to install 2 one-way flow controller between the hydraulic switch and the hydraulic actuator. Set the flow controllers in order to prevent hard hitting through the end of stroke. Minimum commutation time: 1 second.
- Maximum feed pressure: 30 bar.
- To order spare parts see spare parts list at the end of this manual.

- Possible correct hydraulic connection.



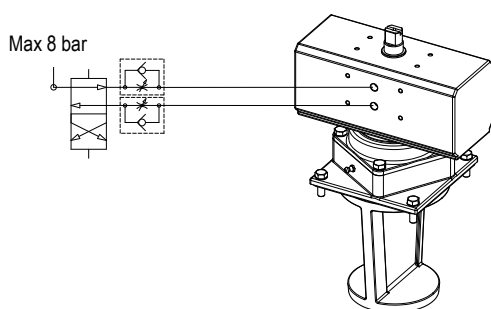
Pic. 4.5

#### 4.7. Pneumatic actuator adjustment

• In the event of 4-way valves equipped with pneumatic actuator, we recommend installing two one-way flow regulators between the pneumatic "control" and the pneumatic actuator. The following figure shows a schematic view of a possible pneumatic installation.

• We recommend adjusting the two flow regulators in order for rotation to occur without knocks and with a switching time of at least one second.

• In case of interruption of the pneumatic supply, the inverter of the suction unit remains in the same position it was when the failure occurred.

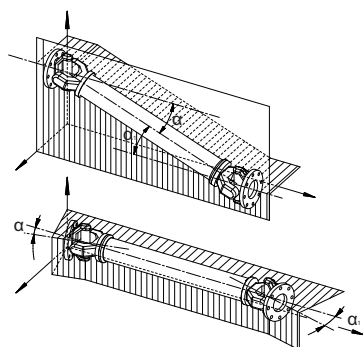


Pic. 4.6

#### 4.8. Pump mounting - Drive connection

##### A) Cardan shaft drive

- Use telescopic cardan shafts.



Pic. 4.7

• In order to achieve a uniform motion of the driven shaft, the following requirements must be met (see Pic. 4.7):

- Equal working angle  $\alpha$  and  $\alpha_1$  of both couplings.
- The internal fork joints must be coplanar.
- Both driven and driving shafts must be coplanar.

• It is also recommended working with limited articulated joint angles (max 15° at 1000 rpm and max 11° at 1300 rpm) and disengaging the transmission for those operations requiring great angles (steering or lifting).



**Follow the rotation direction as indicated on the front flange. Follow the instructions of the cardan shaft's manufacturer.**

• Use the cardan guard supplied with the pump, by fixing it to the pump itself.

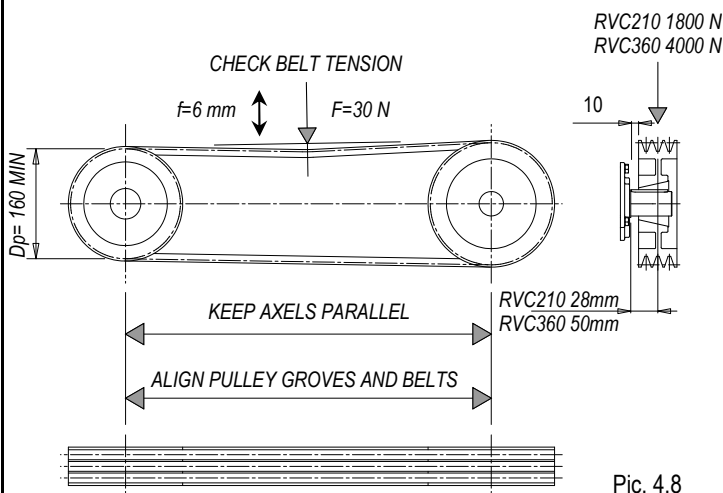


**Use the cardan guard supplied with the pump, by fixing it to the pump itself. In any case, the installation, by the final installer, must comply with the current EC accident prevention regulations and must be compatible with the geometry of the protection cap supplied with the machine.**

• The protection must not be removed; in case of removal, it is the responsibility of the final installer to provide for suitable guards according to the assembly.

• It is the responsibility of the final installer to provide for suitable guards, in presence of transmission shafts exposed during normal operation.

##### B) Belt drive



Pic. 4.8

• Install a suitable pulley on the smooth shaft as close as possible to the pump: 28 mm (RVC210) or 50 mm (RVC360). Taper lock pulley are suggested.

• Apply an adequate belt tension (see manufacturer's data). Max 1800 N for RVC 210 and 4000 N for RVC 360.

• Do not use driven or driving pulleys with a pitch diameter inferior to 160 mm. Small pulleys require a high belt tension, which may cause premature wear to the bearing or transmission damages.

- Let the air circulate freely to cool down the pump. Provide protections, which ensure adequate ventilation.
- A limited speed ratio will extend the belts life and reduce stress on the shafts. When possible prefer:

- Pulleys with a pitch diameter bigger than the one indicated,  $D_p=180\text{mm}$ ;
- Engines or power take-offs with a speed similar to the one of the pump.

Pump	Drive min. pulley p. diam.	T. max	Belts	Max. Speed	Max. Pressure	Max. Vacuum.
RVC 210	160 mm	1800 N	XPB x 3	1450 rpm	2,5 bar abs	93%
RVC 360	160 mm	4000 N	XPB x 3	1300 rpm	2 bar abs	95%
RVC 360 V1	160 mm	4000 N	XPB x 3	1300 rpm	2,5 bar abs	95%

### C) Hydraulic drive (excluded RVC360 V1)

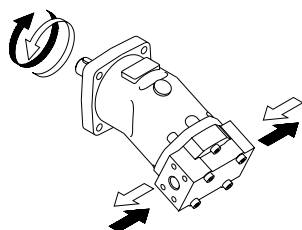
Modell		Displacement	Operating pressure	Flow	Max pressure draining line	Max. pressure motor exhaust	Max pressure
RVC 210	Vac. Max.	34 cc/rev	120 bar	50 l/min (1450rpm)	5 bar	5 bar	210 bar
	0,5 bar rel	34 cc/rev	205 bar	50 l/min (1450rpm)	5 bar	5 bar	210 bar
RVC 360	Vac. Max.	61 cc/rev	130 bar	83 l/min (1300rpm)	5 bar	5 bar	180 bar
	0,5 bar rel	61 cc/rev	160 bar	83 l/min (1300rpm)	5 bar	5 bar	180 bar

- **Fluid:** mineral oil for hydraulic systems in compliance with ISO/DIN.

Temperature	Optimum viscosity ale	Max. viscosity allowed
-20 / +80 °C	12 – 100 cSt	750 cSt

- **Filtration:** class 19/16 contamination according to ISO 4406 to be obtained with a  $\beta_x = 75$  filter.

- **Check circuit connections:** they must be applied in the same rotation direction as that indicated by the arrow on the pump front flange.



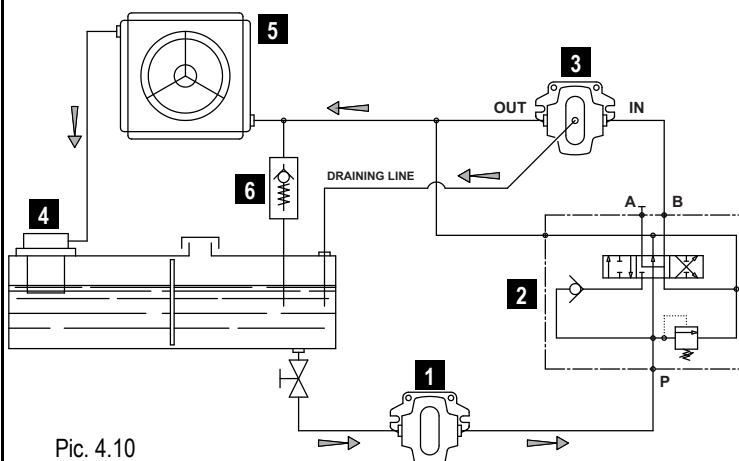
Pic. 4.9

- **Draining:** connect directly to the tank above the maximum oil level. Operating without draining line may damage the motor.

- **Distributor:** open-centre distributor in central idle position (vacuum pump off). It must be equipped with an adjustable overpressure safety valve.

- **Motor pipeline:** outlet pipe must not be of a smaller diameter than that of the inlet port. Inlet pipes always have a diameter smaller than outlet pipes. Choose preferably flexible pipes to avoid vibration transmission.

- **Tank:** with suction pipe and return separated by baffles. If necessary, use a heat exchanger to avoid oil heating above 70-80°C and protect it from extreme pressure with a pressure relief valve. Minimum approximate capacity: as twice as the circulation flow.



Pic. 4.10

1	Hdr pump	4	Oil filter
2	Distributor	5 *	Heat exchanger
3	Hdr motor	6 *	Safety valve

\* optional components

- **Starting-up:** be sure that the system is well cleaned and pour oil into the tank and into the motor housing (necessary to lubricate the internal bearings).

- Vent the circuit and adjust the overpressure safety valve to the lowest possible value.

- Check the oil tank level.

- Increase pressure and rotation speed until operating values are reached.

- The machine/system manufacturer is responsible for dimensioning the lines.



**The machine/system manufacturer is responsible for dimensioning the lines.**

## 5. Start up

### 5.1. Starting-up of the pump

- Check oil levels in rear mounted tank.
- Refill the tank with lubrication oil.
- In order to choose the most suitable oil, see paragraph 2.8.
- Open all valves of the vacuum-pressure system.
- Open all gate valves and remove any possible obstacle from the line.
- Check that all protection devices are correctly installed.
- Check rotation direction: open all system valves and start running slowly.



**Do not rotate in the wrong direction: this may damage the vacuum pump. Follow the arrow indicated on the front flange.**

- Check which position of the four-way integrated valve lever allows vacuum or pressure functioning.
- Close the valve and increase vacuum rate (or operating pressure).
- Check loading and operating speed for vibrations or unusual noises.



**This vacuum pump is designed to work at maximum speed, but for longer operating we recommend the pump be run at working speed (see par. 2.7).**

- To reduce the vacuum rate to 75% max (RVC 210) and 80% max (RVC 360).
- Prepare adequately transmission.

### 5.2. Operating precautions

- Run the vacuum pump at a room temperature of -20°C e +40°C.
- Running at continuous duty: see paragraph 2.5.
- Do not make the vacuum pump overheat. Maximum air temperature on exhaust (or delivery) side: 160-180°C.
- If maximum temperature allowed is reached, in order to prevent damages to the internal parts, it is recommended:
  - to reduce the vacuum rate or the working pressure by opening the venting port;
  - to reduce the pump speed according to list at paragraph 2.7.
  - to start running the pump again only when temperature at exhaust is below acceptable values.
- Do not operate the pump without lubrication: it may cause quick wear and possible breakdown of vanes.
- Do not start running the pump under load: that causes stress to the drive system and the hydraulic motor.
- Check rotation speed. The vacuum pump must:
  - Never exceed the maximum speed: it may cause overheating;
  - Never run below the minimum speed: this may cause an anomalous wear of the housing.
- Do not accidentally operate the pump in the wrong direction: it may break the vanes.

- Do not convey the exceeding delivery outlet towards the suction port, otherwise it will suck warm gas.
- In vehicles do not direct compressor's discharge to the intake of the engine.
- Control the air flow by adjusting the rotation speed: do not use the pressure relief valve to discharge the exceeding flow.
- Once the needed vacuum rate has been reached, we recommend reducing the vacuum pump speed to its working speed (see par. 2.7): this allows keeping the achieved vacuum/pressure rate constant. The pump speed can also be reduced to values lower than the working speed during the tank discharging phase (with the 4-way valve in pressure mode) without increasing the draining time.
- Thus, exhaust temperature is reduced, vane durability is increased and both oil consumption and power absorption are reduced.



**Once the needed vacuum rate has been reached, we recommend reducing the vacuum pump speed to its working speed.**

- After operation in dusty environments, after accidental sucking of liquids inside the pump or before a long inoperativity period it is recommended to wash the pump inside according to the following procedure:

1. Before washing the pump, be sure that it has cooled down. To obtain this in a short time, it is possible to run the pump for a few minutes at zero vacuum conditions, or stop it at all;



**Attention: Do not carry out this operation on very hot pumps (for example after a working day) until they have cooled down.**

2. Use 1-2 liters of water mixed with a non-flammable detergent. We suggest some product like Henkel Bonderite C-NE 5225: 5% concentration in water. This detergent grants a good protection against rust and oxidation.
3. Use one of the openings placed in the vacuum line (closest on the pump) to suck some water mixed with detergent.
4. Start the pump at low speed leaving opened all the suction valves in the tank, in order to keep low the vacuum rate (max vac. 10-20%). Let the detergent mix entering the pump very slowly.
5. The detergent mix stays suspended in the pump inside, before being expelled through the exhaust silencer.
6. After keeping the pump speed for a while to make the product reaching the internal parts, it is necessary to dry the pump preventing oxidation. When the detergent mix is finished, continue running the pump at the lowest possible vacuum rate for a few minutes, then close venting and suction valves up to 50-60% maximum, for a couple of minutes. With this operation the pump will dry from the heated air and protected from the chemical attack of the detergent.
7. Washing the pump with this detergent guarantees a protection after some days of inoperativity. If the pump is not used for more than two weeks, after having washed and dried the inner parts as described above, it is recommended to suck slowly 200 cc anti-rust

and water-repellent protective oil (or, if not available, a very fluid gear oil).



**Attention: do not carry out also this operation on very hot pumps (for example after a working day) until they have cooled down.**



**In case the exhaust line cannot be disconnected, drain the liquids accumulated in the separator of the exhaust silencer.**

## 6. Maintenance

### 6.1. Ordinary maintenance

- Any interventions must be performed when the machine is cold, stopped and switched off.
- Installation and maintenance must be operated only by qualified personnel wearing the proper clothes and the necessary tools as well as protection devices.
- Use suitable protection equipment (gloves, protection glasses, boots...)
- In the following table summarizes the main controls to be performed and the frequency of intervention.

Operating Condition	Maintenance Area	Check	8H	50H	500H	1000H
OPERATING	Vacuum Line	Check safety valve				
		Operating pressure				
	Transmission Pump	Rotation speed				
		Sound pressure level (also HDR motor)				
STANDSTILL	Vacuum Line	Drain the oil gathered in the exhaust separator				
		Clean filter and vacuum line shutoff				
		4-way changeover valve: check and lubricate				
		Clean suction filter				
	Pump	Rear mounted tank oil level (1)				
		Clean fan protections				
		Check vanes wear				
		Pump's inner washing (2)				
	Overall	Greasing				
		Check cardan shaft drive				
		Check transmission pulley				

(1) In order to choose the most suitable oil, see paragraph 2.8.

(2) After operation in dusty environments, after accidental sucking of liquids inside the pump or before a long inoperativity period it is recommended to wash the pump inside according to the procedure described at paragraph 5.2.

#### Checking lubrication

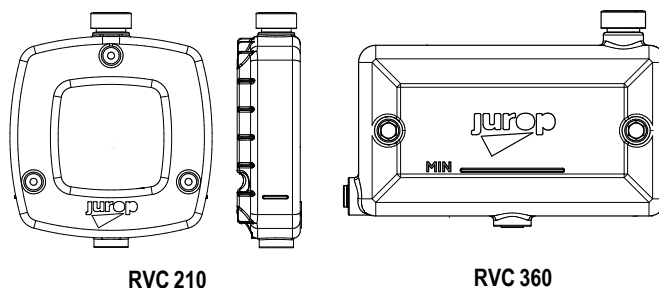
- Check the correct operation of the system / lubrication circuit.



**If the pump is run without lubrication, the internal components may quickly damaged due to overheating. Stop the vacuum pump and check the oil level and the lubricating pump.**

#### Checking the rear mounted oil tank level

- Not run the pump with oil level under the minimum level: that may lead to dry functioning and cause serious damages. See Fig. 6.1.



Pic. 6.1

- Tank capacity: RVC210 2,5 l; RVC360 4l
- Use pure fresh oil.

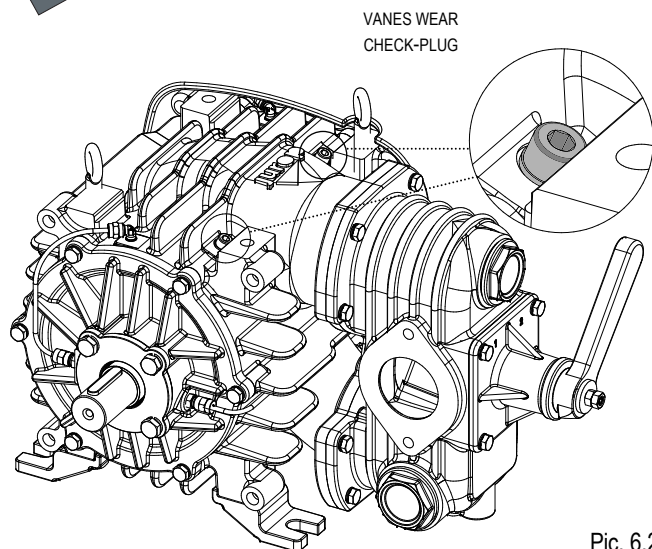


**Do not re-use the exhausted oil gathered on the bottom of the exhaust silencer.**

#### Checking the vanes wear

- Unscrew the vanes wear check-plug on the front flange. See Fig. 6.2.





Pic. 6.2

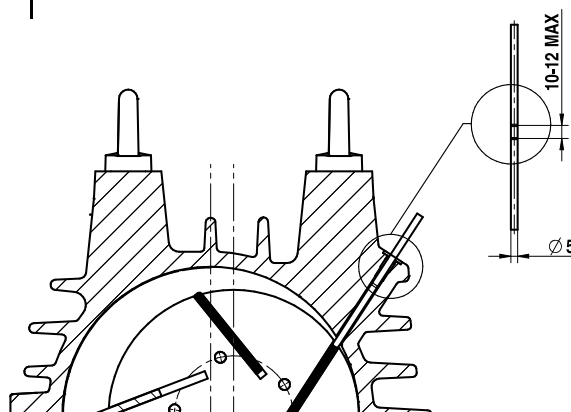
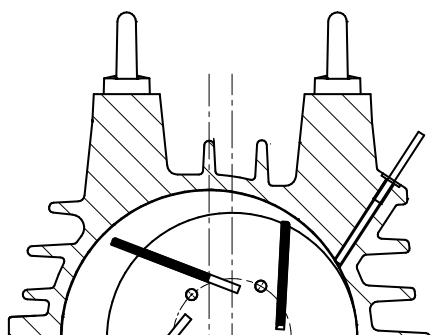
- Turn the shaft by hand until vanes appearance.
- Vanes usually slip on seat bottom due to gravity. Check their right entry in the seat.

- Insert a  $\varnothing 5$  mm stick until it touches the rotor and then mark (see Fig. 6.3)
- Turn the rotor slowly until the stick touches the vane in idle position in its seat. The vanes slide to the bottom of the seat due to gravity: check they really do and mark again on the stick.
- Repeat the same procedure for all the vanes. If wear exceeds 8 mm (RVC 210) or 10 mm (RVC 360): replace the vanes as soon as possible.
- Maximum acceptable wear: 10-12 mm. Immediately replace: vanes are likely to break down.
- Replace all the pump vanes at the same time.



**Replace the vanes when their wear exceeds 10-12 mm (L – L min): they may break. Replace all vanes at the same time.**

- Replace the cap after the measurement.



Pic. 6.3

## 6.2. Extraordinary maintenance

- Except for the cases described below, extraordinary maintenance on a RVC must be carried out by specialized personnel only; otherwise the guarantee will be invalidated.
- All extraordinary maintenance interventions must be carried out when the machine is cold, stopped and switched off. Implement the safety instructions reported in the "Safety and accident prevention" Chapter, before performing any maintenance operation.



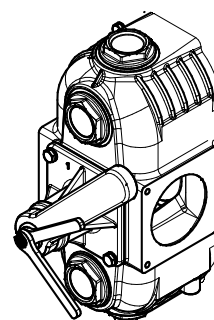
**Follow the safety prescriptions as described in Cap. "Safety and accident prevention".**

### Adjusting the 4-way valve

- For pumps equipped with handle for manual operation or actuator.
- Adjust the screws to avoid the valve blocking in its seat (see Fig. 6.4).



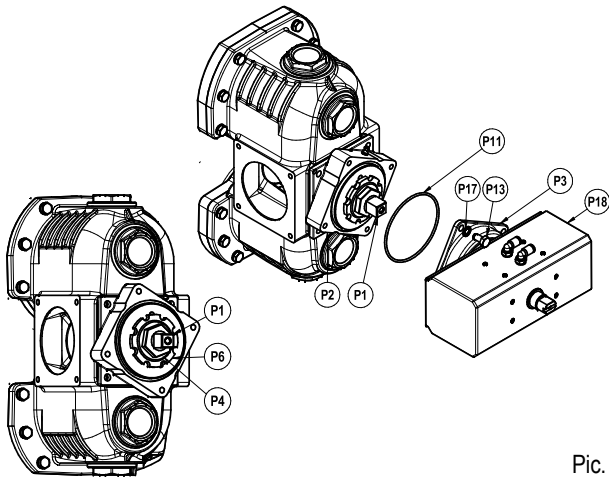
**Attention: do not exceed with the adjustment: possible vacuum loss.**



Pic. 6.4

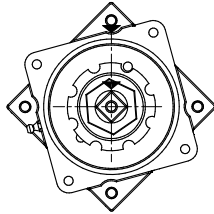
### Adjusting the pneumatically operated 4-way valve

- In case of reduced performance or difficult rotation of the valve in its seat, it is necessary to adjust the operating play.
- Unscrew the 4 screws M8x16 which fasten the top cover (P3) to the inferior support (P2).
- Clean the inner part from the lubricant.
- "Mark" the initial position of the cock (P1). When mounting the cock back in place, it must be in the same position.

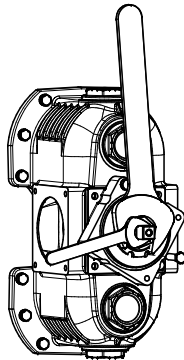


Pic. 6.5

- Turn the valve until one of the cock regulation ferrules (P6) coincides with one of the threaded holes on the inferior flange (P2). Block temporarily the nut ferrule with a screw.

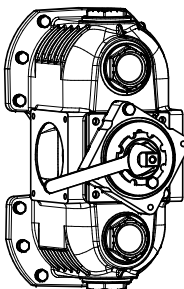


- Hold the valve in place with a 17 mm spanner and loosen the nut (P4) over the ferrule by  $\frac{1}{2}$  -  $\frac{3}{4}$  turn with a 36 mm spanner.



Pic. 6.6

- Valve adjustment: turn the valve clockwise by  $\frac{1}{8}$  turn ( $45^\circ$ ) in order to lower it (in case of excessive play between the valve and its seat and of reduced performance) or anticlockwise by  $\frac{1}{8}$  turn ( $45^\circ$ ) to raise it (in case of difficult rotation of the valve in its seat).
- Hold the valve in place with the spanner and fasten the nut (P4) above the ferrule.



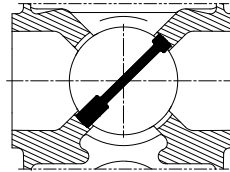
Pic. 6.7

- Remove the screw which temporarily blocks the ferrule and check for the correct rotation of the valve by adjusting the shaft frame. Repeat the valve adjustment, if necessary.

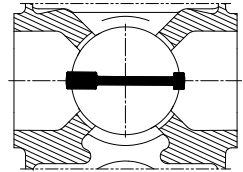


**Attention: get the valve back into the previously "marked" position. Otherwise, the valve may work improperly.**

- The valve - in both its end stroke positions - must separate the air flow sucked from the pump outlet air. The pump may be started in order to check for the proper functioning.



CORRECT POSITION



POSITION INCORRECT

- Lubricate the areas near the ferrule in order to guarantee the lubrication of parts undergoing wear.
- Set the top cover back into place. Do not forget the OR-Ring (P11). Fasten the 4 screws.

#### Replacing the vanes

- Remove the vacuum pump from its bearing frame and wash it before disassembling.
  - We recommend that you work on the pump front.
- The following drawings refers to RVC210 (Fig. 6.8) and RVC 360 (Fig. 6.10).
- Material that is subject to wear: replace.

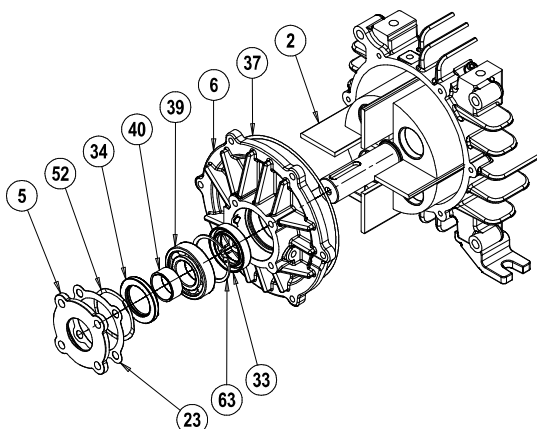
#### Disassembling - RVC210

- Disconnect the drive system, if this is the case, and check conditions.
- Hydraulic drive: mark the position of the driven shaft on the pump shaft.
- Remove the seal cap (5). Do not lose compensation ring (52) and seal cap gasket (23).
- Remove the vacuum pump flange (6) by using the threaded holes to extract it. Do not lose OR-Ring (37).
- Hold the shaft before extracting the flange: the rotor weight must not solicit the internal components.
- Extract the worn vanes (2).
- Complete disassembling:
  - Extract bearing (39) and seal (33) from the pump flange (6);
  - Extract seal (34) from the seal cap (5).

#### Checking the wear condition - RVC210

- Check the condition of following parts:
  - Seals and gaskets: they may be worn or have been damaged during disassembling.
  - Bushings: we recommend they be replaced if remarkably scratched. A grinder may be needed to cut them for removal. Prevent iron filings from entering the pump.

- Check whether the seal and the corresponding bushing need to be replaced also on the pump rear according to their general condition.



Pic. 6.8

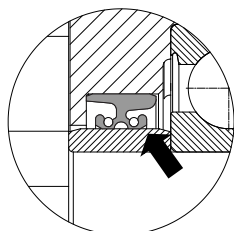
Pos.	Code	Description	Q.ty
2	16016001E0	VANE RVC210	4
23	16807003E0	SEAL FLANGE	2
33	4022200103	SEAL 40X62X13	2
34	4022200114	SEAL 40X62X7 3460 VITON	2
37	4022200353	O-RING 4750 VITON	2
40	4023130009	BUSHING 35X40X17	2
52	4026300010	SEAL LK72	2
63	4026510535	SEAL SEEGER	2

#### Reassembly - RVC210

- Oil and then insert all vanes in their seats.
- Vacuum pump flange (11): insert seal and bearing if they have been previously removed or need to be replaced
- Seal cap (1): insert the new oil seal if replacement has been needed.
- Bushings on pump axle: new bushings may need to be warmed before reassembly. Align them properly.
- Reassemble the parts in the following sequence:
  - Vacuum pump flange: do not damage the seal while inserting it on to the axis. Correctly centre and fasten the screws. Properly align the bearing into its seat.
  - Front seal cap: do not damage the seal while inserting it on to the axis and fasten the screws.



**Do not damage components during assembly by forcing them exceedingly.**

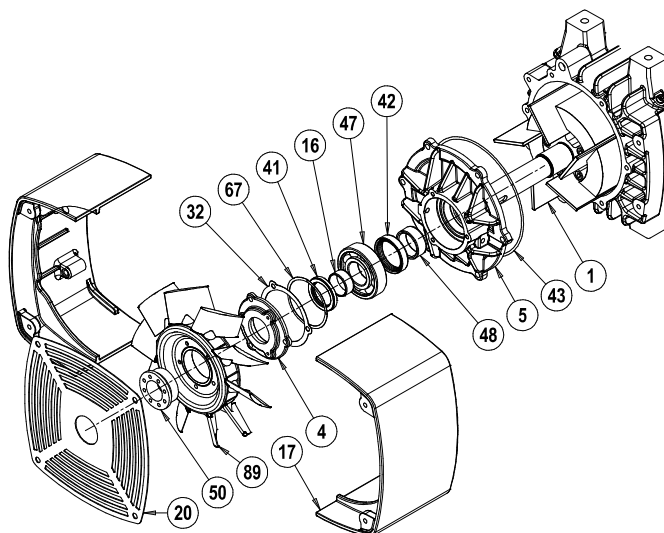


Pic. 6.9

- Do not flip the seal ring during rotation of the shaft. Do not leave foreign objects inside the pump.

#### Disassembling - RVC360

- Disconnect the drive system, if this is the case, and check conditions.
- Hydraulic drive: mark the position of the driven shaft on the pump shaft.
- Remove the conveyor protection (20).
- Remove the aluminium conveyors (17).
- Loosen the 4 screws which blocks the locking set (50) and remove the cooling fan (89) with the hub.
- Remove the seal cap (4). Do not lose compensation ring (67) and seal cap gasket (32).
- Remove the vacuum pump flange (5) by using the threaded holes to extract it. Do not lose OR-Ring (43).
- Hold the shaft before extracting the flange: the rotor weight must not solicit the internal components.
- Extract the worn vanes (1).
- Complete disassembling:
  - Extract bearing (47) and seal (42) from the pump flange (5);
  - Extract seal (41) from the seal cap (4).



Pic. 6.10

Pos.	Code	Description	Q.ty
1	1601605900	VANE RV360	5
16	1626001100	BUSHING	2
32	1680707300	SEAL	2
41	4022200044	SEAL 65X45X8	2
42	4022200113	SEAL 70X55X15 VITON	2
43	4022200309	O-RING 4875 VITON	2
48	4023130035	BUSHING 55X45X22	2

#### Checking the wear condition - RVC360

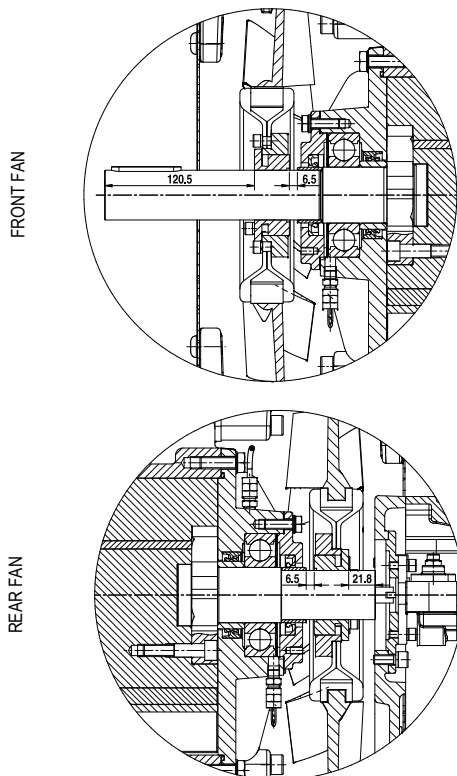
- Check the condition of following parts:
  - Seals and gaskets: they may be worn or have been damaged during disassembling.
  - Bushings: we recommend they be replaced if remarkably scratched.
  - A grinder may be needed to cut them for removal. Prevent iron filings from entering the pump.



- Check whether the seal and the corresponding bushing need to be replaced also on the pump rear according to their general condition.

#### Reassembly - RVC360

- Oil and then insert all vanes in their seats.
- Vacuum pump flange (5): insert seal and bearing if they have been previously removed or need to be replaced.
- Seal cap (4): insert the new oil seal if replacement has been needed.
- Bushings on pump axle: new bushings may need to be warmed before reassembly. Align them properly.



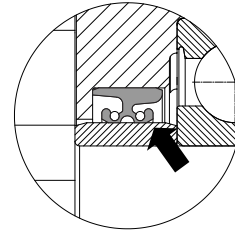
Pic. 6.11

- Reassemble the parts in the following sequence:
  - Vacuum pump flange: do not damage the seal while inserting it on to the axis. Correctly centre and fasten the screws. Properly align the bearing into its seat.
  - Front seal cap: do not damage the seal while inserting it on to the axis and fasten the screws.
  - Fan with docking set.
    - respect the correct distance from the axis head.
    - fasten the 4 screws of the docking set with 10 Nm coupling.
  - Reassembly the conveyors and their protection.



**Do not damage components during assembly by forcing them exceedingly.**

- Do not flip the seal ring during rotation of the shaft. Do not leave foreign objects inside the pump.



Pic. 6.12

#### Mounting the hydraulic drive

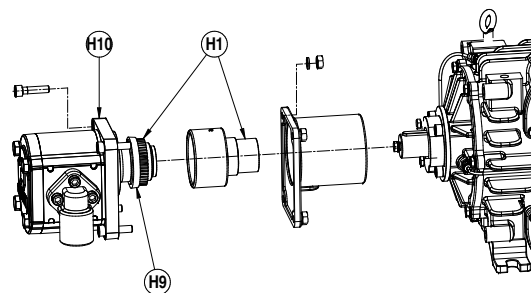
- We recommend the drive coupling be oiled when vanes are being replaced. See Fig. 6.13.
- However lubricate the drive coupling every 1500 hours.



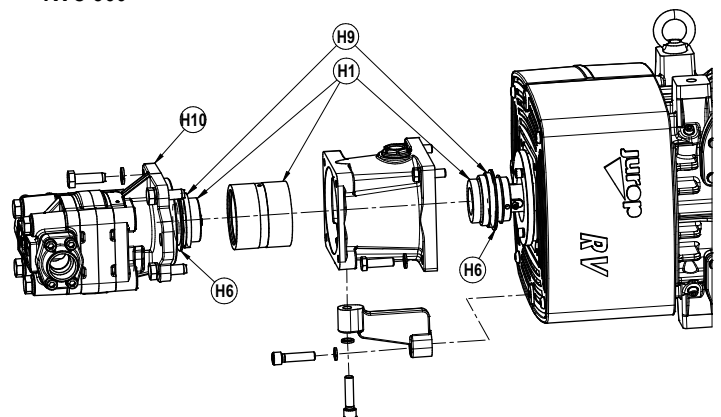
**We recommend the drive coupling be oiled every 1500 hours.**

- Apply coupling hub (H1) to vacuum pump axis respecting the position marked during disassembly: the grain must go back into the seat on the rim.

#### RVC 210



#### RVC 360



Pic. 6.13

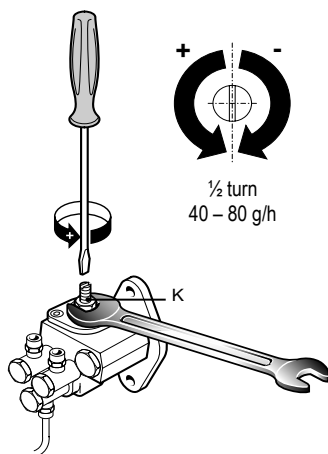
- Mount the coupling (H1) and lubricate internally with NLGI 2 Lithium grease.
- Reassembly the motor without forcing onto the seals (H9).

### Adjusting the self-lubricating pump

• The automatic lubricating pump is adjusted by the manufacturer before the shipping.

• If consumption noticeably differs from the indicated value, adjust it as follows:

- Remove the upper protection cover;
- Using a screwdriver and a 10 mm wrench, adjust the adjusting screw (K). Close the nut and remount the upper protection cover;
- It is advisable to turn the screw of  $\frac{1}{4}$  of turn and verify the actual consumption.



Pic. 6.14

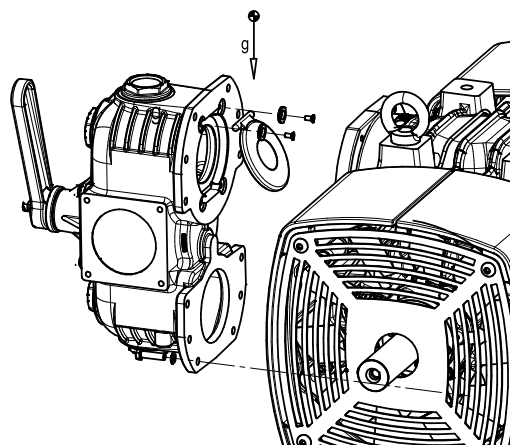
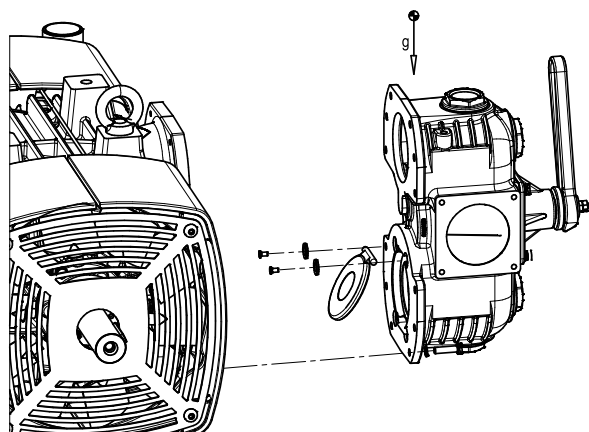


**Do not reduce oil consumption below the value indicated in par. 2.5 (for functioning at speeds different from the maximum, flow is proportionate to rotating speed).**

•  $\frac{1}{2}$  turn of the adjusting screw causes a variation in the flow of approximately 40 - 80 g/h, depending on using conditions.

### Maintenance / replacement clapet valve

- Periodic checks to avoid the accidental suction of solid bodies.
- Every year: replace the OR;
- Every 3 years: replace the clapet and related screw/bolts.
- When reassembling, rotate the clapet as indicated in the figure above. The valve must allow air flow sucked into the pump and not coming out from the pump.

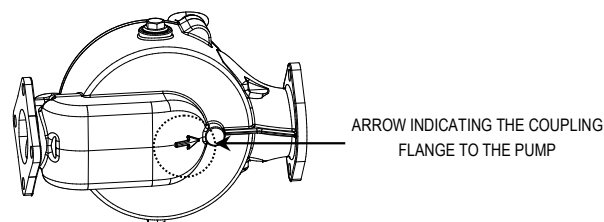


Pic. 6.15

### Installing filter

• Images 4.11 and 4.12 highlights the correct installation of the filter group. On the rear of the filter is shown an arrow, indicating the mating flange to the pump manifold. The support bracket should always be installed above.

### RVC210



### RCV 360

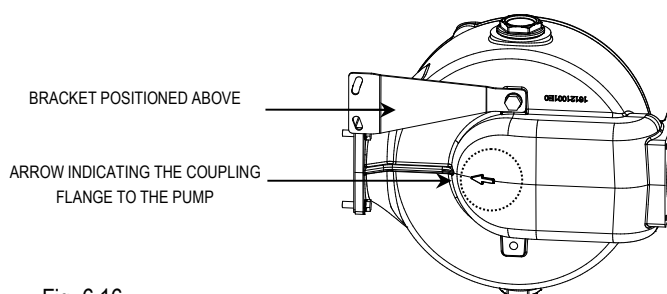


Fig. 6.16

## 7. Malfunctions: troubleshooting

### PROBLEMS

#### The vacuum pump overheats

Cause	Solution
• Insufficient or absent lubrication	• Verify oil and rings. Check oil pump efficiency
• Low tank oil level	• Fill tank with oil
• Excessive rotation speed	• Reduce rpm to the prescribed working speed
• Prolonged functioning at max vacuum rate	• Reduce vacuum rate
• Poor ventilation	• Provide enough room around the pump. Verify fan conditions. Clean fan protections.
• Vacuum and/or exhaust line of insufficient diameter	• Check dimensioning

#### The vacuum pump does not rotate

Cause	Solution
• Broken vanes:	• Clean inner chambers, replace vanes
- due to infiltrated solids	• Check the secondary shutoff and filters of the suction line
- due to insufficient lubrication	• Check the oil pump
• Power transmission breakdown	• Check and replace the damaged parts
• Ice inside the pump (during the cold season)	• Remove ice and slowly start running it. Avoid suction of water

#### Reduced performances

Cause	Solution
• Four way changeover valve in idle position	• Move the lever to vacuum or pressure mode end stroke
• Four way changeover valve not correctly registered	• Adjust the functioning play and lubricate
• Worn vanes	• Replace vanes
• The non-return valve leaks	• Clean or replace if necessary
• Worn seal rings	• Replace
• Tank gate valves or gaskets leak	• Replace damaged or worn parts
• Tank connection pipes leak or are obstructed	• Replace damaged pipes
• Obstructed primary shutoff or suction filter	• Remove and clean
• Encrusted exhaust port	• Remove and clean
• Vacuum line components are too small dimensioned	• Verify dimensions for pump maximum performances
• Obstructed rubber couplings	• Replace

#### Unusual oil consumption

Cause	Solution
• Insufficient or absent lubrication	• Check and adjust the lubricating pump

## 8. Scrapping

• Recycling materials allow reducing the environmental impact and respecting the environment.

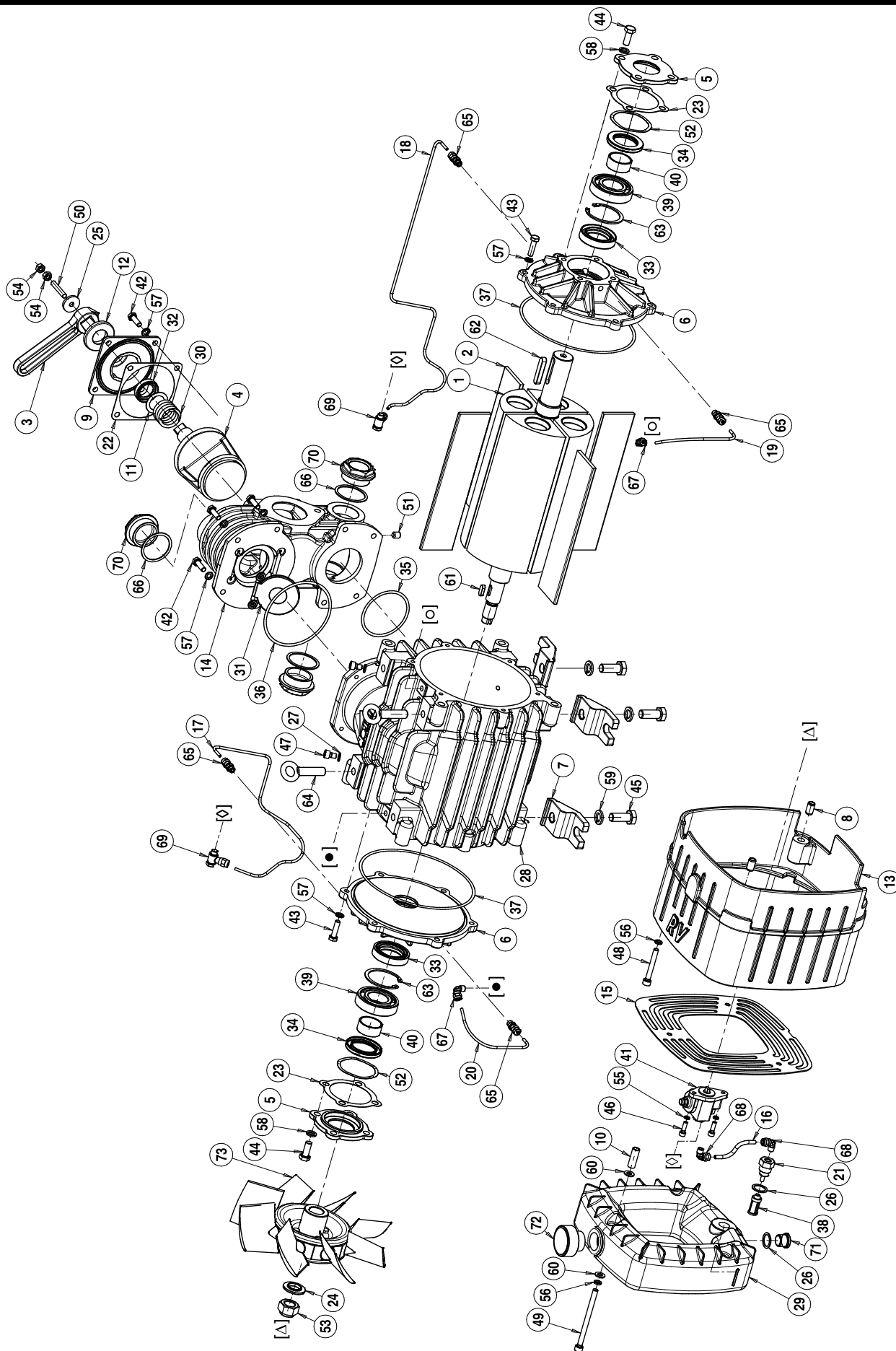


**Do not dispose of in the environment. Dispose of in compliance with the standards in force.**

• Before scrapping the machine, the following materials need to be separated and suitably disposed of:

Material	Cast Iron	Steel	Aluminum	Copper	Bronze	Rubber	Vane	Oil	Gasket
RVC 210	80,0 %	8,0 %	9,3 %	0,2 %	0,1 %	0,1 %	0,7 %	0,7 %	0,8 %
RVC 360	82,0 %	7,0 %	9,1 %	0,1 %	0,1 %	0,1 %	0,6 %	0,6 %	0,7 %
RVC 360 V1	85,0 %	7,0 %	6,0 %	0,1 %	0,1 %	0,1 %	0,6 %	0,6 %	0,5 %

**RVC 210 D MANIFOLD DX**



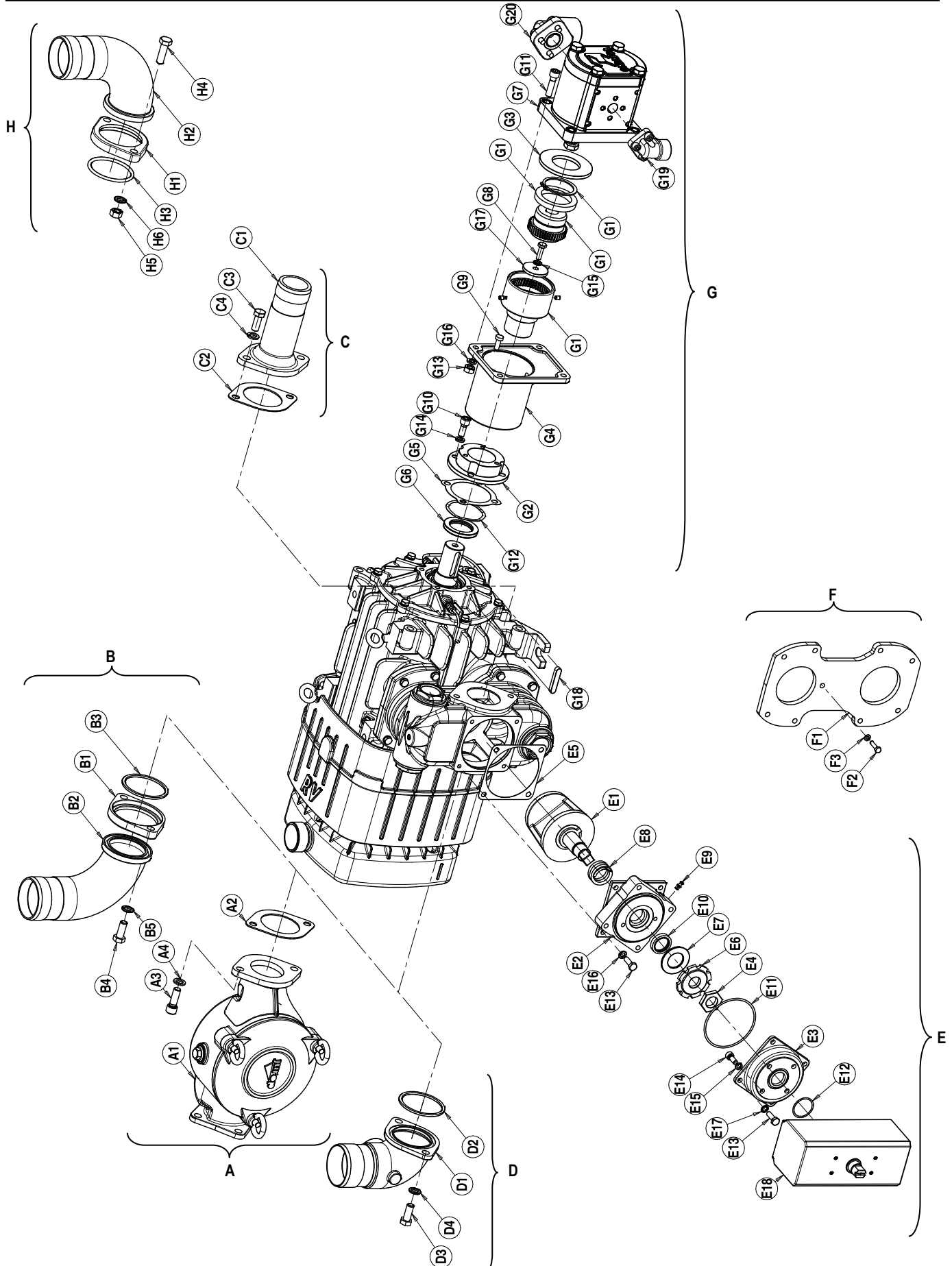
RVC 210 MANIFOLD RIGHT ROTATION LEFT: CODE A610909446

RVC 210: A61...

**RVC 210 D manifold dx**

Pos.	Code	Description	Q.ty	Pos.	Code	Description	Q.ty
1	15215003E0	ROTOR RVC210	1	37	4022200353	SEAL 4750 VITON	2
2	16016001E0	VANE RVC210 BK	4	38	4022300001	FILTER	1
	16016002E0	VANE RVC210 F57	4	39	4023100019	BEARING	2
3	1605500000	COCK HANDLE	1	40	4023130009	BUSHING 35X40X17	2
4	1608500000	D-COCK	1	41	4024251500	OIL PUMP (ROTATION SX)	1
5	16100015E0	SEAL CAP	2		4024251000	OIL PUMP (ROTATION DX)	1
6	16105001E0	FLANGE	2	42	4026102807	SCREW M8X25 GALV.	12
7	16120132E0	SUPPORT	4	43	4026102808	SCREW M8X30 GALV.	12
8	16220001E0	RVC210 CONVEYOR DOWEL PIN	2	44	4026102907	SCREW M10X25 GALV.	8
9	1623100000	COCK COVER	1	45	4026103109	SCREW M14X 35 GALV.	4
10	16240011E0	SPACER	3	46	4026121307	SCREW M6X20 GALV.	2
11	162409YKB0	SPACER	1	47	4026121401	SCREW M8X12 GALV.	4
12	1624202300	SPACER	1	48	4026121412	SCREW M8X60 GALV.	4
13	16271004E0	CONVEYOR	1	49	4026121419	SCREW M8X110 GALV.	3
14	16275002E0	MANIFOLD	1	50	4026135414	SCREW S.TESTA M8X45	1
15	16420009E0	PROTECTION	1	51	4026135504	SCREW M 10X10	1
16	16631003E0	PIPE TANK	1	52	4026300010	SEAL LK72	2
17	16631004E0	PIPE PUMP REAR CL DX	1	53	4026305715	NUT M20X1,5	1
	16631008E0	PIPE PUMP REAR CL SX	1	54	4026308005	NUT M8 ZINC.	2
18	16631005E0	PIPE PUMP FRONT CL DX	1	55	4026350503	WASHER GROWER 6	2
	16631009E0	PIPE PUMP FRONT CL DX	1	56	4026350505	WASHER GROWER 8	7
19	16631006E0	PIPE RVC210	1	57	4026350706	WASHER GROWER 8	24
20	16631007E0	PIPE RVC210	1	58	4026350708	WASHER GROWER 10	8
21	1673001000	FITTING FILTER	1	59	4026350710	WASHER GROWER 14	4
22	1680700200	SEAL CUP	1	60	4026357005	WASHER M8	6
23	16807003E0	SEAL FLANGE	2	61	4026500825	TAB 8X5X20	1
24	16850001E0	WASHER	1	62	4026500909	TAB 10X8X50	1
25	1685002800	WASHER 30X8,5X4	1	63	4026510535	SEAL SEEGER I62	2
26	1685100300	WASHER	2	64	402664FR05	EYBOLT M14X40	2
27	1685100800	WASHER 8X14X1,5	4	65	4026702000	FITTING 4X1/8	4
28	16875003E0	HOUSING RVC210	1	66	4026702708	WASHER1"1/2	3
29	16876001E0	REAR TANK	1	67	4026706000	FITTING 90° 4X1/8	2
30	1691000000	SPRING	1	68	4026706003	FITTING 90° 6X1/8	2
31	18930002E0	CLAPET DN80 INOX OR FKM INT.	1	69	4026706101	FITTING 4-1/8	2
32	4022200030	SEAL 41X27X10	1	70	4026904005	PLUG1"1/2	3
33	4022200103	SEAL 40X62X13	2	71	4026904503	PLUG M20X1,5	1
34	4022200114	SEAL 40X62X7 3460 VITON	2	72	4026910103	PLUG TMDF 1"	1
35	4022200337	SEAL 4325 VITON	1	73	4028360010	FAN (ROTATION SX)	1
36	4022200352	SEAL 4462 VITON	1		4028360011	FAN (ROTATION DX)	1
					1892010100	GASKETS KIT RVC210	1

**RVC 210 - ACCESSORIES**

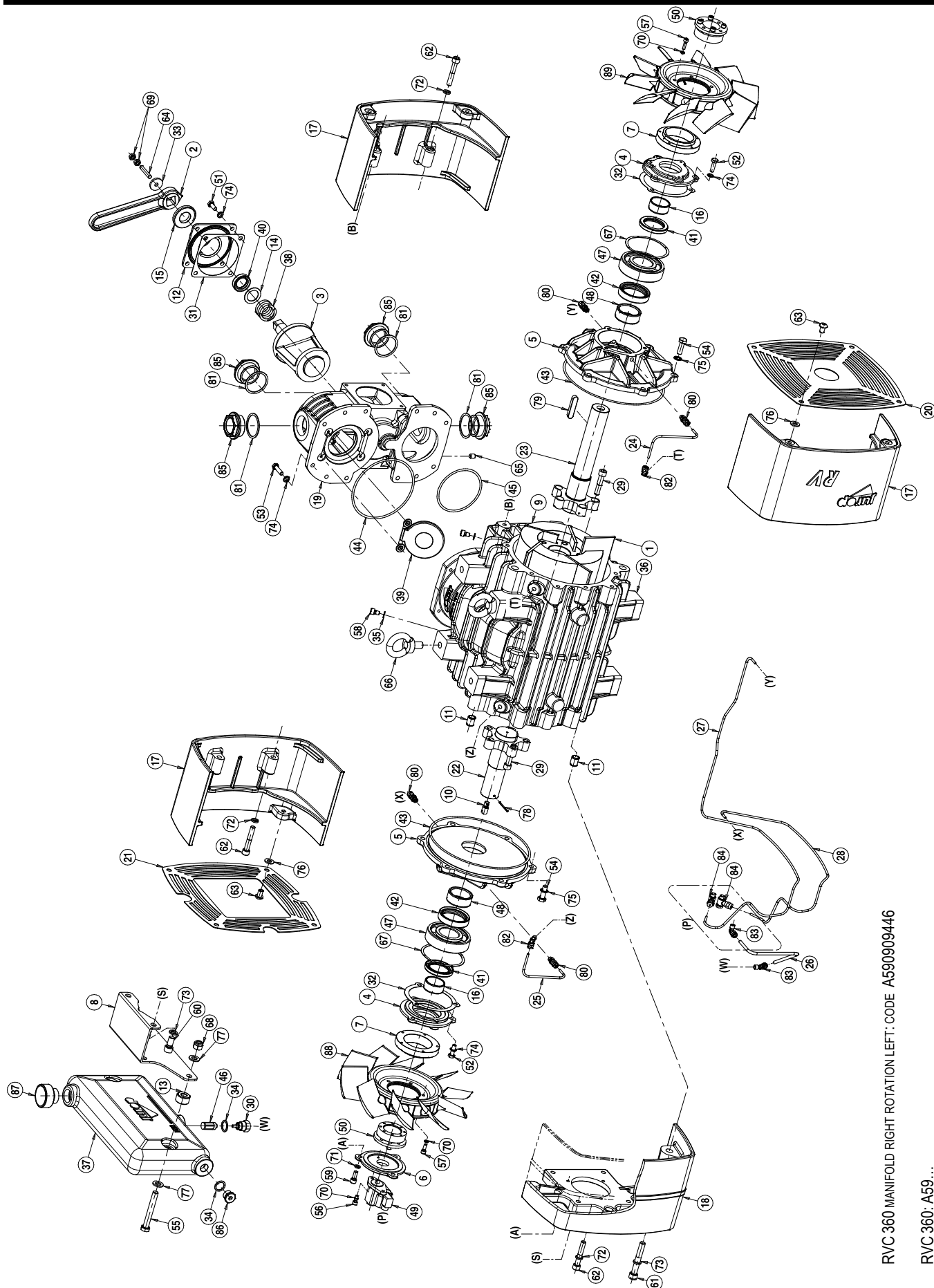




## RVC 210 Accessories

Pos.	Code	Description	Q.ty	Pos.	Code	Description	Q.ty
<b>A</b>	<b>18521005E0</b>	<b>FILTER GROUP</b>	<b>1</b>	<b>F</b>		<b>FLANGE</b>	
A1	14450002E0	AIR FILTER RVC210	1	F1	16120130E0	PLATE	1
A2	1680614500	FILTER SEAL	1	F2	4026102707	SCREW M6X25 GALV.	1
A3	4026121710	SCREW M12X35 GALV.	2	F3	4026350705	WASHER GROWER 6 GALV.	1
A4	4026350709	WASHER GROWER 12 GALV.	2				
<b>B</b>	<b>1852109000</b>	<b>TURNING CONVEYOR Ø76 KIT</b>	<b>1</b>	<b>G</b>		<b>HYDRAULIC TRANSMISSION</b>	
B1	1610100000	FLANGE	1	G1	14701002E0	JOINT	1
B2	1627100500	CONVEYOR Ø76	1	G2	16100020E0	FLANGE	1
B3	4022200307	SEAL OR 6287 VITON	1	G3	16100021E0	FLANGE	1
B4	4026103002	SCREW M12X30 GALV.	2	G4	1612502800	HYDRAULIC BOX	1
B5	4026350709	WASHER GROWER 12 GALV.	2	G5	16807003E0	BEARING CAP GASKET	2
				G6	4022200114	SEAL 40X62X7 DIN 3460 VITON	1
<b>C</b>	<b>1627100700</b>	<b>TURNING CONVEYOR Ø60 KIT</b>	<b>1</b>	G7	4024106905	HYDRAULIC MOTOR	1
C1	1627100700	CONVEYOR Ø60	1	G8	4026102807	SCREW M8X25 GALV.	1
C2	1680614500	FILTER SEAL	1	G9	4026121405	SCREW TCEI 8,8M 8X20 GALV.	3
C3	4026103002	SCREW M12X30 GALV.	2	G10	4026121808	SCREW M10X25 GALV.	4
C4	4026350709	WASHER GROWER 12 GALV.	2	G11	4026121812	SCREW M10X45 GALV	4
				G12	4026300010	SEAL LK72	2
<b>D</b>	<b>1852108900</b>	<b>FIXED SUCTION CONVEYOR Ø76 KIT</b>	<b>1</b>	G13	4026308006	NUT M10 GALV.	4
D1	1627100200	CONVEYOR INLET Ø76	1	G14	4026350506	WASHER GROWER 10 GALV.	4
D2	4022200307	SEAL OR 6287 VITON	1	G15	4026350706	WASHER GROWER 8 GALV.	2
D3	4026103002	SCREW M12X30 GALV.	2	G16	4026350708	WASHER GROWER 10 GALV.	4
D4	4026350709	WASHER GROWER 12 GALV.	2	G17	4026353801	WASHER D. 9X45 SP.5 GALV.	1
				G18	4026500909	TAB 10X8X50	1
<b>E</b>		<b>PNEUMATICALLY OPERATED 4-WAY VALVE</b>		G19	4026710015	FITTING	1
E1	160857Z7B0	SWITCH	1	G20	4026710017	FITTING	1
E2	161258B4B0	HOUSING	1	<b>H</b>	<b>1852104800</b>	<b>KIT CONVEYOR Ø76 (FOR FILTER)</b>	
E3	1640580QB0	COVER	1	H1	1610100000	FLANGE	1
E4	167007ZAB0	NUT	1	H2	1627100500	CONVEYOR Ø76	1
E5	1680700200	COCK COVER GASKET	1	H3	4022200250	SEAL OR 6287	1
E6	168409PQB0	RING	1	H4	4026103004	SCREW M12X40 GALV.	2
E7	168529TFB0	SPACER	1	H5	4026308007	NUT M12 GALV.	2
E8	1691000200	SPRING	1	H6	4026350709	WASHER GROWER 12 GALV.	2
E9	4022100100	GRASE	1				
E10	4022200005	SEAL 37X27X7	1				
E11	4022200330	SEAL OR 3375	1				
E12	4022200331	SEAL OR 2137	1				
E13	4026102807	SCREW M8X25 GALV.	8				
E14	4026121405	SCREW M8X20 GALV.	4				
E15	4026350505	WASHER GROWER 8 GALV.	4				
E16	4026350706	WASHER GROWER 8 GALV.	4				
E17	4026351505	WASHER DENT. M8 GALV.	4				
E18	4027100405	PNEUMATIC ACTUATOR	1				

**RVC 360 D MANIFOLD DX**



RVC 360 MANIFOLD RIGHT ROTATION LEFT: CODE A590909446

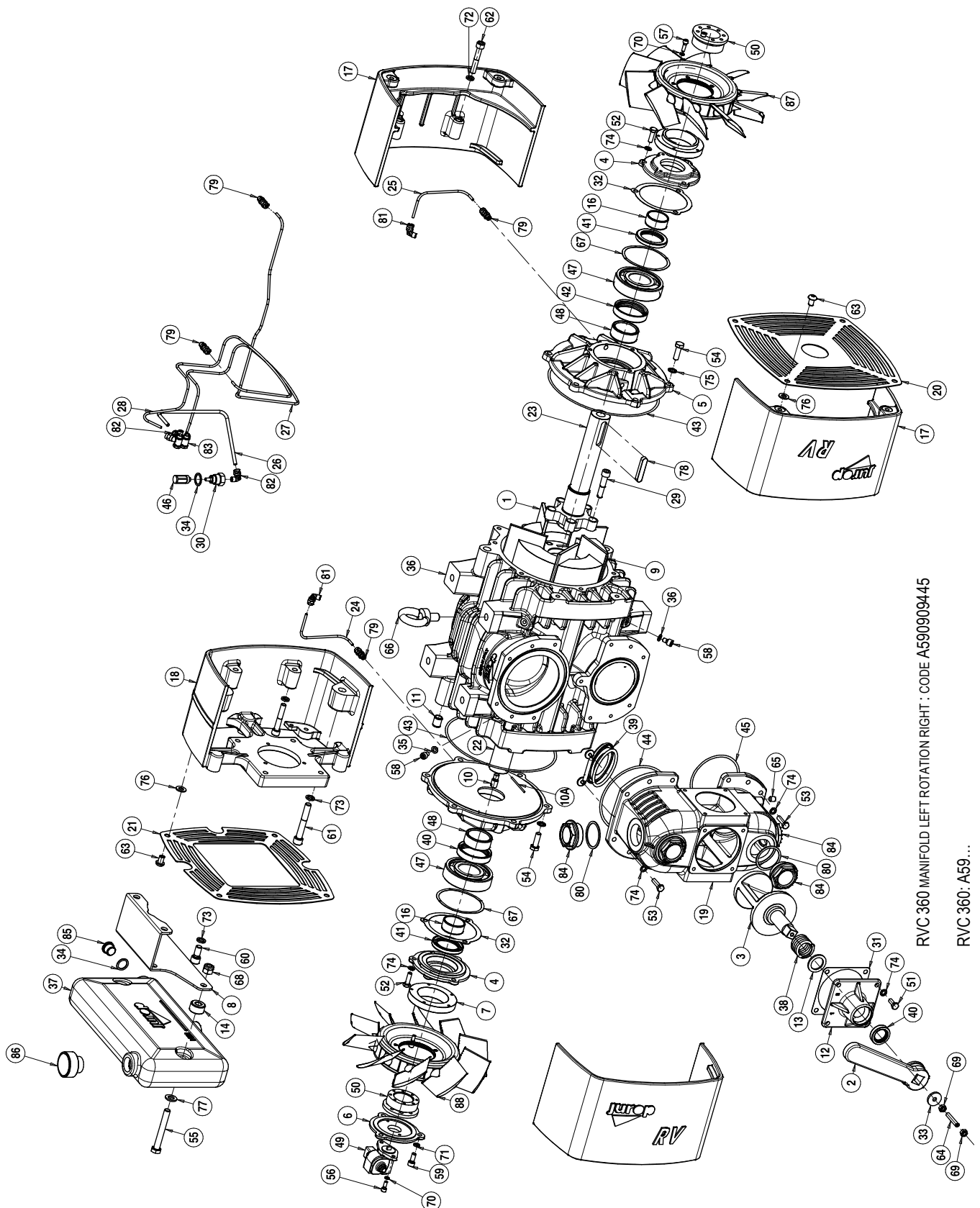
RVC 360: A59...



**RVC 360 D manifold dx**

Pos.	Code	Description	Q.ty	Pos.	Code	Description	Q.ty
1	1601605900	VANE RV360	5	48	4023130035	BUSHING 55X45X22	2
2	1605500100	COCK HANDLE	1	49	4024251500	OIL PUMP (ROTATION SX)	1
3	1608501700	D COCK	1		4024251000	OIL PUMP (ROTATION DX)	1
4	1610508200	SEAL CAP	2	50	4025428111	LOCKING RCK16 40X65	2
5	1610513900	FLANGE RV	2	51	4026102806	SCREW M8X20 GALV.	4
6	16105CF2B0	OIL PUMP FLANGE	1	52	4026102807	SCREW M8X25 GALV.	6
7	1611001400	RVC FUN HUB	2	53	4026102808	SCREW M8X30 GALV.	12
8	1612034000	SUPPORT	1	54	4026102908	SCREW M10X30 GALV.	12
9	1621503500	ROTOR	1	55	4026103013	SCREW M12X90 GALV.	2
10	1622002600	OIL PUMP DRIVE	1	56	4026121305	SCREW M6X16 GALV.	2
11	1622010200	RV COVEYOR DOWEL PIN	2	57	4026121307	SCREW M6X20 GALV.	10
12	1623100000	COCK COVER	1	58	4026121401	SCREW M8X12 GALV.	4
13	1624042800	SPACER	2	59	4026121405	SCREW M8X20 GALV.	3
14	162409YKB0	SPACER	1	60	4026121708	SCREW M12X25 GALV.	2
15	1624202300	SPACER	1	61	4026121719	SCREW 8 M12X80 GALV.	2
16	1626001100	BUSHING	2	62	4026121815	SCREW M10X60 GALV.	8
17	1627105100	CONVEYOR	3	63	4026122005	SCREW M10X15 GALV.	8
18	1627105200	CONVEYOR WITH SUPPORT	1	64	4026135414	SCREW M8X45 GALV.	1
19	16275001E0	MANIFOLD RVC360	1	65	4026135504	SCREW M10X10 GALV.	1
20	1642008300	PROTECTION	1	66	4026190102	EYBOLT M16 GALV.	2
21	1642008400	PROTECTION	1	67	4026300025	SPACER	2
22	1650022100	REAR SHAFT RV	1	68	4026305508	NUT M12	2
23	1650022200	FRONT SHAFT RV	1	69	4026308005	DADO M8 GALV.	2
24	16630009E0	PIPE RVC360	1	70	4026350503	WASHER GROWER 6 GALV.	12
25	16630010E0	PIPE RVC360	1	71	4026350505	WASHER GROWER 8 GALV.	3
26	16630011E0	PIPE TANK	1	72	4026350506	WASHER GROWER 10 GALV.	8
27	16630030E0	PIPE PUMP FRONT	1	73	4026350508	WASHER GROWER 12 GALV.	4
28	1663064300	PIPE PUMP REAR	1	74	4026350706	WASHER GROWER 8 GALV.	22
29	1672001600	SCREW M10X1,5	10	75	4026351506	WASHER DENT.INT.M10 GALV.	12
30	1673001000	FITTING FILTER	1	76	4026357006	WASHER M10 GALV.	8
31	1680700200	SEAL CUP	1	77	4026357007	WASHER M12 GALV.	4
32	1680707300	SEAL FLANGE	2	78	4026414617	PIN 3X40 (ONLY FOR ROTATION SX)	1
33	1685002800	WASHER FE 30X8,5 SP.4 ZINC.	1	79	4026501006	TAB 12X8X56	1
34	1685100300	WASHER DI 20	2	80	4026702000	FITTING 4X1/8	4
35	1685100800	WASHER 8X14X1,5	4	81	4026702708	WASHER 1"1/2	4
36	16875001E0	HOUSING RVC360	1	82	4026706000	FITTING 90°4X1/8	2
37	1687600000	REAR TANK	1	83	4026706003	FITTING 90° 6X1/8	2
38	1691000000	SPRING	1	84	4026706101	FITTING 4-1/8 S	2
39	18930003E0	CLAPET DN100 INOX	1	85	4026904006	PLUG 1" 1/2	4
40	4022200030	SEAL 41X27X10 GP NBR	1	86	4026904503	PLUG M20X1,5	1
41	4022200044	SEAL 65X45X8	2	87	4026910103	PLUG 1"	1
42	4022200113	SEAL 70X55X15 VITON	2	88	4028360000	FAN (ROTATION SX)	1
43	4022200309	SEAL OR 4875 VITON	2		4028360001	FAN (ROTATION DX)	1
44	4022200335	SEAL OR 4575 VITON	1	89	4028360001	FAN (ROTATION SX)	1
45	4022200351	SEAL OR 4412 VITON	1		4028360000	FAN (ROTATION DX)	1
46	4022300001	FILTER NYLON D.6	1				
47	4023100047	BEARING 6309/C3	2		1892009400	GASKETS KIT RVC360	1

## RVC 360 D MANIFOLD SX



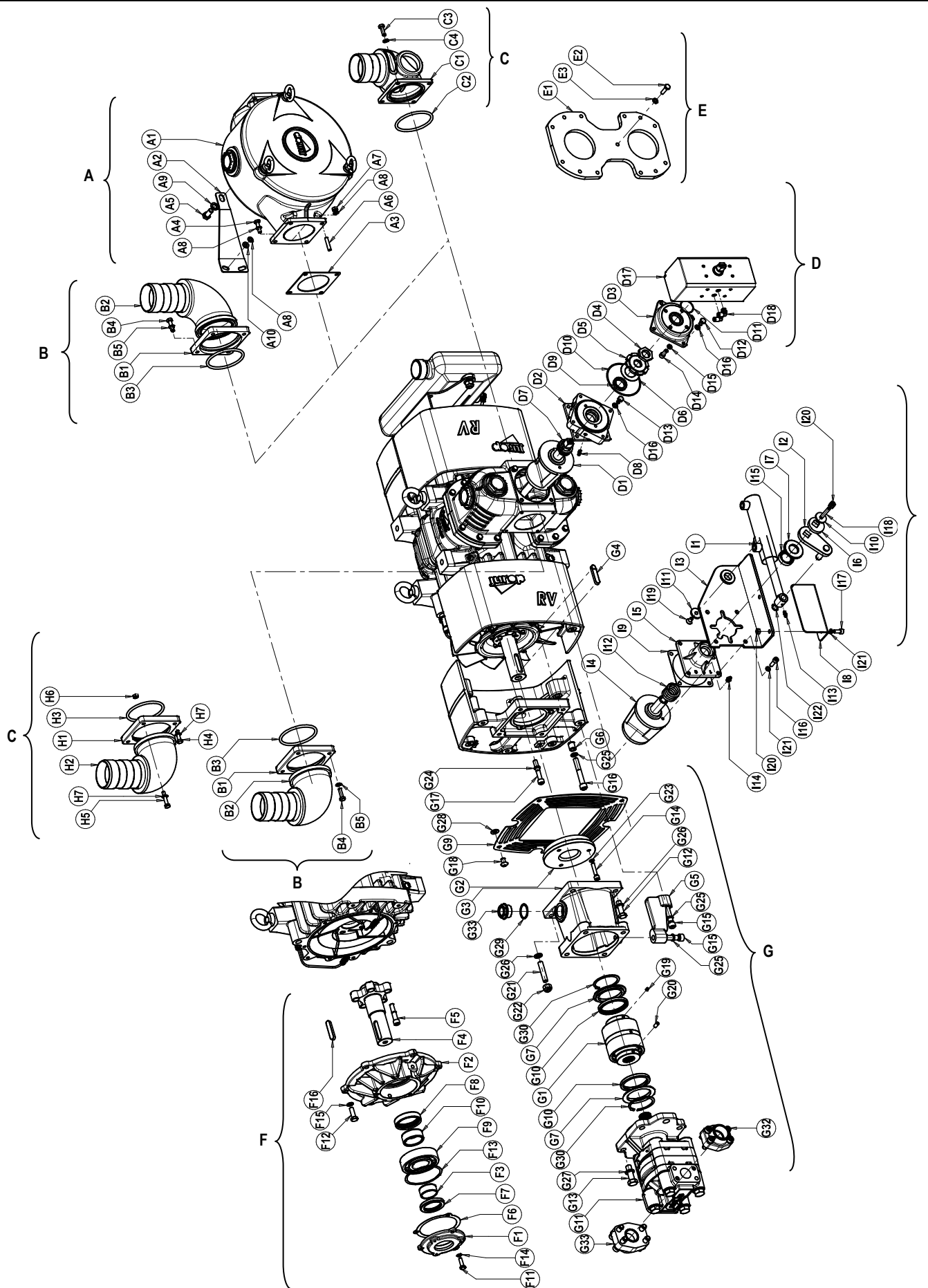
RVC 360 MANIFOLD LEFT ROTATION RIGHT : CODE A590909445

RVC 360: A59...

**RVC 360 D manifold sx**

Pos.	Code	Description	Q.ty	Pos.	Code	Description	Q.ty
1	1601605900	VANE RV360	5	47	4023100047	BEARING 6309/C3	2
2	1605500100	COCK HANDLE	1	48	4023130035	BUSHING 55X45X22	2
3	1608501700	D COCK	1	49	4024251000	OIL PUMP (ROTATION DX)	1
4	1610508200	SEAL CAP	2		4024251500	OIL PUMP (ROTATION SX)	1
5	1610513900	FLANGE RV	2	50	4025428111	LOCKING RCK16 40X65	2
6	16105CF2B0	OIL PUMP FLANGE	1	51	4026102806	SCREW M8X20 GALV.	4
7	1611001400	RVC FUN HUB	2	52	4026102807	SCREW M8X25 GALV.	6
8	1612034000	SUPPORT	1	53	4026102808	SCREW M8X30 GALV.	12
9	1621503500	ROTOR	1	54	4026102908	SCREW M10X30 GALV.	12
10	1622002600	OIL PUMP DRIVE	1	55	4026103012	SCREW M12X80 GALV.	2
10A	4026414617	PIN 3X40 (ONLY FOR ROTATION SX)	1	56	4026121305	SCREW M6X16 GALV.	2
11	1622010200	RV COVEYOR DOWEL PIN	2	57	4026121307	SCREW M6X20 GALV.	10
12	1623100000	COCK COVER	1	58	4026121401	SCREW M8X12 GALV.	4
13	1624027500	COCK SPRING	1	59	4026121405	SCREW M8X20 GALV.	3
14	1624042800	SPACER	2	60	4026121708	SCREW M12X25 GALV.	2
15	1624202300	SPACER	1	61	4026121719	SCREW 8 M12X80 GALV.	2
16	1626001100	BUCHING	2	62	4026121815	SCREW M10X60 GALV.	8
17	1627105100	CONVEYOR	3	63	4026122005	SCREW M10X15 GALV.	8
18	1627105200	CONVEYOR WITH SUPPORT	1	64	4026135414	SCREW M8X45 GALV.	1
19	16275001E0	MANIFOLD RVC360	1	65	4026135504	SCREW M10X10 GALV.	1
20	1642008300	PROTECTION	1	66	4026190102	EYBOLT M16 GALV.	2
21	1642008400	PROTECTION	1	67	4026300025	SPACER	2
22	1650022100	REAR SHAFT RV	1	68	4026305508	NUT M12	2
23	1650022200	FRONT SHAFT RV	1	69	4026308005	DADO M8 ZINC.	2
24	16630009E0	PIPE RVC360	1	70	4026350503	WASHER GROWER 6 GALV.	12
25	16630010E0	PIPE RVC360	1	71	4026350505	WASHER GROWER 8 GALV.	3
26	16630012E0	PIPE TANK	1	72	4026350506	WASHER GROWER 10 GALV.	8
27	16630032E0	PIPE PUMP FORNT	1	73	4026350508	WASHER GROWER 12 GALV.	4
28	1663069900	PIPE PUMP REAR	1	74	4026350706	WASHER GROWER 8 GALV.	22
29	1672001600	SCREW M10X1,5	10	75	4026351506	WASHER DENT.INT.M10 GALV.	12
30	1673001000	FITTING FILTER	1	76	4026357006	WASHER M10 GALV.	8
31	1680700200	SEAL CUP	1	77	4026357007	WASHER M12 GALV.	4
32	1680707300	SEAL FLANGE	2	78	4026501006	TAB 12X8X56	1
33	1685002800	WASHER FE 30X8,5 SP.4 GALV..	1	79	4026702000	FITTING 4X1/8	4
34	1685100300	WASHER DI 20	2	80	4026702708	WASHER 1"1/2	4
35	1685100800	WASHER 8X14X1,5	4	81	4026706000	FITTING 90°4X1/8	2
36	16875001E0	HOUSING RVC360	1	82	4026706003	FITTING 90° 6X1/8	2
37	1687600000	REAR TANK	1	83	4026706101	FITTING 4-1/8 S	2
38	1691000000	SPRING	1	84	4026904005	PLUG 1" 1/2	4
39	18930003E0	CLAPET DN 100 INOX	1	85	4026904503	PLUG M20X1,5	1
40	4022200030	SEAL 41X27X10 GP NBR	1	86	4026910103	PLUG 1"	1
41	4022200044	SEAL 65X45X8	2	87	4028360000	FAN (ROTATION SX)	1
42	4022200113	SEAL 70X55X15 VITON	2		4028360001	FAN (ROTATION DX)	1
43	4022200309	SEAL OR 4875 VITON	2	88	4028360001	FAN (ROTATION DX)	1
44	4022200335	SEAL OR 4575 VITON	1		4028360000	FAN (ROTATION SX)	1
45	4022200351	SEAL OR 4412 VITON	1				
46	4022300001	FILTRER NYLON D.6	1		1892009400	GASKETS KIT RVC360	1

**RVC 360 - 360 V1 - ACCESSORIES**



## RVC 360 - 360 V1 - Accessories

Pos.	Code	Description	Q.ty	Pos.	Code	Description	Q.ty
<b>A</b>	<b>18521002E0</b>	<b>FILTER GROUP</b>	<b>1</b>	F5	1672001600	SCREW TCEI M10X1,5	10
A1	14450001E0	AIR FILTER RVC360	1	F6	1680707300	GASKET	2
A2	16120127E0	SUPPORT	1	F7	4022200044	SEAL 65X45X8	2
A3	1680709900	FILTER SEAL	1	F8	4022200113	SEAL 70X55X15 VITON	2
A4	4026102808	SCREW M8X30 GALV..	2	F9	4023100047	BEARING 6309	2
A5	4026103001	SCREW M12X25 ZINC.	1	F10	4023130035	BUSHING 55X45X22	2
A6	4026171603	SCREW M8X30 GALV.	2	F11	4026102807	SCREW M8X25 GALV.	6
A7	4026308005	NUT M8	2	F12	4026102908	SCREW M10X30 GALV.	12
A8	4026350706	WASHER GROWER 8 GALV.	6	F13	4026300025	SPACER	2
A9	4026350709	WASHER GROWER 12 GALV.	1	F14	4026350706	WASHER GROWER 8 GALV.	19
A10	4026357005	WASHER M8 GALV.	2	F15	4026351506	WASHER M10 GALV.	12
				F16	4026501006	TAB 12X8X56	1
<b>B</b>	<b>1852103800</b>	<b>TURNING CONVEYOR Ø76 KIT</b>		<b>G</b>		<b>HYDRAULIC TRANSMISSION</b>	
	<b>1852103900</b>	<b>TURNING CONVEYOR Ø80 KIT</b>		G1	1470106700	JOINT	1
B1	1610101100	FLANGE	1	G2	1610052300	FLANGE	1
B2	1627102800	CONVEYOR D.76	1	G3	1612501000	HYDRAULIC BOX	1
	1627102700	CONVEYOR D.80	1	G4	1617015500	TAB	1
B3	4022200310	SEAL OR 6362 VITON	1	G5	16171001E0	SQAURE HDR	1
B4	4026102808	SCREW M8X30 ZINC.	4	G6	1622010200	PIN	4
B5	4026350706	WASHER GROWER 8 GALV.	4	G7	1624042300	SPECER HDR	2
<b>C</b>	<b>1852103300</b>	<b>FIXED SUCTION CONVEYOR Ø76 KIT</b>		G8	1627105200	CONVOYER	2
	<b>1852103400</b>	<b>FIXED SUCTION CONVEYOR Ø80 KIT</b>		G9	1642008400	PROTECTION	2
C1	1627102000	CONVEYOR INLET D.76	1	G10	4022200011	SEAL 64X80X8 NBR	2
	1627101300	CONVEYOR INLET. D.80	1	G11	4024107009	HYDRAULIC MOTOR	1
C2	4022200310	SEAL OR 6362 VITON	1	G12	4026103004	SCREW M12X40 GALV.	4
C3	4026102807	SCREW INOX304 M8X25	4	G13	4026103111	SCREW M14X45 GALV.	4
C4	4026350706	WASHER GROWER 8 GALV.	4	G14	4026121409	SCREW M8X40 GALV.	3
<b>D</b>	<b>143028B7B0</b>	<b>PNEUMATICALLY OPERATED 4-WAY VALVE</b>		G15	4026121713	SCREW M12X50 GALV.	2
D1	160858KNB0	SWITCH	1	G16	4026121719	SCREW TE TCEI M12X80 GALV.	4
D2	161258B4B0	HOUSING	1	G17	4026121815	SCREW TCEI M10X60 GALV.	8
D3	1640580QB0	COVER	1	G18	4026122005	SCREW M10X15 GALV.	8
D4	167007ZAB0	NUT	1	G19	4026136005	SCREW M8X12	1
D5	168409PQB0	RING	1	G20	4026136009	SCREW M8X20 GALV.	1
D6	168529TFB0	SPACER	1	G21	4026171203	SCREW M12X40 GALV.	2
D7	1691000200	SPRING	1	G22	4026305508	NUT M12	4
D8	4022100100	GREASE M6X1	1	G23	4026350505	WASHER GROWER 8 GALV.	6
D9	4022200005	SEAL 37X27X7	1	G24	4026350506	WASHER GROWER 10 ZINC.	8
D10	4022200330	SEAL OR 3375	1	G25	4026350508	WASHER GROWER 12 GALV.	8
D11	4022200331	SEAL OR 2137 NBR	1	G26	4026350709	WASHER GROWER 12 GALV.	4
D12	4026102804	SCREW M8X16 ZINC.	4	G27	4026350710	WASHER GROWER 14	4
D13	4026107110	SCREW M8X25	4	G28	4026357006	WASHER M10 GALV.	8
D14	4026120403	SCREW M8X20	4	G29	4026359001	WASHER 40X33,5X1,5	1
D15	4026350505	WASHER GROWER 8 GALV.	4	G30	4026510040	SEAL SEEGER E 63	2
D16	4026350909	WASHER M8	8	G31	4026711003	FLANGE	1
D17	4027100405	PNEUMATIC ACTUATOR	1	G32	4026711004	FLANGE	1
D18	4027421206	FITTING	2	G33	4026904003	PLUG 1" ZINC.	1
<b>E</b>		<b>FLANGE</b>		<b>H</b>	<b>1852113000</b>	<b>KIT CONVEYOR Ø76 (FOR FILTER)</b>	
E1	16120122E0	PLATE	1		<b>1852113100</b>	<b>KIT CONVEYOR Ø80 (FOR FILTER)</b>	
E2	4026102808	SCREW M8X30 GALV.	1	H1	1610101100	FLANGE	1
E3	4026350706	WASHER GROWER 8 GALV.	1	H2	1627102800	CONVOYER D.76	1
<b>F</b>		<b>RVC 360 V1</b>			1627102700	CONVOYER D.80	1
F1	1610508200	FLANGE	2	H3	4022200310	SEALOR 6362 IN VITON	1
F2	1610513900	FLANGE RV	2	H4	4026102808	SCREW M8X30 GALV.	2
F3	1626001100	BUSHING	2	H5	4026102810	SCREW M8X40 GALV.	2
F4	1650014700	SHAFT	1	H6	4026308005	NUT M8 GALV.	2
				H7	4026350706	WASHER GROWER 8 GALV.	4



Pos.	Code	Description	Q.ty	Pos.	Code	Description	Q.ty
I	143029K2B0	KIT HYDRAULIC ACTUATOR		I12	1691000000	SPRING	1
I1	143027T6B0	CILINDER	1	I13	4022100100	GREASER M6X1	1
I2	150206XXB0	LEVER	1	I14	4022100107	GREASER 45	1
I3	151309JVB0	BASE	1	I15	4022200030	SEAL 41X27X10	1
I4	1608503200	MANIFOLD	1	I16	4026120405	SCREW TCEI M8X25	4
I5	1623100800	COVER	1	I17	4026121405	SCREW TCEI M8X20 GALV.	2
I6	16240A0IB0	SPACER	1	I18	4026135414	SCREW M8X45 ZINC.	1
I7	1624202300	SPACER	1	I19	4026155705	SCREW TSPEI M8X16 GALV.	1
I8	164206XYB0	ACTUATOR PROTECTION	1	I20	4026308005	NUT M8 ESAG.GALV.	4
I9	1680700200	GASKET	1	I21	4026350505	WASHER GROWER 8 GALV.	6
I10	1685002800	WASHER FE 30X8,5 SP.4 GALV.	1	I22	4026510012	SEEGER E14	1
I11	168509U0B0	WASHER	1				

## 9. COOLING FANS INSTALLATION INSTRUCTIONS (RVC 360)

### Material

Codice	Descrizione
4025428111	4 SCREW LOCKING COLLAR
4028360000	CLOCKWISE ROTATION FAN
4028360001	COUNTER CLOCKWISE ROTATION FAN
1611001400	FAN HUB
4046850012	THREAD-LOCKER MEDIUM RESISTANCE LOCTITE 243 (*)

(\*): 10 cc tube available upon request.

### Before installation

- Clean all the components: remove dirt and particles that can prevent a correct assembly.
- Prepare the locking element:
  - Align bushing keys.
  - Apply medium resistance thread-locker on the locking screw threads. Pour on the thread evenly.
  - Fasten the 4 screws and leave them loose by at least 2 full turns.
- Do not use the threaded holes that can be seen on the locking collar front. These are used for the disassemble.



**Do not use the threaded holes that can be seen on the locking collar front. These are used for the disassemble.**

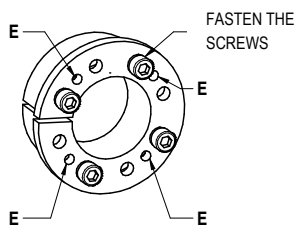


Fig. 9.1

E: Threaded holes for disassembly

- Install the steel hub and the fan by means of the 5 screws and washers.
- Apply medium resistance thread-locker on the locking screw threads. Pour on the thread evenly.
- Fasten the screws following a cross shake pattern.
- Check the screw fastening twice to be sure they have been evenly tightened.

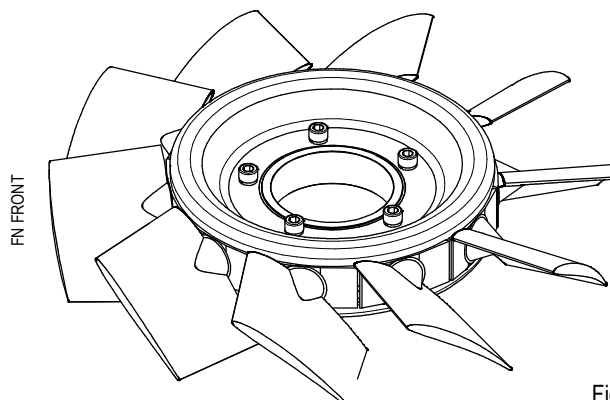


Fig. 9.2

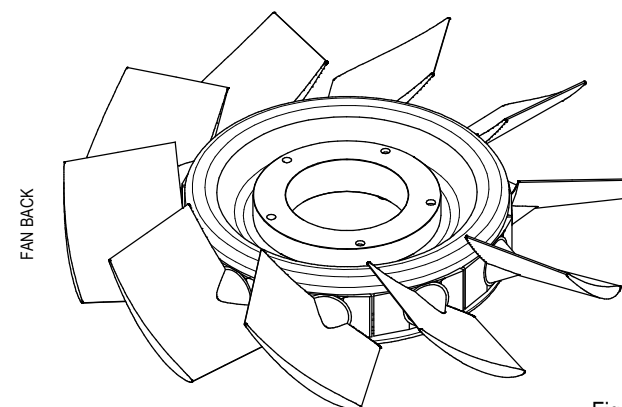


Fig. 9.3

### Installation

- Insert the locking collar inside the fan hub as shown in pictures below, until in touch with the fan hub.

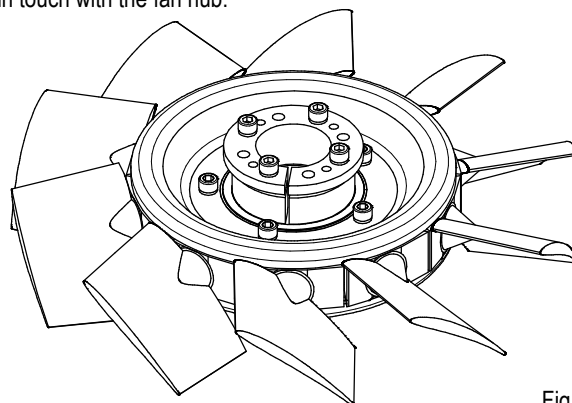


Fig. 9.4

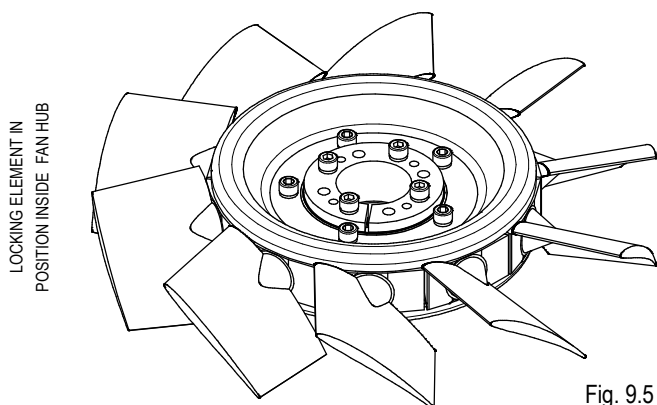


Fig. 9.5

- Install pre assembled fan on the shaft.
- Be careful to respect the suggested distance of 9 mm in between the fan hub and the end of stroke on the shaft.



**Respect the suggested distance of 9 mm in between the fan hub and the end of stroke on the shaft**

- Use a spacer to keep the suggested distance.
- Bring in position, and keep the locking element in touch with the fan hub.

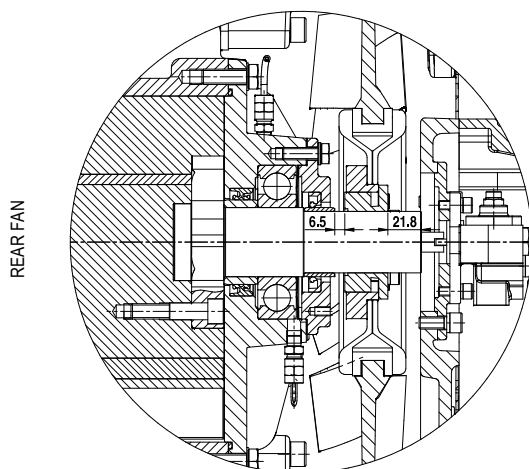
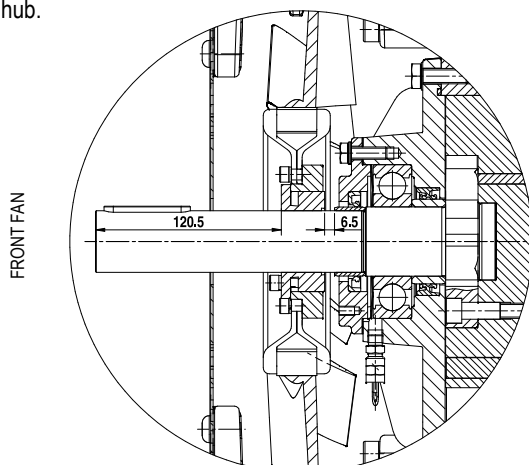


Fig. 9.6

- Tighten the 4 screws on the locking collar with a torque of 13 Nm. Fasten them following a cross shaped pattern.
- Lower the torque to 12 Nm and fasten the screws again, always following a cross shaped pattern.

- Check one last time the screws to be sure that they've been tightened evenly.

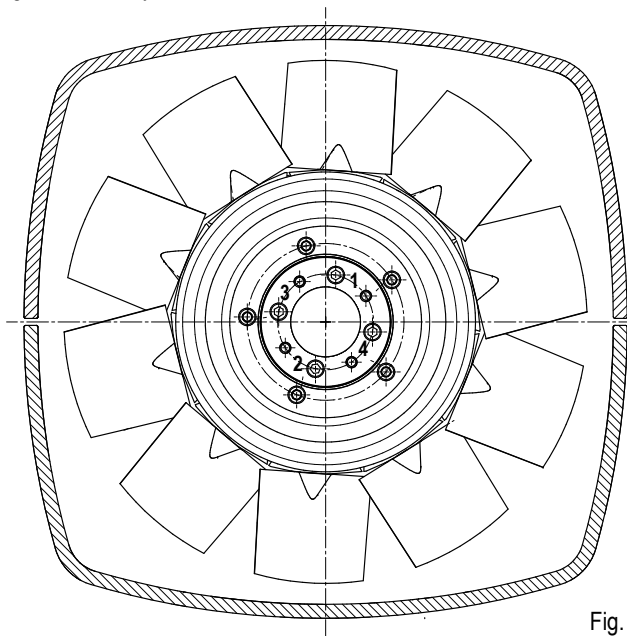


Fig. 9.7

### Disassemble

- Remove the 4 screws that keep the locking collar in place (Fig. 9.8).
- If possible, use an impulse screwdriver.
- Heat the hub with if the screws are stuck because of dirt, rust or if thread locking glue has been used.
- Once the two parts of the locking collar separate, it's possible to remove the fan from the shaft.
- If needed, insert a flat head screwdriver in the crack, to help the removal.



**Heat the hub with if the screws are stuck because of dirt, rust or if thread locking glue has been used.**

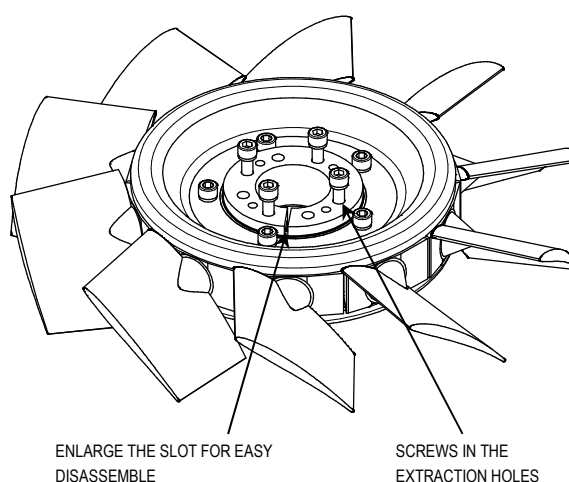


Fig. 9.8

Model	Issue date	Revision No.	Revision date	Filled out by	Viewed by
RVC 210 - 360	10-09-2013	07	08-04-2019	U.T.	A.T.

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