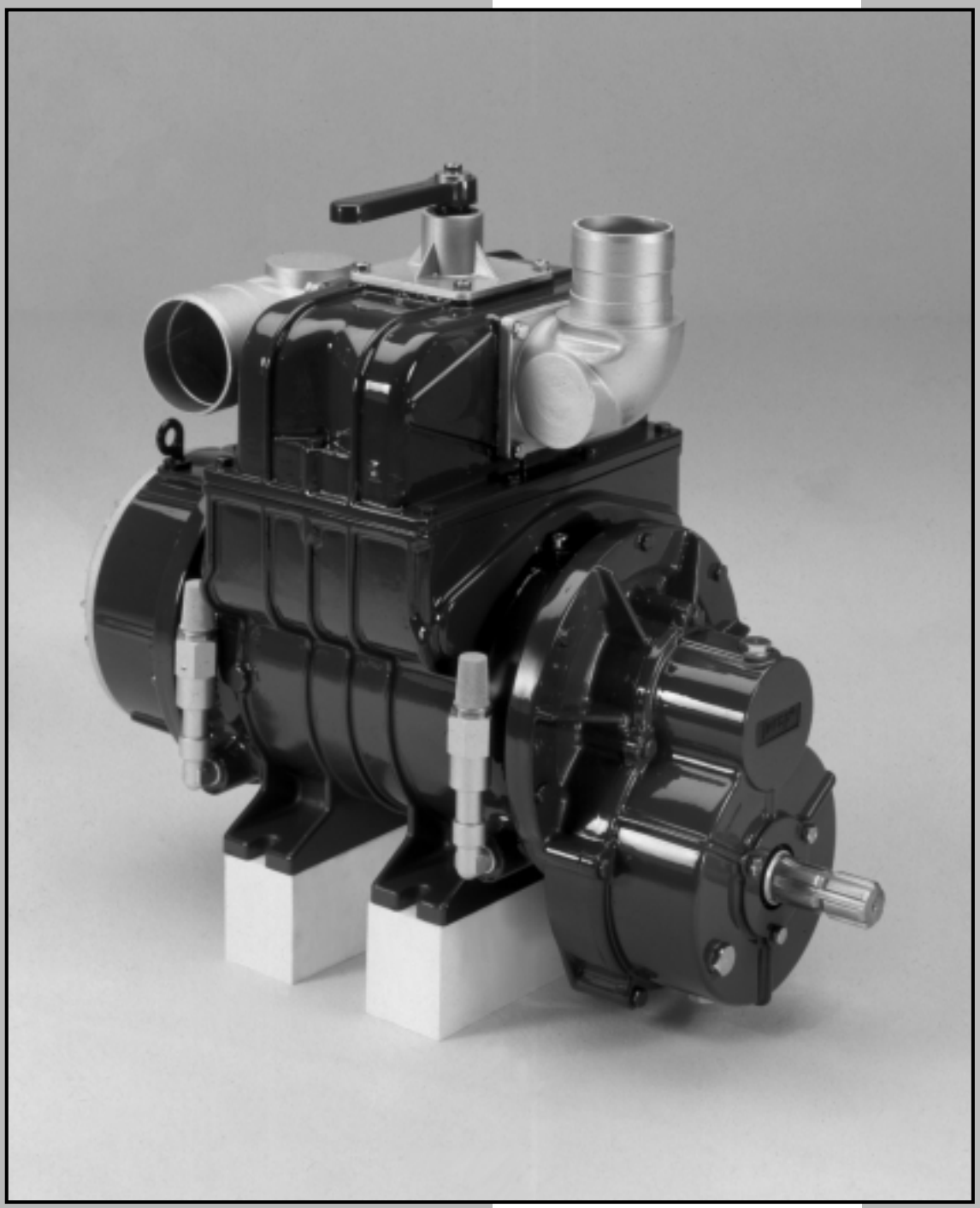
GB PNR/PNE Series



Operating and maintenance manual for air cooled vacuum pump.

jurop PORDENONE

Index

General advises

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.

It is recommended to :

- understand and apply closely the instructions before running the pump.
- keep the booklet at hand and have it known to all operators.

1.2. Request of spare parts

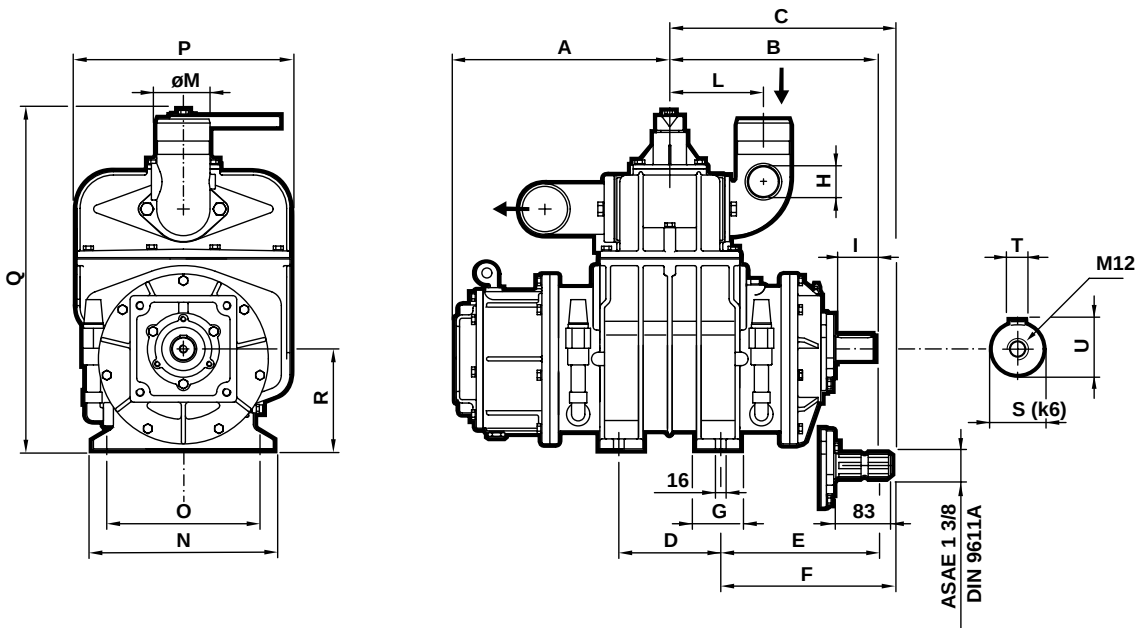
To avoid mistakes when ordering the spare parts make sure you indicate:

a) The model of the pump (see pump tag) PNR142
b) Serial number of the pump X70012
c) Description of the parts (see parts list): . . . . . .Vane
d) Quantity . . . . . .no. 5 pcs
e) The code no. of the part 16016.052.00

2. Technical specification

2.1. Dimensions

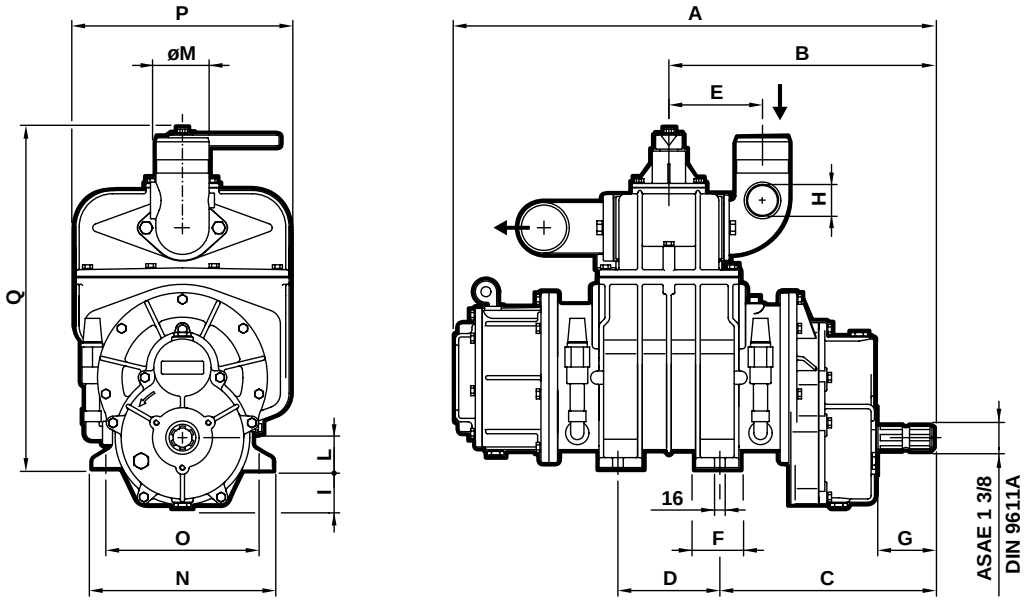
PN... D [direct drive]



Model	A	B	C	D	E	F	G	H	I	L	M		N	O	P	Q	R	S	T	U
											IN	OUT								
PN...72 D	298	284	309	153	207	232	65	G1 1/2	57	140	76-80	76	270	230	320	508	150	35	10	38
PN...82 D	320	306	331	153	230	255	65	G1 1/2	57	140	76-80	76	270	230	320	508	150	35	10	38
PN...102 D	320	313	329	153	237	253	72	(G2)*	64	185	80-100	100	285	255	345	550	168	40	12	43
PN...122 D	353	346	362	153	269	285	72	(G2)*	64	185	80-100	100	285	255	345	550	168	40	12	43
PNR142 D	344	338	355	300	188	205	95	(G2)*	64	257	80-100	100	320	270	340	562	210	40	12	43

*: only if foreseen with additional conveyor Ref. no. 1627102500

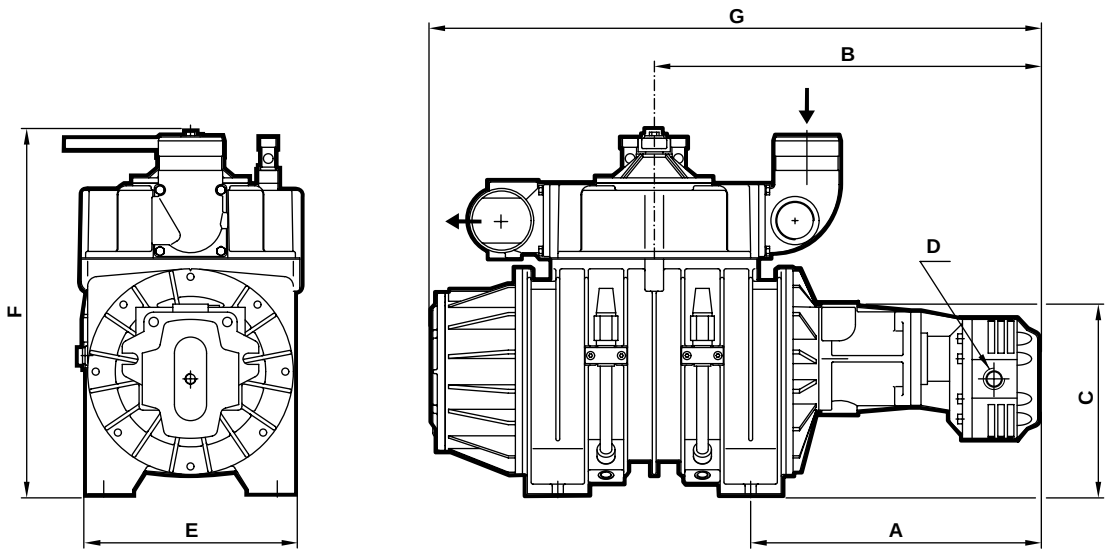
PN... M [gear box]



Mod.	A	B	C	D	E	F	G	H	I	L	M		N	O	P	Q
											IN	OUT				
PN...72 M	670	372	296	153	140	65	84	G1 1/2	59	45	76-80	76	270	230	320	508
PN...82 M	715	395	318	153	140	65	84	G1 1/2	59	45	76-80	76	270	230	320	508
PN...102 M	726	406	329	153	185	72	85	(G2)*	64	50	80-100	100	285	255	345	550
PN...122 M	791	438	362	153	185	72	85	(G2)*	64	50	80-100	100	285	255	345	550
PNR142 M	778	434	284	300	257	95	85	(G2)*	21	88	80-100	100	320	270	340	562

*: only if foreseen with additional conveyor Ref. no. 1627102500

PN... HDR [with hydraulic motor]



Model	Hydraulic motor/system characteristics			Dimensions [mm]							
	Q (l/min)	p (bar)	n (min^{-1})	A	B	C	D		E	F	G
							IN	OUT			
PN...72 HDR	65	120	1350	472	549	235	G1	G1 1/4	270	508	847
PN...82 HDR	65	140	1350	495	571	235	G1	G1 1/4	270	508	892
PN...102 HDR	90	130	1300	510	587	253	G1 1/4	G1 1/2	285	550	907
PN...122 HDR	105	130	1300	523	599	253	G3/4	G1	285	550	952
PNR142 HDR	115	130	1200	446	596	295	G1	G1 1/4	320	562	941

2.2. Technical data

Jurop's sliding-vane, air-cooled vacuum pumps PNR and PNE are standardly delivered with:

- Asbestos-free tangential vanes
- Automatic lubrication by means of volumetric pump and oil tank.
- Change-over valve (4-way valve) for pressure and vacuum
- Single piece, guided check valve
- Suction and discharge connections made of aluminum alloy
- Gearbox transmission with hardened, single piece splined drive shaft ASAE 1 3/8".
- Direct transmission with a.m. drive shaft or smooth shaft.
- Counterclockwise rotation
- PNR: cooled by air injection

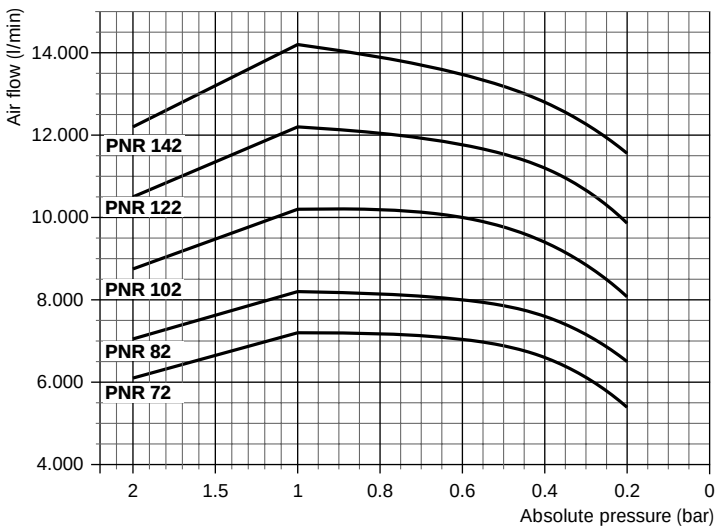
Upon request:

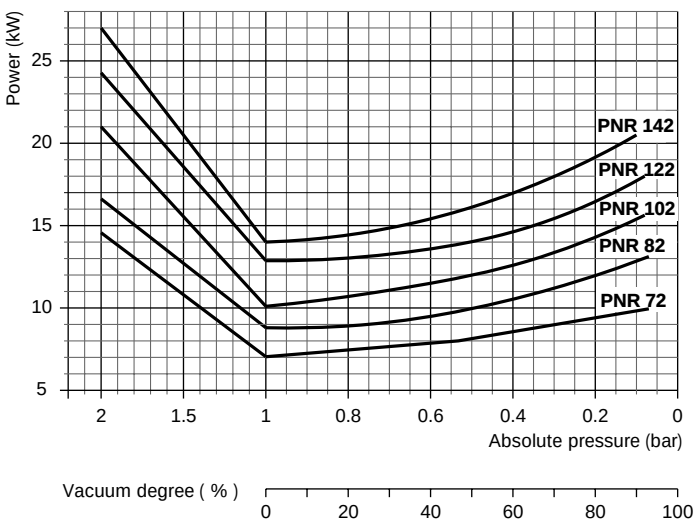
- Clockwise rotation
- Drive by means of internal combustion engine, hydraulic motor or mechanical drive from a Power Take Off.
- Pneumatic or hydraulic actuator on the change-over valve for pressure and vacuum

NOTA **Automatic lubrication:** ***the volumetric pump with variable flow, fitted on the rear part and inside the oil tank, injects the lubricating oil directly inside the vacuum pump, therefore eliminating a manual adjustement of the oil flow.***
It results in a lower lubricating oil consumption and makes unnecessary a periodical lubrication checking and/or adjustment.

2.3. Performances

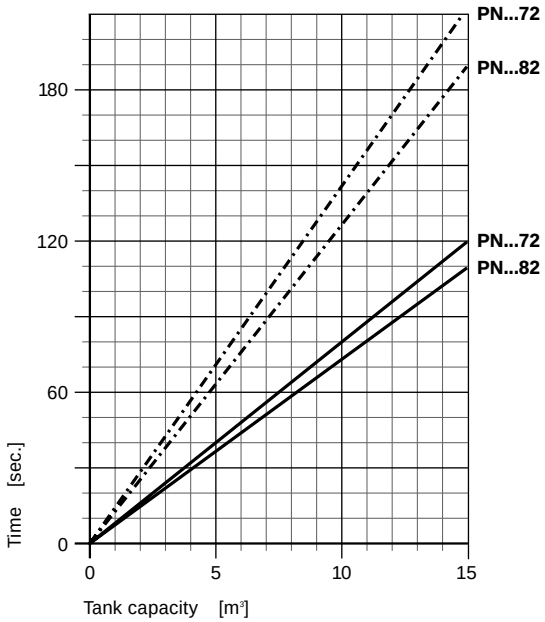
Model			**PN...72**	**PN...82**	**PN...102**	**PN...122**	**PNR142**
Maximum speed	**PN... D**	min^{-1}	1350	1350	1300	1300	1200
	PN... M	min^{-1}	540	540	540	540	540
Minimum speed	**PN... D**	min^{-1}	700	700	700	700	700
	PN... M	min^{-1}	300	300	300	300	300
Air flow free air condition		l/min	7200	8200	10200	12200	14200
Air flow 60% vacuum rate		l/min	6600	7600	9400	11200	12800
Maximum vacuum		%	93	93	92	92	90
Maximum vacuum at continuous duty		%	60	60	60	60	60
Power required at 0,5 bar rel. (1,5 abs.)		kW	11	12,5	16	19	20,5
Max operating rel. pressure (abs.)		bar	1 (2)	1 (2)	1 (2)	1 (2)	1 (2)
Noise level: 60% vacuum, 7 m. c/w silencer	**PNE**	dB(A)	75	75	75	75	75
	PNR	dB(A)	78	78	78	78	78
Weight	**PN... D**	kg	124	130	160	177	240
	PN... M	kg	136	142	173	190	255
Oil consumption		g/h	110÷130	110÷130	130÷150	130÷150	160÷170
Oil tank capacity		l	2,2	2,2	3,2	3,2	4
Torque		kgm^2	0,2	0,23	0,35	0,40	0,58



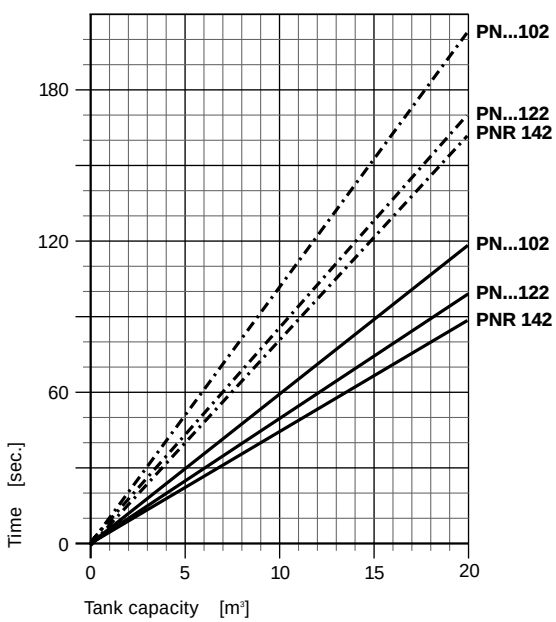


Evacuating time

PN...72 · PN...82



PN...102 · PN...122 · PNR 142



The diagram shows the evacuation time for a tank of given capacity. The actual time is affected by the air tightness of the whole vacuum system.

80% = vacuum

60% = vacuum

2.4. Pump's lubrication

Recommended oils and greases for the lubrication of the housing and the rotor.

Brand	AGIP	ESSO	SHELL	ELF	MOBIL	BP
ISO VG 150	Radula 150	Nuray 150	Vitrea 150	Movixa 150	Rubrex 900	Energol CS 150

Recommended oil and greases for the lubrication of the gearbox and the ball bearings

Brand	AGIP	ESSO	SHELL	ELF	MOBIL	BP
ISO VG 220	Blasia 220	Spartan EP 220	Omala Oil 220	Reductelf SP 220	Mobilgear 630	Energol GR XP 220
NLGI 2 (grease)	GR MU EP2	Beacon EP2	Alvania EP2	Epexa 2	Mobilux EP2	Grease LTX2-EP

3. Safe operating instructions

ATTENTION: STRICTLY COMPLY WITH THESE PRESCRIPTIONS!

3.1. General suggestions

• Installation and maintenance have to be done with the machine totally disengaged from its drive system and must be performed by skilled personell. Disregarding of said safety prescription could result in serious injury to the operator from moving machinery parts.
• Operating personell must wear adequate clothing and protection.
• When running the pump adequate protection for moving parts must be used. If such protections are damaged they must be replaced.
• Be aware that during heavy duty working conditions the pump's housing can reach temperatures of over 60° centigrade. Use adequate means in order to avoid direct contacts with over-heated parts.
• Take care when managing pumps that may have been in contact with dangerous media.
• To lift/move around the pump use an adequate belt or chain inserted through the eyebolts on top of the pump. Rest the pump on safe pedestals in order to avoid accidents.

3.2. Normal use

• Vacuum pumps of the PNR/PNE series are commonly used on stationary or mobile equipment for suction and transfer by means of vacuum or socalled pneumatic-transportation of liquid and solid wastes.

• They are air-cooled and consequentely foreseen for a non-continuous duty. The mod. PNE and the mod. PNR, the latter supplied with air injection system (fig. 1) and meant for heavy duty works, do not accept operating temperatures over 150 °C (300 °F), checked at not more than 150 mm from the discharge connections.

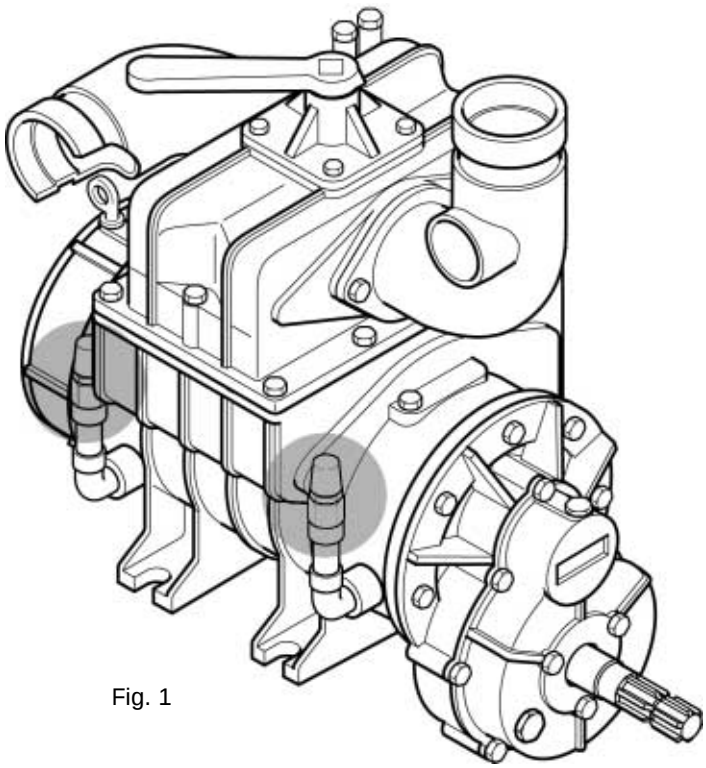


Fig. 1

Minimum and maximum speed and operating pressures must be kept within given limits: overcharging the pump will mean excess of wear, or worse, the breakdown of internal parts. (See par. 2.3)

4. Installation

4.1. Checking at arrival of the goods

Upon receipt check that the pump and accessories are not visibly damaged.

4.2. Pump mounting-drive connection

The pump must be installed so that it is easily accessible for inspection and maintenance. It has also to be fixed on a rigid pedestal or stand, horizontal or slightly inclined, correctly dimensioned in order to avoid vibrations or deformations.

ATTENTION: do foresee the neccessary room for maintenance. To change the vanes it is necessary to dismantle the oil tank on the rear of the pump.
Necessary components for each of the described drive systems are available upon specific request.

For all the different drive systems make sure that the rotation direction corresponds to the one shown by the arrow placed on the front of the pump.

• Drive by belts and pulleys: the pulley has to be mounted on the «smooth shaft» of a direct drive pump model (Models PNR-PNE ... D) Proceed as indications of fig. 2.

ATTENTION: the pulley has to rest against the end-step of the smooth drive shaft. Always use belts SPB or SPBX type.

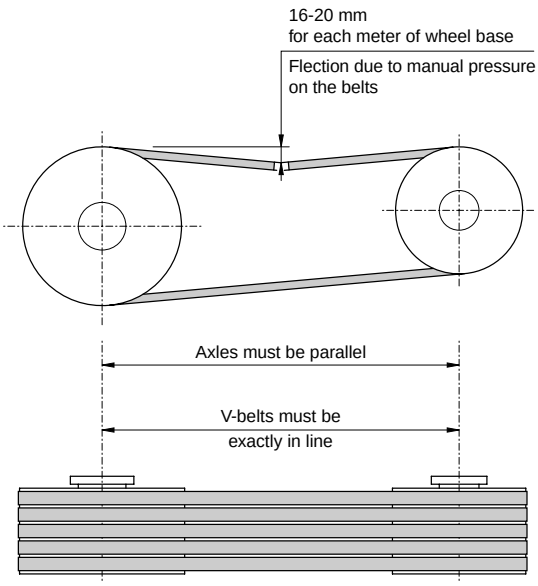


Fig. 2

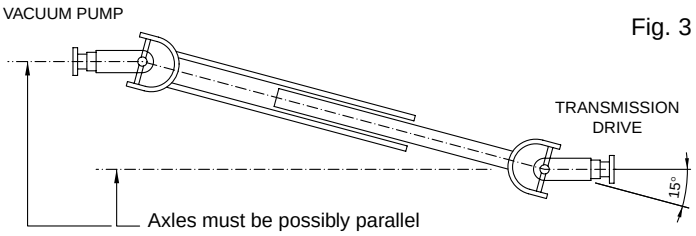
Pulleys with tapered bushing are requested:

Model	PN...72D	PN...82D	PN...102D	PN...122D	PNR142D
Grooves no.	3 SPB	3 SPB	3 SPB	3 SPB	4 SPB
Dp	150-200	150-200	200	200	200
Dp min. trasm.	150	150	200	200	200

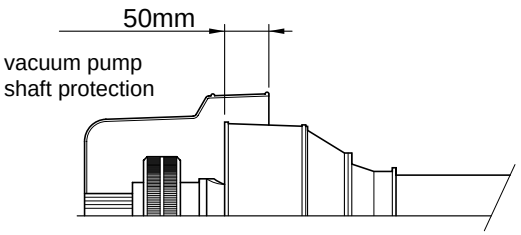
ATTENTION: The transmission's smaller pulley 'Dp min' diameter has to be at least as per above chart in order to avoid excessive axial pull on ball bearings and drive shaft.

• **Mechanical transmission:** for stationary equipment it is suggested to use adequate telescopic cardan propeller shaft. To obtain a smooth rotation of the cardan shaft pay particular care to the angle of the joints. It is recommended not to overstep 15° angle for stationery application.

Fig. 3

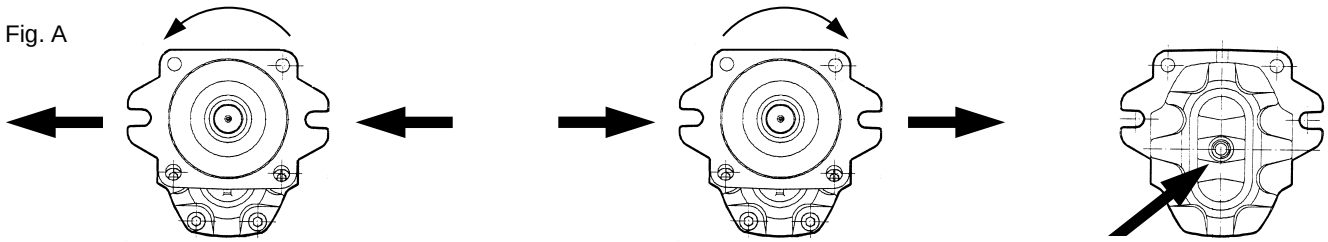


General rules for operating with agriculture pull type machinery:
Check the lenght of the transmission with the minimum and maximum shaft lenght. The overlap of the two members of the cardan shaft must be at least of 1/3 of the total lenght of the whole shaft when operating.
Operate with reduced joint angles (approximately 30°) and possibly the same for both joints.
Disengage the power take off when joint angle encreases greatly (tight turns or lifting operation).
It is suggested to operate with a torque limit device in order to protect the transmission and the pump.
When selecting a cardan shaft for stationery or mobile machinery, when doing maintenance or operating the shaft in any case keep to the manufacturer's instructions in case that they are more tight than the above.
All PNE/PNR models are delivered with cardanshaft protection supplied separately (see Spare Parts List, pos. 21, 22, 23: Drive shaft protection). When mounting it use M8x12 screws with flat washers supplied with the pump.
Do not step on the shaft protection. The torque limit device is allowed on the drive side of the shaft. In any case the protection must overlap the cardan shaft for at least 50 mm.



Safe operating rules
The protection of the drive rotating parts and on the whole equipment where the vacuum pump has been mounted, have to be in compliance with the rules of the Directive: 98/37/CE .
Do not operate the equipment with damaged or tampered protections.

Fig. A



• **Hydraulic drive:** the hydraulic motor is connected to the vacuum pump through a joint fitted on a specific transmission gearbox which grants a correct aligning of the shafts. All components are available upon request, for fitting on the vacuum pump, direct drive model, with smooth shaft.

4.2.1. Indications for the installation of the hydraulic drive (fig. 4)

• **Motor:** make sure that the rotation direction is according to the circuit connections shown in diagram "fig. A" by identifying inlet and outlet port. Connect the draining port of the motor to the oil tank, using a pressureless draining line, discharging above the oil level in the tank itself. All the supplied motors can run in both directions instead the vacuum pump has CW or CCW rotation.

Hydraulic motors running parameters: see part 2.1.

• **Piping:** nominal diameter of all hoses must not be less than the one of the hydraulic motor's connecting port or flanges.
The outlet line between the oil motor and the oil tank must always be a bigger diameter than the inlet line between the hdr control valve and the motor even if outlet port of the oil motor housing is smaller than the inlet port. Connecting line between motor and the hydraulic control valve (which is also used as a Start/Stop control) should be kept as short as possible. It is also necessary to fit in between a length of flexible hose to assorb the vibrations. All components have to be kept absolutely clean.

• **Hydraulic control valve:** nominal oil flow and pressure must be adequately calculated for the chosed hydraulic motor. Said control valve has also to be fitted with an adjustable over-pressure control device.

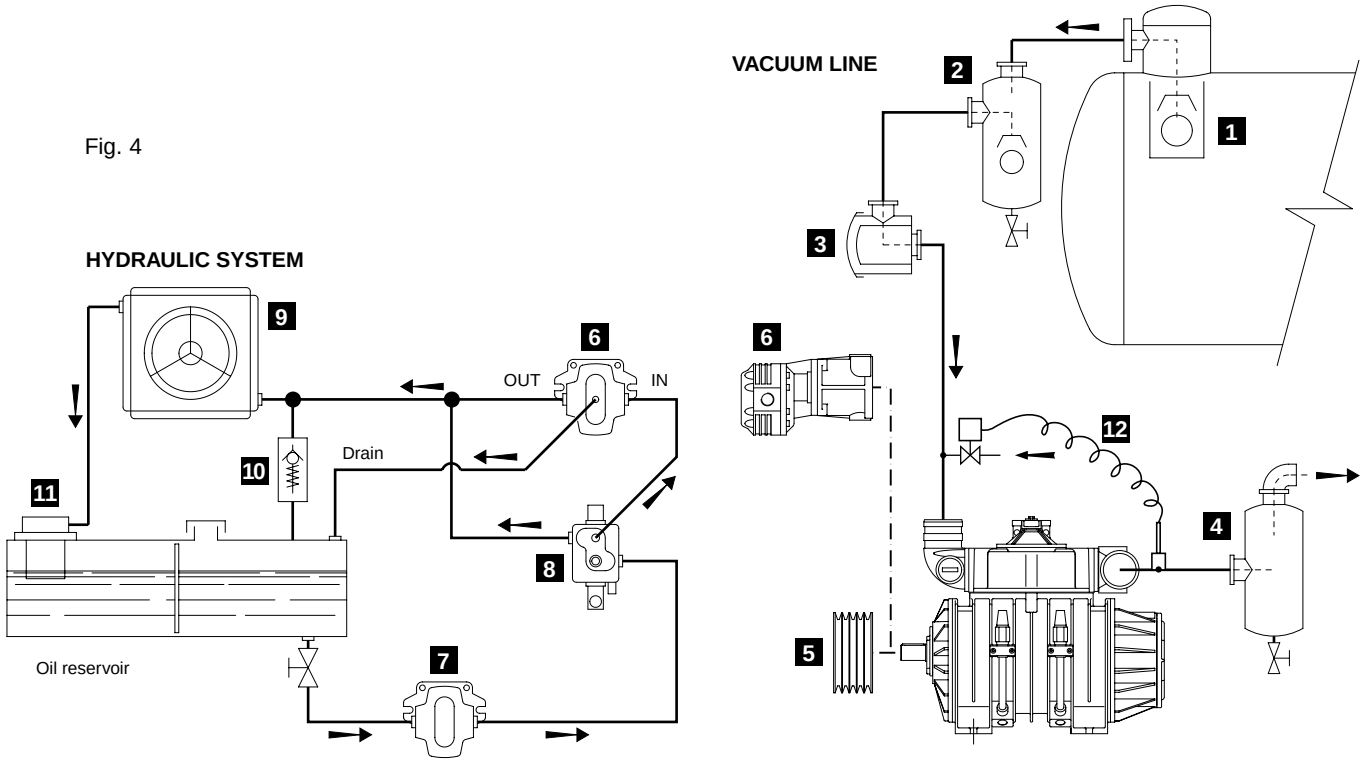
• **Filtration of the oil:** for the whole oil flow must be of 60 µm. Filter has to be fitted on the discharge side of the circuit.

• **Oil tank:** minimum capacity of about 2 times the oil flow of the whole system (in lit/min). Feeding and discharge ports have to be separated by a baffle wall. If necessary an heat exchanger for cooling the oil has to be fitted in the hydraulic plant.

• **Hydraulic pump:** has to be chosed according to the available Power Take Off and its charateristics and in any case must be suitable to drive the hydraulic motor fitted on the vacuum pump.

• **Running of the hydraulic plant:** check that the whole plant is thoroughly clean before filling up the tank with hydraulic oil through an adequate filter. After this do not forget to vent the circuit.
Adjust the safety relief valve at a pressure that guarantees the correct performances of the vacuum pump. Check the oil level in the tank.

Fig. 4



Vacuum line components and mechanical transmission	
1	Primary shutoff
2	Secondary shutoff
3	Suction filter
4	Silencer - oil separator
5	Pulley with tapered bush
12	Overheating limiter

Hydraulic system components	
6	Motor
7	Pump
8	Distributor c/w max press. reg.
9	Oil-air heat exchanger
10	Pressure relief valve
11	Oil filter

4.3. Connection to the vacuum tank

The hoses connecting the suction and exhaust ports of the vacuum pump must be of adeguate diameter (suggested not less than 3") and of oil and corrosion resistant materials and before connecting them, make sure that they are perfectly clean in the inside. Installation diagram as per: fig. 4.
Connect the pump to the tank through the suction manifold (fig. 5, pos. D). which has a threaded port for fitting the over-pressure valve.

Protection of the suction port
To avoid that foreign liquids will enter the vacuum pump it is necessary to mount on the suction line an over-flow valve of 'floating-ball' type (pos. 1). The flow section of this valve (in cm2) must be equivalent to the suction hose's one.
It is also necessary to have on the line a ***suitable air filter*** for preventing solids to be sucked inside the vacuum pump. It is also recommended to mount a 'secondary shutoff' of floating-ball type (pos. 2) between vacuum pump and over-flow (primary shutoff), along with the previously mentioned air filter (pos. 3).

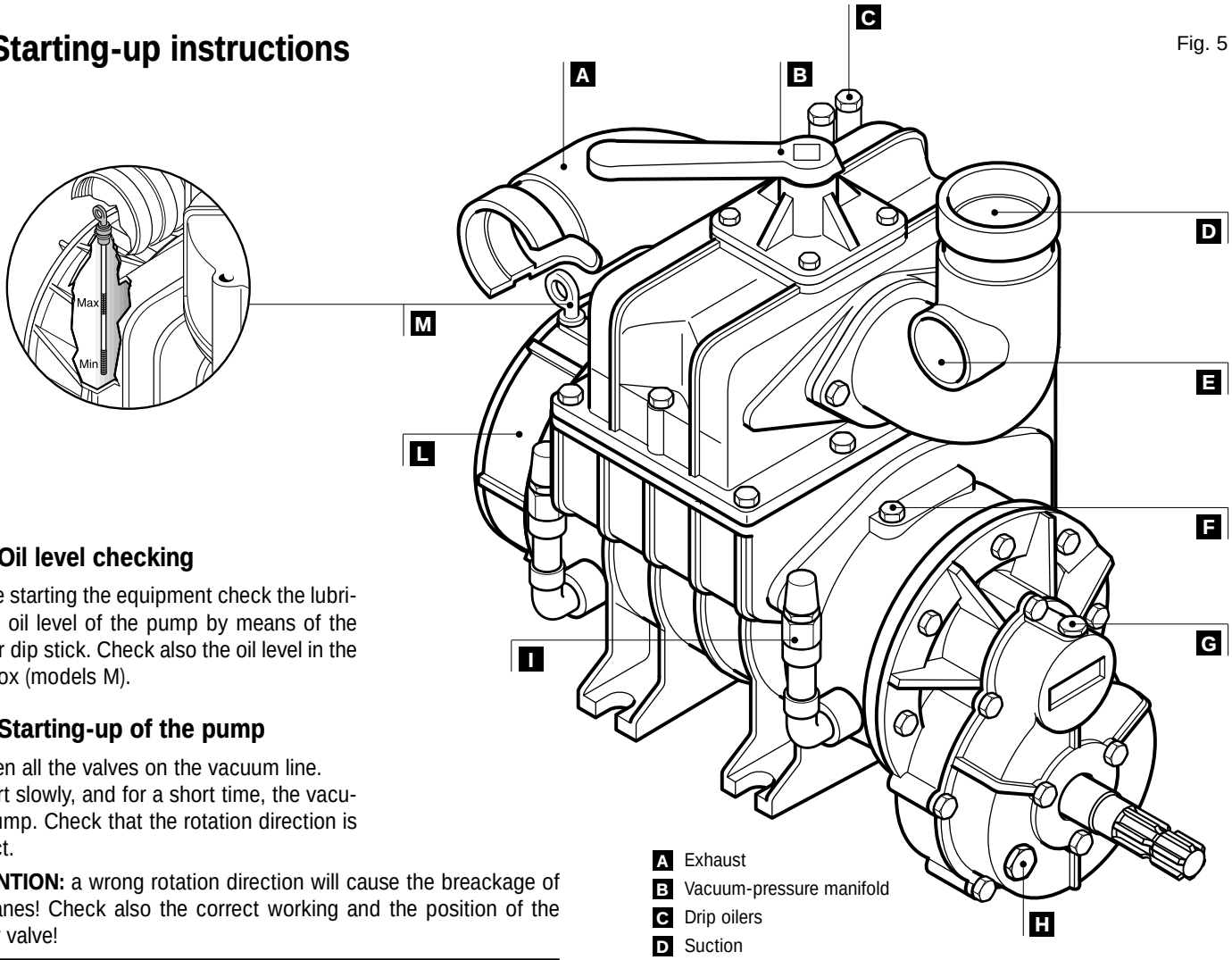
Change-over pressure-vacuum valve
Called also 4-way valve, normally is manually operated but it can be at any time transformed in pneumatically operated upon request of the appropriate 'kit'.

Silencer and oil separator (oil trap)
During normal running of the pump the resulting noise should be reduced by means of a suitable silencer (pos. 4) mounted as close as possible to the pump itself. It has to be dimensioned for the air flow produced by the pump model. The oil used for the pump's inside lubrication has to be separated from the exhausted air by means of an adequate oil-separator, placed directly inside the silencer. The silencer is fitted also with a draining tap for the collected oil and condensed liquids.

Safety valves
Over-pressure safety valve: between the vacuum pump and vacuum tank there must be mounted the above mentioned valve, (fig. 5, pos. E) capable to 'discharge' the whole air-flow produced by the pump. Pressure adjustment on this valve has not to exceed 10% of the work-pressure of the vacuum pump (1,0 bar relative) and in any case not exceed the work-pressure designed for the vacuum tank.
Vacuum check valve: called also 'depressure valve' has to be fitted on the suction line of the equipment. The vacuum check valve, adjusted at a suggested pressure of 0,2 bar (80% vacuum) and anyhow at a value compatible with the job at hand and with the whole equipment, is necessary but not sufficient by itself to avoid damages to the vacuum pump, reducing also the wear-off of most parts.
Overheating limiter: for pumps that reach, during normal operating, discharge air temperature close to 150 °C (300°F) - (checked at not more than 150 mm from the discharge connection) it is necessary to use a device that will not allow to exceed such temperature (contact our Technical Department).

5. Starting-up instructions

Fig. 5



A Exhaust
B Vacuum-pressure manifold
C Drip oilers
D Suction
E Pressure relief valve port.
(Available for PNR-PNE 102-122-142 only if foreseen with additional conveyor Ref. no.1627102500)
F Vanes inspection port
G Gear box oil filling plug
H Gear box oil level plug
I Air injection valves (PNR version)
L Oil tank
M Oil filling port and dip stick

5.1. Oil level checking

Before starting the equipment check the lubricating oil level of the pump by means of the proper dip stick. Check also the oil level in the gearbox (models M).

5.2. Starting-up of the pump

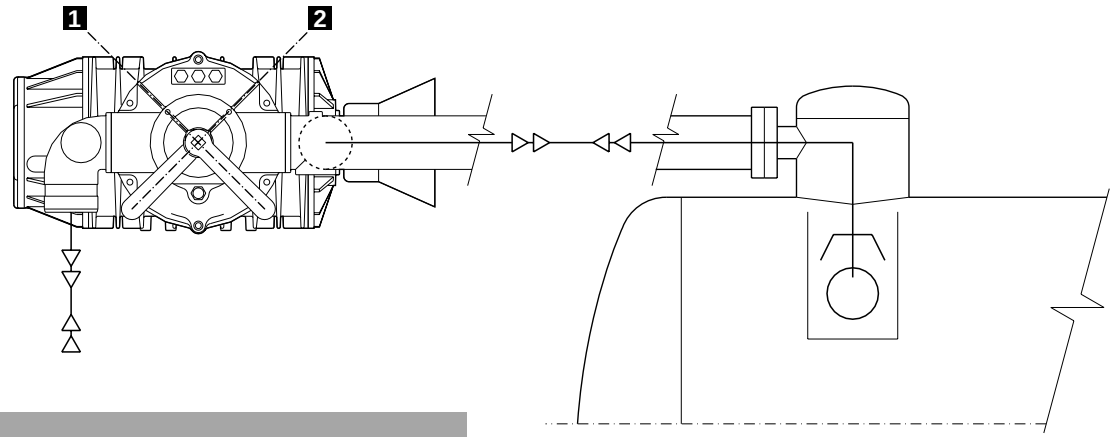
- Open all the valves on the vacuum line.
- Start slowly, and for a short time, the vacuum pump. Check that the rotation direction is correct.

ATTENTION: a wrong rotation direction will cause the breackage of the vanes! Check also the correct working and the position of the 4-way valve!

Transmission	Handle position	Running with
Direct drive LH	1	Pressure
Gearbox dr. RH	2	Vacuum
Direct drive RH	1	Vacuum
Gearbox dr. LH	2	Pressure

Lefthand rot. means counterclockwise and righthand rot. clockwise, looking at the drive shaft of the pump.

Fig. 6



Normally the conveyor/manifold with the threaded connection for the over-pressure valve is fitted on the front of the pump. It can however be moved, if needed, towards the rear.). In this case the function vacuum-pressure will be opposite of the described one.

- Check the lubrication of the pump: oil drops have to fall regulary and constantly inside the oilers. The automatic lubrication pump is correctly adjusted before delivery of the vacuum pump and, normally, does not require any further adjustment. See part 7.1.3.(Lubrication adjustment) if a changement has to be done.

6. Running of the pump

Starting-up: it is recommended a smooth starting without any sudden acceleration in order to avoid damages to the pump and its drive.

Stopping: when the pump is driven by an auxiliary engine disengage the transmission before stopping it.

Take care :

• Do not obstruct or tamper with the safety valves.
• Do not sprinkle water or other liquids on the pump while running.
• Do not exceed temperature of 150 °C (300 °F) measured at the air discharge connection.
• Work speed: once that the wanted vacuum rated has been attained it is recommandable to decrease the RPM. This usefull procedure, that will not increase the time requested to fill up the tank, will hoever result in a lesser wear of the vanes. It is suggested to reduce the speed also when operating with pressure.
• Anyway, always run the pump at the indicated (see also on the pump's tag) RPM possibly without going under the minimum speed, in order to avoid abnormal wear of the pump housing.
• In the eventuality that the suction - exhaust line has some kind of obstruction, stop immediately the pump and remove the obstruction and/or its cause.
• The air flow and the vacuum rate inside the tank has to be adjusted by means of the vacuum pump RPM only (not by any other means like valves etc).
• After long stillstanding periods or after working in rather dusty environment and in the eventuality that foreign liquids have been sucked inside the pump, the insides of the pump have to be washed. This operation to be carried out when the pump has cooled down: by running the pump very slowly, introduce through the suction port, about 1,5 litres of diesel fuel. This liquid has to be removed from the insides once that the washing operation has been completed. Plenty of oil (see point 2.4) must be introduced in order to lubricate again the pump.
• With temperature below 5 °C (40 °F) and long periods of inactivity, introduce some quantity of oil through the suction connection before starting off the pump.
• The air injection cooling system grants the use of the vacuum pump at high vacuum rates. Anyway it has to be remembered that the pump has been designed for non-continuous work. This cooling system allows to dissipate part of the accumulated heat still at satisfactory lubrication conditions. Continuous, heavy-duty work, or prolonged work periods will cause an over-heating of the pump, consequently reducing performances and durability.
• With the PNR models it is quite normal that the vacuum rate in the tank will fall down at about 50%, if and when the pump is stopped for sufficient time. This because atmosferic air will flow back in the tank through the injection valves, which are adjusted at approximately 0,5 bar. Vent the tank and take it to atmospheric pressure when stopping the pump in order to avoid back rotation of the pump.

7. Maintenance

7.1. Ordinary maintenance

Suggested periodical checking in order to maintain a good efficiency of the pump

7.1.1. Periodical checking

• Check the regular dropping of the oil inside the oilers. Prescribed oil quantity as per part. 2.3.
• Clean regulary the filters on the air injection ports (see fig. 5) and the filter placed on the oil block (see fig. B).
• Check the drive elements, according to the manufacturer prescriptions.
• Check the oil level in the gearbox (-M- models).
• Drain the oil from the silencer. Do not use it again on the vacuum pump.

Furthermore check this, with the following frequency:

Unit	Daily	Weekly	Quarterly
Lubricating oil level	•		
Pressure and vacuum	•		
Safety valves		•	
Air filter cleaning		•	
Vanes wear			•

• The oil level has to stay above the minimum mark of the dip stick otherwise the pump will not suck any oil. This will cause quick wear of the vacuum pump and seize the oil pump. Periodically clean also the oil pump filter and the oil tank.
• Decreasing performances (vacuum rate and maximum pressure) indicate clearly a wear-off of some components. Therefore check the vanes without further delay.
• In any case the vanes have to be checked at least every three months.

NOTE ***For particulary heavy duty working conditions (high vacuum rates, dusty environment, long working times) do the checkings more frequently than indicated in the maintenance chart.***

Fig. B

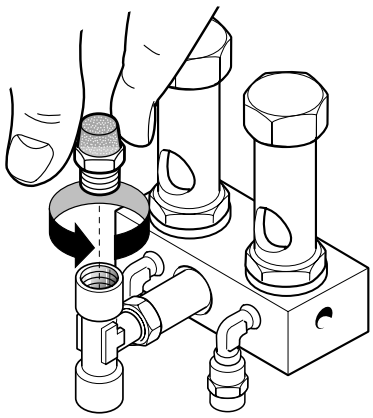
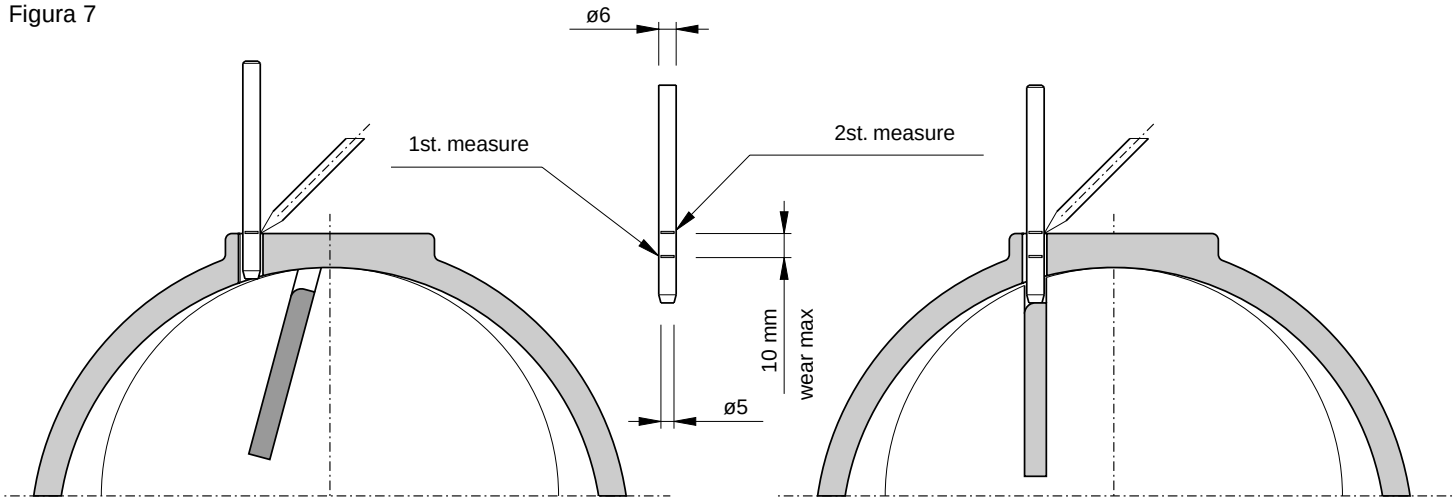


Figura 7



7.1.2. Checking of the vanes wear-off

To check the vanes, just remove the manifold above the proper port (fig. 5). Remove the plug and insert a metal rod ø 6 with a tapered end (see fig. 7). Rest first the rod against the rotor and mark the spot. Afterwards turn slowly the drive shaft until the rod connects with the vane (inserted in its slot) and mark also this spot. If the distance between the two spots is more than 10 mm the vanes have to be changed. At the end of this checking do not forget to replace the plug on the port.

ATTENTION: an excessive wear of the vanes most likely will result in the breackage of the vane itself because the guiding function of the rotor's slot will not be sufficient anymore with a reduced width of the vanes. Vanes breackage may cause serious damages on the inside parts of the pump!

7.1.3. Lubrication adjustment

A faulty or not sufficient lubrication can affect performances and durability of the vacuum pump

The oil pump performance is adjusted during final testing of the vacuum pump. In case that a different oil flow is needed or if the flow needs to be adjusted, before changing the oil flow itself, check the number of oil drops through the sight glass of the oiler, with the vacuum pump at normal work-temperature: **approximately 40 drops per minute (minimum 30) at maximum suggested speed.**

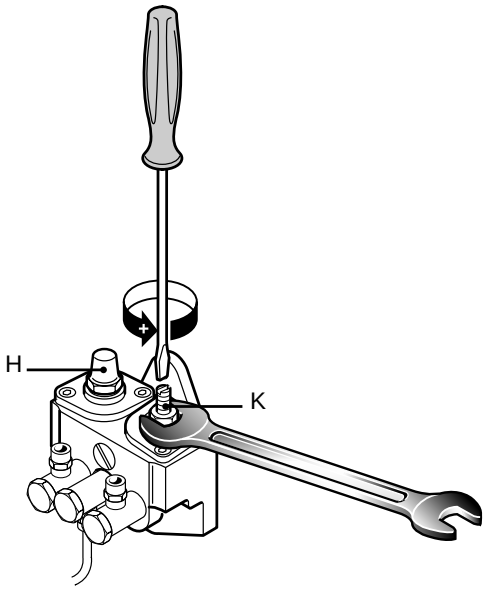
ATTENTION: 1/2 turn of the oil pump adjusting screw will vary the oil flow of approximately 40 g/h.

- Drain the oil tank
- Remove the tank's cover
- Unscrew the protection caps (H).
- To adjust the oil flow use a short screwdriver and a 10 mm wrench (K).
- For this operation, feed the lubrication pump with oil from an extra can, with known capacity or graduated glass, start the pump and check the oil flow reached after the adjustment.
- Reassemble the removed parts.

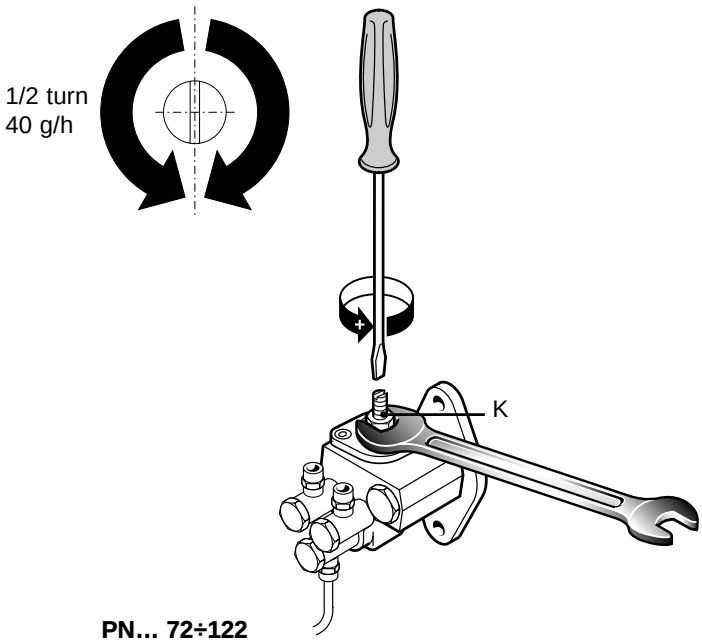
During normal operation of the vacuum pump, both with vacuum or pressure, never reduce the lubrication below the values mentioned in part. 2.3.

For vacuum pumps operating at low speed be aware that the oil flow will be reduced proportionally to the rotation speed.

Fig. 8



PNR 142



PN… 72÷122

7.2. Extraordinary maintenance - changing of the vanes

To be done when the vanes wear has reached the mentioned 10 mm

• It is suggested to remove the oil tank on the rear part because generally the pump's drive components are fitted on the front flange.
• Use always the specific kit of gaskets for the pump model at hand (see also spare parts list)
• Drain the oil tank through the proper port (pos.1).
• Remove the tank's cap (pos.2) and change the gasket (pos.3). Unscrew the lubrication pipe's fittings connecting the oil pump to the oilers (pos. 4).
• Remove the oil pump.
• Remove the screws fixing the oil tank (pos. 6) and carefully remove it, eventually using two screws partially winded inside the threads. Avoid that the rotor falls down inside the housing, supporting it if necessary with adequate tools.
• Change the O-Ring (pos. 7).
• Remove the pump's flange (pos. 8), the ring (pos. 9) and the bearing (pos. 10). This will make the reassembly of the oil tank (pos. 6) much easier.
• Lubricate the new vanes before inserting them in the rotor's slots.

ATTENTION: the new vanes have to be inserted with the rounded corner facing towards the housing (see also fig. 9a).

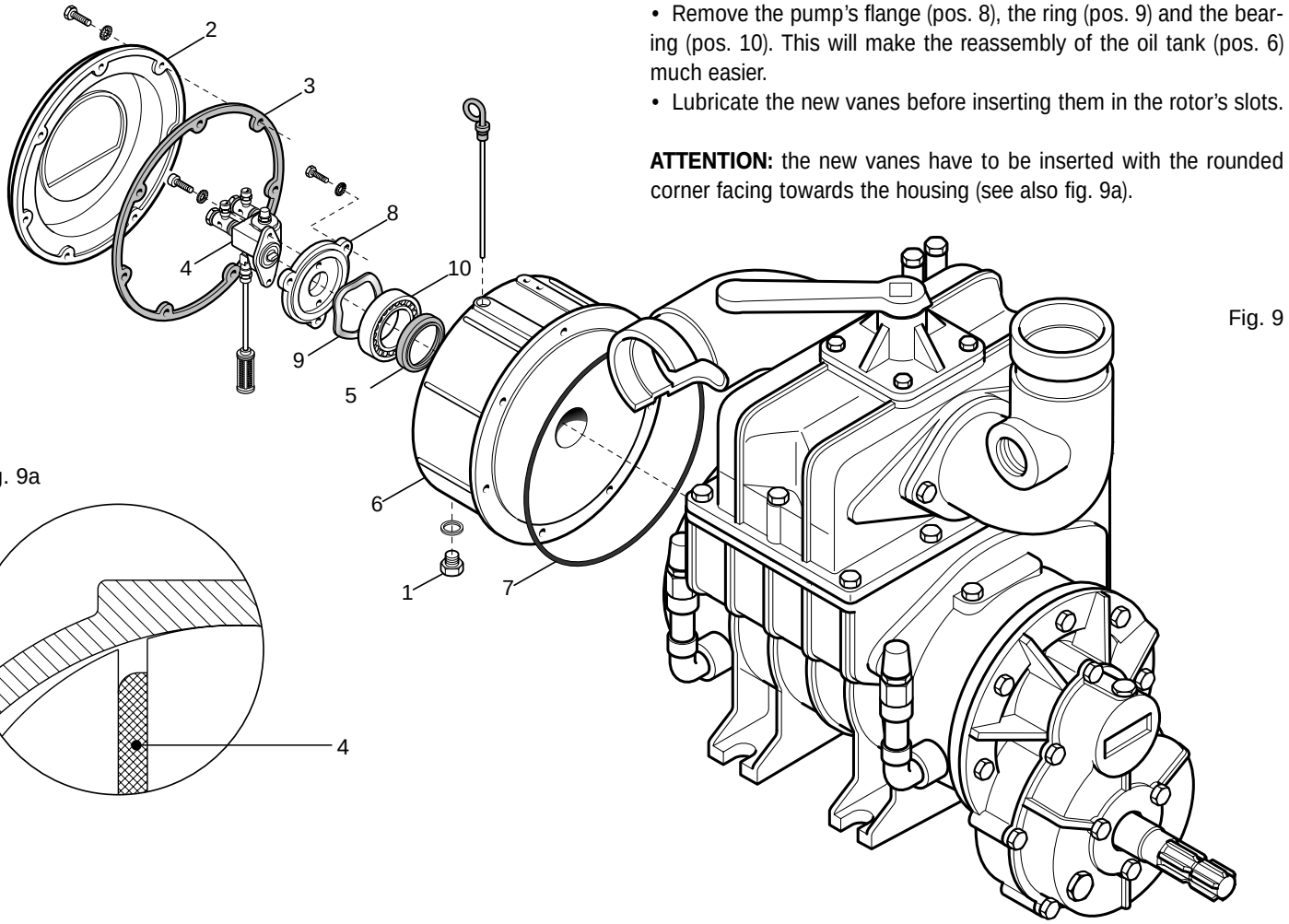


Fig. 9

Fig. 9a

• Reassemble everything again in the right sequence, absolutely avoiding to leave foreign parts inside the pump.
• Always change also all the gaskets and the O-rings after having them properly lubricated and also the seal (pos. 11), if necessary. Put some grease in the space between the bearing (pos. 10) and the flange(pos. 8).
• Reassemble the oil tank (pos. 6) and the O-ring (pos. 7) carefully inserting the drive shaft without damaging the seal. Insert correctly the lubrication pump in the driving slot and refit the flange. Reassemble the lubrication pipes and the tank's cap (pos. 2) and the gasket (pos. 3); replace the plug on the tank and refill it with lubrication oil.

ATTENTION:
• On direct drive models (D) normally it is not necessary to remove the front small flange. However, if this has to be done do not forget to grease the underneath bearing.
• The front bearing (on D models) has been greased during the pump's assemblying. Lubrication of said bearing is necessary after long working periods only (for example, normal duration of a set of vanes). It is consequently suggested to pump carefully new grease through the lubrication nipple in order to avoid damages to the seals.
• When changing the vanes do not forget to carefully clean all the components that you have dismantled (filters, tank, pump etc)

NOTE *Cleaning of the inside exhaust port of the pump housing and the 4-way manifolds.*
Frequency: *at every changing of the vanes.*
How to proceed: *Dismantle the manifold and remove possible oil-scales or other foreign parts. The clogging-up of this manifold and the exaust port depends mainly from heavy duty use of the pump and causes an increase of temperature and a non perfect closing of the check valve. A careful cleaning of all components, including the insides of the housing and the non-return check valve and it's seat, is therefore strongly recommended.*

8. Trouble-shooting : causes and remedies

TROUBLES

Overheating of the pump	
Cause	**Remedies**
• Faulty lubrication	• Check the oil pump
• Missing oil	• Fill up the oil tank
• Revolutions to high	• Reduce the Rpm
• Operating time too long at too high vacuum rate	• Decrease the vacuum rate
• Clogged filters on the air injection system	• Clean the filters
• Exhaust port, check valve partly clogged	• Remove crusts and scales
• Insufficient diameter of vacuum and discharge line	• Check the correct dimensions of the line (minimum suggested 3")

The pump is blocked	
Cause	**Remedies**
• Brocken vanes:	• Dismantle the pump and change the vanes
- due to foreign parts	• Check/clean the filters and elements on the vacuum line
- due to faulty lubrication	• Check the lubrication pump
• Frozen up pump	• Warm-up the pump
• Damaged drive system	• Change the damaged parts

Reduced performances of the vacuum pump (max. vacuum rate, max. pressure, air flow)	
Cause	**Remedies**
• 4-way valve handle in neutral position	• Move the handle against the resting pin
• Worn vanes	• Change the vanes
• Leaking check valve	• Clean the check valve
• Worn O-rings	• Change the seals
• Leaking gaskets and/or valves on the vacuum tank	• Change that damaged parts
• Clogged connecting pipeline	• Change the damaged hoses - pipes
• Floating ball or air filter obstructed	• Dismantle and clean
• Crusted up exhaust manifold	• Dismantle and clean
• Vacuum line components under-dimensioned	• Check the dimensioning for the pump model at hand
• Rubber connection obstructed or damaged	• Change the connections

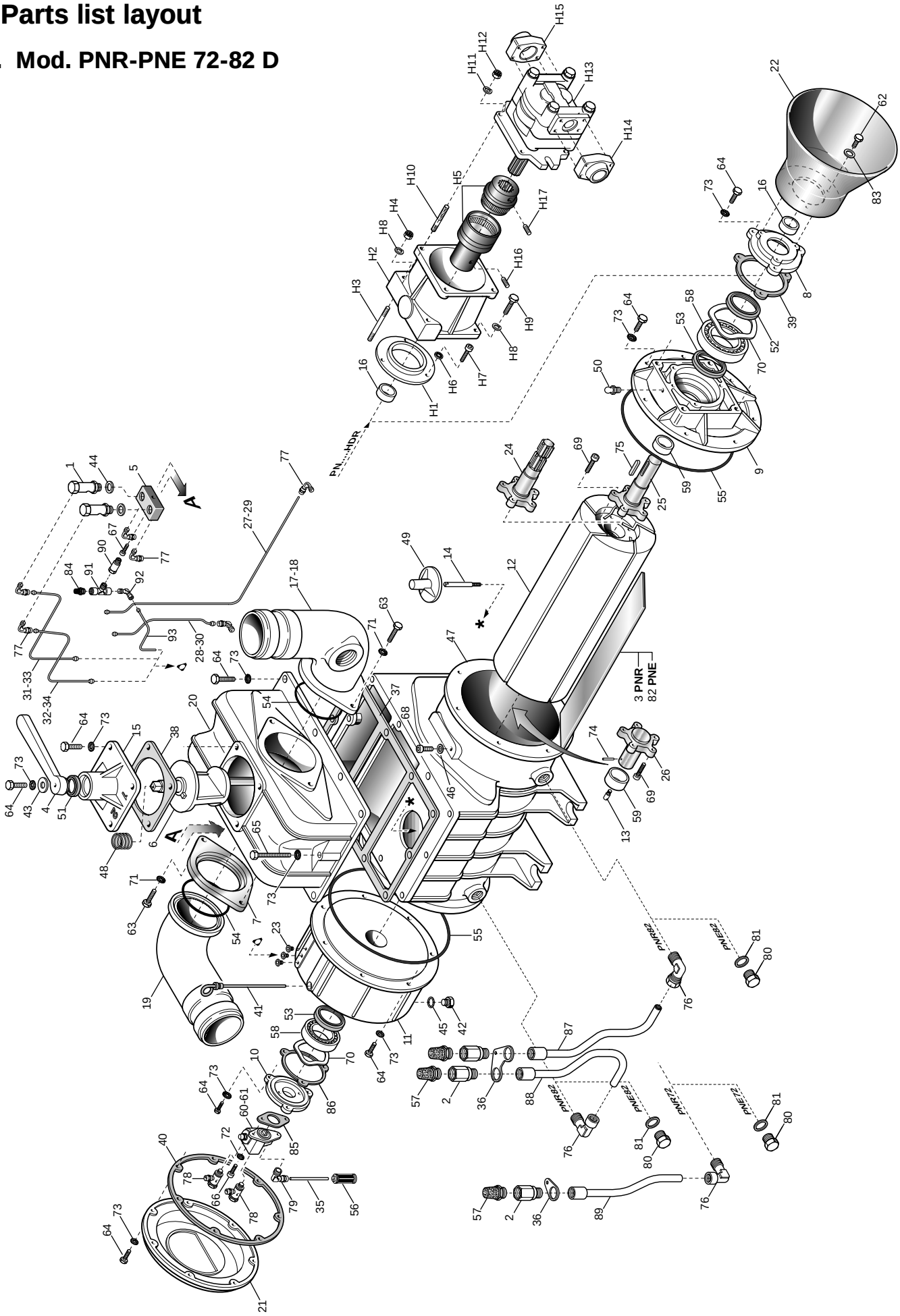
Abnormal oil consumption	
Cause	**Remedies**
• Insufficient lubrication	• Adjust the oil pump flow (see par. 7.1.3)
• Excessive oil consumption	• Loss of adjustment of the oil pump • Probable wear or breakage of the seal rings of the vacuum pump shaft. Replace them • Check the fittings built on the automatic oil pump and screw tight

WARRANTY

A total compliance with the instructions contained in this booklet, concerning running and maintenance of the pump, is mandatory to have granted the manufacturer's warranty conditions on faulty parts.
The Seller warrants the pump against defects in workmanship or material under normal and proper use and installation, excluded the lubricants, the parts subjected to wear and the parts damaged by improper use or inadequate maintenance.

9. Parts list layout

9.1. Mod. PNR-PNE 72-82 D



Parts list PNR-PNE 72-82 D

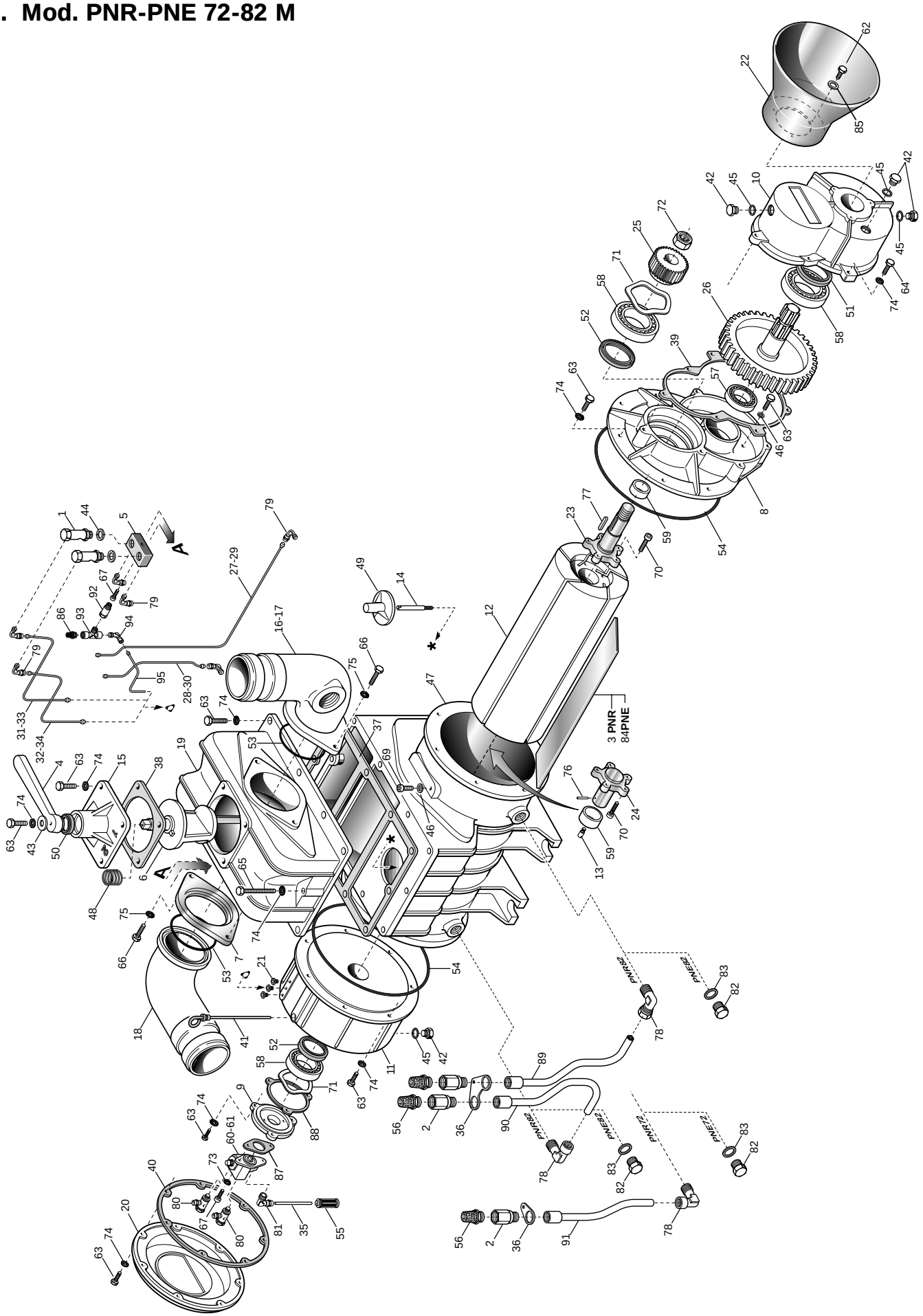
Pos.	Code	Description	Quantity
1	1401200700	Oil dripper automatic lubrication	2
2	1493300200	Air injection valve PNR 72	1
	1493300200	Air injection valve PNR 82	2
3	1601605700	Vane PNR 72	5
	1601605800	Vane PNR 82	5
4	1605500000	Handle R-PNR-PNE	1
5	1508100000	Distributor PR-PNR-PNE	1
6	1608501700	Conveyor PNR-PNE 72-82	1
7	1610100000	Turning conveyor flange	1
8	1610500400	Flange R-PNR-PNE 72-82 D	1
9	1610508400	Flange PNR-PNE 72-82 D	1
10	1610508500	Automatic lubrication pump flange R-PNR-PNE	1
11	1612503300	Oil tank PNR-PNE 72-82	1
12	1621503300	Rotor PNR-PNE 72	1
	1621503400	Rotor PNR-PNE 82	1
13	1622002600	Shaft M10	1
14	1622007800	Check valve shaft PNR-PNE 72-82-102-122	1
15	1623100000	Conveyor cap PNR-PNE 72-82	1
16	1626001300	Bushing PNR-PNE 72-82 D	1
17	1627100200	Conveyor Ø76 with safety valve connection	1
18	1627100300	Conveyor Ø80 with safety valve connection	1
19	1627100500	Turning conveyor Ø76	1
20	1627504300	Manifold PNR-PNE 72-82	1
21	1640101100	Oil tank cap PNR-PNE 72-82	1
22	1642600100	Drive shaft protection	1
23	1642600000	Pipeline protection	3
24	1650014100	Front splined shaft PNR-PNE 72-82 D	1
25	1650014200	Front smooth shaft PNR-PNE 72-82 D	1
26	1650014300	Rear shaft PNR-PNE 72-82	1
27	1663036400	Front lubricating line PNR-PNE 72 D lh/M rh	1
	1663037600	Front lubricating line PNR-PNE 82 D lh/M rh	1
28	1663036500	Rear lubricating line PNR-PNE 72 D lh/M rh	1
	1663037700	Rear lubricating line PNR-PNE 82 D lh/M rh	1
29	1663036800	Front lubricating line PNR-PNE 72 D rh/M lh	1
	1663038000	Front lubricating line PNR-PNE 82 D rh/M lh	1
30	1663036900	Rear lubricating line PNR-PNE 72 D rh/M lh	1
	1663038100	Rear lubricating line PNR-PNE 82 D rh/M lh	1
31	1663037000	External oil dripper line PNR-PNE 72 D lh/M rh	1
	1663038300	External oil dripper line PNR-PNE 82 D lh/M rh	1
32	1663037100	Internal oil dripper line PNR-PNE 72 D lh/M rh	1
	1663038200	Internal oil dripper line PNR-PNE 82 D lh/M rh	1
33	1663037200	External oil dripper line PNR-PNE 72 D rh/M lh	1
	1663038400	External oil dripper line PNR-PNE 82 D rh/M lh	1
34	1663037300	Internal oil dripper line PNR-PNE 72 D rh/M lh	1
	1663038500	Internal oil dripper line PNR-PNE 82 D rh/M lh	1
35	1663041200	Suction line for aut. lubric. pump PNR-PNE 72-82	1
36	1681007100	Air injection pipes bracket PNR 72	1
	1681007000	Air injection pipes bracket PNR 82	1
37	1680608800	Manifold gasket PNR-PNE 72-82	1
38	1680700200	Conveyor gasket PNR-PNE 72-82	1
39	1680700400	Flange gasket PNR-PNE 72-82 D	1
40	1680707500	Oil tank cap gasket PNR-PNE 72-82	1
41	1683600000	Oil stick	1
42	1684000000	Plug G3/8	1
43	1685002800	Washer 30x8,5x4	1
44	1685100000	Alu washer 14x20x1,5	2
45	1685100200	Alu washer 17x22x1,5	1
46	1685100800	Alu washer 8x14x1,5	1
47	1687505800	Housing PNR-PNE 72	1
	1687505700	Housing PNR-PNE 82	1
48	1691000000	Conveyor spring	1
49	1693500300	Check valve PNR-PNE 72-82	1
50	4022100010	Greasing nipple M10x1	1
51	4022200030	Seal 41x27x10	1
52	4022200040	Seal 72x40x10	1
53	4022200111	Seal 72x48x15	2
54	4022200307	OR 6287	2
55	4022200308	OR 4775	2
56	4022300001	Nylon filter Ø6	1
57	4022301004	Silencer-filter 3/4" PNR 72	1
	4022301004	Silencer-filter 3/4" PNR 82	2
58	4023100040	Bearing 6308	2
59	4023130020	Bushing 48x40x22	2
60	4024251000	Automatic lubricating pump (cw rotation)	1
61	4024251500	Automatic lubricating pump (ccw rotation)	1
62	4026101404	Screw M8x12 galvanized	3
63	4026103003	Screw M12x35 galvanized	4
64	4026107110	Screw M8x25	40
65	4026107117	Screw M8x60	2
66	4026120304	Screw M6x16	2
67	4026120300	Screw M6x14	1
68	4026120400	Screw M8x12	1
69	1672001600	PNR rotor screw M10	10
70	4026300020	Compensation ring Ø90	2
71	4026350609	Grower washer M12	4
72	4026350908	Washer M6	2
73	4026350909	Washer M8	42
74	4026414617	Pin 3x40 (*)	1
75	4026500909	Tab 10x8x50	1
76	4026701310	Fitting G1/2 PNR 72	1
	4026701310	Fitting G1/2 PNR 82	2
77	4026706000	Fitting 90° Ø4-1/8	6
78	4026706101	Fitting Ø4-1/8	2
79	4026706003	Fitting 90° Ø6-1/8	1
80	4026904001	Plug G1/2 PNR-PNE 72	1
	4026904001	Plug G1/2 PNR-PNE 82	2
81	4026359003	Alu washer 21,5x26x1,5 PNR-PNE 72	1
	4026359003	Alu washer 21,5x26x1,5 PNR-PNE 82	2
82	1601605300	Vane PNE 72	5
	1601605400	Vane PNE 82	5
83	4026356002	Flat washer M8 galvanized	3
84	4022301001	Oil block filter G 1/4	1
85	1680609700	Oil pump gasket	1
86	1680609800	Oil pump flange gasket	1
87	1563008100	Air injection pipe r. PNR 82	1
88	1563008200	Air injection pipe l. PNR 82	1
89	1563008300	Air injection pipe PNR 72	1
90	4026705702	Oil drain extention	1
91	4026702502	Oil drain T fitting	1
92	4026706004	Fitting 90° G1/4 ø6	1
93	1663042900	Oil drain line PNR 72 D rh	1
	1663043000	Oil drain line PNR 72 D lh	1
	1663043100	Oil drain line PNR 82 D rh	1
	1663043200	Oil drain line PNR 82 D lh	1

(*): on models with ccw (left hand) rotation

PNR-PNE 72-82 HDR

Pos.	Code	Description	Quantity
H1	1610005500	Centering flange PNR 72-82 HDR	1
H2	1612501000	Bracket PNR-PNE ... HDR	1
H3	4026171211	Stud screw M12x80	2
H4	4026305508	Nut M12	2
H5	1470102900	Coupling PNR 72-82 HDR	1
H6	4026350909	Washer M8	3
H7	4026107110	Screw M8x25	3
H8	4026350609	Grower washer M12	4
H9	4026107313	Screw M12x40	2
H10	4026171304	Stud screw M14x40	4
H11	4026350610	Grower washer M14	4
H12	4026300808	Nut M14	4
H13	4024107008	Motor PNR-PNE 72-82 HDR	1
H14	4026711002	Flange G1	1
H15	4026711003	Flange G1 1/4	1
H16	4026136004	Dowel pin M8x10	1
H17	4026136006	Dowel pin M8x14	1
	1892002500	Gaskets kit PNR-PNE 72-82 D	1

9.2. Mod. PNR-PNE 72-82 M



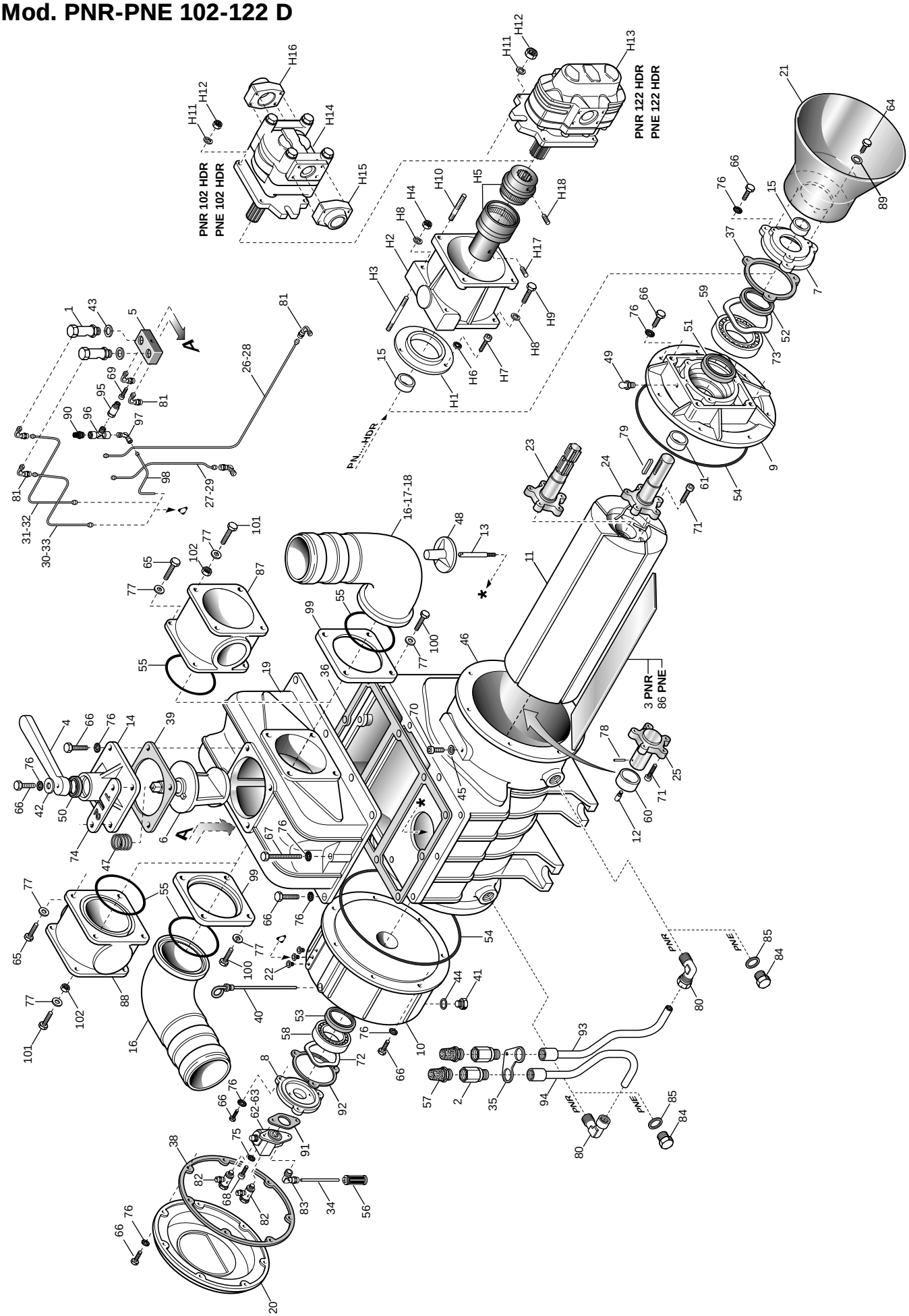
Parts list PNR-PNE 72-82 M

Pos.	Code	Description	Quantity
1	1401200700	Oil dripper automatic lubrication	2
2	1493300200	Air injection valve PNR 72	1
	1493300200	Air injection valve PNR 82	2
3	1601605700	Vane PNR 72	5
	1601605800	Vane PNR 82	5
4	1605500000	Handle R-PNR-PNE	1
5	1508100000	Distributor PR-PNR-PNE	1
6	1608501700	Conveyor PNR-PNE 72-82	1
7	1610100000	Turning conveyor flange	1
8	1610508300	Flange PNR-PNE 72-82 M	1
9	1610508500	Automatic lubrication pump flange R-PNR-PNE	1
10	1612503200	Gearbox PNR-PNE 72-82 M	1
11	1612503300	Oil tank PNR-PNE 72-82	1
12	1621503300	Rotor PNR-PNE 72	1
	1621503400	Rotor PNR-PNE 82	1
13	1622002600	Shaft M10	1
14	1622007800	Check valve shaft PNR-PNE 72-82-102-122	1
15	1623100000	Conveyor cap PN-PNR-PNE 72-82	1
16	1627100200	Conveyor Ø76 with safety valve connection	1
17	1627100300	Conveyor Ø80 with safety valve connection	1
18	1627100500	Turning conveyor Ø76	1
19	1627504300	Manifold PNR-PNE 72-82	1
20	1640101100	Oil tank cap PNR-PNE 72-82	1
21	1642600000	Pipeline protection	3
22	1642600100	Drive shaft protection	1
23	1650014000	Front shaft PNR-PNE 72-82 M	1
24	1650014300	Rear shaft PNR-PNE 72-82	1
25	1651005400	Pinion PNR-PNE 72-82 M	1
26	1651005600	Gear PNR-PNE 72-82 M	1
27	1663036400	Front lubricating line PNR-PNE 72 D lh/M rh	1
	1663037600	Front lubricating line PNR-PNE 82 D lh/M rh	1
28	1663036500	Rear lubrication line PNR-PNE 72 D lh/M rh	1
	1663037700	Rear lubricating line PNR-PNE 82 D lh/M rh	1
29	1663036800	Front lubricating line PNR-PNE 72 D rh/M lh	1
	1663038000	Front lubricating line PNR-PNE 82 D rh/M lh	1
30	1663036900	Rear lubricating line PNR-PNE 72 D rh/M lh	1
	1663038100	Rear lubricating line PNR-PNE 82 D rh/M lh	1
31	1663037000	External oil dripper line PNR-PNE 72 D lh/M rh	1
	1663038300	External oil dripper line PNR-PNE 82 D lh/M rh	1
32	1663037100	Internal oil dripper line PNR-PNE 72 D lh/M rh	1
	1663038200	Internal oil dripper line PNR-PNE 82 D lh/M rh	1
33	1663037200	External oil dripper line PNR-PNE 72 D rh/M lh	1
	1663038400	External oil dripper line PNR-PNE 82 D rh/M lh	1
34	1663037300	Internal oil dripper line PNR-PNE 72 D rh/M lh	1
	1663038500	Internal oil dripper line PNR-PNE 82 D rh/M lh	1
35	1663041200	Suction line for aut. lubric. pump PNR-PNE 72-82	1
36	1681007100	Air injection pipes bracket PNR 72	1
	1681007000	Air injection pipes bracket PNR 82	1
37	1680608800	Manifold gasket PNR-PNE 72-82	1
38	1680700200	Conveyor gasket PNR-PNE 72-82	1
39	1680707400	Gearbox gasket PNR-PNE 72-82 M	1
40	1680707500	Oil tank cap gasket PNR-PNE 72-82	1
41	1683600000	Oil stick	1
42	1684000000	Plug G3/8	4
43	1685002800	Washer 30x8,5x4	1
44	1685100000	Alu washer 14x20x1,5	2
45	1685100200	Alu washer 17x22x1,5	4
46	1685100800	Alu washer 8x14x1,5	3
47	1687505800	Housing PNR-PNE 72	1
	1687505700	Housing PNR-PNE 82	1
48	1691000000	Conveyor spring	1
49	1693500300	Check valve PNR-PNE 72-82	1
50	4022200030	Seal 41x27x10	1
51	4022200040	Seal 72x40x10	1
52	4022200111	Seal 72x48x15	2
53	4022200307	OR 6287	2
54	4022200308	OR 4775	2
55	4022300001	Nylon filter Ø6	1
56	4022301004	Silencer-filter 3/4" PNR 72	1
	4022301004	Silencer-filter 3/4" PNR 82	2
57	4023100018	Bearing 6206	1
58	4023100040	Bearing 6308	3
59	4023130020	Bushing 48x40x22	2
60	4024251000	Automatic lubricating pump (cw rotation)	1
61	4024251500	Automatic lubricating pump (ccw rotation)	1
62	4026101404	Screw M8x12 galvanized	3
63	4026107110	Screw M8x25	37
64	4026107111	Screw M8x30	7
65	4026107117	Screw M8x60	2
66	4026103003	Screw M12x35 galvanized	4
67	4026120304	Screw M6x16	2
68	4026120300	Screw M6x14	1
69	4026120400	Screw M8x12	1
70	1672001600	PNR rotor screw M10	10
71	4026300020	Compensation ring Ø90	2
72	4026305616	Nut M30x2	1
73	4026350908	Washer M6	2
74	4026350909	Washer M8	44
75	4026350609	Grower washer M12	4
76	4026414617	Pin 3x40 (*)	1
77	4026500905	Tab 10x8x32	1
78	4026701310	Fitting G1/2 PNR 72	1
	4026701310	Fitting G1/2 PNR 82	2
79	4026706000	Fitting 90° Ø4-1/8	6
80	4026706101	Fitting Ø4-1/8	2
81	4026706003	Fitting 90° Ø6-1/8	1
82	4026904001	Plug G1/2 PNR-PNE 72	1
	4026904001	Plug G1/2 PNR-PNE 82	2
83	4026359003	Alu washer 21,5x26x1,5 PNR-PNE 72	1
	4026359003	Alu washer 21,5x26x1,5 PNR-PNE 82	2
84	1601605300	Vane PNE 72	5
	1601605400	Vane PNE 82	5
85	4026356002	Flat washer M8 galvanized	3
86	4022301001	Oil block filter G 1/4	1
87	1680609700	Oil pump gasket	1
88	1680609800	Oil pump flange gasket	1
89	1563008100	Air injection pipe r. PNR 82	1
90	1563008200	Air injection pipe l. PNR 82	1
91	1563008300	Air injection pipe PNR 72	1
92	4026705702	Oil drain extention	1
93	4026702502	Oil drain T fitting	1
94	4026706004	Fitting 90° G1/4 ø6	1
95	1663042900	Oil drain line PNR 72 D rh	1
	1663043000	Oil drain line PNR 72 D lh	1
	1663043100	Oil drain line PNR 82 D rh	1
	1663043200	Oil drain line PNR 82 D lh	1

(*): on models with cw (right hand) rotation

	1892002600	Gaskets kit PNR-PNE 72-82 M	1

9.3. Mod. PNR-PNE 102-122 D



Parts list PNR-PNE 102-122 D

Pos.	Code	Description	Quantity
1	1401200700	Oil dripper automatic lubrication	2
2	1493300200	Air injection valve PNR	2
3	1601605900	Vane PNR 102	5
	1601606000	Vane PNR 122	5
4	1605500000	Handle R-PNR-PNE	1
5	1508100000	Distributor PR-PNR-PNE	1
6	1608501800	Conveyor PNR-PNE 102-122	1
7	1610508200	Flange R-PNR-PNE 102-122-142 D	1
8	1610508500	Automatic lubrication pump flange R-PNR-PNE	1
9	1610508600	Flange PNR-PNE 102-122 D	1
10	1612503400	Oil tank PNR-PNE 102-122	1
11	1621503500	Rotor PNR-PNE 102	1
	1621503600	Rotor PNR-PNE 122	1
12	1622002600	Shaft M10	1
13	1622007800	Check valve shaft PNR-PNE 72-82-102-122	1
14	1623100500	Conveyor cap PN-PNR-PNE 102-122	1
15	1626001100	Bushing PNR-PNE 102-122 D	1
16	1627102400	Conveyor ø 100	1-2
17	1627102700	Conveyor ø 80	1
18	1627102800	Conveyor ø 76	1
19	1627504400	Manifold PNR-PNE 102-122	1
20	1640101200	Oil tank cap PNR-PNE 102-122	1
21	1642600100	Drive shaft protection	1
22	1642600000	Pipeline protection	3
23	1650014600	Front splined shaft PNR-PNE 102-122 D	1
24	1650014700	Front smooth shaft PNR-PNE 102-122 D	1
25	1650014800	Rear shaft PNR-PNE 102-122	1
26	1663038800	Front lubricating line PNR-PNE 102 D lh/M rh	1
	1663040000	Front lubricating line PNR-PNE 122 D lh/M rh	1
27	1663038900	Rear lubricating line PNR-PNE 102 D lh/M rh	1
	1663040100	Rear lubricating line PNR-PNE 122 D lh/M rh	1
28	1663039200	Front lubricating line PNR-PNE 102 D rh/M lh	1
	1663040400	Front lubricating line PNR-PNE 122 D rh/M lh	1
29	1663039300	Rear lubricating line PNR-PNE 102 D rh/M lh	1
	1663040500	Rear lubricating line PNR-PNE 122 D rh/M lh	1
30	1663039400	Internal oil dripper line PNR-PNE 102 D lh/M rh	1
	1663040600	Internal oil dripper line PNR-PNE 122 D lh/M rh	1
31	1663039500	External oil dripper line PNR-PNE 102 D lh/M rh	1
	1663040700	External oil dripper line PNR-PNE 122 D lh/M rh	1
32	1663039600	External oil dripper line PNR-PNE 102 D rh/M lh	1
	1663040800	External oil dripper line PNR-PNE 122 D rh/M lh	1
33	1663039700	Internal oil dripper line PNR-PNE 102 D rh/M lh	1
	1663040900	Internal oil dripper line PNR-PNE 122 D rh/M lh	1
34	1663041100	Suction line for aut. lubric. pump PNR-PNE 102-122	1
35	1681006900	Air injection pipes bracket PNR 122	1
	1681007000	Air injection pipes bracket PNR 102	1
36	1680608900	Manifold gasket PNR-PNE 102-122	1
37	1680707300	Flange gasket PNR-PNE 102-122-142 D	1
38	1680707700	Oil tank gasket PNR-PNE 102-122	1
39	1680707800	Conveyor gasket PNR-PNE 102-122	1
40	1683600300	Oil stick	1
41	1684000000	Plug G3/8	1
42	1685002800	Washer 30x8,5x4	1
43	1685100000	Alu washer 14x20x1,5	2
44	1685100200	Alu washer 17x22x1,5	1
45	1685100800	Alu washer 8x14x1,5	1
46	1687505900	Housing PNR-PNE 102	1
	1687506000	Housing PNR-PNE 122	1
47	1691000000	Conveyor spring	1
48	1693500400	Check valve PNR-PNE 102-122	1
49	4022100010	Greasing nipple M10x1	1
50	4022200030	Seal 41x27x10	1
51	4022200113	Seal 70x55x15	1
52	4022200044	Seal 65x45x8	1
53	4022200111	Seal 72x48x15	1
54	4022200309	OR 4875	2
55	4022200310	OR 6362	2(3)
56	4022300001	Nylon filter Ø6	1
57	4022301004	Silencer-filter 3/4"	2
58	4023100040	Bearing 6308	1
59	4023100046	Bearing 6309	1
60	4023130020	Bushing 48x40x22	1
61	4023130035	Bushing 55x45x22	1
62	4024251000	Automatic lubricating pump (cw rotation)	1
63	4024251500	Automatic lubricating pump (ccw rotation)	1
64	4026101404	Screw M8x12 galvanized	3
65	4026102807	Screw M8x25 galvanized	(4)
66	4026107110	Screw M8x25	40
67	4026107117	Screw M8x60	2
68	4026120304	Screw M6x16	2
69	4026120300	Screw M6x14	1
70	4026120400	Screw M8x12	1
71	1672001600	PNR rotor screw M10	10
72	4026300020	Compensation ring Ø90	1
73	4026300025	Compensation ring Ø100	1
74	1681006800	Plate vac-press PNR-PNE 102-122	1
75	4026350908	Washer M6	2
76	4026350909	Washer M8	42
77	4026350606	Grower washer M8	8(12)
78	4026414617	Pin 3x40 (*)	1
79	4026501006	Tab 12x8x56	1
80	4026701310	Fitting G1/2	2
81	4026706000	Fitting 90° Ø4-1/8	6
82	4026706101	Fitting Ø4-1/8	2
83	4026706003	Fitting 90° Ø6-1/8	1
84	4026904001	Plug G1/2	2
85	4026359003	Alu washer 21,5x26x1,5	2
86	1601605500	Vane PNE 102	5
	1601605600	Vane PNE 122	5
87	1627102500	Conveyor with safety valve connection	(1)
88	1627102600	Conveyor	(1)
89	4026356002	Flat washer M8 galvanized	3
90	4022301001	Oil block filter G 1/4	1
91	1680609700	Oil pump gasket	1
92	1680609800	Oil pump flange gasket	1
93	1563007900	Air injection pipe r.	1
94	1563008000	Air injection pipe l.	1
95	4026705702	Oil drain extention	1
96	4026702502	Oil drain T fitting	1
97	4026706004	Fitting 90° G1/4 ø6	1
98	1663043300	Oil drain line PNR 102 D rh	1
	1663043400	Oil drain line PNR 102 D lh	1
	1663043500	Oil drain line PNR 122 D rh	1
	1663043600	Oil drain line PNR 122 D lh	1
99	1610101100	Conveyor flange	2
100	4026102801	Screw TE 8.8 M8x35	8
101	4026102810	Screw TE 8.8 M8x40	(4)
102	4026308005	Nut M8	(4)

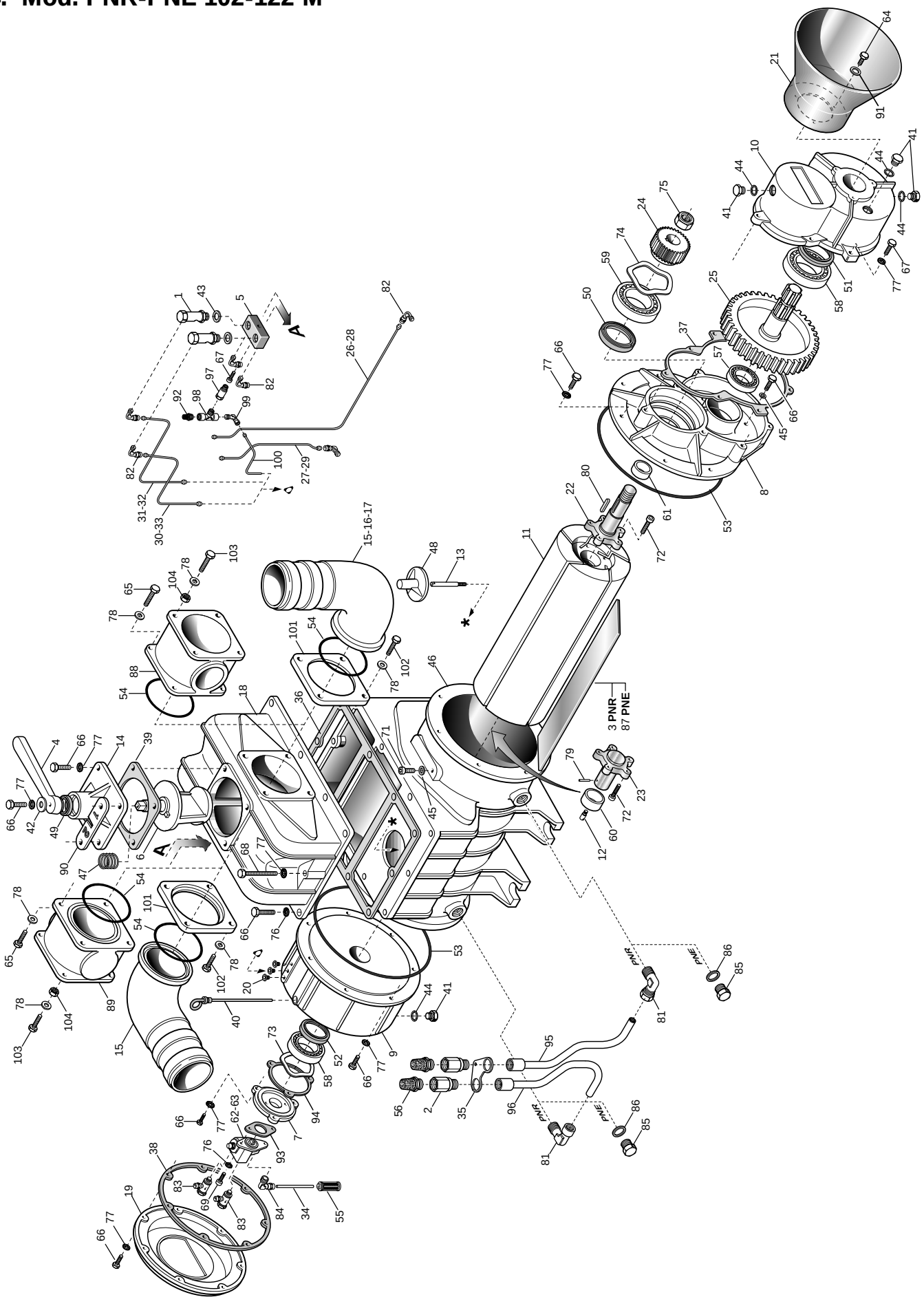
(*): on models with ccw (left hand) rotation

Note: between brackets quantity referred to the conveyor with safety valve connection built.

PNR-PNE 102-122 HDR

Pos.	Code	Description	Quantity
H1	1610021600	Centering flange PNR-PNE 102-122-142 HDR	1
H2	1612501000	Bracket PNR-PNE ... HDR	1
H3	4026171211	Stud screw M12x80	2
H4	4026305508	Nut M12	2
H5	1470102300	Coupling PNR 102-122-142 HDR	1
H6	4026350909	Washer M8	3
H7	4026120403	Screw M8x20	3
H8	4026350609	Grower washer M12	4
H9	4026107313	Screw M12x40	2
H10	4026171304	Stud screw M14x40	4
H11	4026350610	Grower washer M14	4
H12	4026300808	Nut M14	4
H13	4024107001	Motor PNR-PNE 122 HDR	1
H14	4024107009	Motor PNR-PNE 102 HDR	1
H15	4026711003	Flange G1 1/4	1
H16	4026711004	Flange G1 1/2	1
H17	4026136003	Dowel pin M8x8	1
H18	4026136006	Dowel pin M8x14	1
	1892002700	Gaskets kit PNR-PNE 102-122 D	1

9.4. Mod. PNR-PNE 102-122 M



Parts list PNR-PNE 102-122 M

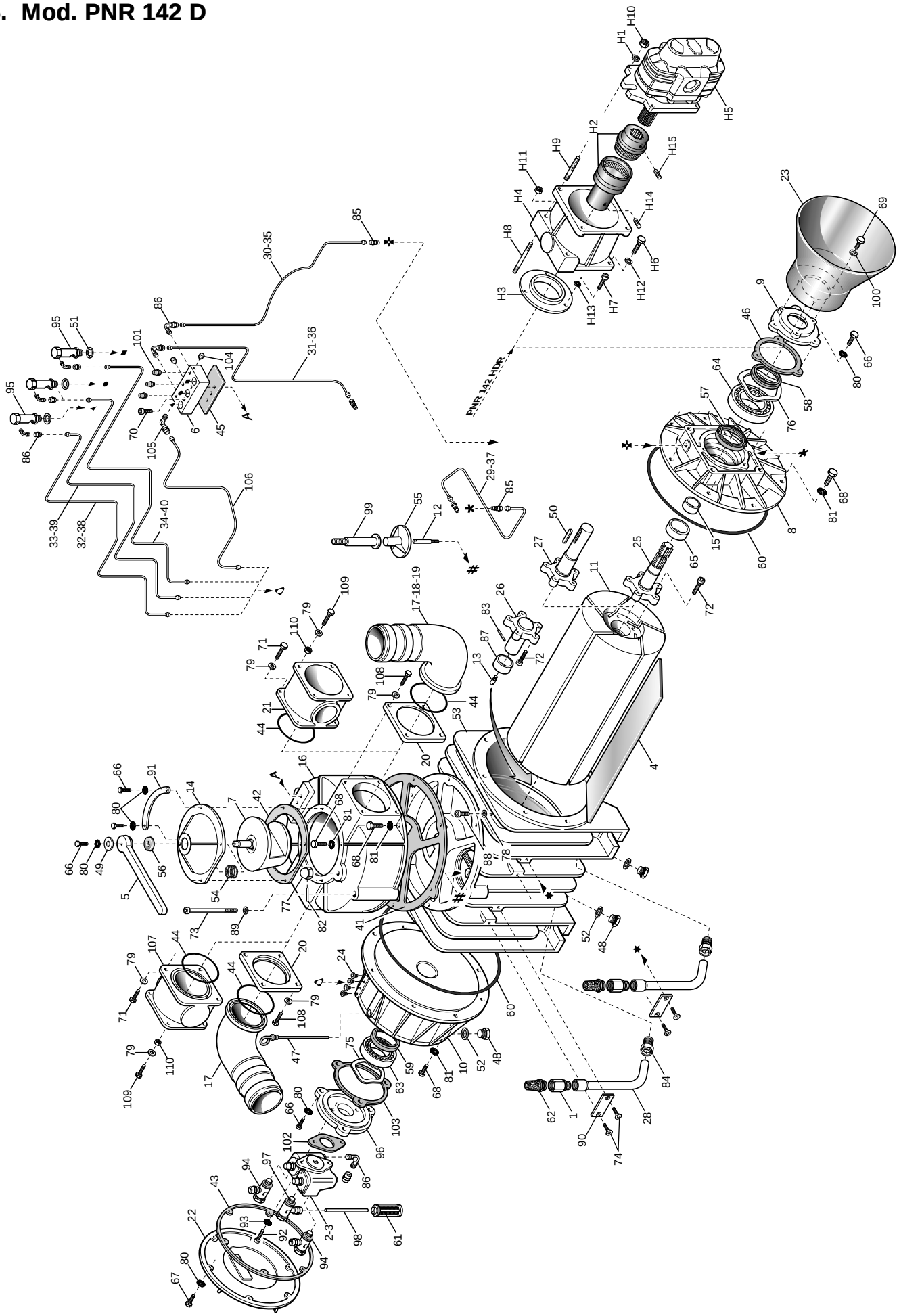
Pos.	Code	Description	Quantity
1	1401200700	Oil dripper automatic lubrication	2
2	1493300200	Air injection valve PNR	2
3	1601605900	Vane PNR 102	5
	1601606000	Vane PNR 122	5
4	1605500000	Handle R-PNR-PNE	1
5	1508100000	Distributor PR-PNR-PNE	1
6	1608501800	Conveyor PNR-PNE 102-122	1
7	1610508500	Automatic lubrication pump flange R-PNR-PNE	1
8	1610508700	Flange PNR-PNE 102-122 M	1
9	1612503400	Oil tank PNR-PNE 102-122	1
10	1612503500	Gearbox PNR-PNE 102-122 M	1
11	1621503500	Rotor PNR-PNE 102	1
	1621503600	Rotor PNR-PNE 122	1
12	1622002600	Shaft M10	1
13	1622007800	Check valve shaft PNR-PNE 72-82-102-122	1
14	1623100500	Conveyor cap PN-PNR-PNE 102-122	1
15	1627102400	Conveyor Ø 100	1-2
16	1627102700	Conveyor Ø 80	1
17	1627102800	Conveyor Ø 76	1
18	1627504400	Manifold PNR-PNE 102-122	1
19	1640101200	Oil tank cap PNR-PNE 102-122	1
20	1642600000	Pipeline protection	3
21	1642600100	Drive shaft protection	1
22	1650014500	Front shaft PNR-PNE 102-122 M	1
23	1650014800	Rear shaft PNR-PNE 102-122	1
24	1651005500	Pinion PNR-PNE 102-122 M	1
25	1651005700	Gear PNR-PNE 102-122 M	1
26	1663038800	Front lubricating line PNR-PNE 102 D lh/M rh	1
	1663040000	Front lubricating line PNR-PNE 122 D lh/M rh	1
27	1663038900	Rear lubricating line PNR-PNE 102 D lh/M rh	1
	1663040100	Rear lubricating line PNR-PNE 122 D lh/M rh	1
28	1663039200	Front lubricating line PNR-PNE 102 D rh/M lh	1
	1663040400	Front lubricating line PNR-PNE 122 D rh/M lh	1
29	1663039300	Rear lubricating line PNR-PNE 102 D rh/M lh	1
	1663040500	Rear lubricating line PNR-PNE 122 D rh/M lh	1
30	1663039400	Internal oil dripper line PNR-PNE 102 D lh/M rh	1
	1663040600	Internal oil dripper line PNR-PNE 122 D lh/M rh	1
31	1663039500	External oil dripper line PNR-PNE 102 D lh/M rh	1
	1663040700	External oil dripper line PNR-PNE 122 D lh/M rh	1
32	1663039600	External oil dripper line PNR-PNE 102 D rh/M lh	1
	1663040800	External oil dripper line PNR-PNE 122 D rh/M lh	1
33	1663039700	Internal oil dripper line PNR-PNE 102 D rh/M lh	1
	1663040900	Internal oil dripper line PNR-PNE 122 D rh/M lh	1
34	1663041100	Suction line for aut. lubric. pump PNR-PNE 102-122	1
35	1681006900	Air injection pipes bracket PNR 122	1
	1681007000	Air injection pipes bracket PNR 102	1
36	1680608900	Manifold gasket PNR-PNE 102-122	1
37	1680707600	Gearbox gasket PNR-PNE 102-122 M	1
38	1680707700	Oil tank gasket PNR-PNE 102-122	1
39	1680707800	Conveyor gasket PNR-PNE 102-122	1
40	1683600300	Oil stick	1
41	1684000000	Plug G3/8	4
42	1685002800	Washer 30x8,5x4	1
43	1685100000	Alu washer 14x20x1,5	2
44	1685100200	Alu washer 17x22x1,5	4
45	1685100800	Alu washer 8x14x1,5	3
46	1687505900	Housing PNR-PNE 102	1
	1687506000	Housing PNR-PNE 122	1
47	1691000000	Conveyor spring	1
48	1693500400	Check valve PNR-PNE 102-122	1
49	4022200030	Seal 41x27x10	1
50	4022200113	Seal 70x55x15	1
51	4022200040	Seal 72x40x10	1
52	4022200111	Seal 72x48x15	1
53	4022200309	OR 4875	2
54	4022200310	OR 6362	2(3)
55	4022300001	Nylon filter Ø6	1
56	4022301004	Silencer-filter 3/4"	2
57	4023100018	Bearing 6206	1
58	4023100040	Bearing 6308	2
59	4023100046	Bearing 6309	1
60	4023130020	Bushing 48x40x22	1
61	4023130035	Bushing 55x45x22	1
62	4024251000	Automatic lubricating pump (cw rotation)	1
63	4024251500	Automatic lubricating pump (ccw rotation)	1
64	4026101404	Screw M8x12 galvanized	3
65	4026102807	Screw M8x25 galvanized	(4)
66	4026107110	Screw M8x25	37
67	4026107111	Screw M8x30	7
68	4026107117	Screw M8x60	2
69	4026120304	Screw M6x16	2
70	4026120300	Screw M6x14	1
71	4026120400	Screw M8x12	1
72	1672001600	PNR rotor screw M10	10
73	4026300020	Compensation ring Ø90	1
74	4026300025	Compensation ring Ø100	1
75	4026306115	Nut M36x3	1
76	4026350908	Washer M6	2
77	4026350909	Washer M8	44
78	4026350606	Grower washer M8	8(12)
79	4026414617	Pin 3x40 (*)	1
80	4026501003	Tab 12x8x40	1
81	4026701310	Fitting G1/2	2
82	4026706000	Fitting 90° Ø4-1/8	6
83	4026706101	Fitting Ø4-1/8	2
84	4026706003	Fitting 90° Ø6-1/8	1
85	4026904001	Plug G 1/2	2
86	4026359003	Alu washer 21,5x26x1,5	2
87	1601605500	Vane PNE 102	5
	1601605600	Vane PNE 122	5
88	1627102500	Conveyor with safety valve connection	(1)
89	1627102600	Conveyor	(1)
90	1681006800	Plate vac-press PNR-PNE 102-122	1
91	4026356002	Flat washer M8 galvanized	3
92	4022301001	Oil block filter G 1/4	1
93	1680609700	Oil pump gasket	1
94	1680609800	Oil pump flange gasket	1
95	1563007900	Air injection pipe r.	1
96	1563008000	Air injection pipe l.	1
97	4026705702	Oil drain extention	1
98	4026702502	Oil drain T fitting	1
99	4026706004	Fitting 90° G1/4 ø6	1
100	1663043300	Oil drain line PNR 102 D rh	1
	1663043400	Oil drain line PNR 102 D lh	1
	1663043500	Oil drain line PNR 122 D rh	1
	1663043600	Oil drain line PNR 122 D lh	1
101	1610101100	Conveyor flange	2
102	4026102801	Screw TE 8.8 M8x35	8
103	4026102810	Screw TE 8.8 M8x40	(4)
104	4026308005	Nut M8	(4)

(*): on models with cw (right hand) rotation

	1892002800	Gaskets kit PNR-PNE 102-122 M	1

Note: between brackets quantity referred to the conveyor with safety valve connection built.

9.5. Mod. PNR 142 D



Parts list PNR 142 D

Pos.	Code	Description	Quantity
1	1493300200	Air injection valve PNR 142	2
2	4024250000	Automatic lubricating pump (cw rotation)	1
3	4024250500	Automatic lubricating pump (ccw rotation)	1
4	1601605200	Vane PNR 142	5
5	1605500100	Handle PNR 142	1
6	1608100200	Distributor PNR 142	1
7	1608500700	Conveyor PNR 142	1
8	1610508100	Flange PNR 142 D	1
9	1610508200	Flange R-PNR-PNE 102-122-142 D	1
10	1612500900	Oil tank PNR 142	1
11	1621503200	Rotor PNR 142	1
12	1622002500	Check valve shaft PNR 142	1
13	1622002600	Shaft M10	1
14	1623500300	Conveyor cap PNR 142	1
15	1626001100	Bushing PNR 142 D	1
16	1627501100	Manifold PNR 142	1
17	1627102400	Conveyor Ø 100	1-2
18	1627102700	Conveyor Ø 80	1
19	1627102800	Conveyor Ø 76	1
20	1610101100	Conveyor Flange	2
21	1627102500	Conveyor with safety valve connection	(1)
22	1640101000	Oil tank cap PNR 142	1
23	1642600100	Drive shaft protection	1
24	1642600000	Pipeline protection	4
25	1650012900	Front splined shaft PNR 142 D	1
26	1650013000	Rear shaft PNR 142	1
27	1650013100	Front smooth shaft PNR 142 D	1
28	1663014000	Air injection valve pipe 1/2" PNR 142	2
29	1663009500	Front lubricating line (housing) PNR 142 D rh/M lh	1
30	1663016510	Front lubricating line (flange) PNR 142 D rh	1
31	1663016310	Rear lubricating line PNR 142 D rh/M lh	1
32	1663034500	Rear oil dripper lubricating line PNR 142 D rh/M lh	1
33	1663034600	Centering oil dripper lubric. line PNR 142 D rh/M lh	1
34	1663034700	Front oil dripper lubricating line PNR 142 D rh/M lh	1
35	1663026010	Front lubricating line (flange) PNR 142 D lh	1
36	1663016610	Rear lubricating line PNR 142 D lh/M rh	1
37	1663025700	Front lubricating line (housing) PNR 142 D lh/M rh	1
38	1663034200	Rear oil dripper lubricating line PNR 142 D lh/M rh	1
39	1663034300	Centering oil dripper lubric. line PNR 142 D lh/M rh	1
40	1663034400	Front oil dripper lubricating line PNR 142 D lh/M rh	1
41	1680608300	Manifold gasket PNR 142	1
42	1680702500	Conveyor gasket PNR 142	1
43	1680702700	Oil tank gasket PNR 142	1
44	4022200310	OR 6362	2
45	1680703700	Distributor gasket PNR 142	1
46	1680707300	Flange gasket PNR 142 D	1
47	1683600300	Oil stick	1
48	1684000000	Plug G3/8	3
49	1685002800	Washer 30x8,5x4	1
50	4026501006	Tab 12x8x56	1
51	1685100000	Alu washer 14x20x1,5	3
52	1685100200	Alu washer 17x22x1,5	3
53	1687501900	Housing PNR 142 D	1
54	1691000200	Conveyor spring	1
55	1693500000	Check valve PNR 142	1
56	4022200030	Seal 41x27x10	1
57	4022200113	Seal 70x55x15	1
58	4022200044	Seal 65x45x8	1
59	4022200111	Seal 72x48x15	1
60	4022200311	OR 4975	2
61	4022300001	Nylon filter Ø6	1
62	4022301004	Silencer-filter 3/4"	2
63	4023100040	Bearing 6308	1
64	4023100046	Bearing 6309	1
65	4023130035	Bushing 55x45x22	1
66	4026100408	Screw M8x20	11
67	4026100410	Screw M8x25	6
68	4026100510	Screw M10x25	21
69	4026101409	Screw M8x12 galvanized	3
70	4026120303	Screw M6x20	2
71	4026102807	Screw M 8x25	(4)
72	1672001600	PNR rotor screw M10	10
73	4026120519	Screw M10x110	2
74	4026155605	Screw M6x16	4
75	4026300020	Compensation ring Ø90	1
76	4026300025	Compensation ring Ø100	1
77	4026322006	Nut M16	1
78	1685100800	Alu washer 8x14x1,5	1
79	4026350606	Grower washer M8	8(12)
80	4026350909	Washer M8	17
81	4026350910	Washer M10	21
82	4026414611	Pin 3x24	1
83	4026414617	Pin 3x40 (*)	1
84	4026701301	Fitting G1/2	2
85	4026702000	Fitting Ø4-1/8	4
86	4026706000	Fitting 90° Ø4-1/8	6
87	4023130020	Bushing 48x40x22	1
88	4026120400	Screw M8x12	1
89	4026350608	Grower washer M10	2
90	1681006600	Bracket	2
91	1681005300	Plate vac-press PNR 142	1
92	4026120304	Screw M6x16	2
93	4026350908	Washer M6	2
94	4026706101	Fitting Ø4-1/8	2
95	1401200700	Oil dripper automatic lubrication	3
96	1610508500	Automatic lubrication pump flange R-PNR-PNE	1
97	4026706104	Fitting Ø6-1/8	1
98	1663041100	Suction line for aut. lubricating pump PNR 102-122-142	1
99	1672001200	Check valve stop	1
100	4026356002	Flat washer M8 galvanized	3
101	4022301000	Oil block filter G 1/8	3
102	1680609700	Oil pump gasket	1
103	1680609800	Oil pump flange gasket	1
104	4026910601	Plug G1/8	2
105	4026706003	Fitting 90° G1/8 ø6	1
106	1663043700	Oil drain line PNR 142 D dx	1
	1663043800	Oil drain line PNR 142 D sx	1
107	1627102600	Conveyor	(1)
108	4026102801	Screw M8x35	8
109	4026102810	Screw M8x40	(4)
110	4026308005	Nut M8	(4)

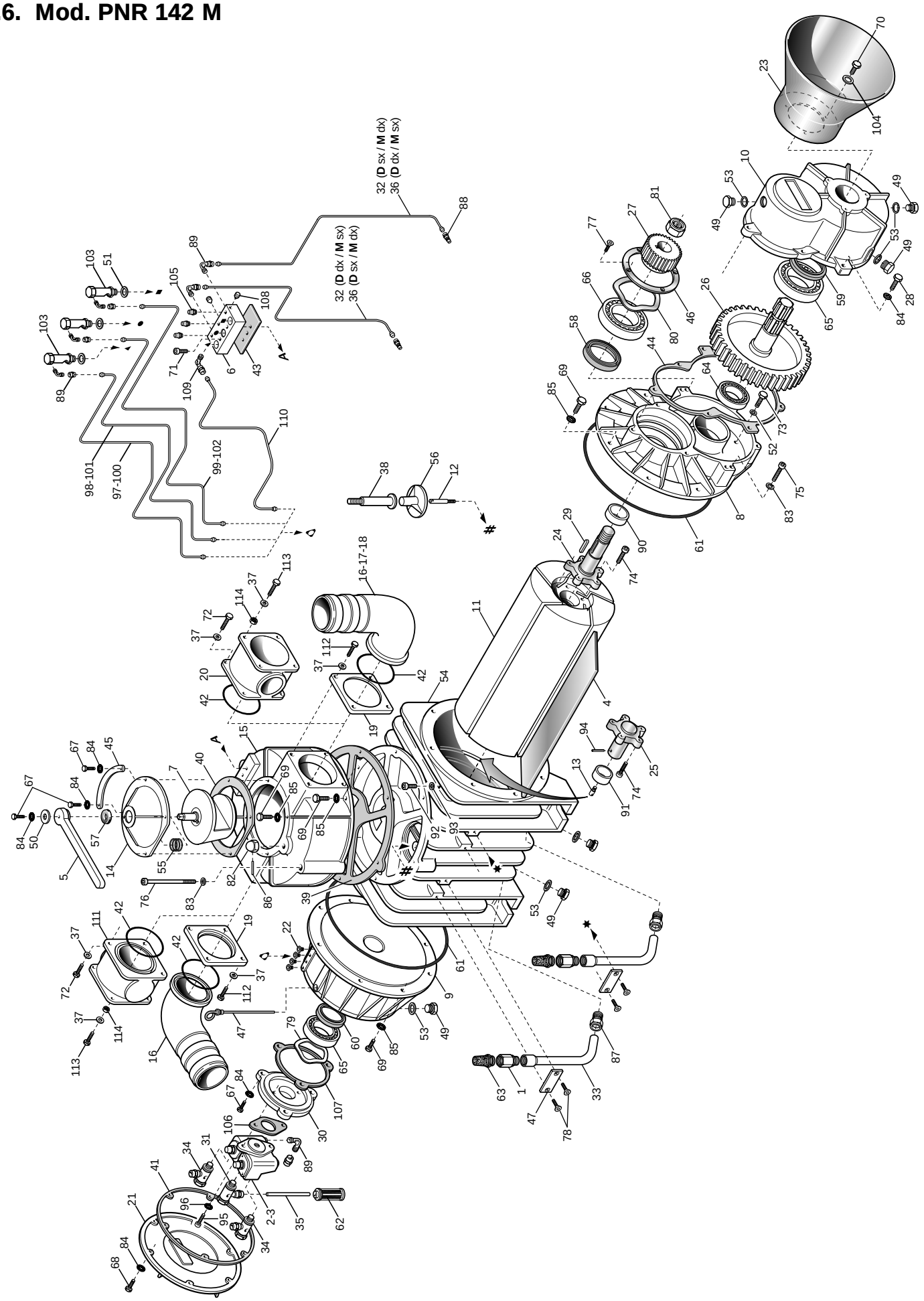
(*): on models with ccw (left hand) rotation

PNR 142 HDR

Pos.	Code	Description	Quantity
H1	4026350610	Grower washer M14	4
H2	1470102300	Coupling PNR 102-122-142 HDR	1
H3	1610021600	Centering flange PNR-PNE 102-122-142 HDR	1
H4	1612501000	Bracket PNR-PNE ... HDR	1
H5	4024107004	Motor PNR 142 HDR	1
H6	4026107313	Screw M12x40	2
H7	4026120403	Screw M8x20	3
H8	4026171211	Stud screw M12x80	2
H9	4026171304	Stud screw M14x40	4
H10	4026308008	Nut M14 galvanized	4
H11	4026305508	Nut M12	2
H12	4026350609	Washer grower M12	2
H13	4026350909	Washer M8	3
H14	4026136003	Dowel pin M8x8	1
H15	4026136006	Dowel pin M8x14	1
	1892002300	Gaskets kit PNR 142 D	1

Note: between brackets quantity referred to the conveyor with safety valve connection built.

9.6. Mod. PNR 142 M



Parts list PNR 142 M

Pos.	Code	Description	Quantity
1	1493300200	Air injection valve PNR 142	2
2	4024250500	Automatic lubricating pump (cw rotation)	1
3	4024250000	Automatic lubricating pump (ccw rotation)	1
4	1601605200	Vane PNR 142	5
5	1605500100	Handle PNR 142	1
6	1608100200	Distributor PNR 142	1
7	1608500700	Conveyor PNR 142	1
8	1610507900	Flange PNR 142 M	1
9	1612500900	Oil tank PNR 142	1
10	1612503000	Gearbox PNR 142 M	1
11	1621503200	Rotor PNR 142	1
12	1622002500	Check valve shaft PNR 142	1
13	1622002600	Shaft M10	1
14	1623500300	Conveyor cap PNR 142	1
15	1627501100	Manifold PNR 142	1
16	1627102400	Conveyor Ø 100	1-2
17	1627102700	Conveyor Ø 80	1
18	1627102800	Conveyor Ø 76	1
19	1610101100	Conveyor flange	2
20	1627102500	Conveyor with safety valve connection	(1)
21	1640101000	Oil tank cap PNR 142	1
22	1642600000	Pipeline protection	4
23	1642600100	Drive shaft protection	1
24	1650012800	Front shaft PNR 142 M	1
25	1650013000	Rear shaft PNR 142	1
26	1651005200	Gear PNR 142 M	1
27	1651005300	Pinion PNR 142 M	1
28	4026100411	Screw M8x30	7
29	4026501004	Tab 12x8x45	1
30	1610508500	Automatic lubrication pump flange R-PNR-PNE	1
31	4026706104	Fitting Ø6-1/8	1
32	1663016310	Rear lubricating line PNR 142 D rh/M lh	1
33	1663014000	Air injection valve pipe 1/2" PNR 142	2
34	4026706101	Fitting Ø4-1/8	1
35	1663041100	Suction line for aut. lubricating pump PNR 102-122-142	1
36	1663016610	Rear lubricating line PNR 142 D lh/M rh	1
37	4026350606	Washer grower M8	8(12)
38	1672001200	Check valve stop	1
39	1680608300	Manifold gasket PNR 142	1
40	1680702500	Conveyor gasket PNR 142	1
41	1680702700	Oil tank cap gasket PNR 142	1
42	4022200310	OR 6362	2(3)
43	1680703700	Distributor gasket PNR 142	1
44	1680707200	Gearbox gasket PNR 142 M	1
45	1681005300	Plate vac-press PNR 142	1
46	1681006500	Compensation ring bracket	1
47	1681006600	Bracket	2
48	1683600300	Oil stick	1
49	1684000000	Plug G3/8	6
50	1685002800	Washer 30x8,5x4	1
51	1685100000	Alu washer 14x20x1,5	3
52	1685100100	Alu washer 10x16x1,5	1
53	1685100200	Alu washer 17x22x1,5	6
54	1687501900	Housing PNR 142	1
55	1691000200	Conveyor spring	1
56	1693500000	Check valve PNR 142	1
57	4022200030	Seal 41x27x10	1
58	4022200113	Seal 70x55x15	1
59	4022200040	Seal 72x40x10	1
60	4022200111	Seal 72x48x15	1
61	4022200311	OR 4975	2
62	4022300001	Nylon filter Ø6	1
63	4022301004	Silencer-filter 3/4"	2
64	4023100018	Bearing 6206	1
65	4023100040	Bearing 6308	2
66	4023100046	Bearing 6309	1
67	4026100408	Screw M8x20	8
68	4026100410	Screw M8x25	6
69	4026100510	Screw M10x25	18
70	4026101404	Screw M8x12	3
71	4026120303	Screw M6x20	2
72	4026102807	Screw M8x25	(4)
73	4026120505	Screw M10x25	1
74	1672001600	PNR rotor screw M10	10
75	4026120510	Screw M10x50	2
76	4026120519	Screw M10x110	2
77	4026155505	Screw M5x16	4
78	4026155605	Screw M6x16	4
79	4026300020	Compensation ring Ø90	1
80	4026300025	Compensation ring Ø100	1
81	4026306115	Nut M36x3	1
82	4026322006	Nut M16	1
83	4026350608	Grower washer M10	4
84	4026350909	Washer M8	21
85	4026350910	Washer M10	18
86	4026414611	Pin 3x24	1
87	4026701301	Fitting G1/2x18	2
88	4026702000	Fitting Ø4-1/8	4
89	4026706000	Fitting 90° Ø4-1/8	6
90	4023130035	Bushing 55x45x22	1
91	4023130020	Bushing 48x40x22	1
92	4026120400	Screw M8x12	1
93	1685100800	Alu washer 14x8x1,5	1
94	4026414617	Pin 3x40 (*)	1
95	4026120304	Screw M6x16	2
96	4026350908	Washer M6	2
97	1663034200	Rear oil dripper lubricating line PNR 142 D lh/M rh	1
98	1663034300	Centering oil dripper lubric. line PNR 142 D lh/M rh	1
99	1663034400	Front oil dripper lubric. line PNR 142 D lh/M rh	1
100	1663034500	Rear oil dripper lubric. line PNR 142 D rh/M lh	1
101	1663034600	Centering oil dripper lubric. line PNR 142 D rh/M lh	1
102	1663034700	Front oil dripper lubric. line PNR 142 D rh/M lh	1
103	1401200700	Oil dripper automatic lubrication	3
104	4026356002	Flat washer M8 galvanized	3
105	4022301000	Oil block filter G 1/8	3
106	1680609700	Oil pump gasket	1
107	1680609800	Oil pump flange gasket	1
108	4026910601	Plug G1/8	2
109	4026706003	Fitting 90° G1/8 ø6	1
110	1663043700	Oil drain line PNR 142 D dx	1
	1663043800	Oil drain line PNR 142 D sx	1
111	1627102600	Conveyor	(1)
112	4026102801	Screw M8x35	8
113	4026102810	Screw M8x40	(4)
114	4026308005	Nut M8	(4)

(*): on models with cw (right hand) rotation

1892002400	Gaskets kit PNR 142 D	1

Note: between brackets quantity referred to the conveyor with safety valve connection built.

Jurop spa

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Rev. 01 - 15/04/'01