USER INFORMATION

KEEP FOR FUTURE USE

6000305E

Rev. B

B.6.20.44



Reciprocating pumps MERKUR 2000

GRACO N.V.

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015.050-DP 020.035-DP 025.008-DP 030.020-DP 030.050-DP 040.035-DP 060.020-DP

REGULAR TESTING OF THE APPLIANCES

| Toot cortificate No | Test date | Person responsible | | | | | |
|----------------------|-----------|--------------------|------|--|--|--|--|
| Test certificate No. | | Company | Name | | | | |
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Liquid spray equipment is intended in particular for surfacing (e.g. airless paint spraying equipment, two-component coating equipment).

The operator must ensure that liquid spray equipment is tested for proper operation after an operating pause of more than 6 months, but at least every 12 months by a <u>competent person</u>¹).

The operator must ensure that the <u>test results</u> are properly recorded in writing for every liquid spray equipment² and kept until the next test.

The operator must ensure that the test certificate is available at the <u>place of use</u>³⁾ of the liquid spray equipment.

- ¹⁾ <u>A competent person</u> is somebody who on the basis of their professional training and experience has sufficient knowledge in the field of liquid spray equipment and is sufficiently conversant with the relevant national health and safety regulations, accident prevention regulations, recommendations and generally accepted rules and industrial norms that they are in the position to evaluate liquid spray equipment.
- ²⁾ <u>Written records</u> (test results) can, for example, be in the form of test certificates.
- ³⁾ <u>At the place of use</u>, a copy of the test certificate or a test stamp on the appliance is considered as compliance with the requirement.

-Extract from: Working with liquid spraying equipment (VBG 87) Issued on: 10th October 1993 § 23 (1), (3) and (4) Implementation instructions VBG 87 to § 1 Para. 1 and to §23 Para. 1, Para. 3, Para. 4



RECIPROCATING PUMPS MERKUR 2000

| GRACO VERFAHRENSTECHNIK GMBH D-33647 BIELEFELD | The original manufacturer's designation can be found on the reciprocating pump. |
|---|---|
| DRUCKLUFTGETRIEBENE KOLBENEPUMPE GERÄTE-TYP HEBSTELL-NB | Read and understand the operator manual and the safety instructions before taking the pump into operation |
| BAUJAHR MATERIAL- VOLUMENSTROM °MAX | Please compare all specifications and complete, if necessary. All important sections in this Operator Manual have been marked with the following symbols: |
| ÜBERDRUCK MAX bar LUFT- EINGANGSDRUCK MAX ÜBERSETZUNGSVERHÄLTNIS | $\sum_{n \\ n \\$ |
| °NACH DIN 24 374 TEIL 1 | Important operational directions |
| Ensure that all other users know | ow and understand all safety directions. |

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| Subject to change | | | Page 1 of 33 |
| Proc. 15.10.99 Hilse | USER INFORMATION | Issued | 10.99 |
| Approved 19.10.99 Kuhn | - OPERATING INSTRUCTIONS - | B.6 | .20.44-B |
| F22.060.01, issued on 01.98 | | | |

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LIST OF REPAIR PARTS

REPAIR - RECIPROCATING PUMPS, REPAIR - ACCESSORIES (Sales catalogue extract)

Includes:

<u>TEST CERTIFICATE (final inspection)</u> <u>EC DECLARATION OF CONFORMITY</u> <u>BRIEF USER INSTRUCTIONS (can be adhered to pump)</u> <u>BRIEF OPERATING INSTRUCTIONS, WARNING SIGNS</u>

CORRECT USE

The MERKUR 2000 reciprocating pumps are exclusively manufactured for the usual applications in surfacing technology (to convey coatings or auxiliary agents or for spraying) or similar work.

Any other purpose above and beyond this is considered inappropriate use. We shall not be liable for any damage or injury resulting from this; the user shall bear sole responsibility in such cases.

Correct use includes observing the operating, maintenance and inspection conditions and regulations laid down by us.

The MERKUR 2000 reciprocating pumps should only be operated, maintained and serviced by personnel familiar with, and trained to recognise its inherent dangers.

The relevant accident prevention regulations as well as safety and medical rules must be observed.

In case of unauthorised modifications of the appliance we cannot be held responsible for any damages or injury resulting from such modifications.

The user is responsible for the correct installation of the equipment.



DESCRIPTION OF FUNCTIONS

The air pressure is supplied to the reciprocating pump (A) from the pressure tank (1) via a tube or hose line (2) and a pressure control value (3).

The air supply from the pressure tank to the reciprocating pump can be interrupted by the ball valve (4).

The ball valve (5) is used for manually releasing condensation (an automatic steam trap would be preferable here).

The safety value (6) protects the pressure tank against inadmissible rises in air pressure (e.g. in the event of heating).

Since as a rule the air pressure supply (B) is not installed for the reciprocating pump and because it is obligatory, the reciprocating pump is also provided with a safety value (7).

During operation of the drive (air motor) of the reciprocating pump, the air pressure escapes into the atmosphere via the silencer (8). This releases its pressure.

The fluid (coating or auxiliary agent) is sucked into the reciprocating pump from a container (9) via the suction line (10) and supplied under pressure to the spray gun (13) via the high-pressure screen (11) and pressure line (hose or pipe) (12).

A sieve (dirt trap) (1) protects the reciprocating pump against foreign bodies which have accidentally entered the fluid.

A liquid unit (detergent unit) (15) is essential in reciprocating pumps of this design. The operating position (attachment position) of the reciprocating pump will depend on it.

Since the appliances also use AIRLESS PLUS for spraying (air-boosted high-pressure spraying equipment), it is recommended to attach a filter regulator (16) at the air pressure branch.

EQUIPMENT COMPONENTS – IMPORTANT INFORMATION

The following components are required in an operational system:

(A) THE RECIPROCATING PUMP

Functional description of the reciprocating pump; following part "Technical Description of Product B.6.20.44-P".

(B) AIR PRESSURE SUPPLY

The air pressure supply consists of the compressor, the pressure tank with steam trap, possibly an air pressure drier and pipeline.

The air pressure supply is generally already available to the user.

- When air pressure supply needs to be installed, the relevant accident prevention regulations, safety rules and user information must be observed, in particular the information supplied by the manufacturer of the compressor.

There must be a flexible connection between the reciprocating pump and the air pressure line (avoids fractures caused by vibrations). A <u>hose line</u> is most suitable

- Nominal diameter 9 or larger
- Operational pressure = max. mains pressure, preferably (16 bar
- air and ambient temperatures -20° to +50 °C
- free from any substances that may interfere with paint spraying, such as silicone

In areas with a danger of explosion the air pressure line and the hose line must be electrically conductive (to avoid electrostatic charging).

- Discharge resistance < $10^6 \Omega$ relative to earth.

The pressure control valve is in most cases directly fitted to the reciprocating pump.

- Efficient flow rate
 - at 6 bar and 25m/s > 50 m3/h
- Air inlet pressure 16 bar
- Air and ambient temperatures 0° C to 50° C

It goes without saying that the pressure control valve can be situated between the hose line and the air pressure line.

The <u>manometer</u> -(3.1 in functional diagram) – enables accurate adjustment and monitoring of the necessary air pressure.

- Display range 0 to 16 bar
- Air and ambient temperatures 0° to 50 °C
- Damped construction

A <u>shut-off mechanism (e.g. a ball retaining valve)</u> should always be fitted between the pressure control valve and the hose line, or between the hose line and the air pressure line. This enables quick and safe switch-off of the reciprocating pump for operational breaks, maintenance work and in cases of breakdown.

- Do not change the values set on the pressure control valve
- Rated pressure \geq 15 bar
- Material CuZn, nickel-plated



The rule for ball retaining valves: wings transverse to flow direction = line is closed off

Do not use PTFE tape or hemp to seal connections

(- malfunctioning of pressure control valve - as a result of residue in air pressure supply).

There are no special requirements as regards the <u>quality of the air pressure</u> supplied to the reciprocating pump.

- Condensation and residue oil from the compressor are trapped (pressure tank, air filter)
- Lubrication of compressed air not necessary
- Temperature of compressed air 10° C to 50° C

The air pressure must be free from any substances that may interfere with paint spraying, like silicone or oil.

- This also applies to component parts of the air pressure supply.

When compressed air is used for fluid atomising, a <u>filter regulator</u>, branched off from the main compressed air supply -16 in functional diagram - must be installed upstream.

- Efficient flow rate
 - at 6 bar and 25m/s > 32 m3/h
- Air inlet pressure 16 bar
- Air and ambient temperatures 0° to 50°C

(C) EXHAUST AIR SILENCER

Without a <u>silencer</u> the sound emission of a reciprocating pump operated by air pressure is high [> 100 dB(A)] and causes damage to hearing. Since there is a relationship between sound absorption and icing of the reciprocating pump control system, it is not possible to lower the sound pressure level as much as desired (not 70 dB(A)].

All MERKUR 2000 reciprocating pumps are therefore equipped with appropriately dimensioned silencers.

See "Technical Description of Product B.6.20.44-P", page 05 for more detailed information on the sound level.



The reciprocating pumps may not be operated without the silencer.

The silencer must <u>not</u> be screwed off during operation.

- The decision to wear ear protection depends on the operating pressure and the resulting sound level.

D FLUID SUCTION SYSTEM

The suction connection of MERKUR 2000 reciprocating pumps is constructed in such a way that both a swivel unit (angular or T-shaped) and a connector or suction pipe can be screwed in.



The connection units (1) and (2) are used for connecting the suction system, the suction line and the suction cup. The connector (3) is only used for retrofitting. The end of the thread is (4) situated at the suction pipes.



Most of the reciprocating pumps are equipped with the connection unit (1) and a <u>suction system</u> (suction hose, tube and suction sieve).

The swivel connector enhances the flexibility of the suction hose so an almost empty fluid container will not be turned over by the recoil force of the suction hose.

The diameter of the suction line is dimensioned in such a way that fluids with a kinematic viscosity of up to 750 mm²/s (cSt) can be sucked without difficulty by the reciprocating pump. A higher viscosity rating can result in a reduction of suction performance, or even result in interrupted suction, which can be identified by an increasing pressure drop during the change of direction (pulsating pressure).

- Measures for improvement are:

keeping the suction line as short as possible or a short suction hose with a larger cross diameter.

Specifications of suction assembly:

 Electrically conductive, maximum permissible resistance 3 x 10⁴ Ω/m (tested to ISO 8031) and leakage resistance to earth < 10⁶ Ω.
 (Suitable for use in hazardous locations.)

- The individual parts of the suction system are designed to withstand an excess pressure of 12 bar (- Suitable for suction heights of up to 8.5 m).
- The suction hose and the suction sieve are resistant to the usual solvents in the surface coating and are silicone-free.
- Minimum rated diameter 19
- Fluid temperature 10 °C to 85 °C
- Mesh size of screen 1.8

All metal parts in contact with the suction area material are made of austenitic stainless steel. (suitable for use with water lacquer).



In case of a fixed installation the connection between reciprocating pump and fluid container must be flexible (to avoid rupture caused by vibration).

The ratings for this connecting <u>suction line</u> must correspond with those of the suction equipment.

The admission pressure (pressure in a supply system, e.g. in a circuit) acting on the reciprocating pump and the suction line, must not exceed 10 bar.

When a threaded tube is used in the suction assembly, the manufacturer's directions for installation of the screwed connection apply.



The viscosity of thixotropic fluids is reduced by stirring; this improves e.g. the suction behaviour of the reciprocating pump.

The <u>agitator</u> is clamped to the suction equipment. The clamp (holder) <u>must</u> be fastened to the rim of the fluid container. This ensures correct positioning of the propeller of the agitator relative to the wall and base of the container as well as to the suction tube, and prevents the parts from touching.

All immersed parts of the agitator (spindle and propeller) are made from austenitic stainless steel (suitable for water-based paints).

The agitator is pneumatically driven: maximum permissible air inlet pressure: 6 bar. Speed can be set on the built-in flow control valve. The ideal agitator speed for a particular fluid must be determined by the user.

- The propeller of the agitator is enclosed within a protection ring.
- Techn. Product Description B.18.10.05-P



Reciprocating pumps with a fixed <u>container</u> are particularly useful for smaller quantities of coating agent (e.g. for repair paint jobs).

- All wetted metal parts of the container are made from austenitic stainless steel (-suitable for water-based paints).
- Container capacity 5 I
- Design certification for highly inflammable liquids class AI and AII is not required, since the container is made entirely from stainless steel.
- Suitable for use in areas with explosion hazards, because electrostatic charging cannot occur.
 - If the reciprocating pump with container is installed on a pump trolley, the connection unit is fixed by a shim (can no longer be rotated).



In special cases, the reciprocating pumps are equipped with <u>suction system and cup</u> (both described above). By means of ball valves, it is possible to provide suction via the suction system or from the cup.

Ball valve

- Nominal diameter 25
- Zinc-plated steel in the area in contact with the fluid (- only suitable for water-based paints in certain cases)

 Δ The rule for ball retaining values: wings transverse to flow direction =line is closed off

Special constructions with two cups and ball valves in between or without ball valves or with two suction systems and ball valves in between are also feasible.

When assembling or dismantling the suction system and the cup keep the ball valve in position with an open-end spanner.

(E) FLUID PRESSURE SYSTEM

The fluid pressure system usually consists of a high-pressure screen, a hose line and a spray gun or atomizer.



In most reciprocating pumps, the <u>screen PN 500</u> is fitted at the factory and tested together with the reciprocating pump (final testing of the pump).

The screen consists of the housing parts, the screen insert and a pressure relief device (drain plug).

The connection sieve \leftrightarrow reciprocating pump is effected by means of a regulated double nipple.

The characteristics of the screen PN 500:

| • | Permissible operating excess pressure | 500 bar |
|---|---|---|
| • | Permissible operating temperature | 120° C |
| • | Screen area | 78 cm ² |
| • | Mesh size | 6 mm |
| • | Material of the housing parts in contact with the fluid | austenitic stainless steel (1.4305) or Cr steel (1.4104) depending on the order. |
| • | Pressure container | Group V of the pressure container regulations, therefore no testing necessary |
| • | Screen inserts | made of stainless steel with different mesh sizes (catalogue 01.2044, page 14) |

A pressure control valve can be fitted instead of the screen or after the screen.



- Observe the relevant user information.
- If the pressure control valve is supplied by us, user information has been provided.

The <u>hose line</u> connects the reciprocating pump to the spray gun. However, in most cases it is screwed on to the screen. The connection hose line \leftrightarrow reciprocating pump or the connection to the screen or to the pressure control valve does not have any sealing (sealed head screwed joint).

The characteristics of the hoseline:

- Operating temperature -40° to +90°C or higher.
- Connection thread generally G 1/4 or G 3/8.
- Operating pressure > max. permissible operating excess pressure of the reciprocating pump (about 400bar).
- Electrically conductive, max. permissible resistance 3 x 10⁴ 1/m (tested to ISO 8031).
- The sealing head nipples of the hose fittings are made from austenitic stainless steel or galvanised and yellow chromatised steel.

Surface lining:

• The inside pipeline coating must be resistant to normal solvents,

- the outer coating resistant under certain conditions.

• Free from any substances that may interfere with paint spraying such as silicone.



The <u>nozzle or spray gun</u> is installed at the end of the hose line, connection thread $G^{1/4}$.

- Observe the relevant user information.
 - When the nozzle/spray gun has been supplied by us, user information has been provided.

In special cases, the fluid pressure connection at the reciprocating pump is connected to a <u>pipeline</u>. The connection must be flexible (to avoid rupture caused by vibration).



The characteristics of the <u>flexible pressure line</u> correspond to those of the connecting hose line.

Minimum rated width 8



In a large fluid pressure system and in cases where the pressure system is influenced by heat (sunrays, heating systems, etc.) it is necessary to fit a suitable <u>non-return valve</u> between the tube and the flexible pressure line (to prevent damage caused by thermal expansion).

(F) EQUIPMENT SUPPORT

The following can be used as a support for MERKUR 2000 reciprocating pumps:

Profiled sheet metal (wall support), stand, container cover, pump trolleys, mechanical elevating trucks, pneumatic elevating trucks, pneumatic elevating equipment.



Most reciprocating pumps are fixed to the wall of a building or machine by means of the <u>profiled sheet metal</u>. If plugs are used for fixing, the drilling hole and screw length must comply with the manufacturer's specifications.

When plugs and corresponding screws are supplied by us, they comply with the Technical Product Description B.17.90.01-P.



The <u>stand</u> is used for installation of the reciprocating pumps on a level base.

The unit "<u>Reciprocating pump with suction tube and stand</u>" is for rapid exchange of containers, it can be elevated in order to exchange the container and also put in another place. Here care should be taken that the stand area is stable and has as little inclination as possible.

The units "<u>reciprocating pump with suction system and stand</u>" or "<u>Reciprocating pump with</u> <u>cup and stand</u>" may not be installed as stand-alone equipment; they must be fixed to the floor.

The supplied plugs and associated screws comply with Technical Product Description B.17.90.01-P.



The <u>vessel cover</u> lies free on the vessel rim and the reciprocating pump can have its height adjusted at the center of the cover

By adjusting the height, the unit can be adapted to a wide variation of vessel bases.

In order to exchange vessels, the complete unit can be simply raised.

If an agitator is used in the equipment, the directive on flammable liquids (VbF) prohibits the use of highly flammable class AI and AII fluids.

The directive does not apply if at the place of work (in the container) AI or AII liquid is only kept in such quantity as is sufficient to continue work.



The <u>pump trolleys</u> are two-wheeled transport units. In their function, they correspond to a bag truck While in idle position, the load holder is located in front of the

wheels, in running position directly behind

The <u>pump trolley Form I</u> can only have one MERKUR 2000 reciprocating pump mounted on it without any add-on equipment.

The <u>pump trolley Form II</u> enables the fitting of an additional flow heater.

Since the trolley wheels cannot be locked, the floor surface on which the pump trolleys are moved must incline as little as possible (inclination < 10°).

The occupied pump trolleys are not designed for setting down

abruptly with a lifting apparatus. The wheels are not electrically conductive. This means that in hazardous locations, zone 1, the pump trolleys can only be used when specific measures are taken. The carts can be used safely in zone 2, however.

The label on the right is affixed to the pump trolleys and refers to the guidelines to be observed.





The <u>lifting trolleys</u> and have four wheels. The undercarriage is designed as a supporting base for one container (30 I max.). The lifting trolleys can only be occupied with one MERKUR 2000 reciprocating pump without add-on equipment.

Since the trolley wheels cannot be locked, the floor surface on which the pump trolleys are moved must incline as little as possible (inclination < 10°).

Fully equipped lifting trolleys are not constructed to be put down vigorously with a lifting tool. The wheels are not electrically conductive.

Regarding the way they are used, the same applies as for the pump trolleys.

With the <u>mechanical lifting trolley</u> (form III), lifting, maintaining the load in an elevated position and lowering to starting position is done manually.

- The screw with the star-shaped handle mounted on the side is used for clamping.



Fast lowering (dropping) can be prevented by manual force.

Lifting height 400

Carrying capacity ca. 40 kg

As for the <u>pneumatic lifting trolley</u> (Form IV), the lifting, maintaining the load in an elevated position and lowering to starting position is effected by means of a pneumatic hand lever valve.

- Hand lever up = lift and hold
- Hand lever down = lowering into starting position

A built-in air pressure throttle valve prevents rapid lifting and lowering motion.

| Lifting height | 400 |
|------------------------|-------------|
| Carrying capcity | about 40 kg |
| operating air pressure | max. 7 bar |
| Pressure line | DN 6 |



Like the stands and the lifting trolleys, <u>pneumatic lifting devices</u> are used for rapid container change.

The <u>lifting apparatus Form V</u> corresponds to the pneumatic lifting trolley with regard to function - (lifting apparatus identical in construction).

The <u>lifting apparatus Form VI</u> is a one-pillar design (vertical lifting cylinder). The advantage of this design is its horizontal swiveling capability.

- The reciprocating pump can be swiveled round from an empty to a full container.

Lifting, maintaining the load in an elevated position and lowering to starting position is effected by means of a hand lever valve mounted on the side.

A built-in air pressure throttle valve prevents rapid lifting and lowering motion.

Specifications of pneumatic lifting equipment:

- Travel of lift 430 mm
- Working air pressure 0.3 bar to 1.5 bar
- Pressure line
 DN 6
- Fitting of the reciprocating pump also with "container cover with agitator".



The lifting apparatus must be secured to the floor. The supplied screws and plugs comply with Technical Product Description B.17.90.01-P.

When a reciprocating pump with container cover and agitator is affixed to the lifting apparatus, the Directive on Flammable Liquids (VbF) prohibits the use of this assembly for highly flammable liquids Class AI and AII (agitator design not approved).

The directive does not apply if at the place of work (in the container) AI or AII liquid is only kept in such quantity as is sufficient to continue work.

 The agitator is identical to the one described on page 8 and in the Technical Product Description B.18.10.05-P.

TOOL LIST

| | | <u>୭</u> = | | Ð= | | | | | | ſ | | _ | | | |
|--------------------|--|------------|----------------------------|------|------------------------|--------------------------|--------------------------|-----|-----|---|-----|------|------|------|------|
| Reciprocating pump | ing pump Open-ended spanner DIN 895 | | Sickle spanner, adjustable | | Allen Screw DIN 911 | | | | | Tubular socket wrench _Γ DIN 659 | | | | | |
| | SW10 | SW17 | SW19 | SW24 | SW28 | 35 to 60 70620 100003 | 60 to 90 70620 100004 | swз | S₩5 | SW6 | SW8 | SW10 | SW14 | SW17 | SW12 |
| 015.050-DP | | | Х | Х | | X | Х | X | X | | Х | | Х | Х | Х |
| 020.035-DP | | | Х | Х | | Х | Х | X | Х | | Х | | Х | | Х |
| 025.008-DP | X | | X | | Х | × | | X | X | Х | Х | | | | X |
| 030.020-DP | | X | Х | Х | | Х | Х | X | Х | Х | | Х | Х | | X |
| 030.050-DP | | | Х | Х | | Х | Х | Х | Х | | Х | | Х | Х | Х |
| 040.035-DP | | | X | Х | | Х | Х | X | Х | | Х | | Х | | Х |
| 060.020-DP | | X | X | Х | | Х | Х | X | Х | Х | | Х | Х | | Х |

Open-ended Spanner DIN 895

- SW 27 Air pressure hose line (air pressure supply)
- SW 30/36 Connection piece for suction system / union nut

SW 35/36 T-connection piece / union nut

- SW 17 Hose line DN 6, G 1/4 (fluid pressure system)
- SW 22 Hose line DN10, G 3/8 (fluid pressure system)

INSTALLATION

INSTALLATION AND MOUNTING



Install or fit the reciprocating pumps in a vertical position.

Wall level and load-bearing.

Plugs and mounting screws must have correct dimensions.

Do not install in confined enclosed areas (cabinets) (malfunctioning due to icing of the air motor control). When installing in hazardous locations, zone 1, you should observe the guidelines for explosion prevention (EX-RL) ZH 1/10 (chapter E2), as regards assembly materials.



The reciprocating pumps must not be installed in Zone 0 (containers).

GROUNDING

In hazardous locations, the appliances must be earthed.

In accordance with the directive on "Static Electricity" ZH 1/200, the following applies:

The grounding connection must be mechanically resistant and corrosion-proof to withstand all conditions to which it may be subjected during operation. The conductors which establish the grounding should be connected to appliances and the earth by soldering, welding or stable screw fittings. Do not use chains. When making connections, in particular to pipelines, ensure that the conductor is not interrupted by non-conductive parts or during repair work

The grounding connection must be tested for correct working conditions by an authorised engineer.

• Grounding points on the appliances are appropriately marked:

Movable, conducting vessels or appliances, which could store an electric charge should also be earthed. The is usually achieved with a flexible connection that is secured, for example, with a clip.

- Chains may not be used.

VENTILATION OF WORK AREA

Must be ensured

AIR PRESSURE SUPPLY

The compressor and air pressure storage container (pressure tank) must have adequate dimensions.

- Check
- See also page 6, "Quality of air pressure "

CONNECTIONS

Air pressure pipe line \leftrightarrow reciprocating pump,

Suction pipe line \leftrightarrow reciprocating pump,

 $\text{Pressure pipe line} \leftrightarrow \text{reciprocating pump}$

Flexible and, in hazardous locations, electrically conductive

See pages 5, 8 and 11

COMPRESSED AIR LINE

If an air pressure line must be laid it must have a gradient of 3 to 5 mm per m down to the air



pressure tank or the water trap.

If a branch line has to be made from an existing air pressure line, this should be carried out above the level of the pipe axis.

In the case of bends in metal air pipes these should be selected with a bend radius of the pipe axis not smaller than 2.5 x the pipe outside diameter.

• Plastic lines in hazardous locations must have a conducting resistance to earth of $< 10^6 \Omega$.

AIR PRESSURE CONTROL VALVE (PRESSURE CONTROL VALVE), MANOMETER AND BALL VALVE



see page 5

If the pressure control valve ① is fitted to the reciprocating pump it can be adjusted for easier reading of the manometer.

- Loosen the set screw 2 in the slide housing with the Allen screwdriver 3
- Adjust pressure control valve
- Tighten set screw

SOUND ABSORBER

see page 6

• Check that the sound absorber is fixed in position by hand.

FLUID SUCTION SYSTEM

see pages 7 to 9





Screw the connector ① or ② into the reciprocating pump as far as it will go. Next, back it out 1 to 1.5 turns, to allow the device to swivel. When attaching the suction assembly to the connection (1), pay attention to the following:

 Insert the tube end of the suction assembly into the connector and press it against the stop in the internal taper.

When the end of the tube does not touch the stop, the installation is incorrect.

Continue until clear resistance is felt

- Use the connector as a hold.

Assembly check



Loosen union nut and check whether there is no clearance between the sealing ring and the retaining ring.

Reassemble after loosening; apply the same torque as the first time.

Use the connector as a hold.

If the suction assembly has already been fitted to the connector, this unit must be installed first, e.g. to the wall, before the reciprocating pump is installed.

FLUID PRESSURE SYSTEM (SCREEN PN500)

see pages 10 and 11

The Screen PN 500 is usually fitted to the reciprocating pump.

If it is to be retrofitted, the following should be noted:



- Screw off the union nut ① and remove the screen housing ②.
- Pull the nut (3) lightly against the stop of the banjo bolt.

Screw in the connection piece ④ (with banjo bolt and nut) as far as possible into the reciprocating pump ⑤.
 – Do not forget the sealing ring A 17x21 ⑥.

Tighten the nut ③ against the reciprocating pump (lock).

A connector with G 1/4 or G 3/8 thread is screwed into the screen PN 500 for connecting a hose line.

- Do not forget the sealing ring A 17x21 (6).

The connections for the connector and hose lines have no sealing (sealed head connection) and do not require any special indications.

- The same applies to the connection of the hose line to a spray gun supplied by us.

GENERAL ASSEMBLY INSTRUCTIONS

- Always use recommended torques.
- Grease thread lightly.
- Do not use PTFE tape or hemp.
- Components not supplied by us must have dimensions that correspond to the given dimensions of the reciprocating pump.

- Follow the manufacturer's instructions

• Observe manufacturer's assembly instructions when using cutting rings or double conical rings.



If liquids are to be pumped which contain chlorinated hydrocarbons, e.g. trichloroethane or methylene chloride, the parts in contact with the fluid in the suction and pressure system must <u>not</u> be made of aluminium or have a zinc-plated surface.

- there can be metal organic reactions which are explosive and extremely caustic.

START UP



Fill the coupling housing (A) up to the middle of the filling connector
(B) with detergent, in the case of oil delivery pumps, fill with oil.
Any detergent used must be compatible with materials to be used later; we recommend consulting your material supplier.







For this, the cover of the filling connector must be first swiveled to the side and after filling, swiveled back to the starting position.

INSTALL SCREEN INSERT

The screens fitted to the reciprocating pumps do not have any insert.

The screen inserts (choice of mesh size depends on the nozzle used) must be fitted later.

Screw off the union nut and remove the screen housing.
 Introduce the screen insert into the housing via the support spring and fasten the housing again.

FLUSH THE RECIPROCATING PUMP

As every reciprocating pump is tested in the works after assembly using an anti-corrosion liquid it is necessary to thoroughly flush out the rest of this liquid (and any other contaminants which have entered during installation) with detergent (flushing agent).

Then the detergent should be removed from the system as much as possible (not from the coupling housing). This is done by air suction.

– Air inlet pressure (manometer to the air motor) < 1bar.

START UP OF APPLIANCE / SYSTEM

Because the reciprocating pump works automatically with back pressure, it can only be commissioned (i.e. fluid be conveyed) when fluid is discharged from the pressure system, e.g. by using the spraying equipment.

- Spraying equipment without nozzle, discharge operated

In order to guarantee fault-free starting of the reciprocating pump, the pressure control valve should be <u>rapidly</u> opened to 0.5 bar.



- Quickly set 0.5 bar air pressure, then regulate normally

AERATING (BLEEDING) OF APPLIANCE/PLANT

The air, which has entered the pump and the system after flushing must be thoroughly removed.

- Operate the reciprocating pump with < 20 bar fluid pressure until no more air is pumped.

- Lock spray equipment, install nozzle.

PREPARING FOR SPRAYING

ADJUST (PLACE) THE STUFFING

Raise the material excess pressure slowly to the maximum value. Operate the reciprocating pump at this pressure for a short time. Then set the required operating pressure.

- Appliance /system is ready for operation.

LOW LOCAL TEMPERATURE

If start up or operation is carried out at a local temperature around 10 °C the air pressure should be supplied with anti-freezer from a dosing apparatus (AIR lubricator). We recommend ethylene glycol, diluted, with high-pressure additives, 1000 ml, Item ID 75682 114002).

IMPORTANT INFORMATION CONCERNING START UP AND OPERATION



Do not operate the reciprocating pump without a liquid primer (detergent in the coupling housing).

- Increased stuffing wear, considerable reduction in the service life



Do not run the reciprocating pump without load, unless under supervision and then only for a very short period of time and at a low air input pressure.

Dry operation after the material has passed through must be strictly avoided. It will damage or destroy important component parts.



Continuous operation with high stroke frequency leads to extensive icing of control system (increased pulsation until reciprocating pump shutdown) (see technical product description B. 6.20.44-P, page 04) and leads to a decrease in service life due to increased wear of the sealing.

Do not remove and replace the suction pipe or hose during operation.

- Air will enter into the system, causing irregularities in the coating.

Never unscrew any parts, e.g. sound absorber from the reciprocating pump during operation.

Never immerse a running agitator propeller into a filled fluid container.



- Increase the speed of the immersed agitator propeller only gradually.

Wear personal safety equipment (breathing apparatus, goggles, gloves, etc.) when working with fluid that has a health hazard.



Operating the spray equipment produces recoil forces – these should be taken into consideration



(Hold the gun properly, take a steady stand, and concentrate while operating the gun).



Because of the risk of fluid injection into skin, never place the spraying equipment directly on any part of the body (thumb, flat of the hand, etc.)



Never direct spraying equipment at humans or animals.

OPERATION

The reciprocating pumps run automatically, i.e. during operational shutdown (no fluid drawn from fluid pressure system) no fluid is pumped. If there is a slight leakage, however, pumping will start.

It is therefore recommended that the pump be disconnected from the air supply overnight or at the weekend and, if possible, material pressure be reduced by withdrawal (after the air is disconnected.) This can be achieved by using a spray device for example.



It is also recommended to drain the detergent before an operating pause (over night) and to fill up again when work starts again (on the next day) provided that it is not yet contaminated.

In order to drain the detergent, turn the detergent filling connector to the left (max 180°). Before filling, turn back to the starting position.



Do not tighten with a tool (lever)

- Risk of breaking

Before long-term shutdown, e.g. company holidays, pumps carrying paint should be flushed.

In order to avoid the hardening of paint residue the detergent should remain in the pump during shutdown.

We recommend using alkyl sulphon acidic ester, "ASE" phenol, as the flushing agent.



Consult the material supplier concerning the compatibility of the detergent.



Do not use nitro thinners or solvents as flushing agents.

MAINTENANCE AND INSPECTION, REPAIR

MAINTENANCE AND INSPECTION MERKUR 2000 RECIPROCATING PUMPS REQUIRE LITTLE MAINTENANCE



- The detergent should be replaced after coloration or 1x month
- Drain using the fixing plug (ar 1)
- Flush the housing ② with detergent
- Fill the filling connector up to the middle

- If there is no automatic water drainage in the air pressure supply to the pressure regulation valve, then drain the condensed water every day from the pressure container, filter or filter regulator.
- When using anti-freeze (when operating at around 10 °C), replenish it after use.
- Regularly check the dirt trap on the suction side.
 - The cleaning interval depends on the fluid and must be determined by the operator.
- The safety valve of the reciprocating pump should be checked for proper operation once a year.
 For this, the max. permissible operating overpressure must be slightly exceeded (opening pressure up to 1.1 x max. permissible operating overpressure).
- Regularly dismantle the screen PN 500
 - The top part remains at the pump. Thoroughly clean all the other parts.
 The cleaning interval depends on the coating substance or auxiliary agent and must be determined by the operator.
- The service life of the hose lines is adversely affected, and thus shortened, by surrounding influences (oxygen in air, temperature, light, etc.), even if correctly.

It is recommended that they undergo regular visual checks and occasional checking of performance.

As a precaution the hose lines should be replaced at intervals set by the operator (- after 2 to 3 years).

Never at any time dismantle a reciprocating pump which is under pressure.

Observe the reciprocating pump regularly every day while it is in operation.



The lubricant in the coupling housing should be checked every day.

The detergent level should be visible in the filling connector and as much as possible in the middle.

If the detergent has visibly changed in color, it should be replaced (see pages 19 and 22).

If the detergent level rises <u>slowly</u> when the reciprocating pump is operating, this is a sign of progressive wear of the piston rod stuffing (top). The reciprocating pump must now be checked more frequently (several times a day)

If the detergent level rises <u>noticeably</u> when the pump is operating between the daily checks, this means that the piston rod stuffing is so worn out that it must be replaced as quickly as possible.

- It is recommended to also replace the piston stuffing (below) during the course of this work.

If during daily inspection, a rise in pressure pulsation or irregular travel of the piston rod is observed, wear at the decant valve (valve in the piston) is usually the reason. If the operating pressure falls with the fluid pressure system closed (gun shut and sealed), the probable cause is a leaky suction valve.

- In both cases, the respective valve should be changed.

If during the daily inspection with the reciprocating pump not working, the noise of air streaming out of the sound absorber is heard, this can be a sign of progressive wear in the control system.

- If the noise increases over an observation interval of a few days, the flat slide and slide plate should be replaced.

REPAIR



Repairs must be carried out by qualified personnel (experts) (VBG 87).



Before dismantling, completely interrupt the air pressure supply to the reciprocating pump and remove the pressure from the pump.

Use only genuine repair parts. Our obligation to replace pumps / aggregates no longer applies if non-genuine repair parts are used (Product Liability Law of 15 December, 1989).

After disassembly, thoroughly clean all parts to be reused.



Do not damage sealing surfaces; therefore do not throw parts around or knock them. Do not use any cutting tools.



Renew all removed seals.



Lubricate all threads and fittings before assembly (grease lightly).



When traces of wear can be seen on running or sealing surfaces the components affected must be exchanged.

The holes "X" in the hydraulic sections and in the screen PN500 are used for applying a sickle spanner (see page 15), - do not use a pipe wrench.

REPAIR OF WEARING PARTS IN THE AIR MOTOR



- Loosen the cheese head screws (ar 1) and remove
- Remove the connection piece (2)
- Replace the flat slide ③ and slide plate ④

The flat slide ③ and the slide plate ④ should always be removed together.

If on replacing the flat slide, it is found that between the drive pin (5) and the new flat slide, the gap "S" > 0.8, (wear at the drive pin) the drive pin must also be replaced.

The drive pin is supplied by us ready to be fitted with pre-stressed piston rings. It must not be dismantled.

REPAIR OF THE STUFFING



When replacing the stuffing, pay attention to the position and the layering of the top packings and spring washers.

All the stuffings should be replaced as complete units.

The top packings cannot be replaced individually.

If the running surfaces of the step piston show palpable signs of wear (scoring, pitting), it must also be replaced.



REPAIR OF THE VALVE SEATS

The valve seats ① are made in such a way that if one side is worn, they can be turned over and replaced.

If the profile sealing rings ② underneath the seats are worn (clear deformation) they should be replaced. Care should be taken with the mounting position in this case.

 Each reciprocating pump has a set of profile sealing rings supplied loose with it.

Whether the valve balls ③ can be used again depends on the state of their wear.

Since this is difficult to assess, we recommend that the balls should be replaced.

The taper of the banjo bolt ④ serves to lock in position during operation



When assembling, the banjo bolt should be screwed in tightly, then loosened and then again tightened securely.

When loosening, it should be established whether the breakaway torque is clearly above the tightening torque.

The running surface of the piston may <u>not</u> be used as a hold during maintenance and repair work. The "Y" key areas are used for this which for technical reasons are located at the top end of the step piston.

After loosening the cheese head screws (connection to the air motor), access can be gained to the air motor.

REPLACING THE SUCTION UNIT



When the suction unit must be replaced, the union nut must be replaced along with it.

Union nut with sealing ring,
 Part No. 75089 100002.

If the sealing ring is defective, it can be pulled off the free tube end after loosening the union nut. Then the new sealing ring should be pushed on to the end of the tube with the metal inside taper as retaining ring.

- Sealing ring, part No. 75188 097002.

Mounting of the suction unit



- Insert the tube end of the suction assembly into the connector and press it against the stop in the internal taper.
- Tighten until clear resistance is felt.
- Use the connector as a hold.
- Assembly check
 see page 18

Repair of the O-Ring at the screen PN 500



If during retrofitting the screen PN 500 (see page 18) the O-Ring ③ is damaged by incorrect assembly, the new O-Ring should only be pulled on to the covered thread of the banjo bolt ④.

THREADED CONNECTIONS



Do not exceed the tightening torques below when tightening the threaded connections.



SHUTDOWN



If the pressure is removed from the air to the air motor while the fluid pressure system is still under pressure, the fluid pressure can rise depending on the system.

Therefore remove the pressure from the reciprocating pump (on the air and fluid side) by removing fluid with the air pressure supply shut off.

FOR A SHORT PERIOD

- Cut off the air pressure supply
- Relieve the pressure from the reciprocating pump by removing all fluid, e.g. by engaging the gun.

FOR A LONGER PERIOD, FOR THE COMPANY HOLIDAY PERIOD

- Flush the reciprocating pump well
- Leave the detergent in the reciprocating pump
 - The liquid primer must be filled up to the middle of the filling connector.
- Cut off the air pressure supply
- Relieve the pressure in the reciprocating pump by removing all fluid, e.g. by engaging the gun.

FOR A LONG PERIOD

- Thoroughly flush the reciprocating pump
- Pump the detergent out of the reciprocating pump
- Let the reciprocating pump run <u>empty</u> for a short while at the lowest air pressure
- Interrupt (screw off) the air pressure connection to the piston pump
- Remove the liquid primer (Page 22)



It should be noted that on shutting down, the piston is in the bottom position in order to prevent drying of fluid residues,

SOLVING PROBLEMS

- Troubleshooting 31

| mponent group pressure supply motor, control | Nature of defect Fluid pressure drops Irregular operation, Stroke frequency drops, | Defect symptoms Heavy leakage Narrowing of diameter | Possible cause Defective fitting Hose line pinched, dirty fittings | Countermeasure Replace defective fitting Check lines, Clean fittings |
|--|---|---|--|---|
| pressure supply motor, control | Fluid pressure drops Irregular operation, Stroke frequency drops, | Heavy leakage Narrowing of diameter | Defective fitting Hose line pinched, dirty fittings | Replace defective fitting Check lines, Clean fittings |
| motor, control | Irregular operation, Stroke frequency drops, | Narrowing of diameter | Hose line pinched, dirty fittings | Check lines, Clean fittings |
| motor, control | Irregular operation, Stroke frequency drops, | | | |
| | | Icing | Air too humid, stroke frequency too high, ambient temperature too low | Remove ice, change operating conditions |
| | | Flat slide defective | Wear | Replace worn parts |
| | Air escapes continually from air exit aperture | Flat slide or slide plate faulty | Foreign bodies have entered, Wear | Renew defective part, check air filter |
| draulic section | ction Pressure fluctuations Suction not in order, operates irregularly | | Pump not aerated | Aerate pump |
| | | O-Ring at suction connection damaged | Incorrect operation | Replace O-Ring |
| ction valve | Pump does not stop during upwards stroke | Valve seat – ball defective | | |
| cant valve | Pump does not stop during | Valve seat – ball defective | | |
| uffing below | upwards stroke | Stuffing defective | Wear | Replace worn parts |
| uffing top | Fluid escapes at the piston | Stuffing defective | | |
| ep piston | rod | Scoring on the running surface | | |
| otion | Pump is working irregularly | Suction screen (dirt trap) is | Fluid contaminated | Clean suction screen |
| | tion valve cant valve ffing below ffing top o piston | irregularlyirregularlyition valvePump does not stop during upwards strokePump does not stop during upwards strokeffing belowIffing top p pistonFluid escapes at the piston rodPump is working irregularly | irregularlyO-Ring at suction connection damagedtion valvePump does not stop during upwards strokeValve seat – ball defectivecant valvePump does not stop during upwards strokeValve seat – ball defectiveffing belowPump does not stop during upwards strokeValve seat – ball defectiveffing topFluid escapes at the piston rodStuffing defectivep pistonFluid escapes at the piston rodScoring on the running surfacetionPump is working irregularlySuction screen (dirt trap) is clogged | irregularlyO-Ring at suction connection damagedIncorrect operationtion valvePump does not stop during upwards strokeValve seat – ball defectiverant valvePump does not stop during upwards strokeValve seat – ball defectiveffing belowPump does not stop during upwards strokeValve seat – ball defectiveffing topFluid escapes at the piston rodStuffing defectiveScoring on the running surfaceScoring on the running surfacetionPump is working irregularlySuction screen (dirt trap) is alegagedFluid contaminated |

F22.060.01, issued on

- 31 -

NOTES

PULSATION REDUCING MEASURES

- Important for demanding painting operations



Self-check

If the MERKUR 2000 reciprocating pumps/appliances are operated without monitoring, dangerous situations should be avoided by using automatic self-regulation.

A stop value is particularly suitable for this purpose as it cuts off the air pressure supply to the reciprocating pump if the set limit is exceeded (e.g. due to excessive stroke frequency in case of a line breakage).

GUIDELINES AND DIRECTIVES TO COMPLY WITH

| VBG 23 | Verarbeiten von Beschichtungsstoffen* |
|--------------|---|
| VBG 23 DA | Durchführungsanweisung zur Unfallverhütungsvorschrift |
| | "Verarbeiten von Beschichtungsstoffen"* |
| VBG 87 | Arbeiten mit Flüssigkeitsstrahlern* |
| VbF | Verordnung über brennbare Flüssigkeiten* |
| ZH1/10/EX-RL | Richtlinien für die Vermeidung der Gefahren durch explosionsfähige |
| | Atmosphäre mit Beispielsammlung - Explosionsschutz-Richlinien - (EX-RL)* |
| ZH1/200 | Richtlinien für die Vermeidung von Zündgefahren infolge elektrostatischer |
| | Aufladung* |
| ZH1/406 | Richtlinien für Flüssigkeitsstrahler (Spritzgeräte)* |
| DruckbehV | Druckbehälterverordnung* |
| Merkblätter | Gefährliche Arbeitsstoffe (Band 1 bis 5) Kühn, Birett / Druckerei Laub GmbH / |
| | Elztal-Dallau |

* Carl Heymanns Verlag KG, Luxemburger Str. 449, 50939 Cologne, Germany

USER INFORMATION

The user information (operating instructions) contains all necessary information about MERKUR 2000 reciprocating pumps, in accordance with the sales catalogue 01.2044.

The Technical Product Description B.6.20.44-P, and the Repair Parts List are standard parts of every operating manual. For organizational reasons they are issued as separate documents.

GRACO

RECIPROCATING PUMPS MERKUR 2000

Air pressure driven double action reciprocating pumps are recommended for coating and process materials.

DESCRIPTION OF THE RECIPROCATING PUMPS

The reciprocating pumps consist of an oscillating air motor (A) and a hydraulic section (B).

The ring piston (1) of the air motor is connected to the step piston (4) of the hydraulic section via the piston rod (2) and the coupling (3).

Air pressure is applied alternately to the ring piston via the control (5) which results in the upwards and downwards strokes.

The area ratio of the ring piston to the thinner part of the step piston determines the pressure transmission ratio.

During the upwards stroke, the material to be pumped is sucked via the suction valve (6) into the lower part of the hydraulic cylinder (7) while the material in the top part of the cylinder leaves the pump under pressure at the pressure connection (8).

During the downwards stroke, the sucked fluid which is prevented from flowing back by the decant valve (9) is forced into the upper part of the cylinder and at the same time forced into the pressure system (line) via the pressure connection.

The fluid volume pumped is the same for the upwards stroke and for the downwards stroke.



Subject to change

| | erren ige | | | Page 01 of 06 |
|------------------------|----------------|--------------------------------|--------|---------------|
| Proc. | 15.10.99 Hilse | USER INFORMATION | Issued | 10.99 |
| Approved 19.10.99 Kuhn | | - TECHN. PRODUCT DESCRIPTION - | B.6.2 | 0.44-P |

Note the protection mark in accordance with DIN 34

F22.060.01, issued on 01.98

When the pressure system is closed, there is an equilibrium of forces [air pressure (p_L) x area of ring piston (A_D) = fluid pressure (p_M) x area of the thinner part of the step piston (A_d)] and the pump is stationary.

When fluid is removed from the pressure system, the pump automatically starts. Even the smallest leakage is replenished by topping up.

In a large pressure system, a non-return value 1 must be fitted at the pressure outlet because of naturally produced temperature fluctuations (increase in pressure due to thermal expansion) – this also applies to hot spraying systems.

A safety valve (1) protects the reciprocating pump and the pressure system in cases where the air inlet pressure exceeds its maximum permissible value.

The sound absorber (12) at the air outlet reduces the noise of the outgoing air.

SUITABILITY, MATERIAL

| Material | suitability |
|--------------------|-----------------------------------|
| Neutral | highly suitable |
| Corrosive | not suitable |
| Abrasive | suitable under certain conditions |
| Acidic | not suitable |
| Inflammable 1) | highly suitable |
| UV-hardening | suitable under certain conditions |
| Hardening agent | suitable under certain conditions |

| Kinema | tic viscos in mm²/s | ity s | Suitability |
|--------|------------------------|----------|-----------------------------------|
| | up to | 500 | highly suitable |
| 500 | up to | 750 | highly suitable |
| | over | 750 | suitable under certain conditions |
| | | | (must be tested) |

| Solids content | Suitability |
|----------------|-----------------|
| Low | highly suitable |
| Low to 2% | suitable |
| over 2% | must be tested |

¹⁾ Hazard class AI, AII, AIII, reciprocating pump earthed.

In the case of strongly abrasive and aggressive materials, please contact us.



PRODUCT RANGE

Reciprocating pump 015.050-DP Reciprocating pump 020.035-DP Reciprocating pump 025.008-DP Reciprocating pump 030.020-DP Reciprocating pump 030.050-DP Reciprocating pump 040.035-DP Reciprocating pump 060.020-DP

RECIPROCATING PUMPS

Detailed information about basic versions,

basic devices, complete devices and article numbers can be found in sales catalogue 01.2044

<u>DATA</u>

| | Str | oke frequ | iency in E | 0H/min | Theoretical transmission | | Air Stroke | Max | aterial |
|--------------------|---------------------------------|-------------------------------------|---------------------------------|------------------------------------|--------------------------|--|---------------|--|-----------|
| Reciprocating pump | ontinuous eration full ad | ontinuous eration Irtial load | ermittent eration full ad | ermittent eration rtial load | ratio | Max. permissible inlet overpressure | volume | permissible operating overpressure (Nominal | volume |
| | og e o | с е е | Int op loa | Inte ope pai | i | in bar | in l | pressure) | in cm³/DH |
| 015.050-DP | 10 | 20 | 50 | 80 | 15 : 1 | 8 | 0,64 | 120 | 100 |
| 020.035-DP | 10 | 18 | 50 | 72 | 20:1 | 8 | 0,64 | 160 | 70 |
| 025.008-DP | 14 | 25 | 63 | 100 | 25:1 | 8 | 0,19 | 200 | 16 |
| 030.020-DP | 10 | 20 | 50 | 90 | 30:1 | 8 | 0,64 | 240 | 40 |
| 030.050-DP | 10 | 15 | 50 | 60 | 30:1 | 8 | 1,38 | 240 | 100 |
| 040.035-DP | 10 | 18 | 50 | 72 | 40:1 | 8 | 1,38 | 320 | 70 |
| 060.020-DP | 10 | 18 | 50 | 70 | 60:1 | 7 | 1,38 | 420 | 40 |

Fluid- max. flow Volume (pump delivery)

| Reciprocating pump | Max. Flow Volume | V= 0 | .4 m/s | V= 0 | .7 m/s | V= 1 | .5m/s |
|--------------------|-----------------------|----------------------------------|-------------------------|----------------------------------|-------------------------|----------------------------------|--------------------------------------|
| | DIN 24374 T1 I/min | Stroke Frequency in DH/min | Flow Volume in I/min | Stroke Frequency in DH/min | Flow Volume in I/min | Stroke Frequency in DH/min | Flow Volume _I in I/min |
| 015.050-DP | 24,8 | 14 | 1,4 | 25 | 2,5 | 53 | 5,3 |
| 020.035-DP | 22,4 | 14 | 1,0 | 26 | 1,8 | 55 | З,9 |
| 025.008-DP | 10,0 | 14 | 0,2 | 24 | 0,4 | 52 | 0,8 |
| 030.020-DP | 14,8 | 14 | 0,6 | 24 | 1,0 | 51 | 2,1 |
| 030.050-DP | 20,8 | 14 | 1,4 | 25 | 2,5 | 53 | 5,3 |
| 040.035-DP | 16,2 | 14 | 1,0 | 26 | 1,8 | 55 | З,9 |
| 060.020-DP | 11,0 | 14 | 0,6 | 24 | 1,0 | 51 | 2,0 |

Key

Air

/Ţ

| | V = Flow rate DH = Double stroke I = <u>Fluid operating overpressure</u> Air inlet overpressure |
|--|--|
| Max. Suction height | 7.8 m |
| Lowest operating temperature | 10 °C |
| (without special measures) | |
| Max. fluid temperature (operating temperature) | 90 °C |

When used for paint spraying: use silicone-free process materials

(air pressure) and accessories only.

The accessories for the fluid side (pressure accessories) of the MERKUR 2000 programme

are not in every case suitable for the reciprocating pump 060.020-DP.

- note the permissible operating pressure

SOUND EMISSION

As the working place cannot be anticipated and every place is different, the highest sound level is shown.

MEASUREMENT SPACING



| | Air inlet overpressure in bar | | | | | |
|-----------------------|-------------------------------|----|----|--------|------|--|
| Reciprocating pump | 2 | 4 | 6 | 8 (7)* | | |
| 015.050-DP | 76 | 81 | 84 | 85 | (A) | |
| 020.035-DP | 76 | 81 | 84 | 85 | dB | |
| 025.008-DP | 74 | 79 | 81 | 84 | e in | |
| 030.020-DP | 76 | 81 | 84 | 85 | sur | |
| 030.050-DP | 78 | 82 | 85 | 89 | ores | |
| 040.035-DP | 78 | 82 | 85 | 89 | l pu | |
| 060.020-DP | 78 | 82 | 85 | 88 | Sou | |
| | | | | | | |

A danger warning sign is attached to the reciprocating pump.



CONSTRUCTION MATERIALS OF

THE SURFACE AREA IN CONTACT WITH FLUID MATERIAL



| Pos. | Designation | Material/surface |
|------|----------------------|----------------------|
| 1 | Cheese head screw | St/galvanised |
| 2 | Seal washer | PA 6 |
| 3 | Fixing screw | St/galvanised |
| 4 | Coupling housing | 1.4104 |
| 5 | Flat packing | Rubber/Aramide fibre |
| 6 | Stuffing | PE/PTFE |
| 7 | Thrust ring and | 1.4305 |
| 8 | support ring | 1.4310 |
| 9 | Spring washer | PE |
| 10 | Seal washer | PE |
| 11 | Profile sealing ring | Hard metal G10 |
| 12 | Valve seat | 1.4305/nickel-plated |
| 13 | Banjo bolt | PA |
| 14 | Level indicator | FPM |
| 15 | O-ring | 1.4305 |
| 16 | Cylinder Step piston | 1.4305/chrome-plated |
| 17 | Ball | 1.4125 |

DIMENSIONS, SCREW CONNECTION THREADS, RATED DIAMETER OF CONNECTIONS, MOUNTING POSITION



The reciprocating pumps have ball valves without springs and can therefore only be operated in the vertical position or in a position slightly departing from the vertical.

FOOTNOTE

Relevant documentation Sales catalogue 01.2044

GRACO

RECIPROCATING PUMPS MERKUR 2000



| Air motor Pos. 10 | Displacement pump Pos. 20 | Thread piece Pos. 30 | Parallel pin Pos. 40 | |
|--------------------------|---|--|--|--|
| | | | | |
| D110 S70 | 000.050-DO 78003 014002 | M14 x 1 | | |
| 78015 004003 | 000.035-DO 78003 015002 | 76742 016001 | | |
| D60 S70 78015 004002 | 000.008-DO 78003 005002 | M8 x 1 76742 009001 | | |
| D110 S70 78015 004003 | 000.020-DO 78003 013002 | | 4 X M6 x 70 740006 084033 | |
| | 000.050-DO 78003 014002 | M14 x 1 | 740000 004035 | |
| D160 S70 78015 004004 | 000.035-DO 78003 015002 | 76742 016001 | | |
| | 000.020-DO 78003 013002 | | | |
| | Air motor Pos. 10 D110 S70 78015 004003 D60 S70 78015 004002 D110 S70 78015 004003 D160 S70 78015 004004 | Air motor Pos. 10Displacement pump Pos. 20Pos. 10Pos. 20D110 S70 78015 004003000.050-DO 78003 014002D60 S70 78015 004002000.035-DO 78003 015002D10 S70 78015 004003000.020-DO 78003 013002D110 S70 78015 004003000.020-DO 78003 014002D160 S70 78015 004004000.035-DO 78003 014002D160 S70 78015 004004000.035-DO 78003 015002D160 S70 78015 004004000.035-DO 78003 015002 | Air motor Pos. 10Displacement pump Pos. 20Thread piece Pos. 30D110 S70 78015 004003000.050-DO 78003 014002M14 x 1 76742 016001D60 S70 78015 004002000.035-DO 78003 015002M14 x 1 76742 016001D60 S70 78015 004002000.008-DO 78003 005002M8 x 1 76742 009001D110 S70 78015 004003000.020-DO 78003 013002M14 x 1 76742 009001D160 S70 78015 004004000.050-DO 78003 014002M14 x 1 76742 016001D160 S70 78003 015002000.035-DO 78003 015002M14 x 1 76742 016001 | |

| Subject to change | | | Page 1 of 7 |
|-----------------------------|--------------------------|--------|-------------|
| Prepared by. 06.10.99 Hilse | USER INFORMATION | Issued | 10.99 |
| Checked by. 19.10.99 Kuhn | - LIST OF REPAIR PARTS - | B.6.2 | 0.44EO |

F22.060.01, issued on 01.98

Note the protection mark in accordance with DIN 34



| | 000 010 | | | |
|--|---|--|---|--|
| List of repair | r parts, Air n | notor control | | Part No. 79978 904103 |
| Pos 180 | 2 off | Flat packing | 80 x 25 x 0.75 | |
| Pos 210 | 4 off | O-ring | 30 x 2 B | |
| Pos 220 | 1 off | Drive pin | | |
| Pos 250 | 1 off | Flat slide | 31,5 x 31,5 | |
| Pos 260 | 1 off | Slide plate | to slide 31,5 | Note assembly position |
| | | | · · · · · · | |
| List of repair | r parts, Air n | notor seals | | Part No. 79978 904102 |
| Pos.40 | 2 off | O-ring | 54 x 3 B | |
| Pos 90 | 1 off | O-ring | 60 x 5 B | |
| Pos 160 | 1 off | Grooved ring | G 12 x 24 x 7.5 | Can only be fitted with set of tools Item ID. |
| Pos 180 | 2 off | Flat packing | 80 x 25 x 0.75 | 10103 011002 |
| [| | | | |
| List of repair | r parts, pisto | on rod | | Part No. 79978 904105 |
| Pos 70 | 1 off | Parallel pin | M 8 x 20 PLAS | |
| Pos 100 | 1 off | Piston rod | D12 L131 | |
| | | | | |
| Single part, | cylinder cov | ver | 1 | Part No. 77536 033006 |
| Pos 10 | 1 off | Cylinder cover | D60 | |
| | | | | D (1) D |
| Single part, | cylinder bot | tom | | Part No. 77542 032002 |
| Pos 110 | 1 off | Cylinder bottom | D60 | |
| AIR MOTO | <u>R D110 S</u> | 70 | | |
| List of repair | r parts, Air n | notor control | | Part No. 79978 904103 |
| Pos 180 | | | | |
| | 2 off | Flat packing | 80 x 25 x 0.75 | |
| Pos 210 | 2 off 4 off. | Flat packing O-ring | 80 x 25 x 0.75 30 x 2 B | |
| Pos 210 Pos 220 | 2 off 4 off. 1 off. | Flat packing O-ring Drive pin | 80 x 25 x 0.75 30 x 2 B | |
| Pos 210 Pos 220 Pos 250 | 2 off 4 off. 1 off. 1 off | Flat packing O-ring Drive pin Flat slide | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 | |
| Pos 210 Pos 220 Pos 250 Pos 260 | 2 off 4 off. 1 off. 1 off 1 off | Flat packing O-ring Drive pin Flat slide Slide plate | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 | Note assembly position |
| Pos 210 Pos 220 Pos 250 Pos 260 | 2 off 4 off. 1 off. 1 off 1 off | Flat packing O-ring Drive pin Flat slide Slide plate | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 | Note assembly position |
| Pos 210 Pos 220 Pos 250 Pos 260 | 2 off 4 off. 1 off. 1 off 1 off parts, Air n | Flat packing O-ring Drive pin Flat slide Slide plate | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 | Note assembly position Part No. 79978 904152 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 | 2 off 4 off. 1 off. 1 off 1 off parts, Air n 2 off | Flat packing O-ring Drive pin Flat slide Slide plate | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 | Note assembly position Part No. 79978 904152 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 Pos 90 | 2 off 4 off. 1 off. 1 off 1 off r parts, Air n 2 off 1 off | Flat packing O-ring Drive pin Flat slide Slide plate notor seals O-ring O-ring | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 100 x 3 B 100 x 5 B | Note assembly position Part No. 79978 904152 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 Pos 90 Pos 160 | 2 off 4 off. 1 off. 1 off 1 off r parts, Air n 2 off 1 off 1 off | Flat packing O-ring Drive pin Flat slide Slide plate notor seals O-ring O-ring Grooved ring | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 100 x 3 B 100 x 5 B G 30 x 45 x 12.5B | Note assembly position Part No. 79978 904152 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 Pos 90 Pos 160 Pos 180 | 2 off 4 off. 1 off. 1 off 1 off <u>parts, Air n</u> 2 off 1 off 1 off 2 off | Flat packing O-ring Drive pin Flat slide Slide plate notor seals O-ring O-ring Grooved ring Flat packing | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 100 x 3 B 100 x 5 B G 30 x 45 x 12.5B 80 x 25 x 0.75 | Note assembly position Part No. 79978 904152 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 Pos 90 Pos 160 Pos 180 | 2 off 4 off. 1 off. 1 off 1 off 2 off 1 off 1 off 2 off | Flat packing O-ring Drive pin Flat slide Slide plate notor seals O-ring O-ring Grooved ring Flat packing | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 100 x 3 B 100 x 5 B G 30 x 45 x 12.5B 80 x 25 x 0.75 | Note assembly position Part No. 79978 904152 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 Pos 90 Pos 160 Pos 180 | 2 off 4 off. 1 off. 1 off 1 off 2 off 1 off 2 off 2 off | Flat packing O-ring Drive pin Flat slide Slide plate notor seals O-ring O-ring Grooved ring Flat packing | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 100 x 3 B 100 x 5 B G 30 x 45 x 12.5B 80 x 25 x 0.75 | Note assembly position Part No. 79978 904152 Part No. 79978 904154 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 Pos 90 Pos 160 Pos 180 List of repair Pos 70 | 2 off 4 off. 1 off. 1 off 1 off 7 parts, Air n 2 off 1 off 2 off 2 off 1 off 2 off 1 off 1 off | Flat packing O-ring Drive pin Flat slide Slide plate notor seals O-ring O-ring Grooved ring Flat packing | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 100 x 3 B 100 x 5 B G 30 x 45 x 12.5B 80 x 25 x 0.75 M16 x 30 PLAS | Note assembly position Part No. 79978 904152 Part No. 79978 904154 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 Pos 90 Pos 160 Pos 180 List of repair Pos 70 Pos 100 | 2 off 4 off. 1 off. 1 off 1 off 2 off 1 off 2 off 2 off 2 off 1 off 2 off 1 off 1 off 1 off 1 off | Flat packing O-ring Drive pin Flat slide Slide plate Notor seals O-ring O-ring Grooved ring Flat packing Dir rod Parallel pin Piston rod | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 100 x 3 B 100 x 5 B G 30 x 45 x 12.5B 80 x 25 x 0.75 M16 x 30 PLAS D30 L121 | Note assembly position Part No. 79978 904152 Part No. 79978 904154 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 Pos 90 Pos 160 Pos 180 List of repair Pos 70 Pos 100 | 2 off 4 off. 1 off. 1 off 1 off 7 parts, Air n 2 off 1 off 2 off 2 off 1 off 2 off 1 off 1 off 1 off | Flat packing O-ring Drive pin Flat slide Slide plate notor seals O-ring O-ring Grooved ring Flat packing on rod Parallel pin Piston rod | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 100 x 3 B 100 x 5 B G 30 x 45 x 12.5B 80 x 25 x 0.75 M16 x 30 PLAS D30 L121 | Note assembly position Part No. 79978 904152 Part No. 79978 904154 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 Pos 90 Pos 160 Pos 180 List of repair Pos 70 Pos 100 | 2 off 4 off. 1 off. 1 off 1 off 2 off 1 off 2 off 2 off 1 off 2 off 1 off 1 off 1 off 1 off | Flat packing O-ring Drive pin Flat slide Slide plate notor seals O-ring O-ring Grooved ring Flat packing pin rod Parallel pin Piston rod | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 100 x 3 B 100 x 5 B G 30 x 45 x 12.5B 80 x 25 x 0.75 M16 x 30 PLAS D30 L121 | Note assembly position Part No. 79978 904152 Part No. 79978 904154 Part No. 79978 904154 Part No. 77536 033011 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 Pos 90 Pos 160 Pos 180 List of repair Pos 70 Pos 100 | 2 off 4 off. 1 off. 1 off 1 off 2 off 1 off 2 off 2 off 1 off 1 off 1 off 1 off 1 off 1 off 1 off | Flat packing O-ring Drive pin Flat slide Slide plate Notor seals O-ring O-ring Grooved ring Flat packing Flat packing Parallel pin Piston rod | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 100 x 3 B 100 x 5 B G 30 x 45 x 12.5B 80 x 25 x 0.75 M16 x 30 PLAS D30 L121 D110 | Note assembly position Part No. 79978 904152 Part No. 79978 904154 Part No. 79978 904154 Part No. 77536 033011 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 Pos 90 Pos 160 Pos 180 List of repair Pos 70 Pos 100 Single part, Pos 10 | 2 off 4 off. 1 off. 1 off 1 off 2 off 1 off 2 off 2 off 1 off 2 off 1 off 1 off 1 off 1 off 1 off | Flat packing O-ring Drive pin Flat slide Slide plate notor seals O-ring O-ring Grooved ring Flat packing Flat packing on rod Parallel pin Piston rod | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 100 x 3 B 100 x 5 B G 30 x 45 x 12.5B 80 x 25 x 0.75 M16 x 30 PLAS D30 L121 D110 | Note assembly position Part No. 79978 904152 Part No. 79978 904154 Part No. 79978 904154 Part No. 77536 033011 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 Pos 90 Pos 160 Pos 160 Pos 180 List of repair Pos 70 Pos 100 Single part, Pos 10 | 2 off 4 off. 1 off. 1 off 1 off 2 off 1 off 2 off 2 off 1 off 1 off 1 off 1 off 1 off 1 off 1 off 2 off | Flat packing O-ring Drive pin Flat slide Slide plate notor seals O-ring O-ring Grooved ring Flat packing Flat packing on rod Parallel pin Piston rod | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 100 x 3 B 100 x 5 B G 30 x 45 x 12.5B 80 x 25 x 0.75 M16 x 30 PLAS D30 L121 D110 | Note assembly position Part No. 79978 904152 Part No. 79978 904154 Part No. 79978 904154 Part No. 77536 033011 Part No. 77542 038011 |
| Pos 210 Pos 220 Pos 250 Pos 260 List of repair Pos 40 Pos 90 Pos 160 Pos 180 List of repair Pos 70 Pos 100 Single part, Pos 10 | 2 off 4 off. 1 off. 1 off 1 off 2 off 1 off 2 off 2 off 1 off 2 off 1 off 2 off 1 off 1 off 1 off 1 off 1 off 1 off 1 off 1 off | Flat packing O-ring Drive pin Flat slide Slide plate Notor seals O-ring O-ring Grooved ring Flat packing Flat packing Dir rod Parallel pin Piston rod Parallel pin Piston rod | 80 x 25 x 0.75 30 x 2 B 31,5 x 31,5 to slide 31,5 100 x 3 B 100 x 5 B G 30 x 45 x 12.5B 80 x 25 x 0.75 M16 x 30 PLAS D30 L121 D110 D110 | Note assembly position Part No. 79978 904152 Part No. 79978 904154 Part No. 79978 904154 Part No. 77536 033011 Part No. 77542 038011 |

AIR MOTOR D160 S70

| List of repair | r parts, Air n | notor control | | Part No. 79978 904103 |
|----------------|----------------|---------------|----------------|------------------------|
| Pos 180 | 2 off | Flat packing | 80 x 25 x 0.75 | |
| Pos 210 | 4 off | O-ring | 30 x 2 B | |
| Pos 220 | 1 off | Drive pin | | |
| Pos 250 | 1 off | Flat slide | 31,5 x 31,5 | |
| Pos 260 | 1 off | Slide plate | to slide 31,5 | Note assembly position |

| List of repair | Part No. 79978 904352 | | | |
|----------------|-----------------------|--------------|----------------|--|
| Pos 40 | 2 off | O-ring | 150 x 3 B | |
| Pos 90 | 1 off | O-ring | 148 x 6 B | |
| Pos 160 | 1 off | Grooved ring | G 30 x 45 x | |
| Pos 180 | 2 off | Flat packing | 80 x 25 x 0.75 | |

| List of repair | r parts, pistor | Part No. 79978 904154 | | |
|----------------|-----------------|-----------------------|---------------|--|
| Pos 70 | 1 off | Parallel pin | M16 x 30 PLAS | |
| Pos 100 | 1 off | Piston rod | D30 L121 | |

| Single part, | cylinder cov | rer | | Part No. 77536 033016 |
|--------------|--------------|----------------|------|-----------------------|
| Pos 10 | 1 off | Cylinder cover | D160 | |

| Single part, | cylinder bott | Part No. 77542 038016 | | |
|--------------|---------------|-----------------------|------|--|
| Pos 110 | 1 off | Cylinder bottom | D160 | |



DISPLACEMENT PUMP 000.008-DO

| Liet of repair parts, apple | | | | | |
|--|-----------------------|---------------------------|--------------------|-----------------------|--|
| | | | | Fait No. 79978 906053 | |
| Pos 90 | 1 Off | Stuffing complete | 11.9 x 26.1 x 18.3 | | |
| Pos 120 | 1 off | Flat packing | D53.5 x T1 | | |
| Pos 170 | 1 off | Stuffing complete | 16.7 x 28.7 x 16.0 | | |
| Pos 210 | 1 off | Seal washer | 33.2 x 36 x 1.5 | | |
| List of repair | · parts, deca | ant valve, Displacement p | oump | Part No. 79978 906054 | |
| Pos 30 | 1 off | Profile sealing ring | 7 x 10.5 x 1.9 | | |
| Pos 40 | 1 off | Valve seat | D 5.5 | | |
| Pos 50 | 1 off | Seal washer | 9 x 11.8 x 2.4 | | |
| Pos 60 | 1 off | Ball | 8 mm l | | |
| Pos 210 | 1 off | Seal washer | 33.2 x 36 x 1.5 | | |
| List of repair | Part No. 79978 906055 | | | | |
| Pos 230 | 1 off | Profile sealing ring | 13 x 16 x 1.9 | | |
| Pos 240 | 1 off | Valve seat | D 9 | | |
| Pos 250 | 1 off | Seal washer | 20.5 x 22.5 x 1 | | |
| Pos 260 | 1 off | Ball | 12 mm I | | |
| List of repair | parts, level | indicator, Displacement | pump | Part No. 79978 906056 | |
| Pos 270 | 1 off | Level indicator | for detergents | | |
| Pos 280 | 1 off | O-ring | 14 x 4 B | | |
| Pos 290 | 1 off | O-ring | 10 x 2 B | | |
| Single part, | step piston, | Part No. 76598 009002 | | | |
| Pos 10 | 1 off | Step piston | D16.8 / D12 | | |
| Single part, Banjo bolt, Displacement pump | | | | Part No. 76031 041002 | |
| Pos 20 | 1 off | Banjo bolt | M14 x 1 x 17 | | |

DISPLACEMENT PUMP 000.020-DO

| Single part, | Part No. 79978 906102 | | | |
|--|-----------------------|-------------------------|--------------------|-----------------------|
| Pos 90 | 1 off | Stuffing complete | 19.9 x 35.1 x 18.3 | |
| Pos 120 | 1 off | Flat packing | D63,5 x T1 | |
| Pos 170 | 1 off | Stuffing complete | 27.7 x 40.1 x 16.0 | |
| Pos 210 | 1 off | Seal washer | 43.2 x 46 x 1.4 | |
| List of repair | parts, deca | ant valve, Displacement | pump | Part No. 79978 906103 |
| Pos 30 | 1 off | Profile sealing ring | 13 x 16 x 1.9 | |
| Pos 40 | 1 off | Valve seat | D 9 | |
| Pos 50 | 1 off | Seal washer | 17.8 x 20.2 x 2.2 | |
| Pos 60 | 1 off | Ball | 12 mm I | |
| Pos 210 | 1 off | Seal washer | 43.2 x 46 x 1.4 | |
| List of repair | · parts, suct | on valve, Displacement | pump | Part No. 79978 906104 |
| Pos 230 | 1 off | Profile sealing ring | 16 x 19 x 1.9 | |
| Pos 240 | 1 off | Valve seat | D 12 | |
| Pos 250 | 1 off | Seal washer | 25.6 x 28 x 1.3 | |
| Pos 260 | 1 off | Ball | 16 mm l | |
| List of repair | · parts, leve | indicator, Displacement | pump | Part No. 79978 906056 |
| Pos 270 | 1 off | Level indicator | for detergents | |
| Pos 280 | 1 off | O-ring | 14 x 4 B | |
| Pos 290 | 1 off | O-ring | 10 x 2 B | |
| Single part, | Part No. 76598 008002 | | | |
| Pos 10 | 1 off | Step piston | D27.8 / D20 | |
| Single part, Banjo bolt, Displacement pump | | | | Part No. 76031 049002 |
| Pos 20 | 1 off | Banjo bolt | M22 x 1.5 x 23 | |
| | | | | |

DISPLACEMENT PUMP 000.035-DO

| List of repair parts, seals | | | | Part No. 79978 906153 |
|-----------------------------|-----------------------|------------------------|-----------------------|-----------------------|
| Pos 90 | 1 off | Stuffing complete. | 24.5 x 42.7 x 19.2 | |
| Pos 120 | 1 off | Flat packing | D73.5 x T1 | |
| Pos 170 | 1 off | Stuffing complete | 34.4 x 49.2 x 16.7 | |
| Pos 210 | 1 off | Seal washer | 53 x 55.8 x 1.4 | |
| List of repair | r parts, deca | nt valve, Displacement | pump | Part No. 79978 906154 |
| Pos 30 | 1 off | Profile sealing ring | 16 x 19 x 1.9 | |
| Pos 40 | 1 off | Valve seat | D 12 | |
| Pos 50 | 1 off | Seal washer | 21.8 x 25.2 x 2.2 | |
| Pos 60 | 1 off | Ball | 16mm I | |
| Pos 210 | 1 off | Seal washer | 53 x 55.8 x 1.4 | |
| List of repair | r parts, suction | on valve, Displacement | oump | Part No. 79978 906155 |
| Pos 230 | 1 off | Profile sealing ring | 20 x 24 x 2.4 | |
| Pos 240 | 1 off | Valve seat | D 14,5 | |
| Pos 250 | 1 off | Seal washer | 33.2 x 36 x 1.5 | |
| Pos 260 | 1 off | Ball | 20 mm l | |
| List of repair | Part No. 79978 906056 | | | |
| Pos 270 | 1 off | Level indicator | for detergents | |
| Pos 280 | 1 off | O-ring | 14 x 4 B | |
| Pos 290 | 1 off | O-ring | 10 x 2 B | |
| Single part, | step piston, | Displacement pump | | Part No. 76598 010002 |
| Pos 10 | 1 off | Step piston | D34.5 / D24.6 | |
| Single part, | Banjo bolt, D | Displacement pump | | Part No. 76031 053002 |
| Pos 20 | 1 off | Banjo bolt | M27 x 1.5 x 24 | |
| DISPI ACE | MENT PU | MP 000.050-DO | | |
| | | | | Dett No. 70070 000000 |
| LIST OF FEPAIR PARTS, SEAIS | | | Part No. 79978 906202 | |
| POS 90 | | Sturing complete | 29.1 X 47.1 X 19 | |
| Pos 120 | | | | |
| POS 170 | | Sturring complete. | 40.9 X 55.1 X 16.5 | |
| Pos 210 | 1 Off | Seal washer | 58.5 X 61.3 X 1.4 | |
| | | | | |

| Pos 210 | 1 off | Seal washer | 58.5 x 61.3 x 1.4 | |
|---|----------------|----------------------------|-------------------|-----------------------|
| List of repair | r parts, deca | Part No. 79978 906203 | | |
| Pos 30 | 1 off | Profile sealing ring | 20 x 24 x 2.4 | |
| Pos 40 | 1 off | Valve seat | D 14.5 | |
| Pos 50 | 1 off | Seal washer | 27.8 x 31.2 x 2.2 | |
| Pos 60 | 1 off | Ball | 20 mm l | |
| Pos 210 | 1 off | Seal washer | 58.5 x 61.3 x 1.4 | |
| List of repair | r parts, sucti | on valve, Displacement pu | mp | Part No. 79978 906204 |
| Pos 230 | 1 off | Profile sealing ring | 23 x 27 x 2.5 | |
| Pos 240 | 1 off | Valve seat | D 18,5 | |
| Pos 250 | 1 off | Seal washer | 40.2 x 43 x 1.5 | |
| Pos 260 | 1 off | Ball | 25 mm l | |
| List of repair | r parts, level | indicator, Displacement pu | ump | Part No. 79978 906056 |
| Pos 270 | 1 off | Level indicator | for detergents | |
| Pos 280 | 1 off | O-ring | 14 x 4 B | |
| Pos 290 | 1 off | O-ring | 10 x 2 B | |
| Single part, step piston, Displacement pump | | | | Part No. 76598 007002 |
| Pos 10 | 1 off | Step piston | D41 / D29.2 | |
| Single part, | Banjo bolt, D | Displacement pump | | Part No. 76031 059002 |
| Pos 20 | 1 off | Banjo bolt | M33 x 1.5 x 24 | |

REPAIR RECIPROCATING PUMPS REPAIR ACCESSORIES

(Sales catalogue 01.2044 extract)





| | Pos | Descriptio | on | Material | N | otes | Item ID |
|--|-------------------|----------------------|---------------|-------------|----------------|---|--------------|
| Compr. air conn. | 1001 | Safety val | ve | - | G¼ | PN 8 | 75591 008006 |
| • | 1002 | Sound abso | orber | - | G | 3 1/2 | 75665 007005 |
| | 1003 | Union comp | olete | - | D 15.5- | ·M22x1.5 | 77638 002003 |
| | 1004 | Air pressure connect | tion complete | - | D15. | 5 G 3/8 | 77631 015002 |
| | 1005 | Ball valve cor | nplete | - | PN 50 R | 3/8-G 3/8 | 77601 013002 |
| | 1006 | Nipple redu | | - | 8 R 3/8 tap | $M_{\rm m} = M_{\rm m}^2 M_{\rm m}^2 M_{\rm m}^2$ | 76639 208001 |
| | 1007 | Air pressure connec | tion complete | - | R 3/8 for 0 | ior gun up with filter | 77522 011003 |
| | 1000 | Flbow | lion complete | - | R ¼ tan | = M14x1 | 75214 006002 |
| | 1010 | Nipple redu | ction | - | 6-G ¼ | A-M14x1 | 76639 014001 |
| | 1011 | Bolted connec | tion -W | - | R ¼ t | ap. – 8 | 75202 001008 |
| Grounding | 1012 | Grounding | wire | - | Leng | gth 8m | 73483 001011 |
| Suction connection | 1013 | Nipple redu | ction | SST | M 26x1 | .5 x G3/4 | 77741 130002 |
| | 1014 | Screwed je | oint | SST | GE 22 - | – ZLR ED | 75204 010002 |
| | 1015 | Niple reduc | tion | SST | With ball v | /alves, StZn | 77741 022002 |
| | 1016 | Nipple redu | ction | SST | M 26x1 | .5 x D22 | 77741 131002 |
| | 1017 | Suction ho | ose | SST | D22 301 | container | 78848 020006 |
| | 1018 | Suction no | DSE | 551 | D22 200 | l container | 78848 020007 |
| | 1019 | Suction by | | 001 997 | - IC 1000mm | - DZZ | 77848 035000 |
| | 1020 | Suction he | 196 | SST | 1600mm | 10000/D22 | 77848 035010 |
| | 1022 | Seal wash | ner | AI | A 2 | 7x32 | 74188 025070 |
| | 1023 | Fixing scr | ew | St/Zn | G | 3⁄4 A | 74035 013003 |
| | 1024 | Detachable doul | ole nipple | CS/NI | R3/8 ta | p. – G3/4 | 77240 004002 |
| Pressure connection | 1025 | Seal wash | ner | SST | 17 x | 22 x 3 | 76188 105003 |
| | 1026 | Seal wash | ner | SST | 17 | x 21 | 74188 015090 |
| | 1027 | Back pressure | e valve | SST | G 3/8 – D | N 8 PN 350 | 78586 008002 |
| | 1028 | Hexagonal | nut | SST | G 3/8 - | - 25 long | 76074 030001 |
| | 1029 | Pipe comp | lete | SSI | G 3/8 – G | 1/4 PN 360 | 77796 063003 |
| | 1030 | Manomet | er | CuZn | 0-1 | 60 Dai 50 bar | 75782 012001 |
| | 1032 | Seal wash | her | SST | 14 | x 18 | 74188 012090 |
| | 1033 | Nipple redu | ction | SST | G 3/8 | - G 1/4 | 76641 017001 |
| | 1034 | Nipple redu | ction | SST | G 3/8 | 8 - G1/4 | 76639 016003 |
| | 1035 | Nipple redu | ction | SST | G | 3/8 | 76640 005001 |
| | 1036 | Pressure contr | ol valve | SST | P 100 – V | /M; PE 180 | 79637 009002 |
| | 1037 | Pressure contr | ol valve | SST | P 200 – \ | /M; PE 360 | 79637 010001 |
| | | | | | | | |
| b) Replacement O-Ri for Post 1003 and 1 | ng 1004 | Item ID 74186 0 | 25020 | | | | |
| c) Replacement O-Ri for Pos 1013 101 | ng 5 and 1016 | Item ID 74186 0 | 26020 | | | | |
| d) Replacement wash for Pos. 1014, 1015 | ner 5 and 1016 | Item ID 75188 0 | 97002 | | | | |
| e) Replacement seali for Pos. 1019 | ng ring | Item ID 76188 0 | 14002 | | | | |
| f) For fluid screen se | e page 1 | | | | | | |
| h) Hose connection G | 3/8 | | | | | | |
| i) Hose connection e | ither G 1/4 | or G 3/8 | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | Or | der Example |
| | | | | | | | |
| | | | Please lay ou | t each orde | r as follows: | | |
| | | | Description | | | Pos. No. | Part No. |
| | | | | V | | | V |
| | | | Reciprocating | pump 015 | .050-DP | 002 | 79042 062002 |
| | | | | | | | |
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GRACO STANDARD WARRANTY

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the repaid return of equipment claimed to be defective to an authorized Graco distributor for verification of claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labour, and transportation.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

Graco does not extend its warranty to accessories, appliances, materials or components which are sold by Graco but are not manufactured by Graco and makes no guarantee, however implied, with regard to the brand capability and suitability for a certain purpose. These parts sold by Graco but not manufactured by Graco (such as electric motors, switches, hoses, etc.) are covered by the warranties of the respective manufacturers. Graco will support the buyer in enforcing any warranty claim with the proviso that in no event can Graco be made liable for indirect, incidental, special or consequential damages which arise from the supply of appliances by Graco under the conditions governed by these provisions, or the supply, performance or use of any products or other goods which are sold under the conditions governed by these or the part of Graco or for any other reason.

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