

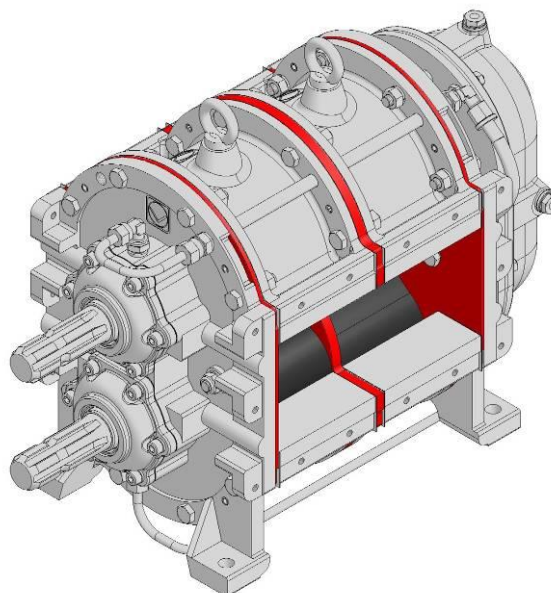
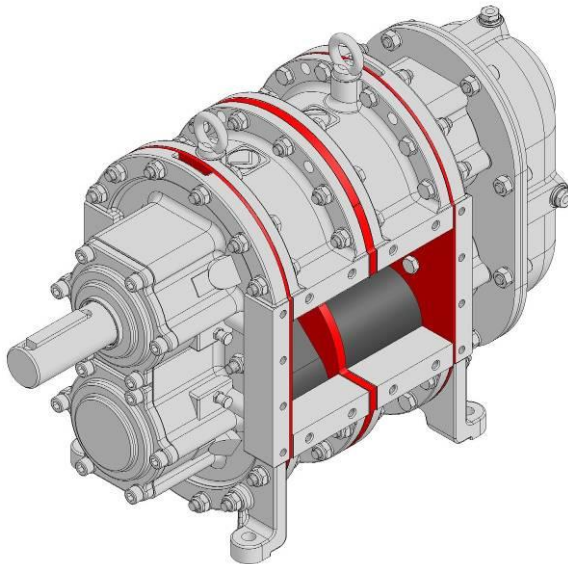


Operating instructions

Rotary lobe pump

R116, FX116, I116, R136, R136HD/I136, RP136

ENGINEERED TO WORK



Original operating instructions

Issuer

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Dear customer,

in every one of our products, you will see the entirety of our competence and our power of innovation at work. Each product is developed and built so that you can work more successfully.
We call it quite simply: ENGINEERED TO WORK

If you want to know more about our company or put forward requests or suggestions, a wealth of information can be found at www.vogelsang.info

1 User information

1.1 Using the operating instructions

These instructions contain all necessary information concerning the operating elements, handling, start-up and maintenance and repair work, as well as all of the relevant technical data.

The operating instructions are a component of the machine.

Please therefore keep the instructions ready to hand to ensure easy access to the necessary information at all times.

Read the operating instructions thoroughly. All of the points presented in these instructions must be understood and observed by those persons responsible for the installation, operation, maintenance and repair of the machine.

Vogelsang does not accept any liability for damage resulting from failure to comply with these maintenance and operating instructions.

1.2 Warning signs, danger symbols, information

Legend of symbols



Warning advisories (technical), safety advisories



Technical or general information

2 Intended purpose

The Vogelsang rotary lobe pump is a self-priming positive displacement pump for pumping aqueous to highly viscous fluids. The fluids can be chemically neutral, acidic or alkaline. They can be loaded with solid particles or/and loaded with gas.

The rotary lobe pump has been designed for the fluid to be pumped as specified by the customer. For other fluids or when the pump is not designed for a particular application, it has to be checked whether the materials of the rotary lobe pump which come into contact with the medium are suitable. If need be, the rotary lobe pump has to be renewed.

Any other use is contrary to the intended purpose. Vogelsang is not liable for any damage resulting from incorrect use.

The rotary lobe pump without connections or without drive is an incomplete machine. The installation instructions are provided in the "Installation" chapter.

The declaration of installation is part of these operating instructions.

The rotary lobe pump described in these operating instructions is not intended for use in potentially explosive atmospheres.

3 Safety Notes



Before putting into operation, carefully read and note the contents of the operating instructions and the safety information.

- **The warning and safety labels fitted provide important notes for safe operation.**
- **In the interests of your own safety, pay attention to these labels.**
- **The warning and safety labels may not be removed and must be replaced immediately if damaged or lost.**

Before starting work you should familiarise yourself with all facilities and controls and their function (see the chapter "Start-up").



- **Before starting operation, make sure**
 - that the pump is filled with liquid.
 - that access to rotating parts is not possible.
 - that the discharge pipe is not completely closed off. Otherwise the pump shaft seals or even the pump housing or the pipelines may be damaged or destroyed by the resulting high pressure.
- The pump may only be **set in operation** if the suction- and discharge pipes are connected so that access to the pumping chamber is not possible.
- The drive shaft must be completely covered by a coupling guard.
- Pump systems must be protected from excessive pressure.
- During pump operation, liquid must always be in the pump to cool the rotary lobes.



Pumping dangerous materials

If contact with the medium cannot be ruled out during maintenance or repair work, appropriate safety measures must be taken (protective goggles, protective gloves, etc.).

Warning! In certain circumstances, this dangerous material may have reached the buffer chamber or the drive unit.

Safety devices

Pressure can be limited, for example, using

- a current limiter on the motor
- a pressure relief valve
- a pressure switch to switch the system off
- an overload coupling



Prevent the pump from **running dry**, for example, using

- a temperature monitor
- a level gauge
- a flow rate gauge



Safety devices must regularly be checked for proper function, especially after maintenance and repair work and before putting into operation.



Drive

Attention! Before carrying out maintenance and repair work, switch off the drive. Ensure that the drive cannot be switched on by mistake.



Use the **lifting eye bolts*** on the pumps only for lifting the pump **without** mounting parts (for example, the motor)! See chapter on "Transport".

4 Assembly

4.1 Transport

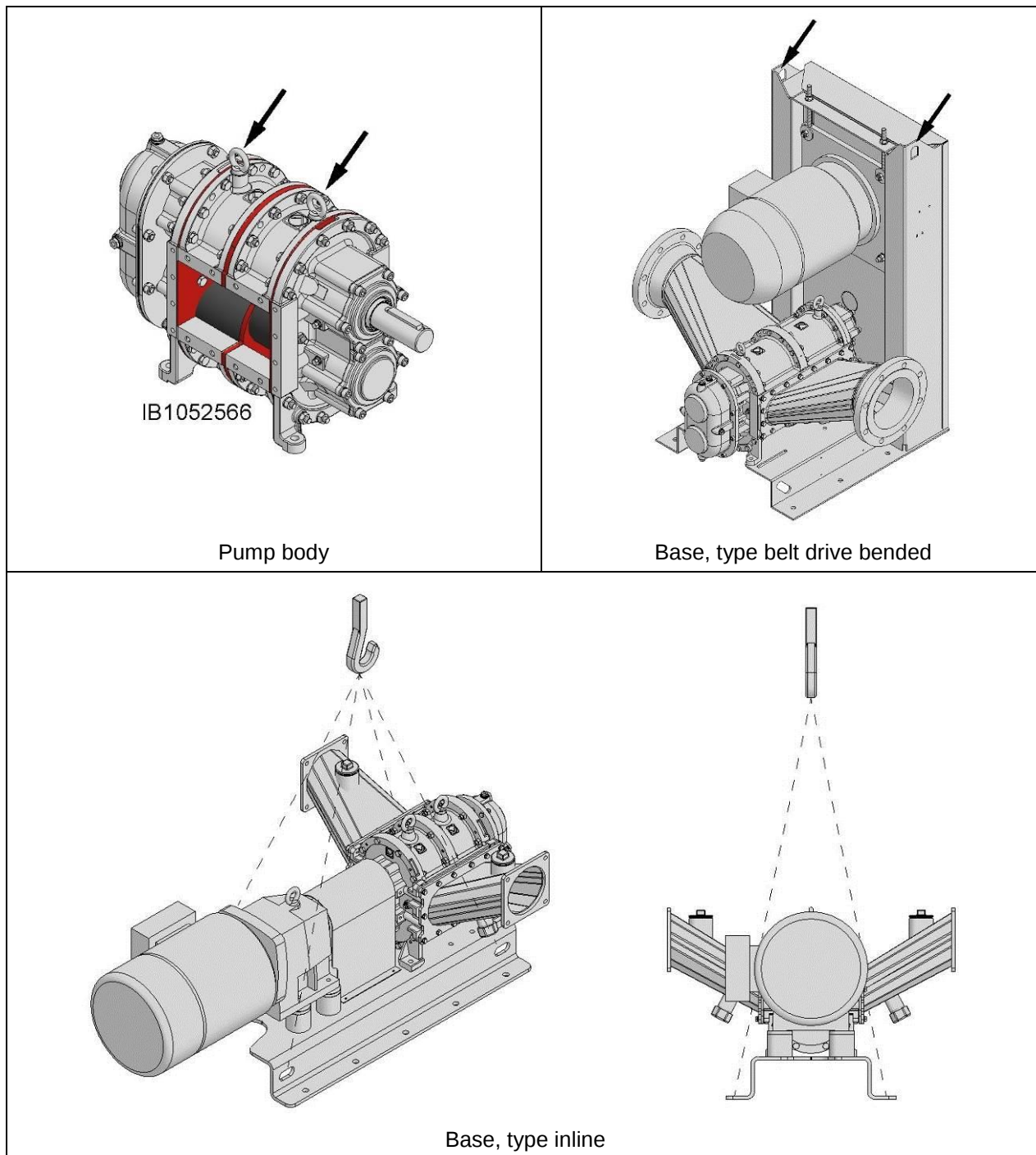


Fig. 1: Transport aids

If the pumps are transported in suspension, use the fitted suspension points for hoisting gear, see fig. "Transport aids".



Use the **lifting eye bolts** on the pumps only for lifting the pump **without** mounting parts (for example, the motor)!

- * Max. permissible weight with one lifting eye bolt M12: 340 kg
Max. permissible weight with two lifting eye bolts M12: 480 kg
(At an angle of attack up to 45°)

4.2 Assembly of pump and motor on base

To prevent wear, vibrations and noise,

- the base for pump and motor must not be out of alignment or under stress by the mounting bolts
- the **alignment of coupling must be checked and corrected before start-up**, see fig. "Alignment methods"

Retighten all motor and pump mounting screws on the base **after 20 operating hours**.

For pumps with belt drive check the belt tension acc. to 'accompanying sheet':

- at start-up
- before and after longer out-of-service periods
- after the first 10 operating hours
- every 2000 operating hours, once per year minimum



Use the **lifting eye bolts*** on the pumps only for lifting the pump **without** mounting parts (for example, the motor)! See chapter on "Transport".

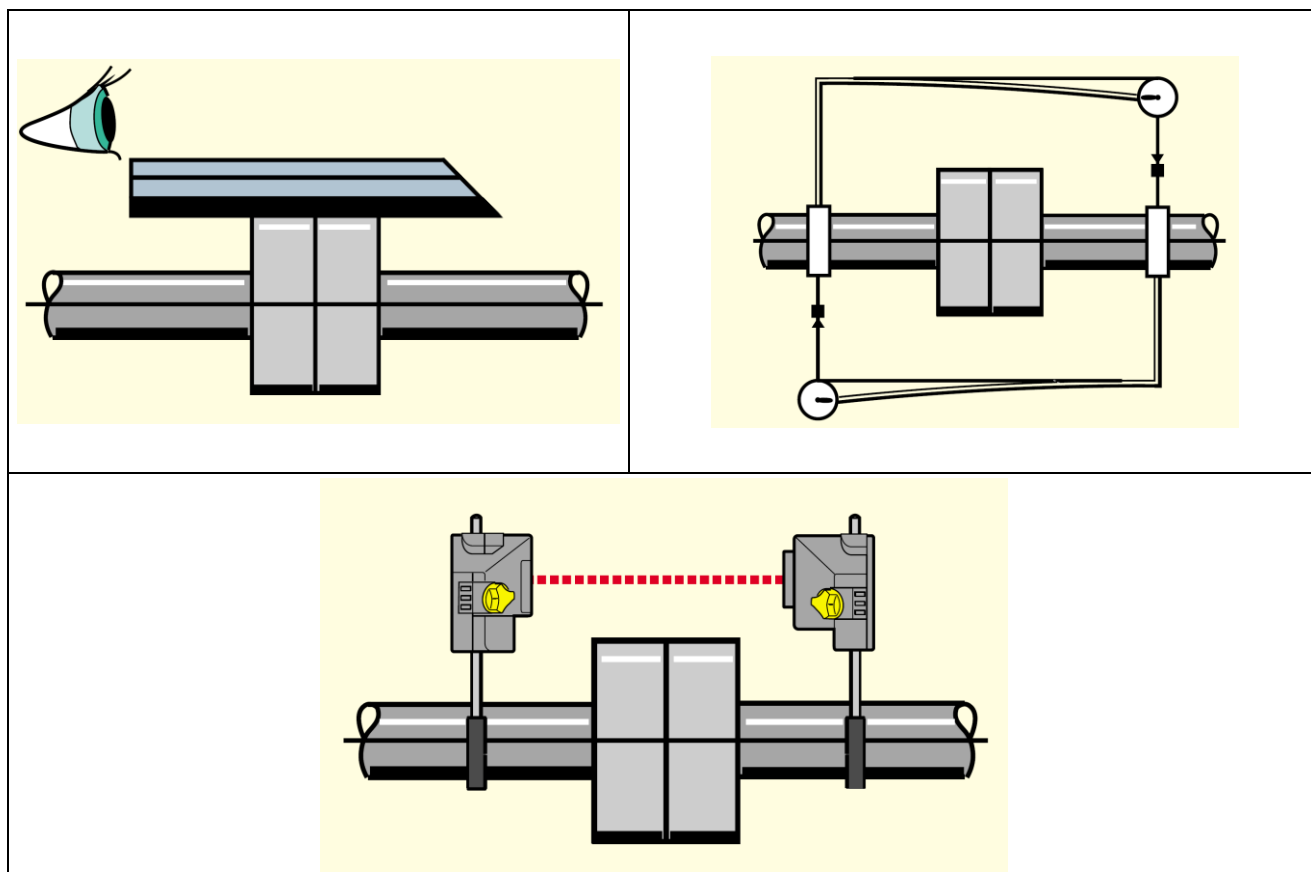


Fig. 2: Alignment methods

4.3 Assembly of rotary lobe pumps without base

Ensure that the pump is free of constraints while installation and while operating, too.

4.4 Installing the rotary lobe pump in pump systems and vehicles

- The connectors must be mounted free from stresses. In other words, the connectors have to be exactly one in front of the other even without screws.
- May be installed either upright or horizontally.
- Position the pressure and suction connections pointing upwards. This will ensure that the fluid remains in the pump after it is switched off.
- If the pump is installed horizontally, position the suction side facing downwards.
- If the pump is to be suspended, please contact us.



Important! Connector with sight glass may only be installed on suction side. Do not exceed the maximum suction height of 8 m (26.2 ft). This is the maximum distance between the lowest and highest points of the suction pipe.



If the diameter of the suction pipe is too small, the maximum suction height will be reduced by the friction loss. Please contact us for a calculation.

4.5 Pipelines and nominal pressures

Only use the pipeline diameters, wall thicknesses and materials recommended by us or by our representatives. This is essential for ensuring that the system functions properly!

Recommended connector diameters:

Pump size of series:		Minimum suction line diameter	Recommended diameter
116	136		
60	70	DN 75	DN 100
-	105	DN 100	DN 125
120	140	DN 125	DN 150
180	210	DN 150	DN 200
240	280	DN 150	DN 200
300	350	DN 150	DN 200
360	420	DN 150	DN 200



Attention! Suction lines whose diameter is too small may restrict the suction capability of your pump (risk of cavitation).

Only use high-pressure pipes on the pressure side:

- up to nominal diameter 150 mm - high pressure pipes with nominal pressure 16 bars (232 psi).
- from nominal diameter 200 mm up – high pressure pipes with nominal pressure 10 bars (145 psi).

If you are uncertain about anything, please contact us!

4.6 Long suction lines over 30m (100 ft)

Long suction lines must be laid with a slope of at least $2 \times$ pipe diameter in the direction of flow, ensuring that the pipeline can never run dry.

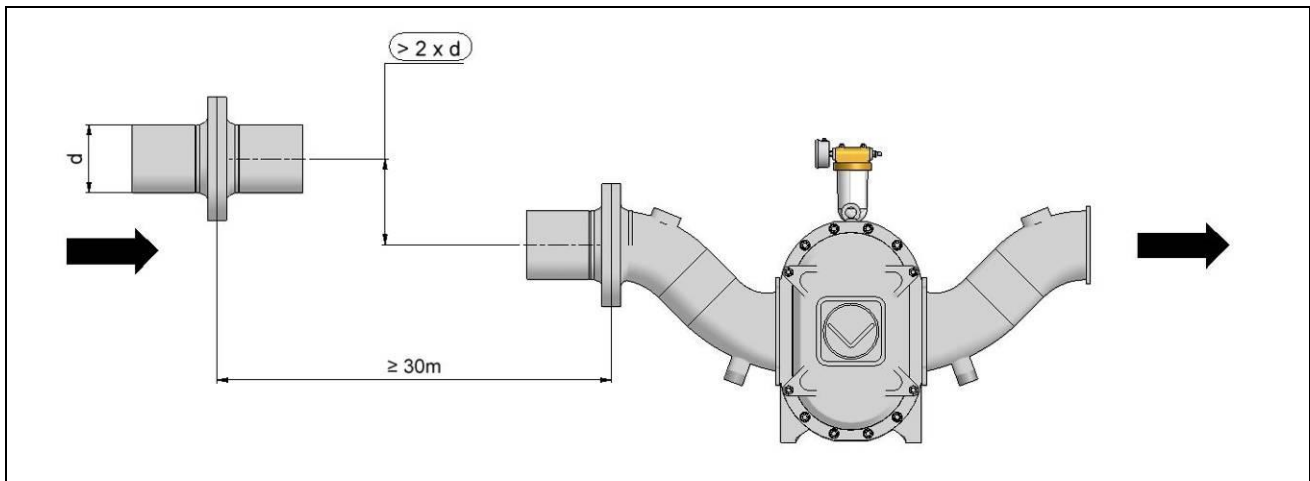


Fig. 3: Long suction lines

4.7 Temperature and pressure control

For running pumps with automatic mechanism, a temperature and pressure monitoring unit (optionally available from Vogelsang) is required. See also point on "Safety devices" in the chapter on "Safety instructions".

5 Start-up

5.1 Before start-up

Before the first start-up or in case of suction problems fill either the suction flange or the discharge flange with water or medium

5.2 Checks after start-up

Please check the following components after 20 operating hours:

- retighten all mounting screws of pump and motor

Pump series R116, FX116, I116

Please check **either** the tightening torque of lock nut **or** of strain screw!

- Tightening torque of lock nut:
 - Lock nut M45: 600 Nm
(Unscrew therefore the bearing cover at the drive side.)
- Tightening torque of strain screw:
 - First tighten the strain screw (M16, 10.9) with 200 Nm, then loosen it and tighten again with 140 Nm.
 - Strain screw (M12, 12.9): 140 Nm

Pump series R136, R136HD/I136

- Tightening torque of strain screw:
 - Strain screw M16: 290 Nm (Unscrew therefore the gearbox housing).

6 Direction Of Flow

The rotary lobe pump is essentially suitable for use in either direction of motion.



Important! The sight glass has to be installed on the suction side.
If the sight glass is on the pressure side (pumping backwards), the pressure may not exceed 2 bars (29 psi).

6.1 Drive units

6.1.1 Direction of rotation

If you are using motor-driven pump (such as an electrically powered motor, hydraulic motor) with one drive shaft, select the direction of rotation by determining the direction of the drive motor.

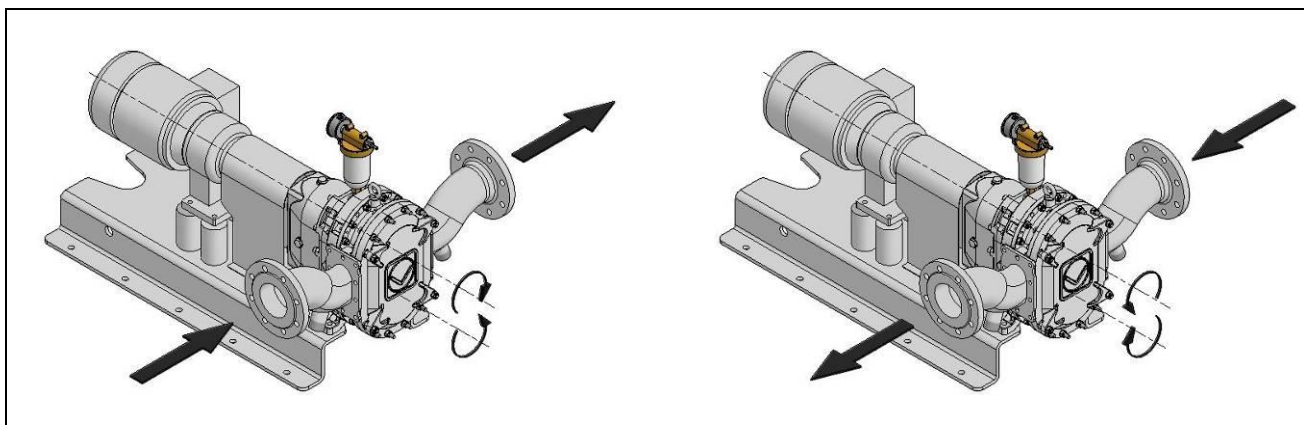


Fig. 4: Motor driven pump

6.1.2 Variable frequency drive operation

In general, rotary lobe pumps can be designed for variable frequency drive operation.

Advantages:

- Adaptation to operating conditions (viscosity, delivery rate, NPSHA)
- Wear compensation
- Speed proportional delivery rate (see characteristic line)

A variable frequency drive with a static characteristic line is to be used.
The starting torque / nominal torque ratio must be > 1.3 .

6.2 PTO drive

If you are using tractor driven pumps with two drive shafts, connect either the upper or lower the cardan shafts thus determining the direction of flow.

Limiting operating torque when tractor driven

To avoid shearing of drive shaft, for example by foreign matter in the pumps:

- The operating torque must be limited to 1600 Nm for cardan shafts with 1 3/8" profile, 6-parts
- The operating torque must be limited to 3200 Nm for cardan shafts with 1 3/4" profile, 6-parts and with 1 3/4" profile, 20-parts.



Attention! This limitation of operating torque is not a safety device to prevent pump overpressure. (see 'Theoretical operating torque' in chapter "Technical data").

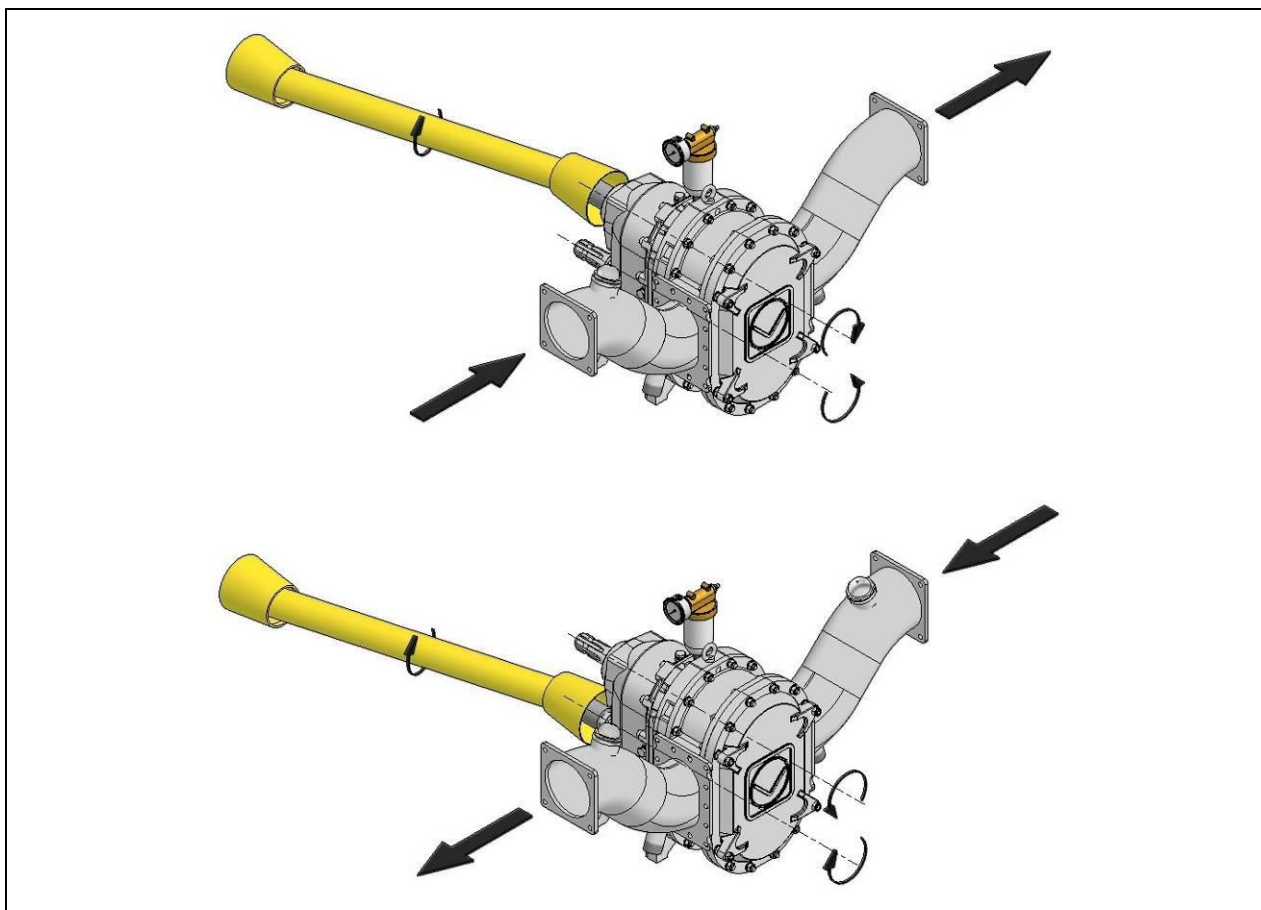


Fig. 5: PTO drive

6.3 Pump systems

The pressure and suction sides are rigidly defined by the rotation of the pumps.

If you are having suction difficulties, you can temporarily fill the suction line by reversing pump direction.

However, this cannot be done with pipelines that are secured by means of check valves / non-return valves.



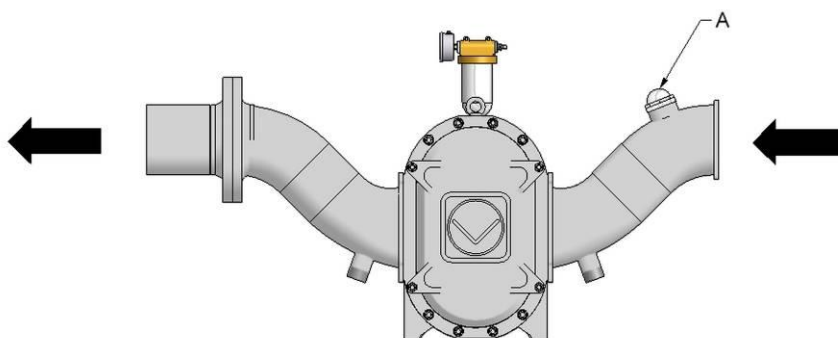
Attention! In case of pumping in the reverse direction pressure may not exceed 2 bar (29 psi).

6.4 Sight glass in the pump connector



Important! The sight glass has to be installed on the suction side.

If the sight glass is on the pressure side (pumping backwards), the pressure may not exceed 2 bars (29 psi).



A sight glass on suction side, max. 2 bar (29 psi)

Fig. 6: sight glass

7 Advisories For Using Rotary Lobe Pumps

Foreign objects	Keep the pipes as free as possible from foreign objects such as stones, wood residues, etc. These foreign objects lead to increased wear of the rotary lobes and the pump housing segments.
Highly viscous liquids	When using the pump for viscous sludges or slurries, depending on the liquid / sludge being pumped, the pump speed must be reduced according to the fluid's viscosity. This prevents cavitation from occurring.
Wintertime operation	If there is a risk of frost, the pump must be drained by dry running the pump in either direction, until all liquid is drained out of the pump. Therefore you may use the drain valves in the connectors. For a complete draining you must remove the cover. Warning! Before start-up, fill up with liquid again.
Periods of hot weather	During hot weather, gas may form in closed pipe systems. Because of higher pressures, this gas may damage the pump or pumping systems. Prevent the medium from becoming trapped in the pump.
Removing from service	Drain the pump by opening the cover and flush if necessary, for example in case of critical medium.

8 Maintenance

8.1 Changing of gearbox oil

Change the gear oil:

- after the first 20 operating hours
- all 2000 operating hours

Fill up gear oil (gearbox stand still):

- all 500 operating hours, all three months minimum

Checking the oil level - R116, R136, RP136 (see fig. "Gear oil")

The oil level has to reach the side check tap. For checking the oil level unscrew one of the side hex head screw plugs. Fill the oil up to the check tap.

Checking the oil level - FX116, I116, R136HD/I136 (see fig. "Gear oil")

For checking the oil level unscrew the **upper magnetic hex head screw plug**. The gearbox must be filled up to the top level, touching the magnetic hex head screw plug. Otherwise fill up oil.

Oil quantities:

Pump type	R116 (60-360)	R136 (70-420) RP136 (140-420)	FX116, I116 (60-360)	R136HD/I136 (70-420)
Oil quantity in liter [l]	1	1.5	2.2	3

Type of oil

VOGELSANG Standard oil

Mineral oil

Titan Gear MP90

SAE 90

Flash point 215°C

Art.-No. BSS.006

If you need other lubricants, please ask us for a table (TINF lubricants) of alternative oils.

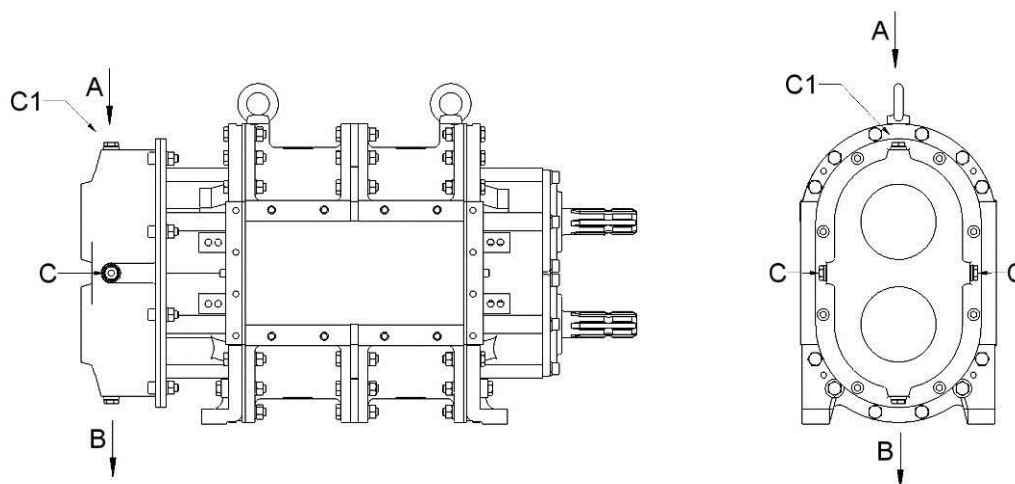
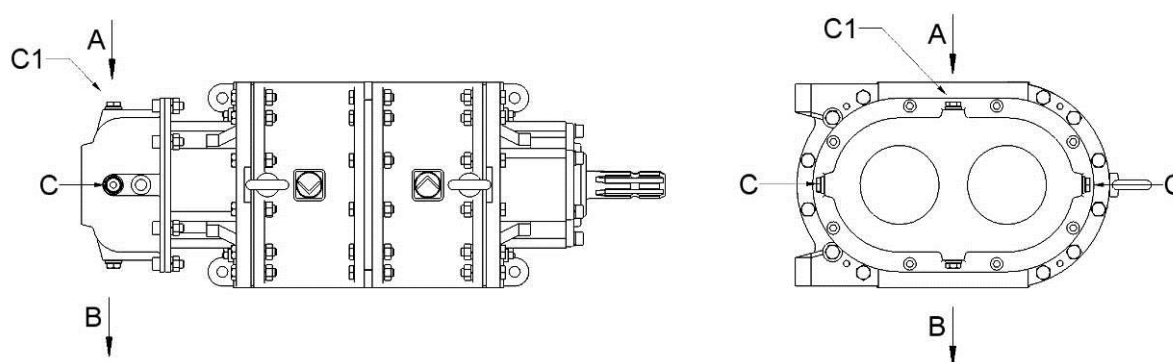
Vertical installation**Horizontal installation**

Fig. 7: Gear oil

A	fill
B	empty
C	check
C1	check (for "HD/I"-pumps)

8.2 Lubrication of sealing

Grease only a running machine, not in standstill.

Lubricate the grease nipples - Pump series R116, R136, RP136

- at start-up
- after each use
- after a longer out-of-service period (2-3 weeks)

Lubricate the grease nipples - Pump series R136HD/I136 (not for pump series FX116, I116)

- at start-up
- after a longer out-of-service period (2-3 weeks)

Lubricant

High-quality lubricant for rotary lobe pumps

Renolit GP2

NLGI-class 2, waterproof

Art-No. BSS.008

Quantity

5 shots per nipple with a grease gun

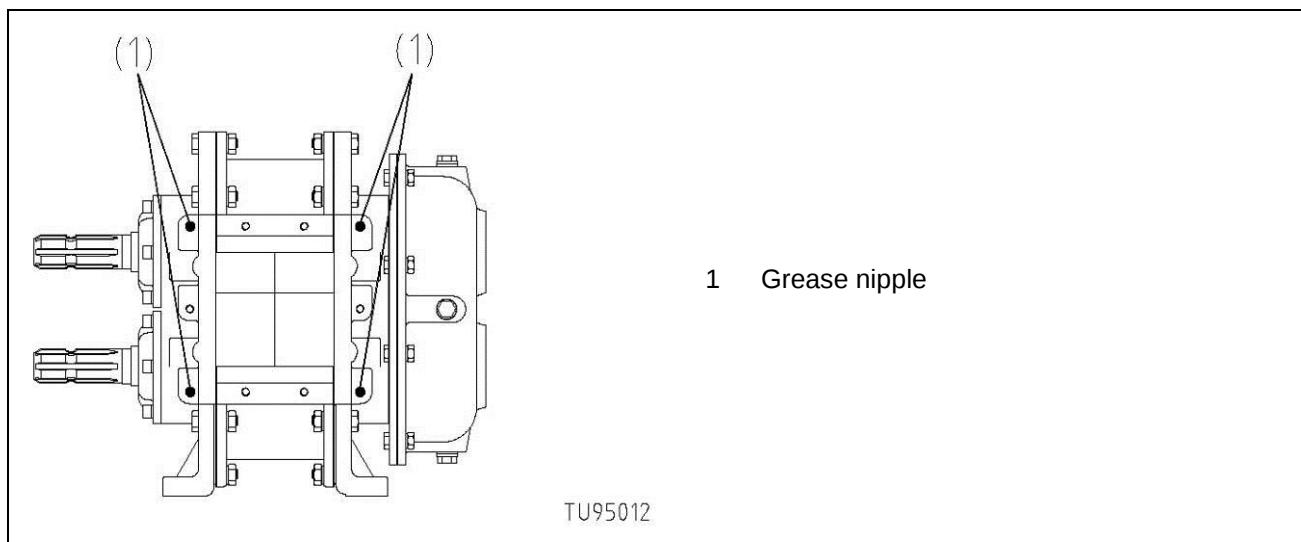


Fig. 8: Grease nipple

9 Repair

9.1 Conversion and spare parts

Modifications or changes to the unit are only permissible after consultation with the manufacturer. Only spare parts approved by the manufacturer or original spare parts can be used. The use of other parts invalidates the guarantee for any resulting damage.

9.2 Gears

The gears must be replaced in pairs only because they are manufactured and marked in pairs.

Pump series R116, FX116, I116

The gears are marked with **one** or **two 'X'**. The **X**-marked tooth of the first gear must be fixed between the both **X**-marked teeth of the second gear (see fig. "Gear R116/R136").

Pump series R136, R136HD/I136, RP136

Put **gear A** on the shaft. The clearance between the 8th and the 9th tooth of the second **gear B** must be opposite the tooth that is located on the centre line of **gear A**.

(Begin at the keyway and then count anti-clockwise! - see fig. "Gear R136")

After replacing the gears, please note the tightening torque of lock nuts or strain screws – see chapter "Control after using the pump the first time/start-up".

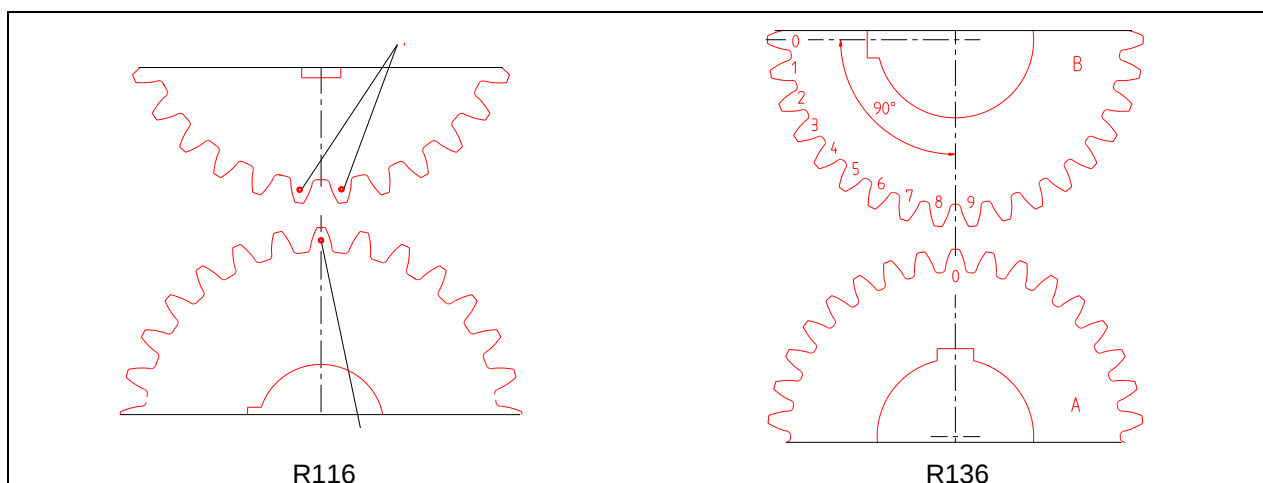


Fig. 9: Gear R116/R136

9.3 Extracting rings

Pay attention to the correct installation of the extracting rings while assembling the pump.

Pump series R116, I116

- Article **PRS.021 Extracting ring without groove** →
Assembling drive side at the fixed bearing (in front).
- Article **PRS.022 Extracting ring with groove** →
Assembling at the gearbox side at the floating bearing (at the end).

Pump series FX116

- Article **PRS0339 Extracting ring without groove** →
Assembling drive side at the fixed bearing (in front).
- Article **PRS0340 Extracting ring with groove** →
Assembling at the gearbox side at the floating bearing (at the end).

Pump series R136, R136HD/I136, RP136

- Article **PRS.003 Extracting ring without groove** →
Assembling drive side at the fixed bearing (in front).
- Article **PRS.004 Extracting ring with groove** →
Assembling at the gearbox side at the floating bearing (at the end).

9.4 Bearing cover

Fill the bearings at the drive side and the bearing covers with grease while mounting.
The bearing in front must not be lubricated by the grease nipples.



Caution when pumping dangerous materials:
Take appropriate safety measures: see "Safety notes" chapter.



Before opening the cover, if possible:

- Shut off the connected pipes
- Empty the pipe as much as possible using drain valves

Warning! The remaining liquid flows out of the pump when the cover is opened.

9.5 Rotary lobe change for RP136 Profi-Pumps

For a rotary lobe change the pump must not be disconnected from its connectors. See also fig. "Rotary lobe change for RP136 Profi pumps".

1. Unscrew the lock nuts (4). Use therefore lock nut wrench Art-No. PMS.004.
2. Remove the 8 nuts (2) and the 4 screws M12 x 80.
3. Pull off the bearing housing (9) through the pressure test-threading (100) by using the demounted screws. **Attention!** Do not wedge the housing!
4. Remove the O-rings (19) from the shaft.
5. Pull off the lobes (28) simultaneously from the two shafts, use lobe puller (Art.-No. PBA.600.TL/TK). Remember the lobe positions.
6. Place the new lobes into the same positions. Be sure that left lobes "L" match to right lobes "R" and that an "L"-lobe is positioned next to a "R"-lobe on one shaft.
7. When mounting the housing (9) again care for the correct fit of the O-ring (24).
8. Care for clean an burr-less fitting while mounting in reverse order). Tighten the lock nut with approx. 800 Nm.
9. Attention! If you change lobes at a Profi-pump **without separation plate** you will not find the following parts: (63) - Distance sleeve, (66) - Separation plate, (67) - Sleeve for separation plate.

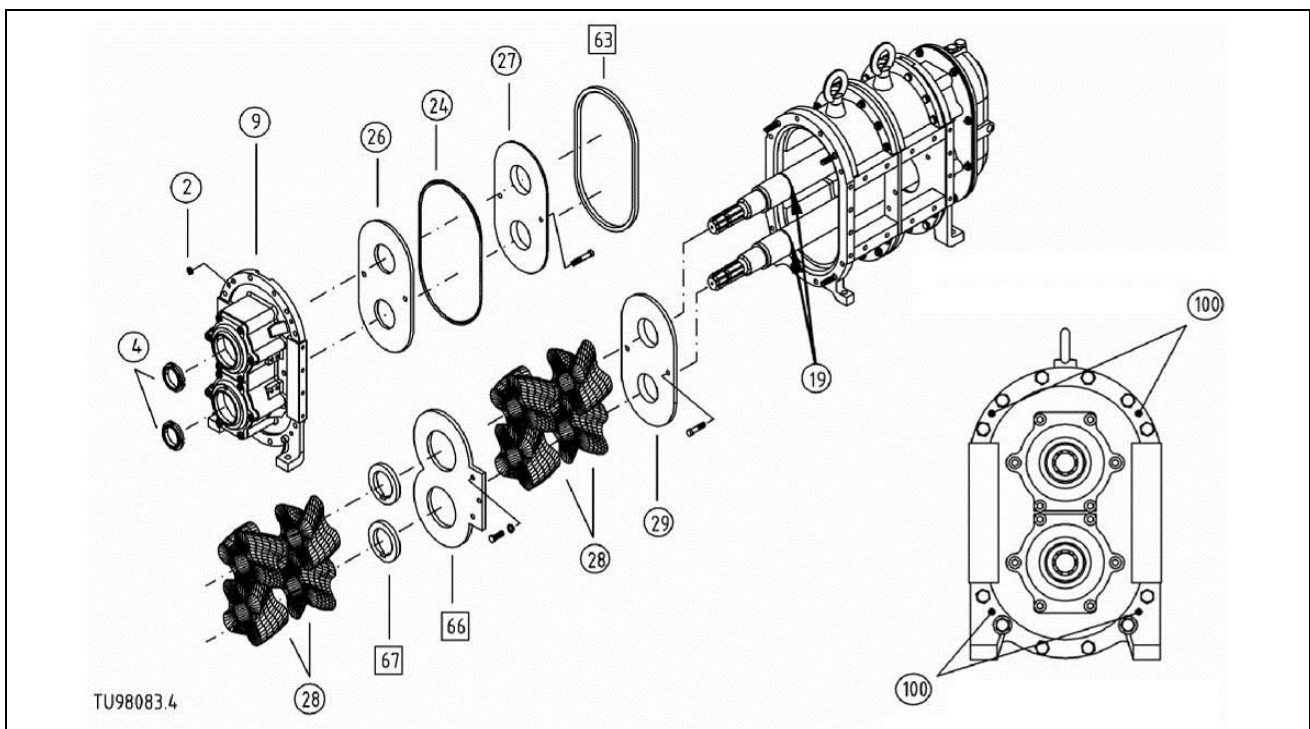


Fig. 10: Rotary lobe change - RP136 Profi-pump

10 Service Instructions In Tabular Form

	Start-up	Before and after longer out-of-service periods	After the first 10 operating hours	After the first 20 operating hours	Every 500 operating hours, at least every three months	Every 2000 operating hours, at least once a year
Lubricate the grease nipples (pump series R116/R136, RP136)	X	X				
Lubricate the grease nipples (pump series R136HD/I136)	X		X			
Check belt tension (for pumps with belt drive) as per the relevant accompanying sheet	X	X	X			X
Tighten the screws to the base				X		
Check the slotted nut or strain screw (pump series R116, R136, FX116, I116, R136HD/I136)				X		
Gearbox oil change				X		X
Check gearbox oil					X	

11 Service Plan

Warranty is valid only when service intervals acc. to chapter "Service instructions" have been followed and performed.

[illegible]

12 Specifications

12.1 Material description for rotary lobes with elastomeric coating

Material	Chem. components	Resistant up to	Pump medium	Properties
SBR	Butadiene, styrene	60°C	Liquid manure	Wear-resistant
NBR	Butadiene, acrylonitrile	80°C*	Sewage sludge, petrol, oil, grease, diesel oil, spindle oil	Oil-resistant
NBR, white	Butadiene, acrylonitrile	80°C*	Oil, butter, linseed and olive oil, lard	Food grade oil
EPDM-SL (EPDM-Sewage-Line)	Ethylene propylene	80°C*	Water, liquid manure, sewage sludge, biogas substrate	Not oil and grease resistant, water resistant, steam resistant
EPDM, white	Ethylene propylene	80°C*	Water, mash, slightly acidic products	Food grade oil
FPM	Fluorocarbon gum	80°C*	Solvents, salt water, oil, petrol, acids	Acid-resistant and alkali-resistant
PU (Werobust)	Polyurethane	50°C	Abrasive media	Wear-resistant
CSM (Hypalon)		80°C*	Petrol, oil, acids, alkali solutions	Wear-resistant, acid-resistant and alkali-resistant
Steel lobes (pure material)	1.4571	150°C 200°C*	Pure media chemicals	High temperatures, high chemical resistance
Steel lobes (pure material)	C45 nitrided	150°C 200°C*	Pure media petrochemicals	High temperatures, chemical resistance

Please consult us



- when operating pure material lobes with media containing foreign material,
- if you should discover discrepancies or if precise media data has not been provided,
- * if you require combinations with high pressure and high temperatures

Attention! Note max. operating pressure:



- The elastomer coating 'FPM' is usable for rotary lobes only up to max. 6 bar operating pressure.
- Seal rings of material 'Duronit' are allowed only up to 10 bar real operating pressure.

12.2 R116 / R136 / RP136 – Technical data

Pump size of series:	Theoretical capacity*			Max. operating pressure**		Theoretical operating torque with max. operating pressure and water (valid for NBR elastomers)	
	[l/rev]	[l/min]	[m³/h]				
116	n_{max}= 650 rpm			R	FX, I	R	FX, I
				[bar]	[bar]	[Nm]	[Nm]
60	1,16	750	45	5	8	125	180
120	2,32	1500	90	5	7	240	315
180	3,48	2250	135	5	6	355	410
240	4,64	3000	180	5	5	460	460
300	5,80	3800	225	4	4	470	470
360	6,96	4500	270	3	3	440	440
136	n_{max}= 650 rpm			R ...	R...HD/I	R ...	R...HD/I
				[bar]	[bar]	[Nm]	[Nm]
70	1,27	800	45	5	10	140	240
105	1,90	1200	70	5	10	205	350
140	2,53	1650	90	5	10	270	460
210	3,80	2500	140	5	10	395	685
280	5,06	3300	180	5	8	515	740
350	6,33	4100	230	5	7	630	815
420	7,59	5000	280	5	6	745	845
RP	RP: n_{max}= 800 rpm			RP		RP	
				[bar]		[Nm]	
280 (4000)	5,06	4000	240	5		515	
350 (5000)	6,33	5000	300	5		630	
420 (6000)	7,59	6000	360	5		745	

* All data are as to theoretical capacity. The actual capacity depends on the various operating conditions.

** Valid only for short operation times. For continuous operation, please contact our technicians. The service life of the rotary lobes is reduced by high temperatures, especially in combination with high pressure.

**Sphere - Ø:**

– Series **116**: max. sphere - **Ø 48 mm**, series **136**: max. sphere - **Ø 40 mm**.

13 Declaration of Installation



Declaration of installation

for an incomplete machine

according to Machinery Directive 2006/42/EG; annex II B

Manufacturer: Hugo Vogelsang
Maschinenbau GmbH
Holthöge 10-14
D-49632 Essen/Oldb.

We declare that this delivery concerns the following machine which is not complete. The machine must not be put into service until the machinery into which this incomplete machine is incorporated is in conformity with the Machinery Directive 2006/42/EC.

Product: Rotary lobe pump

The technical documents according to annex VII B have been prepared and can if necessary be obtained from: Ms Ilona Ballmann; Hugo Vogelsang Maschinenbau GmbH; D-49632 Essen/Oldb., Germany

All basic health and safety requirements according to Annex I of the above-mentioned directive are applied and observed.

Applied harmonised standards:

DIN EN 349:1993+A1:2008
DIN EN 1037:2008
DIN EN ISO 12100-1:2003
DIN EN ISO 12100-2:2003
DIN EN ISO 13857:2008

Applied national standards and technical specifications:

DIN 4844-1:2002
DIN 4844-2:2001+A1:2004
DIN 4844-3:2003
DIN EN 809:2011
DIN EN 12162:2001
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