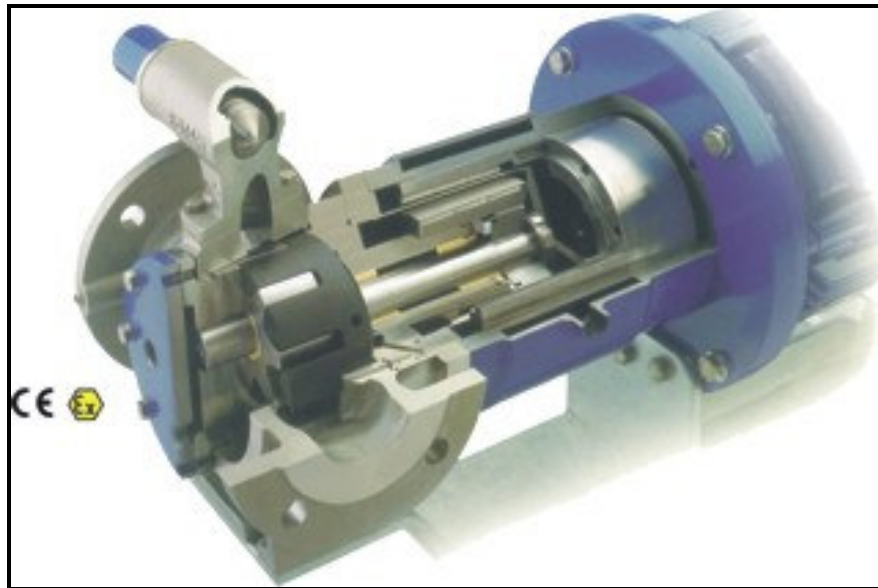


ROTAN PUMP

Annex to Manual T1456

Type MD



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1. General information

This user manual is an annex to Manual T1456 and covers only ROTAN MD gear pumps.

The entire user manual must be read thoroughly before the pump is transported, lifted, installed, assembled and any other activity described in this user manual.

Everyone who is to work with this pump must read this user manual before it is taken into operation.

Upon receipt, check that the delivery is complete and undamaged. Any deficiencies or damage must be reported immediately to the transport company and the supplier, in order that a claim may be valid.

The user is responsible for compliance with the safety requirements described in this user manual.

If people who are expected to have a need to refer to the user manual are of a different linguistic origin than the language in which the user manual has been supplied, it is recommended that the user manual is translated into the language in question.

In addition to the instructions contained in this user manual, we also refer to the prevailing local national laws and regulations. The user is responsible for compliance with these.

The owner of the pump is responsible for ensuring that everyone who works with the pump has the necessary background.

In the event that this user manual or other regulations recommend the use of personal protective equipment or limitations on the use of labour and the pump, such instructions must be observed.

The pump may only be used under the operating conditions specified when the order was placed. Any deviation from this requires DESMI's consent.

The owner or user of the pump must ensure that this manual is updated if there are any modifications to the pump. Especially the description of safety must be emphasised.

In the event that the pump is transferred to a third party, this user manual with any updated amendments and the operating conditions defined when the order was submitted *must* accompany the pump.

DESMI assumes no liability for any personal injury or damage to the pump or other material damage resulting from:

- any amendments to the pump not approved by DESMI A/S
- a failure to observe the safety regulations or other instructions in this user manual
- the use of non-original spare parts that do not satisfy precisely the same, strict quality requirements as original DESMI spare parts
- any fault, blockage or breakdown in the pipe system

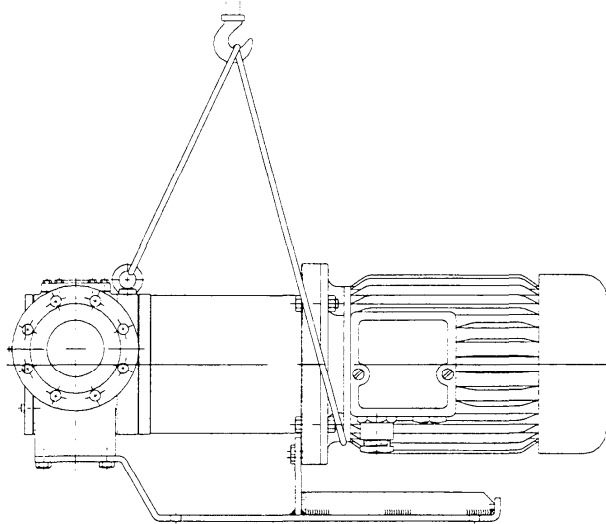
The owner or user is responsible for protecting the pipe system against faults, blockages and explosions.

2. Transport/storage

Do not place fingers in the pump's ports when lifting or handling the pump.

The pump should be transported under normal consideration so that it is not damaged by impacts or blows.

The pump must be lifted in stable lifting points in such a way that the device so that the device is balanced and so that the lifting straps are not positioned over sharp edges.



In the event of storage over long periods of time, it should be ensured that the pump does not corrode or dry out as drying out between the sliding surfaces of the bearings can cause them to become damaged when the pump is put into operation.

Primer and finishing coat has been applied to external, non-stainless surfaces.

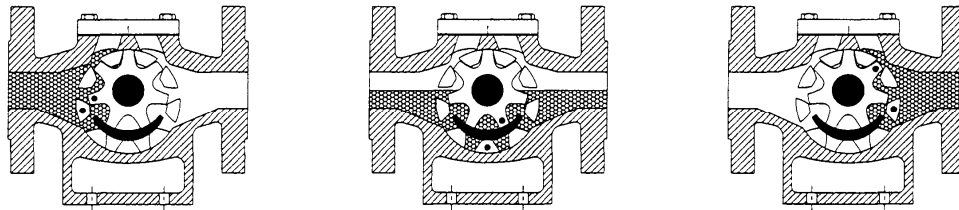
On delivery the pumps are preserved internally using machine oil. Pumps for the food industry are preserved with lubricant approved for foods.

3. Features

3.1 MD pumps in general

MD: Magnetic driven pump – pump with magnetic coupling. Parts in contact with liquid are made of cast iron, stainless steel or steel. The pump with motor/gear is as standard couple together on bottom plate. The pump can be supplied with free shaft end (additional).

The pump is an internally toothed gear pump the functional principle of which appears from the following sketch:



The modularised structure of the MD series allows a great number of pump configurations so that the pump can be adapted to the specific task to a very high extent.

All pumps can be provided with bypass valve, which prevents undesirable pressure generation.

The pumps can be fitted with heating/cooling devices for pump part and magnetic coupling.

Which way to pump is a free choice as the flow direction is solely determined by the motor's direction of rotation.

3.2 Version designation

The designation of the Rotan MD pump is composed of the codes below in the sequence 1-11. The actual variant designation appears from the pump's name plate (see item 12.1).

1) Pump type

MD "Environmental Duty" pump with magnetic coupling, made of cast iron, steel or stainless steel

2) Pump sizes

26 DN25 - 1"
33 DN32 - 1¼"
41 DN40 - 1 ½"
66 DN65-2½"
81 DN80 - 3"
101 DN100- 4"
126 DN125- 5"
151 DN150- 6"

3) Constructions

E Straight-flow pump
B Angle-flow pump
R Bypass valve
F Flange coupling
D Heating jacket on front cover
K Heating jacket on rear cover
T Special tolerances

4)

- Hyphen

5) Material codes for main parts

Code	Pump casing/Covers	Rotor/Idler	Shaft
1	GG-25	GG-25	X 8 CrNiMo 27 5
3	G-X 6 CrNiMo 18 10	X 8 CrNiMo 275	X 8 CrNiMo 27 5
4	GS-52.3	GG-25	X 8 CrNiMo 27 5

6) Lubrication

Idler bearing and main bearing lubricated by pump liquid
M Idler bearing with external lubrication

7) Material codes for idler bearing

Code	Idler bush	Idler pin for cast iron pump	Idler pin for stainless steel pump
1	Cast iron	Hardened 16 MnCr 5	X 8 CrNiMo 27 5
2	Bronze	Hardened 16 MnCr 5	X 8 CrNiMo 27 5
3	Carbon	Hardened 16 MnCr 5	X 8 CrNiMo 27 5
4	Al.oxide	Cr.oxide coated 16 MnCr 5	Cr.oxide coated X 8 CrNiMo 27 5
5	Carbon	Al.oxide, polished	Al.oxide, polished
8	Tungsten carbide	Tungsten carbide	Tungsten carbide

8) Material codes for main bearing

Code	Bearing lining	Shaft
1	Cast iron	X 8 CrNiMo 27 5
2	Bronze	X 8 CrNiMo275
3	Carbon	X 8 CrNiMo 27 5
4	Al.oxide	Coated X 8 CrNiMo 27 5
8	Tungsten carbide	Coated X 8 CrNiMo 27 5

9) Length, magnet

/3 Magnet length 3 cm
/6 Magnet length 6 cm
/9 Magnet length 9 cm
/12 Magnet length 12 cm
/15 Magnet length 15 cm

10) Magnetic material

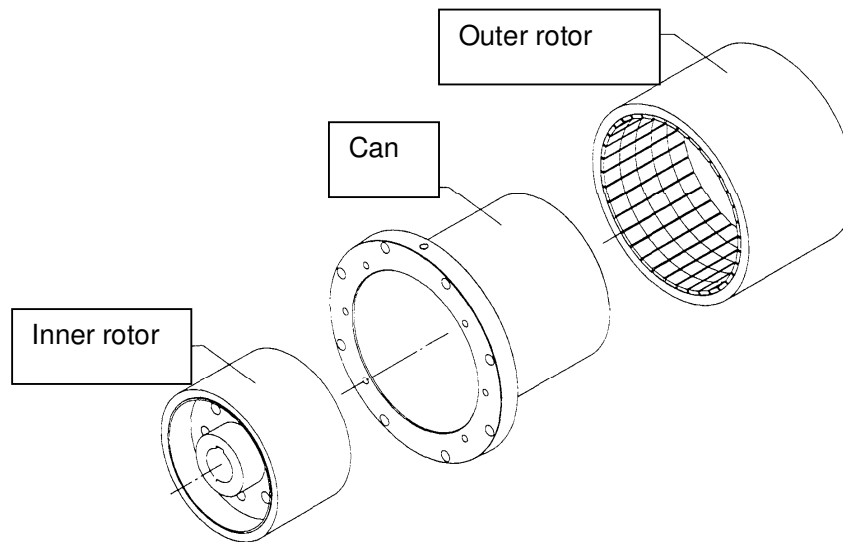
N Neodym (Nd-Fe-B)
C Samarium Cobalt (SmCo)

11) Special constructions

S All special constructions are labelled "S"

3.3 Magnetic coupling

The torque of the motor is transferred to the pump via a magnetic coupling. The magnetic coupling is maintenance-free and makes the pump totally leak-free as the magnetic coupling separates the pump part from the drive shaft. The coupling comprises the following parts:



The inner rotor is covered by a casing to protect the magnets against the pumped liquid. The magnetic coupling is provided with permanent magnets, and outer rotor and inner rotor run synchronously with each other. This entails that the coupling has no slippage as is the case for e.g. electric motors.

The installation must ensure that the motor is stopped if the magnetic coupling slips because of overload. Slippage of the coupling means that the torque of the pump becomes so great that it exceeds the max. torque of the coupling. The pump must not run for a long time with slippage as it may destroy the pump parts because of vibrations.

Slippage may function as overload protection by means of measuring of discontinued flow from the pump or a highly reduced motor output (the pump idles). This situation should switch off the pump.



In order to remove the slippage, the motor should be brought to a standstill.

The magnetic coupling is dimensioned for each individual Rotan pump so that its capacity corresponds to the pump specifications stated when ordering the pump. The magnetic coupling is cooled by the pumped liquid. The liquid volume passing through the coupling for cooling of this is subjected to a temperature increase of max. 86°F/30° C depending on speed and viscosity.

3.4 Bearings

The pump part is designed with slide bearings. The main bearing is a combined radial/axial slide bearing. The pump liquid lubricates the slide bearings.

At the free shaft end (which is additional) there are lifetime lubricated ball bearings in the bracket.

3.5 Heating

Pumps requested to be heated can be provided with a heating chamber at the front cover and/or at the coupling casing, version D and K. The heating chambers are dimensioned to max. 145 psi/10 bar.

3.6 Operating conditions

The limitations (speed, pressure, temperature and viscosity) stated under this section should be viewed as guideline maximum values, as the individual ROTAN pump may have further limitations due to the pump liquid, the shaft seal selected and in particular the motor selected.

Suction height. NPSH

Cavitation-free pumping is ensured by adaptation of the suction conditions so that the pressure on the pump's inlet side is higher than the pump's NPSH at the specific operational conditions.

The temperature limitation in the operating temperature depends among other things on which magnets and elastomers are used in the pump.

MD pumps may as a max. be exposed to 482°F/250°C as allowance is made for the temperature increase in the magnetic coupling – see item 4.3; viton* is the standard elastomer.

Magnetic material:

Neodym-Iron-Bor: Product temperature max. 266°F/130°C

Samarium-Cobalt: Product temperature max. 482°F/250°C

Elastomer:

FPM -Viton® : About -22°F +392°F -30/+200°C

FEP - Teflon® with Viton core: About -76°F +401°F -60/+205°C

EPDM - Ethylene-propylene About -85°F +248°F -65/+120°C

FFKM - Kalrez®: About -58°F +600°F -50/+316°C

Viscosity

The MD series is limited to about 10,000 cSt.

3.7 Protective devices

The system should be provided with suitable protective measure so that pump and motor are not subjected to loads exceeding the specified limits.

Rotan bypass valve

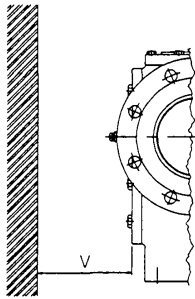
See Manual T1456US

4. Installation

During installation the following considerations should be observed to avoid operational difficulties:

Positioning:

- The foundation should be of such a nature that the unit is supported solidly and not distorted during in connection with installation.
- There must be plenty of room around the pump for service. The following indicates the minimum distance to the wall to ensure that removal of the front cover is possible.



Pump size	26	33	41	51	66	81	101	126	151	152	201
V mm	50	60	65	70	80	100	115	140	165	180	215
V inch	1.96	2.36	2.55	2.75	3.14	3.93	4.52	5.51	6.49	7.08	8.46

- Allowance should be made for the pump's suction lift (see item 4.6.3).
- Normally the pump is installed horizontally. If positioned with the flanges up/down, the pump is not self-priming. Normally the pump must not be placed on a vertical pump shaft.

Electrical coupling:

- The electrical coupling must be performed by an authorised professional in accordance with the local norms.
- Compare the voltage present with the indications on the motor plate.
- Set the protective motor switch maximum to the motor's rated current.
- Check the rotational direction of the motor. Viewed from the motor side, liquid is pumped to the left when the shaft rotates clockwise.

Bypass valve:

- Check that the valve is positioned correctly, **P** over the pressure and **S** over the suction side
- (see manual T1456US for further information)

Monitoring:

- Adjust and control the monitoring systems.

Connecting pipes:

- The pipe system must be cleaned for impurities.
- Remove the dust caps in the pump ports.
- The pump must be installed so that there is no tension between pipes and pump casing.

5. Start-up

With regard to the slide bearings, ROTAN pumps may only run without liquid flow for the short period required for self-priming. After long periods of storage it should be ensured that the slide bearings are not dry.

When starting up, check:

- That cut-off valves on inlet and outlet side are open.
- That the pump casing is filled with liquid at the first start-up to ensure the ability to self-prime.
- That monitoring equipment is in working order.
- That the direction of rotation is correct. Viewed from the motor side, liquid is pumped to the left when the shaft rotates clockwise.
- That the pump is drawing the liquid.
- That the pump does not vibrate or emits jarred sounds.
- That there are no leaks by the pump.
- That the bypass valve opens at the correct pressure.
- That power output and power consumption are correct.
- That the magnetic coupling is not slipping (no flow) and that the temperature increase in the magnetic coupling does not exceed a maximum of 86°F/30°C

6. Maintenance and operation

Check regularly that the operating conditions described in section 6 are correct.

7.1 Dry running

The pumped liquid normally lubricates the slide bearings of the Rotan pump, and therefore dry running is not allowed.

The lubricating properties of the pumped liquid are decisive for how long time the pump may run without liquid flow in connection with priming and emptying of the system.

7. Repairs and inspection



Before any inspection, it must be secured that the unit cannot be started unintentionally.



The system must be depressurised and drained for liquid before dismantling is started.



The repair engineer should be aware of which liquid has been pumped and which safety measures he should take in as to contact with the liquid.



During service, pay attention to the fact that the magnetic parts may cause damage to pacemakers, credit cards, diskettes, computers and watches.



All safety devices such as excess pressure release and electrical shielding must be in place before start-up of the unit is enabled.

The structural designs of the MD pumps appear from the sectional drawings under item 12.2.

7.1 Emptying of pump

During servicing of the Rotan pump, pay attention to the fact that although the pipe system has been emptied, there will still be liquid at the bottom of the pump casing and in the cap of the magnetic coupling.

Normally the pump can be emptied by removing the front cover or by placing the pump with the ports up/down and rotating the shaft. Drain the coupling part of the pump through the plug (pos. MB).



In connection with harmful substances, a number of special measures must be taken before dismantling such as circulation of neutralising liquid in the pump or use of protective clothing and respiratory protection.

7.2 Pump parts

The pump parts rotor, idler, pump casing, front cover and idler bearing can be inspected without removing the pump from the system as removal of the front cover is sufficient.

7.3 Slide bearings

Lubricate the slide bearings during assembly, as they do not tolerate dry running. If there is a lubrication groove in the idler pin, it should be turned towards the crescent.

7.4 Blocking of pump shaft

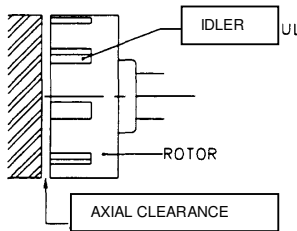
During dismantling/assembly it may be necessary to block the pump shaft. Do this by placing a piece of wood or soft metal between the rotor teeth via one of the ports of the pump.

7.5 Setting the axial clearance

The pump's axial clearance is set by displacing the front cover axially by means of the screws (pos. E, NM). It is recommended to check the clearance in at least 3 different points, to ensure that the front cover is parallel with the rotor. Setting values appear from item 10.3.

An alternative method for setting of axial clearance can be used if the pump is installed and therefore it is not possible to use gauge blades. Adjust the pump upwards so that the so that the front cover touches the rotor after which the clearance between rotor/idler can be achieved by turning the adjusting screws a number of degrees which is determined as follows:

$$\text{Angular turn in } ^\circ = \frac{\text{Axial clearance} \times 360}{\text{pitch}}$$



Thread	M5	M6	M8	M10	M12
Pitch	0.8	1.0	1.25	1.5	1.75

8. Dismantling



Before any inspection, it must be secured that the unit cannot be started unintentionally.



When dismantling, pay attention to the fact that the magnetic parts may cause damage to pacemakers, credit cards, diskettes, computers and watches.

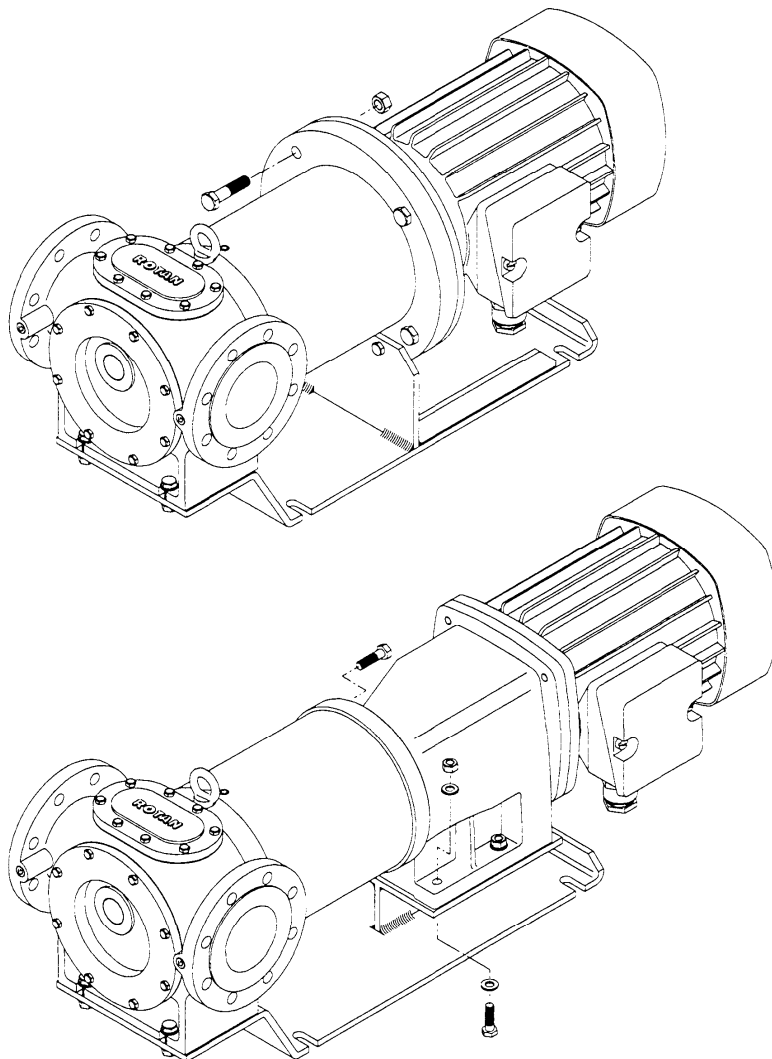


The system must be depressurised and drained for liquid.

The repair engineer should be aware of which liquid has been pumped and which safety measures he should take in as to contact with the liquid.

Remove the bolts joining intermediate flange and motor/gear.

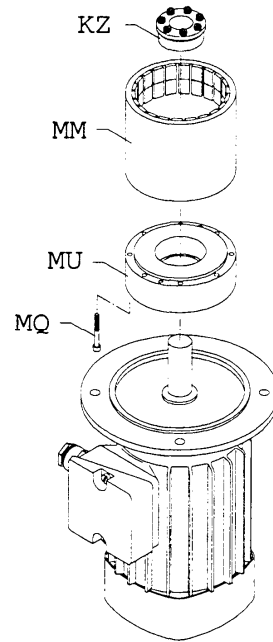
Pull motor/gear with outer magnetic rotor backwards, and remove them from the pump part.



Remove the screws in the taper bushing (pos. KZ).
The screws can be used as dismantling screws to
loosen the cone.

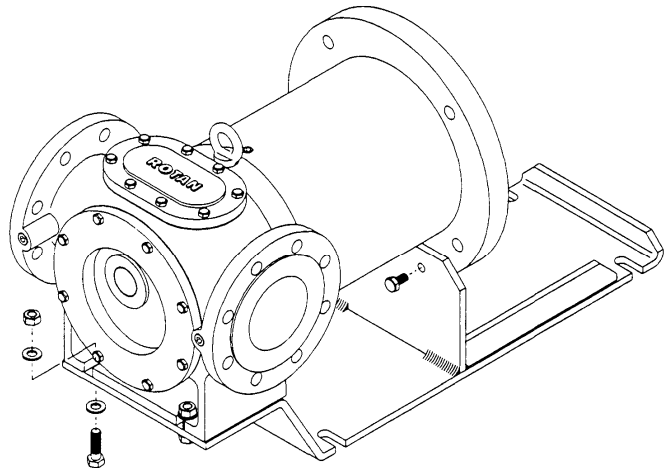
Pull the outer rotor (pos. MM) with inertia hub (pos. MU)
off the motor/gear shaft.

Remove the screws (pos. MM), and the outer rotor and inertia
hub can now be separated.



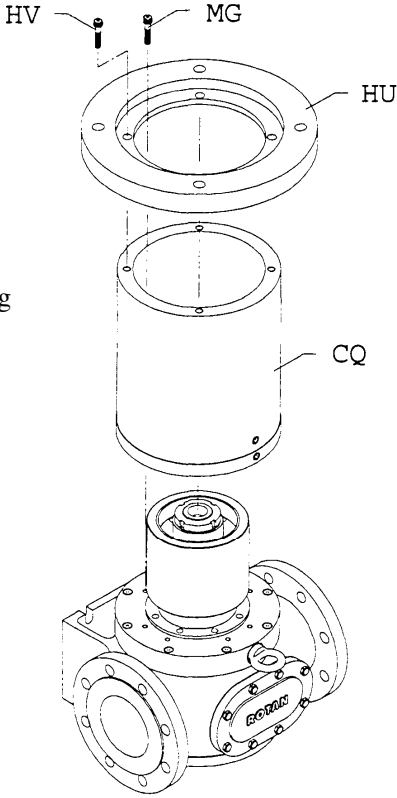
Remove bolts and screws securing the
pump on the base plate.

Now lift the pump away from the base
plate.

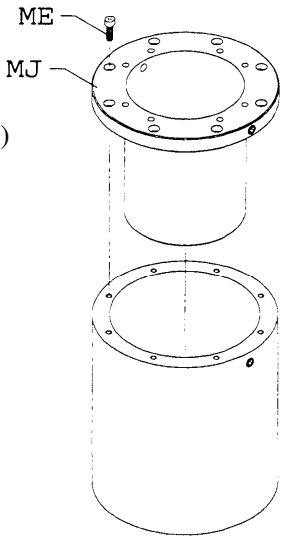


Remove the screws (pos. HV), and remove the intermediary flange (pos. HU) from the coupling casing (pos. CQ).

Remove the screws (pos. MG), and remove the coupling casing with cap from the pump part.



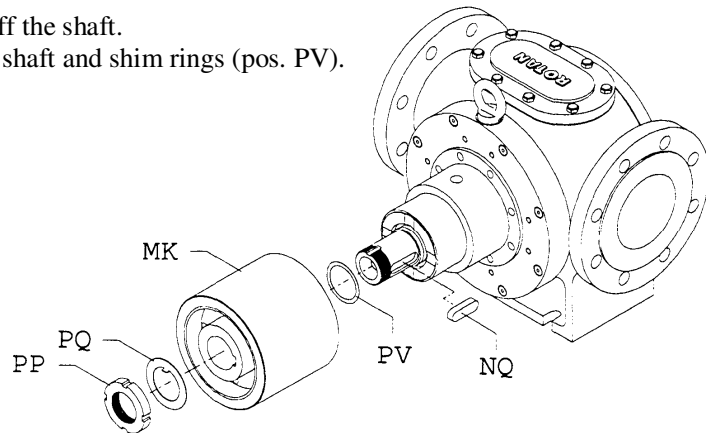
Remove the screws (pos. ME), and remove the cap (pos. MJ) from the coupling casing.



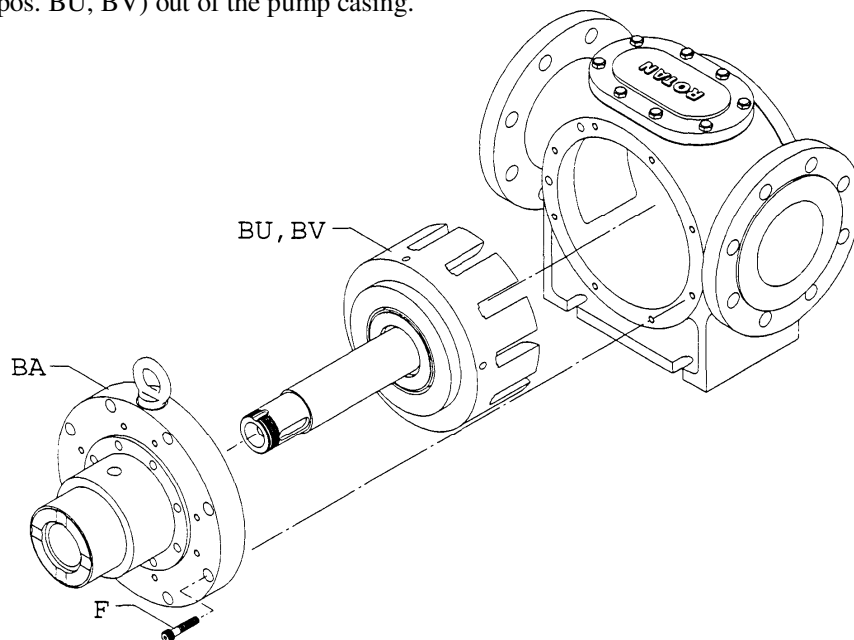
Align lock washer (pos. PQ), and unscrew slotted nut (pos PP) together with the lock washer.

Pull inner magnetic (pos. MK) off the shaft.

Remove key (pos. NQ) from the shaft and shim rings (pos. PV).

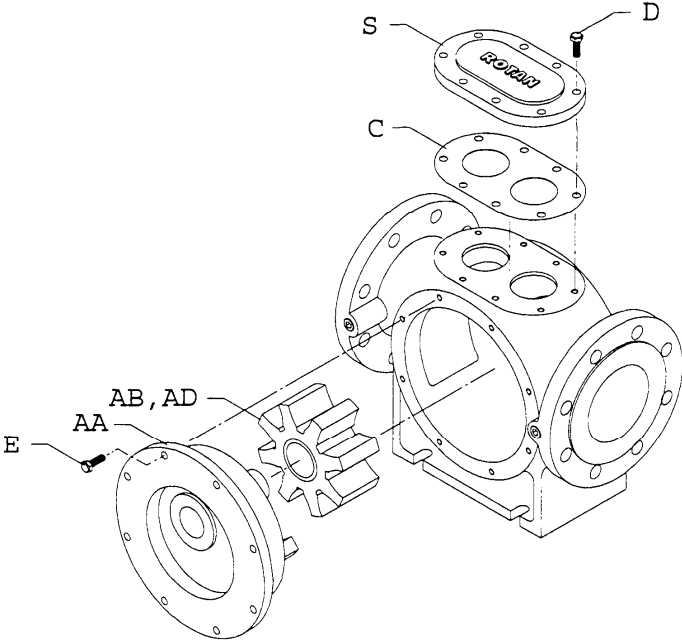


Remove the screws (pos. F) and pull rear cover (pos. BA) with rotor/shaft (pos. BU, BV) out of the pump casing.



Remove the screws (pos. E). Pull front cover (pos. AA) with idler and bushing (pos. AB, AD) out of the casing.

Remove the screws (pos. D). Remove blind cover (pos. S) and sealing (pos. C) from the casing.



9. Assembly



When assembling magnet-driven pumps, please pay attention to the fact that the magnetic parts may cause damage to pacemakers, credit cards, diskettes, computers and watches.



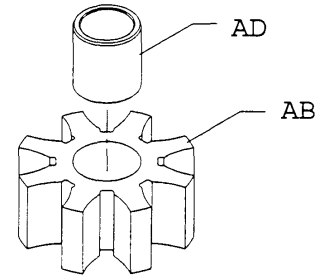
See to keeping the workplace clean for chips and metal dust as the magnets attract these.

9.1 Introductory actions:

Shrink idler bushings (pos. AA) in ceramics or tungsten carbide together with the idler (pos. AB). Press idler bushings in other materials down into the idler.

Temperature for shrinking:

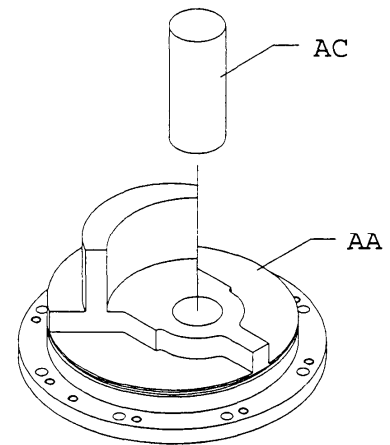
Idler	+572°F/300°C
Idler bush	-4°F/20°C



Fit idler pin (pos. AC) into front cover (pos. AA). Shrink all pins into the front cover except for front covers in cast iron and pump size under MD51. When fitting or replacing the idler pin, apply glue before pressing to ensure tightness.

Temperature for shrinking:

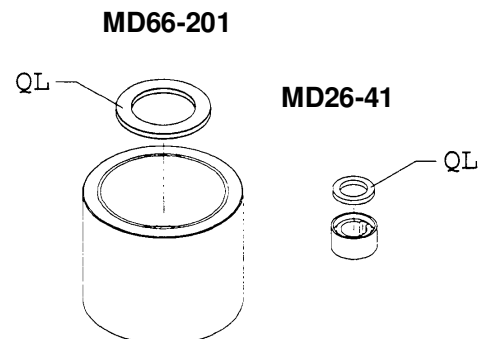
Front cover	+572°F/300°C
Idler pin	-4°F/20°C



Press the rotating bearing ring (pos. QL) into the inner magnetic rotor/adjustment ring.



The bearing ring must under no circumstances be shrunk into the rotor as magnets lose magnetism at high temperatures – see item 4.6.4



Fit parallel key (pos. CB) into the shaft.

In the event of stainless pumps, the rotating bearing ring (pos. PU) and the shaft (pos. BV) are always shrunk into the rotor (pos. BU).

Pumps in cast iron/ steel are pressed together, however with the exception of the following:

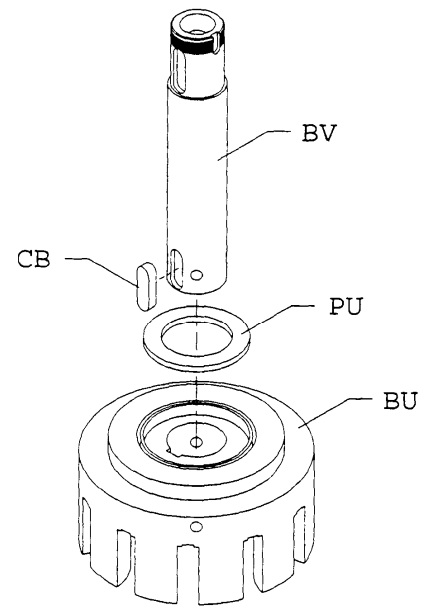
Rotating bearing ring in tungsten carbide or ceramics is to be shrunk into the rotor. Pumps larger than ED101 are to be shrunk together.

Temperature for shrinking:

Rotor	+572°F/300°C
Bearing ring	-4°F/20°C
Shaft	-4°F/20°C

The shaft end must be about 0.019"/0.5mm under the internal surface of the rotor (it must under no circumstances be above the internal surface of the rotor).

After shrinking the cross-sectional borings in rotor/shaft for circulation must be checked carefully to ensure that they are aligned and free from burrs and other impurities.

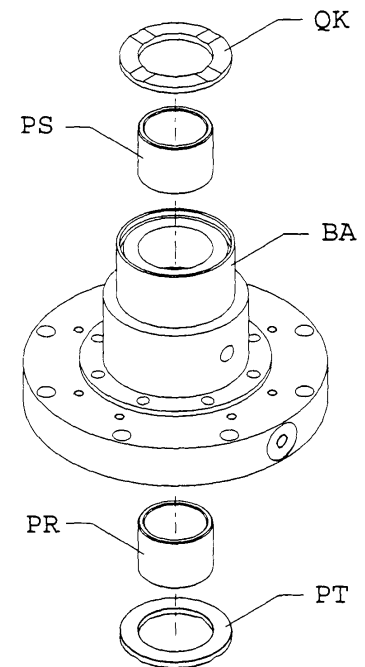


Shrink stationary bearing rings (pos. QK, PT) with lubrication grooves and main bearing bushings (pos. PS, PR) in tungsten carbide or ceramics together with the rear cover (pos. BA).

Other bearing materials are to be pressed into the rear cover.

Temperature for shrinking:

Rear cover	+572°F/300°C
Stationary bearing rings	-4°F/20 °C
Main bearing bush	-4°F/20°C



9.2 Assembly instructions:

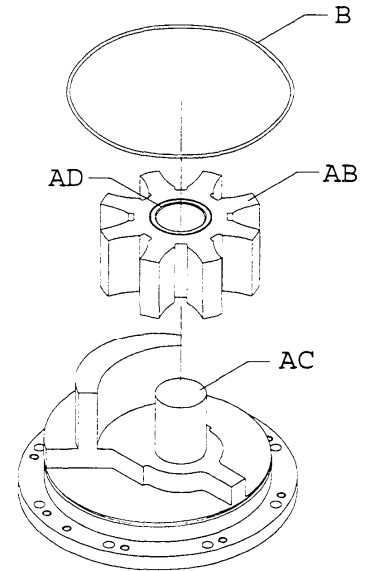
Grease the idler pin (pos. AC) and idler bushing (pos. AD) with a bit of oil.

Fit idler (pos. AB) med idler bushing to the front cover with the idler pin. Idlers with slanting tooth base should be turned with the smallest tooth base diameter facing the front cover.

Check after fitting that the idler rotates freely.

Lubricate O-ring groove in front cover and O-ring (pos. B) with a bit of grease.

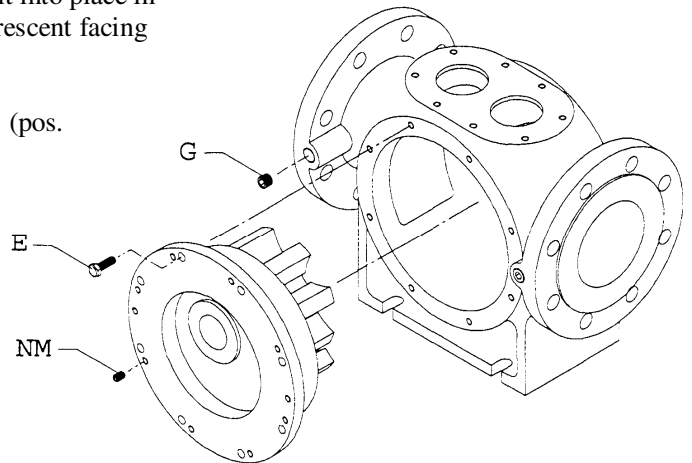
Now fit the O-ring to the front cover.



Lift the front cover with idler fitted up and slide it into place in the pump casing. Turn the front cover with the crescent facing the foot of the pump casing.

Now tighten the screws (pos. E) and set screw (pos. NM) so there is a distance between pump casing and front cover of about $0.078''/2$ mm.

Seal the pipe plugs (pos. G) and fit them into the pressure gauge connections in the flanges.

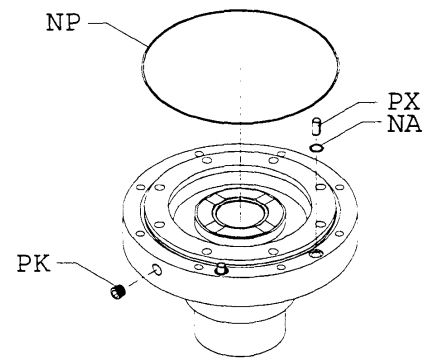


Seal the pipe plug for drainage (pos. PK), and fit it into the rear cover.

Fit the guide pins (pos. PX) into the rear cover.

Lubricate O-rings (pos. NA) and (pos. NP) with grease, and fit them on the outside of the guide pins and in O-ring groove on the rear cover.

Lubricate bearing rings and main bearing bushing in the rear cover with oil.

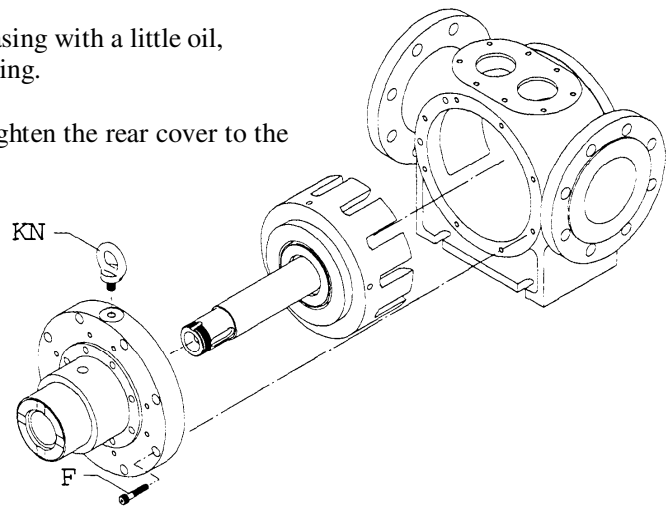


Lubricate rotor/shaft and inside of the pump casing with a little oil, and push rotor/shaft into place in the pump casing.

Fit the rear cover into the pump casing, and tighten the rear cover to the pump casing with the screws (pos. F).

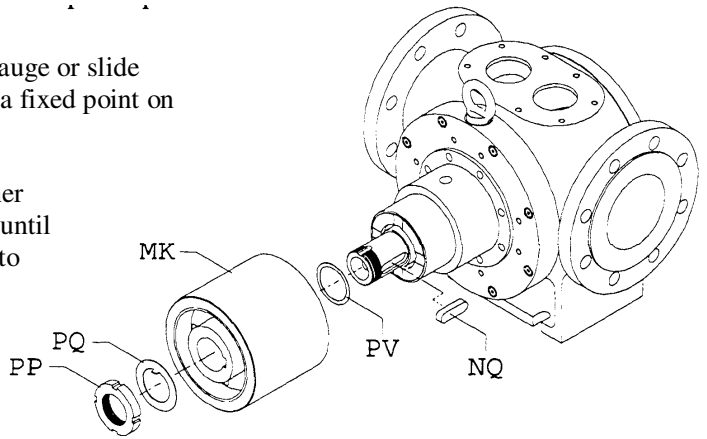
Be aware of the positioning of the positioning of the guide pins in relation to the pin holes in the pump casing.

Screw the ring bolt (pos. KN) onto the rear cover.



Adjustment of length clearance in rotor/shaft assembly MD51-MD201:

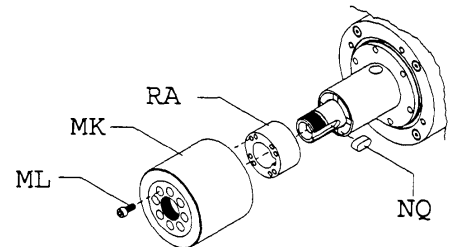
- 1) Place a great number of shim rings (pos. PV) on the shaft so an evident axial clearance is created.
- 2) Push the inner magnetic rotor (pos. MK) into place on the shaft, and fit slotted nut (pos. PP).
- 3) Measure the axial clearance with dial gauge or slide gauge from the inner magnetic rotor to a fixed point on the rear cover.
- 4) Now remove the slotted nut and the inner magnetic rotor, and remove shim rings until the axial clearance constitutes 0.0019" to 0.0039" / 0.05 to 0.1 mm.
- 5) Fit the parallel key (pos. NQ) into the shaft, and fit the inner magnetic rotor, lock washer and the slotted nut.



Check after adjustment that the pump shaft rotates regularly and freely.

Adjustment of length clearance in rotor/shaft assembly MD26-MD41:

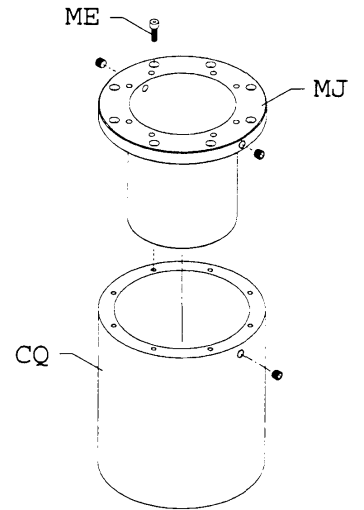
- 1) Fit the parallel key (pos. NQ) into the shaft, and push the adjusting ring (pos. RA) in over the shaft.
- 2) Screw the inner magnetic rotor (pos. MK) onto the thread of the shaft and tighten so that there is no axial clearance. .
- 3) Then screw the inner magnetic rotor 1 or max 2 pitches back in relation to the thread holes of the adjusting ring.
- 4) Fit the screws (pos. ML).
- 5) Measure the axial clearance with dial gauge or slide gauge from the inner magnetic rotor to a fixed point on the rear cover.



Check after adjustment that the pump shaft rotates regularly and freely.

Position coupling casing (pos. CQ) as indicated, and lower the cap (pos MJ), and secure it with the screws (pos. ME).

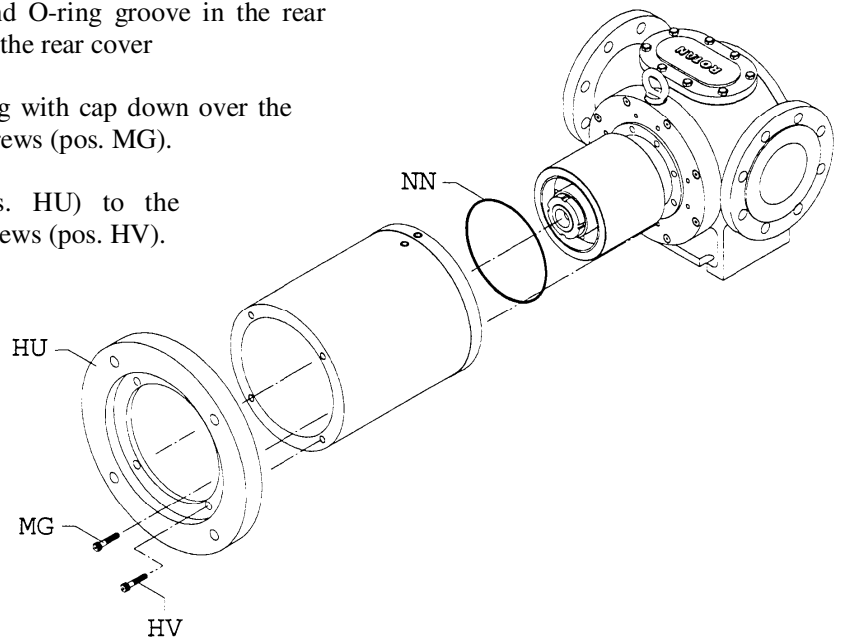
Seal the pipe plugs, and fit them into cap flange and coupling casing.



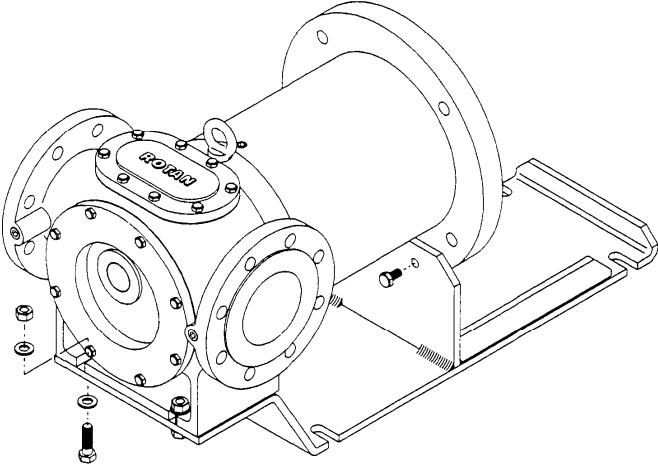
Lubricate the O-ring (pos. NN) and O-ring groove in the rear cover with grease. Fit the O-ring on the rear cover

Lower carefully the coupling casing with cap down over the inner magnetic rotor, and tighten screws (pos. MG).

Fit the intermediary flange (pos. HU) to the coupling casing, and secure with screws (pos. HV).



Lift the pump onto the base plate, and fit bolts and screws to the base plate.

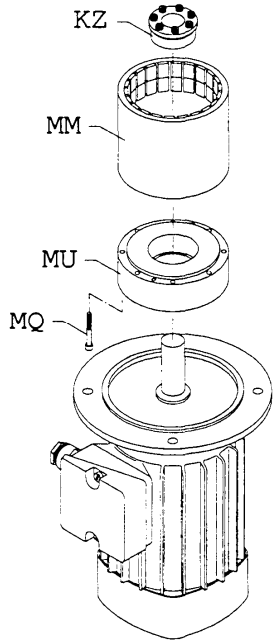


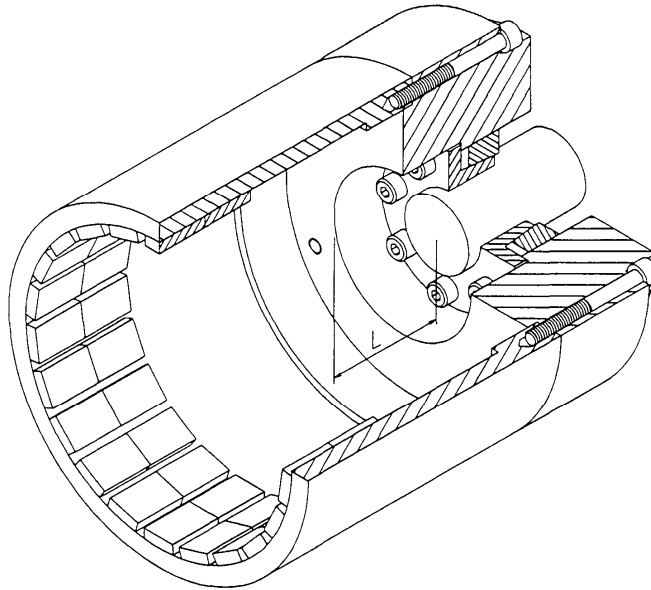
Clamp inertia hub (pos. MU) and outer rotor (pos. MM) together with the screws (pos. MQ).

Position inertia hub/outer rotor over motor/gear shaft, and fit taper bushing (pos. KZ) on inertia hub/shaft journal.



Beware of the magnets' vigorous attraction of taper bushing and tools brought into the magnetic rotor. The magnetic rotor may be lined with corrugated cardboard or similar to protect the very impact-sensitive magnets.





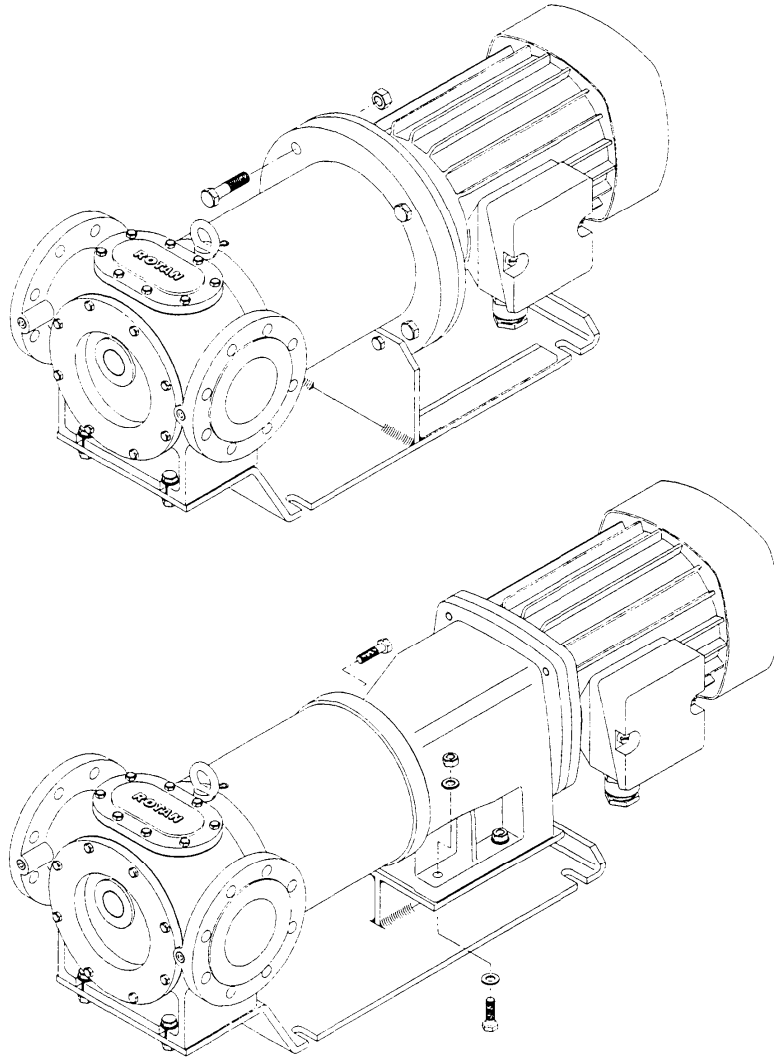
Setting value L measured from shaft end to front end of inertia hub:

IEC	MD26/33/41	MD51/66	MD81/101	MD 126/151
IEC80	20			
IEC90	10			
IEC 100/112	0	42		
IEC 132	0	22		
IEC 160		0	0	
IEC 180		0	0	
IEC 200			0	15
IEC 225			0	0
NEMA				
143/145 TC	22			
182/184 TC	13	44.5		
213/215 TC	0	31.8		
254/256 TC		15.9	26.4	
284/286 TC		0	10.5	
324/326 TC			15.9	
364/365 TC			0	
SK02	22			
SK12	10	42		
SK22	10	30		
SK32		18	20	46
SK42		0	7	25
SK52			0	0
Free shaft end	13	30	30	0

Now slide motor/gear with outer magnetic rotor into the coupling casing. Fit the bolts joining intermediate flange and motor/gear.



Never place your fingers between the coupling part and pump part during assembly as the magnets pull the parts together very forcefully.



Now adjust the axial clearance by displacing the front cover axially by means of the screws.

Check the clearance with a feeler gauge blade through the suction/pressure port on at least three different points.

The axial clearance appears from item 10.3 on the next page.

After adjustment the pump is ready for fitting into the pipe system

9.3 Setting values, axial clearance

The axial clearance is the distance between the rotor/idler and the front cover. See item 8.5 for adjustment. Setting values appear from the table below.

Pump size	26/33	41	51/66	81/101	126/151	201
Normal axial clearance *) mm	0.100 0.125	0.10 0.15	0.15 0.20	0.20 0.25	0.300 0.375	0.40 0.50
Inch	0.003 0.004	0.003 0.005	0.005 0.007	0.007 0.009	0.011 0.014	0.015 0.019
Pumps with spec. tolerances **)	0.20 0.25	0.20 0.30	0.30 0.40	0.40 0.50	0.60 0.75	0.80 1.00
Inch	0.007 0.009	0.007 0.011	0.011 0.015	0.015 0.019	0.023 0.029	0.031 0.039

*) Pumps made of stainless steel are set with 0.003”inch/0.10 mm more clearance than specified.

**) Pumps with special tolerances are identified by the inclusion of a “T” in the designation (see item 4.2).

10. Troubleshooting

The following table gives an overview of the possibility of identifying the problem causes:

Problem	Probable cause	Problem cause
- The pump cannot self-prime	1-3-4-8-9-12	<ol style="list-style-type: none"> 1. Too great a vacuum 2. Cavitation 3. Viscosity too high 4. Temperature too high 5. The pump is drawing air 6. Pressure too high 7. Bypass valve defective or adjusted incorrectly 8. The pump is corroded 9. The pump is worn 10. Impurities in the pump 11. Fault in the motor 12. Pipe too constricted or blocked
- The pump loses liquid after self-priming	1-5	
- The capacity is too low	2-3-5-7-8-9-12	
- The pump is making a noise	2-5	
- The motor is overloaded	4-10	
- The pump has jammed	4-10	
- The pump wears quickly	8-10	

11. Spare parts

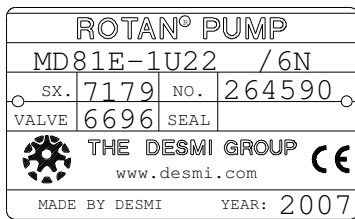
11.1 Ordering spare parts

When ordering spare parts, the following information must be provided:

Example

- The pump's serial no. 269045
- The pump's SX no. 7179
- Pump type designation MD81E-1U22 /6N
- Magnetic coupling's SX no. 7033
- If relevant, number of bypass valve 3654
- The spare part's position designation BU
- The spare part's designation Rotor

Serial no. SX no., type designation and magnetic coupling's SX no. and SX no for bypass valve appear from the name plate. The serial no. is also embossed on the left port of the pump seen from the coupling end. The spare part's position designation and designation appear from the spare part drawings (item 12.2) and the spare part list (item 12.3).

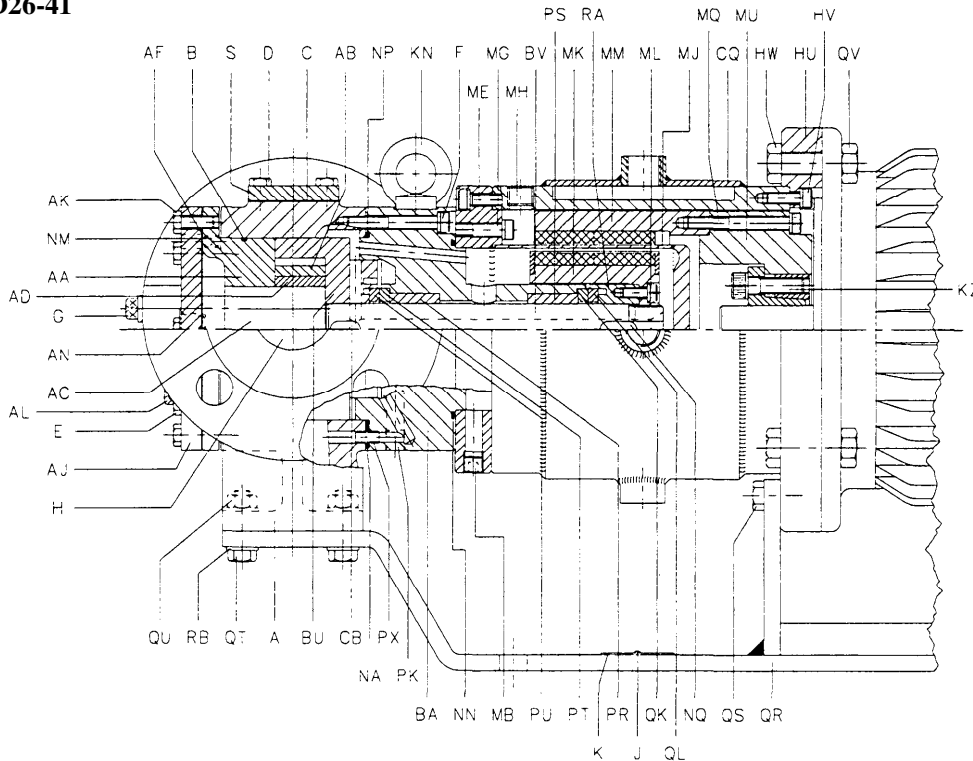


The example shows which information is needed for unambiguous specification of which rotor to supply as spare part for a given MD81 pump.

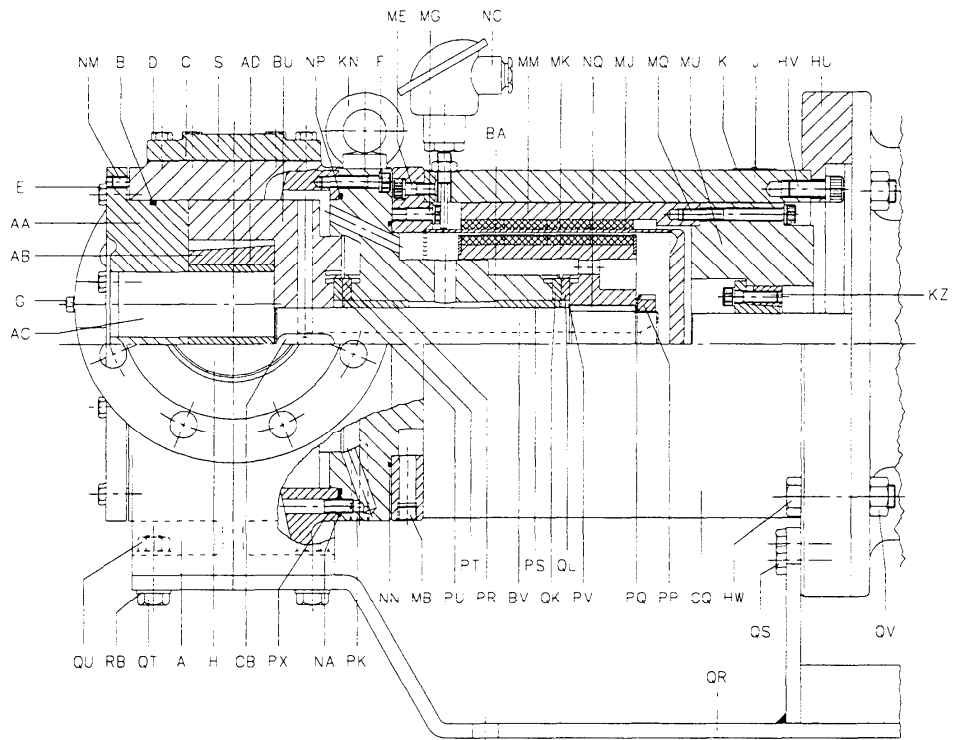
11.2 Spare parts drawings

Representative selections of MD sectional drawings are shown below. Not all pump configurations are included, but taken together the drawings selected show the most common position designations and designs.

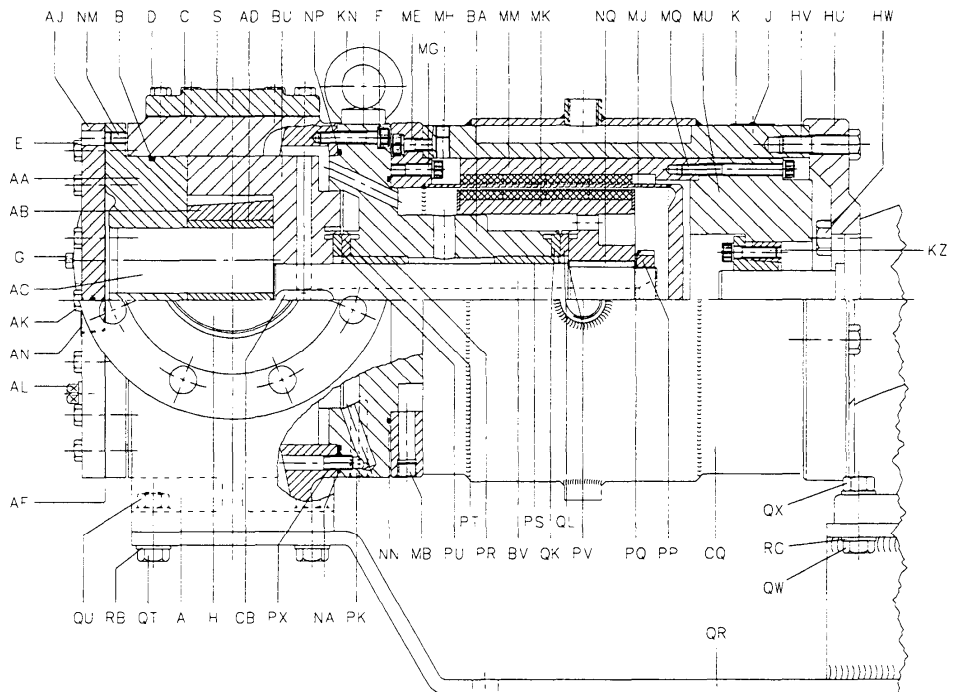
ED26-41



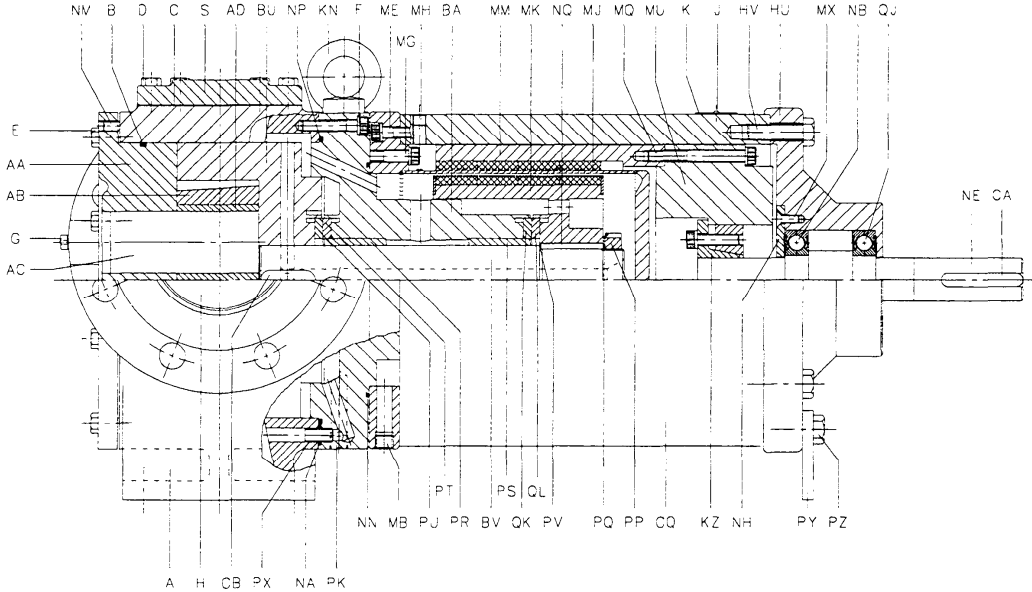
ED...E



ED...EDK



ED...E free shaft end



11.3 Spare part list

<u>Pos.</u>	<u>Designation</u>	<u>Pos.</u>	<u>Designation</u>
A	Pump casing	GH	Pressure disc
B	O-ring	GJ	Valve cover
C	Gasket	GK	Valve casing
D	Screw	GM	Pipe plug
E	Screw	GN	Gasket
F	Screw	GP	Intermediate plate
G	Pipe plug	GQ	Screw
H	Dust cap	GR	Disc
J	Drive screw	HU	Intermediate flange
K	Nameplate	HV	Screw
S	Blind cover	HW	Screw
AA	Front cover	KN	Ring bolt
AB	Idler	KZ	Taper bushing
AC	Idler pin	MB	Pipe plug
AD	Idler bush lining	ME	Screw
AF	Gasket	MG	Screw
AJ	Heating jacket	MH	Pipe plug
AK	Screw	MJ	Cap
AL	Pipe plug	MK	Inner magnetic rotor
AN	Dust cap	MM	Outer magnetic rotor
BA	Rear cover	MQ	Screw
BU	Rotor	MU	Inertia hub
BV	Shaft	MX	Screw
CA	Key	NA	O-ring
CB	Key	NB	Ball bearing
CQ	Coupling casing	NC	Thermal sensor
GA	Valve cone	NE	Shaft
GB	Spring	NH	Bearing cover
GC	Adjusting screw	NM	Set screw
GD	Nut	NN	O-ring
GE	Cap	NP	O-ring
GF	Gasket/O-ring	NQ	Key
GG	Pressure plate	PK	Pipe plug

<u>Pos.</u>	<u>Designation</u>
PP	Slotted nut
PQ	Lock washer
PR	Main bearing lining
PS	Main bearing lining
PT	Thrust bearing, stationary
PU	Thrust bearing, rotating
PV	Shim ring
PX	Spring pin
PY	Base
PZ	Screw
QJ	Ball bearing
QK	Thrust bearing, stationary
QL	Thrust bearing, rotating
QR	Base plate
QS	Screw
QT	Screw
QU	Nut
QV	Nut
QW	Screw
OX	Nut
RB	Disc
RC	Disc

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