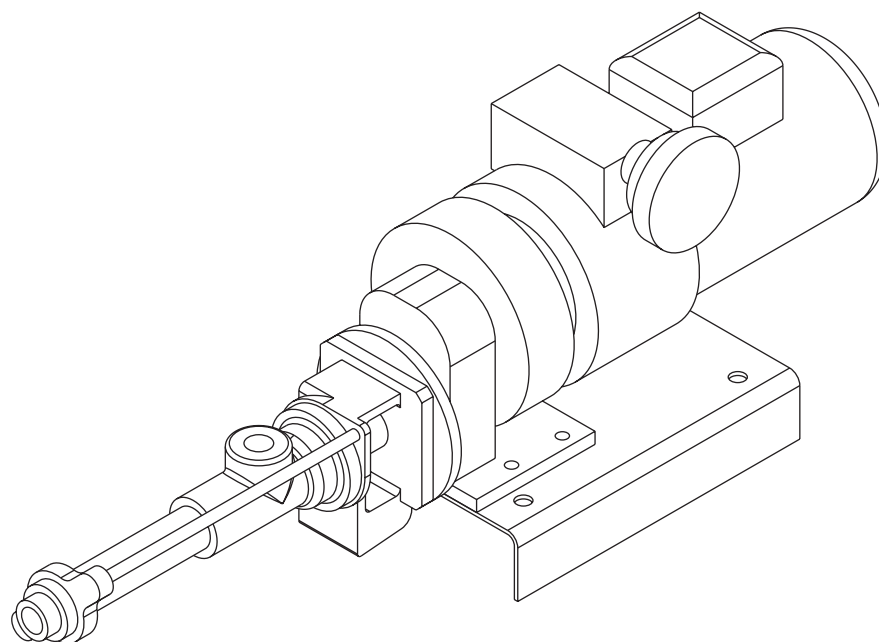


# Operating Instructions Manual

## Progressing Cavity Pump

### Spectra



**Please read through operating instructions manual carefully before use. · Do not discard.  
The guarantee is void if the equipment is subject to misuse.**

**Publishing details:**

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Progressing Cavity Pump  
Spectra  
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**Subject to technical changes.**

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<p>Remark: Because of data transfer the text sheet printouts of our operating instructions do not contain a personal signature.</p>	

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## 1 Safety Instructions

This manual contains basic instructions which must be observed when installing, operating and servicing the machine / equipment. It is essential therefore for the user / installer or responsible technician to read the manual thoroughly prior to installation and operation.

A copy of the manual must always be at hand where the machine / equipment is being used. In addition to the general safety instructions listed in this main section on safety, it is

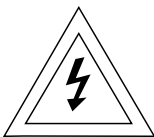
necessary to observe the special safety rules included in other sections of the manual, eg. for private use.

### 1.1 Safety Signs

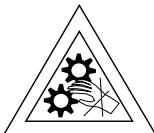
The signs below are printed in the manual as general hazard / danger symbols to mark those safety instructions whose non-observance can result in danger to personnel or to the machine / equipment. These signs are:



Hazard sign DIN 4844 - W9  
Danger to general public



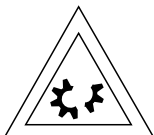
Hazard sign DIN 4844 - W8  
Risk of electric shock



Risk of injury from machinery



Danger from suspended loads



Damage to machinery



Risk of injury to your eyes: goggles required.

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Warning plates located directly on the pump/ equipment showing for example the correct direction of rotation or the fluid connections used must always be observed and kept completely legible.

## 1.2 Personnel Qualifications and Training

Operating, maintenance, inspection and installation staff must possess the correct qualifications for their work. Areas of responsibility, scope of authority and staff supervision must be exactly defined by the user. If personnel do not have the necessary knowledge they must receive due training and instruction. If necessary, the user of the machine / equipment can arrange for such training and instruction to be provided by the manufacturer / supplier. The user must also make sure that the content of the manual is fully understood by the staff concerned.

### Responsibilities

All work on and operation of the pump/ equipment should be carried out by trained/ competent and qualified operators, tradesmen and / or engineers as appropriate.

Any person responsible for or in charge of

- **working with lifting gear** and ropes when moving a pump / equipment will have to be duly instructed prior to doing the transportation job;
- **mounting a drive** to a pump / equipment must be qualified / trained as an industrial mechanic / technician;

– **setting up installations into a plant** must be qualified / trained as an industrial mechanic/ technician and must be familiar with the design and functioning of the plant in which the pump / equipment is being installed;

– **doing work on starting up, operation and maintenance** must gain knowledge of the pump / equipment principle prior to performing such works and must study the safety instructions and the manual thoroughly;

– **doing repair works**, and prior to doing such works, must be trained and skilled in the job. He must have due knowledge of the pump/ equipments specific details set up in the repair instructions. Unskilled personnel must be trained and repair works checked.


## 1.3 Dangers arising from Non-Observance of the Safety Instructions

Non-observance of the safety instructions can result in danger to personnel as well as to the environment and the machine. Non-observance of the safety instructions can result in the loss of claims for compensation.

Non-observance of the safety instructions can have, for example, the following consequences:

- ▲ Failure of essential functions of the machine / equipment
- ▲ Failure of mandatory maintenance and servicing methods

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- ▲ Danger to personnel from electricity, machinery and chemicals
- ▲ Danger to the environment from leakage of hazardous substances.

## 1.4 Safety Conscious Working

In addition to the safety instructions listed in the manual, it is essential to observe the national accident prevention directives currently in force and any of the users own internal regulations concerning work and safety.

## 1.5 Safety Instructions for the User / Operator

- ▲ If there is a risk of danger from any hot or cold machine component, the user must fit protective guards to prevent such components from being touched (according to Standard EN 563).
- ▲ Protective guards fitted to prevent contact with moving parts (eg. couplings) must be in position when the machine / equipment is in use.
- ▲ Leakages (eg. from a shaft seal) of hazardous materials (eg. explosive, toxic, hot material) must be discharged in such a way that neither personnel nor the environment are placed at risk. Legal directives must be observed.

- ▲ All possible danger from electricity must be eliminated (for details see eg. the regulations of your local power supply company).

## 1.6 Safety Instructions for Maintenance, Inspection and Installation

The user must ensure that all maintenance, inspection and installation work is carried out by authorized and qualified personnel who understand the operating instructions and are adequately trained.

Work on a pump / equipment must only be carried out with the machine stopped and electrical power supply turned off. The pump/equipment must not be under any pressure and must have cooled off. All procedures detailed in these operating instructions on the stoppage of the machine must always be adhered to.


Pumps / equipment which convey harmful media must be decontaminated.

Immediately after the maintenance work is finished all safety devices and guards must be re-installed and the safety trips must be tested.

Before putting the machine back into operation the points detailed in section "Start-up" should be observed.

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## 1.7 Unauthorized Modifications and Manufacture of Spares

Modifications or changes to machines / equipment are only permissible with the manufacturer's agreement. Original spare parts and accessories authorized by the manufacturer ensure safety.

The use of other components revokes any liability for consequences which may result.

## 1.8 Improper Application

Delivered machinery / equipment is only guaranteed safe for the use specified.

This machine / equipment was designed in accordance with the prescribed conditions of use.

The limits of use are laid down in the conditions of use and should in no way be exceeded.

## 1.9 Specific Points for the Use of a Spectra Pump

A Spectra pump must be used for the **purpose only** for which it was sold.

If you change or wish to change the process medium, you must check with either the supplier or manufacturer that the pump is suitable for the new medium. This is especially important with aggressive, poisonous or otherwise hazardous substances.

Pump criteria include:

1. Compatibility with the medium

2. Suitability for seal design / material, especially the shaft seal

3. Resistance to pressure and temperature of the medium.

Please note that Spectra pumps are progressing cavity pumps and as such can generate very high pressure.


A blockage or the chance closure of a valve in the discharge line can cause a pressure rise **manifold as high as can be tolerated by the installation**. This can result in the bursting of pipes, which must be avoided especially in the case of dangerous media.

Corresponding safety equipment must therefore be installed, for example an emergency stop button, a pressure relief valve with return pipe or a bursting disc.

During maintenance and repair work on the pump please note the following:


1. Ensure that the pump drive **can not** be turned on without authorization.
2. When opening the pump follow the instructions for handling the medium (eg. protective clothing, no smoking etc).
3. Before putting the pump back into operation ensure that all guards and other safety devices (eg. drive-belt protection, coupling protection) are properly re-installed.

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Always bear in mind your safety during operation, maintenance and installation of equipment. Please adhere to the EC-Directive for Machinery including the national regulations and follow the European Standard EN 292 with the accident prevention rules laid down by the trade unions and other appropriate technical institutions.

Continued Page 1.2R

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## 1.10 Notes on Inspection and Repair

The legal regulations for safety at work, such as regulations for the workplace, regulations governing dangerous materials, accident prevention, environmental protection eg. regulations on disposal and water balance obligate all commercial business to protect their employees and / or people and the environment from adverse effects caused by contact with dangerous materials.

### Important:

Inspection / repair of machinery and its parts only takes place when a safety conformity certificate has been completed by an


authorized and qualified specialist. Please use a copy and leave the original in the operation and maintenance manual.

Where special safety precautions are necessary in spite of careful emptying and cleaning of the machinery, the necessary information must be given.

Machinery operating with radio-active media will only be repaired or inspected by one of our specialist engineers under the safety of the owner.

The safety conformity certificate is part of the inspection / repair service. We reserve the right to refuse acceptance of this order / service for other reasons.

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## Safety Conformity Certificate

The machinery and its accessories together with this safety conformity certificate relating to repair / inspection services given to the undersigned by ourselves

Machine Type .....

Number .....

Delivery Date ..... Delivery Note No. ....

was carefully emptied and cleaned both inside and  
out in preparation for shipment

☐ yes

☐ no

Special safety precautions with regard to health or  
media endangered by water are to be implemented

☐ necessary

☐ unnecessary

The machinery is set up to transport materials dangerous  
to health or water and came in contact with  
media containing harmful substances

☐ yes

☐ no

The following safety precautions are necessary with regard to irrigation media,  
overflow liquid and waste management:

.....  
.....

We confirm that the above mentioned details are correct and complete and that  
despatch will follow in accordance with the legal requirements:

Company

Telephone .....

.....

Fax .....

.....

Telex .....

Address

.....


.....

Name .....

Position .....

.....  
Date

.....  
Company Stamp / Signature

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## 2 Description

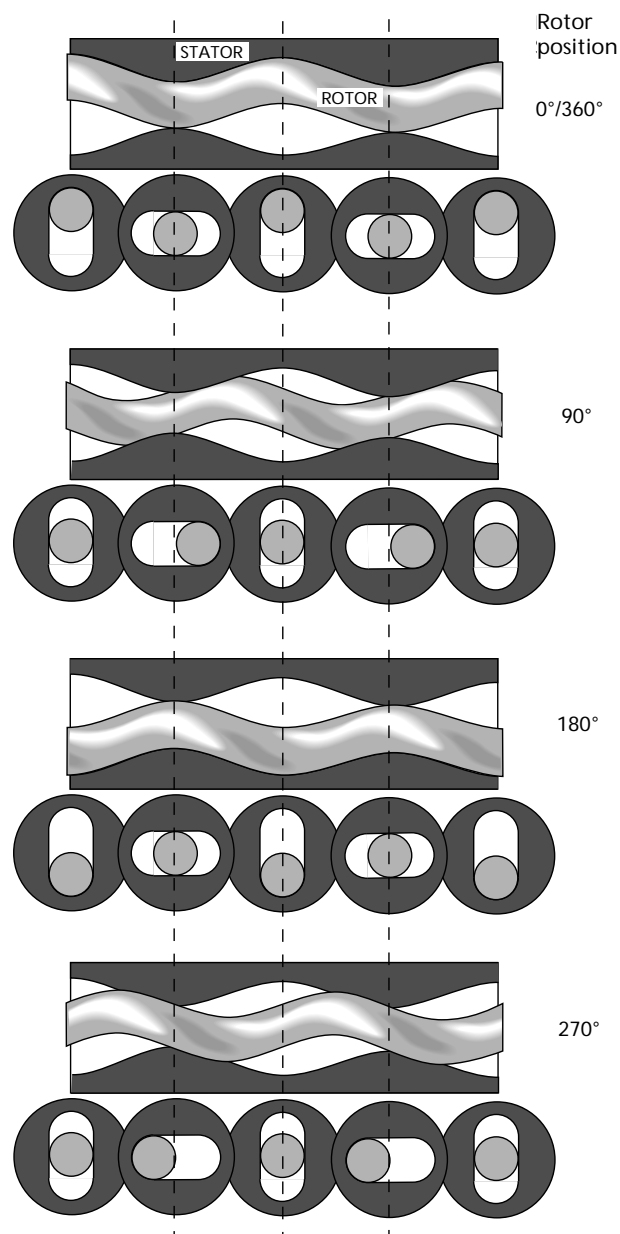
The Spectra pump is a progressing cavity pump.

The main components which determine the system discovered by Professor René Moineau are a rotating part, called the rotor and a static part, called the stator.

The rotor is a helical screw with an extremely large pitch, large thread depth and small centre diameter with round cross-section for 1/2-geometry and elliptical cross-section for 2/3-geometry. The stator has a two start or resp. 3 start thread and is double or resp. 1.5 the pitch length of the rotor. This provides space for the medium between the rotor and stator. When the rotor turns round inside the stator the medium moves continuously from the inlet to the outlet.

The universal Spectra pump system unifies many positive characteristics of other pump types:

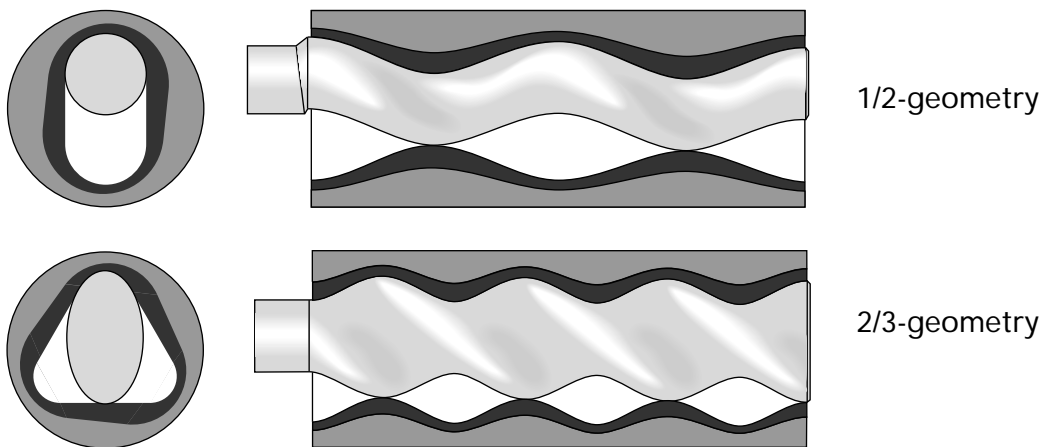
- Like centrifugal pumps Spectra pumps have no suction or pressure valves, but do have a stable flow rate in proportion to the number of revolutions.
- Like piston pumps Spectra pumps have a suction capability of up to 8.5 m vacuum metric.
- Like membrane and peristaltic pumps the Spectra pump can transport every type of inhomogenous, gaseous and abrasive media, as well as those that are not of a liquid consistency or contain solids and/or fibrous material.
- Like gear pumps and screw pumps the Spectra pump is capable of coping with high medium viscosities.
- Like piston, membrane, gear or screw pumps the Spectra pump can perform dosing operations.



Length and cross-sections through the rotor and stator with 1/2-geometry during a rotation.

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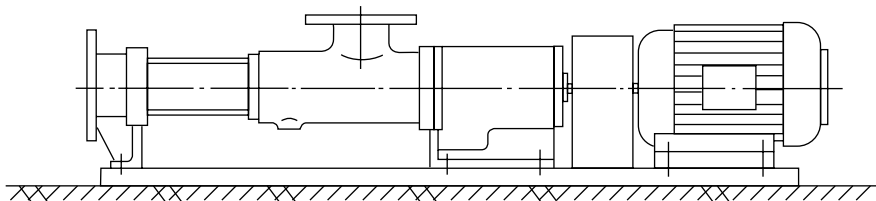


Length and cross-sections through the stator with rotor  
with reduced stator wall thickness

2.2 General Data

Noise emissions:

The maximum permitted noise emission level at a work place is 70 dB (A).  
The noise level was measured in accordance with DIN Standard 45635-24-01-KL2 to assure that the pump does not exceed 70 dB (A).  
Noises generated by the drive and pipes are not included in the above emission value.  
A prerequisite for the noise emission level of  $\leq 70$  dB (A) is that the pump is operated in a cavity free regime and is bolted to a concrete base.



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### 3 Packaging, Transportation, Storage

#### 3.1 Packaging and Transportation

The packings are labelled and symbols give the handling instructions in accordance with DIN 55402.

On receipt check for any transport damages.

Transport damages should be reported to the transporter immediately. The pumps should be transported as closely as possible to the location of installation and only there should they be uncrated.

Uncrated horizontal pumps should be lifted by using a shackle which can be attached to the baseplate. The bolt holes of the frame or the lifting lugs attached to the baseplate could be used as shown on the installation drawing.

Vertical pumps should be lifted by using the bolt down holes, lifting lugs or shackles attached to the baseplate. This is shown on the installation drawing. For most applications, the drive is mounted on top of the pump.



Be careful when lifting top heavy pumps. The centre of gravity may be above the points where the lifting gear is attached to. If the case, secure additionally against tipping over!

Vertical pumps should not be deposited unless they are secured vertically. **Hazards of tipping!** Deposit only in horizontal position!



It is essential to avoid that the total pump unit be suspended with eye bolts of the motor or gear box. These eye bolts should be used for lifting the motor and/or the gear box **only**.


**The Accident Prevention Rules, Section 18.4 relating to lifting accessories for the lifting of loads (VBG 9a) must be strictly adhered to.**

Because of the variety of possible pump designs and applications, only general instructions can be given here. These should be good enough for experienced assemblers or transportation experts.

When in doubt, please ask for detailed information on the pump unit concerned.

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When moving the pump or unit on **wheels** strictly attend to the following:

- Pad lock the motor drive and secure against unintended starting up.
- Move the pump unit carefully and slowly, especially where the ground is uneven. **Hazards of tipping!**
- Ensure a stable position of the pump or unit at the operating/storage place and secure it by actuating **all** clamping devices on **all** the wheels or rollers against voluntary moving away.
- Where fitted loosely, carefully watch the pipe bends when pumping.  
**Power of repulsion!**
- Where necessary, secure the pump unit additionally with support blocks.

### 3.2 Storage

The pumps are preserved for transport unless specified otherwise.  
In cases of longer storage the pumps should be handled as follows until installation:

■ **Stator:**

If the pump is not to be used immediately, then the elastomer along the contact line between rotor and stator may become permanently distorted (compression-set). This will increase the break away torque. Therefore, the stator should be removed and kept separately in a clean, cool and dry environment.

**Standard DIN 7716** summarizes detailed information on the storage of rubber products, some of which is gathered here, and the following notice applies to a storage for a period of up to six months.

*General*

*Most of the rubber products may change their physical properties under unfavourable conditions or if treated improperly, which will result in a shorter lifetime.*


*Or they may become useless through excessive hardening, aging, regenerating or permanent deformation, also because of blistering, cracking or other damages appearing on the surfaces.*

*The changes may occur under the influence of oxygen, ozone, heat, light, humidity, solvents or because of storing the products under tension.*

*If stored and treated properly, the rubber products will keep their properties, even over a long period of time (some years), almost unchanged.*

*This does, however, not apply to uncured rubber compounds.*

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#### *Store room*

*The environment in which rubber products are being kept must be cool, dry, free of dust and rather airy, and they must not be stored in the open, not even in a weather sheltered space.*

*Rubber products should be kept in surroundings not having less than minus 10 °C and not more than plus 15 °C.*

*Store rooms should not be damp, and it must be ensured that there will be no condensation.*

*Most favourable is an environment offering a relative humidity under 65 %.*

*Rubber products must be protected against light, particularly direct sunlight or artificial light when having a high UV portion.*

*They should furthermore be kept away from ventilation, especially draught, by wrapping them up.*

*As ozone is very aggressive and harmful there should be no store room used which houses equipment likely to produce ozone, e.g. electric motors or other equipment which might bring about sparks or other electrical discharges.*

*There must be no solvents, oil, grease, lubricants or any chemicals kept in a store room.*

#### ■ Rotor

Please support with wooden blocks and cover up against harm from mechanical impact.

#### ■ Pump parts in stainless steel


No grease coating necessary.

#### ■ Other, non-coated pump parts

Protect with grease.

#### ■ Drives

Please observe the drive supplier's instructions.

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## 4 Mounting and Installation

If the Spectra pump was stored and the rotor grease protected:  
Remove the grease before installing the stator.

Clean the rotor thoroughly in order to avoid unsuitability of the grease with the stator material and the pumping medium.

Screw the pump at all fixing points (bearing housing / drive stool, end stud, support feet) using all fixing bores securely down to the sub-structure (ground plate, machine frame, foundation etc.).

### 4.1 Direction of Rotation

The direction of rotation of the pump is given on the model plate and in the order confirmation. The direction of delivery of the Spectra pump is a function of the direction of rotation.

**Changes must be agreed upon and confirmed by the supplier.**

### 4.2 Pressure


The maximum permissible pressure inside the pump housing (A) and the maximum permissible pressure inside the end stud (B) can be seen in the following table:

Spectra	pressure A	pressure B
12/2 – 12/105	12 bar	12 bar
6/300 – 6/600	6 bar	6 bar
5/1400 5 bar	5 bar	5 bar
3/3000 – 3/12000	3 bar	3 bar

### 4.3 Piping System

- Arrange suction and pressure pipes so that when the pump is not running, the medium is still present before and after the pump. Sufficient media should remain inside in order to lubricate the pump during restart.

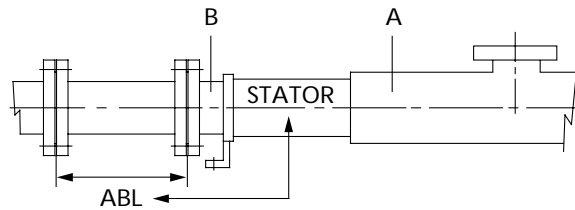
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## 4 INSTALLATION INSTRUCTIONS

- The installation of a removable distance piece between the end flange (B) and the pipe work is recommended in order to make the dismantling of the stator easy. The distance piece (see sketch) needs to have a minimum "ABL" disassembly length the values of which are shown in the table below.



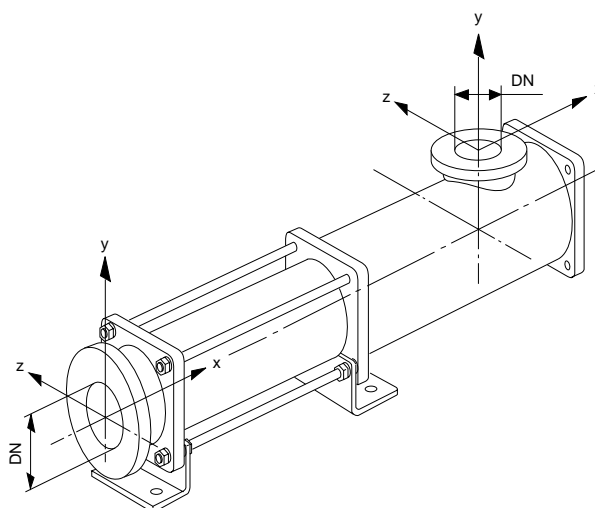
Disassembly length ABL in mm:

Spectra	minimum disassembly length
12/2 – 12/105	130 mm
6/300 – 5/1400	160 mm
3/3000	230 mm
3/6000	310 mm
3/12000	430 mm

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- Clean the pipe work and rinse thoroughly before installing the pump.
- Connect the pipe work ensuring that no external stress attacks the pump body. The installation of compensators between the pump and the pipework is recommended:
  - No risk of damage to the pump housing from pipelines "resting" on the pump.
  - No risk of damage to the pump housing through vibrating pipelines.
- The twisting loads ( $F_x$ ,  $F_y$ ,  $F_z$ ) and bending loads ( $M_x$ ,  $M_y$ ,  $M_z$ ) permitted to be put on the suction/discharge flange comply with the requirements of API 676 and exceed the requirements of EN ISO 14847. They are shown in the table below.



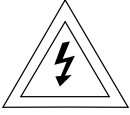
Spectra	Standard nominal diameter DN	$F_x$ , $F_y$ , $F_z$ N	$M_x$ , $M_y$ , $M_z$ Nm*
12/2 – 12/105	G 1/2"	170	85
6/300 – 3/3000	G 1 1/4"	550	300
3/6000	50	780	420
3/12000	65	990	530

\*) Screwed joints must not be charged with loads which may result in tightening or loosening these joints

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#### 4.4 Electrical Connection




All work relating to electricity shall only be made by **authorized and qualified personnel** and it should be in compliance with the requirements of the relevant national regulations!

In particular for control systems should the latest version of the **EC-Directive for Machinery 98/37/EEC, Annex I, Section 1.2 Controls** be carefully observed!

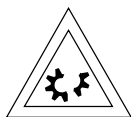
**Note for frequency converter operation:**

It is absolutely necessary to connect the PTC-resistors of the drive in case of frequency converter operation to protect the drive against overheating.

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## 5 Start-up

The Spectra pump design requires strict attention to the following:



**Never run the Spectra pump dry!**  
**A few rotations in dry condition**  
**will damage the stator!**

- Before starting up for the first time, fill the pump with medium. In the case of high viscosity media fill with a liquid. Pump priming is vital to ensure lubrication of the rubber stator. Fill the piping on the pump suction side. In anti-clockwise rotation only: Fill the pump housing.

**The Spectra pump is a progressing cavity pump which can produce pressures that may cause the bursting of vessels or pipes.**

**The power transmission train (shaft, coupling rod, joints, rotor) of the pump may be overloaded thus resulting in damage or breakage.**




**Also the pump housing parts with their connections may be overloaded and break. There is a table in Section 4 of these Maintenance and Operating Instructions showing the pressure resistance of the pump housing parts.**



**Never run the pump against a closed inlet or outlet valve!**

- **Open valves and vents before starting the pump!**
- **Check the direction of rotation by briefly switching on the pump motor.**

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## 6 Temporary Shutdown



- After stopping the pump empty and if necessary rinse it if
  - the medium might freeze due to the temperature surrounding the pump. Especially where there is a danger of frost if the pump is installed outside a building
  - the medium tends to solidify or harden
  - the medium tends to glue up the shaft seal.

- Stator:

When stored for a long period, the elastomer along the contact line between the rotor and stator may become permanently distorted (compression-set).

This will increase the break away torque. For this reason, the stator should be removed (please observe Section 9!), and stored in a cool, dry place in air tight package to give protection against light and air.


- Rotor:

Support **the rotor** on wooden blocks and cover to protect it from mechanical damage, after the stator has been removed.

- Stand-by pump:

A stand-by pump is sometimes used as a back-up for the main pump and, when standing idle for longer periods, should be operated from time to time. The pump may otherwise become seized when being started up. This is due to compression set i.e. distortion of the stator against the surface of the rotor.

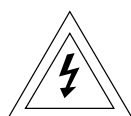
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	Date	Name	Signed	Revision: 4
issued	04.11.97	Mangel		Substitute for issue of 09.12.94
approved	05.11.97	Denk		
released	06.11.97	Hantschk		
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## 7 Maintenance

### 7.1 Pumps in General

- The pumps should be regularly rinsed or cleaned if deposits of medium are likely to build up (sedimentation).




If the pump needs to be opened to do this, ensure that the pump and motor are switched off and cannot be turned on accidentally (eg. by removing the fuse).

Periodical standstill to allow for cleaning during operation depends on the medium and type of operation.

- The pump can be cleaned:
  - through the cleaning ports provided in the pump housing
  - manually by dismantling the pump.

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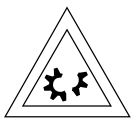
	Date	Name	Signed	Revision: 2
issued	29.10.96	Mangel		Substitute for issue of 18.03.94
approved	30.10.96	Denk		
released	31.10.96	Hantschk		text no. <b>30700</b> 
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## 7.2 Lubrication

The Spectra pump does not require frequent lubrication.

- Maintenance of the drive should be carried out according to the drive manufacturers instructions.
- Maintenance
  - where no manufacturers instructions are available and
  - when normal conditions of use exist:
    - Strip down the drive unit
    - Remove the bearings
    - Clean all parts
    - Renew the lubricant

**every 5000 operating hours or at least every two years.**



Special lubricants are often specified for mechanically controlled variable speed drives. It is therefore important to follow the drive manufacturers maintenance instructions.

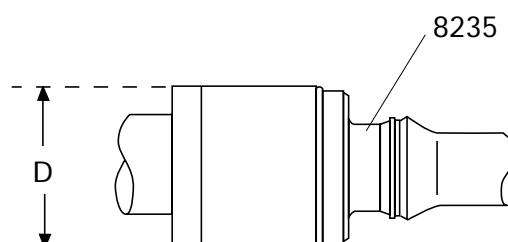
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issued	07.12.94	Mangel		Substitute for issue of 18.03.94
approved	08.12.94	Eitler		
released	09.12.94	Hantschk		text no. <b>30700</b> 
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### 7.3 Lubricating the Pin Joints with SM-Pin Joint Seals

- It is advisable to change the oil and check the seals of the pin joints:
  - when renewing worn joint parts
  - when opening the pump for any reason.

The quantity of oil added per pin joint is a function of the joint external diameter D:

Spectra	Joint external diameter D in mm (see sketch)	Quantity of oil per joint in cm <sup>3</sup>
12/2 - 12/105	25	1
6/300 - 5/1400	28	1,5
3/3000	30	2
3/6000	40	5
3/12000	54	15




Continued Page 7.2R

	Date	Name	Signed	Revision:
issued	23.06.03	Mangel		Substitute for issue of text no. <b>30700</b>
approved	24.06.03	Denk		
released	24.06.03	Denk		
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Lubricating Oil:

Designation	permitted product DIN 51502
CLP 460	SHELL Omala 460
CLP PG 320	KLÜBERSYNTH GH 6-320

Revision:		Date	Name	Signed
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	approved	24.06.03	Denk	
	released	24.06.03	Denk	
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## 7.5 Shaft Sealing through Single Mechanical Seal

There are various constructions of mechanical seals. Especially advantageous is the use of standard mechanical seals according to DIN 24960. These seals have regardless of their brand the same fitting dimensions which makes them interchangeable. Mechanical seals with a coil spring can only be used for pumps which are run in one direction of rotation.

- The seal specification of a Spectra pump is recorded on the order confirmation sheet.
- Pumps fitted with direction dependent seals should **never** be run in the opposite direction of the rotation arrow.
- If excessive leakages occur the spring tension and the seal surfaces should be checked, and the seal be replaced, if necessary.

Single mechanical seals usually work without any additional equipment.

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issued	23.06.03	Mangel		Substitute for issue of
approved	24.06.03	Denk		
released	24.06.03	Denk		
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## 8 Trouble-Shooting and Remedying

### 8.1 Trouble Chart

The chart overleaf lists possible problems


- the type
- the likely reason / cause
- the remedy.

- A problem may have various causes: Several boxes in the vertical column are marked with a cross.
- A reason/cause may result in various problems: Several boxes in the horizontal column are marked with a cross.

### 8.2 How do you trace the kind of problem to find the possible cause ?


- The column describing a possible problem shows one or several boxes marked with a cross.
- On the corresponding lines you will find the possible reasons/cause and some hints how to handle the problem . Thus the actual cause of the problem can be narrowed down and eventually detected.
- If you find further cross-marked boxes on one of the lines and should there appear corresponding problems as well, then the likely cause of the problem has been detected.
- The table helps in finding the root of the problem and will give you the remedy if it is straight forward. For more complicated problems the manufacturer has to be consulted.

Continued Page 8.0R

	Date	Name	Signed	Revision: 2
issued	20.09.95	Mangel		Substitute for issue of 18.03.94
approved	21.09.95	Eitler		
released	22.09.95	Hantschk		text no. <b>30700</b> 
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[illegible]

Possible Causes (Remedy overleaf)
In new pumps or stators : the static friction is too great.
The pump electrical equipment is not compatible with the electrical supply.
The pressure is too high.
There are foreign bodies in the pump.
The temperature of the liquid medium is too high, the stator is too ductile.
The stator has swollen, the elastomer is not compatible with the medium.
The solids content of the medium is too high and leads to blockages.
The liquid medium sediments or hardens when left to stand.
There is air in the suction pipe.
The suction pipe is leaking.
The shaft seal is leaking.
The rpm is too low.
With reduced diameter rotors : operating temperature has not been reached.
The suction is too great or pressure too low (cavitation).
The pump is running dry.
The stator is worn out, or temperature of liquid is too low.
The stator material is brittle.
The rotor is worn out.
The joints are worn out.
The pump and drive are not axially aligned.
The elastic element of the coupling is worn out.
The roller bearings are destroyed.
The rpm is too high.
The viscosity is too high.
The specific weight of the medium is too high.
The stuffing box is incorrectly tightened.
The packing is not suited to the liquid medium.
Mechanical seal : rotation is incorrect.
Mechanical seal : mechanical seal and mating ring have failed.
Mechanical seal : elastomers damaged, swollen or brittle.

Revision:		Date	Name	Signed
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	approved	21.09.95	Eitler	
 text no. <b>30700</b>	released	22.09.95	Hantschk	
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**Remedy**

Fill the pump up, then pump through manually using a suitable appliance; if necessary use glycerine as lubricant in the stator.

Check order information. Examine electrical installation (possibly 2 phase operation).

Measure the pressure with a manometer and check against order details. Reduce the pressure or change the drive.

Remove foreign bodies and eliminate possible damage.

If the liquid medium temperature cannot be lowered, use a reduced diameter rotor.

Check whether the liquid medium agrees with the order requirements. Possibly change stator material..

Increase the liquid part of the medium.

Clean the pump and rinse through after each run.

Increase the suction liquid level, prevent turbulence and air bubbles at the inlet.

Check seals and tighten pipe connections.

Stuffing box : tighten or renew. Mechanical seal : renew seals, eliminate solid deposits.

In the case of adjustable drives : increase the rpm. If necessary change the drive.

Warm up the pump (stator) to operating temperature first of all.

Decrease suction resistance, lower the temperature of the liquid medium, install the pump at a lower location.

Fill up the pump, provide for dry running protection, move the pipes.

Replace with a new stator or ensure correct liquid temperature.

Fit a new stator. Check the liquid medium agrees with order details; if necessary change the stator material.

Change rotor, establish the cause. Wear and tear, corrosion, cavitation; if necessary change to a different material or coating.

Replace relevant parts, carefully reseal and lubricate.

Re-align the unit.

Use a new connection and re-align the pump.

Replace roller bearings, lubricate, reseal. At higher temperatures observe the lubricant and the bearings.

In the case of adjustable drives : lower the rpm.

Measure the viscosity and compare with order details. If necessary adjust viscosity or change the drive.

Measure specific weight and compare with order details. If necessary adjust specific weight or change the drive.

Service stuffing box according to page 7.4, if necessary renew worn shaft.


Replace fitted packing with another packing type.

Change electrical connection.

Replace relevant rings with new ones.

Replace elastomers. Check whether the liquid medium agrees with order details, if necessary change material.

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issued	18.10.95	Mangel		Substitute for issue of 22.09.95
approved	19.10.95	Hantschk		
released	20.10.95	Hantschk		text no. <b>30700</b> 
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## 9 Removal and Fitting of End Stud, Stator and Pump Housing



The pump with attached pipework should be empty and must have cooled off!  
Disconnect the pipework on the suction side and pressure side of the pump.


### Dismantling Spectra 12/2 - 12/105

- Remove the hex nuts (2030) with spring washers (2025).
- Take off the retaining plate (2555).
- Remove the end stud (2005) from the stator (3005).
- Pull the stator (3005) out forward.
- Pull the pump housing (2010) off from drive stool (0085) or bearing housing (0005).

Refitting is a simple reversal of this procedure.

- Engaging the stator (3005) and rotor (1999) will be easier when using glycerine as a lubricant.
- Ensure during refitting that gasket (8110) is in perfect condition and will sit properly.

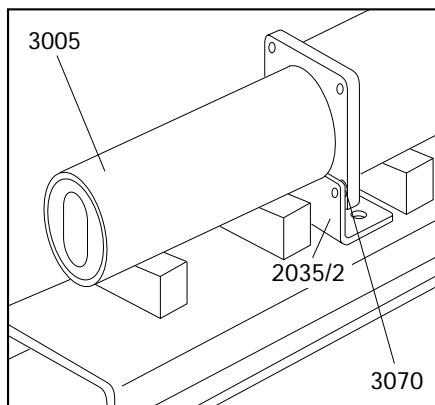
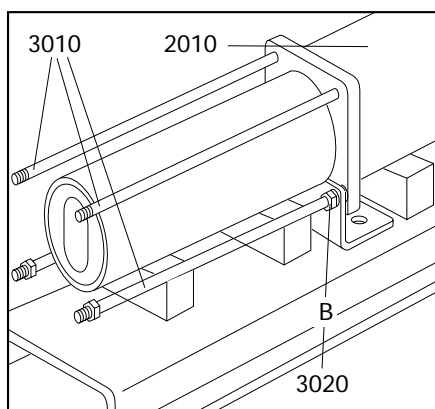
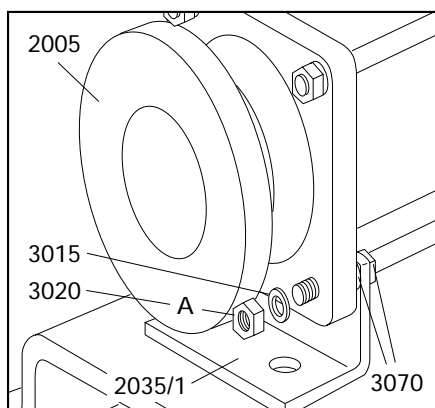
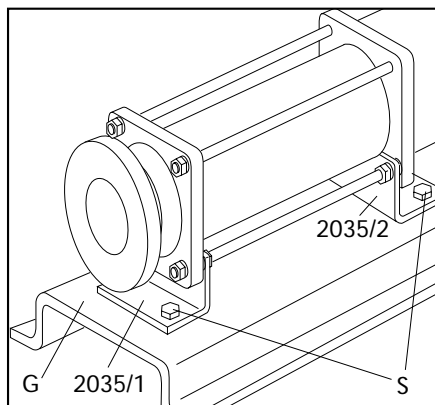
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released	25.06.03	Denk		
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## 9 DISMANTLING AND ASSEMBLY OF THE PUMP HOUSING

### Dismantling Spectra 3/3000 - 3/12000

- Remove the securing screws (S) from support feet (2035) to baseplate (G).
- Unscrew the hex nuts A (3020) and remove with spring washers (3015), then withdraw the end stud (2005) and first support foot (2035/1) with washers (3070).
- Support pump housing (2010) and stator (3005) with wooden blocks.
- Loosen the hex nuts B (3020), where fitted, and remove the thru bolts (3010).
- Where fitted, remove the second support foot (2035/2) and the washers (3070).



Continued Page 9.1

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	approved	25.06.03	Denk	
	released	25.06.03	Denk	
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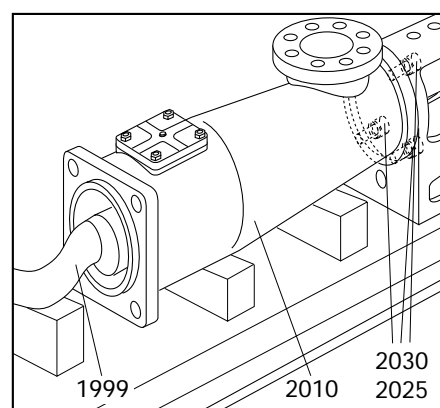
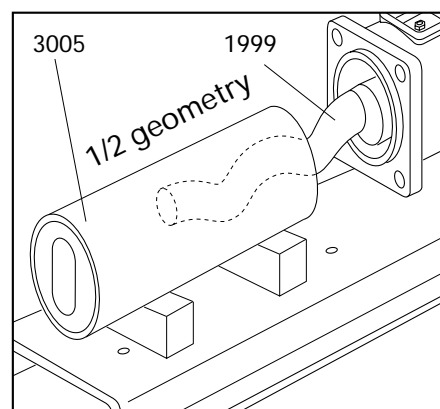


## Caution for pumps with tubular rotors:

Where the walls of tubular rotors are worn in the wear zones, pumping medium may occur inside the rotor and may come out when pulling off the stator.

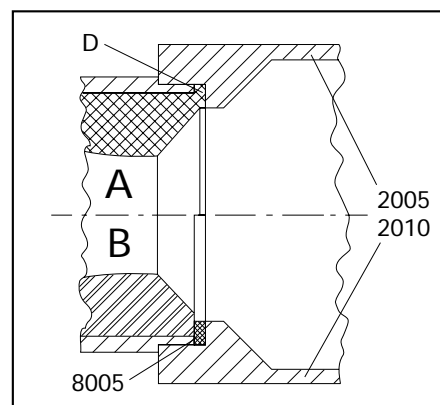
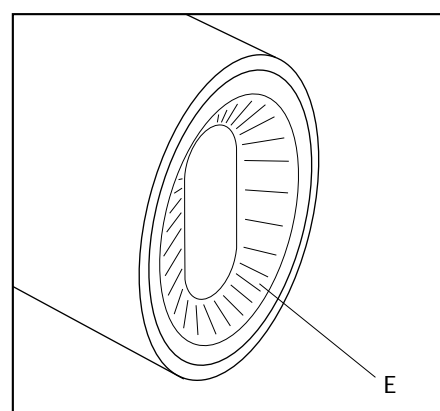
Ensure that protective measures have been taken when pumping dangerous media!

- Pull the stator (3005) out forward.  
A stator extractor can be supplied as special accessory.
- Remove the hex nuts (2030) with spring washers (2025).
- Pull the pump housing (2010) off forward.



## Assembly

- Refitting is a simple reversal of this procedure.  
When refitting the stator (3005) check direction of stator (3005) is correct! The funnel-shaped inflow side (E) of the stator (3005) must show to
  - the pump housing (2010) when rotation is **anti-clockwise**
  - the end stud (2005) when rotation is **clockwise** when viewed on pump shaft end.
- **Elastomer stators (A)** have integrated front side sealing profiles (D). They don't need additional gas-kets for sealing off the end stud (2005) and the pump housing (2010).

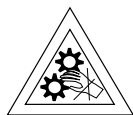


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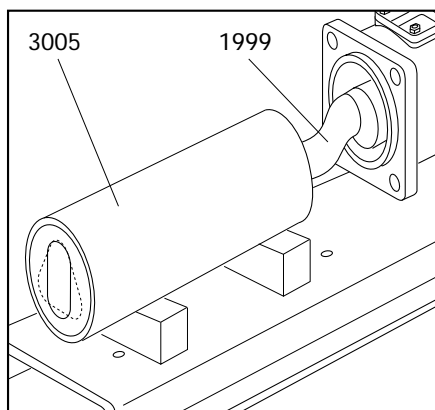


## 9 DISMANTLING AND ASSEMBLY OF THE PUMP HOUSING

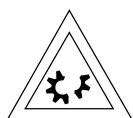


Be careful when engaging the stator (3005) and rotor (1999). Do not trap your fingers!  
Do not reach inside the stator!

- Push the stator (3005) with a rotating movement on to rotor (1999).  
Apply an assembly device and some glycerine to ease engaging the stator (3005) and rotor (1999).



- When tightening hex nuts (2030) a gap will remain between drive stool (0085) and pump housing (2010).



**Please do not try to close this gap by overtightening the nuts!**  
**Drive stool (0085) may break!**

Torque values for hex nuts (2030):

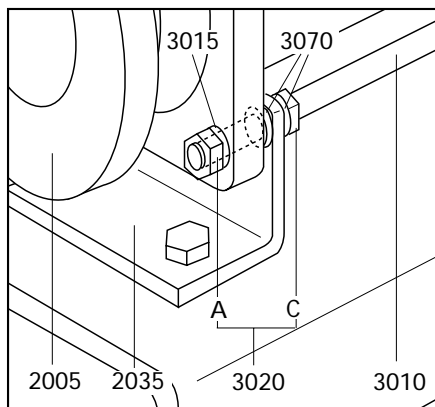
Size	M6	M8	M10	M12	M16	M20	M24	M30
Required torque Nm	8	15	30	45	75	80	100	120

- Fastening the end stud (2005):

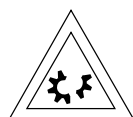
Screw the hex nuts C (3020) down into the thru bolts (3010) as far as possible.

Slip on the first washers (3070), the support foot (2035), the second washers (3070), the end stud (2005) and tighten with spring washers (3015) and hex nuts A (3020).

Finally, fasten the support foot (2035) from behind with the two hex nuts C (3020).



Ensure during refitting that the O-ring (8015) or, where a heating jacket (3025) is installed, the O-rings (8030) are in perfect condition and will sit correctly.



Ensure that the drain plug (2015) is not screwed too tightly into the pump housing (2010), since otherwise its conical thread may break the pump housing (2010).

The torque should be about 40 - 50 Nm.

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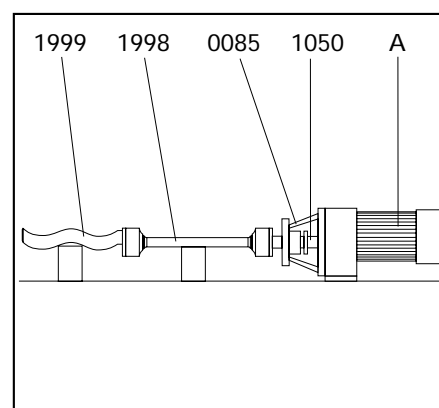


## 10 Dismantling and Assembly of the Rotating Parts (Spectra 3/3000 - 3/12000)

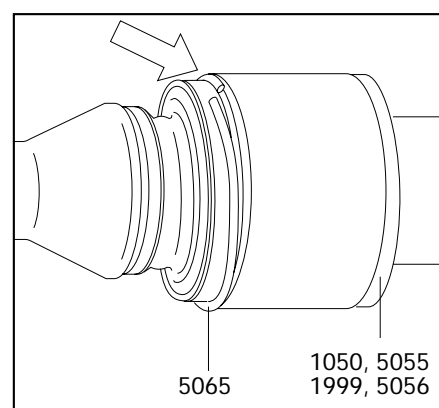
### 10.1 Removal of Rotor and Coupling Rod

For removal of the rotor (1999) and coupling rod (1998) the pin joints should be dismantled as follows:

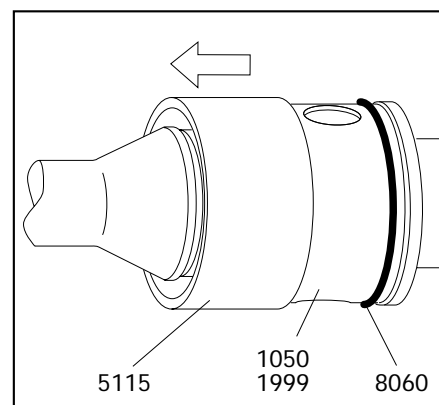
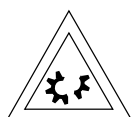
- Place the dismantled unit – consisting of drive stool (0085) with drive (A) and connecting shaft (1050), coupling rod (1998) and rotor (1999) – on the work-bench with a wooden block supporting the rotor (1999).



- Push circlip (5065) out of its groove and slip off over the head of rotor (1999) or connecting shaft (1050).



- If necessary hit the edge of sleeve (5115) at an angle with the help of a wooden block and a plastic hammer. Taking care not to damage the O-rings (8060)!

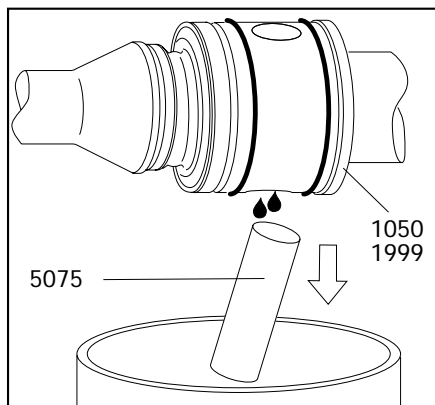


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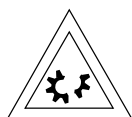
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issued	24.06.03	Mangel		substitute for the issue
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released	25.06.03	Denk		text no. 30700
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- Press the pin (5075) out of the head of rotor (1999) or connecting shaft (1050). If necessary use a hammer and a thin cylindrical pin (DIN 6450 C). Drain the oil into a receptacle.

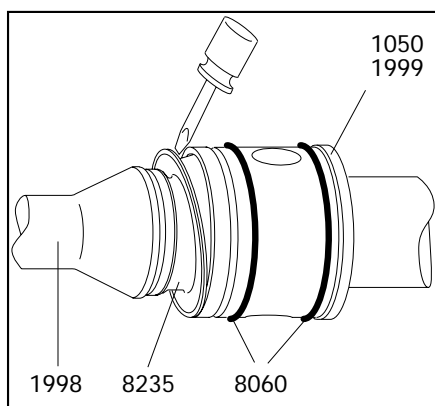
Please dispose of this oil in the proper manner.



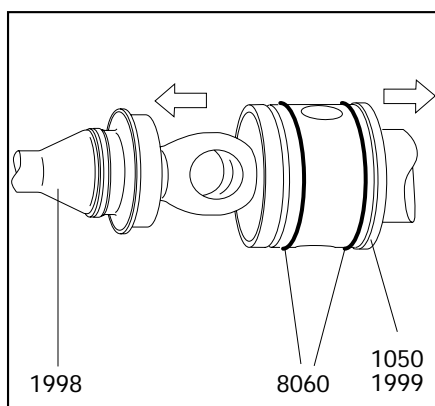
- Using a screwdriver, carefully lever the SM-pin joint seal (8235) out of the head of rotor (1999) or connecting shaft (1050).



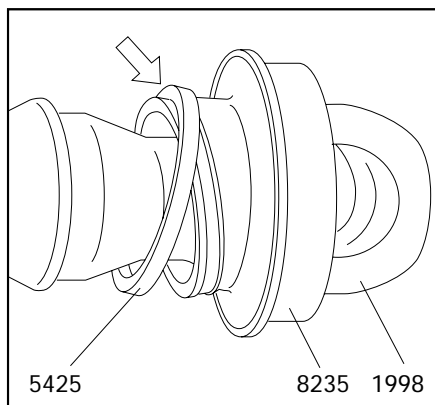
Taking care not to damage the SM-pin joint seal (8235)!



- Pull apart the rotor (1999)/ coupling rod (1998) / connecting shaft (1050) assembly. Remove the O-rings (8060).



- Push the SM-pin joint seal (8235) towards the head of coupling rod (1998). In the narrow coupling rod section press the clamp ring (5425) out of the groove of the seal. Then slip the SM-pin joint seal (8235) and clamp ring (5425) off over the head of the coupling rod (1998).



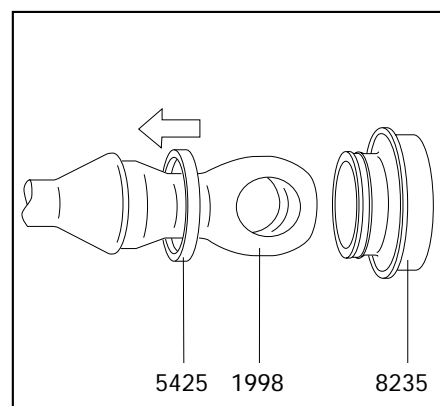
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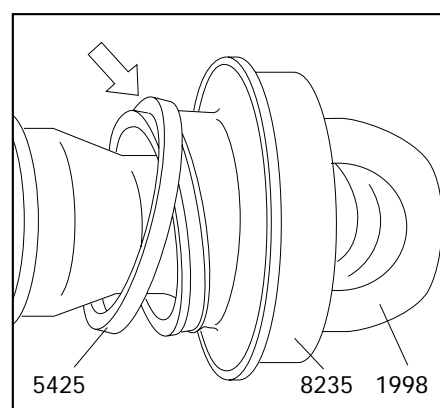
## 10.2 Fitting the Rotor and Coupling Rod

For fitting the rotor (1999) with coupling rod (1998), the two pin joints should be assembled as follows:

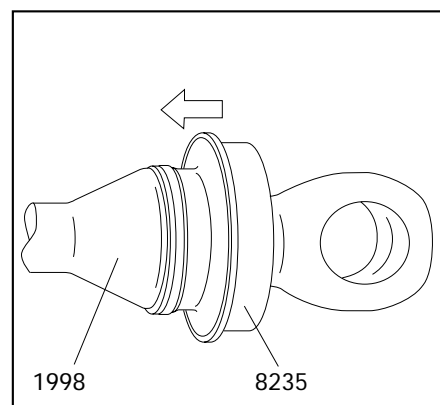
- Slip the clamp ring (5425) over the head of coupling rod (1998).



- Push the SM-pin joint seal (8235) over the head of coupling rod (1998) towards its narrow section, there squeezing the clamp ring (5425) into the groove of the SM-pin joint seal (8235).



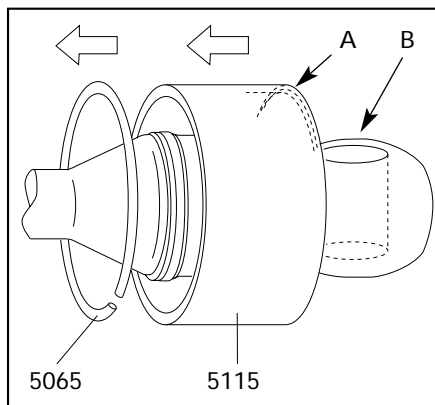
- Push the SM-pin joint seal (8235) with the correctly placed clamp ring (5425) up to the shoulder of coupling rod (1998).



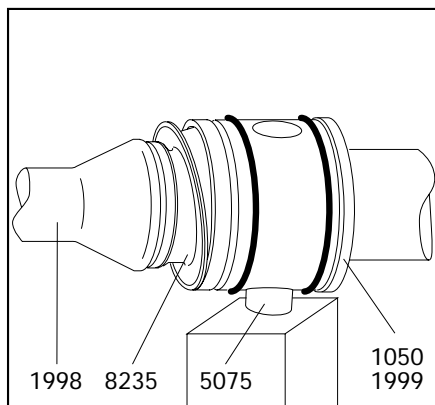
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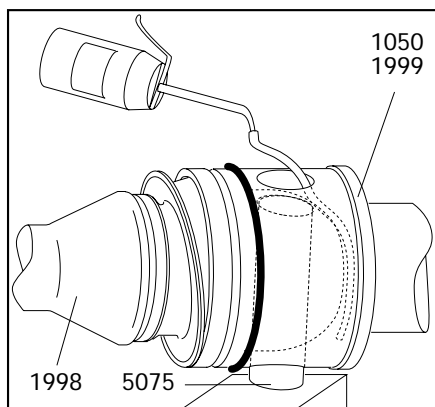
- Slip the circlip (5065) on to the coupling rod (1998). Slide the sleeve (5115) on to coupling rod (1998) so the inside diameter of chamfering (A) is being placed towards the coupling rod (1998) extension. Chamfering (A) will later on ease the installation over the O-rings (8060). Orient the head of coupling rod (1998) until it is in vertical position for the bore (B) for the pin (5075).



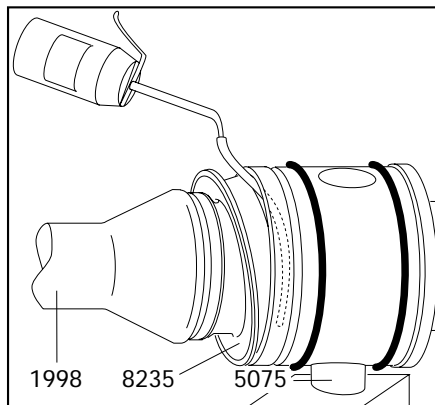
- Slide the coupling rod (1998) with SM-pin joint seal (8235) into the bore of rotor (1999) or connecting shaft (1050) and insert the pin (5075) from below and push up to the upper edge of coupling rod (1998). Support the pin (5075) against dropping out. Slide the SM-pin joint seal (8235) into the rotor (1999) or connecting shaft (1050) only from below, and in a slightly slanted position.



- For lubrication, use an oil can which should be fitted with a thin plastic hose having an outside diameter of not more than 4 mm. Insert this hose into the upper oil port opening in the rotor (1999) or connecting shaft (1050). Then slide the hose end past the coupling rod (1998) all the way down to the bottom section of the rotor head (1999) or connecting shaft (1050). Slowly fill with lubricating oil up to the filling port.



- Pull the hose out. Then insert the hose end through the small gap on the topside of SM-pin joint seal (8235) and guide it down to the bottom of the hollow space between coupling rod (1998) and SM-pin joint seal (8235). Slowly fill with lubricating oil up to the gap.

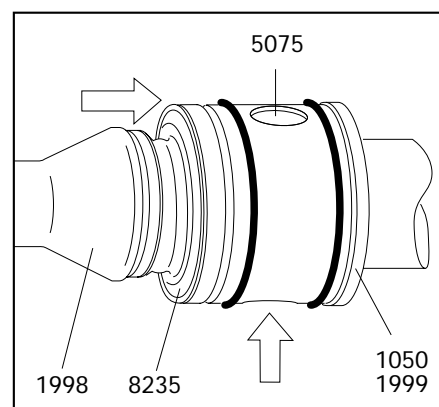


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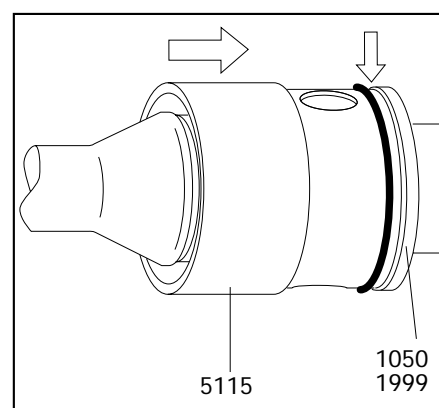
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- Pull the hose out.  
Push the pin (5075) entirely into the bore of head of rotor (1999) or connecting shaft (1050) and retain in place.

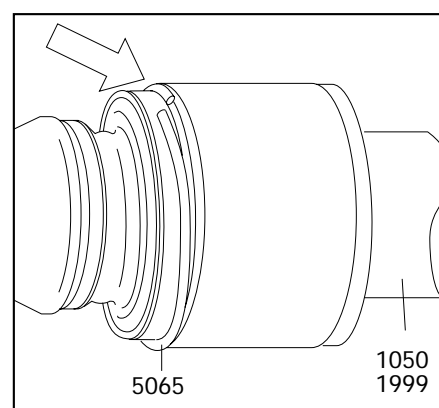
Only now, press the SM-pin joint seal (8235) into the bore of head of rotor (1999) or connecting shaft (1050) and push up to the shoulder. In doing so the SM-pin joint seal (8235) should be slightly bulbous around the outer surface. Wipe off overflow oil. Use this oil for lubricating the O-rings (8060).



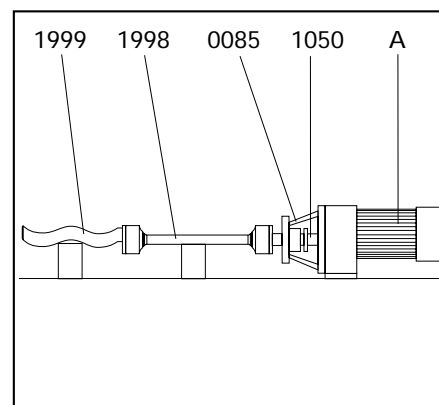
- Slip the sleeve (5110) or (5115), with its chamfering (A) forward, on to the head of rotor (1999) or connecting shaft (1050) and push up to the shoulder.



- Place the circlip (5065) into its groove on the rotor head (1999) or connecting shaft (1050) and carefully snap in place all around.



- Drive connecting shaft (1050), coupling rod (1998) and rotor (1999) are now joined by means of the two pin joints.  
Pump housing (2010), stator (3005) and end stud (2005) may now be fitted.



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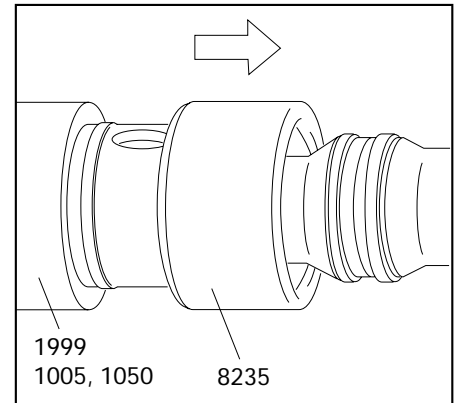
	date	name	signed	revision:
issued	24.06.03	Mangel		substitute for the issue
approved	25.06.03	Denk		dated
released	25.06.03	Denk		text no. 30700
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## 10.3 Dismantling and Assembly of the Rotating Parts (Spectra 12/2 - 5/1400)

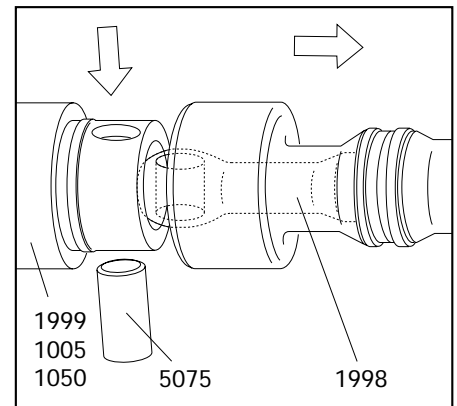
For removal and refitting of the rotor (1999) and coupling rod (1998) the pin joints should be dismantled and re-assembled as follows:

### Dismantling:

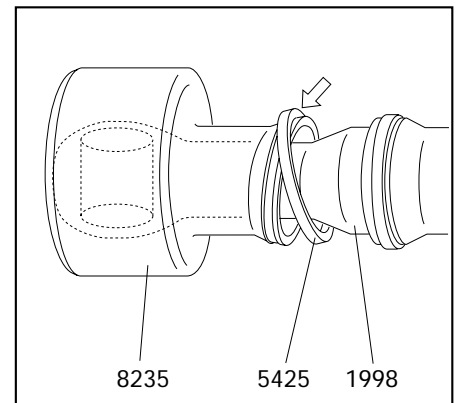
- Push the SM-pin joint seal (8235) away from the rotor (1999), drive shaft (1005) or connecting shaft (1050) so the bore for the pin (5075) comes free.



- Press the pin (5075) out of the rotor (1999), connecting shaft (1050) or drive shaft (1005). Then withdraw the coupling rod (1998) from the bore of rotor (1999), connecting shaft (1050) or drive shaft (1005).



- Push the SM-pin joint seal (8235) towards the head of coupling rod (1998). In the narrow coupling rod section press the clamp ring (5425) out of the groove of the seal. Then slip the SM-pin joint seal (8235) and clamp ring (5425) off over the head of the coupling rod (1998).



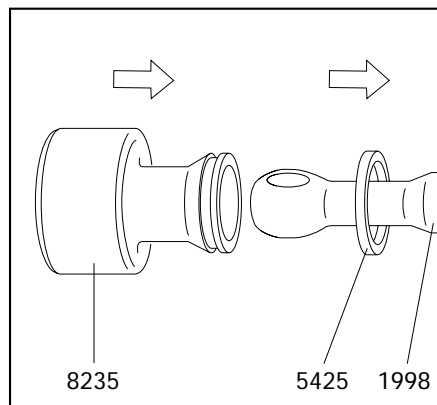
Continued Page 10.3R

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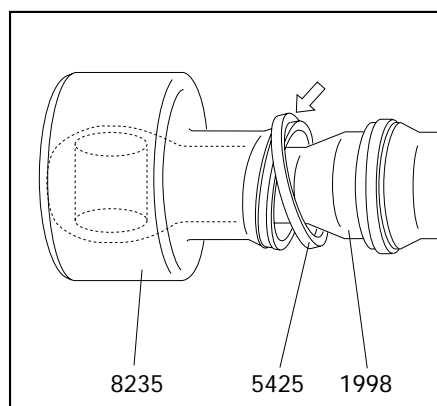
	date	name	signed	revision: 4
issued	22.05.95	Mangel		substitute for the issue
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released	24.05.95	Hantschk		
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## Re-Assembly:

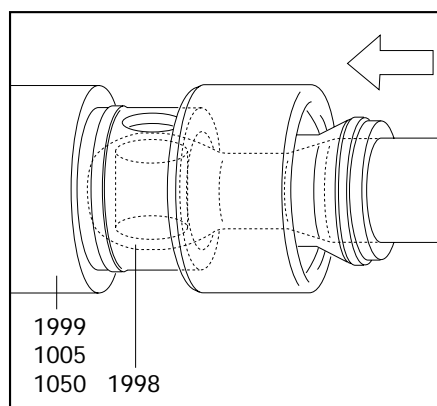
- Slip the clamp ring (5425) and the SM-pin joint seal (8235) on over the head of the coupling rod (1998).



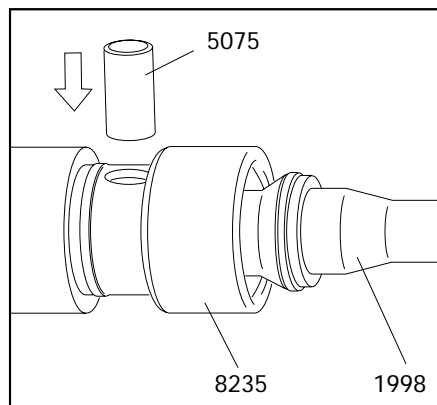
- Push the SM-pin joint seal (8235) towards the narrow section on the head of coupling rod (1998) and place the clamp ring (5425) back into the groove of the SM-pin joint seal (8235). Then move the SM-pin joint seal (8235) up to the coupling rod (1998) shoulder.



- Place the head of coupling rod (1998) into the bore of the rotor (1999), drive shaft (1005) or connecting shaft (1050).



- Join the rotor (1999), drive shaft (1005) or connecting shaft (1050) and coupling rod (1998) by the pin (5075). Then push the SM-pin joint seal (8235) up to the shoulder of the rotor (1999), drive shaft (1005) or connecting shaft (1050).

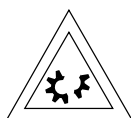


Re-assemble the second pin joint in the same manner.

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dated 23.02.95	approved	03.05.95	Eitler	
	released	04.05.95	Hantschk	
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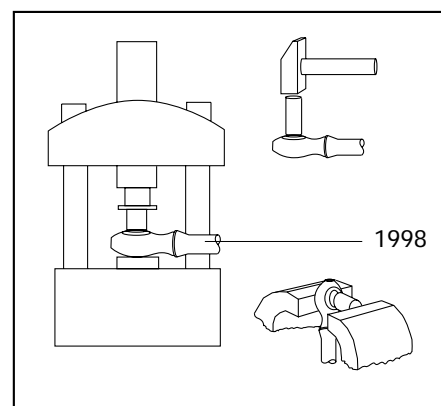


## 10.4 Replacing the Wear Sleeves of Adapter, Rotor and Coupling Rod

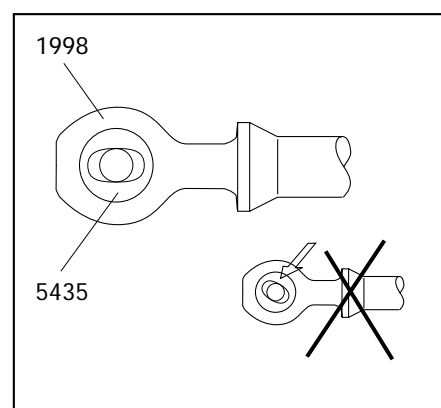


The wear sleeves (5435, 5440) have a very tight fit. **A press should be used** to remove or refit them.

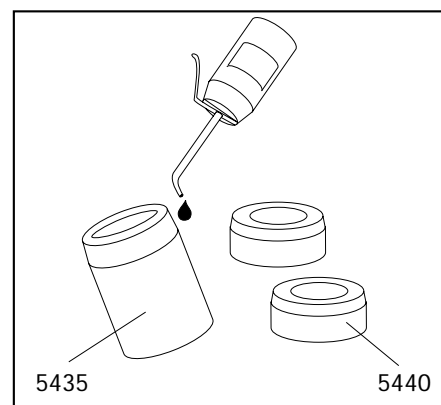
It may be possible though to drive the damaged sleeves out with a suitable mandrel. A rigid vice however is needed at the least for pressing new sleeves (5435, 5440) in again.



Orient the wear sleeves (5435) so that their oval bore agrees with the longitudinal axis of the coupling rod (1998).



- Generously oil the wear sleeves (5435, 5440).
- Every wear sleeve (5435, 5440) has got one smaller outer diameter on one end for better insertion into the bores of the coupling rod.
- Ensure the sleeves are placed in the correct orientation to the coupling rod (1998).



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## 11 Removal and Fitting of the Connecting Shaft with Shaft Seal (Spectra 6/300 - 3/12000)

### Removal:

- Push the circlip (1035) in the direction to the mechanical seal.
- Remove pin (1030).
- Remove the shaft seal housing (7005) and mechanical seal (7010) together with connecting shaft (1050) and set ring (1035) from drive stool (0085) and the drive shaft.  
The thread of cylindrical head screw (1040) can be used as forcing screw.
- If a mechanical seal is installed, see description  
"Removal and Fitting of Mechanical Seal" after Page 12.0.

### Fitting:

- Apply grease into the bore of the connecting shaft (1050) to avoid rust (e.g. TCE-Metallic 600).
- Assemble the shaft seal housing (7005) and mechanical seal (7010) together with connecting shaft (1050) and set ring (1035) with drive stool (0085) and push connecting shaft (1050) on to the drive shaft.  
At this please observe the installation direction of set ring (1035) (please see mark).
- If a mechanical seal is installed, see description  
"Removal and Fitting of Mechanical Seal" after Page 12.0.
- Connect the connecting shaft (1050) and the drive shaft by pin (1030).  
Push set ring (1035) on pin (1030).

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## 11 Removal and Fitting of the Connecting Shaft with Shaft Seal (Spectra 12/2 - 12/105)

### Removal:

- Remove pin (1055).
- If the shaft seal housing (W) is connected tightly to the drive stool (0085), then pull off the connecting shaft (1050) from the drive shaft.  
If the shaft seal housing (W) is a separate part, then take it out of the drive stool (0085) together with the connecting shaft (1050).
- Removal and Fitting of Mechanical Seal after Page 12.0.

### Fitting:

- Apply grease into the bore of the connecting shaft (1050) to avoid rust.
- If the shaft seal housing (W) is connected tightly to the drive stool (0085), then insert connecting shaft (1050) into the shaft seal housing (W) and push connecting shaft (1050) on to the drive shaft.  
If the shaft seal housing (W) is a separate part, then place it into the drive stool (0085) together with the connecting shaft (1050) and push connecting shaft (1050) on to the drive shaft.
- Removal and Fitting of Mechanical Seal after Page 12.0.
- Apply some grease into the pin (1055) also, or oil, and fit in.

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 text no. 30700	released	04.05.95	Hantschk	
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## 12 Removal and Fitting of the Single Mechanical Seal (Spectra 6/300 - 3/12000)

- **Carefully** slide out mechanical seal housing (7005) together with the parts of the mechanical seal contained in it from connecting shaft (1050).
- **Carefully** push mechanical seal (7010) stationary seat out of mechanical seal housing (7005).

Refitting is a simple reversal of the above procedure.

- To reduce frictional forces during seal assembly, apply some glycerine to the shaft and the seal housing in the area of the gaskets.
- Special care must be taken when fitting double PTFE-coated gaskets: the **joint** of the outer coating must point away from the seal assembly direction, otherwise the coating may open or be pulled off!




Ensure that the distribution of pressure is uniform when inserting the pressure sensitive counter rings. When inserting larger rings, use a suitable mandrel.

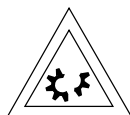
Do not allow any foreign bodies to get between the sliding surfaces.

- Exactly keep to the seal installation dimensions and ensure that the sealing faces are correctly pressed together (see table on sectional drawing W 209.000 or W 210.000).
- Insert mechanical seal (7010) stationary seat into mechanical seal housing (7005).
- Insert mechanical seal housing (7005) together with the stationary seat into the drive stool **without the installed connecting shaft (1050)**.
- If necessary take the installation dimension from the table and add the thickness S of the set ring (7086) when existing.
- Mark this installation dimension on the connecting shaft (1050).
- Fix the rotating unit of the mechanical seal (7010) on the connecting shaft (1050) depending on the installation dimension so that the rotating unit of the mechanical seal (7010) or the set ring (7086) is at the mark.
- Insert connecting shaft (1050) with the rotating unit of the mechanical seal (7010) into drive stool (0085) and install lip seal (7091, if existing). Push the set ring (1035) on to connecting shaft (1050) and observe at this the installation direction (see mark). Push connecting shaft (1050) on to the drive shaft and connect with pin (1030). Push the set ring (1035) on pin (1030).

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## 12 Removal and Fitting of the Single Mechanical Seal (Spectra 12/2 - 12/105)

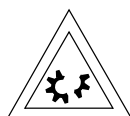


Utmost cleanliness must be observed for all removal and fitting activities. Please avoid any damage to the sealing surfaces and gaskets. The sealing unit is dismantled **on** the shaft.

- Remove all visible connecting screws and pull apart the seal housing on the shaft. The seal housing can be made up of several parts, depending on the seal construction. Compare the attached Sectional Drawing W...!
- **Carefully** remove the housing parts from the shaft together with the seal counter face parts, one after the other.
- **Carefully** push the seal counter face parts out of the housing parts.
- Special care must be taken when fitting double PTFE-coated gaskets: the **joint** of the outer coating must point away from the seal assembly direction, otherwise the coating may open or be pulled off!

Refitting is a simple reversal of the above procedure.

- To reduce frictional forces during seal assembly, apply some glycerine to the shaft and the seal housing in the area of the gaskets.



Ensure that the distribution of pressure is uniform when inserting the pressure sensitive counter rings. When inserting larger rings, use a suitable mandrel. Do not allow any foreign bodies to get between the sliding surfaces.

- **Important** : Exactly keep to the seal installation dimensions and ensure that the sealing faces are correctly pressed together (see Manufacturer's catalogue).

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	released	04.05.95	Hantschk	
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# 14 Recommended Spare Parts


In general, we have all spare parts in stock. Our subsidiaries and exclusive representatives also hold a certain stock. For special cases and when short waiting periods are not acceptable, we recommend to keep an amount of spare parts, corresponding to the pump, in stock on site (please see table below).

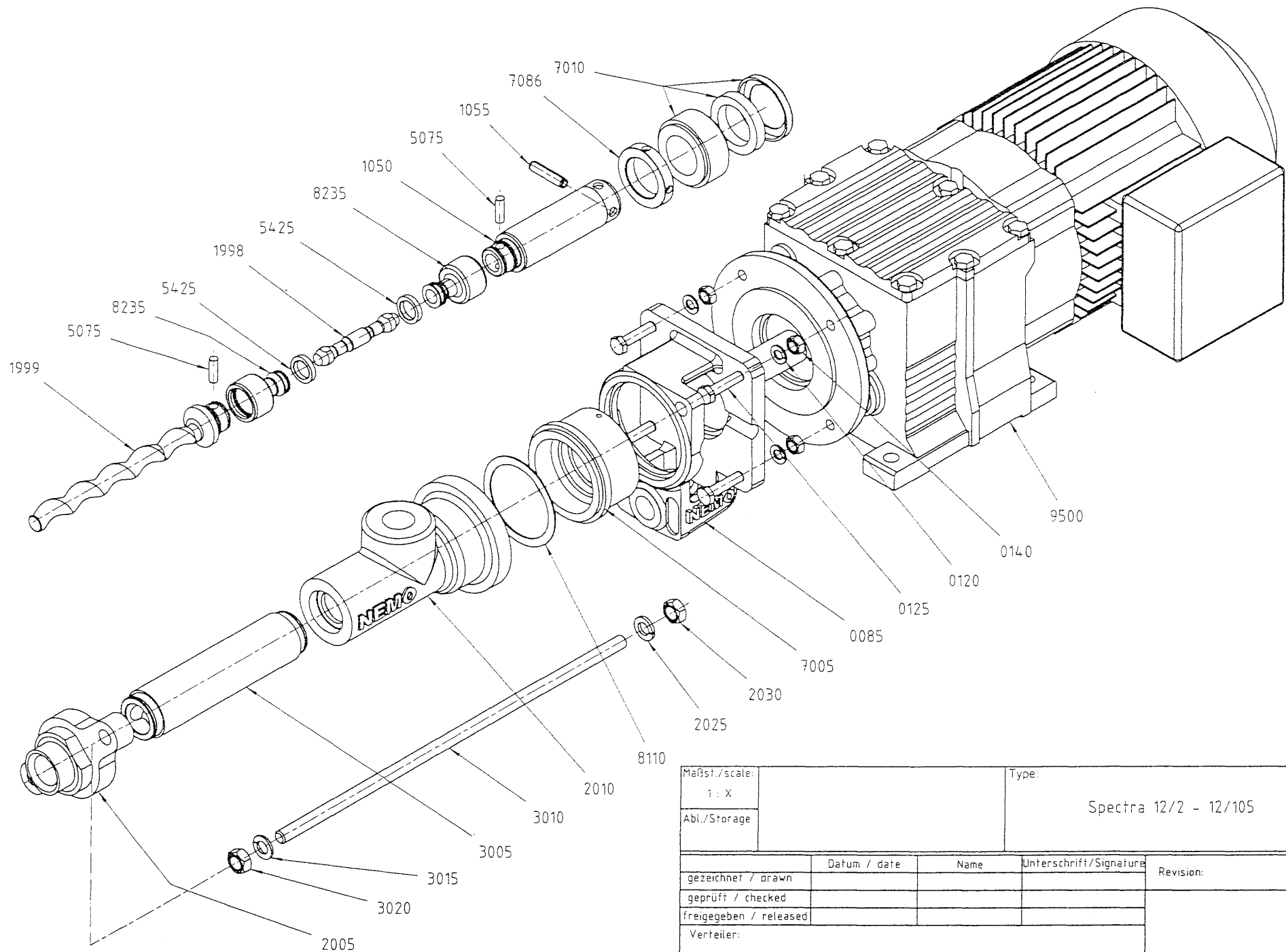
- Rotor
- Stator
- Elastomer parts as O-rings and sleeves
- joint parts
- shaft seals.

To avoid mistakes in delivery, please identify the parts by their position number shown in the spare parts list or on the sectional drawing.

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15 Sectional Drawings and List of Spare Parts

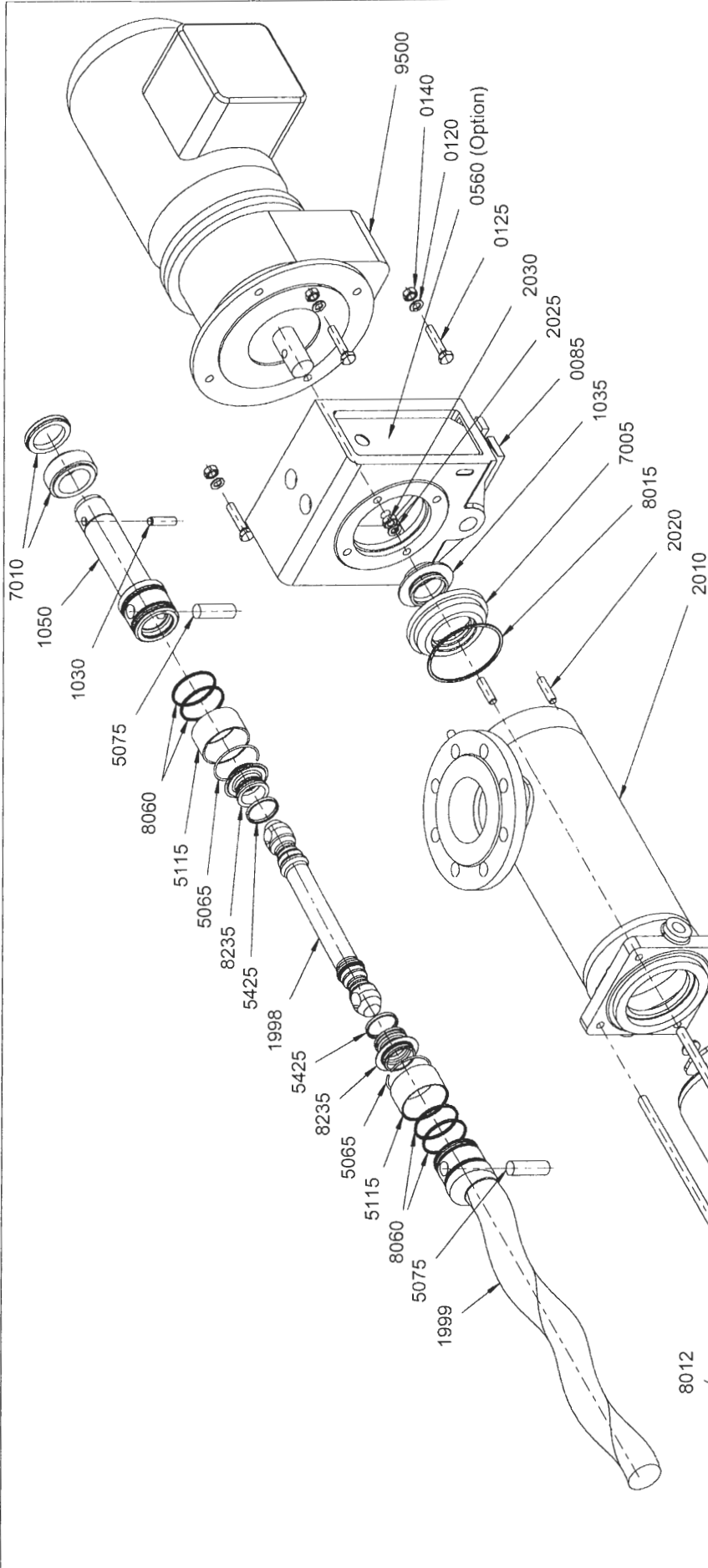
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issued	24.06.03	Mangel		substitute for the issue dated
approved	25.06.03	Denk		
released	25.06.03	Denk		text no. <b>30700</b> 
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Maßst./scale:	1 : X		Type:	Spectra 12/2 - 12/105	
Abl./Storage					
gezeichnet / drawn	Datum / date	Name	Unterschrift/Signature	Revision:	
geprüft / checked					
freigegeben / released					
Verteiler:					







Maßst./scale 1 X		Type: Spectra 3/3000 - 3/12000	
Abl./Storage		Unterschrift/Signature	
gezeichnet / drawn	Name	Revision:	
geprüft / checked	Datum / date		
freigegeben / released			
Verteiler:			

**SPARE PARTS LIST**  
**Prominent® Spectra Progressing Cavity Pumps**

<b>Pos. No</b>	<b>(Type) : Quantity</b>	<b>Designation</b>
0085	1	drive stool
0120	4	spring washer
0125	4	hex head screw
0140	4	hex nut
1030	(6/300 - 3/12000) : 1	pin
1035	(6/300 - 3/12000) : 1	thrower
1050	1	connecting shaft
1055	(12/2 - 12/105) : 1	pin
1998	1	coupling rod
1999	1	rotor
2005	1	end stud
2010	1	housing
2015	(6/300 - 3/12000) : 1	screw
2016	(6/300 - 3/12000) : 1	screw
2020	(6/300 - 3/12000) : 4	bolt
2025	(12/2 - 12/105) : 2	spring washer
2025	(6/300 - 3/12000) : 4	spring washer
2030	(12/2 - 12/105) : 2	hex nut
2030	(6/300 - 3/12000) : 4	hex nut
2035	(6/300 - 3/12000) : 1	support
3005	1	stator
3010	(12/2 - 12/105) : 2	thru bolt
3010	(6/300 - 3/12000) : 4	thru bolt
3015	(12/2 - 12/105) : 2	spring washer
3015	(6/300 - 3/12000) : 4	spring washer
3020	(12/2 - 12/105) : 2	hex nut
3020	(6/300 - 3/12000) : 6	hex nut
3070	4	spring washer
5065	(3/3000 - 3/12000) : 2	circlip
5075	2	pin
5115	(3/3000 - 3/12000) : 2	sleeve
5425	2	clamp ring
5990	pls. see page 7.2	lubricating oil
7005	1	seal housing
7010	1	mechanical seal
7086	(12/2 - 12/105) : 1	set ring
8010	(6/300 - 3/12000) : 1	gasket
8012	(6/300 - 3/12000) : 1	gasket
8015	(6/300 - 3/12000) : 1	O-ring
8110	(12/2 - 12/105) : 1	gasket
8060	(3/3000 - 3/12000) : 4	O-ring
8235	2	SM-pin joint seal
9000	1	substructure
9500	1	drive

# EC Declaration of Conformity

We,

**ProMinent Dosiertechnik GmbH  
Im Schuhmachergewann 5 - 11  
D - 69123 Heidelberg**

hereby declare that, on the basis of its functional concept and design and in the version brought into circulation by us, the product specified in the following complies with the relevant, fundamental safety and health stipulations laid down by EC regulations.

Any modification to the product not approved by us will invalidate this declaration.

Product description : ***Eccentric screw pump, series Spectra***

Serial number : ***see type identification plate on device***

Relevant EC regulations : ***EC - machine regulation (98/37/EC)  
EC - low voltage regulation (73/23/EEC)***

Harmonised standards used,  
in particular ***DIN EN 292-1, DIN EN 292-2, DIN EN 809***

Date/manufacture's signature : ***18.10.2004***



The undersigned : ***Dr. Andreas Höhler, director research and development***