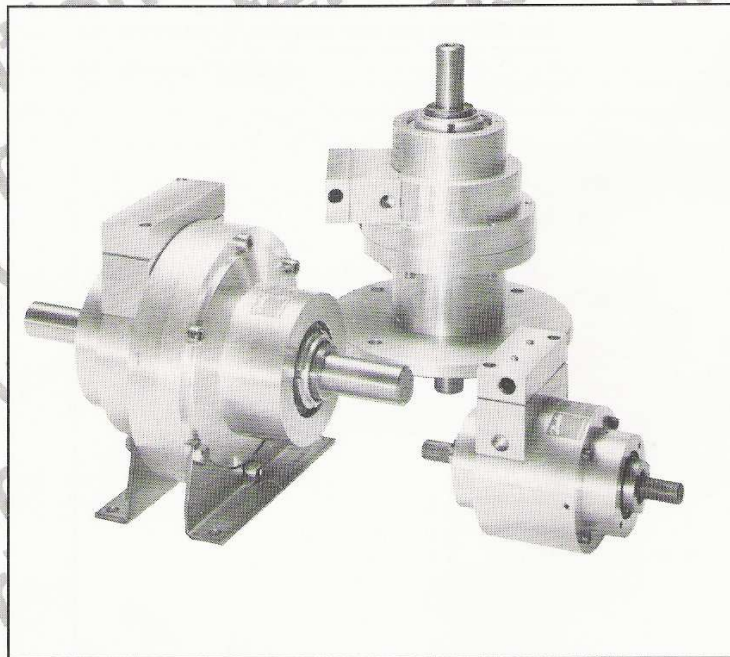


## Clutch/brake units type RotaStep

Service Manual



**Service Manual**

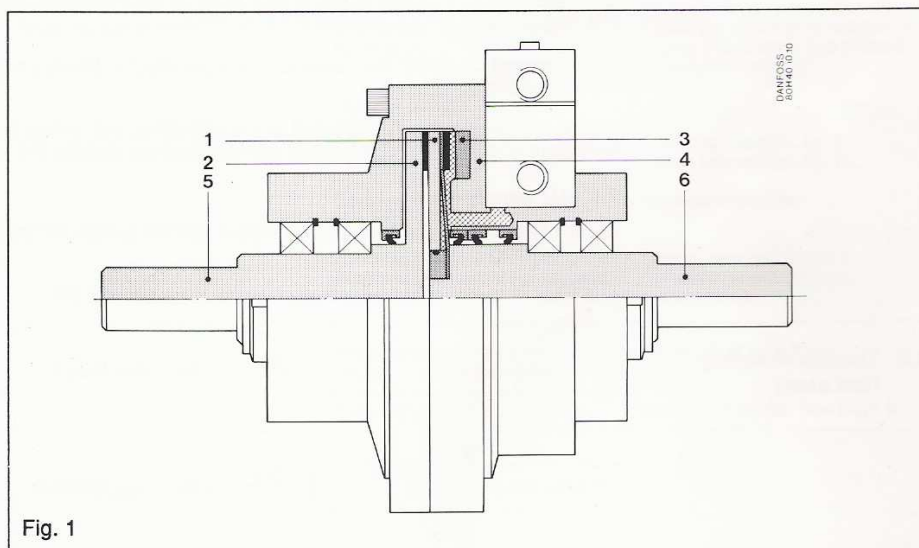
**Clutch/brake units, type RotaStep**

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**1.0 Description of  
function**

- 1. friction disc
- 2. clutch disc
- 3. brake ring
- 4. housing
- 5. clutch shaft
- 6. brake shaft



The RotaStep unit is activated by compressed air (differential pressure 0.5 to 3.0 bar).

The pressure-relieved solenoid valves direct the compressed air to the clutch and brake side respectively. RotaStep in clutch mode is shown in fig. 1.

When neither of the solenoid valves is activated, atmospheric pressure is applied at both clutch and brake side. The clutch shaft (pos. 5) and brake shaft (pos. 6) can rotate freely.

The RotaStep unit can also be activated by vacuum (differential pressure 0.7 bar). The mode of operation is the same.

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**2.0 Trouble shooting**

Before starting the trouble shooting procedure, it is recommended to ensure that specified limits of speed, cycling frequency and load are not exceeded.

Please refer to dimensioning sheet, Danfoss literature no. FS.60.C2.

**2.1 Max. operating limits**

Values for all RotaStep units	
Air pressure, $\Delta p$ , [bar]	3
Revolutions $n_{max}$ [min <sup>-1</sup> ]	1800
Ambient temperature [°C]	40
Surface temperature on RotaStep [°C]	100

**2.2 Initial tests**

In order to reduce the possibilities of failure it is recommended that a number of checks be made:

**2.3 Electrical**

Power supply to control unit must be properly connected and switched on.

Power supply to motor must likewise be connected correctly.

The signal source connections on the control unit must be properly tightened and connected.

It is advisable to check the function of the solenoid valve unit by disconnecting it from the RotaStep body and supply the solenoid valve unit with the proper electronic signal. By the tip of a finger through the hexagon shaped holes, it is possible to detect if the valve plates are moving accordingly.

**2.4 Mechanical connections**

If the motor is connected to the output shaft of the RotaStep, the motor will be blocked, and this might cause fatal overheating of the motor.

Misalignment could be the cause of too rapid wear of bearings and the consequent decreasing of repeatability.

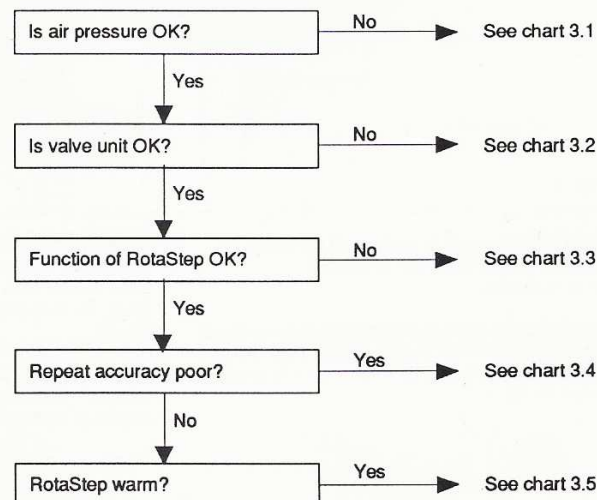
It is essential that the output shaft of the RotaStep can rotate freely after mounting the RotaStep clutch/brake unit, so that no obstructions disable the function.

**2.5 Air supply**

Before dismantling the unit, please check that the proper air pressure is supplied at the air input bushing.

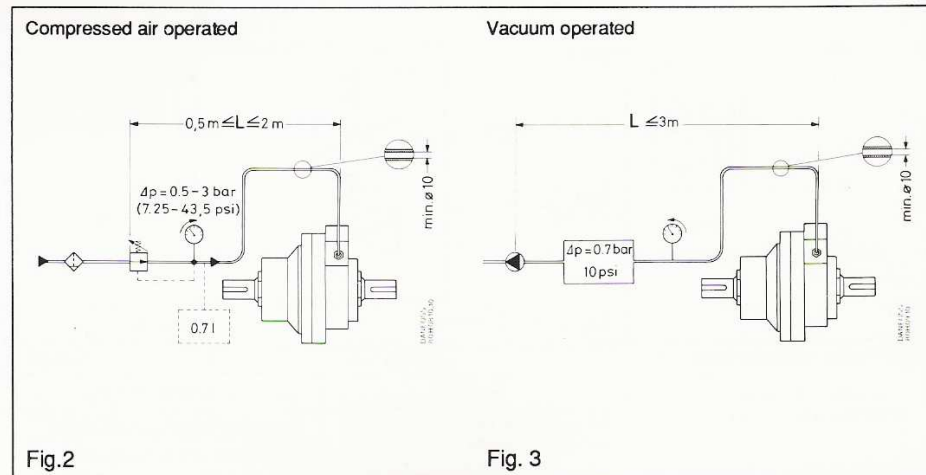
The filter element could be clogged or the hose sucked flat.

**3.0 Trouble shooting  
flow chart**





### 3.1 No air pressure

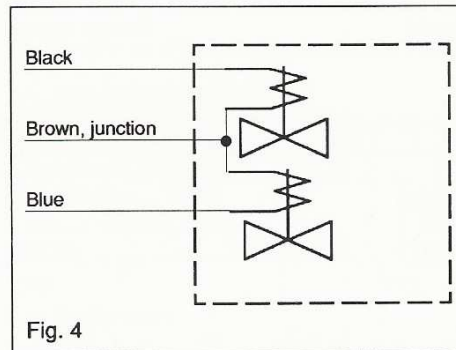


Symptom	Possible cause	Repair
No air pressure Compressed air operated	Compressed air connection not correct.	Check connection fig. 2.
	Air outlet on valve unit blocked. Pressure regulator not set or incorrectly set.	Remove obstruction. Pressure regulator to be set between 0.5 and 3.0 bar, depending on load. Refer to dimensioning sheet.
Vacuum operated	Wrong rotating direction of vacuum pump motor.	Check the direction of rotation, if wrong, interchange two phases on vacuum motor.
	Vacuum pump not connected correctly: - to RotaStep - to vacuum pump	Check connection, fig. 3. Check connection, fig. 10.
	Vacuum supply to valve unit blocked.	Remove obstruction.
	Hose between vacuum pump and RotaStep defective, (sucked flat).	Check hose and renew if defective (or replace with correct type).
	Vacuum pump setting not correct.	To be set at $\Delta p$ 0.7 bar.
	Vanes in vacuum pump worn.	Check and renew. See page 8.

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3.2 No valve function



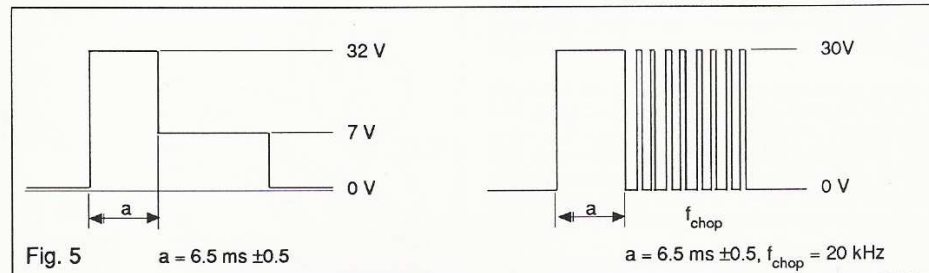
	Vacuum operated	Compressed air operated
Black	Clutch	Brake
Blue	Brake	Clutch

Symptom	Possible cause	Repair
Air pressure OK No valve function	No voltage supply to electronic control.  Valve connections to electronic control not correct.  Driver signal to valves incorrect or missing.  Valve coils defective.  Lead resistance between electronic control and valves too high.  Air filter clogged.	Connect supply.  Check connection fig. 4.  Driver signal must be as described in fig. 5 for correct function.  Check coil resistance according to fig. 9. If exceeding limits, renew valve unit.  Check lead resistance. Max. 0.25 $\Omega$ per lead.  Renew filter.

3.3 No clutch mode or no brake mode

No clutch mode	Incorrect connection of clutch valve.  Clutch valve coil defective.	Check connection fig. 4.  Check coil resistance according to fig. 9. If exceeding limits, renew valve unit.
No clutch mode, airflow through brake valve	Clutch valve mechanically defective.  Friction lining worn.	Renew valve unit. See page 7.  Renew friction disc. See page 6.
No brake mode	Incorrect connection of brake valve.  Brake valve coil defective.  Brake valve mechanically defective.	Check connection fig. 4.  Check coil resistance according to fig. 9. If exceeding limits, renew valve unit.  Renew valve unit. See page 7.
No brake mode, airflow through clutch valve	Friction lining worn.	Renew friction disc. See page 6.
Air leakage from valve unit	Valves obstructed by dust. Valves defective or worn.	Clean with compressed air. Renew valve unit. See page 7.
Air leakage at shaft bearings	Sealing rings worn or defective.	Renew RotaStep.

### 3.4 Repeat accuracy poor



Symptom	Possible cause	Repair
<p>Repeat accuracy poor</p> <p><i>Accuracies higher than specified for RotaStep cannot be expected. Timings must be within the limits given in the dimensioning sheet.</i></p> <p><i>Please refer to specifications page 2.</i></p>	<p>Load variation.</p> <p>Slack or wear in the mechanical parts between brake shaft and load.</p> <p>Rotation speed at input shaft on RotaStep varies.</p> <p>Compressed air supply insufficient.</p> <p>Oil or water from compressed air has contaminated friction disc.</p> <p>Worn or defective friction disc.</p> <p>Sealing rings worn.</p> <p>Valve pick-up voltage too low.</p> <p>Brake valve leaks.</p> <p>Stop signal transmitter defective.</p>	<p>The repeat accuracy depends on the load. If the load varies from step to step, variation in repeatability is unavoidable.</p> <p>Set RotaStep in brake mode and disconnect the clutch valve for safety reasons. Check all connections for wear and slack. Replace worn parts and tighten loose parts.</p> <p>Increase flywheel mass on input shaft. Increase size of motor.</p> <p>The hose between filter/regulator and RotaStep must be at least <math>\varnothing 10 \text{ mm}</math> and max. 2 m long. To optimize the airflow, a 0.5 to 1 litre compressed air tank can be inserted between regulator and RotaStep. Check filter and renew if clogged.</p> <p>Dismantle RotaStep to check contamination, see page 6. Renew friction disc as described. Also replace air filter and hose.</p> <p>Dismantle RotaStep for checking. Renew friction disc. See page 6.</p> <p>RotaStep must be renewed.</p> <p>Check pick-up voltage must be as illustrated, fig. 5.</p> <p>Clean valve unit with compressed air, or renew valve unit.</p> <p>Check to ensure that stop signal transmitter is:</p> <ul style="list-style-type: none"> <li>- connected correctly</li> <li>- mounted correctly</li> <li>- protected against mechanical and electronic interference</li> <li>- adjusted correctly</li> </ul>

### 3.5 RotaStep warm

RotaStep warm	The RotaStep unit is overloaded.	The surface temperature on RotaStep may reach 100°C, depending on rev. per min., load, cycling frequency and ambient temperature. Check the load (refer to dimensioning sheet) and if necessary decrease load, rev. per min. or cycling frequency.
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Service Manual

Clutch/brake units, type RotaStep

4.0 Measuring friction lining wear

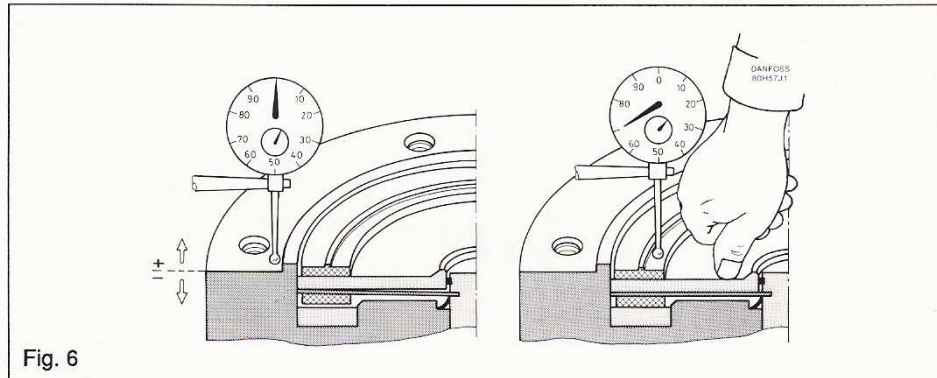


Fig. 6

Measure	Rota 06	Rota 10	Rota 15
New [mm]	0.6	1.8	0
Worn [mm]	-0.4	0.8	-1.0

With brake end removed it is possible to measure wear on the friction lining using a measuring dial on a magnetic foot fastened on the vice. See fig. 6.

Place the RotaStep unit with the clutch end downwards in a vice with aluminium jaws. Unscrew the hexagon socket head screws that retain the two parts.

Please note, it is not the actual thickness that is measured, but the distance from the facing of the housing to the upper lining.

4.1 Friction disc renewal

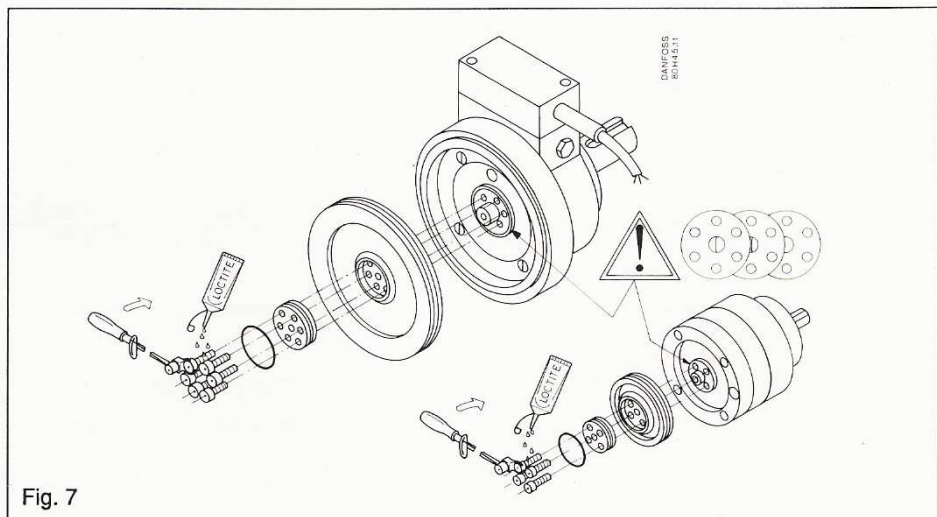


Fig. 7

Torque		Rota 06	Rota 10	Rota 15
A Shaft	Nm	2.2-2.5	4-6	10-12
	ft·lbf	1.6-1.8	2.9-3.6	7.4-8.8
B Housing	Nm	4-5	7-9	13-15
	ft·lbf	2.9-3.6	5.2-6.6	9.6-11

Be careful not to contaminate the friction disc with grease or oil. Small patches of grease can be cleaned off with acetone on a piece of clean cloth.

Renew the rubber sealing ring on the shaft end and insert the shaft end through the hole in the solid side of the friction disc. Add locking adhesive to the thread on the new screws and tighten the screws to the specified torque A.

Unscrew the screws that retain both shaft end and the friction disc. Please note the spacing washers.

With the washers out of the housing, blow the two halves clean with compressed air.

Replace the washers and locate the new friction disc with spring steel downwards and solid side up.

Assemble the two halves of the RotaStep unit, and tighten the screws to the specified torque B.

For ordering service kit, refer to paragraph 9.0 page 8.

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5.0 Valve unit renewal

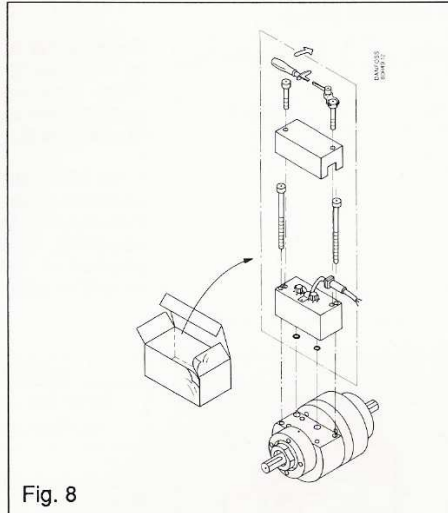


Fig. 8

The valve unit can be replaced without removing the RotaStep unit from the machine. Disconnect the electronics and loosen the two hexagon socket cap screws.

Remove the top cover. After loosening the two black hexagon socket cap screws, the valve unit can be moved. Blow the RotaStep unit clean with compressed air, place the rubber sealing rings as indicated on fig. 8, and mount the valve unit on the RotaStep unit using the new hexagon socket cap screws.

Tighten screws to the specified torque. The cables must be connected to the electronic control unit as required.

For ordering service kit, refer to paragraph 9.0 page 8.

Torque: 5-7 Nm (3.7-5.2 ft·lbf).

6.0 Resistance in valve coils

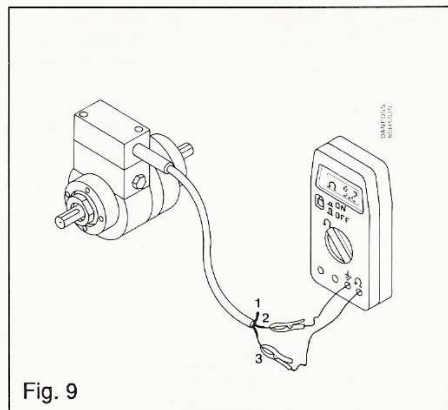


Fig. 9

The resistance in each valve must be measured between wire no. 1 and 2, and between 2 and 3. The resistance must not exceed:

Rota 06, 08, 10	9.4 $\Omega \pm 0.35$
Rota 12, 15, 20	10.4 $\Omega \pm 0.35$

- 1. black
- 2. brown (junction)
- 3. blue

7.0 Vacuum pump  
SRD 7/8

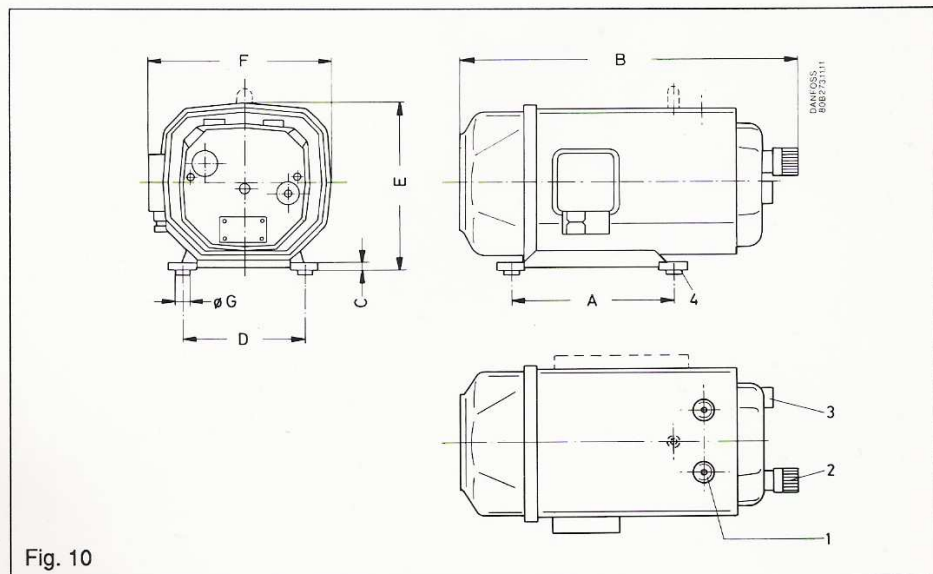


Fig. 10

- 1. vacuum socket
- 2. vacuum regulation valve
- 3. air outlet



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**7.1 Servicing the vacuum pump**

	Min. width, mm	Becker code no.
SRD 7	19	901303
SRD 8	27	901347

Remove the protection cover at the valve end by unscrewing the two screws in the cover. Clean suction filter as required by blowing compressed air from the inside through the filter element.

If the filter element is clogged or contaminated by grease or oil it should be renewed. Vanes are to be inspected after 5000 hours of operation. Clean cylinder with dry compressed air and renew the vanes when the minimum width is reached.

**8.0 Servicing air pressure regulator and filter unit**

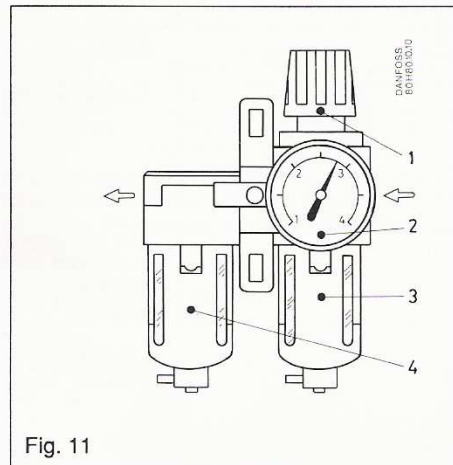


Fig. 11

- 1. air pressure regulator valve
- 2. air pressure gauge
- 3. pre-filter
- 4. micro filter

Elements	SMC code no.
Micro filter element	63093
Pre-filter element	111511-5B

The air pressure regulator contains a pre-filter, which must be renewed, when the air pressure drop through the filter reaches 1.0 bar, or at least once a year.

The filter housings must be drained from time to time to ensure that fluids do not reach the filter element.

The micro filter element must be renewed when pressure drop through the filter reaches 1.0 bar, or at least once a year.

The filter housings can be cleaned with soap water. Do not use acetone, trichlorethylene, toluene or similar solvents.

**9.0 Service kit code no.**

**Danfoss code no.**

	Rota 06	Rota 10	Rota 15
Friction disc	080H0150	080H0152	080H0154
Valve unit	080H0118	080H0118	080H0119