

BE4700 Operating Instructions

(Translation of original)

BRINKMANN Immersion Pumps

TC/STC260...460



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1 Indication to the manual

This operating manual gives basic instructions which are to be observed during installation, operation and maintenance of the pump. It is therefore imperative that this manual be read by the responsible personnel and operator prior to assembly and commissioning. It is always to be kept available at the installation site.

1.1 Identification of safety instructions in the operating manual

Safety instructions given in this manual non-compliance with which would affect **safety** are identified by the following symbol



Safety sign according with
ISO 3864 – B.3.1

or where **electrical safety** is involved, with:



Safety sign according with
ISO 3864 – B.3.6

Where non-compliance with the safety instructions may cause a risk to the machine and it's function the word

ATTENTION

is inserted.

2 Description of product

2.1 General description of the pump

Pumps of this type are multi-stage rotary pumps with immersed parts of stainless steel. Series TC/STC use closed impellers in order to minimizing power consumption and to optimize hydraulic pump efficiencies.

The pump shaft and the motor shaft are connected by a coupling. The pump shaft is sealed by a rotating mechanical seal. The pump is protected again impurity by a filter. Pump and motor form a compact and space-saving unit.

Vertically mounted pumps are equipped with a mounting flange. The pump end immerses into the tank and the motor extends vertically above the tank.

2.2 Intended use

The immersion pumps of the series TC/STC are designed for use on central coolant systems and CNC machining centers with internally cooled tools within the limiting application in accordance with table 1.

Limit of Application (Table 1)

Type	TC/STC260 ... 460
Mediums	Industry water, cooling emulsions, cooling- and cutting-oils
Kinetic viscosity of the medium	...30 mm ² /s
Temperature of medium	0 ... 80 °C
Particle-size in the medium	2 mm
max. operation pressure	25 bar
min. delivery volume	1% of Q max.
Dry running	The pumps are not suitable for dry running.
Switching-on frequency per hour	Motors less 3 kW max. 200 from 3 kW to 4.0 kW max. 40 from 5.0 kW to 10,3 kW max. 20 Motors 11 kW and higher max. 15
Ambient temperature	40 °C
Set-up altitude	1000 m

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The pumps are to be operated within their design limits. Applications outside of these limits are not approved. The manufacturer is not responsible for any damages resulting from use of the pumps in such applications.

2.3 Technical data

Type	Type	Max. del. pressure bar / spec. weight 1	Max. del. volume l/min	Height ¹⁾ H mm	Pipe connec- tion ¹⁾ G	Depth of immer- sion ¹⁾ h mm	Weight		Power		Noise level ²⁾ dBA / 50 Hz
							TC kg	STC	50 / 60 Hz kW		
TC260 / 460	STC260 / 460	6.0	300	504	G 1 ½	455	54	56	3.3	3.8	70
TC260 / 600	STC260 / 600	9.2	305	534		593	64	66	5.0	5.75	70
TC260 / 690	STC260 / 690	11.8	310	575		685	88	90	6.0	6.9	74
TC260 / 920	STC260 / 920	17.5	320	613		915	112	114	9.0	10.3	74
TC260 /1150	STC260 /1150	22.5	320	621		1145	137	139	11.0	12.6	74
TC460 / 320	STC460 / 320	2.9	580	465	G 1 ½	317	40	42	2.2	2.55	63
TC460 / 390	STC460 / 390	4.0	580	504		386	53	55	4.0	4.55	70
TC460 / 460	STC460 / 460	5.7	600	534		455	61	63	5.0	5.75	70
TC460 / 530	STC460 / 530	7.0	600	575		524	85	87	6.0	6.9	74
TC460 / 740	STC460 / 740	11.0	620	613		731	103	105	9.0	10.3	74
TC460 / 870	STC460 / 870	13.9	620	621		869	127	129	13.0	15.0	74

1) Dimensions in accordance with page 5

2) Noise emissions measured in accordance with
DIN 45635 at a distance of 1 m

The motor is surface-cooled and compliant with
DIN IEC 34 and EN 60034 (protection degree IP 55).

3 Safety instructions

When operating the pump, the safety instructions contained in this manual, the relevant national accident prevention regulations and any other service and safety instructions issued by the plant operator are to be observed.

3.1 Hazards in the event of non-compliance with the safety instructions

Non-compliance with the safety instructions may produce a risk to the personnel as well as to the environment and the machine and results in a loss of any right to claim damages.

For example, non-compliance may involve the following hazards:

- Failure of important functions of the machines/plant
- Failure of specified procedures of maintenance and repair
- Exposure of people to electrical, mechanical and chemical hazards
- Endangering the environment due to hazardous substances being released

3.2 Unauthorized modes of operation



- Pump may not be used in potentially explosive environments!
- Pump and discharge piping are not designed to hold any weight and may not be used as a step ladder.

3.3 Remaining Risk



Risk of Injury!

Risk of squeezing or crushing body parts when installing or removing the pump exists. Proper and secured lifting tools must be used.

Risk of burns!

The pump must have cooled down sufficiently prior to commencing any repair, maintenance or installation.

3.4 Qualification and training of operating personnel

The personnel responsible for operation, maintenance, inspection and assembly must be adequately qualified. Scope of responsibility and supervision of the personnel must be exactly defined by the plant operator. If the staff does not have the necessary knowledge, they must be trained and instructed, which may be performed by the machine manufacturer or supplier on behalf of the plant operator. Moreover, the plant operator is to make sure that the contents of the operating manual are fully understood by the personnel.

3.5 Safety instructions relevant for operation

- If hot or cold machine components involve hazards, they must be guarded against accidental contact.
- Guards for moving parts (e.g. coupling) must not be removed from the machine while in operation.
- Any leakage of hazardous (e.g. explosive, toxic, hot) fluids (e.g. from the shaft seal) must be drained away so as to prevent any risk to persons or the environment. Statutory regulations are to be complied with.
- Hazards resulting from electricity are to be prevented (see for example, the VDE Specifications and the bye-laws of the local power supply utilities).
- The pumps' stability against falling over is not ensured unless it is properly mounted onto the tank.
- The female threads on the motor MUST NOT be used to lift the entire pump and motor assembly.

3.6 Safety instructions relevant for maintenance, inspection and assembly work

Any work on the machine shall only be performed when it is at a standstill, it being imperative that the procedure for shutting down the machine described in this manual be followed.

Pumps and pump units which convey hazardous media must be decontaminated.

On completion of work all safety and protective facilities must be re-installed and made operative again.

Prior to restarting the machine, the instructions listed under "Start up" are to be observed.

3.7 Signs on the pump

It is imperative that signs affixed to the machine, e.g.:

- arrow indicating the direction of rotation
- symbols indicating fluid connections be observed and kept legible.

3.8 Unauthorized alterations and production of spare parts

Any modification may be made to the machine only after consultation with the manufacturer. Using spare parts and accessories authorized by the manufacturer is in the interest of safety. Use of other parts may exempt the manufacturer from any liability.

4 Transport and storage

Protect the pump against damage when transporting.

The pumps may only be transported in a horizontal position and hooks or straps must be attached on the motor and pump end.

Do not use the pump shaft for connecting any transportation aids such as hooks or straps.

Pumps must be drained prior to their storage.

Store pump in dry and protected areas and protect it against penetration of foreign bodies.

Always store pump above the freezing point!

5 Installation and Connection

5.1 Mechanical installation

During any assembly or disassembly process the pumps must be secured against tipping through ropes for example at all times.

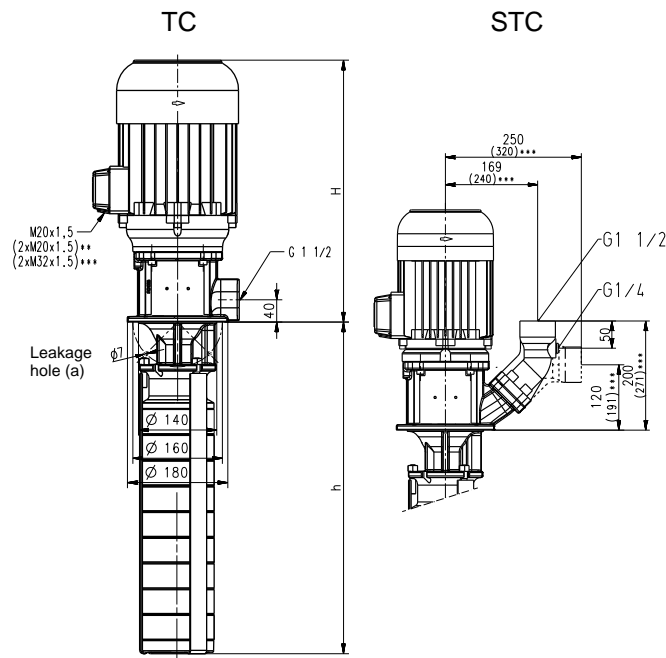
Pumps must be mounted securely. Piping, tank and pumps must be mounted without any tension.

The inlet is at the bottom of the immersed pump body. The distance between the inlet and the tank bottom must be so large that the inlet cannot be blocked by deposits during longer shutdowns.

The leakage is collected in a leakage chamber and drained off by the leakage hole (a) into the tank.

To obtain the full flow rate it is recommended to choose for the pipework the nominal bore diameter of the pumps cross section for connection. Therefore pipe bends should be used, not pipe angles!

The pipework must be qualified for occurring hydraulic pressure.



**) Dimensions 6.0...10.3 kW

***) Dimensions up 11 kW

ATTENTION

Pay attention of the max. tightening torque for piping connection

Type	Pipe connection	Cast iron	Brass
TC260...460	G 1 1/2	150 Nm	75 Nm
STC260...460	G 1 1/2	150 Nm	-

When installed the space around the pump must be large enough to provide sufficient cooling of the motor.

Do not prop up the pressure line via the joining socket.

5.2 Electric wiring



All service work must be carried out by qualified service personnel. Pump must be disconnected from the power source and all rotating parts must stand still. Reassure that pump is disconnected from power source and cannot be switched on. Verify that there is no voltage at the terminal board!

According to the European Standard EN809 a motor overload must be installed and properly set to the full load amps stated on the pump name plate.

It is the responsibility of the machine operator to decide whether or not an additional emergency switch must be installed.



Danger!

Risk of electric shock

Our asynchronous motors can optionally be fitted with temperature sensors in the form of triplet PTC thermistors, which are used for thermal monitoring of the motor windings. Please note that the temperature sensors meet the insulation requirements of basic insulation. The improper connection of the triplet PTC thermistors to evaluation units that do not have a protective function against overvoltage in the event of a fault can lead to voltages dangerous to the touch and electric shock.

Please check whether the evaluation units you intend to use are permissible for the electrical connection of the temperature sensors.

5.2.1 Circuit

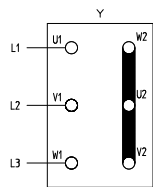


Tension voltage and frequency must correspond with the shown specification on the nameplate.

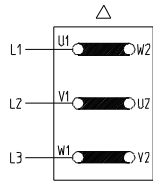
The pump must be wired so that a solid long term electrical connection is ensured. Establish a solid ground connection.

The electrical wiring must be performed according to the wiring diagram shown inside the terminal box cover. (Please see above sample wiring diagrams)

Wiring diagram e.g.



Star connection
up to 5.5 kW
3 x 400 V, 50 Hz
resp. 380-415 V, 50 Hz



Delta connection
up to 5.5 kW
3 x 230 V, 50 Hz
resp. 220-240 V, 50 Hz
From 6.0 kW and higher
3 x 400 V, 50 Hz
resp. 380-415 V, 50 Hz

There may be no foreign objects such as dirt, particles or humidity inside the terminal board.

Mount terminal board cover to motor tight against dust and humidity and close up all unused wiring ports.

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When Variable Frequency Drives are used interfering signals might occur.

Non-sinus shaped supply voltage from a variable frequency drive might result in elevated motor temperatures.

6 Start up / Shut down

6.1 Start up

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Switch off at the mains.

After connection the electrical wires, close the terminal box. Briefly start the motor (max. 30 sec.) and check the rotation according to the arrow on the top of the motor.

If the direction is incorrect change over two of the power leads.

6.2 Shut down

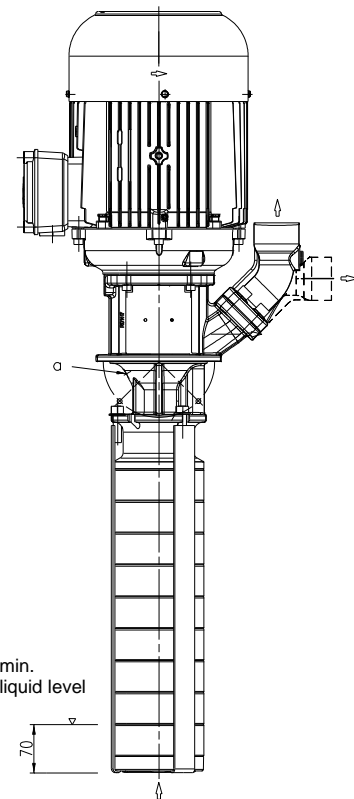
All service work must be carried out by qualified service personnel. Pump must be disconnected from the power source and all rotating parts must stand still. Reassure that pump is disconnected from power source and cannot be switched on. Verify that there is no voltage at the terminal board!

Open terminal box and disconnect the power leads. Empty out the pump.

7 Operation

Liquid level

Be sure that the suction hole of the pump body is immersed about 70 mm in the liquid (min. liquid level) before starting up the motor.



If the pump should lock up and cease, shut pump down (see 6.2) and disconnect from power supply. Pump must be uninstalled and removed from the system prior to its repair.

8 Servicing and Maintenance

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The surface of the motor must be kept free of dirt.

The motor shaft is spinning in permanently greased ball bearings (with special grease and increased bearing play) and does not require any special maintenance.

9 Trouble shooter's guide

Fault	Cause	Remedy
Motor does not start, no motor noise	At least two of the power supply leads have failed	Check fuses, terminals and supply leads .
	Overload has tripped	Inspect overload
Motor does not start, humming noise	One of the supply leads has failed	See above
	Impeller faulty Motor bearing faulty	Replace impeller Replace bearing
Overload trips	Pump locked up mechanically	Inspect pump hydraulics
	High on/of cycling frequency	Check application
Power consumption is too high	Wrong direction of rotation of impeller	See above
	Lime or other deposits mechanical friction	Clean pump mechanism repair pump
Motor overheats	High on/off cycling frequency	See above
	Wrong power supply (voltage or cycles)	Power supply must correspond with name plate rating
	Insufficient cooling	Check air flow at motor fan
Pump does not pump	liquid level too low	Fill up liquid
	Pump mechanism faulty Pipe blocked	replace pump mechanism Clean pipe
Insufficient flow and pressure	Wrong direction of rotation of impeller	Change over two power supply leads
	Pump mechanism silted up Worn pump mechanism	Clean pump mechanism Replace pump mechanism
Incorrect flow or pressure	Wrong power supply (voltage or cycles)	Power supply must correspond with name plate rating
Running noise/Vibration	Foreign objects in pump end	Remove foreign objects
	Impeller damaged Bearing/Bushing broken	Replace impeller Replace bearing/bushing

10 Spare part

10.1 Spare part list for the immersion pumps of the series TC/STC260 ... 460

				Item Description	
19		13		1	Stator with terminal board
9		28		2	Motor flange
8		26		3	End shield
27		3		4	Motor shaft with rotor
16		18		5	Terminal box up to 5.0 kW
10		14		6	Terminal box frame from 6.0 kW and over
6		12		7	Terminal box cover from 6.0 kW and over
11		1		8	Fan
7		4		9	Fan cover
5		23		10	Gasket
17		21		11	Gasket from 6.0 kW and over
15		12		12	Nut up 11 kW DIN 934
2		18		13	Retaining ring
20		86		13	Retaining ring up to 2.6 kW DIN 471
29		87		14	Thread rolling screw DIN 7500
22		82		15	Ball bearing 3.3...6.0 kW DIN 625
74		84		15	Ball bearing up to 2.6 kW and from 7.5 kW and over DIN 628
68		85		16	Ball bearing DIN 625
75		81		17	Slotted cheese head screw DIN 84
76		84		18	Hexagon socket head cap screw DIN 912
77		83		19	Parallel pin DIN 7
73		85		20	Shaft nut from 7.5 kW and over
79		67		21	Bearing cover from 7.5 kW and over
64		78		22	Socket head cap screw DIN 912
		50		23	Hexagon head screw 7.5 kW DIN 931
		71		26	Compensation disk
		72		27	O-ring
		51		28	Shaft seal
		58		29	Shaft seal up 7.5 kW
		57		50	Pump body
				51	Pump shaft
				52	Inlet cover
				53	Diffusor
				54	Impeller
				55	Bearing stage
				57	Split ring (impeller)
				58	Distance liner
				61	Running sleeve
				62	Bearing bush
				64	Split ring (shaft)
				65	Distance liner short bearing stage
				66	Sieve
				67	Clamp coupling
				68	Coupling shield
				69	Mech. seal washer
				70	Distance liner bearing stage
				71	Rotary shaft seal
				72	Mechanical seal
				73	Washer M12
				74	Parallel pin DIN 7
				75	Parallel pin DIN 7
76	Retaining ring				
77	Nut M12				
78	Hexagon socket head cap screw	DIN 912			
79	Clamp				
80	Hexagon head cap screw	DIN 933			
81	Adapter up 11 kW				
82	Joining socket STC				
83	Socket head cap screw STC	DIN 912			
84	Spring washer STC	DIN 7980			
85	O-ring STC				
86	Screw plug STC	DIN 908			
87	Sealing ring STC	DIN 7603			

10.2 Indications to the spare part order

Spare parts are available from the supplier.
Standard commercially available parts are to be purchased in accordance with the model type.
The ordering of spare parts should contain the following details:

1. Pumptype

e.g. TC260 / 690

2. Pump No.

e.g. 06244700

The date of the construction year is a component of the pumps type number.

3. Voltage, Frequency and Power

Take item 1, 2 and 3 from the nameplate

4. Spare part with item No.

e.g. Impeller item No. 54

11 Repair

11.1 Exchange the rotary mechanical seal: TC/STC260...460 up to 870 mm dept of immersion

- 1) Disconnect the pump from the power supply.
- 2) Pull out coupling shield (68). Remove clamp coupling (67.1, 67.2) and parallel pin (75).
- 3) Loosen and pull off the nuts (77) and remove the clamps (79).
- 4) Remove pump unit with pump shaft (51) from the pump body (50).
- 5) Take off rotating axial face seal unit (72.a-72.d) and mech. seal washer (29) from the shaft (51) and clean the shaft. Pay attention to the drilled hole for the parallel pin (75) that it is without any bur. Check the sliding surface for the rotary shaft seal (71) for any damage.
- 6) Remove complete seal (72.e - 72.f) from the pump body (50) and clean the seat.
- 7) Mounting of the new axial face seal :
Ensure that the sliding surfaces of the ring and the rotating axial face seal unit are free from grease and dirt.
Moisten the angle-sleeve (72.f) of the counter ring lightly with rinse water / (water with washing-up liquid) and push the unit into the seat of the pump body (50).
Slide the mech. seal washer (29) first and then the axial face seal (72.a - 72.d) onto the pump shaft (51).
- 8) Lubricate lightly the lip of the rotary shaft seal (71) and push it into the pump body (50). Then insert the pump shaft (51) with the pump unit through the rotary shaft seal (71).
- 9) Fit the parallel pin (75) into the drilled hole of the pump shaft (51). Fit the first coupling clamp (67.1) around the shafts.
Press the pump shaft (51) toward the motor shaft (4). The distance between the two shaft ends **must be zero**.
Fit the parallel pin (74) and the second coupling clamp (67.2).
Tighten the hexagon socket head cap screw (78) (max. 30 Nm).

10) Fit the clamps (79) and screw down with the nuts (77) (max. 40 Nm).

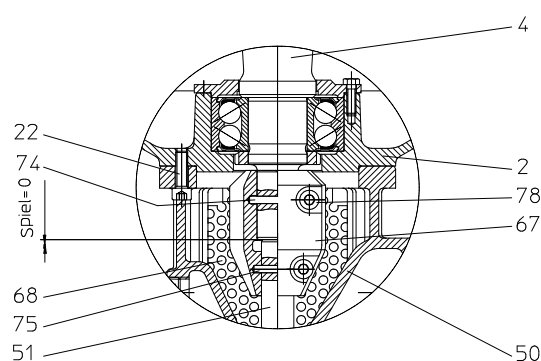
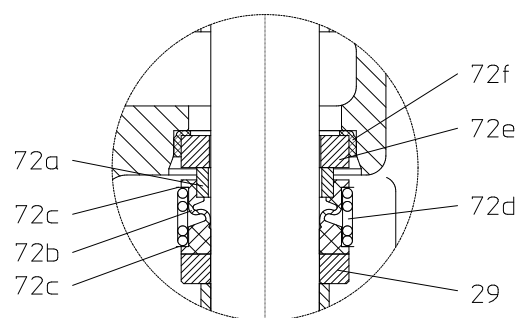
11) Fit the coupling shield (68) into the pump body (50).

12) Reconnect pump to the power supply.

Check direction of rotation!

Tightening torques for screwed connections

Thread - Ø	M4	M5	M6	M8	M10	M12
Strength classes	4.8	4.8	8.8	8.8	8.8 / 10.0	
Tightening torque (Nm)	1 Nm	3 Nm	4.5 Nm 20 Nm Clamp coupling	15 Nm 30 Nm Clamp coupling	30 Nm	40 Nm



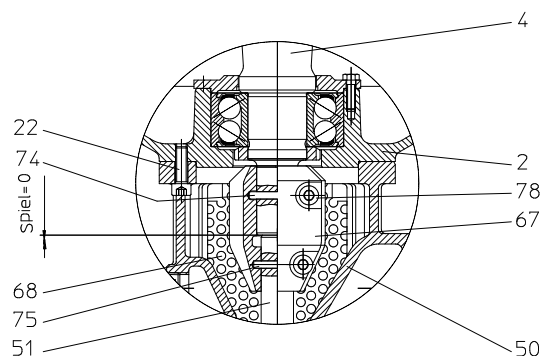
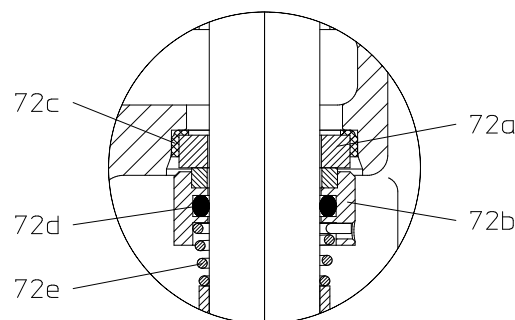
11.2 Exchange the rotary mechanical seal: TC/STC260 / 920 and 1150 mm depth of immersion

- 1) Disconnect the pump from the power supply.
- 2) Pull out coupling shield (68). Remove clamp coupling (67.1, 67.2) and parallel pin (75).
- 3) Loosen and pull off the nuts (77) and remove the clamps (79).
- 4) Remove pump unit with pump shaft (51) from the pump body (50).
- 5) Take off rotating axial face seal unit (72.b - 72.e) from the shaft (51) and clean the shaft. Pay attention to the drilled hole for the parallel pin (75) that it is without any bur. Check the sliding surface for the rotary shaft seal (71) for any damage.
- 6) Remove complete seal (72.a - 72.c) from the pump body (50) and clean the seat.
- 7) Mounting of the new axial face seal :
Ensure that the sliding surfaces of the ring and the rotating axial face seal unit are free from grease and dirt.
Moisten the angle-sleeve (72.c) of the counter ring lightly with rinse water / (water with washing-up liquid) and push the unit into the seat of the pump body (50).
Slide the axial face seal (72.b - 72.e) (**single part**) onto the pump shaft (51).
- 8) Lubricate lightly the lip of the rotary shaft seal (71) and push it into the pump body (50). Then insert the pump shaft (51) with the pump unit through the rotary shaft seal (71).
- 9) Fit the parallel pin (75) into the drilled hole of the pump shaft (51). Fit the first coupling clamp (67.1) around the shafts.
Press the pump shaft (51) toward the motor shaft (4). The distance between the two shaft ends **must be zero**.
Fit the parallel pin (74) and the second coupling clamp (67.2).
Tighten the hexagon socket head cap screw (78) (max. 30 Nm).
- 10) Fit the clamps (79) and screw down with the nuts (77) (max. 40 Nm)
- 11) Fit the coupling shield (68) into the pump body (50).
- 12) Reconnect pump to the power supply.

Check direction of rotation!

Tightening torques for screwed connections

Thread - Ø	M4	M5	M6	M8	M10	M12
Strength classes	4.8	4.8	8.8	8.8	8.8 / 10.0	
Tightening torque (Nm)	1 Nm	3 Nm	4.5 Nm 20 Nm Clamp coupling	15 Nm 30 Nm Clamp coupling	30 Nm	40 Nm



12 Disposal

When disposing of the pump or the packaging materials the local and national regulation for proper disposal must be complied with.
Prior to its disposal, the pump must be completely drained and decontaminated if necessary.