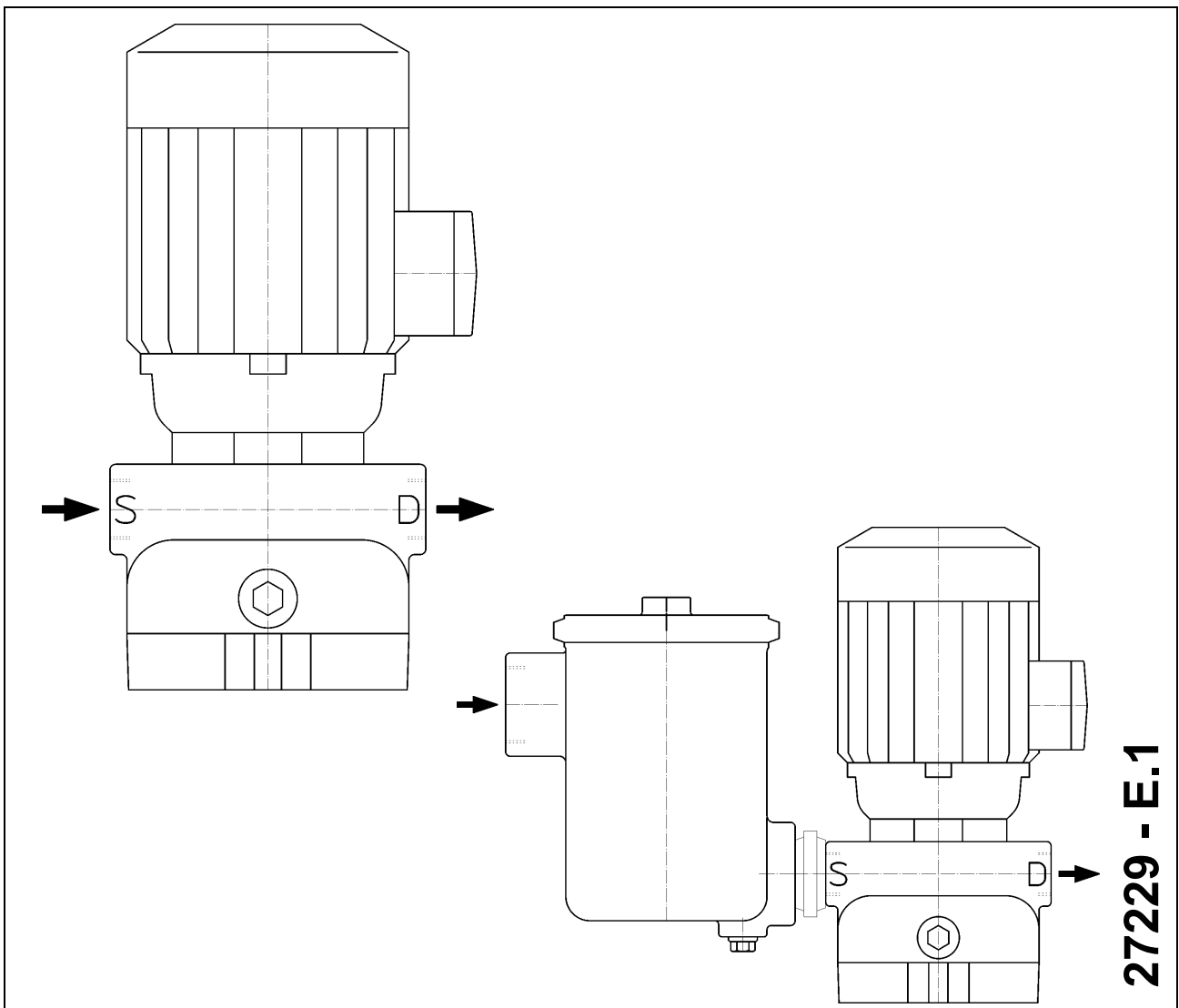


Circulating pumps Typ S / SF / S-L

GB

Operator's manual / installation instructions

Translation of the original



EU Declaration of Conformity

Manufacturer:
Schmalenberger GmbH + Co. KG
Strömungstechnologie
Im Schelmen 9-11
D-72072 Tübingen / Germany

The manufacturer hereby declares that the product:
Centrifugal pump type:
S, SL, SF (identification numbers: all)

Serial number range: 2018000001 - 2025999999

has been manufactured in accordance with the following directives:
Directive 2006/42/EC "Machinery"

Harmonised standards that were used:
EN 809+A1+AC, EN ISO 12100, EN 60034-1, EN 60034-5/A1, EN 60034-30-1

Authorised representative for the compilation of the technical documentation:

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The EU Declaration of Conformity has been issued:
Tübingen, 06 July 2020



Thomas Merkle
Head of Development & Design
Schmalenberger GmbH + Co. KG

EU Declaration of Incorporation

Manufacturer:
Schmalenberger GmbH + Co. KG
Strömungstechnologie
Im Schelmen 9-11
D-72072 Tübingen / Germany

The manufacturer hereby declares that the product:
Centrifugal pump if delivered without drive, type:
S-L (identification numbers: all)

Serial number range: 2018000001 - 2025999999

an incomplete machine in accordance with Regulation 2006/42/EC Article 2g and provided exclusively for assembly with another machine which meets the following basic requirements of Regulation 2006/42/EC: Appendix I, Article 1.1.1, 1.1.2, 1.1.3, 1.1.5.

Harmonised standards that were used: EN 809+A1+AC, EN ISO 12100

The incomplete machine must not be placed in operation until it has been determined that the machine to be installed in the incomplete machine is in compliance with the requirements of the Machinery Directive (2006/42/EC).

Authorised representative for the compilation of the technical documentation:

Robin Krauß
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The EU Declaration of Incorporation has been issued:
Tübingen, 06 July 2020



Thomas Merkle
Head of Development & Design
Schmalenberger GmbH + Co. KG



UK Declaration of Conformity

Manufacturer:
Schmalenberger GmbH + Co. KG
Im Schelmen 9-11
D-72072 Tübingen / Germany

Importer:
IPP - Industrial Process Pumps Ltd.
22-30 Duntun Close, West Meadows Industrial Estate
Derby DE21 6XB
United Kingdom
www.ipp-group.com

Object of declaration:
S, SL, SF
Serial number range: 2022000001 - 2025999999

The manufacturer hereby declares:
The objects of the declaration described above are in conformity with the relevant Statutory Instruments:

SI 2019 No. 492: The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2019
SI 2008/1597: Supply of Machinery (Safety) Regulations 2018

References to the relevant Designated Standards used or references to the other technical specifications in relation to which conformity is declared:

EN 809+A1+AC, EN ISO 12100, EN 60034-1, EN 60034-5/A1, EN60034-30-1.

Electromagnetic compatibility
BS EN 61000-6-1,2,3,4
BS EN (IEC) 60801, Part 2

Electrical safety
BS EN 50110, Parts 1 and 2
BS EN 982, BS EN ISO 12100
PD 5304, BS EN 60204

The UK declaration was issued:
Tübingen, 30th June 2022

Thomas Merkle
Technical Manager
Schmalenberger GmbH + Co.KG



UK Declaration of Incorporation

Manufacturer:
Schmalenberger GmbH + Co. KG
Im Schelmen 9-11
D-72072 Tübingen / Germany

Importer:
IPP - Industrial Process Pumps Ltd.
22-30 Dunton Close, West Meadows Industrial Estate
Derby DE21 6XB
United Kingdom
www.ipp-group.com

Object of declaration:
S-L
Serial number range: 2022000001 - 2025999999

The manufacturer hereby declares:
The objects of the declaration are incomplete machines in conformity with the relevant Statutory Instruments
SI 2008/1597: Supply of Machinery (Safety) Regulations 2018
and provided exclusively for assembly with another machine which meets the following basic requirements:

SI 2008/1597: Supply of Machinery (Safety) Regulations 2018 Appendix I, Article 1.1.1, 1.1.2, 1.1.3, 1.1.5.

References to the relevant Designated Standards used or references to the other technical specifications in
relation to which conformity is declared:

EN 809+A1+AC, EN ISO 12100.

The incomplete machine must not be placed in operation until it has been determined that the machine to be
installed in the incomplete machine is in compliance with the requirements:
SI 2008/1597: Supply of Machinery (Safety) Regulations 2018

The UK declaration was issued:
Tübingen, 30th June 2022

Thomas Merkle
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Schmalenberger GmbH + Co.KG

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1 General Details

1.1 User Information

This operator's manual makes it easier to get to know the centrifugal pump and to make full use of its facilities.

The operator's manual contains important instructions how to use the centrifugal pump safely, properly and economically.

The operator's manual does not take account of local regulations. The user is responsible for ensuring that they are complied with.

The label specifies the machine series, the frame size, the most important operating data and the serial number. We request that you always quote it in case of queries, when placing subsequent orders and especially when ordering spare parts.

1.2 Usage Instructions

The centrifugal pump must only be used in accordance with the original pump specifications and the operator's manual.

Any other usage or operation where these figures are exceeded is not permitted. The manufacturer is not liable for damage resulting from such improper use.

The pump must only be operated in applications that are described in the relevant documents.

- The pump must only be operated if it is in flawless technical condition.
- The pump must not be operated if it is only partially mounted.
- The pump may only be used to convey the media described in the data sheet or in the documentation for the relevant design.
- Never operate the pump without a pumping medium.
- Pay careful attention to the information in the data sheet or documentation regarding minimum delivery volume (to prevent damage from overheating, damage to the bearings, etc.).
- Pay careful attention to the information in the data sheet or documentation regarding maximum delivery volume (to prevent overheating, damage to the mechanical seal, cavitation damage, damage to the bearings, etc.).
- Do not throttle the pump on the suction end (to prevent cavitation damage).

- Coordinate other types of operation with the manufacturer if they are not cited in the documentation or data sheet.

Preventing foreseeable misuse

- Never open the pressure-end shut-off elements beyond the permissible range
 - Exceeding the maximum delivery volume cited in the data sheet or documentation is not permitted (possible cavitation damage)
- Never exceed the permissible operating limits cited in the data sheet or documentation in terms of pressure and temperature, etc.
- Comply with all safety instructions and directions in this operator's manual.

1.3 Relevant Documentation

Various documents are associated with every centrifugal pump that comprise the technical documentation of the pump. These are as follows:

- Operator's manual
- Drive operator's manual
- Manual for accessories listed in the specifications manual
- Acceptance report from the TÜV (Technical Certification Authority) etc.
- Pilot run report
- Performance run report
- Installation drawing (dimensions sheet)
- Declaration of conformity with supplement BA for ATEX-model
- Conformity statement / Declaration of incorporation
- Specification with all data

Not all the above documentation has been produced and supplied in every case. For this please check the details in the specification.

1.4 Technical Data / Specifications

The specifications of the centrifugal pump is the most important document in every operator's manual. Contained therein are all the relevant and technical data relating to the centrifugal pump. It is the birth certificate of the centrifugal pump and should be treated accordingly.

As a substitute the order confirmation together with the delivery schedule may also be a source of technical data.




1.5 Safety Instructions

1.5.1 General

It is essential that the relevant safety regulations and laws that apply in the operating company and / or country where the pumps are to be used are observed .

In this operating manual the following symbols are used to draw your attention to sources of danger. The symbols are intended to attract your attention to these instructions!

Symbol Meaning:


	Attention! Danger of injury! This sign warns you of the danger of mechanical effects.
	Warning! Mortal danger! This sign warns you of the danger from electric shocks.
	Information: It also instructs you in the economic use of the pump.

Notices attached directly to the pump, e.g. arrows indicating direction of rotation and the marking for fluid connections, must always be observed and maintained in a clearly legible condition.


- Use the pump only if it is in perfect technical condition, in accordance with the regulations, observing safety requirements and danger conditions and strictly adhering to all the instructions in the operator's manual!
- Promptly remedy any faults that could influence safety.
- Prior to starting up, make sure that the operators have read and understood the operator's manual. Not the operator but the owner is responsible for safety!
- The centrifugal pump is designed to be built into a total machine or plant. The centrifugal pump is delivered without any protection against accidental contact. If necessary, the system supplier must fit appropriate protective covers in integrating the centrifugal pump into

the plant (e.g. if hot liquids with a temperature over 60° C are delivered).

- Leaks of hazardous delivery media, (e.g. explosive, poisonous, hot) must be controlled so that no danger occurs to persons or the environment. Comply with legal requirements.
- Danger from electric shocks must be completely excluded (for details see the country specific regulations and / or those of the local power supply company).
- Electrical equipment must be installed and maintained exclusively by qualified electricians in accordance with regulations VDE or IEC.
- Before switching on or starting up the centrifugal pump, make sure that no-one will be endangered by the start-up of the pump!

	Important: The centrifugal pump must be immediately stopped if abnormal electrical voltages, temperatures, noises, vibrations, leakages or other faults should arise.
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1.6 Temperature

	Warning! Danger of burns! The centrifugal pump housing gets hot during operation. If the temperature rises to over +50°C, the centrifugal pump must be protected from direct contact by the operator.
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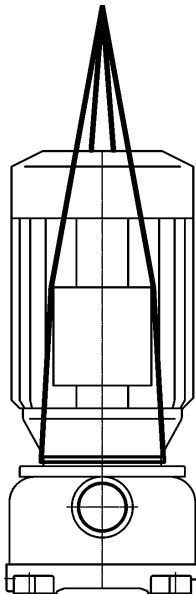
1.7 Safety Instructions for Maintenance and Repairs

- Regardless of what nature they may be, repairs must only be carried out by qualified persons and the centrifugal pump must be emptied first.
 - The attached pipework must be depressurized.
 - Allow the pump to cool off.
- Prior to carrying out repairs to the pump it must be isolated from the electrical supply and protected from unintentional switching on.

2 Transport, Storage, Installation

2.1 Transport and Storage

2.1.1 Transport



Lifting example

If necessary the centre of mass is indicated on the pump aggregate itself and on the packing material and places for applying hooks are marked.



Warning! Risk of injury!

Use only suitable and technically perfect lifting and load-bearing equipment with sufficient carrying power!

Never stand or work underneath swinging loads.

2.1.2 Storage

- Interim storage

Even for short periods of interim storage, store on a wooden base in a dry, well ventilated and vibration free environment at constant temperature.

- Unsuitable storage

If unsuitable storage conditions prevail (e.g. high humidity) or if the pump is to be stored for longer than 6 weeks, then the pump housing should be filled with oil (see 2.1.3).

- Long periods of storage

After a storage period of more than 2 years the motor roller bearings and bearing supports need to be re-greased or replaced entirely.

2.1.3 Conservation

The centrifugal pumps that we deliver are treated with a conservation material corresponding to the storage time quoted us by the purchaser. This conservation must be removed before start-up. See chapter 2.2.2 Cleaning. If the pump is to be taken out of service for a longer period of time or if the originally envisaged storage time is going to be considerably exceeded, then conservation must be undertaken as protection against corrosion.

For a detailed description of how to proceed under these circumstances, see chapter 5.1 Shutdown / Storage / Conservation.

2.2 Unpacking, Cleaning and Assembling

2.2.1 Unpacking

For transportation purposes the pump is fastened to a palette by bands.

For transportation over long distances it is packed in crates or boxes. After removing the retaining bands extract the pump out of its packing with the help of suitable lifting equipment. Be sure to observe the instructions under 2.1.1 Transport.

2.2.2 Cleaning

A number of measures are taken for protection against transportation damage and corrosion. Check your pump for which measures have been taken.

1. Covering lid on the nozzles
2. Shaft protection for deliveries without the motor
3. Protective paint on exposed parts

These protective measures must be removed before the pump is set up or installed.

Under no circumstances must impurities be left inside the pump.



Important:

Depending on the delivery medium to be used, the interior of the pump should be cleaned of residual traces of oil. Use a cleaning agent that will not be harmful to the mechanical seal and the pump materials. Make sure that the pump is carefully dried after cleaning.

The cleaning agents that can be used include spirit, Ritzol 155 or a strongly alkaline soap solution, for example. If a steam jet cleaner is to be used, then let the solvent work itself in for a time first.

Please do not use a steam jet cleaner. If this is unavoidable, then please take care not to damage the electric motor and bearings.

2.2.3 Assembly

In general the pump is delivered fully assembled and can be installed directly.

In special cases the pump is delivered without the drive motor. Prior to installing it in the plant, fit the drive to the pump.



Important:

Before installation check that the pump runs freely and easily.

Other external accessories such as a blast tank or similar equipment that has not been pre-assembled with the pump at the factory, should be fitted to the pump after it has been installed in the system or on the pump base.

2.3 Installing and connecting

2.3.1 Safety requirements



Explosion proof / safety instructions

Electrical appliances that are operated in areas where there is a danger of explosion, must comply with the explosion proof requirements. This is stated on the factory plate of the motor. For installations in areas where there is a danger of explosion, the local explosion regulations and those on the test certificate supplied with the delivery, and which was issued by the responsible inspection authority, must be observed. The test certificate supplied must be kept at the installation location (e.g. the master's office).



Important:

For areas where there is a danger of explosion, please observe the supplementary operating instructions.

2.3.2 Check before you start installing

- Have the machine, the system and the container nozzles been properly prepared in accordance with the figures on the dimensions sheet or installation plan?

2.3.3 Pump installation and assembly

Installation can take place on small concrete pedestals or consoles. Units with up to 3 kW driving power can be installed free in the pipe run. However, this method of installation means that the suction and/or pressure pipes must themselves be strong and stable enough and appropriately fastened. Installation on an elastic base is recommended if the effect of vibrations (resonance) on the surroundings has to be largely eliminated.

Pumps of type "S" must be installed only in a vertical position.



Positioning them with the motor hanging downwards is not permitted.

When installed on a foundation the centrifugal pump must be set up with the aid of a spirit level.

2.3.4 Connecting the pipework



Warning!
Under no circumstances must the pump be used as anchor point for the pipework. No forces or moments (e.g. due to twisting or heat expansion) from the pipework must act on the pump.

**Note the denomination on the housing:
S = suction connection, D = pressure connection**

The pipes must be supported as close as possible to the centrifugal pump and connected to it free of all tension. Their weight must not be supported by the pump.

The positioning must be undertaken with the greatest care as this is the prerequisite for trouble-free operation of the plant.



Important
Pipe compensators must not be used to make up for inaccuracies in the pipelines, for example with a centre offset of the flange.

If these instructions are not observed, then any claims under guarantee will be void.



Warning!
In the case of hot, caustic or poisonous delivery media!

- If the pipe strength is exceeded leaks can occur in the pump or in the flange connections, for example, that could result in vast amounts of medium being expelled.
- In the case of short pipes the nominal bore should be at least the same as the centrifugal pump connections. For long pipes the most economic nominal bore should be determined on a case by case basis.

- Connection pieces to larger nominal bores should be carried out with approx. 8° expansion angle to avoid significant loss of pressure.
- In order to prevent the formation of air pockets, the suction pipe to the centrifugal pump must be installed to rise continuously, on the pressure side it must fall continuously. Depending on the type of system and centrifugal pump being used, it is recommended that backflow prevention and shut-off devices are installed.



Warning! Mortal danger!

Taps that close very suddenly (abruptly) must be avoided in the pipework. The resulting pressure surges can greatly exceed the maximum permitted housing pressure of the pump!

To prevent too strong pressure surges dampers or blast tanks should be installed.



Note:

At the end of installation, before starting up the system the tanks, pipes and connections must be thoroughly cleaned, rinsed and blown through.

- Often welding beads, scales and other impurities do not get dislodged for some period of time. They should be kept clear of the pump by inserting a sieve in the suction pipe.
- The free cross-section of the sieve must be 3 times the cross-section of the pipe so that there is not too large a resistance built up due to foreign bodies that flow in.

Hat-shaped sieves containing a mesh wire net having a mesh size of 2.0 mm and 0.5 mm wire diameter made of corrosion resistant material have proved useful in practice.

2.3.5 Electrical connections


The electrical connections to the pump must be carried out by a specialised company in the electrical engineering branch approved by the local energy provider, taking into account the technical connection requirements.

The connections must be carried out by a qualified electrician. (see chapter 2.3.1)

The relevant DIN VDE (Association of German Engineers) regulations must be observed.

Compare the available mains voltage with the details on the motor's factory plate and select the appropriate switching.

We recommend the use of a motor protection facility.



Risk of explosion!
Where there is a risk of explosion a motor protection device must be fitted!

In compliance with VDE 0530-8, three-phase motors are always wired for clockwise rotation (looking at the motor shaft stub).

The direction of rotation of the pump is anti-clockwise as standard (viewed from the suction flange).

Always note the arrow on the pump indicating the direction of rotation.

Connect the motor according to the circuit diagram in fig. 1 or fig. 2.

Delta connection Δ (lower voltage)

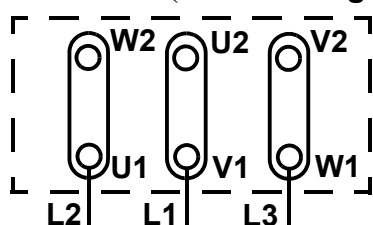


Fig. 1 Connection diagram for 3-phase motors, Circuit arrangement Δ

Star connection Y (high voltage)

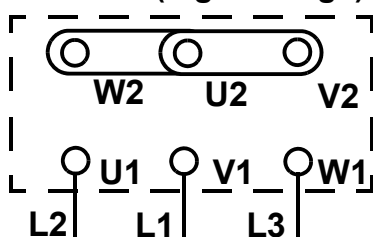


Fig. 2 Connection diagram for 3-phase motors, Circuit arrangement Y

Motor with PTC thermistors as thermal winding protection

Connect the PTC thermistor (PTC sensor) to the downstream trigger unit if required. The PTC thermistors are designed according to DIN 44081 and DIN 44082.

Time relay setting

For three-phase motors with star-delta connection it must be ensured that the switching points between star and delta follow each other very rapidly. Long switching times can result in damage to the motor. Setting of the time relay for star-delta connection: < 3 sec.

Direction of rotation check

The direction of rotation of the motor must agree with the direction of the rotation arrow on the motor housing of the pump. Check by rapidly switching on and off.


If the direction of rotation is wrong, change any two phases L1, L2 or L3 of the power supply in the motor terminal box over.

Additional motor equipment

If particular control devices are to be used e.g. in connection with the installation of the pump in a process engineering facility, the instructions of the manufacturer of the control device must be strictly observed.

3 Pump operation

3.1 Initial start-up



Prior to initially starting up the centrifugal pump please make sure that the following prerequisites have been met:

1. The centrifugal pump has been connected properly electrically and with all requisite safety features.
2. If the pump is supplied with an inflow of medium, i.e. on the suction side the medium is above the level of the pump, then the suction and pressure shut-off devices must be open and the pump must be primed.

3. If the pump is used to deliver medium through suction, i.e. on the suction side the medium is below the level of the pump, then a foot-operated valve must be installed at the lowest point of the suction pipe and the pump and suction pipe must be filled with fluid.

Please observe: Dry running leads to increased wear and damage to the pump!

4. The rotating parts of the pump have been covered by a protective shield. (In accordance with UVV (Accident Prevention Regulations) the centrifugal pump may only be operated if a safety shield has been fitted).
5. It has been checked that the pump shaft rotates easily.
6. The direction of rotation has been checked.

3.1.1 Starting the pump

Start the pump only with the pressure pipe half-open! Only after the maximum rotation speed has been reached, slowly open the shut-off device and adjust to full operational level.

Warning! Do not overload the motor!

- An automatic backflow prevention device must constantly open once the operational value has been reached without the production of abnormal noises, vibrations or increased current consumption in the plant.
- Once the operating point has been reached, the power input to the motor and the bearing temperature must be monitored!
When first started up the ultimate bearing temperature is attained only after about 48 hours, depending on ambient conditions.

3.2 Operating

3.2.1 Operation monitoring

In most cases the centrifugal pump is controlled from the central point of the overall facility. A prerequisite for a perfectly functioning centrifugal pump is adherence to the data provided for its installation and use. See the chapter on specifications.



Pay particular attention to the following points for the manual operation of the centrifugal pump:

1. Temperature of the delivery fluid

Never operate the pump at temperatures in excess of those stated in the original specification.

2. Noise emission

The acoustic power or sound pressure level is determined by the motor as well as the pump, and especially by the installation situation. Special protective measures must be taken to reduce transmission of structure-borne or air-borne sound.

3. Switching frequency

In order to avoid a large temperature increase in the motor and excessive strain on the pump, motor and bearings the switching frequency must not exceed the following guideline figures.

Motor power:	Max. no. switches / h
up to 3 kW	20
from 4 to 11 kW	15

4. Minimum amount

If the sort of facility includes the possibility of a run against closed shut-off device on the pressure-end, a minimum delivery rate at t -30 to +70°C 15% of Q_{opt}. must be supplied during this time. Over +70 to +110°C it must be 25% of Q_{opt}.

5. Density of the delivery fluid

The power input of the pump changes in proportion to the density of the delivery fluid. To prevent the motor being overloaded, the density must correspond to the data in the specifications.

6. Mechanical seal

The sealing unit has been fitted and set at the factory. The gasket is maintenance free but should be checked for leaks from time to time. During initial start up there may be increased leakage for a brief time. If increased leakage persists then the plant should be switched off at once and the cause determined. The cause could be dirty medium or a prior period of dry running through incomplete venting of the pump, for example.

3.2.2 Miscellaneous

Installed reserve pumps must be run briefly once a week to ensure that they are always ready for operation. They should be run each time for approx. 15 minutes. This also applies to any pump that is not in use but must remain ready for operation.

3.3 Indications of faulty operation

3.3.1 General

When operated via a central control facility faulty operation can be largely ruled out.

In the case of manual operation, but also within a control complex, please make sure that:

- The pump always runs quietly and vibration free.
- The pump does not run dry.
- A longer period of operation with closed shut-off device is avoided to prevent heating up the delivery medium. For the requisite minimum delivery quantity see chapter 3.2.1 Operation monitoring.
- The maximum permitted room temperature of +40°C is not exceeded.
- The ball bearing temperature does not exceed the room temperature by more than + 50°C and in any event does not exceed + 90°C overall (measured at the exterior of the motor housing).
- During centrifugal pump operation the shut-off device in the supply line is not closed.

3.3.2 Faults

In case of faults in the operation of the centrifugal pump, that were not caused by the control facility or other foreign devices, proceed as follows:

1. Locate the site of the fault or defect.
2. Determine the cause.
3. Remedy the fault.

In chapter 3.5 Fault elimination there is a table listing the most frequent faults, their cause and the recommended way to eliminate them.

3.4 Shutdown

1. Close shut-off device in the pressure and suction pipes. If backflow prevention is fitted to the pressure pipe the shut-off device can remain open, provided that there is back pressure.
2. Switch motor off. Allow it to come to rest. Depending on the sort of facility, the pump should be allowed sufficient idle run time – with the heat source, if any, switched off to allow the delivery fluid temperature to reduce – to prevent an accumulation of heat within the pump.
3. Close the shut-off device in the suction pipe.



Warning! Risk of damage!

If there is a danger that the pump may freeze and / or for occasions where it is to be at a standstill for longer periods of time, the pump must be emptied or protected against freezing up (by auxiliary heating).

3.5 Fault elimination

Pump stationary	Pump delivery rate too low	Motor overload	Excessive pump pressure	Increased motor / bearing temperature	Pump leaks	Pump runs noisily, operating noises	Pump temperature too high	Cause of the fault	Elimination of the fault
	x							Pump has to work against too high a pressure	Readjust operating point
	x							Back pressure too high	System contaminated, reduce space between distributor and open impeller, install a new impeller (*)
	x					x	x	Pump / pipework not completely vented	Vent and fill with fluid
	x							Supply or impeller blocked	Eliminate the cause in pipework or pump
	x							Air pockets in the pipework	Change pipework, install venting valve
	x					x	x	Suction height too great / NPSH too low (supply)	Correct fluid level / level control, install pump lower down, fully open valves in the suction pipe, decrease resistance in the supply pipe, clean sieves and suction connections
	x							Non-return valve does not open	Check non-return valve
	x				x	x		Wrong direction of rotation	Change over 2 phases in the terminal box
	x							Speed of rotation too low	Increase the rpm (*), observe circuit diagram (if necessary, new motor)
	x		x			x		Worn internal parts (e.g. the impeller), foreign body in the pump	Remove foreign bodies from the pump housing, replace worn parts
		x				x		Pump back-pressure is less than stated in the specifications	Set operating point precisely, increase counter-pressure by throttling, turn off impeller if required (*), use larger motor (*)
		x	x					Higher density or higher viscosity of the delivery medium than specified	(*) (Re-adjust the pump)
					x			Shaft gasket worn or sealing ring defective, gasket old, dry running	Replace shaft gasket, change gasket, check installation and assembly dimensions
		x	x					Motor wrongly connected	Check circuit diagram, see chapter 2.3.5

Pump stationary	Pump delivery rate too low	Motor overload	Excessive pump pressure	Increased motor / bearing temperature	Pump leaks	Pump runs noisily, operating noises	Pump temperature too high	Cause of the fault	Elimination of the fault
				x	x	x		Pump wrongly adjusted	Adjust pump properly
				x	x	x		Pump distorted or resonance vibrations in the pipework	Check pump holder, individual installation
				x		x		Bearing defective, too little or too much or the wrong lubricant	Replace bearing, add or reduce or completely replace lubricant
				x				Coupling distance not observed	Set distance properly
	x	x						Motor runs on 2 phases	Check / repair fuse and conductor connections
				x		x		Impeller out of balance	Clean impeller, balance impeller (*)
x								Foreign body in the pump, motor bearings defective	Remove foreign bodies, clean or replace pump housing, renew motor bearings
x								Circuit breaker tripped due to motor overload, circuit breaker too small, winding defective	Check electrical connection (compare with motor rating plate), if the motor is overloaded: Throttle the pump, smaller impeller (*), larger motor (*) or replace stator (*)
	x					x		High level of air content in medium	De-gas the delivery medium
						x		Cavitation	Throttle pump on pressure side
	x	x		x		x		Impeller loose, clamping pieces loose	Tighten clamping pieces with impeller nut / screw (observe impeller gap)
					x			Impeller does not press enough on mechanical seal	Check installation / assembly dimensions

(*) Please consult the manufacturer.

4 Maintenance / Repair

General Instructions

The operator must ensure that all maintenance, service and repair work on the pump is carried out exclusively by authorised and specially trained persons. It must be established beyond doubt that the person has studied the operator's manual in detail.

We recommend the creation of and adherence to a maintenance schedule. That will enable you to avoid expensive repairs and have a reliable and trouble-free pump operation.

Only original spare parts must be used for repairs. This is particularly important for the mechanical seal (GLRD).

If work has to be carried out on the **motor** the instructions in the manual from the relevant motor manufacturer must be observed.



Warning! Mortal danger!

In order to prevent electric shocks, work on the terminal box and the machine controller must never be carried out before the electrical connections have been isolated or disconnected.



Warning! Risk of injury and mortal danger!

The pump must be safeguarded against unintentional switching on (be disconnected) if checking or maintenance work is to be undertaken.

4.1 Maintenance / Service

Use the following information to create a maintenance schedule. These are recommendations of minimum requirements that must be adjusted to local conditions of use of the pump and may need amending accordingly.

4.1.1 Checks

Continuous checks:

- Centrifugal pump delivery data (pressure, amount)
- Power take-up

Daily checks:

- Pump running is quiet and vibration free
- Bearing temperature
- Leakage at the mechanical seal (GLRD)

More frequent monitoring must be planned for liquids with properties that differ greatly from those of water (which tend to stick or form accumulations, for example, or have a high gas content).

Smooth operation of the shaft may be impaired for example by accumulations on the mechanical seal or if the mechanical seal sticks. If this happens, smooth operation must be restored before starting up. See section 5.1.3 "Restarting after Periods of storage".

4.1.2 Lubrication and changing lubricant

Centrifugal pumps type "S" in the standard models only run on bearings in the drive motors. The bearings in small motors are designed to last the useful life of the motor and are filled with a grease that cannot be replenished. In this case there are no lubrication nipples on the bearing supports.

4.2 Repair

General

Always carry out repair work on the removed centrifugal pump in an appropriate workshop.

Make sure that you observe the safety instructions in the chap. 1!

The following instructions will enable you to dismantle the pump and to re-assemble it properly with the requisite spare parts in place.



Note:

Please also observe the drawing in the chapter "Spare parts / drawing" at the end of this operator's manual!

When a new mechanical seal is fitted special instructions must be observed.


The work can be undertaken with the usual workshop tools. No special tools are needed.

After dismantling thoroughly clean all the individual parts of the centrifugal pump.


Check the individual parts for wear and damage. Parts that are not perfect must be reworked or replaced.

4.2.1 Dismantling Preparations

Prior to starting to dismantle it the pump must be safeguarded against accidental switching on (it must be disconnected).

	<p>Warning! Mortal danger! Fasten a warning on the switching cabinet.</p>
---	--


When used in a facility, inform the shift leader or manager.

	<p>Important: For the following work, please be sure to observe local regulations and conditions.</p>
---	--

4.2.2 Dismantling / Removal of the pump

The pump must be allowed to reach room temperature.

- Disconnect the power supply.
- Close valves (on the suction and pressure sides).
- Empty the pump via the drainage screw 912.
- Disconnect motor.
- Remove existing additional connections.
- Release pressure and suction connections.
- If necessary, loosen the pump from the base plate and remove entirely.

	<p>Warning! When emptying the centrifugal pump please observe the following instructions!</p>
---	--

1. If the pump was used to deliver liquids that are hazardous to health, then great care must be taken in emptying the pump that neither persons nor the environment are placed at risk through the process.
2. If necessary, wear protective clothing and protective mask!
3. The rinsing liquid used and any residual fluid out of the pump must be caught and disposed of properly and without placing persons or the environment in any danger.


4. Pumps that deliver liquids that are hazardous to health must be decontaminated. In draining the delivery medium off care must be taken that neither persons nor the environment are placed in any danger.
5. Legal requirements must be adhered to!

4.2.3 Dismantling / Dismantling the pump


Before you begin:

Begin the work only once you have checked that:

- The required spare parts are available and that they will fit this pump or your particular model thereof. Or that the suspected damaged parts can be obtained promptly. Make sure that the position number is stated in your spare parts order.
- You have all the required tools and accessories for the work.

	<p>Note: Use only original spare parts for the repairs! All the gaskets must be replaced when the pump is re-installed.</p>
--	--

Observing these instructions is a prerequisite for trouble-free operation of the pump and for the acceptance of potential claims under guarantee.

	<p>Customer service: Schmalenberger provides a 24 hour service for the delivery of spare parts!</p>
---	--

4.2.4 Dismantling the pump (from the suction side)

Place the pump on its blower cover and secure against tipping over.

1st step:

Loosen the mounting screws 901/914 on the cover 160 and remove the cover. Remove clamp gasket 400 between cover and pump housing 101.

2nd step:

Loosen the impeller nut 922 or impeller screw 906 and screw it off the motor shaft 819.

Pull off impeller 233 including clamping pieces 859 and distance washers 525 from the motor shaft 819.

-> Remember the sequence of events for re-assembly!

3rd step:

If fitted, remove retaining ring 932. Pull off washer 550.02 or bush 525.02 from the shaft.

4th step:

Loosen screw 901/902 and, if necessary, nut 920.

4.2.5 Removal of the mechanical seal (GLRD)

Carefully pull pump housing 101 with GLRD 433 off the shaft.

Make sure that the shaft and GLRD are not damaged during removal.

The mechanical seals used in the centrifugal pumps are not free of wear. When dismantling the pump check the mechanical seals for damage. Damaged mechanical seals must be completely replaced.

4.2.6 Bearing pedestal (S-L)

If your pump is equipped with an IEC Norm motor as drive, then there is a bearing pedestal for supporting the pump shaft and the coupling between the pump and the motor.

The bearings are enclosed and provided with grease that cannot be replenished. The coupling is designed to last for the service life of the motor under normal operating conditions.

To replace the coupling or one of the bearings, proceed as follows:

- Loosen the drive from the bearing pedestal. Remove the motor with the upper half of the coupling. Now you can replace the inner coupling part.
- To replace the ball bearings the pump must be removed and dismantled as described in chapter 4.2.4 .

- Remove the locking rings from the shaft and out of the bearing pedestal. Take out the ball bearings.

4.2.7 Pump re-installation

In principle the re-installation is in the reverse order of dismantling.

Please observe by way of preparation:

- Thoroughly clean all the individual parts of all dirt.
- Check all parts for wear. Damaged parts must be replaced by new ones.
- Clamp gaskets and O-rings must always be replaced by new ones. Grease O-rings prior to installation.

Exception: Do not grease O-rings on the GLRD. See the special instructions for installing the GLRD.

- When fitting the screw connections always tighten alternately cross-wise. Use a torque wrench for this.

The following table shows the **torque** to be applied for standard DIN 13 thread.

Thread:	Torque [Nm] for screws:		
	to plastic parts	to cast parts	to bright steel parts
M8	7	10 - 15	20
M10	8	25 - 35	40
M12	10	30 - 40	70
M16	--	60 - 90	160
M20	--	80 - 110	--

The figures apply to new, ungreased screws. The table values do not apply if deviating values are specified on the general diagrams or due to other instructions.

4.2.8 GLRD installation

Preparation:


Increased cleanliness must be observed in the immediate area where the GLRD installation is to take place.

Accessories:

- Propyl alcohol and cellulose cloths (no cleaning rags!)
- O-ring lifter
- Water and detergent


Work steps:

- Unpack the GLRD and check for any damage.




Warning! Risk of damage!
Never place sliding rings or their counterparts onto the plane of sliding without using a protective cover.

- Thoroughly clean all sliding surfaces with propyl alcohol and cellulose cloths.
- In the case of GLRD with elastomer coating, to avoid friction when fitting the gasket, bellows and shaft should be moistened with water whose surface tension has been reduced by the addition of detergent, for example



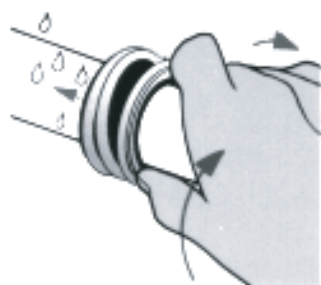
Warning!
Under no circumstances must oil or grease be used to assist with the assembly!

- Cover the sliding surface with a cardboard disc.
- Press the counter-ring slowly and steadily into the holding seat.
- Check that the counter-ring is seated at right-angles to the shaft axis.
- Clean the sliding surfaces to be striation free with propyl alcohol and cellulose cloths.




Important:
Do not touch the sliding surfaces with bare hands.

Push the rotating unit (bellows unit, sliding ring) onto the shaft by turning gently clockwise until the sliding ring lies against the counter-ring.



Installation of the mechanical seal



Important:
Use a suitable guide bush to push the GLRD over the keyways, etc. without damaging it.

You can order suitable guide bushes from Schmalenberger GmbH & Co. KG.

- Check that the thrust collar (spring collar), spring and sliding ring sit tightly.

Then continue with the assembly of the pump by fitting the impeller.

Observe the clearance in the gap on the impeller.

We recommend that you use our device for setting the gap clearance.

4.3 Spare parts list / Drawing

On pages 20 - 24 there are the spare parts list and the drawing of your pump.

Please take note of your pump type and the relevant model.

5 Appendix

5.1 Shutdown / Storage / Conservation

Every pump leaves the factory carefully assembled. If initial operation is predicted to be a long time after delivery we recommend the following measures for storage of the centrifugal pump.

5.1.1 Storage of New Pumps

When requested, new pumps receive a conservation protection corresponding to the storage time stated by the purchaser.

If this period of time is considerably exceeded the condition of the pump must be checked and, if required, re-conserved.

5.1.2 Long Periods of Shutdown > 3 months

1. Pump remains installed

To ensure that the pump is always ready for operation and to prevent the formation of deposits inside the pump and in its immediate vicinity, the pump aggregate should be run for a short time (approx. 15 minutes) monthly or quarterly during longer periods of inactivity. Prerequisite for this is that sufficient fluid is supplied to the pump.

2. Pump is removed and stored

To remove the pump proceed as outlined in chapter 4 Maintenance / Repair . Prior to storing the pump it must be thoroughly cleaned and conserved. Conservation must be done both internally and externally.

5.1.3 Restarting after Periods of Storage

De-conservation

Before the stored pump is re-installed the conservation agent (covering or filling) must be removed.

Proceed as described in chapter 2.2.2 Cleaning.



Warning!

After long periods of storage under conservation conditions check the shape stability and elasticity of the Elastomers (O-rings and mechanical seals). Brittle rings must be replaced. Elastomers made of EPDM should be replaced **in any event.**

Restarting

Re-install the pump according to the procedure described in chapter 2.3 Installing and connecting.

Immediately after completing the above work, all safety and protective measures must be properly installed and checked that they function.

Before the pump is re-started the checks and maintenance measures stated in chapter 4.1 Maintenance / Service must be carried out.

For the new re-start the points listed in section 3.1 Initial start-up must also be observed.

Particularities of the mechanical seal:

Prior to an initial start-up and after longer periods of standstill or after a new mechanical seal is installed it is important to check that the pump runs freely.

The sliding ring and its counterpart ring can stick together very firmly due to adhesive forces. The force of the driving spring is then not enough to break the sliding ring away.

In this case the shaft runs in the static seals and the driving spring, which leads to damage. Remove the blower cover and turn the blower wheel in the direction of the arrow. If there is resistance and the blower wheel feathers back then the mechanical seal has to be removed and the sliding ring and its counterpart ring must be carefully separated.

Under no circumstances should the shaft be turned by force.

5.2 Disposal

If you want to take the pump completely out of service and never re-use it then please observe the local regulations for the disposal of industrial waste.



Warning! Mortal danger / poison!

Pumps that have delivered poisonous, caustic or other chemical substances which are a danger to people and the environment must be thoroughly cleaned and / or decontaminated prior to being disposed of.

The cleaning agents and rests of the delivery medium must also be handled in accordance with legal requirements.

If such legal regulations exist in the area where the pump is operated then the pump must be completely dismantled and sorted into the different materials so that they can be disposed of separately.

5.3 Supporting documents for pump operation

The following documents are enclosed:

- Operator's manual
- Dimensional sketch

In case of complaints regarding the pump motor, please contact us or the motor manufacturer.

5.4 Data sheet

The enclosed data sheet corresponds to the pump supplied.

You are not allowed to change the dimensions of the pump.



Important:

If changes have subsequently been made to the pump supplied then any claims under the guarantee will be void.

Please also be sure to observe the other documentation referred to in these operating instructions, see chapter 1.2 !

5.5 Important Instructions

5.5.1 Factory repair

Please observe the following instructions if the pump is sent back to the factory for repair:

1. If you send the pump back to the manufacturer for repair or an upgrade then please be sure to enclose precise details of the media that were delivered by the pump.



Warning!

2. If the delivered media were poisonous, caustic, etc. then please be sure to enclose a copy of the safety sheet for the media!

3. Only pumps that are completely empty and clean will be accepted for repair.

5.5.2 Ordering Spare Parts

When ordering spare parts please do not fail to give us the following important information:

- Pump serial number and type description or alternatively the motor serial number
- Delivery medium
- Part number from the spare parts list
- Part description
- Material data from the specifications or the order confirmation

The pump serial number is on the type plate which is fastened to the blower cover of the motor.

The order confirmation or motor serial number may also be of assistance.

With this information you make it much easier for us to deliver the correct spare part for your pump!

Customer service

Schmalenberger provides a 24 hour service for the delivery of spare parts!

See our homepage under:

www.schmalenberger.de

Head office address:

Schmalenberger GmbH & Co. KG

Im Schelmen 9 - 11

D-72072 Tübingen

Telephone: + 49 (0) 7071 - 7008-0

Fax: + 49 (0) 7071 - 7008-14

6 Spare parts list and drawings



In the spare parts list (page 21) all parts of the pump types are listed.

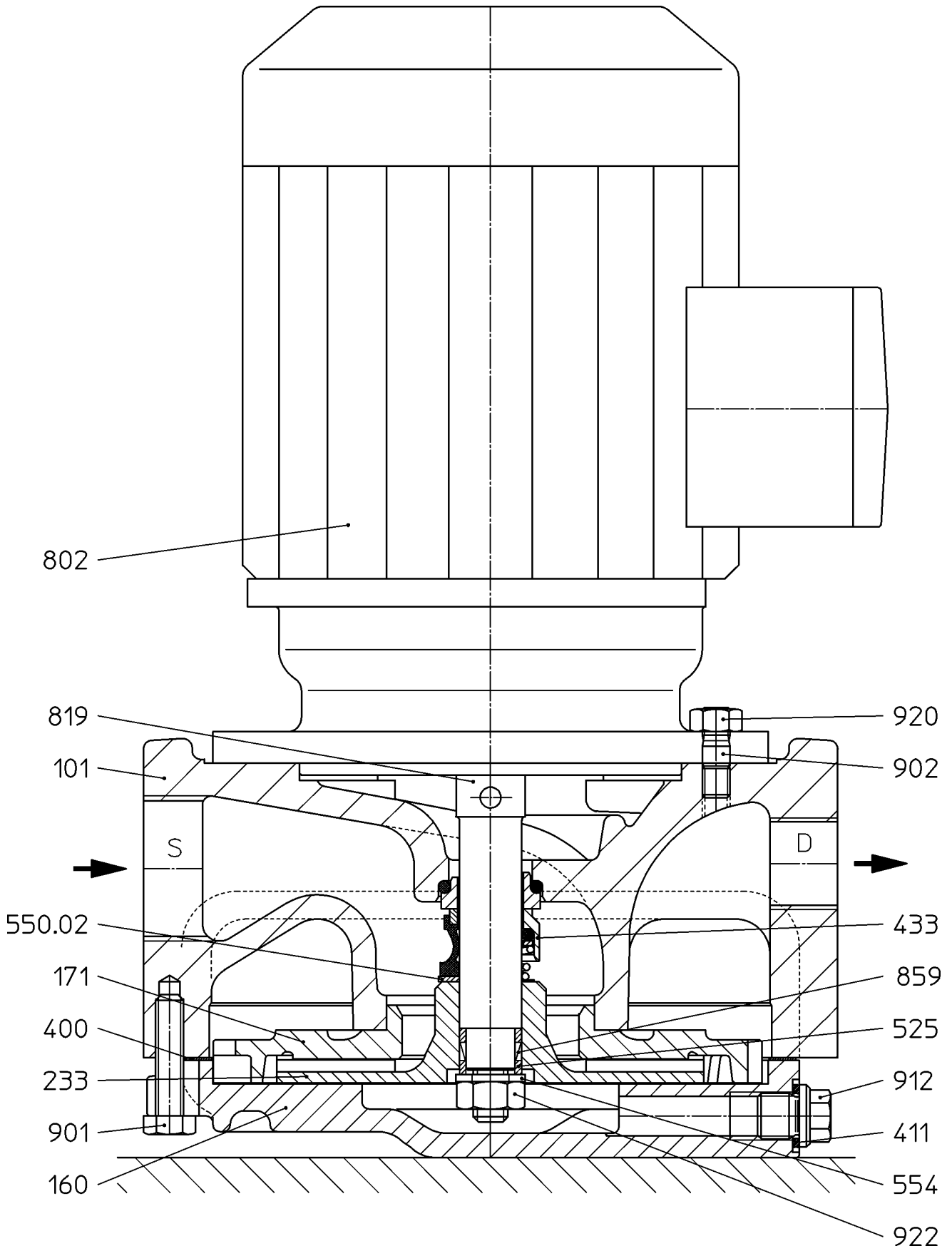
Not all parts are built into every pump, however.

6.1 Spare parts list

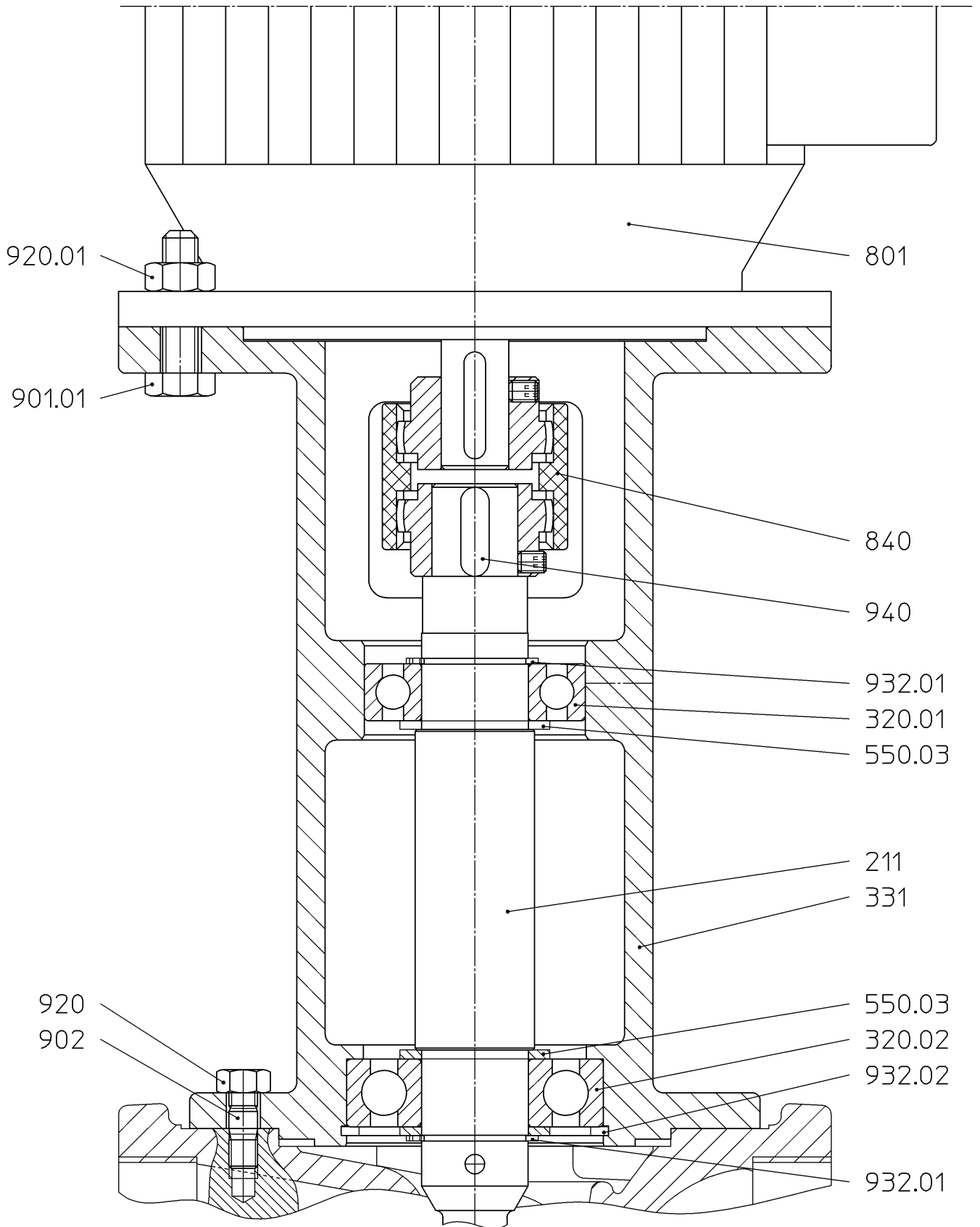
Pos.	Denomination	Note
101	volute	
124	filter housing	
160	lid	
161	housing cover	
171	distributor	
211	pump shaft	
233	impeller	
320/.01/.02	roller bearing	
331	bearing pedestal	
400	clamp gasket	
411	CU-ring	
412	O-ring	
433	mechanical seal	
515	camping ring	
525/.01/.02	distance sleeve	
550/.01/.02/.03	distance washer	
554	distance washer	
734	reducing pipe nipple	
758	filter element	
801	Norm-motor	
802	block motor	
819	motor shaft	
840	coupling	
859	tensioning device	
901/.01	hexagon screw	
902	locking screw	
903	plug screw	
906	impeller screw	
912	outfloor stopper	
920/.01	hexagon nut	
922	impeller cap nut	
932/.01/.02	Retaining ring	
940	key	

Not all parts are built into every pump, however.

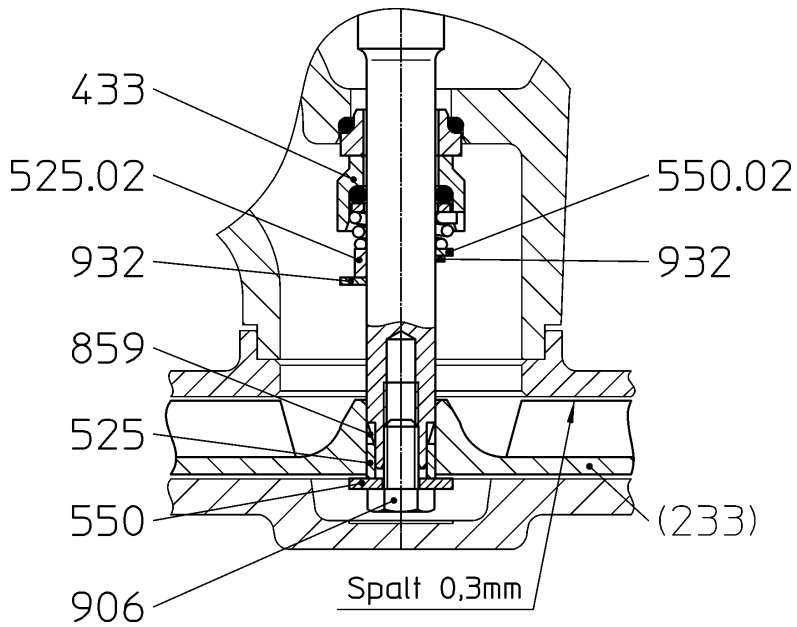
Typ S



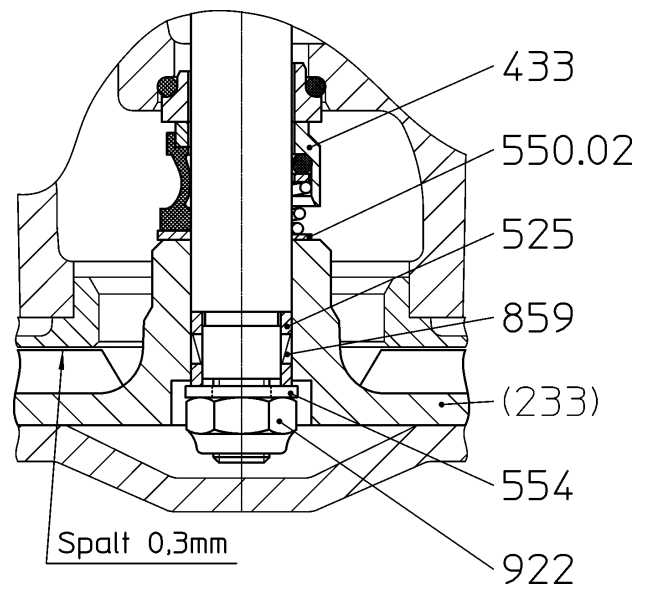
Typ S - L



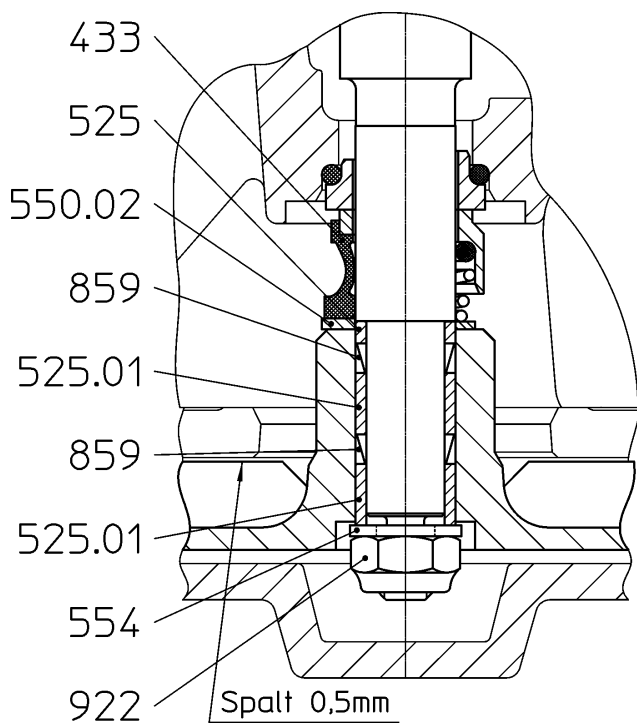
Impeller fixation



S 2008



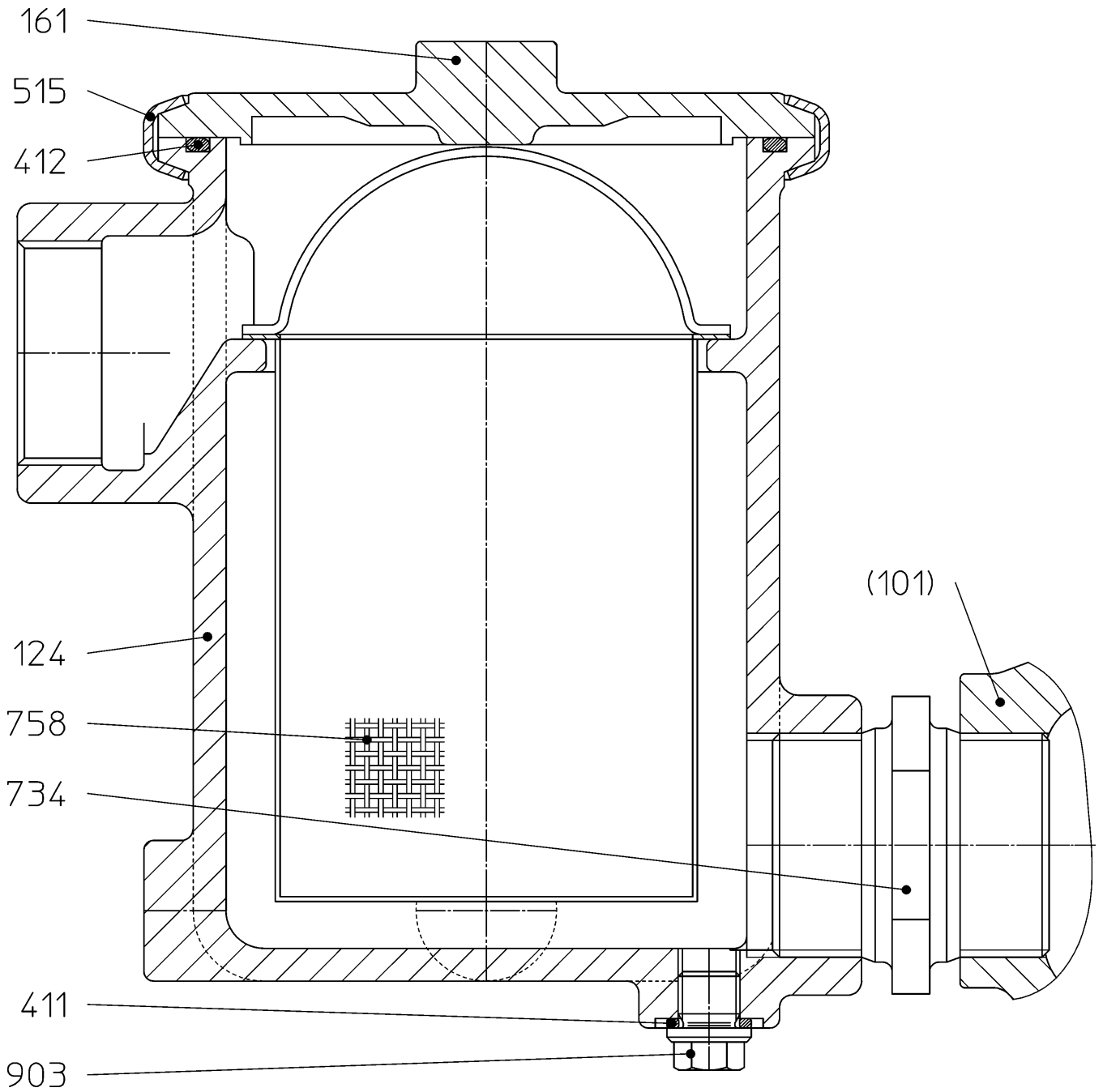
S 0012



S 0014

Spalt = Gap

Filter housing





Importer:
IPP - Industrial Process Pumps Ltd.
22-30 Dunton Close, West Meadows Industrial Estate
Derby DE21 6XB
United Kingdom
www.ipp-group.com

Manufacturer:

Schmalenberger GmbH & Co. KG
Strömungstechnologie
Im Schelmen 9 - 11
D-72072 Tübingen / Germany

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