


# Operating Instructions for Explosion-Proof Radial Piston Pump

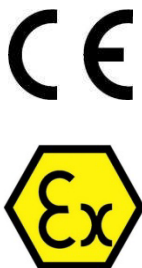
## Type: SRK and MRK

Ex-Designation according to RL 2014/34/EU: CE  II 2Gc -20°C ≤ Ta ≤ 40°C

Ex-Designation according to EN 80079-37: EX h IIC T4 Gb -20°C ≤ Ta ≤ 40°C

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### Further applicable documents:

- none

(English translation of original German operating instructions -E-)

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## General

### 1 Operating instruction

By choosing the special radial piston pump ATEX (SRK-ATEX, MRK-ATEX), henceforth referred to as "pump", you have selected a leadingedge system for the transportation of liquids.

The valvecontrolled, modular radial piston pump can be equipped with 3 till 9 pistons on one level. The pump is suited for the roughest of applications and for high nominal operating pressures of up to 108MPa (1000 bar). The pumps meet the requirements of the device group II category 2G of the ATEX-guideline.

This manual contains notices for your personal safety, as well as for the prevention of damage to property. Read this operating instruction carefully before starting any work on or with this device. It contains regulations and instructions for installation, startup, operation, inspection and maintenance of the device.

The manufacturer accepts no liability for damage or faults arising from failure to follow the instructions. In case of doubt, the enclosed German version of the operating instructions shall apply. In case of any queries or problems, please contact the manufacturer directly.

This operating instruction must be retained for the full service life of the device in complete and legible condition and kept accessible to the necessary persons.

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Bieri Hydraulik AG Könizstrasse 274 CH-3097 Liebefeld

We have checked the contents of this publication for agreement with the described hardware and software. However, deviations cannot be excluded and therefore we do not guarantee full agreement. The information in this publication is regularly checked and any corrections found necessary are contained in subsequent editions.

We are grateful to receive suggestions for improvement.

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## 2 Symbols used in the manual

**Danger**

Means not applying the relevant measures will cause death, serious physical injuries or significant property damage.

**Caution**

Means not applying the relevant caution may cause slight physical injuries or light property damage.

**Notice**

Is important product information, information on product handling or may highlight a particular part of the documentation requiring your special attention.



Only qualified personnel may start up and operate the equipment. Qualified personnel are those who know the safety requirements and are fully trained and worked in on the system.



The manufacturer cannot be held liable for damages caused by not adhering to safety instructions, by unprofessional procedures or for using the equipment for purposes it was not designed for.

**Warning**

The equipment may only be used as specified in the technical datasheet and for the applications described and only in connection with equipment and third-party equipment and components recommended and approved by Bieri Hydraulik AG.

Trouble-free operation of the equipment requires professional transportation, storage, installation, operation and maintenance.

**Explosion-related**

Explosion-related situations or dangers are highlighted.

### 3 Proper use

The special radial piston pump ATEX is intended to be directly driven by commercially available electric or combustion motors, belt drives, gears etc. and is only meant to transport liquids and to increase the pressure of liquids with different chemical and physical characteristics in a defined atmosphere.

The pump meets the requirements in accordance with the European guidelines 2014/34/EU “Intended use of devices and protective systems in an explosion hazard area”, for device category 2G.

I.e. the pumps themselves are not the source of any ignition. They can be used to transport flammable liquids. They are built to withstand harsh applications such as those in industrial plants and machine workshops



#### **Danger**

The special-radial piston pump ATEX may only be set up with in explosion hazard areas of zones 1 and 2 or in other safe areas!

The danger of an explosion must be determined by the operator of the entire system.



#### **Notice**

The manufacturer is not liable for any damages in regard to operational and personal safety caused by disregarding safety instructions, wrong procedures or by using the equipment as not intended.

## 4 General safety instructions

### 4.1 Staff qualification and training

The installation, start-up, operating, inspection and maintenance staff who work on the valve and solenoid coil must have the appropriate qualification for these types of work.

Specialised knowledge in the fields of hydraulics and electrics is required.



#### **Explosion-related**

Each member of staff must be familiar with the required conduct in explosive atmospheres.

The operator is obliged to operate the device only in perfect condition. Any hazards arising between Bieri Hydraulik AG systems and customer equipment must be secured by the operator.

Area of responsibility, responsibility and supervision of personnel must be precisely regulated by the operator. If the personnel do not have the necessary knowledge and skills, they must be adequately trained and instructed.

Furthermore, the operator must ensure that the contents of the operating instructions are fully understood by the personnel.

The integrator is obliged to ensure the continuous traceability of the product back to the manufacturer.

### 4.2 Safe working practice



The safety information given in these operating instructions and the existing national and international regulations on explosion protection and accident prevention must be complied with, in addition to any internal works regulations, operating and safety regulations specific to the owner.

The organisational and general safety conditions must always be observed when working in potentially explosive areas.



#### **Caution**

In environments containing hydraulic oil, small leaks can form films of oil on the ground.



#### **Caution**

Appropriate protective measures must be taken and information provided when using toxic fluids.

### 4.3 Improper use

The radial piston pumps may only be operated in their intended use and within the described technical data. The specified limit values must not be exceeded under any circumstances.

The operator is obliged to report any changes immediately.

The owner must ensure that no safety devices are removed or disabled.



#### **Explosion-related**

The device may only be operated in a clean and undamaged condition.

Any type of damage may bypass the explosion protection.

As soon as there is any suspicion that device safety is impaired, the device must be taken out of operation immediately. Ensure that the device is not restarted inadvertently.



See the "Inspection" chapter for more details.

The other instructions, information and specifications in these operating instructions must be followed and complied with.



#### 4.4 Unauthorized reconstruction and spare parts

Reconstruction and alterations to the device are not permitted (e.g. painting). Original spare parts and accessories authorized by the manufacturer ensure safety. Use of other parts may void the liability for any consequential damage or loss.

##### **Explosion-related**

Signs of wear, like increased noise, altered sound or increased vibrations, may indicate that the pumps service life is coming to an end, or that the valve has not been installed correctly. In such cases, the pump must be replaced or sent to the manufacturer for repair.



If the pump has been installed incorrectly, the manufacturer must be contacted for further advice.

Make particularly sure that the selected materials of those parts of the pump as well as the system (sealing materials, pipes, fittings e.g.) which carry the media are suitable for the media in use.

Media incompatibility of the materials can lead to serious consequential damage due to detached particles.

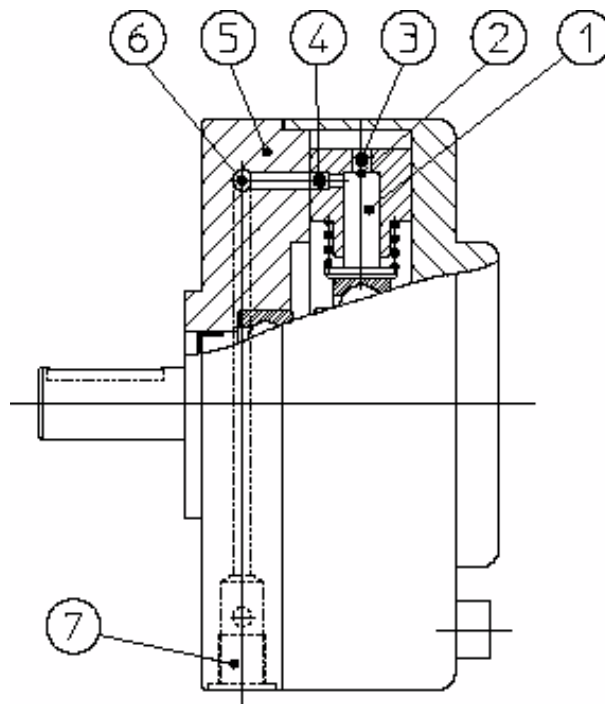


##### **Caution**

Prior to installing/removing the pump, the pressure must be completely released in order to reduce the risk to the fitter. Fluid must not be allowed to escape unchecked from the pipe.

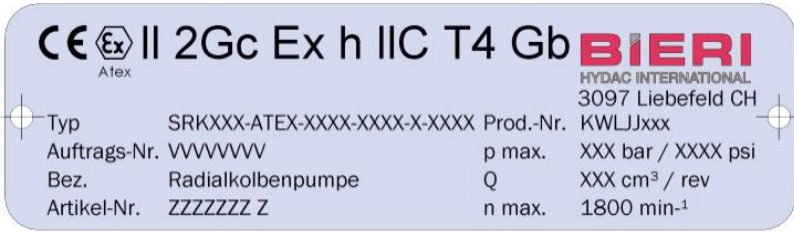
## 5 Designation of the system components

This illustration shows the system components of the pump. The drawings are for general understanding only and are not intended as detailed scale drawings for construction purposes.




Pos.	Description
1	Suction stroke piston
2	Workspace
3	Suction valve
4	Pressure valve
5	Pressure flange
6	Collector pipe
7	Pressure connection

## 5.1 Data plate

Ex-designation acc. to RL 2014/34/EU	Manufacturer
	Address
 <p>The data plate contains the following information:</p> <ul style="list-style-type: none"> <li>CE mark with Ex symbol and ATEX text</li> <li>II 2Gc Ex h IIC T4 Gb</li> <li>BIERI logo</li> <li>HYDAC INTERNATIONAL</li> <li>3097 Liebefeld CH</li> <li>Typ: SRKXXX-ATEX-XXXX-XXXX-X-XXXX</li> <li>Auftrags-Nr.: VVVVVVV</li> <li>Bez.: Radialkolbenpumpe</li> <li>Artikel-Nr.: ZZZZZZZ Z</li> <li>Prod.-Nr.: KWLJjxxx</li> <li>p max.: XXX bar / XXXX psi</li> <li>Q: XXX cm<sup>3</sup> / rev</li> <li>n max.: 1800 min<sup>-1</sup></li> </ul>	
Type designation	Production number + consecutive number within an order
Order number	Max. operating pressure
Type code	Max. flow rate
Part no. + Index	Max. speed



### Notice

If the pump is to be used in explosion hazardous areas as defined by ATEX then this  sign is attached beside the manufacturer's plate and the CE sign. The declaration of conformity is in the appendix of this manual.

## 6 Scope of delivery

Before starting to use the pump, make sure that the delivery is complete:

- Special radial piston pump ATEX
- Operating instruction with EC declaration of conformity

## 7 Transport and installation notices

### 7.1 Delivery

Normal freight: The pump is packed in a parcel and protected by a plastic foil.

Sea freight: For sea freight, the parcel is placed in a wooden box.

Air freight: For air freight, the parcel is placed in the plywood box

### 7.2 Transport

Please observe the danger warnings before transporting the pump:



#### Caution

Heavy object may cause sprained muscles or back ache. Use appropriate tools and the correct technique to lift the pump.

Heavy loads may fall down and cause serious injuries!

The personnel must wear protective shoes.



#### Notice

Always transport the pumps with care and make sure they are not scratched during transportation.

Use a suitable hoist to lift the pump.

### 7.3 Unpacking

- Carefully remove the pump from the package and from any other bindings
- Check the pump for visible damage



**Notice**

Check the shipment against the delivery note (should the delivery be incomplete, please contact our customer service).

Visible damages due to poor packaging or due to the means of transportation must be reported immediately to our customer services, to the shipping company, and to the insurance company.



**Notice**

Heavy object may cause sprained muscles or back ache. Use appropriate tools and the correct technique to lift the pump.

Until it is assembled or after disassembly, always store the pump on its largest surface area.

### 7.4 Set up

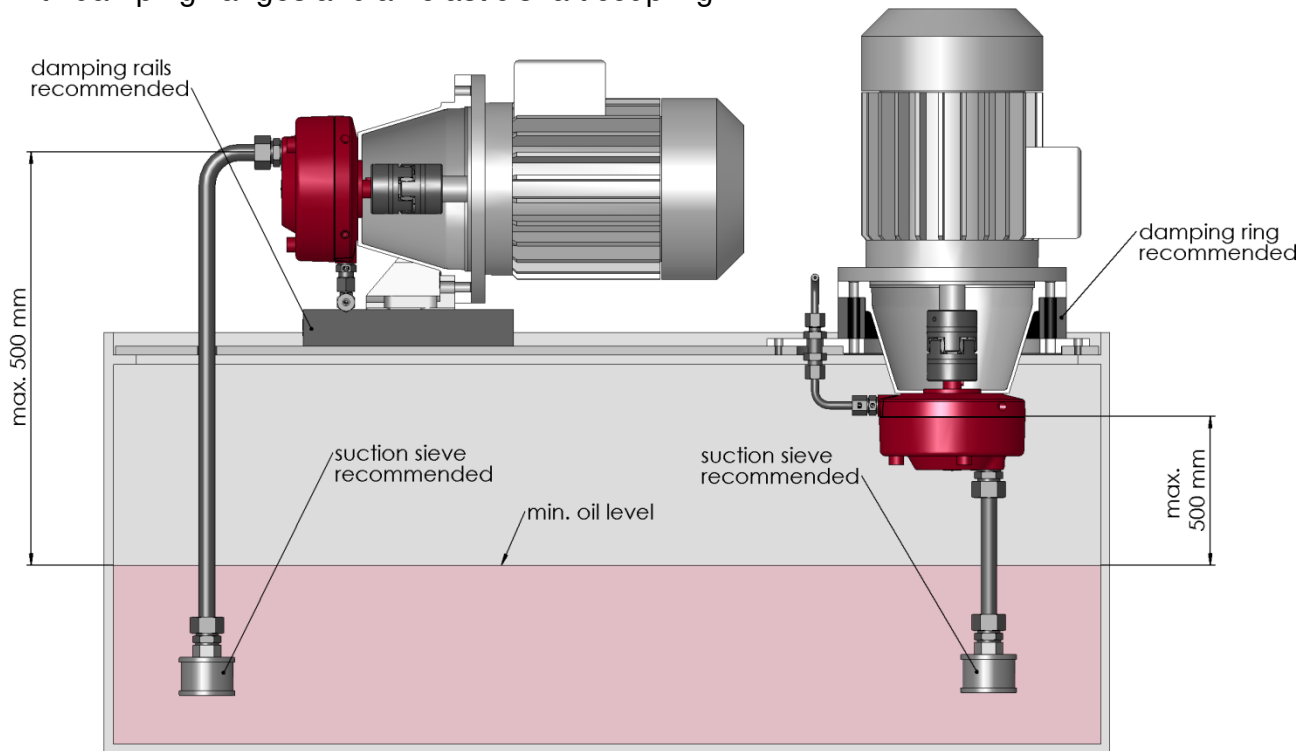
From the factory the pump is delivered with its ducts blocked. Keep the ducts blocked until connecting the pump to the pipes.

The pump is delivered ready-to-use and you can connect it to the drive motor and operate it on your own. However, please read the operating instruction carefully first.

## 7.5 Recommended installation

The pump is stable within itself; it can be installed horizontally or vertically. On unlevelled foundations, the pump must be leveled.

For a smooth run, we recommend using a pump support base with dampening or a foot with dampening flanges and an elastic shaft coupling.



### Notice

Should the pumps be deactivated and uninstalled, then the opening ducts must be blocked again to prevent hydraulic fluid from leaking out.

Should the pump be used in a stationary installation, then it must be mounted on a leveled foundation that will compensate possible movements caused by external influences such as vibrations or expansions.

Use foundation screws to connect the pumping station to the foundation. The operator must ensure a safe anchoring.

Should the pump be intended to be mobile (mounted on a vehicle) then the operator must make sure that the pump does not deviate from the horizontal by more than 5°.

If the pump is operated at the larger slant, air bubbles could get caught in the system.

If the pump is to be used outdoors, then it requires at least a covering roof.



## 7.6 Connections

Install the compressed air pipes as straight as possible and with a minimum of pipe connectors to prevent losses due to friction. Lay the pipes out without tension, because rigidly installed suction and pressure pipes generate tension and significant forces that affect the pump and can damage it.

The permissible suction height of the pumping medium is maximum 500 mm. The suction pipe must be immersed at least 50mm in the medium and must have a minimum distance of 50 mm to the bottom of the tank.

### Notice

The suction connections may be tightened with a maximum of 25 Nm torque. The pressure connections must be connected in accordance with the manufacturer's recommendations and the permissible operating pressure may not be exceeded.



The connections to the pump must be elastic (hoses or compensators). Because of differing temperatures of the pumping medium, expansions may occur in the pipes and continue as tension to the pump, the frame and all the way down to the foundation.

Before assembly, the entire hydraulic system and the pipes must be carefully cleaned to prevent any loose particles from reaching the pump.

Depending on the characteristics of the pumping medium, the operator must take measures to catch any medium that would leak through the pump connections.

### Caution



The pipes and fittings used must correspond to the pressure class for which the system was designed. Always use pipes with the same nominal widths. The sizes of pipes should meet the requirements of the guidelines on hydraulics.

Make sure that the connections between the pump housings, and the pipes are suited for the pressure rating and that they can not be deformed or come loose during operation.

Check the drop in pressure in the pipes in consideration of the viscosity. It may not exceed the performance envelope of the pump.

### 7.6.1 Pipes (under pressure)

The pump feeds by volume independent of the pressure generated. Blocking a pipe under pressure causes serious damage to the pump.



**Caution**

If a shut-off valve is installed in the pressurized side of a pipe, then the safety valve must be located immediately after the outlet of the pump.

### 7.6.2 Pumping medium

As pumping medium HLP-oils acc. DIN 51524 part 2 can be used (other mediums upon request). The recommended oil purity class, according to ISO standard 4406, is at least 17/15/12.

Any particles in the pumping medium subject the pumps to significantly higher loads which may cause serious damage to the pump and to the entire hydraulic system, particles should be eliminated by using filters in the pressurized and the backflow sides.

**Warning**

Mechanical friction may cause the pumping medium to absorb heat. Heat dissipating from the pumping medium may heat up the pump.

With the housing temperature expected to rise above 65°C and without isolation, the warning sign for hot surfaces (side length 5 cm) must be attached to the pump.

(Warning sign for hot surfaces see pictogram on the left!)

Additionally, the operator has to install a cooling system for the circulating medium to prevent the pump from reaching a surface temperature in excess of 65°C. Otherwise, there is danger of the personnel sustaining burns on the hands and arms on touching the pump!



**Caution**

Should there be a danger of the medium freezing, then the operator has to take measures that will prevent the pump from starting if the medium is frozen.

If there is any danger of the medium freezing, it has to be completely drained from the pump. Frozen medium will damage the pump.

If the pumping medium is frozen, do not turn the pump shaft. Always make sure that the pumping medium has thawed.



**Notice**

Create enough free space around the pump for maintenance work.

Make sure there is easy access to change filter cartridges and to fill /drain the pumping medium.





### 7.6.3 Cavitation

It should be noted that in bypass circuits a backflow from the high pressure side to the inlet side is possible. This circuit can cause cavitation problems and thus damage the pump. The same consequence can occur if the inlet pressure falls below the value stated in chapter 14, if the inlet shut-off valve is not fully open or closed, if the inlet line is too small or too long, or if the inlet filter is blocked.

It should also be noted that cavitation problems may occur if the outlet / inlet is below the inlet.



#### **Caution**

No control valve for the pump may be installed on the suction side. The suction side must remain completely open during operation.

### 7.6.4 Drive motor

Couplings may not transmit any axial and radial forces to the pump shaft. Use an elastic coupling. A fixed coupling will lead to damaged bearings.



#### **Notice**

The drive motor may only be installed by authorized specialists in consideration of the local regulations on the installation of pumps. Let the specialists confirm that the installation was performed and checked in accordance with the regulations and that the installation is complete and function tested (or simulated).

To prevent the pump from running dry, we recommend the installation of a pressure sensor that stops the drive motor when there is no pressure and prevents it from starting when there is no pressure.



#### **Explosion-related**

To connect the motor for an ex-protected layout, follow the notices in the EU type certificate of the motor.

### 7.6.5 Main switch / emergency-off from the drive motor

In order to work safely on the pump, a padlockable main switch must be fitted as close as possible to the pump. This switch is called a "pump switch". It only switches the drive motor of the pump ON and OFF!



#### **Notice**

To interrupt the mains power, we recommend the installation of an emergency-off switch by the operator. To be most useful, the switch should be mounted in danger zones or along the escape path.

The EMERGENCY-OFF switch may not be used to start/stop the pump.

## 7.7 Start up

- Please read the safety notices carefully before starting up the pump and pay attention to the signs and markings on the pump. Keep the signs legible at all times and replace missing or damaged signs.
- Separate pressure and suction pipes from the system and check their condition.
- Fill the pump with pumping medium by letting the pumping medium flow into the suction pipe. This can significantly shorten the bleeding time of the pump. Also switching the drive motor on and off several times accelerates bleeding the pump.
- As long as the medium flows unevenly (possibly with small air bubbles) all pumps have not yet been bled. If after 30 seconds no medium has been pumped, then the drive motor has to be stopped at once!
- If after approx. 3 minutes the pump could not be fully bled then check the connections and pipes for leaks.
- The entire hydraulic system has to be properly rinsed.
- Connect the pressure and suction pipes to the system.
- Check if the desired operating pressure can be attained.



### **Danger**

The pump may not be modified, redesigned or rebuilt in a way that impairs its safety or function, or the CE-conformity becomes void.



### **Caution**

Do not switch the power on or off without warning persons in the working area. Power must be switched on and off synchronized with other system functions.



### **Notice**

Only qualified personnel may start up and operate the pump. Personnel trained and worked in on the system and who are instructed on the safety aspects of the system are regarded as qualified personnel.

Before starting work, the personnel must have read and understood the operating manual and the valid regulations regarding «Safety measures». The pumping medium (or the cleaning agents) can change the composition of materials, seals and lubricants through mechanical, chemical or physical influence. The operator must evaluate the risks involved and take appropriate countermeasures.

### 7.7.1 Trial run

Take note of the following notices for the start up or trial run!

#### Notice

Make sure that...



- the operating personnel is familiar with the instructions, settings and controls,
- the safety and monitoring devices have been tested,
- the person whos responsible for safety has checked that the safety devices are installed.
- the electrical connections are made and tested and that the pump rotates in the direction specified.
- there is a lockable main switch connected to the pump.
- all parts are clean and free of foreign particles.
- the pump is assembled to run without vibrations and is mechanically fused.
- the pump and suction connections are correctly and functionally connected.
- pressure and suction connections are without tension,
- current (power) is supplied,
- sufficient pumping medium to prevent the pump from running empty,
- the pumping medium is free of particles or that filters are used in the suction and backflow pipe,
- a safety valve is installed and set to an operating pressure of + approx. 10% above the value,
- no warning and notice signs have been removed.



#### Caution

Trial runs with water or degreased fluids are not permitted.

1. Make sure no unauthorized persons are in the vicinity of the hydraulic system.
2. Start the drive motor of the pump and let the pump run for 5 minutes without pressure. If there is any noise, stop the drive motor of the pump and locate the cause of the noise (refer to section 12).
3. Observe the starting and running characteristics of the pump over an entire cycle.
4. If no errors occur and the desired pressure can be attained and maintained, then the pump that has just been started up is ready for operation.

## 7.8 Storage and conservation

To keep a deactivated pump functional over a long period, adhere to the following points:

- The storage room must be clean and dry.
- The pump should not be exposed to extreme cold or heat.
- Keep the entire system clean. Cover all untreated surfaces with acid-free oil.
- Completely cover the pump to protect it against dirt and dust.



### Notice

The manufacturer does not assume any warranty for corrosion damage caused by improper storage, e.g. storage in a damp room or the like.

### 7.8.1 Deactivation

To change location or to remove the pump, proceed as follows:

- Secure the main switch of the drive motor of the pump against being accidentally switched on!
- Remove pressure and suction pipes from the system.
- Let the pump run for a max. of 10 seconds without pressure until no pumping medium flows out.
- Block the pump outlets.
- Remove the pump from the drive motor and pump support base
- The deactivated pump must be protected against humidity and stored horizontally (refer to section 5.6).



### Notice

The pump may be damaged if it is run for more than 10 seconds without pumping medium.

Rotate the pump shaft once a month to keep the lubricant flowing and to prevent the seals from «sticking».

Before start up, rinse away the lubricant.



### Caution

Heavy objects may cause sprained muscles or back ache. Use appropriate tools and the correct technique to lift the pump.

After disassembly, always store the pump on its largest surface.

### 7.8.2 Deactivation when still installed

To deactivate the pump without a change of location or dismantling, proceed as follows:

- Secure the main switch of the drive motor of the pump against being accidentally switched on.
- Separate or close pumping and suction pipes from the system.
- Block the pump outlet ducts.
- Protect the deactivated pump against humidity.



#### Notice

Rotate the pump shaft once a month to keep the lubricant flowing and to prevent the seals from “sticking”.  
Before start up drain the pumping medium.



#### Caution

The pumping medium can change the composition of materials, seals and lubricants through mechanical, chemical or physical influence. The operator must evaluate the risks involved and take appropriate countermeasures.  
If there is any danger that the pumping medium will harden, then rinse and fill the system with lubricant.

### 7.8.3 Restarting the pump

We recommend contacting our customer service before restarting the pump after a long period of deactivation.

The pump should be inspected first. In particular for:

- Corrosion and damage caused by inactivity. Let our experts or our customer service evaluate the situation for you.
- Check all plugs and connections.
- Make sure all pipes are clean and that no foreign particles are in the pipes.
- Replace the pumping medium or the lubricant.
- To restart the pump, follow the instructions in section 7.7.

## 7.9 Claims

We would like to point out that improper transport does not entitle to any replacement or warranty claim. In the event of any ambiguities prior to transport, please consult the transport officer.

The pump has been manufactured using modern manufacturing methods and has been comprehensively tested for function and performance during manufacture and as an end product by the manufacturer's quality assurance system. The methods and procedures used for production and monitoring correspond to the state of the art. The personnel involved in the manufacturing process have the appropriate qualifications and valid certificates of competence. Should a complaint nevertheless be made, please return the pump unopened. If you have any questions, please indicate the type designation and the order number.



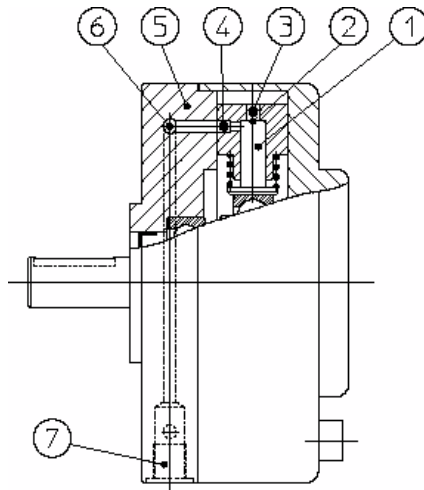
### **Notice**

The manufacturer may be consulted regarding transport matters. However, Bieri Hydraulik AG is not responsible for the transport and any damage resulting therefrom.

If the pump is modified, opened or disassembled by unauthorised personnel, all warranty claims are void.

## 8 Functional principle

During the suction stroke of the piston (1) vacuum is created in the chamber (2). It causes the suction valve (3) to open and the pumping medium flows into the cylinder chamber. At the dead point of the stroke, the pumping stroke is initiated closing the suction valve and the pumping medium flows out through the pressure valve (4). The pumping medium flows directly into the flange (5) with the appropriate collecting main (6) and through the pump connection (7) to the consumer.



Pos.	Description
1	Piston during suction stroke
2	Workspace
3	Suction valve
4	Pressure valve
5	Pressure flange
6	Collector pipe
7	Pump connection



## 8.1 Calculating the drive power

The drive power of the pump can be calculated as follows:

$$P = \frac{p \times V_g \times n \times k}{\eta_t \times 600 \times 10^3}$$

P	Drive power [kW]
p	Operating pressure [bar]
V <sub>g</sub>	Geometric displacement [cm <sup>3</sup> /U]
n	Rotation speed [min <sup>-1</sup> ]
k	Cinematic degree of uniformity
η <sub>t</sub>	Overall efficiency approx. 0,9

Number of pistons	Cinematic degree of uniformity
3	1,05
4	1,11
5	1,02
6	1,05
7	1,01
8	1,03
9	1,01

## 9 Operation

### 9.1 Preparations and general notices

Before operating the pump as intended, make sure there are no external influences that could impair the functions of the pump:

- The pumping medium must be free of foreign particles or filters must be installed on the suction and pressure pipes.
- A safety valve is installed and set + min 10% above the operating pressure.
- The entire hydraulic system incl. pipes must be clean to prevent any particles from reaching and damaging the pump.
- Before every operation check the pump, suction and pressure pipes. If any damage is detected, do not use the pump.

#### Notice

Only qualified personnel may start up and operate the pump. Qualified personnel are those who know the safety requirements, and are fully trained and worked in on the system.

The surface temperature of an unprotected pump must not exceed 65°C. If a higher temperature is to be expected or occurs, then the operator has to isolate the pump or otherwise protect it against being touched.

The pumping medium will heat up due to mechanical friction during pumping. If this could cause any danger, must be determined by the operator and he/she has to take appropriate countermeasures (e.g. cool the pumping medium).



Depending on use, the pump may come into contact with dangerous media. Before performing any cleaning, deactivation work etc., remove or neutralize any dangerous media to prevent it from entering into the system.

The pump may only be run within the RPM range stipulated in section 12.1. The pump will be damaged if the RPM range is exceeded.

Take all safety precautions to assure that the pump and the other equipment work together well and that they pose no danger to persons, material and the pumping medium.

Adhere to the valid local safety regulations. During operating, do not carry out any modifications on the pump or on any part connected to the pump.

Before reaching into the system, always stop the drive motor of the pump to prevent any contact with moving parts or electrical or parts that touch the product. Stop all mechanical movements and take safety measures that will prevent them from starting up accidentally.

It is the obligation of the operator to monitor and adhere to the operating conditions.

## 9.2 Starting the pump



### Notice

If the noise level of the pump exceeds 80 dB(A), check the operational data and all employees must wear ear protection near the pump. The pumping direction cannot be changed by just changing the direction of rotation of the pump.



### Danger

Do not switch the current on and off without warning persons in the operating area of the pump. The pump must be switched off synchronized with other functions in the area. This is valid without exception for all operations. The pump may not be operated without supervision whenever it is pumping medium of unknown reactions or if unknown reactions can be expected. If for operational reasons supervision cannot be maintained, make a report to the system's safety manager and secure the pump against unauthorized manipulations. The system's safety manager has to deal with the question of supervision. It is prohibited to open or remove suction and pressure pipes during operation.

1. Make sure that there is enough pumping medium to prevent the pump from running empty.
2. Open any blocking valves in the suction and pressure pipes.
3. Start the drive motor of the pump.
4. Check the operating parameters at regular intervals.



### Danger

If after 30 s no medium is being pumped, stop the drive motor immediately! The temperature of the pumping medium may not exceed the max. value specified in section 14 and not fall below the solidifying point. The operating pressure of the pump may not exceed the max. value specified in section 14.

## 10 System care

### 10.1 Changing location

- Disassemble the pump as described in section 7.8 when changing location.
- At the new location, set up and operate the pump according to the instructions in the Operating Manual.

### 10.2 Cleaning the System

- Clean the dirt and possible anti-corrosion agents from the surfaces accessible from the outside of the pump.
- Clean the pump according to the manufacturer's cleaning plan. The preferred cleaning agent is the Shell C153.
- Coat all untreated surfaces with non-corrosive oil.

#### Notice

Do not use any cleaning agents that are health hazardous.

Do not use abrasive and/or aggressive cleaning agents.

Use lint-free cleaning cloths.

Do not spray the cleaning agent directly on the surfaces but into a cloth.

Cleaning foam is very aggressive and should only be used to clean stainless steel parts. Aluminum parts or rubber seals must be protected against foam.

Only clean the system when the pump is switched off.

Use and wear appropriate protective gear.

During maintenance, do not place food or drinks near the system.

Adhere to the regulations on accident prevention and to the FCOS guidelines (valid for Switzerland).



#### Caution

Never spray cold liquids, such as water on the hot parts of the pump. The fast cooling down can cause cracks in the housing and destroy the pump.

Before cleaning, check for the protection required for the pump drive.



Only use proven cleaning agents that have not done any damage to pumps (or similar devices) in the past. Test new cleaning agents before using them. If in doubt, consult with our service center; specifying the name of the cleaning agent and the chemical composition.

### 10.3 Electrical / electronic equipment

The pump described in these operating instructions is driven by a drive motor which is directly connected to the pump via a drive shaft and provided by the operator. The operator is responsible for maintaining and monitoring the operating conditions of the drive motor.

When the speed is controlled by a frequency converter, the minimum and maximum speed must not be exceeded as specified in chapter 14. The operator is responsible for maintaining the speed limitation.



#### **Notice**

Electrical parts / components may only be worked on by electricians in keeping with the valid electrical guidelines.



#### **Caution**

Undercutting the RPM of the pump damages the pump due to insufficient lubrication pressure and insufficient slide bearing load capacity. Exceeding the RPM of the pump damages the pump due to mechanical overload (e.g. excessive heating up and the corresponding excessive expansion of the bearings).

## 11 Maintenance

The pump is built in accordance with the valid legal regulations and is safe to operate. The pump may bear some danger if it is operated inappropriately or when it is not fully in order.



### **Danger**

Only operate the pump when all components are installed and functioning!  
The operator of the pump is responsible for the correct operation of the pump!

### 11.1 Safety notices

Please observe and adhere to the general safety and danger notices in this operating manual! Fundamentally:

- Switch off and lock the mains power switch for the drive motor of the pump for repair and inspection purposes.
- Separate the pump from the suction and pressure pipes for repair and inspection purposes.
- Remove all the tools and replace all protective covers after repairs and inspections.
- Possible cleaning of toxic or microbiologically infected parts must be carried out according to internal «SOP's».

## 11.2 Maintenance plan

The maintenance schedule, including the inspections/maintenance work and the corresponding intervals, is shown in the following table. The purpose of the inspection is to identify at an early stage any repair measures that may become necessary so that they can be prepared and carried out.

Component	Inspection / maintenance	Interval [Months] <sup>1</sup>	Performed by
Housing	Check for visual damage and dirt on surfaces accessible from the outside.	3	Operator
Drive	Check drive for mechanical damage, running characteristics, noise and vibrations.	3	Operator
Connections	Check the suction and pressure connections on the pump for leaks, tightness and firm fit.	1	Operator
Pipes	Check the suction and pressure pipes for leaks, tightness and blockages.	1	Operator
Pump support base	Check the connection between the pump and the pump support base for firm fit.	1	Operator

<sup>1</sup>The specified intervals are guidelines. If the system is used more frequently shorten the maintenance intervals accordingly.



### Notice

Maintenance and maintenance intervals become obvious when regular visual checks are made, especially at the beginning stages of your operation.

The maintenance list is only a suggestion made by Bieri Hydraulik AG. The list has to be adapted to your operational realities!

## 11.3 Restoration



### Notice

The pump bearings are lubricated-for-life and do not require any further lubrication.

Only the manufacturer may open the pump for restoration purposes.

## 11.4 Log book

For your own safety and as a contribution towards taking responsibility into your own hands, we recommend maintaining a log book covering all aspects of the pump.

All events should be logged.

In case of any damages or warranty claims, this document could prove to be a very valuable source of information.

E.g. enter with date and signature:

Starting and ending times of a work cycle, special events (even if not directly related to the pump, e.g. a power failure), cleaning times, repairs done, deactivation, special arrangements, etc.



## 12 Troubleshooting

Error	Possible cause(s)	Corrective measure(s)
The drive shaft leaks	Defective drive shaft seal	Replace seal
The pump connections leak	Connection is not tight Defective connection seals	Check and tighten connections. Tighten connections with specified torque Replace connection seals
The pump is not pumping	The pump is not bled Pressure and suction pipes are blocked Filter full of dirt (if installed) No pumping medium	Bleed pump according to section 7.7 Check pipes for dirt, Check the pumping medium for dirt Replace filter at max. difference pressure Check quantity of pumping Check suction height
The pump does not reach operation pressure	The system leaks No pumping medium	Check pipes and pump for leaks Check quantity of pumping medium Check suction height
Pump surface temperature rises	Pumping medium too warm No pumping medium, friction heat cannot dissipate	Cool pumping medium If cooling not possible, stop pump and let it cool off Check quantity of pumping medium Check suction height, If cooling not possible, stop pump and let it cool off
The pump vibrates	Unbalance in drive motor The pump support base is screwed loosely to the foundation Drive motor runs on two phases only	Check drive motor for unbalance Check the foundation screws of the pump support base Check the phase voltage
The pump emits abnormal noise	Piston damage	Return pump to manufacturer for repair

## 12.1 Emergencies and accidents

Any damage that occurs while the pump is in operation due to a breakdown in the machine – whether influenced by the pumping medium or not - or caused by a control signal is considered an emergency and an accident.

The operator has to take measures to assure that if the pump is damaged, no uncontrollable situation can develop (emergency covering concept).

In case of an emergency, e.g. triggered by an erroneous signal of the pump sensor, then the pump has to be shut-down at once. The emergency has to be inspected and corrected. If required, ask Bieri Hydraulik AG for help.



### **Warning**

Never try to continue operation in a case of an emergency. The pump could be damaged beyond repair.

## 12.2 Service and information

In case of problems or questions which are not described or cannot be solved, please contact the customer service of Bieri Hydraulik AG.

**Address:** Bieri Hydraulik AG  
Könizstrasse 274  
CH-3097 Liebefeld

Tel.: +41 (0) 31 970 09 09  
Fax.: +41 (0) 31 970 09 10  
Email: [sales@bierihydraulics.com](mailto:sales@bierihydraulics.com)

## 13 Spare parts

Spare parts must correspond to the manufacturer's technical requirements. Original spare parts always meet those requirements. Always use original spare parts. Our warranty is rendered null and void if third party, rebuilt or non-approved spare parts are used.

### Notice



The pump may only be opened for cleaning, maintenance, dismantling or repair at the manufacturer's.

Defective parts inside the pump can only be replaced at the manufacturer's. Spare and wear parts may not be readily available at the manufacturer's and may take a few days to deliver.

Note that Bieri Hydraulik AG cannot be held responsible for damages and loss of production arising from the delayed delivery of spare parts.

We recommend keeping a spare special radial piston pump-ATEX in store. Order cleaning, maintenance, dismantling or repairs from the sales outlet you bought the pump from or directly contact our customer service (refer to section 12.2).

## 13.1 Recycling

Devices, components, accessories and packaging must be disposed of through environmentally friendly recycling methods!

### Notice



Recycle instead of waste disposal!

Before recycling, clean the parts of residue and health hazardous materials.

Dispose of metal parts through the waste metal disposal.

Dispose of plastic parts through the waste plastic disposal.

Special non-metallic or non-organic parts must be disposed of through the special waste disposal.

Make sure to dispose of the waste material in a professional manner or commission a specialized waste disposal company. The disposal of lubricants requires special attention.

If you dispose of the waste yourself, adhere to the EU-guidelines. Selected guidelines are listed below.

RL 2010/75/EU

RL 2000/76/EG

RL 2000/532/EG

RL 2008/98/EG

Industrial issues,

Burning waste material,

Index of hazardous waste material,

Waste material

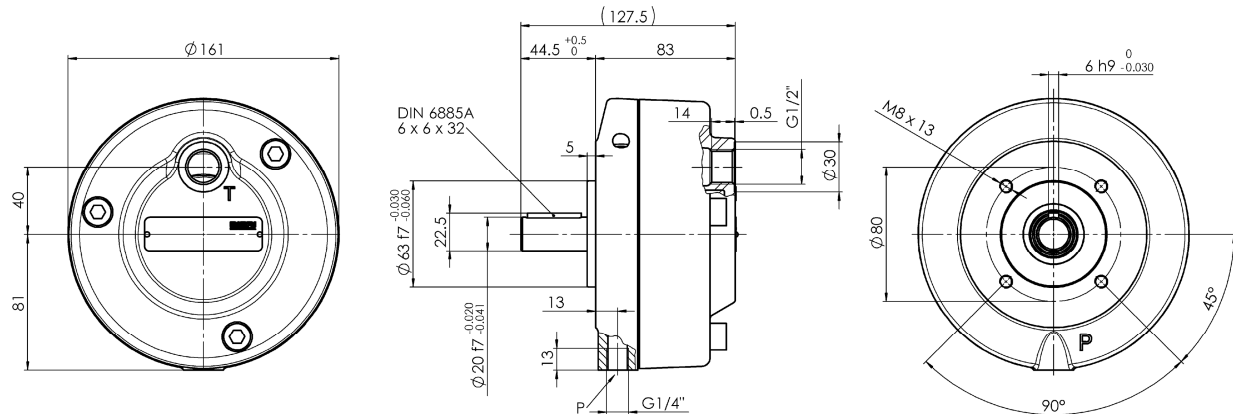
In case of problems or questions which are not described or cannot be solved, please contact the customer service of Bieri Hydraulik AG (see chapter 12.2).

## 14 Technical data

Device designation and type	SRK701-ATEX, MRK701-ATEX	SRK702-ATEX; MRK702-ATEX
Pumpe type	Radial piston pump	Radial piston pump
Edition	with 3, 4, 5, 6 or 7 pistons	with 6, 7, 8 or 9 pistons
Weights	7, 7.5 and 8 kg	12.5 and 13 kg
Dimensions	161 x 88 mm (diameter x depth w/o drive shaft)	230 x 105 mm (diameter x depth w/o drive shaft)
Positioning	random	random
Drive	Direct Radial- und axial forces cannot be absorbed.	Direct Radial- und axial forces cannot be absorbed.
Suction side connection	G 1/2"	G 3/4"
Pressure side connection	G 1/4"	G 3/8"
Drive power required	Refer for formula in section 8.1	Refer for formula in section 8.1
Suction side operating pressure	0.2 bar vacuum up to 0.5 bar excess pressure	0.2 bar vacuum up to 0.5 bar excess pressure
By using a reinforced shaft seal	Up to 5 bar excess pressure	Up to 5 bar excess pressure
Performance data	Refer to section 14.1	Refer to section 14.1
Pumping medium	Mineral oil acc. to DIN 51524 (other medium upon request)	Mineral oil acc. to DIN 51524 (other medium upon request)
Purity of pumping medium	Acc. NAS 1638, classe 6 or ISO/DIN 4406 17/15/12	Acc. NAS 1638, classe 6 or ISO/DIN 4406 17/15/12
Filtering pumping medium suction side	< 100µm	< 100µm
Filtering pumping medium backflow	< 10µm	< 10µm
Pumping medium temperature	-20 to 80°C	-20 to 80°C
By using low temperature sealing	-40 to 80°C	-40 to 80°C
Ambient temperature	-20 to 40 °C	-20 to 40 °C
By using low temperature sealing	-40 to 40 °C	-40 to 40 °C
Viscosity range	5 to 220 cSt (optimal: 15 - 35)	5 to 220 cSt (optimal: 15 - 35)
With application of feeding pressure	Higher viscosities possible	Higher viscosities possible
Sound level	70 dB (A)	70 dB (A)
<b>Materials</b>		
Pressure flange	Steel forged	Steel forged
Drive shaft	Steel	Steel
Cover	Cast aluminum	Cast aluminum
Location	random	random
Location above sea level	From 0 bis 2000 m above sea level	From 0 bis 2000 m above sea level

## 14.1 Performance data / Dimension drawings

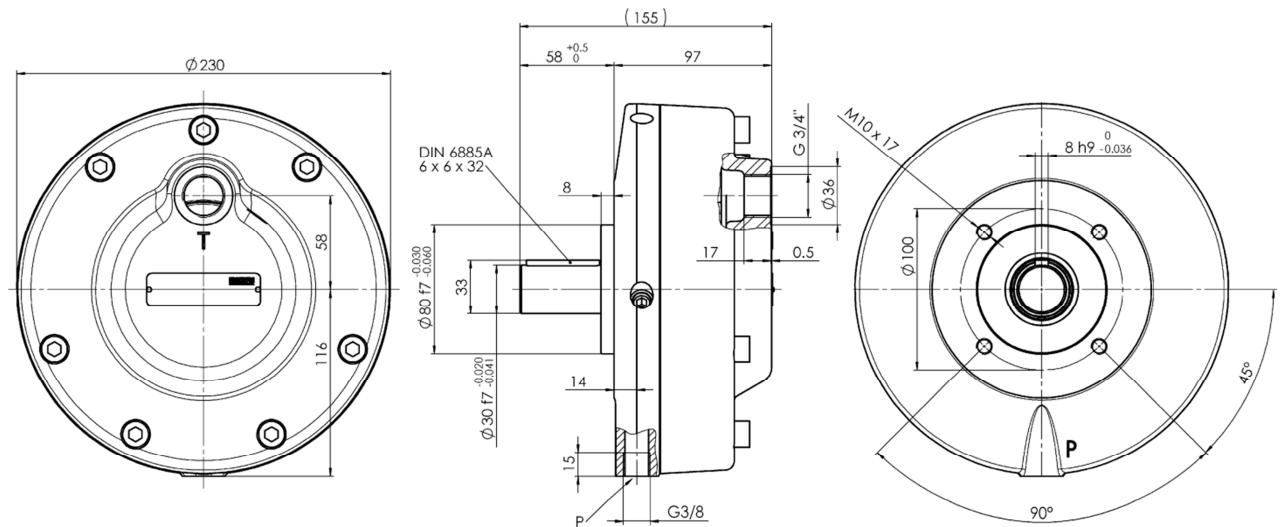
### 14.1.1 SRK701-ATEX



Pumping volume [cm <sup>3</sup> /U]	max. pressure [bar]	Number of pistons	piston Ø [mm]	Weight [kg]
0.24	700	3	5	6.1
0.34	700	3	6	6.1
0.47	700	3	5	6.2
0.60	700	3	8	6.1
0.68	700	3	6	6.2
0.79	700	5	5	6.5
1.10	700	7	5	6.8
1.13	700	5	6	6.5
1.21	700	3	8	6.2
1.53	700	3	9	6.2
1.88	700	3	10	6.2
2.01	700	5	8	6.5
2.71	700	3	12	6.9
2.81	700	7	8	6.8
3.14	700	5	10	6.5
3.56	650	7	9	6.8
4.40	500	7	10	6.8
6.33	350	7	12	6.8

Minimum speed for all pumps: 100 min<sup>-1</sup>  
Maximum speed for all pumps: 1800 min<sup>-1</sup>

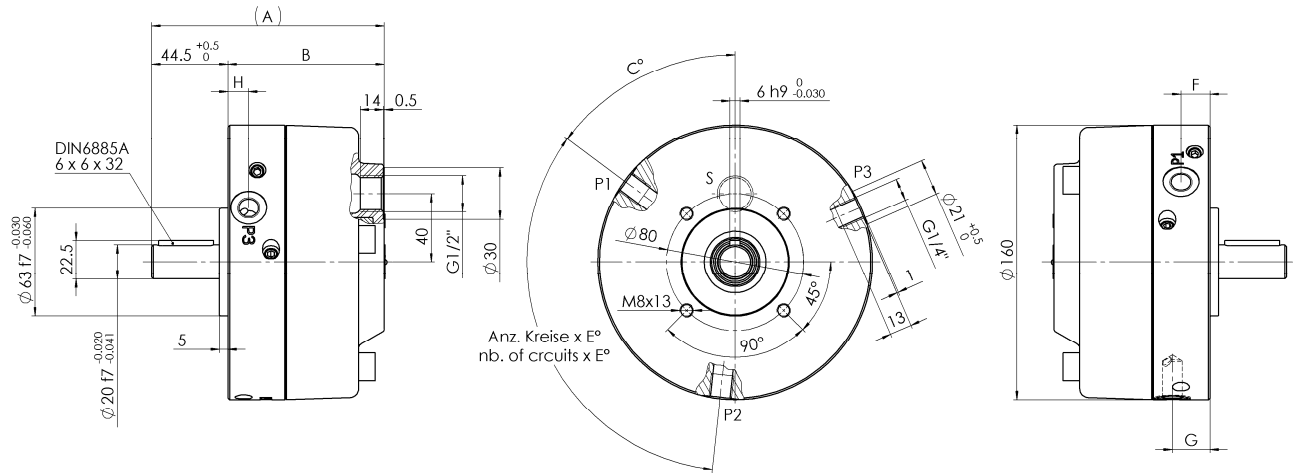
**14.1.2 SRK702-ATEX**



Pumping volume [cm <sup>3</sup> /U]	max. pressure [bar]	Number of pistons	Pistons Ø [mm]	Weight [kg]
2.81	700	7	8	15.2
3.56	700	7	9	15.4
4.40	700	7	10	15.4
4.58	700	9	9	15.7
5.65	700	9	10	15.7
6.33	650	7	12	15.4
8.14	500	9	12	15.7

Minimum speed for all pumps: 100 min<sup>-1</sup>  
Maximum speed for all pumps: 1800 min<sup>-1</sup>

### 14.1.3 MRK701-ATEX

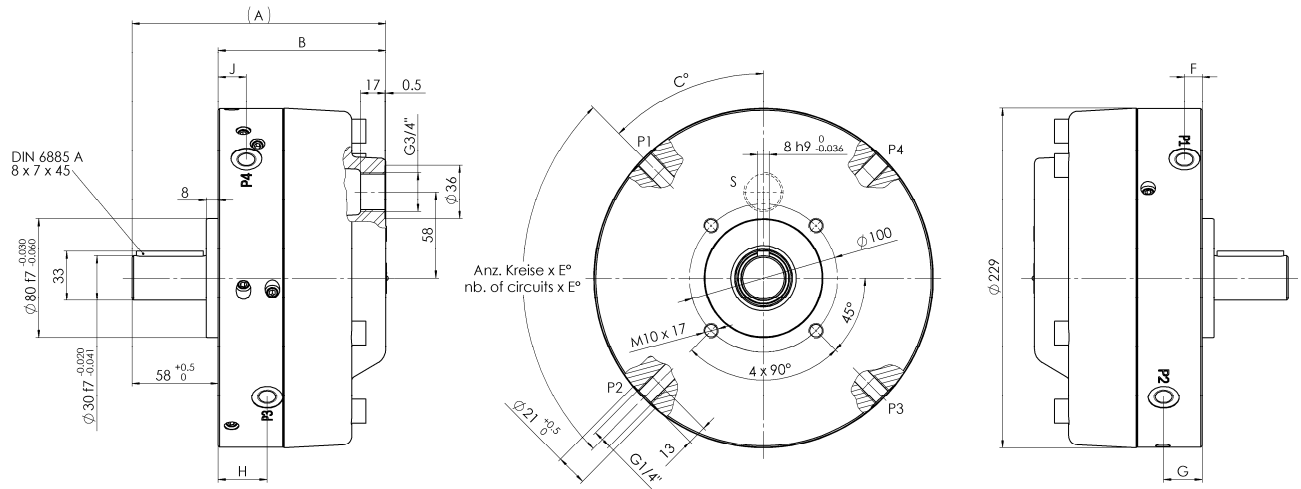


	Numb. of circ. piston /cic.	max. prsssure [bar]	A [mm]	B [mm]	C [°]	E [°]	F [mm]	G [mm]	H [mm]	V/circ. [cm3/U]	Weight [kg]
2	2	700	127.5	83.0	90	180	12.0	14.0	-	0.31	7.1
2	2	700	127.5	83.0	90	180	12.0	14.0	-	0.45	7.1
2	2	700	127.5	83.0	90	180	12.0	14.0	-	0.63	7.1
2	2	700	127.5	83.0	90	180	12.0	14.0	-	0.80	7.1
2	2	700	127.5	83.0	90	180	12.0	14.0	-	1.02	7.1
2	2	700	127.5	83.0	90	180	12.0	14.0	-	1.26	7.1
2	3	700	135.5	91.0	90	180	19.0	19.0	-	1.53	8.7
2	2	700	127.5	83.0	90	180	12.0	14.0	-	1.81	7.1
2	3	700	135.5	91.0	90	180	19.0	19.0	-	1.88	8.7
2	3	700	135.5	91.0	90	180	19.0	19.0	-	2.71	8.7
3	1	700	127.5	83.0	60	120	12.0	12.0	12.0	0.40	7.0
3	2	700	135.5	91.0	53.7	120	17.0	22.0	12.0	0.80	8.7
3	2	700	135.5	91.0	53.7	120	17.0	22.0	12.0	1.14	8.7
3	2	700	135.5	91.0	53.7	120	17.0	22.0	12.0	1.81	8.7
4	1	700	127.5	83.0	45	90	12.0	12.0	12.0	0.16	7.2
4	1	700	127.5	83.0	45	90	12.0	12.0	12.0	0.23	7.2
4	1	700	127.5	83.0	45	90	12.0	12.0	12.0	0.40	7.2
4	1	700	127.5	83.0	45	90	12.0	12.0	12.0	0.51	7.2
4	1	700	127.5	83.0	45	90	12.0	12.0	12.0	0.63	7.2
4	1	700	127.5	83.0	45	90	12.0	12.0	12.0	0.90	7.2
5	1	700	127.5	83.0	36	72	12.0	12.0	12.0	0.16	7.4
5	1	700	127.5	83.0	36	72	12.0	12.0	12.0	0.23	7.4
5	1	700	127.5	83.0	36	72	12.0	12.0	12.0	0.40	7.4
5	1	700	127.5	83.0	36	72	12.0	12.0	12.0	0.51	7.4
5	1	700	127.5	83.0	36	72	12.0	12.0	12.0	0.63	7.4
5	1	700	127.5	83.0	36	72	12.0	12.0	12.0	0.90	7.4
6	1	700	127.5	83.0	23.7	60	12.0	12.0	12.0	0.16	7.5
6	1	700	127.5	83.0	23.7	60	12.0	12.0	12.0	0.23	7.5
6	1	700	127.5	83.0	23.7	60	12.0	12.0	12.0	0.40	7.5
6	1	700	127.5	83.0	23.7	60	12.0	12.0	12.0	0.51	7.5
6	1	700	127.5	83.0	23.7	60	12.0	12.0	12.0	0.90	7.5

Minimum speed for all pumps: 100 min<sup>-1</sup>

Maximum speed for all pumps: 1800 min<sup>-1</sup>

**14.1.4 MRK702-ATEX**

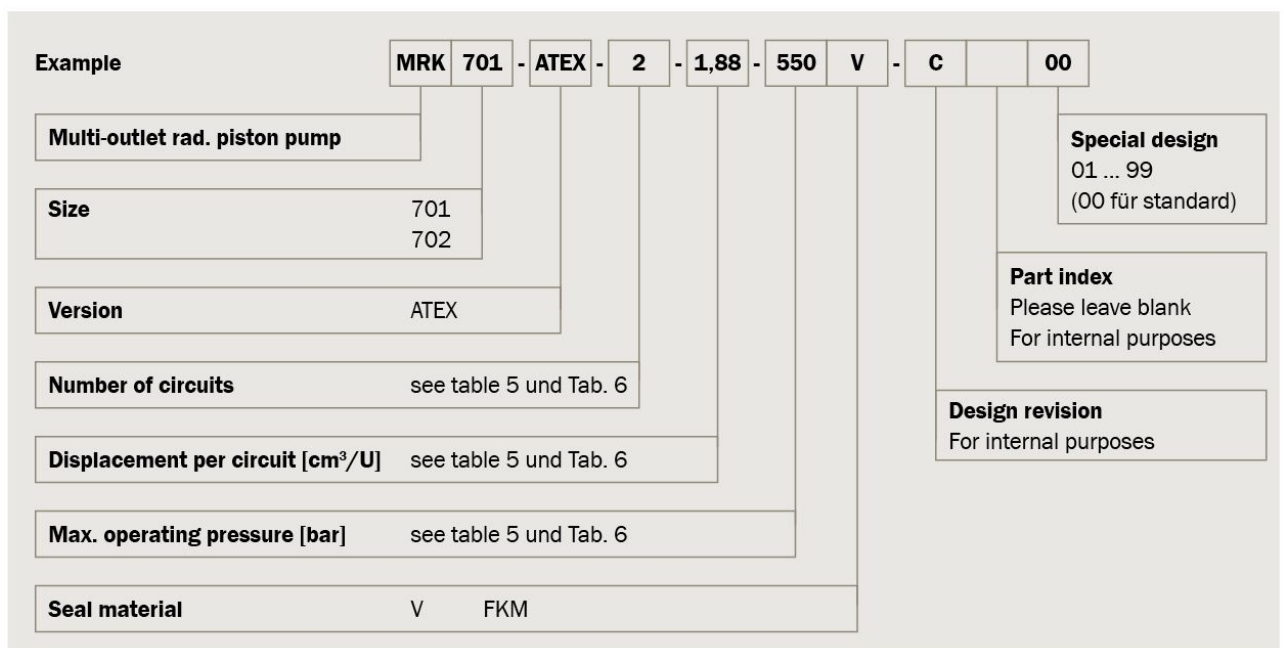
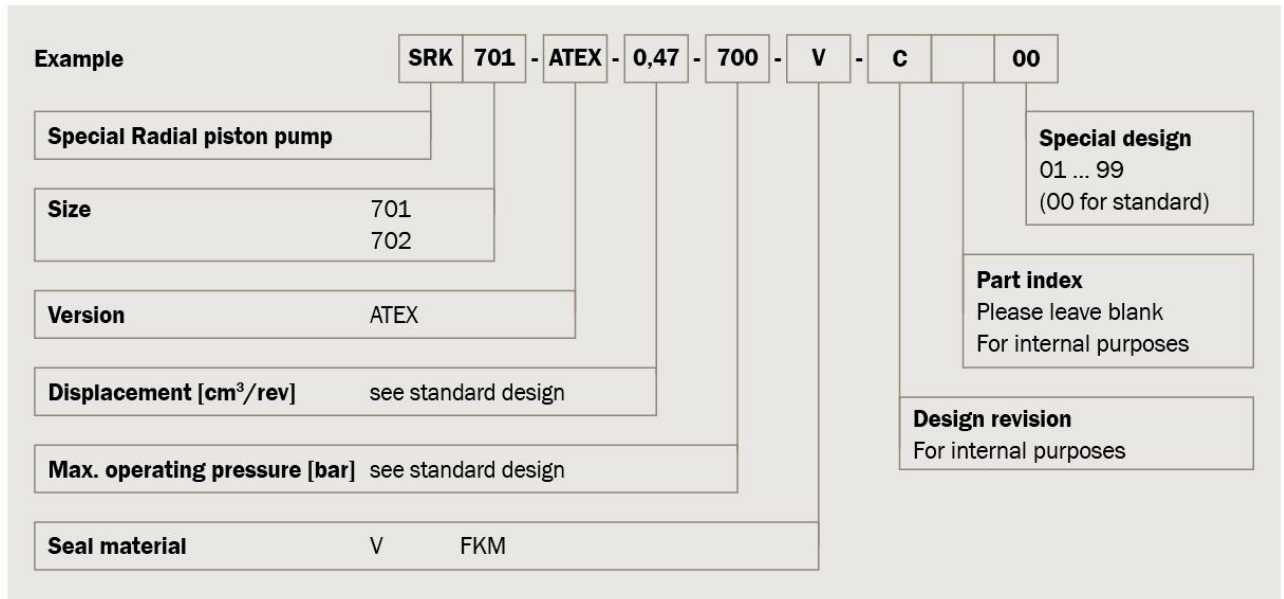


	Numb. of circ. piston /cic.	Numb. of circ.	max. prsssure [bar]	A [mm]	B [mm]	C [°]	E [°]	F [mm]	G [mm]	H [mm]	J [mm]	V/circ. [cm3/U]	Weight [kg]
2	4	700	155.0	97.0	90	180	12.0	12.0	-	-	2.04	16.5	
2	4	700	155.0	97.0	90	180	12.0	12.0	-	-	3.07	16.5	
2	4	700	155.0	97.0	90	180	12.0	12.0	-	-	3.62	16.5	
3	3	700	171.0	113.0	60	120	20.5	15.0	20.5	-	1.88	21.6	
3	3	700	171.0	113.0	60	120	20.5	15.0	20.5	-	2.71	21.6	
4	2	700	171.0	113.0	45	90	12.0	26.0	33.0	19.0	0.80	21.4	
4	2	700	171.0	113.0	45	90	12.0	26.0	33.0	19.0	1.02	21.4	
4	2	700	171.0	113.0	45	90	12.0	26.0	33.0	19.0	1.26	21.4	
4	2	700	171.0	113.0	45	90	12.0	26.0	33.0	19.0	1.41	21.4	
4	2	700	171.0	113.0	45	90	12.0	26.0	33.0	19.0	1.81	21.4	
8	1	700	155.0	97.0	12.5	45	14.0	14.0	14.0	14.0	0.16	16.5	
8	1	700	155.0	97.0	12.5	45	14.0	14.0	14.0	14.0	0.23	16.5	
8	1	700	155.0	97.0	12.5	45	14.0	14.0	14.0	14.0	0.40	16.5	
8	1	700	155.0	97.0	12.5	45	14.0	14.0	14.0	14.0	0.51	16.5	
8	1	700	155.0	97.0	12.5	45	14.0	14.0	14.0	14.0	0.63	16.5	
8	1	700	155.0	97.0	12.5	45	14.0	14.0	14.0	14.0	0.90	16.5	
9	1	700	155.0	97.0	20	40	14.0	14.0	14.0	14.0	0.16	16.7	
9	1	700	155.0	97.0	20	40	14.0	14.0	14.0	14.0	0.23	16.7	
9	1	700	155.0	97.0	20	40	14.0	14.0	14.0	14.0	0.40	16.7	
9	1	700	155.0	97.0	20	40	14.0	14.0	14.0	14.0	0.51	16.7	
9	1	700	155.0	97.0	20	40	14.0	14.0	14.0	14.0	0.63	16.7	
9	1	700	155.0	97.0	20	40	14.0	14.0	14.0	14.0	0.90	16.7	


Minimum speed for all pumps: 100 min<sup>-1</sup>  
Maximum speed for all pumps: 1800 min<sup>-1</sup>



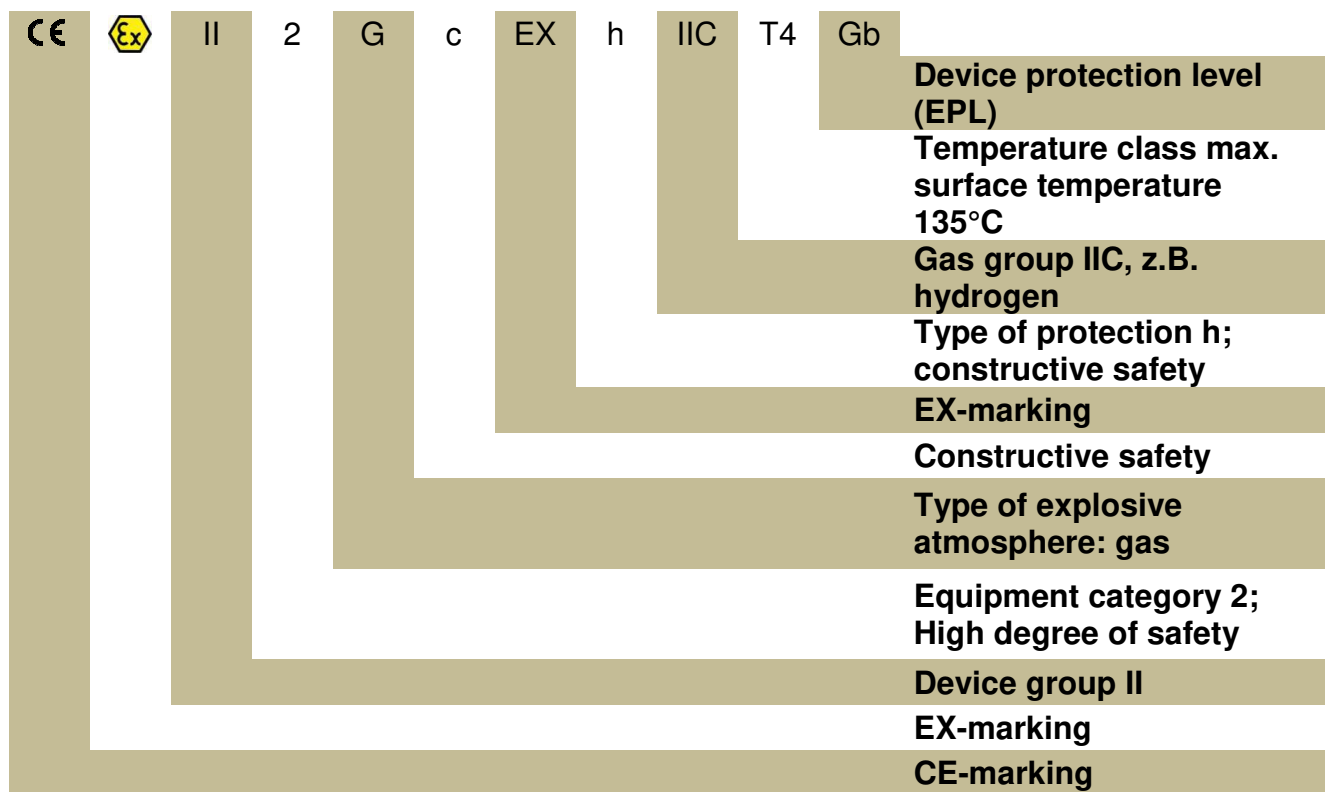
## 14.2 Type code



### 14.3 Standards and guidelines

<p>EC-conform with:</p> <p style="text-align: center;"><b>CE</b></p>	<p><b>Machine guideline</b></p> <p>Devices and protective systems intended for use in explosion hazardous areas</p> <p><b>ATEX guideline</b></p>	<p>RL 2006/42/EG</p> <p>RL 2014/34/EU</p>
<p>Conform with:</p> <p> II 2Gc EX h IIC T4 Gb</p>	<p>Explosion protection / Basics and methodology</p> <p>Non electrical device for applications in explosion hazardous areas</p>	<p>EN 1127-1</p> <p>EN 13463 parts 1 and 5 EN 80079-37</p>

Designation and application area:



## **14.4 ATEX edition**

The special radial piston pump approved for use in hazardous areas and of the version listed in these operating instructions meets both the requirements of the European Directive RL 2014/34/EU Annex II "Basic safety and health requirements for the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres" and those of the relevant harmonized standards EN 1127-1 and EN 13463 Parts 1 and 5 as well as EN 80079-37.

An assessment of the ignition hazards according to EN 13463-1 was carried out. The measures for safe operation determined by this evaluation are presented in this chapter and their consideration for the intended use of the radial piston pump is described.

### **14.4.1 Intended use**

The version of the ex-area certified special radial piston pump may only and exclusively be used for the processes and within the conditions specified by the manufacturer.

Take into consideration:

- Physical and chemical characteristics of the suctioned pumping mediums
- Pressure release device on equipment side, for protection of operation against the shut off exit terminal.
- Max. temperature of the suctioned pumping mediums
- Ambient temperature: -20...+ 40 °C (using low temperature sealing -40...+40°C)
- You are not allowed to do any changes on the radial piston pump. Insulated coatings are not approved.

## 14.5 Declaration of conformity



### BIERI Hydraulik AG

Könizstrasse 274  
3097 Liebefeld  
Schweiz  
Telefon: +41 (0) 31 970 09 09  
Internet: www.bierihydraulics.com



### EC declaration of conformity

(Translation based on German declaration)

We hereby declare that the following designated product, on the basis of its design and construction, and in the version which we have brought to market, corresponds to the fundamental safety and health requirements contained in the standards listed below.


Any modification of this product that is not coordinated with us in writing will cause this declaration to lose its validity.

Designation	Radial piston pump SRK-ATEX / MRK-ATEX		
Type	SRK701.... MRK701....	SRK702.... MRK702....	
Ex-identification	⊕ II 2G c Ex h IIC T4 Gb		-20 < T <sub>pmb.</sub> < +40°C
Ex-identification for low temperature types	⊕ II 2G c Ex h IIC T4 X Gb		-40 < T <sub>pmb.</sub> < +40°C

### Applied directives and standards

EU-Machinery Directive	2006/42/EU, article 1, 1a)
ATEX Directive	2014/34/EU
Applied harmonised standards	EN ISO 12100; EN 4413; EN 1127-1; EN 13463-1; EN 13463-5 ; EN 80079-37

The required documents have been placed at QS Zürich AG, Notified Body No 1254

16.9.2019   
Date ppa. Erich Grossenbacher, VP R& D  
(CE-official)

Geschäftsführer:  
Frank Siebert  
Sitz der Gesellschaft: 3097 Liebefeld  
Registergericht: Bern  
Ust-Identnummer:  
Steuernummer:

Dokumentationsbevollmächtigter:  
Günter Harge  
c/o HYDAC International GmbH, Industriegebiet, 66280 Sulzbach / Saar  
Telefon: +49 6897 509 1511  
Telefax: +49 6897 509 1394  
E-Mail: guenter.harge@hydac.com

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Seite 1 von 1

## **15 Warranty**

The warranty expires on the date entered in the Order Confirmation. Non-repairable and wear parts are not covered by warranty.

We guarantee the availability of compatible spare parts for a period of 10 year as of the date of delivery.

Bieri Hydraulik AG only extends warranty to the suitability and the durability of materials if their technical data had been made known before their production. This also includes certified cleaning agents.

Repairs or restoration works done within the warranty period may only be carried out by our fitters or with our express written approval.

## 16 Glossary

FCOS	Federal Coordination Commission for Occupational Safety
HLP-oils:	Abbreviation for hydraulic oils with ageing, corrosion and wear protection additives. Use with increased wear stresses, e.g. as a result of high pressures.
Viscosity index:	95 bis 105. Standard: DIN 51 524, part 2.
SOP	Standard Operation Procedures

## Suggestions and remarks concerning the operating documentatin

Your remarks and suggestions will help us improve the quality and user friendliness of our docu- mentation. Kindly fill in this questionnaire and mail it to us at BIERI HYDRAULIK AG at your earliest convenience.

To: Bieri Hydraulik AG  
Abt. technische Dokumentation  
Könizstrasse 274  
CH-3097 Liebefeld

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