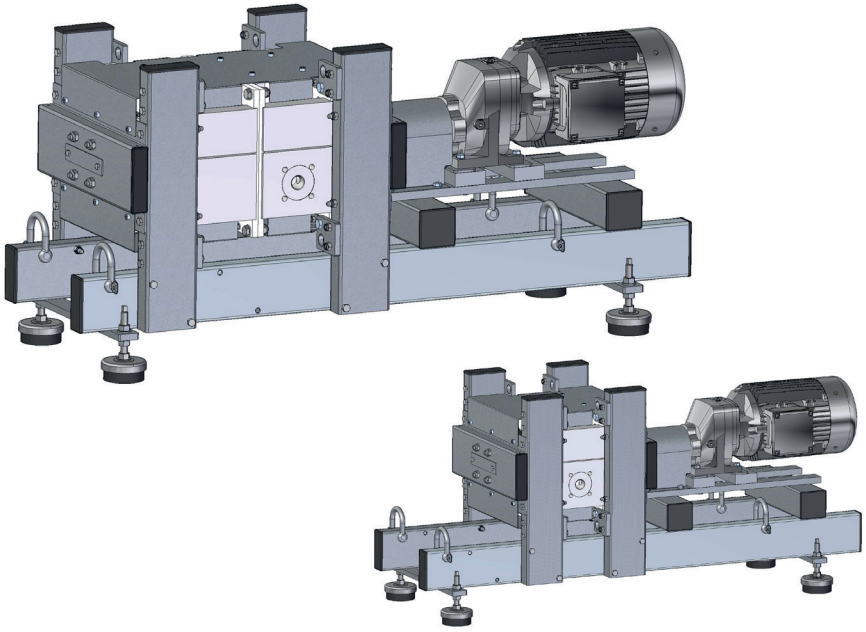


BUNGARTZ

HERMETIC
ROTATRY
PISTON PUMP

CONTENTS

FULLY SYNCHRONIZED.

THE HERMETIC ROTARY PISTON PUMP.

The hermetic rotary piston pump, which we call the HRK for short, really packs a punch. It combines the advantages of a piston pump with those of a centrifugal pump.

The HRK is a hermetically sealed pump with zero dead space and low pulsation. It stands out thanks to its good suction action and high level of efficiency. It is simple in its design. No working parts of the pump that come into contact with the product are wear parts. This makes it virtually maintenance-free.

Further advantages: It is insensitive to gas components and the influence of media viscosity is minimal. It is perfect for completely emptying containers as well as tankers and railway tank cars.

Thanks to its special properties, it is an efficient alternative to single-stage magnetic drive centrifugal pumps or centrifugal pumps with double mechanical seals and their complicated sealing systems. It also has several advantages over eccentric screw pumps, air-operated diaphragm pumps and hose pumps. For more on this, see page 7.

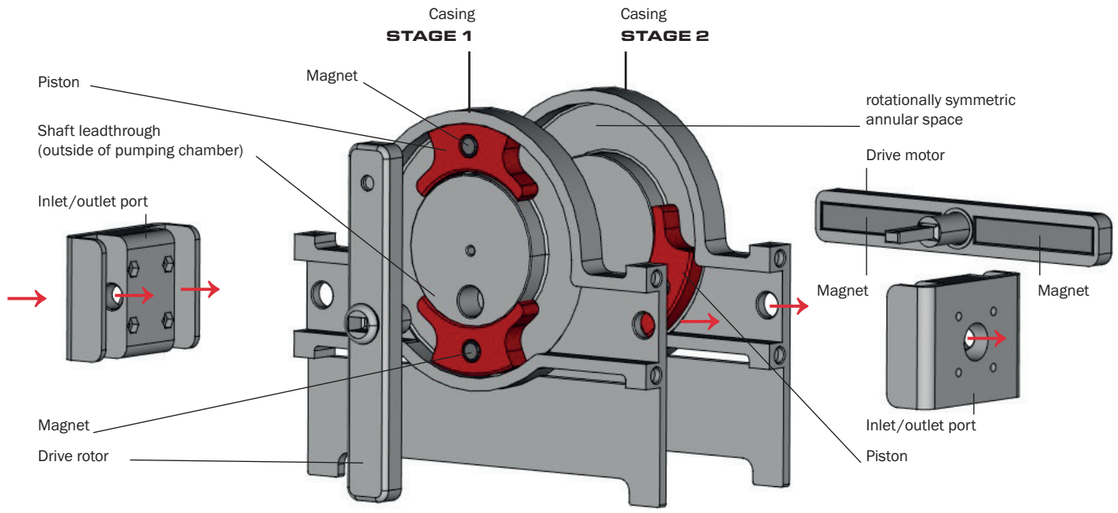


FIG. 1: FUNCTIONAL SHOW MODEL OF THE TWO-STAGE PUMP

The pistons are magnetically driven through the casing wall and rotate in the rotationally symmetric annular space without contact.

The product flows of the two stages 1 and 2 are brought back together at the outlet, phase-shifted by 90°. This lets the pump achieve low-pulsation conveyance with 4 strokes per revolution.

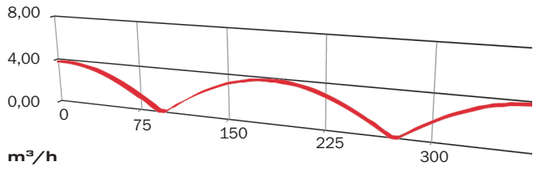
ADVANTAGES

- Virtually wear- and maintenance-free
- Hermetically sealed in accordance with the German Technical Instructions on Air Quality Control (TA Luft)
- Slow-rotating shaft with external bearing and no rotary union
- High level of efficiency, even when working with highly viscous liquids
- No valves
- Fully filled annular space with zero dead space, making it very well suited to CIP (cleaning in place)
- Low-pulsation (4 – 6 strokes per shaft revolution)
- Good suction capacity
- Intrinsically safe with regard to the Machinery Directive and use in hazardous areas

A detailed list of all advantages can be found on pages 22 – 24. Properties relating to design, media type and intrinsic safety are listed separately.

SOPHISTICATED COMBINATION.

HOW THE HRK WORKS.

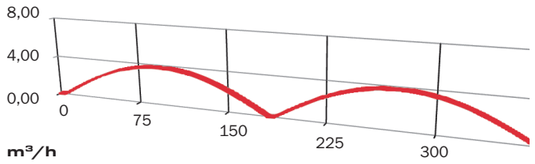


FLOW RATE STAGE 1
Angle of rotation (over one full revolution)

The functional show model (p. 3, Fig. 1) shows the illustrates the simple way in which the HRK works. A characteristic feature of this pump type is the ring-shaped piston chamber with zero dead space and its eccentric position in relation to the drive axis.

In contrast with classic piston pumps with just one oscillating piston (translational motion), this design uses two pistons. These two pistons operate in a completely filled, ring-shaped space and perform an even rotational movement while oscillating in a sine wave pattern.

This kinematic behavior has proven to be particularly effective, as the speed does not cross zero. This, in turn, has a positive effect on the acceleration behavior of the pistons and ultimately on the suction action of the pump (low NPSH value).



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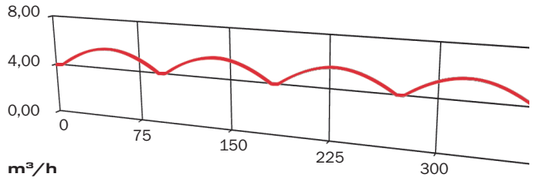
FLOW RATE STAGE 2
Angle of rotation (over one full revolution)



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FLOW RATE STAGE 1 AND STAGE 2
Angle of rotation (over one full revolution)

With the HRK, the pistons are magnetically driven through the casing walls – completely contact-free and from both sides of the piston. The consequence: The pistons are not pressed against the casing wall and have only little contact force.

When the pump is started, the contact forces are neutralized, similar to the lubrication of a slide bearing. In this way, the pistons lift off from the wall hydrodynamically and work in a contact-free manner.

One pair of pistons performs two suction and discharge strokes per revolution. The suction and discharge areas are separated by appropriate control edges. There is no need for valves.

The parallel circuit with two casings, i.e. 2 x 2 pistons, that are offset at a 90° angle, has proven highly effective. This is because it enables even, pulsation-free conveyance with four strokes per shaft revolution.

PILOT PLANT
DEMONSTRATION
STAND HRK

A DEVICE OF MANY TALENTS. APPLICATIONS AND TYPICAL USE EXAMPLES.

The HRK is a good choice in terms of reliability and efficiency. For which types of pump is it a good alternative?

- **SINGLE-STAGE CENTRIFUGAL PUMPS** that are subject to the TA Luft (pumps with double mechanical seal, magnetic coupling). Advantages with regard to efficiency, viscosity dependence, susceptibility to sealing system malfunctions and malfunctions in the case of dry-running.
- **AIR-OPERATED DIAPHRAGM PUMPS** Advantages with regard to energy savings, operational reliability, sound emissions and reduced pulsation.
- **ECCENTRIC SCREW PUMPS** Advantages with regard to avoiding complicated sealing systems and their susceptibility to malfunctioning.
- **ROTRARY PISTON PUMPS** Advantages with regard to avoiding mechanical seals and sealing systems that are prone to malfunction.
- **HOSE PUMPS,** which require the hose to be replaced regularly to due to periodic flexing.

HRK 25 – 150
ON A TEST STAND

The HRK is suitable for almost all liquids. What specific substances can the pump be used for?

- Acids including sulfuric acid, hydrochloric acid, nitric acid or mixed acids
- Toxic and corrosive chemical liquids that are subject to the TA Luft
- Viscous liquids up to approx. 500–1500 cp (4000 cp) (the exact specifications will be provided with the quote; the higher values relate to large pumps with reduced speeds)
- Shear-sensitive liquids
- Gas-laden liquids
- Explosive liquids in terms of ATEX zone 0

The service life of a pump is central to making a purchase decision. What costs have to be considered with a pump system (LCC)?

If a pump system is assessed solely on the basis of the up-front investment costs, only approx. 10 – 20 % of the LCC is taken into account. In fact, up to 75 % of the LCC is accounted for by energy consumption as well as operating, maintenance and repair costs. The HRK offers advantages here in all re-spects.

Wear is avoided due to the low speed and magnetic transmission of torque directly to the hydrodynamically sliding pistons. This makes maintenance costs manageable. The potential for faults and therefore the need for repairs is also minimized. Compared to centrifugal pumps, this significantly reduces operating, maintenance and repair costs. There is also great savings potential in terms of energy costs, which account for around 45 % of the LCC.

EXAMPLE.:
OPERATING POINT: 12 m³/h at 6,5bar

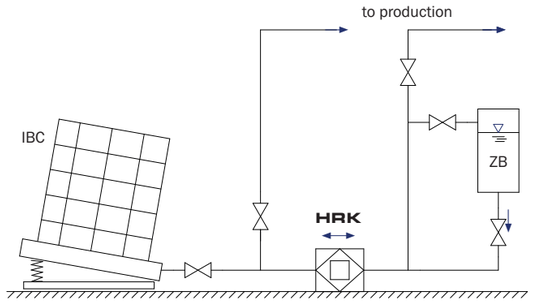
CENTRIFUGAL PUMP 40 – 250, n = 2.950 rpm:
P = 7 KW (8cp), 8.5 KW (50cp), 11 KW (150cp)

HRK 65 – 250, n = 400 rpm:
P = 4 KW (8cp), P = 4.5 KW (50cp), 5KW (150cp), 5.5 KW (300cp)

SAVINGS PER YEAR (at 25 ct/KWH):
- 6,000 Euro at a viscosity of 8cp
- 12,000 Euro at a viscosity of 150cp

EXEMPLARY IN ITS FIELD.

APPLICATIONS IN PROCESS TECHNOLOGY.



– FIGURE 1

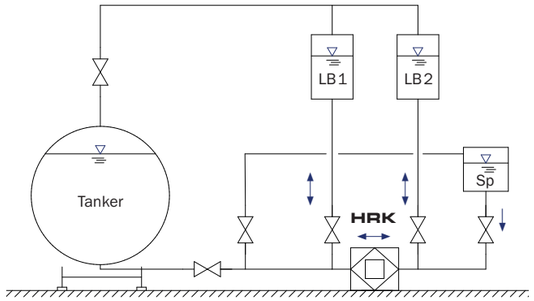
Complete emptying and decanting of IBC containers.

The IBC container is completely emptied and its contents conveyed to production or into a buffer tank (ZB).

For this purpose, it is installed on a spring-loaded tipping device or similar.

By reversing the direction of rotation, the pump can also be used for decanting.

If the IBC is to be emptied from above, the pump system must be installed as shown in Fig. 3.



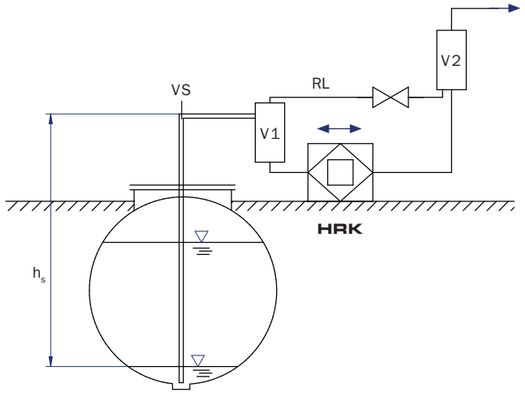
– FIGURE 2

Complete tanker unloading as well as decanting and handling during product changes.

The pump completely empties the tanker into the storage tank (LB2).

When changing products, the pump is first operated in a flushing circuit (Sp).

Decanting is possible by reversing the direction of rotation.



– FIGURE 3

Emptying underground storage tanks, even if there is a zone 0 atmosphere.

The good suction capacity of the pump enables suction from above.

As the pump is not self-priming, a suction pipe (V1) is required.

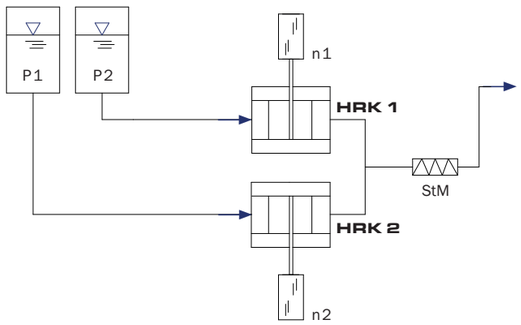
This must be filled before the first priming process.

The vapor pressure and density of the pumping medium determine the suction limit (hs).

The volume of the suction pipe (V1) must correspond to that of the pressure line or the pressure-side expansion tank (V2).

The refilling of the suction pipe (V1) can be carried out by means of a pump or alternatively by means of a return line (RL).

If the hs, volume of the suction line (VS), density and vapor pressure of the pumped medium are specified, Bungartz will design the pump system to match.

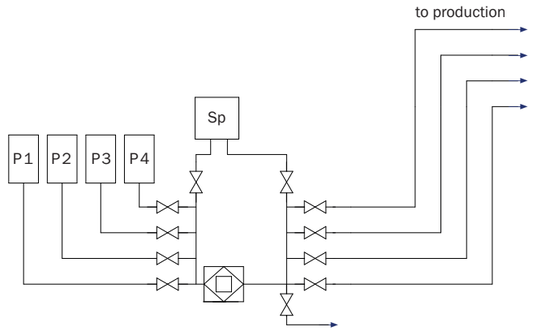


– FIGURE 4

Mixing of liquids.

If two pumps (HRK1 and HRK2) are operated in parallel, they can mix the liquids proportionally to the speeds (n1/n2).

A static mixer (StM) must be installed at the outlet.

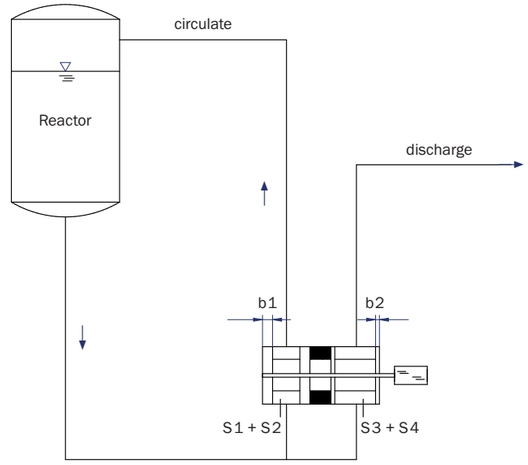


– FIGURE 5

Conveying and product change with intermediate cleaning.

An arrangement with an intermediate flushing circuit (Sp) makes it possible to change the product without mixing.

This is possible because there are no dead spaces in the pump and the annular space of the piston is 100% filled by the medium at a flow velocity greater than 1m/s.



– FIGURE 6

Circulate and discharge.

In a special design, the pump can be configured with 4 stages (S1 + S2 und S3 + S4) .

In this configuration, two stages always work together.

In the first two stages with casing width b1, the flow rate is greater than in the following stages with width b2.

The first stages handle the circulation process, the two further stages handle the liquid discharge. The ratio of the flow rates is b1/b 2.

CONCLUSION

The applications shown are merely examples and provide initial usage ideas.

Overall, the HRK hermetic rotary piston pump has numerous impressive features and advantages. Some of these advantages include the CIP-friendly design with zero dead space, the reversibility of the direction of rotation, suitability for the emptying of residues, insensitivity to gas components, defined pumping volume and variation of the number of stages thanks to the modular design. Thanks to these qualities, many more useful applications can be expected.

PLANNED IN SERIES.

THE RANGE IN DETAIL.

PRODUCT-CONTACT PARTS (CASING, PISTONS): PVDF

STATIC SEALS:
EPDM, FKM, FFKM (available as alternative)

FLOW DIRECTION / ROTATIONAL DIRECTION:
both directions / reversible

ATEX CLASSIFICATION (zone 1/2, gas group: II C,T3):
PVDF coated / EL foil*

ATEX CLASSIFICATION (ZONE 0, GAS GROUP II C, T3): PVDF-EL*

CLASSIFICATION ACCORDING TO TA LUFT: Hermetically sealed

DRIVE (no hazardous area, with integrated frequenzy converter, optionally with potentiometer): Gear motor

DRIVE (zone 1/2 hazardous area, integarated or external frequenzy converter): Gear motor

*EL = electrostatically conductive

HYDRAULIC PARAMETERS

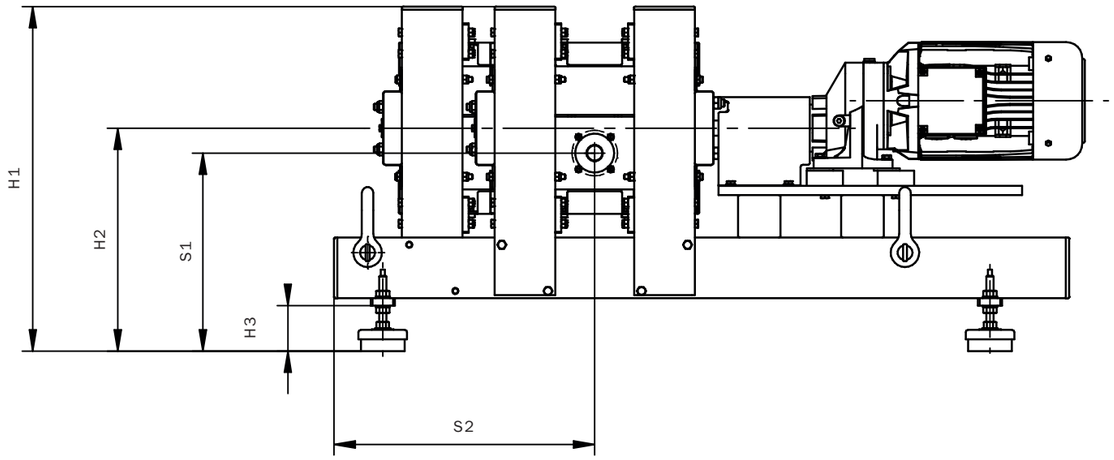
HRK INSTALLATION SIZES	Number of stages/ casings	Piston width V0 = standard width	Number of strokes per revolution	Flow rate range (m3/h) [m^3/h]	Maximum pumping pressure (bar)	Speed range (rpm)	Recommended geared motor (kw) at nominal speed of 1,450 rpm
25 – 150	2 (S2)	V0	4	0,4 – 2,5 (3)	3	50 – 500	1,1
25 – 150 – S3	3 (S3)	V0	6	0,6 – 3,7 (4,5)	3	50 – 500	2,2
40 – 200	2 (S2)	V0	4	1 – 5 (8)	4,5	50 – 400	2,2 / 3
40 – 200 – S3	3 (S3)	V0	6	1,5 – 7 (12)	4,5	50 – 400	3
40 – 200 – V1	2 (S2)	V1	4	1,5 – 8 (12)	4	50 – 400	2,2 / 3
40 – 200 – V1 – S3	3 (S3)	V1	6	2 – 12 (18)	4	50 – 400	3
50 – 230	2 (S2)	V0	4	1 – 6,5 (11)	6	50 – 400	3
50 – 230 –S3	3 (S3)	V0	6	1,5 – 9,5 (16)	6	50 – 400	4
50 – 230 – V1	2 (S2)	V1	4	2 – 11,5 (16)	5	50 – 400	4
50 – 230 – V1 – S3	3 (S3)	V1	6	3 – 17,5 (24)	5	50 – 400	5,5
50 – 230 – V2	2 (S2)	V2	4	2,5 – 17 (21)	4	50 – 400	4
50 – 230 – V2 – S3	3 (S3)	V2	6	4 – 25 (32)	4	50 – 400	5,5
65 – 250	2 (S2)	V0	4	2 – 12 (17)	6,5	50 – 400	5,5 / 7,5
65 – 250 –S3	3 (S3)	V0	6	3 – 17 (26)	6,5	50 – 400	7,5
65 – 250 – V1	2 (S2)	V1	4	3,5 – 22 (27)	4,5	50 – 400	5,5 / 7,5
65 – 250 – V1 – S3	3 (S3)	V1	6	5 – 33 (40)	4,5	50 – 400	7,5 / 11

TABLE 1

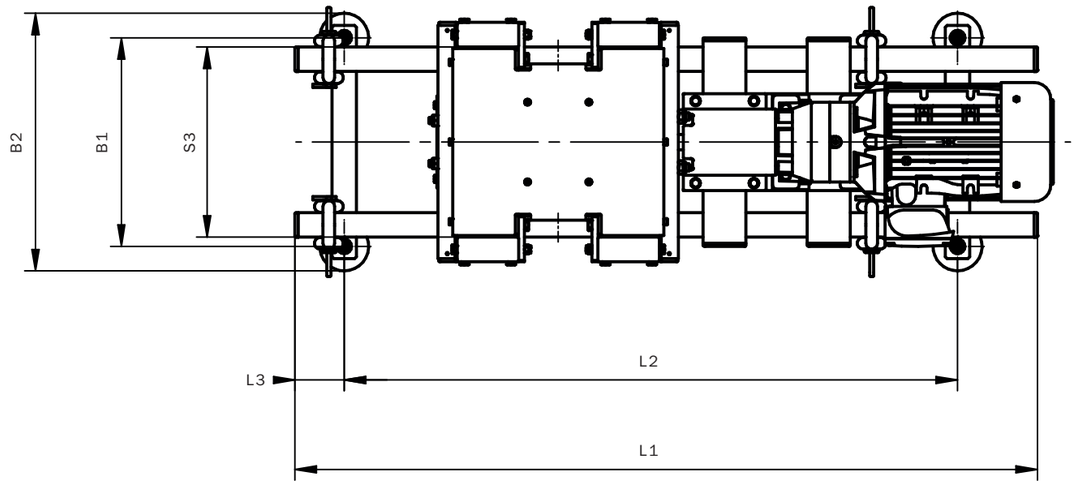
DIMENSIONS

HRK INSTALLATION SIZE	SUCTION PORT Nominal size / pressure Drilling pattern according to DIN EN 1092-1	PRESSURE PORT Nominal size / pressure Drilling pattern according to DIN EN 1092-1	S1 (mm)	S2 (mm)	S3 (mm)	B1 (mm)	B2 (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L1 (mm)	L2 (mm)	L3 (mm)
25 – 150	25 (PN6)	25 (PN6)	326	430	310	310	420	568	367	75	1.211	1.100	80
25 – 150 – S3	25 (PN6)	25 (PN6)	326	430	310	310	420	568	367	75	1.211	1.100	80
40 – 200	40 (PN10)	40 (PN10)	DIMENSIONS UPON REQUEST										
40 – 200 – S3	40 (PN10)	40 (PN10)											
40 – 200 – V1	40 (PN10)	40 (PN10)											
40 – 200 – V1 – S3	40 (PN10)	40 (PN10)											
50 – 230	50 (PN10)	50 (PN10)	DIMENSIONS UPON REQUEST										
50 – 230 –S3	50 (PN10)	50 (PN10)											
50 – 230 – V1	50 (PN10)	50 (PN10)											
50 – 230 – V1 – S3	50 (PN10)	50 (PN10)											
50 – 230 – V2	50 (PN10)	50 (PN10)											
50 – 230 – V2 – S3	50 (PN10)	50 (PN10)											
65 – 250	65 (PN10)	65 (PN10)	398	653	510	550	630	748	467	75	1.862	1.600	126
65 – 250 –S3	65 (PN10)	65 (PN10)	398	653	510	550	630	748	467	75	1.862	1.600	126
65 – 250 – V1	65 (PN10)	65 (PN10)	398	653	510	550	630	748	467	75	1.862	1.600	126
65 – 250 – V1 – S3	65 (PN10)	65 (PN10)	398	653	510	550	630	748	467	75	1.862	1.600	126

TABLE 2

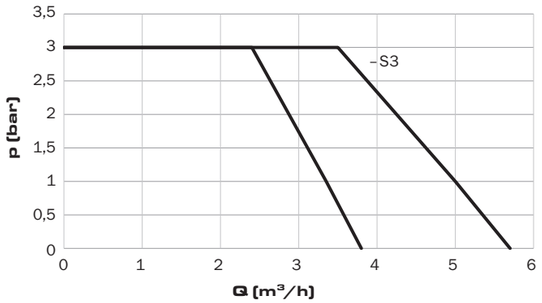


SIDE VIEW
with inlet/outlet branches



TOP VIEW
with exterior dimensions

HRK 25 – 150

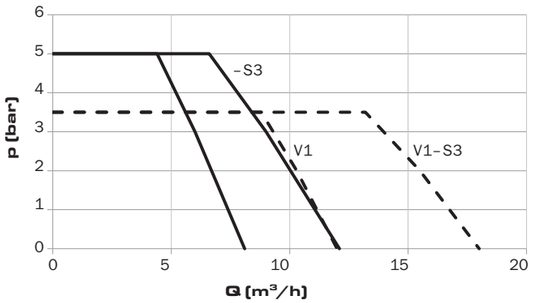


CHARACTERISTIC CURVE HRK 25 – 150
VISCOSITY 3 – 8 CP

S2:
2.5 m³ / H / 3 bar
Recommended motor: 1,1 KW

S3:
3.5 m³ / H / 3 bar
Recommended motor: 2,2 KW

HRK 40 – 200



CHARACTERISTIC CURVE HRK 40 – 200
VISCOSITY 3 – 8 CP

S2:
5 m³ / H / 4.5 bar
Recommended motor: 2.2/3 KW

S3:
7 m³ / H / 4.5 bar
Recommended motor: 3 KW

V1 – S2:
8 m³ / H / 3.5 bar
Recommended motor: 2.2/3 KW

V1 – S3:
12 m³ / H / 3.5 bar
Recommended motor: 3 KW

EXAMPLE: HRK 50 – 230 –V1 – S3

50: nominal size of pressure and suction ports (in mm)

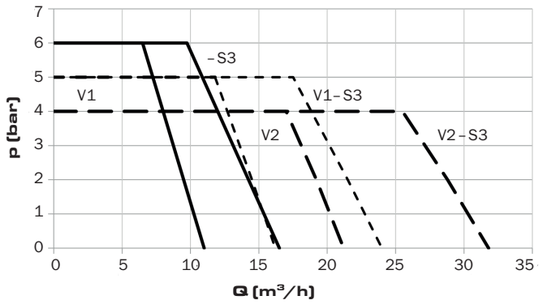
230: average annular space diameter (in mm)

V1: increased flow rate compared with the standard (without attachment sign)

S3: stage (S3) with 6 strokes per revolution compared with the standard (S2)

The **S3** design has a flow rate 1.5 times greater than the **S2** design.
The standard is a 2-stage design (S2) with 4 strokes per revolution.

HRK 50 – 230



CHARACTERISTIC CURVE HRK 50 – 230
VISCOSITY 3 – 8 CP

S2:
6.5 m³ / H / 6 bar
Recommended motor: 3 KW

S3:
9.5 m³ / H / 6 bar
Recommended motor: 4 KW

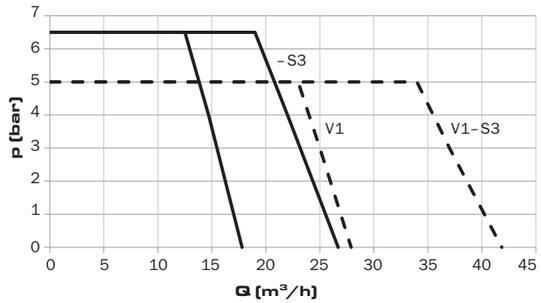
V1 – S2:
11.5 m³ / H / 5 bar
Recommended motor: 4 KW

V1 – S3:
17.5 m³ / H / 5 bar
Recommended motor: 5,5 KW

V2 – S2:
17 m³ / H / 4 bar
Recommended motor: 4 KW

V2 – S3:
25 m³ / H / 4 bar
Recommended motor: 5,5 KW

HRK 65 – 250



CHARACTERISTIC CURVE HRK 65 – 250
VISCOSITY 3 – 8 CP

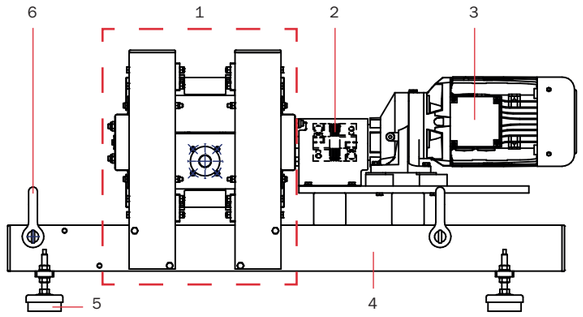
S2:
12 m³ / H / 6.5 bar
Recommended motor: 5.5/7.5 KW

S3:
17 m³ / H / 6.5 bar
Recommended motor: 7.5 KW

V1 – S2:
22 m³ / H / 4.5 bar
Recommended motor: 7.5 KW

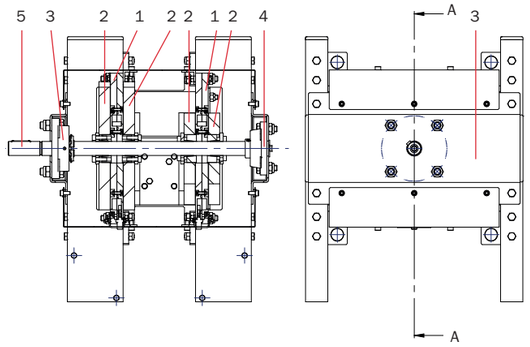
V1 – S3:
33 m³ / H / 4.5 bar
Recommended motor: 7.5/11 KW

NOTE ON CHARACTERISTIC CURVES:
There are fewer areas of applications for higher viscosities. The characteristic curves show the speed range up to 400 (500) rpm. You will receive more detailed information with the quote.



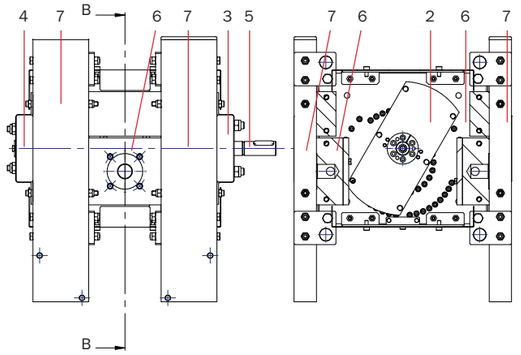
COMPLETE UNIT
with pump, basic frame and motor

SECTION A – A



EXTERNAL VIEW, PUMP ASSEMBLY
with casing, drive rotors, shaft and bearing

SECTION B – B



PUMP ASSEMBLY,
cross-section

MODULAR DESIGN.

DESIGN DETAILS.

PART	DESIGNATION
1	Pump assembly, **comprising pump casing with** **– Piston** **– Suction and pressure ports** **– Bearing unit with roller bearing**
2	Coupling
3	Gear motor
4	Base plate
5	Machine feet
6	Lifting lug/shackle

TABLE 3

PART	DESIGNATION	QUANTITY
1	Pump casing **with piston**	2 4
2	Drive motors **with magnets**	4
3	Fixed bearing unit	1
4	Floating bearing unit	1
5	Shaft	1
6	Suction/ pressure ports	2
7	Supports	4

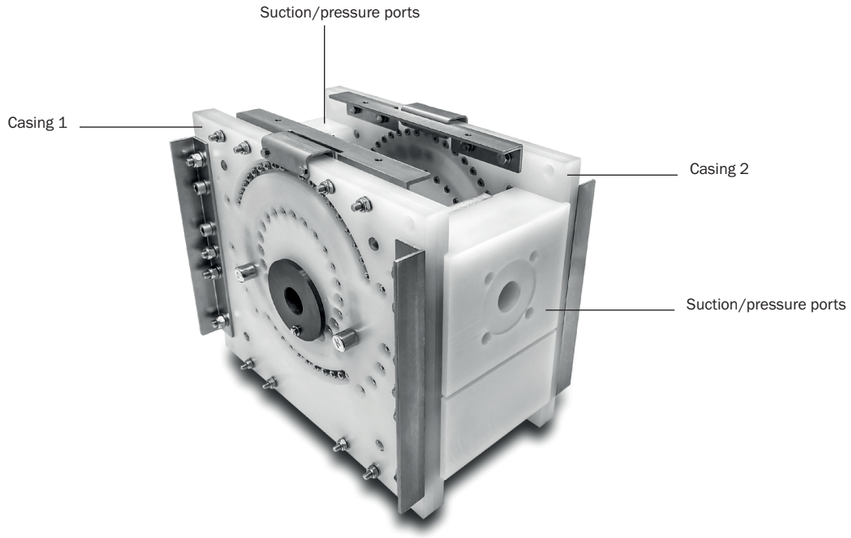
TABLE 4

Despite being so versatile, the HRK consists of only a few parts (see Table 4). The drive rotors, the shaft and the roller bearing units are completely non-wearing. If the fluid is free of solids, this even applies to the casing with the pistons inside. In addition, the pump has a modular design and can be easily expanded.

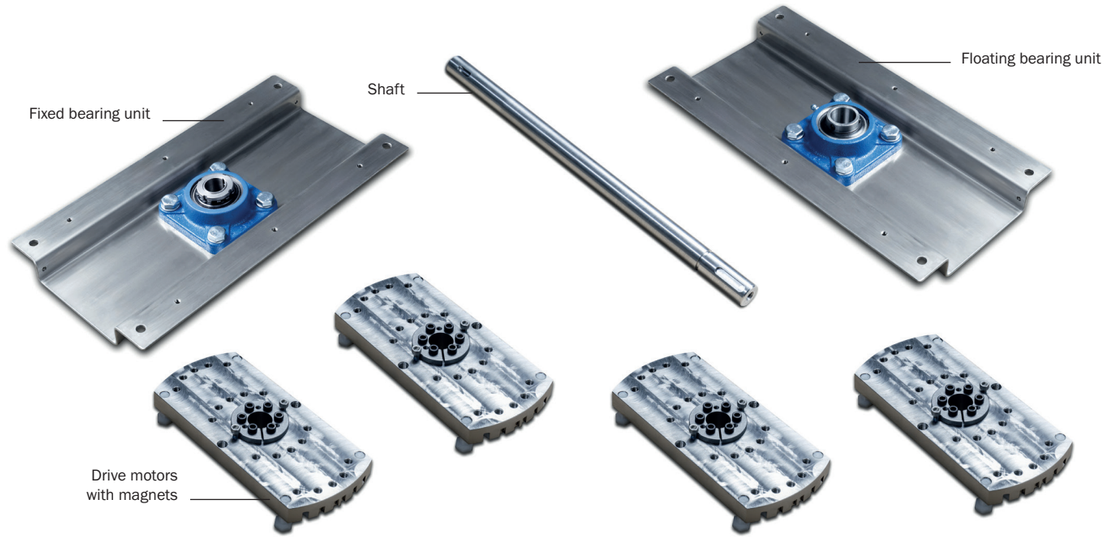
1 ADDITIONAL CASING (VERSION S3):
This increases the flow rate by 50 %. The achievable pumping pressure remains the same, while the drive power also increases by 50 %. Furthermore, the number of strokes increases from four to six strokes per revolution.

2 DIFFERENT CASING WIDTH (VERSION V1, -V2):
This results in a proportional change in flow rate and pressure with the same drive power. If the flow rate increases, the achievable pressure decreases proportionally.
> In case 1 and also case 2, the drive rotors, bearings and base frame remain unchanged.

For details on pumping specifications, see characteristic curves on pages 16 – 17.



PUMP ASSEMBLY WITH TWO PUMP CASINGS AND SUCTION AND PRESSURE PORTS



COMPONENTS OF THE PUMP

UNMATCHED ADVANTAGE.

SPECIAL FEATURES AND STRENGTHS.

The hermetic rotary piston pump brings together numerous advantages. This makes the pump systems safer, more efficient, more reliable and simpler. This reduces costs, conserves resources and therefore protects our environment.

– LOW-WEAR AND LOW-MAINTENANCE

If solid-free liquids are pumped, the pump is not subject to any wear at all.

– HERMETICALLY SEALED IN ACCORDANCE WITH THE GERMAN TECHNICAL INSTRUCTIONS ON AIR QUALITY CONTROL (TA LUFT)

The pump has no shaft feed-through. The pump is driven by a permanent magnetic field, similar to a magnetic coupling. In the HRK, however, only the pistons are in the pumped liquid. There are no slide bearings.

– EFFICIENT

Piston pumps are generally characterized by a high level of efficiency: this is due to their low speed and the small surface area that is wetted by liquid.

– ZERO DEAD SPACE AND NO VALVES

Dead spaces, i.e. spaces through which the medium does not flow, do not exist. The suction and discharge chambers are separated from each other and redirected solely by the piston movement. Valves are not required.

– LOW PISTON ACCELERATION AND VERY LOW PULSATION

This gives the pump good suction (low NPSH) and also allows it to pump gas-laden media.

– INTRINSIC SAFETY

The HRK is completely intrinsically safe with regard to excessive pumping pressure, residual emptying, liquid breakage on the suction side and explosion protection.

On the following pages, the advantages are analyzed in detail according to three criteria:

1 DESIGN PROPERTIES
2 MEDIA-RELATED PROPERTIES
3 INTRINSIC SAFETY

HERMETIC ROTARY PISTON PUMP
1. DESIGN PROPERTIES

PROPERTIES	APPLICABLE YES / NO	METHOD OF IMPLEMENTATION	COMMENTS / OUTLOOK
Hermetically sealed	yes	The pump's pistons are driven through the wall of the rotationally symmetrical casing. There are no mechanical transmission elements, no leadthrough through the casing wall.	
High leakage safety	yes	There are only two static round sealing rings for mechanical sealing.	There are plans to permanently weld the casing parts in the future. This means that the static O-ring seals that are still present are no longer necessary.
No bearings in the pumped liquid	yes	Only the hydrodynamically sliding pistons are located in the pumping chamber.The roller bearings are installed in bearing units on the outside and are easily accessible, regardless of the pumped medium.	
No sealing fluid required	yes	There is no shaft leadthrough. The pistons are located in the pumping chamber and slide hydrodynamically with the pumped medium flowing around them.	
No shaft in the pumped liquid	yes	The shaft is outside the pumping chamber and has no contact with the pumping medium.	
No valves	yes	Pumping is carried out continuously in one direction. This is controlled via the segmental pistons and corresponding control slots at the inlet and outlet of the casing.	
Maintenance-free	yes	The roller bearings do not require any maintenance due to the low speed of max. 500 rpm. The pistons move by hydrodynamically sliding through the pumped liquid. The pump is therefore completely maintenance-free.	
Wear-free	yes	The pump is wear-free when operated as intended, i.e. with liquid filling and without solids, as the pistons are magnetically driven on both sides. As a result, they float almost freely along the axis and are surrounded by liquid on all sides. The roller bearing is also not subject to wear at the low speed of only 500 rpm.	

HERMETIC ROTARY PISTON PUMP
2. MEDIA-RELATED PROPERTIES

PROPERTIES	APPLICABLE YES / NO	METHOD OF IMPLEMENTATION	COMMENTS / OUTLOOK
Suitable for corrosive liquids	yes	In the standard version, the pump is made of corrosion-resistant plastics such as PVDF.	A metallic version is also possible. The eddy current losses are negligible due to the low pump speed.
Suitable for viscous liquids	yes	The pistons rotate freely in the liquid. Small speeds of up to 500 rpm are used due to the hydrostatic pressure increase, which means that the flow losses remain low even at high viscosities.	Higher viscosities are also possible at reduced speed.
Suitable for liquids with gas components	yes	The pump has a continuous pumping action. The single piston has no zero crossing and moves continuously. Only the relative speed between the pistons changes periodically. As a result, the pump achieves very good suction. Forced pumping allows liquids with a high gas component to be pumped. Emptying of residues from containers is possible.	The pump is not self-priming, but can empty containers completely.
Suitable for liquid with soft solids	yes	The large cross-sections and the valveless design enable the pumping of larger, soft solids.	
Suitable for liquid with hard solids	no	In the present hermetic design, the pump is targeted at hazardous liquids or is intended to provide a maintenance-free chemical pump that requires no sealing or flushing liquids and little maintenance.	A metallic version is also planned for development. It could then also be used for harder solids.
Suitable for shear sensitive liquids	yes	The medium flows through a valve-less free cross-section. The gap cross-sections are negligible compared to the pumping chambers. The speed is low.	Speed (100 – 500 rpm)
Suitable for CIP cleaning, and for pumping CIP liquids	yes	The simple rotationally symmetrical ring casing without any valves makes the pump ideal for the CIP concept. However, the present variant is primarily intended for chemical use.	A variant is planned whose casing parts are seamlessly welded. In this version, the pump will be completely free of dead space and the flow will run completely through it. This variant can then be sterilized and requires no maintenance.

HERMETIC ROTARY PISTON PUMP
3. INTRINSIC SAFETY

PROPERTIES	APPLICABLE YES / NO	METHOD OF IMPLEMENTATION	COMMENTS / OUTLOOK
Suitable for pumping from tanks classified under ATEX zone 0	yes	The casing is made of an electrically conductive plastic for zone 0 applications. This variant is therefore suitable for pumping and emptying of residues from a zone 0 tank.	Ensure that the pump does not start up completely dry.
Physical overpressure protection via a magnetic drive	yes	Due to the magnetic torque transmission, the pump cannot be destroyed through a malfunction on the discharge side. At the moment of overload, the magnetic coupling over-revs. The connection between suction and pressure side becomes permeable.	There are only the pistons between the suction and pressure lines, no valves. The pump does not need to be dismantled in the event of over-revving.
Suitable for zero flow / for emptying of residues	yes	The pistons move in a hydrodynamic lubricating film similar to a slide bearing. This is also ensured when the chamber on the suction side is completely emptied. As the pump also works with high gas components, it is possible to completely empty tanks of residues.	A complete emptying of the residue is permitted when using electrically dissipative plastics. Ensure that the pressure line does not run dry.
No heating during lack of liquid	yes	The pump rotates at a low speed, with the pistons sliding hydrodynamically in the liquid. At the low speed, only low eddy current losses are generated even when using a metallic casing material. No eddy current losses occur when using plastic as the casing material.	The pressure line must be filled with liquid, as wear will occur on the piston and casing if it runs completely dry. Complete emptying by the pump may take place on the suction side.

PRODUCT RANGE

Centrifugal pumps, horizontal
with hydrodynamic shaft seal
up to the dry-running magnetic coupling

Centrifugal pumps, vertical
- for dry installations, short design
- for wet installations,
  without bearings in the liquid
- for wet installations,
  with roller bearings independent of product
- with feeder propeller
  for space-saving installation

Centrifugal tank pumps
with inlet from above

Centrifugal pumps, impeller variants
- with semi-open impellers
- with closed impellers
- with torque flow impellers

Downstream seals
for pumps with hydrodynamic relief
of the shaft gap
- gland packing
- mechanical seal
- magnetic coupling
- special solution for problem cases
- lip seal

Hermetic rotary piston pump
- hermetically sealed
- without bearing in the liquid
- low-pulsation
- also suitable for higher viscosities

Comprehensive information about
each type of pumps is featured
in individual product broschures.

MATERIALS
- all castable and weldable stainless steel qualities
- castable and weldable special alloys
- grey cast iron, rubber lined
- special materials such as titanium, zirconium, SiC etc.
- Plastic **(HRK only)**

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