HSR diffusion pumps

Oil diffusion pumps can be used in many applications in the fields of vacuum and high-vacuum technology, for example in metallizing systems, metallurgical facilities, vacuum furnaces, laboratory pumping stations and many more. The proven and tested diffusion pump technology of former Balzers AG has been developed further by HSR AG since they took over this business area in 2003. In keeping with our standards, our customers can always expect the highest quality and performance from our products.

Features

- Pump range is available in nominal sizes from DN40 up to DN1000
- Air and water-cooled oil diffusion pumps are available in size DN40
- High volume flow rates without additional baffles
- Unlimited capacity when used as a so-called feeder pump
- Excellent pre-vacuum stability
- Continual self-cleaning of pump fluid in the purification zone
- Very long lifetime if regular preventive maintenance checks are made
- No wear on parts
- Not sensitive to entering particles

Product lines

Oil diffusion pumps – size DN040

The powerful HSR small diffusion pumps are available with either air or water-cooling. They have a three-stage jet system and a high vacuum flange DN040 ISO-KF. They are fitted with an integrated baffle as well as a thermal circuit breaker.

Features

- Integrated baffle
- 3-stage jet system
- Compact construction
- Available with air or water-cooling
- Thermal circuit breaker
- Ideal for all types of diffusion pump fluids

Oil diffusion pumps with integrated water cooled baffle – sizes DN63 to DN250

This product range has the significant characteristic of a visually non-transparent baffle integrated into the pump casing. The pump casings are made of non-rusting stainless steel and the interior jet system is made of pressed aluminium. A thermal circuit breaker built into the pump casing prevents overheating. The water-cooling circuit is composed of a rust-resistant steel tube fixed on the pump casing.

Features

- Compact design
- High pumping speed
- Integrated water-cooled baffle
- High vacuum stability due to integrated booster stage
- Pump body and adapter flange made of stainless steel
- Thermal circuit breaker
- Ideal for all types of diffusion pump fluids

Oil diffusion pumps with cold cap or baffle cap – sizes DN320 to DN1000

To meet the demands of different applications, HSR produces a range of larger, water-cooled diffusion pumps. This range of pumps possesses a volume flow rate of up to 50,000 l/sec and is particularly suitable for industrial high-vacuum applications.

The DN320 pump housing is made of stainless steel. The housings of DN400 to DN1000 are made of standard steel welded under inert gas. The jet systems are made of die-cast aluminium. Up to size DN630, the systems are three-stage while DN800 and DN1000 are four-stage. The design of the jet systems allows easily dismantling and reassembling for cleaning.

To minimize backstreaming of pump fluid, a cold cap has been integrated into all pumps from DN320 to DN1000. Furthermore, for all pumps with a nominal size of DN400 to DN1000, a so-called baffle cap version has been developed. The baffle cap is a combination of cold cap and water baffle which is mounted in the diffusion pump instead of a cold cap without an additional flange.

There is also a pre-vacuum baffle built into the pre-vacuum port which considerably reduces the consumption of pump fluid at high gas throughput. A further reduction of pump fluid consumption – especially on applications with high operating pressure (> 10 - 4 mbar) – can be acheived by using of an additional HSR oil condenser, which can be installed in the pre-vacuum line as well (option).

Our proven heater device ensures excellent heat transfer, long lifetime, and high serviceability. The electrical connection is located in the cooled zone of the pump. The water cooling of pumps DN320 to DN500 consists of one cooling circuit; DN800 and DN1000 are equipped with two separate cooling circuits.

Rapid compressed air cooling reduces cooling times, which increases cost effectiveness.

Features

- Rugged and proven design
- Low ultimate pressure (depending on type of pump fluid)
- Integrated cold cap reduces oil backstreaming
- Available also with integrated baffle cap (see description below)
- High volume flow rate
- Low pump fluid consumption due to built-in vacuum baffle
- Ideal for all types of diffusion pump fluids

Oil diffusion pumps for special applications, such as magnetic fields

HSR also delivers especially designed diffusion pumps, which can be operated in very strong magnetic fields or in other tough operating conditions. Please ask our specialists for further information or support.

HSR ECO diffusion pumps

When the diffusion pumps we are still using today were developed 30 years ago, their economical and ecological impact was not a priority issue. In those days, all that mattered was to supply the pump with enough energy for achieving maximum stable performance. As a result, even today, a large portion of the energy consumed by the pump gets wasted unused.

Considering these facts, HSR AG has decided to thoroughly revise the existing heating system of their current products under the aspect of energy efficiency. The objective was to bring down operation costs and to fulfill today's ecological and environmental requirements.

During the design phase, the focus was on drastically reducing the consumption of energy while fully preserving the outstanding performance data of HSR's diffusion pumps.

Please refer to page 52 and 55 of this catalogue for more details

Accessories

Thermostatic cut-out switch

The thermostatic cut-out switch (option) signals any overheating of the diffusion pump to an external system controller and allows it to cut off the electrical power to the heaters.

Temperature sensor switch

The temperature sensor switch (option) is used in combination with a pump set controller. It signals to the pump set controller that the pump has reached its normal operating temperature. Depending on the pump fluid used, the operating temperature on the mounting base is between 180° C and 220° C.

Automatic pump fluid refilling device

This device allows replenishing of pump fluid in process applications with a high gas throughput. The refilling can be done while the pump is in operation. A visual level control is shown on the sight glass.

Guide rollers for easy movement of diffusion pumps

Big size diffusion pumps DN400 up to DN1000 can be equipped with guide rollers which allow easy movement of those pumps during maintenance work and repair work.

Advantages of HSR diffusion pump technology

- Outstanding stability in high pressure ranges (up to 10^{-02} mbar)
- Excellent stability with high gas loads
- Low ultimate pressure
- Integrated cold cap reduces oil back streaming
- Low heating power required
- Suitable for all available pump fluid types
- Low pump fluid consumption due to built-in fore vacuum baffle
- Long lifetime of heaters
- Low construction height
- High quality products
- Easy exchange of heaters (electrical connection located in cold zone)
- Fast delivery times
- Cost saving ECO diffusion pumps available
- Upgrade kits for ECO version for standard diffusion pumps available

Diffusion pumps air/water-cooled

Technical Data/Model		PDB040-G	PDB040-W
Order number		**260-002**	**260-012**
Inlet flange		DN40 ISO-KF	DN40 ISO-KF
Foreline flange		DN10 ISO-KF	DN10 ISO-KF
Seal inlet and foreline flange included in delivery			
Cooling		Air	water
High vacuum pumping speed at inlet flange		Values measured according PNEUROP, see page 7 for details	
Nitrogen/Air	l/sec	30	30
Maximal throughput	**mbar l/sec**	0.2	0.2
Fore vacuum stability at max throughput	**mbar**	0.3	0.3
Pump fluid charge, min/max	**cm³**	10/15	10/15
Heating/cooling time	**min**	10/6	10/10
Thermostatic cut-out		–	yes
Cooling water consumption at water temperature 18 °C	**l/h**	–	15
Recommended pumping speed roughing pump at max thoughput	**m³/h**	3	3
Power consumption	**W**	200 including fan power	170
Weight	**kg**	3	1,5

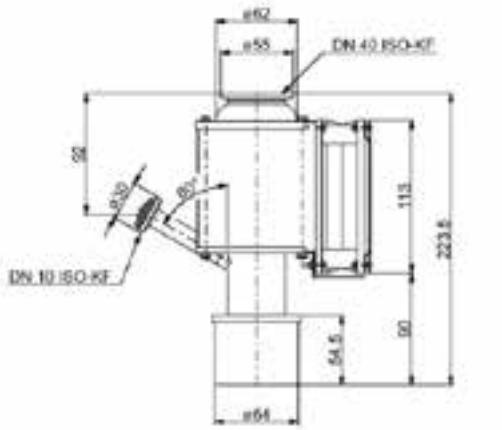
Standard delivery includes

Diffusion pump

O-ring for inlet flange and rough pump connecting flange

No pump fluid included in standard delivery. Please see page 64 for available pump fluids.

Spare parts		
Seal set	**BN841151-T**	**BN841151-T**
Heating plate 230V	**H001529**	**H001529**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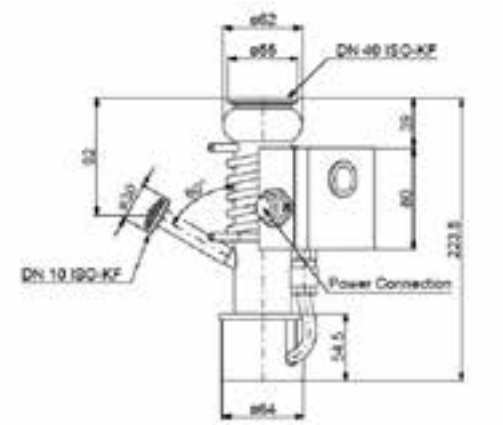
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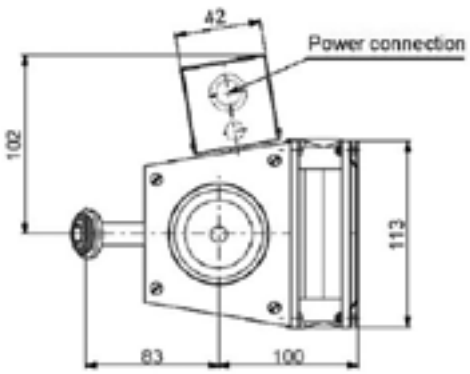
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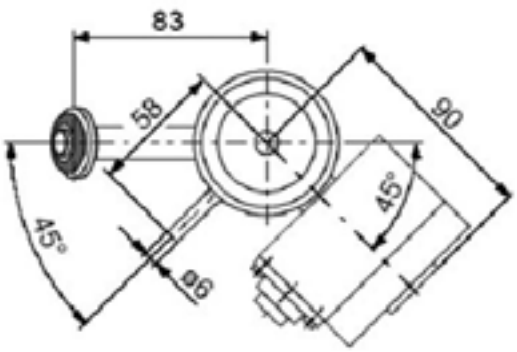
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Diffusion pump with integrated water baffle

Technical Data / Model		PDI063-W	PDI100-W	PDI160-W	PDI250-W
Order number		**260-022**	**260-032**	**260-042**	**260-052**
Inlet flange		DN63 ISO-K	DN100 ISO-K	DN160 ISO-K	DN250 ISO-K
Foreline flange		DN16 ISO-KF	DN25 ISO-KF	DN25 ISO-KF	DN40 ISO-KF
Diffusion pump					
230 V		260-022	260-032	260-042	260-052
115 V		260-023	260-033	260-043	
Cooling		Water	Water	Water	Water
High vacuum pumping speed at inlet flange		Values measured according PNEUROP, see page 7 for details			
Nitrogen / Air	l / sec	190	380	800	2 200
Maximal throughput	**mbar l / sec**	0.5	1	2	4
Fore vacuum stability at max throughput	**mbar**	0.5	0.5	0.5	0.45
Pump fluid charge, min / max	**cm^3**	50 / 70	80 / 120	150 / 300	450 / 1000
Heating / cooling time	**min**	10 / 20	12 / 24	15 / 30	25 / 55
Minimal cooling water requ. at 18° C inlet temp.	**l / h**	25	42	80	160
Recommended pump speed for roughing pump at max. throughput	**m^3 / h**	5	10	20	40
Power consumption	**W**	400	650	1 275	2 600
Weight	**kg**	4	8,5	14,5	30

Standard delivery includes

Diffusion pump

Thermostatic cut-out switch

O-ring for inlet flange and rough pump connecting flange

No pump fluid included in standard delivery. Please see page 64 for available pump fluids.

Spare parts				
Seal set	**BN841180-T**	**BN841181-T**	**BN841182-T**	**BN841193-T**
Heating ring				
230 V	**B5170218QG**	**B5170028QG**	**B5170004QG**	**B5170038QG**
			+ B5170057QG	**+ B5170089QG**
115 V	**B5170217QG**	**B5170027QG**	**B5170003QG**	**–**
			+ B5170056QG	**–**

Accessories				
Thermal switch	**216-058**	**216-058**	**216-058**	**216-058**
Cooling water monitor without fittings	**216-059**	**216-060**	**216-060**	**B4747111SE**
Orifice for flow monitor	**–**	**–**	**–**	**B4747308SE**

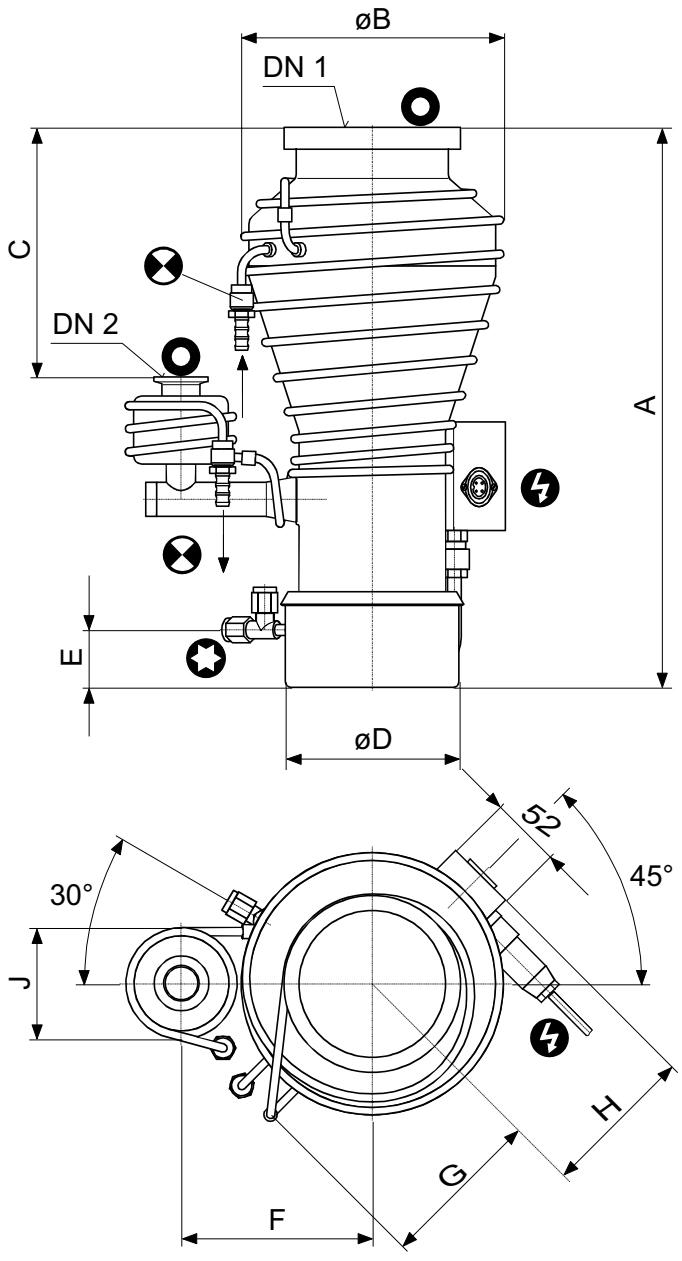
PDI063-W

PDI100-W

PDI160-W

PDI250-W

Dimensions	mm				
	A	360	412	570	690
	B ∅	150	194	290	450
	C ∅	100	128	172	272
	D	169	184	269	330
	E	46	42	53	60
	F	72	82	106	150
	G	115	145	192	295
	H	101	120	185	—
	J	120	135	160	212



- Kühlwasseranschluss
- Vakuumanschluss
- Betriebsmittelkontrolle und Ablass
- Elektrischer Anschluss

- Cooling water connection
- Vacuum connection
- Pump fluid filler control port and drain
- Power connection

	DN1	DN2	A	ø B	C	øD	E	F	G	H	J	
PDI063-W	DN 63 ISO-K	DN 16 ISO-KF	360	150	169	100	46	115	101	120	72	ø10 / G ¼“
PDI100-W	DN 100 ISO-K	DN 25 ISO-KF	412	194	184	128	42	145	120	135	82	ø10 / G ¼“
PDI160-W	DN 160 ISO-K	DN 25 ISO-KF	570	290	269	172	53	192	185	160	106	ø10 / G ¼“
PDI250-W	DN 250 ISO-K	DN 40 ISO-KF	690	450	330	272	60	295	265	212	150	ø10 / G ¼“

Diffusion pumps under the aspect of economy and ecology

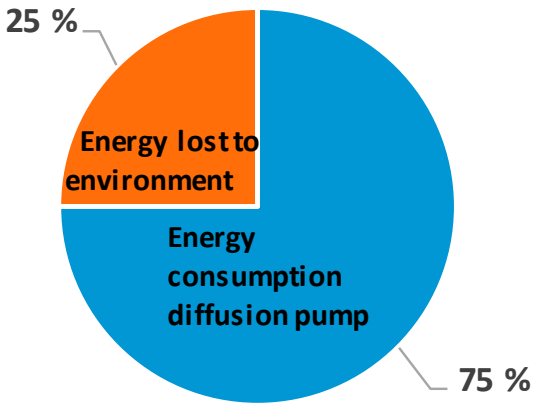
When the diffusion pumps we are still using today were developed 30 years ago, their economical and ecological impact was not a priority issue.
In those days, all that mattered was to supply the pump with enough energy for achieving maximum stable performance. As a result, even today, a large portion of the energy consumed by the pump gets wasted and is unused.

Considering these facts, HSR AG has decided to thoroughly revise the existing heating system of their current products under the aspect of energy efficiency. The objective was to bring down operation costs and to fulfill today's ecological and environmental requirements.

During the design phase, the focus was on drastically reducing the consumption of energy while fully preserving the outstanding performance data of HSR's diffusion pumps.

It has, however, become evident that such energy-saving modifications cannot be transferred from one type of pump to another on a one-to-one basis. Instead, the specific solution and the resulting energy consumption must be determined separately for each type of pump. The data shown in the present description are those of a HSR Typ PDA631-W diffusion pump. However, they also apply – by and large – to the other HSR diffusion pumps of sizes between DN320 and DN1000.

Detailed laboratory tests and measurements have shown that the amount of energy lost during the operation of any of the mentioned diffusion pumps is about 25 %.



By introducing two technical modifications the energy consumption of type ECO PDA631-W diffusion pump has been reduced by 45 %

The total amount of energy saved is made up as follows:

a) The yellow sector represents possible savings during regular operation of the diffusion pump amounting to at least **20 %**

b) The green sector represents possible savings in standby mode of another **25 %**

Saving energy during regular operation

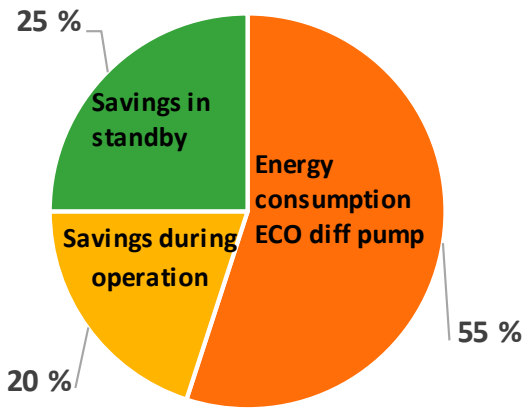
By introducing a technical modification to the heating system and using a special new insulation, the energy consumption of type ECO PDA631-W diffusion pump has been reduced by more than 20 % while fully preserving the performance of the diffusion pump. Additionally, the surface temperature of the pump body is almost down to ambient temperature.

Saving energy in standby mode

Diffusion pumps are often kept in operation for longer periods without any processes running (e.g. for extremely long charging times, overnight or during weekends).
Obviously, during such periods, it is not necessary to operate the diffusion pump at full capacity.

An additional technical modification for standby mode (operation of the pump with the high-vacuum valve shut or without gas load) brings down the power consumption of the diffusion pump by another 25-30 %, which results in another considerable reduction of the operation costs.

Interested? Please feel free to contact us for more detailed information.



ECO Diffusion pumps with COLD CAP

Diffusion pumps are used for classical industrial and other high vacuum applications. Our ECO diffusion pumps are equipped with a cold cap which requires an additional cooled baffle on top to prevent oil backstreaming.
In addition to known advantages of HSR standard diffusion pumps, our ECO diffusion pumps provide following features

- Energy cost savings of up to **45 %**
  made up of
- Operation cost savings of up to **20 %**
- Stand-by cost savings of up to **25 %**

Same performance and pump speed, capacity as standard HSR diffusion pump model of same size

For further advantages of HSR diffusion pumps, please refer to page 56

Technical Data / Model		PDA320-ECO	PDA501-ECO	PDA631-ECO
Order number		**H260107**	**H260109**	**H260110**
Inlet flange		DN320 ISO-K	DN500 ISO-K	DN630 ISO-K
Foreline flange		DN63 ISO-K	DN100 ISO-K	DN100 ISO-K
Cooling		Water	Water	Water
High vacuum pumping speed at inlet flange		values measured according PNEUROP, see page 7 for details		
Nitrogen / Air	l/sec	5 200	12 000	20 000
Maximal throughput	**mbar l/sec**	8	16	18
Fore vacuum stability at max throughput	**mbar**	0.45	0.45	0.45
Pump fluid charge, min / max	**cm³**	1 200 / 1 800	3 000 / 5 000	6 000 / 8 000
Heating / cooling time	**min**	17 / 50	25 / 80	50 / 90
Minimal cooling water requ. at 18° C inlet temp.	**l/h**	300	470	710
Recommended pump speed for roughing pump at max. throughput	**m³/h**	80	160	200
Main supply		3 x 340 / 3 x 230 V	3 x 340 / 3 x 230 V	3 x 340 / 3 x 230 V
Power consumption operation	**kW**	3.6	5.8	8.4
Power consumption stand-by	**kW**	2.4 (minimal)	4 (minimal)	5.8 (minimal)
Weight	kg	58	183	254

Standard delivery includes	
Diffusion pump	No pump fluid included in standard delivery. Please see page 64/65 for available pump fluids.
O-ring for inlet flange and rough pump connecting flange	

Accessories			
Pump fluid replenishing device	**216-061**	**216-061**	**216-061**
Temperature switch	**216-056**	**216-056**	**216-056**
Thermostatic cut-out	**216-057**	**216-057**	**216-057**
Flow monitor	**B4747111SE**	**B4747111SE**	**B4747111SE**
Orifice for flow monitor	**B4747308SE**	**B4747311SE**	**B4747311SE**

ECO Retrofits for standard HSR diffusion pumps

ECO retrofit kits are used to upgrade standard HSR diffusion pumps to the economical, cost saving ECO version. Kits include all needed components and allow an easy and fast retrofit directly on customer site.
Modifcation kit is mandatory, stand-by kit is optional. Stand-by kit can only be used if modification kit is installed!
Please contact us for further detailed information.

ECO Diffusion pumps with BAFFLE CAP

The so-called baffle cap version can be used for applications with high working pressure and high gas loads > 1.0 x 10^{-4} mbar, where minimal oil backstreaming is acceptable.

The baffle cap is installed at the same position as a cold cap and it allows to operate the diffusion pump without any additional water baffle.

A baffle cap decreases pump speed by only 20 % compared to a water baffle which will reduce it by approx. 50 %.

The baffle cap is fully integrated into the diffusion pump and the diffusion pump therefore requires less installation height.

Technical Data/Model		PDB501-ECO	PDB631-ECO
Order number		**H260116**	**H260117**
Inlet flange		DN500 ISO-K	DN630 ISO-K
Foreline flange		DN100 ISO-K	DN160 ISO-K
Cooling		Water	Water
High vacuum pumping speed at inlet flange		values measured according PNEUROP, see page 7 for details	
Nitrogen/Air	l/sec	8 500	16 000
Maximal throughput	**mbar l/sec**	16	18
Fore vacuum stability at max throughput	**mbar**	0.45	0.4
Pump fluid charge, min/max	**cm^3**	3 000/5 000	6 000/8 000
Heating/cooling time	**min**	25/80	50/90
Minimal cooling water requ. at 18° C inlet temp.	**l/h**	470	710
Recommended pump speed for roughing pump at max. throughput	**m^3/h**	160	200
Main supply		3 x 340/230 V	3 x 340/230 V
Power consumption operation	**kW**	5.8	8.4
Power consumption stand-by	**kW**	4 (minimal)	5.8 (minimal)
Weight	**kg**	191	264

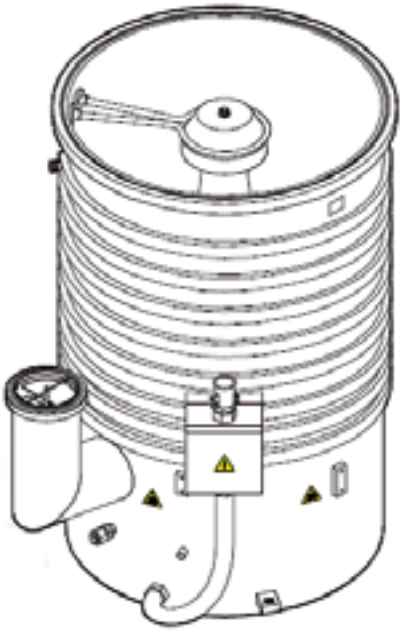
Standard delivery includes	
Diffusion pump	No pump fluid included in standard delivery. Please see page 64/65 for available pump fluids.
O-ring for inlet flange and rough pump connecting flange	

Accessories		
Pump fluid replenishing device	**216-061**	**216-061**
Temperature switch	**216-056**	**216-056**
Thermostatic cut-out	**216-057**	**216-057**
Flow monitor	**B4747111SE**	**B4747111SE**
Orifice for flow monitor	**B4747326SE**	**B4747326SE**

ECO Retrofits for standard HSR diffusion pumps

Order Information	PDA320-W	PDA/PDB501-W	PDA/PDB631-W
Modification kit (mandatory)	**H009286**	**H009288**	**H009289**
Stand-by kit (optional)	**H019286**	**H019292**	**H019293**

Standard diffusion pumps with COLD CAP



Diffusion pumps are used for classical industrial and other high vacuum applications. Our standard diffusion pumps are equipped with a cold cap which requires an additional cooled baffle on top to prevent oil backstreaming.

- Rugged and proven design
- Low ultimate pressure (depending on type of pump fluid)
- Integrated cold cap reduces oil back-streaming
- High volume flow rate without baffle
- High chemical stability using appropriate fluids
- Not sensitive to entering of particles
- Unlimited capacity as so-called feeder pump
- Low pump fluid consumption due to built-in for vacuum baffle
- Ideal for all types of diffusion pump fluids
- Parts not subject to wear
- Very long lifetime with regular preventive maintenance checks

Technical Data / Model		PDA320-W	PDA400-W	PDA501-W
Order number		**260-071**	**260-081**	**260-090**
Inlet flange		DN320 ISO-K	DN400 ISO-K	DN500 ISO-K
Foreline flange		DN63 ISO-K	DN100 ISO-K	DN100 ISO-K
Cooling		Water	Water	Water
High vacuum pumping speed at inlet flange		values measured according PNEUROP, see page 7 for details		
Nitrogen / Air	l/sec	5 200	8 000	12 000
Maximal throughput	**mbar l/sec**	8	13	16
Fore vacuum stability at max throughput	**mbar**	0.45	0.45	0.45
Pump fluid charge, min / max	**cm³**	1 200 / 1 800	2 000 / 3 000	3 000 / 5 000
Heating / cooling time	**min**	17 / 50	28 / 50	25 / 80
Minimal cooling water requ. at 18° C inlet temp.	**l/h**	300	370	470
Recommended pump speed for roughing pump at max. throughput	**m³/h**	80	130	160
Main supply		3 x 400 / 3 x 230 V	3 x 400 / 3 x 230 V	3 x 400 / 3 x 230 V
Power consumption	**kW**	4.4	5.4	7.2
Weight	kg	55	75	180

Standard delivery includes	
Diffusion pump	No pump fluid included in standard delivery. Please see page 64 / 65 for available pump fluids.
O-ring for inlet flange and rough pump connecting flange	

Spare parts			
Seal set	**BN841071-T**	**BN841070-T**	**203-000**
Heating plate			
3 x 400 V / 3 x 230 V	**BP336740-T**	**3 x BP336529-T**	**3 x BP336536-T**

Accessories			
Pump fluid replenishing device	**216-061**	**216-061**	**216-061**
Temperature switch	**216-056**	**216-056**	**216-056**
Thermostatic cut-out	**216-057**	**216-057**	**216-057**
Flow monitor	**B4747111SE**	**B4747111SE**	**B4747111SE**
Orifice for flow monitor	**B4747308SE**	**B4747311SE**	**B4747311SE**
Guide roller (3 sets)		**H001057**	**H001050**

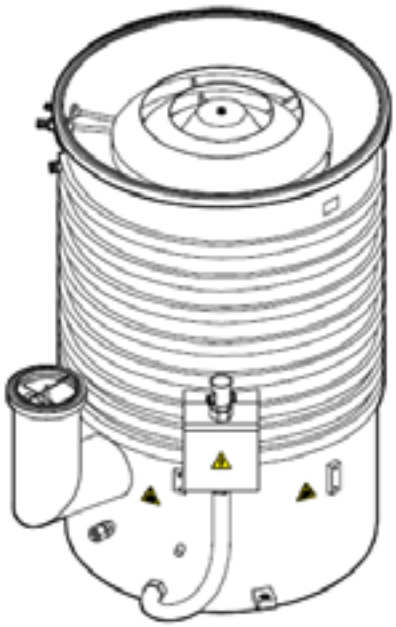
Standard diffusion pumps with BAFFLE CAP

The so-called baffle cap version can be used for applications with high working pressure and high gas loads > 1.0 x 10^{-4} mbar, where minimal oil backstreaming is acceptable.

The baffle cap is installed at the same position as a cold cap and it allows to operate the diffusion pump without any additional water baffle.

A baffle cap decreases pump speed by only 20% compared to a water baffle which will reduce it by approx. 50%.

The baffle cap is fully integrated into the diffusion pump and the diffusion pump therefore requires less installation height.



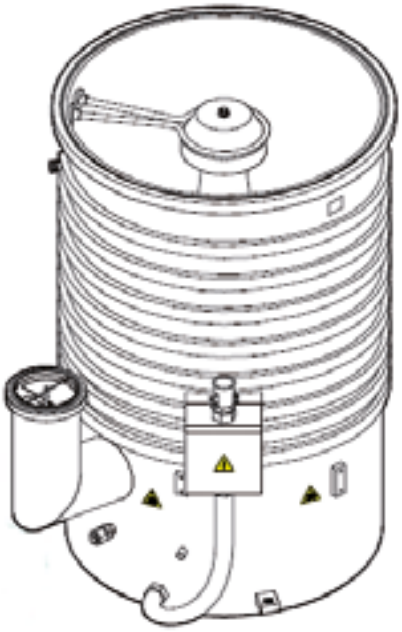
Technical Data/Model		PDB400-W	PDB501-W	PDB631-W
Order number		**260-080**	**260-091**	**260-105**
Inlet flange		DN400 ISO-K	DN500 ISO-K	DN630 ISO-K
Foreline flange		DN100 ISO-K	DN100 ISO-K	DN160 ISO-K
Cooling		Water	Water	Water
High vacuum pumping speed at inlet flange		values measured according PNEUROP, see page 7 for details		
Nitrogen/Air	l/sec	5 300	8 500	16 000
Maximal throughput	**mbar l/sec**	13	16	18
Fore vacuum stability at max throughput	**mbar**	0.45	0.45	0.4
Pump fluid charge, min/max	**cm^3**	2 000/3 000	3 000/5 000	6 000/8 000
Heating/cooling time	**min**	28/50	25/80	50/90
Minimal cooling water requ. at 18° C inlet temp.	**l/h**	370	470	710
Recommended pump speed for roughing pump at max. throughput	**m^3/h**	130	160	200
Main supply		3 x 400/230 V	3 x 400/230 V	3 x 400/230 V
Power consumption	**kW**	5.4	7.2	10.5
Weight	**kg**	81	188	260

Standard delivery includes	
Diffusion pump	No pump fluid included in standard delivery. Please see page 64/65 for available pump fluids.
O-ring for inlet flange and rough pump connecting flange	

Spare parts			
Seal set	**BN841070-T**	**203-000**	**203-009**
Heating plate 3 x 400 V/3 x 230 V	**3 x BP336529-T**	**3 x BP336536-T**	**7 x BP336542-T**

Accessories			
Pump fluid replenishing device	**216-061**	**216-061**	**216-061**
Temperature switch	**216-056**	**216-056**	**216-056**
Thermostatic cut-out	**216-057**	**216-057**	**216-057**
Flow monitor	**B4747111SE**	**B4747111SE**	**B4747111SE**
Orifice for flow monitor	**B4747311SE**	**B4747311SE**	**B4747311SE**
Guide roller (3 sets)	**H001057**	**H001050**	**H001050**

Diffusion pumps with COLD CAP



Diffusion pumps are used for classical industrial and other high vacuum applications. Our standard diffusion pumps are equipped with a cold cap which requires an additional cooled baffle on top to prevent oil backstreaming.

- Rugged and proven design
- Low ultimate pressure (depending on type of pump fluid)
- Integrated cold cap reduces oil back-streaming
- High volume flow rate without baffle
- High chemical stability using appropriate fluids
- Not sensitive to entering of particles
- Unlimited capacity as so-called feeder pump
- Low pump fluid consumption due to built-in forvacuum baffle
- Ideal for all types of diffusion pump fluids
- Parts not subject to wear
- Very long lifetime with regular preventive maintenance checks

Technical Data / Model		PDA631-W	PDA800-W	PDA999-W
Order number		**260-100**	**260-111**	**260-121**
Inlet flange		DN630 ISO-K	DN800 ISO-F	DN1000 ISO-F
Foreline flange		DN160 ISO-K	DN160 ISO-K	DN160 ISO-K
Cooling		Water	Water	Water
High vacuum pumping speed at inlet flange		values measured according PNEUROP, see page 7 for details		
Nitrogen / Air	l/sec	20 000	30 000	50 000
Maximal throughput	**mbar l/sec**	18	26	34
Fore vacuum stability at max throughput	**mbar**	0.4	0.35	0.35
Pump fluid charge, min / max	**cm³**	6 000 / 8 000	7 000 / 13 000	16 000 / 24 000
Heating / cooling time	**min**	50 / 90	50 / 100	45 / 200
Minimal cooling water requ. at 18° C inlet temp.	**l/h**	710	950	1000
Recommended pump speed for roughing pump at max. throughput	**m³/h**	200	320	420
Main supply		3 x 400 / 3 x 230 V	3 x 400 / 3 x 230 V	3 x 400 / 3 x 230 V
Power consumption	**kW**	10.5	17.4	25.2
Weight	**kg**	250	480	700

Standard delivery includes	
Diffusion pump	No pump fluid included in standard delivery. Please see page 64/65 for available pump fluids.
O-ring for inlet flange and rough pump connecting flange	

Spare parts			
Seal set	**203-009**	**BN841236-T**	**BN841237-T**
Heating plate	**7 x BP336542-T**	**1 x BP336233-T**	**7 x BP336233-T**
3 x 400 V / 3 x 230 V	**–**	**6 x BP336252-T**	**–**

Accessories			
Pump fluid replenishing device	**216-061**	**216-061**	**216-061**
Temperature switch	**216-056**	**216-056**	**216-056**
Thermostatic cut-out	**216-057**	**216-057**	**216-057**
Flow monitor	**B4747111SE**	**B4747111SE**	**B4747111SE**
Orifice for flow monitor	**B4747311SE**	**B4747326SE**	**B4747326SE**
Guide roller (3 sets)	**H001050**	**H001057**	**H001057**

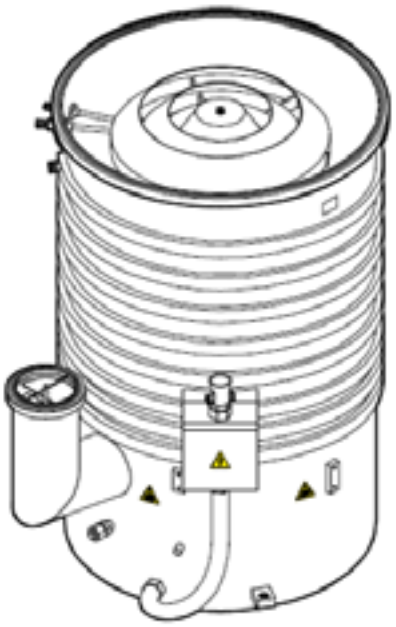
Diffusion pumps with BAFFLE CAP

The so-called baffle cap version can be used for applications with high working pressure and high gas loads > 1.0 x 10^{-4} mbar, where minimal oil backstreaming is acceptable.

The baffle cap is installed at the same position as a cold cap and it allows to operate the diffusion pump without any additional water baffle.

A baffle cap decreases pump speed by only 20% compared to a water baffle which will reduce it by approx. 50%.

The baffle cap is fully integrated into the diffusion pump and the diffusion pump therefore requires less installation height.



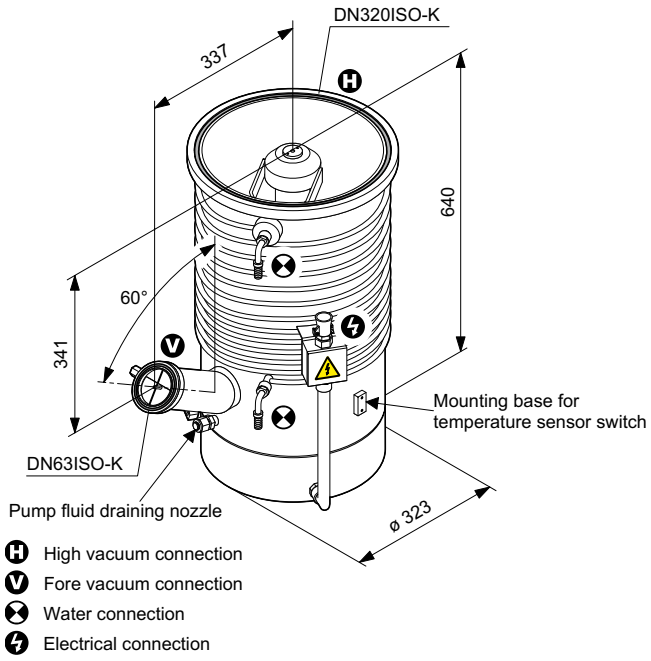
Technical Data/Model		PDB800-W	PDB999-W
Order number		**260-116**	**260-126**
Inlet flange		DN800 ISO-F	DN1000 ISO-F
Foreline flange		DN160 ISO-K	DN160 ISO-K
Cooling		Water	Water
High vacuum pumping speed at inlet flange		values measured according PNEUROP, see page 7 for details	
Nitrogen/Air	l/sec	26 000	40 000
Maximal throughput	**mbar l/sec**	26	34
Fore vacuum stability at max throughput	**mbar**	0.35	0.35
Pump fluid charge, min/max	**cm³**	7 000/13 000	16 000/24 000
Heating/cooling time	**min**	50/100	45/200
Minimal cooling water requ. at 18° C inlet temp.	**l/h**	950	1000
Recommended pump speed for roughing pump at max. throughput	**m³/h**	320	420
Main supply		3 x 400/3 x 230 V	3 x 400/3 x 230 V
Power consumption	**kW**	17.4	25.2
Weight	**kg**	480	700

Standard delivery includes	
Diffusion pump	No pump fluid included in standard delivery. Please see page 64/65 for available pump fluids.
O-ring for inlet flange and rough pump connecting flange	

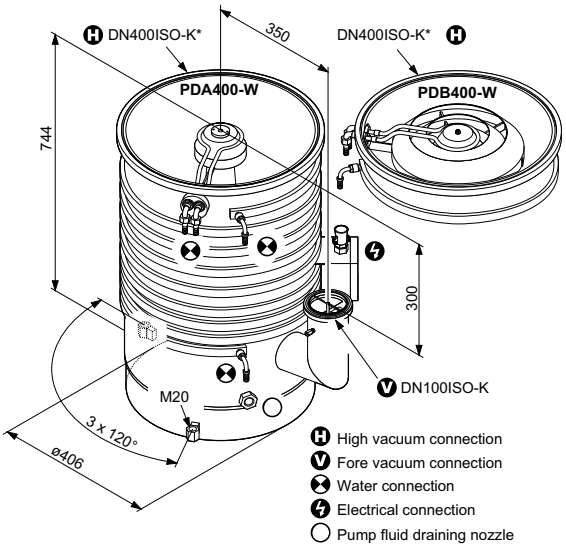
Spare parts		
Seal set	**BN841236-T**	**BN841237-T**
Heating plate 3 x 400 V/3 x 230 V	**1 x BP336233-T + 6 x BP336252-T**	**7 x BP336233-T —**

Accessories		
Pump fluid replenishing device	**216-061**	**216-061**
Temperature switch	**216-056**	**216-056**
Thermostatic cut-out	**216-057**	**216-057**
Flow monitor	**B4747111SE**	**B4747111SE**
Orifice for flow monitor	**B4747326SE**	**B4747326SE**
Guide roller (3 sets)	**H001057**	**H001057**

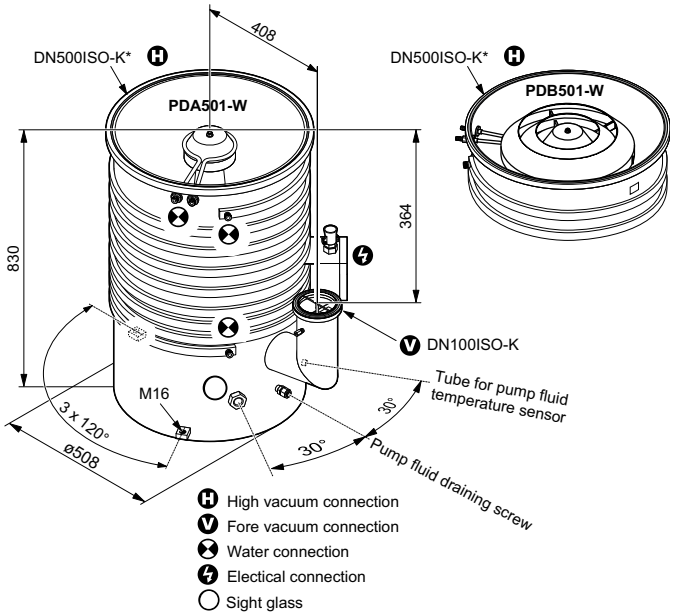
PDA320-W



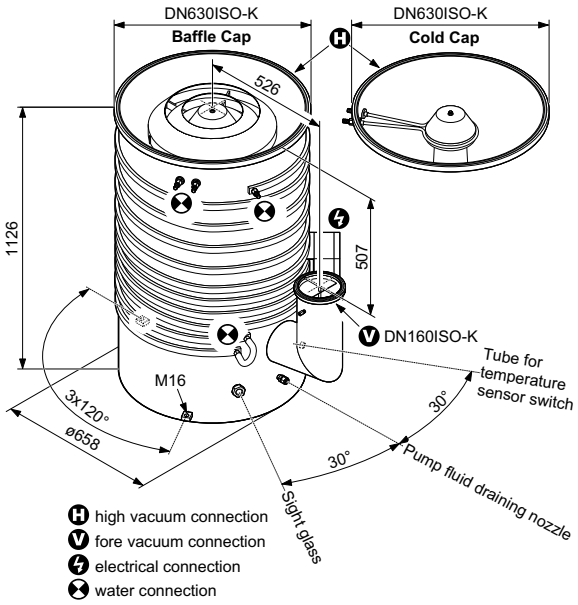
PDA400-W



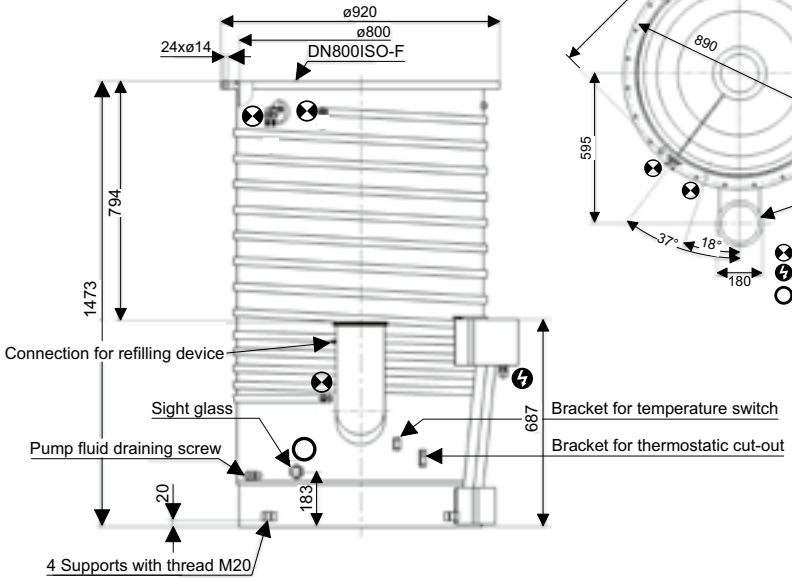
PDA501-W

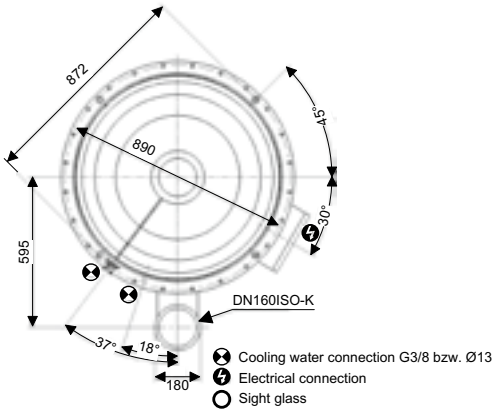


PDA631-W

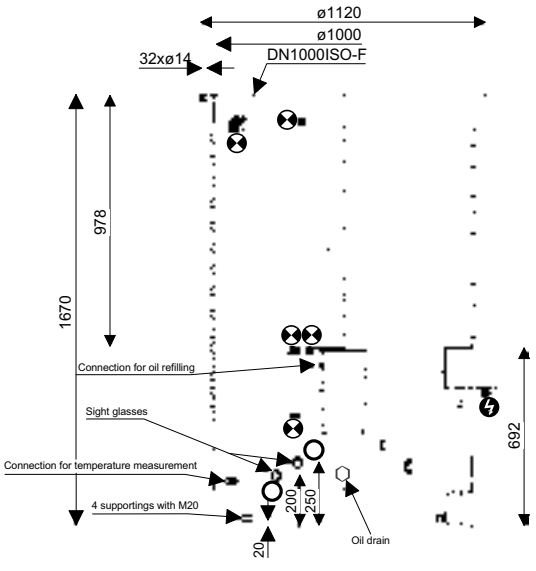


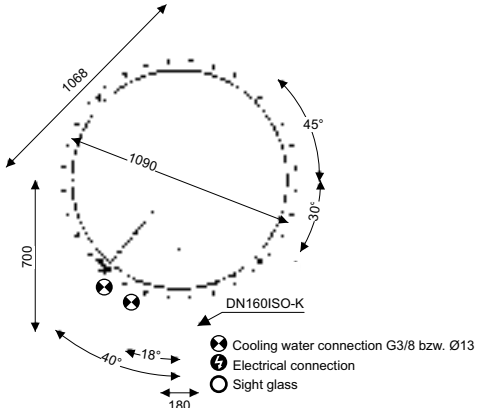
PDA800-W





PDA999-W





Diffusion pumps for high magnetic fields

For a special project, HSR has modified and developed a new line of diffusion pumps which can be used in high magnetic field strengths above 1.5 Tesla.

These highly sophisticated high-vacuum pumps are made of selected materials and include a newly developed heater type that can be operated within strong magnetic fields.

Please contact us for further information regarding available sizes and types.

Diffusion pump sets

HSR provides complete pump sets, either manually controlled or fully automatic with pump set controller **PCA700D**. Pump sets can be modified according to customer needs; they are available with or without rack, pre-vacuum pump and vacuum measurement gauges.

Diffusion pump set without rack

Diffusion pump set mounted on customized rack

Fully automatic diffusion pump set including controller PCA700D

Diffusion pumpset with manual control valves

Pump fluids for diffusion pumps

HSR pump fluids are widely used in high-vacuum diffusion pumps for optical coating applications, electronics industry, metallurgical industry, instrument manufacturing industry, R&D and other high vacuum applications.

Selection Data		Mineral oil	Silicon oil	Silicon oil	Pentaphenylether
Name		**66A**	**HSR704EU**	**HSR705**	**Santovac 5**
Vapour pressure at 20° C	**mbar**	4E 10^{-08}	2E 10^{-08}	3E 10^{-09}	1E 10^{-10}
Resistance					
Chemical		good	better	better	very good
Oxidation		good	better	better	very good
Thermal		good	better	better	very good

Technical Data / Type		Mineral oil	Silicon oil	Silicon oil	Pentaphenylether
Name		**66A**	**HSR704EU**	**HSR705**	**Santovac 5**
Vapour pressure at 20° C	**mbar**	4E 10^{-08}	2E 10^{-08}	3E 10^{-09}	1E 10^{-10}
Viscosity at	**mm²/s**				
20° C		25	–	–	–
25° C		–	39	175	1 000
70° C		–	–	–	12
100° C		–	–	–	12
Preferred pressure range	**mbar**	5E $^{-07}$ - 10^{-03}	10^{-07} - 10^{-03}	10^{-08} - 10^{-05}	10^{-08} - 10^{-03}
Ultimate pressure with	**mbar**				
LN_2 cooling		< 6E 10^{-09}	< 6E 10^{-09}	< 6E 10^{-09}	< 6E 10^{-09}
Refrigerator cooling -20° C		< 6E 10^{-08}	< 3E 10^{-08}	< 3E 10^{-08}	< 3E 10^{-08}
Water cooling 20° C		< 4E 10^{-07}	< 6E 10^{-08}	< 3E 10^{-08}	< 3E 10^{-08}
Air cooling 25° C		< 1E 10^{-06}	< 5E 10^{-07}	< 2E 10^{-07}	< 2E 10^{-07}

Order information	66 A	HSR704EU	HSR705	Santovac 5
500 cm^3	**260-390**	**H271704**	**H267705**	**B0480559**
1000 cm^3		**H272704**	**H262705**	
2000 cm^3		**H273704**	**H263705**	
2500 cm^3	**260-393**			
3000 cm^3		**H274704**	**H264705**	
5000 cm^3	**260-392**	**H275704**	**H265705**	

Attainable ultimate pressure: The ultimate pressures indicated in the table can be attained with correct conditioning of the high vacuum pumping system. They refer to blanked-off groups of pumps with an appropriate pumping fluid baffle combination. The ultimate pressure values shown may be decreased if the gas sources are further reduced.