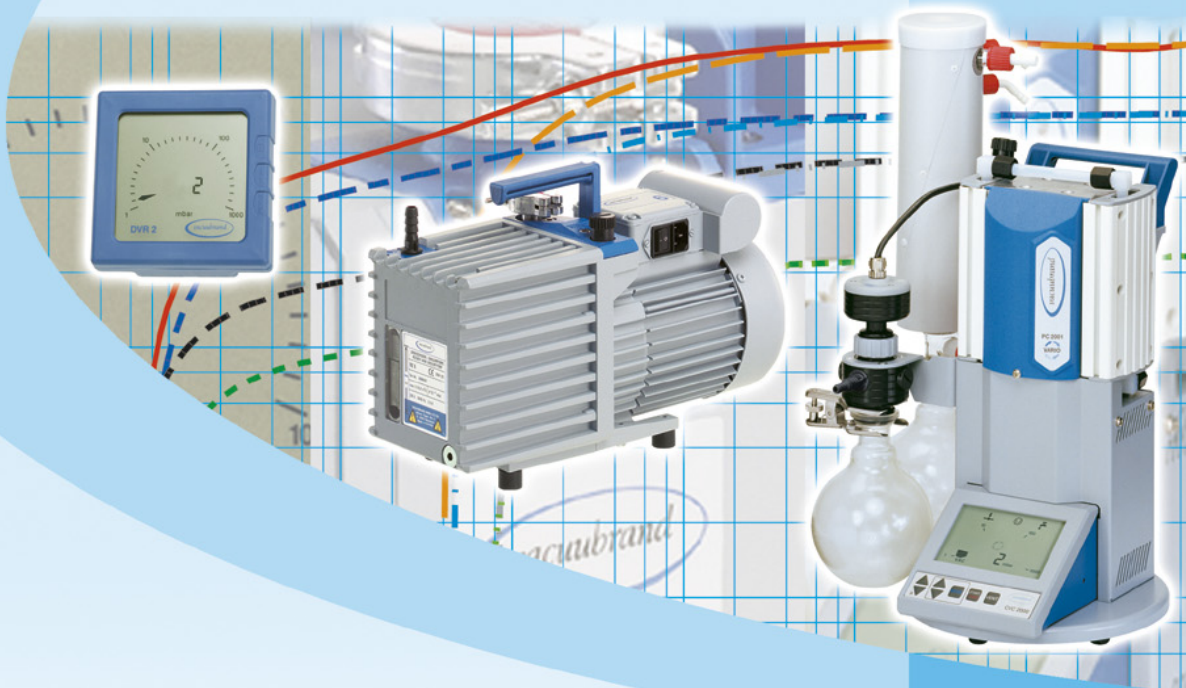


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Technology for Vacuum Systems

TECHNOLOGY FOR VACUUM SYSTEMS

2005/2006



ROTARY-VANE PUMPS

The one-stage and two-stage VACUUBRAND rotary-vane pumps are compact, high-performance appliances that are used for a wide range of laboratory and process applications. They have integrated oil pumps and an effective gas ballast system for high water vapour tolerance. The new XS series of rotary-vane pumps has reached new performance highs in many important aspects.

XS EXTRA...

LIGHTWEIGHT – LOW-NOISE – ENERGY-SAVING – USER-FRIENDLY



Rotary-Vane Pump RZ 2.5



Rotary-Vane Pump RZ 6



Rotary-Vane Pump RZ 9

SPECIAL ADVANTAGES

- **High conductance coefficient**
higher pumping speed even near the ultimate vacuum
- **High vapour tolerance**
for water and solvents through high gas ballast capacity (up to 10% of pumping capacity). Quiet operation and good ultimate vacuum even with gas ballast.
- **Anti-corrosion protection**
vacuum-tight oil circuit at shutdown to prevent corrosive gases or oil contamination from entering the pump module
- **New oil circuit and large oil volume**
for longer service intervals
- **Compact design**
small dimensions and low weight. Simple maintenance due to "telescopic" design.

USE OF ROTARY-VANE PUMPS

Rotary-vane pumps are used where an ultimate vacuum down to 10^{-3} mbar has to be attained. Selection criteria are both the required ultimate vacuum and pumping speed.

Pumping speeds for VACUUBRAND rotary-vane pumps are stated, according to PNEUROP, in m^3/h at atmospheric pressure. However, what counts more in practice is the pumping speed at the required operating vacuum.

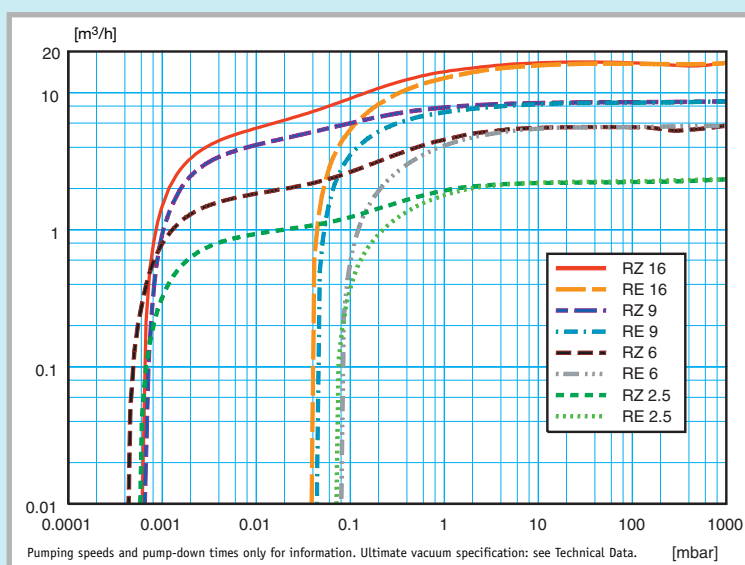
Another important feature is consistently high pumping speed across a wide vacuum range.

Data for ultimate vacuum always refer to the pump running at operating temperature.

High vapour tolerance and an efficient gas ballast system are both important for working with condensable substances.

The pump is sealed off vacuum-tight at shutdown to prevent an uncontrolled intake of air or surge of oil. The special oil circuit shut-off device minimises corrosion risk during standstill.

PUMPING SPEED: ROTARY-VANE PUMPS



Rotary-Vane Pump RZ 16



Chemistry Hybrid Pump RC 6

MODEL	MAX. PUMPING SPEED 50/60 Hz	ULTIMATE VACUUM (total)	PAGE
For data in cfm, l/min and Torr, see individual pages			

Rotary-Vane Pumps

RE 2.5	2.3/2.8 m^3/h	3×10^{-1} mbar	14
RZ 2.5	2.3/2.8 m^3/h	2×10^{-3} mbar	14
RE 6	5.7/6.8 m^3/h	1×10^{-1} mbar	15
RZ 6	5.7/6.8 m^3/h	2×10^{-3} mbar	15
RE 9	8.9/10.2 m^3/h	1×10^{-1} mbar	16
RZ 9	8.9/10.2 m^3/h	2×10^{-3} mbar	16
RE 16	16.6/19.1 m^3/h	1×10^{-1} mbar	17
RZ 16	16.6/19.1 m^3/h	2×10^{-3} mbar	17

Chemistry Hybrid Pump

RC 6	5.9/6.9 m^3/h	2×10^{-3} mbar	18
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Accessories

Oils for rotary-vane pumps	20
Separators, inlet side (AK)	23
Oil mist filters, outlet side (FO)	24
Cold trap, inlet side (SKF)	25
Cold trap, inlet side (GKF)	25
Full-flow inline oil filter (HF)	25

For reliable operation and long service intervals, we recommend a range of accessories (see page 20 ff).



Separator AK R 2/2.5

ROTARY-VANE PUMPS

RE 2.5 AND RZ 2.5

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RE 2.5 one-stage

..... **2.3** m³/h
 **1.65** cfm
 **47** l/min

.. **3×10^{-1}** mbar
 2.3×10^{-1} Torr

High-performance rotary-vane pumps with extra compact design and low weight. For a wide range of laboratory and process applications that require low ultimate vacuum at medium gas flow rate.



SPECIAL ADVANTAGES

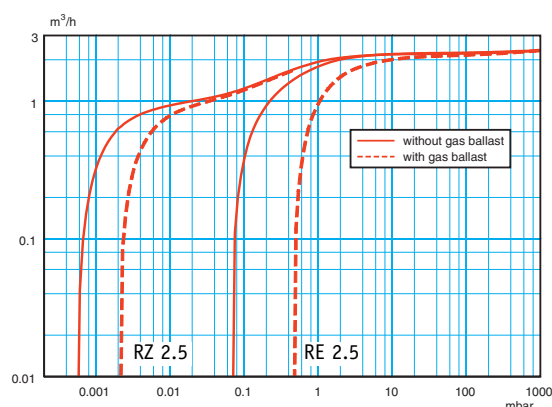
- High pumping speed even near ultimate vacuum
- High water vapour tolerance
- Vacuum-tight switch-off without need for anti-suckback valve
- Large oil volume: long intervals between oil changes
- Ease of maintenance due to telescopic design

RZ 2.5 two-stage

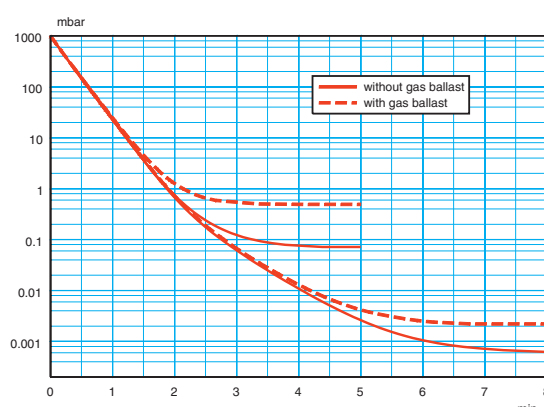
..... **2.3** m³/h
 **1.65** cfm
 **47** l/min

.. **2×10^{-3}** mbar
 1.5×10^{-3} Torr

RZ 2.5



Pumping speed* at 50 Hz



Pump down time* for 10 l volume

TECHNICAL DATA

		RE 2.5	RZ 2.5
Number of stages		1	2
Max. pumping speed 50/60 Hz	m ³ /h/cfm	2.3/2.8//1.65	2.3/2.8//1.65
Ultimate vacuum (partial) without gas ballast	mbar//Torr	3×10^{-1} // 2.3×10^{-1}	4×10^{-4} // 3×10^{-4}
Ultimate vacuum (total) without gas ballast	mbar//Torr	3×10^{-1} // 2.3×10^{-1}	2×10^{-3} // 1.5×10^{-3}
Ultimate vacuum (total) with gas ballast	mbar//Torr	8×10^{-1} // 6×10^{-1}	1×10^{-2} // 0.75×10^{-2}
Water vapour tolerance	mbar//Torr	40//30	40//30
Oil capacity (B-Oil) min.	l	0.18	0.1
max.	l	0.51	0.28
Inlet connection		small flange NW 16	small flange NW 16
Outlet connection		hose nozzle NW 10	hose nozzle NW 10
Motor power	kW	0.18	0.18
Nominal rpm 50/60 Hz	min ⁻¹	1500/1800	1500/1800
Dimensions (L x W x H) (height without handle)	mm	308 x 125 x 190	308 x 125 x 190
Weight, ready for use	kg	10.2	11.4

Items supplied: Oil-filled pump, on/off switch, overload protection and 2 m cable with plug, small-flange centring and clamping ring for inlet, particulate filter, operating instructions.

ORDERING INFORMATION

		RE 2.5	RZ 2.5	RZ 2.5 Package with oil mist filter and butterfly valve VS 16
230 V ~ 50–60 Hz, 1-ph.	plug CEE	69 71 50	69 81 20	69 80 29
230 V ~ 50–60 Hz, 1-ph.	plug CH	69 71 51	69 81 21	–
230 V ~ 50–60 Hz, 1-ph.	plug UK	69 71 52	69 81 22	–
120 V ~ 60 Hz, 1-ph.	plug US	69 71 53	69 81 23	–

*Pumping speeds and pump-down times are only for information. Ultimate vacuum specification: see Technical Data.

ROTARY-VANE PUMPS

RE 6 AND RZ 6



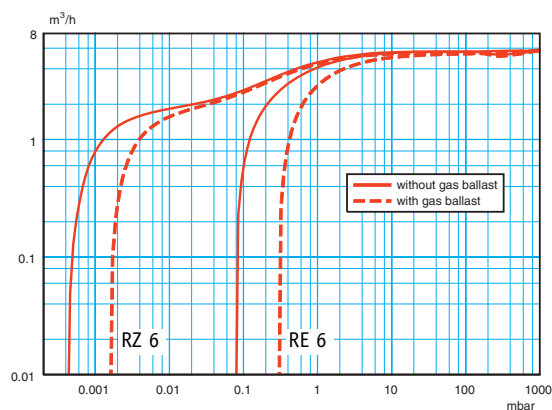
High-performance rotary-vane pumps with outstandingly compact design and low weight. For a wide range of laboratory and process applications. Comprehensive range of accessories.



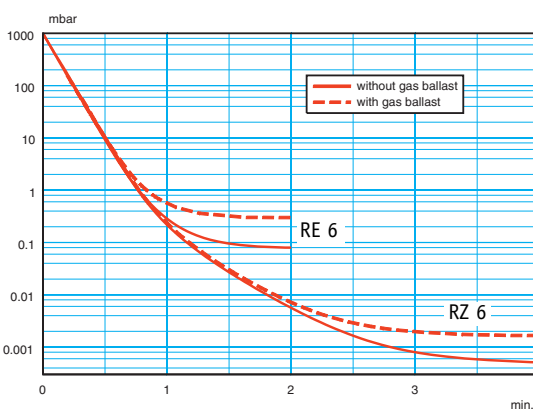
RZ 6

SPECIAL ADVANTAGES

- High pumping speed even near ultimate vacuum
- High water vapour tolerance
- Vacuum-tight switch-off without need for anti-suckback valve
- Large oil volume: long intervals between oil changes
- Ease of maintenance due to telescopic design



Pumping speed* at 50 Hz



Pump down time* for 10 l volume

TECHNICAL DATA

		RE 6	RZ 6
Number of stages		1	2
Max. pumping speed 50/60 Hz	m³/h/cfm	5.7/6.8//4.0	5.7/6.8//4.0
Ultimate vacuum (partial) without gas ballast	mbar//Torr	1×10^{-1} // 0.75×10^{-1}	4×10^{-4} // 3×10^{-4}
Ultimate vacuum (total) without gas ballast	mbar//Torr	1×10^{-1} // 0.75×10^{-1}	2×10^{-3} // 1.5×10^{-3}
Ultimate vacuum (total) with gas ballast	mbar//Torr	6×10^{-1} // 4.5×10^{-1}	1×10^{-2} // 0.75×10^{-2}
Water vapour tolerance	mbar//Torr	40//30	40//30
Oil capacity (B-Oil) min.	l	0.37	0.35
max.	l	0.95	0.75
Inlet connection		small flange NW 16	small flange NW 16
Outlet connection		hose nozzle NW 10	hose nozzle NW 10
Motor power	kW	0.3	0.3
Nominal rpm 50/60 Hz	min ⁻¹	1500/1800	1500/1800
Dimensions (L x W x H) (height without handle)	mm	370 x 142 x 207	370 x 142 x 207
Weight, ready for use (1-ph.)	kg	15.3	16.4

Items supplied: Oil-filled pump, on/off switch, overload protection and 2 m cable with plug, small-flange centring and clamping ring for inlet, particulate filter, operating instructions.

ORDERING INFORMATION

		RE 6	RZ 6	RZ 6 Package with oil mist filter and butterfly valve VS 16	RZ 6 Package with oil mist filter, butterfly valve VS 16, vacuum gauge VAP 5
230 V ~ 50–60 Hz, 1-ph.	plug CEE	69 71 60	69 81 30	69 80 39	2 61 06 79
230 V ~ 50–60 Hz, 1-ph.	plug CH	69 71 61	69 81 31	–	2 61 06 80
230 V ~ 50–60 Hz, 1-ph.	plug UK	69 71 62	69 81 32	–	–
120 V ~ 60 Hz, 1-ph.	plug US	69 71 63	69 81 33	–	–
400 V, 3 ~ 50 Hz, 3-ph.	plug CEE	–	69 81 35	–	–

RE 6 one-stage

..... **5.7** m³/h
 **4.0** cfm
 **113** l/min
 **1×10^{-1}** mbar
 0.75×10^{-1} Torr

RZ 6 two-stage

..... **5.7** m³/h
 **4.0** cfm
 **113** l/min
 ... **2×10^{-3}** mbar
 1.5×10^{-3} Torr

*Pumping speeds and pump-down times are only for information. Ultimate vacuum specification: see

ROTARY-VANE PUMPS

RE 9 AND RZ 9

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RE 9 one-stage

..... **8.9** m³/h
 **6.0** cfm
 **170** l/min
 **1 x 10⁻¹** mbar
0.75 x 10⁻¹ Torr

RZ 9 two-stage

..... **8.9** m³/h
 **6.0** cfm
 **170** l/min
 ... **2 x 10⁻³** mbar
1.5 x 10⁻³ Torr

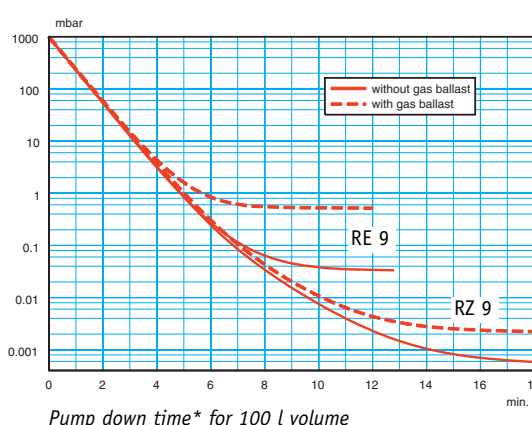
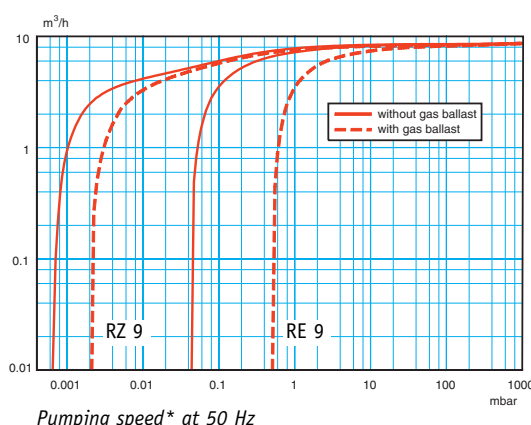
Mid-size high-performance rotary-vane pumps. For a wide range of laboratory and process applications with high pumping speed requirements.



RZ 9

SPECIAL ADVANTAGES

- High pumping speed even near ultimate vacuum
- High water vapour tolerance
- Vacuum-tight switch-off without need for anti-suckback valve
- Reliable start-up even at low temperatures; less energy consumption
- Large oil volume: long intervals between oil changes
- Ease of maintenance due to telescopic design
- Optional full-flow oil filter



TECHNICAL DATA

		RE 9	RZ 9
Number of stages		1	2
Max. pumping speed 50/60 Hz	m ³ /h/cfm	8.9/10.2//6.0	8.9/10.2//6.0
Ultimate vacuum (partial) without gas ballast	mbar//Torr	1 x 10 ⁻¹ //0.75 x 10 ⁻¹	4 x 10 ⁻⁴ //3 x 10 ⁻⁴
Ultimate vacuum (total) without gas ballast	mbar//Torr	1 x 10 ⁻¹ //0.75 x 10 ⁻¹	2 x 10 ⁻³ //1.5 x 10 ⁻³
Ultimate vacuum (total) with gas ballast	mbar//Torr	6 x 10 ⁻¹ //4.5 x 10 ⁻¹	1 x 10 ⁻² //0.75 x 10 ⁻²
Water vapour tolerance	mbar//Torr	40//30	40//30
Oil capacity (B-Oil) min.	l	0.4	0.2
max.	l	1.4	0.8
Inlet connection		small flange NW 25	small flange NW 25
Outlet connection		small flange NW 25	small flange NW 25
Motor power	kW	0.37	0.37
Nominal rpm 50/60 Hz	min ⁻¹	1500/1800	1500/1800
Dimensions (L x W x H) (height without handle)	mm	460 x 152 x 232	460 x 152 x 232
Weight, ready for use	kg	21.4	24.2

Items supplied: Oil-filled pump, on/off switch, overload protection and 2 m cable with plug, small-flange centring and clamping ring for inlet and outlet, particulate filter, operating instructions.

ORDERING INFORMATION

		RE 9	RZ 9
230 V ~ 50–60 Hz, 1-ph.	plug CEE	69 71 70	69 81 40
230 V ~ 50–60 Hz, 1-ph.	plug CH	–	69 81 41
230 V ~ 50–60 Hz, 1-ph.	plug UK	–	69 81 42
120 V ~ 60 Hz, 1-ph.	plug US	–	69 81 43
400 V, 3 ~ 50 Hz, 3-ph.	plug CEE	–	69 81 45

*Pumping speeds and pump-down times are only for information. Ultimate vacuum specification: see Technical Data.

ROTARY-VANE PUMPS

RE 16 AND RZ 16



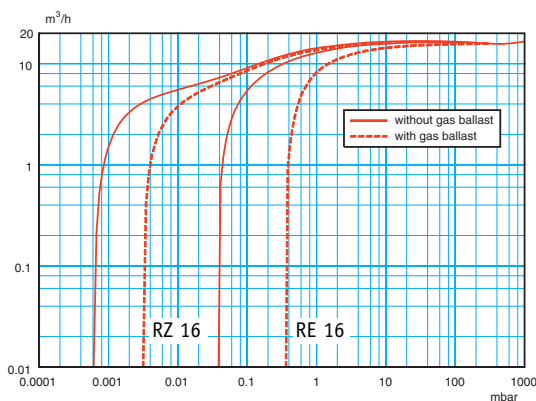
Outstanding high-performance rotary-vane pumps. For pumping of large volumes of gases or evacuation of vessels. Flexible and comprehensive accessories for use in chemistry laboratories.



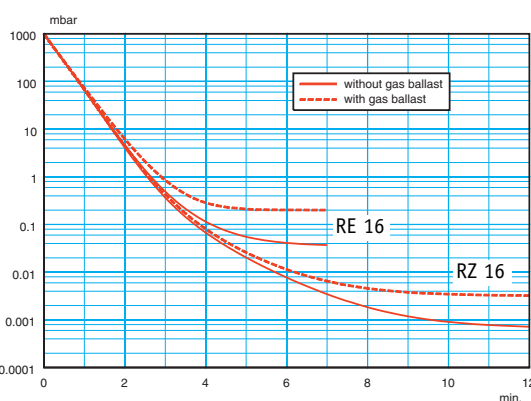
RZ 16

SPECIAL ADVANTAGES

- High pumping speed, even near ultimate vacuum
- High water vapour tolerance
- Vacuum-tight switch-off without need for anti-suckback valve
- Reliable start-up even at low temperatures; less energy consumption
- Large oil volume: long intervals between oil changes
- Ease of maintenance due to telescopic design
- Optional full-flow oil filter



Pumping speed* at 50 Hz



Pump down time* for 100 l volume

RE 16 one-stage

..... **16.6** m³/h
 **11.2** cfm
 **318** l/min
 **1 x 10⁻¹** mbar
0.75 x 10⁻¹ Torr

RZ 16 two-stage

..... **16.6** m³/h
 **11.2** cfm
 **318** l/min
 ... **2 x 10⁻³** mbar
1.5 x 10⁻³ Torr

TECHNICAL DATA

		RE 16	RZ 16
Number of stages		1	2
Max. pumping speed 50/60 Hz	m ³ /h/cfm	16.6/19.1//11.2	16.6/19.1//11.2
Ultimate vacuum (partial) without gas ballast	mbar/Torr	1 x 10 ⁻¹ //0.75 x 10 ⁻¹	4 x 10 ⁻⁴ //3 x 10 ⁻⁴
Ultimate vacuum (total) without gas ballast	mbar/Torr	1 x 10 ⁻¹ //0.75 x 10 ⁻¹	2 x 10 ⁻³ //1.5 x 10 ⁻³
Ultimate vacuum (total) with gas ballast	mbar/Torr	6 x 10 ⁻¹ //4.5 x 10 ⁻¹	1 x 10 ⁻² //0.75 x 10 ⁻²
Water vapour tolerance	mbar/Torr	40//30	40//30
Oil capacity (B-Oil) min.	l	0.3	0.5
max.	l	1.0	1.0
Inlet connection		small flange NW 25	small flange NW 25
Outlet connection		small flange NW 25	small flange NW 25
Motor power	kW	0.55	0.55
Nominal rpm 50/60 Hz	min ⁻¹	1500/1800	1500/1800
Dimensions (L x W x H) (height without handle)	mm	505 x 152 x 232	545 x 152 x 232
Weight (1-ph.)	kg	25.2	29

Items supplied: Oil-filled pump, on/off switch, overload protection and 2 m cable with plug, small-flange centring and clamping ring for inlet and outlet, particulate filter, operating instructions.

ORDERING INFORMATION

		RE 16	RZ 16
230 V ~ 50-60 Hz, 1-ph.	plug CEE	69 70 80	69 80 50
230 V ~ 50-60 Hz, 1-ph.	plug CH	69 70 86	69 80 56
230 V ~ 50-60 Hz, 1-ph.	plug UK	69 70 87	69 80 57
120 V ~ 60 Hz, 1-ph.	plug US	–	69 80 51
400 V, 3 ~ 50 Hz, 3-ph.	plug CEE	–	69 80 52

*Pumping speeds and pump-down times are only for information. Ultimate vacuum specification: see Technical Data.

CHEMISTRY-HYBRID-PUMP

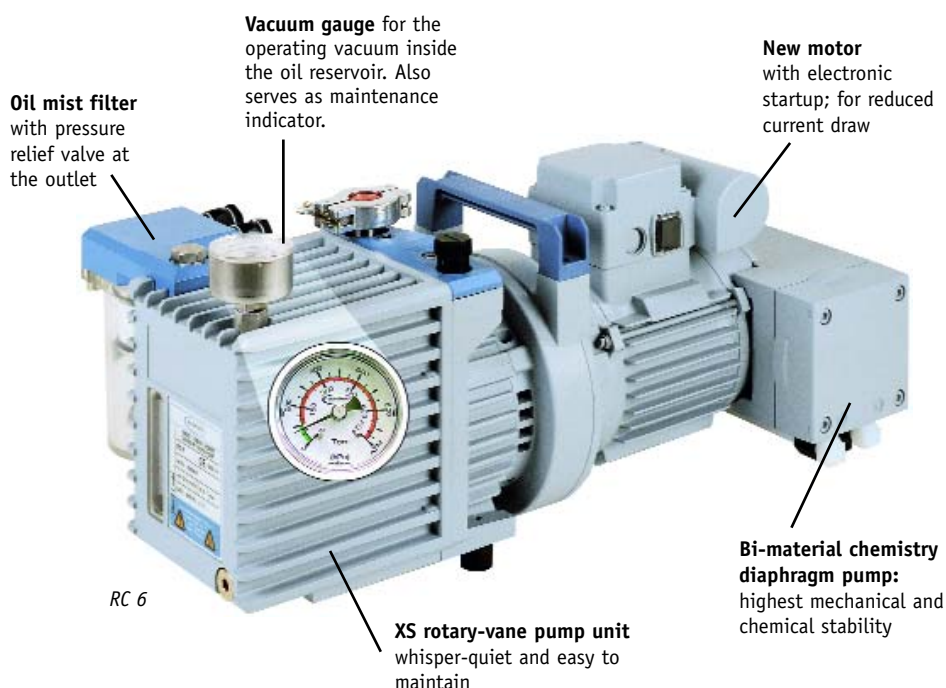
RC 6

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RC 6

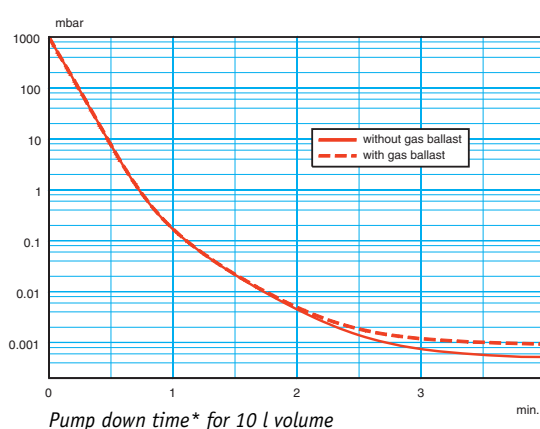
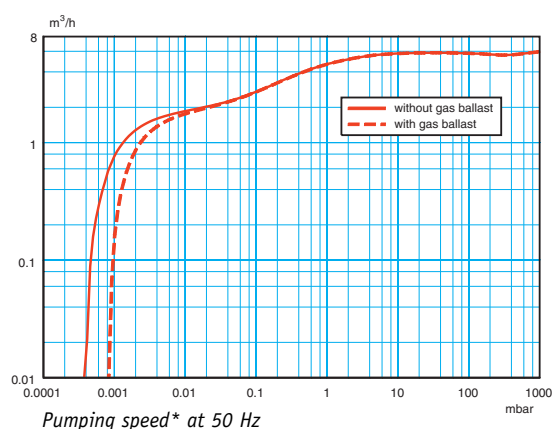
..... **5.9** m³/h
 **4.1** cfm
 **115** l/min
 **2 x 10⁻³** mbar
 .. **1.5 x 10⁻³** Torr

The Chemistry Hybrid Pump RC 6 has been designed to minimise the adverse effects of condensable and corrosive vapours. Its main components are a two-stage rotary-vane pump and a two-stage chemistry diaphragm pump built of corrosion-resistant materials. The diaphragm pump continuously evacuates the oil reservoir of the rotary-vane pump in order to keep the partial pressures of solvent vapours, oxygen and corrosive gases at low level and/or below their condensation point. The RC 6 is a low-maintenance pump for freeze-drying and other applications requiring an ultimate vacuum in the 10⁻³ mbar range.



SPECIAL ADVANTAGES

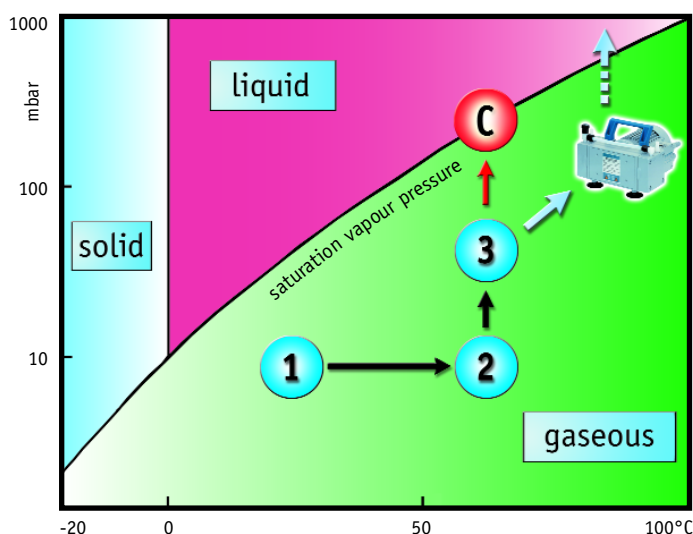
- Vacuum performance of a two-stage rotary-vane pump**
 high pumping speed and low ultimate vacuum (5.9 m³/h; 2 x 10⁻³ mbar)
- Corrosion attack reduced to a minimum**
 when working with corrosive vapours
- Drastically reduced amount of waste oil**
 through extended oil change and maintenance intervals
- Solvent recovery next to 100%**
 easy and effective by means of a vapour condenser (optional) at the outlet
- Low life cycle costs**
 e.g. no need for a cold trap in most cases



*Pumping speeds and pump-down times are only for information. Ultimate vacuum specification: see Technical Data.

The thermodynamics behind

- 1** Vapour is aspirated at low pressure and ambient temperature.
- 2** Vapour is heated to approx. 60°C by heat exchange and compression within pump.
- C** Condensation problem with "normal" rotary-vane pumps:
On the way to atmospheric pressure, the saturation vapour pressure (transition to liquid state) is reached inside the oil-filled section. Result: Condensation and corrosion inside the pump; contamination of the oil.
- 3** **Chemistry Hybrid Pump:**
The diaphragm pump evacuates the vapours from the oil case of the rotary-vane pump. Under intended operating conditions, no condensation takes place inside



the oil-filled part and, in particular, within the oil reservoir.
(Any condensation taking place inside the oil-free diaphragm pump is much less problematic.)

Less condensation means less corrosion and cleaner oil for longer life. For example, in the case of acid vapours, the evacuation of the oil reservoir to 20 mbar reduces corrosion by a factor of about 50!

TECHNICAL DATA

		RC 6
Pumping speed 50/60 Hz	m ³ /h//cfm	5.9/6.9//4.1
Ultimate vacuum (partial) without gas ballast	mbar//Torr	4 x 10 ⁻⁴ //3 x 10 ⁻⁴
Ultimate vacuum (total) without gas ballast	mbar//Torr	2 x 10 ⁻³ //1.5 x 10 ⁻³
Ultimate vacuum (total) with gas ballast	mbar//Torr	1 x 10 ⁻² //0.75 x 10 ⁻²
Water vapour tolerance	mbar//Torr	*
Oil capacity (B-Oil) min.	l	0.34
max.	l	0.53
Inlet connection		Small flange NW 16
Outlet connection		Hose nozzle NW 10
Motor power	kW	0.37
Nominal rpm 50/60 Hz	min ⁻¹	1500/1800
Dimensions (L x W x H)	mm	510 x 305 x 230
Protection class		IP 40
Weight	kg	24.2

Items supplied: Pump with on/off switch, overload circuit breaker and 2 m cable with plug, centring and clamping ring for inlet, particulate filter and operating instructions. Oil supplied in separate bottle.

ORDERING INFORMATION

		RC 6
230 V ~ 50–60 Hz, 1-ph.	plug CEE	69 85 60
230 V ~ 50–60 Hz, 1-ph.	plug CH	69 85 61
230 V ~ 50–60 Hz, 1-ph.	plug UK	69 85 62
100–120 V ~ 50–60 Hz, 1-ph.	plug US	69 85 63

ACCESSORIES

PIRANI Vacuum Gauge VAP 5 Set	68 28 58
Ball valve VKE 16 (KF NW 16, stainless steel)	67 55 04
Butterfly valve VS 16C (KF NW 16, stainless steel, FPM sealing ring)	66 50 07
Emission condenser EK PC 8	69 99 75
Catchpot for EK PC 8 (volume: 1 l)	69 99 76
Base module PC 8 (without pump; including emission condenser EK PC 8 and catchpot)	69 99 49
PTFE vacuum tubing	see page 117

RC 6

..... **5.9** m³/h
 **4.1** cfm
 **115** l/min
 **2 x 10⁻³** mbar
 .. **1.5 x 10⁻³** Torr

Also available as a ready-for-use Chemistry Vacuum Pumping Unit, complete with exhaust waste vapour condenser and condensate catchpot



Chemistry Vacuum Pumping Unit PC 8 / RC 6
See page 85

* Water vapour tolerance or vapour tolerance cannot be stated according to PNEUROP because of the evacuation of the oil reservoir. Due to the pressure reduction in the oil-sealed part of the hybrid pump, the vapour capacity significantly exceeds that of a standard oil-sealed rotary-vane pump and depends mainly on the pressure and temperature in the oil reservoir.

OIL FOR ROTARY-VANE PUMPS

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Oil

Rotary-vane pump oil. . . **B**

Rotary-vane pump oil **K 8**

Silicone oil **SI 2**

Perfluoropolyether oil

Oil and fluids for rotary-vane pumps have to meet various requirements:

- *Low vapour pressure, even at elevated temperatures*
- *Excellent lubrication properties*
- *Minimal backstreaming*
- *High thermal stability*
- *Good resistance to ageing*
- *High oxidation stability*



Oils for rotary-vane pumps

STANDARD OIL:

Rotary-vane vacuum pump oil B

Rotary-vane pump oil B is a high-viscosity oil with low vapour pressure. The high viscosity also at elevated temperatures ensures good sealing and long life characteristics for pumping non-reactive gases. Oil B enables good and constant ultimate vacuum over several weeks even at continuous operation and is used for the first filling of RE/RZ series pumps.

SPECIAL OILS

Many pumped substances can cause deterioration of common pump oil, leading to mechanical problems. Special oils should be used as a prevention. In this case, the rotary-vane pump must be prepared by VACUUBRAND.

Special oils may maintain lubricating properties but only provide limited protection against corrosion.

Rotary-vane vacuum pump oil K 8

Rotary-vane pump oil K8 is specially designed for pumping acid vapours. This oil is very hygroscopic and has limited capacity for water vapour. The alkaline additive is consumed during operation, making it necessary to change the fluid regularly, depending on the amount and type of vapours. When the pump is not used for prolonged periods, the fluid must be drained from the pump and the pump must be rinsed with mineral oil. The vapour pressure and viscosity characteristics of Oil K 8 will not provide the same results as Oil B. Pumps may not reach the stated ultimate vacuum and may not start up well at low temperatures (< 18 °C).

Silicone oil SI 2

Silicone oil SI 2 is used when particularly high ageing stability is required. Because of its chemical composition, this oil is stable against many aggressive gases – particularly chlorine, hydrochloric acid, and solvent vapours. In addition, it is largely resistant against most acids.

Synthetic oil (Perfluoropolyether)

These synthetic oils have excellent chemical resistance and are certified for pumping pure oxygen. These fluids are used for strong oxidants (halogenides, nitrogen oxides, etc.). Perfluoropolyether oil will form an emulsion with mineral oils. Therefore, pumps to be used with these fluids must be free of any mineral oil residues. The high density of perfluoropolyether limits pump start-up temperatures to 18 °C or above.

TECHNICAL DATA

	Vapour pressure at pump operating temperature	Flash point °C	Viscosity at 40°C mm ² /sec	Density at 20°C g/cm ³
Rotary-vane pump oil B	< 1 x 10 ⁻³	264	94	0.87
Rotary-vane pump oil K 8	< 5 x 10 ⁻³	264	128	0.89
Silicone oil SI 2	< 1 x 10 ⁻³	> 255	75	0.96
Perfluoropolyether oil	3 x 10 ⁻⁵	–	60	1.89

ORDERING INFORMATION

	0.5 l bottle	1 l bottle	5 l canister	20 l canister	200 l barrel
Rotary-vane pump oil B	-	68 70 10	68 70 11	68 70 12	68 70 13
Rotary-vane pump oil K 8	-	68 71 00	68 71 01	68 71 02	-
Silicone oil SI 2	-	68 75 00	68 75 02	-	-
Perfluoropolyether oil	68 76 00	-	-	-	-

SYSTEM COMPONENTS AND ACCESSORIES FOR ROTARY-VANE PUMPS

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PROTECT YOUR PUMP AND THE ENVIRONMENT...

... ON THE INLET SIDE



Cold traps (SKF, GKF)

Cold traps are used to recover valuable substances*, e.g. from distillation, or, more frequently, to protect rotary-vane pumps against aggressive, corrosive or otherwise detrimental substances.

* only for pressures < 1 mbar (inlet side)



Separators (AK)

Particles and condensates impair the operation of rotary-vane pumps and must be prevented from entering the pump.

Separators are used to protect vacuum pumps from particulate matter both in liquid or solid form.

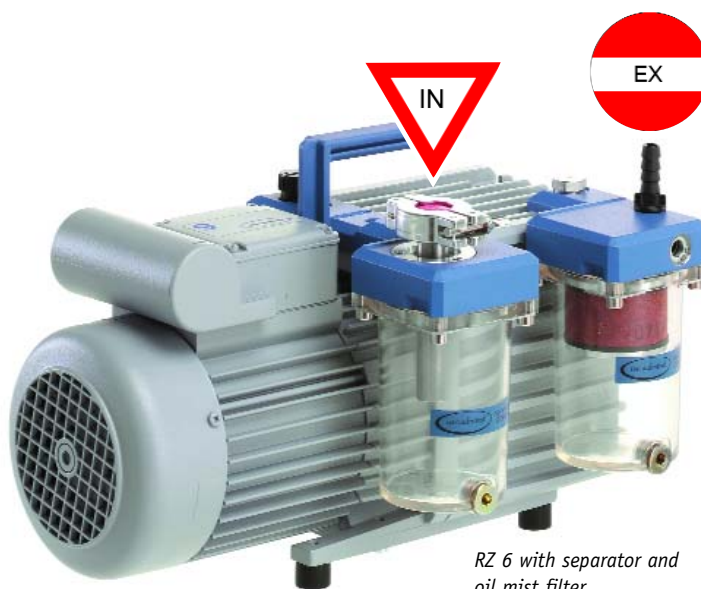
... ON THE OUTLET SIDE



Oil mist filters (FO)

All oil-sealed pumps release oil mist at the outlet, creating a nuisance or even a hazard.

VACUUBRAND oil mist filters will retain approx. 99.99% of oil mist at ultimate vacuum.



RZ 6 with separator and oil mist filter

... INSIDE THE PUMP

Full-flow oil filter (HF)

Contamination reduces oil and pump life and increases maintenance cost. This micro filter efficiently separates micro particles and polar substances.

A service indicator shows actual filter conditions and helps to avoid unnecessary filter changes.

Special oils

The performance of oil-sealed rotary-vane pumps is very much dependent on fluid properties. Some gases or vapours will either react with the standard pump oil, or deteriorate its lubrication properties. Both may lead to problems. For prevention, special oils or fluids may be used. However, this will require previous conditioning of the pump by the manufacturer.



**GOLDEN
RULES**

WHEN USING OIL-SEALED ROTARY-VANE VACUUM PUMPS

- Warm up pump with inlet closed
- Avoid particulates
- Never block the outlet
- Use gas ballast (for condensable substances)
- Use inlet cold trap (for quantities of condensable material)
- Before switching off, let pump run for a few minutes with gas ballast open and inlet closed
- Check and maintain regularly

TABLE OF ACCESSORIES FOR ROTARY-VANE PUMPS

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ESSENTIAL AND RECOMMENDED ACCESSORIES

Rotary-vane pumps have a small flange at the inlet as standard. On the outlet side there is a hose nozzle (RE 2.5, RZ 2.5, RE 6 and RZ 6) or a small flange (RE 9–RZ 16).

The inlet tubing should have a large diameter and be kept as short as possible. For demanding

applications, flexible PTFE tubing of NW 16 and NW 25 is available (page 117).

If the inlet tubing has a smaller diameter than the pump flange, the pumping speed may be considerably reduced, especially with longer tubing and at low pressures.



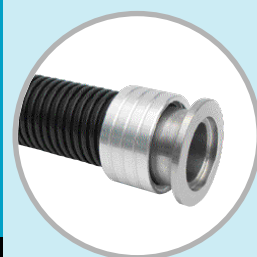
Separator AK



Oil mist filter FO



*Full-flow
oil filter HF*



PTFE vacuum tubing

Pump model	Required accessories for tubing connection at inlet (without small flange)	Recommended accessories to protect pump and environment	
		Inlet	Outlet
RE 2.5/ RZ 2.5	Small flange NW 16 with hose nozzle NW 10* Cat. No. 66 28 06	Separator AK R 2/2.5 Cat. No. 69 80 00 In-line valve VS 16* Cat. No. 66 50 04	Oil mist filter FO R 2/2.5/5/6 Cat. No. 69 80 03
RE 6/RZ 6	Small flange NW 16 with hose nozzle NW 10* Cat. No. 66 28 06	Separator AK R 5/6 Cat. No. 69 80 06 In-line valve VS 16* Cat. No. 66 50 04	Oil mist filter FO R 2/2.5/5/6 Cat. No. 69 80 03
RE 9/RZ 9	Small flange NW 25 / hose nozzle NW 10* Cat. No. 66 28 07 or Small flange NW 25 / hose nozzle NW 15* Cat. No. 66 28 08	Separator AK R 8/9/16 Cat. No. 69 80 07 In-line valve VS 25* Cat. No. 66 50 05	Oil mist filter FO R 8/9/16 Cat. No. 69 80 17
RE 16/RZ 16	Small flange NW 25 / hose nozzle NW 10* Cat. No. 66 28 07 or Small flange NW 25 / hose nozzle NW 15* Cat. No. 66 28 08	Separator AK R 8/9/16 Cat. No. 69 80 07 In-line valve VS 25* Cat. No. 66 50 05	Oil mist filter FO R 8/9/16 Cat. No. 69 80 17
Recommended for small-flange inlets and outlets: Vacuum tubing made of PTFE or stainless steel (see page 117)		Full-flow inline oil filter HF R 8/9/16 Cat. No. 69 80 10	

* Additional centring and clamping rings required for assembly

SEPARATORS INLET SIDE **AK**



Separators are used to protect vacuum pumps from particulates and droplets. When pumping condensable vapours, it is highly recommended to equip the inlet with a separator or, even better, with a cold trap. This will help to protect both the vacuum pump and the installation. In the event of pump failure, the separator will prevent the pump oil from flowing back into the evacuated system (important for expensive or hard-to-clean installations). VACUUBRAND separators can be directly mounted and easily be drained through a condensate drain plug.

Separators, inlet side

AK R 2/2.5

AK R 5/6

AK R 8/9/16

SEPARATOR "AK" FOR ROTARY-VANE PUMPS RE/RZ

The catch pot of the separator is made of transparent TPX® (PMP polymethylpentene) with high resistance to chemicals. Compared to common separators, it offers easy observation of condensate and space-saving mounting without additional fittings.



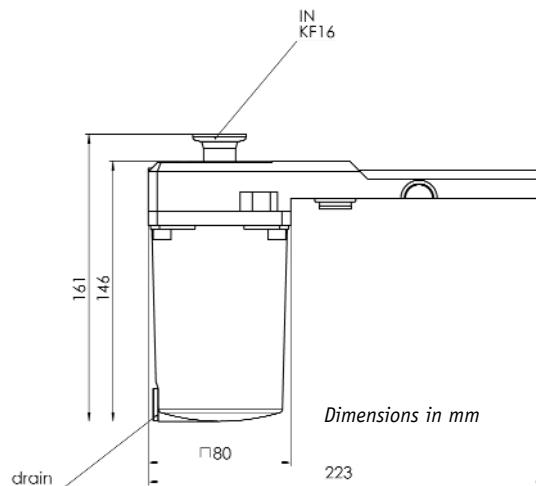
AK R 8/9/16



AK R 2/2.5

SPECIAL ADVANTAGES

- Direct mounting at inlet
- High conductance
- Easy observation of condensate through the transparent catch pot



AK R 5/6

TECHNICAL DATA

	AK R 2/2.5	AK R 5/6	AK R 8/9/16
Connection pump side	directly mounted	directly mounted	directly mounted
Connection plant side	NW 16	NW 16	NW 25
Material (top plate)	Aluminium	Aluminium	Aluminium
Material (catch pot)	TPX®	TPX®	TPX®
Leakage rate	$< 10^{-4}$ mbar · l/s	$< 10^{-4}$ mbar · l/s	$< 10^{-4}$ mbar · l/s
Dimensions (L x W x H)	200 x 80 x 161	223 x 80 x 161	163 x 110 x 161
Weight (approx.)	0.65 kg	0.7 kg	1.1 kg
For VACUUBRAND pumps	RE 2.5, RZ 2.5, RE 2, RZ 2	RE 6, RZ 6, RE 5, RZ 5	RE 8, RZ 8, RE 9, RZ 9, RE 16, RZ 16

ORDERING INFORMATION

	AK R 2/2.5	AK R 5/6	AK R 8/9/16
	69 80 00	69 80 06	69 80 07

OIL MIST FILTERS OUTLET SIDE FO

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Oil mist filters,
outlet side

FO R 2/2.5/5/6

FO R 8/9/16

Exhaust gases from oil-sealed rotary-vane pumps always carry a certain quantity of oil mist. The amount depends on the operating conditions such as inlet pressure, gas ballast and pump temperature. To prevent the contamination of air – in and outside the laboratory – this oil mist should be retained as effectively as possible. VACUUBRAND oil mist filters provide an excellent rate of separation near 100%. These filters can also be useful in separating other aerosols.

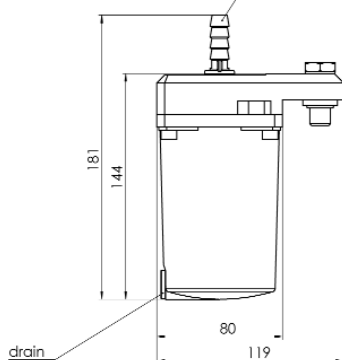
OIL MIST FILTER “FO” FOR ROTARY-VANE PUMPS RE/RZ

Recipient made of transparent TPX® (PMP polymethylpentene) with high resistance to chemicals. Compared to many common filters, the VACUUBRAND oil mist filters FO allow easy observation of filtered oil or condensate and can be installed directly onto the pump.



FO R 2/2.5/5/6

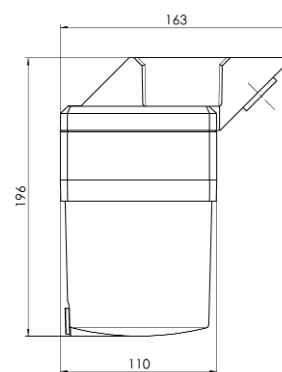
EX
hose nozzle NW 10



FO R 2/2.5/5/6

SPECIAL ADVANTAGES

- Very high degree of separation of 99.99% (at ultimate vacuum)
- Optimal control by transparent catch pot
- Easy draining of oil
- Direct mounting on the oil reservoir outlet
- Integrated pressure relief valve for burst protection in case of blocked filter



FO R 8/9/16

Dimensions in mm

TECHNICAL DATA

	FO R 2/2.5/5/6	FO R 8/9/16
For rotary-vane pumps up to (approx.) pumping speed	6 m³/h	20 m³/h
Connection	direct	direct
Max. collected oil volume	0.25 l	0.5 l
Material (top plate)	Aluminium	Aluminium
Material (catch pot)	TPX®	TPX®
Filter material	fibre glass epoxy	fibre glass epoxy
Separating efficiency for mineral oil (at ult. vacuum)	99.99%	99.99%
Dimensions (L x W x H)	see drawing	see drawing
Weight (approx.)	0.8 kg	1.3 kg
For VACUUBRAND pumps	RE 2.5, RZ 2.5, RE 6, RZ 6, RE 2, RZ 2, RE 5, RZ 5	RE 8, RZ 8, RE 9, RZ 9, RE 16, RZ 16

ORDERING INFORMATION

	FO R 2/2.5/5/6	FO R 8/9/16
	69 80 03	69 80 17

COLD TRAP SKF AND GKF INLINE OIL FILTER HF



Cold traps are used to recover volatile substances – e.g. from distillation – or to protect the pump against aggressive or otherwise detrimental substances, e.g. solvents or water. Cold traps can also protect the vacuum system from back-migrating oil vapours. Thus, cold traps protect both the vacuum system and the pump. They extend maintenance intervals and improve the overall performance of the vacuum installation.

Particle contamination reduces oil life and increases maintenance needs. The full-flow inline filter effectively separates micro particles and polar substances. The service indicator shows actual filter conditions and helps to avoid unnecessary filter changes.

Cold traps,
inlet side

SKF H 25

SKF H 40

GKF 1000i

Full-flow
inline oil filter

HF R 8/9/16

COLD TRAP "SKF H", STAINLESS STEEL

- Sturdy, easy-to-clean design
- Easy to disassemble
- Two-wall design without separate insulating vacuum for good conductance
- Long operating time with one filling
- Easy condensate drain and cleaning without disassembling

COLD TRAP "GKF", GLASS

- Mirrored insulation jacket, extended coolant life
- Vertical window: direct observation of condensate and coolant levels
- PTFE stopcock; condensate drain without disassembly
- Sheet-metal protective shield for protection against external damage and implosion

TECHNICAL DATA

	SKF H 25	SKF H 40	GKF 1000i
Connections	Small flange NW 25	Small flange NW 40	Fem. ground joint NS 29/32 Tube 22 mm
Material	Stainless steel	Stainless steel	Borosilicate glass
Leakage rate	$< 10^{-6}$ mbar · l/s	$< 10^{-6}$ mbar · l/s	-
Coolant capacity	1 l	1 l	1 l
Coolant life approx. for N ₂ (p < 10 ⁻³ mbar) at approx. 20°C ambient temperature	12 h	12 h	14 h
Max. volume of condensate (approx.)	0.5 l	0.5 l	0.25 l
Dimensions (L x W x H)	140 x 166 x 303	140 x 166 x 319	148 x 578

ORDERING INFORMATION

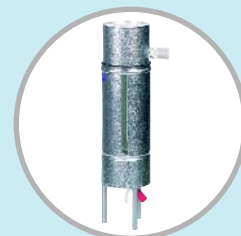
	SKF H 25	SKF H 40	GKF 1000i
	66 70 51	66 70 53	66 70 56

ACCESSORIES for GKF 1000i

Coupling to connect glass tube 22 mm ext. diameter to small flange NW 25	66 70 55
Coupling to connect ground joint NS 29/32 to small flange NW 25	66 27 05



Cold trap
SKF H 25



Cold trap
GKF 1000i

INLINE OIL FILTER HF

- Extended oil life
- Reduced service demands
- Easy space-saving mounting without special tools
- Simple filter change, service indicator

TECHNICAL DATA

Nominal flow	700 l/h
Filter pore size	approx. 10 µm
Max. operational pressure	14 bar
Opening pressure bypass valve and service indicator	1 bar
Additional oil amount due to filter volume	0.35 l
For VACUUBRAND pumps	RE 8, RZ 8, RE 9, RZ 9, RE 16, RZ 16

ORDERING INFORMATION

Full-flow inline oil filter	69 80 10
Spare filter insert	69 80 11

HF R 8/9/16



Full-flow
inline oil filter
HF R 8/9/16