

High Vacuum Pumps

DIP / DIJ / OB / LEYBOJET
Oil Diffusions Pumps

Contents

High Vacuum Pumps

Turbomolecular Pumps **TURBOVAC / TURBOVAC MAG** 6

General

General to TURBOVAC Pumps 6

Applications for TURBOVAC Pumps 12

Accessories for TURBOVAC Pumps 13

Products

Turbomolecular Pumps with Hybrid (magnetic/mechanical) Rotor Suspension

General to TURBOVAC i / iX Pumps. 14

with integrated Frequency Converter 22

with integrated Frequency Converter and integrated Vacuum System Controller 22

Special Turbomolecular Pumps. 34

Turbomolecular Pumps with Magnetic Rotor Suspension

MAG INTEGRA

with integrated Frequency Converter
with and without Compound Stage 36

with separate Frequency Converter
with Compound Stage 50

Accessories

Electronic Frequency Converters

for Turbomolecular Pumps with Magnetic Rotor Suspension. 58

Vibration Absorber 62

Flange Heater for CF High Vacuum Flanges 62

Fine Filter 63

Solenoid Venting Valve 63

Power Failure Venting Valve. 63

Power Failure Venting Valve, electromagnetically actuated 63

Purge Gas and Venting Valve 64

Gas Filter to G 1/4" for Purge Gas and Venting Valve. 64

Accessories for Serial Interfaces RS 232 C and RS 485 C 65

PC-Software LEYASSIST 65

Interface Adaptor for Frequency Converter with RS 232 C/RS 485 C Interface. 65

Miscellaneous

Services 66

Oil Diffusion Pumps DIP, LEYBOJET, OB 68

General

Applications and Accessories for Oil Diffusion Pumps	68
Oil for Diffusion Pumps, for different fields of application	68
Oil for Diffusion Pumps, for different pump types	69

Products

DIP Pumps, Water-Cooled	72
DIJ Pumps, Water-Cooled	76
Oil Booster OB	80
LEYBOJET 630, Water-Cooled	82

Accessories

Astrotorus Baffles	84
Temperature dependant Switching Components for Automatic Pump System Control	86
Monitoring Instruments	87
Power Controller	88
Adsorption Traps with Aluminium Oxide Insert	90
Right-Angle Valves, Electropneumatically Operated	92

Cryo Pumps, Cold Heads and Compressor Units

COOLVAC / COOLPOWER / COOLPAK 94

General

Applications and Accessories	
Cryo Pumps	94
Cryogenics	95
Cryo Pumps	96
Cold Heads	98
Refrigerating Capacity of Cryogenic Cold Heads	100
Compressor Units	101

Products

Cryo Pumps

Cryo Pumps with Fully Automatic Control	
iClassicLine	
COOLVAC 1500 iCL	102
COOLVAC 2000 iCL, 3000 iCL	104
COOLVAC 5000 iCL, 10000 iCL	108
COOLVAC 18000 iCL, 30000 iCL, 60000 iCL	112
Cryo Pumps with Liquid Nitrogen Cooling of Radiation Shield and Baffle of Cryo Pump	
COOLVAC 30000 BL LN ₂ , 60000 BL LN ₂	115

Cryogenics

Cold Heads

Pneumatically driven

Single-Stage Cold Head COOLPOWER 50 and 140 T	118
Dual-Stage Cold Heads COOLPOWER 7/25, 5/100 and 5/100 T	120

Mechanically driven

Single-Stage Cold Head COOLPOWER 250 MD and Dual-Stage Cold Head COOLPOWER 10 MD	122
--	-----

Compressor Units

for pneumatically driven cold heads and pumps

with water cooling

COOLPAK 2000/2200	125
COOLPAK 6000 H/6200 H/6000 HD	128

for mechanically driven cold heads and pumps

with water cooling

COOLPAK 6000 HMD/6200 HMD	130
-------------------------------------	-----

General Accessories for Compressor Units COOLPAK	132
--	-----

Accessories

Cryo Pumps / Cryogenics

Controllers and Monitoring Units for Cryo Pumps.	134
--	-----

COOLVAC iClassicLine, System Configuration

Single Operation	138
Dual and Multiple Operation	139

Low Temperature Measurement Instrument MODEL 211S	141
---	-----

Temperature Sensor	142
------------------------------	-----

General

Applications and Accessories for Oil Diffusion Pumps

Pumps	Application														
		DIP 3000	DIP 8000	DIP 12000	DIP 20000	DIP 30000	DIP 50000	DIJ 10* / 320	DIJ 16* / 500	DIJ 20 / 630	DIJ 35* / 1000	OB 6000	OB 12000	OB 18000	LEYBOJET 630
	Vacuum coating (e.g. Sputtering)	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Research and development	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Metallurgy/furnaces	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Mechanical engineering	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Sputtering process						■	■	■	■	■	■	■	■	■
	Secondary metallurgy (e.g. VIM, VID)										■	■	■		
	High vacuum furnaces										■	■	■		
	Cristal growing plants						■	■	■	■					
	Electron beam welding						■	■	■	■					
	Nitride hardening						■	■	■	■					
	Drying plants						■	■	■	■					

* DIJ 35 available from November 2017, DIJ 10 and DIJ 16 available from March 2018

Accessories	Page														
Astrotorus baffle	84	■	■	■	■	■	■	■	■	■	■				■
Over-temperature protection switch	86	■	■	■	■	■	■	■	■	■	■				■
Contact thermometer	86	■	■	■	■	■									■
Resistance thermometer Pt100	86	■	■	■	■	■									■
Water flow monitor	87	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Power controller	88				■	■	■					■	■	■	■
Adsorption trap	90	For generating an oil-free vacuum with oil sealed backing pumps													
Valve	92	Right-angle valve with, electropneumatically operated, DN 250 ISO-K to DN 1000 ISO-K													

Oil for Diffusion Pumps for different fields of application

Application	LEYBONOL Oils					
		Vacuum coating	Research and development	Metallurgy/furnaces	Mechanical engineering	Sputter processes
	LVO 500	■	■	■	■	■
	LVO 510	●	●	●	●	●
	LVO 520	●	●			
	LVO 530	●	●			
	LVO 540 ¹⁾	■	■	■	■	■

■ = Standard

● = Possible

¹⁾ Only for OB pumps

The table only lists general applications. Your specific requirements might be subject to deeper analysis.
For further questions, please contact our technical Sales support.

Oil for Diffusion Pumps for different pump types

Pumps														
	DIP 3000	DIP 8000	DIP 12000	DIP 20000	DIP 30000	DIP 50000	DIJ 10* / 320	DIJ 16* / 500	DIJ 20 / 630	DIJ 35* / 1000	OB 6000	OB 12000	OB 18000	LEYBOJET 630
LEYBONOL Oils														
LVO 500	■	■	■	■	■	■	■	■	■	■				■
LVO 510	●	●	●	●	●	●	●	●	●	●				●
LVO 520	●	●	●	●	●	●	●	●	●	●				●
LVO 530	●	●	●	●	●	●	●	●	●	●				●
LVO 540											■	■	■	

■ = Standard
 ● = Possible

Note

All oils may be used.
The pumps are supplied as standard without oil.

The table only lists general applications. Your specific requirements might be subject to deeper analysis.
For further questions, please contact our technical Sales support.

**For information on oil specifications please refer to Catalog Part
“Oils / Greases / Lubricants LEYBONOL®”.**

Operating Principle of Fluid Entrainment Vacuum Pumps

The main components of diffusion pumps, the operation of which relies on vapor-phase pump fluids are:

- Cooled pump body with intake and exhaust ports
- System of nozzles
- Pump boiler

In the case of diffusion pumps a pump fluid contained in a boiler is heated to such an extent that it is vaporized. The vapor is then forced through nozzles within the pump. The nozzles are generally designed in such a way, that they accelerate the vapor to a speed exceeding the speed of sound (Laval nozzles), thus creating a high speed vapor jet. The vapor is then deflected by the nozzles at a specific angle onto the pump body. The pump body is

cooled, so that the vaporized pump fluid condenses and is returned back to the boiler as a liquid. The pumping action of diffusion pumps and fluid entrainment pumps in general is based on the transporting capacity of the vapor jet.

The gas which is to be pumped is compressed sufficiently at the fore-vacuum port so that it can be pumped out by a backing pump.

Oil Diffusion Pumps

Compared to other fluid entrainment pumps the density of the vapor in the boiler and in the vapor jet is fairly low so that the gas molecules may almost completely diffuse into the vapor jet. Thus most of the molecules which enter the vapor jet are also pumped out.

For this reason, the pumping speed of diffusion pumps is extremely high with respect to the intake area and constant – starting at an inlet pressure of approx. 10^{-3} mbar (0.75×10^{-3} Torr) down to very low pressures – as within the pressure range the vapor jet is not influenced in any way by the pressure within the vacuum vessel.

Operating Oil Diffusion Pumps

Forevacuum

In all cases diffusion pumps require a sufficiently sized backing pump (see Technical Data). The size and type of

forevacuum pump depends on the operating conditions and the quantities of gas which are to be pumped.

1. Continuous operation at operating pressures above 10^{-4} mbar (0.75×10^{-4} Torr) – large quantities of gas.
2. Continuous operation at operating pressures below 10^{-4} mbar (0.75×10^{-4} Torr) – smaller quantities of gas.

In applications which rely on diffusion pumps, the vacuum chamber must be connected via a valve (3) and a roughing line directly to the backing pump. This is done so that the vacuum chamber may be pre-evacuated by the backing pump down to a pressure where the diffusion pump can take over. Until the high vacuum valve (4) opens, both diffusion pump and pump fluid are preserved. Before venting the vacuum chamber the forevacuum valve (2) and the high vacuum valve (4) must be closed, whereby the diffusion pump remains in the ready status.

Pumping Speed

The pumping speed of any pump is equivalent to the volume throughput through the intake opening of a pump. In the case of diffusion pumps the pumping speed for lighter gases is higher compared to heavier gases.

Backstreaming of the Pump Fluid

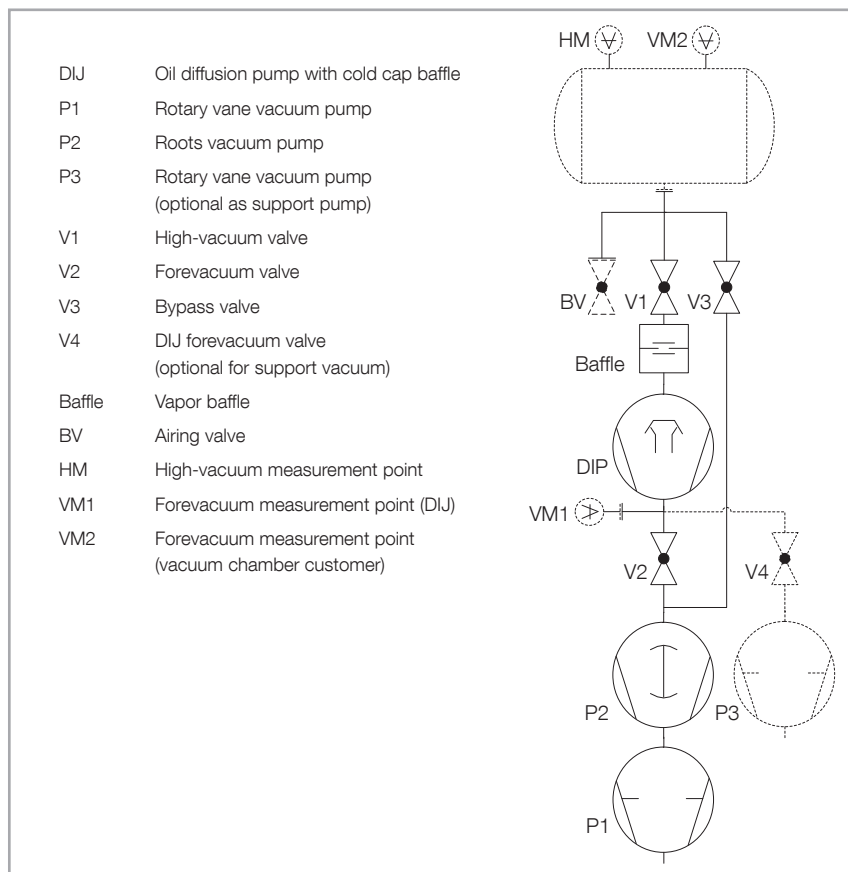
Undesirable backstreaming of molecules from the pump fluid is caused by the effect that some molecules are able to leave the vapor jet and thus do not arrive at the cooled pump body. Because of collisions between each other and due to reflection at the pump body, these molecules are then able to move in the direction of the vacuum chamber.

For DIP pumps the backstreaming effect amounts only to a few μg per cm^2 of intake area per minute. Backstreaming may be almost completely suppressed by including a cold cap baffle or an additional Astrotorus baffle.

Backstreaming of Oil in the Case of Diffusion Pumps

- Pump without baffle
approx. $1 \times 10^{-2} \text{ mg} \times \text{cm}^{-2} \times \text{min}^{-1}$
- Pump with cold cap baffle
approx. $1 \times 10^{-3} \text{ mg} \times \text{cm}^{-2} \times \text{min}^{-1}$
- Pump with Astrotorus baffle
($T = 10^\circ\text{C}$ (50°F))
approx. $1 \times 10^{-5} \text{ mg} \times \text{cm}^{-2} \times \text{min}^{-1}$

The values stated have been measured at an intake pressure of $< 1 \times 10^{-4}$ mbar and apply to LEYBONOL LVO 500.



Schematic for a diffusion-type vacuum pump system

Attainable Ultimate Pressure

The attainable ultimate pressure for a particular vacuum system depends not only on the type and pumping speed rating of the diffusion pump, but also on the vapor pressure of the pump fluid, shape and temperature of the baffle, leaks at connecting flanges or welded joints and the condition of the surfaces within the vacuum chamber.

When excluding all effects which contribute to an increase in pressure within

the vacuum chamber due to leaks and contamination of the vacuum chamber walls, it will be possible to attain the ultimate pressures stated in the table "Attainable Ultimate Pressures with Oil Diffusion Pumps (DIP)" given in chapter "General".

In practice the following combination has been found to work very well when needing a low vacuum free of oil vapors.

- Water-cooled cold cap baffle as a integral part of the diffusion pump together with a water-cooled Astrotorus baffle which may be installed as an additional component on the high vacuum flange of the diffusion pump.

Sealing Methods

For ultimate pressures down to 10^{-8} mbar (0.75×10^{-8} Torr) bakeout temperatures of up to 150 °C (302 °F) are sufficient. FPM [FKM (= Fluor caoutchouc), temperature resistant up to 150 °C (302 °F)] sealing rings or ultra sealing rings made of aluminum must be used.

In order to prevent pressure variations, ultra sealing rings must be used in the connections, between diffusion pump and baffle.

Ultimate pressures below 10^{-8} mbar (0.75×10^{-8} Torr) require bakeout temperatures up to 400 °C (752 °F). However, it is only necessary to bake out the vacuum chamber to 400 °C (752 °F) and to maintain a temperature gradient across the baffle or the cold trap so that a temperature of 150 °C (302 °F) is not exceeded at the intake flange of the pump.

In this way, it is still acceptable to use FPM (FKM) sealing rings or ultra sealing rings made of aluminium.

Cooling

The cooling water temperature should not exceed 25 °C (77 °F) at the intake and 30 °C (86 °F) at the discharge, otherwise sufficient condensation of the pump fluid cannot be ensured. When connecting the cooling system of the pump and the baffle in series, the cooling water must always be made to flow through the baffle first and then through the diffusion pump, because the attainable ultimate pressure in the vacuum chamber depends strongly on the condensation temperature of the pump fluid in the baffle.

Attainable Ultimate Pressures with Oil Diffusion Pumps

Attainable Ultimate Pressure ¹⁾

LEYBONOL LVO 500

Without baffle	mbar (Torr)	1.5×10^{-6} (1.1×10^{-6})
With cold cap baffle	mbar (Torr)	5.0×10^{-7} (3.8×10^{-7})
With Astrotorus baffle	mbar (Torr)	1.5×10^{-7} (1.1×10^{-7})

¹⁾ Attained in consideration of the notes given under "Sealing Methods" in the chapter "General" para. "Oil Diffusion Pumps" and after degassing the connected vacuum chamber for several hours at 200 °C (392 °F)

Products

DIP Pumps Water-Cooled



DIP 12 000



DIP 20 000 with Power Controller

The DIP range of pumps was developed for operation in industrial systems. Excellent vacuum performance data combined with the inherent ruggedness of this kind of pump, make our diffusion pumps a reliable component in high and medium vacuum applications.

Advantages to the User

- High pumping speeds in the fine and high vacuum ranges
- Low attainable ultimate pressure
- Integrated, water-cooled cold cap baffle guarantees low oil backstreaming rates into the vacuum chamber
- Low oil losses (even at high gas throughputs) by integrated water-cooled forevacuum baffle
- High forevacuum resistance even at reduced heating power
- The heating cartridges are accessible from the outside via heating inserts which are built into the boiler. This ensures a quick exchange of single heating cartridges (even when the pump is hot)
- A separate automatic circuit breaker for each heating cartridge ensures a high level of electrical safety
- A standard built-in thermostat acts as an thermal overload switch and ensures that the heating cartridges can not overheat
- All pumps are prepared for installation with an over-temperature switch (optional) for checking the cooling water circuit, and a contact thermometer (optional) to monitor the operating temperature of the diffusion pump
- Indication of the oil level by sight-glass permits simple checking of the current oil level
- All DIP pumps are delivered with their inside chamber cleaned in such a manner that it is free of oil. The inside is evacuated. In the condition as delivered, the pumps may be also operated with silicone oil
- Utilisation of the DIP power controller cuts power consumption by up to 30% without impairing pump performance (option)

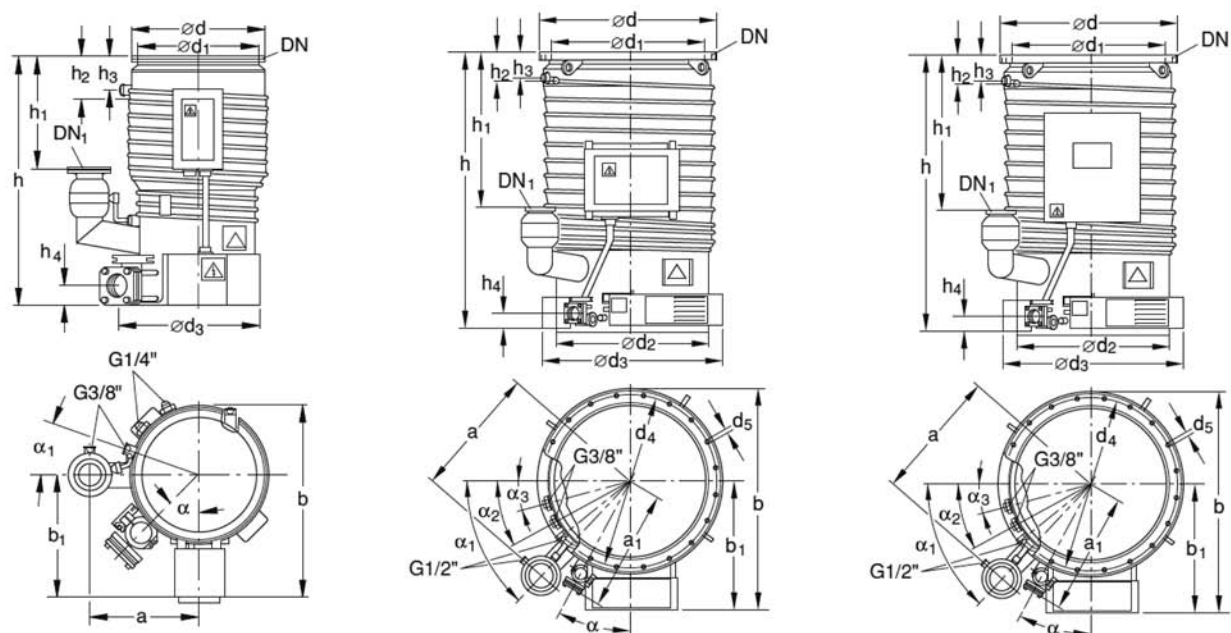
Typical Applications

The diffusion pumps from the DIP range are used in coating systems, vacuum melting and drying systems as well as in vacuum furnaces in the area of metallurgy.

Supplied Equipment

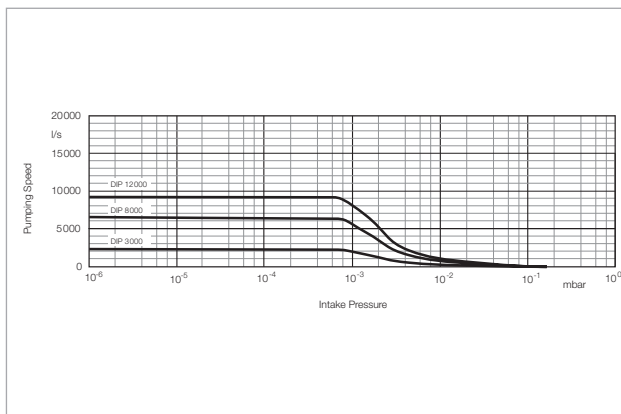
The DIP pumps are supplied ready for connection but without the filling of pump fluid.

The inside of the pump is cleaned before delivery to such an extent that it is free of oil. The inside is evacuated. High and forevacuum flanges are equipped with gaskets and centering rings having shipping flanges and complete with clamping components.

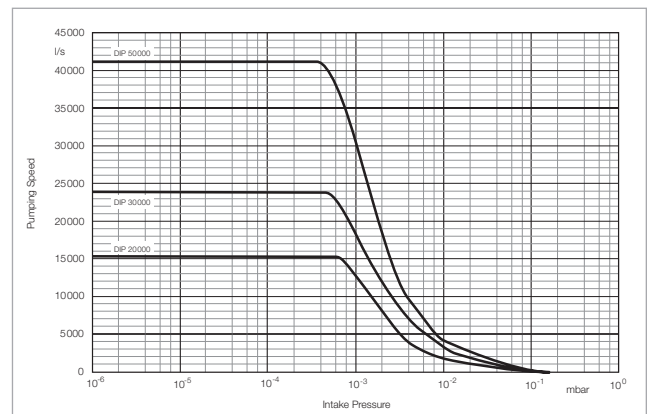


DIP	3 000	8 000	12 000	20 000	30 000	50 000
DN	250 ISO-K	400 ISO-K	500 ISO-K	630 ISO-F	800 ISO-F	1000 ISO-F
DN ₁	63 ISO-K	63 ISO-K	100 ISO-K	100 ISO-K	160 ISO-K	160 ISO-K
a	240 (9.45)	350 (13.78)	420 (16.54)	540 (21.26)	600 (23.62)	800 (31.5)
a ₁	250.5 (9.86)	375.5 (14.78)	432 (17)	496 (19.53)	536 (21.10)	636 (25.04)
b	443 (17.44)	643 (25.31)	775 (30.51)	980 (38.58)	1150 (45.28)	1350 (53.15)
b ₁	276 (10.87)	373 (14.69)	460 (18.11)	600 (23.62)	690 (27.17)	790 (31.10)
d	290 (11.42)	450 (17.72)	550 (21.65)	750 (29.53)	920 (36.22)	1120 (44.09)
d ₁	261 (10.28)	400 (15.75)	501 (19.72)	651 (25.63)	800 (31.5)	1000 (39.37)
d ₂	—	405 (15.94)	506 (19.92)	636 (25.04)	716 (28.19)	916 (36.06)
d ₃	278 (10.94)	530 (20.87)	630 (24.80)	760 (29.92)	840 (33.07)	1040 (40.94)
d ₄	—	—	—	720 (28.35)	890 (35.04)	1090 (42.91)
d ₅	—	—	—	14 (0.55)	14 (0.55)	14 (0.55)
Quantity of holes	—	—	—	20	24	32
h	560 (22.05)	785 (30.91)	940 (37)	1130 (44.49)	1450 (57.09)	1880 (74.02)
h ₁	250 (9.84)	400 (15.75)	470 (18.5)	620 (24.41)	870 (34.25)	1275 (50.2)
h ₂	68 (2.68)	88 (3.46)	92 (3.62)	97 (3.82)	102 (4.02)	102 (4.02)
h ₃	75 (2.95)	102 (4.02)	106 (4.17)	110 (4.33)	116 (4.57)	116 (4.57)
α	45°	30°	30°	30°	20°	25°
α ₁	20°	45°	45°	45°	45°	45°
α ₂	—	30°	30°	30°	30°	25°
α ₃	—	15°	15°	15°	15°	15°

Dimensional drawing for the DIP 3000 [left], DIP 8000 and DIP 12000 [middle], DIP 20 000 to DIP 50 000 [right]; dimensions in brackets () are in inch



Pumping speed characteristics of the DIP 3000 to 12000 pumps as a function of intake pressure



Pumping speed characteristics of the DIP 20000 to 50000 pumps as a function of intake pressure

Technical Data

DIP 3 000

DIP 8 000

DIP 12 000

High vacuum / forevacuum connection	DN	250 ISO-K / 63 ISO-K	400 ISO-K / 63 ISO-K	500 ISO-K / 100 ISO-K
Pumping speed for air ¹⁾ below 1×10^{-4} mbar	l/s	3 000	8 000	12 000
Operating range	mbar (Torr)	$< 10^{-2}$ to 10^{-7} (0.75×10^{-2} to 0.75×10^{-7})	$< 10^{-2}$ to 10^{-7} (0.75×10^{-2} to 0.75×10^{-7})	$< 10^{-2}$ to 10^{-7} (0.75×10^{-2} to 0.75×10^{-7})
Ultimate total pressure ¹⁾	mbar (Torr)	$< 5.0 \times 10^{-7}$ (3.75×10^{-7})	$< 5.0 \times 10^{-7}$ (3.75×10^{-7})	$< 5.0 \times 10^{-7}$ (3.75×10^{-7})
Max. permissible forevacuum pressure	mbar (Torr)	6.0×10^{-2} (4.5×10^{-2})	6.0×10^{-2} (4.5×10^{-2})	6.0×10^{-2} (4.5×10^{-2})
Pump fluid filling, min. / max.	l (qts)	1.0 / 1.4 (1.1 / 1.5)	1.7 / 3.4 (1.8 / 3.6)	2.4 / 5.3 (2.5 / 5.6)
Mains connection				
Standard EURO, 50/60 Hz	V	230 ~ 1 Ph	400 ~ 3 Ph Y	400 ~ 3 Ph Y
Standard Americas, 50/60 Hz	V	230 ~ 1 Ph	460 ~ 3 Ph Y	460 ~ 3 Ph Y
Special, 50/60 Hz	V	–	230 ~ 3 Ph Δ	230 ~ 3 Ph Δ
Heating power	kW	2.4	4.8	7.2
Number of heating cartridges		2	6	9
Heating up time	min	< 25	< 25	< 25
Cooling water (minimum) for pump ²⁾ for cold cap baffle max. supply pressure	l/h (gal/min) l/h (gal/min) bar (psig)	160 (0.7) 20 (0.09) 6 (87)	290 (1.28) 30 (0.13) 6 (87)	500 (2.2) 50 (0.22) 6 (87)
Number of cooling circuits (including cold cap baffle)		2	2	2
Cooling water connection for pump for cold cap baffle	G (BPS) G (BPS)	3/8" 1/4"	1/2" 3/8"	1/2" 3/8"
Weight, approx.	kg (lbs)	29 (64)	70 (154)	102 (225)
Recommended backing pump ³⁾ at operating pressures > 10^{-4} mbar (> 0.75×10^{-4} Torr) at operating pressures < 10^{-4} mbar (< 0.75×10^{-4} Torr)		TRIVAC D 65 B + W 251 –	SV 300 + W 251 TRIVAC D 65 B + W 251	SV 300 + W 501 TRIVAC D 65 B + W 251

Ordering Information

DIP 3 000

DIP 8 000

DIP 12 000

	Part No.	Part No.	Part No.
Oil diffusion pump			
Standard EURO	222 10	222 20	222 25
Standard Americas	222 10	500 670	500 591
Special	–	500 649	22225V003
Astrotorus baffle	227 50	227 60	227 65
Water flow monitor	500006623	500006623	500006623
Over-temperature protection switch	122 84	122 84	122 84
Contact thermometer	218 81	218 81	218 81
Resistance thermometer Pt100 sensor	200 02 958	200 02 958	200 02 958
Pump fluid ⁴⁾	see Catalog Part "Oils / Greases / Lubricants LEYBONOL"		

¹⁾ Measured to DIN 28 427 with LEYBONOL LVO 500 as the pump fluid

²⁾ The required quantity of cooling water refers to $\Delta T = 10^\circ \text{C}$ (50°F). The discharge temperature should not exceed 30°C (86°F)

³⁾ Single- or two-stage rotary vane vacuum pump (TRIVAC; SOGEVAC) from our range of forevacuum pumps jointly with Roots vacuum pumps (RUVAC) in pump systems

⁴⁾ Oil must be purchased separately

Technical Data

DIP 20 000

DIP 30 000

DIP 50 000

High vacuum / forevacuum connection	DN	630 ISO-F / 100 ISO-K	800 ISO-F / 160 ISO-K	1000 ISO-F / 160 ISO-K
Pumping speed for air ¹⁾ below 1×10^{-4} mbar	l/s	20 000	30 000	50 000
Operating range	mbar (Torr)	$< 10^{-2}$ to 10^{-7} (0.75×10^{-2} to 0.75×10^{-7})	$< 10^{-2}$ to 10^{-7} (0.75×10^{-2} to 0.75×10^{-7})	$< 10^{-2}$ to 10^{-7} (0.75×10^{-2} to 0.75×10^{-7})
Ultimate total pressure ¹⁾	mbar (Torr)	$< 5.0 \times 10^{-7}$ (3.75×10^{-7})	$< 5.0 \times 10^{-7}$ (3.75×10^{-7})	$< 5.0 \times 10^{-7}$ (3.75×10^{-7})
Max. permissible forevacuum pressure	mbar (Torr)	6.0×10^{-2} (4.5×10^{-2})	6.0×10^{-2} (4.5×10^{-2})	6.0×10^{-2} (4.5×10^{-2})
Pump fluid filling, min. / max.	l (qts)	7.0 / 11.0 (7.4 / 11.6)	10.0 / 15.0 (10.6 / 15.9)	15.0 / 25.0 (15.9 / 26.4)
Mains connection				
Standard EURO, 50/60 Hz	V	400 ~ 3 Ph Y	400 ~ 3 Ph Y	400 ~ 3 Ph Y
Standard Americas, 50/60 Hz	V	460 ~ 3 Ph Y	460 ~ 3 Ph Y	460 ~ 3 Ph Y
Special, 50/60 Hz	V	230 ~ 3 Ph Δ	230 ~ 3 Ph Δ	230 ~ 3 Ph Δ
Reduced power consumption through power controller (saves up 30%)	kW	8.4	12.6	16.8
Heating power	kW	12	18	24
Number of heating cartridges		12	18	24
Heating up time	min	< 25	< 30	< 30
Cooling water (minimum) for pump ²⁾	l/h (gal/min)	600 (2.6)	900 (4.0)	1500 (6.6)
for cold cap baffle	l/h (gal/min)	60 (0.26)	80 (0.35)	150 (0.66)
max. supply pressure	bar (psig)	6 (87)	6 (87)	6 (87)
Number of cooling circuits (including cold cap baffle)		2	3	3
Cooling water connection for pump	G (BPS)	1/2"	1/2"	1/2"
for cold cap baffle	G (BPS)	3/8"	3/8"	3/8"
Weight, approx.	kg (lbs)	172 (379)	296 (653)	560 (1235)
Recommended backing pump ³⁾ at operating pressures > 10^{-4} mbar (> 0.75×10^{-4} Torr) at operating pressures < 10^{-4} mbar (< 0.75×10^{-4} Torr)		SV 200 + W 501 TRIVAC D 65 B + W 251	SV 300 + W 1001 SV 300 + W 251	SV 630 B + W 2001 SV 300 + W 501

Ordering Information

DIP 20 000

DIP 30 000

DIP 50 000

	Part No.	Part No.	Part No.
Oil diffusion pump			
Standard EURO with control unit	222 30V001	222 35V001	222 40V001
Standard Americas with control unit	222 30V002	222 35V002	222 40V002
Standard EURO	222 30	222 35	222 40
Standard Americas	500 882	500 665	500 728
Special	22230V004	22235V006	500 654
Retrofit kit energy control unit	503 647V001	503 648V001	503 649V001
Retrofit kit energy control unit US	503 647V002	503 648V002	503 649V002
Astrotorus baffle	227 70	227 75	227 80
Water flow monitor	500006623	500006623	500006623
Over-temperature protection switch	122 84	122 84	122 84
Contact thermometer	218 81	218 81	218 81
Resistance thermometer Pt100 sensor	200 02 958	200 02 958	200 02 958
Pump fluid ⁴⁾	see Catalog Part "Oils / Greases / Lubricants LEYBONOL"		

¹⁾ Measured to DIN 28 427 with LEYBONOL LVO 500 as the pump fluid

²⁾ The required quantity of cooling water refers to $\Delta T = 10^\circ \text{C}$ (50°F). The discharge temperature should not exceed 30°C (86°F)

³⁾ Single- or two-stage rotary vane vacuum pump (TRIVAC; SOGEVAC) from our range of forevacuum pumps jointly with Roots vacuum pumps (RUVAC) in pump systems

⁴⁾ Oil must be purchased separately

DIJ Pumps

Water-Cooled



DIJ 20 with plug (right), DIJ 20 with fuse box (middle) and DIJ 630 with energy saving unit (EER) (right)

The Leybold oil diffusion pumps are ideal for all industrial high vacuum applications.

The DIJ series impresses with innovative and energy-efficiency construction.

Important features are a new heating conception; variable flange connections; fully equipped with fore line baffle and cold cap baffle; electrical connect variants and a powerful five stage nozzle system.

Advantages to the User

- Lowest operation costs by minimized energy consumption
- Stable throughput in the 10^{-2} to 10^{-3} mbar range (e.g. for sputtering or steel degassing)
- Flexible flange design
Flange variants:
 - ANSI / Inch flanges (with O-ring)
 - ISO-F or ISO-K flanges (with centering ring)
- Highest system uptime
- Smart temperature control ensures minimum load and longest lifetime for heaters and oil
- Unique baffle design
- Various electrical connection possibilities:
 - Three different connection variants available incl. energy control system (ECU)
- 4 + 1 stage system design:
 - The 4 diffusion pump stages provide excellent high-vacuum pumping speed
 - The additional jet-stage ensures stable throughput at pressures $> 10^{-3}$ mbar

Typical Applications

The diffusion pumps from the DIP range are used in coating systems, vacuum melting and drying systems as well as in vacuum furnaces in the area of metallurgy.

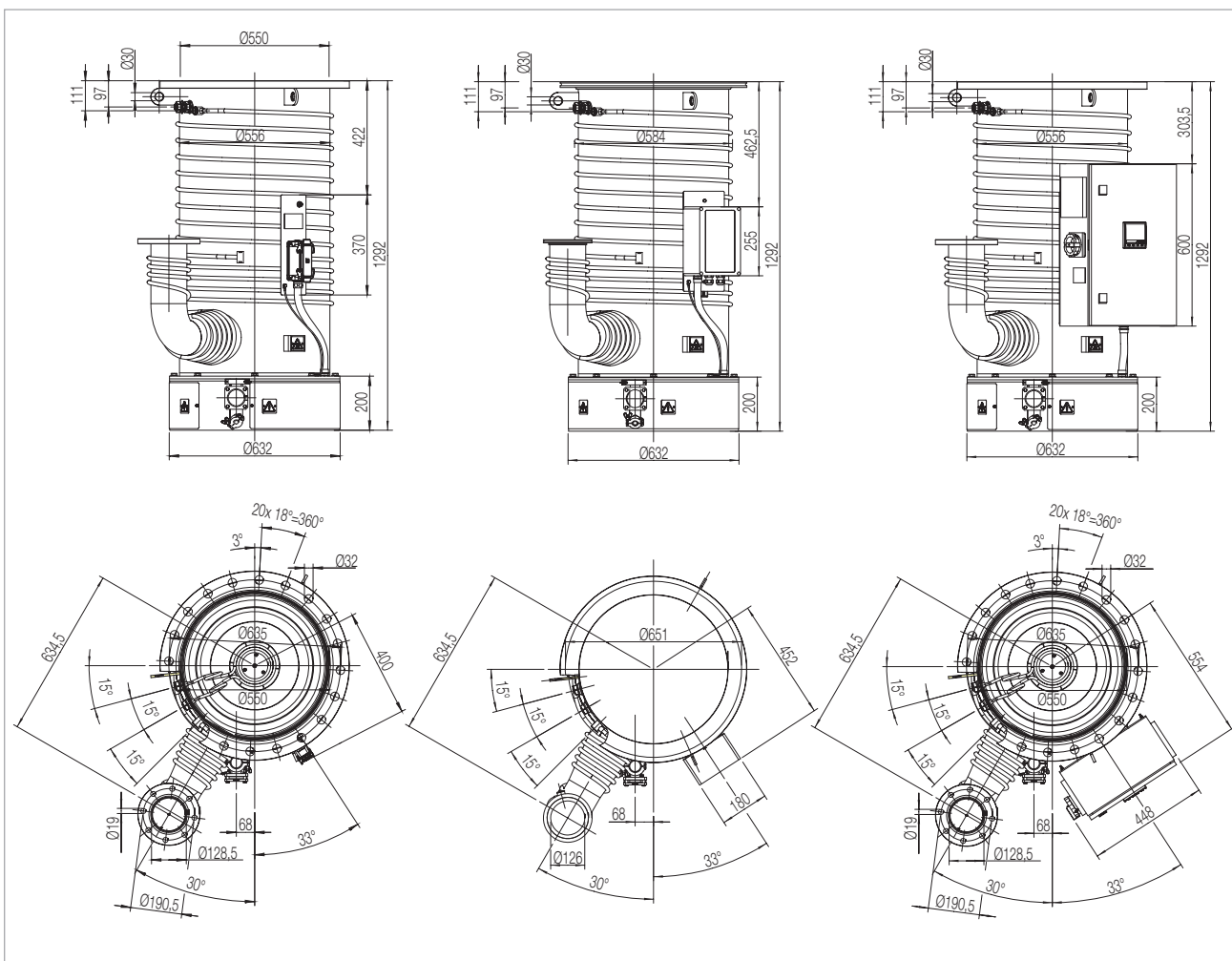
Supplied Equipment

All DIJ pumps are shipped from the factory without pump fluid installed.

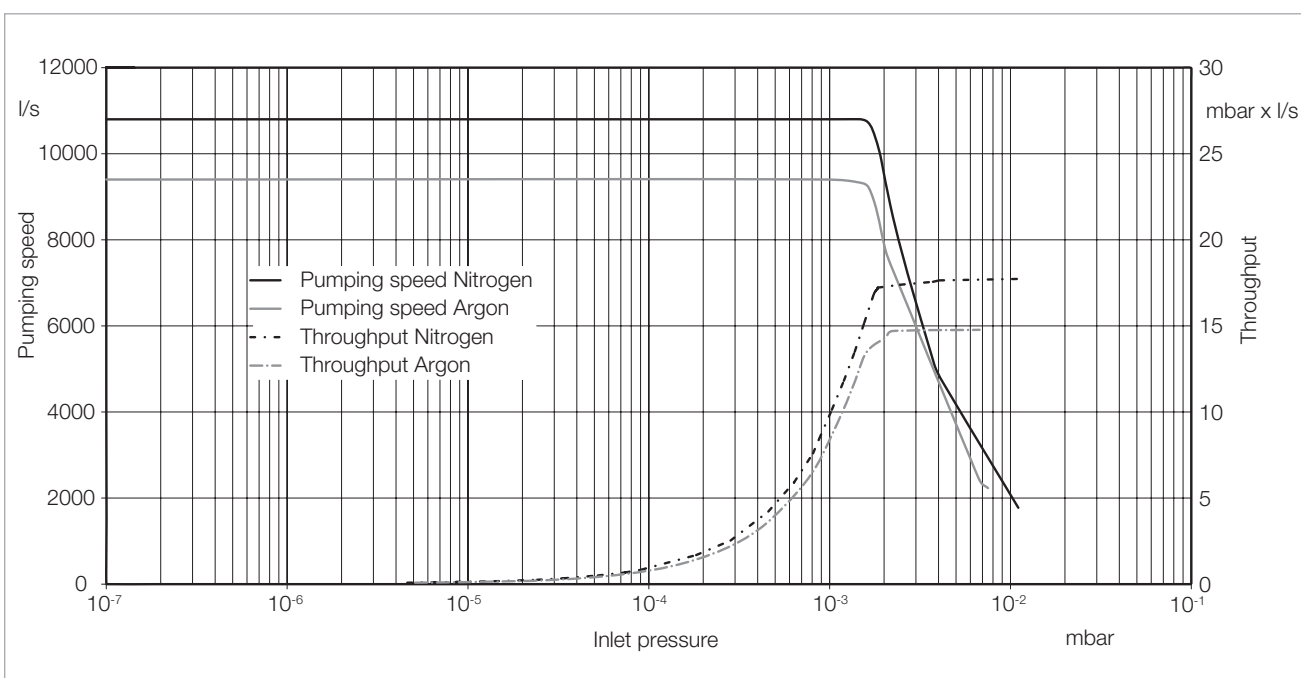
Included as standard equipment with the pump are

- centering ring with centering star, O-ring and outer ring for the high-vacuum flange,
- centering ring with insert for forevacuum baffle, O-ring and outer ring for the forevacuum flange.

The high-vacuum and forevacuum flanges are closed with shipping flanges and claws. The insides of the pumps have been cleaned; they are evacuated prior to shipment.



Dimensional drawings for DIJ 20 with plug, (left), DIJ 20 with ESU (middle) and DIJ 630 with junction box (EER) (right)



Pumping speed overview for nitrogen and argon

Technical Data

		DIJ 10	DIJ 320	DIJ 16	DIJ 500	DIJ 20	DIJ 630	DIJ 35	DIJ 1000
High vacuum connection	DN	10" ANSI	320 ISO-K	16" ANSI	500 ISO-K	20" ANSI	630 ISO-K	35" ANSI	1000 ISO-F
Forevacuum connection	DN	2" ANSI	63 ISO-K	3" ANSI	100 ISO-K	4" ANSI	160 ISO-K	6" ANSI	200 ISO-K
Pumping speed ¹⁾ for Nitrogen < 10 ⁻⁴ mbar		2 800		6 800		10 800		28 000	
Working range	mbar	< 10 ⁻² to 10 ⁻⁷		< 10 ⁻² to 10 ⁻⁷		< 10 ⁻² to 10 ⁻⁷		< 10 ⁻² to 10 ⁻⁷	
Ultimate total pressure ²⁾	mbar	< 5 x 10 ⁻⁷		< 5 x 10 ⁻⁷		< 5 x 10 ⁻⁷		< 5 x 10 ⁻⁷	
Max. permissible forevacuum pressure	mbar	5 x 10 ⁻¹		5 x 10 ⁻¹		5 x 10 ⁻¹		5 x 10 ⁻¹	
Pump fluid fill, min. / max.	l	1.0 / 1.4		1.7 / 3.4		5.0 / 7.0		12.0 / 18.0	
Mains voltage	V	1 ~ 230 /N/PE		3 ~ 400 /N/PE		3 ~ 400 /N/PE		3 ~ 400 /N/PE	
depending on variant, 50 / 60 Hz	V	1 ~ 230 /N/PE		3 ~ 460 /N/PE		3 ~ 460 /N/PE		3 ~ 460 /N/PE	
Heating power	kW	2.4		3.6		10.8		21.6	
Number of heating cartridges		2		3		9		18	
Warm up period	min	< 25		< 25		< 25		< 30	
Coolant (minimum) ²⁾									
for the pump	l/h	160		290		600		1 200	
for the cold cap baffle	l/h	20		50		80		150	
Number of cooling circuits (including cold cap baffle)		2		2		2		2	
Coolant connection									
for the pump	G	3/8"		1/2"		1/2"		1/2"	
for the cold cap baffle	G	1/4"		3/8"		3/8"		3/8"	
Weight, approx.	kg	45		110		208		720	
Recom. forevacuum pumps ³⁾									
at working pressure > 10 ⁻⁴ mbar		SV 100 B & W 501		SV 200 & W 501		SV 300 B & W 1001		SV 630 B & W 2001	
oil-sealed		-		DV 450 & W 501		DV 450 & W 1001		DV 650 & W 2001	
dry-compressing									
at working pressure < 10 ⁻⁴ mbar		D 25 B		D 65 B & W 251		SV 100 B & W 501		SV 300 B & W 1001	
oil-sealed		ECODRY plus 60		ECODRY plus 60 & W 251		-		DV 450 & W 1001	
dry-compressing									
Recom. supporting pump ³⁾		TRIVAC D 25 B		TRIVAC D 40 B		TRIVAC D 65 B		TRIVAC D 65 B	

1) Measured as per DIN 28 427 using DC 704 normal as the pump fluid.

2) The coolant water volume is referenced to $\Delta T = 10$ K. The discharge temperature should not exceed 30 °C.

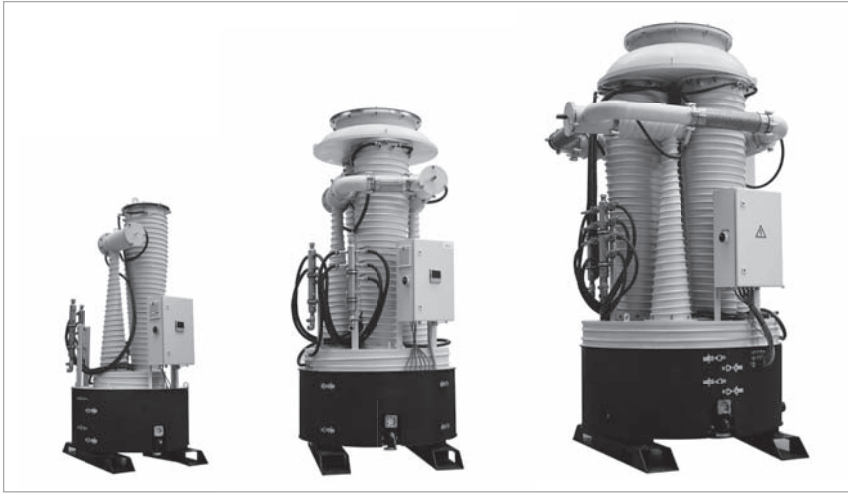
3) Single- and two-stage rotary vane pumps (TRIVAC; SOGEVAC), or dry-compressing pumps (ECODRY plus ;DRYVAC) from our line of forevacuum pumps in conjunction with roots pumps (RUVAC) in pumping systems.

Ordering Information

	DIJ 10	DIJ 320	DIJ 16	DIJ 500	DIJ 20	DIJ 630	DIJ 35	DIJ 1000
	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
with plug 400V / 50/60 Hz / 3ph PN/Y	22213V000	22214V000	22223V000	22224V000	22227V000	22228V000	22243V000	22244V000
with plug 460V / 50/60 Hz / 3ph PN/Y	22213V001	22214V001	22223V001	22224V001	22227V001	22228V001	22243V001	22244V001
with fuse box 400V / 50/60 Hz / 3ph PN/Y	22213V005	22214V005	22223V005	22224V005	22227V005	22228V005	22243V005	22244V005
with fuse box 460V / 50/60 Hz / 3ph PN/Y	22213V006	22214V006	22223V006	22224V006	22227V006	22228V006	22243V006	22244V006
with energy saving unit (EER) 400V / 50/60 Hz / 3ph PN/Y	-	-	-	-	22227V009	22228V009	22243V009	22244V009
with energy saving unit (EER) 460V / 50/60 Hz / 3ph PN/Y	-	-	-	-	22227V010	22228V010	22243V010	22244V010
Accessories								
Water flow monitor	500006623	500006623	500006623	500006623	500006623	500006623	500006623	500006623
Over-temperature protection switch	122 84	122 84	122 84	122 84	122 84	122 84	122 84	122 84
Astrotorus baffle	227 51	227 50	227 61	227 60	227 71	227 70	227 81	227 80
Right angle valve	504138V008	504138V002	504138V008	504138V002	504138V008	504138V002	504138V008	504138V002
Pump fluid ¹⁾	see Catalog Part "Oils / Greases / Lubricants LEYBONOL"							

1) Oil must be purchased separately

Oil Booster OB 6000 to OB 18000



Oil Booster OB 6000 (left), OB 12000 (middle) and OB 18000 (right)

The design of the oil booster pumps from Leybold is well proven in industrial high vacuum applications. They excel above all through excellent vacuum performance data and are, owing to their rugged design a reliable component in many medium and high vacuum units.

The water cooled oil booster pump was developed in particular for applications in the rough and medium vacuum range. The pumps from the OB line from Leybold deliver when properly deployed, a maximum pumping speed at high gas throughputs.

Advantages for the User

- Very high pumping speed from a small sized pump
- Pump sizes 6000, 12,000 and 18,000 m³ per hour
- Simple to operate
- Rugged and long life
- Selectable flange connections (OB 12,000 and 18,000 only)
- Small manageable amount of spare parts
- Pump components (e.g. heating elements, diffusion corpus, jet corpus) are similar for all OB sizes and can be exchanged easily
- Modern electronic pump monitoring (PLC controlled)
- High efficiency due to direct heating
- Optimized heating design for long oil change intervals

Typical Applications

- Vacuum Induction Melting (VIM) or Vacuum Induction Degassing (VID) of special alloys are utmost important process steps in the metallurgy.
- Depending on the required steel-quality, the required process pressure in such applications is particularly low.
- Secondary metallurgy processes are becoming more popular thanks to the greater demand for better steels e.g. in the automotive, construction and rail markets.

Supplied Equipment

The OB pumps are plug-and-play but are delivered without pump fluid.

The pump chamber is free of oil and has been cleaned.

The inside volume is evacuated. The high vacuum and forevacuum flanges are equipped with sealing and centering rings as well as shipping flanges. Moreover, the electric circuit breaker box and the cooling water manifold have been installed for immediate connection.

The included Pt100 temperature sensor ensures safe oil temperature monitoring.

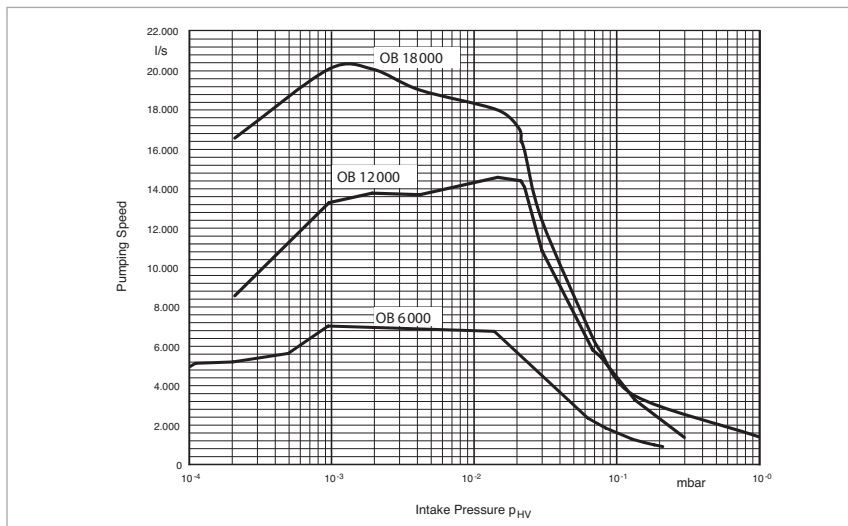
The installed overtemperature protection switch monitors and ensures safe operation of the pump.

Technical Data

		Oil Booster		
		OB 6000	OB 12000	OB 18000
Pumping speed for air below 1.0×10^{-3} mbar (7.5×10^{-3} Torr)	mbar x l/s	6.000	12.000	18.000
High vacuum connection standard optional	DN DN	400 ISO-K 400 ISO-K / ASA 16 / ASA 18	630 ISO-F 500 ISO-K / 800 ISO-F / ASA 16 / ASA 20	630 ISO-F 800 ISO-F / 1000 ISO-F / ASA 32 / ASA 35
Fore vacuum connection (standard)	DN	160 ISO-K	160 ISO-K	160 ISO-K
Operating range	mbar (Torr)	1 to 10^{-6} (0.75 to 10^{-6})	1 to 10^{-6} (0.75 to 10^{-6})	1 to 10^{-6} (0.75 to 10^{-6})
Ultimate total pressure	mbar (Torr)	5×10^{-6} ($< 3.75 \times 10^{-6}$)	5×10^{-6} ($< 3.75 \times 10^{-6}$)	5×10^{-6} ($< 3.75 \times 10^{-6}$)
Pump fluid filling	l (qts)	45 (47.6)	60 (63.4)	90 (95.1)
Mains connection Standard EURO, 50/60 Hz Standard Americas, 50/60 Hz Special, 50/60 Hz	V V V	400 ~ 3 Ph Y 460 ~ 3 Ph Y 230 ~ 3 Ph Δ	400 ~ 3 Ph Y 460 ~ 3 Ph Y 230 ~ 3 Ph Δ	400 ~ 3 Ph Y 460 ~ 3 Ph Y 230 ~ 3 Ph Δ
Weight	kg (lbs)	450 (992)	850 (1874)	1400 (3086)
Cooling water consumption connection	l/h (gal/min) G	700 (3.1) 1"	800 (3.5) 1"	1360 (6.0) 1"

Ordering Information

		Oil Booster		
		OB 6000	OB 12000	OB 18000
		Part No.	Part No.	Part No.
Oil diffusion pump Standard EURO Standard US with control unit EURO version US version with control unit and waterflow/ -temperature monitoring EURO version (400 V) US version (460 V)		503750V001	503654V001	503508V001
		503750V006	503654V006	503508V006
		503750V002	503654V002	503508V002
		503750V005	503654V005	503508V005
		503750V003	503654V003	503508V003
		503750V004	503654V004	503508V004
Pump fluid	see Catalog Part "Oils / Greases / Lubricants LEYBONOL"			



Pumping speed curves of the Oil Booster OB 6000 to OB 18000 as a function of the intake pressure

LEYBOJET 630

Water-Cooled



LEYBOJET 630

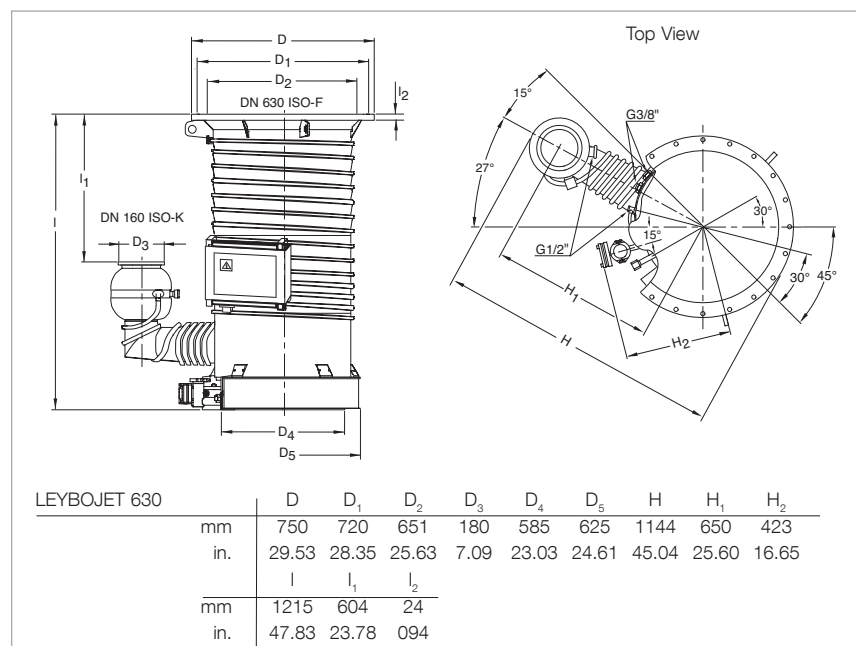
The oil diffusion pumps from Leybold are well proven in industrial high vacuum applications.

They excel through their excellent vacuum performance data and owing to their rugged design are a reliable component in many medium and high vacuum systems.

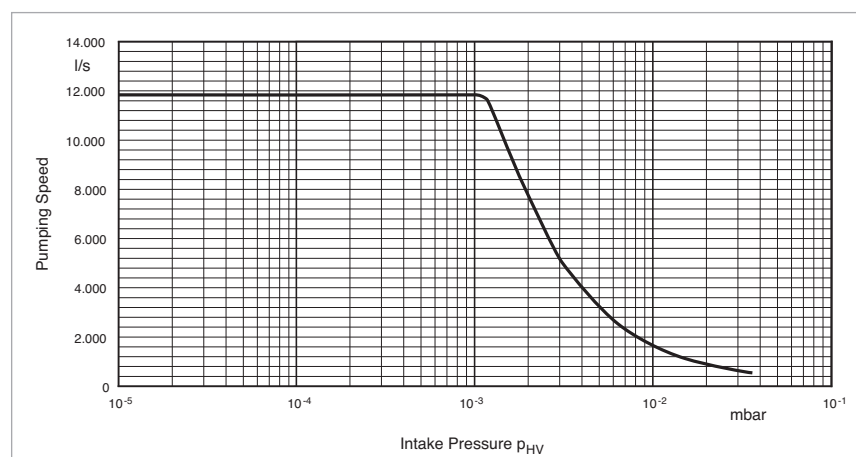
The water-cooled LEYBOJET 630 was developed especially with the medium vacuum in mind.

Advantages for the User

- High and stable pumping speed well into medium vacuum range
- Low ultimate pressure
- Low oil backstreaming due to integrated water-cooled cold cap baffle
- High forevacuum tolerance
- Each heating cartridge is protected by a separate circuit breaker
- In maintaining the well proven heating system - heating insert with thermally conducting panels and heating cartridges - the LEYBOJET 630 is now equipped with an additional ejector nozzle for the purpose of obtaining a stable pumping speed well into the medium vacuum range



Dimensional drawing for the LEYBOJET 630



Pumping speed curve of the LEYBOJET 630 as a function of the intake pressure

Typical Applications

The principal areas of application of the LEYBOJET 630 are modern sputtering processes as well as vacuum melting and drying plants.

Supplied Equipment

The LEYBOJET 630 are supplied ready for connection but without the filling of pump fluid.

The inside of the pump is cleaned before delivery to such an extent that it is free of oil. The inside is evacuated. High and forevacuum flanges are equipped with gaskets, centering rings, shipping flanges, and clamping components.

Technical Data

LEYBOJET 630

High vacuum connection	DN	630 ISO-F
Forevacuum connection	DN	160 ISO-K
Pumping speed for air ¹⁾		
at 1×10^{-2} mbar	l/s	1 700
at 1×10^{-3} mbar	l/s	12 000
< 1×10^{-4} mbar	l/s	12 000
Operating range	mbar (Torr)	< 10^{-2} (< 0.75×10^{-2})
Ultimate total pressure ¹⁾	mbar (Torr)	< 5×10^{-7} (< 3.75×10^{-7})
Max. permissible forevacuum pressure		
mbar (Torr)		6×10^{-1} (4.5×10^{-1})
Pump fluid filling, min. / max.	l (qts)	5.0 / 8.0 (5.3 / 8.5)
Mains connection 50/60 Hz	V	400, 3 Ph
Heating power	kW	10.8
Number of heating cartridges		9
Heating up time	min	< 30
Cooling water		
min. throughput ²⁾	l/h (gal/min)	500 (2.2)
connection	G	1/2"
Number of cooling circuits (including cold cap baffle)		2
Cooling water connection		
for pump	G (BPS)	1/2"
for cold cap baffle	G (BPS)	3/8"
Weight, approx.	kg (lbs)	145 (320)
Recommended backing pump ³⁾		
at operating pressures		
> 10^{-4} mbar (> 0.75×10^{-4} Torr)		SV 200 + W 501
at operating pressures		
< 10^{-4} mbar (< 0.75×10^{-4} Torr)		TRIVAC D 65 B + W 251

Ordering Information

LEYBOJET 630

	Part No.
Oil diffusion pump LEYBOJET 630	502 180
Astrotorus baffle	227 70
Water flow monitor	500006623
Over-temperature protection switch	122 84
Contact thermometer	218 81
Resistance thermometer Pt100 sensor	200 02 958
Pump fluid ⁴⁾	see Catalog Part "Oils / Greases / Lubricants LEYBONOL"

¹⁾ Measured to DIN 28 427 with LEYBONOL LVO 500 as the pump fluid

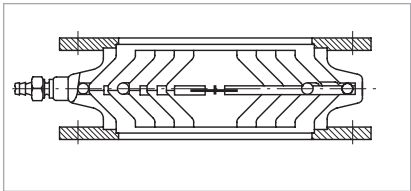
²⁾ The required quantity of cooling water refers to $\Delta T = 10^\circ \text{C}$ (50°F). The discharge temperature should not exceed 30°C (86°F)

³⁾ Single- or two-stage rotary vane vacuum pump (TRIVAC; SOGEVAC) from our range of forevacuum pumps jointly with Roots vacuum pumps (RUVAC) in pump systems

⁴⁾ Oil must be purchased separately

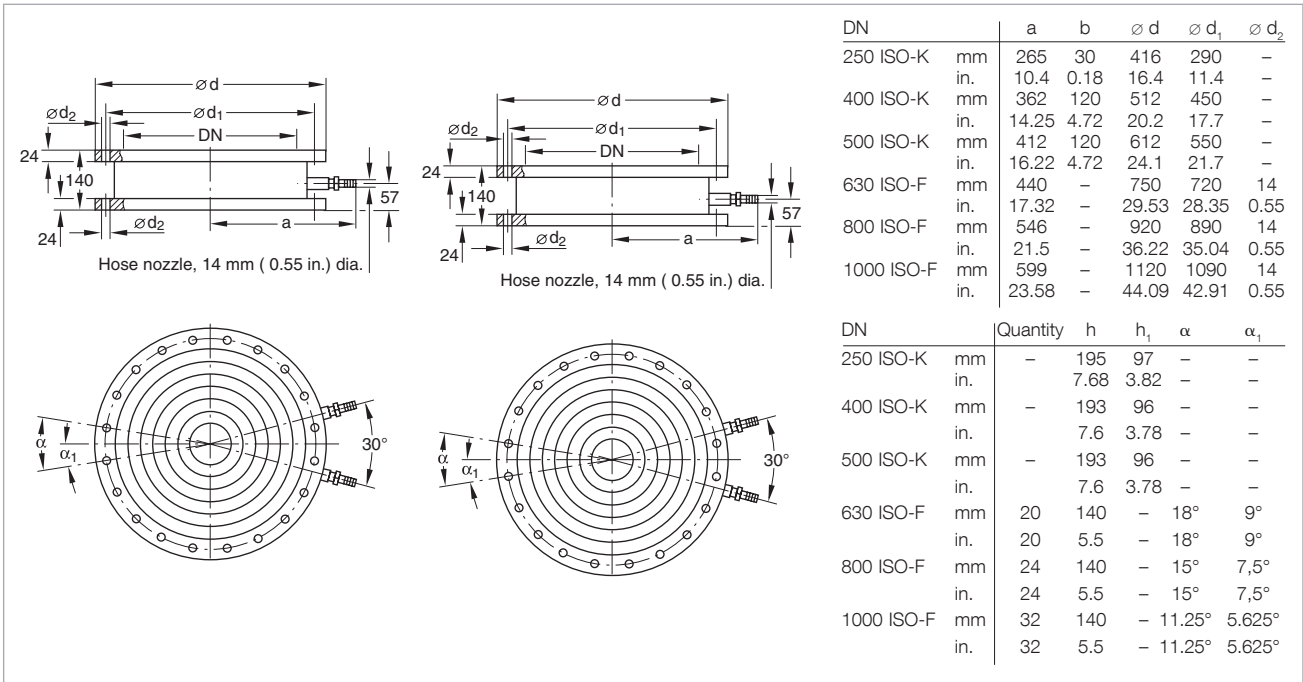
Accessories for Oil Diffusion Pumps

Astrotorus Baffles



Section through an astrotorus baffle

The cooling inserts of the astrotorus baffles are made of copper, whereas the housing and the connection flange are made of standard steel.



Dimensional drawing for the astrotorus baffle ISO-K (left) and ISO-F (right)

Technical Data

Astrotorus Baffles

Connection to pump	DIP	3 000	8 000	12 000
HV connection flanges	DN	250 ISO-K	400 ISO-K	500 ISO-K
Throttling of the pumping speed, approx.	%	30	30	30
Conductance	l/s	3 000	9 000	12 000
Weight	kg (lbs)	25.0 (55.2)	30.0 (66.2)	65.0 (143.5)

Ordering Information

Astrotorus Baffles

	Part No.	Part No.	Part No.
Astrotorus baffle			
250 ISO-K	227 50	–	–
400 ISO-K	–	227 60	–
500 ISO-K	–	–	227 65

Technical Data

Astrotorus Baffles

Connection to pump	DIP	20 000	30 000	50 000
HV connection flanges	DN	630 ISO-F	800 ISO-F	1000 ISO-F
Throttling of the pumping speed, approx.	%	30	30	30
Conductance	l/s	18 000	28 000	50 000
Weight	kg (lbs)	120.0 (264.9)	170.0 (375.3)	190.0 (419.4)

Ordering Information

Astrotorus Baffles

	Part No.	Part No.	Part No.
Astrotorus baffle			
630 ISO-F	227 70	–	–
800 ISO-F	–	227 75	–
1000 ISO-F	–	–	227 80

For matching valves, please ask us for a quotation.

Temperature dependant Switching Components for Automatic Pump System Control

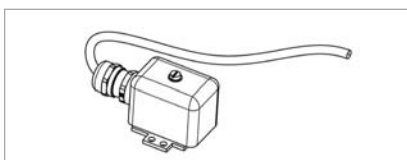
The operational status of the diffusion pump depends on the temperature of the pump fluid in the pump boiler. Through temperature dependent switching components which are inserted into the pump boiler it is possible to monitor the operational status of the diffusion pump and signal its status to a process controller.

For this, the diffusion pump requires two thresholds. Depending on the type of pump, the upper threshold should be between 180 and 200 °C (356 and 392 °F) and the lower threshold between 90 and 100 °C (194 and 212 °F).

The upper threshold indicates that the diffusion pump is ready for operation and thus actuates certain devices, for example opening of the high vacuum valve ahead of the diffusion pump.

The lower threshold indicates that the diffusion pump has cooled down to such an extent that the backing pump and the cooling water supply may be switched off.

Over-temperature protection switches are used to monitor the temperature of the cooling water in the cooling water circuit of the diffusion pumps. When the temperature rises to unacceptably high levels (for example when the cooling water supply fails) the heater in the diffusion pump is switched off (correct electrical connection to the main supply is required). The use of over-temperature protection switches avoids unnecessary alarms that may be triggered by contaminated water when only a water flow monitor is used. The over-temperature protection switch is screwed on to a contact plate which is soldered to the cooling pipe on the



Over-temperature protection switch

pump's body.

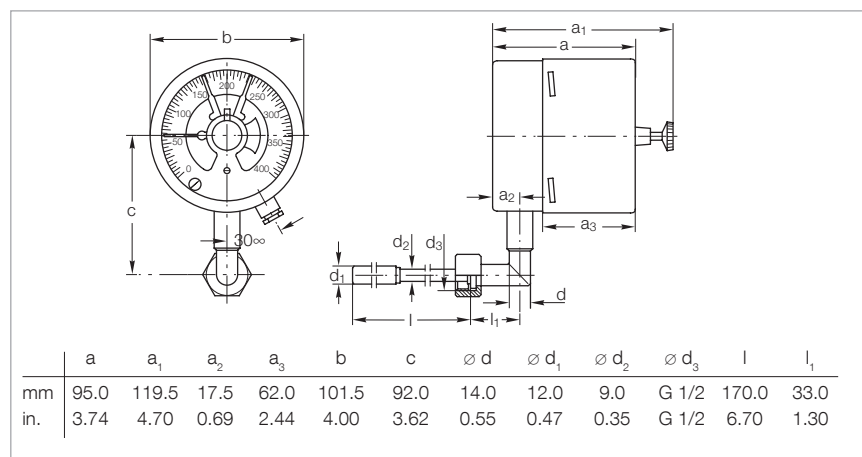
Max. switching current: 5 A (230 V, 50/60 Hz).

Contact thermometer with a range from 0 to 400 °C (32 to 752 °F).

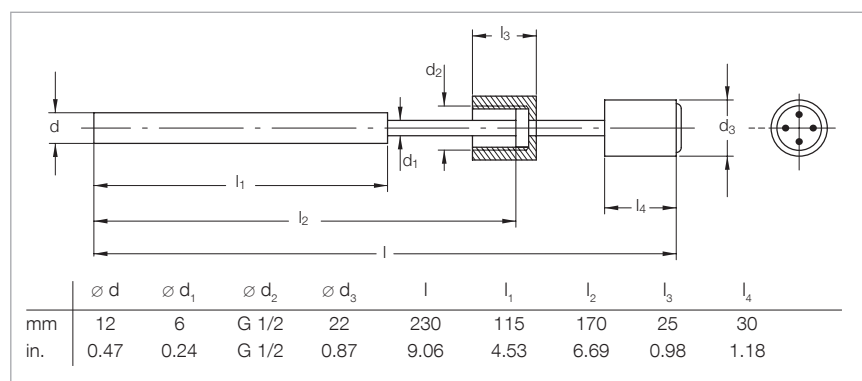
Through a trailing pointer two switching thresholds may be set up independently. The current oil temperature and the thresholds which have been set up can be read off at the

location of the diffusion pump. The contacting thermometer is not suited for remote signaling of temperatures.

Resistance thermometer Pt100 sensor. The measurement range of this sensor depends on the temperature display unit used by the customer where also the required thresholds are set up. The Pt100 sensor is ideal for remote signaling of temperatures.



Dimensional drawing for the contact thermometer



Dimensional drawing for the resistance thermometer Pt100 sensor

Ordering Information

Monitoring Instruments

	Part No.
Over-temperature protection switch	122 84
Contact thermometer (Measurement range 0 to +400 °C (+32 to +752 °F), Rating at 220 V AC: 250 mA [resistive load], Weight: 1.7 kg (3.7 lbs))	218 81
Resistance thermometer Pt100 sensor	200 02 958

Monitoring Instruments

Protection against Overheating

Water flow monitors are installed in the cooling water return section of the diffusion pump. When the cooling water throughput drops below a certain level, either the heater in the diffusion pump is switched off or a warning light or signal is triggered, depending of the type of circuit.

Measurement range: 1 to 40 l/min
(0.2 to 10.6 gal/min)

The water throughput may be set within the limits stated with a high degree of reproducibility.

Water flow monitors may be installed in any orientation.

Max. switching capacity:
100 VA (230 V, 50/60 Hz).

Ordering Information

Water Flow Monitor

	Part No.
Water flow monitor	500006623

Protection against Power Failure

A SECUVAC valve (see Product Section "Vacuum Valves") must be installed in the forevacuum line in order to prevent damage to the diffusion pump or the pump fluid in the event of a power failure affecting backing pumps which are not equipped with an automatic isolation valve. Rotary vane vacuum pumps from the TRIVAC B series are equipped with an automatic Pressure relief valve (intake isolation valve) as standard.

Protection against Pressure Increases in the Forevacuum Line

For protection against a pressure increase in the forevacuum line which is not caused by a power failure you may use our vacuum gauges which offer an adjustable switching threshold (see Product Section "Vacuum - Measuring, Controlling").

Power Controller



Power controller with integrated USB interface



Ethernet interface for PLC data integration

When it comes to the aspect of economic and efficient operation of diffusion pumps, power consumption plays an important role.

Through our DIP power controller, you may now drastically cut your power consumption – and this without impairing pump performance in any way!

Leybold Solutions provides a unique energy control unit with less thermal loss to control the heating power to save energy significantly!

Advantages to the User

- Energy saving up to 30% (low costs and ROI in less than three years)
- Further potential savings through temperature decrease in standby-mode
- High quality regulation with customized software
- Increased operation safety and comfort
- Improved service life for oil and heating cartridges
- Easy and exact to operate via PLC or manual directly at the pump
- Uncomplicated integration of generated data into your own process control or export data via USB port
- Strategically process analysis and optimization by interpretation of energy control unit data

Technical Data

Power Controller for

		DIP 20 000	DIP 30 000	DIP 50 000
Pumping speed for air below 1×10^{-4} mbar	l/s	20 000	30 000	50 000
Installed heating power	kW	12	18	24
Number of heating cartridges		2	6	9
Heating up time	min	< 25	< 30	< 30
Cooling water (minimum) for the pump	l/h	600	900	1500
for the cold cap baffle	l/h	80	80	150

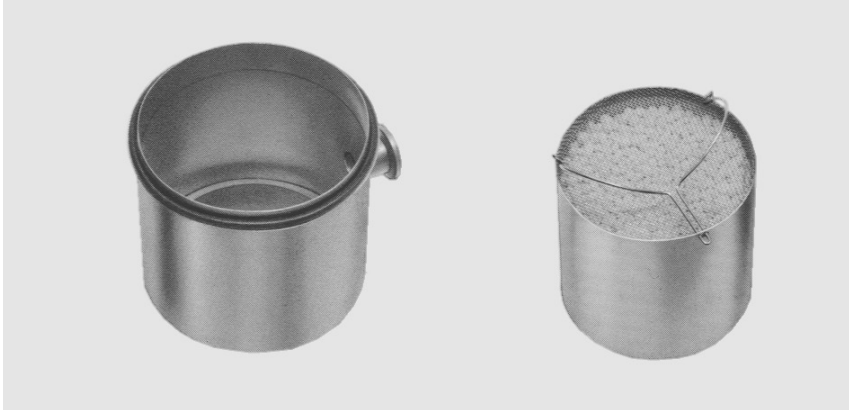
Ordering Information

Power Controller for

	DIP 20 000	DIP 30 000	DIP 50 000
	Part No.	Part No.	Part No.
Oil diffusion pump with power controller			
DIP 20 000	22230V001	-	-
DIP 30 000	-	22235V001	-
DIP 50 000	-	-	22240V001
Retrofit kit (DIP power controller)			
DIP 20 000	503647V001	-	-
DIP 30 000	-	503648V001	-
DIP 50 000	-	-	503649V001
Full-service retrofit kit ¹⁾			
DIP 20 000	AS8100F	-	-
DIP 30 000	-	AS8101F	-
DIP 50 000	-	-	AS8102F
Mineral oil LVO 500			
1 l	L50001	L50001	L50001
5 l	L50005	L50005	L50005
20 l	L50020	L50020	L50020
Mineral oil LVO 510			
1 l	L51001	L51001	L51001
5 l	L51005	L51005	L51005
Silicone oil LVO 520			
1 l	L52001	L52001	L52001
5 l	L52005	L52005	L52005
Silicone oil LVO 530			
1 l	L53001	L53001	L53001

¹⁾ Delivery, installation, commissioning and instruction of the staff is included

Adsorption Traps with Aluminium Oxide Insert



Adsorption traps are installed in all those cases where an oil-free vacuum is to be produced with oil-sealed vacuum pumps.

Advantages to the User

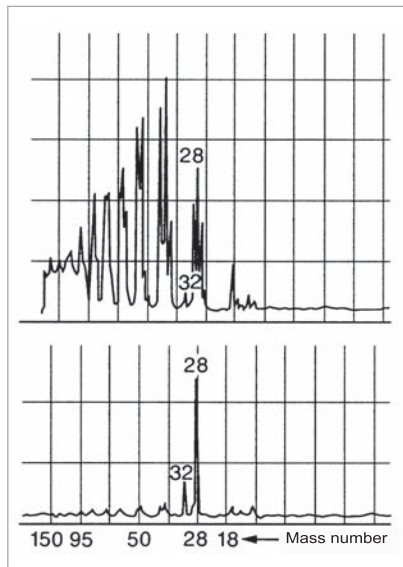
- Backstreaming of oil is reduced by 99%
- Long service life
- High conductance
- Filling can be easily exchanged
- Improvement in the ultimate pressure attained by backing pumps by one order of magnitude
- Stainless steel housing and insert
- NBR gasket

Typical Applications

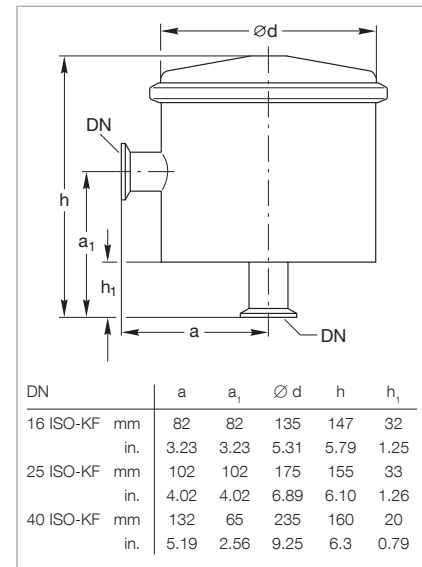
- Product of an oil-free vacuum

Supplied Equipment

- Complete with insert
- Without adsorbent



Residual gas spectrum; top ahead of a rotary vacuum pump, bottom ahead of a rotary vacuum pump with adsorption trap



Dimensional drawing for the adsorption traps

Technical Data

		Adsorption Traps		
		16 ISO-KF	25 ISO-KF	40 ISO-KF
Conductance at 10 ⁻² mbar (Torr)	I/s	4.0	6.0	12.0
Service live with Al oxide	Months	3	3	3
Al oxide filling	l (qts)	0.5 (0.53)	1.0 (1.06)	2.0 (2.1)
Weight, approx.	kg (lbs)	1.3 (2.9)	1.3 (2.9)	4.0 (8.8)

Ordering Information

		Adsorption Traps		
		16 ISO-KF	25 ISO-KF	40 ISO-KF
	Part No.	Part No.	Part No.	
Adsorption trap	854 14	854 15	854 16	
Activated aluminum oxide in tin 1.6 l (approx. 1.2 kg (2.65 lbs))	854 10	854 10	854 10	

Right-Angle Valves, DN 250 ISO-K to DN 1000 ISO-F, Electropneumatically Operated

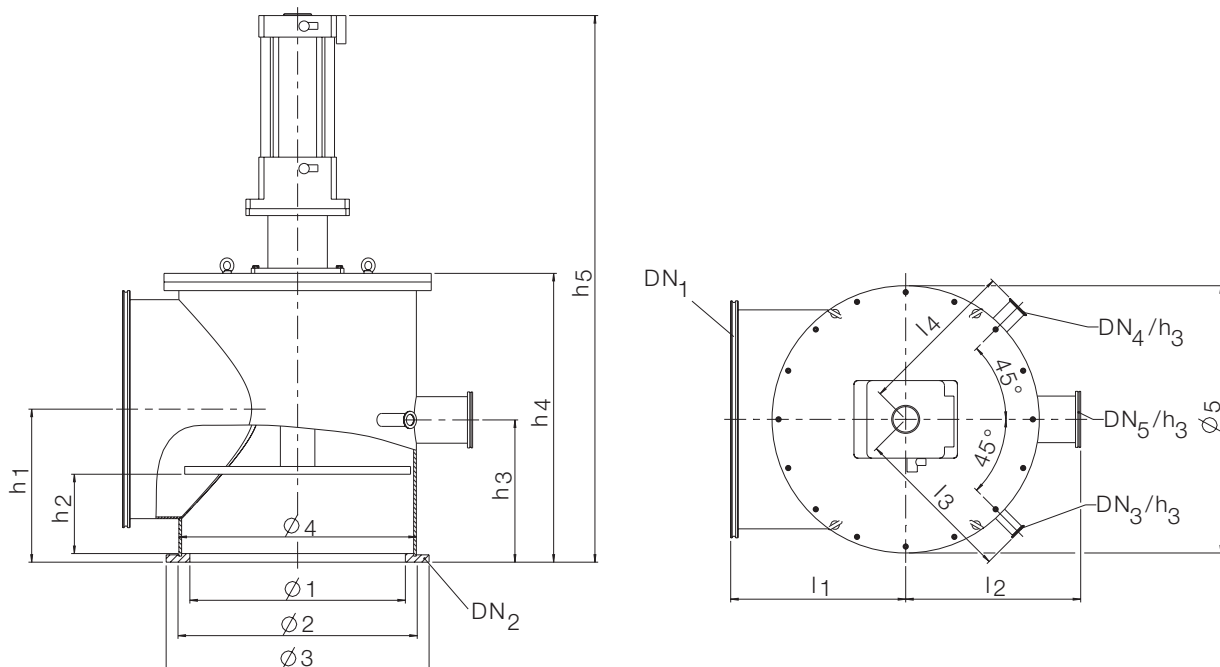


Electropneumatically actuated right-angle valves, stainless steel, DN 250 ISO-K

Electropneumatically actuated right-angle valves are used in automated vacuum systems which need to be controlled electrically.

Advantages to the User

- Pneumatic or electropneumatic opening
- Short opening and closing times
- Optical position indicator
- Electric position indicator
- With and without pilot valve IP 54
- Protection class IP 50
- The valves are closed by the restoring force of a spring
- Installation in any orientation and no restrictions as to the direction of flow



Nominal width (DN ₁ /DN ₂)	DN ₃	DN ₄	DN ₅	h ₁	h ₂	h ₃	h ₄	h ₅	Ø ₁	Ø ₂	Ø ₃	Ø ₄	Ø ₅	l ₁	l ₂	l ₃	l ₄
DN 250 ISO-K	16 KF	40 KF	63 ISO-K	211	83	211	392	565	262	-	290	292	330	208	206	206	206
DN 320 ISO-K	16 KF	40 KF	63 ISO-K	208	107	208	433	934	318	395	425	398,5	470	279	279	258	258
DN 400 ISO-K	25 KF	40 KF	63 ISO-K	246	148	220	538	1045,5	400	480	510	450	510	350	325	300	300
DN 500 ISO-K	25 KF	40 KF	100 ISO-K	355	184	330	670	1268	500	580	610	551	620	406	406	370	370
DN 630 ISO-K	25 KF	40 KF	160 ISO-K	403	233	355	821	1469	630	720	750	690	759	537	470	436	436
DN 800 ISO-F	25 KF	40 KF	250 ISO-K	491	267	440	1002	1668	800	890	920	899	990	595	533	505	505
DN 1000 ISO-F	25 KF	40 KF	250 ISO-K	592	333	542	1206	2133	1000	1090	1120	1110	1220	700	635	603	603

Dimensional drawing (all dimensions in mm)

Technical Data

DN 250 **DN 320** **DN 400** **DN 500** **DN 630** **DN 800** **DN1000**
ISO-K **ISO-K** **ISO-K** **ISO-K** **ISO-K** **ISO-F – F** **ISO-F**

Installation orientation	vertical / pneumatic Cylinder at the top						
Conductance	4,000	6,000	9,000	12,000	20,000	30,000	50,000
Weight (kg)	51	110	150	190	270	350	450
Drive pneumatic	(opening and closing)						
Pressure difference when opening	Max. 200 mbar						
Opening time ²⁾ (sec)	2	3	5	5	6	8	8
Closing time ²⁾ (sec)	2	3	5	5	6	8	8
Service life (actuations)	> 1 x 10 ⁵	> 1 x 10 ⁵	> 1 x 10 ⁵	> 1 x 10 ⁵	> 1 x 10 ⁵	> 5 x 10 ⁴	> 5 x 10 ⁴
Helium leak rate	< 1 x 10 ⁻⁷ mbar l/s						
Pressure range	1 x 10 ⁻⁷ mbar to atmospheric pressure						
Max operating temp.	60 °C						
Connecting flange ¹⁾	DN 250 ISO-K – K	DN 320 ISO-K – F	DN 400 ISO-K – F	DN 500 ISO-K – F	DN 630 ISO-K – F	DN 800 ISO-F – F	DN1000 ISO-F – F
Bypass Flange	63 ISO-K	63 ISO-K	63 ISO-K	100 ISO-K	160 ISO-K	250 ISO-K	250 ISO-K
Further Flanges	NW40 NW16	NW40 NW16	NW40 NW25	NW40 NW25	NW40 NW25	NW40 NW25	NW40 NW25

Materials

Housing and disk	Stainless steel 1.4301
Seals	FKM
Sealing bellows	Stainless steel 1.4373

Pilot valve

Nominal voltage	24 V DC
Nom. power consumption	4,5 W
Duty ratio	100 %

End position switch (max. contact ratings)

Nominal voltage	5 – 240 V AC/DC
Current	100 mA
Power consumption	10 W

Compressed air supply

Air connection	¼" NPT
Pressure range	5 – 7 bar

1) per flange, 12 clamping screws are needed for mounting (Part No. 267 10)

2) under vacuum, differential pressure $\Delta p = 0$ and compressed air = 6 bar (overpressure)

Ordering Information

DN 250 **DN 320** **DN 400** **DN 500** **DN 630** **DN 800** **DN1000**
ISO-K **ISO-K** **ISO-K** **ISO-K** **ISO-K** **ISO-F – F** **ISO-F**

	Part. No.	Part. No.	Part. No.	Part. No.	Part. No.	Part. No.	Part. No.
Right-angle Valve, electropneumatic drive	504137V002	504138V002	504139V002	504140V002	504141V002	504142V002	504143V002
Seal kit with bellows	EK121870-00	EK121871-00	EK121872-00	EK121873-00	EK121874-00	EK121875-00	EK121876-00
Seal kit without bellows	EK121870-01	EK121871-01	EK121872-01	EK121873-01	EK121874-01	EK121875-01	EK121876-01
Electronics-solenoid and position indicators	EK121870-02	EK121871-02	EK121872-02	EK121873-02	EK121874-02	EK121875-02	EK121876-02

More valves please find in the catalog part “Valves”