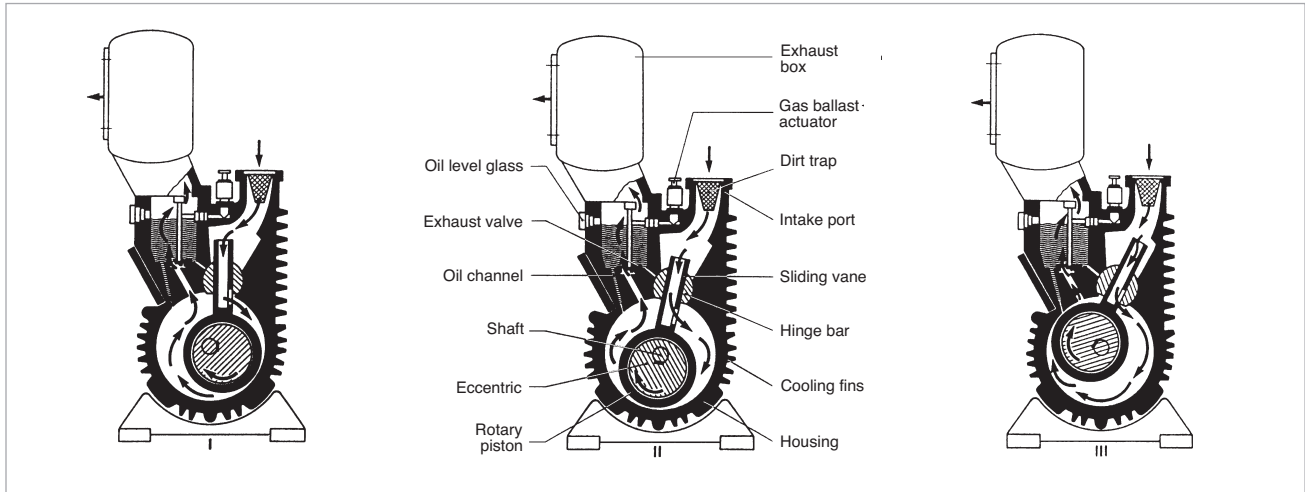


General

Applications and Operation for E and DK pumps



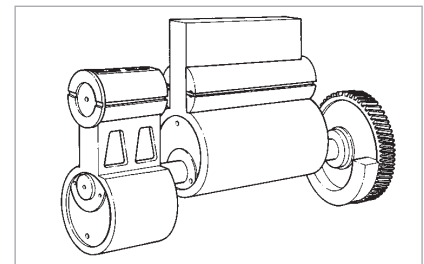
Functional diagram of a rotary piston vacuum pump

Advantages to the User

- Gas ballast facility
- Easy maintenance
- Good ultimate pressure with and without gas ballast
- High pumping speed at low intake pressures
- Compact design with flange mounted motor
- High water vapor tolerance
- Reliable continuous operation
- Tolerant and rugged, due to non-contact rotary piston within the pump chamber
- Very smooth operation due to dynamically balanced masses
- Separate oil filling for the gear protects the gear against contaminated pump oil
- Oil is used for sealing, lubrication and cooling
- A built-in anti-reverse lock prevents incorrect rotation of the piston and also stops it being pulled back when the pump is switched off while under vacuum
- Air cooling makes the pump environmentally-friendly and economic
- Clear design and service-friendly due to the modular design

Technical Note

- By installing a filter, the oil may be cleaned simultaneously



Balancing the masses within a rotary piston vacuum pump: Eccentric shaft, 2 pistons and toothed wheel

Application and Accessories for E and DK pumps

Pumps	E 250	DK 200
Application		
Manufacture of semiconductors	■	■
Vacuum coating	■	■
Chemistry/Pharmaceuticals	■	■
Metallurgy/Furnaces	■	■
Electrical engineering	■	■
Mechanical engineering	■	■
Backing pump for Roots vacuum pumps and in diffusion pump systems	■	■

Accessories

Page

AFK 2 Oil Filter Box with Oil Return Line	187	■	■
Oil Filter Unit	188	■	■
Oil Control Unit	188	■	■
AK Condensate Separator	189	■	■
AF Exhaust Filter	190	■	■
FS Dust Filter	191	■	■
AS Dust Separator	192	■	■

Oil for E and DK pumps for different fields of application

Applications		Manufacture of semiconductors	Vacuum coating	Chemistry/Pharmaceuticals	Metallurgy/Furnaces	Electrical engineering	Mechanical engineering	Backing pump for Roots vacuum pumps	Backing pump for in diffusion pump systems
LEYBONOL Oils									
LVO 100	▲	■	▲	■	■	■	■	■	■
LVO 400	■	●	■	●	●	●	●	●	●

■ = Standard
 ● = Possible
 ▲ = Please contact Oerlikon Leybold Vacuum

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 E and DK pumps for different pump types

Pumps		E 250	DK 200
LEYBONOL Oils			
LVO 100		■	■
LVO 400		●	●

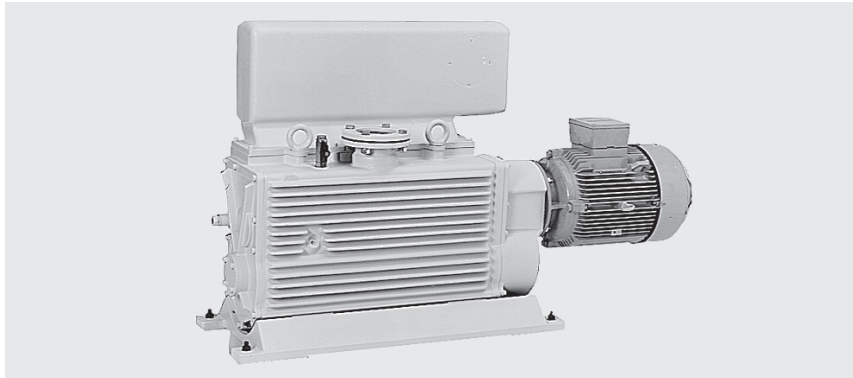
■ = Standard
 ● = Possible
 ▲ = Please contact Oerlikon Leybold Vacuum

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®”.**

Products

Single-Stage Rotary Piston Vacuum Pump E 250

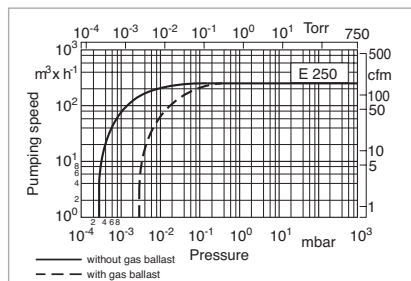


Typical Applications

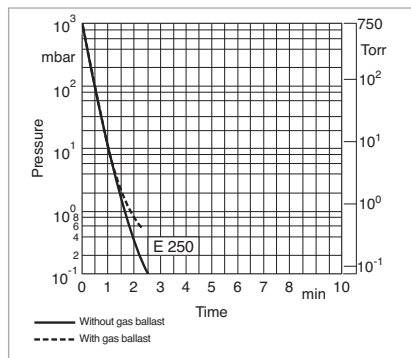
- Chemical, metallurgical and electronic vacuum processes
- Impregnating, degassing and drying processes in experimentation systems, in drying cabinets, extrusion etc.
- Pressure range down to 4×10^{-2} mbar (2.4×10^{-2} Torr) without gas ballast or to 5×10^{-1} mbar (3×10^{-1} Torr) with gas ballast
- Backing pump for Roots vacuum pumps at intake pressure down to 10^{-3} mbar (0.75×10^{-3} Torr)

Supplied Equipment

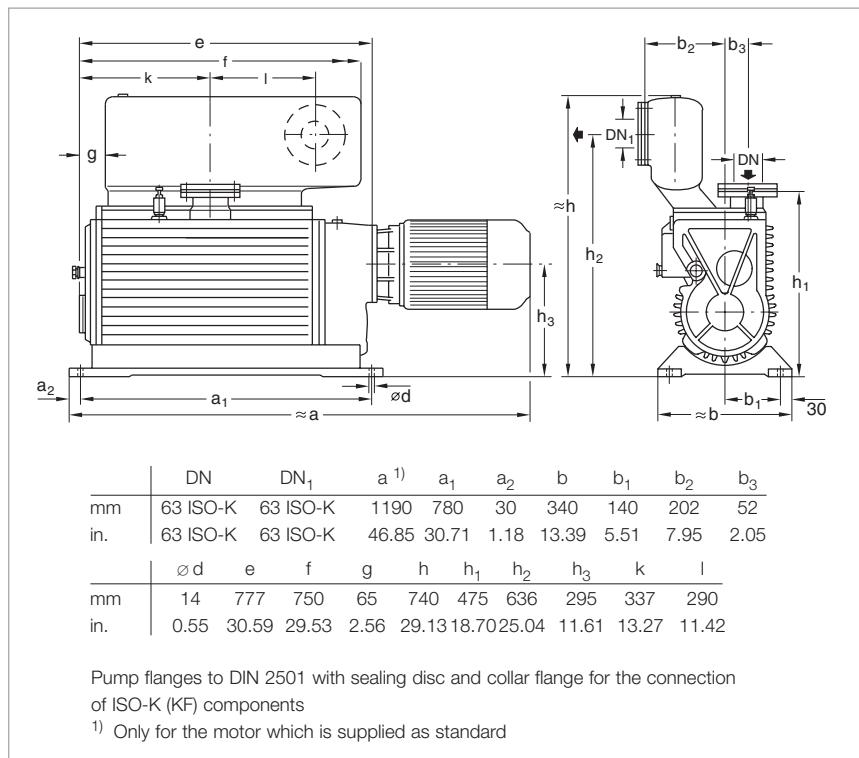
- With DN 65 DIN flanges on the intake and exhaust sides for direct connection of DN 63 ISO-K flange components
- Ready for operation, complete with oil filling
- Special models for different motor voltages, motor frequencies and other protection class ratings are available.



Pumping speed characteristic of the E 250 rotary piston vacuum pump
(60 Hz curves at the end of the chapter)



Pumpdown characteristic of a 1000 l vessel for the E 250 rotary piston vacuum pump
(60 Hz curves at the end of the chapter)



Dimensional drawing for the single-stage rotary piston vacuum pump E 250

Technical Data

E 250

		50 Hz	60 Hz
Nominal pumping speed ¹⁾	m ³ x h ⁻¹ (cfm)	290 (170.8)	290 (170.8)
Pumping speed ¹⁾	m ³ x h ⁻¹ (cfm)	250 (147.3)	250 (147.3)
Ultimate partial pressure without gas ballast ¹⁾	mbar (Torr)	< 4x 10 ⁻² (< 2.4 x 10 ⁻²)	< 4x 10 ⁻² (< 2.4 x 10 ⁻²)
Water vapor tolerance ¹⁾	mbar (Torr)	60 (45)	60 (45)
Average noise level to DIN 45 635 ²⁾	dB(A)	< 76	< 76
Mains voltage 3-ph.	V	230/400	208-230/460
Motor power at			
220 / 380 V, 50 Hz	kW (hp)	5.5 (7.5)	5.5 (7.5)
220 - 230 / 460 V, 50 Hz	kW (hp)	5.5 (7.5)	5.5 (7.5)
200 - 230 V / 460 V, 60 Hz	kW (hp)	5.5 (7.5)	5.5 (7.5)
Nominal motor speed	rpm	1500	1800
Speed of the pump	rpm	540	540
Motor protection	IP	54	54
Oil filling	l (qt)	8.4 (8.9)	8.4 (8.9)
Weight	kg (lbs)	375 (827)	375 (827)
Intake port	DN	63 ISO-K	3" ANSI
Exhaust port	DN	63 ISO-K	3" ANSI

Ordering Information

E 250

	50 Hz	60 Hz
	Part No.	Part No.
Single-stage rotary piston vacuum pump		
E 250, with 50 Hz-motor ³⁾ (220 / 380 V ± 10%)	105 36	-
E 250, with 460 V/50 Hz motor ³⁾ (220 - 230 V / 460 V ± 10%)	895 08	-
E 250, with 460 V/60 Hz motor ^{3), 4), 5)} (200 - 230 V / 460 V ± 10%) US version	-	895 09
E 250, without motor, with 50 Hz gear ^{3), 6)}	166 37	-
Sealing kit, pump	192 63	192 63
Vibration absorbing metal feet	101 55	101 55
ANSI adaptor	upon request	upon request

¹⁾ To DIN 28 400 and following numbers

²⁾ Operated at ultimate pressure without gas ballast, free field measurement at a distance of 1 m (3.5 ft).
When fitting accessories, for example AFK 2, the noise level may change by 2 to 3 dB(A)

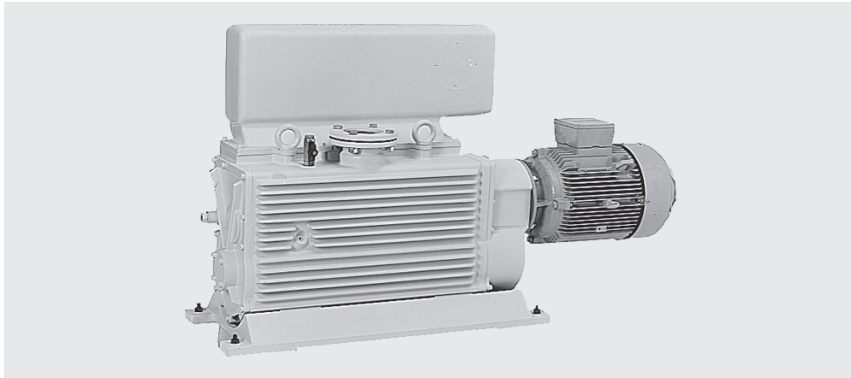
³⁾ For operation at a different frequency, the gear will have to be exchanged. Please state the mains frequency and connection (star or delta) in your order

⁴⁾ Continuous operation from 60 mbar (45 Torr)

⁵⁾ US version supplied with 3" ANSI flanges

⁶⁾ The maximum speed must not exceed 1,500 rpm at 50 Hz. The motor rating must be at least 5 kW (6.8 hp)

Two-stage Rotary Piston Vacuum Pump DK 200



Typical Applications

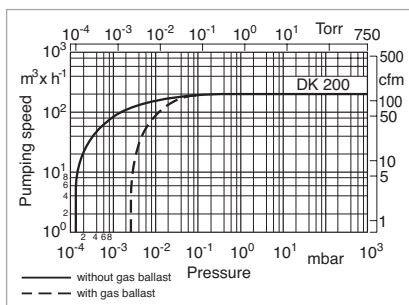
- For particularly low ultimate pressures
- For all chemical, metallurgical and electronic vacuum processes in the pressure range down to 5×10^{-4} mbar (3×10^{-4} Torr) without gas ballast and

4×10^{-3} mbar (2.4×10^{-3} Torr) with gas ballast

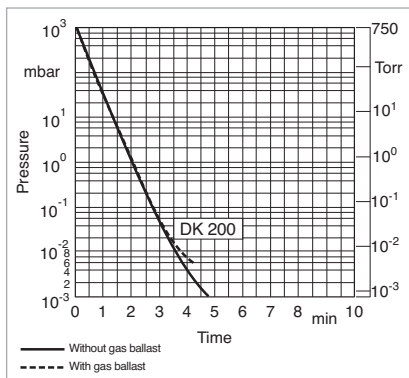
- Backing pump for Roots vacuum pumps
- Use as backing pump in pump systems in connection with diffusion, booster-type diffusion and vapor pumps

Supplied Equipment

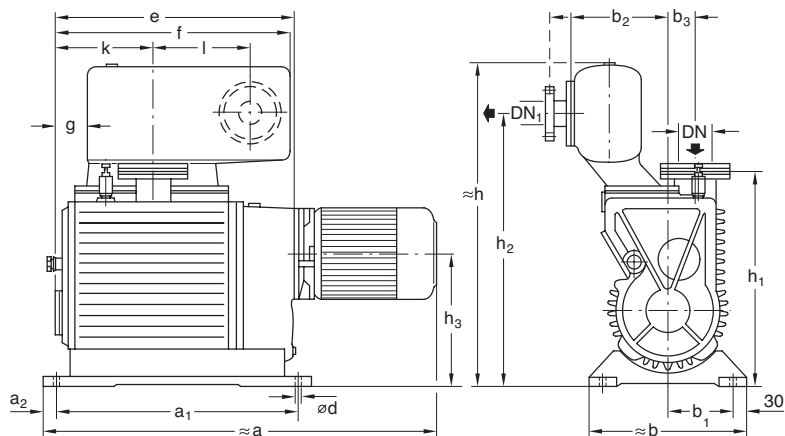
- With DN 65 DIN flanges on the intake and exhaust sides for direct connection of DN 63 ISO-K flange components
- Ready for operation, complete with oil filling
- Special models for different motor voltages, motor frequencies and other protection class ratings are available



Pumping speed characteristic of the DK rotary piston vacuum pump (60 Hz curves at the end of the chapter)



Pumpdown characteristics of a 1000 l vessel for the DK type rotary piston vacuum pump (60 Hz curves at the end of the chapter)



	DN	DN ₁	a ¹⁾	a ₁	a ₂	b	b ₁	b ₂	b ₃	
mm	63 ISO-K	63 ISO-K	1190	780	30	340	140	202	52	
in.	63 ISO-K	63 ISO-K	46.85	30.71	1.18	13.39	5.51	7.95	2.03	
	∅ d	e	f	g	h	h ₁	h ₂	h ₃	k	l
mm	14	777	750	65	740	475	636	295	337	290
in.	0.55	30.59	29.53	2.56	29.13	18.70	25.04	11.61	13.27	11.42

Pump flanges to DIN 2501 with sealing disc and collar flange for the connection of ISO-K (KF) components

¹⁾ Only for the motor which is supplied as standard

Technical Data

DK 200

		50 Hz	60 Hz
Nominal pumping speed ¹⁾	m ³ x h ⁻¹ (cfm)	225 (132.5)	225 (132.5)
Pumping speed ¹⁾	m ³ x h ⁻¹ (cfm)	200 (117.8)	200 (117.8)
Ultimate partial pressure without gas ballast ¹⁾	mbar (Torr)	< 5 x 10 ⁻⁴ (< 3 x 10 ⁻⁴)	< 5 x 10 ⁻⁴ (< 3 x 10 ⁻⁴)
Water vapor tolerance ¹⁾	mbar (Torr)	26 (19.5)	26 (19.5)
Average noise level to DIN 45 635 ²⁾	dB(A)	< 76	< 76
Mains voltage 3-ph.	V	230/400	208-230/460
Motor power at			
220 / 380 V, 50 Hz	kW (hp)	5.5 (7.5)	5.5 (7.5)
200 - 230 V / 380 V, 60 Hz	kW (hp)	5.5 (7.5)	5.5 (7.5)
Nominal motor speed	rpm	1500	1800
Speed of the pump	rpm	540	540
Motor protection	IP	54	54
Oil filling	l (qt)	4.4 (4.6)	4.4 (4.6)
Weight	kg (lbs)	375 (827)	375 (827)
Intake port	DN	63 ISO-K	3" ANSI
Exhaust port	DN	63 ISO-K	3" ANSI

Ordering Information

DK 200

	50 Hz	60 Hz
	Part No.	Part No.
Two-stage rotary piston vacuum pump		
DK 200, with 50 Hz motor ³⁾		
(220 / 380 V ± 10%)	111 16	-
DK 200, with 60 Hz motor ^{3), 4), 5)}		
(200 - 230 V / 460 V ± 10%) US version	-	895 10
Sealing kit, pump	192 63	192 63
Vibration absorbing metal feet	101 55	101 55
ANSI adaptor	upon request	upon request

¹⁾ To DIN 28 400 and following numbers

²⁾ Operated at ultimate pressure without gas ballast, free field measurement at a distance of 1 m (3.5 ft). When fitting accessories, for example AFK 2, the noise level may change by 2 to 3 dB(A)

³⁾ For operation at a different frequency, the gear will have to be exchanged. Please state the mains frequency in your order

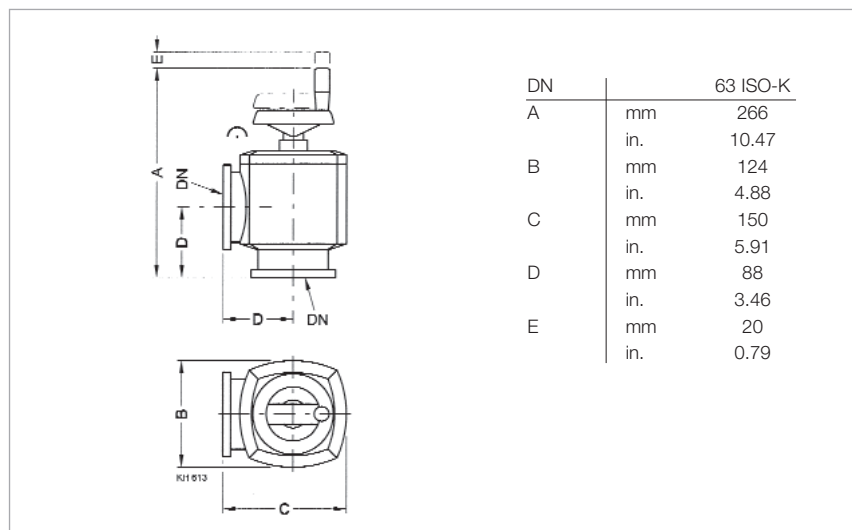
⁴⁾ Continuous operation from 30 mbar (22.5 Torr)

⁵⁾ US version supplied with 3" ANSI flanges

Accessories

Valves

The flange components which are required for installation of the accessories to the pump must be ordered separately. For flange components and valves please refer to the corresponding Catalog Parts "Valves" and "Feedthroughs".

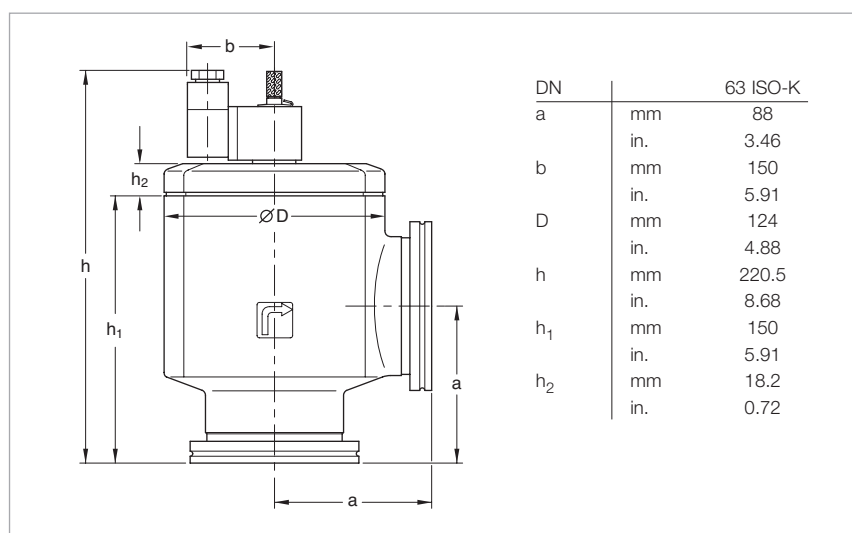


Dimensional drawing for the right-angle valve, bellows-sealed, manually operated

Ordering Information

Right Angle Valve

	Part No.
Right angle valve DN 63 ISO-K, Aluminium, manually operated	107 80



Dimensional drawing for the SECUVAC valves with ISO-K clamp flanges

Ordering Information

SECUVAC Valve

	Part No.
SECUVAC valve DN 63 ISO-K	
24 V DC	215 205
100 - 115 V AC	215 206
200 - 230 V AC	215 207

Advantages to the User

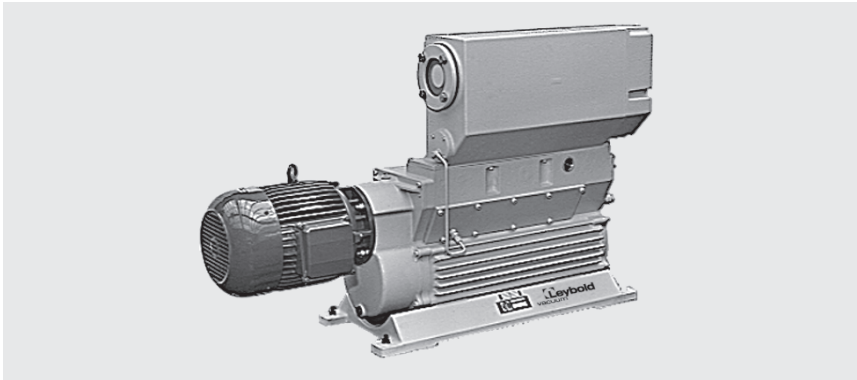
- The pump may warm up while the intake line is isolated
- Energy-conserving and environmentally friendly operation at ultimate pressure
- The pump may continue to operate while the vacuum chamber is vented for brief periods
- After completion of a process the pump may continue to operate so as to regenerate the oil

Advantages to the User

Two valve functions in one:

- Fast-closing high vacuum isolation valve for separating the vacuum chamber or a vapor jet pump (a diffusion pump, for example) from the backing pump
- Venting valve for venting of the valve's chamber and thus the pump (backing pump)
- Immediate closing action upon power failure
- Opening action only after the intake line has been evacuated
- Delayed isolation of the vacuum chamber and venting the vacuum pump (negligible "gulp")

Exhaust Filter Box AFK 2 with Oil Return Line



The oil mists entrained in the exhaust gas from the pump are cleaned in the exhaust filter box.

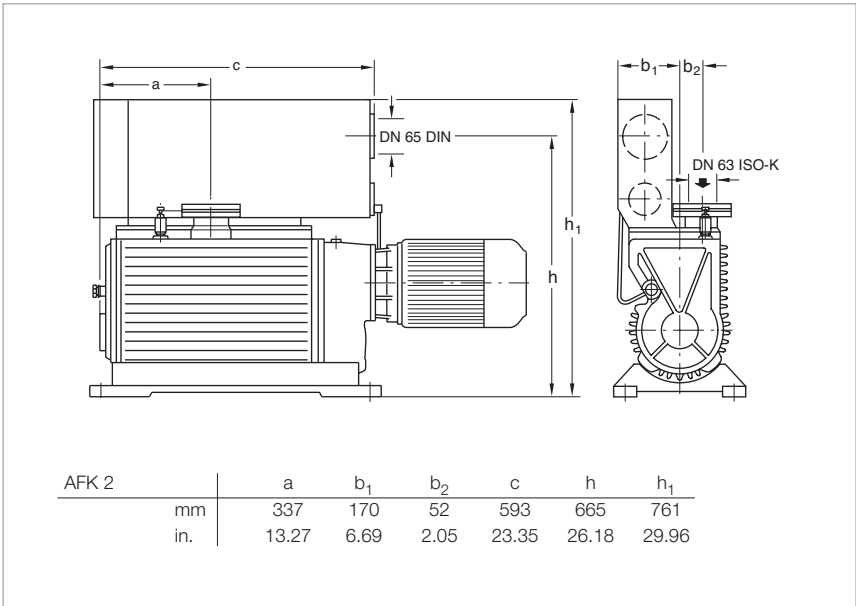
The exhaust filter box is installed instead of the standard filter box on the rotary piston vacuum pump.

Advantages to the User

- At intake pressures below 100 mbar (75 Torr) this is a space saving alternative to the separate exhaust filter
- Almost oil-free exhaust gas, over 99% effective
- Exchangeable filter elements
- Built-in over-pressure valves
- Low oil consumption due to the integrated oil return line

Technical Notes

In case of toxic or hazardous gases and vapors the exhaust lines must comply with the safety regulations.



Dimensional drawing for the exhaust filter box AFK 2 with oil return line

Technical Data

Exhaust Filter Box AFK 2

Weight	kg (lbs)	10 (22.1)
Connection for collar flange	DN	63 ISO-K

Ordering Information

Exhaust Filter Box AFK 2

	Part No.
Exhaust filter box AFK 2 for E 250, DK 200	189 47
Replacement filter element (FE) (2 are required)	390 26 144

Oil Filter Unit



Mechanical oil filters are required when a severe contamination of the pump's oil can be expected due to solid particles like dust, for example.

Advantages to the User

- Protection of the pump against contamination of its oil
- Longer service life for the oil
- Easy to fit without having to disassemble the pump

Mechanical Oil Filter Unit

- Automatic oil circulation from the oil reservoir on the exhaust side via the filter to the intake chamber
- Filter insert which is easy to exchange (bypass filter)
- Particulate retention to 3 μm

Technical Notes

Increases the required quantity of oil by about 1.3 liters (1.37 qt).

When using the oil filter, the pump must be vented when shut down in order to prevent the oil from rising into the intake line; for this we suggest you install a SECUVAC valve.

Oil Control Unit



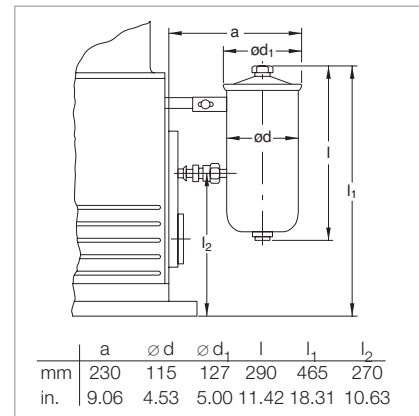
Adding the oil can be automated through the oil control unit without having to interrupt operation. For this purpose, an additional oil reservoir holding 7 liters (7.4 qt) is connected to the pump.

Advantages to the User

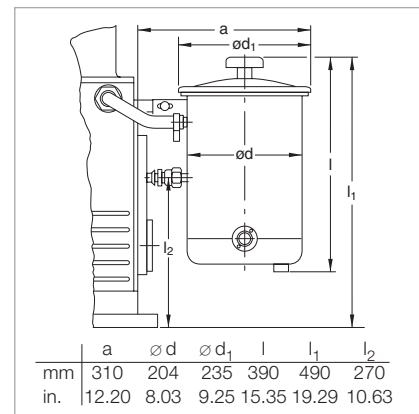
- Optimum oil level over long periods of operation
- Reduction of oil losses
- Visual function check (transparent connecting hose)
- Simple installation of the unit without the need to disassemble the pump
- Closed circuit by connection of oil reservoir, vessel and pump
- Built-in filter insert separates mechanical contamination

Technical Notes

You must under all circumstances use a SECUVAC valve, otherwise the oil reservoir will be emptied by the pump as soon as it is switched off.



Dimensional drawing for the oil filter unit



Dimensional drawing for the oil control unit

Ordering Information

	Part No.
Mechanical oil filter unit with special filter insert, complete with adaptor screw and mount for attachment to the pump	101 31
Replacement filter	101 32

Oil Filter Unit

Ordering Information

	Part No.
Oil control unit	101 37
Replacement filter	101 32

Oil Control Unit

Condensate Separator AK 100-250



Welded condensate collecting vessels.

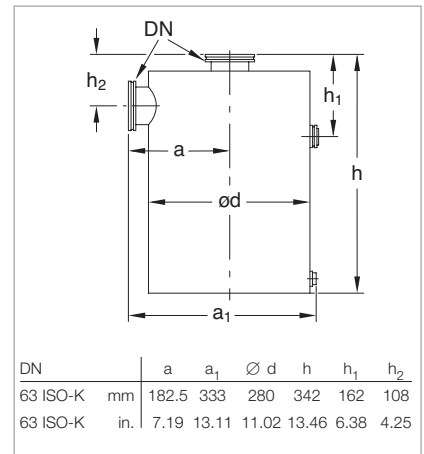
Advantages to the User

- May be used either on the intake or the exhaust side
- Corrosion-protected
- Condensate level glass
- Protects the pump against condensate which collects in the exhaust line and the intake line
- Effect independent of the direction of flow

Technical Notes

When used on the intake side the drain cock must provide a vacuum-tight seal.

Half of the quantity of required clamping screws is provided.



Dimensional drawing for the condensate separator AK 100-250

Technical Data

Condensate Separator

AK 100-250

Capacity for condensate	l (qt)	10 (10.57)
Weight	kg (lbs)	12 (26.5)
Connection	DN	63 ISO-K

Ordering Information

Condensate Separator

AK 100-250

	Part No.
Condensate separator AK 100-250	188 45
Drain tap, vacuum-tight	190 90
Connection components	
Connection to the intake side of the E 250, DK 200	
Elbow	887 25
Centering ring	268 05

Exhaust Filter AF 100-250 A



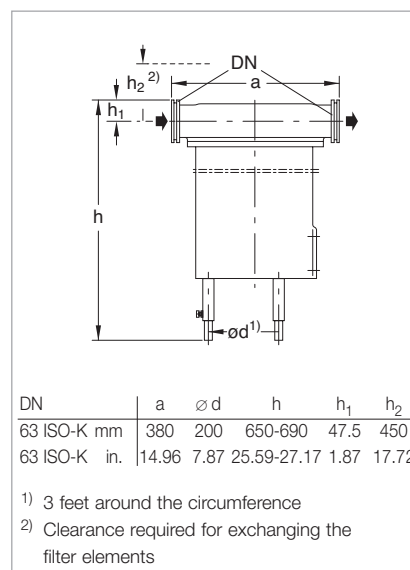
To remove oil mists entrained in the exhaust gas.

Advantages to the User

- Over 99% effective
- Optimally matched to our rotary piston vacuum pumps
- Exchangeable filter insert
- Built-in over-pressure valves
- Sight glass for checking the amount of separated oil
- Solvent-resistant, helium-tight
- Cast aluminium housing

Technical Notes

In case of toxic or hazardous gases and vapors the exhaust lines must comply with the safety regulations.



Dimensional drawing for the exhaust filter
AF 100-250 A

Technical Data

AF 100-250 A

Weight	kg (lbs)	12 (26.5)
Connection	DN	63 ISO-K

Ordering Information

AF 100-250 A

	Part No.
Exhaust filter AF 100-250 A	189 45
Replacement filter element (2 are required)	390 26 144
Drain tap, vacuum-tight	190 90
Connection components	
Connection to the E 250, DK 200	
Bellows	887 70
Centering ring ISO-K	268 05

Dust Filter FS 100-250



Dust filters protect the pumps against the intake of dust.

Advantages to the User

- Easy to disassemble
- Vacuum-tight cast housing
- Replacement filters
- Separates dust from a grain size of 1 μm

Technical Notes

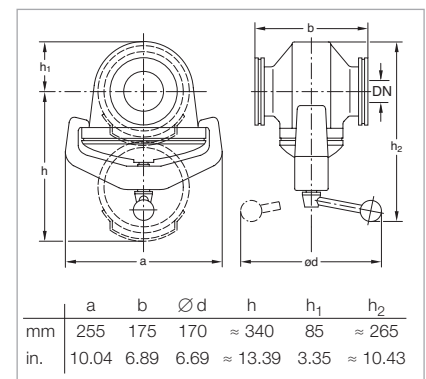
Install horizontally so that the filter insert may be removed from below.

In case of very large quantities of dust use a dust separator.

Only throttles the pumping speed significantly at very low intake pressures.

Supplied Equipment

Half of the quantity of required clamping screws is provided.



Dimensional drawing for the dust filter FS 100-250

Technical Data

FS 100-250

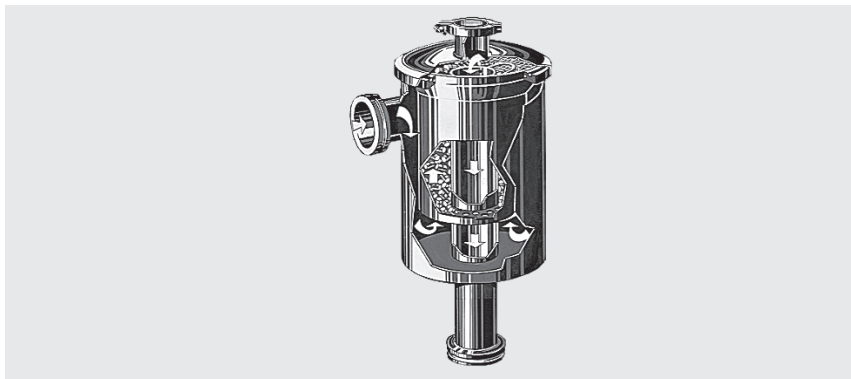
Connection to pump		E 250, DK 200
Throttling of pumping speed		
at an intake pressure of 13 mbar (9.8 Torr) approx.	%	28
at an intake pressure of 1.3 mbar (0.98 Torr) approx.	%	38
Weight	kg (lbs)	11 (24.3)
Connection	DN	63 ISO-K

Ordering Information

FS 100-250

	Part No.
Dust filter FS 100-250	278 17
Filter insert	178 37
Replacement cotton wadding cartridges (1 set = 10 pieces)	178 27
Connection components	
Connection to the E 250, DK 200	
Elbow	887 25
Centering ring	268 05
ANSI adaptor	upon request

Dust Separator AS 100-250



Dust separators protect the pumps against being contaminated by dust.

Advantages to the user

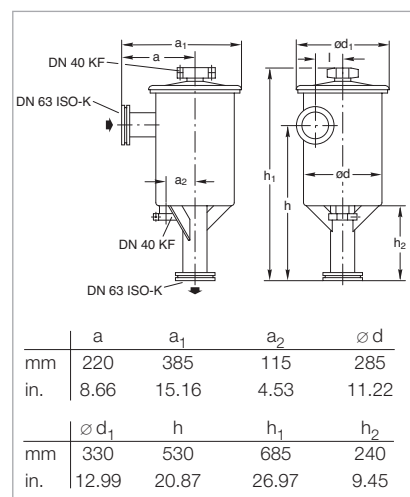
- Dust separator for large quantities of dust
- Dual-stage, thus low throttling effect
- Cyclone and wet filter
- Replacement inserts for both filters
- Dust of a grain size of 2 μm and more are separated in a cyclone
- Finer dust is separated in an insert moistened with oil

Technical Notes

Dust separator filters throttle the pumping speed only at low intake pressures.

Supplied Equipment

Half of the quantity of required clamping screws is provided.



Dimensional drawing for the dust separator AS 100-250

Technical Data

AS 100-250

Connection to pump		E 250, DK 200
Throttling of pumping speed		
at an intake pressure of 13 mbar (9.8 Torr) approx.	%	3.5
at an intake pressure of 1.3 (0.98 Torr) mbar approx.	%	7
Capacity for dust	l	4.0
Weight	kg (lbs)	27 (59.5)
Connection	DN	63 ISO-K

Ordering Information

AS 100-250

	Part No.
Dust separator AS 100-250	178 02
Filter insert	178 06

