



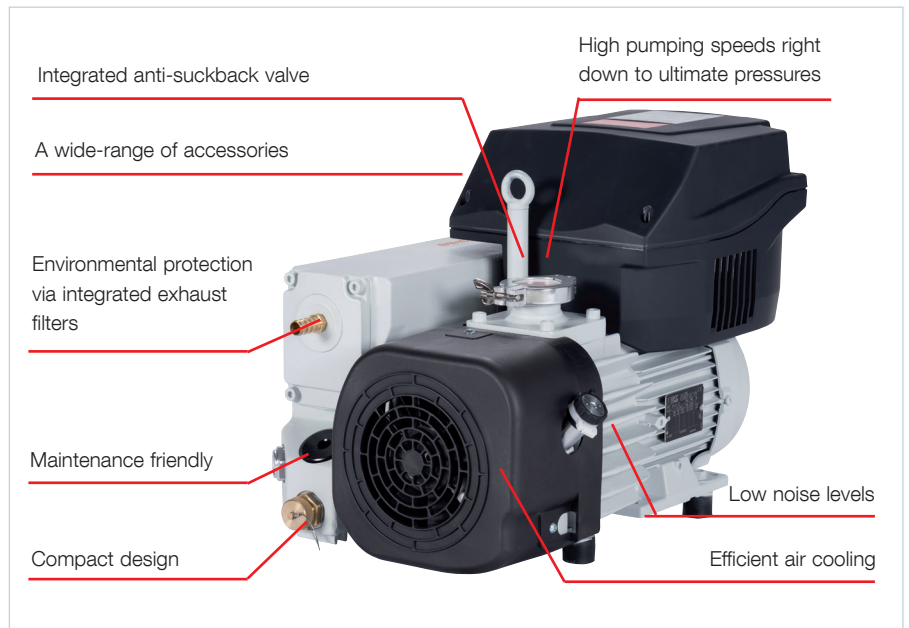
## **SOGEVAC DI & BI**

The preferred roughing pump for analytical applications



# Features and design

Oil-sealed rotary vane vacuum pumps are used in all areas of vacuum engineering. Our SOGEVAC BI and DI pumps are the preferred rotary vane vacuum pumps for generating medium vacuum in analytical applications and offer higher ultimate pressures, higher pumping speeds and single phase drives. Their excellent reliability and unmatched maintenance-free operation intervals are well proven. Pumping speeds range between 16 and 147 m<sup>3</sup>/h. Unique, top-notch engineering oils provide maintenance-free operation for three years on Liquid Chromatography and Gas Chromatography Mass Spectrometers.



SOGEVAC BI and DI pump features

## Typical applications

- Liquid Chromatography and Gas Chromatography Mass Spectrometers
- Inductively-Coupled Plasma Mass Spectrometers
- Electron Microscopes
- Turbomolecular pump backing for other research and development applications
- Leak testing
- Refrigerating and Air-Conditioning
- Metallurgy
- Freeze Drying

## Our solution

- Up to 24.000 hours maintenance free operation on Liquid Chromatography and Gas Chromatography Mass Spectrometers
- High pumping speeds at low pressures
- Very low noise levels below 61 dB(A) and low vibrations
- Exhaust gas free of oil mist thanks to integrated efficient exhaust filters (oil loss below 1 ppm)
- Single-phase wide-range drives from 200 to 240 V,  $\pm 10\%$ , 50/60 Hz
- F/C drives with RS 485 interface for preventive maintenance and pump control
- Preventive maintenance possible by read-out of pump operating hours and/or trends
- Pump speed control through RS485 interface
- Pumps are EN/UL 61010-1 certified
- Pumps reach EMC Class B levels
- Smart packaging and handling devices for safe set-up at site
- High reliability

## Design principle

SOGEVAC pumps are oil-sealed rotary vane pumps. The oil carried with the process gas is preliminarily sent to the oil box before the discharged gas enters the integrated exhaust filters, where the fine oil mist is then trapped. Afterwards, the filtered oil is collected in the oil box and returned to the pump. SOGEVAC vacuum pumps are a superior choice due to their extremely low power consumption, low noise levels and excellent reliability.

## Materials used

Steel, cast iron, aluminium, bronze, FPM (FKM), glass, polyamid 6.6, filter material (polymers, paper), epoxy resin and glass fibers.

# Customer benefits

Leybold's SOGEVAC BI and DI series of rotary vane vacuum pumps are a superior choice due to their:

## Compact design

These pumps have been designed for high efficiency, especially at low pressures. For the SV 16 DI through the SV 65 BI FC, the pump and motor use the same shaft. For the SV 120 BI FC, the motor is mounted via a coupling housing.

## Quiet operation

SOGEVAC pumps are designed to operate as quietly as possible — below 61 dB(A) — and at continuous low-pitched noise levels. This typically allows for operation without expensive noise enclosures.

## Universal use

All pumps can be operated on single phase mains of 200 to 240 V, %10 % @ 50/60 Hz.

## Anti-suckback valve

A valve is built into the SOGEVAC pump's intake. During non-operation of the pump (for example, due to a shutdown or power failure) the valve closes the intake. This prevents the pressure from rising in the connected chamber while the pump remains vented. Any suckback of pump oil into the vacuum system is therefore also prevented. This blocking process works under all operating conditions (below 800 mbar (600 Torr)) and even when the gas ballast valve is open.

## Interface capabilities

- I/O and RS 485 interface.
- Adjustable speed 50 to 100 %
- Predictive maintenance

## Environmental protection

The built-in exhaust filter ensures oil-mist-free exhaust gases over the entire range of operating pressures – from atmospheric pressures to ultimate pressures. The oil loss level at pump exhaust is below 1 ppm.

## Supplied equipment

All pumps are delivered with the required quantity of oil already in the pump. Pumps are ready for operation and in packaging that simplifies the job of the field service engineer (smart unpacking without HSE risks). Each pump is delivered with convenient tools for easy maintenance, including:

- A hex key for the oil-filling plug
- An oil drain hose

SOGEVAC models										
Brief techlnial data		SV 16 DI		SV 28 BI		SV 40 BI		SV 40 BI FC	SV 65 BI FC	SV 120 BI FC
		Unit								
Frequency	Hz	50	60	50	60	50	60	50 / 60	50 / 60	50 / 60
Nominal pumping speed (DIN 28 400 ff)	m³/h	≥ 16.0	≥ 18.7	≥ 25	≥ 30	≥ 42	≥ 50	50	71	≥ 147
Pumping speed, according to DIN 28 400 ff	m³/h	≥ 14.5	≥ 17.0	≥ 23	≥ 27	≥ 40	≥ 48	≥ 48	≥ 64	≥ 122
Pumping speed at 2 mbar	m³/h	≥ 12	≥ 13	≥ 19	≥ 23	≥ 36	≥ 43	43	50	≥ 100
Ultimate total pressure without gas ballast	mbar	≤ 0.1	≤ 0.1	≤ 0.05	≤ 0.05	≤ 0.20	≤ 0.20	≤ 0.20	≤ 0.20	≤ 0.20
Ultimate total pressure with standard gas ballast	mbar	≤ 1.0	≤ 1.0	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5	≤ 1.0	≤ 1.0
Noise level	dB(A)	≤ 59	≤ 59	≤ 57	≤ 60	≤ 60	≤ 63	≤ 59	≤ 60	≤ 61
Oil capacity capacity (min.)	l	2.0	2.0	1.5	1.5	1.0	1.0	1.0	2.0	2.0
Main plug	IP	C14	C14	C14	C14	*	*	*	*	C20
Main switch		Yes	Yes	Yes	Yes	Possible	Possible	Possible	Possible	Possible
Interface		N/A	N/A	N/A	N/A	RS 485	RS 485	RS 485	RS 485	RS 485
See page		4	4	5	5	6	6	7	7	8

\* please refer to ordering information on the product page



# SOGEVAC SV 16 DI

## Our solution

- Compact and rugged design
- Optimized pump temperature due to an all-new-air cooling concept
- Long oil service life due to increased oil volumes within the pump (up to four times more oil capacity compared to equivalent pumps)
- High reliability
- Integrated lubrication via an oil-recovery system with no external oil lines
- Low levels across the entire operating pressure range due to low generator speeds
- Integrated anti-suckback valve
- Flexible, customer-oriented design
- Various single-phase motors with overload protection in accordance with EN 61010-1



Technical Data			
		SV 16 DI	
		50 Hz	60 Hz
Nominal pumping speed <sup>1)</sup>	m <sup>3</sup> /h (cfm)	16.0 (9.4)	18.7 (11.0)
Pumping speed <sup>1)</sup>	m <sup>3</sup> /h (cfm)	14.5 (8.5)	17.0 (10.0)
Ultimate total pressure			
without gas ballast <sup>1)</sup>	mbar (Torr)	≤ 0.1 (≤ 0.08)	
with gas ballast <sup>1)</sup>	mbar (Torr)	≤ 1.0 (≤ 0.8)	
Water vapor tolerance <sup>1)</sup>	mbar (Torr)	15 (11.3)	
Oil capacity	l (qt)	2 (2.1)	
Noise level	dB (A)	59	
Motor power (1~ + 3~), max.	kW (hp)	0.75 (1.01)	0.90 (1.21)
Nominal speed	min <sup>-1</sup> / rpm	1440	1750
Weight (with oil)	kg (lbs)	25 (55.1)	
Connections, intake and exhaust side <sup>2)</sup>		DN 25 ISO-KF	
Dimensions (L x W x H)	mm	440 x 268 x 259	

Ordering Information *	SV 16 DI
SOGEVAC rotary vane pump with UL/CSA three-phase universal motor and integrated gas ballast valve	
200 - 240 V ±10% and 380 - 415 V ±10%, 50 Hz/ 200 - 240 V ±10% and 380 - 460 V ±10%, 60 Hz	960 191V3001
SOGEVAC rotary vane pump with single-phase AC motor and integrated gas ballast valve	
200 - 240 V / ±10%, 50/60 Hz	960 195V3001
110 V -15% and 100 V +10%, 50/60 Hz	960 194V3001
110 - 115 V ±10% and 220 - 230 V ±10%, 50/60 Hz, manually switchable	960 196V3001

<sup>1)</sup> in acc. with DIN 28 400 et. seq.

<sup>2)</sup> Please indicate when ordering

\* Excerpt from our line of products. Details on other motor voltages/frequencies as well as accessories and maintenance materials are available upon request.

# SOGEVAC SV 28 BI

## Our solution

- Compact design via an integrated motor
- Long oil service life due to an increased oil volumes within the pump (up to four times more oil capacity compared to equivalent pumps)
- High reliability, thanks to dynamic shaft seals
- Integrated lubrication via an oil-recovery system with no external oil lines
- Low noise levels across the entire operating pressure range due to low generator speeds
- Integrated anti-suckback valve
- Flexible, customer-oriented design
- Various single-phase motors with overload protection in accordance with EN 61010-1



### Technical Data

		SV 28 BI	
		50 Hz	60 Hz
Nominal pumping speed <sup>1)</sup>	m <sup>3</sup> /h (cfm)	25 (14.8)	30 (17.8)
Pumping speed <sup>1)</sup>	m <sup>3</sup> /h (cfm)	23 (13.6)	27 (15.9)
Ultimate total pressure without gas ballast <sup>1)</sup>	mbar (Torr)	≤ 0.05 (≤ 0.04)	
with gas ballast <sup>1)</sup>	mbar (Torr)	≤ 0.5 (≤ 0.4)	
Water vapor tolerance <sup>1)</sup>	mbar (Torr)	10.0 (7.5)	10.0 (7.5)
Oil capacity	l (qt)	1.5 (1.59)	
Noise level (1~ / 3~)	dB (A)	57 / 54	60 / 57
Motor power (1~ / 3~), max.	kW (hp)	0.55 / 0.75 (1.0 / 1.2)	0.66 / 1.1 (0.9 / 1.5)
Nominal speed	min <sup>-1</sup> / rpm	1500	1800
Weight with oil (min./max.)	kg (lbs)	34 to 37 (75 to 82)	
Connections, intake and exhaust side		DN 25 ISO-KF	
Dimensions (L x W x H)	mm	423 x 258 x 301	

### Ordering Information \*

		SV 28 BI
SOGEVAC rotary vane pump with wide-range three-phase motor, gas ballast and 1.5 l oil casing		
170–253 / 294–440 V, 50 Hz and 170–292 / 294–506 V, 60 Hz		960 273
SOGEVAC rotary vane pump with wide-range single-phase motor, gas ballast and 1.5 l oil casing		
180–264 V, 50/60 Hz		970 277

<sup>1)</sup> in acc. with DIN 28 400 et. seq.

\* Excerpt from our line of products. Details on other motor voltages/frequencies as well as accessories and maintenance materials are available upon request.

# SOGEVAC SV 40 BI and SV 40 BI FC

## Our solution

- Compact design via an integrated motor
- Long oil service life. PFPE variants available for ICPMS (Inductively Coupled Plasma Mass Spectrometers) instruments
- High reliability
- Integrated lubrication via an oil-recovery system with no external oil lines
- Low noise levels across the entire operating pressure range due to low generator speeds
- Integrated anti-suckback valve
- Flexible, customer-oriented design
- Various single-phase motors or drives with overload protection in accordance with EN61010-1



Technical Data				
		SV 40 BI		SV 40 BI FC
		50 Hz	60 Hz	50/60 Hz
Nominal pumping speed <sup>1)</sup>	m³/h	42.0	50.0	53.0
Pumping speed <sup>1)</sup>	m³/h	40.0	48.0	36.0
Ultimate total pressure				
without gas ballast <sup>1)</sup>	mbar	≤ 5 x 10 <sup>-2</sup> to ≤ 0.20		≤ 0.20
with gas ballast <sup>1)</sup>	mbar	≤ 0.5		≤ 1.0
Water vapor tolerance <sup>1)</sup>	mbar	10		10
Oil capacity	l	1.0		1.0
Noise level	dB (A)	60	63	≤ 59
Motor power	kW	1.3	1.6	1.5
Nominal speed	rpm	1500	1800	1800
Weight (with oil)	kg	43	43	45
Connections, intake and exhaust side		DN 40 ISO-KF		DN 40 or DN 25 ISO-KF
Dimensions (L x W x H)	mm	497 x 296 x 340		506 x 306 x 386
Ordering Information *		SV 40 BI		SV 40 BI FC
SOGEVAC rotary vane pump with single-phase motor and gas ballast				
230 V, ± 10%, 50/60 Hz		960331V3001		–
180-264 V, ± 10%, 50/60 Hz		960331V3012		–
SOGEVAC rotary vane pump with single-phase motor, frequency drive, RS 485 interface and gas ballast				
180 - 264 V, 50/60 Hz				
with LVO 702, inlet DN 40/outlet DN 25 ISO-KF		–		960359V01
with LVO 702, inlet DN 25/outlet DN 25 ISO-KF		–		960361V01
with LVO 420 PFPE, inlet DN 25/outlet DN 25 ISO-KF		–		960362V01

<sup>1)</sup> in acc. with DIN 28 400 et. seq.

\* Excerpt from our line of products. Details on other motor voltages/frequencies as well as accessories and maintenance materials are available upon request.

# SOGEVAC SV 65 BI FC

## Our solution

- Compact design via an integrated motor
- Long oil service life. PFPE variants available for ICPMS (Inductively Coupled Plasma Mass Spectrometers) instruments
- High reliability
- Integrated lubrication via an oil recovery system with no external oil lines
- Low noise levels across the entire operating pressure range due to low generator speeds
- Integrated anti-suckback valve
- Flexible, customer-oriented design
- Various single-phase motors or drives with overload protection in accordance with EN61010-1



Technical Data		
		SV 65 BI FC 50/60 Hz
Nominal pumping speed <sup>1)</sup>	m <sup>3</sup> /h	71.0
Pumping speed at 2 mbar <sup>1)</sup>	m <sup>3</sup> /h	≥ 50.0
Ultimate total pressure		
without gas ballast <sup>1)</sup>	mbar	≤ 0.20
with gas ballast <sup>1)</sup>	mbar	≤ 1.0
Water vapor tolerance <sup>1)</sup>	mbar	10
Oil capacity	l	2.0
Noise level	dB (A)	≤ 60
Motor power	kW	1.5
Nominal speed	rpm	1800
Weight (with oil)	kg	58
Connections, intake side exhaust side		DN 40 ISO-KF DN 40 ISO-KF or 1/2" barbed hose fitting
Dimensions (L x W x H)	mm	521 x 351 x 386

Ordering Information *		SV 65 BI FC
SOGEVAC rotary vane pump single-phase motor, frequency drive, RS 485 interface and gas ballast		
180 - 264 V, 50/60 Hz with LVO 420 PFPE, inlet/outlet DN 40 ISO-KF		960462V01
with LVO 200, inlet DN 25 ISO-KF outlet 1/2" barbed hose fitting		960463V01

<sup>1)</sup> in acc. with DIN 28 400 et. seq.

\* Excerpt from our line of products. Details on other motor voltages/frequencies as well as accessories and maintenance materials are available upon request.

# SOGEVAC SV 120 BI FC

## Our solution

- Easy to handle, thanks to an integrated cart and „foldable” handles: The pump is placed on castors and equipped with two foldable handles to allow for easy one-person unpacking and moving with no lifting devices
- Long oil service life
- High reliability
- Integrated lubrication via an oil-recovery system with no external oil lines
- Low noise levels across the entire operating pressure range due to low generator speeds
- Integrated anti-suckback valve
- Flexible, customer-oriented design
- Various single-phase drives with overload protection in accordance with EN61010-1



Technical Data		
		SV 120 BI FC 50/60 Hz
Nominal pumping speed <sup>1)</sup>	m³/h	≥ 147
Pumping speed at 2 mbar <sup>1)</sup>		
with DN 50 ISO-KF inlet	m³/h	≥ 100.0
with DN 40 ISO-KF inlet	m³/h	≥ 90.0
Ultimate total pressure		
without gas ballast <sup>1)</sup>	mbar	≤ 0,2
with gas ballast <sup>1)</sup>	mbar	≤ 1.0
Water vapor tolerance <sup>1)</sup>	mbar	10
Oil filling	l	2.0
Noise level	dB (A)	≤ 61
Motor power	kW	2.2
Nominal speed	rpm	1800
Weight (with oil filling)	kg	98
Connections, intake side exhaust side		DN 40 ISO-KF or DN 50 ISO-KF 1/2" barbed hose fitting
Dimensions (L x W x H)	mm	733 x 470 x 483

Ordering Information *	SV 120 BI FC
SOGEVAC rotary vane pump with single-phase motor, frequency drive, RS 485 interface and gas ballast	
180 - 264 V, 50/60 Hz with LVO 702, inlet DN 40 ISO-KF, outlet 1/2" barbed hose fitting	960563V3001
with LVO 702, inlet DN 50 ISO-KF, outlet 1/2" barbed hose fitting	960565V

<sup>1)</sup> in acc. with DIN 28 400 et. seq.

\* Excerpt from our line of products. Details on other motor voltages/frequencies as well as accessories and maintenance materials are available upon request.



# Smart pumping with our **SOGEVAC BI FC** models

## Our solution

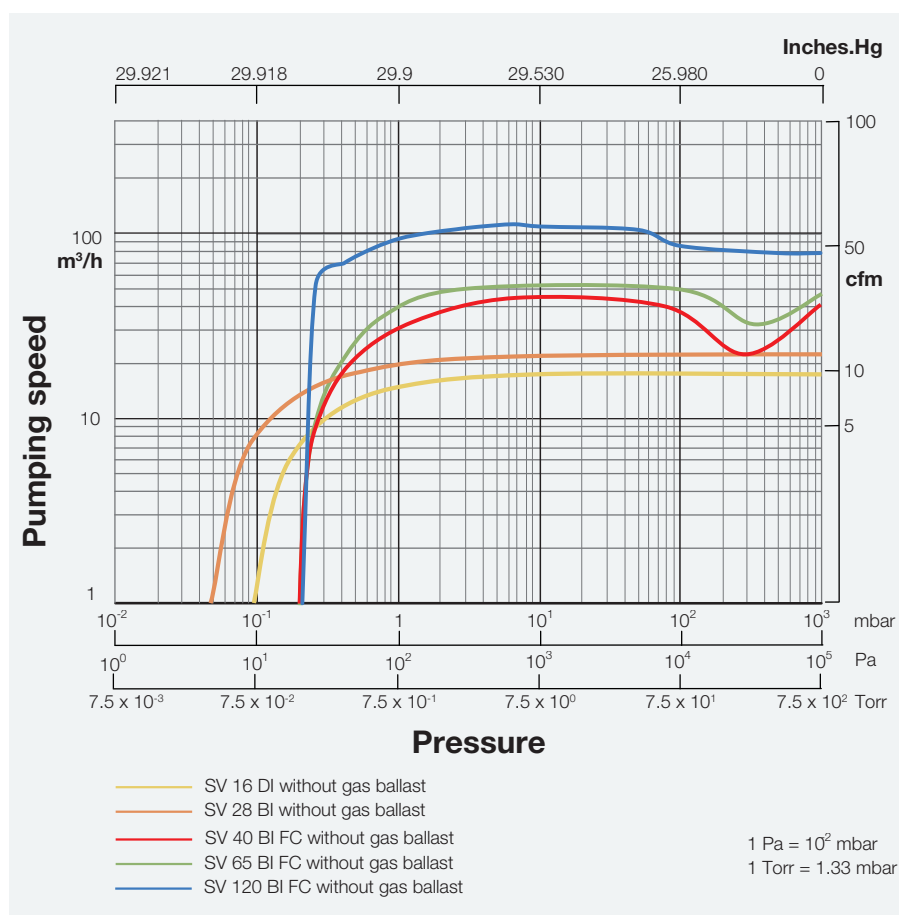
The SOGEVAC SV 40 BI FC, SV 65 BI FC and SV 120 BI FC come equipped with a frequency converter. At high inlet pressures, the frequency converter automatically reduces the pump rotational speed (not to exceed 13 A mains current).

These pumps use a single-phase power supply, protected by normal building breakers. This type of regulation avoids overloading the mains.

Additionally, the frequency converters are designed to limit the inrush current, so standard curve B breakers can be used. Pumps equipped with a frequency converter can be controlled through an RS 485 interface for start/stop or speed control. The interface also allows for monitoring of power consumption and drive temperatures for preventive maintenance. SOGEVAC BI FC pumps include overload protection with fuses accessible from the outside or a breaker on the single-phase motor that can be re-set.



## Pumping Speed Characteristics (at 50/60 Hz)



# Accessories

## Mobile base frame

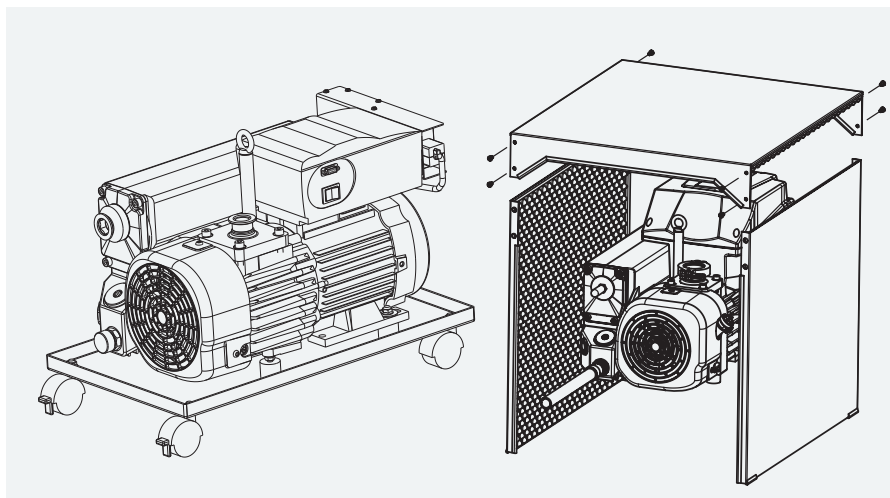
The mobile base frame allows for easy moving of single and double-stage rotary vane pumps (up to 120 m³/h), thereby simplifying their maintenance. The oil-tight base frame holds up to two liters of oil and has swivel casters (two of which come with breaks). The base frame does not affect pump noise but facilitates oil draining and pump displacement.

## Noise Enclosure

Leybold has developed a special noise enclosure for vacuum pumps which reduces the noise level by approximately 5 dB(A) and prevents overheating via an open design on both sides. A combination featuring the mobile base frame is also available.

## Power Cords

We offer a wide range of power cords with various plugs to meet most requirements.



A SOGEVAC pump on a mobile base frame and in a noise enclosure (from left to right)

Ordering Information *			P/N
Accessories			
Mobile base frame for single-stage pumps up to 65 m³/h with handles and oil pan with oil pan			960560WB 960331BASE
Mobile base frame for single-stage pumps up to 120 m³/h			960560WB
Noise enclosure for single-stage pumps up to 65 m³/h up to 120 m³/h			960331NENC 960560NENC
Adapter for tubing			71241608
Hex key metric male 12 mm			E6507617
Power cords - plug: pump side/plug: supply side			
2.5 m	Hirschmann	Euro/Schuko 16 A	971457EUR
2.5 m	Hirschmann	UK plug 13 A	971457GB
2.5 m	Hirschmann	NEMA 6-15P 250 V	971457NEMA
2.5 m	Hirschmann	Swiss plug 10 A	971457CH
2.5 m	Hirschmann	w/o	971457WW
5 m	Hirschmann	IEC 309 16 A	EK6506966
2.5 m	Hirschmann	C20	EK6510715
2.8 m	Hirschmann	Cable shoes 5 mm	EK6520102
2.5 m	Hirschmann	C14	EK6510720
1.8 m	C19	NEMA 5-15P 125 V	140304
1.8 m	C19	NEMA 6-15P 250 V	140305
1.8 m	C19	Euro / Schuko 16 A	140306
1.8 m	C19	UK plug 13 A	140307
2.5 m	C19	C20	E6500825
5 m	C19	IEC 309 16 A	E6505883
2.5 m	C19	C14	EK6502798

\* Excerpt from our line of products. Details on other motor voltages/frequencies as well as accessories and maintenance materials are available upon request.

## Oil for **SOGEVAC** pumps

Leybold's LEYBONOL oils and lubricants are specially designed to hold up to the extreme demands of vacuum technology. Their vapor pressure remains low at high temperatures, and their water content and water uptake is minimal. Viscosity characteristics are flat, their lubricating properties are excellent, and they are highly resistant to thermal decomposition and extreme levels of mechanical stress.

For Liquid Chromatography and Gas Chromatography Mass Spectrometer applications, we recommend our LVO 702 synthetic oil, while on most ICPMS (Inductively-Coupled Plasma Mass Spectrometer) instruments, our PFPE LVO 420 is sufficient.

Please note that PFPE oil can only be used on pumps that are specifically designed for this type of fluid.



### SOGEVAC models

#### LEYBONOL Oils

LVO 420 (PFPE oil)	●	●	●	●	●	●
LVO 702 (Synthetic cyclic hydrocarbon oil)	●	●	●	●	●	●

● = Possible

For further questions, please contact our technical sales support.

**For information on oil specifications, please refer to our general catalog.**

Ordering Information *	
"LEYBONOL LVO pump fluid, one-liter bottle	
LVO 702 synthetic oil	L702 01
LVO 420 PFPE oil	L420 01

\* Excerpt from our line of products. Details on our full range of LEYBONOL pump fluids are available in our general catalog or our webshop [www.leyboldproducts.com](http://www.leyboldproducts.com).

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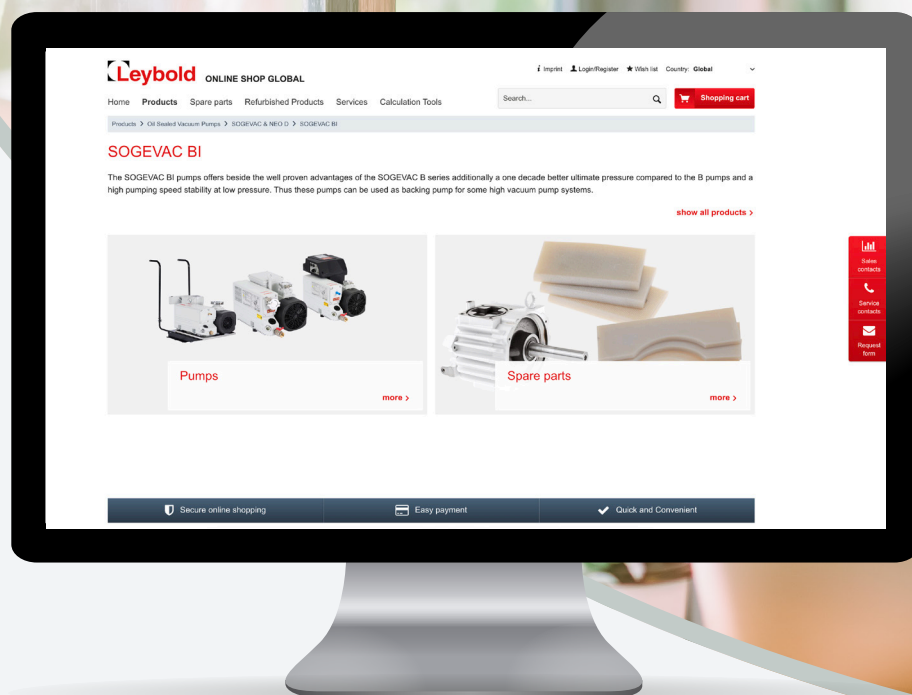
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