

# Rotary Vane Vacuum Pumps TRIVAC B A proven concept.



# For vacuum work in Industry and Research



## Applications

### TRIVAC models\*

D4B D8B D16B D25B D40B D65B D16B ex D16 BCS  
D25 BCS  
D40 BCS  
D65 BCS

Production of semiconductors  
Vacuum coating  
Research and development  
Chemistry/pharmaceuticals  
Metallurgy/furnaces  
Lamps and tubes manufacture  
Automotive industry  
Space simulation  
Analytical engineering  
Environment engineering  
Cooling and air-conditioning  
Electrical engineering  
Mechanical engineering  
Medicine technology  
Vacuum drying cabinets  
Chemistry and research labs  
Freeze-drying systems  
Backing pump for  
high vacuum pump systems  
Leak detectors

|  |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|
| Production of semiconductors                 |   |   |   |   |   |   |   | ■ |
| Vacuum coating                               | ■ | ■ | ■ | ■ | ■ |   |   |   |
| Research and development                     | ■ | ■ | ■ | ■ | ■ | ■ |   | ■ |
| Chemistry/pharmaceuticals                    | ■ | ■ | ■ | ■ | ■ | ■ |   |   |
| Metallurgy/furnaces                          |   |   |   |   | ■ | ■ |   |   |
| Lamps and tubes manufacture                  | ■ | ■ | ■ | ■ | ■ | ■ |   |   |
| Automotive industry                          |   | ■ | ■ |   |   |   |   |   |
| Space simulation                             |   |   |   |   | ■ | ■ |   |   |
| Analytical engineering                       | ■ | ■ | ■ | ■ | ■ | ■ |   |   |
| Environment engineering                      | ■ | ■ | ■ | ■ | ■ | ■ |   |   |
| Cooling and air-conditioning                 | ■ | ■ | ■ | ■ | ■ |   | ■ |   |
| Electrical engineering                       | ■ | ■ | ■ | ■ | ■ | ■ |   |   |
| Mechanical engineering                       | ■ | ■ | ■ | ■ | ■ | ■ |   |   |
| Medicine technology                          | ■ | ■ | ■ | ■ | ■ | ■ |   |   |
| Vacuum drying cabinets                       | ■ | ■ | ■ | ■ | ■ | ■ |   |   |
| Chemistry and research labs                  | ■ | ■ | ■ | ■ | ■ | ■ |   | ■ |
| Freeze-drying systems                        | ■ | ■ | ■ | ■ | ■ | ■ |   |   |
| Backing pump for<br>high vacuum pump systems | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Leak detectors                               |   |   | ■ | ■ | ■ | ■ |   |   |

# Dual stage rotary vane vacuum pumps

Oil sealed rotary vane vacuum pumps are used in all areas of vacuum technology and are particularly well-suited to many applications in production and research.

They are also used to produce rough medium vacuum pressures, or as backing pumps in combination with roots, diffusion, turbomolecular or cryopumps.



## Special features

**TRIVAC B series pumps are oil sealed vacuum pumps based on the rotary vane principle.**

**The oil injected into the pump chamber is used for sealing, lubrication and cooling purposes.**

**The inner pump body is made of separate components with no additional sealing elements. The components are fitted with dowels to ensure easy disassembly and re-assembly.**

### Environment-friendly

- Low noise
- Low vibration

### Energy saving

- Low power consumption
- Low thermal losses

### Modern vacuum technology

- High pumping speed right down to the ultimate pressure
- Low ultimate pressure, even with gas ballast
- High water vapor tolerance
- Continuous operation right up to 1000 mbar
- Built-in oil pump, force-feed lubrication sliding bearing
- Minimal inherent air intake
- Highly leaktight (<sup>4</sup>He-capable)

### Well-proven design

- Compact, air cooled
- Handy, retractable handle
- All controls and oil level check on the front side
- Either horizontal or vertical intake and exhaust port
- Service-friendly
- Exchangeable inner section
- Installation of mechanical and chemical/mechanical full flow oil filters possible
- Shaft seals and O-rings are all made of elastomer FPM
- Pumps are free of non-ferrous metals
- Motor protection IP 54/IP 55



# Technology you can rely on



## Design features

### Coupling and motor

The pumping section of the TRIVAC B is directly linked to the motor via an elastic coupling element to ensure that the pump runs evenly and smoothly. Type B 14 flanged motors are screwed to the housing of the coupling.

### Gas ballast valve

The gas ballast valve is opened and closed by means of a short lever. By admitting a well controlled amount of air - the gas ballast - it is possible to prevent a certain degree of vapor condensation within the pump.

### Exchangeable inner section

The inner section of the pump may be exchanged without special tools or any special knowledge. It consists of all components vital to the operation of the pump. Exchanging the inner section makes the TRIVAC B as good as new again.

### 1000 mbar intake pressure

Trouble-free operation even at 1000 mbar intake pressure is ensured by a built-in oil pump, providing force-feed lubrication of the bearings from where a minimum amount of lubricant is fed to the compression and expansion chambers to ensure lubrication of the sliding vanes.

### Surface corrosion

All components are protected against surface corrosion. Non-ferrous metals are not used. The oil box, intake and exhaust line are made of aluminum and only solvent-resistant sealing materials are employed.

### Flexible

All pumps from the D 4 B to the D 25 B are available with either a single-phase or a three-phase AC motor. Other pumps and motors are available upon request.

### Anti-suckback valve

An oil pressure-controlled anti-suckback valve is built into the intake of the TRIVAC B. During stand-still (as a result of a power failure, for example), the anti-suckback valve blocks the intake to prevent a pressure rise in the connected vacuum system. At the same time, the inner pump body of the TRIVAC is vented. The blocking process will also work correctly when operating the pump with an opened gas ballast valve.

As a result, the backstreaming of any oil from the pump into the vacuum system is effectively prevented. The leak rate of the anti-suckback valve is less than  $3 \times 10^{-5}$  mbar/l·s<sup>-1</sup>.

### TRIVAC BCS

The fields of operation for TRIVAC BCS models will be found wherever an increased tightness, numerous accessories and/or monitoring capabilities are required.

# Complete product range



All TRIVAC B basic models (1~ and 3~ motor) are certified in accordance with 94/9/EG (ATEX), Cat. 3 inside. Additionally there is one pump in every pumping speed class available certified in accordance with 94/9/EG (ATEX), Cat. 3 inside and 3 outside. For special explosion resistant applications two different TRIVAC D 16 B pump models are available for pumping explosive atmospheres out of zone 0. Both models are certified according to 94/9/EG (ATEX) - EC type exam.cert. IBExU03ATEX1017 X and IBExU03ATEX1016 X - Cat. 1 inside and 2 outside.



| TRIVAC models*                                      | D4B | D8B | D16B | D25B | D40B | D65B | D16B ex | D16 BCS<br>D25 BCS<br>D40 BCS<br>D65 BCS |
|---|-----|-----|------|------|------|------|---------|--|
| Exhaust filters AF(-DOT)                            | ■   | ■   | ■    | ■    | ■    | ■    |         | ■  |
| Condensate traps / separators AK                    | ■   | ■   | ■    | ■    | ■    | ■    |         | ■  |
| Exhaust filters with<br>lubricant return ARP / AR   | ■   | ■   | ■    | ■    | ■    | ■    |         | ■  |
| lubricant return ARS                                |     |     |      |      |      |      |         | ■  |
| Oil drain tap                                       | ■   | ■   | ■    | ■    | ■    | ■    | ■       | ■  |
| Oil drain kit                                       | ■   | ■   | ■    | ■    | ■    | ■    | ■       | ■  |
| Dust filters FH/DF, DN 16 to 40 KF                  | ■   | ■   | ■    | ■    | ■    | ■    |         | ■  |
| Adsorption trap FH/RF,<br>DN 16 to 40 KF            | ■   | ■   | ■    | ■    | ■    | ■    |         | ■  |
| Cold trap TK  | ■   | ■   |      |      |      |      |         |  |
| Dust separators AS                                  | ■   | ■   | ■    | ■    | ■    | ■    |         | ■  |
| Molecular filters MF                                | ■   | ■   | ■    | ■    | ■    | ■    |         | ■  |
| Mechanical oil filters OF                           | ■   | ■   | ■    | ■    | ■    | ■    |         |  |
| Chemical oil filters CF                             | ■   | ■   | ■    | ■    | ■    | ■    |         | ■  |
| Chemical filters with<br>safety isolation valve CFS |     |     |      |      |      |      |         | ■  |
| Inert gas system IGS                                |     |     |      |      |      |      |         | ■  |
| Limit switch system LSS                             |     |     |      |      |      |      |         | ■  |
| Roots pump adapter                                  |     |     |      |      | ■    | ■    |         | ■  |
| Flange components, valves                           | ■   | ■   | ■    | ■    | ■    | ■    | ■       | ■  |

\* Please refer to our full line catalog for the complete range of TRIVAC pump models and accessories

## Oil filters OF/CF

Since there is a pressure-lubrication system with an oil pump in every TRIVAC B, it is possible to connect main flow oil filters. These filters are available either for mechanical filtering (OF types) or combined chemical/mechanical filtering (CF types).

### Advantages:

- Enhanced life span of the pumps
- Extended oil service life (application-dependent)
- Easy installation on the TRIVAC B
- No hose connections required
- Easily exchangeable filters
- Low oil loss during filter exchange
- Expanded range of applications to meet special requirements
- Prevents mechanical pump damage
- Identical filter housings
- Maintenance indicator for

## Condensate traps AK

Condensate traps protect the pumps against the accumulation of condensate and backstreaming of fluids.

### Advantages:

- Easy installation without the use of additional accessories
- For use either on the intake or exhaust side
- Solvent-resistant
- Drain via drain screw or drain tap

Under certain circumstances liquid may accumulate in the intake line when pumping vapors. In such cases, it is advisable to install a condensate trap on the intake side of the TRIVAC B. Its use is also recommended in situations where it is awkward to run the exhaust line and where the exhaust line may drain back to the pump.

## Roots pump adapter

The Roots pump adapter allows the direct installation of a small Roots pump on a TRIVAC D40/65B/BCS.

### Advantages:

- Compact and space-saving
- Short and direct connection between the pumps
- Low conductance loss
- Easy installation



TRIVAC D 16 B



## Exhaust filters AF

These exhaust filters retain oil mists, aerosols and harmful substances.

### Advantages:

- Retains dirt and cracked products
- Built-in overpressure relief valve
- Separation efficiency over 99%
- Sight glass for checking the quantity of collected substances
- Exchangeable filter inserts
- Solvent-resistant
- Easy to use and to clean

## Exhaust filters with lubricant return ARP/AR/S

This combination of an exhaust filter and a float-controlled valve considerably extends the maintenance intervals of the TRIVAC B. As a result, oil consumption is lowered to negligible levels.

### Advantages:

- Filtering the exhaust air of entrained lubricant particles
- Lubricant return with the aid of a float-controlled valve
- No operation costs caused by lost lubricant
- Standard filter element
- Built-in overpressure relief valve
- Hardly any oil consumption
- All seals made of FPM (FKM)
- The intake port may be easily exchanged (either vertical or horizontal orientation)

Exhaust filters with lubricant return are connected to the exhaust port of the TRIVAC B while the return line is connected to the intermediate flange under the intake line.

Depending on the properties of the pumped medium, we recommend connecting an exhaust line to the exhaust filter - particularly when pumping hazardous substances.



Dust filter casing (empty), for optional equipping



Adsorption traps and filter insert with various adsorbents



Application example

## Dust filters

Dust filters protect the pump against inlet particles. They consist of a steel casing with a cover featuring three locking clips for fast and easy opening and closing. The dust filter casings are equipped with a KF flange.

The filter housing are supplied without inserts. The filter insert should be selected for the individual requirements.

### Advantages:

- Easy to fit
- Vacuum tight steel casing
- Easy filter replacement
- High filter capacity

## Adsorption traps

The adsorption traps are containers with a stainless steel insert which can be filled with different kinds of adsorbents. They provide a high adsorbing capacity for vapors and water vapor in particular.

### Advantages:

- Stainless steel adsorption inserts (option)
- Bakeable stainless steel insert (up to 300 °C) for adsorbent regeneration
- For use with various adsorbents and separating components
- Simple and rapid replacement of insert and adsorbent
- Cost-effective generation of hydrocarbon-free vacuum
- Low maintenance costs compared to many dry compressing pumps

# Ordering information

| TRIVAC B  |        | D 4 B                  | D 8 B                  | D 16 B                 | D 25 B                 | D 40 B                 | D 65 B                 |
|---|--------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Nominal pumping speed <sup>1)</sup>                         | m³/h   | 4.8                    | 9.7                    | 18.9                   | 29.5                   | 46.0                   | 75.0                   |
| Pumping speed <sup>1)</sup>                                 | m³/h   | 4.2                    | 8.5                    | 16.5                   | 25.7                   | 40.0                   | 65.0                   |
| Ultimate partial pressure <sup>1)</sup> without gas ballast | mbar   | < 1 · 10 <sup>-4</sup> | < 1 · 10 <sup>-4</sup> | < 1 · 10 <sup>-4</sup> | < 1 · 10 <sup>-4</sup> | < 1 · 10 <sup>-4</sup> | < 1 · 10 <sup>-4</sup> |
| Ultimate total pressure <sup>1)</sup> with gas ballast      | mbar   | < 5 · 10 <sup>-3</sup> | < 5 · 10 <sup>-3</sup> | < 5 · 10 <sup>-3</sup> | < 5 · 10 <sup>-3</sup> | < 5 · 10 <sup>-3</sup> | < 5 · 10 <sup>-3</sup> |
| Water vapor tolerance                                       | g/h    | 95                     | 160                    | 305                    | 480                    | 1185                   | 1925                   |
| Oil filling min./max.                                       | l      | 0.3 / 0.8              | 0.3 / 0.9              | 0.45 / 1               | 0.6 / 1.4              | 1.7 / 2.6              | 2.0 / 3.3              |
| Motor power   | W      | 370                    | 370                    | 550 / 750              | 750                    | 2200                   | 2200                   |
| Rotational speed of the pump                                | U/min. | 1500                   | 1500                   | 1500                   | 1500                   | 1500                   | 1500                   |
| Connection ports  | DN     | 16 KF                  | 16 KF                  | 25 KF                  | 25 KF                  | 40 KF                  | 40 KF                  |
| Weight  | kg     | 17.9                   | 18.9                   | 31.5                   | 35.8                   | 72.5                   | 81.7                   |

<sup>1)</sup> according to ISO/R 1000, DIN 28 400, and other German and international vacuum technology standards

| Ordering information                                   |              | D 4 B                   | D 8 B                   | D 16 B                | D 25 B                | D 40 B                | D 65 B                |
|--|--------------|-------------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <b>TRIVAC B rotary vane vacuum pumps, dual stage</b>   |              |                         |                         |                       |                       |                       |                       |
| <b>with single phase motor</b>                         |              |                         |                         |                       |                       |                       |                       |
| 230 V, 50 Hz   |              | 112 45 <sup>2)</sup>    | 112 55 <sup>2)</sup>    | 112 65 <sup>2)</sup>  | 112 75 <sup>2)</sup>  | —                     | —                     |
| 218-242 V, 50/60 Hz <sup>1)</sup>                      |              | —                       | —                       | 113 25 <sup>2)</sup>  | 113 35 <sup>2)</sup>  | —                     | —                     |
| 110-115 V / 210-230 V, 50/60 Hz, including Schuko plug |              | 140 081**               | 140 082**               | —                     | —                     | —                     | —                     |
| 110 V, 50 Hz, NEMA plug / 115 V, 60 Hz, NEMA plug *    |              | —                       | —                       | 912 65-1              | —                     | —                     | —                     |
| 208-230 V, 50/60 Hz, NEMA plug *                       |              | —                       | —                       | 912 65-2              | 912 75-2              | —                     | —                     |
| <b>with three-phase motor</b>                          |              |                         |                         |                       |                       |                       |                       |
| 200-240 V, 50 Hz / 200-240 V, 60 Hz                    |              |                         |                         |                       |                       |                       |                       |
| 200 V, 50 Hz (IE2) / 208-240 V, 60 Hz (EPAct)          |              | 112 46 <sup>2) 3)</sup> | 112 56 <sup>2) 3)</sup> | 112 66 <sup>2)</sup>  | 112 76 <sup>2)</sup>  | 112 86 <sup>2)</sup>  | 112 96 <sup>2)</sup>  |
| 380-400 V, 50 Hz / 380-400 V, 60 Hz                    |              |                         |                         |                       |                       |                       |                       |
| 380-400 V, 50 Hz (IE2) / 416-480 V, 60 Hz (EPAct)      |              |                         |                         |                       |                       |                       |                       |
| 230 V / 400 V, 50 Hz                                   |              | 140 140 <sup>4)</sup>   | 140 150 <sup>4)</sup>   | 140 160 <sup>4)</sup> | 140 170 <sup>4)</sup> | 140 180 <sup>4)</sup> | 140 190 <sup>4)</sup> |
| <b>Accessories:</b>                                    |              |                         |                         |                       |                       |                       |                       |
| Roots pump adapter                                     |              | —                       | —                       | —                     | —                     | 168 30                | 168 30                |
| Condensate trap  | AK           | 188 06                  | 188 06                  | 188 11                | 188 11                | 188 16                | 188 16                |
| Exhaust filter   | AF           | 189 06                  | 189 06                  | 189 11                | 189 11                | 189 16                | 189 16                |
| Condensate trap  | AK 8 / AK 25 | 190 60                  | 190 60                  | 190 63                | 190 63                | —                     | —                     |
| Exhaust filter   | AF 8 / AF 25 | 190 50                  | 190 50                  | 190 53                | 190 63                | —                     | —                     |
| Exhaust filter with lubricant return                   | AR           | 189 20                  | 189 20                  | 189 21                | 189 21                | 189 22                | 189 22                |
| Dust filter and adsorption trap housing                | FH           | 140 116T                | 140 116T                | 140 125T              | 140 125T              | 140 140T              | 140 140T              |
| Dust filter insert                                     | DF           | 140 117S                | 140 117S                | 140 117S              | 140 117S              | 140 141S              | 140 141S              |
| Adsorption trap filter insert, bakeable to 300 °C      | RF           | 140 118A                | 140 118A                | 140 118A              | 140 118A              | 140 142A              | 140 142A              |
| Adsorbents   |              | on request              | on request              | on request            | on request            | on request            | on request            |

<sup>1)</sup> 208-252 V

\* Version for the North and South American Continent

\*\* other plugs upon request

<sup>2)</sup> Certification after 94/9/EG (ATEX), Category 3 inside. Inside: II (I) 3G IIC T4 (50 Hz), T3 (60 Hz).

<sup>3)</sup> Not subject to energy efficiency class directive.

<sup>4)</sup> Certification after 94/9/EG (ATEX), Category 3 inside and 3 outside. Inside: II (I) 3G IIC T4 (50 Hz). Outside: II (0) 3G IIC T3 (50 Hz).

Please refer to our full line catalog for the complete range of TRIVAC pump models and accessories.

**The pumps and accessories described in this folder are a just a selection from our complete product range. Additional motors and oils upon request.**



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