ZIRKON

D003 V - D040 V

Dry operating rotary vane vacuum pump

Translation of the original instructions

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Contents

2 Introduction

2.1 Information relating to the operating instructions

These instructions describe the handling of the dry-operating ZIRKON rotary vane vacuum pumps of the series type:

ZIRKON D003 V to D040 V

A condition for secure operation is adherence to all safety and operating instructions.

Read the operating instructions!

The operating instructions must be carefully read through before commencement of any operation! They are an integral part of the equipment and must at all times be kept in close proximity to the machinery for immediate use by the operating and maintenance personnel.

Observe the operating instructions!

The company "briwatec GmbH" will not be held liable for workplace accidents, damage to the equipment, production losses or completion disorders that occur as a result of non-observance of the operating instructions.

Furthermore, the local accident-avoidance directions and general safety regulations in respect of the operation of machinery will apply.

The figures serve for a general understanding of the machinery and may differ somewhat from the actual construction thereof.

Components produced by other suppliers have their own safety instructions and guidelines. These must also be observed.

2.2 Limitation of liability

All data and directions in this introduction have been assembled with due consideration of the corresponding norms and regulations of the state of the art as well as of our own knowledge and experience.

The company "briwatec GmbH" will not be held liable for damages due to:

- Non-observance of the operating directions
- Misuse of equipment
- Employment of unqualified personnel
- Use of spare parts that have not been provided by the company "briwatec GmbH"
- Arbitrary alteration of machinery components or of accessories (supply list from the company "briwatec GmbH")

The responsibilities agreed in the supply contract, the general commercial conditions as well as the conditions of supply by the company "briwatec GmbH" and the regulations current at the time of signing of the contract will apply.

We reserve the right to make technical changes with a view to improving the operating conditions and further development.

2.3 Copyright

The transfer of the operating instructions to third parties without written permission from the company "briwatec GmbH" is prohibited.

NOTICE!

All data contained herein, texts, drawings, pictures and other illustrations are protected by copyright and are subject to commercial patent rights.

All misuse thereof is liable to prosecution!

Duplication in any type or form - even extracts - as well as the utilization and/or communication of the contents hereof are not permitted without written authorisation by the company "briwatec GmbH".

2.4 Spare parts

The company ""briwatec GmbH" recommends the use of original spare parts. Original spare parts possess special quality properties and provide reliable and safe functionality;

- Development of the special use of the equipment
- Manufacture in high quality and value
- Warranty period of 12 months after installation or shipping (excluding wearing parts) or other agreements made.

NOTICE!

The use of non-original spare parts can alter the properties of the equipment and put its safety at risk!

The company "briwatec GmbH" is absolved of any liability for damage that results there from.

DISPOSAL!

Worn-out components (indicated in the spare parts list) are waste products.

After exchange, the worn-out components should be disposed of in accordance with the national regulations.

2.5 Service

For servicing queries, the company "briwatec GmbH" can be contacted as follows:

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Schönauer Str. 62
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For faster response to your queries, please have available the following data and information:

- Serial number
- Which activity has already been undertaken?

Service work: Prior to service works on-site, the motor has to be disconnected from the circuit by a qualified electrician so that an unforeseen start does not occur.

For servicing work, we recommend that the manufacturer or its local branch or sub-contractor be engaged, especially where possible repairs under warranty are involved.

The address of the servicing station appropriate for yourselves can be obtained from the manufacturer (see the manufacturer's address). Following a repair or prior to re-start-up, the jobs indicated under "Installation" and "Start-up" must be carried out as for the initial start-up procedure.

2.6 CE-Declaration of Conformity

briwatec GmbH
Schönauer Str. 62
79669 Zell im Wiesental / Germany

Konformitätserklärung
EC declaration of conformity

im Sinne der EG-Maschinenrichtlinie 2006/42/EG
as defined by machinery directive 2006/42/EG

Hiermit erklären wir, dass die **Drehschieber-Vakuumpumpen (ZIRKON V)**
Herewith we declare that the **rotary vane vacuum pumps (ZIRKON V)**

ZIRKON D003 V, ZIRKON D005 V, ZIRKON D006 V, ZIRKON D008 V,
ZIRKON D010 V, ZIRKON D015 V, ZIRKON D025 V, ZIRKON D040 V,
ZIRKON D060 V, ZIRKON D080 V, ZIRKON D100 V, ZIRKON D140 V

folgenden einschlägigen Bestimmungen entsprechen:
the following special regulations correspond to them:

- Maschinenrichtlinie 2006/42/EG i.d. aktuellen Fassung/ in the actual version
- Niederspannungsrichtlinie 2014/35/EU i.d. aktuellen Fassung/in the actual version

Angewendete harmonisierte Normen, insbesondere:
Applied harmonized standards, in particular:

- DIN EN 1012-1:2010; DIN EN 1012-2:2011
- DIN EN ISO 12100-1, DIN EN ISO 12100-2

Diese Konformitätserklärung verliert ihre Gültigkeit, wenn an der Maschine Änderungen vorgenommen werden, die nicht vorher mit uns abgestimmt und schriftlich genehmigt wurde.
If some changes on the machine will be done without approval by supplier, this EC declaration of conformity will loose it's validity.

Dokumentations-bevollmächtigter Markus Britsche
Schönauer Str. 62
79669 Zell im Wiesental/Germany

Zell i.W., den 24. März 2016
(Ort, Datum der Ausstellung/date)

Markus Britsche (Geschäftsführer/Managing Director)
(Unterschrift/signature)*

* rechtsverbindlich; mit Angaben zum Unterzeichner / legally binding; with declaration to the signer

K_0009 Rev.5

Fig. 1 CE-Declaration of Conformity

3 Safety

3.1 General

The ZIRKON rotary vane vacuum pump has been constructed, completed and tested in accordance with the safety guidelines of the latest state of the art, and has been released in a technically safe and impeccable condition. Nevertheless, dangers can occur with use of the machinery, for persons and objects, if it is used in an improper manner.

The operating instructions must be read comprehensively and the safety directions must be adhered to.

The operating directions that are attached to the machinery must be followed and must be kept in a readily readable condition. This relates, for example, to:

- Connection indicator
- Data and motor identification plate
- Instructions and warning plates

In the event of non-conforming operation, all liabilities and warranties on the part of the company "briwatec GmbH" are rescinded.

3.2 Description of safety instructions

Safety instructions refer to particular dangers. These are indicated in this guidebook by way of symbols.

SAFE refers to 4 basics in the description of the safety instructions:

- **S**everity of danger (Signal word)
- **T**ype and origin of the danger (description)
- **C**onsequence of non-observance
- **A**voidance (measures to avoid a danger)

The corresponding warning symbol serves to identify the point of danger.

Model construction of safety directions:

DANGER!

DESCRIPTION OF THE TYPE AND ORIGIN OF THE DANGER!

Description of the consequences of ignoring the danger.

- Measures taken to avoid the danger

3.3 General safety advice

The following general safety instructions are used according to the type of danger:

DANGER!

Refers to an immediate, dangerous situation that results in death or serious injury if not avoided.

WARNING!

Refers to a possibly dangerous situation that could lead to death or serious injury, if not avoided.

CAUTION!

Refers to a possibly dangerous situation that could lead to slight or minor injury or to damage of objects if not avoided.

The following indicators are used in this guidebook:

NOTICE!

This symbol refers to an important state of affairs.

Relevant instructions for the installation, operation or maintenance are provided.

RECYCLING!

This symbol refers to relevant instructions for disposal.

Materials must be separated and disposed of individually.

Similarly, the instructions for the disposal of lubricants (oils and greases) as well as of additives must be observed!

3.4 Personnel requirements

WARNING!

Danger from inadequately qualified personnel

Inappropriate actions can lead to serious personnel injury and material damage. Therefore:

- All activities must only be carried out by qualified personnel.

Electrical equipment

Work with electrical installations may only be undertaken by expert electricians in accordance with electro-technical regulations.

This refers to work on the installation, operation, repair to and maintenance of electrical equipment.

This relates to work on the electrical system for installation, commissioning, repairs and maintenance.

The operation of the machine must only be performed by trained or skilled personnel. The operator must be conversant with the basic directions regarding safety at work and accident avoidance, and must have been trained in the management of the machinery. The operator must have read and understood the operating instructions prior to start-up of the machinery.

3.5 Definition of terms

Trained persons / operators … Trained Personnel/Operators have been trained by the operator in regard to the tasks given to him and the possible dangers from inappropriate actions.

Skilled personnel … Qualified Personnel because of their technical training, knowledge and experience as well as their knowledge of the appropriate directions, are capable of carrying out the tasks given to them and able to identify dangers and how to avoid them.

Machinery ... connection-ready combination of the pump housing, rotor and motor.

Motor ... Driving motor of the vacuum pump.

Vacuum pump … machine for generating an under pressure (vacuum).

Suction power … Volume flow of a vacuum pump in relation to the condition in the suction connection.

Final pressure (absolute) … the maximum vacuum that a pump achieves with a closed suction opening, indicated as absolute pressure.

Permanent vacuum ... The vacuum or suction pressure area, which operates the pump in continuous operation. The permanent vacuum and suction pressure is ≥ than the final vacuum and < than atmospheric pressure.

Noise emission … The given noise at any particular load condition as numerical value, the noise level in dB (A) in accordance with EN ISO 3744.

3.6 Use in accordance with regulations

The ZIRKON V series machines are suitable for evacuation of closed systems, or for a permanent vacuum in the intake pressure range 120 to 1000 mbar (abs). These dry operating vacuum pumps are suitable for pumping air with a relative humidity of 30 to 90%.

The machine may only be operated in the following manner:

- Only when the machine is operated in a technically faultless condition
- When the machine is not in a partially assembled condition
- The machine may only be operated in an ambient temperature and an inlet temperature of between 5° and 40°C. At temperatures outside this range please refer to the supplier.

The machine can be used in the following media:

- Air having a relative humidity of minimum 30%, maximum 90%,
- Dry, non-aggressive gases.

WARNING!

Danger when used in non-prescribed manner!

Any use of the machinery that is outside and/or alternative to the prescribed manner can lead to dangerous situations.

- ZIRKON rotary vane vacuum pumps must only be used as intended.
- All instructions in the operating manual should be strictly adhered to.

Claims of any kind in respect of damage due to non-prescribed use are not permitted. The operator alone is liable for damage due to non-prescribed use.

3.7 Improper operation

Mis-usage can result from the following methods of operation:

- No dangerous substances may be sucked into the machine such, for example, as:
  - o combustible or explosive gases or fumes,
  - o Water vapour,
  - o aggressive gasses.
- The use of the machine in non-industrial establishments, in which the necessary precautions and safety measures have not been undertaken.
- The installation in explosion-prone environments.
- Alterations to the machinery and its component accessories.

3.8 Protective measures by the operator/user

The machine is operated in commercial/industrial situations. The operator of the machine is, therefor, subject to the legal requirements in respect of working safety. In addition to the safety regulations stated in this operating manual, the applicable safety-, accident- and environmental protection regulations must be adhered to for operation of this machinery.

In this regard, it should be specially noted that:

- Hot parts of the machine must not be accessible or be provided with protective contact means.
- Personnel should not be placed in danger from free suction or expulsion of medium substances.
- Danger from electrical energy should be prevented.
- The operator must be conversant with the relevant protection-at-work regulations and must ascertain any situation judged to comprise dangerous conditions when the work place of the machinery will have special safety regulations. These should be available to him as operating instructions for using the machinery.
- The operator must undertake tests throughout the operation of the machinery to check whether the operating instruction being followed by him actually conform to the prescribed instructions for operating the machinery and, if necessary, modify accordingly.
- The operator must clearly regulate and establish the adequacy of the installation, operation, fault removal and maintenance.
- The operator must ensure that all co-workers involved in operation of the machinery have read and understand these operating instructions. In addition, he or she must subject the personnel to training sessions at regular intervals and keep them informed about dangers.

DANGER!

Safe access to the operating components!

If operating components are displaced and unreachable, there is the risk of injury and life-threatening injury.

- Operating components should not be displaced and safe access should be available.

In addition, the operator is responsible for ensuring that the machinery is permanently in a faultless technical condition.

4 Technical specifications

4.1 Spare suction filter

The model plate contains the relevant technical information about the machine.

In the event of technical service queries the model references, date of manufacture and serial number must be available.

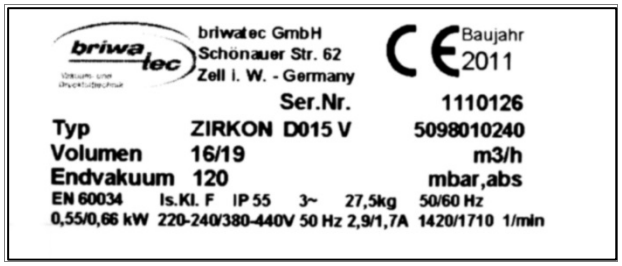

Fig. 2 Type plate (example)

The highest permitted flow volume and vacuum are dependent upon the size of construction and are indicated on the model plate.

4.2 Technical Information

The following technical details and noise emissions apply to the ZIRKON V series:

ZIRKON		D003V	D005V	D006V	D008V	D010V	D015V	D025V	D040V
noise level	50 Hz	62	59	60	60	64	63	65	68
(max.) dB(A)	60 Hz	65	61	62	62	66	65	67	67
weight	3 ~	5	5,4	7,5	7,5	14	27,5	28,5	37,5
(max.) kg	1 ~	5	5,4	8,5	8,5	15,5	29,5	29	40
Length mm		210	226	253	253	304	412	412	484
Width mm		125	140	163	167	182	206	206	230
Hight mm		135	140	163	160	174	271	271	308

Fig. 3 ZIRKON V series, Technical Information

The suction power at free intake amounts to 3, 5, 6, 8, 10, 15, 25 and 40 m³/h at 50 Hz. The dependence of the pumping capacity of the inlet pressure is shown on the corresponding data sheets.

The sound pressure levels or sound power level according to EN ISO 3744, measured at 1 m distance in an operating point at about 2 / 3 of the permissible total differential pressure and connected lines without vacuum reduction, tolerance ± 3 dB (A), are indicated in the table, Fig. 3

Ear protectors! To prevent hearing damage through lengthy presence in the vicinity of an operating machine, the use of hearing protection means is recommended.

5 Functional description

5.1 Conditions of use

The ZIRKON rotary vane vacuum pumps are intended for use in the commercial sector, i.e. the safety arrangements conform to DIN EN ISO 13857 for persons aged from 14 years.

They are suitable for the conveyance of air with a relative humidity of 30% up to 90% and dry, non-aggressive gases.

The vacuum pump can be operated in continuous vacuum in the intake pressure range of 120 to 1000 mbar (abs).

Suction power, suction pressure

The dependency of the suction power on the suction pressure is type-specific and can be taken from the corresponding datasheets:

Data page No.	Construction series
D142	ZIRKON D003 V
D143	ZIRKON D005 V
D133	ZIRKON D006 V
D262	ZIRKON D008 V
D135	ZIRKON D010 V
D132	ZIRKON D015 V
D136	ZIRKON D025 V
D137	ZIRKON D040 V

Extracted substances:

The suctioned air may contain no water or other fluids. Aggressive or combustible gases and vapours may not be suctioned. No hazardous additives (e.g. combustible or explosive gases or vapours) or aggressive gases may be suctioned.

Operation in rooms with an explosion risk is not permitted.

The suction and inlet temperature must be between 5 °C and 40 °C For temperatures outside of this range, the manufacturer should be consulted.

NOTICE!

At increased duty cycles (evenly spaced about 10 times per hour) and elevated ambient and inlet temperatures, the maximum temperature of the motor winding and the bearings is exceeded.

In the case of such conditions seek advice from the manufacturer.

In outdoor set ups, the unit must be from protected from environmental influences (e.g. by means of a shelter).

DANGER!

Unintentional stoppage or interruption

In the case of an operation in which an unplanned stoppage or failure of the vacuum pump can cause harm to persons or equipment, appropriate safety measures must be taken on the equipment side.

5.2 Construction

The ZIRKON rotary vane vacuum pump consists of the following major components:

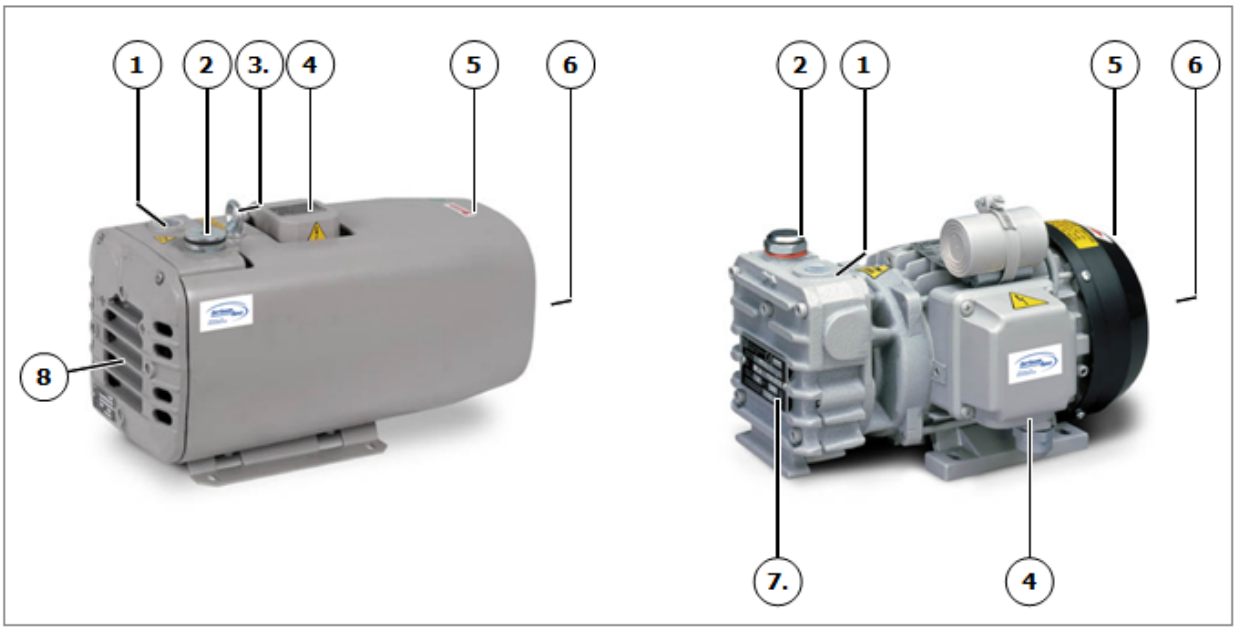

Fig. 4 Principle components of the ZIRKON V

1. Connection for suction line (vacuum port)
2. Exhaust port / exhaust silencer
3. Lifting
4. Terminal box
5. Direction of rotation arrow
6. Cooling air inlet
7. Type plate
8. Cooling air outlet

5.3 Function

The machines of the ZIRKON series have suction and exhaust sides, each with a connecting thread (item 1 and 2, Fig. 4).

The motor and pump have a common shaft.

The machines of the ZIRKON D015 V and D040 V series are clad with an acoustic hood made of plastic. Within the acoustic enclosure is a cooling fan.

The machines in the ZIRKON D003 V to D010 V series have an open design without any cover.

Accessories

The following accessories are available for the machine types of the ZIRKON series if required:

- Vacuum-regulating valve,
- non-return valve,
- motor protection switch
- hose connection,
- additional vacuum filter.

6 Transport / Storage

6.1 Precautions for transportation

DANGER!

The machine may swing outwards.

Be aware of the centre of gravity when lifting and follow the lifting instructions!

- The machine must be correctly packed in the original packaging prior to transporting to its destination.
- The package must be fixed on a Euro pallet or similar system so that the machine cannot tip over.
- Ensure stable centre of gravity.

Observe the accident prevention regulations!

When lifting and transporting the machine, the safety regulations and general accident prevention regulations and the recognized technical rules must be observed.

6.2 Machine lifting and transportation

The D040 series machines ZIRKON V may only be suspended by the designated eyebolt (item 3, Fig. 4).

The machine can swing out. When lifting pay special attention to the centre of gravity, readjust the lifting gear!

Packaging

The machinery must be properly packed in its original packaging before being transported to the destination. The packaging should be attached to a European pallet or similar so that the machine cannot topple over.

The packaging should protect the individual components up to their assembly, from transportation damage, corrosion and other damage. Therefore, the packaging must not be disturbed and only removed shortly before assembly.

ENVIRONMENTAL DAMAGE THROUGH DISPOSAL!

Packaging material is a valuable product and can, in many cases, be re-used or carefully prepared and re-used. Therefore:

- The packaging material must be disposed of in an environmentally friendly manner
- Observe the local waste disposal regulations; if necessary, use the services of a specialist disposal company.

6.3 Storage

The machinery of the construction series ZIRKON must be stored in a dry situation that has normal air humidity

At a relative humidity above 80% it is recommended that the site is enclosed in a sealed cover containing a drying agent.

Storage for longer than a year should be avoided.

7 Commissioning

7.1 Setup

NOTICE!

All parts listed with the item number refer to the illustration, fig. 4 on page 12.

During set up and installation of the machine, make sure that the cooling air inlet (item 6) and the cooling air outlet (item 8) are at least 10 cm from the nearest wall

At least 30 cm clearance must be available in order to dismantle the exhaust grille, casing and cover for maintenance work.

Assembly of the ZIRKON frame sizes D015 V to D040 V can be undertaken on a stable and secure surface without the need for fixed footings.

We recommend a fixing at the smaller ZIRKON 003 V to D010 V frame sizes. For assembly on an under-construction we recommend a fixing using elastic rubber pads.

Vibration of machines of the ZIRKON construction series is minimal.

NOTICE!

For assembly at levels greater than 1000 metres above sea-level, reduced output is noticeable.

In this case, we advise prior advice from the manufacturer.

7.2 Installation

WARNING!

Mortal danger from electrical shocks!

Non-professional handling of electrical components can lead to life-threatening electric shocks, if undertaken with insufficient experience.

- Electrical installations should only be undertaken by qualified personnel
- Fused security for the construction should be carried out via the main junction box.

ATTENTION!

Accident prevention rules:

The current accident prevention regulations must be observed for all activities relating to installation and operation!

1. Vacuum line connection, item 1, Fig. 4.
   The hose must withstand a pressure of 5 kPa (absolute). The diameter of the hose should be at least the same as the diameter of the inlet flange.
2. The absorbed air can be blown out by the air exhaust or led away through pipe hose and pipe connections.

NOTICE!

With too narrow and / or too long lines, the performance of the vacuum pump is reduced.

3. The electrical motor data is indicated on the type plate (item 7) and on the motor data plate. The motors comply with DIN EN 60034 and are in safety class IP 55 and insulation class F. The corresponding connection diagram is located in the motor terminal box (not needed for the version with a plug connection). The motor data should be compared with the existing grid (current type, tension, grid frequency and permitted current strength).
   For information regarding single-phase and triple-phase alternating current as well as connection setting see below!
4. The motor and motor protection switch (for security a motor protection switch and for draught exclusion of the connecting cable a cable threading are provided).

NOTICE!

We recommend the use of circuit breakers with delayed switch-off according to over-current conditions. Overcurrent time delay occurs.

Momentary overcurrent can occur during cold start of the vacuum pump!

Single-phase alternating current

Single-phase AC is an alternating current that flows through a two-strand cable (in German power outlets).

From the three-phase alternating current of low voltage single-phase network obtained has an outer conductor.

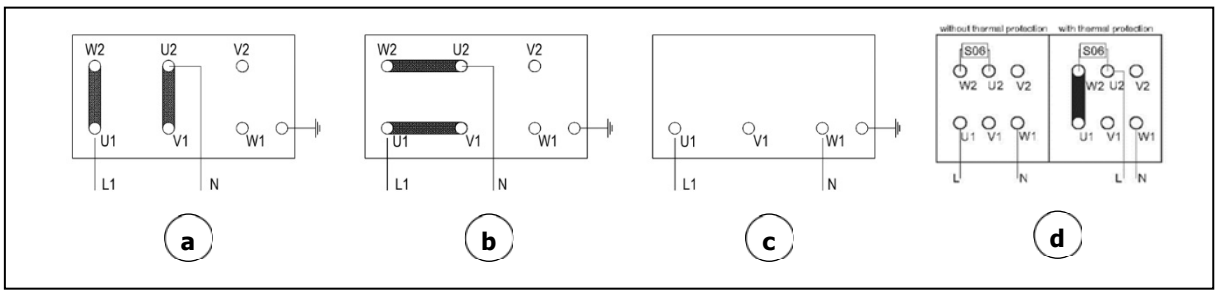

Fig. 5 Connections for single phase alternating current

a. 6-pin terminal board, clockwise rotation
b. 6-pin terminal board, anticlockwise rotation
c. 3-pole terminal board
d. 6-pin terminal board, thermal protection

Triple-phase alternating current:

With triple-phase alternating current three alternating tensions are carried across five connections that have a timed relationship to one another, a so-called phased relationship.

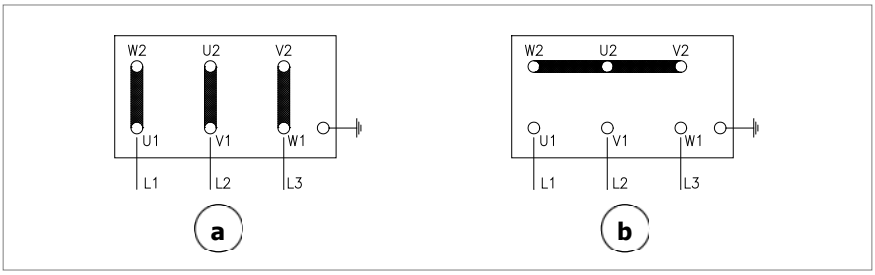

Fig. 6 Connection of three-phase electrical power

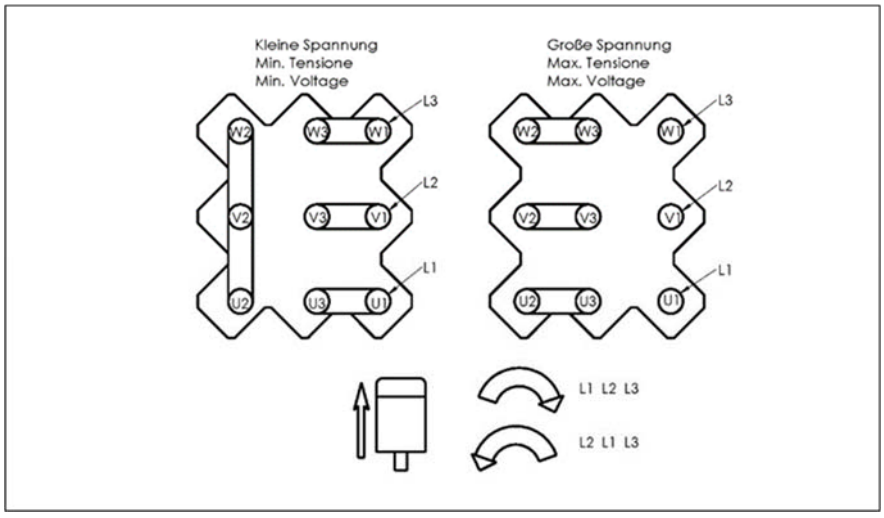

Fig. 7 Connection of three-phase alternating current – 9-pole terminal board

a. △- connection (triangular), lower tension (Example: 230 V)
b. Y - connection (star), upper voltage (Example: 400 V)

Standard Tension Range	
50 Hz	**60 Hz**
220 / 380 V ± 5% 230 / 400 V ± 10% 240 / 415 V ± 5%	265 / 460 V ± 10%

7.3 Commissioning

NOTICE!

The maximum number of starts per hour may not exceed 10

1. Start engine and check the rotation direction of the arrow on the housing, see item 5, Fig. 4.

CAUTION!

The suction line must not be connected!

With this start-up the suction line must not be connected. With reverse flow of the vacuum pump and connected suction line, a vacuum can build up that can lead to damage to the blades and actual fracture of the blades.

2. Suction line connected to item 1, Fig. 4. Notice: If the vacuum pump is connected to the generator via a conduit in excess of 3 m in length, we recommend the inclusion of a non-return valve between the pump and the conduit. This will avoid reverse flow after shutdown.
3. Vacuum-regulating valve (option): The regulation of the vacuum is carried out by turning the regulation knob; take note of the indicated turning direction.

8 Operation

Noise emission

We recommend wearing ear protection when working permanently in the vicinity of the vacuum pump to prevent damage to hearing.

HOT SURFACE!

Surface temperatures in excess of 70°C!

At hot operating temperatures the surface temperatures of components can rise above 70°C. Risk of burns!

- Avoid touching the components.
- Wear protective gloves.

Before start-up of the operation, the correct set up for the machine, the installation and start-up (trial run) should be organised.
See chapter 7 Commissioning page 14.

The machine should be checked prior to start-up in respect of observance of the service measures! See chapter 9 Maintenance, page 19.

9 Maintenance

DANGER!

Before undertaking maintenance works:

For maintenance activities, the machine must be secured by withdrawal of the circuit plug or operation of the main switch to separate it from the E-Grid and to ensure against re-switch-on.

Pressure-conducting conduits must be purged of air before disassembly! Maintenance **must not** be carried out on operation-warm machinery (danger of injury through contact with hot components)!

All machines of the ZIRKON D003 V to D040 V series have a permanent lubrication for the bearing. This must not be re-lubricated.

For maintenance operations, the blades and the filter cartridge of the air filter must be checked, see chapter 9.1 and 9.2.

For maintenance of the filter and blades the exhaust screen and casing lid must be unscrewed.

For this purpose the fixing screws must be withdrawn and the cover / lid removed.

9.1 Air Filter

CAUTION!

In the case of insufficient maintenance of the filter, the power of the vacuum pump is reduced.

The filter cartridge for the suction air, depending on the degree of contamination, should be cleaned by purging from inside to outside.

The operational readiness of the degree of separation will be reduced in spite of cleaning the filter. Therefore, we recommend replacement of the filter every half year.

Filter replacement:

Filter replacement is carried out in the following manner:

- Outlet grilles / Unscrew the housing cover, Fig. 8 item 1,
- Remove the cartridge filter, Fig. 9 item 2,
- Filter box lid gasket
- Reassemble in reverse order.

CAUTION!

In cartridge could have different sealing. The housing cover (Fig. 8 , item 1) should be screwed with equal force until achieving right position.

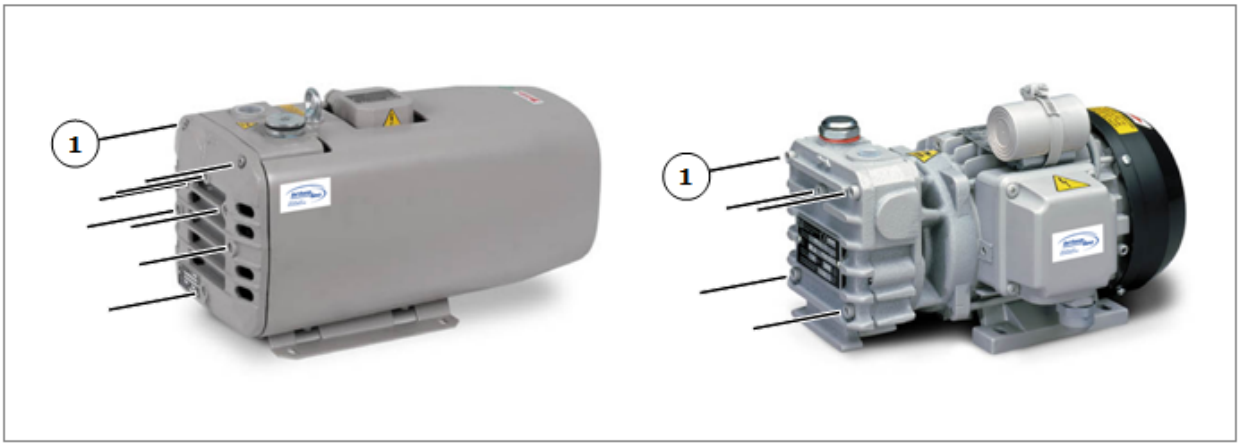

Fig. 8 Removing exhaust grille / cover

1. Exhaust grille / housing cover mounting screws

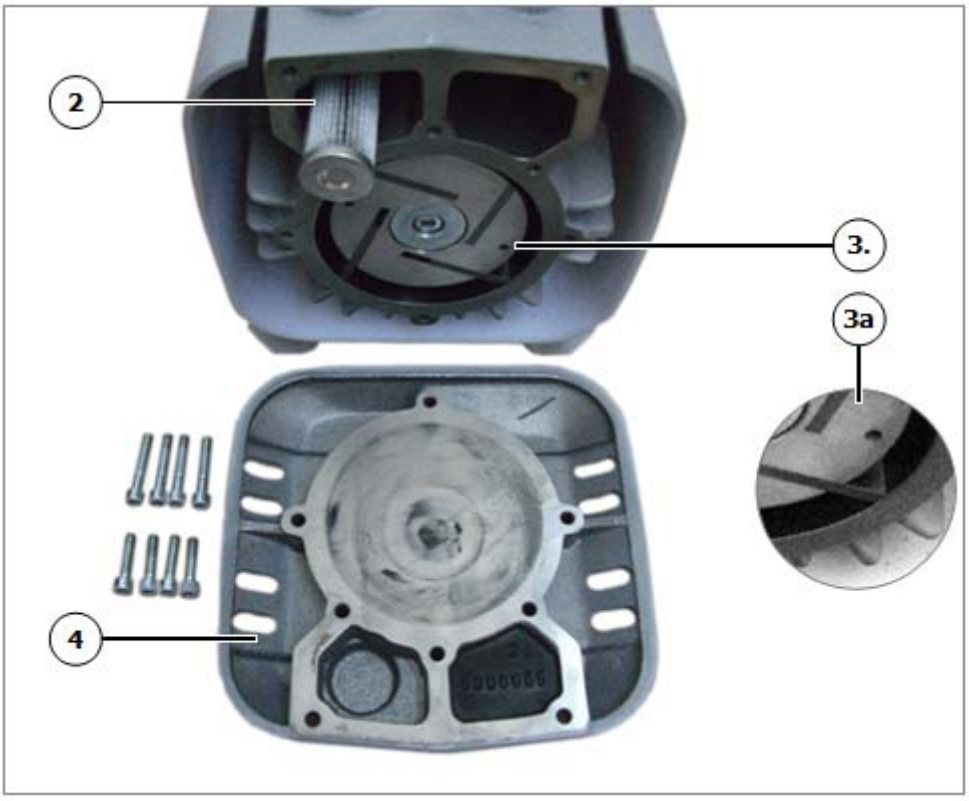

Fig. 9 Case opened

2. Filter cartridge
3. Fins (3a blades chamfer on housing bore)
4. Air grille/front cover

9.2 Blades

Blade maintenance:

The machines of the construction series ZIRKON D003 V to D040 V have 4 carbon blades that wear out during operation through abrasion. In order to achieve faultless operation, the blades must be checked for wear at regular intervals.

For this purpose the blades are disassembled:

- Outlet grilles / Unscrew the housing cover, Fig. 8 item 1,
- blades for inspection see, Fig. 9 item 3,
- Check minimum height and condition of the blades.

The blades must have the following thickness (A):

Construction series	Minimum height A
ZIRKON D003 V	14 mm
ZIRKON D005 V	19 mm
ZIRKON D006 V	19 mm
ZIRKON D008 V	20 mm
ZIRKON D010 V	20 mm
ZIRKON D015 V	27 mm
ZIRKON D025 V	32 mm
ZIRKON D040 V	34 mm

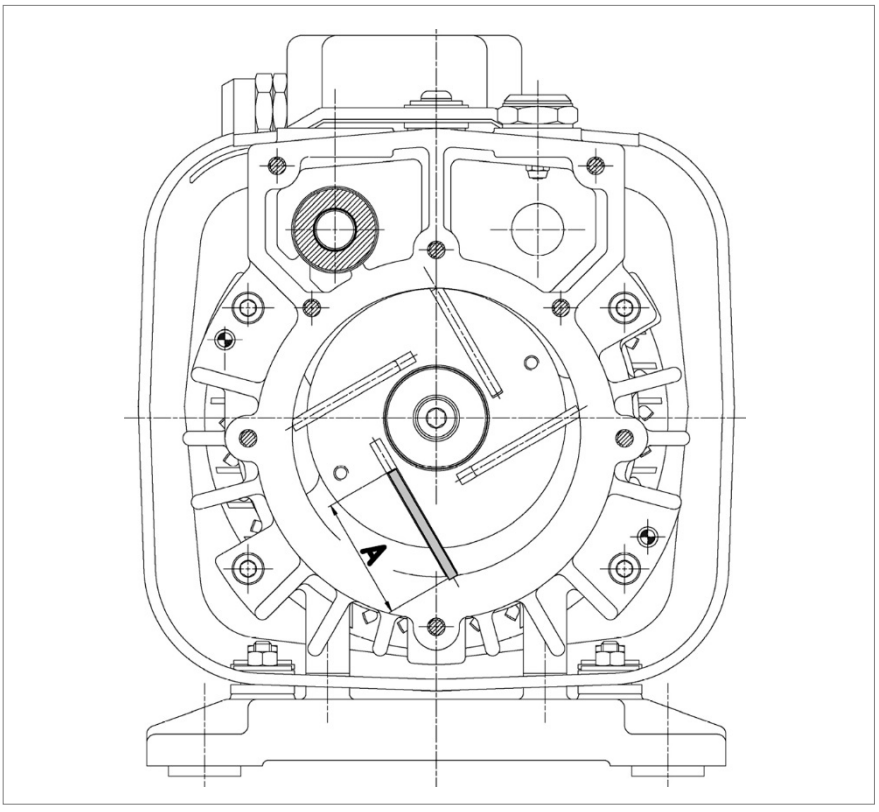

Fig. 10 Minimum blades A

Following inspection intervals must be observed:

D003 V - D025 V

- First control after 6,000 operating hours (approximately 22 months in two-shift operation),
- Then every 1,000 operating hours (about 3 months in 2-shift operation).

D040 V:

- First control after 5,000 operating hours (approximately 16 months in two-shift operation),
- Then every 1,000 operating hours (about 3 months in 2-shift operation).

Blade change:

NOTICE!

The blades may only be exchanged batchwise!

On reaching or falling below the minimum thickness A (see Table above), the blades must be changed batchwise.

After removal of the blades, the housing and rotary slit must be blown clear. Then the new blades are inserted into the rotor slit.

Care should be taken that the insertion is in the correct structural position:

The slanting side of the blade must show to the outside and the slant in the rotation direction must coincide with the motion of the housing boring, see detail Fig. 9 , item 3a and Fig. 10 .

The housing lid / cover is then re-screwed in.

CAUTION!

Before start-up the free movement of the blades must be checked by turning the ventilator.

For this, the suction screen or protection cap should be unscrewed!

10 Fault diagnosis

1. Pumping speed is insufficient:

Cause	Remedy
The inlet filter is dirty.	Clean the inlet filter or change it.
The suction pipe is too long or too narrow.	Provide a larger diameter conduit, clear the restriction sites.
Leakage in the vacuum pump or in the system.	Check the pump and the pipes for pressure loss.
The blades are damaged.	The cool air flow is hindered.

2. Vacuum pump is turned off by circuit breaker:

Cause	Remedy
The grid tension/frequency does not conform to the motor data.	Conform to the motor data.
The motor protection switch is incorrectly set.	Check the setting of the motor protection switch.
The motor protection switch turns off too quickly.	Use a motor circuit breaker with a load-dependent switch-on delay time that takes into account the short-time overcurrent at start-up (version with short-circuit and overload trigger in accordance with VDE 0660 Part 2 and IEC 947-4).
Check the connections and/or plug.	Check the connection or plug connection.
The exhaust back pressure at the discharge is too high.	Check exhaust line and remove if necessary.

3. Final pressure (max. vacuum) is not reached:

Cause	Remedy
Leakage on the suction side of the vacuum pump or in the system.	Check the vacuum pump and the pipes for pressure loss.
The counter pressure should conform to the technical instructions.	The cool air flow is hindered.

4. Vacuum pump is too hot:

Cause	Remedy
Obtain repairs from the manufacturer or contract workshop.	The inlet temperature must be between 5 °C and 40 °C.
The exhaust back pressure at the discharge is too high.	Check exhaust line and remove if necessary.
Cooling air flow is impeded.	The cold air inlet and cold air outlet must be at least 10 cm distant from the nearest wall (exhaust cool air cannot be re-sucked in).

5. Vacuum pump makes unusual noise:

Cause	Remedy
The pump housing is worn out (chatter marks).	Obtain repairs from the manufacturer or contract workshop.
The vacuum regulation valve "vibrates" (if present).	Replace the valve.
The blades are damaged.	The cool air flow is hindered.

11 List of Figures