

# CITRIN

## 80 - 210

Side-channel vacuum pump  
Side-channel compressor



### Translation of original operating manual

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## 2. Introduction

### 2.1 Data about the instruction manual

This manual provides information on how to operate the CITRIN Side channel vacuum pumps / Side channel compressors of the type series:

#### **CITRIN 80 - 210**

The prerequisite for safe operation is compliance with all specified safety and operating instructions.

#### **Read the instruction manual.**

Read the instruction manual carefully before starting work. It is part of the product and must be kept in the immediate vicinity of the machine for the operating and maintenance personnel at all times.

#### **Observe the operating instructions.**

The company briwatec GmbH assumes no liability for accidents, equipment damage and loss of production or flow disturbances caused by the failure to observe the operating instructions.

In addition, the local health and safety regulations and general safety rules for the operation of the machine must be observed.

The illustrations are used to promote fundamental understanding and may differ from the actual execution of the machine.

Components from other suppliers have their own guidelines and safety regulations. They must also be respected.

### 2.2 Limitation of liability

All information and advice in these instructions has been compiled in accordance with current standards and regulations, the state of technology and our knowledge and experience.

The company briwatec GmbH assumes no liability for damage due to:

- Failure to follow the instructions
- Improper use
- Use of untrained staff
- Use of spare parts that were not released by the company briwatec GmbH.
- Unauthorized changes to the machine or equipment (supplied by briwatec GmbH)

The agreed contract obligations, general terms and conditions and the delivery conditions from briwatec GmbH apply, as well as the valid legal regulations at the time of signing the contract.

We reserve the right to make technical changes in the context of improving the performance characteristics and further development.

### 2.3 Copyright

The transfer of these operating instructions to third parties without written approval from briwatec GmbH is prohibited.



#### **Note!**

All content, texts, drawings, pictures and other images are copyrighted and are protected by intellectual property rights.

Any improper use is punishable by law.

Reproduction in any shape or form - even in part - and the use and / or communication of content without a written declaration from briwatec GmbH is not permitted.

### 2.4 Spare parts

The company briwatec GmbH recommends the use of original spare parts. Original spare parts have special qualities that ensure a reliable and safe operation:

- Development for the specific use of the device
- High-quality manufacturing
- Warranty period of 12 months after installation or shipping (excluding wearing parts) or other agreements made



#### Note!

The use of non-original replacement parts may change the characteristics of the machine and compromise safety. Any liability of the company briwatec GmbH is excluded for damage resulting from this.



#### Disposal!

Wearing parts (in the spare parts list) are hazardous waste. After replacement, wearing parts must be disposed of according to national laws.

### 2.5 Service

For service questions, please contact the company briwatec GmbH as follows:

<b>briwatec GmbH</b>	Tel. +49 (0) 7625 918 868-0
Schönauer Str. 62	Fax. +49 (0) 7625 918 868 -33
79669 Zell i. W.	info@briwatec.de
Germany	www.briwatec.de

For faster processing of your requests, we ask you to have the following data and information ready in advance:

- Serial Number
- What actions have already been taken?

**Servicing:** For service work on site, the motor must be disconnected from the network by a qualified electrician, so that an accidental start up cannot take place.

For maintenance, we recommend using the manufacturer, its agents or contractors especially if it is a question of warranty repairs.

The address of your local service centre can be obtained from the manufacturer (see manufacturer's address). After repair and before restarting, the measures listed under "Installation" and Startup" must be performed as after the initial startup.

## 2.6 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 Seitenkanal-Vakuumpumpen und Seitenkanal-Verdichter (CITRIN)  
 Herewith we declare that the side channel vacuum pumps and side channel compressors (CITRIN)

**CITRIN 80, CITRIN 90, CITRIN 140, CITRIN 210**

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

- Maschinenrichtlinie 2006/42/EG i.d. aktuellen Fassung/ in the actual version
- Geräte- und Produktsicherheitsgesetz (GPSG) i.d. aktuellen Fassung/in the actual version
- Niederspannungsrichtlinie 2006/95/EG i.d. aktuellen Fassung/in the actual version

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

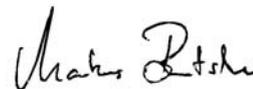
- DIN EN 1012-1:2010, DIN EN 1012-2:2011
- DIN EN ISO 12100-1, DIN EN ISO 12100-2

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 lose its validity.

**Dokumentations-  
 bevollmächtigter**

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



Zell i.W., den 04. April 2014  
 (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\_0022 Rev.1

Figure. 1 CE-Declaration of Conformity

### 3. Safety

#### 3.1 General

The CITRIN side-channel vacuum pumps / side-channel compressors reliably designed, manufactured and tested based on the latest state of the art have left the factory in perfect condition. Nevertheless, the machinery may cause risks to people and material objects when it is operated improperly.

The instructions must therefore be read in full and the safety instructions must be followed.

Information attached directly to the machine must be respected and maintained in a legible condition. This applies to:

- Identifiers of connections
- Data and motor data plate
- Information and warning signs

In the event of use that deviates from the proper and intended use, all liability and warranty will be rejected by the company briwatec GmbH.

#### 3.2 Description of safety instructions

Safety instructions refer to specific hazards. They are marked by symbols in this manual.

There are 4 principles that must be considered in the design of safety information:

- Severity of the risk (signal word)
- Type and source of danger (description)
- Result of failure to comply
- Prevention (measures to prevent the hazard)

The appropriate warning sign is used to mark the area of risk.

Example structure of a safety warning:



#### **Danger!**

##### **Description of the nature and source of the danger.**

Description of the consequences of ignoring the danger.

- Measures and instructions to avoid danger.

#### 3.3 General safety

The following general safety precautions are applied according to the nature of the hazard:



#### **DANGER!**

Indicates an imminently hazardous situation which leads to death or serious injury if not avoided.



**WARNING!**

Indicates a potentially hazardous situation that can result in death or serious injury if not avoided.



**CAUTION!**

Indicates a potentially hazardous situation that can lead to minor injuries or property damage if not avoided.

The following additional information is used in these instructions:



**CAUTION!**

This symbol indicates an important fact. It provides valuable information about installation, use or maintenance.



**RECYCLING!**

This symbol indicates useful information for disposal.

Materials are separated and disposed of separately.

In addition, the requirements for the disposal of lubricants (oils and fats) and other additives are to be considered.

**3.4 Personnel requirements**



**WARNING!**

**Danger resulting from insufficient qualifications.**

Improper handling may result in serious personal injury and property damage. Therefore:

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

**Electrical equipment** Work on electrical equipment shall be performed by a qualified electrician in accordance with electrical regulations. This relates to work on the electrical system installation, commissioning, repair and maintenance.

**Operation of the machine** The operation of the machine must be performed by trained or skilled personnel. The operator must be familiar with the basic regulations on occupational safety and accident prevention and must be familiar and trained in the operation of the machine. Before switching on the machine, the user must have read and understood this manual.

### 3.5 Definitions

<b>Trained persons /instructed operators</b>	... have been informed by the operator in a briefing about the tasks and potential hazards of improper conduct.
<b>Skilled personnel</b>	... are, through technical training, knowledge, experience and knowledge of the relevant provisions, in a position to execute their assigned tasks and identify and prevent potential hazards independently.
<b>Machine</b>	... pre-wired combination of impeller and motor.
<b>Motor</b>	... Drive motor of the vacuum pump / compressor
<b>Max. permissible pressure difference</b>	... under pressure or overpressure for air, depending on the integrated motor
<b>Noise emissions</b>	... the noise emitted at a given load state as a numeric value, sound pressure level dB (A) according to EN ISO 3744

### 3.6 Intended use

The CITRIN series can be used in identical manner as a vacuum pump or a compressor. The maximum pressure difference must be observed according to the type (see type plate or separate sheet).

The machine may only be operated as follows:

- Only operate the machine in a technically perfect condition.
- Do not operate the machine in a partially assembled condition.
- The machine must only be operated at ambient temperature and suction temperature between 5 ° and 40 ° C. At temperatures outside this range, please contact us.

The machine may be used for the following media:

- Air with a relative humidity up to max. 90%
- Dry, non-aggressive gases.



#### CAUTION!

##### Risk of improper use.

Any use of the machine beyond the intended use and / or other use of the machine can lead to dangerous situations.

- RUBIN side-channel vacuum pumps / side-channel compressor must only be used as intended.
- All information in the instructions must be strictly complied with.

Any claims for damage from improper use are excluded. For any damage due to improper use, repairs are under the sole responsibility of the operator.

### 3.7 Improper operation

Misuse may result from the following circumstances:

- No dangerous mixtures may be suctioned, such as:
  - Flammable or explosive gases or vapours,
  - Water vapour,
  - Aggressive gases.
- The use of the machine in non-commercial premises, assuming that the necessary precautions and protective measures are not taken on the premises.
- Installation in hazardous environments.
- Modifications to the machine and accessories.

### 3.8 Protective measures by the operator/user

The machine is used in the commercial / industrial sector. The operator of the machine is therefore subject to the legal obligations regarding occupational safety. In addition to the safety instructions in this manual, the safety, accident prevention and environmental protection regulations applicable to the machine's field of use must be observed.

This applies in particular to the following:

- Hot parts of the machine must not be accessible in operation or provided with protection against being touched.
- No people may be endangered by the free suction or ejection of the fluids.
- Dangers from electrical energy are excluded.
- The operator must be aware of the applicable safety regulations and conduct a risk assessment to identify additional risks posed by specific working conditions at the machine. This must be implemented in the form of operating instructions for the operation of the machine.
- The operator must, during the entire operating time of the machine, check whether the operating instructions provided by him correspond to the latest regulations and adapt them when necessary.
- The operator has the responsibility for installation, operation, troubleshooting and maintenance, and the setting of clear rules.
- The operator must ensure that all employees who work with the machine have read and understood this manual. He must also conduct training for personnel at regular intervals and inform them about the dangers.



#### **DANGER!**

##### **Risk-free access to the controls.**

If the controls have been moved and are not accessible, there is a risk of injury, including fatal injury.

- Do not move the controls and ensure safe access to them.

Furthermore, the operator is responsible for ensuring that the machine is always in perfect working condition.

## 4. Technical data

### 4.1 Type plate

The type plate shows the main technical specifications of the device.

For technical service consultations, the type description, year of manufacture and serial number must be available.



Figure. 2 Type plate

The maximum permitted pressure difference (under pressure or overpressure) for air is dependent on the motor fitted in the series and is indicated on the type plate.

### 4.2 Technical specifications

For CITRIN series, the following technical specifications and noise emissions apply:

CITRIN	#auf Anfrage		80	90	140	210
Sound pressure level (max)	dB(A)	50 Hz	64	68	74	76
		60 Hz	68	70	76	79
Sound power level (max)	dB(A)	50 Hz	-	-	-	-
		60 Hz	-	-	-	-
Weight (max)	kg	11	12	17	25	
Length (max)	mm	260	260	289	355	
Width	mm	246	268	286	333	
Height	mm	247	272	302	375	

Figure. 3 CITRIN series, Technical specifications

The sound pressure levels or sound power level according to EN ISO 3744, measured at 1m distance from operating point and about 2/3 of the total allowable pressure difference with connected lines without vacuum or pressure-limiting valve, tolerance  $\pm 3$  dB (A), fig .3

**Ear protection!** To prevent hearing damage due to prolonged working in the vicinity of an operating machine, the use of ear protection is recommended.

## 5. Functional description

### 5.1 Conditions of use

The CITRIN side-channel blowers are designed for use in the commercial sector, i.e. the safety equipment corresponds to DIN EN 294 table 4 for people aged over 14 years.

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

A version with a reduced leak rate is available as a variant. The leak profess depends of the shaft seal (service life depends on the conditions of use).

#### Pressure difference

The maximum pressure difference (under pressure or overpressure) for air depends on the type of motor fitted. It is indicated on the label and can be found in the following data sheets for standard voltages and frequencies:

Sheet number	Series
D280	CITRIN 80
D285	CITRIN 90
D272	CITRIN 140
D286	CITRIN 210

For operation above the specified pressure differences, the motor is overloaded. In addition to the pressure difference indicated on the type plate, the maximum current must also be observed.

As the load depends on the density of the medium, for the delivery of gases different pressure differential limits apply than those for air. Please ask the manufacturer.

If there is a risk of throttling the flow rate beyond the permissible limits, the use of a suction or pressure-relief valve (accessories) must be provided.

The maximum internal pressure limited to max. 3.5 bar (absolute). When this pressure is reached, this may lead to a malfunction.



#### **DANGER!**

##### **Unplanned shutdown or failure:**

In application cases in which an unplanned shutdown or failure of the blower can cause harm to persons or entities, appropriate safety measures must be taken on the equipment side.

## 5.2 Construction

The CITRIN side-channel vacuum pump / side channel compressor has the following main components:

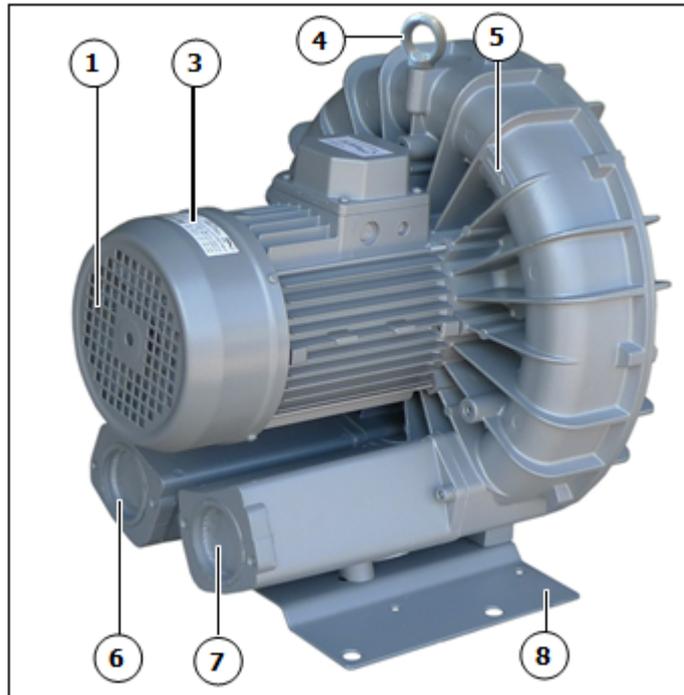


Figure .4 CITRIN main components

1. Cooling air inlet
2. Cooling air outlet
3. Type plate
4. Eyebolt
5. Direction of rotation arrow
6. Suction line (vacuum operation)
7. Pressure line (Pressure operation)
8. Base plate

### 5.3 Function

CITRIN series machines can be used in an identical configuration as vacuum pumps or compressors.

The CITRIN series machines, which compress according to the dynamic principle, work with a non-contact rotating impeller. They have an integrated motor, on the shaft end of which a double-flow impeller is fitted in a "flying" arrangement.

The motor fan provides cooling of motor and fan housing.

The inlet and outlet sides are each equipped with a built-in absorption silencer. The inlet and outlet have a connection internal thread according to DIN ISO 228 (gas thread measured in inches).

#### Variants and Accessories

Variants of the RUBIN have different flanges on the suction side and pressure side.

Excluding the shaft, motor armature and stator, the main components are made of a light metal casting.

If necessary, the following accessories are available:

- Suction or pressure-relief valve
- Check valve
- Suction
- Vacuum filters
- Motor protection switch
- Suction/pressure alternating switch
- Anti-vibration metal buffer
- Additional silencer

## 6. Transport storage

### 6.1 Safety instructions for transport



#### **DANGER!**

#### **Risk of suspended load.**

Risk of injury or death due to falling loads.

- Do not stand underneath suspended loads.
- Maintain adequate distance to suspended loads.
- Ensure stable centre of gravity.

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

### 6.2 Lifting and transporting the machine

The larger machines of the series CITRIN may only be suspended on the designated lifting eye(s); see item 4 Figure 4 page 12.

The machine may swing out. During lifting, observe the centre of gravity and follow the lifting hoist.

**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 is intended to protect the individual components prior to assembly against shipping damage, corrosion and other damage. Therefore, do not destroy the packaging until just prior to installation.



#### **Environmental damage caused by improper disposal!**

Packaging materials are valuable commodities and can often be reused or prepared for recycling. Therefore:

- Dispose of packaging materials in an environmentally safe way.
- Observe the local waste disposal regulations; if necessary, use the services of a specialist disposal company.

### 6.3 Storage

The CITRIN series machines must be stored in dry ambient conditions with normal humidity.

At a relative humidity of over 80%, storage in a closed container with appropriate drying agents is recommended.

## 7. Commissioning

### 7.1 Setup



#### NOTE!

All parts listed with the item number refer to the illustration in Figure 4 on page 12.

In the setup and installation of the blower, make sure that the cooling air inlets (item 1) and the cooling air outlets (item 2) have at least 10 cm distance from the nearest wall.

The discharged cooling air must be able to flow freely and not be sucked in again. The CITRIN series machines can be operated in various positions.

Setup on a solid surface is possible without mounting feet. If placed on a base plate, fastening using an anti-vibration buffer is recommended.



#### NOTE!

For installations higher than 1000 m above sea level, a loss in capacity is noticeable.

In this case, we ask for prior consultation with the manufacturer.

### 7.2 Installation



#### WARNING!

##### Risk of electric shock.

- Unprofessional handling of electrical equipment due to lack of skills can lead to life threatening electric shock.
- Electrical installation must only be performed by qualified personnel. Protection by means of a main switch must be carried out on site.



#### ATTENTION!

##### Accident prevention rules:

In all activities involved in setup or operation the accident prevention regulation "**Compressor**" VBG 16 must be followed.

1. In vacuum operation, the suction line (item 6) is connected, and in pressure operation the pressure line (item 7) is connected.



### NOTE!

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

2. The electrical data is indicated on the type plate (item 3) or the motor type plate. The motors comply with DIN EN 60034 and are in safety class IP 55 and insulation class F. The connection diagram is located in the motor terminal box (not needed for the version with a plug connection). The motor data must be compared with data from the available power supply (current, voltage, frequency, maximum permitted current).
3. Connect the motor and motor protection circuit breaker (for safety, a circuit breaker, and for strain relief of the connecting cable, a cable gland must be provided). We also recommend the connection of the thermal protection contact for AC versions.



### NOTE!

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

Momentary over current can occur during cold start of the blower.

## 7.3 Commissioning



### NOTE!

The maximum number of start-ups per hour must not exceed 10.

Exception: 6 starts per hour for drive power outputs greater than or equal to 11 kW.

1. Start the motor and check the direction of rotation (see item 5, direction arrows on the housing).
2. With the system-side maximum possible throttle, the pressure differences on the vacuum pump / compressor must not be greater than the max. allowable pressure differences indicated on the type plate (item 3).



### ATTENTION!

**Observe the maximum allowable pressure differences.**

After exceeding the values indicated in the warm operating condition, a discharge of the blower by subsequent addition of a relief valve (available as an accessory) is required.

3. A comparison of the measured current values / current consumption to the indicated nominal current on the type plate (item 3) is not recommended because the values are voltage dependent.

## 8. Operation

**Noise emission:** We recommend wearing ear protection when working permanently in the vicinity of the operating pump to prevent damage to hearing.



### **HOT SURFACE!**

#### **Surface temperatures over 70 ° C.**

In the hot operating state, the surface temperatures of components can increase to above 70 ° C. Risk of burns.

- Avoid touching the components.
- Wear protective gloves.

Before starting operation, the correct installation of the machine, the installation and commissioning (test run) must be ensured.

See chapter 7 "C" page 15.

Check the machine before operating to ensure the observance of the recommended maintenance. See chapter 9 "Maintenance", page 18.

## 9. Maintenance

The CITRIN series machines are maintenance-free with the exception of the filtering.



### DANGER!

#### Before carrying out maintenance work:

For maintenance, the machine must be disconnected from the electrical network by unplugging the power cord or by pressing the main switch and securing it against restarting.

Pressure lines must be vented before disassembly.

Do not perform maintenance on a machine that is still warm after operating (risk of injury from hot parts).

### 9.1 Suction filter (accessory)



### ATTENTION!

If the filters are not maintained adequately, this causes a reduction in the power of the blower.

The suction filter must be cleaned at least every 250 hours. The filter should be changed after 3000 operating hours.

To remove it, proceed as follows:

1. Unscrew the wing nut (item. 1),
2. Remove the cover (item 2) and filter cartridge (item 3)
3. Clean the filter cartridge (blow out with compressed air, shake out by hand) and replace it,

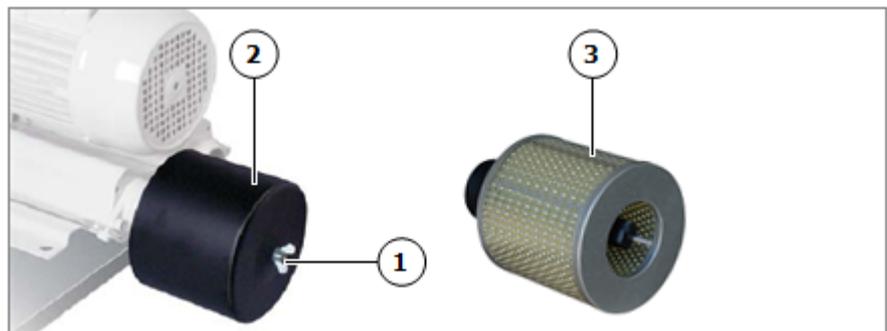


Fig. 5 Suction filter

4. Reassemble it in the reverse order.

## 9.2 Vacuum filter (accessory)



### ATTENTION!

If the filters are not maintained adequately, this reduces the power of the blower.

The contamination level of the filter cartridge (item 3) of the vacuum-tight suction filter depends on the contamination level of the medium suctioned out. According to the working conditions, clean the filter cartridge by blowing out with compressed air or replace it.

To remove it, proceed as follows:

1. Loosen the clamps (item 2),
2. Remove the housing cover (item 1),
3. Remove the filter cartridge (item 3),

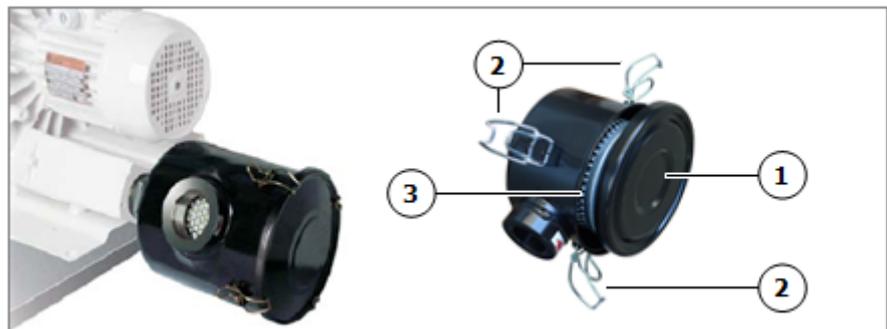


Figure 6 Vacuum filter

4. Clean the filter cartridge (shake out with compressed air, by hand) or replace it,
5. Reassemble in the reverse order.

## 9.3 Bearings

The bearings are lubricated for life and are therefore maintenance free. The lifetime of bearings is at least 12.000 hours

## 10. Troubleshooting

### 1. Blower does not reach the operating RPM speed after switching on:

Cause	Remedy
Mains voltage / frequency does not match the motor data.	Observe the motor data.
Connection to motor terminal board is incorrect.	Attach the correct connection.

### 2. Blower is switched off by circuit breaker:

Cause	Remedy
See points below 1	
Motor protection switch is not set correctly.	Adjust it.
Motor circuit breaker is triggered too fast.	Use a motor circuit breaker with a load-dependent switch-on delay time that takes into account the short-time overcurrent at startup (version with short-circuit and overload trigger in accordance with VDE 0660 Part 2 and IEC 947-4).
Blower is overloaded, i.e. pressure difference is too high.	Increase the suction and discharge of the supplied system, reduce line losses by using larger line size, eliminate bottlenecks in the line. Limit the pressure difference due to subsequent addition of a relief valve (accessory).
Drive power is too low.	Use the next largest size. (separate motor replacement is not possible.)

### 3. Desired pressure differential is not achieved:

Cause	Remedy
The selected blower or drive power is too small.	Use the next largest size.
Filter dirty.	Clean filter, replace if necessary.
Pressure losses in piping system are too large.	Provide larger pipe cross-sections, eliminate bottlenecks.
Leakage in the system.	Eliminate leaks.

### 4. Blower becomes too hot:

Cause	Remedy
Ambient or intake temperature is too high.	The suction temperature must be between 5 ° C and 40 ° C.
Pressure difference is greater than allowed.	Observe the information on the type plate or datasheet.
Cooling air flow is restricted.	Ensure adequate ventilation.

### 5. Noise level:

Cause	Remedy
Annoying exhaust noise (vacuum pump) or intake noise (compressor).	Install an additional silencer (accessory).

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