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Keep in a safe place for future reference!

Translation of the original Operating Instructions

Operating Instructions

V-VTN 16 | 26 | 41

Vacuum pump

Elmo Rietschle

V Serie
V Series
Drehschieber
Rotary Vane

Table of contents

1 Foreword

1.1 Principles

These Operating Instructions:

- Are part of the following dry running rotary vane vacuum pumps of type V-VTN 16 | 26 | 41.
- Describe how to use these compressors safely and properly in all life phases and are to be observed by all responsible persons
- Include general information on installation, commissioning, maintenance and inspection
- Must be available at the place of application

Figures presented in these Operating Instructions serve for better understanding and can deviate from the components installed. This does not influence the validity of the details set out in these instructions.

1.2 Target group

Target group for these Operating Instructions are the technically trained specialist personnel which have been qualified by appropriate training and instruction.

1.3 Supplier documentation and accompanying documents

Document	Contents	No.
Supplier documentation	Operating Instructions	BA 281
	Declaration of Conformity	C 0083
	Declaration of no-objection	7.7025.003.17
Spare parts list	Spare parts documents	E 281
Data sheet	Technical data and characteristic curves	D 281
Info sheet	Storage guideline for machines	I 150

The documents can be ordered via our Service or downloaded using the following link:

- http://www.elmorietschle.com

1.4 Directives, standards, laws

See Declaration of Conformity.

1.5 Copyright

These Operating Instructions are intended for the customer's internal purposes.

Unless expressly permitted, passing on to third parties, copying of these documents, except for internal purposes, as well as using and providing their contents to third parties, even in excerpts, is prohibited.

Contraventions will lead to claims for damages.

1.6 Disclaimer

Please note that we cannot accept any liability for damages arising from failure to observe the instructions. Gardner Denver Schopfheim GmbH does not assume liability for the following cases:

- Not intended use
- Not complying with these instructions
- Nonobservance of all documents and specifications belonging to the overall documentation
- Erection, operation, maintenance and repair by insufficiently qualified staff
- Modification or removing of the manufacturing or serial number
- Using spare parts that have not been approved by **Gardner Denver Schopfheim GmbH**
- Unauthorised modifications to the machine or the accessories supplied by **Gardner Denver Schopfheim GmbH**

Please, also consider that repairs are only allowed to be done by authorised workshops using original spare parts; otherwise our guarantee will expire.

1.7 Technical terms and abbreviations

Term	Explanation
Machine	Pump and motor combination ready for connection
Motor	Pump drive motor
Vacuum pump	Machine for creating underpressure (vacuum)
Rotary vane	Design or operating principle of the machine
Suction capacity	Flow rate of a vacuum pump referred to the condition in the inlet connection, specified in m^3/h
Final pressure (abs.)	The maximum vacuum that a pump reaches while the inlet opening is closed, displayed as absolute pressure in mbar (abs.)
Permanent vacuum	Vacuum or the inlet pressure range, at which the pump operates in continuous operation. The permanent vacuum or inlet pressure is ≥ than the final vacuum and < than the atmospheric pressure.
Noise emission	Noise emitted at a specific loading state indicated as a numeric value, sound pressure level dB(A) as per EN ISO 3744.

Abbreviation	Meaning
Fig.	Figure
Tab.	Table
V-VTN	Type of vacuum pump

2 Safety

The manufacturer is not responsible for damages due to non-observance of the overall documentation.

2.1 General

These operating instructions contain basic instructions for installation, commissioning, maintenance and inspection work which must be obeyed to ensure the safe operation of the machine and prevent physical and material damages.

Observe the safety instructions in all chapters.

The operating instructions must be read by the responsible technical personnel / user before installing and commissioning and must be fully understood. The contents of the operating instructions must always be available on site for the technical personnel/user. Instructions attached directly to the machine must be obeyed and must always remain legible. For example, this applies to:

- Symbols for connections
- Data plate and motor data plate
- Information and warning signs

The data plates on the machine may not be removed, not even if the machine is resold. For all queries about the product, please always quote the serial number.

The operating company is responsible for observing local regulations.

2.2 Indication of warnings

Warning	Danger level
DANGER	...warns of a hazardous situation, which will lead to death or life-threatening injuries if not avoided.
WARNING	...warns of a potentially dangerous situation, which can lead to death or serious injuries if not avoided.
CAUTION	…warns of a hazardous situation, which can cause slight or medium personal injuries if not avoided.
NOTICE	...warns of a situation that can cause damages to or destruction of material assets if not avoided.

2.3 Symbols and meaning

Symbol	Explanation
➢	Instructions, action
a), b),...	Instructions in several steps
⇨	Results
🗎	Reference

Symbol	Explanation
Warning signs	Obey all safety instructions with this symbol in order to avoid injury or death.
	It warns of potential risk of injury
	It warns of electrical voltage
	It warns of suspended loads
	It warns of hot surface
Mandatory signs	Obey all instructions with this symbol in order to avoid injury or death.
	Observe the Operating Instructions
	Wear eye protection
	Wear protective gloves
	Wear safety shoes
	Wear ear protection
	Disconnect the plant and secure it against unexpected restart
	Information, note
	Protection of environment

2.4 Intended use

The machine is suitable for conveying the following media:

- Conveying of air with a relative humidity of 30 to 90%
- All non-explosive, non-combustible, non-aggressive and non-poisonous, humid gases and gas-air mixtures

The machine must only be operated in such areas as described in the operating instructions:

➢ Only operate the machine in technically perfect condition

➢ The machine is only permitted to be operated at ambient temperature and inlet temperature between 5 and 40 °C
Please contact us for temperatures outside this range.

Any use extending beyond this use is seen as not in accordance with the intended use.

The intended use also includes the compliance with the operating data and operating agents specified in the operating instructions, the listed maintenance works, as well as the details in the documentation issued by the manufacturers of components and attachments.

If used under critical conditions and/or in case of any doubts, please contact the manufacturer. Non-observance can cause machine failures.

2.5 Inadmissible operating modes

- Extracting, conveying and compressing explosive, inflammable, aggressive or poisonous media, e.g. dust as per ATEX zone 20-22, solvents as well as gaseous oxygen and other oxidising agents
- Erection and operation in potentially explosive environment (explosive gas/vapour/mist-air mixtures or dust-air mixtures or hybrid mixtures of air and flammable substances)
- Using the machine in non-commercial plants unless the necessary precautions and protective measures are taken in the plant
- Operation of the machine when it is only partially assembled
- Using the machine in areas with ionising radiation
- back pressures on the outlet side of more than +200 mbar
- Modifications to machine and accessories
- Operation by not or not sufficiently qualified personnel

2.6 Personnel qualification and training

All works are only allowed to be done by qualified and trained specialist personnel of legal age. Unauthorised persons are not allowed to stay within the area of the vacuum pump and must be kept away from the danger zone by suitable measures.

➢ Ensure that people entrusted with working on the machine have read and understood these operating instructions before starting work, particularly the safety instructions for installation, commissioning, maintenance and inspection work

➢ Responsibilities, competences and monitoring of personnel must be regulated by the operating company.

➢ The following works are only allowed to be done by technical specialist personnel, who have been trained and instructed for the works assigned:

- Transport only by forwarding agents
- Erection, commissioning, maintenance and inspection works, as well as troubleshooting by specialist personnel (e.g. locksmith, mechanics)
- Works on the electrical system are only allowed to be done by electricians

➢ Personnel to be trained and laypersons may only carry out work on the machine when under the supervision of authorised specialist personnel and must be instructed about possible hazards in a safety instruction.

Specialist personnel:
Persons that can evaluate work assigned to them and evaluate possible risks as a result of their training, knowledge and experience as well as the applicable regulations.

Qualified electrician:
Specialist personnel that has obtained an electrotechnical specialist education and is familiar with work for setting up, operation and maintenance of electrical systems and operating material.

Unauthorised persons:
Unauthorised persons are persons who cannot appropriately prove that they are qualified, trained, or instructed for the works on the vacuum pump. In addition, those persons shall be seen as unauthorised who, due to their physical, cognitive, and health abilities, are not able to recognise hazards caused by the vacuum pump.

2.7 Personal protective equipment

The user must make sure that the required protective clothing and protective equipment is available on the plant and used by the personnel. The national legal provisions and the national regulations for industrial safety must be observed.

Recommended protective equipment:


Wear eye protection


Wear protective gloves


Wear safety shoes


Wear ear protection

2.8 Safety-conscious working

The following safety regulations apply in addition to the safety instructions and intended use listed in these instructions:

- Accident prevention regulations, safety and operating regulations
- Standards and laws in force

➢ Hot parts of the machine must not be accessible during operation or must be fitted with a guard
➢ Risks arising from electrical energy must be eliminated
➢ The machine must not come into contact with flammable materials. Risk of fire due to hot surfaces, output of hot pumped media or cooling air

2.9 Responsibilities of the user

During the whole operating period of the machine, the operating company is obliged to prove that the limits have been met and the required maintenance and inspection works have been performed.

The user must ensure that:

- All works for installation, commissioning and maintenance are carried out by authorised and qualified specialist personnel, who gained enough information by an in-depth study of the operating instructions
- All works on electrical equipment are done by an electrician in compliance with the regulations for electrical installations
- The Operating Instructions are always available in the site of operation of the vacuum pump for the whole life phase

- All safety instructions and signs on the vacuum pump are always complete and legible
- The operating and maintenance personnel take note of all safety instructions - especially of information provided in these Operating Instructions - and observe them
- The personal protective equipment is available and is used by the personnel
- All safety-relevant regulations are met
- Unauthorised persons cannot enter the operating site
- Fire warning and firefighting possibilities have been installed and are active
- These Operating Instructions shall be amended by working instructions, as well as the duties to supervise and report. With this they shall consider the operational distinctions. Among others, it refers to instructions referring to:
  - Organization of work
  - Work procedures
  - Specialist personnel assigned

In the event of accidents caused by the vacuum pump notify the Gardner Denver Schopfheim GmbH. Please find contact data on the back page.

2.10 Hazardous substances

2.10.1 Conveying media

Machinery that may have contact to hazardous substances can cause serious burns, cauterisation or poisoning during disassembly, maintenance and repair work.

- ➢ Before using our services each time, for occupational safety and environmental protection reasons, it is necessary to indicate and declare hazardous substances on or in the device.
- ➢ Send the declaration of clearance filled in and signed back to Gardner Denver.
  If no declaration takes place, we must assume that the device is free from such substances. In case of doubt, our service department reserves the right to reject the acceptance until the safety has been determined without doubt.

2.10.2 Auxiliary materials and lubricant

Incorrect auxiliary materials and lubricants may decompose at high temperatures. The resulting vapours may be harmful to health and cause fires.

- ➢ Use exclusively the recommended auxiliary materials and lubricants
- ➢ Observe the safety data sheets of the substances used
- ➢ Ensure proper use
- ➢ Observe the maintenance intervals

2.11 Safety equipment, monitored functions

Missing or non-functional safety equipment may lead to dangerous operating states and thus result in life-threatening injuries.

- ➢ Do not modify or bypass safety equipment and safety functions
- ➢ Check the function at regular intervals

2.12 Emergency Stop / Emergency Off

Missing safety equipment may lead to hazardous operating states. This can result in severe to mortal injury.

- ➢ The machine does not have its own Emergency Stop or Emergency Off. This **must** be implemented by the user, for instance, by integration of the machine in the user's safety concept.

2.13 Protection of environment

Environmental damage may be caused by the incorrect disposal of operating material and materials. For questions about environmental protection as well as national regulations, please consult your local disposal company.

- All operating materials as well as all gases, vapours or liquids, e.g. lubricating oil escaping during operation and maintenance must be collected and disposed of in an environmentally friendly manner.

3 Transport and storage

3.1 Transport

WARNING

Death by falling down or tipping over of the transported goods!

Falling or tipping over of transported goods can cause serious or fatal injuries. Limbs can be crushed.

- ➢ Select the lifting device according to the total weight to be transported.
- ➢ Secure the machine against tipping over and falling.
- ➢ Always attach the machine on all present load handling equipment.
- ➢ Do not stand underneath a suspended load.
- ➢ Put the goods to be conveyed on a horizontal base (max. inclination: 10 ° in all directions).

3.1.1 Unpack and check the as-delivered condition

a) Unpack the machine on receipt and check for transport damage.
b) Immediately notify the manufacturer of transport damages.
c) Check the scope of deliveries for completeness.
d) Dispose of the packaging in accordance with the local regulations in force.

3.1.2 Lifting and transporting

WARNING

Bodily injury resulting from improper operation!

Improper operation of the lifting gear and the transported goods can cause serious or fatal injuries.

- ➢ Lift and transport the machine only on the permissible load handling equipment.
- ➢ Loads crosswise to the load handling equipment are not permitted.
- ➢ Avoid impact stress.
- ➢ Wear your personal protective equipment.

1	Eyebolt

Fig. 1 Load handling equipment for lifting and transporting

The pump is supplied on a pallet.

a) Unload the pump using a forklift or pallet truck and transport to the installation location.
b) Tighten the eyebolt (Fig. 1/1) firmly.
c) For lifting, the machine must be suspended on the eyebolt using the lifting gear.
d) Lift the pump from the pallet and align.

3.2 Storage

NOTICE

Material damage caused by improper storage!

Improper storage can damage the machine.

➢ Observe the storage conditions described below.

3.2.1 Ambient conditions during storage

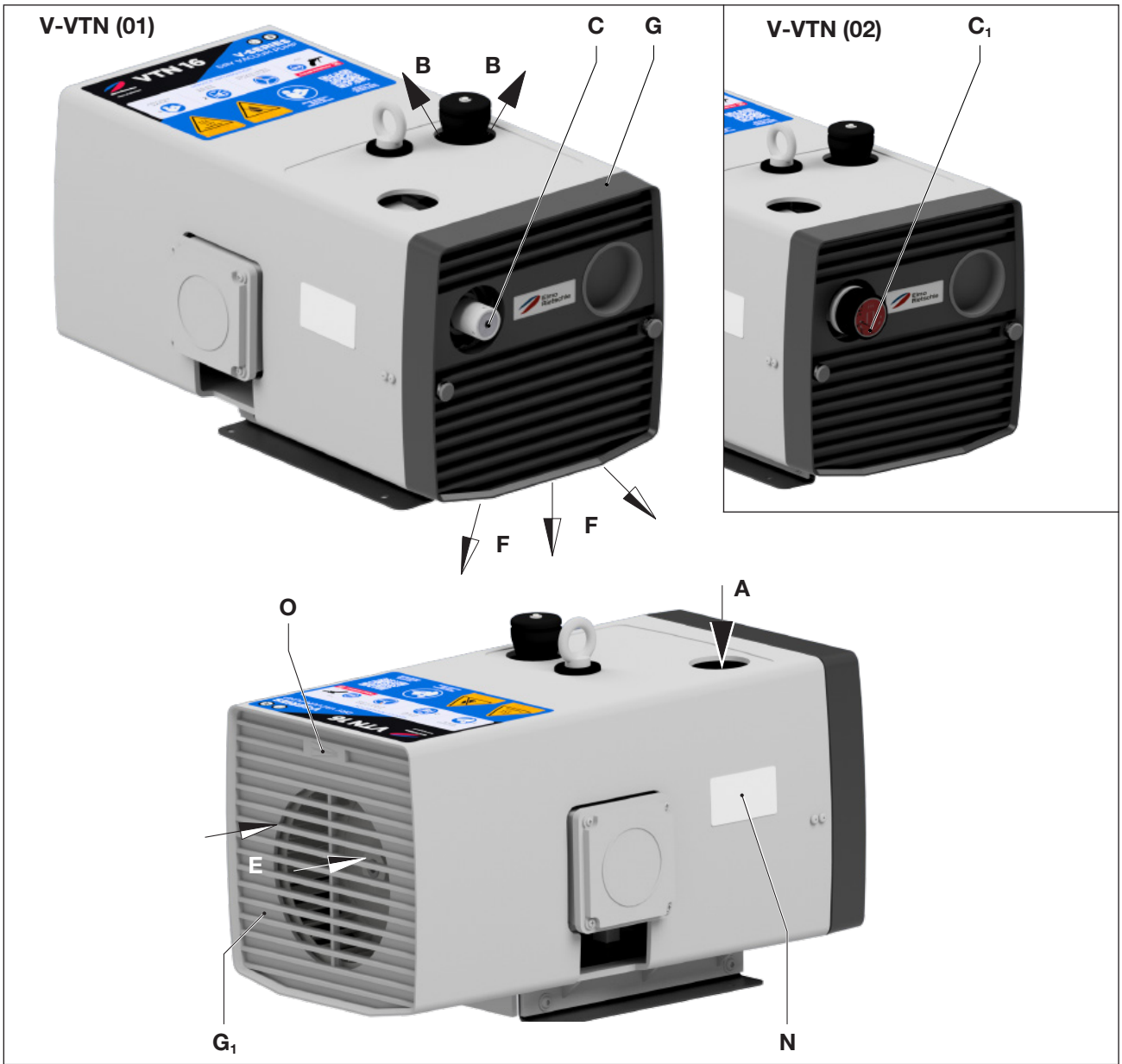
- Dust-free
- In a dry place
- Vibration free
- Protected against sun radiation
- Storage temperature: -10 °C to +60 °C
- Rel. air humidity: max. 80 %
- Close the openings air-tight

The machine must be stored in a dry environment with normal air humidity. It should not be stored for more than 6 months.

See Info "Storage instructions", page 4.

4 Product overview and functioning

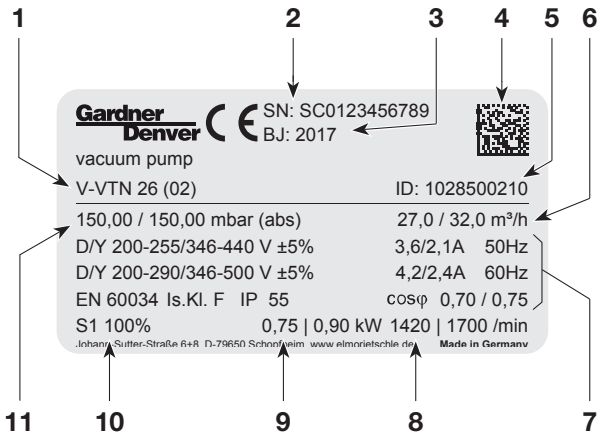
4.1 Product Overview



A	Vacuum connection	**F**	Cooling air outlet
B	Exhaust air outlet	**G**	Cover
C	Vacuum safety valve	**G_1**	Ventilation grid
C_1	Vacuum control valve	**N**	Data plate
E	Cooling air inlet	**O**	Rotation direction arrow

Fig. 2 Vacuum pump V-VTN - variant 01 (with safety valve) / variant 02 (with control valve)

4.2 Data plate



1	Model / size (mechanical version)	**7**	Motor data 50 Hz / 60 Hz
2	Serial number	**8**	Speed 50 Hz / 60 Hz
3	Year of construction	**9**	Motor output 50 Hz / 60 Hz
4	Data matrix barcode	**10**	Operating mode
5	Article No.	**11**	Final pressure (abs.) 50 Hz / 60 Hz
6	Pumping capacity 50 Hz / 60 Hz		

Fig. 3 Data plate (example)

The following information is encoded as barcode:

- Material number (MA)
- Production order (PR)
- Serial Number (SC)

4.3 Description

The V-VTN machines are one-step, dry running rotary vane vacuum pumps. The rotary blades of the rotor mounted on the motor shaft divide the pump housing into multiple chambers whose volumes change periodically.

The pumps have a connecting thread on the inlet side and an exhaust silencer on the outlet side. The intake air is cleaned by an integrated micro fine filter.

The vacuum pumps V-VTN are installed in a noise-reducing cover of plastics. A fan provides for cooling of the pump.

As standard, the V-VTN (01) has a vacuum safety valve that triggers after it reaches a vacuum of 150 mbar and with this, it limits the final pressure.

As standard, the V-VTN (02) has a vacuum control valve with which a desired vacuum can be set, however this is limited to a top limit value.

4.4 Fields of application

These dry running rotary-vane vacuum pumps V-VTN are suitable for evacuating closed systems and for a permanent vacuum in the intake pressure range 150 - 1000 mbar (abs.). They are suitable for conveying air with a relative humidity of 30 to 90 %.

With free intake, the nominal pumping capacity is 15 m^3/h (VTN 16), 25 m^3/h (VTN 26) and 40 m^3/h (VTN 40) at 50 Hz. Data sheet D281 shows the dependency of the pumping capacity on the inlet pressure.

If the unit is switched on more frequently (at regular intervals of approx. 10 times per hour) or at higher ambient temperatures and inlet temperatures, excess temperature limit of the motor winding and the bearings may be exceeded.
Contact the manufacturer regarding such operating conditions.
Observe the ambient and intake temperature (see chapter 2.4).
Observe the protection class of the motor (data plate).

If it is installed in the open air the unit must be protected from environmental influences, (e.g. by a protective roof).

5 Installation

We urgently recommend having the installation carried out by qualified specialist personnel. Gardner Denver does not accept liability for damages caused by improper carrying out of installation.

5.1 Preparation of installation

Ensure the following conditions:

- Machine freely accessible from all sides
- Do not close ventilation grids and holes
- Sufficient space for installing and removing pipes and for maintenance work, particularly for the installation and deinstallation of the machine
- No influence by external vibrations
- Hot exhaust air from other machines may not be sucked in the cooling system
- Good ventilation in the installation room
- Cover (Fig. 2/G) and ventilation grid (Fig. 2/G_1) must be readily accessible.
- For maintenance works, provide for a space of at least **30 cm** around the machine.

5.2 Installation

CAUTION

Burns due to hot exhaust gases!

Place the freely blowing machine in a way that hazards due to hot exhaust gases are prevented.

NOTICE

Property damage caused by improper installation!

Improper erection and installation can damage the machine.

- ➢ The machine may only be operated when it is set up horizontally (Max. inclination: 10 ° in all directions).
- ➢ Secure the machine against tipping over and falling.
- ➢ The floor must be plane and even.
- ➢ The bearing surface must be designed to be able to carry the weight of the machine (see chapter 10 “Technical Data”).
- ➢ The bearing surface must be at least the same size as the machine.

NOTICE

Property damage from overheating!

Due to too low cooling capacity, the machine can overheat and can be damaged.

- ➢ Ensure for a good aeration and venting of the installation room. Observe the ambient temperature: min. +5 °C, max. +40 °C
- ➢ The cooling air inlets and the cooling air outlets must be at least 10 cm away from the adjacent walls. Cooling air coming out must not be sucked in again.

a) Align the pump at the installation location and if necessary, bolt to the substrate.

b) If available, check optional accessories for the correct mounting and correct electrical connection.

An output reduction is noticeable when installed at more than 1000 m above sea level. In this case, please contact us.

It is possible to install the machine on a firm base without anchoring. When installing on a substructure we recommend fixing it with flexible buffers.

5.3 Connection of pipes

NOTICE

Property damage due to high forces or torques!

If forces and torques during installation and operation are too high, the machine can be damaged.

- ➢ Only screw in pipes by hand.
- ➢ If necessary, use flexible connections.

NOTICE

Property damage due to missing ventilation!

For standstill times longer than two minutes, we recommend venting the connected inlet line to atmospheric pressure in order to avoid possible damage to the machine.

- ➢ Provide for an air release position in the inlet line, for instance a ball valve etc.

NOTICE

Property damage in case of parallel operation!

If parallel operation of multiple pumps is used, a switched off pump can be damaged due to the suction capacity of the operating pumps.

- ➢ For parallel operation, an external non-return valve must be installed in the inlet line upstream of each pump.

a) Remove the blind plug on the inlet connection (Fig. 2/A).
b) Connect the pipes with the vacuum connection (Fig. 2/A).
c) The exhausted air can be blown out through the exhaust air outlet (Fig. 2/B) or conducted away using a hose or pipeline.
CAUTION! If the extracted air is discharged by hose or pipe line, the maximum back pressure of +200 mbar may not be exceeded!

The suction capacity of the vacuum pump is reduced if the inlet pipe is too narrow and/or too long.

5.4 Vacuum safety valve

As standard, the vacuum pumps of variant (01) are equipped with a vacuum safety valve.

The vacuum safety valve limits the final pressure to 150 mbar.

NOTICE

Property damage!

If the permissible vacuum (see data plate) is exceeded, this can damage the pump.

- ➢ Operation without the standard vacuum safety valve does not comply with the intended use.

5.5 Vacuum control valve

As standard, the vacuum pumps of variant (02) are equipped with a vacuum control valve.

The required vacuum can be regulated by the vacuum control valve (Fig. 2/ C_1) as shown on the symbol plate affixed to the rotary knob.

NOTICE

Property damage!

If the permissible vacuum (see data plate) is exceeded, this can damage the pump.

➢ Operation without the standard vacuum control valve does not comply with the intended use.

5.6 Connection of motor

DANGER

Danger to life if the electrical installation has not been carried out professionally!

Installation that has not been carried out professionally or properly can cause serious injuries or death. The whole electrical system can be destructed.

➢ The electrical installation must only be carried out by a qualified electrician observing EN 60204.

➢ The main switch must be installed by the operating company.

➢ The motor must be safeguarded via a motor protection switch. This must be installed by the operating company.

NOTICE

Property damage due to wrong energy supply!

Wrong operating voltages, frequencies or currents can cause loss of power or damages to the machine.

➢ The conditions at the installation location must comply with the details on the motor data plate.

Please find the electrical data of the motor on the data plate (Fig. 2/N) or the motor data plate. The motors comply with DIN EN 60034 and are designed in protection class IP 55 and insulation class F. The appropriate connection diagram is in the terminal box of the motor.

Machines with AC motors that have an apparent power greater than 1.7 kVA or three-phase motors with an apparent power greater than 5.2 kVA, or motors with starting currents greater than 60 A are not designed for direct grid start.

High starting torques occur when the motor is started. The mechanical load must be reduced.

This can be achieved, for example, by starting the motor with a star-delta starter, soft starter or frequency converter.

Permissible tolerances:

- -25 % /+10 % voltage deviation referred to the nominal value
- ± 2% frequency deviation

a) Compare the motor data with the data of the existing mains network (current type, voltage, network frequency, permitted current value).

b) The direction of rotation of the motor must correspond with the direction of rotation arrow (Fig. 2/O) on the motor flange. Check the rotation direction!

c) Directly connect the motor in the terminal box or use the optional connector (accessories).
For securing, a motor protection switch and a strain relief provide for a screwed cable connection to connect of the connecting cable.

We recommend using motor protection circuit breakers with delayed switch off, depending on a possible excess current. Temporary excess current can occur when the machine is started under cold conditions.

6 Commissioning and decommissioning

WARNING

Risk of injury due to improper operation!

Improper operation of the machine can cause serious or fatal injuries.

➢ Only use the machine in accordance with the intended use. See chapter 2.4.

CAUTION

Risk of injury due to noise emission!

High sound pressure level can permanently damage hearing.

➢ Observe measured sound pressure level, see chapter 10.

➢ When spending a long time in the vicinity of the running machine use ear protection to avoid permanent damage to hearing.

NOTICE

Property damage!

➢ Wait until it stands still. The machine is only allowed to be switched on again after it stands still.

6.1 Start-up

6.1.1 Installation check

WARNING

Risk of injury!

A faulty installation as well as missing or non-functional safety equipment may lead to severe injury.

➢ Put the vacuum pump into operation only after it has been ensured that the installation is carried out flawless and the requirements for installation, assembly and electrical installation have been observed.

The following checks must be carried out:

- no transport or assembly damage of the vacuum pump and assembly steps attached
- the vacuum pump is standing safely on the substrate at a horizontal installation position
- Correct connection of the pipelines (inlet side, outlet side), check for leak tightness!
- Tight fit of the screw and flange connections
- Electrical installation complies with the specifications (connection diagram)
- The installation room is equipped with an adequate ventilation system
- vacuum pump and pipelines cleaned
- check the function of optional accessories (if present)

6.1.2 Check the rotation direction

NOTICE

Property damage due to wrong direction of rotation!

Running the machine in reverse direction for a long time may cause damage to the blades and cause breaking of blades.

➢ Use a phase sequence indicator to check the direction of rotation (anti-clockwise).

The intended direction of rotation of the drive shaft is indicated by the rotation direction arrow (Fig. 2/O).

a) Start the motor briefly (max. two seconds) to check the direction of rotation. If looking at the motor fan, it must rotate clockwisely.
CAUTION! The inlet pipe must not be connected when starting up like this.

b) After a possible correction of the direction of rotation, restart the motor.

6.2 Decommissioning

6.2.1 Decommissioning of the machine

DANGER

Danger of death from touching live parts!

Touching of live parts cause serious injuries or death.

- ➢ Disconnect the machine from the power supply by actuation of the main switch or disconnection of the plug and secure it against unexpected restart.
- ➢ Works on the electrical installation or electrical components must be carried out by an electrician only.

CAUTION

Risk of injury due to hot surfaces!

When the machine is at operating temperature the surface temperatures on the components may rise to above 70 °C. This can cause burns.

- ➢ Avoid touching the hot surfaces. They are marked by warning signs.
- ➢ Wear suitable protective gloves, if necessary.

a) Switch the machine off.
b) If available, close the cut-off device in the inlet and outlet line.
c) Disconnect the machine and all electrical components from the power supply.
d) Depressurise the machine:
Open the pipes slowly.
⇨ The pressure reduces slowly.
e) Remove the pipes and hoses.
f) Seal the connections for inlet and outlet stubs using blind plugs or adhesive foil.
g) Storage of the machine.

6.2.2 Storage of the machine

See also chapter 3.2.1, page 13

6.3 Recommissioning

a) Check the condition of the machine (cleanliness, cabling etc.).

For installation see chapter 5 page 17
For commissioning see chapter 6.1 page 20

7 Maintenance and repair

DANGER

Danger of death from touching live parts!

Touching of live parts cause serious injuries or death.

- ➢ Before starting any maintenance and repair works disconnect the machine by actuation of the main switch or disconnection of the plug and secure it against unexpected restart.
- ➢ Works on the electrical installation or electrical components must be carried out by an electrician only.
- ➢ Repair works are only allowed to be done by authorised specialists.

CAUTION

Risk of injury due to hot surfaces!

When the machine is at operating temperature the surface temperatures on the components may rise to above 70 °C. This can cause burns.

- ➢ Before maintenance and repair works allow the machine to cool down.
- ➢ Wear suitable protective gloves, if necessary.

CAUTION

Risk of injury due to missing safety devices!

Missing safety devices can cause injuries.

- ➢ Safety devices as well as fan grills on motor fans and ventilators may not be removed.

7.1 Ensure operational safety

Regular maintenance work must be carried out in order to ensure operational safety.

The cleaning intervals strongly depend on the machine load (operating time, operating conditions, etc.). Depending on the pollution of the sucked in medium and the environmental conditions, the cleaning intervals of the inlet filters will be shorter.

For all works, observe the safety instructions described in chapter 2 “Safety”.

The whole plant should always be kept in a clean condition.

7.2 Maintenance table

Interval (Operating hours)	Maintenance activities	Chapter
Depending on the degree of pollution	Clean vacuum pump	7.4
At least 1 x per month	Check the pipes and screws for leaks and ensure their tight fit and if necessary re-seal or re-tighten.	—
	Check the terminal box and cable inlet holes for leaks and if necessary re-seal.	—
	Clean the control valve and louvres of the machine and the cooling ribs of the motor.	—
	Clean the filter cartridge in the inlet connection	7.5
6 months	Replace the filter cartridge in the inlet connection	7.5
3,000 h / 1,000 h	Check/replace the blades VTN 41	7.6
5,000 h / 1,000 h	Check/replace the blades VTN 26	7.6
7,000 h / 1,000 h	Check/replace the blades VTN 16	7.6
As per manufacturer's instructions	Motor (maintenance, lubrication and cleaning)	7.7

Tab. 1 Maintenance table

7.3 Preparing maintenance works

a) Switch the plant off electrically and secure it against unexpected restart.
b) Vent the vacuum pump with atmospheric air; for this purpose open the shut-off valve on the inlet side. Exception: Clean the outside of the vacuum pump
c) Allow the vacuum pump to fully cool down.
d) Post the warning sign "Caution, maintenance works!".

7.4 Clean vacuum pump

The vacuum pump must regularly be checked for dust deposits and cleaned, if necessary. The cleaning interval depends on the operational requirements.

a) Clean the vacuum pump with a dump cloth or using a vacuum cleaner. Remove dust deposits:
   - On the ventilation grid and cover
   - On the exhaust air outlet (silencer)
   - On the hood
   - Between the cooling ribs of the motor (if the hood has been removed)

7.5 Air filter

CAUTION

Danger of injury when dealing with compressed air!

When the filter is blown off with compressed air, loose solid particles or powder dust swirling around may cause injury to the eyes. Inhaling can damage lungs.

➢ Wear protective glasses and dust mask when cleaning the filter with compressed air.

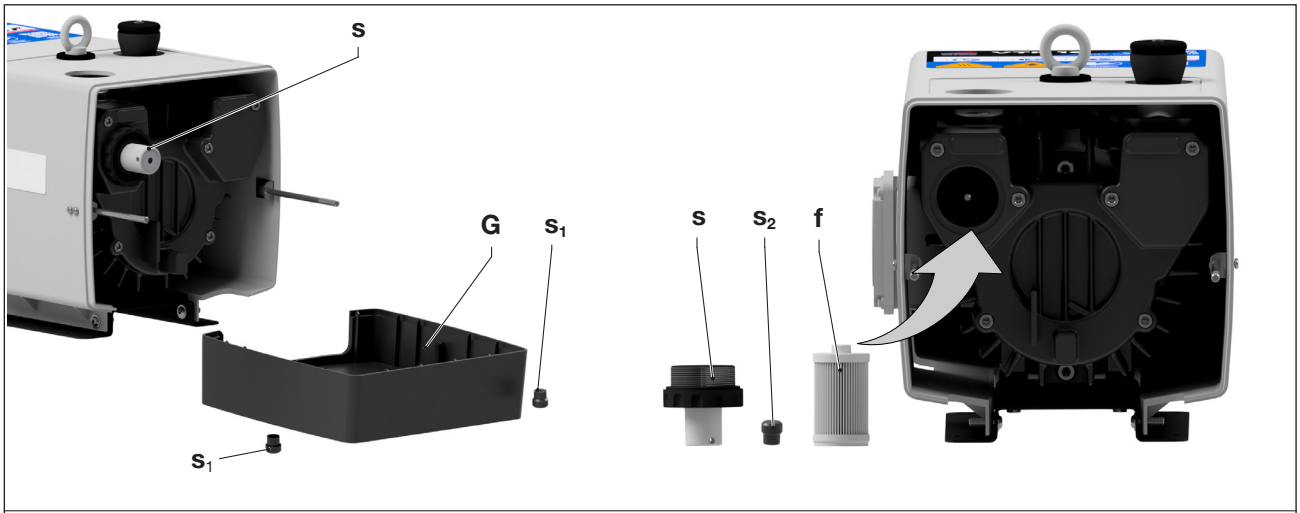
NOTICE

Property damage due to insufficient maintenance of the air filter!

Performance of the machine is reduced by a polluted air filter and insufficient maintenance. This can cause damage of the machine.

➢ Clean the air filter at regular intervals.

➢ Replace highly polluted or damaged filter cartridges.



G	Cover	**s**	Screw cap
f	Filter cartridge	**s_{1-2}**	Knurled knob

Fig. 4 Replacement of air filter

Clean or replace the filter cartridge (Fig. 4/f) every month, or more often depending on pollution, by blowing off. In spite of cleaning the filter its separation efficiency will continue to deteriorate. Therefore the filter should be replaced every six months.

a) Switch the machine off, secure it against accidental switching on and vent to atmospheric pressure.

b) Remove the cover (Fig. 4/G) after releasing of the knurled knobs (Fig. 4/s_1).

c) Release and remove the screw cap (Fig. 4/s) and knurled knob (Fig. 4/s_2).

d) Remove and clean or replace the filter cartridge (Fig. 4/f).
CAUTION! Blow off the filter cartridges from the inside to the outside.

e) Insert the filter cartridge (Fig. 4/f) in the inlet connection and fasten it with the knurled knob (Fig. 4/s_2) and the screw cap (Fig. 4/s). Tighten the knurled knob and the screw cap by hand.

f) Mount the cover (Fig. 4/G) with the knurled knobs (Fig. 4/s_1). Tighten the knurled knobs by hand.

7.6 Blades

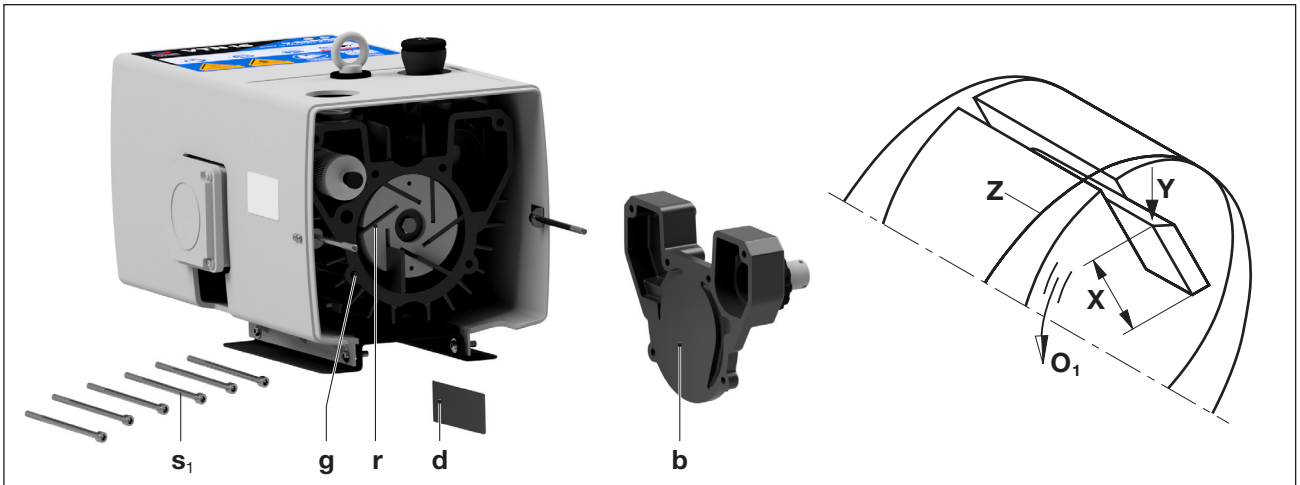
The V-VTN 16 and V-VTN 26 have 6 carbon blades, the V-VTN 41 has 7 carbon blades that wear out gradually during operation.

V-VTN 16: First check after 7,000 operating hours, then every 1,000 operating hours.

V-VTN 26: First check after 5,000 operating hours, then every 1,000 operating hours.

V-VTN 41: First check after 3,000 operating hours, then every 1,000 operating hours.

The blades must only be changed as a set.



b	Housing cover	O_1	Direction of rotation
d	vane	**X**	Minimum height
g	Housing	**Y**	Slanting side of vane
r	Rotor slit	**Z**	Drilled hole of housing
s_1	Screws		

Fig. 5 Replacement of blades

a) Switch the machine off, secure it against accidental switching on and vent to atmospheric pressure. Let the pump cool down.

b) Remove the cover (Fig. 4/G) after releasing of the knurled knobs (Fig. 4/s_1).

c) Undo six screws (Fig. 5/s_1) on the housing cover (Fig. 5/b) and remove the housing cover.

d) Take out the blades (Fig. 5/d) for checking.

e) Check all blades for wear and damage.
The height of the blades must be at least (Fig. 5/X):

Type	X (minimum height)
V-VTN 16 | 26	24 mm
V-VTN 41	35 mm

f) If the minimum height has been reached or it is already smaller, the set of blades must be replaced.

g) Blow off the housing (Fig. 5/g) and the rotor slits (Fig. 5/r).

h) Insert all blades (Fig. 5/d) into the rotor slits (Fig. 5/r). While doing this make sure that the blades (Fig. 5/Y) point outwards with the sloping side and the direction of rotation (Fig. 5/O_1) matches with the direction of the drilled hole for the housing (Fig. 5/Z).

i) Mount the housing cover (Fig. 5/b) with the six screws (Fig. 5/s_1).

j) Mount the cover (Fig. 4/G) with the knurled knobs (Fig. 4/s_1). Tighten the knurled knobs by hand.

k) Before starting up, check that the blades run freely by turning the fan around. For this purpose, unscrew the inlet grating (Fig. 2/G_1) and fan by hand in the direction of the rotation of the pump (see the rotation direction arrow on the inlet grating).

7.7 Motor

Perform the maintenance of the motor in accordance with the manufacturer's operating and maintenance instructions.
For this, contact our service people.

7.8 Repair / service

For repairs contact the manufacturer, its branch offices or authorised dealers.
Please contact the manufacturer for the address of the authorized service centre (see manufacturer's address at the rear side).

WARNING

Risk of injury due to substances hazardous to health!

Due to contamination with hazardous substances and operating agents during operation, there is a high health risk for the repair personnel.

- For each machine that is sent to an Elmo Rietschle Service centre for inspection, maintenance or repair, a fully completed, signed declaration of harmlessness must be enclosed.
  The declaration of harmlessness is part of the supplier's documentation.
- Before returning, properly clean the machine.

After a repair or re-commissioning, the actions listed in chapter 5 “Installation” and chapter 6 “Commissioning and decommissioning” are to be performed as in the first commissioning.

7.9 Spare parts

NOTICE

Property damage due to wrong or defective spare parts!

Wrong or defective spare parts can cause malfunctions or blackout failure of the machine.

- Only use original spare parts or parts approved by the manufacturer.
- The use of other parts may revoke liability or guarantee for any resulting consequences.

Please find an overview of the spare parts in the **List of spare parts E281**.

Wearing parts and sealings are separately listed. For ordering spare parts, please contact the Elmo Rietschle Service (address on the back of the page).

For a simple and fast maintenance we are offering several service kits for our vacuum pumps. They include all wearing parts and sealings that are required for the respective maintenance works.

These service kits can directly be ordered from our Elmo Rietschle Service with quotation of the material numbers.

Service kits	Material number	Description
Set of blades VTN 16 VTN 26	 5137020000 5137020006	Includes*: 6x blade
Set of blades VTN 41	 5189430007	Includes*: 7x blade
Service kit VTN 16 VTN 26	 1022180104 1022190104	Includes*: 6x blade, 1x filter cartridge, 1x seal ring
Service kit VTN 41	 1022370104	Includes*: 7x blade, 1x filter cartridge, 1x O-ring

Tab. 2 Service kits

* Please find the exact positions in the service drawing E281.

8 Errors

DANGER

Danger to life!

If malfunctions are disregarded and/or removed only insufficiently, serious to lethal injuries can occur.

➢ Never put the pump in operation again after it has been switched off automatically without unequivocally finding out the reason for this shut-off and remedying it.

8.1 Table of malfunctions

Malfunction	Cause	Elimination	Note
Machine is switched off by the motor protection switch	Mains voltage/ Frequency does not correspond with the motor data	Check by qualified electrician	Chapter 5.6
	Connection to motor terminal board is not correct		
	Motor protection switch is not set correctly		
	Motor protection switch is triggered too quickly	Use a motor protection switch with an overload-dependent delayed switch off that takes into consideration the short term excess current at start up (version with short circuit and overload trigger as per IEC 60947-4-1)	
	The safety valve / control valve is dirty so that the permissible vacuum value is exceeded	Replace safety valve / control valve	Chapter 7.9
Pumping capacity is insufficient	The inlet pipe is too long or too narrow	Check the hose and/or the pipe	Chapter 5.3
	There are leakages on the machine or in the system	Check the pipework and screw connections for leaks and check for tight fit	Chapter 7.2
	The intake filter is dirty	Clean or replace the intake filter	Chapter 7.5
	Blades are damaged	Replace blades	Chapter 7.6
Final pressure (max. vacuum) is not reached	There are leakages on the machine or in the system	Check the pipework and screw connections for leaks and check for tight fit	Chapter 7.2
	Blades are worn or damaged	Replace blades	Chapter 7.6

Tab. 3 Table of malfunctions

Malfunction	Cause	Elimination	Note
Machine gets too hot	Ambient or inlet temperatures too high	Ensure proper use	Chapter 2.4
	Cooling air supply is obstructed	Check ambient conditions	Chapter 5.1
		Clean ventilation slots	Chapter 7.4
	The safety valve / control valve is dirty so that the permissible vacuum value is exceeded	Replace safety valve / control valve	Chapter 7.9
The machine makes a strange noise	The pump housing is worn (chatter marks)	Repair by manufacturer or authorised workshop	Elmo Rietschle Service
	The vacuum adjustment valve (if available) is vibrating	Replace the control valve	Chapter 7.9
	Blades are damaged	Replace blades	Chapter 7.6

Tab. 3 Table of malfunctions (continued)

Please contact Elmo Rietschle Service for other malfunctions or those that cannot be eliminated.

9 Disassembly and disposal

9.1 Disassembly

WARNING

Risk of injury due to substances hazardous to health!

Due to contamination with hazardous substances and operating agents during operation, there is a high health risk for the personnel.

- ➢ Before disassembly, properly clean the machine.
- ➢ Wear suitable protective clothing.

a) Put the machine out of service according to chapter 6.2.

b) Disassemble the machine.
Dismantle large components and assemblies.

9.2 Disposal

NOTICE

Damage to the environment!

Environmental damage may be caused by the incorrect disposal of operating material and materials.

- ➢ All operating materials as well as all fluids such as cooling water and cooling oil required during operation and maintenance must be collected and disposed of in an environmentally friendly manner.
- ➢ Separate components according to the materials and if possible, recycle.

a) Collect oils and grease separately and dispose of in accordance with the local regulations in force.

b) Do not mix solvents, cold cleaning agent and paint residues.

c) Remove components and dispose of them in accordance with the local regulations in force.

d) Dispose of the machine in accordance with the national and local regulations in force.

e) Parts subject to wear and tear (marked as such in the spare parts list) are special waste and must be disposed of in accordance with the national and local waste laws.

10 Technical Data

V-VTN			16	26	41
Sound pressure level (max.) EN ISO 3744 Tolerance ±3 dB(A)	dB(A)	50 Hz	61	67	73
		60 Hz	63	66	75
Weight *	kg	3~	29	31	53
		1~	28	32	47
Length *	mm	(01)	459	489	599
		(02)	477	507	638
Width	mm		254	254	272
Height	mm		283	283	319
Vacuum connection			G½	G½	G¾

Tab. 4 Technical Data

* Length and weight may differ from the information listed here depending on the motor design and configuration.

(01) Standard variant with vacuum safety valve
(02) Variant with vacuum control valve

Please find more technical details in the data sheets **D281** → V-VTN 16| 26 | 41

Subject to technical changes!

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