

Operating Instructions and Installation



Vacuum Pumps
MODEL:CVP-42



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1. Description

The vacuum pump is intended for the suction of air and other dry non-corrosive, non-explosive & non-erosive gases. Temperature must be between 5 to 40°C.

Model range has a connecting thread on the suction side and an exhaust silencer on the pressure side. With the CVP the incoming air is cleaned by a filter cartridge. The pump has pre-filter on the suction side. The unit is a double shaft vacuum pump in which the claws roll off against each other contact free and dry. The claw rotors are synchronized by timing gears. Gear and bearings on the motor side are lubricated with a synthetic oil from the oil sump. Oil conveying devices always ensure that the bearings and the gears are sufficiently supplied with oil at all permissible speeds. The pumping chamber has no sealants or lubricants. The gearbox and the pumping chamber are separated from each other by special seals. The gearbox is sealed from the outside with shaft seals and O rings, chamber with piston rings. Between the two there is also another atmospherically ventilated area that can be loaded with sealing gas (special version).

In order to dissipate compression heat, the cooling air is sucked through between the machine and the hood using drum fan that sucks in the fresh cooling air and discharges the heated air out of the cooling air outlet. CVP is driven by standard C-flanged motor via a coupling (with an elastomer component). A vacuum regulating valve is used to set the vacuum to the required value.

Principle of Operation

The Vacuum Pump works on claw principle.

The components are dimensioned such that on the one hand there is never contact between the two claws or between a claw the cylinder on the other hand the gaps are small enough to keep the clearance loss between the chambers low.

Avoid (1) suction of solid that is equipped with a screen in the suction connection.

(2) reverse rotation after switching off that is equipped with a non-return valve.

This pump compresses the inlet gas absolutely oil-free. Lubricant of the pump chamber is neither necessary nor allowed.

Cooling

Front Non-Drive cooling fan + bottom side fan.

2. Safety

The vacuum pump is intended for industrial use. It shall be handled only by qualified personnel.

Personnel being trained to work on the machine must be supervised by technical specialists only.

Insure personnel directed to work on the pump have read and understood these operating instructions before starting work,




All work must only be carried out by technical specialists for the purpose of these instructions, "handling" the vacuum pump means the transport, storage, installation, commission, influence on operating conditions, maintenance, troubleshooting and overhaul of the vacuum pump.

Hot parts of the machine must not be accessible during operation or must be fitted with a guard.

People must not be endangered by the free extraction or discharge of pumped media.

Risk arising from electrical energy must be eliminated.

DANGER and CAUTION

| | | |
|---|----------------|--|
|  | DANGER | Disregard of this safety note will always lead to accidents with fatal or serious injuries |
|  | WARNING | Disregard of this safety note may lead to accidents with fatal or serious injuries. |
|  | CAUTION | Disregard of this safety note may lead to accidents with minor or property damage. |

Transport

Packing

Packed on a pallet the vacuum pump is to be transported with a forklift.

Unpacking

In case the vacuum pump is bolted to a pallet or a base pallet:

- ◆ Remove the bolting between the vacuum pump and the pallet or pallet base

In case the vacuum pump is packed in a cardboard box with inflated cushions:

- ◆ Remove the inflated cushions from the box

In case the vacuum pump is in a cardboard box cushioned with rolled corrugated cardboard:

- ◆ Remove the corrugated cardboard from the box

In case the vacuum pump is fastened to the pallet by means of tightening straps:

- ◆ Remove the tightening straps

In case the vacuum pump is laid in foam:

- ◆ Remove the foam

In case the vacuum pump was bolted to a pallet or a base pallet:

- ◆ Remove the stud bolts from the rubber feet.

Note:

- ◆ Make sure that the eyebolt is fully screwed in
- ◆ Lift the vacuum pump with a crane
- ◆ Attach lifting gear securely to the eyebolt on the synchronizing gear
- ◆ Attach the lifting gear to crane hook with safety latch

If vacuum pump without drive motor is to be lifted, attach another belt/rope at a suitable point.

The position of the eyebolt fits to the center of gravity of vacuum pump.



CAUTION Do not stand, walk or work under suspended loads.



CAUTION The vacuum pump emits noise of high intensity in a narrow band. Risk of damage to the hearing. Person staying in the vicinity of a non noise insulated vacuum pump over extended periods shall wear ear protection.

3.Storage

Ensure that the storage area meets (a. dust free)(b. vibration free)

The vacuum pump must be stored in a dry environment with normal air humidity .It shouldn't be stored for more than six month.

Ambient conditions:

Relative humidity value during 0 % to 80 %

Lager temperature Value during -10°C to +60°C

- ◆Disconnect pump's electricity.
- ◆Make sure the suction connection and the gas discharge are closed and remove the pipes and hoses.(seal the connections for suction and discharge nozzles with adhesive foil.)
- ◆Store vacuum pump :(a)If possible in original packaging.(b) In door. (c)Dry (c)Dust free(d)Vibration free.

Conservation

In case of adverse ambient conditions conserve the vacuum pump immediately.

In case of favourable ambient conditions conserve the vacuum pump if a storage of more than 3 months is scheduled.

Please make sure:

(a.)All parts are firmly closed.

(b.)Seal all ports are not sealed with PTFE-tape, Gaskets, O-rings with adhesive tape.

Note:

Wrap the vacuum pump in Volatile corrosion inhibitor files

- ◆Store vacuum pump :(a)If possible in original packaging.(b) In door. (c)Dry. (c) Dust free(d)Vibration free.

4.Installation

Check the following points:

Machine freely accessible from all sides

Do not close ventilation grids and holes

Sufficient room for installing and removing pipes and for maintenance work, particularly for install- ing and dismantling the machine

No external vibration effects

Do not suck any hot exhaust air from other machines into the cooling system.

The oil filling point oil sight glasses and oil outlets must be easily accessible.

The cooling air inlets and cooling air outlets must be at least more 30 cm from adjacent walls. Cooling air coming out must not be sucked in again.

For maintenance work there must be a minimum of more 40 cm in front of the inlet filter and outlet silencer.

Note:

Installation prerequisites :Non-compliance with the installation prerequisites, particularly in case of insufficient cooling: Risk of damage or destruction of the vacuum pump and adjoining plant components and Injury. The installation prerequisites must be complied with.

Do not operate without the standard regulating and relief valve.

If the permissible vacuum is exceeded (see data plate) the machine may be damaged.

Note:

Vacuum pump may only be operated when it is set up horizontally.

Material damage resulting from the machine tipping over and falling.

When installed at more than 1000 m above sea level a reduction in power is noticeable.

In this case we would ask you to contact us.

Contamination in the intake air

To protect the machine the operator should install appropriate filters on the suction side.

It's possible Install the machine on a firm base without anchoring. When installing on a sub-structure ,recommend fixing with flexible buffers.

Pre-Start Checks

- The integration of the vacuum pump is carried out such that essential safety requirements of the machine directive are complied with.
 - That the environment of the vacuum pump is not potentially explosive.
 - Following ambient conditions will be complied with : (a.) Ambient temperature: 0...40°C. (b.) Ambient pressure: atmospheric
 - The environmental conditions comply with the protection class of the drive motor
 - Installation space or location is vented such that a sufficient cooling of the vacuum pump is warranted
 - Do not heat sensitive parts (Ex plastics, wood, cardboard, paper, electrics) will touch the surface of the vacuum pump.
 - In order to warrant a sufficient cooling there will be a clearance of minimum 1M between the vacuum pump and nearby walls.
 - The vacuum pump will be placed or mounted horizontally.
 - During operation the surface of the vacuum pump may reach temperatures of more than 70°C. (Risk of burn)
 - Vacuum pump will not be touched inadvertently during operation provide, a guard.
 - Sight glass of the synchronizing gear will remain accessible.
- In case the synchronizing gear oil change is planned to be carried out on location:
- The drain port and filling port of the synchronizing gear will remain easily accessible.



CAUTION Avoid touching the surfaces.

- Non-compliance with the installation prerequisites, particularly in case of insufficient cooling: Risk of damage or destruction of the vacuum pump and adjoining plant components and Injury. The installation prerequisites must be complied with.
- During operation the surface of the vacuum pump may reach temperatures of more than 70°C. (Risk of burn)



CAUTION

- Intruding foreign objects or liquids can destroy the vacuum pump.

Mounting

Set down or mount the vacuum pump at its location.

Installation preemptive is complied with.

Gear Oil

Vacuum pump is delivered with oil filled in the gear case (US350PAO).

Level shall be slightly above the middle of the sight glass.

Check on the sight glass proper amount of oil is filled.

Electrically



WARNING

Risk of electrical shock or damage to equipment.

Electrical installation work must only be executed by qualified personnel that know and above the regulations. Danger of death if the electrical installation has not been done professionally.

The electrical installation must only be done by a qualified electrician observing..

Incorrect direction of rotation

Operating in the wrong direction of rotation leads to damage to be the machine. (Use a phase sequence indicator to check the direction of rotation. (clockwise rotating filed)



CAUTION

The connection schemes give below are typical. Depending on the specific order or for certain markets deviating connection schemes may apply.

Risk of damage to the drive motor!

The inside of the terminal box shall be checked for drive motor connection instructions/schemes.



CAUTION

Operation in the wrong direction of rotation can destroy the vacuum pump in short time.

Prior to starting-up it must be made sure vacuum pump is operated in the proper direction.

Connect the protective earth conductor.

Electrically connect the drive motor.

- Motor's electrical data is given on the data plate or on the motor data plate. The appropriate connection diagram is located in the motor's terminal box (not for the plug connection version). The motor data must be compared with the data of the existing mains network (current type, voltage, network frequency, permitted current value).

- Connect the motor via the plug connection or the motor protection switch (for safety reasons, a motor protection switch is required and the connecting cable must be installed via a cable fitting to provide strain relief).

Recommend using motor protection switches with delayed switch off, depending on possible excess current.

Temporary excess current may occur when the machine is started cold.

Note:

The conditions at the installation location must match the information on the motor data plate.

Without derating the following is permissible:

- $\pm 5\%$ Voltage deviation
- $\pm 2\%$ Frequency deviation
- Vacuum pump must only be switched on again after it stops.

Connecting Lines/Pipes

To make sure

- Connect Suction and discharge line the gas discharge is open.
- All provided covers, guards, hoods etc are mounted.
- Cooling air inlets and outlets are not covered or obstructed and that the cooling air flow is not affected adversely in any other way.
- Start the motor briefly to check the direction of rotation. When looking at the motor fan, it must rotate anti-clockwise. (< 2 sec).

Material damage resulting from the forces and torques of the pipes on the unit being too high.

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

With connection pipes that have the same pipe cross section as the machine connection and are more than 3m long, a non-return valve especially for the purpose must be installed in order to avoid reverse operation when the machine has stopped.

No blocking systems must be built into the exhaust air pipe. When the exhaust air pipe is connected it must be checked regularly for impurities.

5.Maintenance

Regular maintenance work must be carried out in order to ensure operational safety. Maintenance intervals also depend on the operational demands on the machine. With any work observe the safety instructions described "Safety notes for installation, commissioning and maintenance".

Keep in cleaning.

| Time | Maintenance |
|----------------------|--|
| Month | Check the pipes and screws for leaks and to ensure they are seated properly and if necessary seal again or tighten up. |
| Month | Check the terminal box and cable inlet holes for leaks and if necessary re-seal. |
| Month | Clean the regulating valve, the ventilation slots on the machine and the motor cooling ribs. |
| Month | Check the oil level |
| 5.000Hours | Changing the oil |
| Month / Per 6 Months | Clean or replace filter cartridge |
| Least once a year | Check Coupling wear. |

Change the oil when vacuum pump is operating temperature and in atmospherically ventilated area. If it is not completely emptied the amount that can be refilled is reduced.

Oil level sight glasses must be checked every month.

Vacuum pump must be switched off and vented to atmospheric pressure to top up the oil.

Clean operations, the oil must be changed after per 5,000 hours operating .

Notice:

Filter cartridge for suction must be cleaned per month or more often depending on the level of contamination by purging from the inside outwards.

Filter should be replaced per 6 months.

Filter cartridge can be removed after undoing the tension clamps.

When blowing through with compressed air, solid particles may be carried along or powder dust swirling around may cause injury to the eyes. Therefore, when cleaning with compressed air always wear goggles and a dust mask.

Wear

Frequent starting up and high ambient temperature

The service life of the sprocket is reduced.

The coupling sprocket is subject to wear and must be checked regularly (at least once a year).

Defective sprockets may lead to the rotor shaft

Check the coupling switch the motor off and ensure that it cannot be switched on again.

Undo the screws on the housing flange and remove the motor axially with the half of the coupling on the motor side and suspend with the lifting device.

If the sprocket is damaged or worn, then replace it.

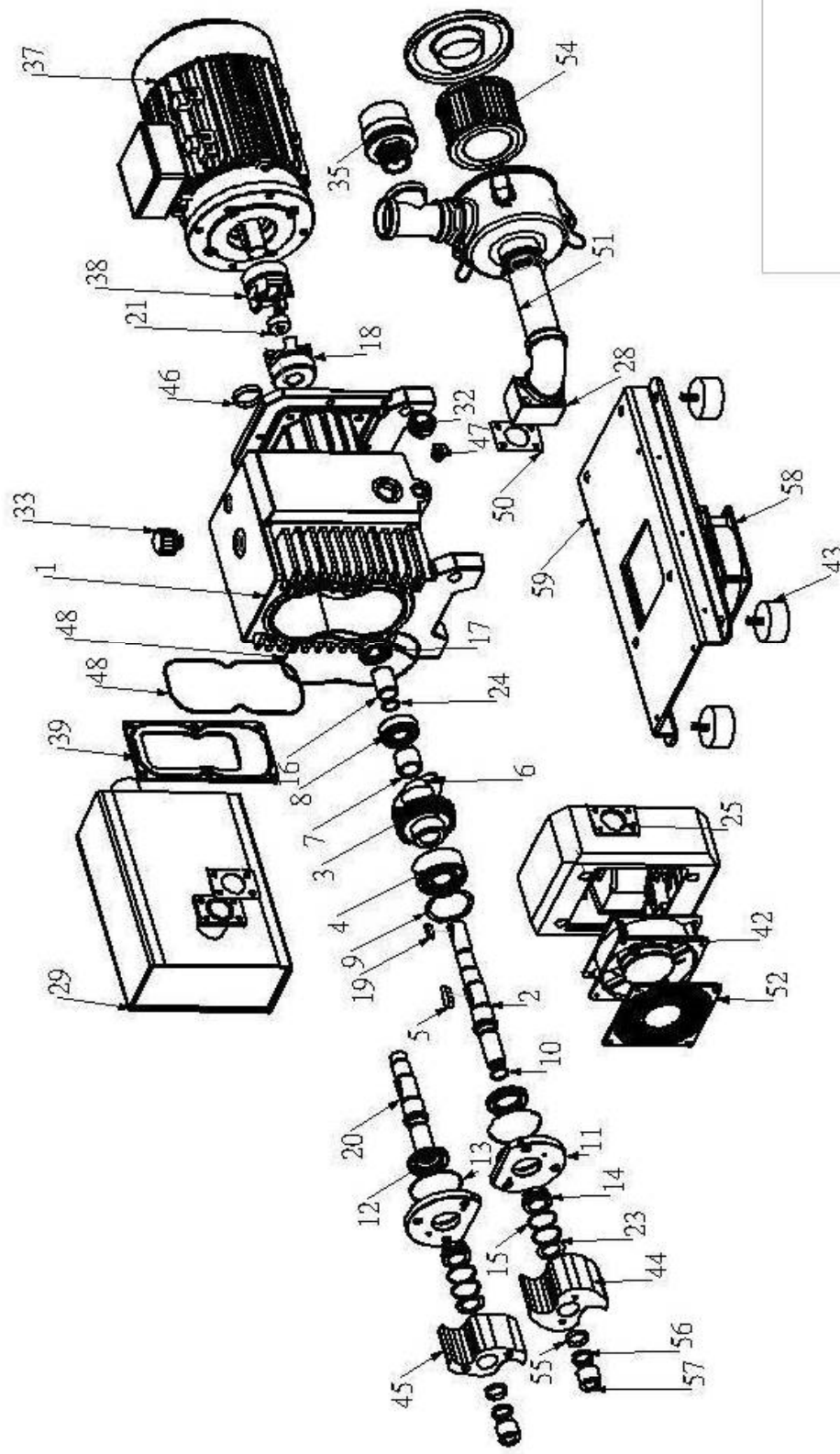
For on site repair work the motor must be disconnected from the mains by a qualified electrician so that it cannot be started up again accidentally. For repairs use the manufacturer, its branch offices or authorized dealers. Please contact the manufacturer for the address of the service center responsible for you (contact Manufacture).

Troubleshooting

| Problems | Cause | Troubleshooting |
|--|---|--|
| Vacuum Pump cannot start | Motor is not supplied with correct voltage or over the load | Supply the drive motor with the correct voltage |
| | Motor starter over load protection is too small or trip level is too low. | Compare the trip level of the drive motor starter overload protection with the data on the nameplate, correct if necessary. In case of high ambient temperature set the trip level of the drive motor starter overload protection 5 % above the nominal drive motor current. |
| | One of the fuses has blown | Check the fuses |
| | Connection cable is too small or too long causing a voltage drop at the vacuum pump | Use sufficiently dimensioned cable |
| | Vacuum pumps or motor is blocked | <ul style="list-style-type: none"> ● Check the motor is disconnected from the power supply. ● Remove the fan cover ● Try to turn motor with vacuum pump by hand ★ If the unit is still frozen: Remove the motor and check motor and vacuum pump separately ★ If vacuum pump is blocked: Repair the vacuum pump |
| | Motor is defective | Replace the motor. |
| Machine is switched off by the motor protection switch | Mains voltage/ Frequency does not correspond with the motor data | Check by qualified electrician |
| | 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 |
| | The regulating valve is dirty so that the permissible vacuum value is exceeded | Clean or replace the regulating valve |
| Vacuum Pump is blocked | Solid foreign in vacuum pump from remaining condensate | Check the suction line is equipped with a screen If necessary add provide filter. Repair the vacuum pump |
| | Corrosion in the vacuum pump from remaining condensate | Check the process and Observe the chapter Repair the vacuum pump. |

| | | |
|---|--|---|
| Vacuum Pump is blocked | Vacuum pump was run in wrong direction | Connecting vacuum pump and check the correct direction |
| Capacity Lower | The suction filter is dirty | Clean or replace the suction filter |
| | The suction pipe is too long or too narrow | Check the hose or the pipe |
| | Machine or system leaking | Check the pipework and screw connections for leaks and to ensure that they are firmly seated. |
| Final pressure (max. vacuum) is not reached | Machine or system leaking | Check the pipework and screw connections for leaks and to ensure that they are firmly seated. |
| Vacuum Pump too hot | Temperature of the inlet air too high or ambient temperature too high | Observe the permitted temperature for inlet gas |
| | Cooling air supply is obstructed | Check environmental conditions |
| | | Clean ventilation slots |
| | The regulating valve is dirty so that the permissible vacuum value is exceeded | Clean or replace the regulating valve |
| | Long suction discharge or pressure line with too small diameter. | Use larger diameter |
| Noisily | Deposits on the rotary piston | Clean the working space and the rotary piston |
| | The regulating valve is vibrating | Replace the valve |
| | Defective Bearings | Repair vacuum pump |
| | Coupling element is wrong | Replace coupling element |
| | Low oil level in Gear box | Gear leaky Repair vacuum pump |
| | Foreign objects in the vacuum pump stock bearings | Repair vacuum pump |

Please contact USVACUUM LLC for other more functions or that cannot be eliminated.



| | |
|------------------------------|--------------|
| MODEL: | |
| TITLE: VACUUM PUMP | |
| SIZE | CODE. NO. |
| | REV |
| WEIGHT: | SHEET 1 OF 1 |

2

4

5

| NO . | PN | Description | Q 'ty | NO . | PN | Description | Q 'ty |
|------|--------|------------------|-------|------|-----------|-------------------|-------|
| 1 | K8 | pum p-body | 1 | 28 | K75 | AL-flange | 1 |
| 2 | K6 | shaft-A | 1 | 29 | K60 | silencer-box | 1 |
| 3 | K25 | gear | 2 | 32 | K46 | sight-glass | 1 |
| 4 | K28 | bearing | 2 | 33 | K42 | oil-filler | 1 |
| 5 | K34 | key | 2 | 35 | K72 | K8-vacuum valve | 1 |
| 6 | K26 | flinger | 1 | 37 | 2HP2PB14A | 2HP2PB14A | 1 |
| 8 | K23 | bearing | 2 | | flange | flange | 1 |
| 9 | k29 | bearing spring | 2 | 38 | K052-A | coupling-A | 1 |
| 10 | K35 | o-ring | 2 | 39 | K30 | gear box cover | 1 |
| 11 | K39 | flange | 2 | 42 | K88 | cooling fan 120 | 1 |
| 12 | K36 | oil-seal | 2 | 43 | K16 | rubber foot | 4 |
| 13 | K41 | o-ring | 2 | 44 | K1 | rotary-2A | 1 |
| 14 | K37 | sleeve | 2 | 45 | K2 | rotary-2B | 1 |
| 15 | K43 | piston ring | 4 | 46 | K45 | oil seal cover | 1 |
| 16 | K21 | sleeve | 1 | 47 | K31 | oil- plug | 1 |
| 17 | K20 | oil-seal | 1 | 48 | K12 | o-ring | 2 |
| 18 | K052-B | coupling-B | 2 | 50 | K65 | gasket | 2 |
| 19 | K51 | key | 1 | 51 | | air filter system | 1 |
| 20 | K007-B | shaft-B | 1 | 52 | K61 | fan cover | 1 |
| 21 | K003-B | spacer bushing-B | 2 | 54 | K85 | K004-air filter | 1 |
| 23 | K13 | spacer | 2 | 55 | K10 | power lock-A | 2 |
| 24 | K22 | o-ring | 1 | 56 | K11 | power-lock-B | 2 |
| 25 | K51 | AL-pum p cover | 1 | 57 | K003-A | spacer-bushing-A | 2 |
| | | | | 58 | K86 | cooling fan 80 | 1 |
| | | | | 59 | K73 | base | 1 |

(for 110V /220V /380V /460V)

(only for 110V and 220V)