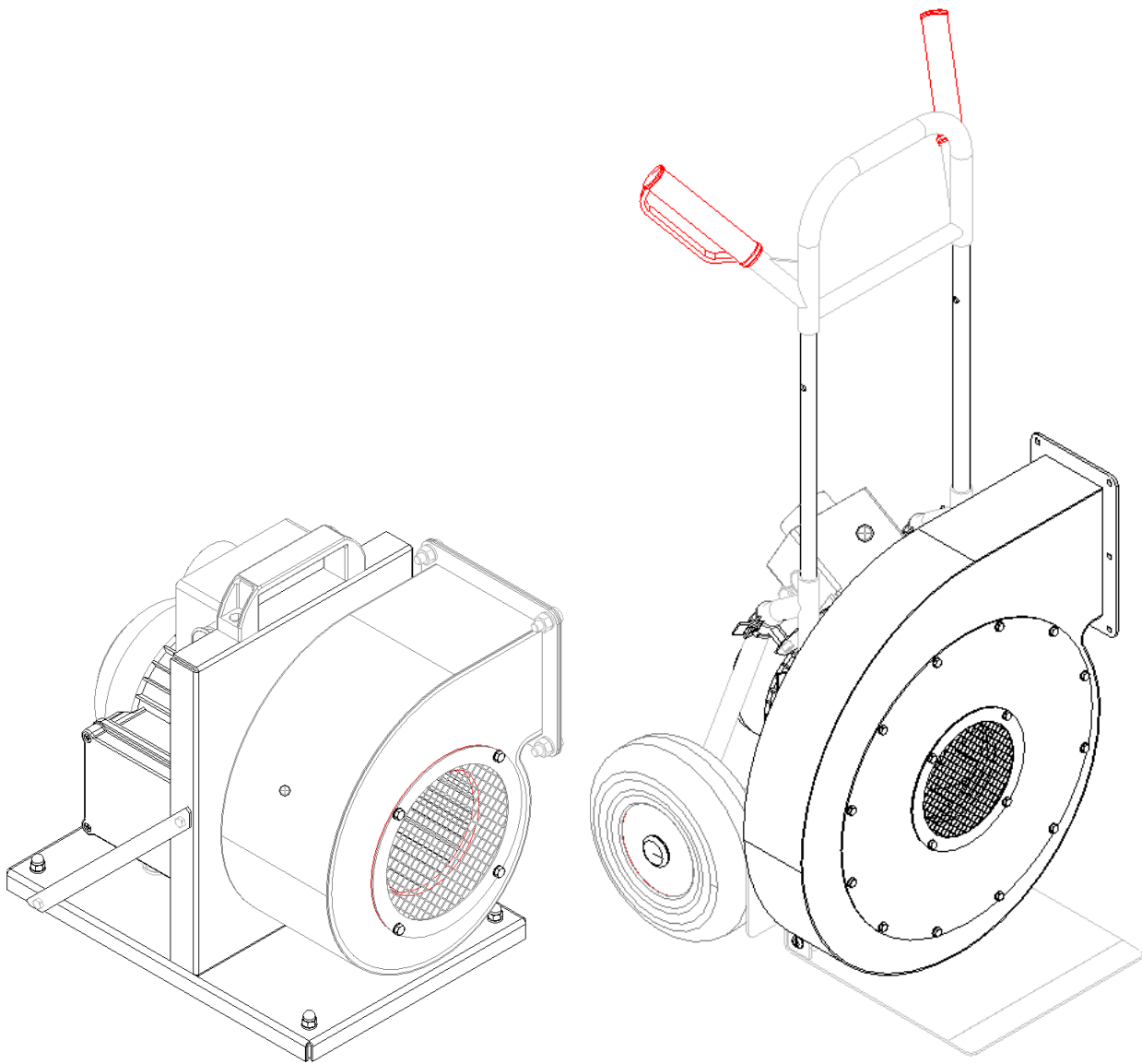




User Manual

for all mobile radial fans
in standard configuration



Printed in Germany

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Revision level updates are not supplied for this user manual.
The latest revision level can be obtained from the manufacturer.

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1 Preliminary remarks

1.1 Manufacturer's instructions for the operating entity



Follow safety instructions!

Carefully read all safety instructions contained in this user manual.

Before commencing the work, familiarize yourself with the fan operations.

It is too late for this while doing the work!

Never allow someone without subject-matter knowledge to start up and operate this fan.

Effectivity

This user manual applies to all mobile fans with the following type labels:

MRV- (ENG or DNG) 3-6, -(ENG or DNG) 3-9.8, -(ENG or DNG) 4-14, -DNG 5-12.5, -DNG 5-16, -DNG 5-19 ...

MRV-DNG 9-30, -DNG 9-43, -DNG 10-45, -(ENG or DNG) 10-65 ...

MRV-DMVL 345-1-12, -DMVL 355-1-25, -DMVL 315-1-60, -DMVL 375-1-35, (EMVL or DMVL) 410-1-30 ...

Purpose of this user manual

This user manual accompanies the equipment. It is also used as an assembly instruction. The manufacturer prepared the user manual based on its design-engineering, manufacturing, and operating knowledge and experience.

It can be supplemented by special-purpose instructions from the operating entity (e.g. for supervisory and reporting duties, in-house maintenance and service schedules).

Symbols shown in this user manual

The graphics and drawings render the schematic view of a fan. They are not to scale and also do not reflect the proportions of each fan from the product line. The depictions are only used as a guide.

Copyright

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As the operating entity you are responsible for

- the appropriate and intended use of the fan, exclusively by instructed subject-matter experts,
- compliance with safety regulations and safety instructions, and preventive occupational safety and accident prevention,
- the technical instruction of operators on the equipment and for their acknowledgment of the user manual.

1.2 Tasks for the operating entity of fans

The German Occupational Safety Directive (BetrSichV) defines certain measures as the scope of responsibility for operating entities of technical equipment.

Pursuant to Section 3 of the German Occupational Safety Directive (BetrSichV), the operating entity must conduct a risk evaluation of the function where the equipment will be used. This involves identifying and addressing hazards that can arise while the equipment is used in conjunction with processed materials and the operating environment.

Pursuant to Section 4 of the German Occupational Safety Directive (BetrSichV), the operating entity shall implement the required measures and shall select the operating equipment appropriate for the conditions at the workstation, wherein operational and health safety are ensured if the equipment is used as intended.

It is solely the operating entity's task to select the appropriate operating equipment (fan) for the intended function and the intended application.

1.3 Product Warranty

KARL KLEIN Ventilatorenbau GmbH shall assume a product warranty as stated in its general sales and delivery terms and conditions.

Warranty claims are null and void if the installation and operating procedures described in this user manual, in particular the intended uses, are not adhered to.

Unauthorized reconfigurations or modifications of the fan are prohibited.
Only use original spare parts and accessories approved by KARL KLEIN Ventilatorenbau GmbH. The use of other parts can impair function.
The operating entity is liable for any resulting damage.

KARL KLEIN Ventilatorenbau GmbH assumes no liability or product warranty for losses from repairs or defective assemblies of the fan performed by the operating entity in-house.

1.4 Used symbols

This user manual employs the following symbols. They supplement instructions related to safety and loss prevention.



Caution electrical shock!

Identifies potentially dangerous situations. Non-compliance with these warnings can result in death, serious injuries, or property damage.



Attention!

Identifies a potentially dangerous situation. Non-compliance can result in bodily injury or property damage.



Note!

User instructions for efficient equipment use and miscellaneous useful information.

1.5 Type tags and warnings signs



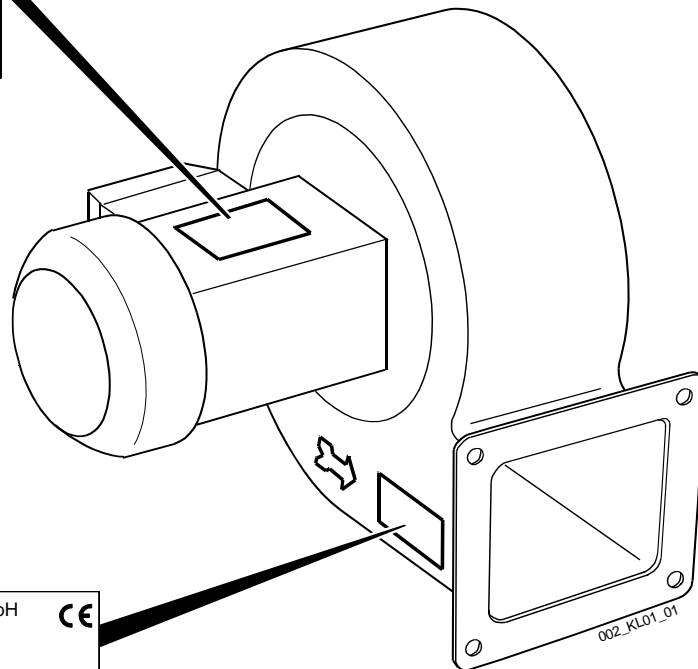
Note!


Type tags are located on the fan element, the on/off switching device, and the drive.

The data on the type tags are important for the intended use.

All tags must be legible at all times. Illegible or lost type tags and warning signs must be replaced promptly.

Typ		Isol. Kl.
~ Mot.-Nr.		IP
KW	S	
V	A	
n	$\frac{1}{\text{min}}$	cos ϕ
Hz		
<small>T.Nr. 002</small>		<small>YDE: 0000.04</small>



	Karl Klein Ventilatorenbau GmbH D - 73773 Aichwald	CE
DNG 4-14		
Teile-Nr: 75475-1.030		
50 Hz	850 m ³ / min	580 Pa
Nr:		

The details on the type tags identify the relevant fan type and performance ratings. The details on the type tags correspond to the performance specifications in the purchase order. These can change.



Note!

The values indicated on the type tag are definitive.

Other approved specifications can be found in the order confirmation

2 INTENDED USES

This KLEIN fan was designed and fabricated

- to convey gaseous, non-aggressive, and non-abrasive media.

The fan is also suited to convey aggressive media (the manufacturer must be consulted) if suitable materials are used and after surface protection has been applied (corrosion protection).

- Other media must not be conveyed.
- Conveying explosive air mixtures must be avoided under all circumstances.

Intended use implies observing and complying with specifications and instructions in this user manual.

2.1 Limits of use and special considerations for intended operations

Intended use also entails:

- The conveyed media must not contain solid or liquid contaminants. Where required, a filter must be installed upstream of the fan intake (see accessory list, KLEIN Ventilatorenbau GmbH).
- The temperature of the conveyed medium must not drop below -15°C and must not exceed $+80^{\circ}\text{C}$.
- Fans with temperature lockout are excluded from this temperature. In this case, the upper temperature limit for the conveyed media is as follows:
 - at a speed of 1,400 rpm = max. 200°C
 - at a speed of 2,800 rpm = max. 300°C
- The ambient temperature must range between -20°C and $+40^{\circ}\text{C}$.
- The fan must only be operated with the intake and exhaust safety screen installed!
- Do not transfer external shocks, vibrations, or oscillations onto the equipment since these can degrade the balancing status and therefore result in dangerous vibrations.

2.2 Prohibited uses

Prohibited and dangerous uses specifically include:

- Conveying explosive or flammable media;
- Operating the fan in an environment classified as an ATEX zone;

- Conveying gaseous mixtures that contain other chemical reactants;
- Conveying abrasive media;
- Conveying without intake or exhaust safety screen;
- Operating without a motor circuit breaker;
- Conveying / transporting persons on the fans / frames;
- Transporting / positioning additional / foreign loads on the fans / frames;
- Continuing to operate after the equipment has fallen over or was exposed to strong vibrations/shocks;
- Operating without continuous grounding/equipotential bonding;
- Operating outdoors under the influence of weather, sun irradiation, lightning strikes, without weather protection, or in violation of the specified IP protection class;
- Any other use that deviates from the intended uses, and as a result creating a hazard;
- Shocks or vibrations associated with traveling over uneven ground, traveling up or down and across stairs or steps, or sparking due to setting down / grinding of the equipment must be generally avoided. Equipment that has fallen over must not be overhauled or continue to be operated. Corresponding use can e.g. degrade the balancing status of the flywheel in a manner that can result in dangerous operating states up to and including flywheel failure, damage to property, and bodily injury. The equipment must be sent to the manufacturer for repair after the equipment has fallen over or was exposed to shock or dangerous vibrations.

3 Safety

3.1 Basic safety instructions

KLEIN fans are designed and fabricated in accordance with generally approved engineering practices, occupational safety and accident prevention regulations, and the EU Directive for Safety of Machinery. They correspond to the state-of-the-art.

Fans can nevertheless be the source of danger, and can in particular

- create dangerous situations
- when used inappropriately
or when not used as intended.

All user instructions for the fan must therefore be adhered to.

**Note!**

- The fan must only be used in sound technical condition and in conjunction with undamaged electrical installations. **L i f e - t h r e a t e n i n g c o n d i t i o n s** are created when a defective device or an unbalanced flywheel are used.
- Easily ingested materials, such as Styrofoam, rags, etc. must not be present in the intake zone. Maintain sufficient clearance to the intake opening. The intake opening must not be covered by sucked in objects. The fan must only be operated with a safety screen installed on the intake side.
- Note the exhaust flow direction and zone. The fragments created by a fan wheel failure must not result in consequential bodily injuries or property damage. The fan must only be operated with a safety screen installed on the intake and exhaust side.
- The safety screens must never be removed. Operating the unit without safety screens is prohibited.
- This fan is not rated for ATEX zones! Extraction from or conveying into an ATEX zone are prohibited!
- Depending on the installation size of the fan and its installation situation, a considerable vacuum effect in the intakes zone, and a considerable blowing effect in the exhaust zone can be created. The operating entity must take all steps appropriate to exclude any resulting hazards from these fan characteristics.
- Electrical safety devices must correspond to the requirements of the machinery, in conjunction with any applicable machinery used to operate the fans (e.g. motor circuit breaker, etc.)
- Operators must be familiar with all measures in this user manual that describe appropriate handling and the appropriate, intended operation of this device.
- The operating entity is required to specify the appropriate type and scope of personal protective equipment its employees are required to wear, and to ensure compliance with these instructions.
- The customer/operating entity has the responsibility for training and instructing operators/employees.

**Attention! Risk of burn injuries when touching hot surfaces!**

In certain operating modes, the housing surfaces of motors can reach 80 °C. Allow these to cool off before touching.

Radiant heat from other machinery components or devices must be avoided.

Ongoing radiant heat creates the risk of bearing damage due to lubricant loss.

3.2 Emissions

3.2.1 Dust, gases, vapors

The presence of hazardous emissions depends on the relevant conveyed medium. The operating entity is required to institute appropriate occupational and health safety procedures.

3.2.2 Noise

The noise exposure depends on the installation method, the attachment method, on environmental conditions, and the particular operating state of the fan. For certain applications, the operating noise generated by the fan can reach a high noise level. These values can range between 60 and up to 110 dB (A). The KLEIN catalog contains detailed noise specifications.

Any unavoidable activities in the immediate environment require the operating entity to install appropriate noise protection measures in compliance with its responsibilities pursuant to the German Occupational Safety Directive (BetrSichV) (e.g. hearing protection)

3.2.3 Vibrations

KLEIN fans are balanced at such a high level of performance that no dangerous vibrations will occur ex factory.

Do not transfer external shocks, vibrations, or oscillations onto the equipment since these can degrade the balancing status and therefore result in dangerous vibrations.

3.3 Overheating / weather influences

In all operating phases, the equipment must only be operated with sufficient cooling. For instance, the equipment must not be covered, and the maximum allowable medium and ambient temperatures must not be exceeded. The equipment must not be exposed to direct sun irradiation or strong heat sources.

The equipment is not approved for outdoor use under the influence of weather

3.4 Transport and storage

**Note!**

Use an appropriate lift strap for transporting the unit to the installation location, and mount the fan so that it remains balanced.
Only transport the unit with appropriate rigging and/or hoisting devices. Avoid tipping the unit.

**Attention!**

Transporting the unit creates crushing risks and body blow risks between the fan, the frame, and the environment.

Inappropriate rigging and hoisting devices can cause the equipment to fall onto objects or persons!

Traveling over or transporting across steps or stairs can result in dangerous changes of the balancing state of the flywheel and is prohibited. Steps must be crossed without shock, slowly, and with caution.

The grounding strip must not be disabled while traveling.

**Note!**

Dispose of packaging materials properly. Do not burn these.

**Storage instructions!**

Prior to transporting the fan to the installation location, it should only be stored in locked, dry rooms.
Under-roof, outdoor storage is only permitted for short periods.

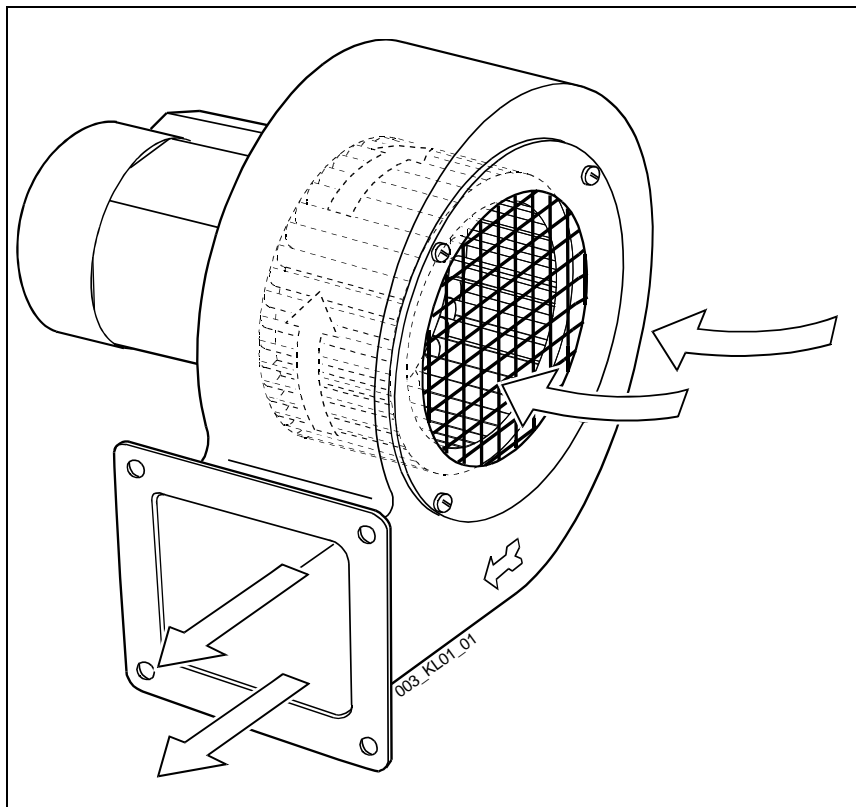
The fan must be protected against all damaging environmental influences and against mechanical damage.

If the unit is stored without being operated, ball bearings (part of the motor assembly) may no longer be used after two years and must be replaced; depending on storage conditions this may have to be done earlier. Note the included documentation for the motor.

4 Description

KLEIN fans are radial fans with ball bearing electrical drive.

The relevant medium is ingested axially and exhausted radially in the desired direction (see figure).



Flow direction of the medium

5 Set up / connection / start up / operation

5.1 General safety instructions



Warning! Risk of death due to electrical shock!

An electrical shock risk exists while connecting the unit to the electrical power supply, unless power is disconnected first.

Always disconnect power before working on live parts.

- The electrical connection must only be made by appropriately qualified and trained electricians.
- Set up and operation is only approved on level and even ground Components connected by the operating entity must not compromise the stability of the delivered scope consisting of the fan and the frame. Where appropriate, the operating entity must install additional supports/fasteners.
- Carrying versions with carrying frame as well as tipping and rolling versions with mobile frame require minimum physical operator capabilities and wearing personal protective equipment, such as firm safety shoes. The ergonomic principles for lifting and setting down loads must be adhered to.
- Electrical cables, control cables, etc., such as hoses or other technical air connections must be routed in a manner that they can either not be traveled across, or in a manner that they are reliably protected against deformation and damage when traveled across. No loads of any kind must be set down on electrical cables, control cables, etc. and on hoses or similar technical air connections. Cables must always be rolled up and stowed in a manner that they cannot kink, twist, or form knots. Air lines must not be operated when kinked or plugged.
- The operating entity must call attention to tripping hazards due to connected hoses, cables, etc. Cables, hoses, or pipe routes must be identified by signs and secured.
- The customer/operating entity is not authorized to make changes of any kind to the supplied electrical equipment. The included cable length and the included connectors must not be removed, replaced, or modified. If not included with the purchase order, the operating entity must use the mating connector approved for the included connector.
- Trained electricians are persons who are familiar with setting up, installing, startup, and operating the equipment/machinery, and who have the qualifications commensurate with their assigned duties, or training or instruction pursuant to the standards for safety practices related to maintaining and using appropriate safety equipment, and for accident prevention procedures.
- Setup, connecting, startup, and operation at the operating entity/customer depend on the requirements on the fan at the installed location and on the function-specific conditions at the set up and operating location (on the machinery or the equipment). The customer/operating entity is responsible for the intended use, and for maintaining operational and health safety during all lifecycle phases, starting with product acceptance.

5.2 Setup, connecting, installation



Note!

The connection line with connector was harnessed at the factory and must not be modified. If not included in the relevant delivered scope of the manufacturer, the customer/operating entity must supply and appropriately connect an approved mating connector. Deviations from the electrical connection specifications are prohibited. Equipment must only be installed and operated if it corresponds to the application requirements and the relevant local regulations.

- On mobile frames, the transportation handle can be retracted and locked in this position to save space for set up or to store the mobile fan. The handle must be extended and engaged for moving/changing locations.
- On mobile versions, the support feet must be extended and engaged for set up for operation, or for secure storage. These extendable supports provide an additional safeguard against tipping over.

5.3 Assembly and installation requirements

Additional mandatory requirements:



Note!

The fastening method of the fan on the mobile frame must not be modified. Technical air connections can be made on the exhaust flange and on the intake via the nozzle or adapter flanges.



Attention!

Connecting the unit creates crushing risks and body blow risks between the fan, the frame, and the environment.

Components connected at the installation location, such as hoses, pipe assemblies, mating Storz couplings, etc. must have a complete equipotential bonding connection to the fan and to the mobile frame.

- If the intake side of fan is operated without a hose connection, the ambient environment must be free of objects that can be sucked in.
- Minimum clearance from a wall to the cooling-fan hood: 30 mm.
- The flow velocity must be sufficient to prevent dust buildup that can cake up on technical flow components. As a result it must not drop below 20 m/s in connected flow components.

- A motor circuit breaker is included in the on/off switch. It is rated for the included motor.
- Any motor protection at the installation site based on fuses or motor circuit breakers must meet the rated motor current pursuant to the motor specifications. The associated minimum specification (nominal current and t_e time) is shown on the motor type tag.
- Hoses or rigid lines must be designed in a manner that no electrostatic charges can be created on the interior or exterior surfaces. Metal spirals must be integrated into hoses to achieve sufficient mechanical strength. Negative or positive pressure or storage must not cause these to collapse, constrict, or swell.
- The metal spiral must be exposed on both ends of a hose run. The bare ends must be electrically connected with the connection components so that the overall assembly or equivalent steps create a complete, permanent electrical equipotential bond for the entire system.

5.4 Fan connection

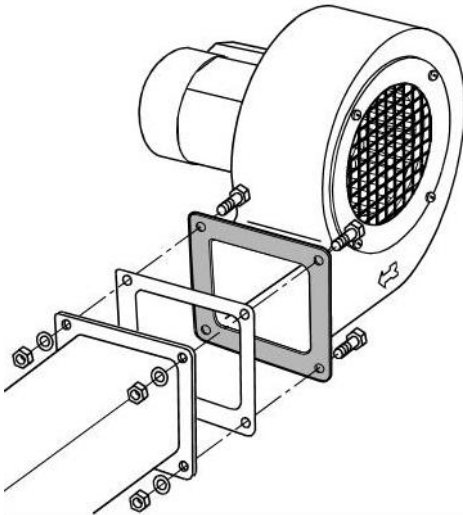


Note!

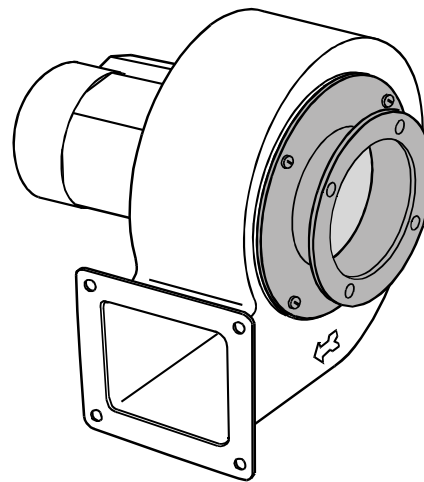
A rigid connection at the same time on the intake and exhaust side can result in damage and failure of fan components.
Structure-borne sound / vibrations must be decoupled by installing an electrically conducting canvas connection.

Technical air lines can be connected to the fan either on the exhaust flange or on the intake adapter flange.

Connection examples:



On the exhaust flange



On the intake adapter flange

6 Maintenance, service, and repair instructions



Note!

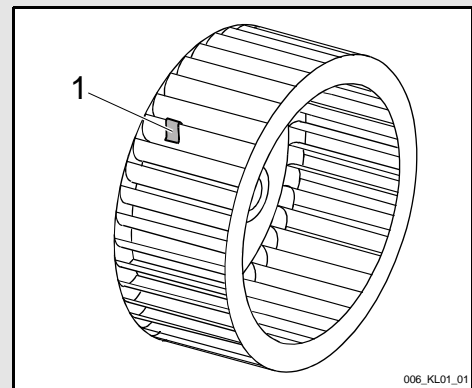
Depending on use of the fan and the relevant installation concept, the operating entity can develop additional cleaning and/or maintenance intervals.



Attention! Property damage possible!

Static imbalances are created when balancing clamps **(1)** on the fan fins are moved or removed.

Under no circumstances should the fan be serviced in-house. Property damage is possible if the unit is used after inappropriate assembly.



6.1 Maintenance and care

- Inspect for dirt buildup on the flywheel to identify flywheel imbalances at an early stage and to prevent an imbalance.
- Regularly remove dust buildup on equipment components.

6.2 Inspect bearings

- Ball bearings and/or roller bearings are located in the motors of the delivered scope, and in the wheels of the mobile frames for the relevant models. The unrestricted function of ball bearings and/or roller bearings must be inspected regularly by checking for operating noise; these must be replaced as required.
- After no more than 20,000 operating hours or after 3 years (depending on what comes first), the manufacturer or an authorized dealer must replace the motor ball bearings.

6.3 Maintain carrying and mobile frames in operational condition

- On versions with carrying frame, the screw fasteners must be inspected regularly and retightened as required. An injury risk exists e.g. if the carrying handle detaches.
- On frames with traveling casters, the condition of these must be inspected regularly, and the casters must be replaced as required. The rollers must be replaced no later than when the running surfaces show signs of wear, or the material has cracks. Roller bearings of the wheels: see Section 6.2.

6.4 Repair instructions and procedures

- Fans that are defective, have fallen over, or are running out of round must be taken out of service. Damaged frames, electrical components, housings or casters, as well as imbalances or improperly adjusted minimum gap spacing entail the risk of serious property damage and serious to deadly injuries. Do not attempt to repair the unit in-house; the unit must be instead sent for repair to the manufacturer. Only the manufacturer is authorized to properly service the unit and to provide certified balancing.
- Only qualified and trained staff are authorized to dismantle the fan from the application. The supplied scope consisting of the fan and frame must also not be separated for the return shipment for repair.

6.5 Contamination on repair shipments

- When a fan with dirt buildup or a fan contaminated with hazardous substances is returned to the manufacturer, a complete itemized listing of the contained substances and their hazard potential must be included with the shipment.
- If this itemized listing is not included, Karl Klein Ventilatorenbau GmbH reserves the right to make the repairs only after this itemized listing has been submitted. In certain cases, the manufacturer can refuse to accept contaminated repair goods, or return received goods without processing and at the customer's expense.

7 Disposal

Continuing to use defective fans and / or their components, such as flywheels, rolling bearings, etc., including the frame, can result in property damage and bodily injury, and in environmental damage.

The operating entity is required to appropriately dispose of all fan components in compliance with national and international laws and regulations.

EU Conformity Declaration

As required by the Directive 2006/42/EU, Attachment II Part 1 A

We hereby declare that the products:

Mobile low-pressure fans:

MRV-ENG/-DNG 3-6, -ENG/-DNG 3-9.8, -ENG/-DNG 4-14, -DNG 5-12.5, -DNG 5-16, -DNG 5-19

Mobile low-pressure, high-performance fans:

MRV-DNG 9-30, -DNG 9-43, -DNG 10-45, -ENG/-DNG 10-65,

Mobile medium-pressure, high-performance fans:

MRV-DMVL 345-1-12, -DMVL 355-1-25, -DMVL 315-1-60, -DMVL 375-1-35, -EMVL/-DMVL 410-1-30

All of the above without ATEX rating

comply with the following applicable regulations:

Machinery Directive 2006/42/EU

EMC Directive: Until 04/19/2016: 2004/108/EU, after 04/20/2016: 2014/30/EU

Other applicable guidelines:

DIN EN 61000-6-4: 2011

**Electro-magnetic compatibility (EMC) – Part 6-4:
Generic standards - Emitted interference in industrial zones**

The signatory is authorized to compile the technical documentation.

City, Date Issued

Aichwald/Germany, 03/09/2016

Name and Title of Signatory

Siegfried Seidler

Technical Director

