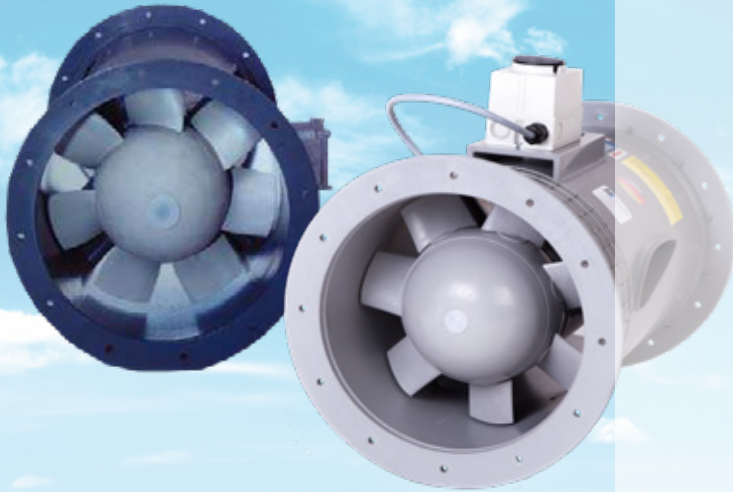


Operating manual



Axial fans

HFA ...-... D
Size 200 up to 1000

AX 58
Size 200 up to 1000





These operating instructions are part of the fan and must be available to the operating personnel at all times. The safety information given in these instructions must be followed. In the event of a fan resale, these operating instructions must be included with the equipment supplied.

Translation

In the event of supply or subsequent sale into the countries of the EEA, the operating instructions must be translated into the language of the user country accordingly.

If the translated text contains divergences, always refer to the wording of the original (German) operating instructions, or contact the manufacturer.

1. Content

1.1 Index

1.	Content	3
1.1	Index	3
1.2	EC-/EU-Declaration of Conformity	4
2.	Construction and correct use for the intended application	6
2.1	Construction of the fans	6
2.2	Correct use for the intended application and field of application	7
3.	Product specific data	9
3.1	General data	10
3.2	Power supply (see motor type label)	11
4.	Safety	11
4.1	Signs and explanations	11
4.2	Fan marking	12
4.3	Safety measures (to be implemented by the user)	13
4.4	Interfaces of the fan	14
4.5	Safety measures (to be implemented by the user)	14
4.6	User's responsibilities	14
5.	General warning symbols	15
5.1	Hazards	15
5.2	Operating and hazardous areas on the fan	15
5.3	Installation of spare and wear parts	16
6.	Installation	17
6.1	Scope of supplies	17
6.2	Transport and packing	17
6.3	Delivery (also with spare and substitute parts)	17
6.4	Intermediate storage	17
6.5	Transport to the place of installation (at the customer's site)	18
6.6	Installation, mounting, Initial commissioning	19
6.7	Operating modes	20
7.	Operation	20
8.	Maintenance / Cleaning	20
8.1	Cleaning	22
8.2	Lubrication	22
8.3	Inspection interval / Function checking	22
8.4	Vibrations	23
8.5	Tightening torques for bolt connections	23
8.6	General hints for maintenance	23
8.7	Checks	24
9.	Troubles, causes and measures	24
10.	Emergency	25
11.	Dismantling / Disposal	26

1.2 EC-/EU-Declaration of Conformity

For the purpose of

- EC Machine Directive 2006/42/EC, Annex II A for Machines
- EC Low Voltage Directive 2014/35/EU, Annex III
- EMC Directive 2014/30/EU, Annex I and II

We hereby declare that the construction type of the supplied version of:

HF R ..., HF D ..., HF A ..., AX 58 ..., RV ..., MRV ..., SDR ...

Manufacturer: Hürner Luft- und Umwelttechnik GmbH
Ernst-Hürner-Straße
35325 Mücke-Atzenhain
Germany

Hürner Luft- und Umwelttechnik GmbH
Sälzerstraße 20a
56235 Ransbach-Baumbach
Germany

in the delivered version, as a separate component within an installation, complies with the above regulations and the following standards or normative documents:

Directive / Standard	Title
DIN EN ISO 12100:2011	Safety of machinery - General principles for design – Risk assessment and risk reduction
Reference to the following standards is made additionally in the DIN EN ISO 12100: DIN EN ISO 13857:2008, DIN EN 349:2009, DIN EN ISO 14120:2016, DIN EN ISO 13732-1:2008, DIN EN 60204-1:2014	
DIN ISO 21940-11:2017	Procedures and tolerances for rotors with rigid behaviour
DIN EN 61000-6-4:2011	Electromagnetic compatibility, Generic standards - Immunity for industrial environments
DIN EN 61000-6-2:2011	Electromagnetic compatibility, Generic standards; Emission standard for industrial environments
DIN EN 82079-1:2013	Preparation of instructions - Structuring, content and presentation
VDMA 24167:1994	Fans - Safety requirements

precluding responsibility for components provided or mounted by the customer. If the fan is modified without prior agreement with HLU, this declaration is void.

Hürner Luft- und Umwelttechnik GmbH



L. Roßkothien (Managing Director)
Mücke-Atzenhain, 08-01-2019

Name and address of the persons, who are authorized, to assort the technical documents:

- Anne-Christin Vögl-Schmitt, Hürner Luft- und Umwelttechnik GmbH, Ernst-Hürner-Straße, 35325 Mücke-Atzenhain, Germany
- Marcel Pfeifer, Hürner Luft- und Umwelttechnik GmbH, Sälzerstraße 20a, 56235 Ransbach-Baumbach, Germany

For the purpose of

- EC Directive 2014/34/EU (ATEX) concerning equipment and protective systems intended for use in potentially explosive atmospheres

We hereby declare that the construction type of the supplied version of:

HF R ..., HF D ..., HF A ...	PTB 03 ATEX D089
RV ..., MRV ...	PTB 04 ATEX D097
SDR ...	PTB 04 ATEX D098
AX 58 ...	PTB 04 ATEX D099

Manufacturer: Hürner Luft- und Umwelttechnik GmbH
Ernst-Hürner-Straße
35325 Mücke-Atzenhain
Germany

Hürner Luft- und Umwelttechnik GmbH
Sälzerstraße 20a
56235 Ransbach-Baumbach
Germany

confirm in exclusive responsibility to produce solely in combination with the ATEX-name plate and the individual test report 2.2 according to DIN EN 10204:2004 in the delivered version, as a separate component within an installation, complies with the standards / regulations of the general declaration of conformity, the above regulations and the following standards or normative documents:

Directive / Standard	Title
DIN EN 1127-1:2011	Explosion prevention and protection - Part 1: Basic concepts and methodology
DIN EN 13237:2013	Terms and definitions for equipment and protective systems intended for use in potentially explosive atmospheres
DIN EN 14986:2017	Design of fans working in potentially explosive atmospheres
DIN EN 15198:2007	Methodology for the risk assessment of non-electrical equipment and components for intended use in potentially explosive atmospheres
DIN EN ISO 80079-36:2016	Part 36: Basic method and requirements
DIN EN ISO 80079-37:2016	Part 37: Protection by constructional safety „c“

precluding responsibility for components provided or mounted by the customer. If the fan is modified without prior agreement with HLU, this declaration is void.

Hürner Luft- und Umwelttechnik GmbH

L. Roßkothen (Managing Director)
Mücke-Atzenhain, 08-01-2019

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- Marcel Pfeifer, Hürner Luft- und Umwelttechnik GmbH, Sälzerstraße 20a, 56235 Ransbach-Baumbach, Germany

2. Construction and correct use for the intended application

2.1 Construction of the fans

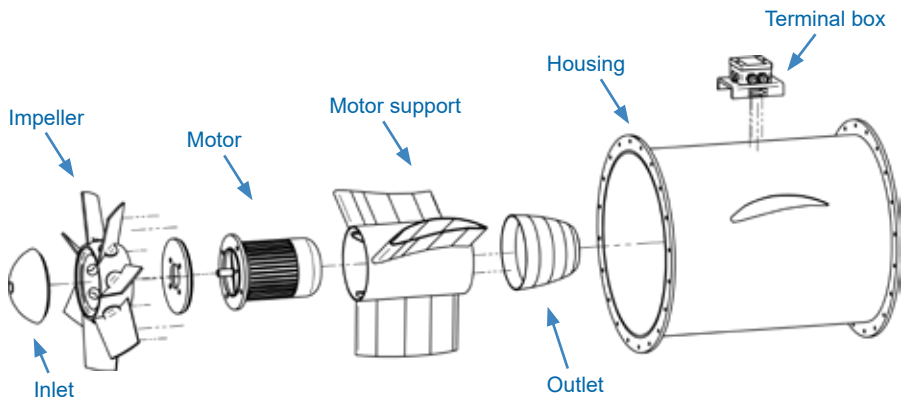
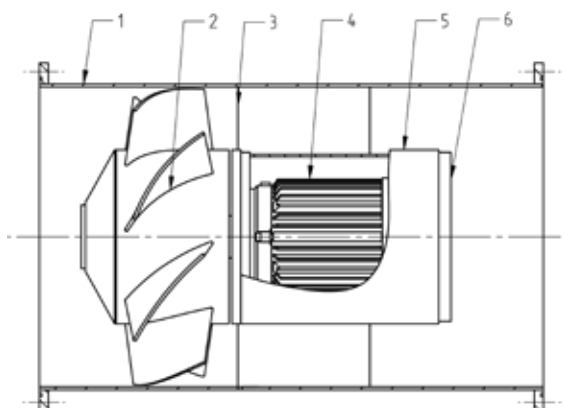


Fig. 1a| Overview of the fan HF A D



Designation		Designation	
1	Housing	4	Motor
2	Impeller	5	Motor holder
3	Supporting and ventilation spar	6	Domed and cover

Fig. 1b| Overview of the fan AX 58-...

The axial fans consist of the following main assemblies: Housing, motor, motor support and impeller. Only available in direct driven version (impeller float-mount on the motor shaft).

The housings are manufactured in self-supporting construction with different thermoplastics adapted for the particular conditions of use. The housing is performed with a splinter protection.

The impeller is statically and dynamically balanced (min. quality class G 6.3 acc. to DIN ISO 21940-11). The vibration limits correspond to the ISO 14964 standard.

The impellers are made of polypropylene (PPs/PP-FR) by injection moulding. They are equipped with adjustable blades. The blades are in the range between 20° and 60° in 5°-steps adjustable. They allow a later adaptation of the fan to changed performance data of the ventilation system. Depending on the speed and other procedural parameters, various special materials are used as impeller materials in addition to thermoplastic. For the fan sizes AX 58-200, AX 58-250 and AX 58-315, injection moulded, glass fibre reinforced impellers with adjustable blades are used. They also allow a later adaptation of the fan to changed performance data of the ventilation system.

On the type label are registered the maximum impeller r.p.m.s. For increasing the impeller r.p.m., previous consultation of the manufacturer is indispensable.

For fans which are appropriated for the use in Ex-zone 1 the housing and the impeller are made of electrical conductive thermoplastics. The standard thermoplastic plastic fan is not equipped with shaft sealing.

The exhaust fluid is aspirated axially by the rotating impeller and transported radially to the outlet in the helicoidal housing. The applied energy is converted into mass flow and pressure increase of the exhaust fluid in the impeller.

2.2 Correct use for the intended application and field of application

The fans are suitable for exhausting aggressive, dust-free, low-aerosol gases and clean air. Explosive atmosphere can be exhausted only using fans designed specially for this application.

The permissible gas temperatures for the most frequently used plastics materials are generally with PVC: 0 °C bis 50 °C,

with PE, PE-FR (PEs) -20 °C to 60 °C,

with PP, PP-FR (PPs): 0 °C to 70 °C,

and with PVDF: -10 °C to 100 °C.

These temperatures must not be exceeded.

Depending on gas composition and impeller speed, these temperature ranges must be checked and restricted, if necessary. With particularly aggressive media, the reductions must be checked and determined individually in each case. The max. ambient temperature is 40 °C.

Sufficient cooling can be ensured regardless of the volume flow, in accordance with the above-mentioned conditions.

The fan was developed, designed and built exclusively for industrial and commercial use. Using the fan for domestic purposes is excluded.

Installation inside the explosion-hazarded area:

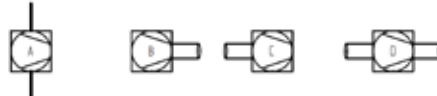
Installation inside the explosion-hazarded area is not permissible, unless the fan is provided explicitly for this purpose (see type label Chapter 4.2).

If the fan is provided for an inlet-side duct connection as part of a larger installation, the operator is obligated to prevent the penetration of foreign bodies that can cause ignition according to DIN EN 14 986, point 4.22.



Repair and maintenance works of explosion-proof fans may **only** be performed **by qualified persons in the explosion protection** by using **original spare parts**.

If the fan has an open inlet and / or outlet (Type A, B, C according to ISO 13349), the fan must have the same category inside and outside.



Types of connection

Residual risks

Although the fans have been constructed according to the newest technology as well as to the security rules and they are monitored by quality assurance (QA) system, there remains a residual risk due to the possible rupture of the impeller. This happens especially, when the conditions of use have not been complied. Therefore it is necessary to pay attention on technically perfect conditions and on the right case of application. The environment of the fans has to be secured in such a way, that in case of a damage, neither persons nor objects get harmed.



These assemblies are intended exclusively for the above purpose. Using the assemblies for different purposes than described above, or modifying them without written consent of the manufacturer are considered as non-compliant with the intended application. The manufacturer cannot be held responsible for damage resulting from such use. The risk is borne exclusively by the user. The fan may be started only after checking that all safety devices are operable and that the system in which this fan is installed complies with the EU directives.



The correct use for the intended application also implies compliance with the instructions given in the manufacturer operating manual and with the conditions for maintenance and repair.

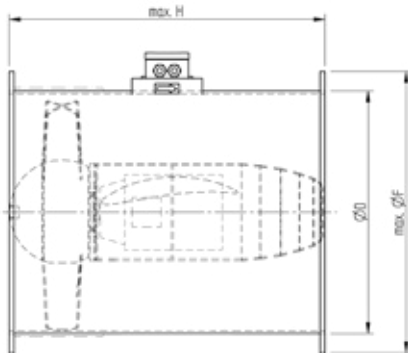
The plastic fans are not covered by the „Regulation No 327/2011 of the European Commission about the implementation of Directive 2009/125/EC (ErP Directive)“ because they are intended for the extraction of highly corrosive media.

3. Product specific data



The materials/fluids for the correct use of the fan in compliance with the intended application are procured and applied by the manufacturer. The user is responsible exclusively for correct handling of these materials/fluids and the related hazards. Information on hazards and disposal must be provided by the user. Follow the rules given in the manufacturer's safety data sheets for materials and fluids.

Technical data sheet



Type	Dimensions		
	max. Ø D	max. Ø F	max. H
HF A 200	270	460	15
HF A 250	320	500	18
HF A 315	395	600	25
HF A 400	480	660	35
HF A 500	580	650	40
HF A 630	722	830	70
HF A 800	920	1050	130
HF A 1000	1140	1400	300

Fig. 2a| Overview of the fan HF A

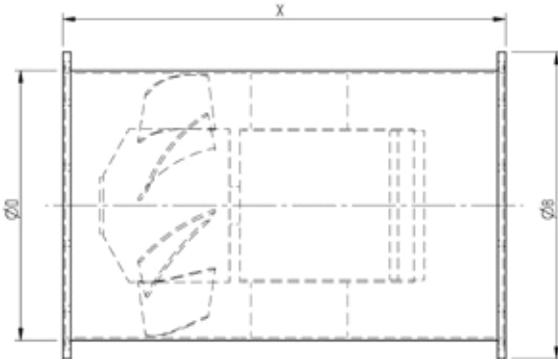


Fig. 2b| Overview of the fan AX 58

Type	Dimensions				max. kg
	$\varnothing B$	$\varnothing D$	$\varnothing K$	X	
AX 58-200	270	200	240	400	7,5
AX 58-250	320	250	290	400	9
AX 58-315	395	315	350	500	14,5
AX 58-355	435	355	400	630	
AX 58-400	480	400	445	690	
AX 58-450	530	450	497	750	
AX 58-500	580	500	551	840	
AX 58-560	660	560	628	940	52
AX 58-630	730	630	697	1050	69
AX 58-710	810	710	774	1135	125
AX 58-800	900	800	861	1105	130
AX 58-900	1000	900	958	1275	
AX 58-1000	1110	1000	1067	1500	290

Dimensions and design can be changed | Dimensions in mm

3.1 General data

Ambient temperature range

The specifications on the type label are applicable. If they are missing, the temperature range is - 20 °C to + 40 °C.

Noise level

For the value applicable to each fan, see the manufacturer internet site, or contact us via phone.

Others

More relevant data are given on the type label.

3.2 Power supply (see motor type label)

Optionally, the electric motors can be controlled continuously by means of a frequency inverter. The maximal rotation speed at the impeller (see fan type label) must not be exceeded. The ICA (instrumentation technology, control technology, automation technology) on site must give protection against overspeed according to DIN EN 60204-1.

In case of operation of several motors with a frequency inverter all-pole sinusoidal filters should be used between frequency inverter and motor.

If frequency inverters are used in the explosion-hazarded area (Zone 1) these must be installed outside the explosion-hazarded area and flameproof motors to DIN EN 60079-1 must be used.



Before connecting the fan, check the specifications on the type label and dimension the electrical control system accordingly.

With a motor power ≥ 4 kW for starting up the fan is a star-delta-connection, a soft starter or a FI regulation to use to protect the impeller and the motor bearing against premature damages.

In the case of direct involvement or frequent restart, damage or increased wear may arise by the torque forces on the impeller.

4. Safety

4.1 Signs and explanations



The information given in the operating manual is binding is marked with a „book“.



Warnings are marked with a „STOP“ sign.



Danger warnings are marked with a warning triangle.



Notes are marked with a hand symbol.



Hazards due to electric current
are marked with the symbol shown opposite.



Protective earth connection
is marked by these symbols at the connecting points.



Hazards due to explosive atmosphere
are marked with the symbol shown opposite.

4.2 Fan marking

HLU Hürner Luft- und Umwelttechnik GmbH
35325 Mücke-Alzenheim
Germany
Tel. + 49 6401 9180 - 0
www.hlu.eu

Hürner Luft- und Umwelttechnik

Typ
Type: HF A 315 - 40[°] D

Ex-Zone
Ex-Zone: [] []

Ex-Schutz Motor
Ex-Protection motor: []

AB-Nr.
Order-no.: 68200/18-001

Baujahr
Date of construction: 2018

∅ 3500 mm/s P_{max} 0,55 kW
ΔP 310 Pa n_{max} 2850 U/min
L 20 °C R_L 1,2 kg/m³ P_{max} 3000 U/min

CE [] Made in Germany

Specifications for fans without explosion protection:

Type
Order no. (AB) Construction year
Fan-specific data

Fig. 3a| Type label (normal application)

HLU Hürner Luft- und Umwelttechnik GmbH
35325 Mücke-Alzenheim
Germany
Tel. + 49 6401 9180 - 0
www.hlu.eu

Hürner Luft- und Umwelttechnik

Typ
Type: HF A 315 - 40[°] D II 3G Ex h IIB T3 Gc

Ex-Zone
Ex-Zone: 2 innen / 2 außen -20°C <= Ta <= 60°C

Ex-Schutz Motor
Ex-Protection motor: II 2G Exe II T3

AB-Nr.
Order-no.: 68200/19-001

Baujahr
Date of construction: 2019

∅ 3500 mm/s P_{max} 0,55 kW
ΔP 310 Pa n_{max} 2850 U/min
L 20 °C R_L 1,2 kg/m³ P_{max} 3000 U/min

CE [] PTB 03 ATEX D089 Made in Germany

Specifications for fans with explosion protection:

Type Denomination of explosion
 protection type
Ex-Zone Temperature
Motor explosion protection type
Order no. (AB) Construction year
Fan-specific data

Fig. 3b| Type label (explosive atmosphere)



Caution

Fans without explosion protection marking are not permissible for operation inside the explosion-hazarded atmosphere.
This applies to the environment and the exhausted fluid.

Meaning of possible device categories on the type label:

II 2G	The fan is suitable for exhaustion from zone 1 and for installation in zone 1
II 2/3G	The fan is suitable for exhaustion from zone 1 and for installation in zone 2
II 3G	The fan is suitable for exhaustion from zone 2 and for installation in zone 2
II 3/-G	The fan is suitable for exhaustion from zone 2 and must be installed outside the hazardous area

The information given in these operating instructions is only applicable to the fan type specified on the title page. The type label with the type denomination is located on the base frame or on the side panel of the fan housing. With all enquiries, make sure to specify the order confirmation no. and the type label properly to ensure correct and quick handling.

4.3 Built-in safety systems (to be implemented by the user)

The built-in safety devices must be checked at regular intervals:

d = daily, **w** = weekly, **m** = monthly, **j** = yearly.

The following methods must be used for checking:

V = visual check, **F** = functional check, **M** = measurement.

Overcurrent protection device

To prevent overheating (fire hazard) in the event of overload (e.g. due to clogging), the fan drive has to be provided with an overcurrent protection device.

Check	
Interval	Method
y	F

Thermal contact (optional)

For temperature monitoring, the fan is equipped with a thermal contact. In the event of a temperature increase, the motor switches off.

Check	
Interval	Method
y	F

PTC resistor (optional)

Don't connect the PTC resistor to the mains voltage. Avoid exceeding a max. PTC resistor test voltage of 2.5 V.

Check	
Interval	Method
y	F

Protective claddings

All mobile fan components driven by the electric motor as well as all other hazardous parts of the fan are covered by fixed, safely fastened protective claddings that can be removed only using tools.

Check	
Interval	Method
m	V

Electrical connection

The electrical connections are made using a 4-wire supply cable system, 3 phases and 1 earth conductor with three-phase motors and using a 3-wire supply cable system, 1 phase, 1 neutral wire and 1 earth conductor with alternating current motors.

Check	
Interval	Method
y	V, F, M



Deactivating the safety devices, or changing their operating principle, is strictly prohibited. .

4.4 Interfaces of the fan

An dem Ventilator befinden sich folgende Schnittstellen:

- Druckrohrleitung (Anschluss mit Flansch)
- Klemmkasten oder Wartungsschalter (Elektroinspeisung)
- Ansaugrohrleitung (Anschluss mit Flansch)

4.5 Safety measures (to be implemented by the user)

We point out that the user is under the duty to:

- instruct the operating and maintenance personnel on the **protective devices** of the fan,
- and to ensure supervision concerning compliance with the safety measures.

This operating manual must be kept for future use. The specified frequency of inspection and control measures must be met.

- The chapters related to transport, installation and mounting, maintenance, troubles/causes/troubleshooting must be understood by a **qualified person**. Work described in this chapter may be performed only by qualified personnel.

4.6 User's responsibilities



In the European Economic Area, compliance with Council Directive (89/391/EEC) and the related individual directives, especially Council Directive 89/655/EEC Concerning the Minimum Safety and Health Requirements for the Use of Work Equipment by Workers at Work in the relevant national version is mandatory.

The user must obtain the local **operating licence** and follow the relevant rules.

Additionally, the user must ensure compliance with the national legal regulations concerning

- the personnel safety (regulations relating to accident prevention)
- the safety of work equipment (protective equipment and maintenance)
- product recycling (Waste Management Law)
- material disposal (Waste Management Law)
- cleaning (cleaning agents and disposal)
- and comply with the requirements for environment protection.



To avoid the occurrence of ignition sources, the operating and maintenance personnel must be equipped properly and receive adequate instructions for realization of cleaning and maintenance work, e.g.

- to avoid the use of tools giving rise to sparking,
- strict observance of the smoking ban,
- to avoid the actuation of ignition sources (e.g. lighters, etc.).

5. General warning symbols

5.1 Hazards

Pay attention to the safety devices described in this manual and follow the safety notes.



During setup, maintenance and repair work, mind the **squeezing hazards**.



During setup, maintenance and repair work, mind the **hazard due to electric current!**



During setup, maintenance and repair work, be aware of the **risk of getting burned** due to hot components.
In the event of a failure of the forced ventilation, the drive motor presents a hazard of **getting burned**.



When doing setup, maintenance and repair work within the explosion-hazarded area, make sure that there isn't a critical gas concentration. Use a gas detector. Always avoid handling all kinds of ignition sources inside the explosion-hazarded area. Welding, cutting and polishing work may be performed only, if the related permission was granted.

5.2 Operating and hazardous areas on the fan

Hazardous area

During setup, maintenance and repair work, the overall area around the fan is a hazardous area.



During maintenance and repair work, the hazardous area extends 1 m around the fan. The flap pivoting area must be taken into account as well. Keep the area around the fan free from any objects.

5.3 Installation of spare and wear parts

We point out explicitly that spare parts and accessories not supplied by us are not checked and released for use by us either. Installation and/or use of these products can change the design properties of your fan negatively.

The manufacturer cannot be held responsible for damage resulting from the use of other than original components. In connection with the order confirmation, you will receive a data card and a spare parts list for the fan.

If you need spare parts, please, inform our sales partner:

Hürner Luft- und Umwelttechnik

Ernst-Hürner-Straße
35325 Mücke-Atzenhain
Germany

Tel. +49 6401 9180 - 0
Fax +49 6401 9180 - 142
E-Mail info@hlu.eu
www.hlu.eu

Sälzerstraße 20a
56235 Ransbach-Baumbach
Germany

Tel. +49 2623 92 95 9 - 0
Fax +49 2623 92 95 9 - 99

For Asien: Hürner Funken Malaysia Sdn. Bhd.

Lot 3, Milon Industrial Park
Jalan Minlon Utama off Jalan Taming 2
Taming Jaya, 43300 Balakong
Selangor DE
Malaysia

Tel. + 603 8961 9863
Fax + 603 8961 9862
www.huerner-funken.com.my

When ordering spare parts, please specify the following data:

- Order no. (see type label)
- Fan type
- Spare part denomination

6. Installation

6.1 Scope of supplies

The equipment delivered to the user comprises:

- Axial fan
- Operating manual
- Technical documents

For the detailed scope of equipment supplied, refer to the order confirmation.

6.2 Transport and packing

Although the fans are checked and packed carefully before shipment, damage during transport cannot be excluded.

6.3 Delivery (also with spare and substitute parts)

Inspection of incoming components:

- Check, if the consignment is complete according to the bill of delivery.

In the event of damage

- Check the consignment for damage (visual inspection).

In the event of complaints

If the consignment was damaged during transport:

- Contact the last forwarder immediately.
- Keep the packaging (for checking by the forwarder or for returning the product).

Packaging for returning the product

- If possible, use the original packaging and the original packaging material. If the original packaging and packaging material haven't been kept, use commercial packaging material. Fasten the fan to a transport pallet (it must be dimensioned appropriately for the weight).
- With any questions relating to packaging and safe transport, please, consult the manufacturer.

6.4 Intermediate storage

The fans should be stored in a room or under a shelter. With outdoor storage, protect the fan from dirt and atmospheric conditions using a canvas cover. Keep the storage temperature between 0 °C and + 40 °C.

6.5 Transport to the place of installation (at the customer's site)



Transport must be performed only by qualified personnel in compliance with the local conditions and any warning notes on the packaging material.

The fan or fan unit is transported on transport pallets to the site.



The fan or transport unit **may tip** over during transport. Pay attention to the **focus** (the focus is centred) and **weight** (see technical data).

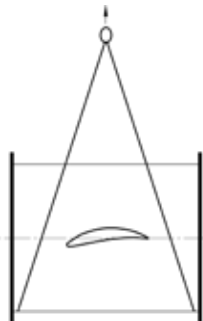
Secure the fan or the transport unit with appropriated resources before the transport.

Transport with forklift

- The forklift has to be adjusted according to the weight of the fan or the transport unit.
- Drive with the forks of the forklift between or under the arbors of the transport pallet of the fan or the transport unit.
- Make sure that the forks of the forklift are completely under the arbor (the forks have to look out at the opposite).
- Lift the fan or transport unit and transport it.

Weight see cap. 3.

Transport of the fan to the site



The fan has to be transported with appropriated resources at the designated points and it has to be secured against overturning.

Attention: The focus must be on the bottom!

The lifting and transporting of the fans can be done manually depending on the size and the weight.

Fig. 4| Transport of the fan to the site

6.6 Installation, mounting, Initial commissioning

Installation, mounting and initial commissioning of the fan are performed by qualified personnel of manufacturer or by qualified customer personnel that must have been trained adequately for this work.

- The constructional arrangement of the fan must ensure that operational underpressure conditions are present at the shaft passage.
- The installation of the fans and their components are based on the on-site installation plan.
- The fan must not be operated in non-installed condition. The impeller must be free to move without any impediment at all times.
- Mount the (on-site) pipe.
- The fan is equipped with a terminal box (or maintenance switch) for connecting to the mains supply. The motor enclosure must be closed using a sealing joint certified according to the EN IEC 60079-0 and EN IEC 60079-1 standards. Users will have to connect the cable terminals using one of the protection types specified in standard EN 60079-0. The energy supply can be cut off using an onsite maintenance switch (if it is not already installed at the fan).
- Check before the first operation that the turning direction is correct (direction arrow on the fan housing) and that the max. speed is not exceeded (see type label).
- If there is danger of foreign parts falling into the fan or being aspirated, the connected pipe upstream and downstream of the fan must be provided with a protective grid (min. IP20 to EN 60529).
- The motors are designed for a maximum ambient temperature of 40 °C
- The inside of the fan and of upstream and downstream channels and units must be kept free from foreign bodies.
- See point 3.2
- Ensure that connected lines do not carry loads which lead to a distortion of the fan housing



The fan may be connected to the supply voltage and switched on only, when the pipe (on the inlet and outlet side) has been connected completely.

Installation must be performed according to the connecting diagram in the motor operating instructions only by adequately trained and qualified personnel.

The following conditions must be met:

- Compliance with the national regulations relating to the public utilities.
- The supply voltage at the place of installation and the mains frequency must correspond to the values specified on the motor type label.
- The power supply cable must be protected against damage and dimensioned adequately for the power rating.
- Set the thermal overcurrent relay to the nominal current specified on the motor type label and follow the instructions given in the motor operating instructions. We reserve ourselves the right to cancel the motor warranty in the event of failure to comply with this protective measure.



Make sure that the **rotating direction** is correct. To check the rotating direction, switch on the motor shortly and compare the impeller rotating direction with the arrow marked on the housing. If the rotating direction is wrong, change the motor polarity in compliance with the safety regulations. After reaching the operating speed, measure the power consumption immediately and compare it to the motor current specified on the type label.



24 h after initial commissioning: Check the tightness of the housing and the quiet run of the fan and re-tighten the screws.



Caution

The fan pipe connections may be performed only using flexible couplings (compensators)

6.7 Operating modes

The fan is switched on and off via an on-site operating unit provided by the user, or operated via an on-site supervisory system. It is designed for continuous operation.

7. Operation



The fan may be operated only by specialized personnel qualified and trained for operation.

8. Maintenance / Cleaning



The chapter on „**Maintenance / Cleaning**“ is intended only for qualified personnel. Maintenance, cleaning and repair work may be performed only by qualified personnel.

Qualified person

A person who is able to assess the work he/she is in charge of and aware of potential hazards due to his/her professional training, skills and experience as well as his/her knowledge of the relevant standards.

Definition according to EN 60204-1.

To ensure smooth operation of the fan, cleaning and maintenance of the fan at regular intervals is required.

During operation, the fan is subject to vibration susceptible of releasing screwed and clamping connections. To prevent damage, check the fan for loosened connections at regular intervals (recommended interval with single-shift operation: 3 months).



For information on maintenance/cleaning of individual components purchased from other manufacturers (e.g. electric motor), refer to the corresponding manufacturer operating instructions.



When switching off the supply voltage because of cleaning, maintenance and repair work, measures to prevent the supply voltage from being switched on accidentally must be taken by the user (locking the main or maintenance switch using a padlock).



During maintenance and repair work, mind all rotating and mobile parts. **Risk of entanglement!** Tight clothing must be worn in the danger area.



During maintenance and repair work, mind the **squeezing hazards**.



When doing maintenance and repair work, mind the **hazards due to electric current**.



Cleaning, maintenance and repair work may be done only at non-explosive atmosphere.
For reasons of safety, only tools made of **non-sparking material** may be used when doing this work.



The work intervals specified below are intended for single-shift operation (8 hours a day; 22 days a month; 12 months a year).

d	= daily	y	= yearly
w	= weekly	R	= cleaning required when opening
m	= monthly	LT	= lifetime
$\frac{1}{2}$ y	= half-yearly	MO	= manufacturer operating manual

8.1 Cleaning



Don't use any sharp objects or tools for cleaning. Only objects that are explicitly provided for this purpose are suitable.

Cleaning (Depending to the degree of contamination the cleaning intervals must be adapted)	Interval
Keep the fan and the area around the fan free from deposits on the outside regularly (e.g. dust, exhaust fluids).	w
Check the impeller regularly for contaminations and cakings and clean it, if necessary. Caution Contaminations on the impeller can cause imbalance of the fan. Depending on the intensity, this can even cause the destruction of the fan.	½ y
Make sure that the cooling fins of the electric motor are not clogged by pollution in order to avoid overheating, if necessary clean them.	m



Caution

When doing cleaning work, wear protective equipment in compliance with the operational regulations for occupational health and safety (e.g. protective gloves).

8.2 Lubrication

The bearings of the built-in electric motors are provided with a grease filling calculated for a service life of 10 000 – 20 000 operating hours.

8.3 Inspection interval / Function checking

	Interval with single-shift operation					
	d	w	m	½ y	1 y	MO
Superordinate facility for connecting the supply voltage				x		
Settings of the on-site protective devices						x
Fan motor function checking						x

8.4 Vibrations

International standards for the balancing quality and vibration values for industrial fans are defined in the standard ISO 14694:2003. The vibrations are measured radially on the shaft bearing of the drive motor. If a measurement is not possible directly on the motor, it is measured radially at the next point that has a mechanical connection to the motor. The following table shows the fan application categories for maximum permissible vibration.

Vibration values according to ISO 14694						
Standard group ISO 14694	Motor power [kW]	Min. balancing quality	Limit values			
			At manufacturer Average values; maximum values in brackets		In operation Average values; maximum values in brackets	
			Fixed mounted [mm/s]	Flexibly mounted [mm/s]	Fixed mounted [mm/s]	Flexibly mounted [mm/s]
BV-2	>0.15<3.7	G16	3.5 (5.1)	5.6 (7.6)	Start-up 5.6 (7.6) Alarm 9.0 (12.2) Slow-down 10 (14)	Start-up 9.0 (12.7) Alarm 14.0 (19.1) Slow-down 16 (21)
BV-3	>=3.7<37	G6.3	2.8 (3.8)	3.5 (5.1)	Start-up 4.5 (6.4) Alarm 7.1 (10.2) Slow-down 9.0 (12.7)	Start-up 6.3 (8.8) Alarm 11.8 (16.5) Slow-down 12.5 (17.8)
BV-4	>=37<300	G2.5	1.8 (2.5)	2.8 (3.8)	Start-up 2.8 (4.1) Alarm 4.5 (6.4) Slow-down 7.1 (10.2)	Start-up 4.5 (6.4) Alarm 7.1 (10.2) Slow-down 11.2 (15.2)

8.5 Tightening torques for bolt connections

On the basis of VDI 2230 the following tightening torques are recommended for bolts of strength class 8.8:

Nominal diameter [mm]	Tightening torques [Nm]
M4	3,3
M5	6,5
M6	11,3
M8	27,3
M10	54

Nominal diameter [mm]	Tightening torques [Nm]
M12	93
M16	230
M20	464
M24	798

8.6 General hints for maintenance

Correct maintenance is decisive for the fan safety of operation and lifetime. Operational disorders due to insufficient or improper maintenance can cause high repair costs and long downtimes. For this reason, regular maintenance is indispensable.



Before starting maintenance and repair work (especially when the fan must be opened), compliance with the switch-off procedures is essential.

Checks	Interval
The inspection intervals must be shortened at strong degree of pollution, high ambient temperatures and frequent start / many load changes.	
Check, if the fan is installed correctly and safely and pay attention to possible vibrations during operation. If necessary, re-tighten the screw connections.	m
Check the connections of the pipe on the inlet and outlet side for tightness.	m
Check the housing for stress cracks and quiet run. Check the impeller for deformations, wear and cakings.	y

8.7 Checks

After completing work, please, check:

- The completeness of performed work,
- Unless there is reason to complain, the fan can be taken into operation



After checking and replacing the wear parts, please check, if all safety devices are fully operable.

9. Troubles, causes and measures



The facts and information relating to „Troubles, cause and measures“ described in this operating manual are formulated in a way that they are understood by persons with a professional training in the fields of

- electrics / electronics
- mechanics / maintenance.

Appropriate tools and test equipment must be made available to this personnel. Before any maintenance and repair work, the fan must be de-energized and protected against re-activation. Unless the specified measures are successful, please, contact the manufacturer.

Störung	Mögliche Ursache	Behebung
Ventilator läuft unruhig (starke Vibrationen)	Unwucht des Laufrades	Auswuchten erforderlich, Rücksprache mit Hersteller
	Ablagerungen am Laufrad	Laufrad reinigen
	Beschädigung am Laufrad	Rücksprache mit Hersteller
Motorlagergeräusche	Lagerschaden am Motor	Lager wechseln oder Motor austauschen, Rücksprache mit Hersteller oder Motorlieferanten
	Falsche Drehrichtung des Laufrades	Drehrichtung umkehren
Ventilatorleistung zu gering	Drosseleinrichtungen sind nicht oder nur teilweise geöffnet	Drosseleinrichtungen überprüfen
	Saug- oder Druckleitungswiderstände zu groß	Widerstände verkleinern, Ventilatorleistung vergrößern, Rücksprache mit Motor austauschen, Rücksprache mit Hersteller oder Motorlieferanten
Stromaufnahme des Motors zu hoch	Motorwicklung defekt	Rücksprache mit Hersteller oder Motorlieferanten
	Falsche Drehrichtung des Laufrades	Drehrichtung umkehren
	Motorschutzschalter nicht richtig eingestellt	Motorschutzschalter richtig einstellen
Störung	Mögliche Ursache	Behebung
Motor wird vom Motorschutzschalter abgeschaltet	Motorschutzschalter nicht richtig eingestellt	Motorschutzschalter richtig einstellen
	Wicklung des Motors defekt	Motor austauschen, Rücksprache mit Hersteller oder Motorlieferanten
	Laufrad blockiert	Laufrad überprüfen
Schleifgeräusche	Motorwicklung defekt	Rücksprache mit Hersteller
	Unwucht des Laufrades	Auswuchten erforderlich, Rücksprache mit Hersteller
Plötzlicher Leistungsabfall	Fremdkörper zwischen Laufrad und Gehäuse	Fremdkörper entfernen
	Saug- oder Druckleitung undicht	Rohrleitung überprüfen
	Anschlussmanschette defekt	Manschette auswechseln

10. Emergency

In case of emergency, switch off the main switch or withdraw the power supply connector.

11. Dismantling / Disposal

Dismounting

Dismounting may be done only by qualified personnel.

Before starting dismantling work, make sure that the switch-off procedures are followed.

Disposal

The fan is made mainly of steel and plastics (except the electrical equipment) and must be discarded in compliance with the applicable local environmental regulations.



For discarding the cleaning agents, follow the local regulations and the information given in the manufacturer safety data sheets.

Contaminated cleaning tools (brushes, clothes, etc.) must be discarded in compliance with the manufacturer specifications as well.

Depending on the fan application, the housing and the impeller must be considered as special waste and discarded accordingly.

Injection moulded or sintered housings are provided with recycling signs indicating which type of plastic material was used.

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