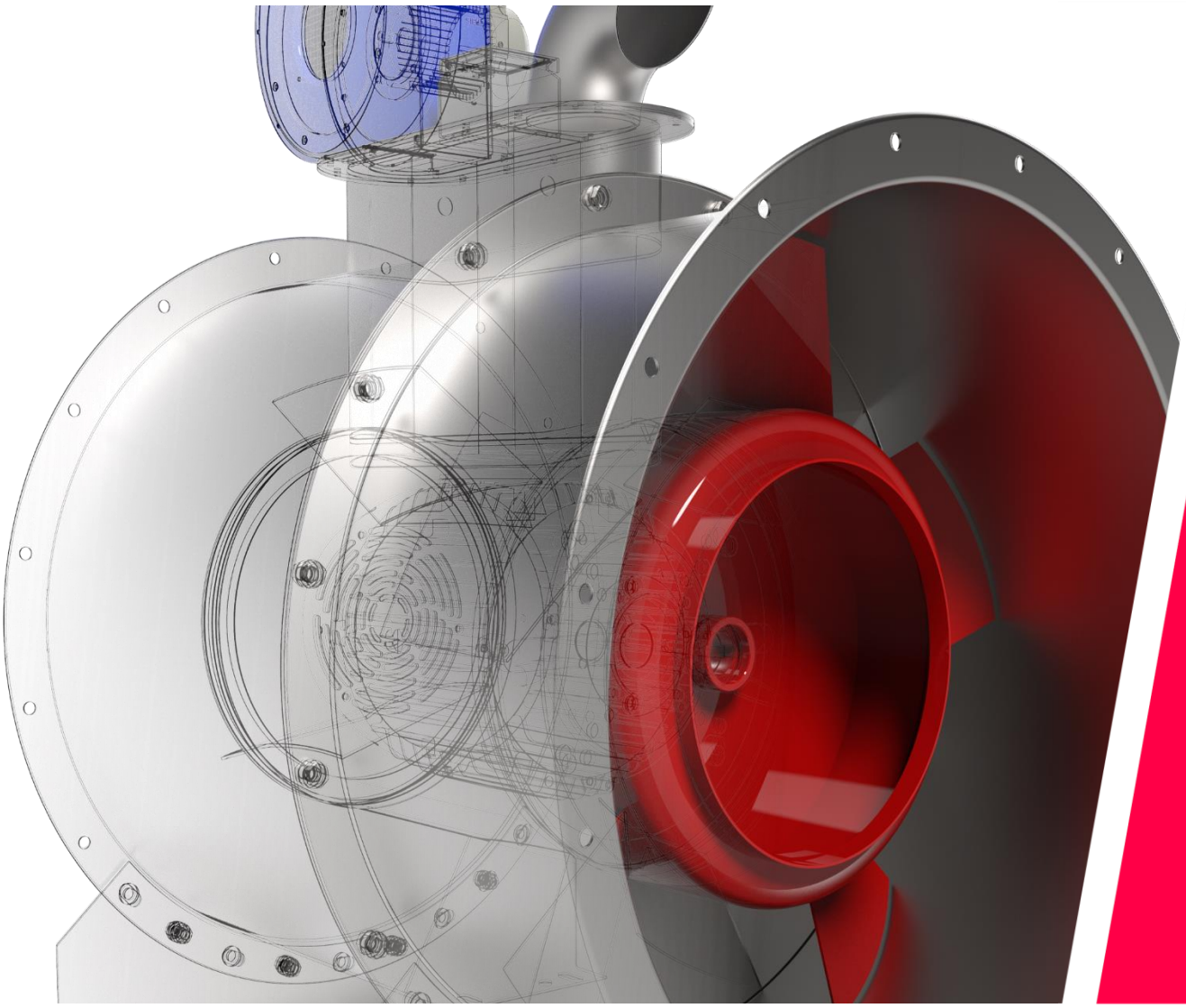
HVVENT
THE FAN FACTORY



BVHA F600 AXIAL VENTILATOR

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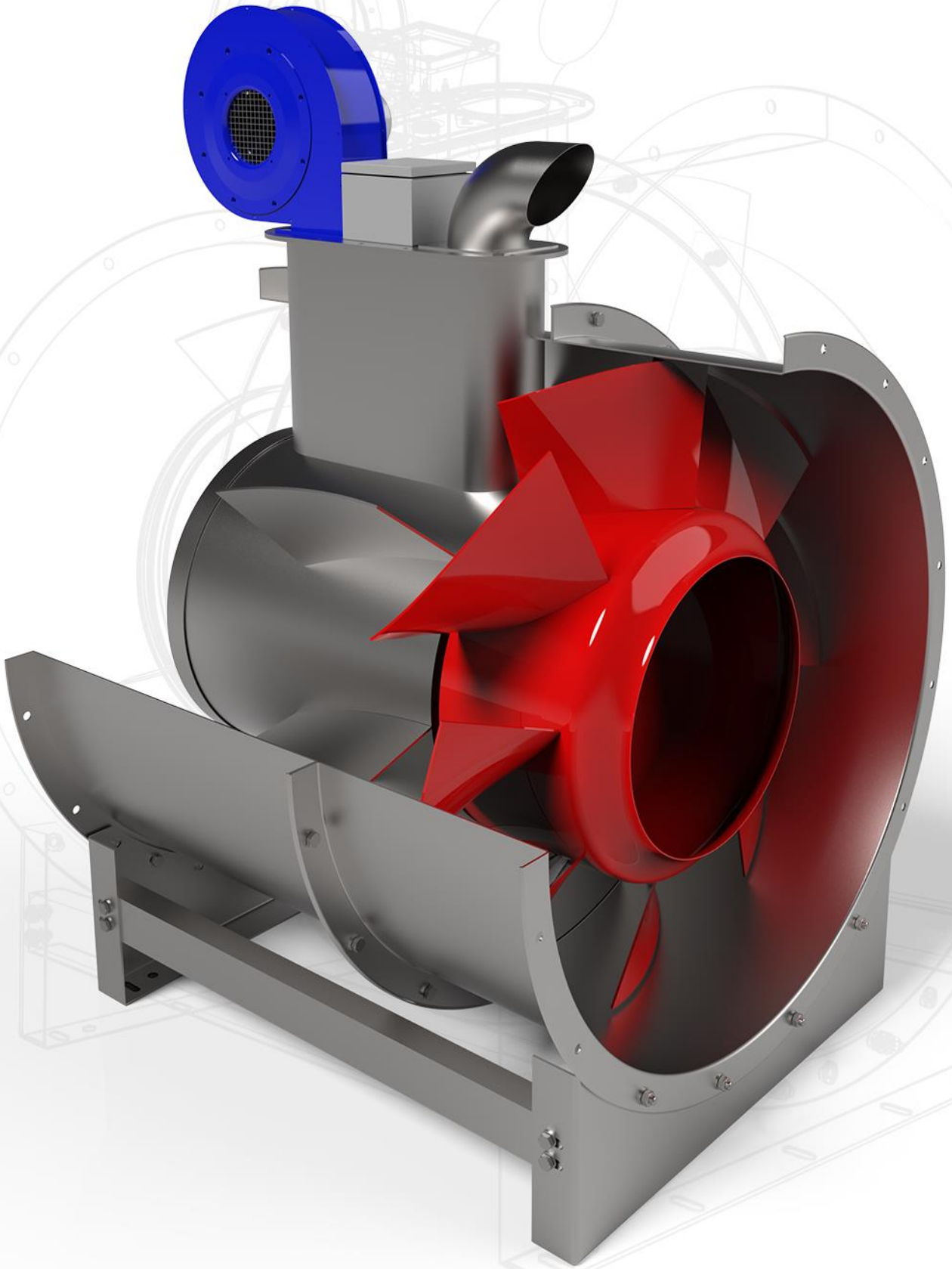
PRODUCT DESCRIPTION



1.1 Type designation

BVHA 800-8-23°-2 600°C/60 min.

BVHA	=	Smoke extraction fan
800	=	Fan factory size/front diameter
8	=	Impeller blade number
23°	=	Impeller Blade angle
2	=	Motor pole number
600°C/60min	=	F600 (Class according to EN 12101-3; 2006-4)

1.2 Intended use

The BVHA heat-resistant smoke extraction axial fans were developed for use in modern ventilation and air conditioning systems and for safe emergency ventilation. They are primarily blown into a pipeline or diffuser, but they are also suitable for transporting air from open space to open space.

They can also be used as roof fans.

The BVHAD fans can operate in smoke extraction mode at the specified temperature and duration.:

F Class	Temperature [°C]	Period [perc]
F200	200	120
F300	300	60
F400	400	120
Not classified	300	120
F600	600	60
Not classified	600	120

If the fan has been operating in smoke extraction mode, its service life has expired, regardless of the duration of operation, and it must be replaced!

The fans - under normal conditions (from -20 °C to +40 °C) - are also suitable for continuous operation. In this case, in addition to performing maintenance work, the lifetime of the fans is in principle unlimited. The fans were tested and approved for normal and smoke extraction mode. A certain degree of deviation from the previously specified temperature interval is possible, ask for the manufacturer's opinion on this..

The regulations of the applying countries provide for the possibility of continuous operation with the emergency function (smoke extraction), which may differ, therefore the regulations of the applying country are the guiding principles, as well as the local regulations. The product manuals, descriptions, and datasheets issued for the fans contain the basic condition.

Terms of use:

Enviromental limitations:

- Temperature:
  - *emergency: maximum 600°C (F600 – 60 minutes; Unclassified – 120 minutes*)
  - *continuous operation: -20°C - +40°*C
- Pressure: Atmospheric pressure at all times
- Relative humidity: max. 95%
- It can be used under the conditions described in the equipment certificate for application based on the provisions of the regionally valid fire protection regulations
- BVHA F600 type axial fans are suitable for transporting the following media:
  - clean air; max. 1,2 kg/m3
  - The fan must not be used to ventilate air spaces classified in zones Z0, Z1, Z2, Z20, Z21, Z22, or to transport such classified media!
    - In the heat and smoke extraction function, for gases with a temperature corresponding to the class for a specified period of time
      Environments with temperatures between -20 +40 °C
  - for CO ventilation of underground garages

A certain degree of deviation from the above temperature ranges is possible, ask for the manufacturer's opinion on this

Installation conditions:

- The fans are either installed in a pipeline or in an arrangement without a pipeline or air duct connection, set as a roof fan on a plinth element.
- The fans can be installed with a horizontal or vertical axis, using a suitable accessory.
- Pipeline or in the case of operation without an air duct connection - in order to prevent access to the rotating parts - the use of a protective grid is mandatory!
- The fans cannot be operated without the necessary safety devices.
- Foreign objects must be prevented from entering the device.
- Adequate air inflow and outflow conditions must be ensured during installation.
- The BVHA F600 fan and the unclassified BVHA 600°C fan can be installed with an installed and prescribed cooling fan only.
- When placing the cooling fan and the connecting cable of the cooling fan, it must be taken into account whether it is placed inside or outside the fire section.

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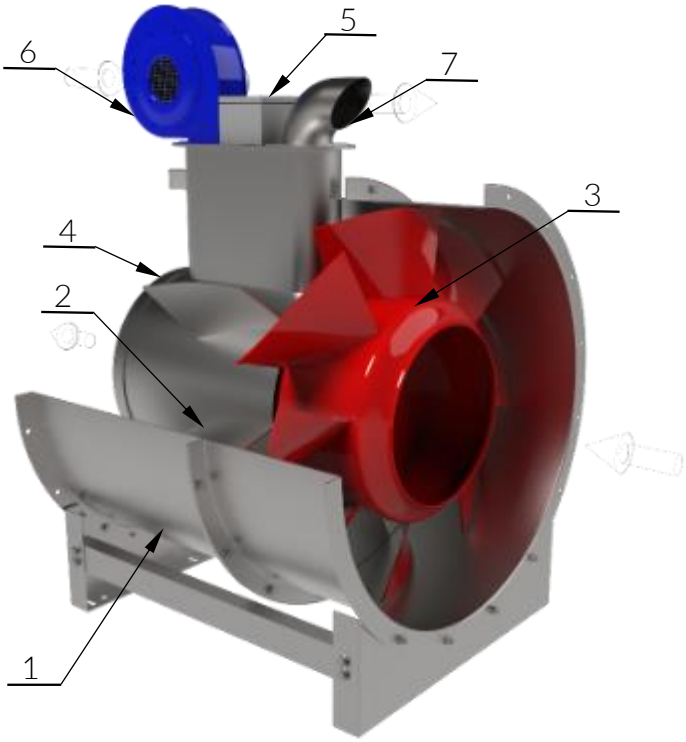
1.3 Structure

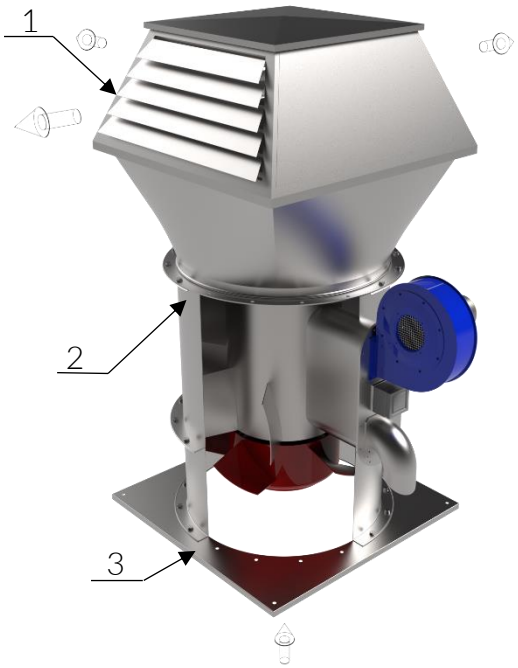
The axial fan consists of the following main parts:

1) Fan housing
2) Guide vane
3) Ventilator Impeller
4) Electric motor heat protection casing
5) Terminal box
6) Cooling fan
7) Exhaust piece

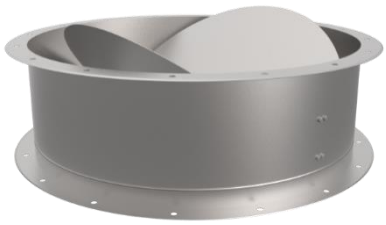


The roof fan consists of the following main parts:

1) Raoof Cap (DL-F600 type)
2) Axial fan
3) Base plate



1.4 Optional accessories



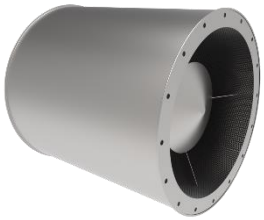
Automatic shut-off damper
for vertical use

Automatic shut-off damper
for horizontal use

Flexible Canvas

Protection grill

Motorized control damper
with connection plate



Tube silencer

Diffuser

Inlet cone

45° intake or exhaust
idom with protective grid

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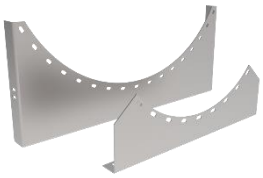
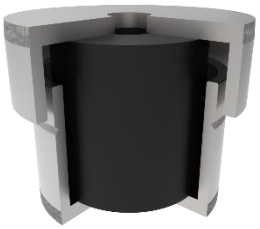
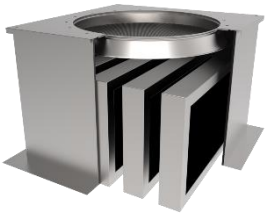


Mounting Feet

Bracket for vertical installation



Heat-resistant vibration absorber



Roof silencer socket

Thermally insulated Roof Socket

Insert Plate

Lamellar Roof Cup
(DL-F600 - for exhaust only)

1.5 General description

The BVHA F600 fans are solidly constructed, welded devices. Its surface protection can be galvanized or painted.

The fan housing is a welded steel plate, which is an integral part of the rear deflector blade, which was included in the construction to optimize air flow. The central part of the guide vane is also the engine mount. The flanges are flanged from the housing material.

The edge of the house is equipped with a standard hole distribution, which can be used to install it in a pipeline, or in the case of horizontal installation, it can be equipped with mounting feet. In the case of vertical installation, barckets are placed on the casing of the fan housing, and when used as a roof fan, the edge of the fan housing is set up on the base plate.

The central part of the guide vane is the engine holder capsule, which houses the engine, which is completely covered by the capsule. The internal surface of the capsule, on the engine side, is lined with suitable thermal insulation materials. The internal air space of the capsule is connected to the casing of the fan housing by a split pipe (chimney). Fresh cooling air enters the capsule on one side of the split connecting pipe, and warmed cooling air leaves on the other side. The split pipe extends beyond the casing of the house and ends at the edge. The terminal box is installed on the edge.

The axial impeller is attached directly to the motor shaft (latch and locking screw). The impeller consists of a steel hub and steel blades welded to the hub, the angle of which is fixed and cannot be changed. The impeller is balanced both statically and dynamically. The impeller can be made with a normal or increased blade gap (gap between the impeller blade and the fan housing), which allows the fan to be set up in different places.

The electric motor is an asynchronous, alternating current, peripheral motor with at least IP 55 protection.The terminal box is placed outside the fan housing, in which there is a ceramic terminal block, for which only metal glands can be used. The motor and terminal are wired with a heat-resistant cable.

The cooling fan is either mounted directly on the rim of the "chimney" or connected to the rim via a Promat channel. It depends on where the fan is placed. (Point 3.1)

1.6 Functional description

Through the rotating impeller, the fan sucks in air from the suction side pipeline, which it transports in the axial direction to the discharge side through the free circular cross section between the capsule and the fan housing through the guide vane. The motor is cooled by a separate cooling fan.

CAUTION: For the BVHA F600 fan, only the cooling fan supplied by the manufacturer can be used, the type of which is indicated on the fan's data plate, but its suitability must be verified on the basis of point 1.8 (discharge side pipeline resistance)!

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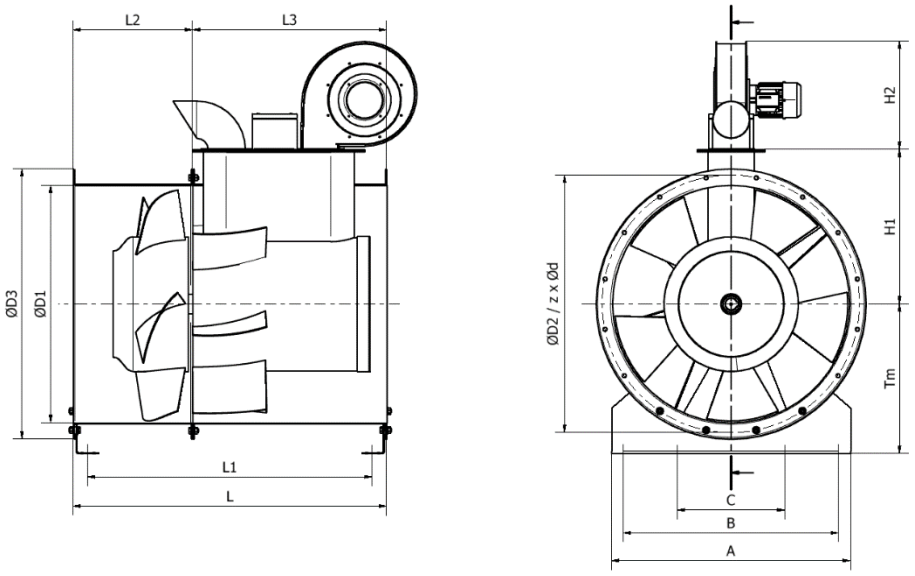
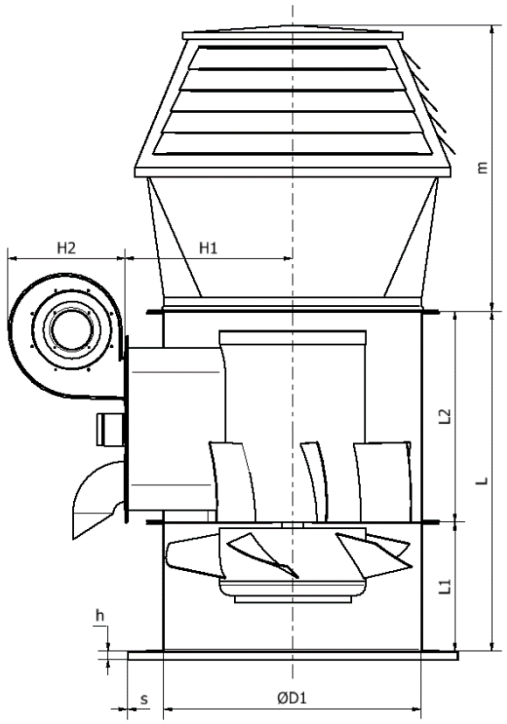
1.7 Size range

BVHA F600 type size range:



Vent.	Motor	ØD1 [mm]	ØD2 [mm]	ØD3 [mm]	L [mm]	L1 [mm]	L2 [mm]	L3 [mm]	A [mm]	B [mm]	C [mm]	z [db]	Ød [mm]	Tm [mm]	H1 [mm]
500	up to 160	500	541	580	935	600	675	260	500	440	220	12	12	315	335
560	up to 160	557	629	667	875	566	645	230	560	500	250	16	14	360	365
630	up to 160	634	698	744	875	556	645	230	630	560	280	16	14	405	402
710	up to 160	710	775	820	1050	560	400	650	710	640	320	16	14	450	441
800	up to 160	794	861	904	1050	554	400	650	800	720	360	16	14	500	482
900	up to 160	907	958	1017	1050	553	400	650	900	820	410	16	14	580	540
	from 180				1300	803		900							
1000	up to 160	1001	1067	1111	1050	553	400	650	865	780	390	16	14	635	585
	from 180				1300	803		900							
1120	up to 160	1114	1200	1320	1035	540	390	645	1024	940	470	16	14	775	645
	from 180				1285	790		895							
1250	up to 160	1256	1337	1376	1035	540	390	645	1228	1120	560	24	14	815	713
	from 180				1285	790		895							
1400	up to 160	1401	1491	1521	1035	538	390	645	1367	1260	630	24	14	894	791
	180-tól				1285	788		895							

BVHAD F600 type size range:



Vent.	Motor	ØD1 [mm]	L [mm]	L1 [mm]	L2 [mm]	s [mm]	h [mm]	m [mm]	H1 [mm]
500	up to 160	500	935	260	675	12	315	780	335
560	up to 160	557	875	230	645	14	360	840	365
630	up to 160	634	875	230	645	14	405	855	402
710	up to 160	710	1050	650	400	14	450	875	441
800	up to 160	794	1050	650	400	14	500	910	482
900	up to 160	907	1050	650	400	14	580	940	540
	up to 180		1300	900					
1000	up to 160	1001	1050	650	400	14	635	985	585
	from 180		1300	900					
1120	up to 160	1114	1035	645	390	14	775	1150	645
	from 180		1285	895					
1250	up to 160	1256	1035	645	390	14	815	1470	713
	from 180		1285	895					
1400	up to 160	1401	1035	645	390	14	894	1600	791
	from 180		1285	895					

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1.8 Cooling fan assortment

Before installing and operating the delivered fan, you must make sure, knowing the cooling air supply (PROMAT channel) to be used during installation, whether the delivered cooling fan is suitable for operation, taking into account the following:

Minimum cooling air volume for F600 fans per size:

Ø500-1120 550m^3/h

Ø1250 640m^3/h

Ø1400 690m^3/h

For these air volumes min. pressure:

$$dP_{cooling\ fan} = 610\ Pa + A + B$$

, where:

- *A* = aerodynamic resistance (Pa) of the PROMAT channel - if there is one. See PROMAT catalog. If there is no PROMAT cooling air channel, then *A=0 Pa*
- *B* = the part of the pressure created by the F600 fan on the trailing side of the fan (Pa). If the F600 fan blows outdoors on the pressure side, then B=0 Pa

The selection of cooling fans must be checked based on the table below before installation:

Maximum pressure values of cooling fans depending on the nominal size of the BVHA_F600			
Cooling fan type	1. Ø500-1120 (550 m3/h)	2. Ø1250 (640 m3/h)	3. Ø1400 (690 m3/h)
KG1	610 Pa	-	-
KG2	900 Pa	730 Pa	-
KG5	1320 Pa	1210 Pa	1130 Pa
KG7	1710 Pa	1600 Pa	1500 Pa
KG9	2260 Pa	2250 Pa	2210 Pa
KG10	3000 Pa	2850 Pa	2800 Pa

Example 1. - Selection of a cooling fan for the pressure on the discharge side:

The pressure increase of the BVHA_F600-1000 type fan is 1000 Pa, of which 700 Pa falls on the suction side and 300 Pa on the pressure side.

Calculation:

- DN = 1000 mm
- B = 300 Pa

Determination of the minimum required pressure:

$$dP_{cooling\ fan} = 610\ Pa + A + B = 610\ Pa + 300\ Pa = \mathbf{910\ Pa}$$

The cooling fans are selected based on the table above. Since the nominal diameter of the fan is 1000 mm, we take column number 1 of the table, and here we read the type of cooling fan corresponding to a value greater than 910 Pa. Based on the calculation, types KG5, KG7, KG9 and KG10 can achieve sufficient pressure. When choosing a cooling fan, it is advisable to always choose the smallest type.

The cooling fan type to be selected: **KG5.**

Example 2. – Checking the delivered cooling fan for the pressure on the discharge side and the maximum pressure that can be used on the PROMAT cooling air duct

A BVHA_F600-1000 type fan was delivered with a KG5 type cooling fan. What pressure is the cooling fan suitable for - that is, what is the maximum A+B?

Calculation:

The KG5 cooling fan max. pressure increase for Ø1000: **1320 Pa**

$$dP_{cooling\ fan} = 610\ Pa + A + B \rightarrow dP_{cooling\ fan} - 610\ Pa = A + B$$

$$A + B = 1320\ Pa - 610\ Pa = \mathbf{710\ Pa}$$

So, if there is no PROMAT cooling channel installed, the above cooling fan can be used if there is a maximum pressure drop of 710 Pa on the pressure side of the BVHA_F600.

And if a PROMAT cooling channel is installed - and its resistance is 300 Pa - then the above cooling fan can be used if there is a maximum pressure drop of 710 Pa - 300 Pa = 410 Pa on the pressure side of the BVHA_F600.

In the case of roof fans - since these are the last elements of the air duct network and there is definitely no PROMAT cooling duct installed, because they are in the open - from Ø500 to Ø1120, the KG1 cooling fan is always installed. The type of cooling fan used is always KG2 for Ø1250, and always KG5 for Ø1400.

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Performance data and installation height values of applicable cooling fans:

Cooling fan type	Cooling fan performance [kW]	V [m^3/h]	$dP_{max.}$ [Pa]	V [m^3/h]	dP_{max} [Pa]	V [m^3/h]	dP_{max} [Pa]	H2 [mm]
KG1	0,18	550	610	640	-	690	-	361
KG2	0,18		900		730		-	346
KG5	0,37		1320		1210		1130	385
KG7	0,55		1710		1600		1500	385
KG9	0,75		2260		2250		2210	431
KG10	0,75		3000		2850		2800	590

BVHA F600 different diameters for selection of cooling fans:

Cooling fan type	Fan diameters for selection of cooling fan									
	500	560	630	710	800	900	1000	1120	1250	1400
KG1	x	x	x	x	x	x	x	x		
KG2	x	x	x	x	x	x	x	x	x	
KG5	x	x	x	x	x	x	x	x	x	x
KG7	x	x	x	x	x	x	x	x	x	x
KG9	x	x	x	x	x	x	x	x	x	x
KG10	x	x	x	x	x	x	x	x	x	x

About our company:

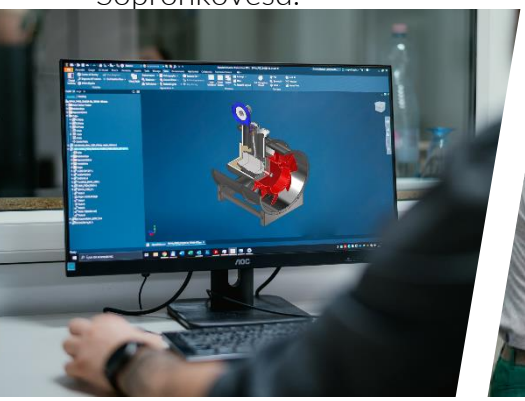
The name of Hungaro-Ventilator Ltd. is now completely connected to quality and expertise.

Our company was founded in 2005, now has 50 employees and manufactures smoke extraction and emergency ventilation equipments in Sopronköves on 6.500 m^2 production area.

We have more, than 15 years of experience and we are one of the largest Hungarian manufacturing and exporting companies in the sector.

Beside of Hungary, the additional export destinations are in EU, and we have several partners outside the EU as well.

The eqiupments manufactured by the company, - with exception of electric motors, - are entirely self-developed. Year to year thousands of fans and pressure relief dampers were manufactured is our factory in Sopronkövesd.



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GENERAL SAFETY REGULATIONS

2.1 Operating regulations

BVHA F600 type fans are manufactured in accordance with the requirements of today's technical standards, thanks to which the fans guarantee a high degree of operational safety. However, this operational safety can only be achieved in operational practice by following the instructions in the operating instructions. Plan and carry out the installation, operation and maintenance of the devices taking these regulations into account.

It is especially important that:

- The fans should only be installed in accordance with the regulations (see the product description chapter).
- The fans should only be operated in perfect, functional condition, and the safety devices should be regularly checked for their functionality.
- The operating instructions must be permanently available in a legible state in their entirety at the place of operation of the fan.
- Only properly trained and authorized personnel may operate and maintain the machines.
- The operating personnel must be familiar with the operating instructions - and the safety regulations contained therein.
- All safety and warning instructions on the fans must be clearly visible and legible.

2.2 Explanation of safety signs

Warning — Risk of injury to life and health.

Danger of life — Danger of electric shock. Ignoring this instruction can have serious - even fatal - consequences.

Advices — User suggestions, useful advice. Ignoring them can cause significant material and personal damage, or the desired technical parameters cannot be achieved.

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2.3 Basic safety measures

Axial fans and roof fans manufactured by Hungaro-Ventilátor Kft. are made according to high technical requirements. Numerous material, functional and quality tests guarantee the correct operation and long service life of the devices. Nevertheless, the operation of the machines can be dangerous if they are not used by qualified and competent people.

- The fans may only be operated when installed - connected on the air side. (with air duct connection or using a protective grid)

- Installation, electrical connection and maintenance may only be carried out by qualified personnel.
- Operate the fan only according to the regulations, within the specified power limits (see type plate) and with a permitted medium.

2.4 Dangerous operation

Due to the rotating impeller and the high air speed, the following must be observed:

- Do not hold the rotating impeller; do not attempt to apply the brakes manually during maintenance work.
- In the case of open suction operation, the operating personnel should always wear closed clothing, because the high air flow can suck in loose clothing and light items of clothing.
- Any larger objects (tools, etc.) that get into the device can brake or destroy the impeller, therefore a protective grid is required in open suction or open-air operation.

2.5 Occupational health and safety regulations

When moving, installing, operating and maintaining the fans and their accessories, the general and special occupational safety regulations must be strictly observed, especially when working at heights! (For example: Roof fan)

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INSTALLATION REQUIREMENTS

3.1 Where can the ventilator be placed

The BVHA F600 type fan can be installed in the following ways, taking into account the named factors:

- The fan can be placed inside the fire section to be extracted without external insulation. (fan with normal blade spacing) In this case, the cooling fan must be placed outside the fire section. The channel connecting the cooling fan to the "chimney" can be made of PROMAT sheet or an equivalent material ("calcium silicate").
- The fan can be placed in a well-ventilated room. The concept of a well-ventilated room is defined in DIN 4102; It is formulated in standard No. Teil 4-1994/03. In the case of such a location, the fan housing must be thermally insulated from the outside, and the air duct and its fittings (e.g.: vibration damping canvas) must also be thermally insulated until the exit to the open space. The same standard provides for the quality of the insulation and the permissible external surface temperature of the insulation. (in the case of insulation, a fan with normal blade spacing can be used). In this case, the cooling fan can be placed directly on the fan housing (on the edge of the chimney).
- The fan can also be placed outdoors. In this case, the fan does not need to be insulated, but it must be safely protected from precipitation. (if installed without insulation, a fan with an increased blade gap is used) The cooling fan can also be placed directly on the edge of the cooling air pipe in such an installation.
- *IMPORTANT: The fan can only be placed where the blade gap allows from the previous placement options! The normal or increased blade gap is indicated on the fan nameplate! When ordering the fan, it must always be clarified what fan blade spacing the customer needs!*

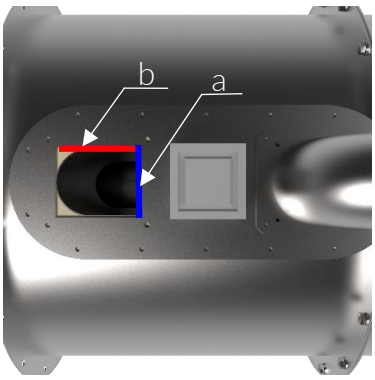
3.2 Fastening the cooling fan

As described above, the cooling fan is installed either directly on the fan "chimney" or on the PROMAT channel connected to the "chimney".

If the cooling fan is placed directly on the chimney, two cases are possible:

- The axis of the cooling fan is perpendicular to the axis of the fan.
- The axis of the cooling fan is parallel to the axis of the fan.

If the pressure nozzle of the fan has a square cross-section (types KG1 and KG10), the following must be observed during installation:



In the first case (the axis of the cooling fan is perpendicular to the axis of the fan), the edge marked "c" of the pressure nozzle of the cooling fan must coincide with the edge of the fan chimney marked "a"!

In the second case (the axis of the cooling fan is parallel to the axis of the fan), the edge marked "c" of the pressure nozzle of the cooling fan must coincide with the edge of the fan chimney marked "b"!

3.3 Ventilator mounting

The fan can be installed with both a horizontal and vertical axis. For horizontal installation, the fan must be mounted on legs, for vertical installation, on appliance feet, or set on the edge of the fan. A heat-resistant spring can be used for the support points. In the case of dual-function operation, spring support is required, but not in the case of single-function operation.

Attention: The installation height of the fan must take into account the subsidence due to the softening of the kick. (May occur when smoke extraction is in operation!)

3.4 Suction and pressure side connection

If the fan is installed in a pipeline, the use of a vibration damper is recommended. In the case of dual-function mode, the use of a vibration damper is required. In case of single-function mode - if the possibility of thermal expansion is not ensured by another device - it is also necessary to use a vibration damper. A silencer can be installed on both sides of the fan. In this case, the muffler is attached to the rim of the fan housing with screws. In the case of suspended installation, the silencer must also be provided with a safety attachment, which will hold the device in the event of failure of the original, intended installation, thereby preventing accidents or material damage. The original intended grip must also meet the heat resistance requirements for the application class. The safety fastening can be a fastening rope or a fastening chain, which must be fixed regardless of the original attachment points (the original attachment points must also be heat-resistant, according to the application class) and in a normal situation these safety attachments must be in a loose, unloaded state! These safety elements are also subject to the heat resistance requirement for the application class. If it is installed with a free fan side, a suction or pressure fitting must be used to increase performance. In any case, they must be provided with a protective grid.

For use as a roof fan, the installation of the automatic roof cap is a prerequisite.

3.5 Electric power supply

The motor side of the terminal strip located in the electrical terminal box is connected. (See wiring diagram under point 5.0)

A suitable heat-resistant cable (min. 600°C/120 minutes) must be used to connect the motor, and a metal gland must be used for its introduction into the terminal box. The supply cable must be properly secured and mechanically protected, and the cable must not come into contact with the fan housing. These requirements apply throughout the entire area of the fire section. When choosing the cable type, the installation method used and the contact protection solution, the relevant standards (DIN 4102-12) and the laws in force and those prescribed by the local authorities must be taken into account to the maximum extent..

3.6 Ventilation system connected to fan

When the fan is installed, the air flow measured during commissioning must be within the operating range defined by the fan's characteristic curve. If it falls outside this, there is a possibility of the equipment being destroyed, and this fact in itself leads to loss of warranty. The fan motor has been selected to transport media with a density of 1.2 kg/m^3!

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Roof fan assembly variations

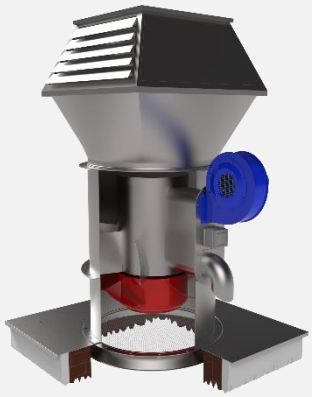
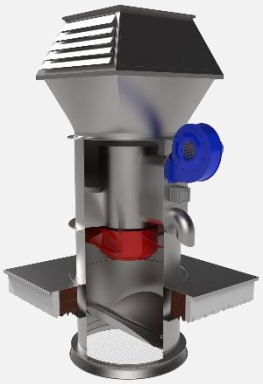
Roof Silencer Sockets:

		
Plinth package "A" BVHA F600 fan with lamellar F600 roof cap (DL-F600), Roof Silencer Socket with Inlet cone and automatic shut-off damper.	**Plinth package „A1”** BVHA F600 fan with lamellar F600 roof cap (DL-F600), Roof Silencer Socket with Inlet cone and insert plate.	**Plinth package „C”** BVHA F600 fan with lamellar F600 roof cap (DL-F600), Roof Silencer Socket with Inlet cone

Thermally insulated plinth elements :

			
Plinth package „E1” BVHA F600 fan with lamellar F600 roof cap (DL-F600), with thermally insulated plinth element, and with Inlet cone.	**Plinth package „E2”** BVHA F600 fan with lamellar F600 roof cap (DL-F600), with thermally insulated plinth element.	**Plinth package „F”** BVHA F600 fan with lamellar F600 roof cap (DL-F600), with thermally insulated plinth element and with automatic shut-off damper.	**Plinth package „Zs”** BVHA F600 fan with lamellar F600 roof cap (DL-F600), with thermally insulated plinth element and motorized damper.

Built-in plinth elements:

			
Plinth package „G1”	**Plinth package „G2”**	**Plinth package „H1”**	**Plinth package „H2”**
BVHA F600 fan with lamellar F600 roof cap (DL-F600), with built-in plinth elements and Inlet cone.	BVHA F600 fan with lamellar F600 roof cap (DL-F600), with built-in plinth elements.	BVHA F600 fan with lamellar F600 roof cap (DL-F600), with built-in plinth elements and automatic shut-off damper.	BVHA F600 fan with lamellar F600 roof cap (DL-F600), with built-in plinth elements, inlet cone and automatic shut-off damper.

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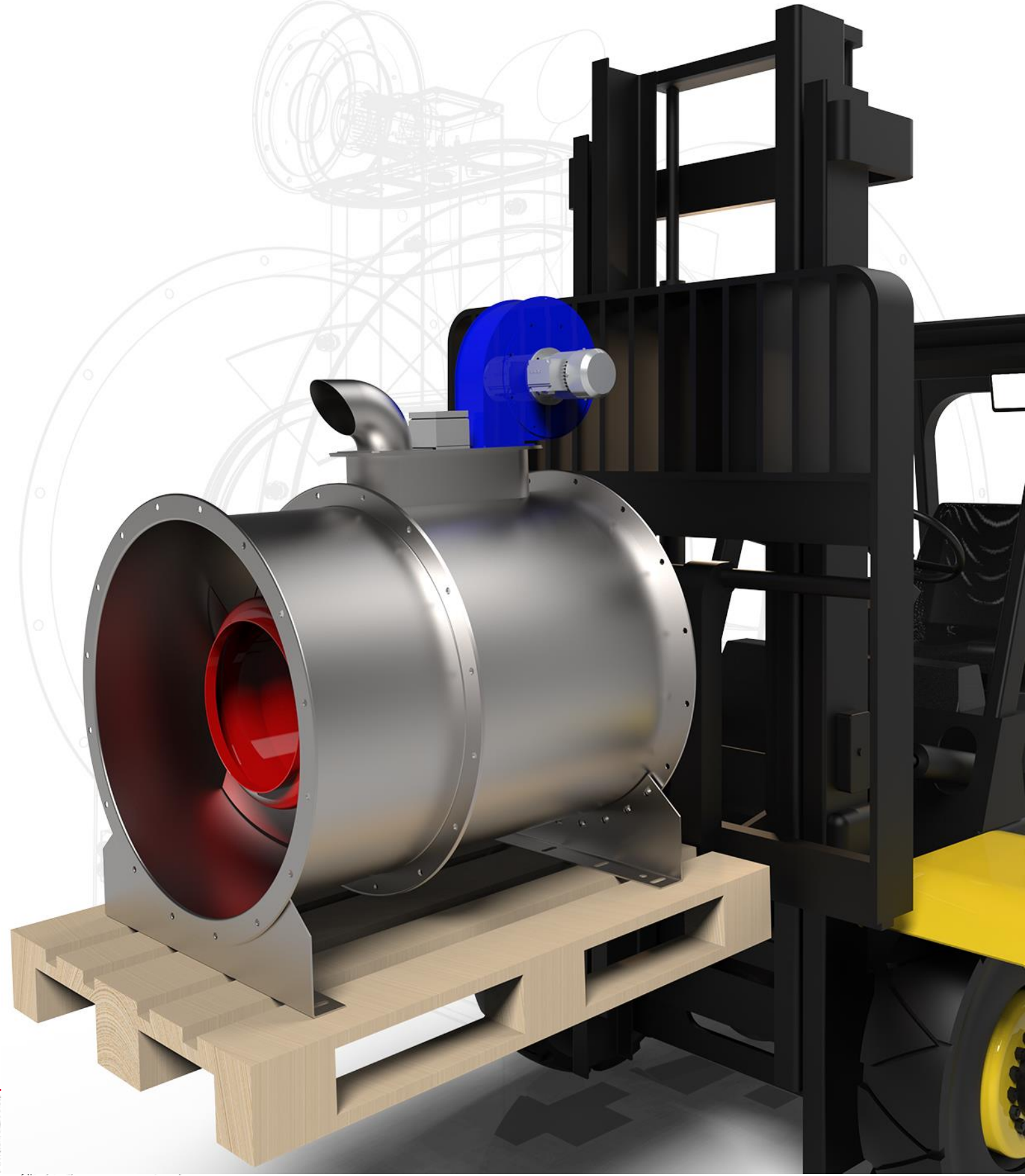
HV-VENT
THE FAN FACTORY

TRANSPORTATION AND STORAGE

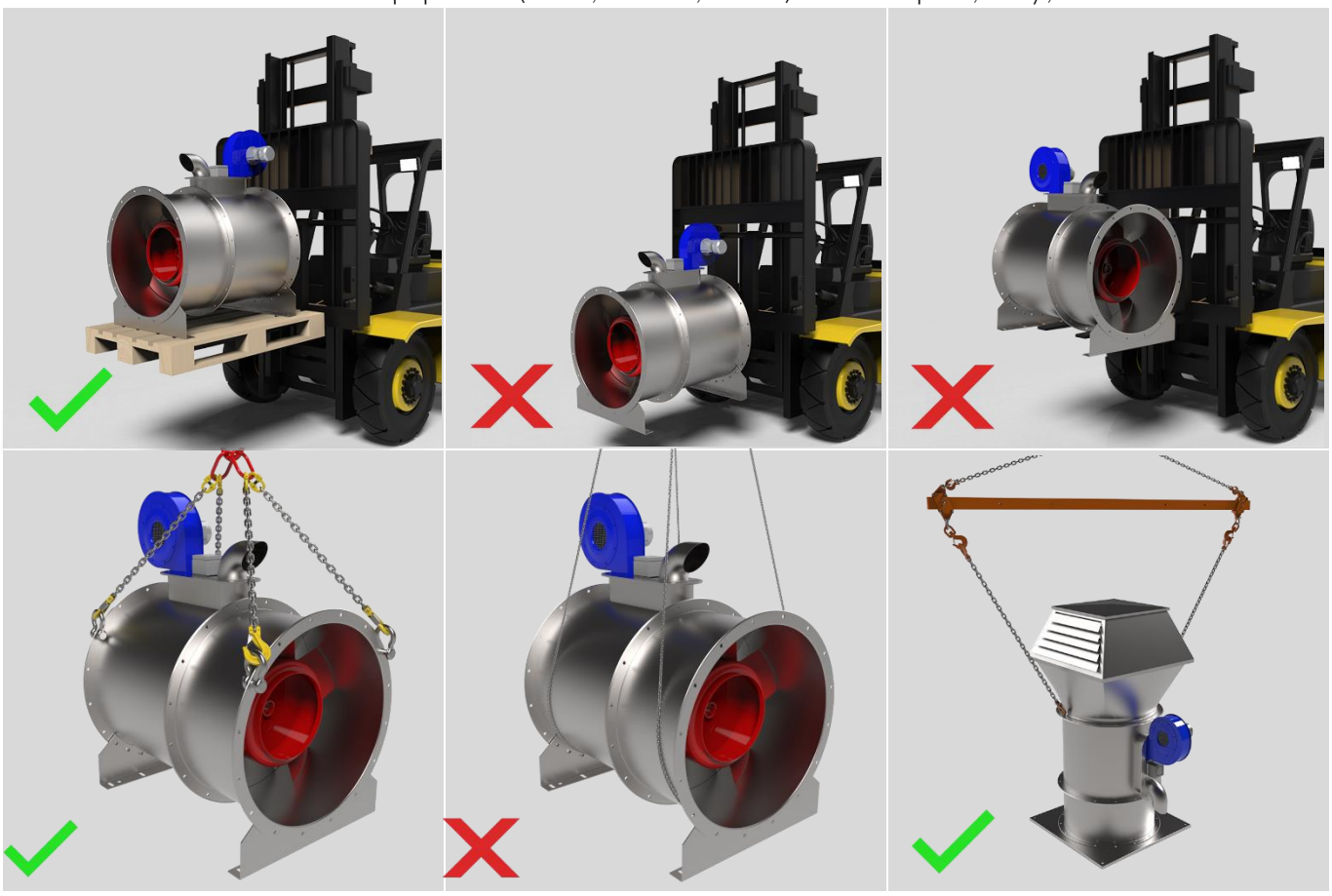


4.1 Transportation

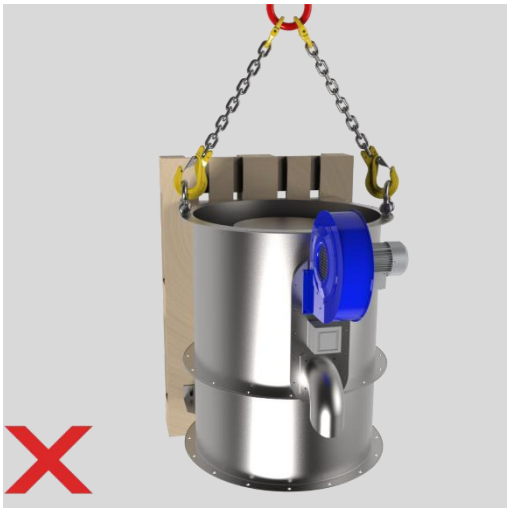
The fans are delivered fixed on a pallet. BVHAD F600 roof ventilators are delivered fixed on individual pallets.

The following must be observed during transport:

- use suitable equipment (hoist, forklift, crane) for transport, only;



- in the case of manual transport, take into account the human lifting and holding power.
- the fan attached to the pallet cannot be transported and lifted upside down in a vertical position



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The following hazards must be considered when transporting machines:

- The transport packaging does not prevent damage caused by improper transport. The machines must not be tipped or thrown.
- Protruding, sharp edges and corners can cause injury.
- Suspended objects can fall, so do not stay under a suspended load!
- Objects piled too high may fall!

- The highly flammable packaging material is a fire hazard, so the use of open flames and smoking are prohibited!
- When working on the roof, the occupational safety rules for working at height must be strictly observed!

4.2 Storage

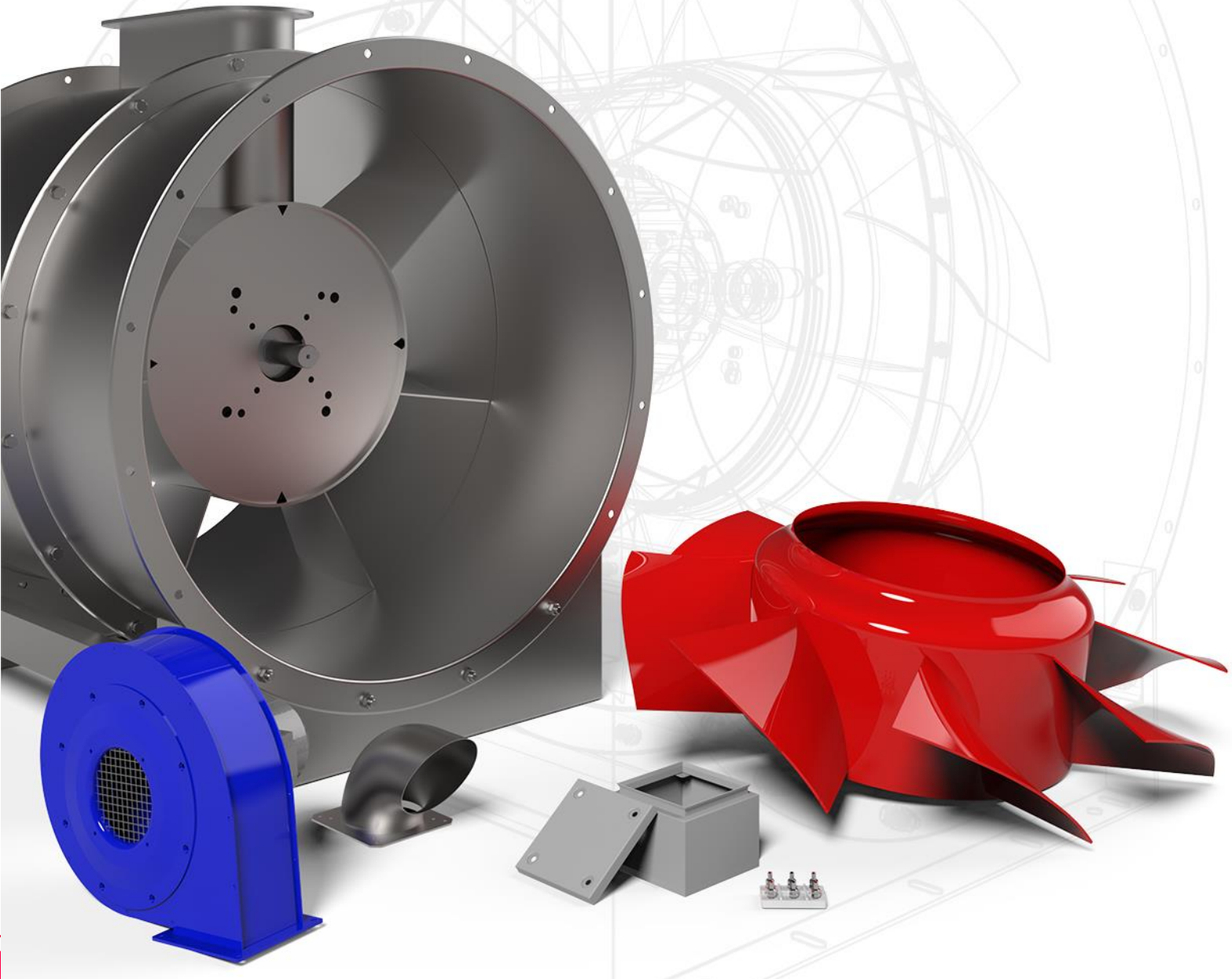
- The fan must be stored in a dry, covered place, protected from the elements, possibly covered with a tarp, protected from dirt.
- The fan must be protected from extreme temperatures!
- An excessively long storage time (max. 1 year is recommended) causes a rapid decrease in the service life of the equipment. Before installation, the correct operation of the motor bearings must be checked, as well as the insulation resistance between the windings and the phases and the fan body must be measured. The insulation resistance is adequate if the measured value is greater than 1MΩ when measured with a DC voltage of 500V, in a cold state (EN 60204-1: 2019). If the measured value is less than 1 MΩ, the fan must be dried, and the manufacturer must be informed immediately.

4.3 Dimensions

See chapter "Size range" (1.7. point).

HV-VENT
THE FAN FACTORY

ASSEMBLING



5.1 Electrical connection

Electrical and mechanical installation work may only be carried out by a qualified specialist, taking into account the regulations in force at all times.

Installation, repair and maintenance are permitted only after the fan has been completely disconnected from the electrical network.

The following must be observed when installing the fan:

- Proper fixing of the fan.
- The fan housing must not be strained, use compensation if necessary.
- The installation position must match the one specified in the order.
- Vertical damper for correct installation position (only suitable for extraction, the slats should open upwards).

Caution: The wiring of the electrical equipment must be carried out primarily according to the data plate of the electrical motor of the equipment, and secondarily based on the wiring diagrams supplied by the manufacturer, as well as the relevant regulations. You can find the circuit diagrams on the next page!

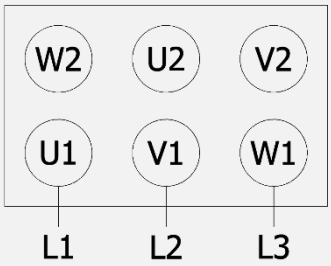
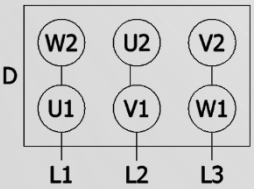
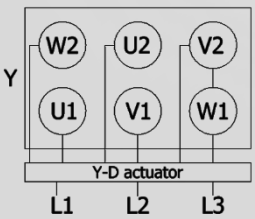
Measure the insulation resistance of the electrical part according to the chapter under "4.2 Storage".

In case of any problem, please contact our company. Hungaro-Ventilátor Kft. assumes no responsibility for damages resulting from faulty wiring. Such a defect is not covered by the warranty.

Checking the direction of rotation is mandatory, before which the following must be taken into account:

- Foreign bodies must be removed from inside the fan.
- Objects that do not belong in the electrical connection box must be removed and the inner surface must be kept clean.
- It is necessary to check that the connections of the wires are secure.
- The tightness of the junction box must be checked (tight packing glands, lid seal) in accordance with the protection classification.
- Rotating parts should be protected against contact by installing a protective grid (see accessories).
- The impeller must be turned a few times by hand to check for free rotation.
- The direction of rotation must be checked with a short (impulse-like) activation according to the direction arrow on the housing.

Wiring diagrams:

	Wiring diagram	Pole number	Motor voltage	Remarks
A2		2 4 6 8 12	~230/400 V	3x400V motor star circuit
B	With direct actuator  Y With direct actuator 	2 4 6 8 12	~400/690 V	3x400V motor in delta connection For star/delta (Y/D) start, appropriate timing must be included.

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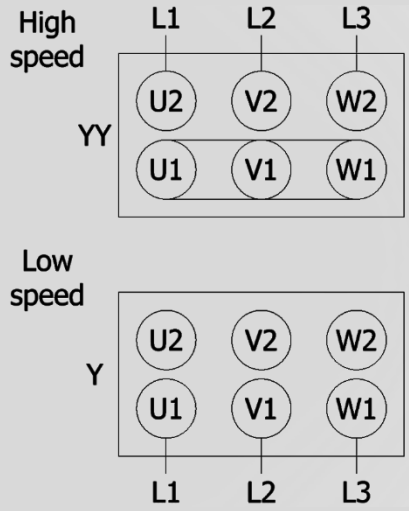
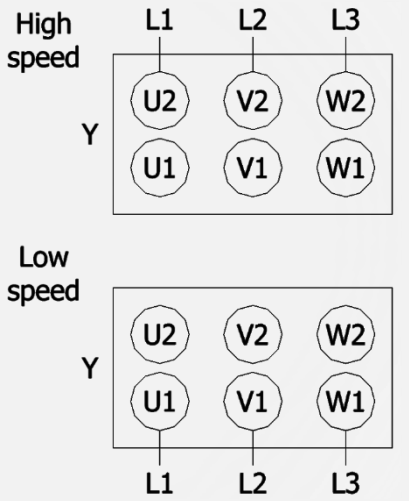
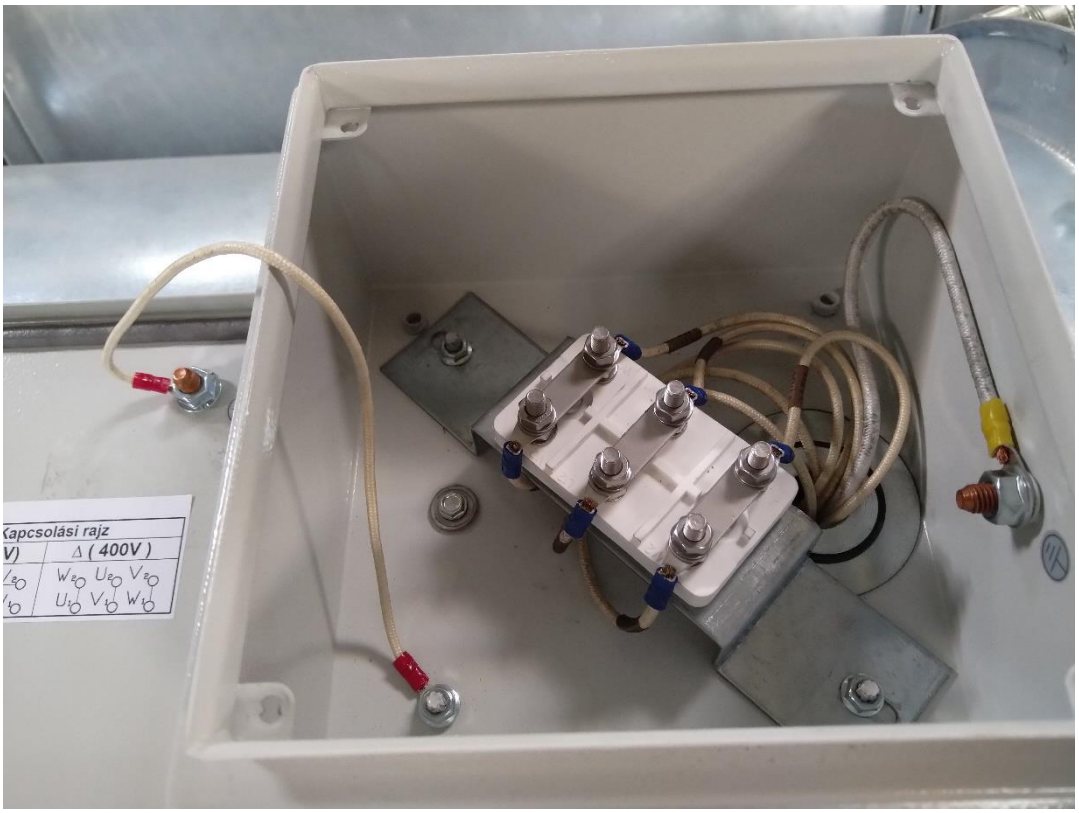
	Wiring diagram	Pole number	Motor voltage	Remarks
C		2/4 4/8 6/12	~400 V	3x400V two-turn motor, with Dahlander coil
D		4/6 6/8 8/12	~400 V	3x400V two-turn motor with split winding

For equipment other than the above, as well as equipment equipped with special motors, ask our company for additional information.

Connecting fans

For the electrical connection of the fan motor, polymer or ceramic terminal strips are placed in the junction box. When tightening the cable fixing nut, the load capacity of the terminal strip material must be taken into account. Tightening of the nuts is done with appropriate resistance, considering the maximum tightening torque values in the table below.

Screw size	M6	M8	M10
Maximum pulling torque (+0% / -10%)	6 Nm	15 Nm	20 Nm



Exceeding the specified torque values can lead to breakage of the terminal strip! We are not responsible for damages resulting from improper tightening of the nuts!

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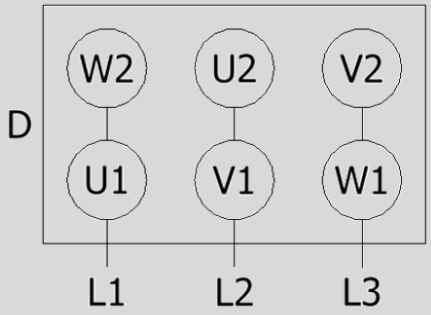
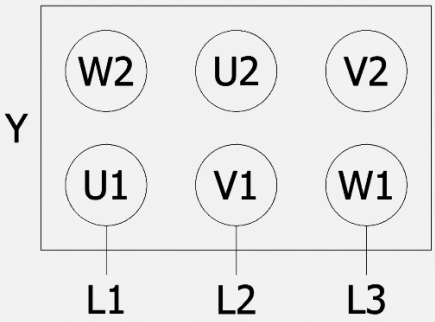
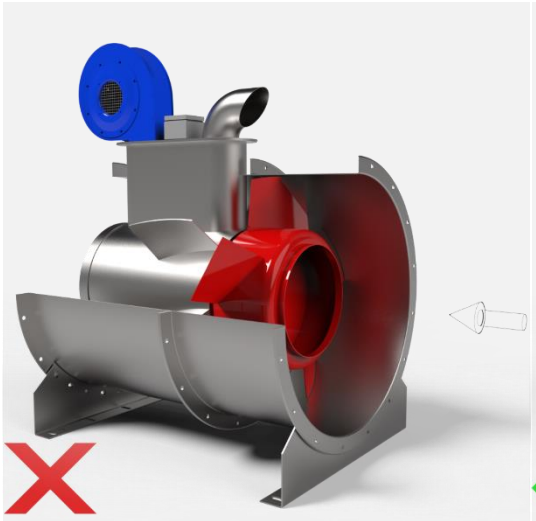
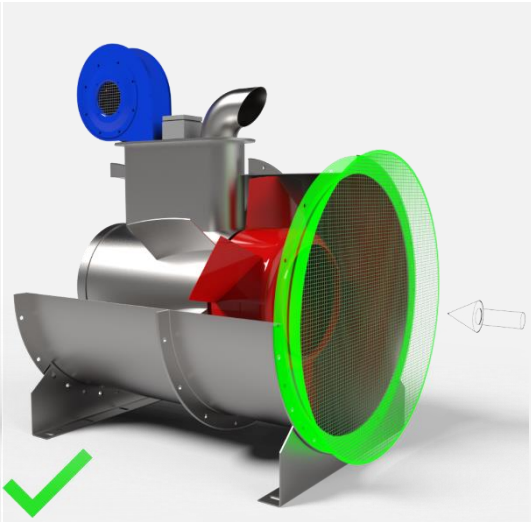
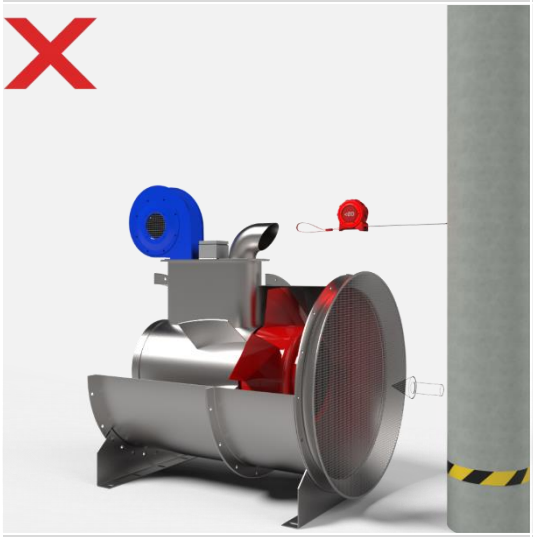
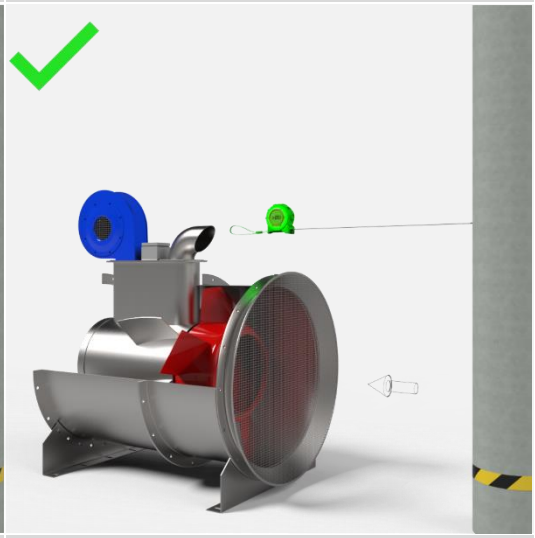
Wiring of the cooling fan:

Wiring diagram	Motor voltage	Type of cooling fan
	~230 V	KG-1 KG-2 KG-5
	~400 V	KG-7 KG-9 KG-10

5.2 Common installation errors

To reach the desired working point and to guarantee the safe operation of the fan, the following points must be constantly taken care of:

5.2.1 Inflow

Incorrect	Correct
	
Incorrect: Without suction nozzles, the ends of the blades are not in the air flow, so the air delivery is reduced, the power consumption and the noise increase. Impeller blades may be damaged. The operating point will not be on the characteristic curve.	**Correct:** In the case of free suction, a suction pipe must be installed in front of the fan.
	
Incorrect: There is an obstacle near the inlet side, the performance decreases, the impeller may be damaged.	**Correct:** In the case of free intake, min. before the fan. 1xD free space must be provided.

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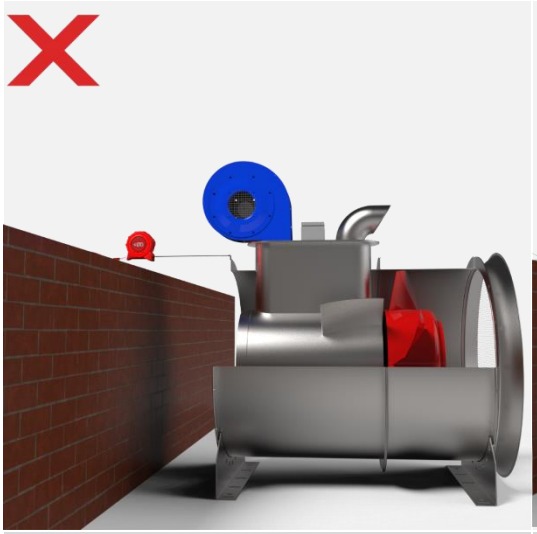
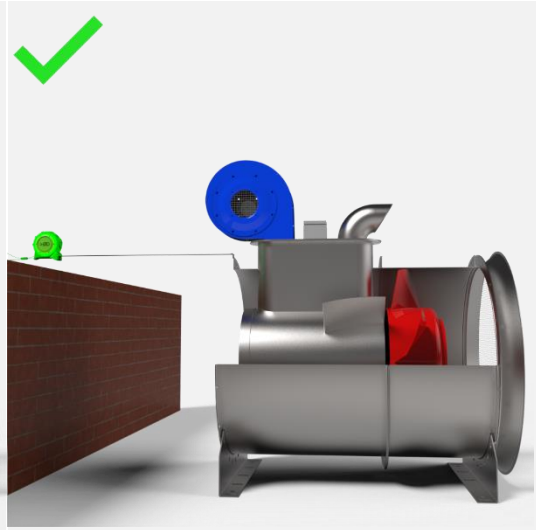
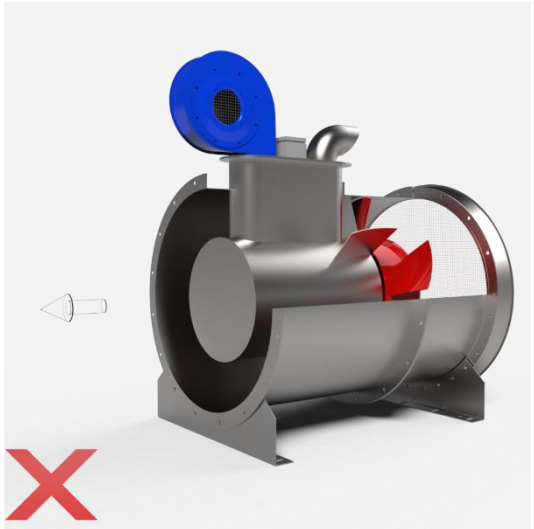
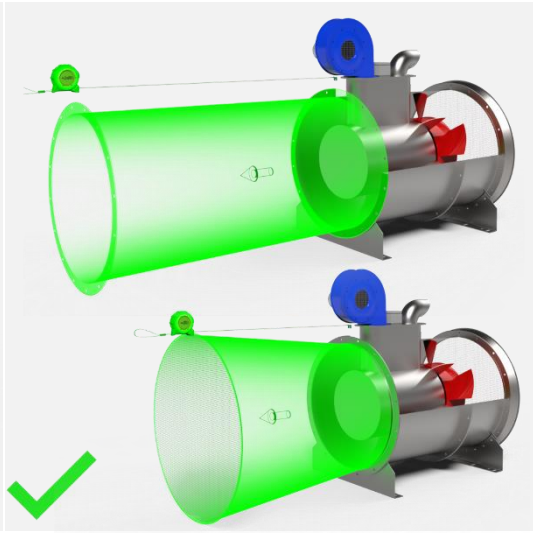
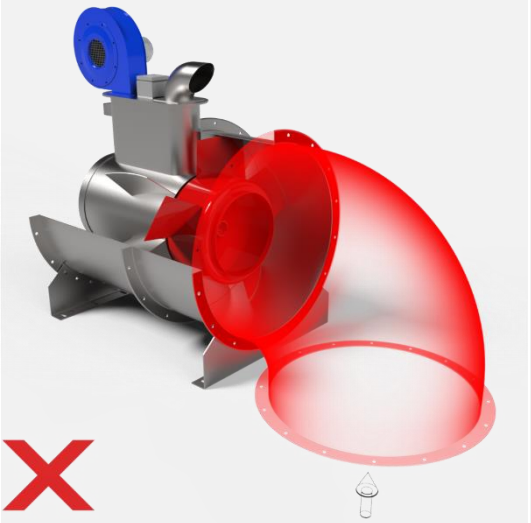
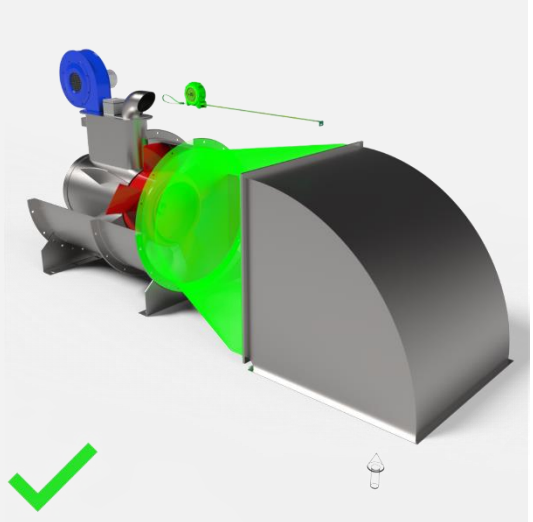
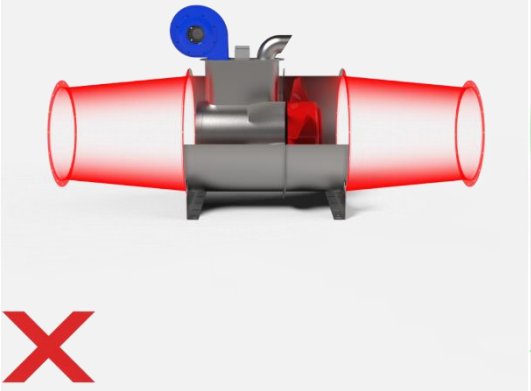
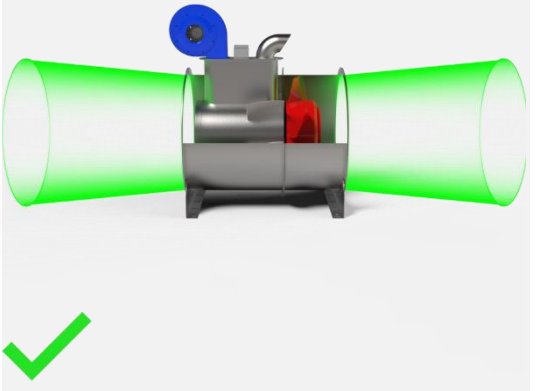
5.2.2 Exhaust

Incorrect	Correct
	
Incorrect: An object obstructing the outflow on the pressure side of the fan prevents correct operation.	**Correct:** There should be at least 1xD free space on the pressure side of the fan.
	
Incorrect: The air duct ends with the fan, the fan blows outside, the exit loss is high!	**Correct:** After the fan, a 2xD duct or diffuser reduces exit losses.

5.2.3 Arches and elbows before and after the fan

Incorrect	Correct
	
Incorrect: An elbow installed directly before or after the fan reduces the performance of the fan and increases the noise.	**Correct:** Elbow with a square cross-section, equipped with deflector plates, with a transitional joint at least 1xD long.

5.2.4 Cross section changes

Incorrect	Correct
	

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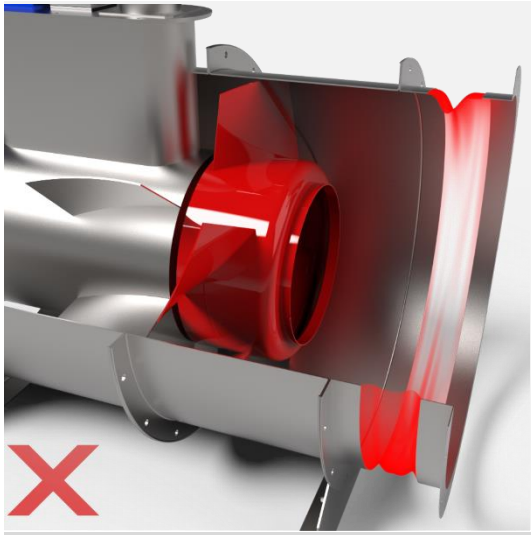
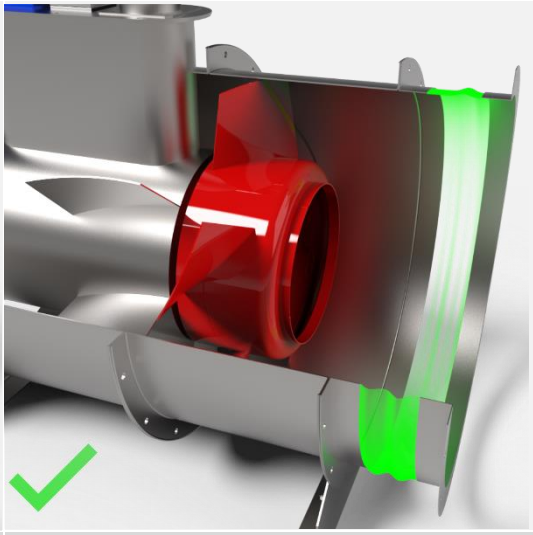
5.2.5 Flexible connections

Incorrect	Correct
	
Incorrect: The flexible vibration damper installed loosely in front of the fan interferes with the flow, thereby reducing the performance of the fan and increasing the noise.	**Correct:** The flexible vibration damper should only be tensioned so that it is tight, but avoid to be not too tight, as this can lead to tearing.

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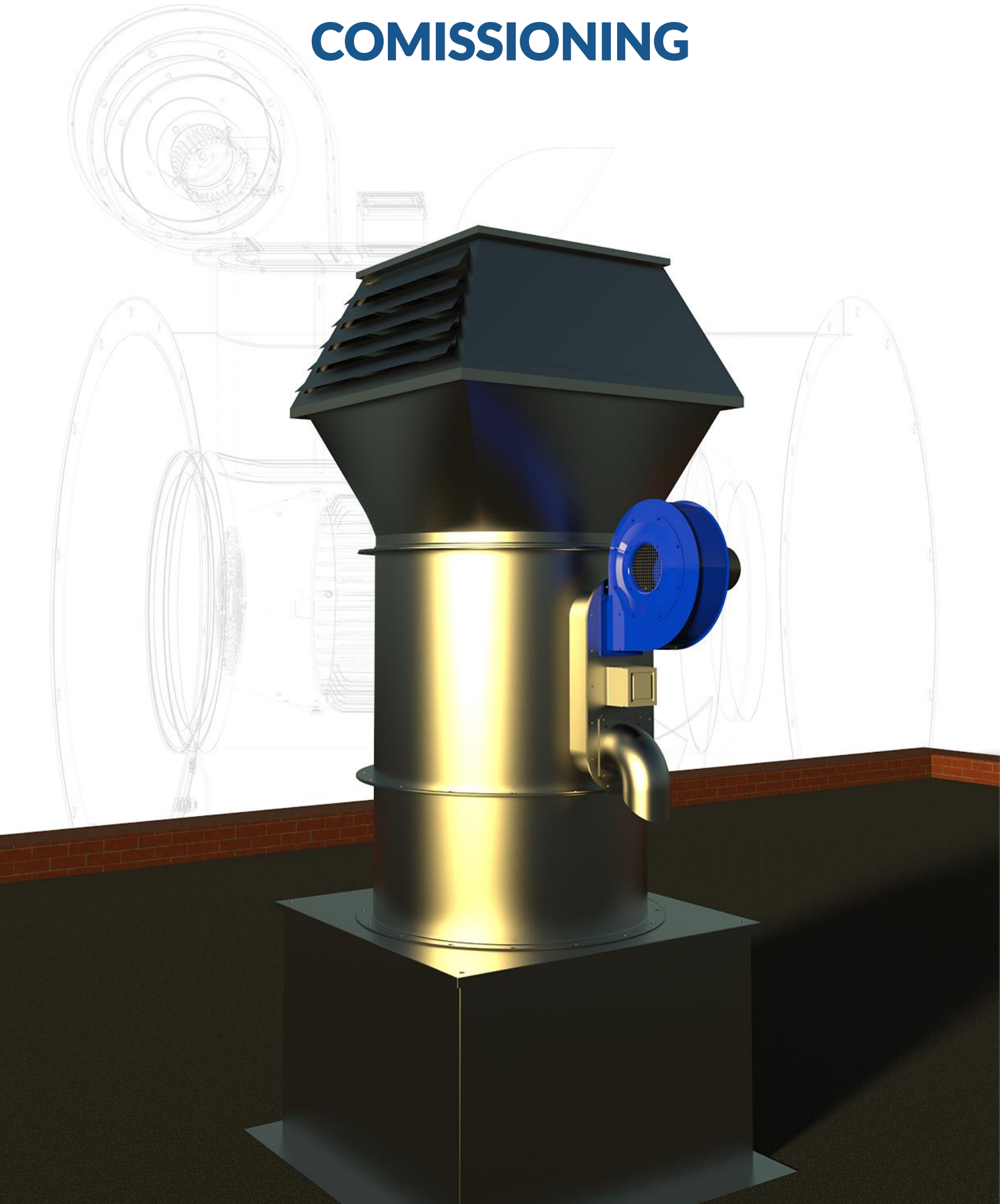
COMISSIONING



To avoid damage to the machine and life-threatening injuries during commissioning, the following points must be observed:

- Commissioning of the machine - in compliance with safety regulations - may only be carried out by qualified personnel.
- Before starting, check that all tools and foreign objects have been removed from the machine.
- Before installation, activate all safety devices and emergency switches.
- Before installation, check the direction of rotation of the motor.
- Read the 'general safety regulation'. chapter. (2.0 points)
- The existence of the commissioning protocol is a condition of the guarantee.

6.1 Check before the first start

When installing the fan, proceed in the following order:

- Check for proper installation!
- Remove foreign objects from the suction and discharge side.
- Check that the electrical connection has been made in accordance with the factory wiring diagram and local electrical regulations.
- Is the mains voltage the same as the voltage on the machine's nameplate?
- Is the switch used suitable for the motor in terms of switching functions, switching conditions and switching performance?
- Is the motor protection set correctly for the rated current of the motor? The adjustment must be made according to the corresponding values of the motor data plate. Motor protection is only permitted in the case of dual-function applications, in normal operating mode, or required! No motor protection can work in the smoke extraction function, nothing can stop the fan! This provision also applies to the cooling fan! Therefore, if the fan and the cooling fan motor are equipped with a PTC due to the continuous mode, they cannot start in case of emergency functions, they cannot stop the fans due to overheating.
- Is the motor connected correctly according to the wiring diagram? The connection of the motor must basically be carried out based on the motor data plate or on the basis of the circuit diagram attached/sent by the manufacturer.

Accident prevention:

- To protect rotating parts from contact, a protective grid (see accessories) must be installed.
- If the fan draws in or pushes to the outside, the suction or pressure opening **must be equipped with a protective grid for accident prevention reasons.**

6.2 Starting the ventilator for the first time

Only put the fan into operation after it has been installed according to the regulations. The fan can only be operated together with a cooling fan!

The type of cooling fan must be identified according to the fan data plate, the fan can only be operated with the cooling fan indicated on the fan data plate!

At the first start-up, the measured electrical data must be recorded in the attached "*COMMISSIONING LOG*". This also applies to the fan motor and the cooling fan motor.

The existence of the "COMISSIONING LOG" is also a condition of the guarantee!

Check for correct operation (vibration, unbalance, current consumption, etc.).

If the fan is not operating at the correct (designed) working point (the air delivery is low or the current consumption measured per phase is higher than that stated on the data plate), then ask for the help of a specialist company or the manufacturer. In order to prevent overloading and motor burnout, measure the current consumption, the value of which must not exceed the nominal/maximum current specified on the fan's data plate. If the current consumption of the motor is higher than the value given on the data plate, the overload protection must switch off the motor. This can only be used if a dual-function fan is installed and can only work in normal mode!

No engine protection can work in emergency mode**!!!**

After a longer period of operation, check the temperature of the bearings. The suction opening must always be kept free and clean! Dirt deposited on the protective grid must be removed!

6.3 Check after the first start

After the first start-up, check the mechanical connections, **especially the fan screws.**

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OPERATION

During the operation of the machine, to prevent life-threatening injury to the operator and damage to the machine, the following safety advice must be observed.

Cleaning and maintenance work - in strict compliance with the operating instructions - may only be carried out by qualified personnel.

- Repair work may also only be carried out by specialist personnel - in compliance with accident prevention regulations.
- Before carrying out cleaning, repair, maintenance and other installation work, the fan must be completely disconnected from the electrical network, with a reconnection prohibition (padlock, lock, etc.) at the same time.
- Secure the area before starting operational work.
- The specified sequence of work must be followed.
- Only qualified electricians may work on electrical equipment.
- The specified tightening torque of the screws must be observed.
- Read the "general safety regulations". chapter. (2.0 points)

Electrical operating conditions:

1) In the case of starting a motorized closing damper and a fan together, the damper must be opened in the first step. The fan should be started with an open damper, optimally with a delay of **20 seconds** - but at least **10 seconds**.
2) Hungaro-Ventilátor Kft.'s smoke extraction fans are certified for fire operation in accordance with the Local Fire Regulation according to the EN 12101-3 standard together with the **DANFOSS FC 102** series frequency converter. By using a frequency converter, you can save a significant amount of expensive automation elements.
3) The smaller STAR motor - usually under 3 kW - marked **"Y"** on the data sheet - **230/400 V (50 Hz)** - starts directly, i.e. **DOL** (**D**irect **O**n **L**ine) - its current can be found on the data sheet.
4) The DELTA motor with a higher power - usually above 3 kW, marked **"D"** on the data sheet - **400/690 V (50Hz)** - is usually started with star/delta **(Y/Δ)** switching in the case of a 3x400V supply voltage. In this case, the short-term current maximum is approx. the rated current of the motor. **3** times. If there is sufficient available current, direct, i.e. **DOL** (**D**irect **O**n **L**ine) starting is also possible. Its current can be found on the data sheet.
5) In the case of starting with a soft starter or a frequency converter, the starting current does not exceed the rated current of the motor.
6) **In case of fire operation, the motor protection must be disabled**, the fan cannot stop in case of overcurrent or overheating. In the case of a trial run or function test, the guarantee condition is that the motor protection is active!
7) In a non-fire function, the fan motor must be protected against overheating with PTC motor protection and against overcurrent with overcurrent protection. To protect the fans from overcurrent, a small circuit breaker with characteristic **"D"** or a fuse of category **"aM"** must be used! If a fuse is used, a **phase monitoring relay** must be apply to prevent phase loss. Malfunctions resulting from the lack of motor protection are not covered by the warranty.

HV-VENT
THE FAN FACTORY

TROUBLESHOOTING

When troubleshooting, pay particular attention to the following points:

- The fault can only be eliminated by a person with appropriate professional qualifications.
- First of all, the machine must be secured against unintentional restart (accidental) by turning the machine's switch or closes its switch cabinet.
- Secure moving parts against rotation.
- Read the “general safety regulation” chapter. see (2.0. point)

Tabular overview of possible disturbances and help for troubleshooting:

In dual-function mode, with respect to the normal mode of the fan:

Failure	Cause	Elimination
The motor or motor control switches off	The motor has overheated, the thermal contact trips.	Cool down the engine. Depending on the switch, the fan restarts itself or needs to be restarted. Check that: • Is the delivered medium too hot? • Are all phases equally loaded and connected? • Does the fan’s operation point match the selection? • Is the impeller jammed/stuck?
	The impeller is blocked.	Turn off the fan. Remove the obstruction. In the meantime, pay attention to the safety regulations.
	The impeller is damaged and worn.	Turn off the fan. Remove the impeller and install a new one.
	Filter or roof cap perforation is dirty	Replace or clean the filter.
	The back draft damper was installed in the reverse position.	Reverse the installation direction of the back draft damper.
The fan pumps, the air flow is interrupted periodically.	The fan works in the unfavorable characteristic curve area	Check the correct installation of the non-return valve. In case of incorrect (inverted) installation, turn it over. Reduce system resistance if possible. In case of continuous operation, the impeller of the fan will be destroyed.
Inadequate air flow	The slats of the automatic sunroof are dirty and do not open.	Turn off the fan. Carry out the necessary cleaning or repair.

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THE FAN FACTORY

MAINTENANCE

Regarding maintenance, a distinction must be made according to the fan's function and mode of operation. (The regulations shall accordingly apply mutatis mutandis)

Function:

to air at normal temperature

smoke extractor - for high temperature air

Operating cycle:

permanent or regular operation (S1)

emergency operation – (S2)

When installing and operating the smoke extraction system, the laws in force in the country in question must be observed, together with local authority regulations.

Professional maintenance is a condition of the warranty!

Factory Service:

Hungaro-Ventilator Kft. (H-9483 Sopronkövesd, Táncsics M. u 18.)
E-mail: service@hungaro-ventilator.hu
Tel.: +36-99-536-072

Maintenance intervals:

- for normal air ventilation fans: 3 months recommended (depending on air pollution)
- For CO and smoke extraction fans: mandatory every 6 months

Caution:

Please carry out the maintenance work described in this manual at the specified intervals - failure to do so will void the warranty. The warranty is void and the safety of operation is compromised if you do not use parts sold by the manufacturer!

Maintenance should also cover the cooling fan!

Dust, caustic and acidic vapors and gases mixed with the transported air flow have a natural abrasive and corrosive effect on the impeller and the housing, and can deposit. Because of these natural wear and tear, the material can wear out to such an extent that it no longer meets expectations. Uneven deposits on the impeller can cause imbalance and thus unstable running, which in turn leads to damage to the motor bearings. Deposits on the housing lead to a reduction of the free cross-section and a roughening of the housing, which adversely affects the performance data of the fan. If the inspection, which depends on the transported medium and the different operating conditions in each case, shows even a small amount of wear, then the individual parts must be cleaned in time, in case of greater wear, immediate replacement is justified.

Before any maintenance work:

- The fan must be properly stopped and completely disconnected from the electrical network, simultaneously with reconnection prohibition (padlock, lock, etc.).
- Wait until the impeller comes to rest!
- Ensure non-restartability!
- Clean the fan.
- Clean the suction opening.
- Clean the impellers (if necessary, remove the protection against penetration).

In addition to following the prescribed safety instructions, only use commercially available cleaning agents! The use of scratching or rubbing tools that damage the surface protection is prohibited!

- Protect the engine from water jets!
- The integrity of the impeller and blades must be checked!

General checks:

- Is lubricant leaking from the bearing?
- Is the surface protection intact? (Caution: Aggressive transported medium?)
- Unusual operational noises

If the fan operates in normal mode, but also has an emergency function, you must make sure that the criterion that no motor protection can operate is met in case of emergency function mode. This applies to both the fan itself and the cooling fan!

CAUTION: The screws of the fan (with the exception of the screws of the electrical connection, see: Installation) and the screws for fixing the impeller must be tightened with the torque specified in the attached tables!

Screws (strength class 8.8):

Screw	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20
pulling torque (+0% / -10%)	3,4 Nm	6,5 Nm	11 Nm	28 Nm	55 Nm	95 Nm	155 Nm	230 Nm	275 Nm	385 Nm

The given values refer to galvanized screws and non-oiled screw connections!

Checking motor bearings:

- The use of diagnostic tools is recommended
- Frequency: During maintenance

CAUTION: The electric motor may only be dismantled by the manufacturer or a specialist company designated by the manufacturer!

In the event of a limited motor fault, notify the manufacturer or distributor of the fan! De-energize the fan motor at the same time as reporting the error, but do not disconnect the wiring, leave it unchanged.

By disassembling the engine, the operator assumes all legal consequences!

Commissioning of the machine - in compliance with safety regulations - may only be carried out by qualified personnel!

Steps of comission:

- Before starting, check that all tools and foreign objects have been removed from the machine.
- Refit protection against penetration
- Before installation, activate all safety devices and emergency switches.
- Before commissioning, check the direction of rotation of the motor.
- Read the "General safety regulations". chapter. (2.0 points)

Thank you for your attention!

We trust that the above instructions will help you in your work and that the equipment will operate as intended.

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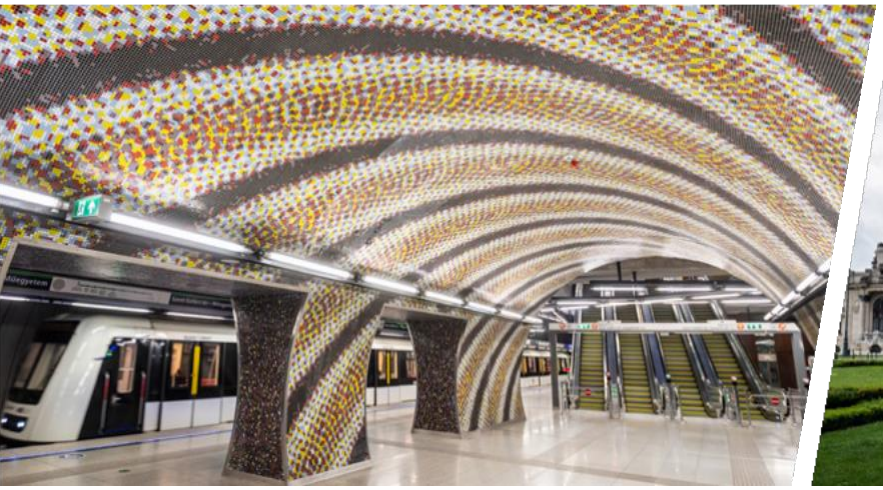
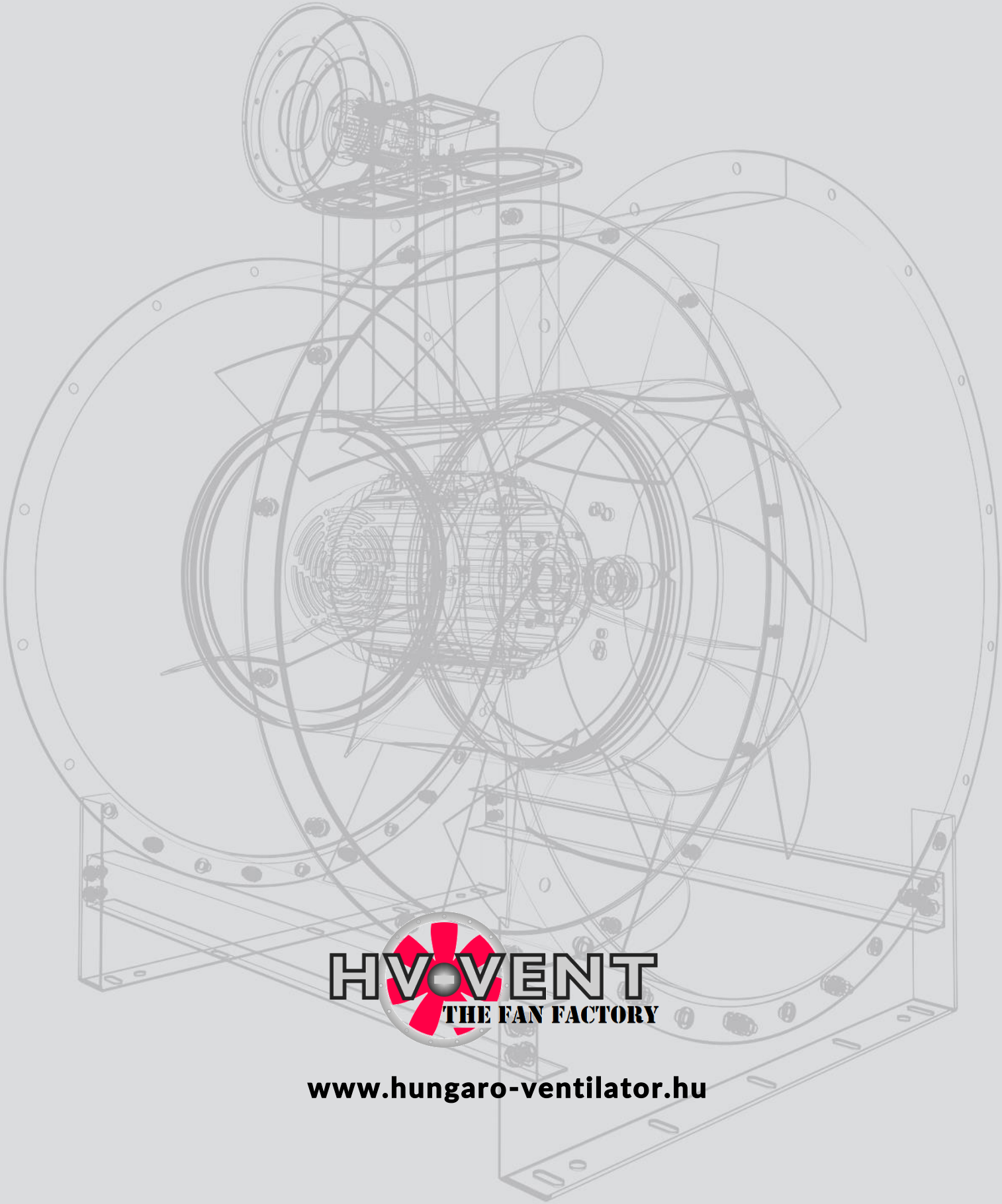
- ✓ Elysium Residental Park
- ✓ M4 Metro Budapest
- ✓ Széchenyi Bath
- ✓ Groupama Arena
- ✓ Puskás Stadium
- ✓ Museum of Fine Arts
- ✓ Hungarian Academy of Sience



Why choose us?

- ✓ We believe in the power of quality: due to the reliability of our products, the number of complaints is minimal
- ✓ Adherence to the delivery deadline is a basic requirement for the company
- ✓ Our products have outstanding price
- ✓ In addition to design and installation expertise, we also have the appropriate manufacturing tools
- ✓ Our products meet all comfort and technological, air-conditioning requirements, as well as modern, energy-saving and aesthetic
- ✓ The product innovation is continuous
- ✓ Thanks to the large stock, we can ensure a short delivery time
- ✓ Our excellent and recognized professionals are available to our clients
- ✓ All equipment's accessories are self-manufactured
- ✓ Our unique VentiCalc fan selection software for our business partners is connected to the main manufacture software, so there is no unnecessary lead time, thus the production time is shortened



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