italBLOWERS

CE

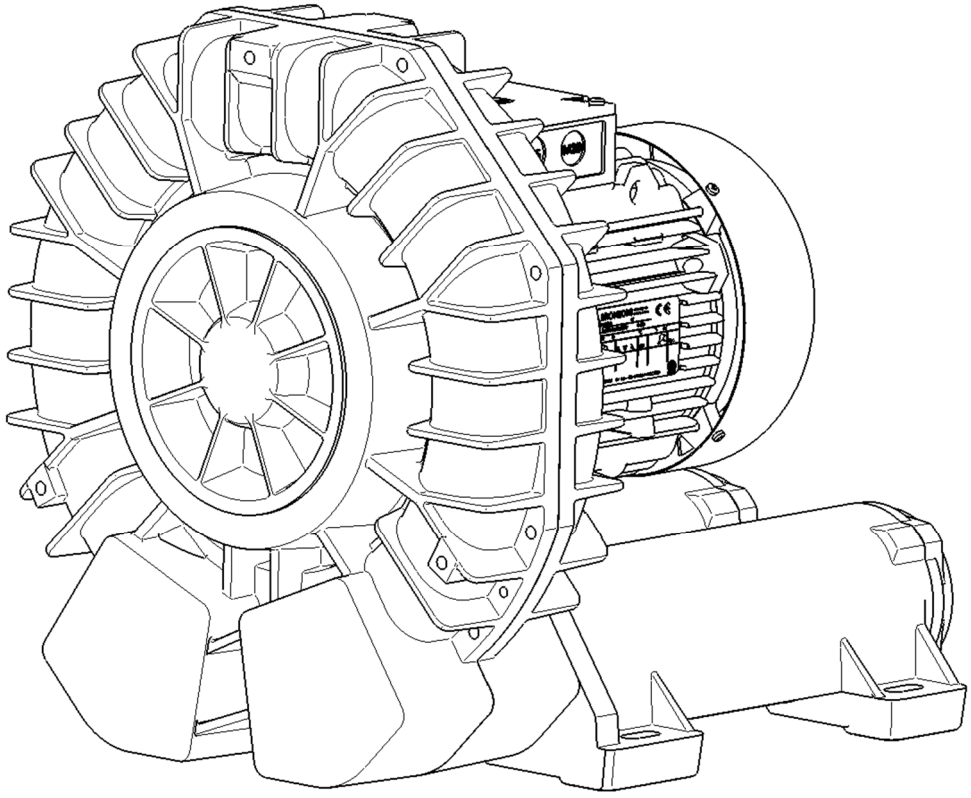
OPERATING INSTRUCTIONS

EN

X1 / X2 / D1 / D2 Series

Side channel blowers

SM Execution



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1. SAFETY

This operating manual:

- is intended for side channel blowers of the X1 / X2 / D1 / D2 series.
- must be completely read and understood by all operating and servicing personnel before beginning to work with or on the unit for:
  - storage
  - transport,
  - installation,
  - commissioning,
  - operation ,
  - maintenance,
  - shut-down, storage, servicing and disposal of the X1 / X2 / D1 / D2 series.

Before any operation on the unit, carefully read these operating instructions and store it in a secure place.

Failure to comply the safety standards in these instructions may result in serious injury to people and to materials and environment damage . These operation instructions for use must always be available in the same place where the unit is located.

1.1 SIGNAL USED

In this manual are used the following types of signals for safety warnings and general information:

DANGER
The "DANGER" identifies a hazardous situation which, if ignored causes serious injury or death!

CAUTION
The "CAUTION" identifies a hazardous situation that can cause damage!

Note
Indicates a possible advantage if the corresponding measures are taken.

1.2 GENERAL SAFETY PRECAUTIONS

Incorrect installation can cause damage to persons or property, taking into account also that the safety of the machine is also linked to the regular maintenance and care with which it is used, for which the manufacturer is not responsible.

GENERAL SAFETY PRECAUTIONS

The following table illustrates the general safety with an indication of the risk areas, the possible consequences and preventive measures to protect suggested.

 **DANGER**	**Preventive measures to adopt**
Improper use of the unit can result in serious or even fatal injuries!	These operating instructions must have been read completely and understood before beginning any work with or at the pump-motor unit, must be strictly observed, must be available at the operating location of the pump-motor unit.
	Only operate the pump-motor unit for the purposes indicated under "Intended Use", with the fluids indicated under 'Intended Use', with the values indicated under 'Technical Data' .
	All work on and with the pump-motor unit (transport, installation, operation, shut-down, maintenance, disposal) may only be carried out by trained, reliable expert personnel.

When working on the unit, there is a danger of injury, e.g. in the form of cuts/cutting off, crushing and burns!	During all work on and with the pump-motor unit (transport, installation, operation, shut-down, maintenance, disposal) wear **personal safety equipment (safety helmet, protective gloves, safety shoes)!**
Hair and clothing can be pulled into the unit or caught and wound up moving parts!	Do not wear long, loose hair or wide, loose clothes! Use a hair net!
Electrical danger!	Work on electrical installations may be carried out by trained and authorized electricians only!
	Before beginning work on the unit or system, the following measures must be carried out: ï Deenergize. ï Secure against being switched on again. ï Determine whether deenergized. ï Ground and short-circuit. ï Cover or block off adjacent energized parts.
	Do not open the motor terminal box until absence of electricity has been ensured!
Danger due to vacuum and gauge pressure: **Åsudden escape of fluids (skin and eye injuries), sudden drawing in of hair and clothing!** **ÅDanger due to escaping fluid: Burns!**	Use mounting elements, connections, lines, fittings and containers with sufficient freedom from leaks and strength for the pressures which occur. Check the mounting elements, connections, lines, fittings and containers for strength, leaks and firm seating at regular intervals!
Danger from rotating parts (external fan, impeller, shaft) **Cutting/cutting off of extremities, Grasping/winding up of hair and clothing!**	Start-up and operation only under the following conditions: ï The pump-motor unit must be completely assembled. ï When doing so, pay particular attention to the following components: ï the vacuum unit cover ï the muffler on inlet and discharge connections, ï the fan guard. ï The pipes/hoses must be connected to inlet and discharge connections
	Before beginning work on the pump-motor unit, take the following measures: ï Shut down pump-motor unit and secure against being switched on again. ï Allow pump-motor unit to cool. ï Shut-off lines. Release pressure.
Danger from rotating parts (external fan, impeller, shaft): **Cutting/cutting of off extremities!**	The rotating impeller is accessible with the inlet and discharge connections open! ï Do not reach into the unit through open connections! ï Do not insert objects into the unit through the openings!
	With free entry and exit of gases, i.e. with direct intake out of or direct feeding into the atmosphere without piping, the following therefore applies: Provide the inlet and discharge connections of the pump-motor unit either with additional mufflers or with additional piping of a sufficient length to prevent access to the impeller!
Danger of burns from hot surfaces of the pump-motor unit!	High temperatures of up to approx. 160°C can occur on the surface of the pump-motor unit. Cover the pump-motor unit with a suitable touch protection (e.g. perforated plate cover or wire cover). Do not touch during operation! Allow to cool after shut-down!

2. INTENDED USE

The X1 / X2 / D1 / D2 series of side channel blowers are units suitable:

- ï are intended for industrial applications,
- ï are designed for continuous operation,
- ï to generate vacuums and pressures,
- ï format are made to generate vacuums and pressures, and for conveying air and gas that is not explosive, not inflammable, not poisonous, and not aggressive.

If the blower should be transferred to another owner, always ensure that these instructions accompany the unit, so they can be viewed by the new owner or installer. In case of loss of these instructions require a new copy.

During operation of the unit are absolutely respect the limit values indicated in the nameplate of the unit.

2.1 IMPROPER USE PREDICTABLE

IT IS PROHIBITED:

- ï Using the unit in non-industrial installations;
- ï Using the unit in places in which there are explosive dust and/or gas or where these may form;
- ï Sucking up and conveying explosive, inflammable, aggressive, corrosive, and/or harmful fluids;
- ï Using the unit under conditions that differ from those indicated in the nameplate ;
- ï Operating with the suction and/or delivery openings closed;
- ï Making modifications to the unit or transforming it based on your own initiative, (Maintenance works are only to be carried out as described in this operating manual by qualified personnel).
- ï Starting the unit up again after a fault, unless it has been repaired by qualified personnel.

IT IS OBLIGATORY:

- ï Make the preliminary checks and periodic as shown in chapter ñCOMMISSIONINGñ
- ï Perform maintenance as indicated in chapter "PREVENTIVE MAINTENANCE".

2.2 RESIDUAL RISKS

The following table illustrates the residual risks with the indication of the risk areas, the possible consequences and protective measures suggested.

Danger zone	Hazard	Protective measures
Hot surface up to approx. 160°C	Possible burns.	Cover the pump-motor unit with a suitable touch protection (e.g. perforated plate cover or wire cover).
Fan guard of the electric motor.	Long, loose hair can be drawn into external fan through fan guard grate, even with fan guard mounted!	Wear hair net!
Missing or defective muffler inlet or discharge connection. Environment of pump-motor unit.	Possible serious hearing damage due to emitted noise.	Have missing or defective mufflers replaced. Conduct a noise measurement in the system after installing the pump-motor unit. The following measures can be taken from 85 dB(A) and must be taken from 90 dB(A): ï Mark noise area with a warning sign. ï Wear hearing protection. With free entry and exit of gases, i.e. with direct intake out of or direct feeding into the atmosphere without piping, attach an additional muffler.

3. TECHNICAL DATA

3.1 PERFORMANCE DATA

The characteristic data of side channel blowers X1 / X2 / D1 / D2, SM execution, are listed on the unit nameplate.
Following there is a brief explanation of the performance data and the conditions under which they are valid.

Admissible differential pressure:

The maximum differential pressure of work is the value that should not be exceeded by which it ensures the continued safe operation of the machine.
Exceed this limit value can result to burning of the motor or the locking of the impeller.
This value is a function of the motor power installed.

The total pressure difference applies only for the following conditions:

- Ambient temperature 15°C
- Absolute pressure of 1013 mbar in the suction inlet, in the case of functioning as a compressor.
- Absolute pressure of 1013 mbar in the discharge port, in case of operating as exhauster.

For conditions other than those indicated, you will need to apply correction factors that take into account the following variables:

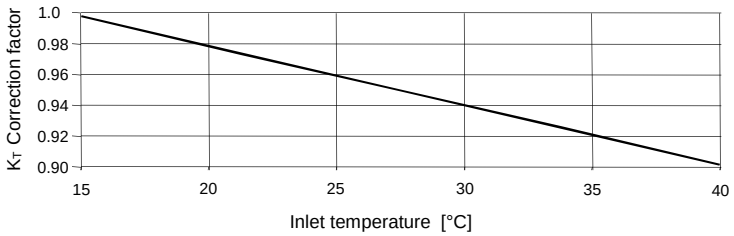
- density of the gas conveyed
- type of operation of the machine: compressor or exhauster
- Ambient temperature
- installation altitude
- speed of rotation (or frequency)

Temperature of the fluid to be conveyed:

- Max. temperature: +40°C
- Min. temperature: -15°C

Performance data refer to inlet temperature of 15°C.

For inlet temperatures between +15 ° C to +40 ° C, apply the K_T correction factor to the value of the maximum differential pressure as the following diagram:



For temperatures outside the range shown, please contact technical support.

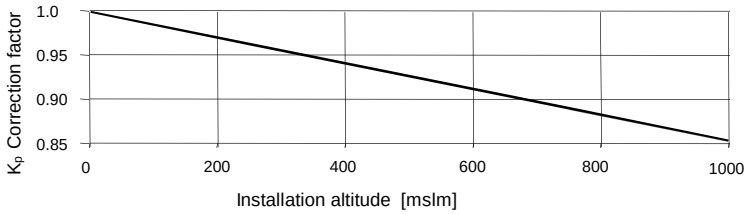
3.2 ENVIRONMENTAL CONDITIONS

Permissible ambient temperature:

- Max. temperature : +40°C
- Min. temperature. : -20°C

Installation altitude:

The characteristic data refer to sea level (0 meters above sea level).
For installation altitudes between 0 and 1000 m above sea level to apply the $K_{pò}$ correction factor to the value of the maximum differential pressure as the following diagram:



When installing the unit at an altitude of more than 1,000 meters above sea level, first inquire with the Service department.

3.3 ELECTRICAL DATA

The electric motors are compliant with Directive PHASE ASYNCHRONOUS International IEC 60034, which includes the Low Voltage Directive 2006/95/EC, the Electromagnetic Compatibility Directive and Directive 2009/95/EC 204/108/CE (RoHS).

For nominal data refer to the nameplate of the motor.

3.4 MECHANICAL DATA

Minimum distances:

- ï Minimum distance to fan guard (for sucking in cooling air) : 20 cm
- ï Minimum distance to the front side of the cover of the blower: 5 cm

Sound power level:

Measuring-surface sound-pressure level as per EN ISO 3744, measured at a distance of 1 m at an operating point of approximately of the permissible total pressure difference with the lines connected without a vacuum or pressure relief valve, tolerance ±3 dB (A).

Sound power level:

Sound power level LW as per EN ISO 3744, tolerance ±3 dB (A).

4. TRANSPORT

All groups who weigh over 30 kg are equipped with two eyelets on the housing of the electric motor.

The hook for lifting must be securely attached to the eyelets. Loads are not allowed to cross the plane of the loops. Avoid strong jolts during transport.

DANGERS THAT CAN BE ENCOUNTERED DURINGTHE TRANSPORT

The following table illustrates the dangers that may be encountered during transport, the possible consequences and preventative measures suggested.

 **DANGER**	**Preventive measures to adopt**
Tipping or falling can lead to crushing, broken bones etc.! **Sharp edges can cause cuts!**	Wear personal safety equipment (gloves, safety shoes and protective helmet) during transport!

Danger from lifting heavy loads!	Manual handling of the unit is only permitted within the following limits: ï max. 30 kg for men ï max. 10 kg for women ï max. 5 kg for pregnant women For weights above the given values use suitable lifting appliances and handling equipment!
Danger from tipping or falling loads!	Prior to transport and handling make sure that all components are securely assembled and secure or remove all components the fasteners of which have been loosened! When transporting with lifting equipment, observe the following basic rules: ï The load capacity of the elevators and the means of taking the load must be at least equal to the weight of the unit. ï The weight of the apparatus can be found in the section on "TECHNICAL DATA" ï The group must be set so as not to tip over and can not fall. ï Do not place under suspended loads!

5. INSTALLATION

CAUTION!

For an installation that differs from the following specifications, it is necessary to inquire with the Service Department!

Ambient conditions:

The unit is suitable for installation in environment temperature max. of +40°C, min. of -20°C and maximum relative humidity of 90%.
For values of relative humidity higher than 90% are needed units with protective treatment (contact customer service). When properly installed in the open, the pump-motor unit must be protected from exposure to intensive sunlight, e.g. by attaching a protective roof. Otherwise, no special protective devices against the effects of weathering are required.

Minimum distances

To ensure adequate cooling unit, you must strictly observe the minimum distances against the fan guard and front of the blower. See chapter "Mechanical Data", Section "Minimum distances"

CAUTION!

To ensure sufficient cooling of the pump-motor unit the ventilation screens and openings must remain clear and the discharge air of other units may not be directly sucked in again!

Noise radiation:

To reduce the noise radiation, the following must be observed:

- ï Do not mount pump-motor unit on noise- conducting or noise-radiating parts (e.g. thin walls or sheet-metal plates).
- ï Provide pump-motor unit with sound- insulating intermediate layers (e.g. rubber buffers under the base of the pump-motor unit) if necessary.
- ï Install the pump-motor unit on a stable foundation or on a rigid mounting surface. This provides for smooth, low-vibration running of the pump-motor unit.

Components for reducing noise on the pump- motor unit:

- ï Mufflers: (included as standard equipment): On delivery the pump-motor units are equipped with attached mufflers as standard. The noise radiation is considerably reduced by the mufflers
- ï Additional silencer: The additional mufflers enable a further noise reduction. They may only be used with free entry and exit of gases, i.e. with direct intake out of or direct feeding into the atmosphere without piping.
- ï Sound protection hood: available as accessory.

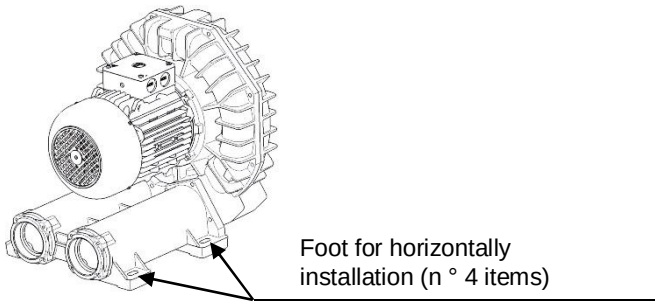
5.1 INSTALLATION IN HORIZONTAL OR VERTICAL OF THE AXIS

For the installation of the following variants are possible with different position of the motor:

- ï Horizontally installation
- ï Vertically installation on the cover of the unit

Horizontally installation

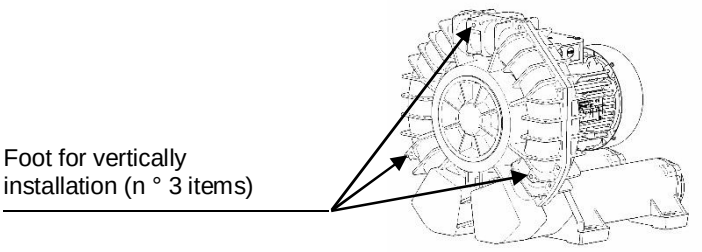
The foot of the group is provided with 4 fixing holes.
Tighten the foot to the base / foundation, inserting 4 antivibration elements (available as accessories).



Vertically installation on the unit cover

When installed vertically in the cover unit using 3 antivibration elements (available as accessories).

Fix the antivibration elements on the front cover of the unit.
Fix the assembly to the supporting surface / foundation.



CAUTION!
Do not fasten the unit to the wall or vertical surface. Order to satisfy this demand, there should be a platform / plate on the wall and on which to set the unit placing it on the cover as shown in the ñVertically installation in the unit cover**"**

DANGERS THAT CAN BE ENCOUNTERED DURING THE INSTALLATION

The following table illustrates the dangers that may be encountered during the installation, the possible consequences and preventative measures suggested.

DANGER	**Preventive measures to adopt**
Improper use of the unit can result in serious or even fatal injuries!	Have you read the safety precautions in Chapter 1, "Safety"? Otherwise you many not carry out any work with or on the pump-motor unit!
Danger from missing view into area of pump- motor unit!	When operating the control elements without a view into the area of the pump-motor unit, there is a danger that the pump-motor unit will be switched on while other persons are still performing work on it. Extreme injuries are possible! Provide control elements at a location with a view of the pump-motor unit.

Electrical danger!	The pump-motor unit must be installed so that the electrical device cannot be damaged by external influences! In particular, the feed pipes must be securely routed, e.g. in cable ducts, in the floor etc.
Danger from balance damage caused by vibration!	Vibrating environments can cause balance damage! Install the pump-motor unit on a solid foundation or on a solid mounting surface. Check screw glands/unions for mounting the pump-motor unit on the mounting surface regularly for strength and firm seating.
Danger from crushing due to pump-motor unit tipping over!	Wear personal safety equipment (protective gloves and safety shoes). Handle the unit with the appropriate care. Install the pump-motor unit on a solid foundation or on a solid mounting surface! Check screw glands/unions for mounting the pump-motor unit on the mounting surface regularly for strength.
Danger of fire from flammable substances!	The pump-motor unit must never come into contact with flammable substances.
Danger of burns from hot surfaces of the pump-motor unit and from hot fluids!	High temperatures of up to approx. 160°C can occur on the surface of the pump-motor unit. The pump-motor unit must be installed so that accidental touch of its surface is not possible. Cover the pump-motor unit with a suitable touch protection (e.g. perforated plate cover or wire cover).
Danger of injuries from flying parts!	Select installation so that parts that are thrown out through the grate if the external fan breaks cannot hit persons!
Danger of tripping and falling!	Make sure the unit does not present a danger of tripping. Lay cables and pipes so that they cannot be reached during operation(recessed in floor, in ducts on the wall etc.).
Danger of overheating due to hot surface of pump-motor unit!	High temperatures can occur on the surface of the pump-motor unit. Temperature sensitive parts, such as lines or electronic components, may not come into contact with the surface of the pump-motor unit.

5.2 ELECTRIC MOTOR CONNECTION

Work on electrical installations must be performed only by qualified electricians.

DANGERS THAT CAN BE ENCOUNTERED DURING THE ELECTRICAL CONNECTION

The following table illustrates the dangers that may be encountered during the electrical connetion, the possible consequences and preventative measures suggested.

 **DANGER**	**Preventive measures to adopt**
Electrical danger!	Malpractice can result in severe injuries and material damage!
	The electrical connection may be carried out by trained and authorized electricians only!
	Before beginning work on the unit or system, the following measures must be carried out: ï Turn off the power to adopt measures to prevent a reinsertion, ï Verify the absence of tension, ï Make the connection to earth and short circuit, ï Isolating or prohibiting the neighboring parts under power.

Electrical danger!	Incorrect connection of the motor can lead to serious damage to the unit!
	The terminal box must be free from foreign bodies, dirt and humidity. Terminal box cover and cable entries must be tightly closed so as to make them dustproof and waterproof. Check for tightness at regular intervals.
	Clearance between bare live parts and between bare live parts and ground: at least **5.5 mm** (at a nominal voltage of U_N Ò690V). There may be no protruding wire ends!
	There is danger of an electrical shock when a defective pump-motor unit is touched! Mount motor circuit breaker. Have electrical equipment checked regularly by an electrician.

Standards:

The electrical connection must be made accordingly to the applicable national and local ordinances, provisions and requirements as well as prescriptions for specific plants.

Electrical supply:

See electrical data on the motor plate.
Conditions of installation place must be accordingly to data indicated on the motor plate.
Allowed divergences, without loss of efficiency:

±10% of the nominal voltage

±2% of the nominal frequency

Wiring box connection of electrical motor:

Make the connection as described in the wiring diagramm into the terminal box.

Connect the ground wire to the terminal with the following symbol ofgrounding: 

Electrical connection must be made as follow:

- ï The electrical connection must ensure endurance safety.
- ï Must not protrude wire ends.
- ï Clearance betweenbare parts under voltage and ground : at least 5.5 mm (at nominal voltage Un 690V).
- ï In case of terminals with jumpers (i.e. according to DIN 46282) put the conductors so that atboth sides of the terminals are at approximately at the same height.
- ï So it is necessary to bend U-shaped conductors or some must be affixed with an anchor cable (DIN 46234).

The same thing is applied to :

- ï the ground wire,
- ï the outer ground.

The conductor and the wire are recognizable bytheir color (green-yellow).

To protect the motor against overload:

Use current limiter or thermal protections.
Must be adjusted to therated current (see data plate of the motor).

Starting rate

Units equiped with electrical motors till 15kW : 30 starting/hour at intervals equally distributed.
Unitsequipped with electric power over 15 kW: 15 starting/hour at intervals equally distributed.

Operation with frequency converter

Electrical motors installed on our units are suitable for operation with static frequency converters, taking into account the following remarks:

- ï peak voltage Ò1460V,
- ï dV / dT Ò 13 kV/µs *

High-frequency current and voltage harmonics in the motor supply cables can lead to emitted electromagnetic interference. This is dependent on the converter design (type, manufacturer, interference suppression measures).
Be sure to observe the EMC notes of the converter manufacturer!
Use screened power supply cables if necessary. For optimal screening, the screen must be conductively connected over a large area to the metal terminal box of the drive motor with a screwed metal gland.

Maximum operating frequency depends of the unit model (see characteristics data) and of the power of electrical motor installed.
*) for peak voltages or dV/dT higher than values above mentioned, special insulation is required.

Direction of rotation

The direction of rotation of the shaft is marked by an arrow on the fan guard of the electric motor.

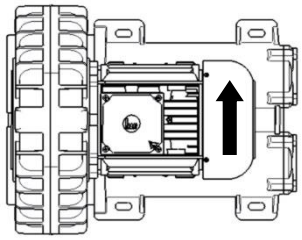


Fig. 1

5.3 CONNECTING THE UNIT TO THE SYSTEM

CAUTION!
To prevent foreign bodies from entering the unit, all connections are sealed off when delivered. Do not remove the sealing plugs until immediately before connecting the pipes/hoses!

The following applies for the arrangement of the pipe/hose connections:
The **pumped gases** are sucked in via the inlet connection (see chapter 5.3.1) and discharged via the discharge connection (see chapter 5.3.2).

The **delivery direction of the gases** is marked with arrows on both connections.

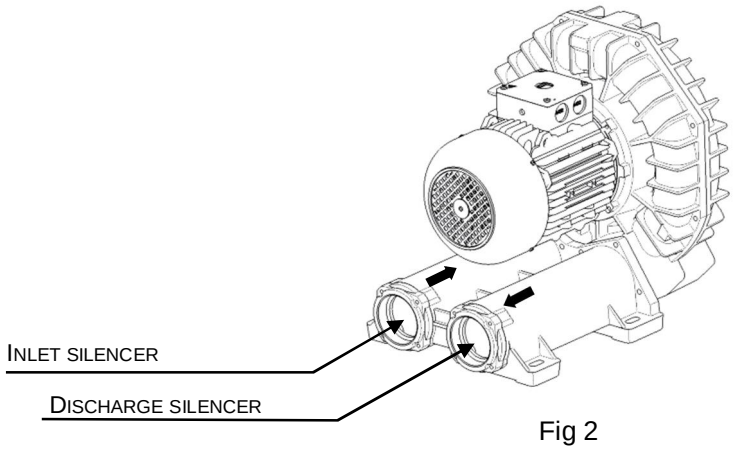


Fig 2

Note
Attach pipes / hoses in order do not perceive mechanical tension.
Support the weight of the pipes / hoses with external the unit (do not use the blower to support the pipes).

5.3.1 INLET SILENCER

The inlet connection (fig. 2) is marked with an arrow pointing into the blower. Connect the inlet pipe here. The pumped gases are sucked in via this. Procedure: see Chapter 5.3.3.

5.3.2 DISCHARGE SILENCER

The discharge connection con il relativo silenziatore (fig. 2) is marked with an arrow pointing out of the blower. Qui viene collegata la tubazione di mandata. Connect the discharge pipe here. The pumped gases are discharged via this. Procedure: see Chapter 5.3.3.

5.3.3 PROCEDURE WHEN CONNECTING PIPES/HOSES

Attach the pipes/hoses to the unit as described in the following.

- ï remove the flanges from the muffler to make connections with flexible connectors, avoiding rigid connections that may cause tensions and cause vibration harmful.
- ï Reinstall the flange on the muffler full of seals and tighten the screws.

DANGERS THAT CAN BE ENCOUNTERED DURING THE CONNECTION

The following table illustrates the dangers that may be encountered during the connetion, the possible consequences and preventative measures suggested.

 **DANGER**	**Preventive measures to adopt**
Danger from rotating impeller: Cutting/cutting of off extremities!	The rotating impeller is accessible with the inlet and discharge connections open! With free entry and exit of gases, i.e. with direct intake out of or direct feeding into the atmosphere without piping, the following therefore applies: Provide the inlet and discharge connections of the pump-motor unit either with additional mufflers or with additional piping of a sufficient length to prevent access to the impeller!
Danger from interchanging inlet and pressure line!	Interchanged inlet and pressure lines can lead to damage to the pump-motor unit and the system, and as a result of this to serious injuries! Make sure that the inlet and pressure line cannot be confused when connecting. Look for the clear marking with the arrow indicating the delivery direction on the inlet and discharge connections.
Danger due to overpressure and depression! **Danger due to escaping service!**	Both pipes and containers connected in function are under excessive pressure and / or depression! Use only fasteners, connections, pipes, fittings and tanks with a tight seal and strength sufficient for the pressures that are created. Ensure that the fasteners and connections are tight and good contact!
Danger from solid bodies and impurities in the pump-motor unit!	If solid bodies penetrate into the pump-motor unit, blades of the impellers can break and broken pieces can be thrown out. Install a filter in the inlet pipe. Replace filter regularly!

5.3.4 RELIEF VALVE TO LIMIT OVERPRESSURE / VACUUM

All units must be equipped with a relief valve to limit overpressure or vacuum. If you were not specifically request a regulation of pressure / vacuum different, set the relief valve to the overpressure / vacuum on its maximum pressure / vacuum allowable indicated on nameplate.

5.3.5 INTAKE AIR FILTER

All equipment must be provided on the suction side of an air filter with a maximum filtering capacity of 25ε m
Cleaning or replacement of the filter must be done in function to the air flow and to the amount of dust and dirt in the environment and in the fluid aspirated.

6. COMMISSIONING

The starting up the unit must only be:

- ï In compliance with the purposes of use, listed in ñINTENDED USEò;
- ï in compliance with the values indicated in the nameplate;
- ï after analyzing the prohibitions and requirements listed in " IMPROPER USE PREDICTABLE";
- ï after considering the risks identified in " RESIDUAL RISKS".

CAUTION!
Before commissioning the device, ensure that neither the intake silencer nor the outlet silencer are clogged or dirty!

DANGERS THAT CAN BE ENCOUNTERED DURING COMMISSIONING

The following table illustrates the dangers that may be encountered during commisioning, the possible consequences and preventative measures suggested.

 **DANGER**	**Preventive measures to adopt**
Improper use of the unit can result in serious or even fatal injuries!	Have you read the safety precautions in Chapter 1, "Safety"? Otherwise you many not carry out any work with or on the pump-motor unit!
Danger from rotating parts (external fan, impeller, shaft): Cutting/cutting off of extremities, Grasping/winding up of hair and clothing! **Danger due to vacuum and gauge pressure: sudden escape of fluids (skin and eye injuries), sudden drawing in of hair and clothing!** **Danger due to escaping fluid: Burns!**	Start-up and operation only under the following conditions: The pump-motor unit must be completely assembled. When doing so, pay particular attention to the following components: ï the vacuum pump/compressor cover, ï the muffler on inlet and discharge connections, ï the fan guard. The pipes/hoses must be connected to inlet and discharge connections. Inlet and discharge connections and the connected pipes/hoses may not be closed, clogged or soiled. Check the mounting elements, connections of the pipe/hose connections, lines, fittings and containers for strength, leaks and firm seating at regular intervals!
Danger from closed connections!	With closed/soiled intake or discharge connections vacuum or gauge pressure results in the pump-motor unit. This can overheat and damage the drive motor winding. Before start-up, make sure that the inlet and discharge connections are not closed, clogged or soiled!
Danger due to rotating parts! **Danger due to vacuum and gauge pressure!** **Danger due to escaping fluid!**	Test runs may also only be conducted with the pump-motor unit completely mounted.
Electrical danger!	The electrical connection may be carried out by trained and authorized electricians only! Before beginning work on the unit or system, the following measures must be carried out: ï Turn off the power to adopt measures to prevent a reinsertion, ï Verify the absence of tension, ï Make the connection to earth and short circuit, ï Isolating or prohibiting the neighboring parts under power.
Danger of hearing damage due to noise radiation!	For the noise emission of the pump-motor unit measured by the manufacturer, see the nameplate of the unit.

6.1 PREPARATION

Measures before start-up:

If a shut-off device is installed in the discharge pipe:

- Make sure that the unit is NOT operated with the shut-off device closed.
- Before starting up the pump-motor unit, observe the values specified on the rating plate,
- Specifications on the drive-motor nominal current apply at a gas entry and ambient temperature of -15°C / +40° C,
- Check the motor circuit breaker to the drive- motor nominal current.

Check direction of rotation:

- The intended rotating direction of the shaft is marked with arrows on the fan guardo f the electric motor (fig. 1).
- The gas delivery direction is marked with arrows on the inlet and discharge connections (fig. 2).
- Make sure the pipes/hoses on the inlet and discharge connections are properly connected.
- Switch the pump-motor unit on briefly and then off again. Compare the actual rotating direction of the external fan with the intended shaft rotating direction indicated with the arrows shortly before the pump-motor unit comes to a standstill.
- If necessary, reverse the direction of rotation of the motor.

Check the operating parameters (pressure / vacuum, current consumption):

Respect the allowable working pressure or vacuum indicated on the nameplate of the unit. These values must not be exceeded, if not worsen the emission of noise, the characteristic of the oscillation, the duration of the grease and the periodicity of the replacement of bearings and there is a risk of burning of the electric motor and the locking of the impeller.

Measure the current consumption of the engine and compare it with the nominal value.

For data on noise emissions measured by the manufacturer of the unit see the nameplate of the unit.
The actual emission of noise during operation depends on the conditions of installation and placement of the implant.

After mounting the unit in the plant to measure the level of noise during operation. The following measures can be taken from 85 dB (A) and must be taken from 90 dB (A):

- Mark the noisy area with warning signs.
- Wear a hearing protection.
- In case of free entry and exit of gases, that is during direct extraction from the atmosphere or direct discharge into the atmosphere without casing mount additional silencers.

Measuring vibrations:

Perform reliefs of vibration velocity [mm / s] using electronic vibrometer, as described below:

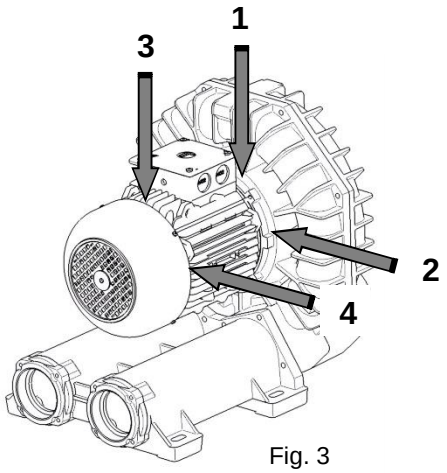


Fig. 3

- **Position 1 e 2 (front bearing):** the tip of the vibrometer must be placed in the direction perpendicular to the axis motor on the surface of the body in proximity of the bearing housing in the positions shown in fig 3. Take a reading by recording the highest value,

- **Position 3 e 4 (rear bearing):** the tip of the vibrometer must be placed in the direction perpendicular to the axis motor on the surface of the electric motor in proximity of the bearing housing in the positions shown in fig 3. Take a reading by recording the highest value.

The results must be evaluated by comparing the maximum speed value measured with the limits laid down for the zones (A, B) shown in the table below:

Effective vibration speed value [mm/s]	***Class I*** (Ò15kW)
3.5	***A***
4.5	***B***

Effective vibration speed value [mm/s]	***Class II*** (> 15kW)
4.0	***A***
5.0	***B***

Legend:

Machine classification:

Classe I = Unit with electric motor power Ò15kW
Classe II = Unit with electric motor power > 15kW

Evaluation zones:

Zone A = Unit with vibrations within this zone are considered acceptable for long-term service.

Zone B = Unit with vibrations within this zone are considered unsuitable for continuous long-term service. Under these conditions the machine can be operated for a limited period, until the opportunity arises for suitable corrective work to be done.

CAUTION!

Vibration values exceeding zone B (table of effective vibration speed values) are considered NOT admissible and may cause damage to the machine and resulting serious injury!

6.2 START-UP AND SHUT-DOWN

Start-up

- ï Open shut-off device in intake/discharge pipe.
- ï Switch on power supply for drive motor.

Shut-down

- ï Switch off power supply for drive motor.
- ï Close shut-off device in intake/discharge pipe.

7. OPERATION

DANGERS THAT CAN BE ENCOUNTERED DURING OPERATION

The following table illustrates the dangers that may be encountered during operation, the possible consequences and preventative measures suggested.

 **DANGER**	**Preventive measures to adopt**
Improper use of the unit can result in serious or even fatal injuries!	Have you read the safety precautions in Chapter 1, "Safety"? Otherwise you many not carry out any work with or on the pump-motor unit! Also **be sure** to read the safety precautions in Chapter 6, "Commissioning"!
Danger of burns from hot surfaces of the pump-motor unit and from hot fluids!	High temperatures of up to approx. 160°C can occur on the surface of the pump-motor unit. Do not touch during operation! Allow to cool after shut-down!
Danger of overheating due to hot surface of pump-motor unit!	High temperatures of up to approx. 160°C can occur on the surface of the pump-motor unit. Temperature sensitive parts, such as lines or electronic components, may not come into contact with the surface of the pump-motor unit.
Danger of rusting due to collection of condensed water in drive motor area!	On drive motors with closed condensed water openings: Remove closures occasionally to allow any water which has collected to drain off.
Danger of bearing damage!	Heavy mechanical impacts must be avoided during operating and while at a standstill.

8. SHUT-DOWN AND LONGER STANDSTILLS

8.1 PREPARING FOR SHUT-DOWN OR LONGER STANDSTILL

Prior to shut-down or longer standstill, proceed as follows:

- ï Switch off the pump-motor unit.
- ï Close shut-off device in inlet and pressure line if installed.
- ï Disconnect pump-motor unit from power supply.
- ï Release pressure. When doing so, open pipes/hoses slowly and carefully so that the vacuum or gauge pressure in the pump-motor unit can be released.
- ï Remove pipes/hoses.
- ï Provide mufflers on inlet and discharge side with sealing plugs.

DANGERS THAT CAN BE ENCOUNTERED DURING SHUT-DOWN OPERATIONS

The following table illustrates the dangers that may be encountered during shut-down operations, the possible consequences and preventative measures suggested.

 **DANGER**	**Preventive measures to adopt**
Improper use of the unit can result in serious or even fatal injuries!	Have you read the safety precautions in Chapter 1, "Safety"? Otherwise you many not carry out any work with or on the pump-motor unit! All maintenance work on the pump-motor unit must always be performed by the Service Department! Maintenance work on the pump-motor unit may only be conducted by the operator itself when the related **maintenance manual** on hand!
Danger of rusting due to collection of condensed water in drive motor area!	On drive motors with closed condensed water openings: Remove closures occasionally to allow any water which has collected to drain off.
Danger of bearing damage!	Avoid mechanical shocks during operation and shut-down.

8.2 STORAGE CONDITIONS

To prevent standstill damage during storage, the environment must provide the following conditions:

- ï dry,
- ï dust-free,
- ï low-vibration (Veff 2,8 mm/s).
- ï Ambien temperature: min. -30°C / max. 40°C.

Lubrication of rolling bearings after longer storage:

The new pump-motor unit may at first be stored following delivery. If the time from deliver to commissioning exceeds the following periods, the lubrication of the rolling bearings must be renewed:

- ï Under advantageous storage conditions (as specified above): 4 years..
- ï Under disadvantageous storage conditions (e.g. high humidity, salty air, sandy or dusty air): 2 years.

In this case be sure to inquire with the Service Department. In particular, exact information with regard to the procedureand grease type are required.

Commissioning after longer standstill:

Before recommissioning after a longer standstill, measure the insulation resistance of the drive motor. With values Ò1 kÝ per volt of nominal voltage, the winding is too dry.

9. PREVENTIVE MAINTENANCE

9.1 EMPTYING/RINSING/CLEANING

Before any maintenance/servicing work, empty, rinse and clean the outside of the unit.

- Empty unit with air and rinse until all residues have been removed.
- Clean the outside of the unit with compressed air.

taking care of the following measures:

- Wear gloves and protective safety glasses.
- Secure the surrounding area.

DANGERS THAT CAN BE ENCOUNTERED DURING MAINTENANCE OPERATIONS

The following table illustrates the dangers that may be encountered during maintenance operations, the possible consequences and preventative measures suggested.

DANGER	**Preventive measures to adopt**
Improper use of the unit can result in serious or even fatal injuries!	Have you read the safety precautions in Chapter 1, "Safety"? Otherwise you many not carry out any work with or on the pump-motor unit! All maintenance work on the pump-motor unit must always be performed by the Service Department! Maintenance work on the pump-motor unit may only be conducted by the operator itself when the related maintenance manual on hand! Inquire with the Service Department!
Danger of pollution!	During emptying, washing and cleaning outside the group are in danger of polluting the environment. Take the necessary precautions to avoid spreading harmful substances and / or harmful to the environment or human health.

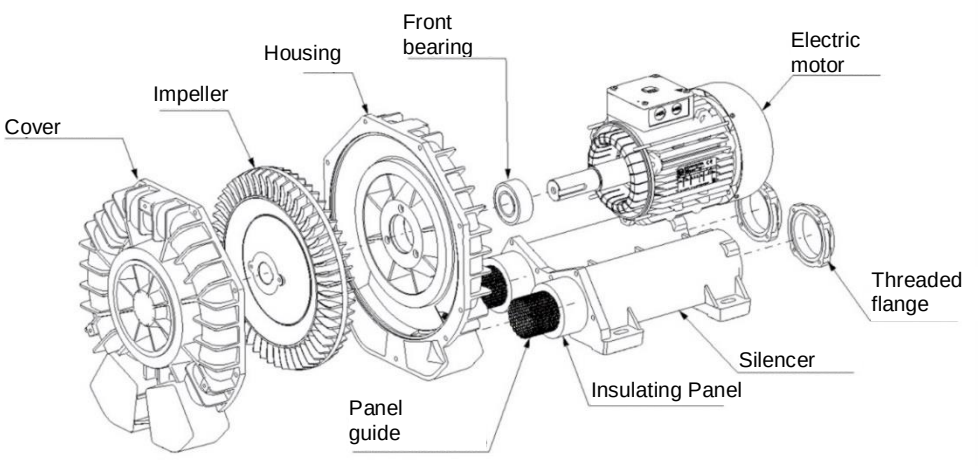
9.2 SERVICE/AFTER-SALES SERVICE

Our Service is available for work (in particular the installation of spare parts, as well as maintenance and repair work), not described in these operating instruction.

Observe the following when **returning** pump- motor unit:

- The pump-motor unit must be delivered complete, i.e. not dismantled.
- The pump-motor unit may not present a danger to the workshop personnel.
- The original rating plate of the pump-motor unit must be properly mounted, intact and legible. All warranty claims are voided for pump-motor units delivered for a damage expertise without the original rating plate or with a destroyed original rating plate.
- In case of warranty claims, the manufacturer must be informed of the operating conditions, operating duration etc. and additional detailed information provided on request if necessary.

9.3 SPARE PARTS LIST



10. DISPOSAL

Have the entire pump-motor unit scrapped by a suitable disposal company. No special measures are required when doing so.
For additional information on disposing of the unit, ask the Service Department.

11. COMMERCIAL CONDITIONS AND WARRANTY

All undertakings, agreements, or legal relations are governed by the relevant sales contract. These are in no way limited by the contents of this manual.

The quality of the materials and workmanship is guaranteed, as indicated in the general sales conditions.

Guarantees are regulated by the general conditions of sale.

12. TROUBLESHOOTING

Fault	Cause	Remedy	Carried out by
Motor does not start; no motor noise.	At least two power supply leads interrupted.	Eliminate interruption by fuses, terminals or power supply cables.	Electrician
Motor does not start; humming noise.	One power supply lead interrupted.	Eliminate interruption by fuses, terminals or power supply cables.	Electrician
	Impeller is jammed.	Open vacuum pump/compressor cover, remove foreign body, clean.	Service*)
		Check or correct impeller gap setting if necessary.	Service*)
	Impeller defective.	Replace impeller.	Service*)
	Rolling bearing on drive motor side or vacuum pump/compressor side defective.	Replace motor bearing or vacuum pump/compressor bearing.	Service*)
Protective motor switch trips when motor is switched on. Power consumption too high.	Winding short-circuit.	Have winding checked.	Electrician
	Motor overloaded. Throttling does not match specification on rating plate.	Reduce throttling.	Operator
		Clean filters, mufflers and connection pipes if necessary.	Operator
	Compressor is jammed.	See fault: "Motor does not start; humming noise." with cause: "Impeller is jammed".	Service*)
Pump-motor unit does not generate any or generates insufficient pressure difference.	Leak in system.	Seal leak in the system.	Operator
	Wrong direction of rotation.	Reverse direction of rotation by interchanging two connecting leads.	Electrician
	Incorrect frequency (on pump-motor units with frequency converter).	Correct frequency.	Electrician
	Shaft seal defective.	Replace shaft seal.	Service*)
	Different density of pumped gas.	Take conversion of pressure values into account. Inquire with Service Department.	Service*)
	Change in blade profile due to soiling.	Clean impeller, check for wear and replace if necessary.	Service*)
Abnormal flow noises.	Flow speed too high.	Clean pipes. Use pipe with larger cross-section if necessary.	Operator
	Muffler soiled.	Clean muffler inserts, check condition and replace if necessary.	Service*)
Abnormal running noise.	Ball bearing lacking grease or defective.	Regrease or replace ball bearing.	Service*)
Compressor leaky.	Seals on muffler defective.	Check muffler seals and replace if necessary.	Service*)
	Seals in motor area defective.	Check motor seals and replace if necessary.	Service*)

*) Only when the maintenance manual is at hand: rectification by the operator.

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CE

DICHIARAZIONE DI CONFORMITA' CE

EC DECLARATION OF CONFORMITY

Produttore:
Producer
italBLOWERS S.r.l.
Via Gaetano Donizetti, 47
20122 Milano (MI) Italia

Prodotto :
Product
Soffiante a Canale Laterale, Serie X / *Side Channel Blower, X Serie*

Modelli / *Models*

X1.10 / X1.14 / X1.20 / X1.28 / X1.40 / X1.50 / X1.70 / X1.85
X2.05 / X2.07 / X2.10 / X2.14 / X2.20 / X2.25 / X2.35 / X2.42
D1.140 / D1.170 / D2.50 / D2.70 / D2.85

Esecuzione / *Execution*

SM

Le Soffianti a Canale Laterale sopra descritte soddisfano le seguenti Direttive/Norme comunitarie :
The Side Channel Blowers above mentioned are in conformity with the following standards :

2004/108/CE
Direttiva 2004/108/CE concernente la Compatibilità Elettromagnetica e che abroga la direttiva 89/336/CEE.
Low Voltage Directive 2004/108/CE related to Electromagnetic Compatibility that abolish the Directive 89/336/EEC.

2006/42/CE
Direttiva Macchine 2006/42/CE relativa alle macchine e che modifica la direttiva 95/16/CE.
Machinery Directive 2006/42/EC related to machinery and amending the Directive 95/16/EC.

È stata rispettata la Direttiva 2006/95/CE per quanto attiene i relativi obiettivi di protezione.
The protection targets of the directive 2006/95/EC have been met.

Norme applicate:
Standards applied:

EN 1012-1:1996
Compressori e pompe per vuoto ï Requisiti di sicurezza ï Parte 1: Compressori
Compressors and vacuum pumps ï Safety requirements ï Part 1: Compressors

EN 1012-2:1996
Compressori e pompe per vuoto ï Requisiti di sicurezza ï Parte 2: Pompe per vuoto
Compressors and *vacuum pumps ï Safety requirements ï Part 2: Vacuum pumps*

Il Fascicolo tecnico elaborato secondo Allegato VII della Direttiva Macchine 2006/42/CE viene conservato presso la sede della società italBLOWERS S.r.l. a Milano (MI), via Gaetano Donizetti 47.

italBLOWERS S.r.l. in Milano (ITALY), Via Gaetano Donizetti 47, store the Technical Files developed according Annex VII of Machinery Directive 2006/42/CE.

Milano (MI), 18.04.2014

Luis Enrique Sagastegui Alfaro
Amministratore Delegato
Managing Director

(Firma / Signature)