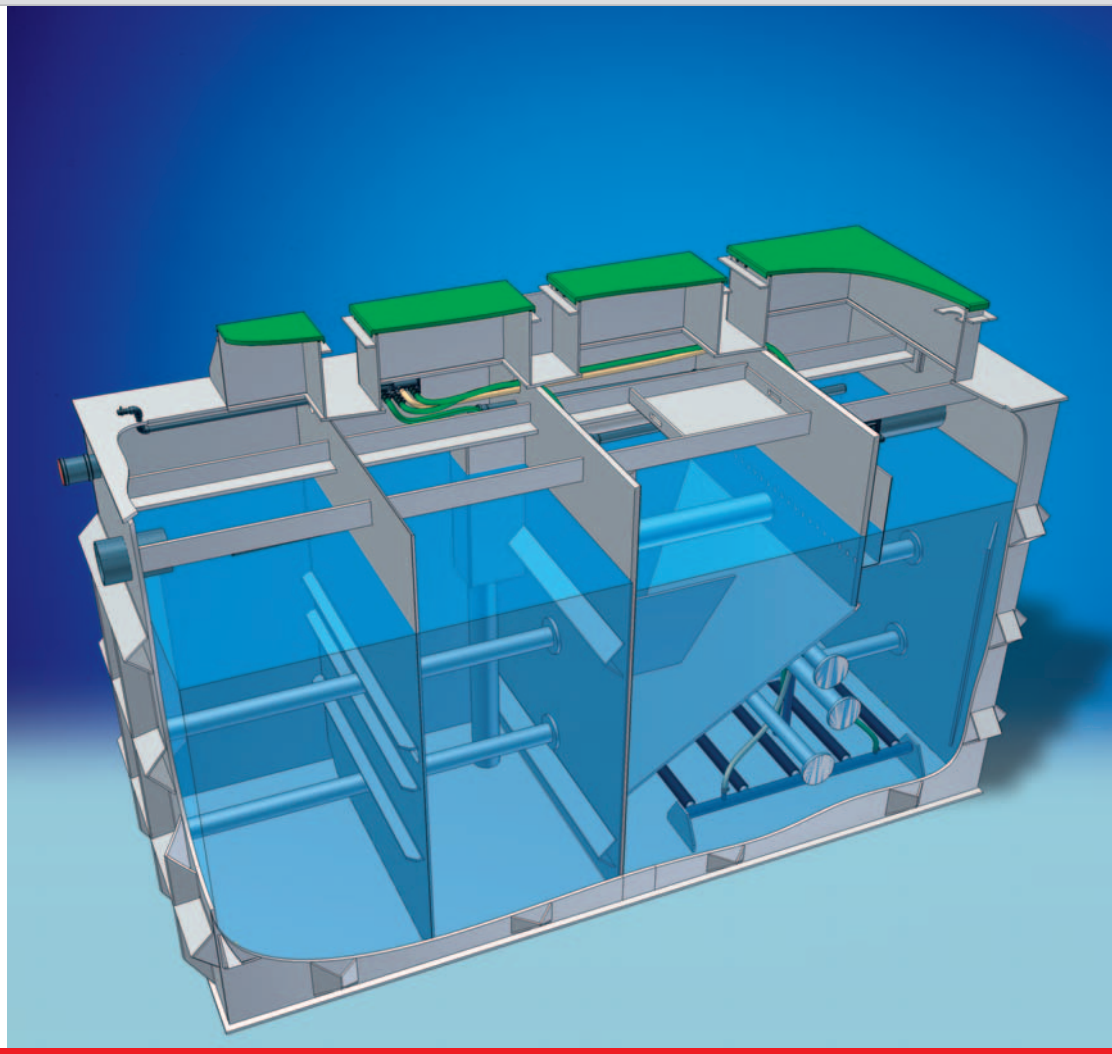
Operation manual



Waste water treatment plant

ACO ClarA

19-38, 24-48, 30-60, 38-76, 48-96, 60-100

Operation manual
ACO Clara

List of contents:

Operation manual
ACO Clara

1 Introduction

This manual is valid for type line: ACO Clara 19-38
ACO Clara 24-48
ACO Clara 30-60
ACO Clara 38-76
ACO Clara 48-96
ACO Clara 60-120

When you are fully familiarized with this document, you will be able to understand all the functions of ACO Clara waste water treatment plants (hereinafter referred to as plants) and to ensure their safety and reliable operation.
If all the instructions given in this manual are followed it will ensure compliance with all safety instructions for the operation of plants, corresponding with currently valid standards, rules, and safety procedures.
Following other operating procedures than those laid down in this manual without the manufacturer's approval would be considered as unsuitable or otherwise unsatisfactory and would result in a loss of the ability to claim for repair under guarantee within the guarantee period.

The illustrations used in this manual are only of an informative character and they are not necessarily in accord with your type of plant.

You will meet some important warnings highlighted in this manual:

Warning, which if not respected, may cause a risk for persons or property, eventually resulting in serious damage to the treatment effect.

Important warning for proper plant operation.

Other important warnings.

1.1 What water we can treat

The ACO Clara plants were designed for the treatment of municipal waste water. This water, which is dumped from houses or services, is produced mainly as a product of the human metabolism and household activities (domestic sewage). It can originate in households by the connection of a WC, bathrooms and kitchens. Contact the manufacturer in the event of any origin of domestic sewage other than the above-mentioned ones.

Grease must be removed from the water from industrial kitchens using an appropriate grease separator.

Rainwater or other ballast waters must not be allowed to flow into the plant.

The usage of garbage disposal units significantly increases the mass load of waste water and has to be taken into account when choosing the correct size for the plant.

The treatment effect is developed as a result of the activities of microorganisms, which could be seriously damaged by the composition of the waste water on the inlet side.

The waste water must not contain:
Oil products, paints, and solutions
Acids and alkalis
Heavy metals
Drugs and toxins

In relation to the biological system providing the treatment effect, allowance should be made in regard to the following activities:
Disinfection – disinfectants should be used to such an extent that they do not harm the bacteria in the plant. Sanitary hygiene disinfectants are intended for the elimination of microorganisms and so they can be used only to a limited extent.
Fats and oils – a large quantity of used fats and oils significantly impairs the living conditions for bacteria.
Washing clothes – it is recommended to use detergents that are biologically well degradable and to avoid the frequent washing of clothes within a short period.

2 Safety

2.1 General requirements regarding occupational safety

All work related to the operation and maintenance of the plant should only be performed by persons manually and mentally qualified for such activity, namely after thorough familiarization with this manual. In the course of this work the stress must be placed on the safety of the persons carrying out the work and other persons in the vicinity of the plant.

Do not allow children to come into contact with the plant.

When operating the plant always use protective devices in accordance with the occupational safety provisions.

It is recommended that two persons operate and maintain the plant.

Enter the plant only in the case of necessity. If access to the vessel is needed, the person inside must be safeguarded by a second person outside who is in permanent visual contact.

2.2 Protection against accidents

By electric shock

An electric shock can cause serious health problems or death.

Only persons with suitable electro technical qualifications can access the electrical installation.

Work on electrical equipment or handling it must not be done with wet hands, even in rubber gloves.
Disconnect the line cord immediately if damaged and ensure its repair by a qualified person.
Before doing any work on the electrical equipment it is imperative to check that the electric power is switched off.

By falling inside

The plant is an underground object which has an opening just above ground level, so there is a risk of falling inside.
The interior of the plant can be wet, with a risk of slipping.

Leave the cover open only for the period necessary for the checking, maintenance or servicing of the plant.
Never leave the plant with the cover open.

2.3 Protection against infections caused by waste water

Waste water can become the source of serious infections, so it is undesirable to come into direct contact with the water in the plant.

Disinfect the affected area in the event of direct contact of water from the plant with the skin.
In the event of the ingestion of water or an accident involving direct contact between the injured area and the water, seek medical assistance.

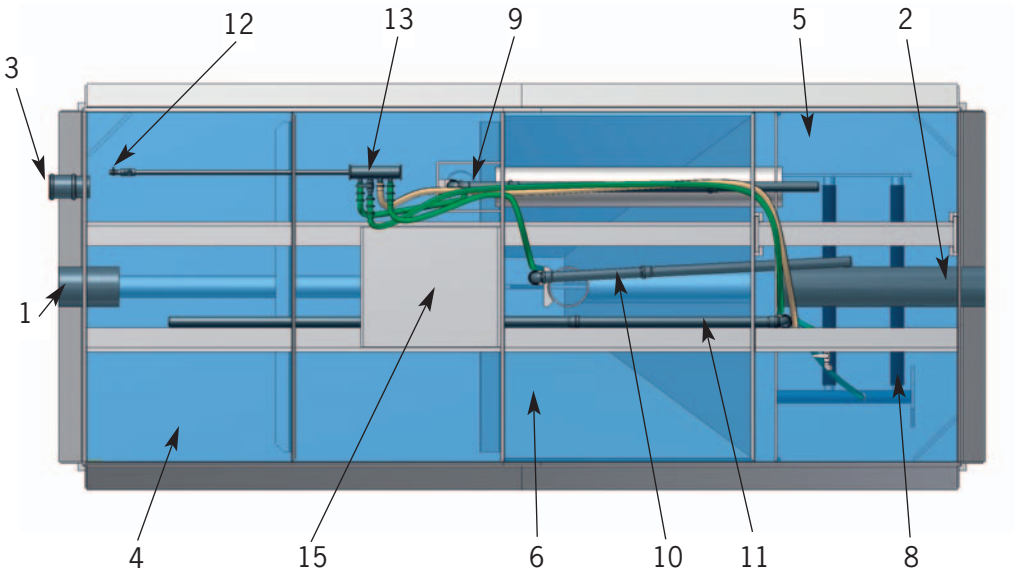
When working with the plant follow the basic sanitary principles; do not smoke and drink. Wash your hands with soap after work.

Tools that have been in direct contact with the plant water must be thoroughly washed and stored in a suitable place.

3 Description of plant

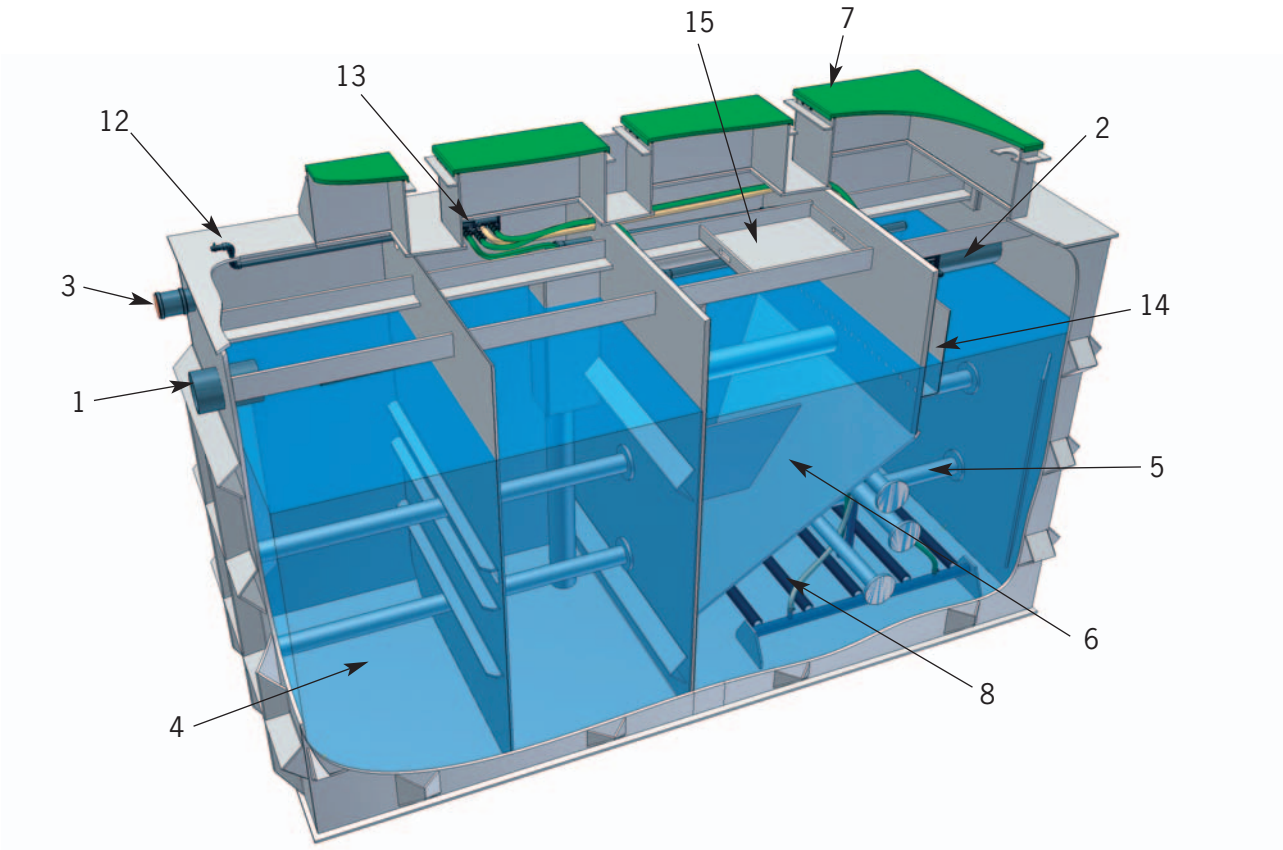
3.1 General description

The waste water treatment plants of the ACO Clara line (hereinafter referred to as plants) consist of a main tank made of polypropylene divided into other technological parts. The sewage water is brought by the inlet pipe (Pos. 1) to the pre-treatment tank. From here the pretreated waste water is pumped to the biological part of the plant, consisting of an aerated activation tank (Pos. 5) and a final sedimentation tank (Pos. 6), from where the treated water is drained by an overflow across the drain of the plant into a outlet pipe (Pos. 2) connected to a storm drain or drained away directly to a receiving body. Accesses to the tank are provided by a fiberglass covers (Pos. 7).



Description:

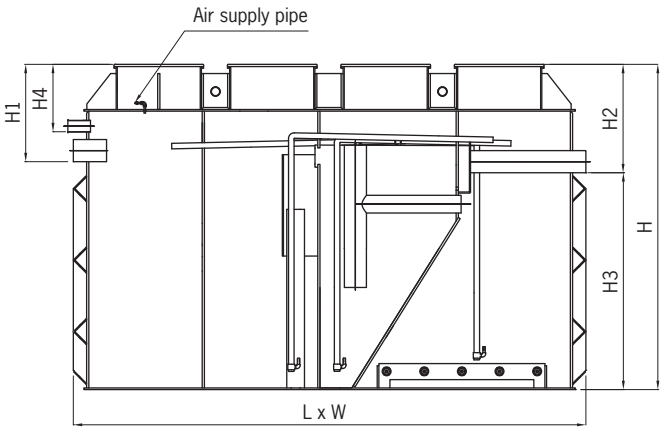
1. inlet pipe
2. outlet pipe
3. ventilation pipe
4. pre-treatment
5. activation tank
6. finally sedimentation tank
7. access cover
8. aeration element
9. raw sewage water air-lift pump
10. return sludge air-lift pump
11. surplus sludge air-lift pump
12. connecting of air supply hose
13. air distributor
14. outlet object
15. manipulation board

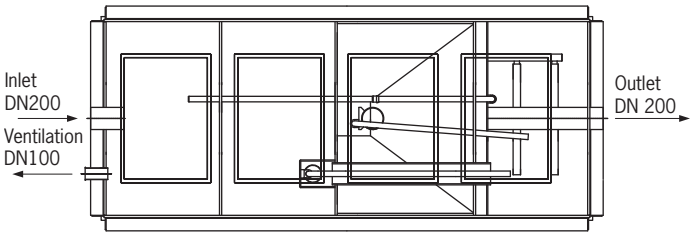


Operation manual
ACO Clara

Technical information

ACO Clara	19 - 38	24 - 48	30 - 60	38 - 76	48 - 96	60 - 120
Nominal size in PE	32	40	50	63	80	100
Nominal hydraulic load [m^3/day]	4.8	6.0	7.5	9.45	12.0	15.0
Nominal biological load BOD_5 [kg/day]	1.9	2.4	3.0	3.7	4.8	6.0
Range of usage						
Number of persons	19 - 38	24 - 48	30 - 60	38 - 76	48 - 96	60 - 120
Hydraulic load [m^3/day]	2.8 - 5.7	3.6 - 7.2	4.5 - 9.0	5.7 - 11.4	7.2 - 14.4	9.0 - 18.0
Biological load BOD_5 [kg/day]	1.14 - 2.28	1.44 - 2.88	1.80 - 3.60	2.28 - 4.56	2.88 - 5.76	3.60 - 7.20



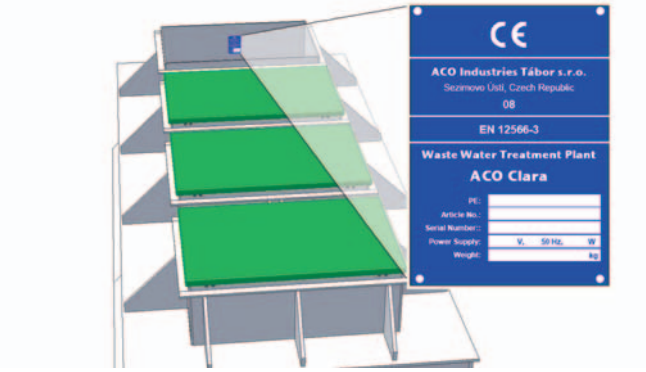


ACO Clara	19 - 38	24 - 48	30 - 60	38 - 76	48 - 96	60 - 120
Lenght L [mm]	3740	4140	4636	5240	5890	7290
Width W [mm]	1740	1890	2036	2190	2390	2390
Height H [mm]	2940	2940	2940	2940	2940	2940
Height of inlet pipe H1 [mm]	880	880	880	880	880	880
Height of outlet pipe H2 [mm]	980	980	980	980	980	980
Depth of water level H3 [mm]	1950	1950	1950	1950	1950	1950
Height of ventilation pipe H4 [mm]	610	610	610	610	610	610
Weight [kg]	1165	1365	1580	1840	2150	2580
Power supply [V/Hz]	230/50	230/50	400/50	400/50	400/50	400/50
Power input [kW]	0.43	0.43	0.75	0.75	0.98	1.30
Article no.	411006	411007	411008	411009	411010	411011

3.2 Check of plant type, nameplate

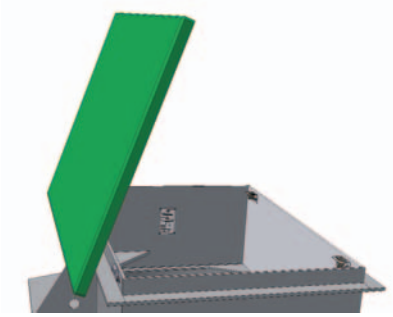
The nameplate is placed under the cover on the wall of the bodywork in accordance with CE certification as per the EN 12566-3 standard.

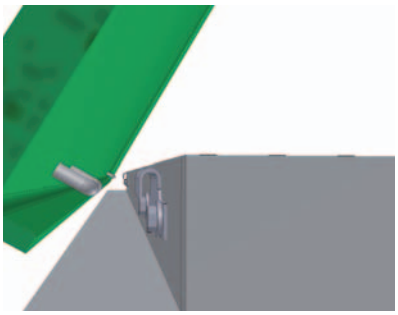
Legend:
PE – scope of usage, number of equivalent inhabitants
Article Number – serves for identification of size and type
Serial Number – serial number
Power Supply – information on installed electric output
Weight – information on weight

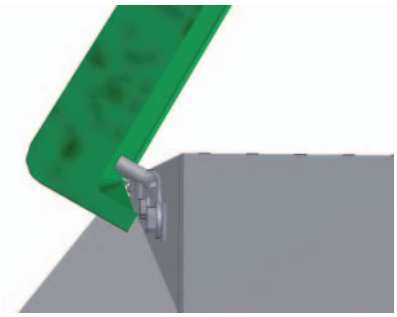


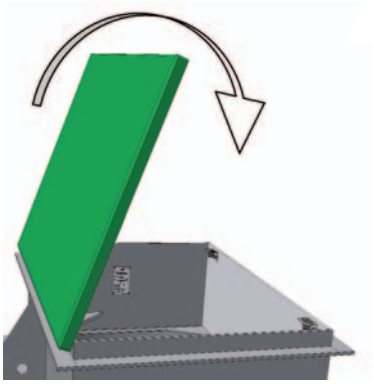
3.3 Cover

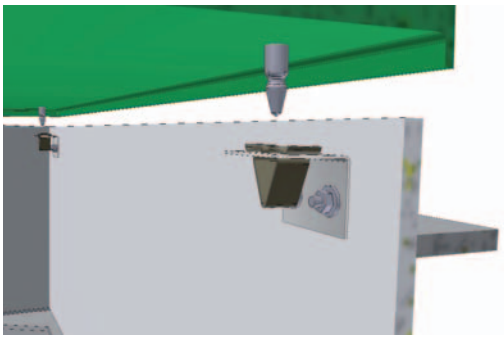
The covers facilitate easy access to the technological parts of the plant. They are made of glass fiber and are fitted with an ingenious locking system that permits easy removal of the cover, together with good protection in its closed state. The upper part consists of an anti-slip layer and there is microporous rubber packing preventing smells from escaping into the vicinity of the plant on the underside. The space between the upper and bottom layers is filled with polyurethane foam.

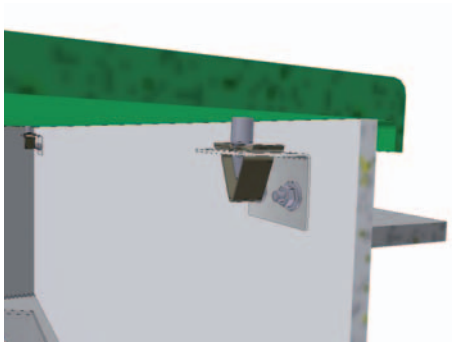












Closing and opening of access cover.

**Leave the cover open only for the period necessary for the checking, maintenance or servicing of the plant.
Never leave the plant with the cover open.**

The plant cover is only suitable for carrying the weight of persons.

3.4 Inlet and outlet pipes

The plant is supplied with firmly fixed built-in inlet (Pos. 1) and outlet pipes (Pos. 2) DN 200. The inlet pipe is labeled INLET and the outlet pipe is labeled OUTLET.

3.5 Air-lift pumps

The pumping of raw water, the recirculation of activated sludge, and the pumping of surplus sludge are performed by air-lift pumps (Pos. 9, 10, 11). These pumps work on the principle of a vertical pipe immersed in the pumped liquid, where the air is supplied to the bottom part (beyond the liquid inlet). This liquid rises upwards because of the difference in liquid densities between the air in the pipe and the ambient liquid. The liquid flow through the air-lift pump changes, depending on the level, with the result that a decreasing level reduces the flow through the air-lift pump.

3.6 Blower

The supply of the volume of air needed for the micro-bubble aeration of the activation tank and to drive the air-lift pumps is ensured by a lamella/side channel blower situated outside the main tank; see Chapter 5.2. The blower is connected to the air system by means of a hose and via connecting pipe (Pos. 12).

The air is heated in the blower. Take increased care when handling the hose on the outlet side.

The heated air runs in the hose connecting the blower and the plant, and so a hose resistant to an increased air temperature must be used.

The blower requires regular maintenance and service; this is specified in Chapter 9.

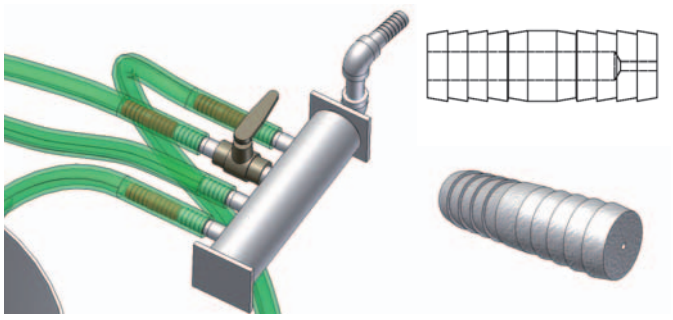
Blower specification

Type of plant	*Type of blower*	*V / Hz*	*Blower input [kW]*	
			maximum	*actual*
AC 19-38	2 x Secoh EL 250	230/50	0,67	0,43
AC 24-48	2 x Secoh EL 250	230/50	0,67	0,43
AC 30-60	Becker DT 4.25	330-440/50	1,10	0,75
AC 38-76	Becker DT 4.40	330-440/50	1,85	0,96
AC 48-96	Becker SV 8.190/2	330-440/50	2,00	0,75
AC 60-120	Becker SV 5.250/2	370-460/50	2,00	1,30

Air distributor

The air distributor (Pos. 13) serves to distribute the supplied air to individual devices. The outlets from the distributor and hoses are fitted with tags and the name of the unit. The necessary air volume supplied to the individual parts of the plant is regulated by nozzles (excluding aeration).

The nozzles are adjusted by the manufacturer. No interference with the nozzle layout is permitted.



Legend:
Return sludge – air-lift pump for return sludge
Aeration elements – aeration elements in activation tank
Surplus sludge – air-lift pump for surplus sludge
Raw sewage water – air-lift pump for raw sewage water

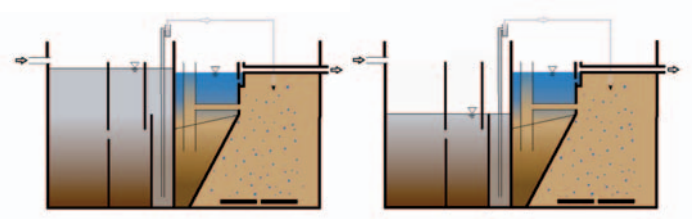
3.7 Mechanical pretreatment

The mechanical pretreatment is divided into two chambers using a partition with holes. The first is open to the inlet pipe. Here solids are deposited and the substances floating on the water surface are trapped. The pretreated water from the second chamber is pumped by the air-lift pump for raw sewage water (Pos. 9) to the activation tank, while the pumped volume is controlled by the backflow box (Pos. 15) at the mouth of the air-lift pump. The air-lift pump for raw sewage water is protected against getting blocked by these solid impurities by a scum board.

During operation the buffer tank is gradually filled up, so that the content of this tank has to be removed if needed; see Chapter 6.4.11.

Buffer area
The waste water is accumulated in the sedimentation tank during hydraulic peaks in the daily peak period and is pumped gradually to the biological part. This ensures that its load is uniformly distributed, which helps to achieve the excellent purification qualities of the whole plant.

The pretreated water from the second chamber is continuously pumped by the air-lift pump for raw sewage water (Pos. 9) to the activation tank. With a higher flow rate through the air-lift pump a part of the water is returned by overflow to the buffer tank.

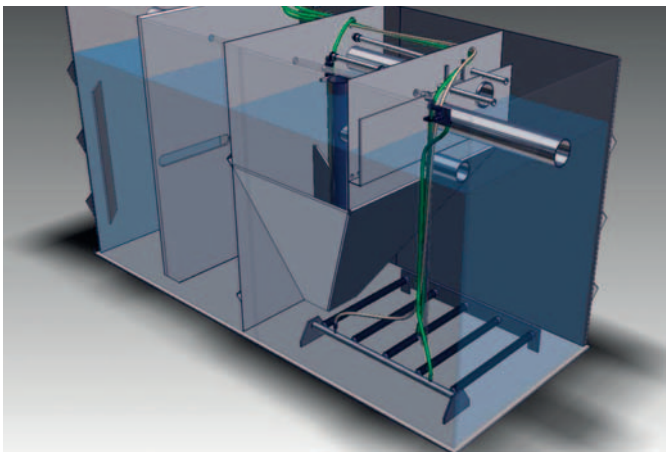


Storage accommodation
The air-lift pump that pumps the surplus sludge from the activation tank during desludging (reduction of activated sludge concentration) is open to the first chamber. The surplus sludge forms sediment here. With a full biological load the storage accommodation will be filled up within 100-150 days.

3.8 Activation tank

The aeration elements (Pos. 8) are placed in the activation tank. These elements ensure micro-bubble aeration. They are placed in such a way as to ensure the ideal agitation of the whole space of the activation tank. The aeration elements are placed on a distribution main which is fixed to the bottom of the activation tank. Air supply from air distributor (Pos. 13) is provided by flexible hose.

The activation tank is interconnected with the final sedimentation tank by the connecting pipe.
The air-lift pump for the pumping of surplus sludge (Pos. 11) leads from the activation tank to the first chamber of pretreatment.



3.9 Final sedimentation tank

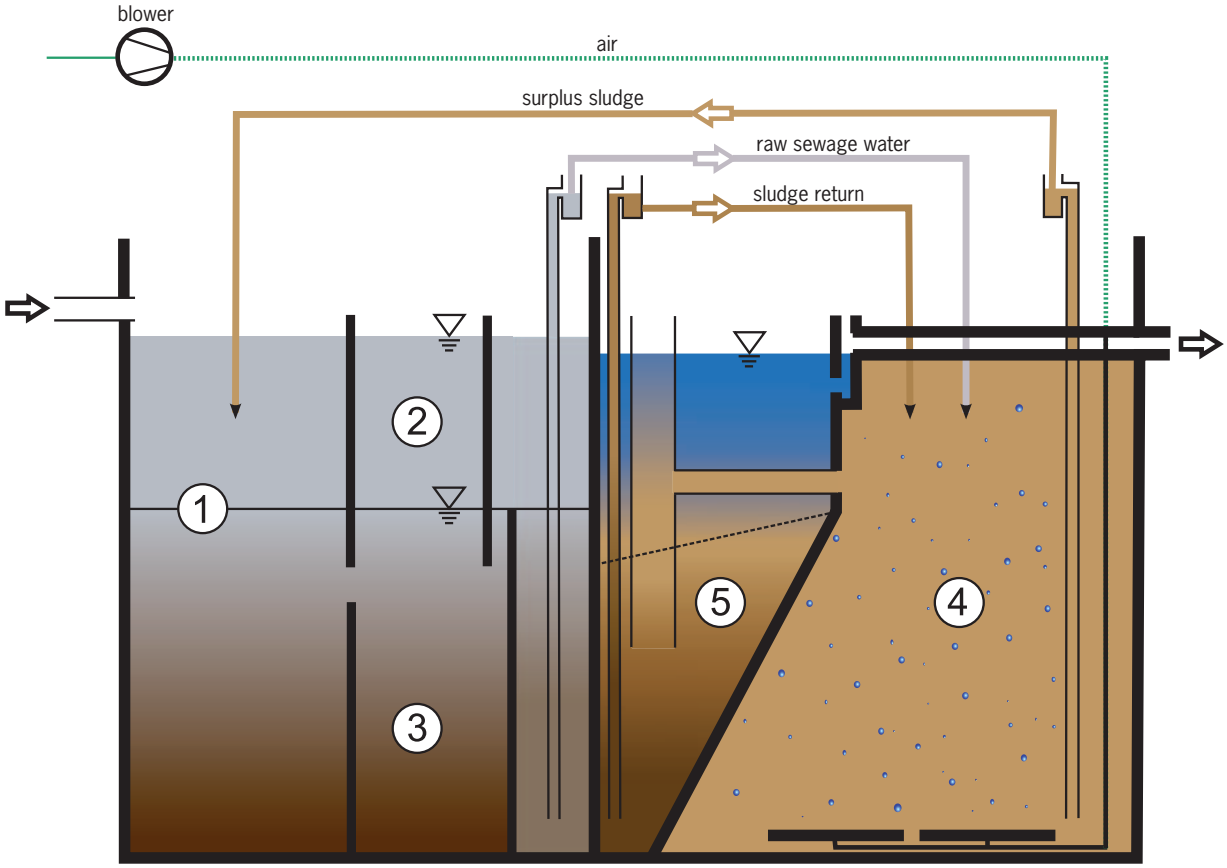
The activated sludge flows through the stilling cylinder into the final sedimentation tank, where the activated sludge is separated from the treated water by the effect of gravity. The treated water then flows away over the outlet object (Pos. 14) of the plant by overflow to the outlet pipe (Pos. 2) and the sedimented activated sludge is pumped from the sludge sump by the air-lift pump for return sludge (Pos. 10) back to the activation tank.

3.10 Ventilation pipe

It is designed for an air outlet, supplied for the activation and driving of the air-lift pumps, outside the tank. The outlet of the ventilation pipe (Pos. 3) DN 100 is blocked off with a cap from the factory. For plant ventilation, see Chapter 5.3. The ventilation pipe is marked VENTILATION.

4 How the plant works

The ACO Clara waste water treatment plant is a mechanical-biological treatment plant with a continual flow rate working on the principle of mixing activation with the gravitational separation of activated sludge from the treated water in the final sedimentation tank.
The ACO Clara waste water treatment plant consists of mechanical pre-treatment and a biological part. The mechanical pre-treatment part is formed of a primary treatment tank with a buffer area and a storage area. The waste water enters the ACO Clara unit via the inlet pipe and flows into the first chamber of the primary treatment tank. Settable solids sink to the bottom of the tank and floating matter is caught by a scum board and the sewage water overflows to the second chamber, where the raw waste water air lift pump is placed. The air lift pump is protected against blockage by a scum board.
Hydraulic peaks at the inlet of ACO Clara waste water treatment plants are absorbed in the buffer area. The pre-treated water is then pumped at a uniform flow rate from the buffer area into the biological part of the plant. Hydraulic peak equalization increases the stable purification efficiency of the plant considerably.
The biological part of the ACO Clara consists of the activation tank and the built-in final sedimentation tank. The activation tank is aerated by micro-bubble aeration. The water goes from the activation tank into the final sedimentation tank, which enables treated water to be separated gravitationally from activated sludge. The treated water flows out of the waste water treatment plant through the outlet connection. The activated sludge sinks to the bottom of the final sedimentation tank, from where it is pumped back as return sludge and also partly into the storage area as surplus sludge. The final sedimentation tank is optionally equipped with a skimmer for the automatic collection and removal of floating sludge from the water surface. This device can reduce maintenance work during operation.
Surplus sludge is stored in the storage area, which in fully loaded plants is capable of holding about 100-150 days' capacity. The pumping of sewage water and return and surplus sludge is achieved in the ACO Clara by using air-lift pumps. These air-lift pumps need no maintenance and are resistant to clogging. The hydraulic capacity of the air–lift pumps is continuously adjustable, even at very low flow rates. This helps to ensure uniformity in the purification process and thus achieve stable purification efficiency. The only electric part of the ACO Clara is a blower supplying air to the aeration elements in the activation tank and into the air-lift pumps.



Key:
1. Pre-treatment
2. Buffer area
3. Storage area
4. Activation tank
5. Final sedimentation tank

5 Installation

5.1 Transport and storage

No handling of the plant should take place below a temperature of +5°C.

Before handling it is necessary to ensure the plant spaces are free of foreign objects and stormwater and that the cordings on the plant are sufficiently tight.

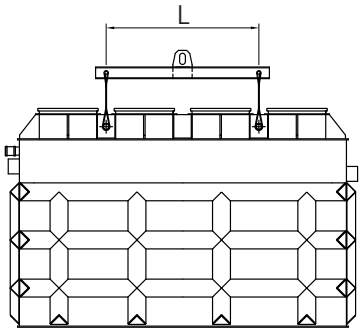
The plant can be transported only on a truck with sufficient carrying capacity and sufficient freight space dimensions. The handling can be performed using crane. It is necessary to use a beam hanger.

For manipulation with unit always use a beam hanger.

Always handle in a horizontal position with a view to the strength of the materials used.

For temporary storage of the waste water treatment plant it is necessary to provide a flat surface with the ground area of the plant as a minimum area and under conditions that prevent any mechanical damage.

During long-term storage the plant must not be exposed to solar radiation for longer than 3 months.

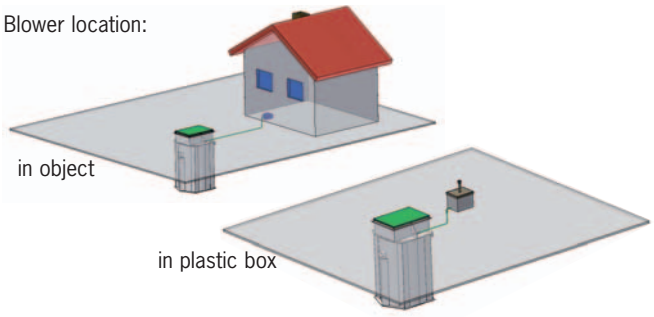


ACO Clara	*19-38*	*24-48*	*30-60*	*38-76*	*48-96*	*60-120*
L [mm]	1810	2050	2050	2200	2390	2800

5.2 Installation of blower

Depending on the location of the blower, it is necessary to ensure a passage for the hose regarding the power supply to the box for the blower. A 7-m hose is a part of supply.
It is recommended to run the hose underground at a depth suitable for connection to the plant. The hose must be protected against ground pressure; it must not be pressed down or broken (connect this hose to the pipe sleeve).
During the preparation for installation it is necessary to provide either a power supply to the blower or a passage for the inlet hose, depending on the location of the blower.
The blower should be situated up to 7 m from the plant. In the event of a greater distance please contact the manufacturer.

Blower location:



5.3 Plant ventilation

The air supplied to the plant by the blower must be ventilated to an outdoor space. The ventilation is provided by the ventilation pipe DN 100, which must be opened above ground.

The ventilation pipe must terminate at a sufficient height above ground for it to be above snow level during the winter period.

In some cases the plant can be ventilated by inlet or outlet pipes. Then the ventilation pipe can remain unused.

5.4 Construction requirements

The construction work must be performed as a project of an authorized design organization.
A supply of service water in a minimum quantity corresponding with the operating volume of the plant volume and an adequate handling area must be provided during installation.
During the operation of the plant a handling area of at least 1m must be provided around the plant.

A traffic load and any other load on the surroundings of the plant are allowed at a distance of 3 m from the tank wall.

Both the plant covers and the ground above the plant itself can bear a load of up to a maximum of 2,5 kN/m^2.

Installation in the ground
The ACO Clara waste water treatment plant is designed as a self-supporting plastic tank for installation in a ground bed without any concrete encasement.

The procedure for embedding the plant in the ground described below is intended for the installation of the inlet pipe to a depth of 0.8 m and must not be used for impervious soil or if the level of underground water is above the level of the base plate or if the plant is situated on a slope steeper than 10%.

Installation procedure:
1. Excavation of foundation pit – the subsoil must not be loosened by extraction. If necessary it will be compacted so as to correspond with compact natural material.
2. Concreting of base plate – the tank will be laid on a concrete reinforced plate thickness min. 150 mm with a flatness of ± 5 mm/m. No irregularities must occur between the tank bottom and the plate.
3. Placing plant into foundation pit – The pit must be excavated in such a way that after the concreting of the base plate and emplacing the plant the upper edge of the cover will be approx. 70 mm above ground level.
4. Connect the: inlet pipe
   outlet pipe
   hose from the blower
   ventilation line (if needed)
5. Filling with water – gradually fill the entire interior of the plant with water up to 1 m.
6. Backfill – the backfill must be done in single layers with a maximum thickness of 400 mm thick all round the plant perimeter together with compaction. The compaction grade is calculated to be between 90–92% Pgs.
7. Gradual filling of tank with water – gradually fill the tank with water and backfill the surroundings of the plant. A water level ca. 300 mm above the backfill level must be permanently kept in all parts of the tank.
8. Gradual backfill – proceed with tank backfill acc. to item 6.
9. As soon as the water level in the waste water treatment plant reaches the level of the outlet pipe, the remaining backfill is done without additional filling up with water.
10. Proceed with backfill up to ground level.

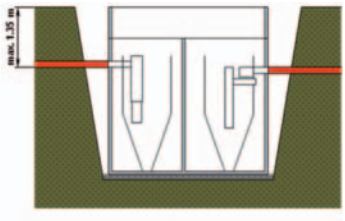
After completion of backfill leave the tank filled up with water.

Installation procedure:

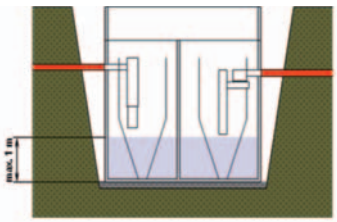

1. Excavation of building pit


2. Laying of base plate

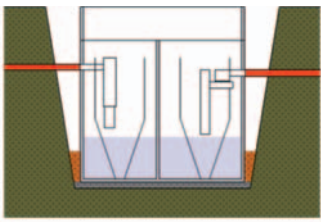

3. Plant location

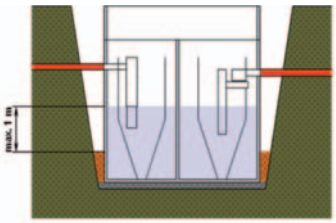


4. Connection of branches

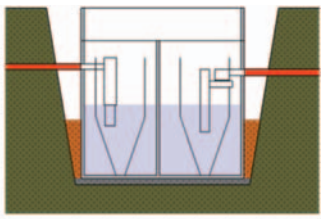


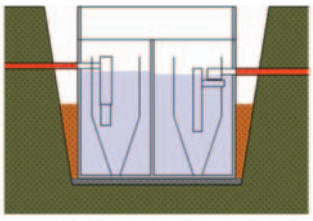
5. Start of filling with water

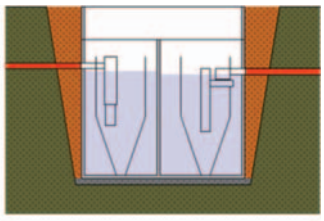

6. Start of backfill



7. Gradual filling with water


8. Gradual backfill


9. Filling with water up to outfall


10. Gradual backfill up to ground level

5.5 Electrical installation

5.5.1 1 phase motor

The plant connection arrangement consists of the connection of the blower to a socket with an earth pin powered from 1/N/PE AC 230V/50Hz mains installed as per national safety standards and regulations on blower space. The recommended socket protection is via a 10A char.B circuit breaker. A revision will be made to the socket according to the appropriate national standards and regulations.

5.5.2 3 phase motor

The plant connection arrangement consists of the connection of the blower to a switchbox powered from 3/N/PE AC 230V/50Hz mains installed as per national safety standards and regulations on blower space. The recommended protection of the blower is via motor-circuit breaker which is sized according to rating plate value. A revision will be made to the cable according to the appropriate national standards and regulations.

While using of blower with 3 phases engine to check proper engine rotation (rotation arrow is on the body of blower).

6 Operation and maintenance instructions

If the following procedures are not followed the plant will not work correctly.

Follow all procedures in accordance with the occupational safety instructions described in Chapter 2.

6.1 Plant commissioning

If the time taken for installation and plant commissioning is too long and the water quality drops significantly (turbid water, smell), it is recommended to drain the tank and fill it up again with clear service water.

Check before connection
Check if the tank is filled up with water up to the outlet pipe.
Check the proper state of all plant parts (air-lift pumps, electrical connection, hoses etc.)

Check the right electric connection of blower

While using of blower with 3 phases engine to check proper engine rotation (rotation arrow is on the body of blower).

- Disconnect hose between the unit and the plant.
- Switch the blower on and check air flow. If no flow is detected with air being sucked into the blower, change phase position.
- Reconnect hose between blower and air jet.

By sucking of water inside the blower will occur a critical damage of the blower.

Functional check
When connecting to the mains check the functioning of the blower and air-lift pumps and the aeration of the activation tank acc. to Chapter 6.4. After the functional check you can start feeding in the waste water.

Initial plant operation
To reach the proper purification effect the concentration of activated sludge in the activation tank must be in the range of 3-6 kg/m³.

After the plant has been put into operation the concentration of activated sludge gradually increases. With a correct plant load the required concentration is reached within 4-8 weeks.

During the initial operation of the plant the full purification efficiency is not reached.

During the initial operation of the plant check the concentration of activated sludge weekly by means of a sedimentation test.

During the initial operation of the plant foam can occur on the water surface in the activation tank because of the presence of e.g. cleaning agents in the waste water. This foam will disappear when the correct concentration of activated sludge is reached.

Filling up with activated sludge from another waste water treatment plant
To reach full plant efficiency it is possible to use activated sludge from another properly functioning plant.
Pump out the water from the activation and final sedimentation tanks and fill them with activated sludge. You will find the required quantity in the following table.

ACO Clara	*19-38*	*24-48*	*30-60*	*38-76*	*48-96*	*60-120*
Required volume of the activated sludge [m³]	3,2	4,0	5,0	6,5	8,0	10,0

After filling up with activated sludge check the concentration of activated sludge by means of a sedimentation test.

6.2 Records of plant operation

A operation journal with records of regular activities such as inspections, maintenance work, repairs, revisions, service work, sediment value, and operating conditions, as well as events, is part of every ACO Clara plant.

The non-keeping of the operation journal is considered as improper operation resulting in a loss of the right to claim repairs under the guarantee from the manufacturer during the guarantee period.

6.3 Accessories for plant operation

The following list of things will enable you to operate and maintain the plant correctly and comfortably.
- Rubber gloves
- Protective clothing
- Graduated 1000-ml cylinder (to be supplied)
- 1000-ml bottles for sampling
- Sampling scoop with handle
- Brush with handle for cleaning of air-lift pumps

6.4 Description of individual checks and maintenance work

This chapter provides information on the checking process and describes the state in which the plant is in good technical and operating condition.

The troubleshooting is described in the following chapter, Chapter 7.

List of maintenance tasks and checks

Interval	*Activity*	*Description*	*Chapter*
daily	Check of blower function	Engine sound is heard, visual check of aeration of activation tank	6.4.1
weekly	Visual check of plant	Aeration in activation tank	6.4.2
		Function of air-lift pumps	6.4.3
		Water level of sedimentation tank, inlet pipe	6.4.4
		Water level of final sedimentation tank	6.4.5
		Quality of treated water	6.4.6
2 weeks	Check of activated sludge	Sedimentation test	6.4.7
monthly	Check of blower filter	As per manual for blower	9
	Check of treated water	Sampling; water must be clear and without smell	6.4.8
4 months	Discharging of condensate water from aeration system		6.4.9
	Check of lamellas in blower, only AC 30-60 and AC 38-76	As per manual for blower	9
if needed	Removal of surplus sludge	As per result of sedimentation test	6.4.10
	Discharge of storage tank	As per sedimentation test	6.4.11
	Cleaning of walls of tanks		6.4.12
	Cleaning of air-lift pumps		6.4.13
18 months	Replacement of lamellas/membranes in blower, no for AC 48-96 and AC 60-120	As per manual for blower	9
5-8 years	Replacement of aeration elements	As per visual check of aeration in activation tank	6.4.14
	Changing of bearings in blower, no for AC 19-38 and AC 24-48	Authorized company	

The procedure for the performance of individual activities is described in following chapters.

Perform all activities in accordance with the occupational safety instructions described in Chapter 2.

6.4.1 Check of blower function

The blower is in continuous operation. For that reason any breakdown is a fault state.

Any blower breakdown longer than 24 hours will seriously damage the activated sludge.

The blower can be checked simply by a listening test of whether the engine is producing a sound. Whether the aeration of the activation tank is occurring can be checked visually.

Visual check of plant

6.4.2 Aeration in activation tank

If properly aerated, air bubbles with a size of ca. 3-10 mm occur in whole area of water surface in the activation tank. If the activated sludge is in good condition, no surplus foam is developed. The level of the activation tank must not be filled up with too great a volume of foam.

6.4.3 Functions of air-lift pumps

The air-lift pumps for the pumping of raw sewage water and the air-lift pump for the pumping of return sludge are in continuous operation.

Air-lift pump for raw sewage water: the capacity of the air-lift pump depends on the level of the sedimentation tank. If the volume in the balancing chamber is not fully drained, then the waste water has to be pumped to the activation tank.
We identify the choking of the air-lift pump as per continuous maximum level in the primary sedimentation tank, together with waste water overflow to the activation tank via the by-pass pipe.

Air-lift pump for return sludge: The air-lift pump must be permanently in operation with the constant flow rate set by the manufacturer.

The inactivity of the air-lift pump for return sludge will seriously damage the entire purification effect of the plant within 24 hours.

6.4.4 Tank Level of Mechanical Pretreatment, Inlet Pipe

The inlet pipe must be free of all impurities.
There must be the same water level in all chambers. Sediment of solids can develop in the first chamber. We recommend loosening it by means of a stream of water.
The water level beyond the scum board, where the air-lift pump for the pumping of raw sewage water is, must be free of gross impurities that could cause it to clog.
Check the state of filling the tank with sediment.
If the sediment level in the tank reaches the level of the edge of the overflow to the air-lift pump for raw sewage water it is necessary to pump the whole tank volume immediately. It will become evident because of the air-lift pump for raw sewage water pumping sewage water with a high concentration of black digested sludge in the event that the air-lift pump is clogged.

6.4.5 Level of Final Sedimentation Tank and Outlet object

Floating sludge can occur on the surface of the final sedimentation tank. When a higher quantity has accumulated this sludge can build up into a continual layer with a thickness of ca. 10 cm. This layer does not need to cause the quality of the treated water to deteriorate, but it makes it impossible to perform a visual check of the final sedimentation tank. Therefore it is necessary to remove it.

The outlet of the plant must be free of any sediment, matted material, or other impurities.

6.4.6 Quality of Treated Water

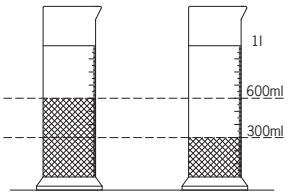
Check the quality in the outlet of the plant, where the treated water should be clearly visible without any floating impurities (e.g. flakes of activated sludge).

6.4.7 Check of concentration of activated sludge – sedimentation test

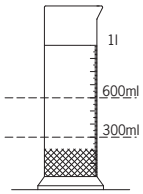
To perform the test you need a graduated cylinder with a volume of 1000 ml (to be supplied).
The sedimentation test manages to define simply an approximate concentration of activated sludge.

The activated sludge must not be grey or black in colour. The correct colour is brown.

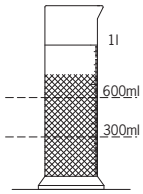
Procedure:
- In accordance with Section 6.5 put a sample of 1000 ml of activated sludge from the activation tank into the graduated cylinder (the aeration must be running in the activation tank).
- Put the graduated cylinder on a flat surface and wait for 30 minutes.
- Observe the boundary line between the settled sludge and separated water after 30 minutes.



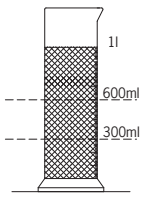
300-600 ml, optimal concentration of activated sludge
shows the proper concentration. No removal of surplus sludge is required.



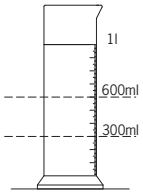
0-300 ml, low concentration of activated sludge
means an insufficient concentration of activated sludge in the activation tank.



600 ml and more, high concentration of activated sludge
means that there is too high a concentration of activated sludge in the activation tank and the surplus sludge should be removed.



No sedimentation of activated sludge
If no boundary line has developed between the sedimented sludge and separated water, this means that the activated sludge is not in good condition and has bad sedimentation qualities. It could be a natural process during the initial operation of the plant or could be due to an incorrect load and eventually the occurrence of too high a quantity of unsuitable matter on the inlet side (disinfecting agents, toxic substances, acids etc.).



No activated sludge in sample
No activated sludge has developed. Such a state can be considered as a natural one during initial plant operation or it can show improper plant operation.

6.4.8 Check of Treated Water

Sample the treated water from the outlet object of the plant to a specimen holder with plain walls. The treated water should be free of undissolved substances (e.g. flakes of activated sludge) and not be significantly coloured or have a strong smell.

6.4.9 Discharging of condensate water from aeration system

Condensate water is discharged by air pressure in aeration system by opening the valve placed above activation tank.
Let valve opened until the water is coming out of valve.

6.4.10 Discharging of Surplus Sludge

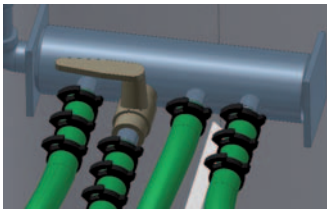
Improper or wrongly performed removal of sludge can cause a reduction in the concentration of activated sludge below the optimal level and thus cause a temporary reduction in the efficiency of purification.

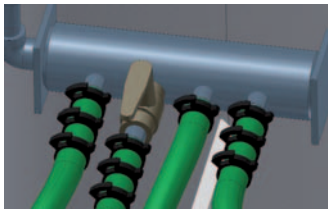
When should the removal of sludge be performed?
The removal of sludge is carried out if we find a higher-than-optimal concentration of activated sludge. During the sedimentation test the boundary line value of sedimented sludge and separated water is higher than 600 ml.
The interval between one removal and the next depends on the actual conditions in which the plant is being operated. This interval can range between 2-16 weeks as low-loaded plants have a longer desludging interval than highly loaded ones.

How to remove the sludge?

The blower must be turned on during sludge removal.

The removal is carried out with the air-lift pump for the removal of surplus sludge, which is activated by opening a cock on the air valve.


close position


open position

Leave the cock open for 4-8 hours as per initial concentration and continuously check the concentration of activated sludge by means of a sedimentation test. You will complete the sludge removal by closing the cock after reaching the value of 300 ml.

Make sure that the clock is closed after the removal of sludge.

In the course of sludge removal the aeration intensity can be reduced, as can the output of the other air-lift pumps.

Alternative solution
The removal of surplus sludge can be carried out by draining a partial volume of activated sludge with a sludge pump external to the plant (to be used for the initial operation of another plant, putting in a sludge removal truck and carrying away for disposal, etc.).
The maximum quantity of pumped sludge depends on the actual concentration as indicated by the sedimentation test. After pumping a partial volume of activated sludge and filling up with waste water the boundary line value of the settled-down sludge and separated water must not to lower than 300 ml.

6.4.11 Discharging of mechanical pretreatment tank

The sludge must be handled in compliance with legal regulations.

Perform the sludge draining by means of a sludge removal truck.

The minimum distance between the tank and the wheels of the sludge removal truck is 3m. Coming closer could lead to the deformation of the plant tank caused by the pressure of the weight of the truck, with the possibility of total collapse.

Procedure:
- Turn off the blower.
- Insert a suction basket into the bottom of the tank and pump out the sediment. When pumping, if the sludge is too heavy perform the pumping gradually from one and then from the other chamber of the sedimentation tank.
- Fill up the tank with fresh water after pumping out all the content.
- Turn on the blower.

When handling the suction hose take care to prevent damage to the interior of the tank.

6.4.12 Cleaning of tank walls

Clean with a brush or fresh water jet.

6.4.13 Cleaning of air-lift pumps

During plant operation the air-lift pumps can become clogged or even choked if not maintained properly.
Remove the top part of the air-lift pump and clean its interior with a brush with a handle.

6.4.14 Replacement of aeration elements

The working life of the aeration elements is 5-8 years.

Do not use other types of elements than those approved by the manufacturer.

The aeration elements are placed on a distribution main which is fixed to the bottom of the activation tank.
To replace the aeration elements it is necessary to pump out the whole activation tank and final sedimentation tank volume. It is also recommended to clean away any remaining sediments.

Before pumping out the volume of the activation tank it is recommended first to drain the mechanical pretreatment tank and to use it for the storage of activated sludge. Leave the activated sludge without aeration for a maximum of 24 hours.

When the replacement of damaged aeration elements is carried out it is recommended to do a replacement of all elements in activation tank and air supply hoses as well.

Replacement procedure:
- Turn off the blower
- Pump out the water from activation tank and final sedimentation tank in a way to leave app. 150 mm water above the elements (app. 350 mm from the bottom of the tank)
- Turn on the blower
- Visually check all aeration elements
- Turn off the blower
- Discharge the rest of water
- Unscrew the element(s) in an anticlockwise manner
- Check the cleanliness of the connection
- Provide the connection thread with sealing (e.g. teflon tape)
- Screw in the new element in a clockwise manner
- Fill the activation tank and the final sedimentation tank with water in a way to have app. 150 mm water above the elements (app. 350 mm from the bottom of the tank)
- Switch on the blower
- Visually check all aeration elements
- Fill the activation tank and the final sedimentation tank with water (activated sludge) up to maximum level.
- Visually check the aeration described in Chapter 6.4.2

6.5 Sampling

Sampling and its consequent analysis in an accredited laboratory are the only conclusive way to evaluate the efficiency of the plant.
When sampling follow the procedures defined by the individual regulations which are prescribed for the given type of analysis (size of sample, method, maximum period of storage, etc.).

Using contaminated sampling bottles or tools (scoop, etc.) for sampling can influence the results of the analysis. Therefore, before sampling wash the sampling bottles and all other tools coming into contact with the sample thoroughly.

If not specified otherwise, keep the obtained sample in a cool and dark place for a maximum period of 24 hours.

6.5.1 Sample at inlet

It is recommended to sample directly under the inlet pipe or shaft on the inlet sewer system.

6.5.2 Sample at outlet

Take sample directly from the outlet of the plant in the final sedimentation tank using a scoop or directly to a sampling bottle.

6.5.3 Sample of activated sludge

Take always sample from the activation tank, provided that the blower is running for a minimum of 1 minute.

6.6 Plant breakdown

The means of purification using activated sludge requires a steady flow of waste water containing organic substances that represent nutrition for the organisms in the activated sludge. The absence of nutrients for these substances can result in the so-called starvation of the activated sludge and the collapse of the whole biological system.

6.6.1 Short-term operational constraints

Short-term operational constraints (holidays etc.) are to be understood as a reduction or shutdown of the waste water inflow to the plant for a period not longer than 25 days. No significant reduction in the quality of the activated sludge occurs within the first 10 days, but with longer operational constraints the quality of the activated sludge gradually deteriorates up to full “starvation“. This “starvation” will occur after approximately 8 weeks. The capacity of the plant is then completely lost and it must be allowed to resume work again after a fresh commencement of operation as specified in Chapter 6.1.
Leave the plant to work during short-term operational constraints.

6.6.2 Long-term shutdown

Long-term plant shutdown is to be understood as being for a period longer than 8 weeks.
During long-term plant shutdown turn off the blower, pump out all the plant content (sedimentation tank, activation tank and final sedimentation tank) according to Section 6.4.11, and fill it immediately with water.
After putting the plant back into operation again, it must be allowed to start work again as stated in Chapter 6.1.

7 Troubleshooting

An overview of possible faults of the technological plant equipment and how they can be remedied can be found in the following table:

	Fault	Possible cause	Remedy procedure
1.	*Blower does not work (no motor noise).*	Failure of circuit breaker for connection.	Switch on the circuit breaker.
		Disconnected or faulty socket for connection.	Reconnect the socket or ensure specialized repair.
		Faulty blower.	Ensure specialized repair of blower – see Chap. 9.
2.	*Blower undercapacity (weak aeration of activation, undercapacity of air-lift pumps).*	Clogged blower filter.	Clean the blower filter – see Chap. 9.
		Disconnected air supply to air distributor, air-lift pumps or aeration elements.	Repair the line for air supply.
		Blower defect (abnormal wear of membrane/lamella, defect of blower aggregate).	Ensure specialized repair of blower – see Chap. 9.
3.	*Inadequate aeration of activation (visually weak intensity of tank agitation), or irregular bubbles, but air-lift pumps are running.*	Aeration elements and distribution line filled up with condensate.	Make condensate outlet. If the condensate outlet cannot be made or ensured, remove aeration elements and check them – see Chap. 6.4.14.
		Fault of aeration elements.	Replace aeration elements – see Chap. 6.4.14.
4.	*Some air-lift pumps do not work.*	Disconnected or clogged air supply to air-lift pump.	Repair the line for air supply.
		Clogged nozzle of air supply to air-lift pump.	Clean the nozzle.
		Clogging of air-lift pump.	Clean the air-lift pumps – see Chap. 6.4.13.
5.	*The air-lift pump for pumping raw water from the pretreatment does not work repeatedly.*	The layer of sludge in the sedimentation tank is so high that the sludge overflows the partitions to the air-lift pump.	Pump the sludge from the sedimentation tank – see Chap.6.4.11 and clean the air-lifts – see Chap. 6.4.13.
6.	*The plant smells strongly.*	Wrong function of ventilation of inner plant space.	Provide ventilation for the inner plant space – see chap. 5.3.
		Inadequate function of ventilation unit.	The same procedure as in faults 2 and 3.
		The plant is loaded with waste water above the design value.	Ensure technical expertise of qualified worker.
		Other causes.	Ensure technical expertise of qualified worker.
7.	*Repeated occurrence of floating sludge in final sedimentation tank.*	No observing of instructions for operation and maintenance (high concentration of sludge in activation tank…).	Observation of instructions specified in Section 6.
		Other cause.	Ensure technical expertise of qualified worker.
8.	*The plant does not reach the required purification efficiency.*	Failure to observe instructions for operation and maintenance.	Observation of instructions specified in Section 6.
		Other causes.	Ensure technical expertise of qualified worker.
9.	*The escape of flakes of activated sludge from the final sedimentation tank to the outlet.*	The plant is hydraulically overloaded.	Check the functioning of the air-lift pump for raw sewage water. Find the source of the abnormal supply of waste water.
		Result of inflow of harmful substances.	Eliminate inflow of harmful substances, ensure technical expertise of qualified worker.
		Other causes or failure to follow instructions for operation and maintenance.	Ensure technical expertise of qualified worker.
10.	*During sedimentation test no deposit of activated sludge occurred.*	Result of inflow of harmful substances.	Eliminate inflow of harmful substances; ensure technical expertise of qualified worker.
		High concentration of activated sludge.	Observe instructions for removal of surplus sludge; see Chap. 6.4.10.
		Other cause.	Ensure technical expertise of qualified worker.
11.	*During sedimentation test no sludge occurs in sample.*	Low concentration of activated sludge.	Observe instructions for removal of surplus sludge; see Chap. 6.4.10.
		The sludge was not developed because of low plant load.	Minimal mass load on plant makes 40% of designed capacity.
		Other cause.	Ensure technical expertise of qualified worker.
12.	*Abnormal occurence of foam on water in activation tank.*	Result of inflow of harmful substances.	Eliminate inflow of harmful substances, break up the foam with a stream of water.
		Increase of fibrous organisms.	Break up the foam with a stream of water, ensure technical expertise of qualified worker.

8 Certification

During long-term testing as per EN 12566-3 in an accredited laboratory the following average values were achieved:

BSK_5.....9.5 mg/l
CHSK.....59.0 mg/l
NL .....16.4 mg/l
N-NH4 .....2.1 mg/l

Guaranteed average values for nominal hydraulic and biological loading is:

BOD_5 .....25 mg/l
COD.....90 mg/l
TSS .....35 mg/l
N-NH4 .....10 mg/l - for temperature 12°C

CE

Declaration of Conformity / Konformitätserklärung
Declaration de Conformite / Dichiarazione di Conformita

Manufacturer
Name: ACO Industries Tábor s.r.o.
Street: Průmyslová 1158
Town: 391 02 Sezimovo Ústí II
Country: Czech Republic

Represented by the undersigned, declare that wastewater treatment plants ACO Aeropur Plus version ACO Clara:

ACO Clara 3 – 6	ACO Clara 15 - 29
ACO Clara 5 – 10	ACO Clara 19 - 38
ACO Clara 7 – 14	ACO Clara 24 - 48
ACO Clara 11 - 22	ACO Clara 30 - 60

meet all the requirements of standards mentioned below.

Description of the product: Product range of biological treatment plants with mechanical pre treatment for purification of domestic wastewater.

Harmonised standard used: EN 12 566 – 3, EN 626–1+A1, EN 61000–6–1, EN 61000–6–3 ed.2, EN 1778.

Notified office: Technical and Test Institute for Construction Prague – Accredited Testing Laboratory, Authorized Body 204, Certification Body, Notified Body 1020, Inspection Body, Prosecká 811/76a, 190 00 Praha 9.

Type test report number: 1020 – CPD – 090020628

External supervisor: T. G. Masaryk Water Research Institute Prague, Podbabská 30, 160 62 Praha 6.

Sezimovo Ústí, 22nd December 2008

Václav Tikalský
Managing director

ACO Industries Tábor, s.r.o.

9 Operation manual for blowers

9.1 Installation

The blower must always be installed above the water level!! If it is set below, the back-flowing water can cause an electrical short circuit.

The blower should be installed at least 10 cm higher than the foundation on a stable platform. If installed on an unstable base, noise from vibrations can result.

The blower must be located on a leveled platform to prevent biased strain on the diaphragms that could lead to reduced component life of the blower.

9.2 Ambience

Ensure that the unit has good ventilation, especially when subjected to servere operating conditions. If installed in a control cabinet, sufficient ventilation (louvered vents) is essential to prevent overheating.

A cool ambience will ensure longer diaphragm and valve life!

The blower should not be operated in a dusty environment. The life of the diaphragms and valves may be shortened by overheating due to easily blocked filter elements. Where the air is dirty, corresponding filters should be provided.

The blowers are weatherproof. However, they should not be exposed to direct sunlight, rain or snow.

9.3 Medium quality

The blowers were specially developed for transporting air. The atmosphere humidity should not be higher than 90%. Inflammable or aggressive gases and vapors should not enter the pump as the flow path leads to current-carrying parts. A requirement for transporting gases or vapors is that the medium has been previously tested to their resistance and operating safety. This test must take place on the initiative of the user. The producer accepts no responsibility.

Ambient temperature should not exceed 40°C. For operation at higher temperatures, contact the producer.

9.4 Piping

Select tube size, lengths and accessories to keep the pressure loss as small as possible, in particular:

- Make the piping as short and straight as possible
- Do not use tubing of smaller diameter than the port of the unit (inside R min. 27 mm for EL twin system, G ¾" for lamella blowers and G 1 for vane blowers).
- Utilize large valves of smaller diameter than the blower's connector port. Use check valves that provide the lowest pressure drop rather than spring loaded valves.
- Select low air loss diffusers for aeration.

9.5 Storage

The blowers may not be stored at less than -10°C. The permanent magnet would be weakened in such a case, and the performance would not be expected.

The pump may not be stored in direct sunlight or at high temperatures. The rubber parts would age too quickly.

9.6 Maintenance and service for membrane blower

Apart from occasional filter cleaning and the simple replacement of some components, such as broken diaphragms, long-term maintenance-free operation is ensured. Complete repair kits available.

Always disconnects power before servicing. Failure to do so could result in electrical shock, personal injury or death.

Do not touch live parts. Touching live parts will result in electric shock.

9.6.1 Filter element cleaning

Clean the filter element quarterly. A clogged filter element can cause overheating or pump failure.

- **If the filter element is heavily clogged, wash it with a neutral detergent. Rinse with water and dry it in the shade.**
- **Reassemble the filter element back in place and press in the filter cover.**
- **Fix the filter cover by the truss head screw.**

1. Undo the truss head screw.

2. Remove the filter cover.

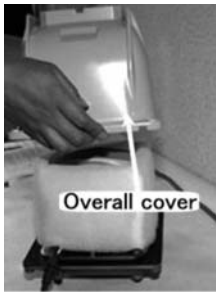
3. Remove the filter element and shake out the dust by hand.

9.6.2 Filter element replacement

- **Replace the filter element, following the procedure in 1. Filter element cleaning.**

9.6.3 Valve box, diaphragm replacement

1. Undo the four corner bolts.



2. Remove the overall cover.

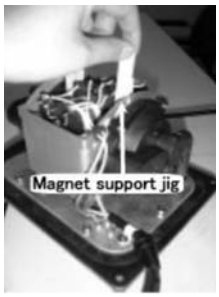

3. If it is hard to remove, insert a screwdriver.

4. Pull out the bushing

5. Remove the shock.

6. Undo the screws

7. Remove the holder cover.



8. Insert the magnet support jig in four corners between magnet and core.

9. Undo the screws

10. Slide the hose clamp.

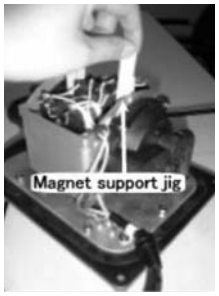
11. Pull out the connecting pipe and remove the valve box of one side.

12. Undo the nut or bolt.
EL-60,120W: Nut
EL-200: Bolt

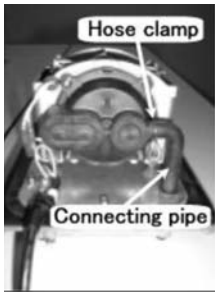
13. Remove the diaphragm.

14. Set the new diaphragm and fix them by the nut or bolt.

15. Set the new valve box and fasten it with the four corner screws.
16. Replace the valve box, diaphragm of the other side in the same way.



17. Pull out the magnet support jig.



18. Push in the connecting pipe and tighten it by the hose clamp.
19. Reset the auto-stopper, if necessary.

20. Connect power and confirm operation.

Make sure that the magnet is in the centre of the solenoids. Failure to do so could result in the damage on parts, short circuiting.
• Improper setting of the bushing can result in electric shock, air leakage.

21. Fasten the holder cover with the screws.

22. Put the shock absorber back into place.

23. Put the overall cover, inserting the power cord bushing into the location notch.

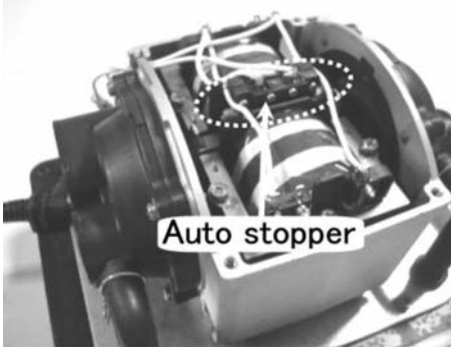
24. Fasten the overall cover securely by the nuts and bolts.

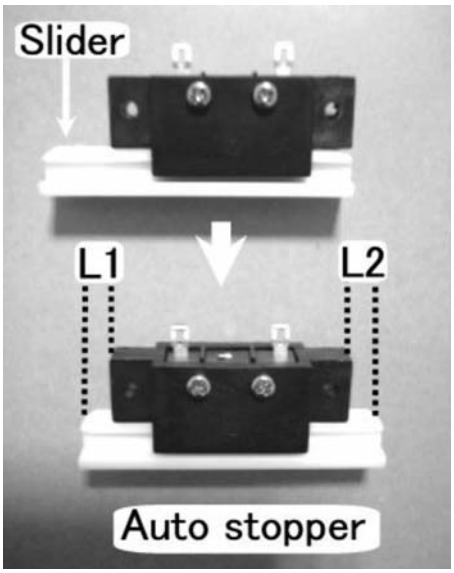
9.6.4 Reset of auto stopper

Disconnect the power before servicing. Do not touch the terminal of the switch. If hazard is ignored, electric shock is possible. If not disconnected, the magnet starts moving upon reset of auto stopper.

Function of auto stopper
If the diaphragm is broken, the magnet reciprocates with abnormal amplitude and the projection of the magnet hits the slider of the auto stopper. The contact is interrupted and power is off.

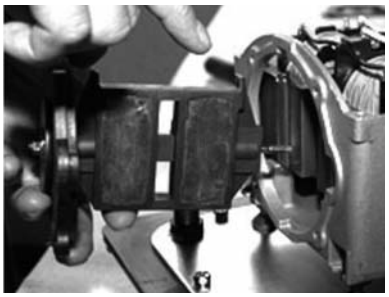
Reset of auto stopper
Set the slider at the position L1=L2.





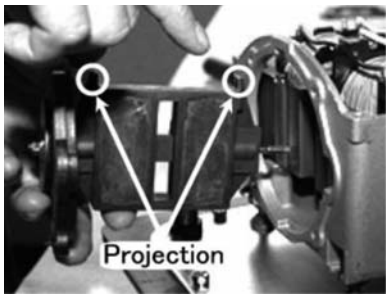
9.6.5 Magnet replacement

Follow the procedure of valve box and diaphragm replacement (1 – 7, 9 -12).



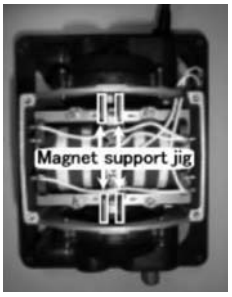
1. Remove the diaphragm and pull out the diaphragm and the magnet from the other side.

2. Set the new magnet with the nut or bolt.



3. Insert the diaphragm and the magnet between the solenoids. The projection should be upward.

4. Fix the diaphragm of the other side.



5. Insert the magnet support jig in four corners between the magnet and the core.
   Follow the procedure of valve box and diaphragm replacement (15 – 24).

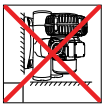
Make sure that the magnet is in the centre of the solenoids. Failure to do so could result in the damage on parts, short circuiting.

9.7 Pictograms for maintenance and service

1. Warning Notice

 **High Voltage** Only qualified staff may work on electronic components	 **High Voltage** according to **ANSI** American, National StandardsInstitute	 **Qualified Staff** Marked operations may only be executed by qualified electricians
 **Automatic Start-Up** When servicing the device must be turned off	 **Hot Surface** will cause burns. Let device cool down before maintenance	 **Note** Ignoring notices will cause severe damage to the pump

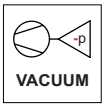
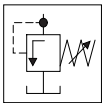
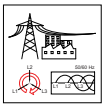
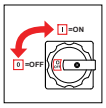
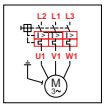
2. Interdiction

 **Pump works without oil** Avoid absorption of oil fumes	 Marked areas **may not be subject to weight**	 **Liquids** may not be conveyed
 **Explosive substances** may not be conveyed	 **Flammable Substances** may not be conveyed	 **Toxic Substances** may not be conveyed
 **Assembly** Incorrect fitting position		

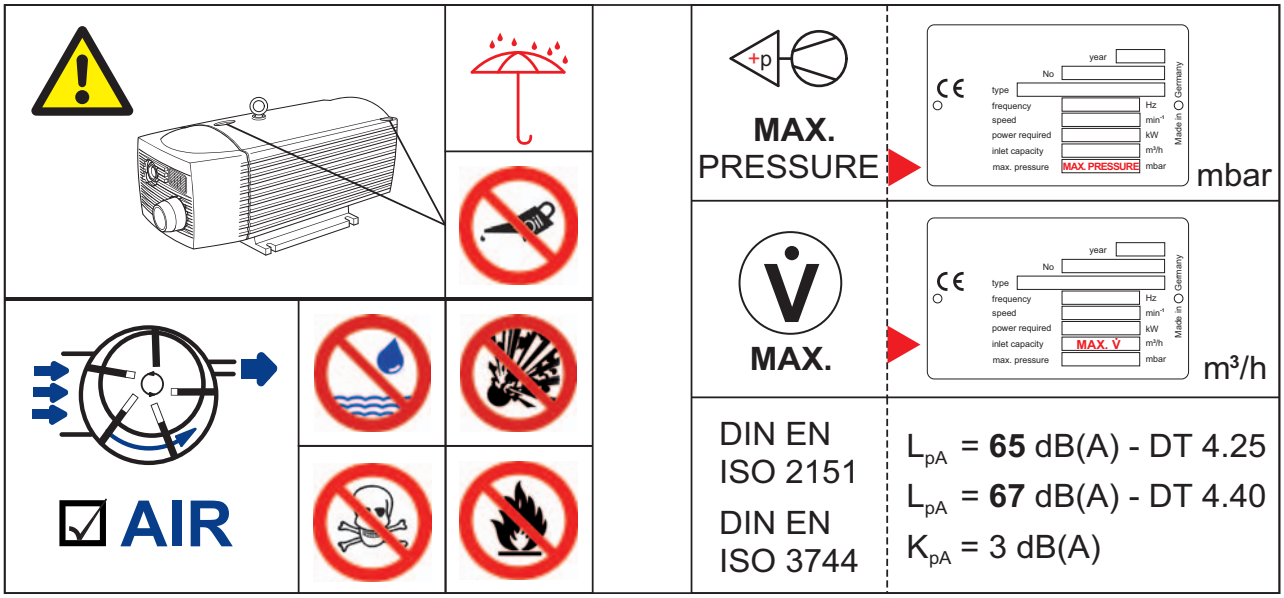
3. Rules

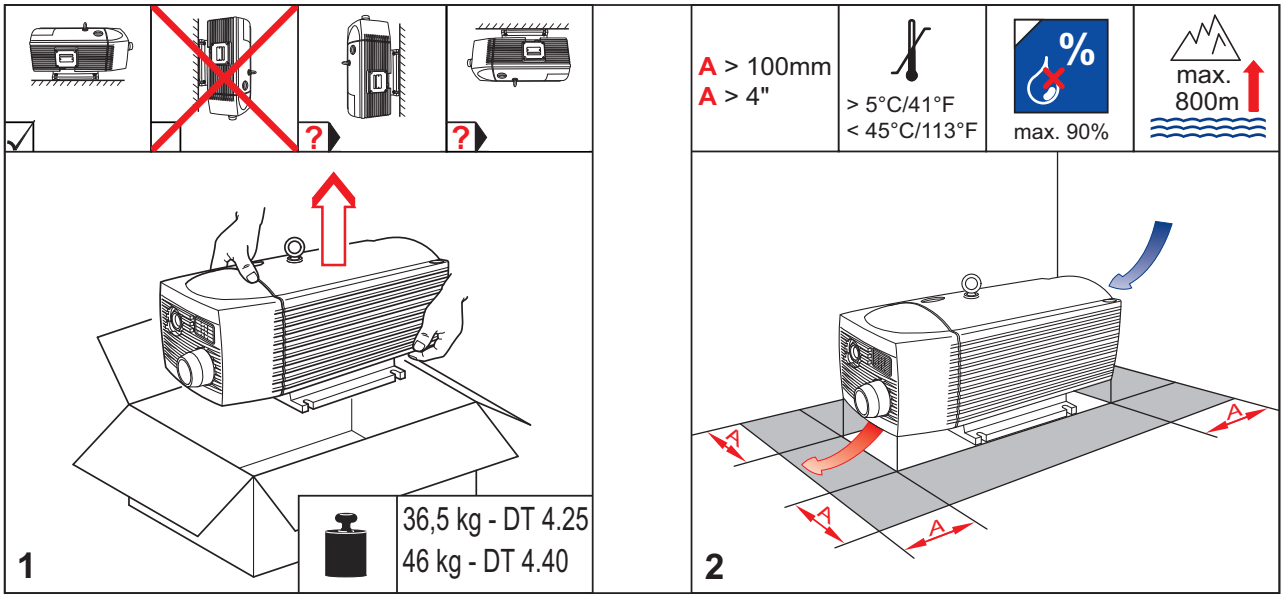
 **Wear protective goggles**	 **Wear protective gloves**	 **Wear protective ear-muffs** Sound level information e.g. 85 dB (A)

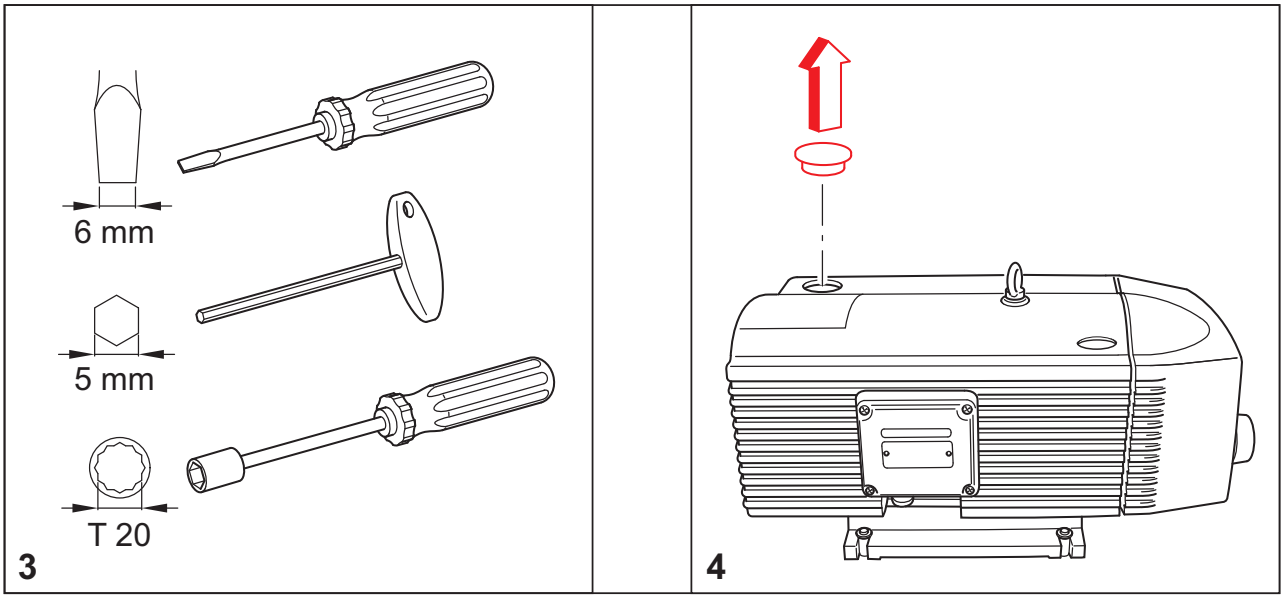
4. Advice

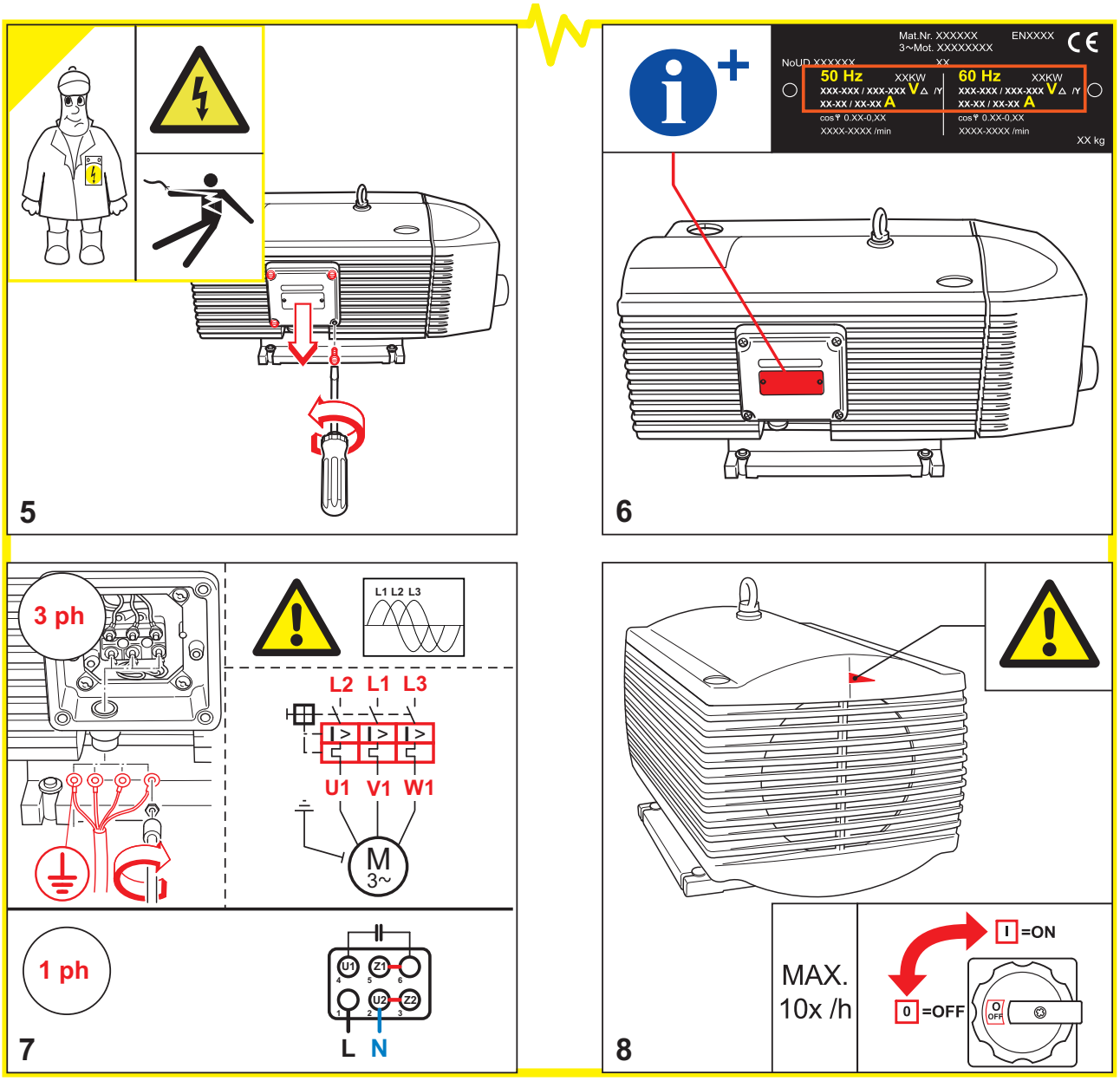
 **Active principle** Rotary vane pump Only air may be conveyed	 **Active principle** side channel fan only air may be conveyed	 **Maintenance** Regularly execute the marked procedures
 **Storing / Assembly** Protect pump from humidity	 **Assembly** Characteristic data is valid up to 800m above sea level	 **Further Information** (optional Data) - name plate - Internet
 **Specification** Vacuum pump	 **Specification** Compressor	 **Safety valve**
 Factory-made **Revolving field clockwise** as pre-requisite for pump attachment	 **Switch interval** Not more than 10x per hour	 Arrange **Motor-circuit switch**
 **Blow out** marked areas with air pressure	 **Maintenance interval** Observe minimum gate valve measurement every 3.000 hours	 **Filter Maintenance** Service according to dust accumulation exchange old cartridge dispose old

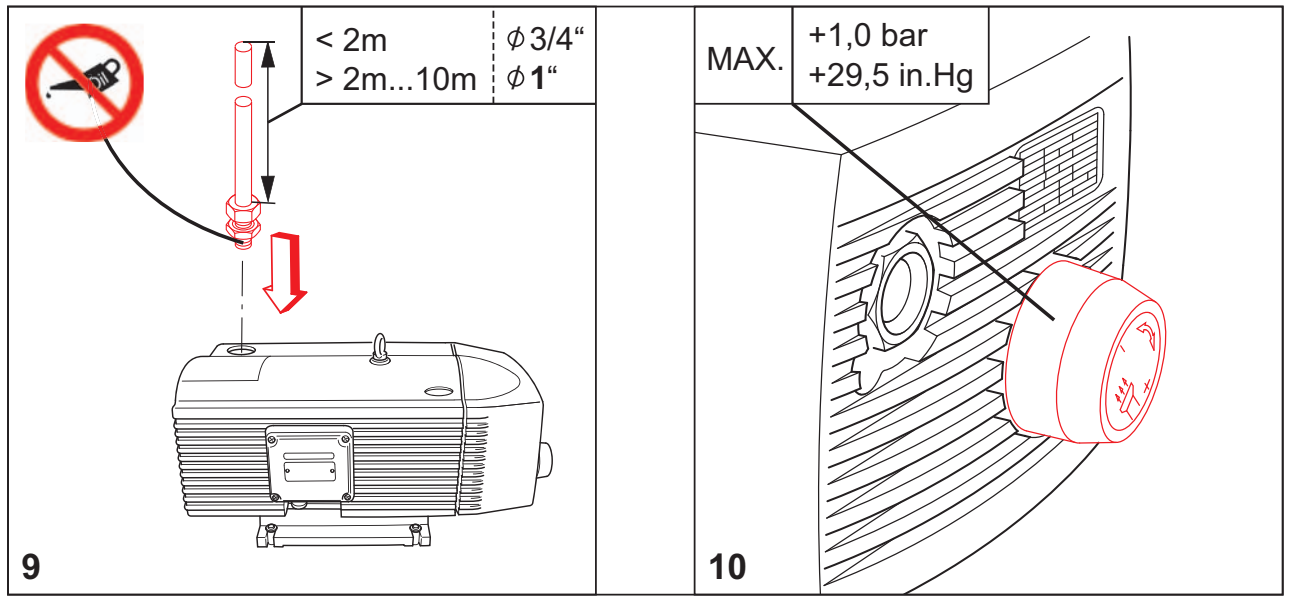
9.8 Maintenance and service for lamella blowers DT 4.25 and DT 4.40

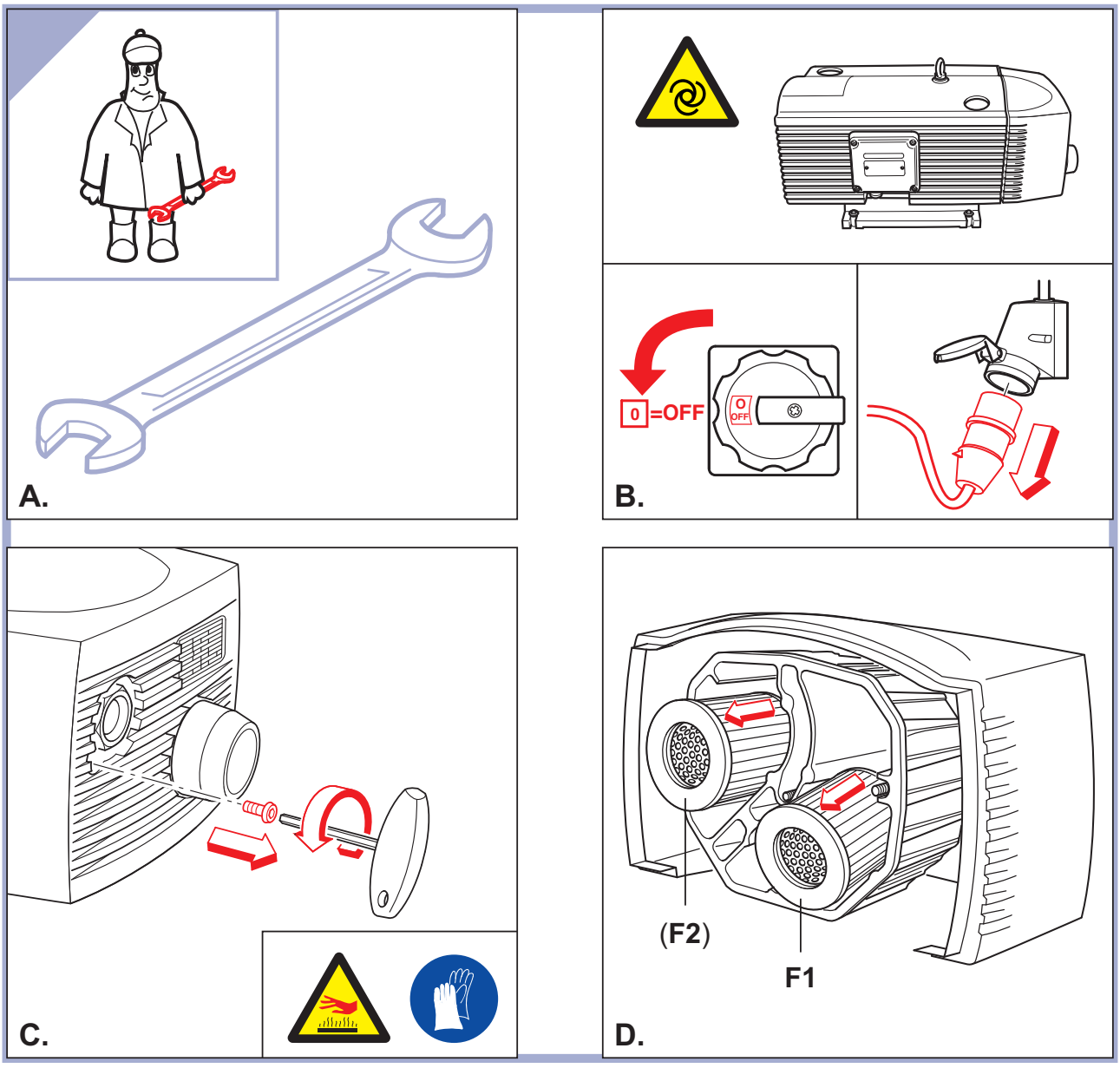


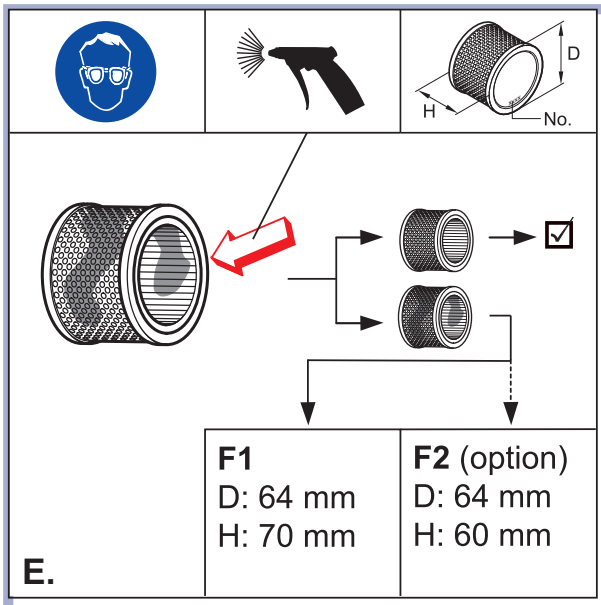


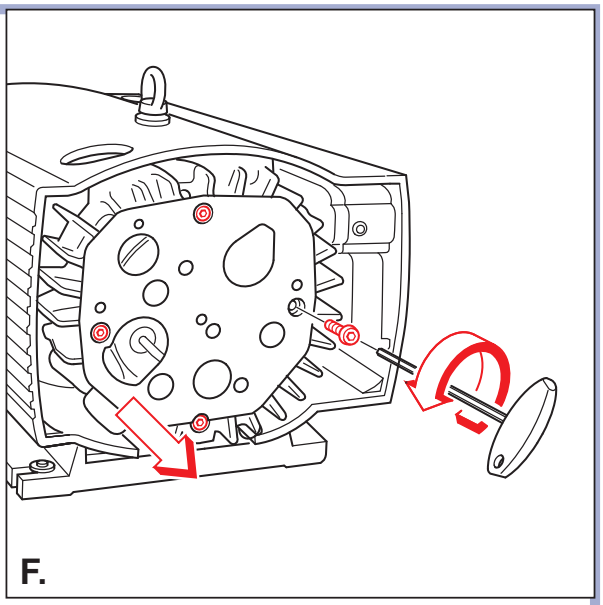


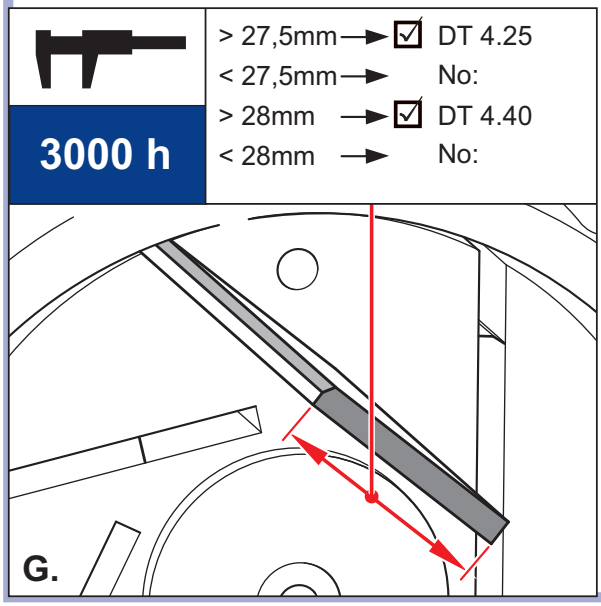

5
6
Mat.Nr. XXXXXX
3~Mot. XXXXXXXX
ENXXXX
NoUD XXXXXX
50 Hz
60 Hz
XXKW
XXX-XXX / XXX-XXX V
XX-XX / XX-XX A
cos φ 0.XX-0,XX
XXXX-XXXX /min
XX kg
3 ph
L1 L2 L3
L2 L1 L3
U1 V1 W1
M
3~
1 ph
U1
Z1
U2
Z2
L N
7
MAX.
10x /h
I =ON
0 =OFF
8

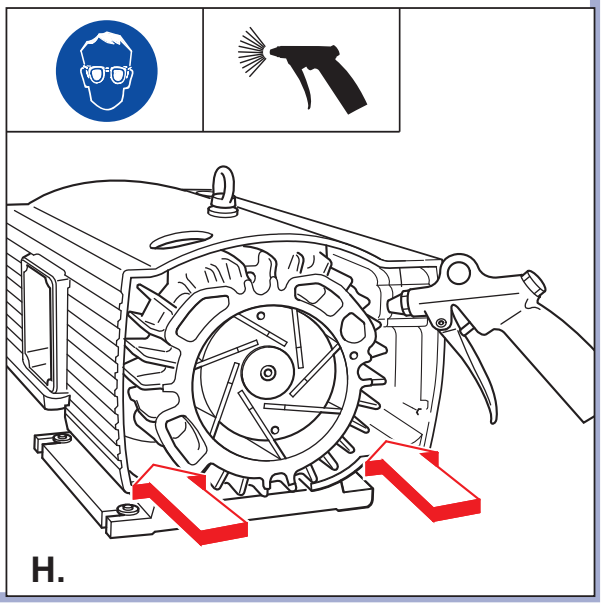

< 2m
> 2m...10m
ϕ3/4“
ϕ1“
9
MAX.
+1,0 bar
+29,5 in.Hg
10


A.
B.
0 =OFF
C.
(F2)
F1
D.

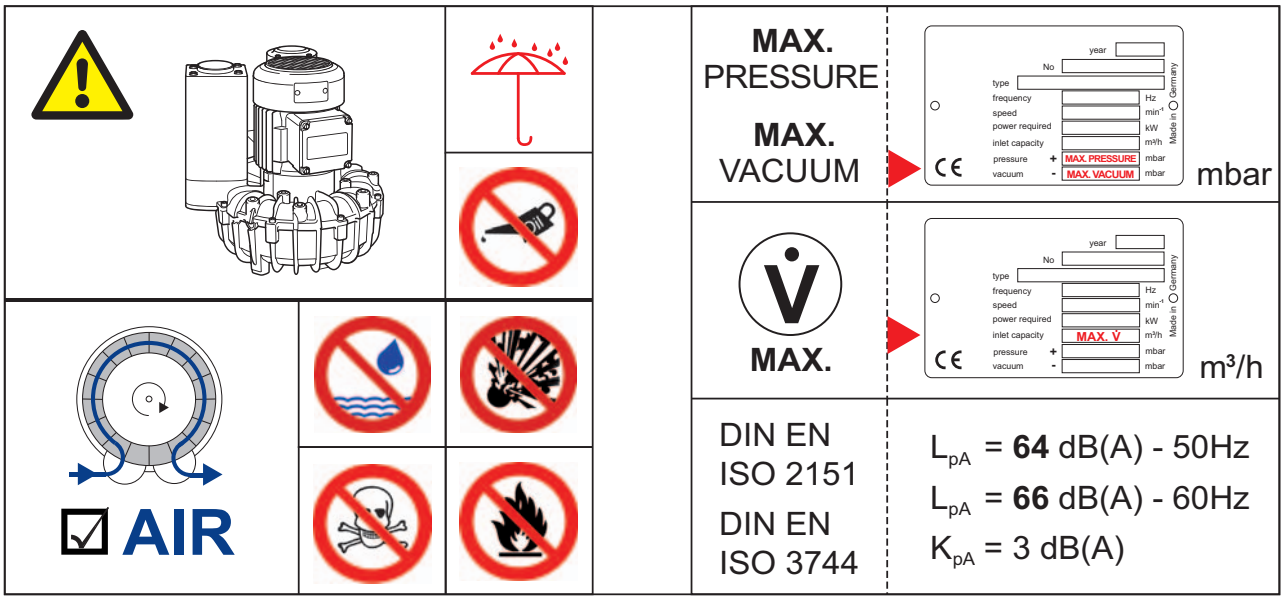

D
H
No.
F1
D: 64 mm
H: 70 mm
F2 (option)
D: 64 mm
H: 60 mm
E.

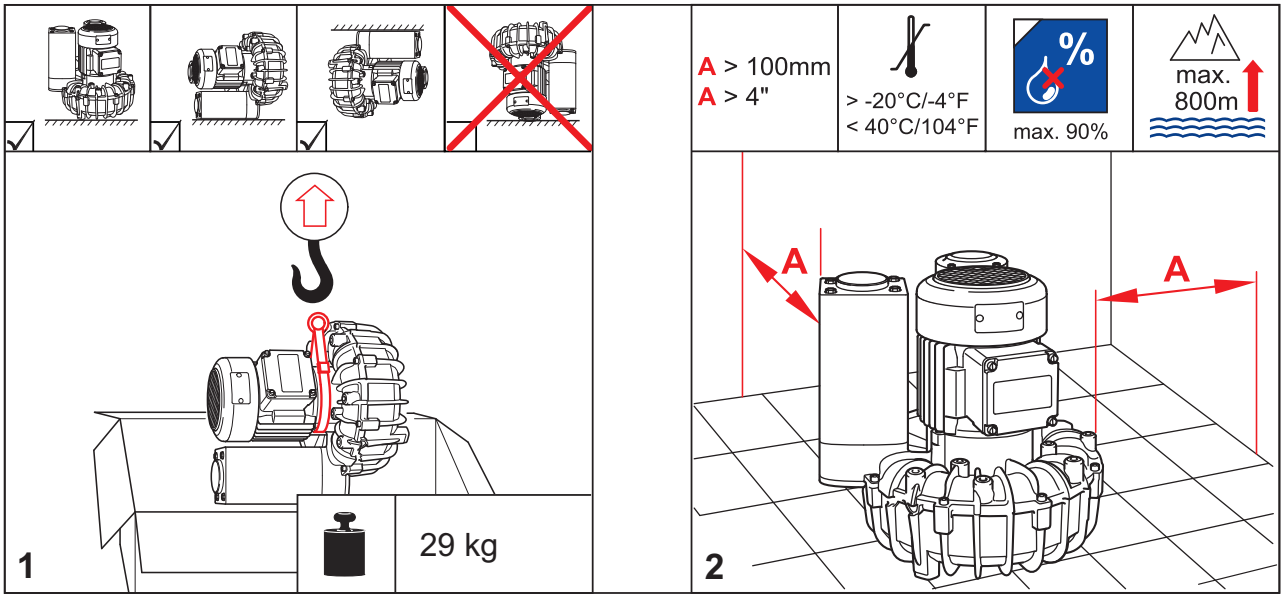

F.

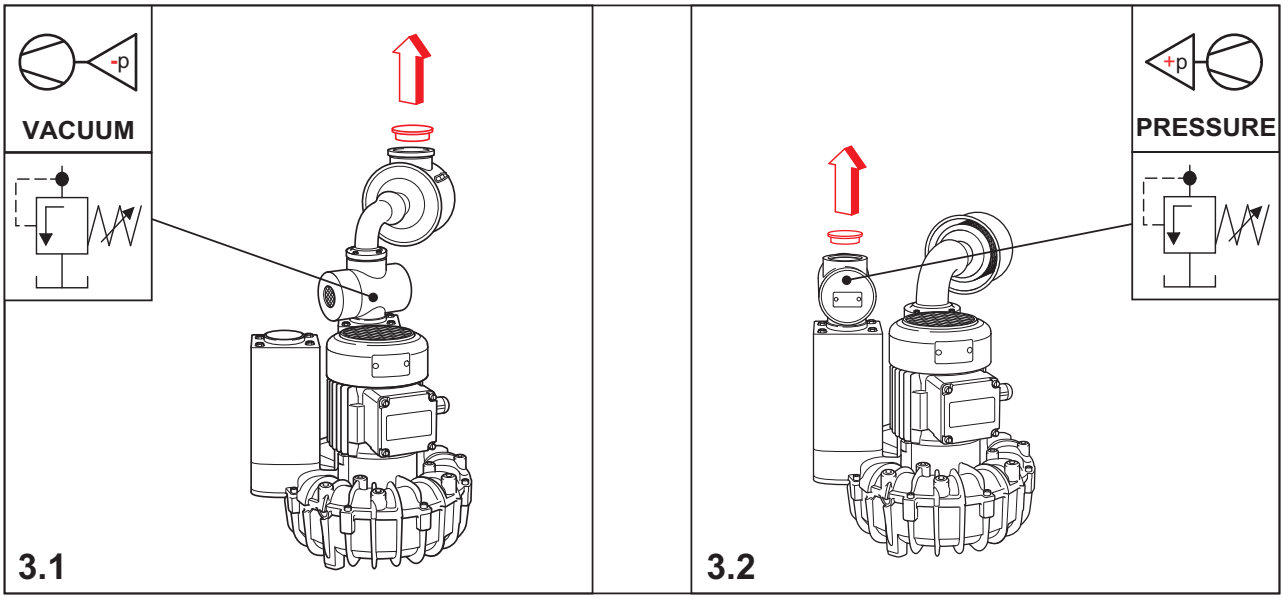

3000 h
> 27,5mm → DT 4.25
< 27,5mm → No:
> 28mm → DT 4.40
< 28mm → No:
G.

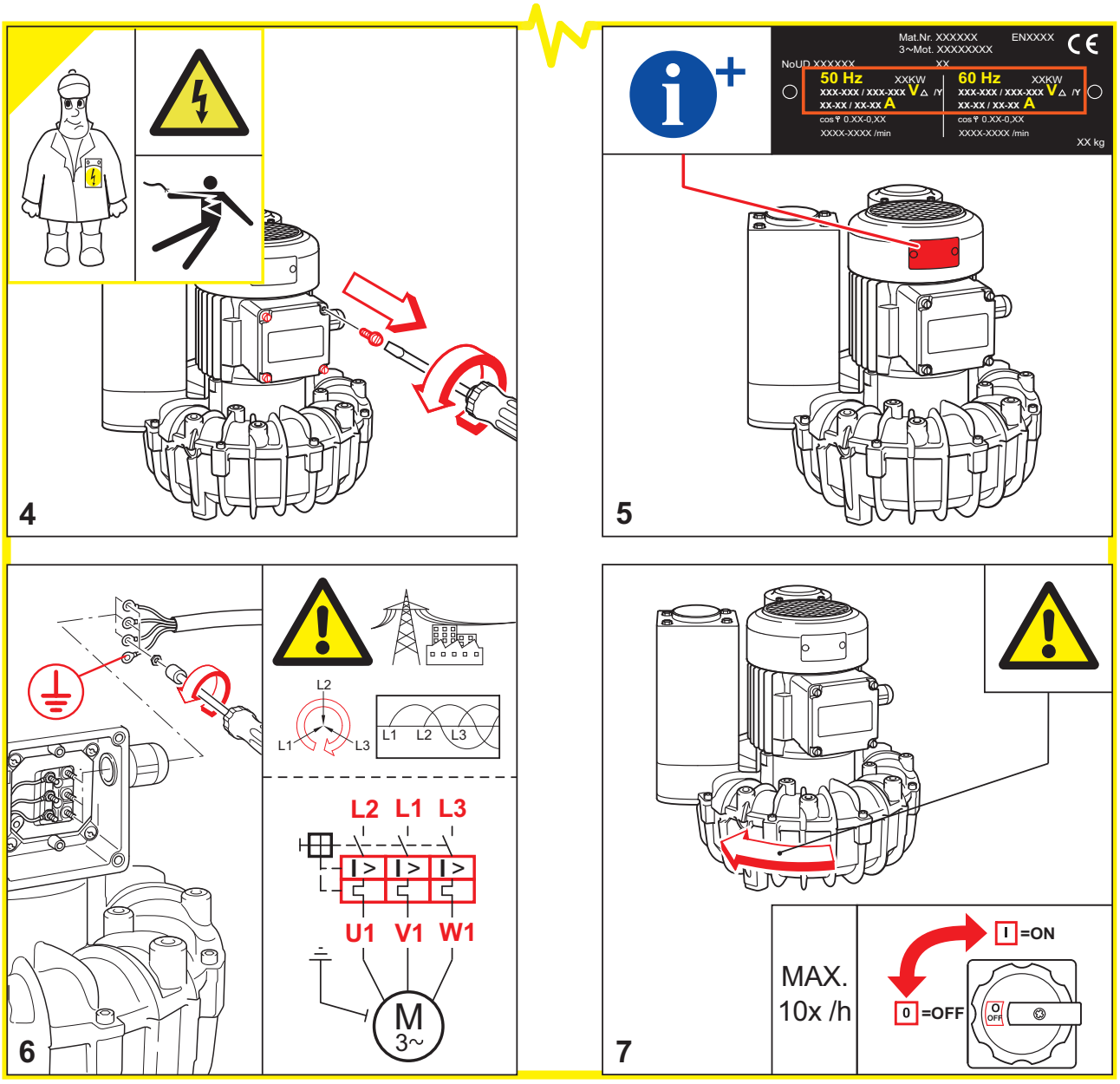

H.

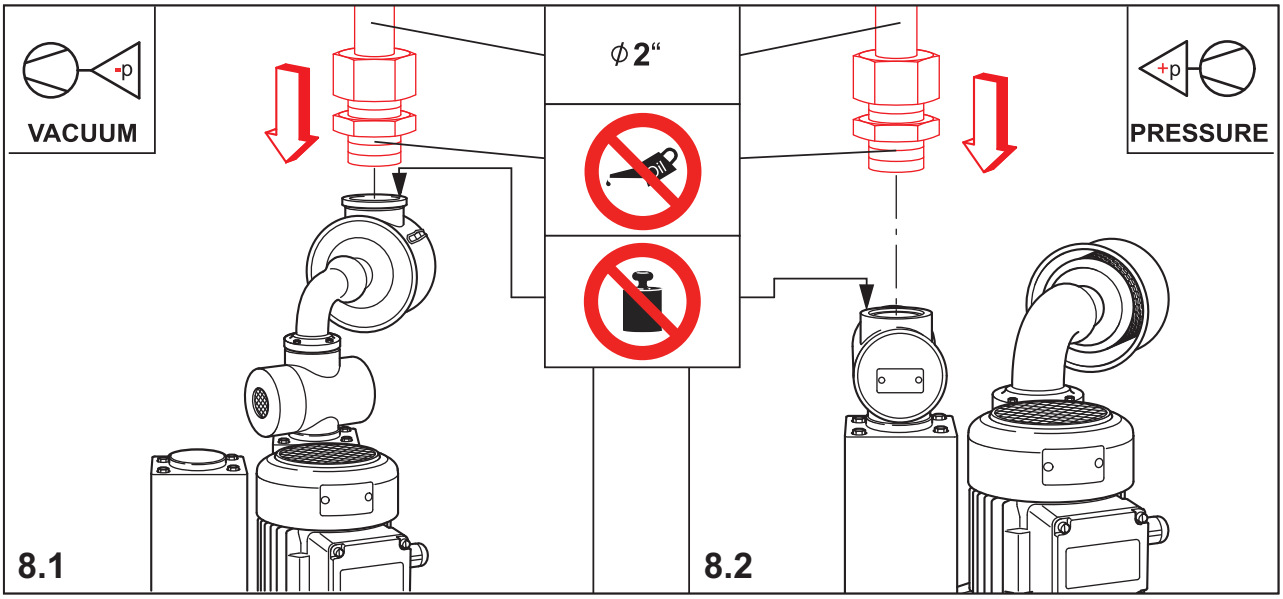
9.9 Maintenance and service for side channel blower SV 5.250/2

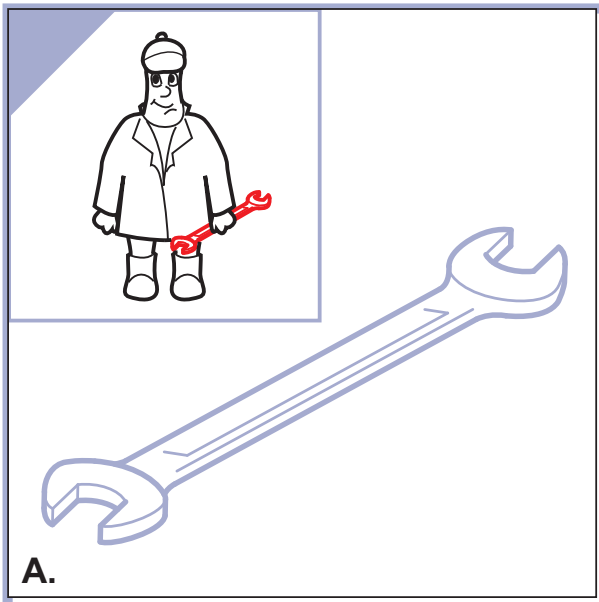


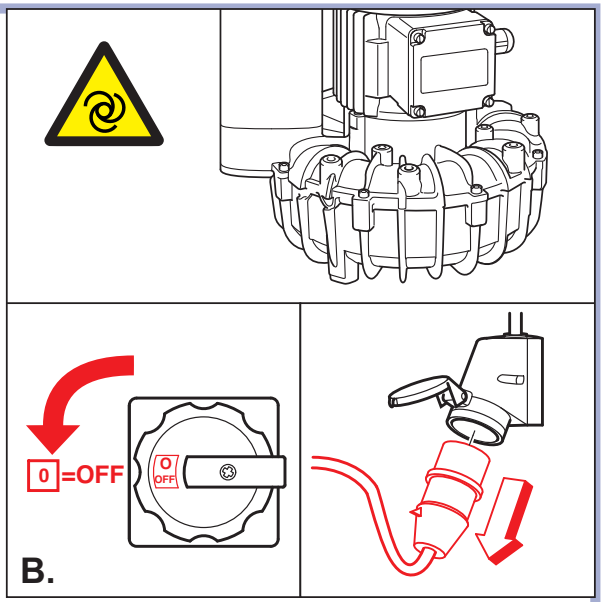


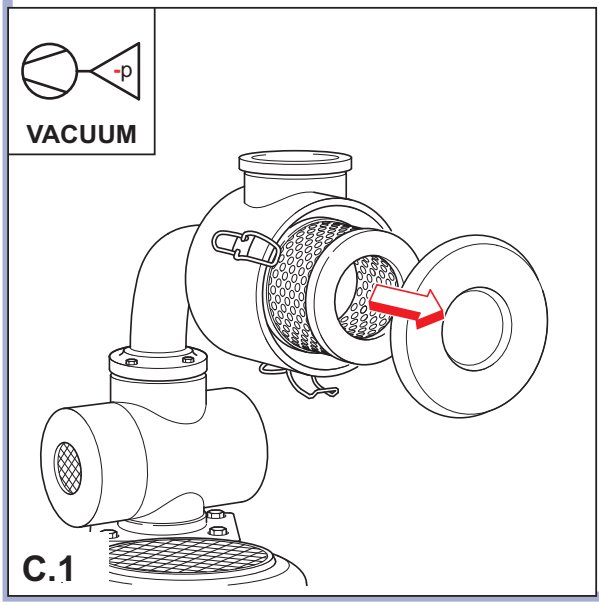


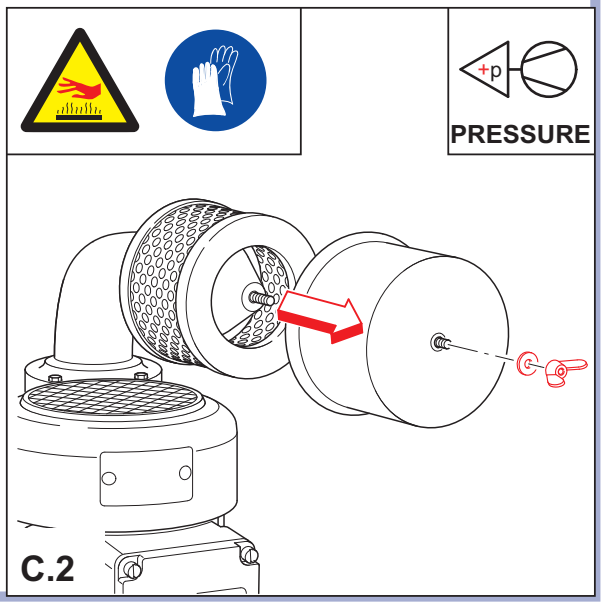

4
5
Mat.Nr. XXXXXX
3~Mot. XXXXXXXX
ENXXXX
NoUD XXXXXX
XX
50 Hz
XXKW
XXX-XXX / XXX-XXX V Δ /Y
XX-XX / XX-XX A
cos φ 0.XX-0,XX
XXXX-XXXX /min
60 Hz
XXKW
XXX-XXX / XXX-XXX V Δ /Y
XX-XX / XX-XX A
cos φ 0.XX-0,XX
XXXX-XXXX /min
XX kg
6
L2
L1
L3
L1 L2 L3
L2 L1 L3
I > I > I >
U1 V1 W1
M
3~
7
MAX.
10x /h
I =ON
0 =OFF
O
OFF

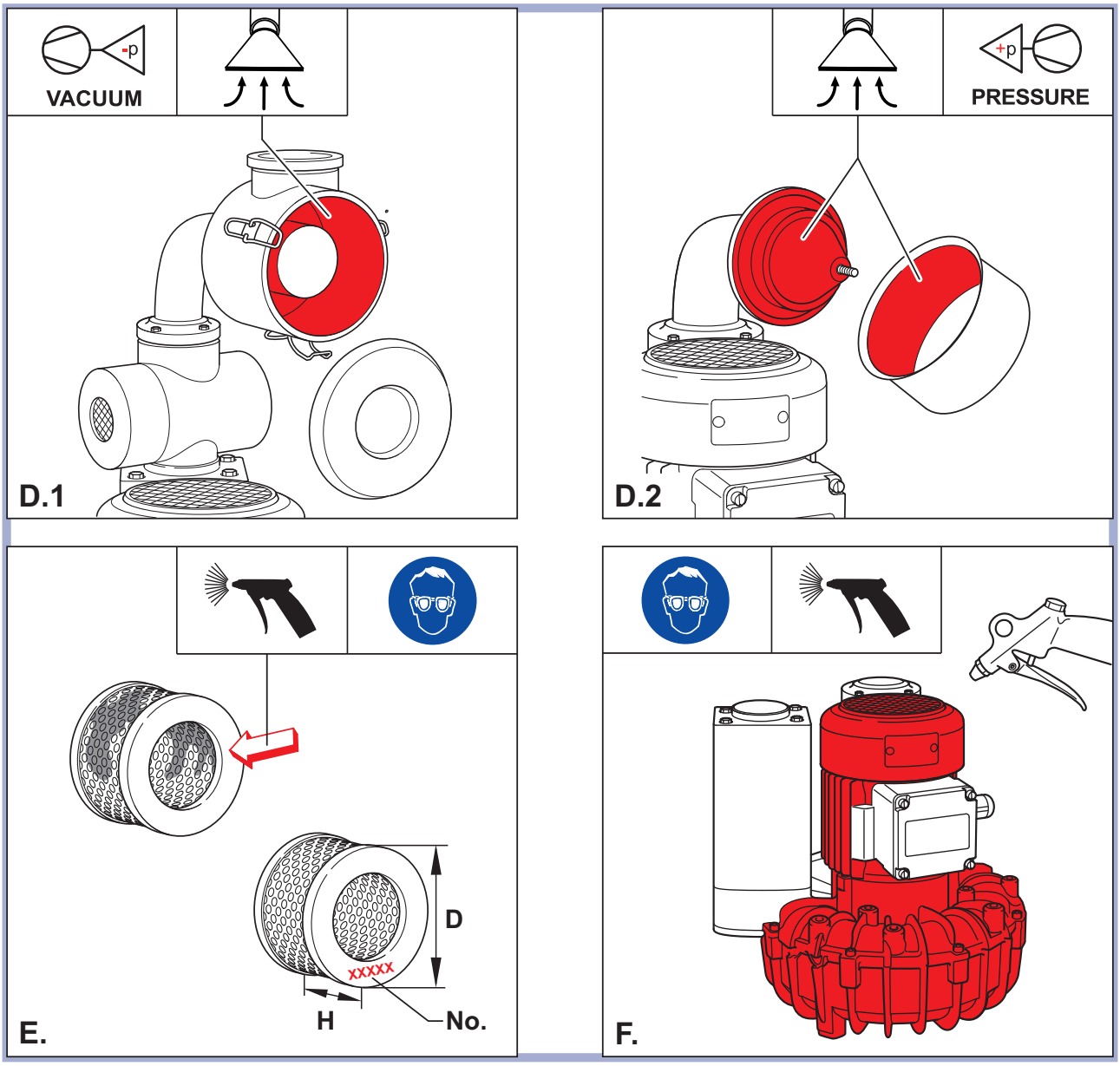

-p
VACUUM
ϕ 2“
+p
PRESSURE
8.1
8.2


A.

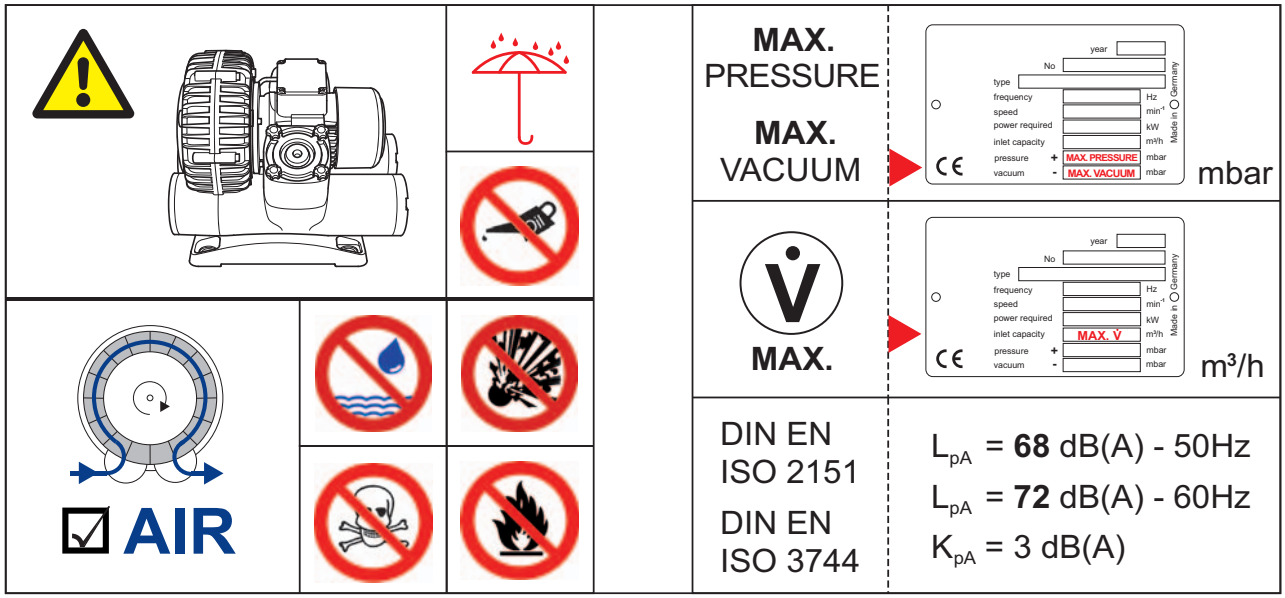

0 =OFF
O
OFF
B.

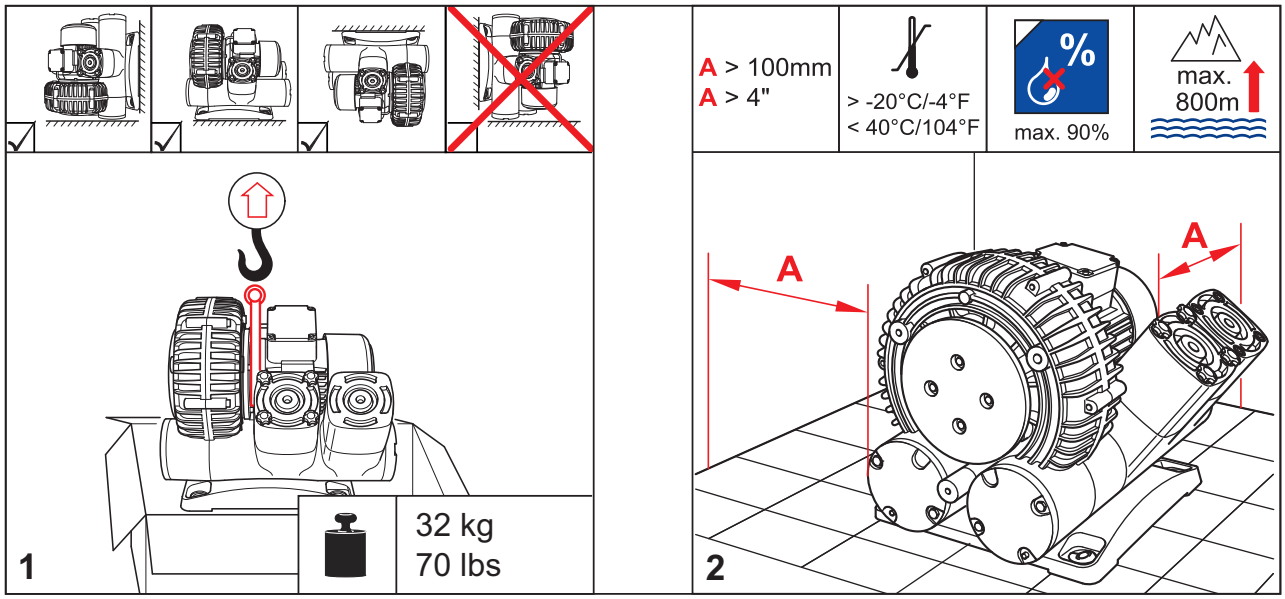

-p
VACUUM
C.1

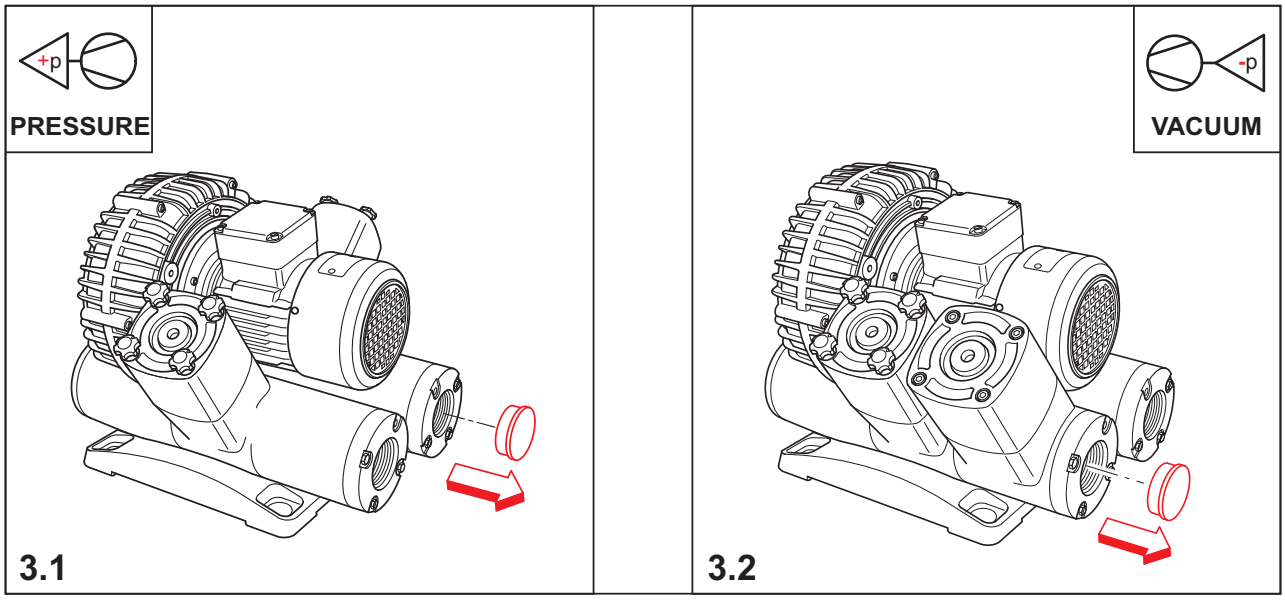

+p
PRESSURE
C.2

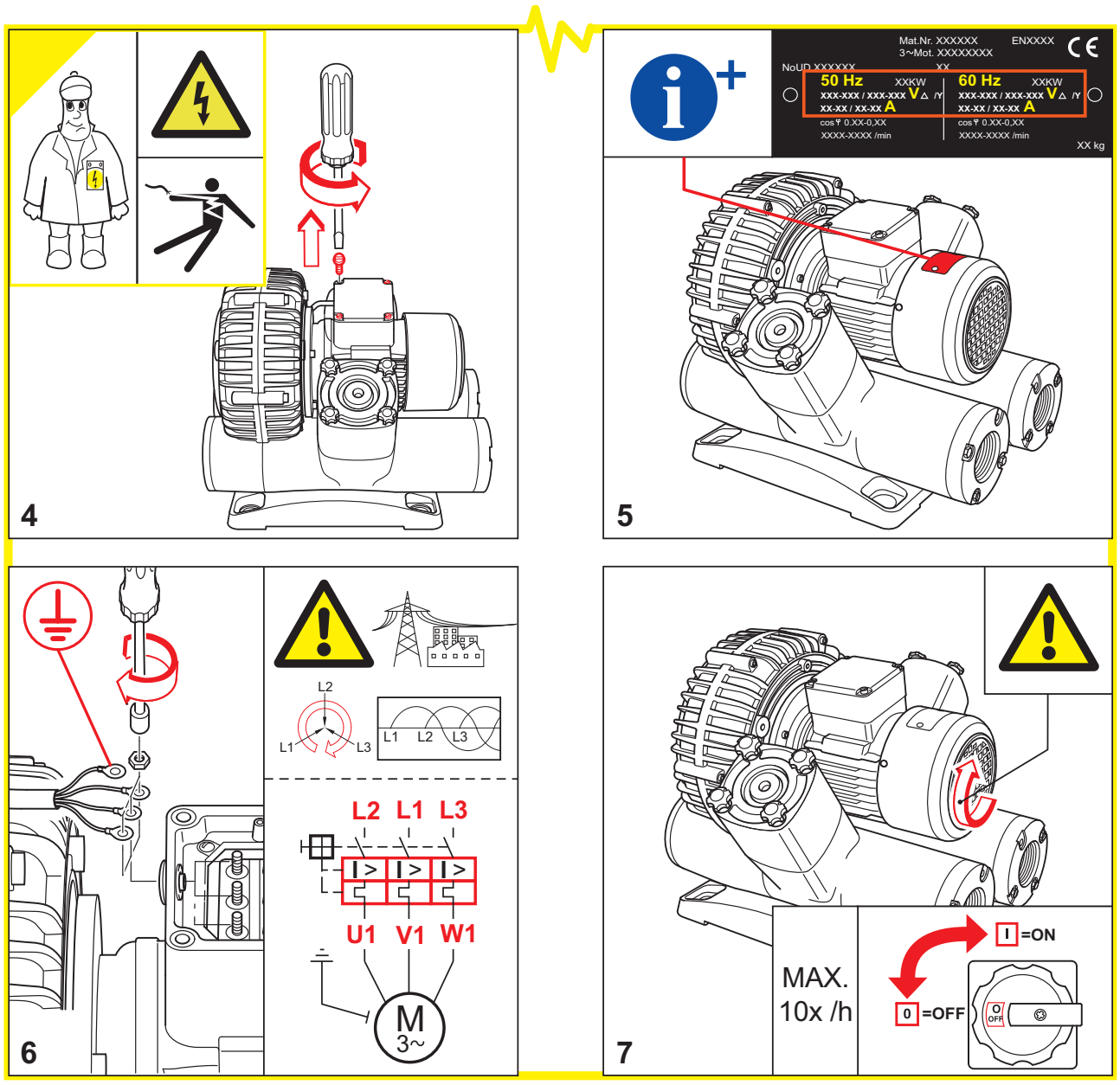

-p
VACUUM
D.1
+p
PRESSURE
D.2
D
xxxxx
H
No.
E.
F.

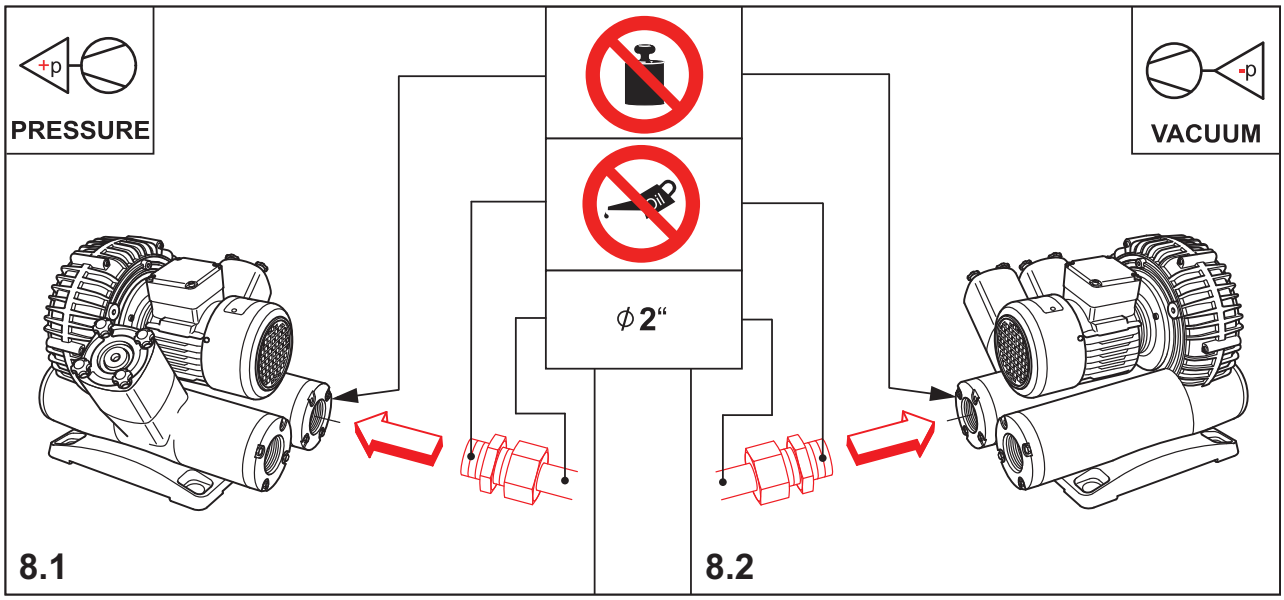
9.10 Maintenance and service for side channel blower SV 8.190

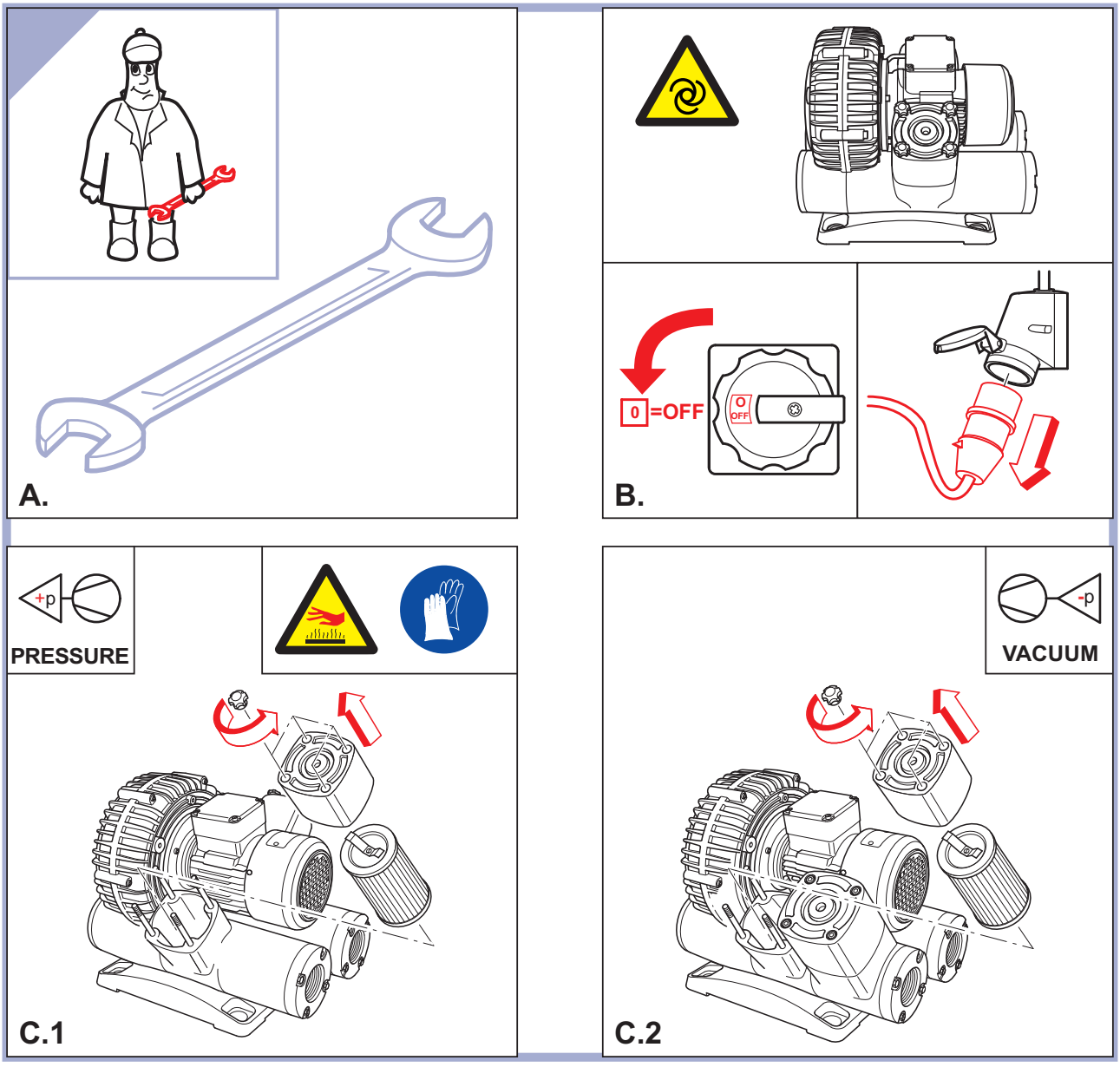


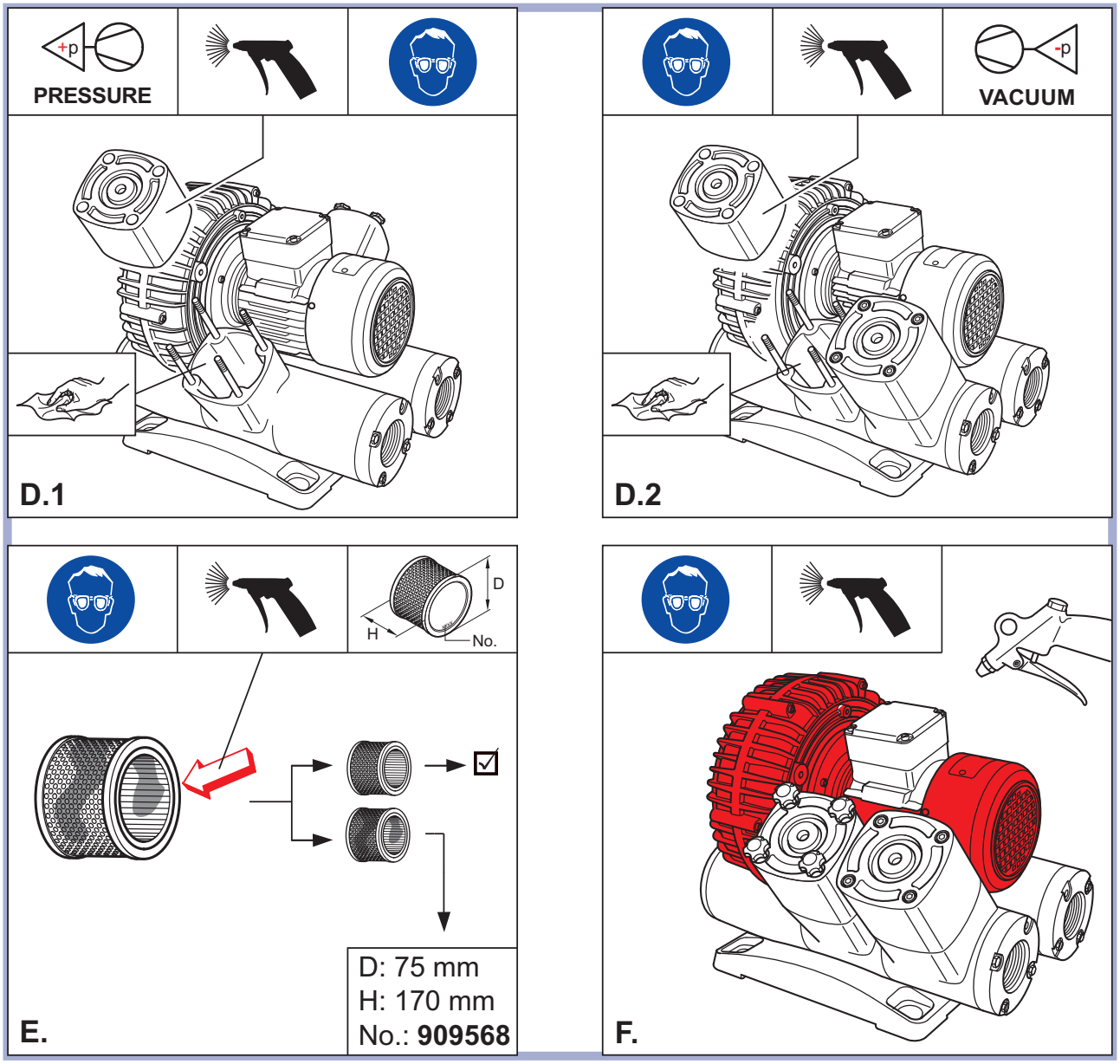





4
5
Mat.Nr. XXXXXX
3~Mot. XXXXXXXX
ENXXXX
NoUD XXXXXX
XX
50 Hz
XXKW
XXX-XXX / XXX-XXX V Δ /Y
XX-XX / XX-XX A
cos φ 0.XX-0,XX
XXXX-XXXX /min
60 Hz
XXKW
XXX-XXX / XXX-XXX V Δ /Y
XX-XX / XX-XX A
cos φ 0.XX-0,XX
XXXX-XXXX /min
XX kg
6
L2
L1
L3
L1 L2 L3
L2 L1 L3
U1 V1 W1
M
3~
7
MAX.
10x /h
I =ON
0 =OFF


+p
PRESSURE
-p
VACUUM
ϕ 2“
8.1
8.2


A.
B.
0 =OFF
O OFF
+p
PRESSURE
-p
VACUUM
C.1
C.2


+p
PRESSURE
D.1
-p
VACUUM
D.2
D
H
No.
E.
D: 75 mm
H: 170 mm
No.: 909568
F.

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