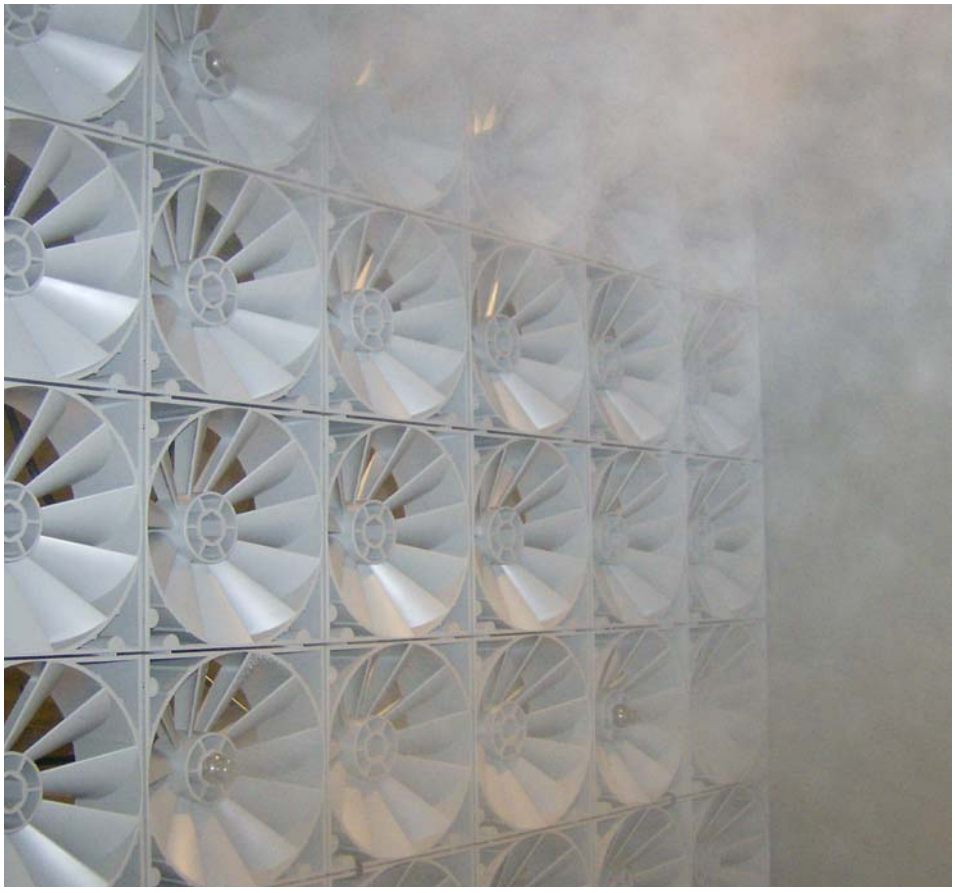
HYGROMATIK

Operating manual

HDS-P

Adiabatic humidification and cooling system



CE

Current version of this manual can be found at: www.hygromatik.co.uk

Caution: Voltage: All work must be carried out by specialists. All electrical installation work and work on the device's electrical components must be carried out by authorised electricians. Switch off devices and disconnect them from the mains supply first!

1. Introduction

Dear Customer,

Thank you for purchasing a HygroMatik high-pressure nozzle system HDS.

The HygroMatik high-pressure nozzle system HDS corresponds to the current state of the art. It features exceptional operational reliability, ease of use and cost-effectiveness.

To ensure the proper, safe and economical operation of your HygroMatik high-pressure nozzle system HDS, please read this operating manual.

Only use the HygroMatik high-pressure nozzle system HDS if it is in perfect condition and only for its intended purpose, considering all safety and risk aspects as well as all instructions in this manual.

If you have further questions please contact us:

Airtrend Ltd.-Gobrid. Ltd.
Kumanovska 14, 11000 Beograd
Tel. +381 11 383 68 86, 308 57 40
Faks +381 11 344 41 13
E-mail: gobrid@eunet.rs

Please have your device data ready for queries or spare part orders!

1.1 Typographic markings

- lists with items beginning with bullets: general lists

» lists with items beginning with arrows: work or operating steps which should or must be carried out in the specified order

☑ installation steps which must be checked

italics figure and plan names

1.2 Documentation

Storage

Please keep this operating manual in a safe place where it is accessible at all times. If you sell the product, be sure to include this manual. Please contact HygroMatik if the documentation is lost.

Language versions

This operating manual is available in different languages. Please contact your HygroMatik dealer or HygroMatik for details.

1.3 Intended use

The HygroMatik high-pressure nozzle system HDS is used for air humidification and cooling with desalinated water having a conductivity of 5-20 µS/cm. The feed water should have a temperature of 5-40°C.

Caution: Proper use includes fulfilment of the assembly, disassembly, reassembly, start-up, operating and maintenance conditions specified by us as well as disposal measures.

Only appointed qualified staff may work on or with the system. Persons transporting or working on or with the system must have read and understood the relevant parts of this operating manual, particularly the 'Safety instructions' section. Staff must also be informed of possible hazards by the operating company. Please keep a copy of the operating manual at the location where the device is being used.

The HygroMatik high-pressure nozzle system HDS is not frost-proofed and not suitable for outdoor installation.

The room temperature should be between 5 and 40°C.

Applications:

The HygroMatik high-pressure nozzle system HDS has a wide range of applications. These systems are used wherever low-energy adiabatic humidification or cooling or systems with high-precision control are needed. They can be found in such places as offices, storerooms, production halls, clean rooms, hospitals and concert halls.

Note: Components installed in ventilation and air-conditioning systems must be suitable for the intended use; i.e. they must be corrosion-resistant, easy to clean, accessible and hygienic. Furthermore, they must not facilitate growth of micro-organisms.

Improper use:

Hardware and software may not be modified.

2. Safety instructions

2.1 General information

The safety instructions are prescribed by law. They are intended to ensure health and safety at work and accident prevention.

Warnings and safety symbols

The following safety symbols are used in this manual to indicate hazard and risk warnings. Please familiarise yourself with these symbols.

Caution: Failure to heed this warning may result in injury or danger to life and limb and/or damage to the device.

Caution: Voltage: Dangerous electrical voltage! Failure to heed this warning may result in injury or danger to life and limb.

Caution: Failure to heed this warning may result in damage to the device from electrostatic discharge. The electronic components of the control system are highly sensitive to electrostatic discharge. To protect these components from damage by electrostatic discharge, special measures (ESD protection) must be taken during all installation work.

Note: indicates materials and consumables which must be handled and/or disposed of in accordance with statutory requirements.

Note: precedes explanations for or cross-references to other places in the text.

2.2 Operational safety instructions

General information

Observe all safety instructions and warnings found on the system.

If malfunctions occur switch the system off immediately and secure it to prevent it from being switched on. Eliminate the malfunctions immediately.

After maintenance work has been carried out, expert staff must ensure that the system is safe to operate.

Only use original spare parts.
National regulations beyond the scope of this manual apply without restriction for operation of this device.

During operation of the HygroMatik high-pressure nozzle system it is not allowed to stay in the humidification chamber.

The desalinated water used for feeding the HygroMatik high-pressure nozzle system is unsuitable for drinking.

Work on the high pressure components of the nozzle system is only allowed if the unit is disconnected from the power supply.

Accident prevention regulations

Caution: Heed the HSW (Health and Safety at Work) regulations for electrical installations and equipment (VBG4/BGVA3).
By doing so you protect yourself and others from harm.

Operating the HygroMatik high-pressure nozzle system

Refrain from all work practices which compromise the safety of the system.

Check all protection and warning devices at regular intervals to ensure they are in perfect working order.

Do not remove or deactivate safety devices.

Assembling, disassembling, servicing and maintaining the device

Disconnect system parts from the mains supply before servicing or repairing them.

Mounting or insertion of **additional devices** is only permitted with the **written consent** of the manufacturer.

Electrical equipment

Caution: Only a qualified electrician is permitted to work on the electrical system and the control cabinet.

Disconnect system parts from the mains supply before working on them.

Switch off the system immediately if faults in the electrical energy supply occur.

Only use original fuses with the specified amperage.

Inspect the system's electrical equipment at regular intervals. Promptly eliminate deficiencies, such as loose connections or melted cables. After carrying out the corresponding electrical assembly or maintenance work, test all protective measures used (e.g. earth resistance).

The HygroMatik high-pressure nozzle system is protected to IP22. Ensure that the devices are protected from dripping water at the installation location.

If a HygroMatik high-pressure nozzle system is to be set up in an area without water drainage, safety measures which eliminate the possibility of water entering the system due to leaks must be taken.

2.3 Disposal upon disassembly

Note: The operating company is responsible for disposal of the system parts in accordance with statutory requirements.

3. Transport

3.1 General information

Note: Take care when transporting the HygroMatik high-pressure nozzle system to prevent the device and packaging from being damaged by impact or accidental loading or unloading.

3.2 Packaging

Note: The HygroMatik high-pressure nozzle system is delivered on a pallet.

3.3 Temporary storage

Store the material in a clean dry place. The storage temperature should be 0-40°C.

Note: Only clean components may be installed in a ventilation duct.

3.4 Inspecting for correctness and completeness

When you receive the goods, ensure that:

- the equipment is complete and all parts are in perfect condition.

Note: Any transport damages and/or missing parts must be reported immediately to the shipper or supplier.
The periods in which notification of the transport company must occur for the purposes of identifying the damage are as follows*:

Transport company	Time after receipt of goods
Post	no later than 24 hours
Rail	7 days at the latest
Rail and road transport companies	4 days at the latest
Parcel services	immediately

* Periods are subject to change without notice.

3.5 Scope of delivery

The following items are included in the delivery:

- vortex modules
- droplet separators
- high-pressure pump station
- operating instructions for the system.

Note: Hoses and nozzles are delivered at the time of start-up.

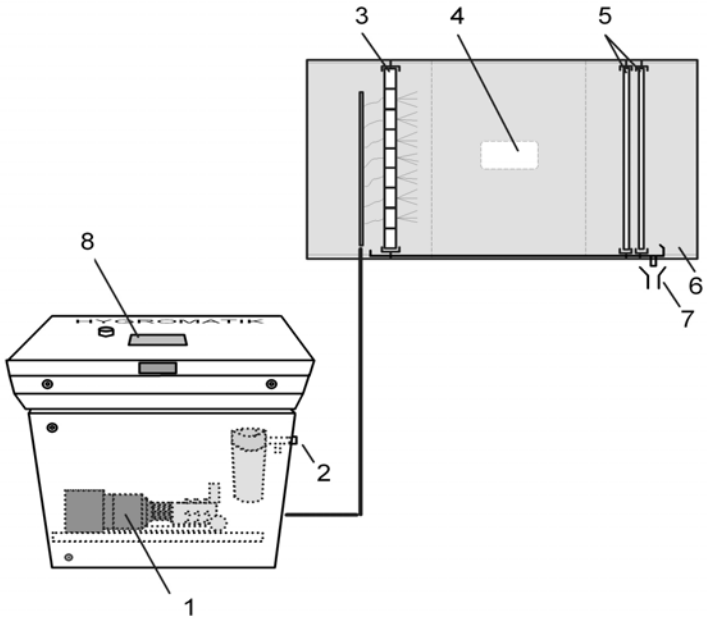
4. Function and design

4.1 Functioning

The HygroMatik high-pressure nozzle system is based on atomisation of water.

Desalinated water is fed into a high-pressure piston pump. With an operating pressure of up to 75 bar, the water then goes to the high-pressure nozzles. These nozzles generate a very fine spray mist which is taken up by the air in the device chamber. The ambient air is cooled adiabatically in the process.

4.2 Design and process



1: Pump group with mounted PLC cabinet

2: Water feed

3: Vortex module wall

4: Viewing window (necessary according to VDI 6022)

5: 2-stage droplet separator

6: Humidification chamber or duct with service doors and water tray

7: Water drain, siphoned

8: SPS-control

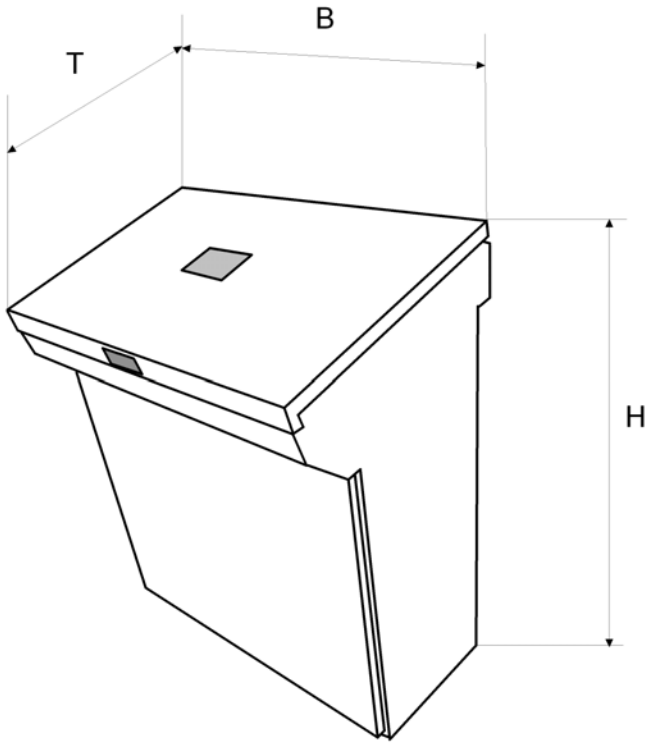
Note: The swept area of the control cabinet door may not be changed.

4.2.1 High-pressure pump group

The high-pressure piston pump generates a pressure of up to 75 bar. The maintenance-free asynchronous motor with variable frequency and voltage enables continuous 9-50 Hz operation.

Pump group	Capacity [l/h]	Max. speed [rpm]
HDS-1100-P	46-260 (14-180 with Bypass)	1400
HDS-2200-P	90-520 (65-390 with Bypass)	1400

4.2.2 Dimension drawing of HygroMatik high-pressure nozzle system

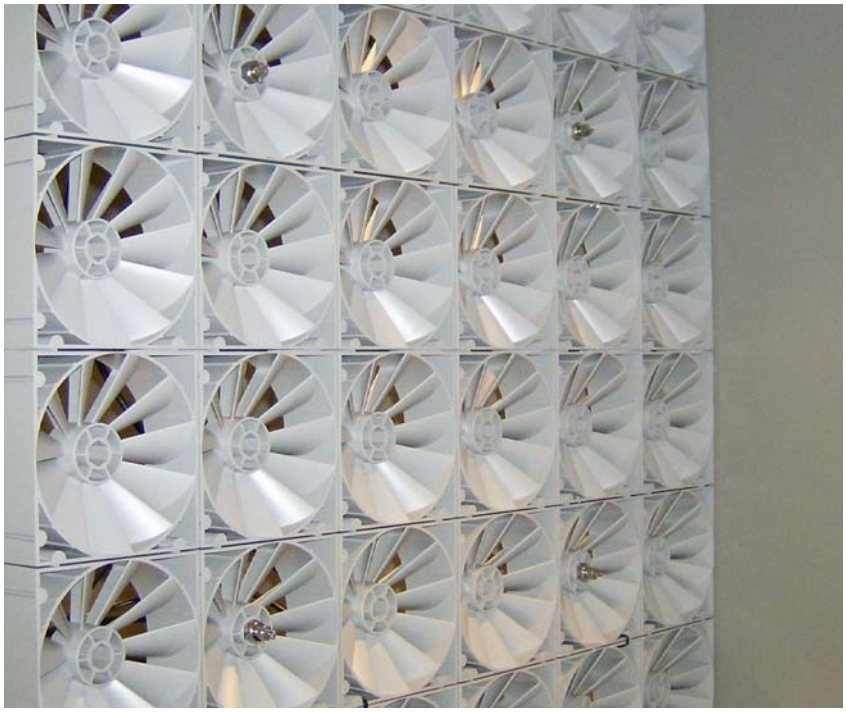


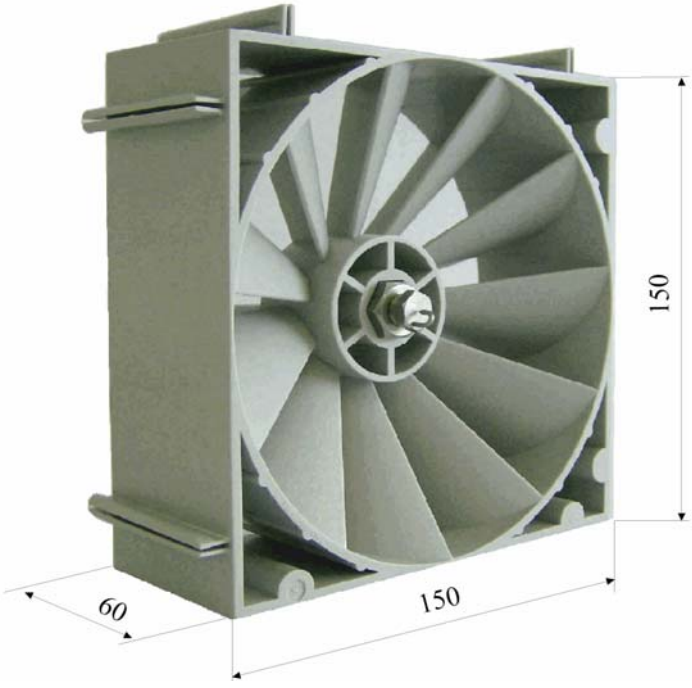
	H	T	B	
HDS-1100-P	952	480	850	approx 60 Kg
HDS-2200-P	952	480	850	approx 80 Kg

4.2.3 Vortex modules

The vortex modules provide for effective mixing of the air and the water mist.

Due to their special design, they generate turbulence and shear zones which lead to a homogeneous distribution of moisture along the humidification section (0.9 m).
The vortex modules (dimensions: 150 x 150 mm) are delivered individually and can be assembled to form a wall. For optimal moisture absorption, the air velocity is 1.0-2.5 m/s. The vortex module wall exhibits a low pressure drop of 10Pa at an air velocity of 2.0 m/s.

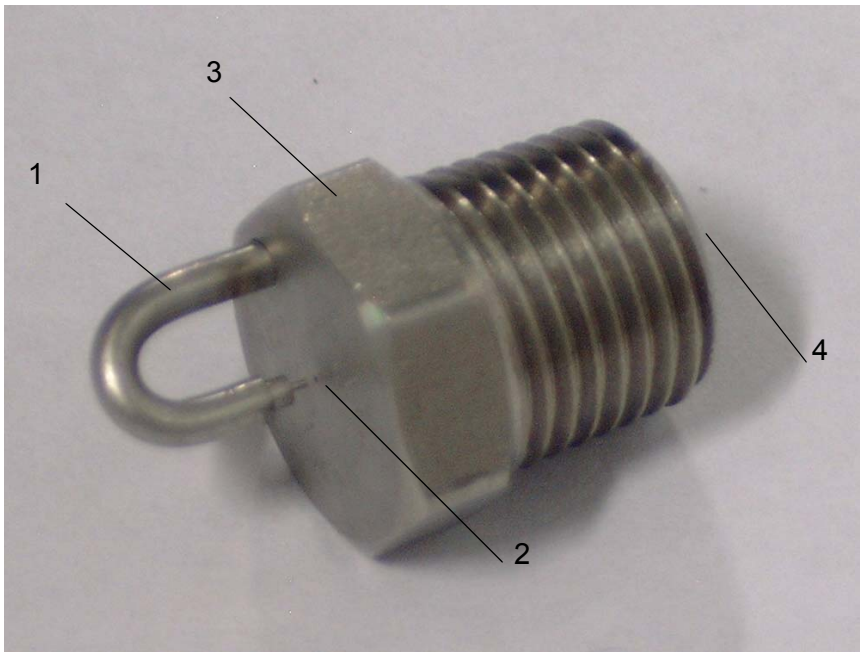




4.2.4 Atomising nozzles

Desalinated water at a pressure of 10-75 bar reaches the high-pressure nozzles where the water is atomised to form ultra-fine mist-like aerosols. The aerosols enter the area of the vortexed air stream downstream of the vortex modules. The air and aerosols are mixed intensively here.

The atomising nozzle generates a spray cone with a wide opening angle.



1: Impact pin

2: Nozzle opening

3: Nozzle body

4: Filter (not visible in figure)

Functioning:

Water hits the impact pin at a high velocity. It is thereby split into extremely fine droplets.

The high operating pressure of the water (up to 75 bar) is nearly completely translated into the exit velocity from the nozzle. The higher the operating pressure the finer the droplets.

High-pressure nozzle material: stainless steel 1.4401

The nozzle contains a filter to protect it from contamination.

Spray characteristics at operating pressure of 75 bar

Volumetric flow rate:	[l/h]	6,8*

Most droplets with diameter less than 50µm.

(*: Information is subject to change or alteration without prior note)

4.2.5 Droplet separators


droplet separators

There are no more atomised water droplets in the air stream behind the HygroMatik high-pressure nozzle system (if the environmental parameter specifications are complied with). The two wire-mesh droplet separators arranged in series ensure this. The trap pads exhibit a low pressure drop (75 Pa at air velocity of 2.0 m/s and average air density of 1.2 kg/m³).

The air velocity should be between 0.9 m/s and 2.8 m/s. If it is outside this range it can cause moisture breakthrough downstream of the droplet separators - in such cases please first contact HygroMatik.

The droplet separators are inserted into the humidification chamber via guide rails and are hence easy to remove for servicing.

The traps are standardly delivered with corrosion-resistant metal frames.

4.2.6 Humidification section

The section between the vortex module wall and the droplet separators is called the 'humidification section' in this system. It is unobstructed and hence easy to monitor and clean.

For a total standard installation length of 1.5 m for the HygroMatik high-pressure nozzle system the humidification section should have a length of at least 0.9 m. The exact dimensions are described in the schematic in the section entitled 'Overview of the humidification chamber'.

4.3 Partial and Full-Load

For optimal humidification control under various input conditions the HygroMatik high pressure nozzle system can be equipped with a „Partial and Full-Load" control function.

At Full-load all nozzles are fed with high pressure water. At Partial-load a solenoid valve switches off the water supply for approximately half of the nozzles.

Construction:

The high pressure pump has to exits for high pressure water - one is the water supply for the nozzles for Partial load and the othe one is the water supply for the nozzles for Full load.

If the external control signal decreases below a special switching point, the high pressure nozzle system switches off the water supply for half of the nozzles.

5. Connnections

5.1 Water

Connection:	3/4”-external thread
Conductivity:	5-20 µS/cm
Pressure:	0.1-0.5 MPa (1-5 bar)
Temperature:	max. 40°C
pH value:	7 +/- 1

Note: The supply water for the HygroMatik high-pressure nozzle system must comply with VDI 6022; i.e. from a microbiological point of view it must be of drinking water quality.

5.2 Waste water

Connection:	Plastic hose DN 12
Fitting:	with constant fall and with siphon

5.3 High pressure water

Connection „Full-Load”:	3/8”-external thread for high-pressure hose
Connection „Cooling”:	3/8”-external thread for high-pressure hose
Connection „Partial-Load”:	3/8”-external thread for high-pressure hose

5.4 Electrical

Power supply:	LNE 230 V AC, 50 Hz
External control signal:	0-10 V DC
System enabling:	via ext. potential-free contact
Collective fault signal:	potential-free contact (change over contact)
Operating status signal:	potential-free contact (NO)

6. Interfaces to the HygroMatik high-pressure nozzle system

6.1 Air

Air purity: A Class F7 pre-filter is to be placed upstream of the HygroMatik high-pressure nozzle system.

Air velocity: 0.9-2.8* m/s

If the air velocity is outside this range please contact HygroMatik.

(*: under ideal conditions)

Pressure drop: Approx. 85 Pa (at an air velocity of 2.0 m/s and with use of a vortex module wall and two dry droplet separators).

Air volume flow (for 'partial-load / full-load switching' option):

If the HygroMatik high-pressure nozzle system is operated in systems with modifiable air volume flows (reduced air volume of less than 70% of the maximum air volume), the full-load solenoid valve is switched off and the partial-load mode is activated. This also applies for systems with multi-stage ventilators.

Note: For humidification of rooms the humidified air must exhibit a purity in terms of bacterial count in accordance with VDI 6022.

6.2 Humidification chamber

The humidification component should be designed, like a scrubber housing is, to have an inclination of at least 1.5° towards the trap and to be waterproof.

The water drain must be at the end of the humidification section.

The ideal humificiation section length (distance between vortex module wall and droplet separators) is 0.9 m. This corresponds to a total installation length of 1.5 m (see schematic in section entitled 'Overview of the humidification chamber'). Should this installation length not be available please contact HygroMatik.

The humidification chamber should be aerosol-tight and it should be able to withstand desalinated water.

Note: The guide rails for the vortex module wall and droplet separators are supplied by the manufacturer. The guide rails must already be installed for the system to be started. The vortex module wall and droplet separators must also already be installed.

Note: The guide rails must be designed such that the vortex module wall and droplet separators can be removed (for servicing).

Note: When starting the system check again that the humidification chamber has been thoroughly cleaned. In particular the humidification chamber and the ventilation duct upstream of it must be free from metal swarfs to prevent corrosion.

7. Mechanical assembly

Caution: The device may only be assembled by qualified staff. HygroMatik accept no liability for damages resulting from incorrect assembly.

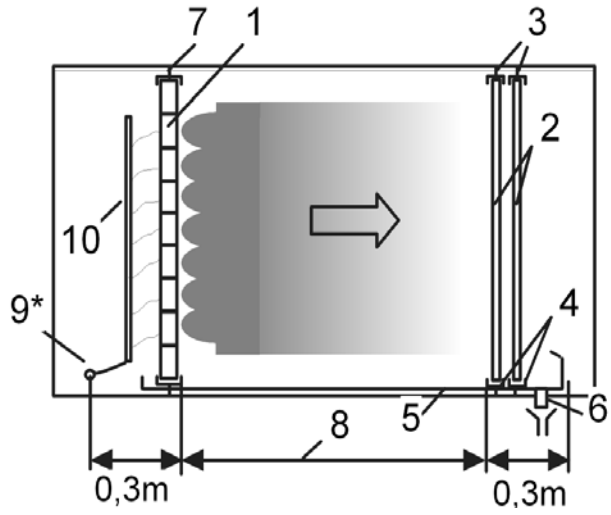
Observe all safety instructions and warnings found on the device. The device must be de-energised during assembly.

Mounting or insertion of additional devices is only permitted with the written consent of the manufacturer. Otherwise the guarantee and warranty will become void.

7.1 Housing of the high pressure nozzle system

Screwing the housing of the high pressure nozzle system to the floor ensures a stable stand. Therefor use the 12mm drillings located in the four corners of the housing.

7.2 Overview of the humidification chamber



1: Vortex module wall with spray system

2: Droplet separators

3: Upper guide rails for droplet separators

4: Lower guide rails for droplet separators

5: Collection tray

6: Drain with trap

7. Guide rails for vortex module wall

8. Humidification section, >/= 0.9 m

9. Two M32 cable glands (for partial-load / full-load switching) for connecting high-pressure hoses * Only one cable gland is needed for the standard model.

10. Distribution pipe

Note: In front of the vortex module wall and from the droplet separators a minimum distance of 0.3 m to other installed components must be maintained (see above schematic). Temperatures higher than 60°C may destroy the vortex modules.

7.3 Assembling the vortex module wall

Two guide rails are required for assembly of the vortex module wall.

We recommend to have an air gap sideways between the vortex module wall and the housing wall as it generates a laminar air flow and prevents moisture build-up on the walls.

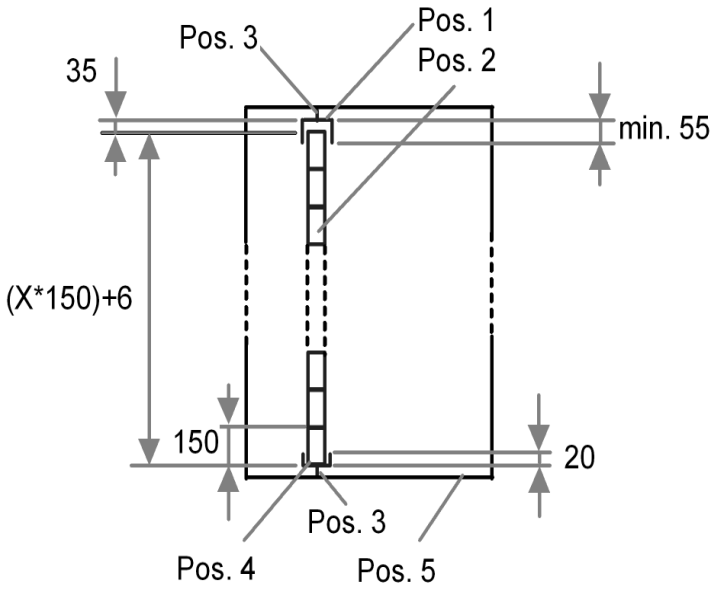
7.3.1 Guide rails for the vortex module wall:

In order to position the vortex module wall in the humidification chamber guide rails are required. The guide rails are fixed to the ceiling and the floor of the humidification chamber.

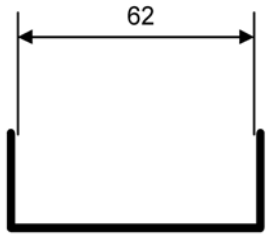
The guide rails must be installed in a way that makes it possible to either pull out of or lift up the vortex module wall.

Ensure that after installation the floor of the humidification chamber is leackage-free.

7.3.2 Examplary design of guide rails for a vortex module wall



Guide rail (cross section)



Pos. 1: upper guide rail

Pos. 2: vortex module wall

Pos. 3: spacer or direct connection floor of chamber

Pos. 4: lower guide rail

Pos. 5: humidification chamber

Inner dimension of guide rail: 62 mm

Hight: please see above sketch

Material: 1.4301 stainless steel sheet, thickness: 1 mm

7.3.3 Side rails for the vortex module wall:

If the wall consists of 11 or more vortex module rows side rails are required in order to avoid bending of the vortex module wall.

Having more than 16 vortex modules in horizontal position the the vortex module wall has to be vertically separated into two halfs, that are separately fixed by side rails

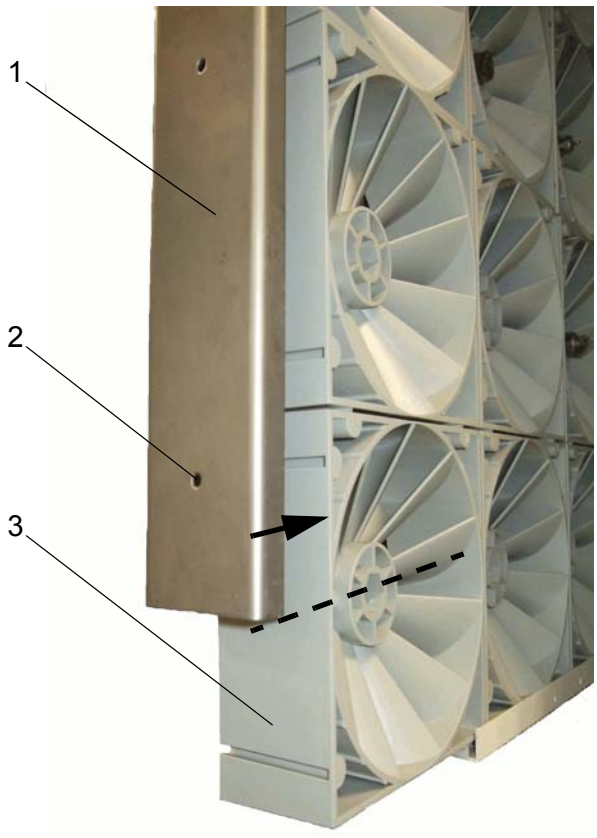
7.3.4 Assembling of the side rails for the vortex module wall

Vortex module walls consisting of 11 or more vortex module rows are automatically equipped with side rails and self-tapping screws.

The side rails have to be adapted to the right lenght by the installer. The required lenght is the distance between the middle of the lowest and the middle of the top vortex module.

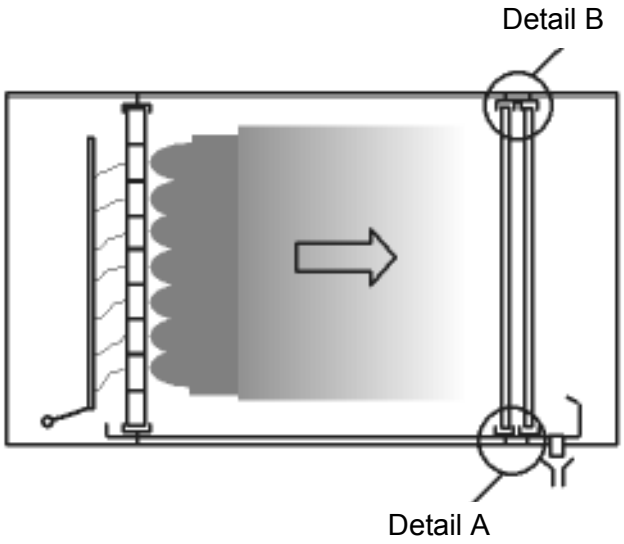
The side rail is an u-section and made of stainless steel. It is 1.5mm thick. For the assembling the open side of the u-section has to be attached to the latteral edge of the vortex module wall (pos. 3). The lower end of the side rail is positioned in the middle of the lowest vortex module. The lowest drilling (pos. 2) of the side rail is used to screw in a self-tapping screw (M3.9X20). A second self-tapping screw is used for the upper end of the side rail.

The side rail for the other side of the vortex module wall has to be assembled in the same way.



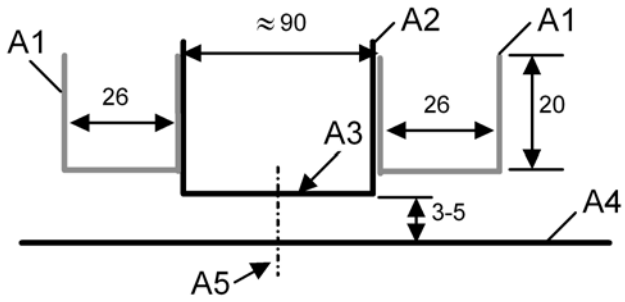
7.4 Assembling the droplet separators

The guide rails must be installed in a way that makes it possible to either pull out or lift up the vortex module wall.



7.4.1 Examplary design of guide rails for the droplet separators

Detail A:



Dimensions given in mm

A1: **Trap guide rail:** U-section with perforated 1.4301 stainless steel sheet

A2: **Trap guide rail holder:** U-section made from 1.4301 stainless steel

A3: Several **holes** (at least 4 per metre) 8-10 mm in diameter distributed over the length of the trap holder

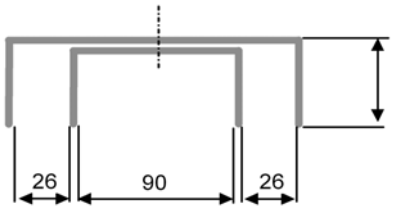
A4: **Collection tray** for humidification chamber

A5: **Fixation** of guide rail with the floor of the humidification chamber (ensure that condensate can freely run to the drain)

7.4.2 Dimensions of guide rails for droplet separators

Material used for **upper guide rail**: 1.4301 stainless steel sheet, thickness: 1 mm

Detail B:



Hight is variabel:

pushed in droplet separators: **55**

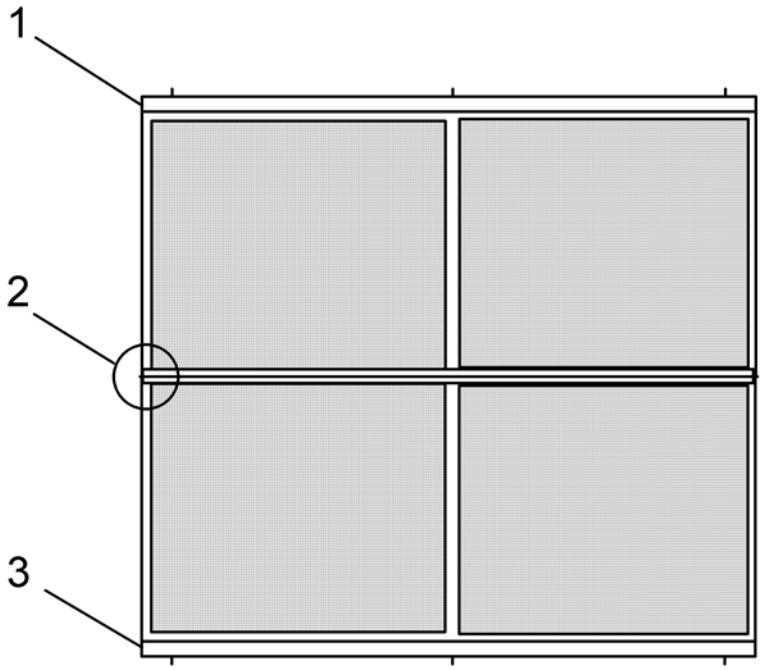
lifted in droplet separatosr: **30**

The upper guide rail is directly attache to the ceiling of the humidification chamber (using screws, rivets or similar)

7.4.3 Assembling two droplet separators in a stack

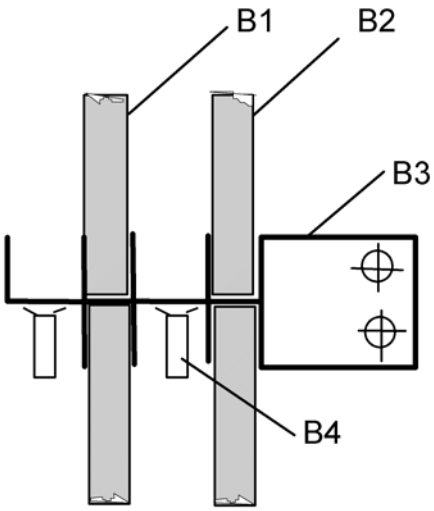
For installation heights of above 1.5 m, two droplet separators must be mounted in a stack.

The waste water from the upper droplet separator is drained via an additional collector. For this the waste water from the upper trap is drained via a flexible hose either directly or into the collection tray. This additional collector is to be provided for both the preliminary and the final droplet separator.



1. Upper guide rail
2. Detail C (please see next page)
3. Lower guide rail

Detail C (side view):



B1: Preliminary droplet separator

B2: Final droplet separator

B3: Angle bracket

B4: Hose connection for drainage of waste water from upper droplet separator

Perforated sheet metal (material: 1.4301) should be used for the lower guide rails for the droplet separators. Alternatively, sheet metal with several holes (at least 4 per metre) 8-10 mm in diameter can be used.

7.5 Assembling of the distribution pipe

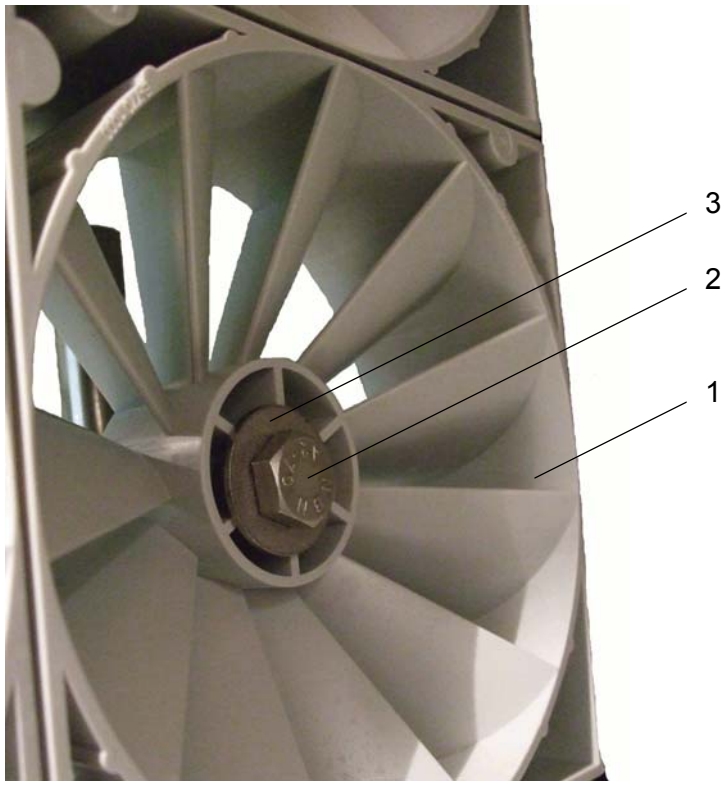
The distribution pipe has to be attached to the vortex module wall in accordance to the assembling sketch that HygoMatik delivers for each project.

Each nozzle on the vortex module wall has to be connected to the distribution pipe by using a high pressure hose. Each nozzle has to be positioned on a higher level than its connection point at the distribution pipe - there should be a constant fall in the high pressure hose.

Assembling:

A distribution pipe is attached at least to two vortex modules.

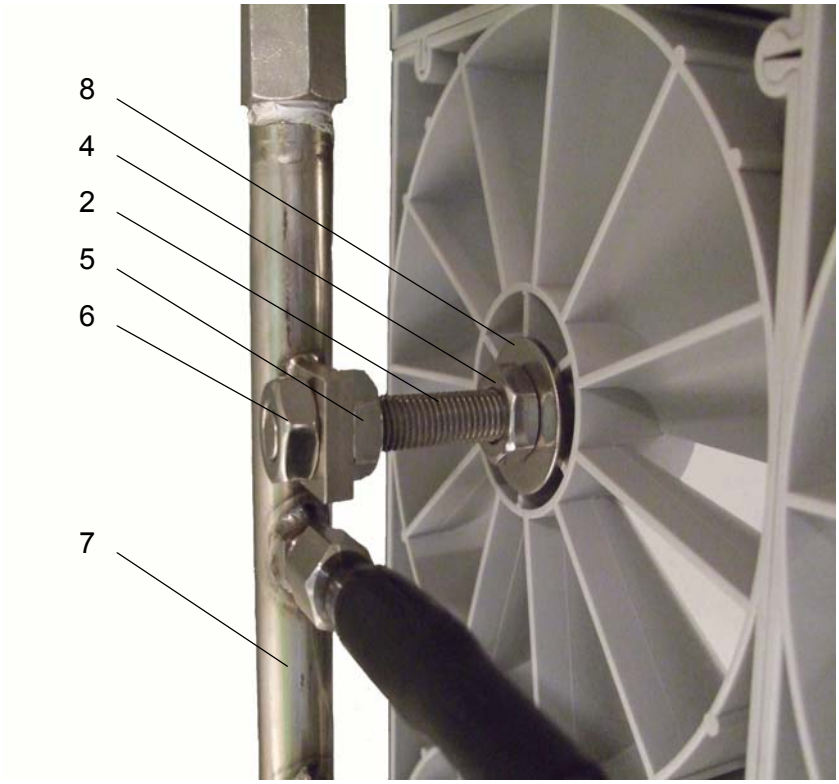
On the upstream side of such a vortex module (pos.1) a screw (pos.2) is pushed in the vortex module by using a washer (pos. 3).



On the opposite side of the vortex module a nut (pos. 4) and another washer (pos. 8) are put onto the screw (pos. 2). The nut has to be tightened.

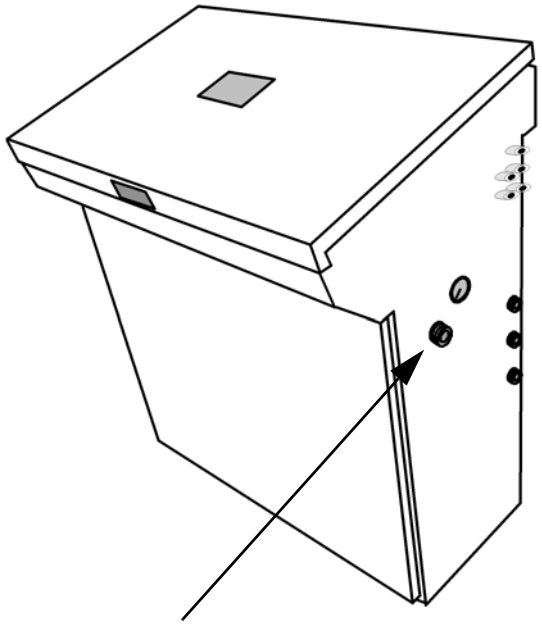
Next step is to put a second nut (pos. 5), the distribution pipe (pos. 7) and a third nut (pos. 6) onto the screw.

Thightening two nuts will fix the distribution pipe on the screw. The distance between vortex module and distribution pipe depends on the position of the two nuts and is therefore variable.



8. Water connection

8.1 Connection



3/4”-external thread, right side of housing

Connection of the water supply is made at the high-pressure pump group's water inlet solenoid valve. There is a 3/4“ external thread.

Note: We recommend designing the last segment of the water line to be flexible to prevent translation of vibration from the high-pressure pump group to the pipework.

Note: A stopcock in the direct vicinity of the HygroMatik high-pressure nozzle system is to be provided by the manufacturer.

8.2 Water quality

Conductivity:	5-20 µS/cm
Pressure:	0.1-0.5 MPa (1-5 bar)
Temperature:	5-40°C
pH value:	7 +/- 1

8.3 Water inlet

If desalinated water is used we recommend that stainless steel or plastic pipes be used.

Caution: During installation please bare in mind that:

- all work should be done by specialists only;
- the system must first be disconnected from the mains electricity supply; and
- local regulations of the waterworks or supply operations must be complied with.

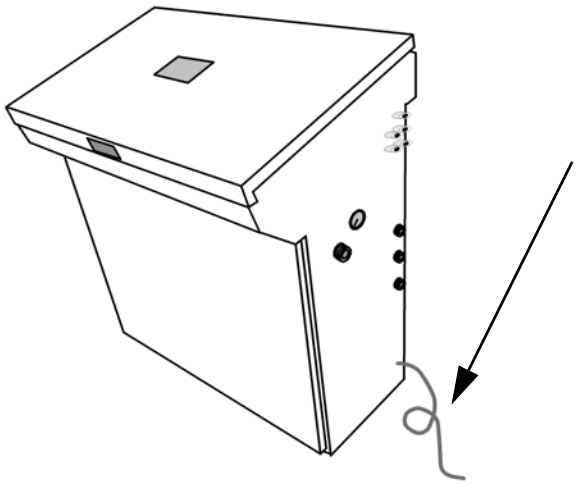
8.4 Water drain

On the right side of the housing of the high pressure nozzle systema plaastic hose DN12 for drainig is located. It is marked with „Drain”. This water drain is used to:

- empty and relieve the high-pressure lines to the vortex module wall after the enabling signal has been removed;
- drain the flushing water from the feed water line in a flushing process.

8.4.1 Design of the water drain

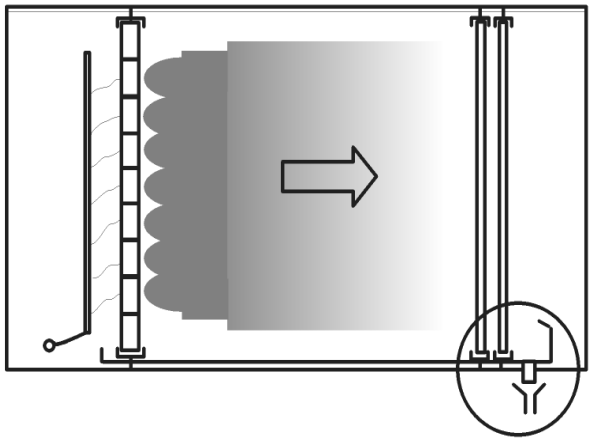
A plastic hose (belonging to the HygroMatik high pressure nozzle system) has to be connected to the external drain. Ensure that the laying shows a constant fall and a siphon.



8.4.2 Water drain for the humidification chamber

Note: The water drain in the collection tray must be at the lowest point in the humidification chamber.

It is recommendable to have the water drain positioned behind the droplet separators with respect to the direction of air flow. Only in this way can the waste water drain completely.



9. Hygiene

9.1 Ensuring hygiene (VDI 6022)

The regulations require that only inert materials must be used and biocides should only be used as a last option. Prior to humidification the supply air is to be purified using a Class F7 filter.

A metal filter made of mesh wire is used as a droplet separator.

The droplet separators can, as far as is necessary, be easily cleaned and reused. Addition of a biocide is not required.

9.2 Automatic flushing

If the HygroMatik high-pressure nozzle system is in „stand by mode" and there is no demand for work for 24 hours the system will periodically run (every 24h) flush cycles.

Hereby the growth of bacteria in standing water is obviated.

During flushing the inlet water solenoid valve and the flushing valve are simultaneously open. Thus the water in the pump station is being exchanged and directly led into the drain without reaching the humidification chamber.

10. Electrical connection

Caution: Voltage! All electrical installation work must be carried out by qualified specialist staff (electricians or skilled workers with equivalent training) only. It is the customer's responsibility to monitor qualifications.

Caution: Voltage! All installation work must be completed before the HygroMatik high-pressure nozzle system is connected to the mains supply.

Please observe all local regulations for electrical installation work.

Caution: The electronic components of the HygroMatik high-pressure nozzle system control system are sensitive to electrostatic discharge. To protect these components from damage by electrostatic discharge, special measures must be taken during all installation work.

Caution: During installation please perform the following steps:

- Disconnect the system from the mains supply and secure it to prevent it from being switched on again.
- Ensure that the system is de-energised.
- Installation and removal of the control system may only be performed if the device is switched off.
- Lay electrical cables properly.
- Make the electrical connections according to the circuit diagrams.
- Ensure that all terminals are tight.
- Connect the system permanently to the supply network. The back-up fuses specified in the technical data must be used.

Note: For leakage currents of above 35 mA a second PE conductor must be connected to the second PE terminal (shielded cables: 2.5 mm²; unshielded cables: 4 mm).

10.1 Connection data

Power supply:	LNE 230 V AC, 50 Hz
External control signal:	0-10 V DC
System enabling:	via ext. potential-free contact
Group fault signal:	potential-free contact (change over contact)
Operating status signal:	potential-free contact (NO)

Note: If a residual current device should be installed upstream of the system a universal-current-sensitive circuit-breaker should be selected.

Note: When sizing the connection lines, observe that the supply impendance must be low! If a short circuit occurs the circuit-breaker must switch off automatically within 0.4 s. The magnetic short circuit trigger for the circuit-breaker (type B) acts immediately when the flowing short circuit current is more than five times the rated current.

Pump group	Rated power [kVA]	Rated current [A]	Fuse [A]
HDS 1100	0,94	4,0	1 x 10
HDS 2200	1,6	6,7	1 x 16

10.2 System enabling / Safety chain

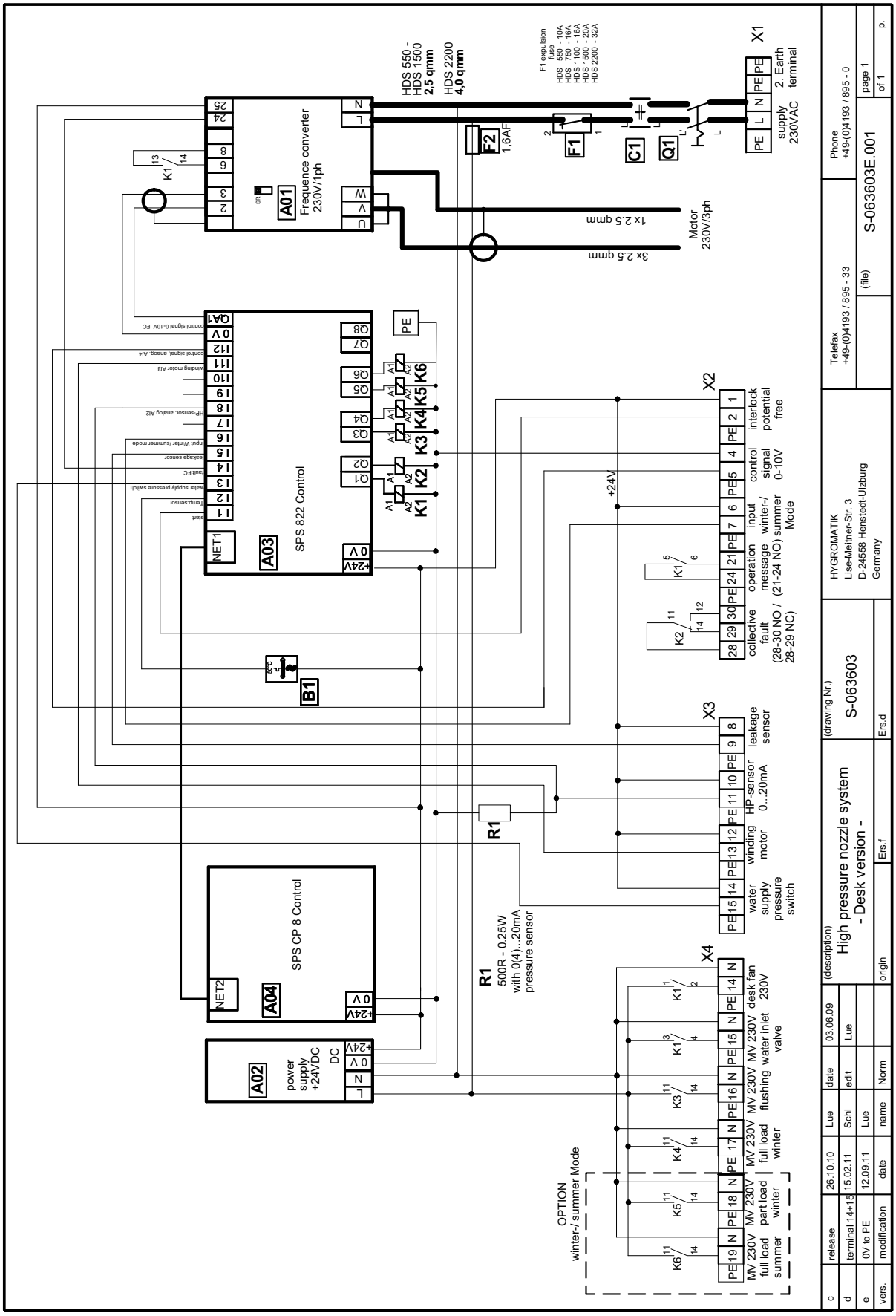
Note: Interlock contacts, such as max. hygrostat, air flow relay, duct pressure switch, ventilator interlock etc., are placed in series between series terminals X2.1 and X2.2 (= safety chain).

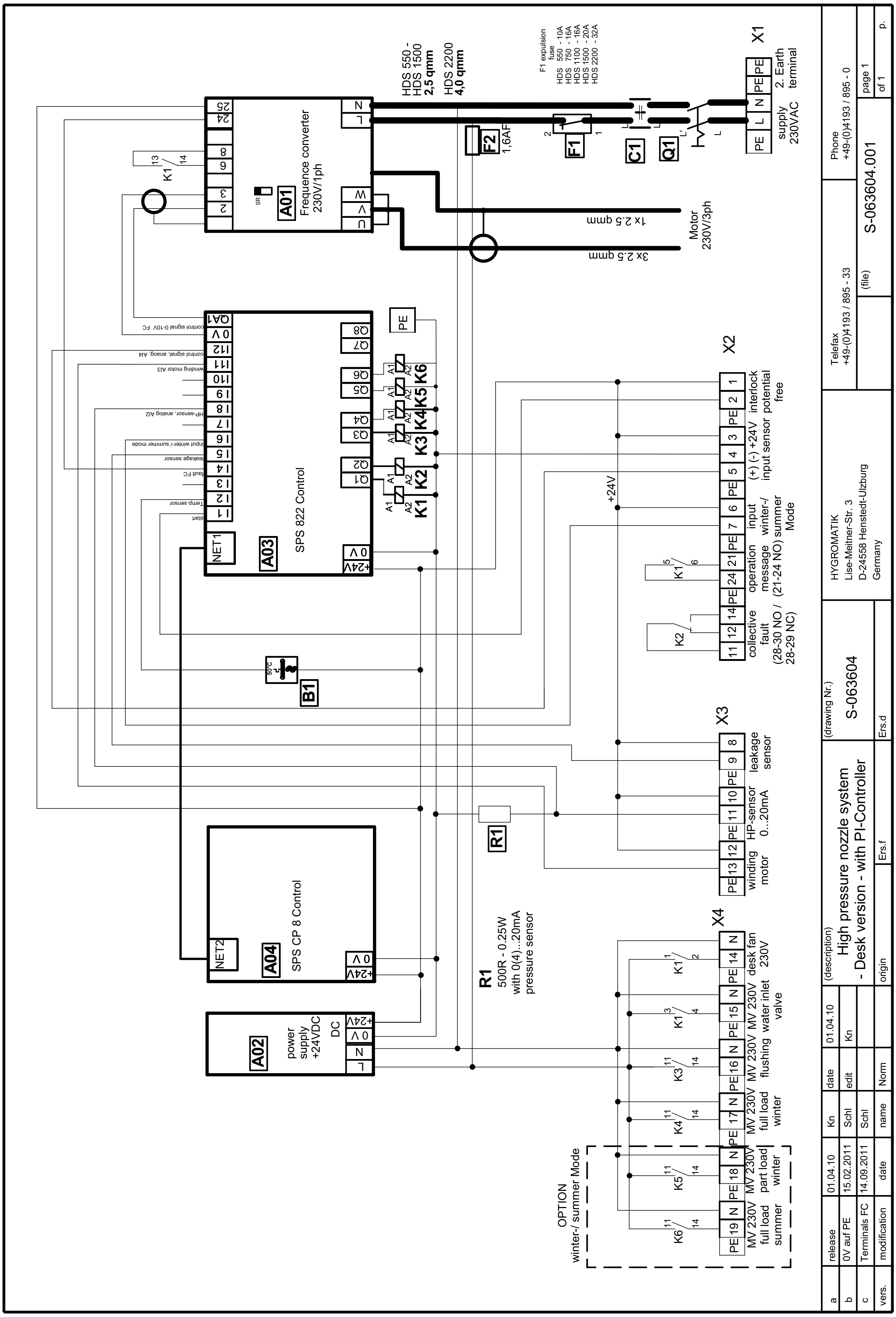
Caution: If the ventilation system fails or the supply air face velocity is too low (less than 0.9 m/s) the built-in control must switch off the humidifier via the safety chain. Otherwise undesired condensate build-up behind the droplet separator may occur.

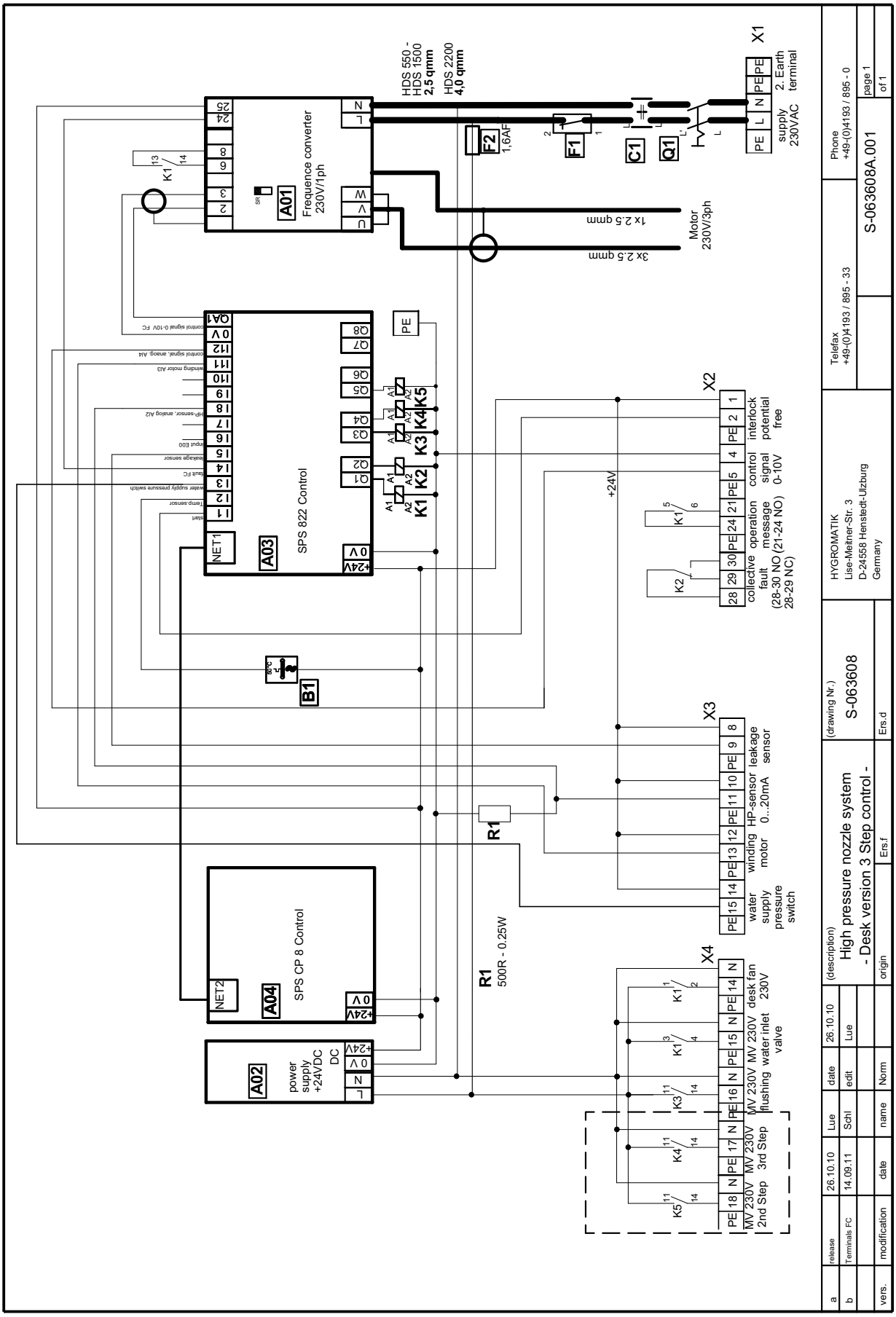
Caution: Integration of a max. hygrostat into the safety chain is state-of-the-art. The max. hygrostat serves as a safety element in case of malfunction of the humidity sensor and protects against over-humidification.

Caution: The contacts which are placed on terminals X2.1 and X2.2 must be potential-free and suitable for switching 24 V DC / 100 mA. After the HygroMatik high-pressure nozzle system has been started, a standard voltage of 24 V DC is applied to terminal X2.1.

10.3 Circuit diagram




A01 Frequence converter 230V/1ph
A02 power supply +24VDC DC
A03 SPS 822 Control
A04 SPS CP 8 Control
B1
R1 500R - 0.25W with 0(4)...20mA pressure sensor
F1 expulsion fuse HDS 550 - 10A HDS 750 - 16A HDS 1100 - 16A HDS 1500 - 20A HDS 2200 - 32A
HDS 550 - HDS 1500 2,5 qmm
HDS 2200 4,0 qmm
F2 1,6AF
C1
Q1
Motor 230V/3ph
1x 2.5 qmm
3x 2.5 qmm
X1 supply 230VAC 2. Earth terminal
X2 collective fault (28-30 NO / 28-29 NC) operation message (21-24 NO) input winter-/ summer Mode (+) (-) +24V input sensor interlock potential free
X3 winding motor HP-sensor 0...20mA leakage sensor
X4 MV 230V full load summer MV 230V part load winter MV 230V full load winter MV 230V flushing MV 230V water inlet valve desk fan 230V
OPTION winter-/ summer Mode
+24V
K1 K2 K3 K4 K5 K6
(description) High pressure nozzle system - Desk version - with PI-Controller
(drawing Nr.) S-063604
HYGROMATIK Lise-Meitner-Str. 3 D-24558 Henstedt-Ulzburg Germany
Telefax +49-(0)4193 / 895 - 33
Phone +49-(0)4193 / 895 - 0
(file) S-063604.001
page 1 of 1
a release 01.04.10 Kn 01.04.10 Kn
b 0V auf PE 15.02.2011 Schl edit
c Terminals FC 14.09.2011 Schl
vers. modification date name Norm origin Ers.f Ers.d


HDS 550 - HDS 1500 2,5 qmm
HDS 2200 4,0 qmm
X1
2. Earth terminal
supply 230VAC
F2 1,6AF
F1
C1
Q1
A01 Frequence converter 230V/1ph
1x 2.5 qmm
3x 2.5 qmm
Motor 230V/3ph
A03 SPS 822 Control
A04 SPS CP 8 Control
A02 power supply +24VDC
B1
R1 500R - 0.25W
X2
collective fault message (28-30 NO (21-24 NO) 28-29 NC)
operation message
control signal 0-10V
interlock potential free
X3
water supply pressure switch
winding motor
HP-sensor 0...20mA
leakage sensor
X4
MV 230V 2nd Step
MV 230V 3rd Step
MV 230V flushing
MV 230V water inlet valve
desk fan 230V
HYGROMATIK
Lise-Meitner-Str. 3
D-24558 Henstedt-Ulzburg
Germany
Telefax +49-(0)4193 / 895 - 33
Phone +49-(0)4193 / 895 - 0
S-063608
S-063608A.001
High pressure nozzle system
- Desk version 3 Step control -
page 1
of 1

10.4 Inspecting the electrical installation

The electrical installation must be checked by an electrician in accordance with customer requirements and the regulations set out by the public electricity supply company:

- ☑ Does the mains voltage match the voltage specified on the nameplate / delivery note?
- ☑ Have all electrical connections been carried out according to the connection diagrams?
- ☑ Have all electrical screw and plug cable connectors been attached properly?
- ☑ Are the switch-off conditions for protection in case of faults complied with?
- ☑ Has the system been earthed?

The system can then be switched on.

11. Control system

11.1 Control and speed regulation

All electric components and the terminal blocks are located in the housing of the HygroMatik high pressure nozzle system below the hinged desk lid. A SPS control (pos. 1) supervises the system.

Important operating status messages are shown on the control display. A frequency converter (pos. 2) delivers various frequencies and voltages to the asynchronous motor for the pump group, that sits in the lower part of the system.

Depending on the frequency of the high pressure pump the water pressure and therefore the amount of atomized water can be varied. The range of permissible values of the water pressure is between 25 and 75 bar. Below 25bar the spray pattern is not optimal. The higher the water pressure the better the spray pattern (and the humidification result).

The main switch (pos. 3) - located at the right side of the system housing - is used to switch the HygroMatik high-pressure nozzle system on and off.

HygroMatik high pressure nozzle system with opened desk lid

11.1.1 Full- and Partial-load operation mode

The HygroMatik high pressure nozzle system is connected to an external 0-10V control signal.

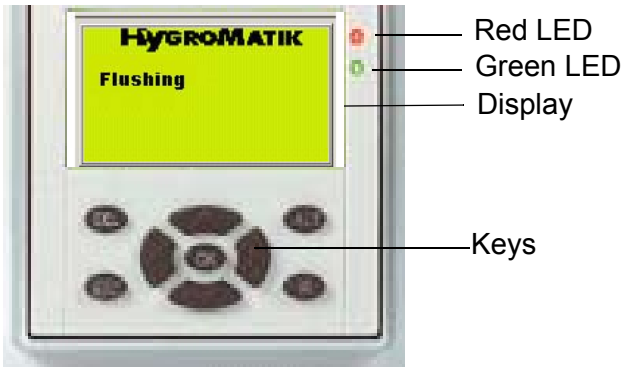
In the range between 5-10V all nozzle are supplied with high pressure water. If the external control signal decreases below 5V the system switches to „Partial-load" operation mode. Thereby nearly half of all nozzles are not supplied with high pressure water. Thereupon the high pressure pumps work on a higher pressure level - this means a better spray pattern.

11.2 Description of the controller (SPS)

11.2.1 General description

The HygroMatik high-pressure nozzle system controller monitors the entire atomisation process and processes the control signal. Operating status and fault messages are output to the display. Various menus containing different information can be accessed through key-based navigation.

A constantly illuminated red LED indicates a general error; a constantly illuminated green LED indicates that the service interval has elapsed.



11.2.2 Menu

1. System start-up

After the Hygromatik high-pressure nozzle system has been switched on via the main switch, an initial flushing process is carried out (duration standardly preset to 10 s).

2. Function of the safety chain

In the main display window (= display after start-up; can be recognised by the presence of the HygroMatik logo as a heading) an indication of whether the system has been enabled for operation is given. For enabling (= closing of the safety chain) a potential-free closing contact is to be supplied by the manufacturer. Multiple safety contacts (opening / NC) can be switched in series.

Message: 'Stand-By'

This means that the safety chain is open.

Terminals X2.1 and X2.2 are not bridged.

Message: 'Operation'

This means that the safety chain is closed.

The high-pressure nozzle system is thereby enabled and processes a 0-10VDC control signal applied to terminals X2.4 (GND) and X2.5 (Y+).

3. Scrolling between display windows

The <<*right arrow*>> and <<*left arrow*>> keys can be used to scroll between display windows.

4. 'Operating parameters' display window

The 'Operating parameters' display provides an overview of the control signal / demand signal / internal signal and the generated high pressure of the supply water.

5. 'Operating hours' display window

The 'Operating parameters' display provides the total amount of working hours.

6. 'Enter password (PASSWORTEINGABE)' display window

Further sub-menus are built in for servicing purposes.

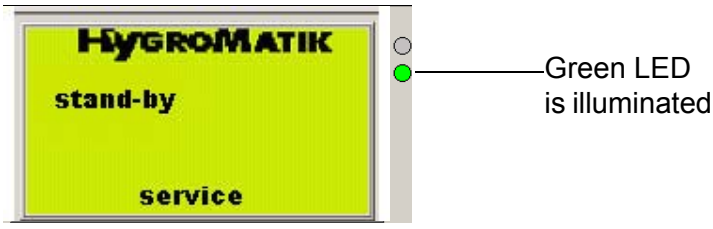
Access to these menus is reserved for trained service technicians.

The sub-menus are used for:

» setting an offset for the control signal;
» setting the flushing time;
» adjusting the overcurrent device for the pump in case of overpressure;
» resetting the service signal;
» manually flushing;
» manually starting the system without an external control signal; and
» switching to zone control if the system is expanded.

7. Message indicating that the system must be serviced

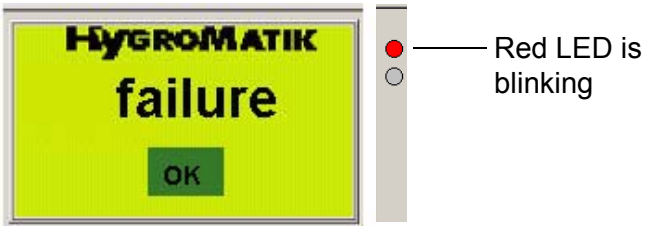
The scrolling text 'Service' appears on the master menu and at the same time the green LED is constantly illuminated. The number of operating hours which signalises that the system must be serviced has been reached. Trained service staff reset this signal after servicing the system.



8. Notification of a monitoring unit of a group fault

The red LED signalises that a functional fault has occurred.

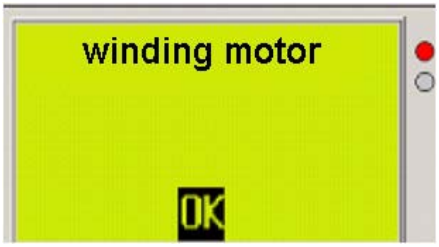
If you are in a window other than the main display window, you can scroll to the main display window (in which the HygroMatik logo appears in the top row) using the <<***right arrow***>> and <<***left arrow***>> keys.



Analysing a functional fault

Press the <<*OK*>> button to access the sub-menu 'Fault diagnostics'.

As long as the functional fault is not acknowleged it will be displayed in plain text here.



Acknowledging the functional fault

Press the <<*OK*>> button to access the sub-menu 'Reset the fault'. Elimination of the fault is acknowledged through pressing of the <<***OK***>> button. The system then restarts.

11.2.3 Overview of fault messages

Message	Description	Possible cause	Repair
Leakage	Water or oil runs out of the pump and the floating switch releases.	The pump has a leakage.	Change sealings or change pump if necessary.
Motor winding	Temperature control of motor winding releases due to too high temperature.	Breakdown of fan for motor. Inlet of fan is blocked.	Check fan or change fan if necessary. Remove blockage.
freq. inverter	Variable-frequency inverter reports a failure and shows it on its display.	Overload of the motor Motor cable is short-circuited PCB board for variable-frequency inverter is defective	For fault clearance please see the attached technical manual for the variable-frequency inverter.
HP < 12 bar	Not possible to build up high pressure even though high pressure pump is getting a signal to work.	High pressure line is leaking. Water deficiency Signal cabel at highpressure sensor is not connected.	Check high pressure line or change it if necessary . Check and correct cable connection
HP > 90bar	Monitored high pressure is above 90 bar for more than 10 sec..	Nozzles are blocked. Overflow valve is not correctly adjusted.	Clean nozzles or substitute nozzles if necessary. Please contact HygroMatik.
Box temp.	Monitored temperature in switch cabinet is above 50°C +/-10%.	Fan in switch cabinet is defective. Air intake is blocked.	Check fan or substitute fan if necessary. Clean air intake.

12. Maintenance

The HygroMatik high-pressure nozzle system HDS is maintenance-friendly. However, operational faults which can be traced back to inadequate or improper maintenance may occur.

Regular maintenance of the HygroMatik high-pressure nozzle system HDS is indispensable for ensuring long service life.

Caution: For maintenance work please bear in mind that:

- the system must be serviced by qualified appointed staff only;
- safety instructions must be followed;
- the system must be taken out of operation and secured to prevent it from being switched on before maintenance work is performed; and
- after maintenance work has been completed the device must be inspected by qualified staff to determine whether it is safe to operate.

12.1 Maintenance activities

For the system to operate without any problems the following checks and maintenance tasks must be carried out regularly:

1 x per month:

» Check water tray and housing for contamination and clean if necessary.
» Carry out a visual inspection of droplet separators and clean if necessary.
» Check the high-pressure pump oil level.
» Check the water filter cartridge upstream of the pump group for contamination and replace if necessary; flush the mains water system if necessary.
» Check the resulting spray cone of the nozzles and clean or change nozzles if necessary.

1 x per year (or after 2500 h):

» Check the nozzles as part of annual maintenance and clean in an ultrasonic bath if necessary.
» Change the high-pressure pump oil.
» Change sealings and valves of high-pressure pump
» Replace the water filter cartridge.
» Carry out a visual inspection of the vortex module wall and clean if necessary.
» Check the function of the switch-off devices, e.g. the max. hygrostat.

Note: If the system has been out of operation for more than three months, maintenance including cleaning of the spray system as well as an oil and O-ring change on the high-pressure pump must be carried out.

Note: The longer the duration of the running time of the pump the quicker the sealings will wear. In such a case please contact HygroMatik or - if qualified appointed staff is available - please see the attached „Extented service manual for HDS“.

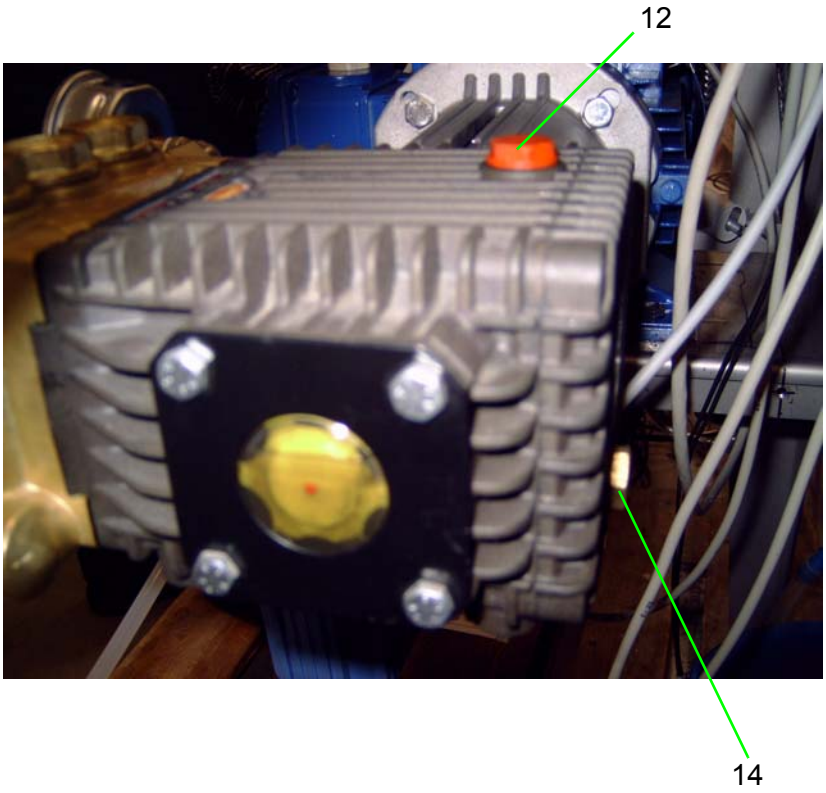
12.1.1 Changing the oil in the high-pressure pump

An oil change on the high-pressure pump must be carried out once a year (or every 2500 operating hours). If contamination is visible through the oil sight glass the oil may have to be changed more frequently.

Changing the oil:

1. Switch off the HygroMatik high-pressure nozzle system by setting the main switch on the control cabinet to position '0'.

2. Unscrew the oil dipstick (see no. 12).



3. Loosen the drain screw (no. 14.) and let the oil drain. Be careful of the sealing ring.

4. Tighten the drain screw (no. 14) with the sealing ring in place.

5. Add 15W40 motor oil (approx. 0.4 l) via the filler hole (no. 12).

6. Check the oil level using the dipstick and close the filler hole.

7. Set the main switch to 'I'.

Note: Only use **mineral oil**!

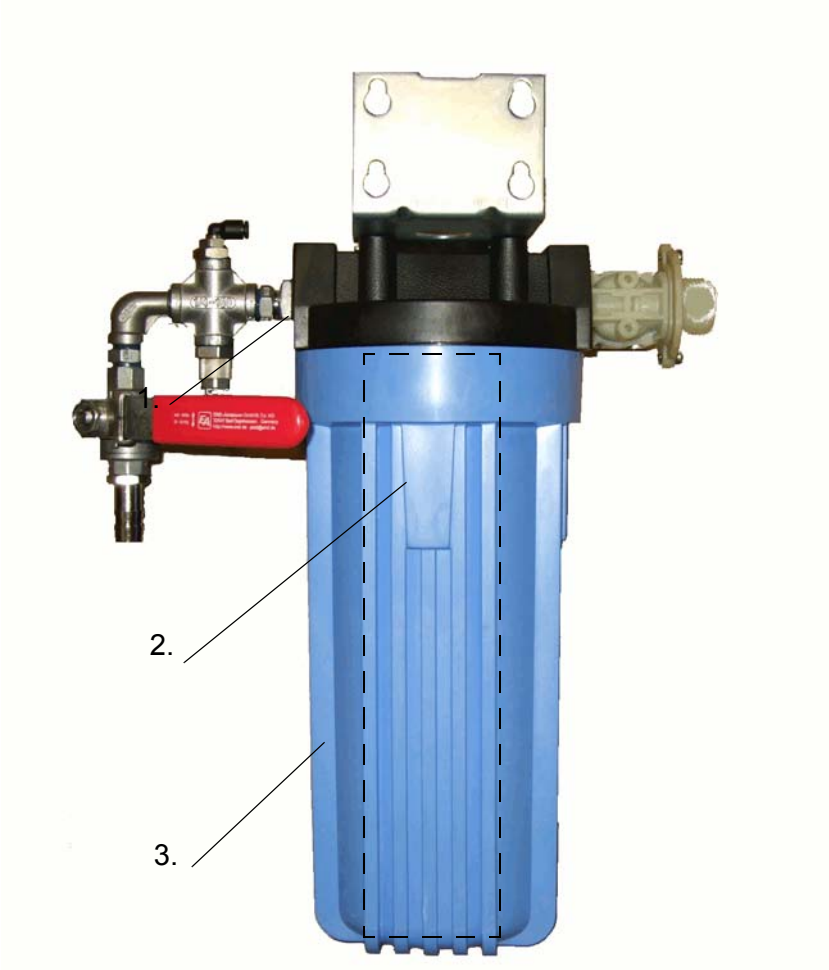
12.1.2 Checking/replacing the mains water filter

The mains water filter must be checked monthly for contamination and replaced if necessary. Colouring of the originally white water filter cartridge indicates contamination.

Contamination results in an increased resistance to flow. This lowers the supply pressure to the pump. An excessively low supply pressure can lead to switch-off of the high-pressure nozzle system HDS (dry run protection).

Replacing the water filter:

1. Mount of water filter housing
2. Filter catridge (int.)
3. Water filter housing



1. Set the main switch on the control panel of the HygroMatik high-pressure nozzle system HDS to '0'.

2. Close the (external) stopcock.

3. Relieve the line pressure.

4. Open the filter housing by hand. The threads may be damaged if pliers are used.

5. Clean the filter housing.

6. Replace the filter cartridge (if necessary).

7. Screw the filter housing into the seat by hand.

Note: Do not pinch the sealing ring.

8. Open the external stopcock.

9. Set the main switch to 'I'.

12.1.3 Flushing the mains water system

1. Set the main switch on the control panel of the HygroMatik high-pressure nozzle system to '0'.

2. Close the external stopcock.

3. Remove the connector for the fresh water supply to the pump group.

4. Open the fresh water valve and flush the water line until the water appears to be free of contamination.

5. Close the fresh water valve.

6. Reconnect the fresh water supply to the pump group.

7. Open the external stopcock and

8. set the main switch back to 'I'.

12.1.4 Cleaning the high-pressure nozzle

1. Set the main switch on the control panel of the HygroMatik high-pressure nozzle system to '0'.

2. Unscrew the nozzle from the holder. Do not bump against the impact pin.

3. Remove the nozzle filter. Therefore screw a little bolt into the nozzle filter. By using the head of the bolt the nozzle filter can be pulled out.

4. Check O-ring and change it if necessary.

5. Clean the nozzle in an ultrasonic bath for approx. 10 minutes; add a scale dissolver in a weak concentration (less than 10%) to the ultrasonic bath if necessary.

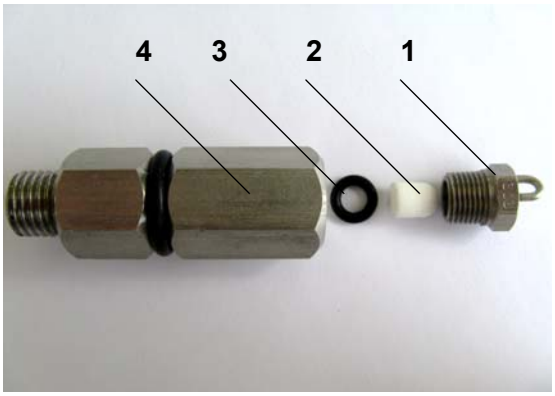
6. Insert a new nozzle filter with the round side ahead as deep as possible. Cut the overlaying rest of the filter by using a sharp knife.

Caution: Risk of injury.

Screw the nozzle back on.

7. Set the main switch back to 'I'.

8. Finally: check the spray pattern.



Caution: Ensure that the high pressure is reduced by, for example, activating the flushing program.

Caution: Wear safety goggles when cleaning the high-pressure nozzle.

Caution: Use proper tools to screw on or unscrew nozzles. Even slight mechanical modifications to the impact pin lead to an asymmetric spray pattern.

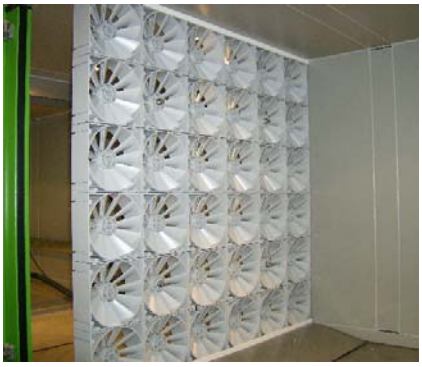
12.1.5 Cleaning the droplet separators

The droplet separators should be checked every 4 weeks for possible contamination and cleaned if necessary. The droplet separators should be thoroughly cleaned at least once a year.

Cleaning the droplet separators:

1. Pull or lift the droplet separators out of the guide rails.
2. Clean the droplet separators with a cleaning agent and then rinse and dry them.
3. Carry out a visual inspection of the droplet separators, repeat the cleaning step if necessary and replace the droplet separators if damaged.
4. Place the droplet separators back on the guide rails. While doing so ensure that the trap frame drain holes are facing downwards to guarantee free drainage.

12.1.6 Cleaning the vortex module wall



The vortex module wall should be checked for contamination and damage as part of annual maintenance. Any contaminants must be removed with a cleaning agent.

12.1.7 Cleaning the humidification chamber

Clean the humidifier housing and the base tray as required with a cleaning agent, then rinse and dry them.

For cleaning and disinfection we recommend INCIDUR produced by Ecolab.

When using other cleaning and disinfection agents please check material compatibility with all plastic materials used in the humidification chamber.

Caution: Do not aim the water jet at the droplet separators. Any upstream or downstream heating or cooling units must not become wet during cleaning.

13. EC declaration of conformity

EG-Konformitätserklärung
EC Declaration of Conformity

Hersteller: **Hygromatik LTA GmbH**
Manufacturer: *Hygromatik LTA GmbH*

Anschrift: Lise-Meitner-Straße 3
Address: *D-24558 Henstedt-Ulzburg / Germany*

Produktbezeichnung / ***Product description:***
HD System (HDS): HDS1100, HDS2200

In den Ausführungen / *Type*: Volllast, Voll- und Teillast / full load, full and partial load

Die bezeichneten Produkte stimmen in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender Europäischer Richtlinien überein:
The products described above in the form as delivered are in conformity with the provisions of the following European Directives:

DIN EN 61000-6-3 Elektromagnetische Verträglichkeit (EMV) - Teil 6-3: Fachgrundnormen - Fachgrundnorm Störaussendung - Wohnbereich, Geschäfts- und Gewerbebereiche sowie Kleinbetriebe (IEC 61000-6-3:1996, modifiziert); Deutsche Fassung EN 61000-6-3:2001 + A11:2004
Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3:1996, modified); German version EN 61000-6-3:2001 + A11:2004

DIN EN 61000-6-2 Elektromagnetische Verträglichkeit (EMV) - Teil 6-2: Fachgrundnormen - Störfestigkeit für Industriebereiche (IEC 61000-6-2:2005); Deutsche Fassung EN 61000-6-2:2005
Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments (IEC 61000-6-2:2005); German version EN 61000-6-2:2005

DIN EN 60204-1 Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen (IEC 60204-1:2005, modifiziert); Deutsche Fassung EN 60204-1:2006
Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2005, modified); German version EN 60204-1:2006

Die Konformität mit den Richtlinien wird nachgewiesen durch die Einhaltung folgender Normen:
Conformity to the Directives is assured through the application of the following standards:

Referenznummer: *Reference number:*	**Ausgabedatum:** *Edition:*	**Referenznummer:** *Reference number:*	**Ausgabedatum:** *Edition:*
DIN EN 55011	VDE 0875-11:2003-08	DIN EN 61000-4-5	VDE 0847-4-5:2007-06
DIN EN 61000-4-2	VDE 0847-4-2:2001-12	DIN EN 61000-4-6	VDE 0847-4-6:2001-12
DIN EN 61000-4-3	VDE 0847-4-3:2006-12	DIN EN 61000-4-8	VDE 0847-4-8:2001-12
DIN EN 61000-4-4	VDE 0847-4-4:2005-07	DIN EN 61000-4-11	VDE 0847-4-11:2005-02

Die Anforderungen des Geräte- und Produktsicherheitsgesetzes (GPSG) §4 Abs. 1 bis 3 werden eingehalten. Eine vom Lieferzustand abweichende Veränderung des Gerätes führt zum Verlust der Konformität. *The requirements of the German Appliance and Product Safety Law (GPSG) paragraph 4 clause 1 to 3 are met. Product modifications after delivery may result in a loss of conformity.*

Henstedt-Ulzburg, den / *the* 01.07.2007

Hygromatik LTA GmbH

Maike Nielsen
General Manager

i.V. Dirc Menssing
Technical Manager / Quality Manager

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety documentation accompanying the product shall be considered in detail.

14. Spare parts

HDS-1100-P	HDS-2200-P	Article-No.	Pump Station
x		E-7703020	motor, 1.1 KW 230/400V-50 Hz ; 1400 rpm
	x	E-7703040	motor, 2.2 KW 230/400V-50 Hz ; 1400 rpm
x		B-7773151	Pump, highpressure EH 2009 incl. automatic press.contr., clutch, covering
	x	B-7773155	Pump, highpressure EH 1416 incl. automatic press.contr., clutch, covering
x		E-7703100	pump, highpressure EH2009 without adapting devices drive left sided adaption press.contr. left sided
	x	E-7703110	pump, highpressure EH1416 without adapting devices drive left sided adaption press.contr. left sided
x		E-7703150	flange bowl for EH 2009 housing-connect. pump to motor
	x	E-7703152	flange bowl for EH 1416 housing-connect. pump to motor
x		E-7703170	coupling for EH 2009 drive-axis motor to pump
	x	E-7703172	coupling for EH 1416 drive-axis motor to pump
		B-7773177	pressure control valve, autom. EH2009 &EH1416 high press.pump contains HP- & LP-adaption max. 200 bar, max. 50 l/min
		K-WTB175-810	float switch
		E-7702010	mounting hook: level control
		E-7774312	Water pan for HDS
		E-7706060	Hose, high pressure, DN 8 mm length 0,7 m from pump to highpressure valves
		E-7600184	Hose type PA, black, 10x8 (Piece goods)
		E-7702200	protection grill, cabinet fan HDS, incl. filter inlay 120 x 120 mm
		E-7621028	Filter element 10" filter quality 10 µm for water-prefilter HP-pumpstation
		E-7705200	Water filter housing, 10" bothside connection 3/4" iD blue sump, pressure release button
		E-7601618	Manometer, 0-10 bar, for control unit CU D=40mm, rear connection G1/8"
		E-7601626	Hose, PA, black, 4x2 for control unit CU (Piece goods)
		E-7701050	Solenoid valve HDS 220 - 240 V, 50 - 60 Hz 3/4"m - 3/4"m waterinlet
		E-7704510	Coil for HiPres-solenoid valve 230V 50-60Hz
		E-7701100	Solenoid valve, highpressure 2-100 bar for HDS-system
		E-7703044	Fan 230V, 150x172x38 mm, 300m³/h
		E-7703046	Fan covering incl. filter
x		E-7704100	Frequency converter 1,1kW 230V/1ph./N - 230V/3ph
	x	E-7704110	Frequency converter 2,2 kW 230V/1ph./N - 230V/3ph
x		E-7704148	Radio interference sup. filter suppression filter ; 1,1kW HPS 230V/1ph./N
	x	E-7704150	Radio interference sup. filter suppression filter ; 2,2kW HPS 230V/1ph./N
		E-7704316	Power supply HDS control 230VAC/24VDC 15W
		E-2507046	main contactor 20A(AC1) DILM7 for HDS 1100-2200 coil 24V DC rated voltage 690V
		B-2504025	Auxiliary relay 24V DC 1 switching contact
		E-2505206	Safety fuse 1,6A 5x20mm
x		E-7704610	Line safety switch 16A 1-pole , B-characteristics
	x	E-7704630	Line safety switch 32A 1-pole , B-characteristics
		E-7704320	CPU-unit 822 for HDS
		E-7704308	CPU-unit NT for multifunc.display HDS
		E-7704300	multifunktion display display & keyboard for HDS and VD

HDS-1100-P	HDS-2200-P	Article-No.	Pump Station
x		E-0605001	Main switch 25 A
	x	E-0605002	Main switch 32 A
		E-7702200	protection grill, cabinet fan HDS, incl. filter inlay 120 x 120 mm
		E-7704870	Thermal circuit breaker ; NC with automatic reset, switching point at 50°C ± 5K
		E-7704950	Resistor, 1000 Ohm +/- 5%, 0,25 Watt
		E-7705620	Bypass valve for HDS-system 1/4" female - 1/4" female
			Spare parts for Pump
1		E-7621026	Repair kit KIT 123 to consist of 6 valves for highpressure pump EH2009 (pf100/pf250)
1		E-7621098	Repair kit KIT 160 seals (water) highpressure pump EH2009 (pf100/pf250)
3		E-7621022	Repair kit KIT 166 seals and metal parts highpressure pump EH2009 (pf100/pf250)
1		E-7621032	O-ring 55,56x3,53 for highpressure pump EH2009 sealing pump shaft (oil)
3		E-7621260	shaft seal crankcase for high pressure pump EH2009 18 x 26 x6 mm, 3 parts nessesary
1		E-7621262	oil dipstick for high pressure pump EH2009
1		E-7621254	gasket oil sump for high pressure pump EH2009, 101,27 x 2,62 mm
1		E-7621238	O-ring 10,82 x 1,78mm sealing for oil drain for pump EH2009
3		E-7621256	gasket piston for high pressure pump EH2009 5,28 x 1,78 mm
3		E-7621030	Piston, ceramics for high pressure pump EH2009
1		E-7621220	Drive shaft seal for high pressure pump EH2009 (oil sided)
1		E-7621258	gasket sight glass for high pressure pump EH2009 26,58 x 3,53 mm
		E-7621224	Special oil for high pressure pumps canister contains 1 liter
			Vortex-wall
		E-7701000	Vortex module
		B-7771301	Sealing set, complete for distribution pipe incl. sealing cone and nut
		E-7700550	Blind cap for distributor pipe tighting blind cap without nut
		E-7700554	nut of ferrule fitting at blind cap(distributor pipe) without tighting element
		E-7700556	Closing female fitting 3/8" to close end of distrib. tube
		E-7701010	nozzle holder for high pressure system without o-ring
		E-7621020	O-ring for nozzle holder for highpressure nozzle system 12 x 3 mm
		E-7621024	Filter for HDS nozzles
		E-7621006	Nozzle, highpressure PJ6, 7,2l/h, for hds systems
		E-7621076	O-Ring 5 x 2 mm between nozzle and nozzle holder
		E-7706040	Hose, high pressure, DN 4 mm, length 370 mm, connection distributor pipe - nozzle
		E-7706042	Hose, high pressure, DN 4 mm, length 440 mm, connection distributor pipe - nozzle
		E-7706044	Hose, high pressure, DN 4 mm, length 640 mm, connection distributor pipe - nozzle
		E-7706046	Hose, high pressure, DN 4 mm, length 820 mm, connection distributor pipe - nozzle
		E-7706048	Hose, high pressure, DN 4 mm, length 960 mm, connection distributor pipe - nozzle
		E-7706050	Hose, high pressure, DN 4 mm, length 1130 mm, connection distributor pipe - nozzle
		E-7706052	Hose, high pressure, DN 4 mm, length 1330 mm, connection distributor pipe - nozzle
		E-7706054	Hose, high pressure, DN 4 mm, length 1750 mm, connection distributor pipe - nozzle

HDS-1100-P	HDS-2200-P	Article-No.	Pump Station
			Hose, high pressure, DN 8 mm
		E-7706062	Hose, high pressure, DN 8 mm, length 2 m to connect pump station and nozzle collector pipe for HDS-systems
		E-7706064	Hose, high pressure, DN 8 mm, length 2,5 m to connect pump station and nozzle collector pipe for HDS-systems
		E-7706066	Hose, high pressure, DN 8 mm, length 4 m to connect pump station and nozzle collector pipe for HDS-systems
		E-7706068	Hose, high pressure, DN 8 mm, length 6 m to connect pump station and nozzle collector pipe for HDS-systems
		E-7706070	Hose, high pressure, DN 8 mm, length 8 m to connect pump station and nozzle collector pipe for HDS-systems
		E-7706072	Hose, high pressure, DN 8 mm, length 10 m to connect pump station and nozzle collector pipe for HDS-systems
		E-7706074	Hose, high pressure, DN 8 mm, length 14 m to connect pump station and nozzle collector pipe for HDS-systems

17. Fax Form - Order for spare parts

HYGROMATIK
We humidify the air.

Airtrend Ltd.-Gobrid. Ltd.
Kumanovska 14, 11000 Beograd
Tel. +381 11 383 68 86, 308 57 40
Faks +381 11 344 41 13
E-mail: gobrid@eunet.rs

Fax Form

Please copy, fill in and fax to

Fax.No. **+381 11 344 41 13**

Order of spare parts

unit type *_____ serial no.* _____

commission: _____ order no.: _____

quantity	article	article no.

date of delivery _____forwarder _____ shipment by _____

delivery address (if different from invoice address)

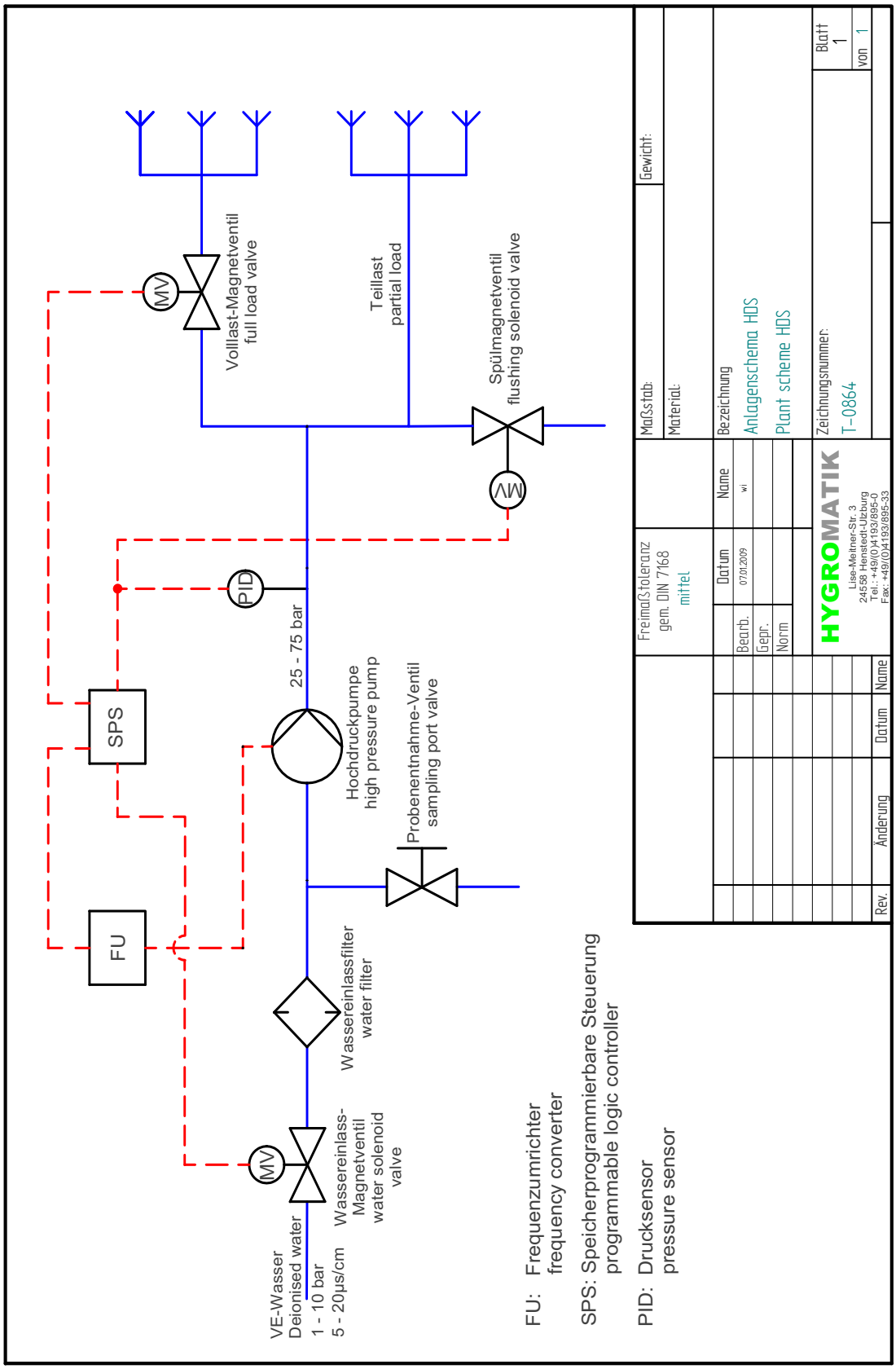
_____
_____
_____
_____

company stamp (delivery adress)

date/signature

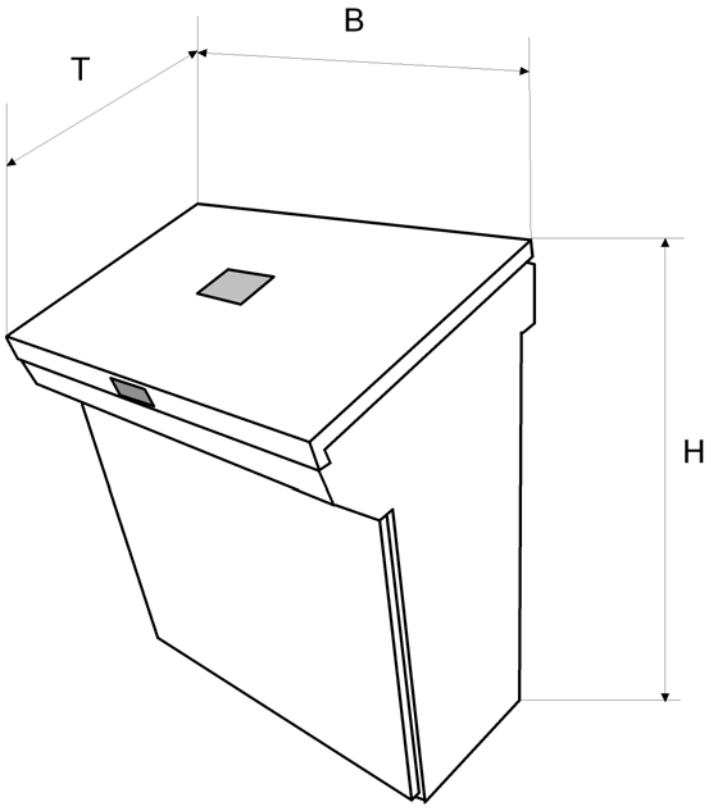
* Order can only be processed if unit type and unit serial no. are filled in.

16. Plant scheme



17. Technical data

Pump group	Capacity [l/h]	Rated power [kVA]	Rated current at 75 bar [A]	Max. speed [rpm]	Fuse [A]
HDS-1100-P	46 - 260 (with Bypass: 14 - 180)	0,94	4,0	1400	1 x 10
HDS-2200-P	90 - 520 (with Bypass: 65 - 390)	1,6	6,7	1400	1 x 16



	H	T	B	Weight
HDS-1100-P	952	480	850	60 Kg
HDS-2200-P	952	480	850	80 Kg

HYGROMATIK®

Predstavništvo u Beogradu
Airtrend Ltd.-Gobrid. Ltd.
Kumanovska 14, 11000 Beograd
Tel. +381 11 383 68 86, 308 57 40
Faks +381 11 344 41 13
E-mail: gobrid@eunet.rs