

LPS

Humidifies and Cools





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LPS EN

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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	6
1.1 Typographic markings	6
1.2 Documentation	6
1.3 Intended use	7
2. Safety instructions	9
2.1 General information	9
2.2 Operational safety instructions	9
2.3 Disposal upon disassembly	10
3. Transport	11
3.1 General information	11
3.2 Packaging	11
3.3 Temporary storage	11
3.4 Inspecting for correctness and completeness	11
3.5 Scope of delivery	11
4. Function and design	12
4.1 Functional principle	12
4.2 System design and operating modes	12
4.2.1 Pump station	13
4.2.2 Dimension drawing of HygroMatik LPS nozzle system	13
4.2.3 Vortex modules	14
4.2.4 Atomising nozzles	15
4.2.5 Droplet separators (optional)	16
4.2.6 Humidification section	16
4.3 Operating modes	17
4.3.1 Functional principle of load switching	17
5. Connnections on the HygroMatik LPS nozzle systems	18
5.1 Supply water	18
5.2 Waste water	18
5.3 Pressure water	18
5.4 Electrical	19
6. Interfaces to the HygroMatik LPS nozzle system	20
6.1 Air	20
6.2 Humidification chamber	20
7. Mechanical assembly	22
7.1 Overview of the humidification chamber	22
7.2 Vortex modules assembly to form a module wall	23
7.3 Mounting the vortex module wall	23
7.3.1 Guide rails for the vortex module wall	24
7.3.2 Examplary design of guide rails for a vortex module wall	24
7.3.3 Side rails for the vortex module wall	25
7.3.4 Assembling of the side rails for the vortex module wall	25
7.4 Installation of the nozzles, the distributor pipe and the tubing	26
7.4.1 Nozzle Installation	26

7.4.2 Mounting the manifold(s)	27
7.4.3 Piping	28
7.5 Assembling the droplet separators	32
7.5.1 Examplary design of guide rails for the droplet separators	32
7.5.2 Mounting 2 droplet separators on top of each other	33
7.6 Pump station wall mounting	34
7.7 Checking the installation	35
8. Dimensions - Pump Station	36
9. Water connection	37
9.1 Overview on water connection	37
9.2 Water supply	38
9.3 Drainage	39
9.4 Water drain for the humidification chamber	39
9.5 Water Quality	40
9.6 Inspection of water supply	40
10. Hygiene	41
10.1 Ensuring hygiene (VDI 6022)	41
10.2 Automatic flushing	41
11. Electrical connection	42
11.1 Connection data	43
11.2 System enabling / Safety chain	43
11.3 Circuit diagram	44
11.4 Inspecting the electrical installation	45
12. Commissioning	46
13. Control System	47
13.1 Control and speed regulation	47
13.2 Exhaust air cooling/Supply air humidification	48
13.3 Description of the Storage Programmable Controller (SPC)	49
13.3.1 General functional description of LPS system control	49
13.3.2 Display and control unit	49
13.3.3 Description of code levels (operating depth)	52
13.3.4 Menu structure and navigation	52
13.3.5 Descriptions of menus	52
13.3.6 Table of parameters and their selectable presettings and default values	54
13.3.7 Operating the control	55
13.3.8 Overview on error codes and troubleshouting hints	57
13.3.9 Detailed parameter descriptions	58
13.3.10 Menu structure and parameter setting	61
14. Maintenance	62
14.1 Maintenance activities	62
14.1.1 Inspection / replacement of the net-based water filter	63
14.1.2 Cleaning the atomizer nozzle	64
14.1.3 Cleaning the droplet separators	65



14.1.4 Cleaning the vortex module wall	. 65
14.1.5 Cleaning the humidification chamber	. 66
15. EC declaration of conformity	. 67
16. Spare parts	. 68
17. Fax Form - Order for spare parts	. 70
18. Technical Specifications	. 71
19. Plant scheme	. 72

1. Introduction

Dear Customer,

Thank you for purchasing a LPS nozzle system.

The HygroMatik LPS nozzle system 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 LPS nozzle system, please read this operating manual.

Only use the HygroMatik LPS nozzle system when 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:

Tel.:	+49 (0)4193 895 0	(Switchboard)
Tel.:	+49 (0)4193 895 293	(Technical Hotline)
Fax:	+49 (0)4193 895 33	
Email:	hot1@HygroMatik.de	

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 several languages. Please contact your HygroMatik dealer or HygroMatik for details.

1.3 Intended use

The HygroMatik LPS nozzle system is used for air humidification and cooling with desalinated water having a conductivity of 5-20 μ S/cm. The feed water should have a temperature of 5-15°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 LPS nozzle system is not frost-proofed and not suitable for outdoor installation.

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

At an altitude of over 1000 meters please contact your HygroMatik dealer or HygroMatik for details.

Applications:

The HygroMatik LPS nozzle system 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 must not be modified.

Exemptions of usage:

The HygroMatik nozzle system LPS is not frost resistant and is unsuitable for outdoor installation.

The HygroMatik nozzle system LPS PLC control may not be deviate from the preset programmed On-/Off Control (or only after consultation with HygroMatik).

The default constant pressure level of the HygroMatik LPS nozzle system may not be changed (or only after consultation with HygroMatik).

The HygroMatik LPS nozzle system may only be used for the purpose of cold-water cooling after consultation with HygroMatik.

The HygroMatik LPS nozzle system or may not be used in a vertical flow (or only after consultation with HygroMatik).

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.

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 LPS nozzle system it is not allowed to stay in the humidification chamber.

The desalinated water used for feeding the HygroMatik LPS nozzle system is unsuitable for drinking.

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

This unit is not designed for the use by persons (including children) with limited physical, sensory and mental abilities - or person that do not have the required knowledge and experience unless supervised or trained by a person responsible for their sa-



fety. Children must be supervised in order to ensure that they will not play with the unit.

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 LPS 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.

The HygroMatik LPS nozzle system is protected according to IP20. Ensure that the devices are protected against dripping water and dust at the installation location.

If a HygroMatik LPS 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.

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).



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 LPS nozzle system to prevent the device and packaging from being damaged by impact or accidental loading or unloading.

3.2 Packaging



Note: The HygroMatik LPS 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 (optional; Hygiene compliance checks applies only to systems with droplet separators)
- pump station
- operating instructions for the system
 - bushing/s for duct



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

4. Function and design

4.1 Functional principle

The HygroMatik LPS nozzle system is based on the atomisation of water.

Desalinated water is fed into a vane pump. With an operating pressure of up to 16 bar the water is subsequently pushed through the nozzles. These nozzles generate a very fine spray mist which is absorbed by the air in the device chamber. By this mechanism the ambient air is cooled adiabatically.

4.2 System design and operating modes



Schematic drawing of system composition

- 1: Pump station
- 2: Water feed
- 3: SPS control
- 4: Humidification chamber or duct with service doors and water tray
- 5: Water drain, siphoned
- 6: Vortex module wall
- 7: Viewing window (required according to VDI 6022)
- 8: 2-stage droplet separator

4.2.1 Pump station

The vane pump generates a pressure of up to 16 bar. The maintenance-free asynchronous motor with variable frequency enables continuous operation up to 50 Hz.

Pump station	Max. through- put [l/h]	Max. capacity [l/h] @ 80 % efficiency	Max. speed [rpm]
LPS 45	56	45	1350
LPS 72	90	72	1350
LPS110	130	110	1350

4.2.2 Dimension drawing of HygroMatik LPS nozzle system



	Н	D	W	Weight
LPS 45-110	700 mm	230 mm	600 mm	30 kg

4.2.3 Vortex modules

The vortex modules provide for effective mixing of air and 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 by piece and may be assembled to form a wall. For optimal moisture absorption air velocity must be in the range of 1.0 to 2.5 m/s. The vortex module wall exhibits a low pressure drop of 20 Pa at an air velocity of 2.0 m/s.





4.2.4 Atomising nozzles

Desalinated water at a pressure of up to 16 bar reaches the 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 where they are intensively mixed.

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



- 1: Nozzle body
- 2: Nozzle opening

Functionality

The nozzle makes the flowing water rotate and escape through the opening at high speed, generating a very fine water spray. The higher the operating pressure, the finer the droplets.

Material of the nozzle

The nozzle is made from corrosion-free stainless steel



Droplet separators

4.2.5 Droplet separators (optional)

When implementing the two sequentially arranged (optional) wire-mesh droplet separators, no more atomised water droplets will be found in the air stream downstream of the HygroMatik LPS nozzle system (if the environmental parameter specifications are complied with). The trap pads exhibit only a low pressure drop (60 Pa at air velocity of 2.0 m/s and average air density of 1.2 kg/m³).

The air velocity must lie between 0.9 m/s and 2.8 m/s. Exterior of this range moisture breakthrough may occur downstream of the droplet separators - in such a case please first contact HygroMatik before operating the system.

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

Delivery of the traps includes corrosion-resistant metal frames as the default.

Note: The hygiene certificate of conformity applies only to systems featuring droplet separators.

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.

With a standard total installation length of 1.5 m for the Hygro-Matik LPS nozzle system, the humidification section must not be any shorter than 0.9 m. The exact dimensions are depicted in the schematic in the section entitled 'Overview of the humidification chamber'.

4.3 Operating modes

The HygroMatik LPS nozzle system allows for operating in up to three load ranges in order to achieve optimum humidification control even under variable input conditions. Up to 3 pressure ports are available for feeding a corresponding number of nozzle sections.



Please note: Combined systems (ordering option) that allow for a change in operation between exhaust cooling and supply air humidification may only be operated within 2 load ranges.

4.3.1 Functional principle of load switching

The vane pump works on up to 3 pressure pipes. One of the pipes is permanently connected to one of the nozzle sections. The other one or two nozzle sections (if applicable) are separated from the pump by solenoid valves incorporated in the corresponding pressure pipe. Such, the momentary humidification output of the system results from the combination of the number of nozzle sections and the pump driving pressure, as controlled by the control signal.

5. Connnections on the HygroMatik LPS nozzle systems

5.1 Supply water

Connection type:	3/4"-external thread
	(system side)
Conductivity:	5-20 µS/cm
Pressure:	0.15-0.5 MPa (1.5-5 bar)
Temperature:	max. 15°C
pH value:	7 +/- 1



Note: The supply water for the HygroMatik LPS 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 type:	Connecting piece DN 12 for
	plastic hose (resistant to low
	conductivity water)
Laying:	with constant fall and free outlet
	and siphon

pressure hose

5.3 Pressure water

Outlets I to III(depending on systemconfiguration):plug-in connection for 6/4

5.4 Electrical

Power supply:	LNE 230 VAC, 50 Hz
External control signal:	0-10 V DC 4-20 mA DC
System enabling:	via ext. potential-free contact (NO)
Collective fault signal:	potential-free contact (change-over contact)
Operating status signal:	potential-free contact (NO)

6. Interfaces to the HygroMatik LPS nozzle system

6.1 Air

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

Air velocity: 0.9-2.8 m/s *)

*) under ideal conditions

Should air velocity be outside this range please contact Hygro-Matik.

Pressure drop: Approx. 80 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 "1 to 3 load" option):

If the HygroMatik LPS nozzle system is operated in systems with variable air volume flow (reduced air volume less than 70% of the maximum air volume), loads are switched off. This also applies for systems with multi-stage ventilators.



Note: For room humidification application the humidified air must exhibit a purity (as expressed by bacterial count) in accordance with VDI 6022.

6.2 Humidification chamber

The humidification device should be waterproof and feature a floor tray with an inclination of at least 1.5° towards the trap .

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

The minimum humidification 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 drawing in the section entitled 'Overview of humidification chamber'). Should this installation length not be feasable, please contact HygroMatik.

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



Note: The guide rails for the vortex module wall and droplet separators must be provided on-site. The guide rails must be installed prior to system start-up which is also applicable for the vortex module wall and droplet separators.



Note: Design of the guide rails must be such that the vortex module wall and droplet separators may be removed (for servicing purposes) and stagnant water may not built up (drill hole in bottom section, mounting with a slight pitch, guide rails made of perforated sheet metal).



Note: When starting-up the system it must be ensured that the humidification chamber has been thoroughly cleaned. In order to prevent corrosion, it is of special interest that the humidification chamber and the upstream ventilation duct is free from metal swarfs.

7. Mechanical assembly



Caution: The device may only be assembled by qualified staff. HygroMatik accepts 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 Overview of the humidification chamber



- 1: Upper guide rails for vortex module wall
- 2: Vortex module wall with spray system
- 3: Distribution pipe
- 4: 1 to 3 duct bushings depending on no. of load ranges in use
- 5: Drains (with trap)
- 6: Collection trays
- 7: Lower guide rail for vortex module wall
- 8: Lower guide rails for droplet separators
- 9: Droplet separators
- 10: Upper guide rails for droplet separators



Note: Next to the vortex module wall and the droplet separators (in direction of the humidification chamber walls) a minimum distance of 0.3 m to other installed components must be maintained . In case of an upstream installation of a fan in front of the vortex module wall, the minimum distance must be 1 m . Else, appropriate measures must be taken in order to ensure a laminar flow towards the vortex module wall.

Temperatures higher than 60 $^\circ\text{C}$ may destroy the vortex modules.

7.2 Vortex modules assembly to form a module wall

The vortex module wall function is twofold: generation of air turbulence and mounting bracket for the atomiser nozzles and water distributors.

Assembly of the vortex module wall must be carried out according to the nozzle positioning sheet supplied with the system (please make sure that the correct number of vortex modules in the horizontal and vertical dimensions is obeyed).

» Position the bottom right vortex module in a way that the flat surfaces show to the right and down while the sides with the guide bars (1) face up and to the left.



»

According to the the nozzle positioning sheet supplied with the system, connect the rest of the vortex modules to the bottom right module and each other making use of the guide bars

7.3 Mounting the vortex module wall

Two guide rails and 2 side rails (if applicable) are required for mounting the vortex module wall within the humidification chamber. For a laminar air flow that prevents moisture build-up on the housing inner walls, it is recommended that an air gap is provided between the vortex module wall sides and the housing .

7.3.1 Guide rails for the vortex module wall

For holding the vortex module in place, guide rails on the ceiling and floor of the humidification chamber are used.

The guide rails must be installed in a way that allow for either pull-out or lift-up of the vortex module wall. Also, water stagnation must be prevented.

When finishing mounting work make sure that the humidification chamber floor is leackage-free.







7.3.3 Side rails for the vortex module wall

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

With more than 16 vortex modules in the horizontal dimension, 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

For use with a vortex module wall consisting of 11 or more vortex module rows, HygroMatik ships an appropriate number of side rails and self-tapping screws.

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

The side rail is a 1.5 mm stainless steel u-section. For attachment to the vortex modul wall, slide the open side of the section onto the latteral edge of the vortex module wall (pos. 3) in a way that the lower end of the side rail alignes with the center of according vortex module. Insert a self-tapping screw (M3.9X20) into the bottom hole (pos. 2) of the side rail and another screw into the top hole.

In the same way, attach the opposite side rail on the vortex module wall as well.



7.4 Installation of the nozzles, the distributor pipe and the tubing

7.4.1 Nozzle Installation

- » Check the nozzle positioning sheet supplied with the system to identify those vortex modules that shall be equipped with a nozzle
- » For all nozzle positions, insert a nozzle body (1) supplied with o-ring (2) into the vortex module bracket (see fig. below) from the side were the flow will occur, allowing for a protrusion of approx. 10 mm on the other side. The nozzle body is held in the bracket by the oring



»

Screw nozzle (3) with o-ring (4) firmly into the nozzle body on the downstream side



7.4.2 Mounting the manifold(s)

High-pressure water from the pump station is fed to one or more manifolds (depending on system ordering option) and then to the nozzles.

The manifold(s) is/are individually equipped with snap-in connections and/or blind bolts to support the project-specific nozzle configuration defined by the nozzle positioning sheet supplied with the system. They are mounted on the upstream side of the vortex module wall.



Please note: Make sure to position the manifold/s according to the nozzle positioning sheet.

Each single nozzle of the vortex wall is connected to a manifold outlet by means of a hose. The mounting position of a nozzle must generally lie on a higher level than the position of the corresponding manifold outlet so that the water hose has a constant slope.

Manifold installation steps:







В

С

The manifold(s) is/are mounted on the flow side of the vortex module wall with fixing points on two discrete vortex modules (s. fig. $_{a}A^{*}$).

- » Determine manifold retainer clip position on vortex wall in accordance with nozzle positioning sheet (Fig. "A")
- » Mount a retaining clip (1) in each required position on a vortex module by means of a screw (2), washer (3) and nut (4) as shown in fig "B"
- Press manifold (5) into the retainer clamps (see fig. "C"). Make sure that it fits tightly

7.4.3 Piping

Manifold(s) to nozzles piping

For connecting a nozzle to a manifold outlet a 4/2 hose comes with the system. It must be cut into pieces of appropriate length. The two ends of a piece of hose connect to the snap-connections on the manifold and the nozzle, respectively.

- » Check nozzle positioning sheet for routing of a particular nozzle-manifold connecting hose
- » Insert hose end into the manifold outlet snap-in connection and ensure that it fits tightly by a slight pull on the hose
- » Estimate required hose length to the nozzle snap-in connection to be used. Observe minimum bending radius of 25 mm for the hose



Cut the hose at right angles with a hose cutter

»



» Insert free hose end into the nozzle snap-in connection and ensure that it fits tightly by slight pull on the hose

When finished, a hose-to-manifold connection should look like this:





Manifold(s) to pump station piping

Depending on the system ordering option, the HygroMatik LPS Low Pressure System comes with one or up to three manifolds. Each single manifold must be connected to the pump station by means of a 6/4 hose.

For feed-through of the hoses through the air conditioning duct wall the appropriate number of bushings is supplied by Hygro-Matik.

Assembly of the hose bushing

- » Drill a 15 mm hole through the wall of the air conditioning duct
- » Attach washer (2), nut (3) and snap connector (4) to the hose bushing (1) and, subsequently, insert bushing into the hole in the duct wall from the outside (see fig. below)



From the inside of the duct, attach washer (5) and nut (6) to the bushing and tighten with a wrench. Attach snap connector (7).



Make piping from pump station to wall bushing(s) and from wall bushing(s) to manifold(s)

In the lines following hereunder the assembly of a hose is described in detail. The assembly instructions apply to all of the hoses (i.e. both sides of the wall bushings) as well as both ends of a particular hose.



»

Please note: All hoses must be layed in a way that water run-off is not obstructed (i.e. no hose loops or hanging "bellies" allowed)

- » Insert a 6/4 hose line in the pump station outlet to be connected
- » Ensure the tight fit by gently pulling on the tube
- » Estimate the required hose length to the ducting snapconnector on the external duct wall. Keep in mind that maximum bend radius is 40mm
- » Cut the hose at right angles with a hose cutter
- » Insert the open 6/4 hose end into the snap-connector on the external duct wall
- » Ensure the tight fit by gently pulling on the tube

7.5 Assembling the droplet separators

The guide rails must be installed in a way that allows for either pull-out or lift-out of the droplet separators from their normal positions.

7.5.1 Examplary design of guide rails for the droplet separators



Drawing: Lower rail, droplet separator Material: 1.4301, stainless steel sheet, thickness: 1mm





Drawing: Upper guide rail, droplet separator Material: 1.4301stainless steel sheet, thickness: 1mm

7.5.2 Mounting 2 droplet separators on top of each other

When the humidification chamber inner height exceeds 1.5 m, two droplet separators must be mounted on top of each other.

Residual water from the upper droplet separator must then be collected by an additional tray. Water is then routed either directly to a drain or to the lower collecting tray. Both droplet separators (primary and secondary) must be treated in that way.



Drawing: Middle rail for 2 droplet separators to be mounted on top of each other

Material: 1.4301stainless steel sheet, thickness: 1mm

7.6 Pump station wall mounting



The installation of the pumping station must only be carried out by qualified personnel. We can assume no liability for damages caused by incorrect installation.

Please observe all safety instructions and warnings on the device housing.

On the rear wall of the unit housing there are 4 mounting brackets (see chapter 8). Supplied with the LPS systems is a mounting kit including four screws and rawlplugs for hanging the unit housing.

Firstly, holes are to be drilled according to the pump station dimensions (see fig. in chapter 8). Press rawlplugs into the drilled holes. Then screw the two top screws to the wall (allowing a 12mm gap between screw head and wall) and hang up the pump station. Then attach and tighten the bottom two screws.





Note: If the wall mounting is made by a single person, hazard of dropping the unist exists. Thus, it is recommended that two persons do the installation.

7.7 Checking the installation

Assembly of the vortex module wall

✓ Was the vortex module wall assembled in accordance to the nozzle positioning sheet (no. of vortex modules correct with respect to width and height of the wall)?

Vortex module wall installation

- Do the guide rails allow for sliding-out or lifting-out of the vortex module walls?
- Has leakiness of floor pan been checked with no leaks detected?
- When wall height is 11 modules or more: is vortex module wall supported by two side rails?
- When wall width is 16 modules or more: is vortex module wall split vertically and individually supported by two side rails for both parts?

Droplet separator installation

- Do the guide rails allow for sliding-out or lifting-out of the droplet separators?
- Has leakiness of floor pan been checked with no leaks detected?

Manifold and tubing installation

- ✓ Was the positioning of the manifold(s), nozzles and tubing made in accordance to the nozzle positioning sheet supplied?
- Were all of the hoses checked for a tight seating in their repective snap-in connectors?

Pump station installation

Has the pump station been mounted level to a loadbearing wall?

8. Dimensions - Pump Station






9.1 Overview on water connection

9: Manometer, 0-10 bar



Note: There must be a stopcock and a sampling valve in the immediate vicinity of the HygroMatik LPS nozzle system provided.

9.2 Water supply



- Attention: Please observe during installation:
 - All work must only be performed by qualified personnel
 - System must be switched off and voltage free
- Please observe local waterworks and utilities regulations

When using de-mineralized water we recommend the use of stainless steel or plastic pipes.

Water supply:

- » Locate water Filter (position 5 in the graph above) near the pump station (7)
- » Transfer mounting bracket hole pattern (6) to a suitable location on wall and drill holes
- » Using screws, rawlplugs and mounting brackets included with the water filter, fix water filter on wall
- » A 8mm plastic tube is supplied (length 1.5 m, shorten if necessary). Connect this to the snap-connector on the output side of the water filter. Gently pull on the hose to check for tight fit
- » Attach other end of the 8mm plastic tube into the snapconnector to the pump station water supply. Gently pull on the hose to check for tight fit
- » Connect the external feed water line to the input side of the water filter (3/4 "external thread)

9.3 Drainage

At the bottom of the housing, a DN12 spout is sticking out. This is a drain and is used to:

- empty and relieve the pressure lines to the vortex wall after removal of the module enable signal
- drain the flush water after flushing

Water drainage

- » A DN12 water hose (position 4 on the graph above) is attached to the DN12 spout on the bottom and made fast with a clamp
- » The tube is then siphoned off and installed on the slope to the drain (8).

9.4 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 recommended to have the water drain positioned downstream of the droplet separators with respect to the direction of air flow. Only in this way can the waste water drain completely.



9.5 Water Quality

Conductivity:	5 - 20 µS/cm
Pressure:	0.15 - 0.5 MPa (1.5 - 5 bar)
Flow rate	greater than max output of the
	nozzle system
Temperature:	5-15°C
PH value:	7 +/-1

9.6 Inspection of water supply

Water supply

- Is the supplied water filter installed to the water inlet for the pump station?
- \blacksquare Is the feed water quality within the specified range?
- Is the hose that lies between the water filter and pump station waterproofed?

Drainage

- ☑ Is the drain hose siphoned and installed with a constant incline to the drain?
- ☑ Can the flushing water drain off freely?

Humidification chamber

☑ Is the humidification chamber provided with a drain at the lowest point?

10. Hygiene

10.1 Ensuring hygiene (VDI 6022)

Regulations require that only inert materials must be used. The use of biocides should only be a last option.

Prior to humidification the supply air must be purified using a Class F7 filter.

For droplet separators metal mesh filters are used.

The droplet separators allow for easy cleaning and reuse, if required. Addition of a biocide is not necessary.

All components must be easily accessible for cleaning purposes in accordance with VDI 6022.

For visual inspections according to VDI 6022, sufficiently large windows or removable panels must be provided close to the droplet separators and vortex modules.

10.2 Automatic flushing

If the HygroMatik nozzle system LPS is in "stand by mode" without a demand in a 24-hours time frame, the system will periodically run flush cycles every 24 hours. This measure is to prevent microbial contamination in standing water.

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

11. 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 nozzle system LPS is connected to the mains supply.

Please observe all local regulations for electrical installation work.



Caution: The electronic components of the HygroMatik nozzle system LPS 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.

11.1 Connection data

Power supply:	LNE 230 V AC, 50 Hz
External control signal:	0-10 V DC
	4-20 mA 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 [kW]	Rated current [A]	Fuse [A]
LPS 45	0.15	1.9	1 x 16
LPS 72	0.16	2.1	1 x 16
LPS 110	0.18	2.7	1 x 16

11.2 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 nozzle system LPS has been started, a standard voltage of 24 V DC is applied to terminal X2.1.



11.3 Circuit diagram

11.4 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.

12. Commissioning



Note: The LPS nozzle system may only be operated by qualified personnel.

Turning the LPS nozzle system off



Note: Before the LPS nozzle system is put into operation, it must be well known how to switch the system off.

- » Switch off nozzle system using control switch (Pos. 0).
- » Turn-off water supply shut-off valve.

Check all cable connections

» Check all cable connections for tightness.

Activating the LPS nozzle system

- » Operate main switch
- » Set manometer to "open"
- » Open up water shut-off valve
- » Switch on unit using control switch (Pos. I)
- » Set commissioning control to permanent demand steam production.

The following functions begin:

A self-test.

When humidity is demanded, the pump vane is operated and directs the water at a pressure of up to 16 bar to the nozzle.

The water is atomized at the nozzle. All nozzles should not drip and show an even spray pattern.

Further tests:

- All electrically-powered functions must function.
- » Observe LPS nozzle system and let it run for 15-30 minutes. The air conditioning duct fan should be in operation so that the moisture produced can be blown away. Should any leakages be evident then turn the LPS nozzle system off
- » Eliminate the leaks



Attention, voltage! Please observe all safety instructions while working on live components.

13. Control System

13.1 Control and speed regulation

The main switch (item 1 in the figure below) located at the top left-hand side of the housing cover is for switching the HygroMatik low-pressure nozzle system LPS on and off.

All electrical components and terminal stripes are located in the system cabinet under the removable cover. A frequency converter (item 2) supplies different frequencies and voltages for the asynchronous motor of the pumping station located in the lower part of the system cabinet.

A Stored Program Controller (item 3) is responsible for the control function. Important operating data are shown in the control system display.

Depending on the speed of the pump, water pressure and, consequently, the amount of atomized water may be varied. Water pressure is in the range from 5 to 16 bars.

HygroMatik low-pressure nozzle system LPS



- 1 Main switch
- 2 Frequency converter
- 3 SPC control

13.2 Exhaust air cooling/Supply air humidification

The HygroMatik LPS nozzle system may be operated in one of the basic operating modes, **"Exhaust air cooling"** or **"Supply air humidification"**. Prerequisite is a suitable system configuration (ordering option "Combined system" is required). The operating mode is determined by the status of a potentialfree contact to be attached across terminals 6 and 7.

Contact status/Operating mode

Open contact = Supply air humidification

Closed contact = Exhaust air cooling

The operating mode selected is shown in section (1) of the SPC display (see 13.3.2.2).

When **Exhaust air cooling** is selected, system control is purely 1-step as determined by the safety chain contact status (across terminals 1 and 2). As long as the safety chain is closed the system will sport 100 % humidification output.

Operating mode **Supply air humidification** allows for running the system in different load ranges. The number of load ranges (max is 3) is defined during system start-up by means of the control type parameter setting. Usually, the operating mode is set within the manufacturing process already as a made-to-order feature.



Please note: Combined systems that allow for a switch between exhaust air cooling and supply air humidification may only be run in 2 load ranges.

Operating in a single load range

All of the nozzle sections are enabled. Humidification output is determined by pump pressure only. Pump pressure generally follows the control signal (any offsets are disregarded here).

Operating in two load ranges

A maximum of 2 nozzle sections is enabled. Humidification output is determined by the number of nozzle sections active (one or two) and the pump pressure.

Depending on the switchpoint chosen (default is 50 %) initially only one nozzle section is enabled as long as the control signal is below that percentage. Pump pressure, however, is driven to its maximum by half of the control signal (with the switchpoint set to 50 %). Beyond that, the second nozzle section is enabled too. Pump pressure and, consequently, humidification output now follow the full control signal swing.

Operating in three load ranges

A maximum of 3 nozzle sections is enabled. As before, humidification output is determined by the number of active nozzle sections (one, two or three) and the current pump pressure. In addition to the 1^{st} switchpoint introduced in the paragraph above, a 2^{nd} switchpoint setting is available. Defaults now are 30 % of the control signal for the 1st switchpoint and 60 % for the second one. The 2 switchpoints divide the control signal swing in 3 partial sections, namely 0 - 30 %, 31 - 60 % and 61 to 100 % (simply put). All of the partial sections see a pump pressure variation from minimum to maximum pump output (i.e. 5 to 16 bar).

13.3 Description of the Storage Programmable Controller (SPC)

13.3.1 General functional description of LPS system control

The HygroMatik LPS Nozzle system control device is in charge of controlling the complete operation of the nozzle system. For activating and monitoring system functions a display and control unit is built into the front plate of the SPC encorporated in the nozzle system housing. Operating is accomplished through use of menus and submenus. Acces to the menus and submenus is controlled by password codes.

13.3.2 Display and control unit

The display and control unit features 4 function keys and an alphanumerical display for showing operating status information, time-of-the-day information, as well as actual and set values of physical variables. LED icons indicate the current operational state . A numbered line of orange coloured LEDs in the lower part of the display show the status of the corresponding relay assigned to that particular LED.



13.3.2.1 Functional description of the keys

Key function is context sensitive. The following steps may be executed pressing the key in question:



advance to next level (calling up a menu, submenu, parameter or input value)

call up reading level

13.3.2.2 Functional description of display



The display is structured in the following sections:

- (1) Operational mode icons
- (2) Values
- (3) Explanation of the value indicated
- (4) Switching status

Meaning of LED icons and status

lcon	Description	State
\triangle	Error (error codes F1FE are displayed for explanation see chapter 13.3.8)	; on
*	Exhaust air cooling Power retention active	on blinking
*	Supply air humidification Power retention active	on blinking
\bigcirc	No demand (safety chain is closed but demand is below threshold)	on

Please note: in case of no icon lit (exemption: error icon) while the display shows "0.0 bar", the safety chain may not be closed.

lcon	Description	State
Ŷ	Pressure value is displayed [bar]	on
%	Relative humidity is displayed [%]	on
ABC	Control signal not correct (control signal not correct or missing - humidification is interrupted) Pause because of clocking	on blinking

Description of switching status



LED No.	Description	LED state
1	Operation (Nozzle system operating)	on
2	Maintenance/Error Normal operation Error Maintenance required	on off blinking
3	Water inlet	on
4	Flushing solenoid active	on
5	Load solenoid K5 active	on
6	Load solenoid K6 active	on
7	Load solenoid K7 active	on

13.3.3 Description of code levels (operating depth)

The following code levels are available for operating the control unit:

Code 0

Allows for call-up of read values. Changing of settings, however, is restricted to manipulating the system clock only. Code 0 level is activated automatically on power-up of the device and is returned to after a certain time of inactivity on one of the other code levels. After system start the control unit display shows the actual pressure value [bar]. Other read values may be called up.(see below). In case of an error the corresponding error code (see chapter 1.7.3.3) is displayed instead.

Code 10

This code level makes further settings available concerning the basic functioning of the system when submenu "Settings (SET)" is called up. In addition to that, fault memory may be read-out in "FF" submenu.

13.3.4 Menu structure and navigation

Overview on menu structure



Navigation

Navigation in menus and submenus is accomplished using the 4 keys on the control unit. The assignment and function of the keys are explained in chapter 13.2.2.1 The menu tree is depicted in chapter 13.3.10.

All parameters settable within the corresponding submenu are dealt with extensively in chapter 13.3.9.

13.3.5 Descriptions of menus

13.3.5.1 Read values

The read value menu "[L-P]" gives access to read-out of the operational parameters of the device. Keys F1and/ or F3 allow for scrolling among the read values. Their meaning is as such:

- L01 Momentary value of pressure [bar]
- L03 Momentary value of control signal [%]

- L04 Type of control signal set
- L05 Output limitation value set [%]
- L06 Relative humidity set value (only relevant when PI controller is activated) [%]
- L07 Momentary value of humidity (only relevant when PI controller is activated) [%]
- L11 Total pump operating hours [hrs.]
- L13 Total system operating hours [hrs.]
- L14 Time left until next maintenance request indication [hrs.]
- L15 Time left until next stand-by flushing [h]
- L16 Clocking counter

13.3.5.2 Settings

Choosing the appropriate code level determines the scope of possible settings.

Basic setting options for the user

Code level "0" only allows for time-of-the-day and date settings in submenu "SET". This level is automatically active after powerup.

Setting options for the operator on code level "10"

On entry of "10" as the code password basic operational settings for the system are made available. Among these are control, control signal, output limitation, rel. humidity set value, control characteristic (only when PI controller was selected) and maintenance indication reset. These parameters and their possible setting ranges as well as the defaults are listed in a table in chapter 1.6. For a full description of parameters pls. refer to chapter 1.8.

Also available on code "10" level is fault memory read-out and history reset. Fault memory holds the 8 latest error messages and is updated in a rolling manner.

Parameter name/ function	Selectable presettings	Code
U06/Control	 0 = extern. controller 1 = 1-step 	10
	• $2 = PI \text{ controller}$	90
	Factory setting = 0	
E03/Control signal	 4 = 0 - 10V 3 = 4 - 20 mA 	10
	Factory setting = 4	90
U08/OFF-threshold [%]	5.0 - 50.0	10
	Factory setting = 10.0	90
C11/P-value r.h. [Gain] *)	50 - 200 Factory setting = 100	10 90
C12/I-value r.h. [sec] *)	50 - 500	10
	Factory setting = 100	90
r_S/Reset maintenance	yes/no	10
	Factory setting – no	90
P01/Output limitation [%]	25 - 100	10
	Tactory Setting - 100	90
L06/Set value r.h. [%] *)	10 -100 Factory setting = 50	10
		90
C10/Power retention [%]	0 - 50 Factory setting = 0	10
		90
FLU/Manual flush	On/Off Factory setting = Off	10
		90
C_U/Set clock	0 = read 1 = save	0
	2 = enable setting	
CM/Minutes	0 - 59	0
CH/Hours	0 - 23	0
CD/Day	1 - 31	0
CMo/Month	1 - 12	0
CY/Year	10 - 99 (2010 - 2099)	0

13.3.6 Table of parameters and their selectable presettings and default values

13.3.7 Operating the control

13.3.7.1 Power-up device

When turning the mains switch on the frontpanel of the device to the On-position, the system will be in **Main menu** with the momentary pressure value shown in the display. Using the keys on the control unit front, **Read-out level** may be accessed that allows for presentation of the read value parameters L1 ... L16). Also, **Programming level** is accessable where parameter values may be set or changed.

13.3.7.2 Programming

Set system time

- » Press the F2 (esc) and F4 (set) keys simultanously. As a consequence, the display will show "PAr"
- » Confirm parameter setting by pressing F4 (set). The display will show "SEt"
- » Confirm using the F4 (set) key. The display will show "C_U" which interprets to "Set clock"
- » Selection of the "2" pre-setting enables clock setting
- » Using the F1 and F3 keys, scrolling through a list of presets may be carried out with "CM" allowing for the subsequent setting of the minute, "CH" for the hour, "CD" for the day, "CMo" for the month and "CY" for the year, respectively
- » Select the parameter to be set by pressing the F4 (set) key
- » Use the F1 and/or F3 keys to input the intended value and confirm by pressing the F4 (set) key
- » The rest of the time and date parameters may be set in the same way as described above
- » Pressing F2 (esc) will guide you step-by-step back to the level where C_U is shown in the display
- » For saving of the changes made, select "1" and confirm by pressing the F4 (set) key

After finishing all of the time and date settings, F2 (esc) will bring you back to the main menu.



Please note: After a certain time of inactivity on a particular submenu level, the system will automatically return to main menu (showing the momentary pressure value in the display).

Set parameter values

- » Press the F2 (esc) and F4 (set) keys simultanously. As a consequence, the display will show "PAr"
- » Use the F1 and/or F3 keys to access "PASS" and confirm by pressing the F4 (set) key
- » Use the F1 and/or F3 keys for input of the intended password code and confirm with the F4 (set) key

Depending on the password code input ("10" or "90"), only the parameter list associated with the SET submenu or all parameter lists (divided in SET, CS and CC groups, s. chapter 1.6) become accessable.

- » Select the parameter you intend to change, confirm the selection with the F4 (set) key and subsequently make the value input or selection of a value preset
- » Finish and confirm your input by pressing the F4 (set) key
- » Repeat the a.m. step until all intended settings are completed
- » Pressing the F2 (esc) key makes you return to the next higher submenu level and , finally, the main menu

13.3.7.3 Read fault memory

From "FF" submenu

When "10" was chosen as the password code, "FF" for read-out of the fault memory becomes additionally available. Fault memory holds the last 8 coded error messages produced by the device with the most recent message in the last place. Error code is from "F1" to "F8", plus "FE" (s. code list in the table below). Besides the code each entry comprises a time and date stamp.

As shown in the control unit display when operation has ceased

When the system control detects an error the error icon in section (1) of control unit display (s. Chapter 13.3.2.2) is lit and the corresponding error code "F1" to "F8" or "FE" is shown in section (2). The error codes are explained in the table below.

Error code	Error mes- sage	Decription	Possible cause	Counter measure
F1 Water inlet pressure < 1bar		Water supply inade- quate Inlet pressure must lie	Water supply not con- nected	Connect to water supply with ade- quate pressure
		between 1 and 5 bar	nated	ter
F2	Temperature in cabinet too high	Temperature sensor in cabinet reports a value in excess of 50°C +/-	Fan defective	Check fan and replace if neces- sary
		10%	Cabinet air inlets blocked	Clean air inlets
F3	Frequency converter	Error message reported by frguency converter	Pump motor overload	See frequency con- verter trouble
	defective	(message is shown in converter display)	Converter electronic circuit defective	shooting informa- tion
			Output terminals ground shorted	
F4	Motor coil	Pump motor coil tem-	External fan defective	Check external fan
		gered	External fan vents blocked.	essary
				Remove blockage
F5 Low pres- sure		No pressure built up after the rotary vane pump has run for 30 secs	Pressure pipe leaking Water deficiency	Check pressurized water supply and replace, if neces- sary
			Pressure sensor cable not connected	Check cable con- nection
F6	Excess pres- sure	Supply pressure exceeds 16 bar for a period of 30 secs	Nozzles blocked	Clean or replace nozzles
F7	Pressure sensor fault	Pressure value reported by pressure sensor is	Pressure sensor defec- tive	Replace pressure sensor
		not within normal range	Broken pipe	Replace pipe
F8	Humidy sensor fault	Humidity value reported by optional pressure sensor is not within nor- mal range	Humidity sensor defec- tive	Replace humidity sensor
			Broken pipe	Replace pipe

13.3.8 Overview on error codes and troubleshouting hints

Error code	Error mes- sage	Decription	Possible cause	Counter measure
FE	Expansion unit	Expansion unit not detected	LAN cable broken Supply voltage missing	Replace cable Check power sup- ply

13.3.9 Detailed parameter descriptions

13.3.9.1 U6/Control

Control of the system may be in 1-step mode (on/off), using an external control signal or based on the internal PI controller.

1-step control

This operational mode is used for humidifying and exhaust cooling. Prerequisite is a safety chain enabling across terminals 1 and 2 (e.g. by means of a max. hygrostat). No additional control signal is required and will not be propagated. The humidifier system runs with maximum output as long as the a.m. contact remains closed.

External control signal

An external control signal is required for the control of supply air humidification. The mode of supply air humidification is defined by the "control type" parameters. The control signal must be supplied by the operator. The type of control signal may be selected by setting the control signal parameter.

PI controller (internal)

When using the internal PI controller an external humidity sensor is required.

13.3.9.2 E03/Control signal

The control signal type may be chosen from the following selection: 0 - 10V or 4 - 20 mA.

13.3.9.3 U08/OFF-threshold

OFF-threshold determines the cut-off threshold for humidifier operation. This threshold serves the avoidance of frequent switch-off/switch-on cycles in the proximity of the cut-off point caused by control signal ripple that may have a negative effect on device life expectancy. The OFF-threshold is determined as a percentage of the maximum control signal. Humidifier operation is not cut on "zero" control signal but on the value preset.



<u>Please note:</u> When switching-on humidifier operation by means of a control signal, an offset is effective as well for interference

suppression. However, this parameter is not changeable by the operator. It is calculated based on the setting for the OFF-threshold parameter plus 5% of the maximum control signal. The offset serves for the suppression of noise or transient signals that may be overlayed on a weak control signal. Control will only commence operation when the input signal exceeds the offset preset.

13.3.9.4 C11/P-value r.H.

This parameter determines the proportional component (i.e. the gain) of the internal PI controller.

13.3.9.5 C12/I-value r.H.

This parameter determines the integral component (i.e. the time constant) of the internal PI controller.

13.3.9.6 R_S/Reset maintenance

On completion of a maintenance procedure this parameter should be set to "yes" in order to reset the maintenance interval counter. After resetting, the orange LED No. 2 in display section (4) will stop blinking (in normal operation this LED is permanently "on").

13.3.9.7 P01/Output limitation

This parameter allows for limitation of the system output to a percentage of the maximum output. By this, activation of all of the nozzle sections may be avoided.

13.3.9.8 L06/Set value r.H.

This parameter determines the closed loop set value.

13.3.9.9 C10/Power retention

This parameter determines the output of the humidifier in case of no (internal) control signal present.



Please note: For power retention to become effective, the safety chain must be closed.

13.3.9.10 FLU/Manual flush

Setting this parameter to the "on"-state will trigger manual flush operation. Flushing will only end when the parameter is put back to "off" or on switching-off the pump.

13.3.9.11 C_U/SET Clock

Selecting this submenu allows reading and setting the system clock. The following modes are supported depending on the predefined digit code:

<u>C_U=_0":</u> system clock setting may only be read on the next submenu level

<u>C_U=,1":</u> changes made to the settings are saved. Subsequently, C_U automatically returns to $_0$ ".

<u>C_U=,.2"</u>: System clock parameters may be changed on the next submenu level and subsequently be saved by selecting C_U= $_{,1}^{1}$.

Below the C_U submenu level time and date details become available. Select CM for minute input, CH for hours, CD for day, CMo for months and CY for year. CY is only a 2-digit variable allowing an input range from 10 to 99 with "10" corresponding to the year 2010.



13.3.10 Menu structure and parameter setting

14. Maintenance

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

Regular maintenance of the HygroMatik nozzle system LPS 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 (take the plug out of the socket) on before maintenance work is performed;
- after maintenance work has been completed the device must be inspected by qualified staff to determine whether it is safe to operate.

14.1 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 housing for contamination and clean if necessary.
- » Carry out a visual inspection of droplet separators and clean if necessary.
- » Check the water filter cartridge upstream of the pump 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)

- Nozzles should be checked as part of annual maintenance and cleaned if necessary (see "Cleaning nozzle).
 If required, the nozzles to be replaced.
- » Water filter cartridge change
- » Visual inspection of the vortex module wall, if necessary clean.
- » Check shutdown function, such as a "Max-Hygrostat".

14.1.1 Inspection / replacement of the net-based water filter

Water filter check

Water filter must be checked for contamination 1 x monthly and if necessary replaced. If the white water filter cartridge changes its colour this means it is polluted.

Pollution causes a higher flow resistance. This reduces the water pressure at the pump. Too little pressure can cause the nozzle system to switch off (dry-run protection).

Replacing the water filter:

- 1. Filter housing holder
- 2. Filter cartridge (insidelying
- 3. Filter housing
- 4. Mounting plate



1. Set the main switch on the control panel of the HygroMatik nozzle system LPS 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'.

14.1.2 Cleaning the atomizer nozzle

1. Switch the HygroMatik LPS Nozzle System power supply to 0

2. Unscrew the nozzle from nozzle holder. Take care not to touch the impact pin.

3. Unscrew the nozzle by screwing the inside part out.

4. Clean the nozzle components in an ultrasonic bath for about 10 minutes, if necessary use a lime remover in low concentration (less than 10%).

- 5. Put nozzle components back together.
- 6. Screw nozzle in the nozzle holder.
- 7. Switch power switch back to I
- 8. Finally check spray pattern



Caution: Make sure that the pressure reduces by, for instance, activating the wash cycle.



Caution: Wear eye protection when cleaning the nozzle.



Caution: Use only an appropriate tool to remove the nozzles.

14.1.3 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.



14.1.4 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.

14.1.5 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.

15. EC declaration of conformity

			HVG	RO	MATIK
				WIR MA	CHEN DIE LUFT FEUCHT
	EC	G-Konformitä	itserklärung		
	E	C Declaration	of Conformity		
Hersteller / Manu	ifacturer:	HygroMatik GmbH			
Anschrift / Addre	SS:	Lise-Meitner-Straße	3, D-24558 Hensted	t-Ulzburg,	Germany
Produktbezeichn	ung / Product	description: Low Pressure Syst	tem: LPS45, LPS72,	LPS110	
In den Ausführu	ngen / Type:	Volllast, Voll- und T full load, full and partial le	eillast, 3-Stufigkeit oad, 3-step control		
Die bezeichneten Vorschriften folg The products describe Directives:	Produkte stingender Europä d above in the for	mmen in der von un ilscher Richtlinien ü m as delivered are in confo	s in Verkehr gebrad berein: nrmity with the provisions of	chten Aus	führung mit den g European
2004/108/EG	Richtlinie des über die elek Council Directive compatibility.	Rates zur Angleichu tromagnetische Vertre on the approximation of t	ung der Rechtsvorsch äglichkeit. he laws of the Member Sta	riften der I ates relating t	Mitgliedstaaten o electromagnetic
2006/95/EG	Richtlinie des betreffend ele Spannungsgi Council Directive designed for use	Rates zur Angleichu ektrische Betriebsmitte renzen. e on the approximation of t e within certain voltage limi	ing der Rechtsvorsch el zur Verwendung ir he laws of the Member Sta ts.	riften der I nnerhalb bo ates related to	Mitgliedstaaten estimmter o electrical equipment
Die Konformität m Conformity to the Dire	it den Richtlini ctives is assured t	en wird nachgewiese hrough the application of th	n durch die Einhaltur he following standards:	ng folgende	er Normen:
Referenznumme Reference Number: DIN EN 55016-1-2 DIN EN 55016-2-1 DIN EN 55016-2-3 DIN EN 61000-3-2 DIN EN 61000-3-3 DIN EN 61000-4-2 DIN EN 61000-4-3 DIN EN 60204-1	r: Ausgabed Edition: 2007-08 2009-12 2007-08 2006-10 2009-06 2009-12 2008-06 2007-06	latum:	Referenznummer: Reference Number: DIN EN 61000-4-4 DIN EN 61000-4-5 DIN EN 61000-4-5 DIN EN 61000-4-6 DIN EN 61000-4-8 DIN EN 61000-6-2 DIN EN 61000-6-3	Ausgab Edition: 2010-11 2007-06 2009-12 2009-10 2005-02 2005-01 2007-09	edatum:
Die Anforderunge Eine vom Lieferzu The requirements o Product modification	n des Produkts Istand abweich f the German Pr Ins after delivery	icherheitsgesetzes Pr iende Veränderung di oduct Safety Law (Prod may result in a loss of c	rodSG §3 Abs. 1 bis es Gerätes führt zum SG) paragraph 3 clause conformity.	2 werden Verlust de 1 to 2 are	eingehalten. er Konformität. <i>met.</i>
Henstedt-Ulzburg,	den / the 01.0	1.2013			
HygroMatik GmbH	4				
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Geschäftsführer /	General Mana	ger	Technischer Leiter /	Head of E	Engineering
Diese Erklärung bes von Eigenschaften. This declaration certifi documentation accom	scheinigt die Übe Die Sicherheitst es the conformity panying the produ	ereinstimmung mit den g inweise der mitgeliefert to the specified directives b ct shall be considered in de	genannten Richtlinien, is en Produktdokumentati out contains no assurance etail.	st jedoch ke on sind zu l of properties.	nine Zusicherung beachten. The safety
HygroMatik GmbH Postfach 12 19 D-24549 Henstedt-Ulzburg Lise-Meitner-Str. 3	T +49 4193 895 F +49 4193 895 hy@hygromatik.	- 0 Geschäftsführung: - 33 Dirc Menssing de Maike Nielsen	AG Kiel HR B 1282 USI-ID-Nr. DE 1341 Ein Unternehmen c	? No 846785 Ier	Deutsche Bank Kto. 825689 00 . BLZ 200 700 00 IBAN DE12 2007 0000 0625 6689 00

16. Spare parts

Article no.	pump station
E-7800100	Motor LPS systems, 230V, 0,37kW
E-7800202	Rotary vane pumpe LPS-100; LPS110
E-7800204	Rotary vane pumpe LPS72
E-7800206	Rotary vane pumpe LPS45
E-3720010	fan, axial, 230VAC
E-7702200	protection grill, cabinet fan HDS, incl. filter inlay 120 x 120 mm
B-7800400	Solenoid valve water inlet, incl. pressure switch 1bar
E-7800300	3/2 Solenoid valve, incl. coil 230 V/50-60Hz
E-7800310	Plug for solenoid valve
E-7800610	High pressure sensor LPS
E-7800436	pipe fitting G3/8, 12mm hose
E-7800438	pipe fitting G3/8, 90°, turnable, 12mm hose
E-7800416	pipe fitting G1/8, 6mm hose
E-7800444	female pipe fitting G1/8, 6mm hose
	Filter element 10" filter quality 10 µm for water-prefilter HP-
E-7621028	pumpstation
	Water filter housing, 10" bothside connection 3/4" iD blue sump,
E-7705200	pressure release button
B-2504021	Auxiliary relay 230V AC 2 switching contact
E-2505206	Safety fuse 1,6A 5x20mm
E-2504039	Safety fuse 1,6A 5x20mm
	Thermal circuit breaker ; NC with automatic reset, switching point at
E-7704870	50°C ± 5K
E-7800544	Transformer 230V/12V 11VA
E-7800500	Frequenzy converter 0,37kW
E-7800540	Display CPU unit
E-2501005	main contactor 16A(AC1)coil 230V AC

Artikel-Nr.	Article no.	Vortex-wall
E-7701000	E-7701000	Vortex module
E-7800400	E-7800400	LPS water distribution tube
E-7601630	E-7601630	T-piece female 1/8"
E-7601586	E-7601586	Double nipple G1/8" - G1/8"
E-7800410	E-7800410	Sealing plug M5
E-7800412	E-7800412	Sealing plug male 1/8"
E-7800414	E-7800414	Pipe fitting M5, 4mm hose
E-7800416	E-7800416	Pipe fitting G1/8, 6mm Hose
E-7800472	E-7800472	Fixing clip
E-7800452	E-7800452	Mountin bracket for nozzle
E-7621020	E-7621020	O-ring for nozzle mounting bracket
E-7800450	E-7800450	Nozzle HY 0,27/120°
E-7800454	E-7800454	Nozzle HY 0,27/60°
E-7601572	E-7601572	O-Ring, 10 x 1.5, 70° Shore
E-7800424	E-7800424	Pipe fitting male 1/8", 90°, turnable, 4mm hose
E-7800428	E-7800428	Hose PA, 6mm
E-7800426	E-7800426	Hose PA, 4mm
B-7800301	B-7800301	LPS duct inlet fitting

17. Fax Form - Order for spare parts



Lise-Meitner-Str. 3 24558 Henstedt-Ulzburg Tel. +4904193/895-0 Fax Form

Please copy, fill in and fax to

Fax.No. +49(0)4193/895-33

Order of spare parts

unit type *_____ serial no.* _____

commission: ______ order no.: _____

quantity	article	article no.

date of delivery	forwarder		shipment by	
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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.

	LPS 45	LPS 72	LSP 110	
Effective humidification capacity [I/h]	45	72	110	
Nominal power rating [kW]	0.15	0.16	0.18	
Amps [A]	1.9	2.1	2.7	
Volts [VAC/Ph/Hz]	230/1/50			
Control signals	0-10V / 4-20mA (other control signal levels on request)			
Nozzle number	15	22	32	
Humidification path, ideal [m]	0.9			
Installation lenght, ideal [m]	1.5			
Flow velocity [m/s]	0.9 - 2.8			
Pressure drop in duct [Pa]	80 at 2.0m/s air speed			
Dimensions H, D, W [mm]	700, 230, 600			
Weight [kg]	30			

18. Technical Specifications










HygroMatik

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