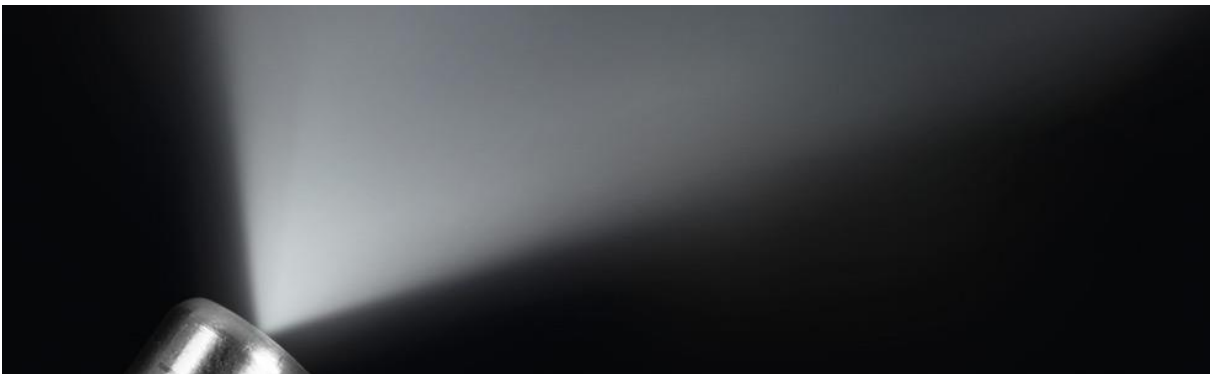


Technical Documentation

FINESTFOG Air Humidifier – EM Easy



FINESTFOG high-pressure humidifiers are quality products: "Made in Germany"

All systems are tested and checked prior to delivery

The systems are CE compliant and VDE tested

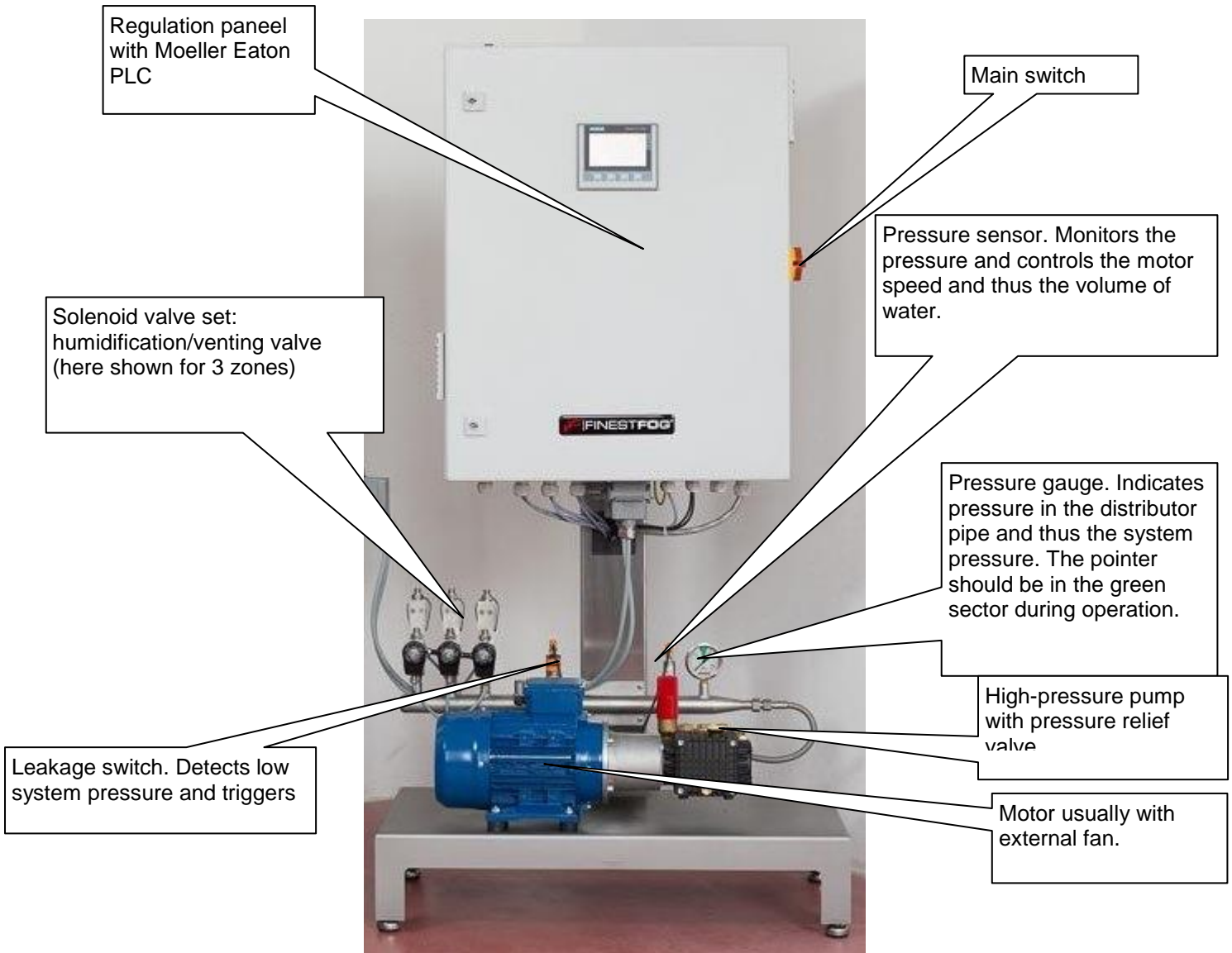
FINESTFOG systems humidify according to VDI 6022 guidelines

They are issued with a certificate of hygiene by the GBA Gesellschaft für Bioanalytik mbH

- Benefits:

Some of the many benefits available compared with conventional air humidifiers:

- Low energy consumption thanks to frequency-controlled high-pressure pump
- 3 different nozzle sizes suitable for any room height
- Very low noise emission
- Optimal moisture distribution through flexible use of stainless steel pipes
- System can be used simultaneously across several zones
- Finest water aerosols do not cause moisture precipitation on floors
- Impeccably hygienic operation thanks to periodic flushing of the entire pipe network
- Optimal humidity measurement via digital humidity sensors and high limit hygrometers



- Operating principle:

FINESTFOG high-pressure humidifiers atomize water at high pressure. They are single-medium nozzles, ie, there is no need for pressurized air as required in the case of dual-medium nozzles. A high-pressure pump raises the normal mains water pressure (approx. 3.5 bar) to approx. 80 bar. The high-pressure nozzle atomizes the water. The fine aerosols are readily taken up by the ambient air. No additional carrier gas (by way of fans) is necessary. Thanks to the control unit and the humidity sensors, the system operates fully automatically, if required also in several different zones (rooms).

Air humidification is activated if the humidity sensor detects insufficient humidity in at least one humidity zone. The humidification solenoid valve of the relevant zone opens and the pressurized water flows directly to the nozzles. The high pressure opens the nozzle spring and the nozzle atomizes the water without any drips forming. Once the specified air humidity is reached, the zone is switched off. After a delay, first the humidification valve closes followed a few seconds later by the venting solenoid valve. This sequence ensures that pressure in the system is relieved and that nozzles do not drip. A switched off humidification zone is not under pressure. The venting valve is also used during periodic flushing of the zone.

All zones are switched on according to a selectable regime (as a rule every 5 to 12 hours) independent of the humidity sensor. The humidification valve then opens at the same time as the venting valve. For a programmable time period the water flows through the entire pipe network and is flushed out as waste water via the return line. This prevents standing water in any of the pipes for any length of time. The regime and the duration of the flushing operation vary with operational routines, the length of piping and the number of nozzles.

- High-pressure pump

The high-pressure pump is an oil-lubricated piston pump that delivers a uniform pressure of approx. 80 bar. A manostat monitors the water intake pressure. In the event of too little water or insufficient water pressure (under approx. 1.5 bar) the manostat sends an error signal to the controller. The pump is switched off. A manometer displays the working pressure of the pump. The frequency converter of the controller ensures stepless operation of the high-pressure pump. A pressure sensor measures the water pressure after the pump. The converter transmits the signals to the continuously variable motor. This means the pump delivers only as much water as is required at any time. The pump is not overworked and power consumption is reduced. For more information on the frequency converter refer to the technical documentation.

Pump size

Pumps are supplied in six standard sizes:

Water volume/h	Power consumption	Pump and motor speed	Model
120 l	0.55 kW	690 rpm	EH-1708-VH
240 l	1.5 kW	1,400 rpm	EH-1708-VH
400 l	1.5 kW	1,400 rpm	EL-1707-VH
480 l	2.2 kW	1,400 rpm	EL-1708-VH
600 l	2.2 kW	1,400 rpm	EL-1510-VH
780 l	3.0 kW	1,400 rpm	EL-1513-VH

The high-pressure pump is driven by a 400/230 V, 50 Hz, IP 55 3-phase motor via an elastic coupling. The high-pressure pump is mounted on a sandblasted stainless steel frame together with the controller and other optional components.

Pressure sensor

The pressure sensor continually measures the pressure in the distributor pipeline. The pressure sensor is set via the controller unit for a permanent working pressure of 80 bar. If for instance a further zone is switched on, the pressure in the distributor pipeline will drop because of the additional water usage. The sensor registers the drop in pressure and sends a signal to the frequency converter. The frequency converter changes (increases) the speed of the motor. This produces more water and the pressure again rises to 80 bar. The whole process takes about 1 to 2 seconds. If a zone is switched off, the pressure will rise slightly and the frequency converter will again change (reduce) the speed of the motor.

Manometer

The manometer displays the pressure in the distributor pipeline and thus the pressure in the entire pipe network. The optimal pressure range (70 to 90 bar) is indicated by a green sector. FINESTFOG should be contacted if the pressure is permanently outside this green sector.

Pressure relief valve

The pressure relief valve serves as protection against excessive pressure in the pump. If in the event of a system error the pressure rises above 100 bar, the pressure relief valve opens to relieve the pressure via the water inlet side. Caution: The pressure relief valve is factory-set and may be reset only by an authorized technician.

Hose rupture protection

Rupture protection can be seen as the airbag of a FINESTFOG humidification system. Since all hoses and pipes are under high water pressure (80 bar), care must be taken that in the event of a line break (eg, through material fatigue or rupture) no appreciable amount of water is set free. The sensor continuously measures the water pressure in the distributor pipelines. If the pressure drops well below 80 bar within a given time, the manostat cuts off the water supply to this zone and issues the error message "Leakage". This prevents large amounts of water leaking into rooms.

Example: Water pressure drops under 50 bar for more than 30 s. The sensor initiates the error message "Leakage". The water supply is cut off, the system loses only a few litres of water (depending on pump size).

Solenoid valve

Two high-quality stainless steel solenoid valves are used for each humidification zone. The solenoid valves have an armature with an integrated industrial ruby. These components are durable and absolutely leakproof. One solenoid valve is used to open the humidification zone, the other for venting and flushing of pipelines (see Operating principle).

- Controller

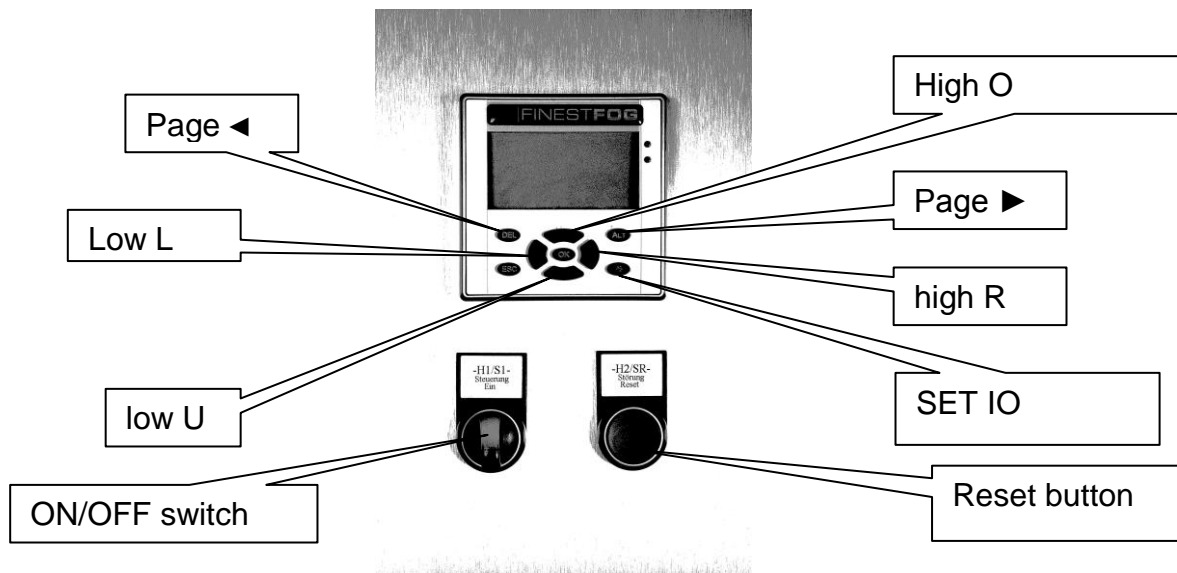
The FINESTFOG controller for high-pressure humidifiers ensures fully automated operation of the humidification system. It serves as information transmitter for both the high-pressure pump and the humidification units.

The controller is cased in a powder-coated metal housing with a lockable front door. On the right side of the housing is the main on/off switch for the power supply to the system.

For more information on the components of the FINESTFOG controller and the electrical wiring refer to the enclosed parts list and the electric circuit diagram.

The controller incorporates a Möller frequency converter. For technical data and operation of the converter refer to the enclosed technical documentation.

- **Operation and indicators on the Möller MFD-Titan controller and Easy 800 control relay**



The MFD-Titan combines the functions of the RMQ-Titan command and alarm units and the easy 800 control relays in a single unit, the multifunction display. The MFD-Titan features a brilliant, fully graphic, high-performance backlit display. The MFD-Titan is based on a modular design. It includes the display unit, power supply with CPU plus optional input and output terminals. For the electrical wiring refer to the enclosed electric circuit diagram.

Control operation:

- Starting page:
www.finestfog.com
 Service phone number:
 +49(0)89 6735915-0

Press **Bild>** to advance to next page. Press **Bild<** to return to previous page.

- Page 1

ZONE	1	2	3
ON	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OFF	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Page 1 shows the individual zones. For instance, if the field ON is dark for zone 2, it means that this zone is switched on and is being humidified. Similarly, if the field OFF is dark for zone 3, it means that this zone is switched off and is not being humidified.

Option: A FINESTFOG humidification system is combined with a reverse osmosis system (see picture on right). The osmosis system is then also controlled via the display (see Technical Documentation Reverse Osmosis System).



Press **Bild>** to advance to next page. Press **Bild<** to return to previous page.

- Page 2 to page 4
Display: Zone 1 to zone 3 (example)
Set humidity (eg, 55%)
Actual humidity (eg, 45%)

The actual humidity displays the instantaneous relative humidity in a given zone. This value must **not** be changed. The set humidity (desired relative humidity) is increased by pressing **▲ (High O)** and decreased by pressing **▼ (Low U)**.

Press **Bild>** to advance to next page. Press **Bild<** to return to previous page.

Hose rupture protection

- Page 5
Display: Time pressure supervision all zones
Input (eg, 1.50 m)
Actual value (eg, 0.00 m)

The function "**Hose rupture protection**" checks the pressure in a zone when the zone is switched on. The minimum pressure can be set on the pressure sensor. A setting of approx. 50 bar is recommended. The **supervision time interval** can be set via **Input**. The default setting is **1.5 min**. This corresponds to a time interval of 1 minute and 30 seconds.

The time is increased by pressing **▲ (High O)** and decreased by pressing **▼ (Low U)**.

Actual value displays the time lapsed since the zone was switched on and pressure build-up started. If the pressure fails to build up, for instance due to a burst pipe, the fault "**Leakage**" is indicated after 90 seconds. The system switches off and no more water can leak after this time. For more information on hose rupture protection see below.

Press **Bild>** to advance to next page. Press **Bild<** to return to previous page.

- Page 8 (error messages) Password 13

Leakage	<input type="checkbox"/>
Water deficiency	<input checked="" type="checkbox"/>
Motor overtemperature	<input type="checkbox"/>
UV radiator	<input type="checkbox"/>

If any fields are filled in, it means that the control has detected a fault. Press **Reset** to clear the fault.

Note! All further functions are protected by a security code. These functions are reserved for use by an authorized service technician.

Enter a 5-digit security code to access these pages. These codes are currently 1 2 3 4 5 and 5 4 3 2 1. On the first page, the last two digits 1 3 are displayed. First press **ok** twice to enter the security code. The field for the code now blinks. Press **◀ (Low L)** and **▶ (High R)** to get to the last position (3 blinks) and press **▲ (High O)** and **▼ (Low U)** to enter the number. Press **ok** to confirm and then press **◀ (Low L)** and **▶ (High R)** to get to the next position and enter the next number. Again confirm by pressing **ok**. Continue until all 5 numbers have been entered.

- **Code 12345**
 - Level 1: Interval (timing) zone 1 to zone 3
This function can be activated, but is not relevant. The timing is not required!
 - Level 2: Hysteresis zone 1 to zone 3
The default hysteresis setting is 3% and should normally not be changed.
Press **ok** twice to change the hysteresis for the zones. To change the value press **▲ (High O)** and **▼ (Low U)**.
Confirm by pressing **ok**.

Level 3: Manual ON

This function is reserved for service purposes and should only be activated by an authorized service technician!

- **Code 54321**

Level 1: Reset
Maintenance interval hours
Set runtime (eg, 500 hours)
Actual runtime (eg, 135 hours)

Actual runtime displays the actual runtime of the pump. **Set runtime** can be changed. The default setting of the **Set runtime** is 1000 hours. This value should not be changed.

Once the set time has elapsed, "Maintenance, advise service personnel" is displayed on Page 1.

The maintenance display can be reset in the field "**Reset**" on completion of maintenance.

Actual runtime is now set to zero and starts again to count up the hours to **Set runtime**.

Level 2: Venting time zone 1 to zone 3

This sets the time that the solenoid valve is switched on for pressure relief. The longer the time, the longer the solenoid valve remains open and the more water is removed from the pipeline. This reliably stops water dripping at the nozzles. The default setting for the venting time is 10 seconds and this should normally not be changed.

Press Bild< to return automatically to page 1.

- Measuring transducer (humidity sensor) - high limit hygostat



- **Humidity sensor EE 160**

In each zone a capacitive humidity sensor measures the relative air humidity and the temperature. The data are transmitted to the PLC of the controller via the sensor cable. In this way each zone is automatically humidified as required.

Model:	EE 160
Measured values:	Humidity and temperature
Output:	0...10 V
Protection grade:	IP 65
Sensor length:	50 mm

- **High limit hygostat PHY**

Each zone is fitted with a high limit hygostat. The high limit hygostat should be set roughly 15 to 20% higher than the desired humidity (example: desired humidity 50% RH – set high limit hygostat to 70% RH). If the measuring transducer in a zone fails to measure accurately or is defective, causing the humidity to rise above a certain value, the high limit hygostat switches the humidification in this zone off until the humidity drops again below this value.

- FINESTFOG high-pressure nozzle



The three FINESTFOG high-pressure nozzles were specially developed to guarantee optimal humidity distribution with finest atomization without the need for support by a carrier gas. The nozzle achieves the finest atomization at a water pressure of approx. 80 bar.

Advantages that speak for themselves:

- No need for additional fans
- No drafts and yet good humidity distribution
- Optimal installation options thanks to minimal space requirements
- Can be connected directly into supply air systems
- Virtually noiseless

FINESTFOG nozzles are suitable for virtually any room height. Three performance ratings are available:

Type:	Bore:	Humidification rate/h
	FF 100 μ	1.5 l
	FF 150 μ	3.2 l
	FF 200 μ	5.4 l

All nozzles are made of high-grade stainless steel. The nozzles have special bore holes and are hand finished. A check valve reliably prevents water dripping. Prior to delivery each nozzle must pass a function test. The suggested nozzle spacing is one nozzle per metre of stainless steel pipe section (1/4"). Pipe sections can be extended to accommodate different room sizes (eg, pipe length 16 m, 16 nozzles).

Accessories: joints



Joints are used in areas where nozzle spray may be hampered (eg, by obstructions such as lamps, chains, cables, etc.). This joint allows a nozzle to be turned by 30° in any direction, provided it is switched off. Spray is then not impeded by the obstruction. A feature of the joint is that in any position on all components it can handle the operating pressure of 80 bar. Alternatively, nozzles can be replaced by a blind plug.

- Notes on hygiene

FINESTFOG takes great care that its air humidification and water conditioning systems meet all current hygiene standards. Many precautionary measures are taken to ensure safe operating conditions. Equally important is that the user undertakes the necessary measures to ensure an impeccably hygienic operation. The following information summarizes how FINESTFOG ensures a healthy air humidity.

Water conditioning

For hygienic reasons a FINESTFOG air humidification should be operated only in conjunction with a water conditioning system. A FINESTFOG reverse osmosis system supplies “pure” water. This means the water is virtually free of all solids, such as minerals, dirt, microorganisms and bacteria.

Pressure tank

FINESTFOG does not use open water storage tanks. Water is stored in as small volumes as possible in pressure tanks only. If on-site water treatment systems are used it is important to ensure that no large, open tanks are used.

UV sterilization

After the reverse osmosis system, UV sterilization is the last operation prior to air humidification. UV sterilization ensures that any microorganisms and bacteria in the humidification water are killed off. The UV sterilization moreover inhibits colony forming bacteria. A digital day counter counts the residual operating time of the UV radiator. The radiator should be replaced after a year (because of loss of performance). A defective radiator is detected by the integrated current monitor. An error signal is passed to the controller and the humidification system is stopped. Operation can be resumed only once the UV radiator is replaced.

Forced humidification

A FINESTFOG system effectively **prevents water standing** over longer periods. A timer starts whenever a humidity sensor has switched off a zone. If the sensor fails to switch on the zone within a preprogrammed time, **the timer initiates forced humidification**. The residual water in the pipelines is atomized. The duration of the forced humidification per zone depends on the number of nozzles and the pipeline length. The process is repeated until the zone is switched on again by the sensor when fresh water enters the pipeline.

Note!

The user of the humidification system must make sure that the system is not switched off at the main switch (to the right of the controller). The system may be powered down for brief periods of time only during maintenance or for service reasons. In a system that is completely shut down neither the hygiene flushing nor the UV sterilization will function. All protective mechanisms affecting the system’s hygiene are deactivated. Following a prolonged general shut-down of the system it is strongly recommended that all pipelines are disinfected and water filters replaced by the FINESTFOG service team. Bear in mind: in the last analysis it is you who has to bear the responsibility for an impeccably hygienic operation of the humidification system.

- SERVICE AND MAINTENANCE OF FINESTFOG HIGH-PRESSURE AIR HUMIDIFIERS

The BG ETEM advises its members to perform an annual maintenance on their humidification systems. The maintenance procedures performed should be documented in a maintenance logbook (available from FINESTFOG or the BG ETEM).

FINESTFOG offers a maintenance contract for every humidification system. A maintenance is performed after 3,000 operating hours or at the latest after one year. After an operating time of 3,000 hours the following message is displayed:

Maintenance due for air humidification (please notify service personnel)

Note: This message does not result in system switch-off!

The operator can, of course, choose to have maintenance performed by in-company service staff. The employees assigned to this task will, however, require thorough training. This training can be given by the FINESTFOG service team.

The following service and maintenance procedures are recommended for FINESTFOG high-pressure humidification systems.

The service protocols are divided into sections:

- 1: High-pressure pump
- 2: High-pressure nozzles
- 3: Controller
- 4: Humidity sensors – high limit hygrometers
- 5: Water filters
- 6: Water softening unit (option)
- 7: Reverse osmosis system (option)
- 8: UV sterilization

1. High-pressure pump

The high-pressure pump is a piston pump with ceramic pistons that is subject only to minimal wear. The seals on the water side are replaced as part of the maintenance schedule, the seals on the oil side as necessary. The pump is lubricated by an SAE 15W 40 mineral transmission oil. Under normal operating conditions there is no oil loss, but the oil level should be checked at regular intervals. The oil level is visible through the oil-level glass. The oil should be changed twice a year.

2. High-pressure nozzles

The humidification nozzles have a very fine bore. Thanks to the high-quality stainless steel used for the nozzles, even the high water pressure (approx. 80 bar) will not as a rule lead to an alteration of the nozzle orifice. FINESTFOG nozzles are guaranteed for 5 years against wear and tear. Poorly performing nozzles should be replaced immediately. Replacement nozzles are available from FINESTFOG.

3. Controller

Filters of cooling fans must be replaced and electrical connections need be checked.

4. Humidity sensors

The humidity sensors and the high limit hygrometers must be checked once a year. We recommend that the hygrometers are checked using a calibrated hand-held measuring instrument.

5. Water filter

The water filter inserts must be replaced at regular intervals. The frequency depends on the degree of contamination of the water. For hygienic reasons the inserts should be replaced at least every 6 months.

Caution: If the filter housing is dropped during cleaning or maintenance, we recommend that it be replaced, because the impact can result in invisible micro fractures that in time can cause total failure of the filter housing.

6. Water softening unit

The salt fill level of the water softening unit must be checked at regular intervals and, if necessary, replenished with commercially available cooking salt tablets for the water softener.

7. Osmosis system

A reverse osmosis system removes all salts from the softened water. The osmosis modules should be checked after about one year. The whole system must be sterilized and blocked modules unblocked, or, if necessary, replaced.

8. UV sterilization

The lamp of the UV sterilization unit must be replaced at least every 12 months since the radiation power drops off appreciably over time. The radiator usually still emits visible light, but it should nonetheless be replaced.

Maintenance intervals

	Every 3 months	Every 6 months	Every 12 months
Description			
Check oil in high-pressure pump	Yes	No	No
Change oil in high-pressure pump	No	No	Yes
Check high-pressure nozzles	Yes	No	Yes
Check measuring transducers/hygrostats	No	No	Yes
Replace water filter inserts	No	No	Yes
Check osmosis system	Yes	No	Yes
UV sterilization – replace UV lamp	No	No	Yes
Check water softening unit	Yes	No	Yes

Should you experience technical problems with your FINESTFOG high-pressure humidification system or have any other questions, simply contact:

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