

Operating instructions

Dust binding system

As of: 01.07.2020

Read the operating instructions before starting any work!

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Modifications:

Modifications and alterations are not permitted for safety reasons. Doing so will invalidate the device's operating licence.

General

You have decided to purchase an air humidification system from our company. We congratulate you on your decision, as you have chosen a cost-effective, extremely fast and optimally effective method. We wish you every success in using our technology. If you encounter any problems, please contact PFALZ TEC, we will be happy to assist you with advice and support.

1.1 About the operating instructions

This operating manual provides important information on how to use the system. Compliance with all safety instructions and operating instructions is a prerequisite for safe working. We also expressly point out the need to comply with generally applicable occupational safety regulations. All persons working with the system must have read and understood the operating instructions before starting work.

The system may only be operated by trained specialist personnel.

The operating instructions are part of the product and must be kept accessible to personnel at all times.

The supplier documents are part of the operating instructions and must be kept with them and observed.

1.2 Liability and warranty

The warranty for the system is contingent upon compliance with these operating instructions. Any violation of the regulations described herein by the user will generally void the warranty.

The manufacturer accepts no liability for damage resulting from:

- Failure to observe the operating instructions
- Improper use
- Use by untrained and unqualified personnel
- Unauthorised modifications and alterations to the system

The actual scope of delivery may differ from the explanations and illustrations in this document due to the latest technical changes.

1.3 Explanation of symbols

Warnings

Warnings in this operating manual are indicated by symbols and different coloured panels. Signal words express the extent of the hazard.

It is essential to follow the instructions and act with caution in order to avoid accidents, personal injury and damage to property.



Potentially dangerous situation!

... indicates a potentially dangerous situation that could result in death or serious injury if not avoided.

- Avoid the source of danger!

 CAUTION
Potentially dangerous situation!

... indicates a potentially dangerous situation that could result in minor or slight injury if not avoided.

► Avoid the dangerous situation!

NOTE
Potentially harmful situation!

... indicates a potentially dangerous situation that could result in damage to property or the environment if not avoided.

► Avoid the dangerous situation!

Tips

A tip consists of a pictogram, the signal word "tip" and text.

	Tip Upon receipt of the goods, immediately check the delivery for completeness, identity and integrity. Report any defects to the delivery company or dealer immediately after checking.
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Safety

Failure to follow the instructions and safety information in this manual may result in serious danger and damage.

This chapter provides an overview of all important safety aspects for optimum protection of personnel and safe handling of the system.

1.4 Intended use

The system is intended exclusively for the following purposes:

- Air humidification
- Dust binding



Danger due to misuse!

Any use of the system that exceeds its intended use and/or is otherwise different may lead to dangerous situations.

- The system is not suitable for outdoor use!

1.5 Requirements for use

The following points must be observed for the safe and proper use of the system indoors:

- The room to be fogged must be sealed so that the fog cannot escape and cause damage.
- The room must have adequate ventilation.
- Technical equipment that could be damaged by the fog, such as control technology, lighting or heating technology, must be protected by secure covers.
- Above a certain room size, additional ventilation is necessary to ensure even distribution of the fog.
- The room must be equipped in such a way that the fog jet can flow unhindered into the room for 3 to 5 metres. Otherwise, undesirable high-concentration deposits may occur.
- Always operate the system frost-free.

1.6 Suitable agents

Do not use or mix any agents other than or different from those listed below.

Only the following agents or substances may be atomised:

- Water
- Agents with dust- or odour-suppressing effects
(only after consulting Pfalz Tec regarding the composition of the agent)

Despite high quality standards, no general chemical resistance can be guaranteed for mixtures of substances. Pfalz Tec accepts no liability for agents that have not been approved in writing in advance. The application solution should be mixed in an external container. If this is done in the system container, the water must always be added first. As moving parts, pumps are covered by a 6-month warranty.

Special versions are available for various acids and solvents.

Agent consistency

The agents can have very different properties; they can be water-soluble or water-insoluble powders, they can be liquid or oily. The agents are mixed with a small amount of water and fogging additives to form a fogging solution. The solution must not contain any solid particles larger than 0.3 mm. The information provided by the agent manufacturers must be observed and, in case of uncertainty, they must be consulted. In particular, in the case of acidic disinfectants, consultation

with the manufacturer is necessary due to the low dilution. It is always advisable to carry out a test fogging before large-scale use.

1.7 Responsibilities

The operator is responsible for compliance with occupational safety regulations and the proper use of the system. All users and employees must be adequately trained in all aspects of fogging and this training must be documented in writing. The operating instructions for the system must always be kept ready.

1.8 Personnel requirements



Risk of injury if qualifications are insufficient!

Improper handling can lead to significant personal injury and property damage.

- ▶ Only allow qualified personnel or trained and instructed personnel to work with the device!
- ▶ Keep unqualified personnel away from the danger areas!

- **Trained personnel**
has been instructed by the operations manager on the tasks assigned to them and the potential hazards of improper behaviour.
- **Specialist personnel**
is able to carry out the work assigned to them and independently recognise potential hazards due to their professional training, knowledge and experience, as well as their knowledge of the relevant regulations.

1.9 Personal protective equipment

When working with the system, personal protective equipment must be worn in accordance with the requirements of the agent manufacturer in order to minimise health risks. Please refer to the application and safety data sheets for the agent to be nebulised.

Please note: Without adequate personal protective equipment, nebulised substances enter the body more quickly through inhalation via the lungs than in other forms. Neglecting personal protective measures (gas mask, protective suit, gloves) when entering a room filled with mist, for example, can lead to health problems – even if the mist is no longer visible!

1.10 General safety instructions

- All employees and temporary staff must be instructed in writing about the safety regulations to be observed.
- The cold fogging system may only be used if it is in perfect working order.
- If damage is detected before or during operation, the system must be shut down immediately. All measures must be taken to prevent further damage to equipment and facilities or damage to plants and animals, the environment and people.
- The sockets responsible for supplying electrical power must be in perfect and tested condition. The nominal voltage must correspond to that of the system and it must be able to supply at least 10 A of current. In accordance with DIN VDE 0100-410:2007 Section 411.3.3, the system must be connected to a socket protected by a residual current circuit breaker.
- All parts of the building, technical equipment, stored goods and other items located in the room to be treated must be checked for compatibility with the agents to be used!
- Modern disinfectants often contain acids. The general regulations for handling acids must be observed. In addition, the compatibility of the acids with the materials used in the device must be checked.

- The applicable TRGS, occupational health and safety guidelines and the Hazardous Substances Ordinance must be observed.
- The ambient temperature for the system must not be below 8°C.
- It is prohibited to stand in front of the nozzles when the system is in operation.
- The room may only be entered during fogging and until the end of the ventilation period with appropriate personal protective clothing, as required by the fogged agents. Particular attention must be paid to maximum protection of the respiratory tract! The fact that no more fog is visible does not mean that there is no longer any danger.
- Substances that are hazardous to the environment must be stored safely until use and disposed of in an environmentally friendly manner in accordance with the applicable regulations.
- The fogged room must be effectively protected against unauthorised access.

1.11 Basic hazards

Observe the safety instructions listed here and the warnings in the following chapters of this manual to avoid health hazards, dangerous situations and damage to property.

Hazards associated with the use of the product



Risk of injury due to flammable components!

The use of unsuitable agents or mixtures can lead to fire or explosion.

- Do not use agents that contain flammable components or that can form fire-hazardous mixtures when atomised.



Risk of injury from toxic substances!

The use of aggressive or toxic substances can lead to severe poisoning and, in the event of eye or skin contact, to serious injuries.

- Do not use chemically aggressive or toxic substances such as solvents or paints.
- Always wear the protective clothing described in these instructions!



Risk of injury from flammable substances

Improper use of substances classified as hazardous can result in damage due to explosion.

- Do not atomise flammable substances (liquids and dusts), as this may cause an explosion!



Property damage due to the use of unauthorised substances

Prohibited agents containing acids, bases or solvents may damage the device, other existing products and surfaces, and possibly the system.

- Only use agents described as "Suitable agents" in the safety chapter for atomisation!



Property damage due to mixing unauthorised agents!

Mixing unauthorised agents can cause unforeseen chemical reactions, which may damage the device, other products and surfaces, and possibly the system.

- ▶ Do not mix unauthorised agents!

NOTE**Property damage due to the use of certain agents**

The use of agents containing sodium hypochlorite can lead to corrosion of the cold fogging device, especially the stainless steel parts.

- ▶ When using agents containing sodium hypochlorite, the cold fogging device must be rinsed with clean water after each use. The device surfaces must be cleaned with water and then dried.

Dangers when handling the system**CAUTION****Potentially dangerous situation!**

When fogging, air is supplied to the rooms, which must escape somewhere in a controlled manner. Unaccounted for openings in the room to be fogged can lead to unwanted wetting and thus to damage to persons, equipment or the environment, even in other rooms or outdoors.

- ▶ Ensure that the supplied air can escape in a controlled manner!
- ▶ Take the escape of air into account in all occupational health and safety considerations!

NOTE**Property damage due to mist escaping!**

Failure to comply with the steps described here may result in unforeseen fog leakage and thus damage to property. Objects, items or furnishings located in the room that are not adequately protected may be damaged.

- ▶ Follow the steps described in these instructions!
- ▶ Protect furnishings or, if necessary, system components adequately by attaching protective covers!

NOTE**Property damage due to improper handling!**

If objects, items or pieces of furniture are sprayed too closely, highly concentrated deposits may form, resulting in consequential damage.

- ▶ When fogging, maintain sufficient distance from existing objects, items or furnishings!

Dangers when handling compressed air **WARNING****Property damage due to improper handling of compressed air!**

Defective pipes and hoses can cause serious accidents

- ▶ Check connections and pipes for leaks and proper fit
- ▶ Replace defective pipes and hoses

2. Technical description

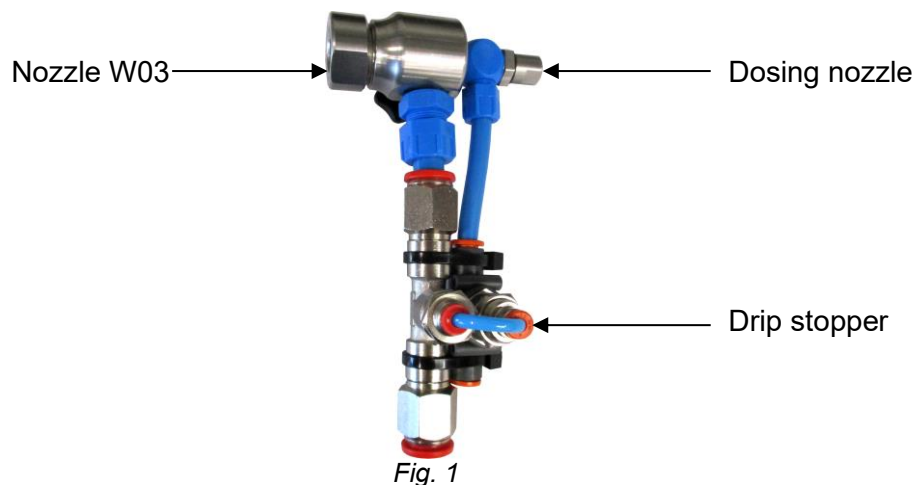
2.1 Brief description

The cold fogging process developed by PFALZ TEC is based on the atomisation of liquid media into extremely fine droplets which, depending on the medium used, form a dense and homogeneous fog that remains stable and effective for a very long time.

A prerequisite for fog production is the supply of compressed air to the system, whereby the respective requirement depends on the performance of the nozzle.

2.2 Nozzles

- Nozzle W03: Stainless steel nozzle (see Fig. 1)
- Nozzle W03: Stainless steel metering nozzle (see Fig. 1)
 - Dosing of the water flow rate via the dosing nozzle on the nozzle head or via the fine control in the control system
 - With two nozzles per supply line, each with a replaceable metering nozzle for even flow rate of the nozzle heads
 - The different metering nozzle sizes are marked with numbers on the metering nozzle head. *ATTENTION: the higher the flow rate, the wetter the mist / the greater the risk of moisture pockets (depending on the product and application)
- Compressed air and water supply connection on the underside via plug-in screw connection
- Drip stopper (see Fig. 1)



2.3 Standard media supply

- Power supply: stationary 230 V
- Compressed air supply: oil-free compressed air from compressor or central line
 Required accessories: Compressed air filter incl. condensate separator
 Activated carbon filter (in accordance with food processing regulations)
- Compressed air requirement depending on the number and performance of the nozzles, possibly installed pressure line system
- Water supply: water from the drinking water pipe or from a storage tank (see section 5.2.2)

 Achtung	All hose clamps on compressed air hoses must be retightened after 1-2 hours of operation (at maximum operating temperature) to prevent leaks.
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2.4 Electrical control

- Stationary power supply 230 V / control voltage 24 V DC / solenoid valves 24 V DC
- The humidification system is started via an external signal.
- The humidification system is controlled exclusively via a small control system (SIEMENS LOGO!). Signals and operating statuses are displayed on a text display on the SIEMENS LOGO!

	All work on the electrical system and the control system must generally be carried out by qualified personnel and with the power disconnected. External signals are integrated by qualified personnel in accordance with the enclosed circuit diagrams.
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2.5 Operation of the air humidification system

Water inlet pressure (min. 2.0 bar), compressed air (number of W03 nozzles x 100 l/min) and mains voltage 230 V must be connected to the system cabinet.

Switch the main switch to "On" – the air humidification system is now ready for operation.

Humidification is started by pressing the green buttons at the control points.

Attention! After switching on the humidification for the first time, there will be a delay before mist comes out of the nozzle! It takes time for the water to travel from the system to the nozzle.

Humidification is stopped by pressing the green buttons on the control points.

Attention! It is recommended to empty the system once a day. To do this, press and hold the button for longer than 5 seconds. (Yellow LED lights up on the button)

The cold mist system can be stopped immediately by pressing the emergency stop button on the system cabinet.

2.6 Components of the air humidification system

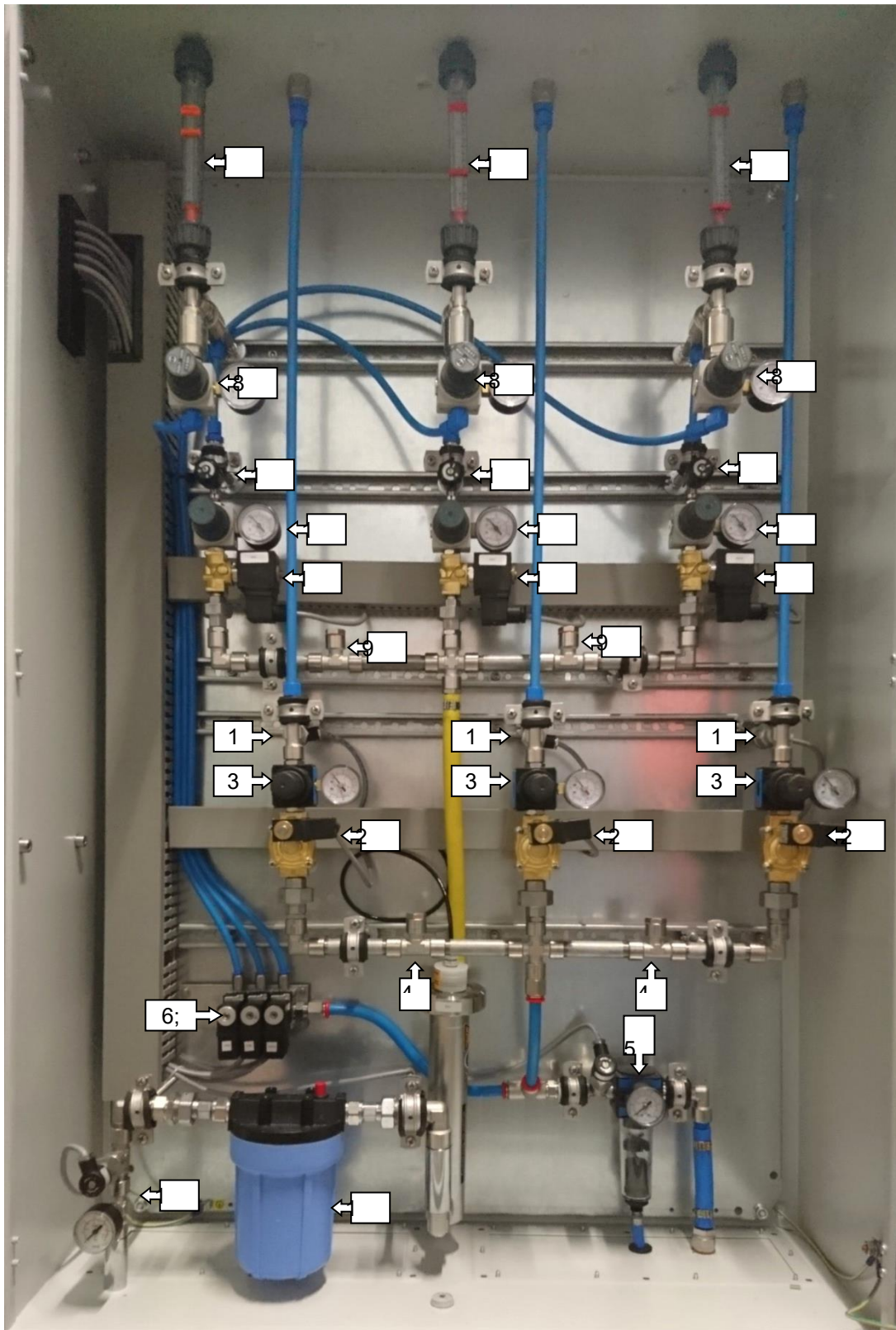


Fig. 1

1	Compressed air channel 1 - 3	Pressure switch – The respective channel only starts when the set air pressure is applied. All channels operate independently of each other.
2		Solenoid valve – opens and closes the respective channel
3		Pressure reducer – The pressure reducer is used to set the working pressure at the mist nozzle. The length of the pipe and the associated pressure loss must be taken into account.
4		Connection – Reserve connection for possible extensions
5		Compressed air inlet Pressure switch / pressure regulator
6	Purge air Channel 1 - 3	Connection – reserve connection for possible extensions
7		Solenoid valve – opens and closes the respective channel
8		Pressure reducer – The pressure reducer is used to set the working pressure at the fog nozzle. The length of the pipe and the resulting pressure loss must be taken into account.
9	Water Channel 1 & 2	Connection – Reserve connection for possible extensions
10		Solenoid valve – opens and closes the respective channel
11		Fine control valve – the fine control valve is used to adjust the water flow rate. The flow values can be found in the control system.
12		Pressure reducer – the pressure reducer is used to set the working pressure at the mist nozzle. The length of the pipe and the associated pressure loss must be taken into account.
13		Water inlet Pressure switch/pressure regulator
14		Water flow meter
15		Water filter – the water used is filtered. The filter must be changed at regular intervals!

2.7 Settings

Set the compressed air for the humidification nozzles on the pressure reducer (Fig. 1/No. 3) to a minimum of 3.0 bar.

Set the water for the humidification nozzles on the pressure reducer (Fig. 1/No. 12). The setting is made when the air humidification system is commissioned and is indicated by a mark on the pressure gauge.

Set the compressed air for flushing the water pipe after completing the air humidification at the pressure reducer (Fig. 1/No. 8). The setting is made when the air humidification system is commissioned and is marked on the pressure gauge.

The time for post-misting of the nozzles after switching off is set when the air humidification system is commissioned.

3. Compressor and compressed air supply

The manufacturer selects commercially available compressors based on the technical parameters, local conditions and the performance of the dust binding system.

Fig.: Example of a compressor for operating a **dust binding system with 2 W06 nozzles**
5.5 kW piston compressor with an effective delivery rate of > 800 l/min



Fig. 5

Cross-sections for compressed air lines

In order to ensure the required pressure at the device, the hose properties play an important role in addition to the compressor performance.

The longer the hose, the larger the hose diameter that must be used.

Nozzle	Hose length up to 8 m	Hose length 9 - 100 m
W03	8 mm	10 mm
W06	1/2"	3/4"
W12	1/2	1

4. System setup and hose routing

All system components, from the control system to the nozzle heads and compressor, must be installed or set up in a frost-free location. If necessary, heating or appropriate frost protection measures must be used.

4.1 Positioning of the nozzle heads

- The water mist should be directed slightly above the heat source.
- Depending on the nozzle type, the following minimum distances from the heat source must be maintained:

Nozzle type	Distance from the dust source	Example position for nozzle W03
W03	0.10 – 0.50 m	
W06	0.6 – 1.5 m	

Figure 6

4.2 Laying the hoses

- Cut the hoses straight and at right angles from the roll
- Protect all ends of the pipes from contamination before laying, e.g. seal them
- All hoses must be laid without tension, loops or kinks.
- Before final assembly of the nozzle heads, blow out the hoses for compressed air and water with compressed air.
- Insert the hose connections for compressed air and water (8/6 or 10/8 mm) into the plug connector as far as they will go until the hose can no longer be pulled out.
- Push the compressed air hoses (from 10/8 mm) completely onto the hose nozzles, secure with clamps and check for leaks.

5. Commissioning

5.1 basic settings and functions

The nominal pressure range for the compressed air is 3-8 bar at the central compressed air inlet. If this pressure range is exceeded or not reached, proper operation of the system cannot be guaranteed. The system cannot be started.

The nominal pressure range for water is 2.5-5 bar at the central water inlet.

If this pressure range is exceeded or not reached, proper operation of the system cannot be guaranteed. The system cannot be started.

The inlet ball valves for the compressed air and water must be opened in advance.

Fogging continues until the system or the respective channel is switched off.

Changes to the pressure stages on the pressure regulators should only be carried out by trained personnel.

5.1.1 Control: Compressed air and media line

All compressed air channels are monitored by a pressure switch. If the pressure falls below the set value (e.g. a solenoid valve does not switch), a fault is reported on the display. When setting the individual pressure ranges, always note the following:

1. low water pressure and high air pressure means a fine mist with a long range
2. High water pressure and low air pressure means a short throw range and coarse water droplets that do not float
3. low water pressure and low air pressure means fine mist, but no significant increase in humidity

5.1.2 Water supply from storage tank (optional)

- If the system is supplied with water from a storage tank, a domestic waterworks should be installed upstream.



Fig. 7
served:

- The container must be installed in the immediate vicinity of the system to avoid long connection routes.
- A pump for conveying must be provided.
- The hose connection for the water supply must be tension-free and without kinks.

Check the container regularly for contamination, as the suction of dirt particles impairs the functionality of the nozzle.

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Fig.:

IBC container with GEKA coupling for hose connection from the water pipe

The container has a float switch that automatically fills the container with water.

follow-

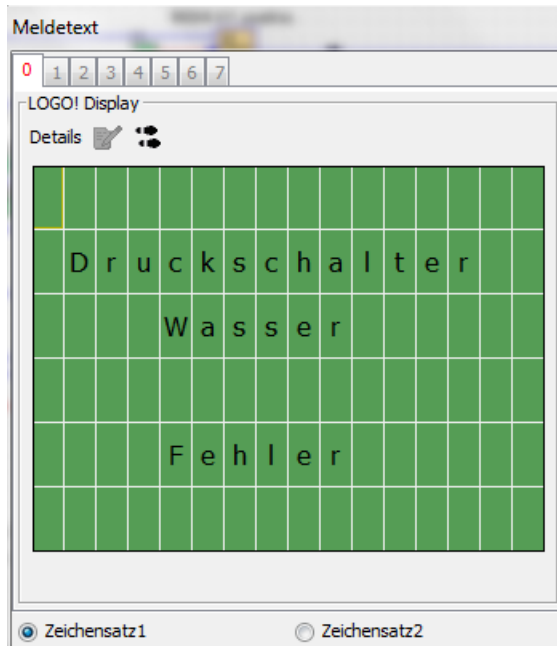
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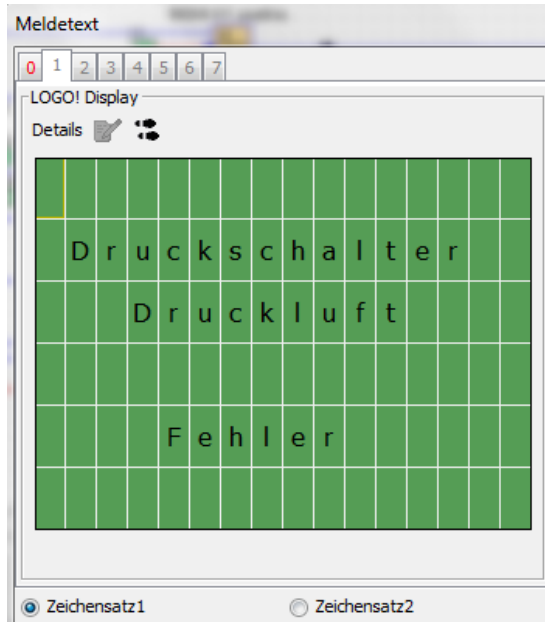
Caution: The water in the storage tank must be changed daily! Stale water is contaminated with germs and must not be atomised!

6. Error messages



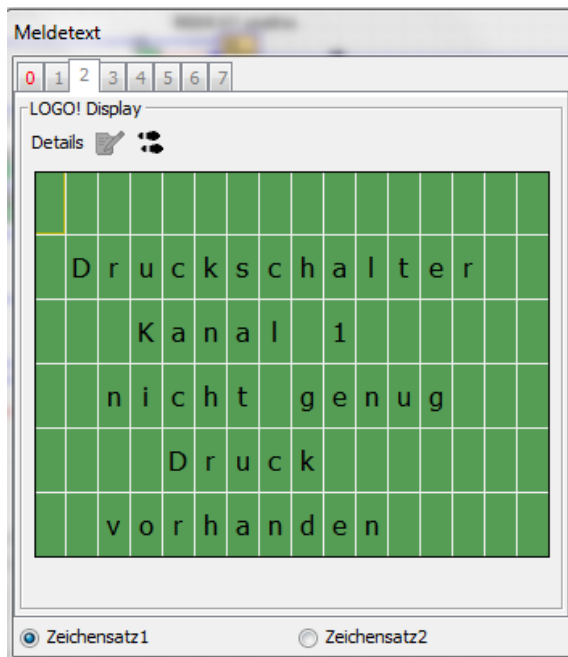
Indicator light flashing red

No water pressure
Check the connection cable



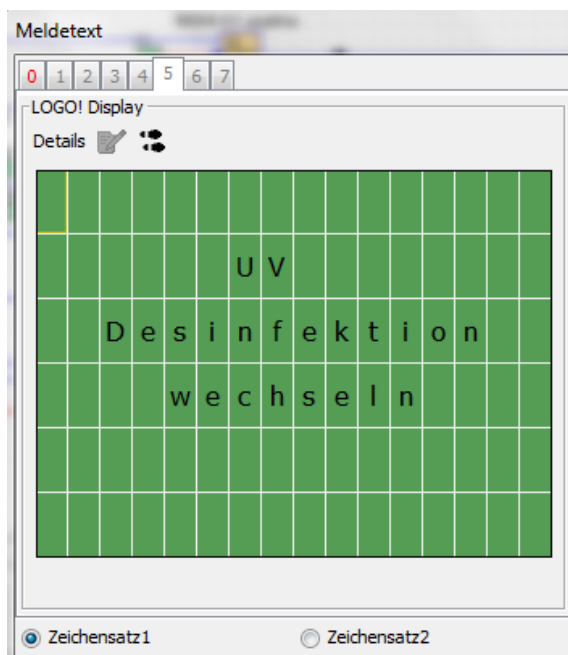
Red indicator light flashing

No compressed air available
Check the connection cable

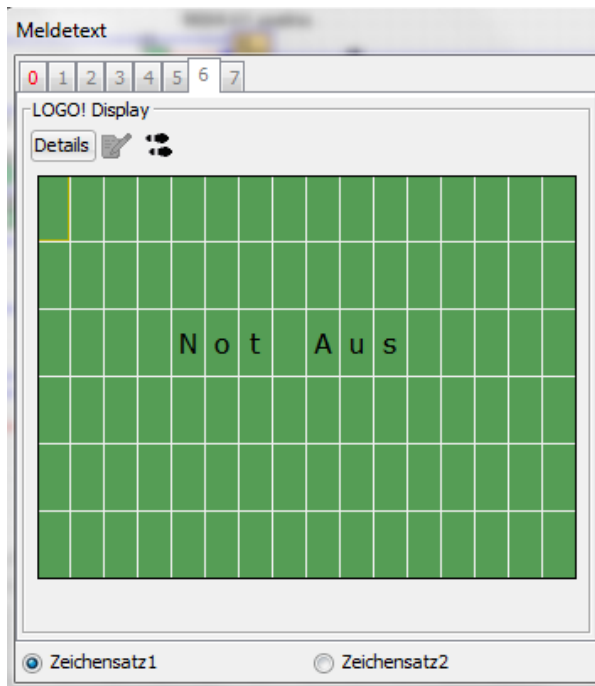


Not enough compressed air available.
Check the pressure reducer setting
Identical for each channel.

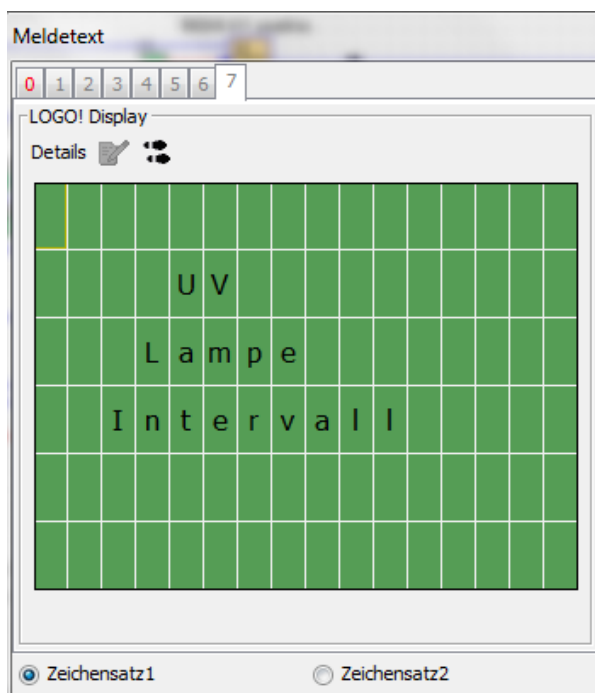
Red indicator light active.



UV lamp is not emitting an input signal.
Replace UV lamp.
System not ready for operation.



System at a standstill.
Red indicator light active



Warning message: UV lamp operating hours – the regular operating time of the light source has expired. The light source must be replaced. Then reset the operating hours counter of the disinfection system.



The light source in the disinfection system must be replaced, otherwise the sterilisation of the water used cannot be guaranteed.

7. System operation – maintenance

7.1 After prolonged periods of inactivity

- Flush old water from the pipes and storage tanks, remove any contamination
- Check all hoses and connections, including those inside the control unit, for leaks
- Check that the nozzles are in the correct position
- Test run in manual and automatic mode with leak check

7.2 Before long periods of downtime

- Shut off all media and empty hoses as completely as possible (risk of frost)
- Close all pressure connections (water and compressed air)
- Switch off the power

7.3 Regular maintenance /UV disinfection

- Check that the nozzles are correctly positioned and secured
- Check the dosing nozzles for contamination in the nozzle channel
- All hose clamps on compressed air hoses must be retightened after 1-2 hours of operation (at maximum operating temperature) to prevent leaks.
- Check all hose connections, including those within the control system, for leaks
- Check the container regularly for contamination; the suction of dirt particles impairs the functionality of the nozzle
- Check compressed air and water filters for contamination; clean or replace if necessary
- Annual maintenance by the manufacturer or a specialist company authorised by the manufacturer is required.
- Disinfect all compressed air hoses, especially after warm periods. For best results, use our Pfalz Tec hose disinfection device.
- The UV disinfection lamp must be checked regularly (see error message section)!

	The air humidification system is equipped with a UV water disinfection system. The service life of the UV lamp is limited and must be checked monthly. The PLC (control cabinet) display indicates when the lamp needs to be replaced. A defective light source will cause the air humidification system to fail!
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7.4 Troubleshooting

	Fault/problem	Solution
Fogging system		
System does not fog	No power	Check connections for fog system (fuse)
	No external signal received	Switching of the external start signal Ensure
	No water pressure	Check water pressure
	No compressed air available	Check compressed air
Compressed air		
System not fogging	Insufficient or no effective delivery volume from the compressor/pressure line	Compare the air consumption of the nozzle head with the capacity of the compressor or pressure line (observe minimum pressure at central inlet)
	Ball valve on central inlet closed	Open ball valve
	Too many (angle) valves in the line, resulting in pressure losses	Reduce the number of valves or lay a new line
	Incorrect direction of rotation of the compressor	Check the direction of rotation on the compressor and correct if necessary
	Pressure regulator in the line is set too low	Check the pressure regulator setting and correct if necessary
	Compressor oil filter is dirty	Clean/replace oil filter
	Compressor intake filter is dirty	Clean/replace the intake filter
	Hose diameter too small for its length (pressure loss)	Adjust hose diameter to required length and compressed air consumption of the fogging system
	Leak in the pressure line	Check pressure line, repair if necessary
	Water accumulated in the compressed air hose in the outdoor area has frozen (e.g. if the hose is sagging)	Check the hose and carefully warm the affected area
Water		
System is not fogging	Insufficient or no effective delivery volume from the water pipe	Ensure water supply with the necessary pressure at the central inlet
	Ball valve at central inlet closed	Open ball valve
	Pressure regulator closed	Open pressure regulator
	No or insufficient air pressure at the system inlet	Check the compressed air connection and provide the necessary inlet pressure

EC Declaration of Conformity

In accordance with

- the EC Machinery Directive 98/37/EC, Annex II A,
- the Low Voltage Directive 73/23/EEC in the form of 93/68/EEC and
- the EMC Directive 89/336/EEC in the form of 93/68/EEC

, we declare that the products

air humidification system

complies with the relevant provisions mentioned above.

The following harmonised standards have been applied:

- EN 292-1 (11.91) Safety of machinery
- EN 292-2 (06.95) Safety of machinery, technical guidelines
- EN 294 (08.92) Safety of machinery, safety distances to prevent access to danger zones with upper limbs
- EN 60204-1 (11.00) Safety of machinery – Electrical equipment
- EN 61000-6-1:2001 EMC generic standard for immunity
- EN 61000-6-3:2001 EMC standard for immunity

A German-language operating manual is available.

Design changes that affect the technical data specified in the operating instructions and the intended use, i.e. that significantly alter the device, invalidate this declaration of conformity!

Dipl.-Wirtsch.-Ing. H. Gerke,

Managing Director

Markersdorf, 1 July 2020