

Operating instructions

Drinking trough flushing

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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 a water impulse flushing system. We congratulate you on your decision. We wish you every success with the system.

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 operation. We also expressly point out the need to comply with the 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 due to:

- 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 hazards 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:

- Drinking water pipe systems
- Drinking water pipe systems
- Water pipes in the food industry



Danger due to misuse!

Any use of the system that exceeds its intended purpose and/or is otherwise inappropriate 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 system may only be put into operation if it is in perfect working order.
- The system must be installed and operated in a frost-free area.
- The ambient temperature for the device must not be below 5°C.
- Unauthorised persons must be prevented from adjusting or tampering with the system.
- The compressed air and water connections of the system may only be connected or disconnected when they are free of pressure and flow.
- All pipes and fittings to be treated must be checked for compatibility and pressure resistance.
- When using cleaning agents and disinfectants, the compatibility of the materials coming into contact with the agent must be checked beforehand.
- If damage is detected before or during operation, the device must be shut down immediately. Measures must be taken immediately to prevent damage to persons, devices and equipment.
- The compressors used to operate the automatic drinking trough flushing system must be installed in a frost-free location.

1.6 Suitable agents

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

- Water

Despite the high quality standards, no general chemical resistance can be guaranteed for mixtures of substances. Pfalz Tec GmbH does not accept any 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. Pumps, as moving parts, 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 insoluble powders, or they can be liquid or oily. The solution must not contain any solid components larger than 0.3 mm. The information provided by the manufacturer must be observed and, in

case of uncertainty, the manufacturer must be consulted. In particular, in the case of acidic disinfectants, consultation with the manufacturer is necessary due to the low dilution.

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 manufacturer of the medium in order to minimise health risks.

1.10 General safety instructions

- All employees and temporary staff must be instructed in writing about the safety regulations to be observed.
- The drinking trough flushing 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.
- 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.

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 from 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 lead to damage caused by explosion.



Property damage due to the use of unauthorised substances

Unauthorised agents containing acids, bases or solvents can damage the device, other existing products and surfaces, and, if applicable, the system.

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



Property damage caused by mixing unauthorised agents!

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

- ▶ Do not mix unauthorised agents!



In the event of a power failure, the system ensures that the drinking troughs continue to operate. The only condition is that the water supply to the system remains available so that the drinking trough pipes continue to be supplied with water. The following system functions can no longer be performed in the event of a power failure:

- Automatic drinking system flushing

- Manual drinking trough flushing
- Temperature-dependent water change
- Automatic dosing

Hazards when handling the system



Potentially dangerous situation!

When fogging, air is supplied to the rooms, which must escape somewhere in a controlled manner. Uncovered 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!

Hazards when handling compressed air



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

The automatic drinking trough flushing system is used to remove deposits and dirt from drinking trough pipes in stables while maintaining and controlling drinking trough operation.

If a flushing cycle is desired (programmed), the software switches the central control group and line control groups to flushing mode. The lines are flushed one after the other (water and compressed air pulses) and then refilled with water.

Optional:

Regardless of the automatic flushing system, the water in the drinking lines is changed when the maximum drinking water temperature is reached. The water is changed automatically depending on the set maximum drinking water temperature.

Optional:

Automated dosing system via bypass control in drinking mode.

The optimum working pressures of the system (water/compressed air) are determined and set at the drinking line. This is a prerequisite for ensuring that the water and compressed air pulses can be gently dosed into the lines in alternation and that the drinking lines are thoroughly flushed. Once the pulse flushing has been completed, the system automatically switches back to drinking mode.

In the event of a sudden power failure, the drinking system flushing system makes it possible to maintain drinking operation. The system is fully automatic and requires no maintenance.

2.2 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
- Water supply: Water from the drinking water pipe



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

2.3 Electrical control

- Stationary power supply 230 V / Control voltage 24 V DC / Solenoid valves 24 V DC
- The drinking trough flushing is controlled exclusively via a small control system (SIEMENS LOGO!). Signals and operating statuses are shown on a text display on the SIEMENS LOGO!



All work on the electrical system and the control system must always 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.

3.0 Operation of the air humidification system

3.1 Connecting and adjusting the automatic drinking trough flushing system

The automatic drinking trough flushing system must be installed and commissioned by an authorised person or company. The required media – water, compressed air and 230 V mains voltage – must be connected professionally as intended.

Existing feed-in systems and pressure maintenance devices in the existing drinking system must be removed or switched off, as these systems can interfere with the proper functioning of the automatic drinking trough flushing system.

Before switching on the system, the inlet pressure for water and compressed air must be reduced to prevent damage to the drinking line to be flushed. The flushing pressure for water and compressed air is set as described after switching on the automatic drinking trough flushing system. The length of the water and compressed air pulses is set at the factory in the control system and can be adjusted to the drinking trough system if necessary. To do this, contact the manufacturer of the automatic drinking trough flushing system.

3.2 Setting the automatic drinking trough flushing system

The length of the flushing pulses is set at the factory in the PLC. The pulses for compressed air and water can be set independently of each other. The pulse lengths for compressed air and water can be set to a minimum of 1.0 s and a maximum of 10.0 s. The optimum setting must be determined and adjusted in the control system. The setting for the compressed air and water pulses must be determined based on the condition of the pipes and the degree of contamination.

3.3 Starting the device

Check that the inlet pressure for water and compressed air has been reduced to 0. Open all shut-off valves on the drinking trough pipes (outside) and switch on the main switch. The automatic drinking trough flushing system is now ready for operation and can be adjusted as described.

3.4 Setting values

The longer the pipe and tube sections are, the longer the time intervals must generally be selected. For optimal, powerful flushing, the pipe must be filled with sufficient water. To do this, the water pulse must be set to a sufficiently long duration. A powerful jet of water must escape at the end of the pipe. The following table serves as a recommendation.

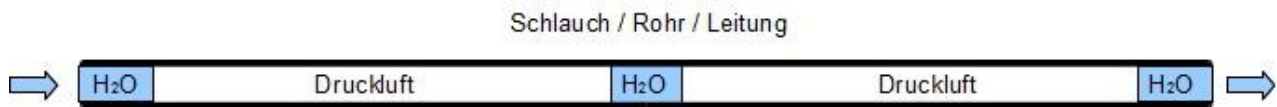
Value in sec	Up to 50 m System length	Up to 100 m System length	> 100 m; <= 1" System length	> 100 m; > 1" System length
Compressed air pulse	1 – 2 s	2 – 6 s	4 – 8 s	10 s
Water pulse	2 - 4 s	4–8 s	6–10 s	10 s

Exact values always depend on the system to be cleaned and can only be determined in specific tests. The following procedure is recommended.

1. Set compressed air to 10 s and water to 1 s until air flows out at the end of the pipe. This process may take some time (the longer the pipe, the longer it takes to build up the pulse effect).
2. Then set the air and water according to the table above.
Select the lower values in the table for air and the higher values for water.

3. Gradually reduce the water time until only a small "spurt" of water flows out at the end. The aim is to alternate between water and compressed air at the end of the pipe, producing a short, powerful, visible jet of water.
4. Optimisation tips: The time for water should be set as short as possible. Ideally, the compressed air time can then be reduced as well, but only while simultaneously reducing the water time.

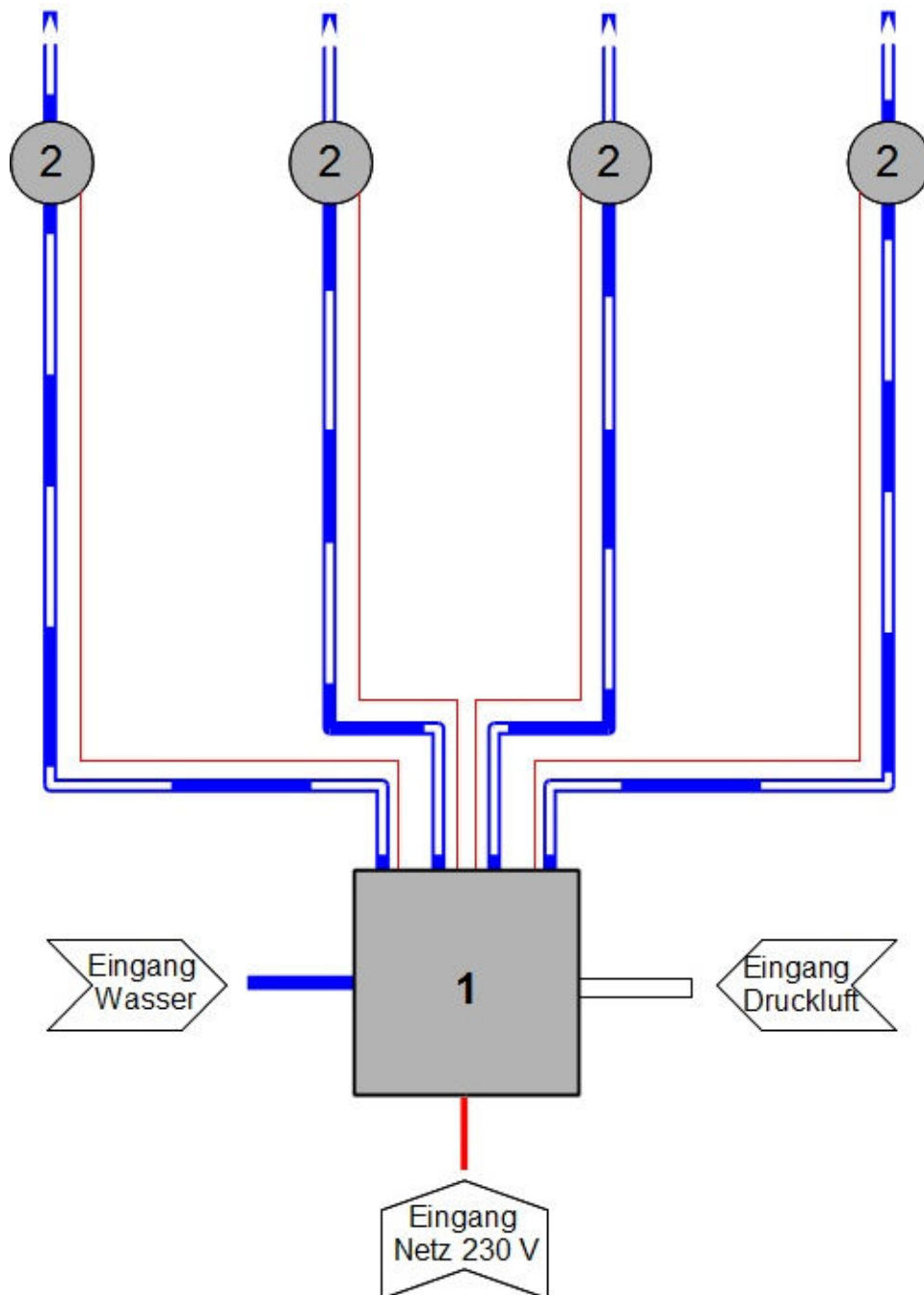
3.5 Procedure in the drinking line



1. The water-carrying system is filled with water.
2. The water valve closes. No more water flows into the system.
3. The compressed air valve is opened. This sends a timed pulse of compressed air into the water-filled system.
4. The water is forced out of the pipe by the compressed air.
5. The compressed air valve closes.

The process is repeated for as long as the flushing time for the lines has been set.

3.6 Diagram / schematic of automatic drinking trough flushing



1 Control cabinet Automatic drinking trough flushing with pressure reducer for water and compressed air pulses and automatic control system

2 End fitting / Shut-off of the automatic filling system and open water outlet



Drinking trough pipe with water/compressed air pulse

Control line End fitting / float switch

3.7 Components of the air humidification system

1	Compressed air	Pressure reducer – The pressure reducer is used to set the working pressure of the compressed air pulse flushing
2		Pressure switch – Monitors the inlet pressure
3		Solenoid valve – Opens and closes the compressed air line
4	Drinkers Channel 1 - 3	Solenoid valve – NC
5		Solenoid valve – NO
6	Water Channel	Water filter – the water used is filtered. The filter must be changed at regular intervals!
7		Pressure reducer – The pressure reducer is used to reduce the working pressure to
8		Pressure switch – Monitors the inlet pressure

9	UV disinfection Purion – UV sterilisation of the water used
10	Solenoid valve water – Impulse flushing
11	Solenoid valve bypass – dosing of agent
12	Dosatron – dosing device!

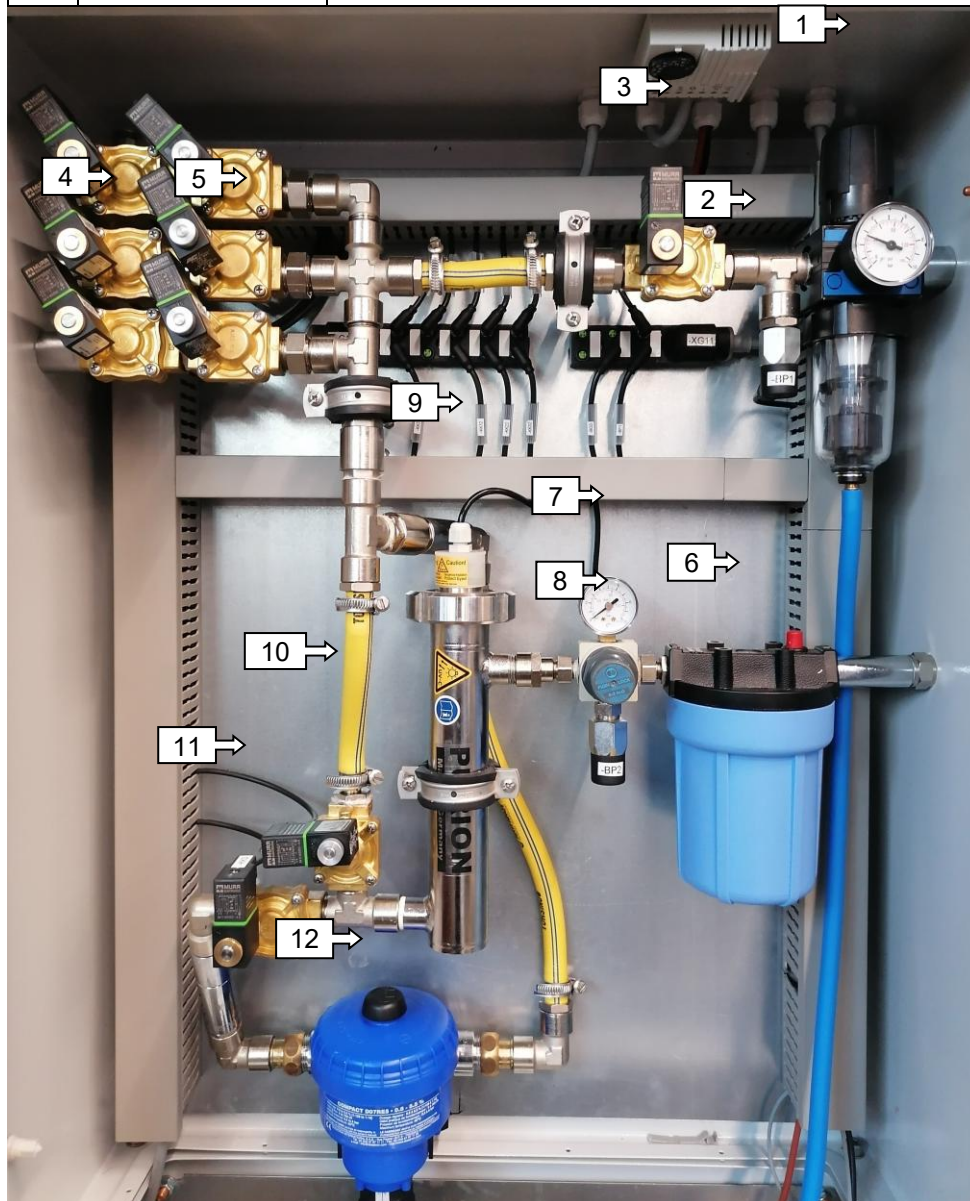


Fig. 1

Compressor and compressed air supply

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



Figure

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.

3.8 Laying the hoses

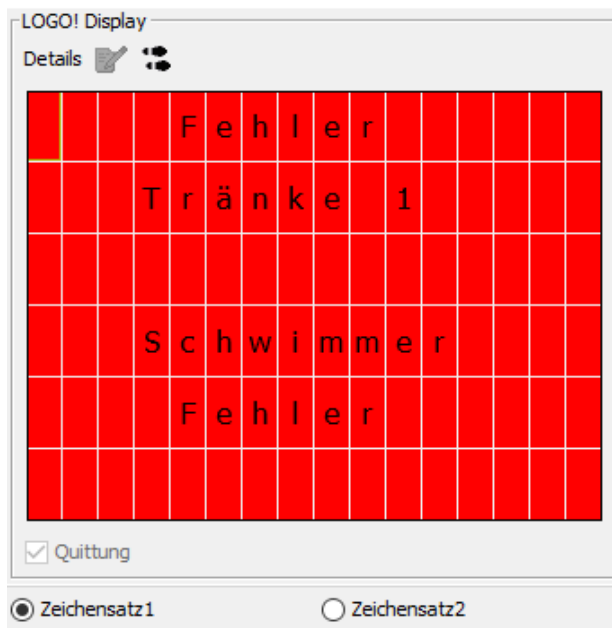
- Cut hoses straight and at right angles from the roll
- Protect all ends of the lines from contamination before laying, e.g. seal them
- All hoses must be laid without tension, loops or kinks.

4. Commissioning

4.1 Control: Compressed air and media line

The compressed air channel is monitored by a pressure switch. If the pressure falls below the set value, a fault is reported on the display.

4.2 Error message



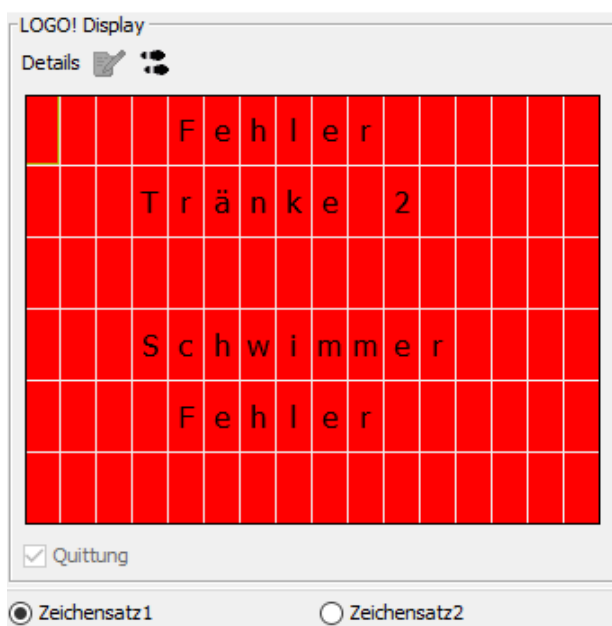
Red indicator light

Error/problem:

Float switch has not switched for some time

Solution:

- Ensure that the water supply has the necessary pressure at the central water inlet
- Check the float switch



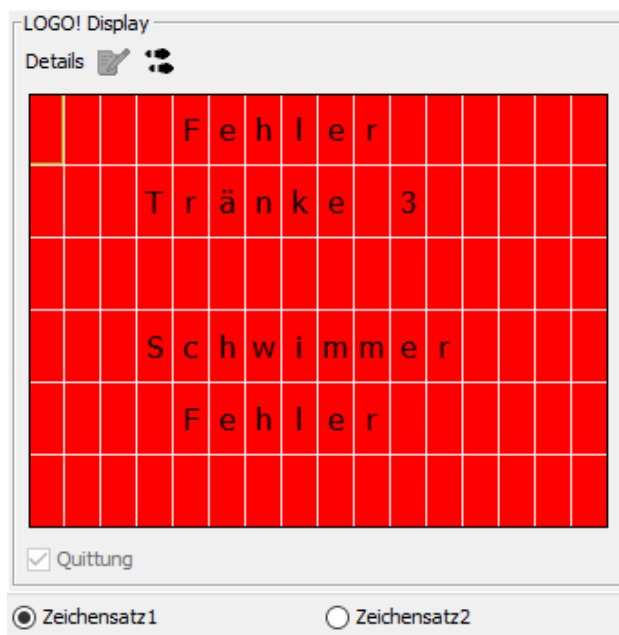
Red indicator light

Fault/problem:

Float switch has not switched for some time

Solution:

- Ensure that the water supply has the necessary pressure at the central water inlet
- Check the float switch



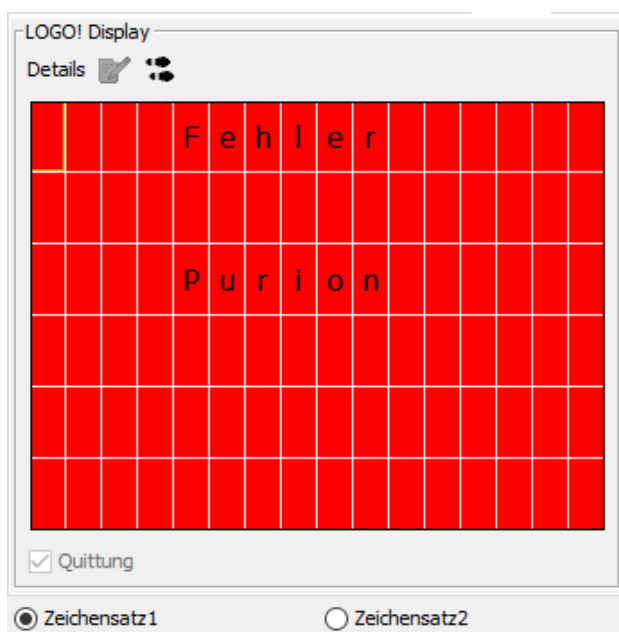
Red indicator light

Fault/problem:

Float switch has not been switching for some time

Solution:

- Ensure that the water supply has the necessary pressure at the central water inlet
- Check the float switch



Red indicator light

Error/problem:

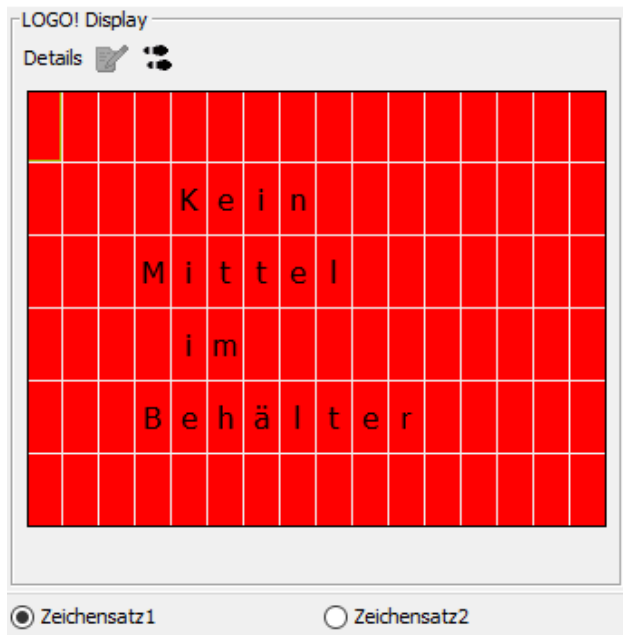
The ballast is reporting an error. System continues to run.

Solution:

- Restart the system using the main switch
- If the error reappears, replace the UV lamp



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



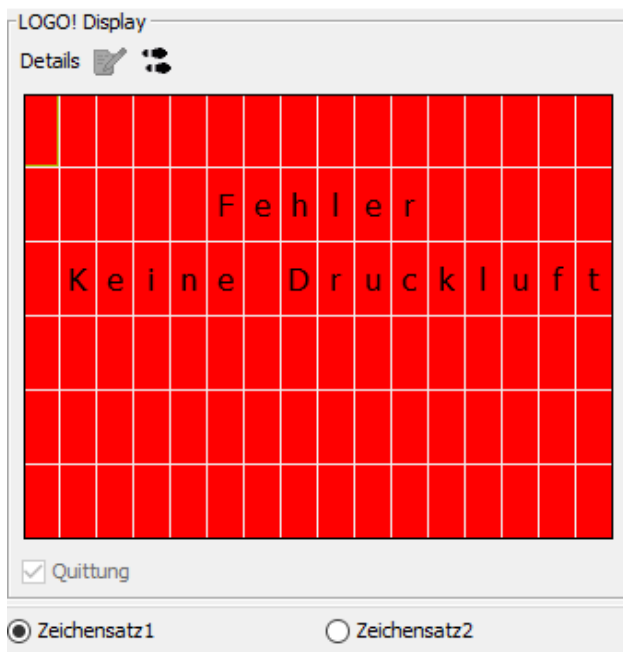
Red indicator light

Error/problem:

Middle container is empty

Solution:

Refill the centre container



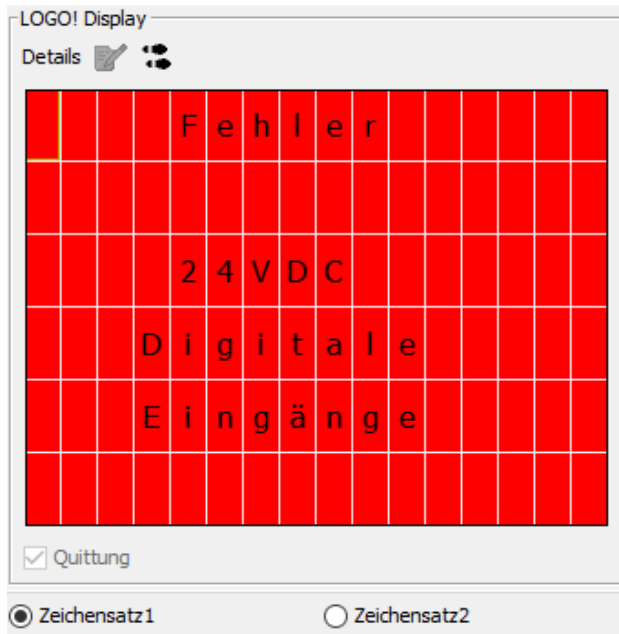
Red indicator light

Error/problem:

Insufficient compressed air

Solution:

Check/increase compressed air supply



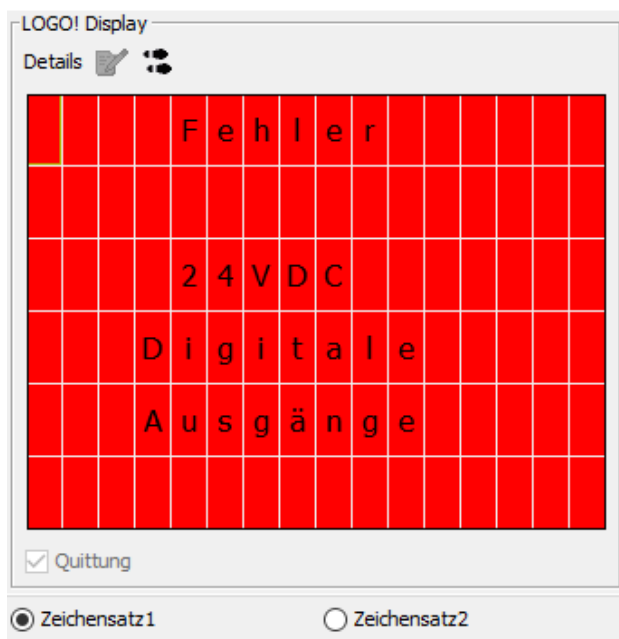
Red indicator light

Error/problem:

Digital input fuse has tripped

Solution:

Activate the fuse



Red indicator light

Error/problem:

Digital output fuse has tripped

Solution:

Activate the fuse

5. System operation – maintenance

5.1 After prolonged periods of inactivity

- Flush old water out of the pipes and storage tanks, remove any dirt if necessary
- Check all hoses and connections, including those inside the control system, for leaks
- Test run in manual and automatic mode with leak check

5.2 e long downtimes

- 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

5.3 Regular maintenance of the /UV disinfection system

- 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 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.

5.4 Regular maintenance/dosing device

To change the dosing device, loosen the union nuts (item 1).



The drinking trough flushing 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 display (control cabinet) indicates when the lamp needs to be replaced.

A defective lamp does not cause the drinking system to fail!

5.5 Troubleshooting

	Fault / problem	Solution
Drinking trough flushing		
System not working	No power	Check connections (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 working	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 (Note 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 losses)	Adjust hose diameter to required length and compressed air consumption
	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

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

Drink flushing

complies with the aforementioned relevant provisions.

The following harmonised standards have been applied:

- EN 292-1 (11.91) Safety of machinery
- EN 292-2 (06.95) Safety of machinery, technical principles
- 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