

## High pressure cooling

# Assembly instruction and Operators manual

Pump unit & Controller Type: D-Line + MBWeich 4



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This manual contains all information you need for the installation and the operation of the MEIER-BRAKENBERG Top-Climate-System. The manual facilitates the understanding and shows the intended use of the system.

This manual provides all information you need to install and later run the system safely, appropriately and economically. Following the instructions helps avoiding hazards, reducing repair costs and downtime and increasing lifetime.

All persons responsible for running the system must read, understand and heed the manual. This applies in particular to the safety information that is given. After reading this manual you will be able to:

- install the Top-Climate-System properly,
- operate the Top-Climate-System safely,
- maintain the Top-Climate-System according to the rules,
- clean the Top-Climate-System according to the rules,
- take the necessary action in the event of a fault.

In addition to this operators manual, it is necessary to comply with general laws and other regulations concerning accident prevention and environmental protection in the country of use.

This manual is part of the pump unit. It must be kept within reach throughout the system's service life and must also stay with the system if it is sold. This manual is not subject to a change service. You can find out about the current status at

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## 1.1 Description MEIER-BRAKENBERG Top-Climate-System

The MEIER-BRAKENBERG Top-Climate-System is a cooling and humidifying system for agricultural houses and industrial buildings. It is designed for an effective and efficient cooling, humidifying and cleaning of the air inside the house. The working principle is direct evaporative cooling.

The main components of the system are a high pressure pump unit with an electronic controller which supplies water with a pressure of 70 bar. The water is distributed in stainless steel pipes to high pressure fogging nozzles which atomize the water. The extremely small droplets evaporate immediately. The necessary heat energy is extracted from the air – the air cools down. This cooling effect can reduce the necessary ventilation rate which can save energy. The MEIER-BRAKENBERG Top-Climate-System is also used to increase the humidity during heating periods and after the date of entry of young animals.

The electronic controller is responsible for the evaluation of the applied electrical signals from a climate computer or its own humidity and temperature sensors. The controller switches the pump and the valves accordingly. In addition, control functions are integrated into the controller to ensure safe, reliable and long-lasting operation of the system.

<b>NOTE</b>
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The system must be monitored regularly despite the built-in control and alarm function - Several times a day on climatically extreme days.
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The Top-Climate-System is intended exclusively for evaporative cooling or air humidification, for example in stables. Any use beyond this is considered not intended. The manufacturer is not liable for any resulting damage. The risk is borne solely by the user. Intended use also includes observance of all instructions in these assembly instruction and operation manual. Non-observance of the instructions or improper use will void any warranty claims.

Installation, maintenance and repair work may only be carried out by qualified personnel.

## 1.2 Notational conventions

Passages of this manual that require special attention or that are a direct hazard warning are shown as follows:



### **⚠ DANGER**

#### **Warning of electrical hazard**

This warning indicates an electrical hazard.

Only qualified and authorized specialists are allowed to work on electrical equipment.

### **⚠ DANGER**

This warning indicates a direct hazard which, unless avoided, involves a high risk of death or (serious) injury.

### **⚠ WARNING**

This warning indicates a potential hazard which, unless avoided, may involve a medium risk of death or (serious) injury.

### **⚠ CAUTION**

This warning indicates a hazard which, unless avoided, could involve a low risk of slight or medium injury.

### **NOTE**

This warning indicates a hazard which, unless avoided, could involve a low risk of material damage.



#### **Important information!**

This symbol indicates information about the controller function or setting, or information that care is required.

The following notational conventions are also used:

- Text following this mark represents an item in a list.
- “ “ Text in double quotation marks refers to other chapters, sections or documents.
- ▶ Text following this mark represents a result of the above mentioned action.

## 1.3 Warranty and liability

The obligations under the supply contract, the general and delivery terms and conditions of MEIER-BRAKENBERG GmbH & Co. KG and the legal regulations in force at the time the contract was signed will apply. All information in this manual has been compiled in line with the applicable standards and regulations, the state of the art and longstanding knowledge and experience. Warranty and liability claims for personal injury and material damage are excluded if they are attributable to one of the following causes:

- Unintended or inappropriate use of the system,

- Inappropriate installation, commissioning, operation, maintenance or cleaning of the system,
- Operation of the system with defective safety devices or with improperly fitted or non-functional safety devices and guards,
- Failure to heed information in the installation instructions regarding installation, commissioning, operation, maintenance and cleaning of the system,
- Deployment of untrained personal,
- Structural alterations to the system (conversions or other alterations to the system are not allowed to be made without prior written permission from MEIER-BRAKENBERG GmbH & Co. KG; any breach of this causes the controller to lose its EC conformity),
- Technical alterations,
- Improperly executed repairs,
- Use of nonpermitted spare parts or of spare parts that do not satisfy the technically established requirements,
- Disasters, effects of extraneous elements and force majeure.

We reserve the right to make technical alterations in the course of further development and improvement of features.

#### **1.4 Copyright**

This manual is protected by copyright and intended for internal use only.

This manual or parts thereof must not be passed or disclosed to any third party or be reproduced or exploited in any form without the prior written consent of MEIER-BRAKENBERG GmbH & Co. KG except for internal use.

Contravention is an offense and results in liability for damages (German Copyright Act UrhG; German Civil Code – BGB). All rights are reserved in the event of the grant of patent or the registration of a utility model or design.

#### **1.5 Guarantee terms**

The guarantee terms are contained in the general terms and conditions of MEIER-BRAKENBERG GmbH & Co. KG.

The following safety information must be read carefully before working on the system and must be heeded. It concerns your safety and is intended to prevent hazards and/or injuries.

**⚠ WARNING**

**Failure to observe the safety information below may have serious consequences:**

- Risk to persons due to electrical, mechanical or chemical effects,
- Failure of important functions of the system.

Read the safety and hazard information in this section thoroughly before putting the system into operation.

In addition to the information specified in this manual always comply with general safety and accident prevention regulations.

In addition to the information specified in this manual the plant operator/machine operator must comply with national occupational, health and safety regulations. It is also important to follow internal rules and regulations.

**2.1 General safety information**

The following general safety information has to be observed:

- Always read and understand the operators manual before operating the system.
- Only use the system for its intended purpose(see chapter 2.4 “Intended use“)
- Never operate the system without associated guards and safety devices. Never take fitted safety devices out of operation.
- Always keep the work area around the system clean and tidy to prevent hazards due to dirt and things lying around.
- Do not exceed the technical data (see chapter 8 “Technische Daten/Technical data“).
- Only trained personnel are allowed to operate or work on the system.
- Do not start the system if other persons are in the danger zone.
- Take the system out of operation immediately if a fault occurs. Have faults rectified by appropriately qualified personnel.
- Always keep the operators manual at the place where the system is used. It must be ensured that all persons dealing with the system are able to view the operators manual at any time.

## 2.2 Safety measures before startup

Familiarize yourself with the system's

- Operating and control elements,
- features,
- working principles,
- immediate environment,
- safety devices,
- measures for an emergency.

Carry out the following activities before every startup:

- Inspect the system for visible damage; rectify any detected defects immediately or report them to the supervisory staff – the system must only be operated in a perfect condition.
- Remove all objects and other materials that are not needed to operate the system out of its work area.

## 2.3 Safety measures during normal operation

**Carry out the following inspection activities every day:**

- Inspect the system for externally visible damage.
- Also pay attention to the instructions and information in or concerning higher-level operating manuals or control systems.

## 2.4 Intended use

The safety of the system is only ensured if it is used as intended. The system is made for cooling and humidifying the air inside a house only.

The system is not intended for another use than as described here; other use counts as inappropriate, e.g. pumping liquids other than water. The manufacturer/supplier is not liable for any resulting damage. The risk is borne solely by the user.

Intended use also includes

- Heeding all information from the operators manual,
- Complying with the inspection and maintenance intervals,
- Complying with the operating and maintenance conditions,
- Taking foreseeable misconduct into consideration.

It is necessary to comply with the technical specifications in chapter 8 "Technische Daten/Technical data" without exception.

The system is not allowed to be converted or otherwise altered without prior written permission from MEIER-BRAKENBERG GmbH & Co. KG.

Any breach of this causes the system to lose its EC conformity. Such a breach absolves the manufacturer of the machine from warranty. Any parts not in a perfect state must be replaced immediately. Parts and special features not delivered by MEIER-BRAKENBERG GmbH & Co. KG are not released for use with the system.



### **Important Information!**

Only use the system as intended; otherwise there is no guarantee of safe and reliable operation.

It is not the manufacturer but the plant operator who is responsible for any and all personal injuries and material damage resulting from unintended use!

## 2.5

### **Hazards due to electricity**

#### **⚠ DANGER**

##### **Warning of electrical hazard!**

Touching live parts or parts that have become live due faults, poses a direct risk of death. Damage to the insulation or individual parts can be fatal hazard. Short-circuits and overloading pose the risk of being hit by ejected molten parts.

- Always keep the control cabinet and all electricity supply units locked. Access is only allowed for authorized persons with a key or special tool.
- Always run the controller with the correct electrical voltage.
- Only electrical specialists are allowed to work on the controller's electrical equipment.
- Regularly inspect the controller's electrical equipment for defects such as loose connections or damaged insulation.
- If there is a damage, switch off the power supply immediately and have the damage repaired.
- When working in the electrical equipment always shut off the power and verify safe isolation.
- Switch off the power supply during maintenance, cleaning and repair work and prevent unexpected restoration on power.
- Never bypass fuses or take them out of operation. When replacing fuses, pay attention to the correct amperage.
- Keep moisture away from live parts as it can cause short-circuits. Never clean the electrical equipment with water or similar liquids.
- Have the electrical equipment and fixed electrical apparatuses tested by an electrical specialist every four years at least.
- Alterations made after testing must comply with DIN EN 60204-1.
- Observe the regulations of VDE (Verband der Elektrotechnik Elektronik Informationstechnik e.V.) or IEC (International Electrotechnical Commission) and the national accident prevention regulations for electrical systems and equipment.



## 2.6 Further hazards

### **⚠ WARNING**

#### **Injury hazard from hydraulics/pneumatics!**

Work on hydraulic equipment may only be done by qualified personnel. All lines, hoses and fittings must be properly installed and checked regularly for leaks and externally visible damage. Damage must be repaired immediately. Splashing liquids can lead to injuries. Before starting repair work depressurize system sections and pressure lines to be opened. Secure the system against being switched on again.

### **⚠ CAUTION**

#### **Injury hazard from sharp edges!**

Wear suitable protective clothing (incl. protective gloves).

### **⚠ WARNING**

#### **Injury hazard due to incorrect spare parts!**

Incorrect or faulty spare parts may cause damage, malfunctioning or total failure, and may also give rise to safety hazards. Use original spare parts only.

Procure spare parts via MEIER-BRAKENBERG GmbH & Co. KG.

### **Special works within the scope of use**

If the system is switched off for special work, such as maintenance and repair work, it must be secured against unexpected restarting.

## 2.7 Safety devices and guards

- Before switching on the system always make sure that all safety devices and guards have been fitted properly and are functional.
- When subcomponents are delivered the plant operator must ensure that the guards are fitted according to the rules.
- You must not bypass or remove safety devices and guards or defeat them in any other way.
- Check the functioning of all the system's safety devices regularly.

## 2.8 Obligations of the plant operator

The system is used in industrial plants. The plant operator is therefore subject to the legal requirements concerning health and safety at work.

In addition to the safety information in these manual it is necessary to comply with the safety, accident prevention and environmental protection regulations valid for the area of application, where the system is being used. The following applies in particular:

- The plant operator must ensure that the system is used as intended (see chapter 2.4 "Intended use")

- The plant operator must always keep the manual in a legible and complete condition at the place where the system is used.
- Throughout the time that the system is in use the plant operator must check that the plant instructions are in line with official regulations and must update them if necessary.
- The plant operator must only let suitably qualified and authorized personnel work on the system.
- The plant operator must ensure that all personnel working on or with the system have read and understood this operators manual. The plant operator must also train the personnel and inform them about hazards at regular intervals.
- The plant operator must provide sufficient lighting at the control points of the system in accordance with local health and safety regulations.
- The plant operator must make sure that individuals whose reactivity is impaired by drugs, alcohol, medication and the like do not work on the system.

In addition, the plant operator is responsible for keeping the system in a perfect technical condition so the following also applies:

- The plant operator must regularly check that all safety devices are functioning correctly and are complete.

## **2.9 Personnel requirements**

The device is only allowed to be operated, maintained and repaired by persons who have been trained for this and are authorized to do so. These persons must know the installation instructions and operators manual and act in accordance with them. The respective authorizations for personnel must be defined clearly.

### *2.9.1. Responsibilities*

Personnel require the following qualifications for the various activities:

#### **Personnel requiring training**

Personnel requiring training, such as trainees or temporary workers, are not aware of all hazards that operation of the system can entail. They are only allowed to work on the system under the supervision of skilled personnel.

#### **Instructed personnel**

Instructed personnel have been instructed by the plant operator about their tasks and the potential risks of inappropriate behavior.

#### **Skilled personnel**

Skilled personnel are able to do their work and recognize/avoid potential hazards on their own as a result of their training, knowledge and experience and their familiarity with regulations.

#### **Electrical specialists**

Electrical specialists are able to work on electrical equipment and recognize/avoid potential hazards on their own as a result of their training, knowledge and experience and their familiarity with standards and regulations. Electrical specialists have been trained for their specific point of deployment and know the relevant standards and regulations.

### 2.9.2. *Qualifications required by personnel*

#### **⚠ WARNING**

##### **Injury hazard due to inadequate qualifications!**

Inappropriate actions when working on the system can lead to considerable personal injury and material damage.

All activities must therefore be carried out by qualified personnel only.

Personnel must consist of individuals who can be expected to perform their work reliably. Individuals whose response is impaired by drugs, alcohol, medication and the like must not work on the system.

All persons working on the system must read the operators manual and confirm with their signature that they have understood it.

Initially, personnel requiring training are only allowed to work on the system under the supervision of skilled personnel. The completion and success of instruction must be confirmed in writing.

All control and safety devices must only be activated by instructed persons.

##### **In addition, particular qualifications are required for the following activities:**

- Installation – only allowed to be carried out by trained specialists
- Commissioning – only allowed to be carried out by trained specialists
- Instruction – only allowed to be carried out by trained personnel
- Cleaning – only allowed to be carried out by instructed personnel
- Maintenance/ serving – only allowed to be carried out by trained specialists
- Repairs – only allowed to be carried out by trained specialists

### 2.9.3. *Obligations of personnel*

Before working on or with the system, all persons undertake the following:

- To comply with basic regulations concerning health, safety and accident prevention
- To read the safety information and warnings in this manual and to confirm with their signature that they have understood the issues.

### 2.9.4. *Unauthorized persons*

#### **⚠ WARNING**

##### **Hazard for unauthorized persons!**

Unauthorized persons who do not have the required qualifications are not aware of the hazards in the work area.

Therefore:

- Keep unauthorized persons away from the work area
- Address persons in case of doubt and eject them from the work area if applicable.
- Interrupt work while any unauthorized persons are in the work area.

## 2.10 **Instruction**

Personnel must receive regular instruction from the plant operator. Keep a record of all instruction given in order to keep track of matters.

Datum	Name	Type of instruction	Instruction given by	Signature

### 3 Assembly instruction

The Top-Climate-System is generally supplied in components as a modular system. Each system is designed to meet the individual requirements of the customer.



#### Important information!

The system must always be thoroughly flushed before being put into operation. For this purpose, the ball valves at the ends of the nozzle lines are opened after the assembly of the lines and all lines are thoroughly flushed. The first flushing of the system must take place without nozzles. Only after flushing the mounting of the nozzles is the last step to complete the system.

#### 3.1 Installation of the pump unit



Place the pump unit on an even, horizontal, clean floor that is easily accessible and adequately ventilated. Instead of placing the pump unit on the floor, it can alternatively be mounted to a flat vertical wall using the optional wall mounting kit (Art. 7290). Depending on the wall, suitable dowels/screws (Art. 7290) are used for horizontal mounting of the bracket. The machine feet can be screwed to the angle plate in prefabricated holes. The pump unit is then suspended from the holder in a vibration-decoupled manner and fixed with nuts.



#### Important information!

Check whether a red transport plug still closes the pump housing. If this is the case, replace it with the supplied oil vent screw. Check the oil level and refill if necessary (15W-40).

Remove the protective foil from the attached high-pressure hose and connect it to the connecting pipe by means of a cutting ring fitting (remove union nut and cutting ring on one side). Alternatively, a PressFix fitting with a suitable connection for the hydraulic hose can be used for the connection (Art. 7409). If optional modules are used, the hydraulic hose is connected to the respective module (see chapter 3.3 "Installation of additional modules").

The pump unit is designed for connection to a MEIER-BRAKENBERG Touch Controller. Without the MEIER-BRAKENBERG Touch Controller no correct function of the system can be guaranteed. The pump unit must not be connected to the power supply until "First start-up" (chapter 4.1)!

## 3.2

### Installation of the filter unit



(Example: Art. 7126-V1-B)

#### Selection of the filter unit:

If a pump unit is connected directly, a filter unit with integrated main valve is required (the valve plug is connected to the Touch Controller). A 1/2"-valve is sufficient for up to 25 l/min, a 3/4"-valve is required for more than 25 l/min. A pressure gauge is installed behind the valve. While the pump is running, it must be ensured under all operating conditions that the pressure at this pressure gauge (inlet pressure of the pump) is **1...4 bar**. Filter units with bypass can be used for the dosing of additives, in which any 3/4" dosing units can be installed. Usually filter units with 4 filters are used, only with very good water quality on site, filter units with only 2 filters can be used. The smallest required filtration degree is 1 micron.

Mount the prefabricated filter battery horizontally on a wall or bracket near the pump unit.

Be sure to observe the installation direction! Filter sizes are pressed into the filter inserts (25 micron, 10 micron, 5 micron, 1 micron). The water must flow through the filter battery in this direction. This ensures optimum filtration of the supply water and a long service life of the filter cartridges.

The supply line is connected to the input of the filter unit (3/4" IT). The supply line should at least correspond to the diameter of the pump suction connection, preferably larger, and should be as free as possible of resistances and throttling points. There is a hose connector at the outlet of the filter unit. Here the 3/4" hose of the pump unit (or a hose to a tank) is connected. The hose must be laid in such a way that it is not bent too much and does not rub. The valve connector cable is connected to the Touch Controller according to the "Anschlusspläne/Wiring plans" (chapter 7). After the connection, the manual shut-off valve can be opened and the filters can be put under water. Before switching on the system, the filters need to be vented: Open the breather valves on the filter head until only water emerges.

When later replacing used filter cartridges, make sure that the O-ring is cleaned and lightly greased (e.g. with Vaseline).

#### Important information!



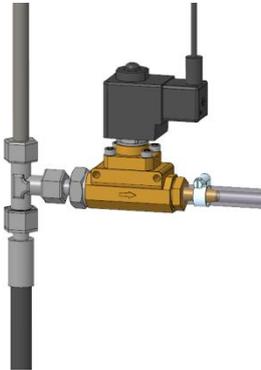
Make sure that the order of the filter cartridges is correct.

Check the condition of the filter cartridges regularly. If they are very dirty, replace them. Regular replacement (e.g. once a year) is recommended. Dirty filters can lead to an insufficient inlet pressure below 1 bar.

When using a chem. filter cartridge (5 micron chem.), it must be replaced regularly (twice a year or after 150 m<sup>3</sup> flow).

**Important information!**

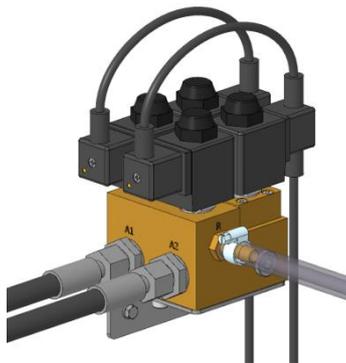
The hoses must be installed in such a way that they cannot rub against other components/sharp edges. The hoses must not be bent too much. Non-observance will reduce the lifetime of the hose.



The pressure relief module for connection to the connection pipe (**Art. 7113 - STANDARD**) is mounted between the hydraulic hose of the pump unit and the connection pipe. For the connections of the T-piece, the information in chapter 3.5.2 “Cutting ring fittings” must be observed. The mounting position of the valve should be with the solenoid upwards. The hose at the connector should be led into the drain. The cable of the valve connector is connected to the Touch Controller according to the specifications in the chapter 7 “Anschlusspläne/Wiring plans”.



The additional module 2-house without pressure relief (**Art. 7114**) is mounted near the pump unit on a wall or alternatively in the pump unit on the rear wall of the angle plate. The mounting position of the valves should be with the solenoids pointing upwards. The connector between the valves is connected to the hydraulic hose of the pump unit. The two hydraulic hoses behind the valves are connected to the connecting pipes to the two compartments. The cable of the double valve connector is connected to the Touch Controller according to the specifications in the chapter 7 “Anschlusspläne/Wiring plans” (version **LC-2** or **LCS-2** required!).



The additional module 2-house with pressure relief (**Art. 7115**) is mounted near the pump unit on a wall or alternatively in the pump unit on the rear wall of the angle plate. The mounting position of the valve block should be with the solenoids pointing upwards. The right connection (P) is connected to the hydraulic hose of the pump unit. The hose at the nozzle (R) is led into the drain. The two hydraulic hoses behind the valve block (A1 and A2) are connected to the connecting pipes to the two compartments. The cables of the double valve connectors are connected to the Touch Controller according to the specifications in the chapter 7 “Anschlusspläne/Wiring plans” (version **LC-2** or **LCS-2** required!). The two valves at the inlet of the valve block control the two outputs. The two valves at the block outlet each serve as pressure relief.

**NOTE**

All protective conductors of the modules must be connected to the protective conductor terminal in the touch controller. The multicore cables must be connected according to the wire colors in the chapter 7 “Anschlusspläne/Wiring plans”. For the double valve connectors of the 2-house modules, the position of the respective connectors must be taken into account (compare the function of the valves in the wiring plans).

**Important information!**

The MEIER-BRAKENBERG Touch Controller is essential for controlling the Top-Climate-System. The manufacturer accepts no liability for the installation of a system without the Touch Controller.

The MEIER-BRAKENBERG Touch Controller should be installed in a dry, clean and easily accessible location near the pump unit. For mounting, the cover must be opened and the housing is fastened with suitable screws through the holes intended for fixation.


**⚠ DANGER**
**Warning of electrical hazard!**

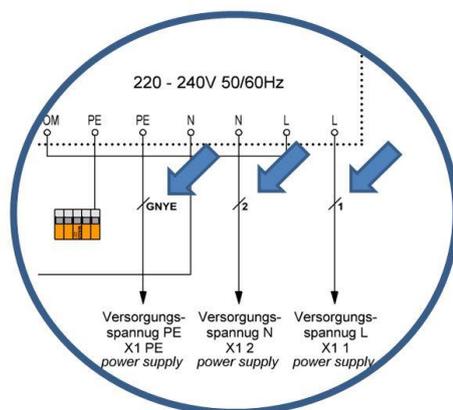
Touching live parts or parts that have become live due faults, poses a direct risk of death. Damage to the insulation or individual parts can be fatal hazard.

- Only electrical specialists are allowed to work on the system's electrical equipment.
- When working in the electrical equipment always shut off the power and verify safe isolation.
- Observe the regulations of VDE (Verband der Elektrotechnik Elektronik Informationstechnik e.V.) or IEC (International Electrotechnical Commission) and the national accident prevention regulations for electrical systems and equipment.

The MEIER-BRAKENBERG Touch Controller has a wide voltage input (85-264 V, 50/60 Hz). The voltage supply is usually made via a multi-core connection cable of the pump unit and must usually be 220-240 V to supply the valves. Other cables (e.g. from additional modules, pressure switches, climate computers, etc.) are also inserted into the Touch Controller. Depending on the pump unit and the additional modules, the appropriate Touch Controller must be selected (for pump units with frequency inverter, the "LCM vario" version is required).

**NOTE**

Suitable cable glands must be used to ensure good sealing and strain relief of the cables.

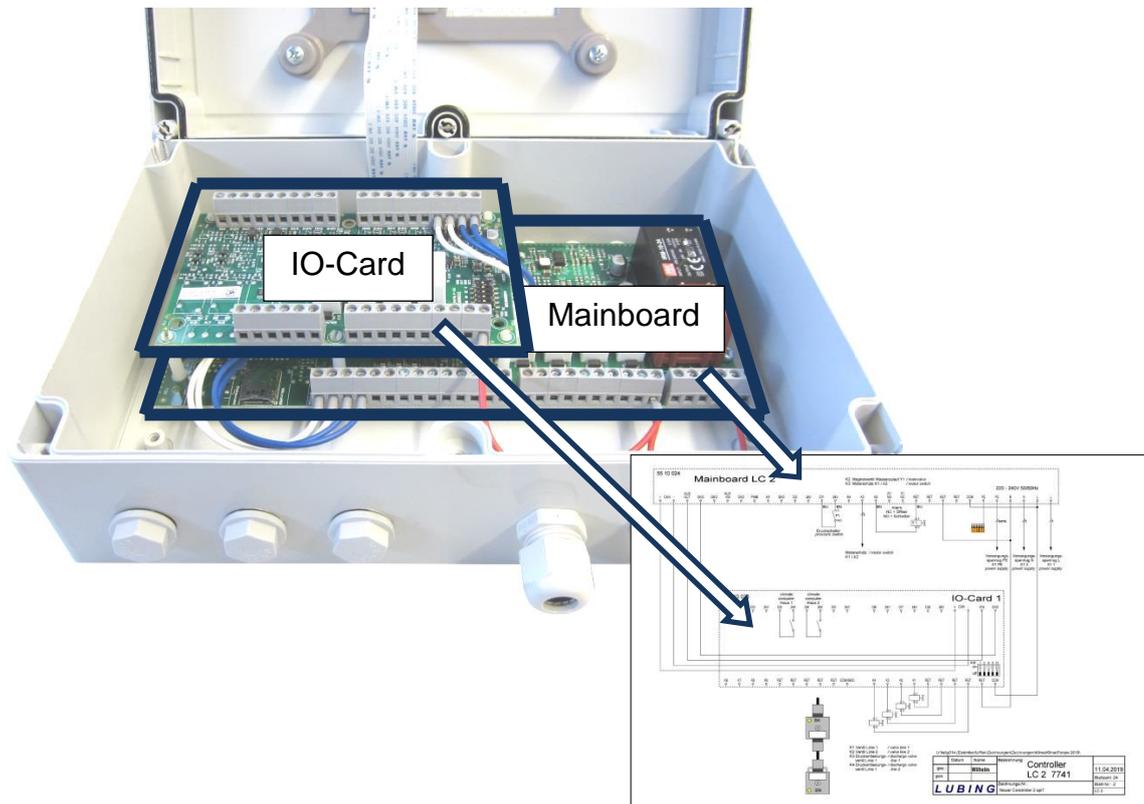


The cables are connected according to the wiring plans (see chapter 7 "Anschlusspläne/Wiring plans").

The multi-core cables of the pump unit are labelled with numbers. In the circuit diagrams, the numbering is marked as shown in the adjacent detail. Coloured cables are marked accordingly (abbreviations according to IEC 60757). GNYE (green/yellow) identifies the protective conductor. The protective conductors of all components must be connected to each other!

**Important information!**

Make sure that the mainboard and the IO-Card are not confused when connecting the cables. Mainboard and IO-Card are marked in the circuit diagrams. Attention: Sometimes there is the same name of the terminals on both boards.



### 3.4.1. Connection of external climate computers and sensors

The correct pin assignment for external climate computers and sensors can be found in the wiring plans (see chapter 7 “Anschlusspläne/Wiring plans”).

#### **⚠ CAUTION**

To avoid malfunctions, lay all cables in the controller close to the base plate. Never connect or disconnect components when the controller is switched on.

#### **External climate computer**

The potential-free switching contact of an external climate computer is connected to the prescribed input terminals of the controllers (e.g. D11 and 24V for MBWEICH3; see chapter 7 "Wiring diagrams/Wiring plans"). These cables must be laid separately and should be shielded. Only potential-free cables are allowed for connection. If the potential-free contact is closed (24V are applied to the input), the system cools/humidifies.

#### **Sensors**

Sensors are also connected to the input terminals. These cables must also be installed separately. The cables must have a low resistance (1.5 mm<sup>2</sup>).

### 3.4.2. CAN connection

In the LCM vario version (Art. 7745), the controller can be connected to extension boxes (Art. 7750) if required. Eight additional outputs are available for each box. The connection is

made via CAN bus. The corresponding mainboard and IO-Card terminals must be connected as shown in the wiring plans (see chapter 7 “Anschlusspläne/Wiring plans”).

- The CAN connection must be looped through. Do not use stub lines!
- Jumper J12 must be plugged into the last extension box (terminating resistor).
- Only twisted pair cables may be used for the connection.
- For longer cables, we recommend using shielded cable.
- The addresses of the IO-Cards must be set with the DIP switches as shown in the wiring plans.

### 3.5 Installation of connecting pipes and nozzle lines

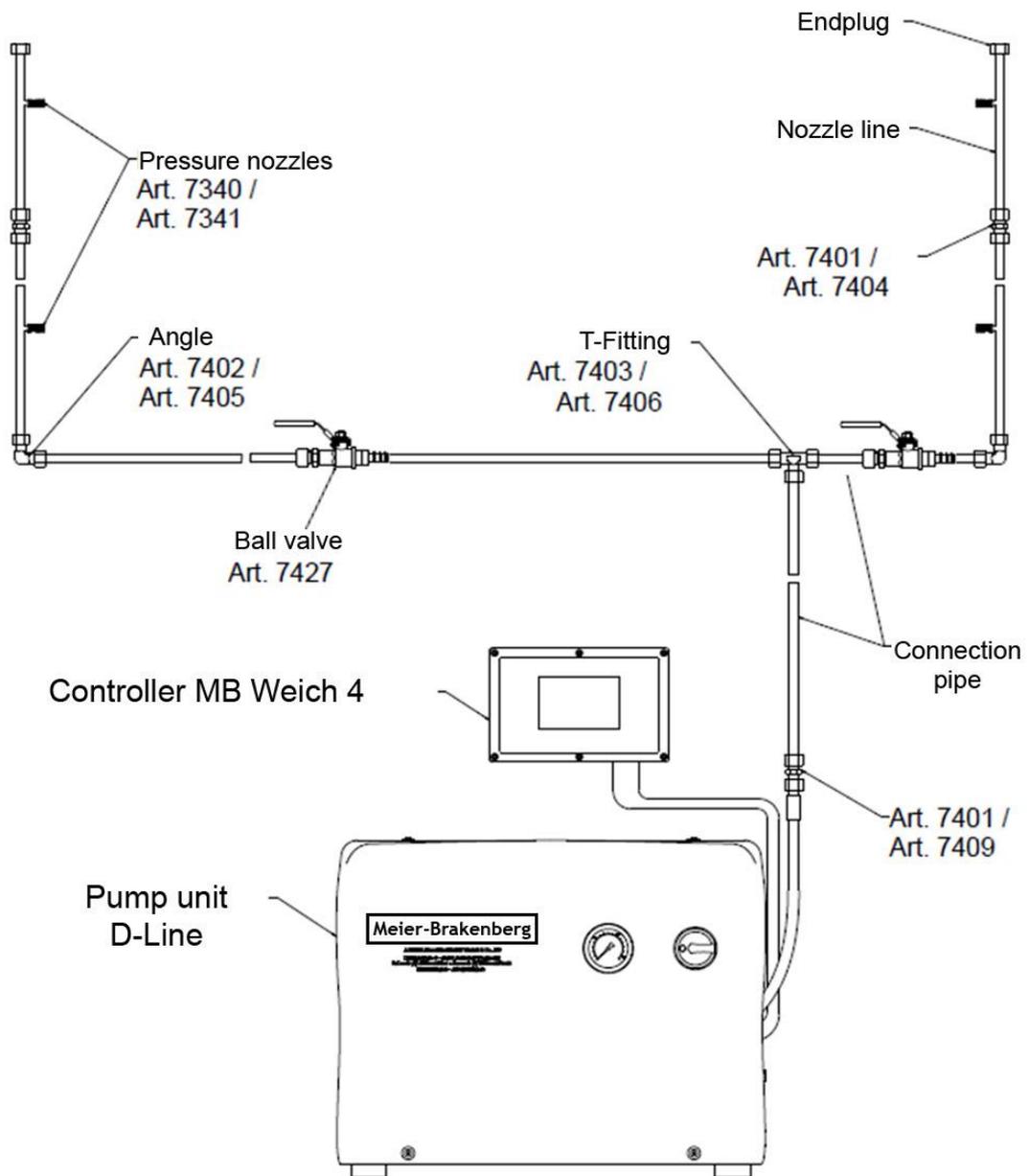
The pipes must first be positioned with brackets or suspension material. Only then both the connecting pipes and the nozzle pipes are connected with cutting ring fittings or alternatively with PressFix fittings.

	<p><b>Important information!</b> Make sure that no impurities or dirt get into the pipe system. This will ensure that the nozzles will work properly later on.</p>
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#### 3.5.1. *Positioning and orientation of nozzle lines*

The following details are recommendations which have often proven themselves in practice. Depending on the ambient conditions (air flow, barn equipment, etc.), the optimum installation of the nozzle lines may differ from the recommendations.

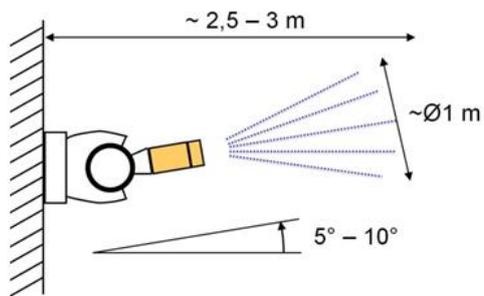
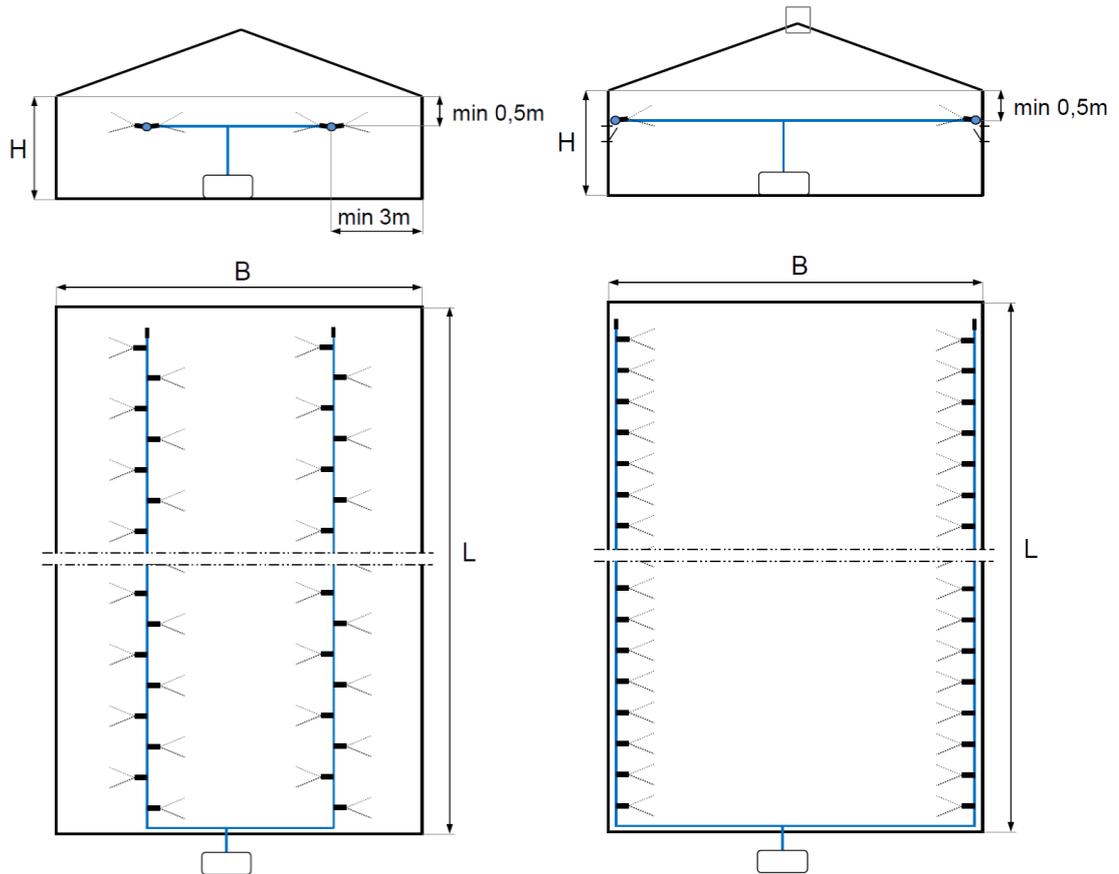
The following illustration shows in principle a possible arrangement of the components in a system. In addition there are components in the supply line to the pump unit (filter unit etc.). The ball valves at the ends of the lines can be opened for flushing and venting.



Depending on the size of the barn and the ventilation system, the layout of the nozzle lines is determined. Generally applies:

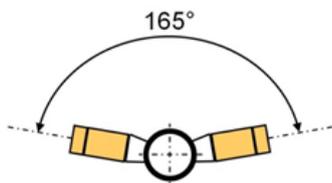
- The nozzles should not spray against the air flow.
- The minimum distance to the ceiling of at least 0.5m should be maintained.
- There should be a free space of at least 3m in the spraying direction of the nozzle. In case of obstacles in this free space, these adapters can be closed with plugs (Art. 7326).
- The line lengths should be kept as short as possible to minimize pressure losses (especially with high flow rates!).

The following sketches show examples of possible layouts:



Nozzle line in line

- Rotate the nozzle lines so that the nozzle orientation is 5-10° upwards.



Nozzle line alternating

- In case of alternating nozzle lines also ensure that the nozzles are pointing a little bit upwards.

### 3.5.2. Cutting ring fittings

The following cutting ring fittings can be used to connect the connection pipes and nozzle pipes with an outside diameter of Ø12 mm:



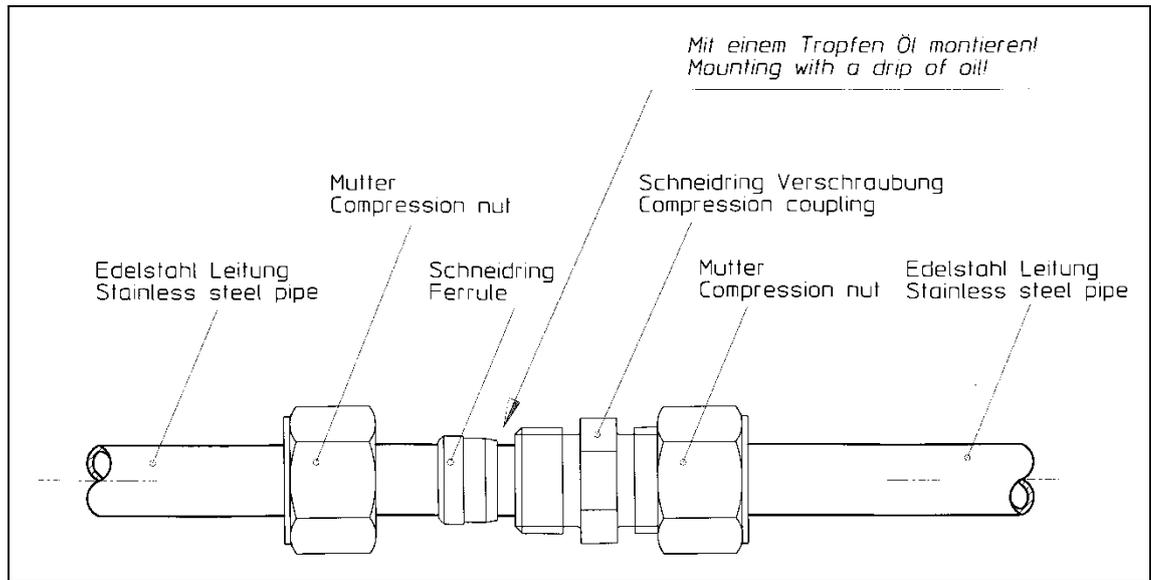
Art.-No. 7401  
No. 7403



Art.-No. 7402



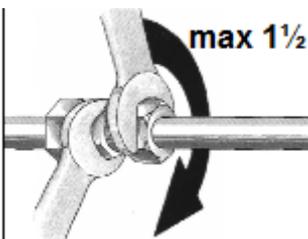
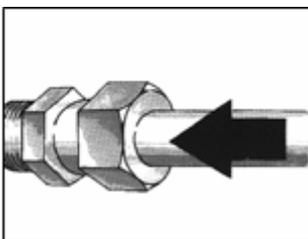
Art.-



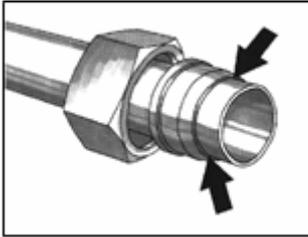
#### Required assembly tools:

Open-end wrenches (size 17/19/22), oil

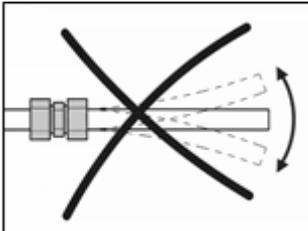
The basic requirement for installation is a right-angled cut pipe end that is clean and burr-free. Proceed as follows during assembly:



- Lightly oil the cutting ring and thread
- First push the union nut onto the pipe, then the cutting ring with cutting edge pointing towards the pipe end.
- Screw on the union nut by hand until you feel the contact. Press the pipe against the stop in the inner cone. **Note: Non-contact of the pipe end with the stop leads to incorrect assembly.**
- Tighten union nut **max. 1½** revolutions. Hold the screw connection piece with a wrench. The pipe must not rotate.



- To check correct assembly, loosen the union nut and check whether the visible collar has formed on the pipe in front of the cutting edge (collar throw-up). Then retighten the nut.
- After each loosening, the union nut must be tightened without increased effort.



**Never load screw connections with bending.**

- Always mount the nozzle lines in their final position and support them during assembly.
- Do not mount nozzle lines on the ground.

### 3.6 Last steps of the assembly

After switching on the water and power supply, the “First start-up” (chapter 4.1) can follow. The high-pressure nozzles are only installed after thorough flushing of all lines during the “First start-up”.

## 4 Operators manual

### 4.1 First start-up

After switching on the water and power supply, the system is ready for operation. First the supply line (incl. filter unit) is vented. To flush the lines, open the ball valves at the line ends. If necessary, a hose can be pushed on the outlet of the ball valve to drain off the water. Only after thorough flushing of all lines, the installation of high pressure nozzles can follow (see chapter **Fehler! Verweisquelle konnte nicht gefunden werden. "Fehler! Verweisquelle konnte nicht gefunden werden."** or chapter **Fehler! Verweisquelle konnte nicht gefunden werden. "Fehler! Verweisquelle konnte nicht gefunden werden."**). After the assembly of all nozzles, the lines are completely flushed again for approx. 2 minutes with the ball valves open. After the ball valves have been closed again, the assembly is completed.

A flushing process can be started on the MEIER-BRAKENBERG Touch Controller as a special function. Since the nominal pressure cannot be reached during flushing, the pressure switch is not checked for this special function. Flushing also vents the lines. After sufficient flushing, the ball valves are closed again and the flushing process must be terminated at the Touch Controller.

#### NOTE

The ball valves must be closed during the flushing process, otherwise air will enter the lines again.

### 4.2 Temporary shut-down and restarting

If the system is not used (e.g. during the winter months) or there is a risk of frost, the water should be drained from the pipes. To do this, open the ball valves at the end of the line and loosen the hydraulic hose of the pump unit. The water can be blown out with compressed air.

#### NOTE

If there is a risk of frost or longer downtimes, the pump unit and the filter unit also have to be drained.

The lines must be thoroughly flushed and vented before each restart. Only then close the ball valves at the line ends.

#### NOTE

Make sure that the pipes are thoroughly flushed regularly, but at the latest before the start of a new cooling period.

It is recommended to check the correct function of all nozzles during restart of the system. If nozzles are blocked or the spray pattern is not okay, clean or replace the nozzles.

### 4.3 Water quality

Meier-Brakenberg recommends every operator of the climate system to operate the system only with drinking water quality and in conjunction with the supplied filter unit. In accordance with the limit values of the German Drinking Water Regulations, the following values should not be exceeded:

	Unit	Limit value
<b>pH value</b>		6,5 – 9,5
<b>Total hardness (Ca + Mg)</b>	mmol/l	1,8
<b>Sulfate</b>	mg/l	240
<b>Nitrate</b>	mg/l	50
<b>Chloride</b>	mg/l	250
<b>Iron</b>	mg/l	0,2

With these values you achieve a long service life of the system, especially of the nozzles. If these values cannot be achieved, a water treatment system should be installed upstream in case of problems.

### 4.4 Disinfection/medication

Spraying additives dissolved in water is basically possible with the MEIER-BRAKENBERG Top Climate System. But the following points have to be considered:

- Commercially available disinfectants\*/medicines can be used, but only up to a maximum dosage of 1%. A suitable MEIER-BRAKENBERG medicator or electrical doser MBDOS Touch can be used for the dosage. The position of the dosing unit is before the last filter of the filter unit. Accordingly, a bypass for the filter units is available. MEIER-BRAKENBERG mixers MBMISCH can be used for pre-dilution of the additives.
- The additive used must dissolve completely in water. For example, no crystals may form which could damage the pump and clog the nozzles.
- The dosing should only be done for a short time in order to avoid permanent damage to the system.
- After disinfection/medication, the system must be thoroughly flushed with clear water for a few minutes. First flush the pump and pipes with open ball valves at the pipe ends. In order to flush the nozzles thoroughly, the ball valves should then be closed and flushed further.

\*A list of the commercial usual disinfectants is e.g. at the “Deutsche Veterinärmedizinische Gesellschaft (DVG) for the food range available (Frankfurter Str. 89, 35392 Gießen, - <http://www.dvg.net> ).

NOTE
Excluded are additives containing chlorine, as these can cause damage to the system components.

**⚠ WARNING**

**When operating with aggressive, flammable, hazardous to health and the environment or media critical due to other properties, a hazard must be prevented by suitable protective measures.**

If additives are used frequently, HR components with increased resistance can be used for a longer lifetime.

Meier-Brakenberg accepts no liability for damage caused by the use of additives.

#### **4.5 Operation pump system**

The pump unit may only be supplied with cold water. The water temperature at the inlet must not exceed 40°C. This applies in particular to operation with a minimum flow rate (min. number of nozzles). The water temperature should not exceed 20°C when the water is supplied from a tank structure installed above the pump unit and approved by Meier-Brakenberg .

The supply line to the pump should at least correspond to the specified diameter of the pump suction connection, preferably larger, and should be as free as possible of resistances and throttling points. Low inlet pressure and increased water temperature can cause cavitation and lead to a drastically shortened service life of the pump. Make sure there are no leaks in the connections.

If the pump unit is pressure fed, a filter unit with integrated main valve must be used. A pressure gauge is installed behind the valve. While the pump is running, it must be ensured under all operating conditions that the pressure at this pressure gauge (inlet pressure of the pump) is **1...4 bar**.

Depending on the operating conditions, the crankcase might heat up to 60°C. Higher temperatures indicate impermissible operating conditions or a fault in the pump unit.

Any deviations from the normal operating pressure indicate errors in the system. The fault does not have to be at the pump, so the following should be checked first:

- condition of the supply line (shut-off valves open, inlet pressure sufficient, ...)
- condition of pressure lines, nozzles, pressure control valve and pressure gauge

Refer to chapter 6 “Troubleshooting” for further details.

The following descriptions concern components integrated in the pump unit:

#### 4.5.1. *Pressure regulator/bypass valve*

Plunger pumps are positive displacement pumps, i.e. they work against any pressure. A pressure regulator or bypass valve is therefore absolutely necessary. It must be set so that the nominal pressure cannot be exceeded by more than 7% (max. 75 bar) in the event of a fault (outlet closed, no water consumption). The valves in the pump units are correctly factory preset. No liability will be accepted if the setting is changed inadmissibly or if a safety device is missing.



#### 4.5.2. *Pressure switch/sensor*

A pressure switch is installed in the pump units (switching point 25 bar). If the signal from the pressure switch is missing after the set waiting time, the controller outputs the error message "No water alarm" and stops the system.

Pump units with frequency converter are equipped with a pressure sensor instead of a pressure switch, which additionally gives a signal for speed control.



#### 4.5.3. *Thermo valve*

A thermo valve is installed in the pump units to drain hot water from the pump in the event of a fault. Cold fresh water flows in and thus counteracts overheating. The switching temperature is 60°C. During normal operation no water may escape. If the valve drains hot water, this indicates a fault in the system.



#### 4.5.4. *Additional fan*

An additional fan is only integrated in pump units with frequency converter (Vario). This fan starts with the pump and continues to run for a few minutes after the pump has been switched off.

### 4.6 **Further system components**

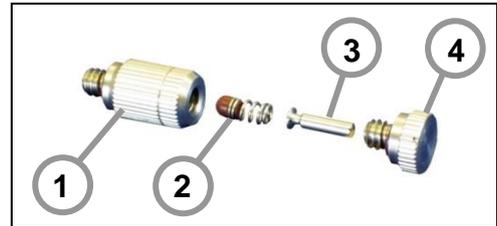
#### 4.6.1. *Pressure relief*

An electrical pressure relief system releases the pressure from the high-pressure lines immediately after the pump unit is switched off. The high-pressure solenoid valve is controlled by the MEIER-BRAKENBERG Touch Controller. Due to the rapid drop in pressure, dripping of the nozzles is almost impossible.

In normal operation only a small amount of water is drained within a few seconds after the pump unit has stopped. An increased volume may indicate a defective main valve or air in the pipes. If water also escapes while the pump is running, this indicates, for example, a defect in the high-pressure valve (e.g. due to wear).

#### 4.6.2. High pressure nozzles

The high-pressure nozzles ensure extremely fine atomization of the injected water at pressures above 50 bar. They consist of the nozzle body (1), the spring valve (2), the bolt (3) and the nozzle head (4).



Cleaning:

Blocked nozzles or nozzles with poor spray pattern can be unscrewed and disassembled. If the nozzle is calcified, it might be cleaned in a descaling bath / acetic acid bath / ultrasonic bath. Afterwards rinse thoroughly and blow out.

In case of frequent problems with the nozzles due to calcareous or ferrous water, water treatment should take place.

If it is observed that brass nozzles are not sufficiently resistant (e.g. chemically), they should be replaced with stainless steel nozzles.

## 4.7 Operation Touch Controller



The Touch Controller is designed to control the MEIER-BRAKENBERG Top-Climate-System. The manufacturer accepts no liability for any use other than this.

- The controller controls the pump and the connected valves.
- The controller monitors the correct functioning of the system. In the event of faults such as large leaks or insufficient water supply, this is registered and the system goes into alarm mode. This prevents consequential damage.
- The controller can be connected to external climate computers.
- Spraying and breaking intervals can be set precisely.
- All controllers can be either set in manual or automatic mode for "cooling" (or rather "humidifying"). They also have the functions "dust binding", "soaking", "flushing" and a daily timer.

Depending on the type of system, different versions are available. The version is noted on the front foil.

- The controllers **MBWEICH3** and **MBWEICH4** control one area.
- The controllers **LC-2** and **LCS-2** can control two sections independently.
- The controller **LCM vario** can control 8 compartments separately. This control can be extended by 8 compartments with extension boxes (the maximum number of extension boxes is 4).
- In the **MBWEICH4** and **LCS-2** versions, temperature and humidity sockets can be connected. This allows the system to control independently of a climate computer.

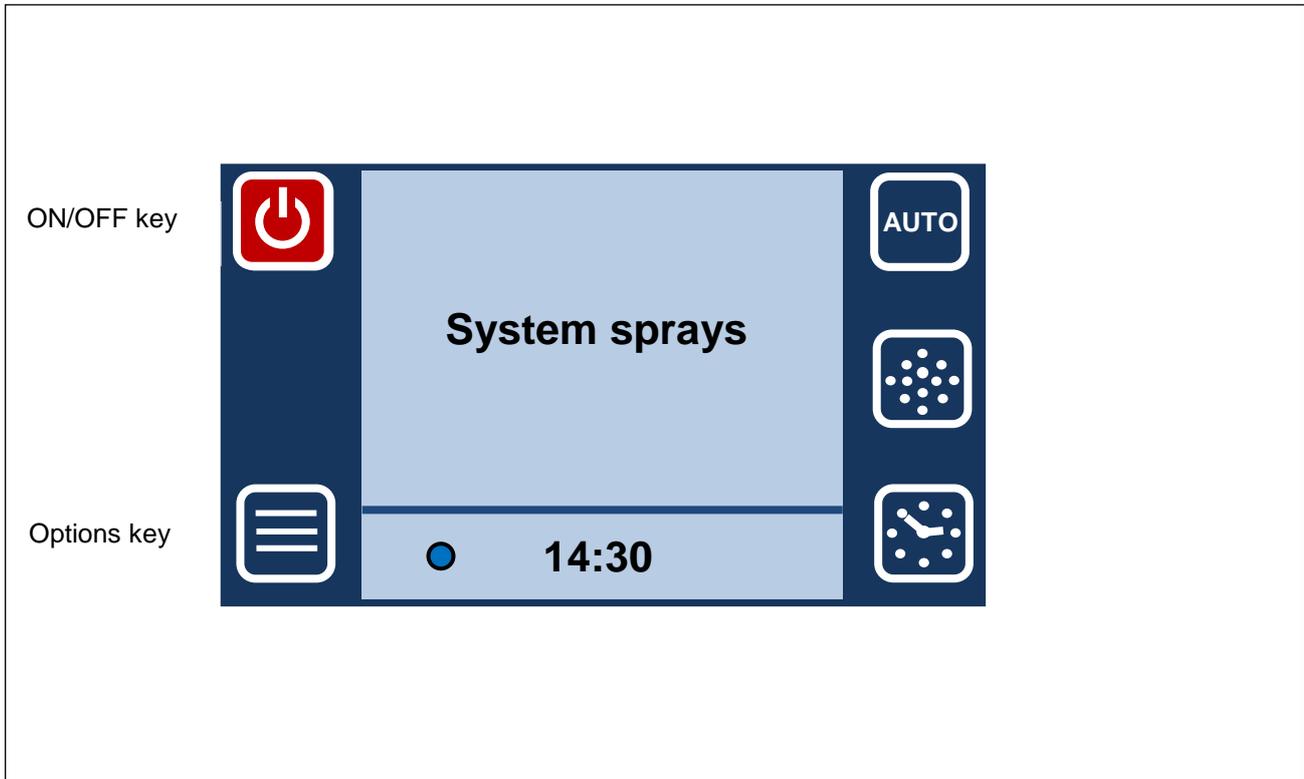
The controller is characterized by its intelligent system and intuitive operating features:

- Frequently used functions are integrated as direct-access functions. Less often used and administrative functions are placed in subordinate menus.
- Basically pictograms and simple menu structures ensure that all required functions can be understood and activated quickly and easily.
- Status messages and instructions are shown in context on the interactive display and guide the user through the operations in a logical sequence. No special knowledge is required to operate the controllers.

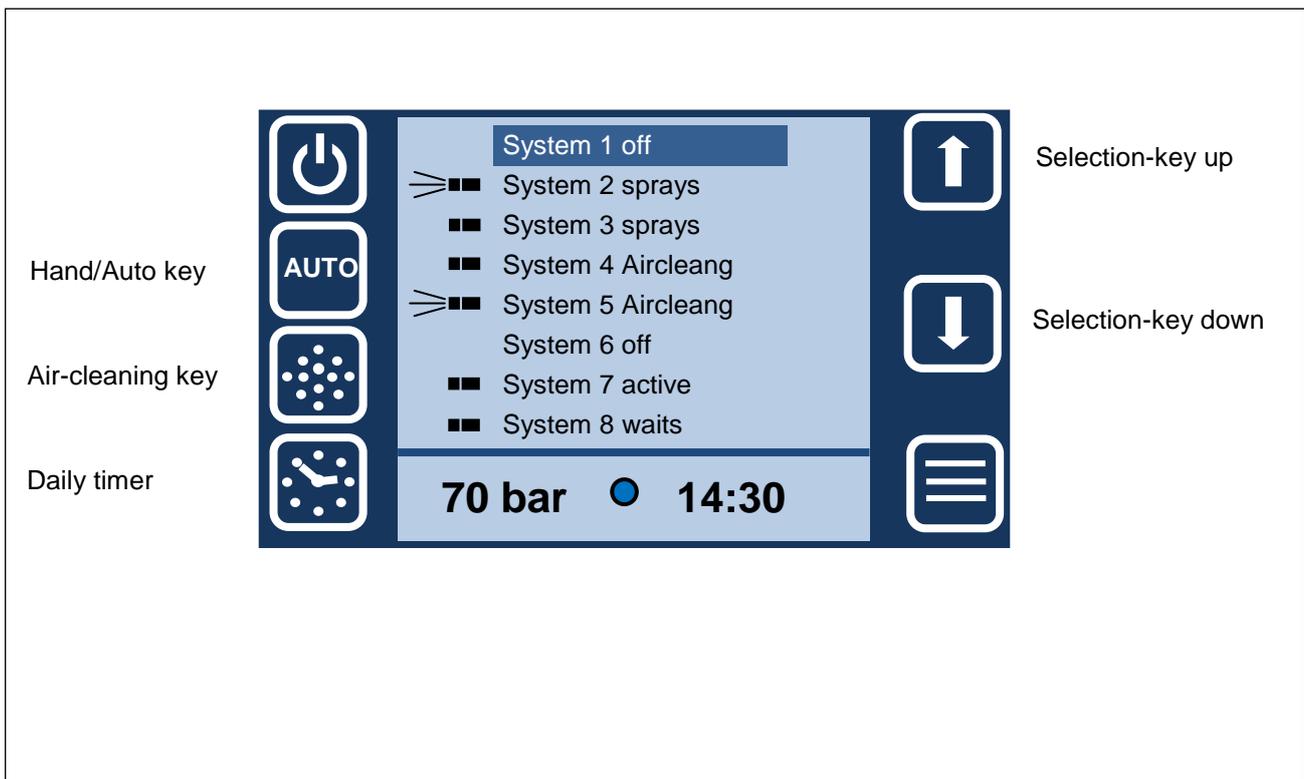
4.7.1. Function keys

Examples standard screen

MBWEICH3 and MBWEICH4



LCM vario



The various functions of the system can be switched on or off using the function keys. They apply to the area/section shown active on the display.

*Note: If a function key is pressed for approx. 5 seconds, the set values of this function appear in the display. They can then be set with the +/- buttons and confirmed with the OK button.*

Press the ON/OFF button to switch the system on or off. (red = ON)

**Note: This button has no emergency stop function!** The emergency stop switch is mounted directly on the pump unit.

The AUTO key is used to switch between manual and automatic mode (green = auto mode). In manual mode, the system runs continuously in the set interval, in automatic mode it runs parameter-controlled, either via the connected sensors or via the external climate computer. The potential-free contact of the air-conditioning computer must be closed for the system to cool. If the potential-free contact is open, "System ready" appears in the status display.

The AIR-CLEANING key turns the dust binding mode on or off. When the function is switched on (green), the system runs at the previously set dust binding interval, but only if it is otherwise not activated in auto mode.

The daily timer can be switched on or off with the DAILY TIMER key. When the function is switched on (green), the system is only active during the set operating time. It can be switched off automatically with this function, e.g. at night.

Press the OPTION key to enter the menu.

Use the arrow keys to select individual menu items or areas. After selecting a change function (EDIT), the +/- keys are displayed. These can be used to change values.

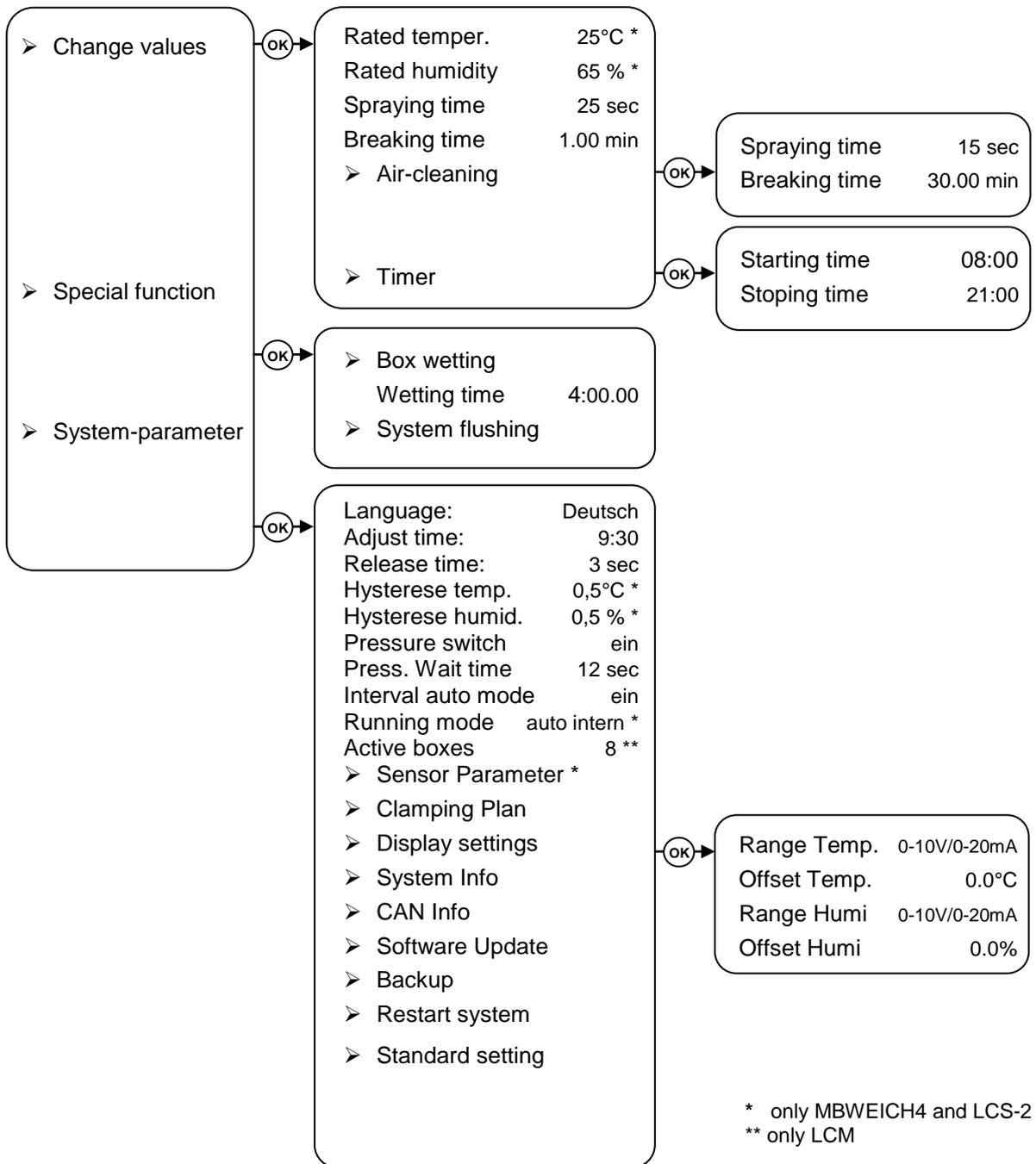
Press the OK key to confirm a selection or a value change. Only after this confirmation the change is made.

The ESC key is used to jump back in the menu or to cancel an operation.

The HOME button returns to the standard screen.

The EDIT key can be used to change variable values.

4.7.2. Menu overview



#### 4.7.3. Start-up

After installation, the controller is immediately ready for operation. You can change the language as required. Proceed as follows:

1. Use the OPTION key to select the third main menu "System parameters".
2. Press the OK key to enter the "Language" menu item.
3. After selecting the menu item (EDIT), the desired language can be set with the "+" and "-" keys.
4. The change must then be confirmed with the OK key.

If you want to use the "Daily timer" function, you have to **adjust the time**. Proceed as follows:

1. Use the OPTION key to select the third main menu "System parameters".
2. Press the OK key to enter the "Adjust time" menu item.
3. After selecting the menu item (EDIT), the time can be set with the "+" and "-" keys. *Note: Pressing and holding the arrow keys increases the interval of the counting steps.*
4. The change must then be confirmed with the OK key.

After first start-up, all values are set to the factory default values. The parameters of the various menu levels are described below.

**Important information!**  
**The parameters with (\*) are only available for versions with sensors (MBWEICH4, LCS-2).**  
**The parameters with (\*\*) are only available for the LCM versions.**  
**In the case of versions for several sections, the section whose values are to be changed can be selected in advance with the arrow keys.**

#### 4.7.4. Change values

The Options key can be used to select the "Change values" main menu.

The following parameters can be set here:

Parameter	Description
Rated temper.*	The system will cool up to the set temperature, but only if the set rated humidity is not exceeded.
Rated humidity*	The system will raise the humidity up to the set value, but only if the temperature does not fall below the set rated temperature.
Spraying time	The spraying time determines how long the spraying interval is. The spraying interval applies to both hand and automatic mode. <b>Attention: The spraying time should always be longer than the pressure waiting time. Otherwise there is no protection against dry running or water damage.</b>
Breaking time	The pause time determines the distance of the spraying times in the spraying interval. The spraying interval applies to both hand and automatic mode.

Air-cleaning	<p>The system sprays in the set air-cleaning interval. If the "Air-cleaning" function is activated, "Air-cleaning" appears in the status display.</p> <p><b>Note:</b> The breaking time in the air cleaning interval should be much longer than the set spraying time, so that the influence on the climate remains small.</p> <p><b>Note:</b> In automatic mode, the system only sprays for air cleaning if there are no further spraying requirements for the duration of the set breaking time (from a climate computer or on the basis of the sensor values).</p>
Timer	<p>The timer switches the system on at the starting time and off again at the stopping time. When the stopping time is reached, the status display shows "System waits". The timer function key also flashes.</p> <p><b>Note:</b> In order to be able to use the "Timer" function, the time must first be set under "Adjust time" in the "System-parameter" menu.</p>

#### 4.7.5. Special functions

Use the Options key to select the "Special functions" main menu.

The following parameters can be set here:

Parameter	Description
Box wetting	<p>The system sprays without interruption until the set wetting time has elapsed. If the "Wetting" function is activated, "House wetting" appears in the status display. After wetting, the system switches off automatically.</p> <p><b>Note:</b> The wetting process can be stopped prematurely with the ON/OFF button.</p>
System flushing	<p>This function enables the pressure lines to be cleaned.</p> <p>Prerequisite: The ball valves at the end of the lines must first be opened. When the flushing function is activated, the pressure switch query is automatically ignored so that the system can be flushed without pressure.</p> <p><b>Note:</b> The flushing process is terminated again by pressing the OK key.</p> <p>In the LCM controller versions, the sections to be flushed must be selected in blocks. Each connected IO card is selected separately.</p>

#### 4.7.6. System parameter

Use the Options key to select the "System-parameter" main menu.

The following parameters can be set here:

Parameter	Description
Language	You can choose a language from the list of supported languages.
Adjust time	You can set the time. The time is only required for the "Daily timer" function. <b>Note:</b> If the controller is not supplied with power for a longer period of time (approx. 3 days), the time must be adjusted again when it is put back into operation.
Release time	The release time of the electric pressure release of the pump is set. The factory setting of 3 sec. is sufficient in most cases. Only with very long lines the value can be increased if necessary.
Hysteresis temp. *	The switching hysteresis of the temperature is set. The switching point is delayed upwards and downwards by the set value.
Hysteresis humid. *	The switching hysteresis of the humidity is set. The switching point is delayed upwards and downwards by the set value.
Pressure switch	The pressure switch monitoring can be switched off and on again. When the system has reached the operating pressure, the color in the circle next to the time changes from white to blue. <b>Note:</b> If the system does not reach the operating pressure, the pressure switch can be switched off to enable troubleshooting. If only the pressure switch is defective, this can also enable emergency operation until spare parts are available. <b>ATTENTION: If the pressure switch query is switched off, there is no longer any protection against dry running of the pump and against water damage in the stable!</b>
Press. Wait time	The wait time until the pressure switch is checked can be set. Setting recommendation: approx. 10 sec., so that the pump is not stopped when starting. For very long lines, it may be necessary to adjust the value upwards. <b>Attention: The pressure switch waiting time should be shorter than the set spraying time. This is the only way to protect against dry running or water damage.</b> <b>Note:</b> If the system takes much longer than 10 seconds to build up pressure, this probably indicates a fault in the system.
Interval auto mode	The interval operation for automatic mode can be switched on or off. Applies only to the "auto extern" operating mode (enables interval control to be implemented in the climate computer).
Running mode *	You can select between "auto intern" and "auto extern". "auto intern": When automatic mode is switched on, the temperature and humidity sensors are queried to determine the cooling requirement. "auto extern": The system only reacts to commands from a connected climate computer.

Active boxes **	With the controller versions LCM, the number of actually required sections is set. Each connected IO card allows 8 sections. A maximum of 4 additional IO cards can be connected. A total of 40 sections can theoretically be controlled. The numbering of the sections is fixed for each IO-Card (IO-Card1 = 1-8; IO-Card 2 = 9-16; ...).
Sensor Parameter *	In this submenu the spectrum of the sensor signals can be selected. If necessary, offset values can also be set to correct the displayed values. If, for example, the displayed temperature is 1.0°C too low, then the offset is set to +1.0°C.
Clamping Plan	In this submenu, the status of the inputs and outputs on the installed boards can be displayed. In addition, a "Manual mode" (password protected) offers the possibility to switch individual outputs manually.
Display settings	Various display settings can be made (e.g. display brightness, dimming settings).
System Info	Displays the installed software version.
CAN Info	Logging the errors of the CAN bus.
Software Update	It is possible to install a new software version from a MicroSD card (password protected; password 1949).
Backup	You can read out all settings (password 1949).
Restart System	When this menu item is selected, the system reboots. Note: If additional CAN components are connected, the controller must be restarted (otherwise the components will not be recognized).
Standard setting.	All values will be set back to standard default values.

4.7.7. Software update performance

**Important information!**  
It is possible to update every Touch Controller with a new software version in order to activate new features.  
The new software version will be installed via micro SD card.

Before the start of the updating process please observe the following safety notes:

**DANGER**

**Warning of electrical hazard!**

- Before working on the electrical equipment always shut off the power and prevent from unexpected restoration of power.
- Touching live parts, or parts that have become live due to faults, poses a direct risk of death.

1. **Shut off the power supply.**
2. **Open cover of the controller.**
3. Remove microSD card of the card adapter and put it into the slot which is located on the main-board (fig. 1).
4. Close cover of the controller.
5. Connect controller to the power supply
6. Press option key on the touch screen and select menu “System-Parameter” (fig. 2).
7. Select parameter “Software Update“.
8. Enter password **1949**.
9. Choose the required software version from the list (fig. 3). Confirm with OK.
  - ▶ The system will restart with the new software version.



Fig. 1

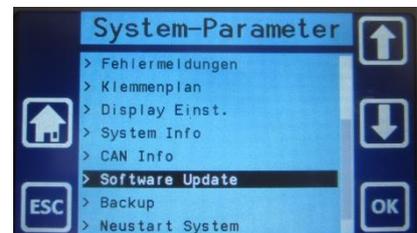


Fig. 2

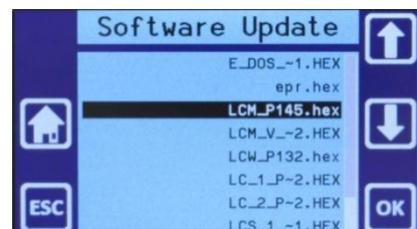


Fig. 3

## Maintenance

Despite the integrated monitoring and alarm function, the system must be monitored by qualified personnel regularly. On climatically extreme days, the system should be checked several times a day.

Check the system regularly for leaks in seals, fittings or valves and repair them. Also check the function of all components and pay attention to changes in the operating conditions. The instructions in section 6 "Troubleshooting" can support you doing this.

### Spare parts

Only use original spare parts, otherwise the warranty will expire.

Wear parts are excluded from the warranty.

### Piston pump instructions

Before each start-up, check the oil level in the crankcase of the piston pump and refill if necessary (15W-40).

First oil change after 50 operating hours, then at intervals of six months or after max. 500 operating hours.

Good lubrication is the simplest, most effective and cheapest maintenance.

Ensure safe and environmentally friendly disposal of operating and auxiliary materials.

It is also recommended to regularly check the condition of the seals and valves in the pump head. In the event of leaks, the defective seals and other defective parts must be replaced if necessary. If the pump flow rate is insufficient, this may be caused by worn valves.

#### NOTE

Please note for pump units with belt drive: The motor shaft and the drive of the pump must be aligned. Check the belt tension regularly. Excessive V-belt tension can shorten the service life of the bearings and the belt!

### Filter unit instructions

Check the condition of the filter cartridges regularly. If they are very dirty, replace them. Regular replacement (e.g. once a year) is recommended. Make sure that the order of the filter cartridges is correct. When replacing used filter cartridges, make sure that the O-ring is cleaned and lightly greased (e.g. with Vaseline).

When using a chemical filter cartridge (5 micron chem.) it must be changed regularly (twice a year or after 150 m<sup>3</sup> flow).

### High-pressure nozzles instructions

Check the spray pattern of the high-pressure nozzles regularly. If necessary, the nozzles can be unscrewed and disassembled for cleaning. In the case of limescale deposits, cleaning may be done in a descaling bath / acetic acid bath / ultrasonic bath. Afterwards rinse thoroughly and blow out.

If there are leaks in the O-ring seals of the nozzles, the O-rings must be replaced. If the nozzle on the nozzle body or on the spray head is damaged by mechanical or chemical overloading, the complete nozzle must be replaced.

If nozzles drip, the spring valve may be worn out and should be replaced.

**Cleaning instructions**

The system must be protected as good as possible against contamination. In particular, dirt on the pump unit and the control unit must be removed regularly. Contamination can endanger the function of the system, for example through inadequate ventilation.

Do not clean the pump unit, control unit and other electrical components with a high-pressure cleaner. Before cleaning with water, cover all openings which have to be protected - for safety and/or functional reasons – against water, steam or detergent penetration. After cleaning, the covers must be completely removed.

**Faults Touch Controller**

<b>Problem</b>	<b>Possible causes</b>	<b>Procedure/repair work</b>
Error message "No water alarm" <b>Note:</b> The controller also switches the alarm relay (see wiring plans).	The error message is triggered if no signal is present at the pressure switch input of the controller after the Press. wait time. This can have the following causes: - Press. wait time too short  - Duration for pressure build-up too long - No sufficient pressure is reached (switching point of the pressure switch is 25 bar) - compare with pressure gauge! - Pressure switch does not switch - Electrical connection of the pressure switch faulty	- Increase Press. wait time at the controller (System-parameter) - Remove cause of slow pressure build-up - Remove the cause of insufficient pressure (see further notes).  - Replace pressure switch - Repair connections
Malfunction of outputs or inputs	- Relay or other parts of the boards worn out/defective.	- Replace the affected board. When replacing the mainboard, the required software must be installed (please specify the version when ordering).

**Faults pump system**

<b>Problem</b>	<b>Possible causes</b>	<b>Procedure/repair work</b>
The pump is running, but does not reach sufficient pressure.	- Main valve does not open, e.g. due to faulty connections or defective solenoid coil. - Main valve does not open completely, because e.g. the membrane is damaged (torn)  - Inlet pressure not sufficient during operation - Filters blocked - The pump sucks in air  - Pump valves are leaking - Pressure regulator is worn out or incorrectly adjusted - Leaking pressure lines	- Repair connections or replace solenoid  - Repair main valve (replace diaphragm); if membrane is defective frequently, check pump valves and pressure regulator and replace if necessary. - Increase inlet pressure, check dimensioning of supply line - Replace filter cartridges - Check the supply line and ensure that it is absolutely airtight. - Replace valves - Replace pressure regulator or correct setting - Check pressure lines
The pump is running, but does not reach sufficient pressure.	- Leaking seals - Pump speed too low - Pump flow rate too low for the connected nozzle system	- Replace seals - Check drive - Check the dimensioning of the nozzle system and the selection of

	<ul style="list-style-type: none"> <li>- Pressure relief valve not closed</li> <li>- Pressure gauge defective</li> </ul>	<p>the pump and correct if necessary.</p> <ul style="list-style-type: none"> <li>- Repair/replace pressure relief valve</li> <li>- Replace pressure gauge</li> </ul>
The pump runs, but reaches the rated pressure very slowly.	<ul style="list-style-type: none"> <li>- Air in the high-pressure lines</li> </ul>	<ul style="list-style-type: none"> <li>- Vent high-pressure lines</li> </ul>
Nozzles drip on for a long time.	<ul style="list-style-type: none"> <li>- Pressure relief defective/not installed</li> <li>- Air in the high-pressure lines</li> </ul>	<ul style="list-style-type: none"> <li>- Repair/Retrofit pressure relief</li> <li>- Vent high-pressure lines</li> </ul>
Shocks in the high-pressure lines	<ul style="list-style-type: none"> <li>- Air in the high-pressure lines</li> <li>- Insufficient mounting</li> <li>- Pressure fluctuations</li> </ul>	<ul style="list-style-type: none"> <li>- Vent high-pressure lines</li> <li>- Improve fixation</li> <li>- See following notes</li> </ul>
Irregular pressure fluctuations	<ul style="list-style-type: none"> <li>- Worn pump valves</li> <li>- Foreign objects in the pump valves</li> <li>- The pump sucks in air</li> <li>- Leaking seals</li> <li>- Pressure regulator does not function properly</li> </ul>	<ul style="list-style-type: none"> <li>- Replace pump valves</li> <li>- Clean valves</li> <li>- Check supply line (air bubbles?)</li> <li>- Replace seals</li> <li>- Replace pressure regulator</li> </ul>
Increase in noise level	<ul style="list-style-type: none"> <li>- The pump sucks in air</li> <li>- Cavitation due to insufficient water supply (low pressure, suction line too small or blocked, main valve defective, filter blocked, high water temperature)</li> <li>- Inlet pressure not sufficient during operation</li> <li>- Too high temperatures of the pumped liquids</li> <li>- Valve spring broken or softened</li> <li>- Foreign objects in the pump valves</li> <li>- Bearings worn out</li> </ul>	<ul style="list-style-type: none"> <li>- Check the supply line and ensure that it is absolutely airtight.</li> <li>- Check the water supply</li> <li>- Increase inlet pressure, check dimensioning of supply line</li> <li>- Reduce the temperature of the pumped liquid.</li> <li>- Replace pump valves</li> <li>- Clean valves</li> <li>- Replace pump or repair bearings</li> </ul>
Oil leakage at the drive shaft	<ul style="list-style-type: none"> <li>- Shaft seal defective</li> </ul>	<ul style="list-style-type: none"> <li>- Replace seal</li> </ul>
Water in the oil (white emulsion)	<ul style="list-style-type: none"> <li>- Seals damaged or worn out</li> <li>- High humidity (condensation water)</li> <li>- Piston damaged or worn (hairline crack?)</li> </ul>	<ul style="list-style-type: none"> <li>- Replace seals</li> <li>- Change oil and reduce oil change interval by half.</li> <li>- Replace piston</li> </ul>
Water leakage between pump casing and pump head	<ul style="list-style-type: none"> <li>- Worn gasket kit</li> <li>- Worn or damaged piston</li> <li>- Worn seal between piston and piston screw</li> </ul>	<ul style="list-style-type: none"> <li>- Replace gasket kit</li> <li>- Replace piston</li> <li>- Replace seal</li> </ul>

Overheating of the pump	<ul style="list-style-type: none"> <li>- Flow rate below minimum flow rate</li> <li>- Excessive air and/or water temperature</li> <li>- Poor ventilation</li> <li>- Oil level in pump housing does not meet specifications</li> <li>- Excessive heat input through the drive/motor</li> </ul>	<ul style="list-style-type: none"> <li>- Increase flow rate (increase number of nozzles)</li> <li>- Reduce temperatures</li> <li>- Ensure adequate ventilation</li> <li>- Correct oil level</li> <li>- Check and repair/replace the drive/motor</li> </ul>
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### Faults with Vario-pumps

Problem	Possible causes	Procedure/repair work
System can only build up sufficient pressure when only few compartments are in operation	<ul style="list-style-type: none"> <li>- Main valve does not open completely, because e.g. the membrane is damaged (torn)</li> <li>- Pressure sensor defective (continuously outputs too high voltage above 7,5 V) - System runs continuously at minimum speed</li> </ul>	<ul style="list-style-type: none"> <li>- Repair/Replace main valve (e.g. replace membrane)</li> <li>- Replace pressure sensor</li> </ul>
Motor runs at high speed even with a small number of nozzles	<ul style="list-style-type: none"> <li>- Pressure regulator is worn out or incorrectly adjusted (pressure always below rated pressure of 70 bar)</li> <li>- Pressure sensor defective (permanently outputs too low voltage below 7,5 V)</li> </ul>	<ul style="list-style-type: none"> <li>- Replace pressure regulator or correct setting</li> <li>- Replace pressure sensor</li> </ul>
System does not start any more	<ul style="list-style-type: none"> <li>- Frequency converter on fault (diagnostic LED red)</li> <li>- Frequency converter defective</li> <li>- incorrect/no software on the frequency converter - diagnostic LED flashes green (4Hz) - only the fan is running</li> </ul>	<ul style="list-style-type: none"> <li>- Restart the system (main switch) and, if necessary, rectify the cause of the overload.</li> <li>- Replace frequency converter; when ordering, specify for which pump it is required (software will be installed)</li> <li>- Re-install software (e.g. using another EEPROM with correct software)</li> </ul>
GFCI (ground fault circuit interrupter) triggers	<ul style="list-style-type: none"> <li>- Jumper in frequency converter is plugged in incorrectly:</li> </ul>	<ul style="list-style-type: none"> <li>- Reposition jumper</li> </ul> <p>Correct:                      Wrong:</p>

### Faults with pumps with belt-drive

Problem	Possible causes	Procedure/repair work
Pump does not reach sufficient pressure	<ul style="list-style-type: none"> <li>- too much slippage of the belt</li> </ul>	<ul style="list-style-type: none"> <li>- Tension or replace belt</li> </ul>
excessive heating of the pulleys / the pump	<ul style="list-style-type: none"> <li>- The condition of the belt and/or the pulleys is not okay.</li> <li>- Tension of the belt</li> <li>- Motor and pump shaft not correctly aligned</li> </ul>	<ul style="list-style-type: none"> <li>- Replace belt and/or pulley</li> <li>- Correct belt tension</li> <li>- Align motor and pump shaft parallel, belt pulleys must be alignment</li> </ul>

### Faults high-pressure valves/electric pressure relief

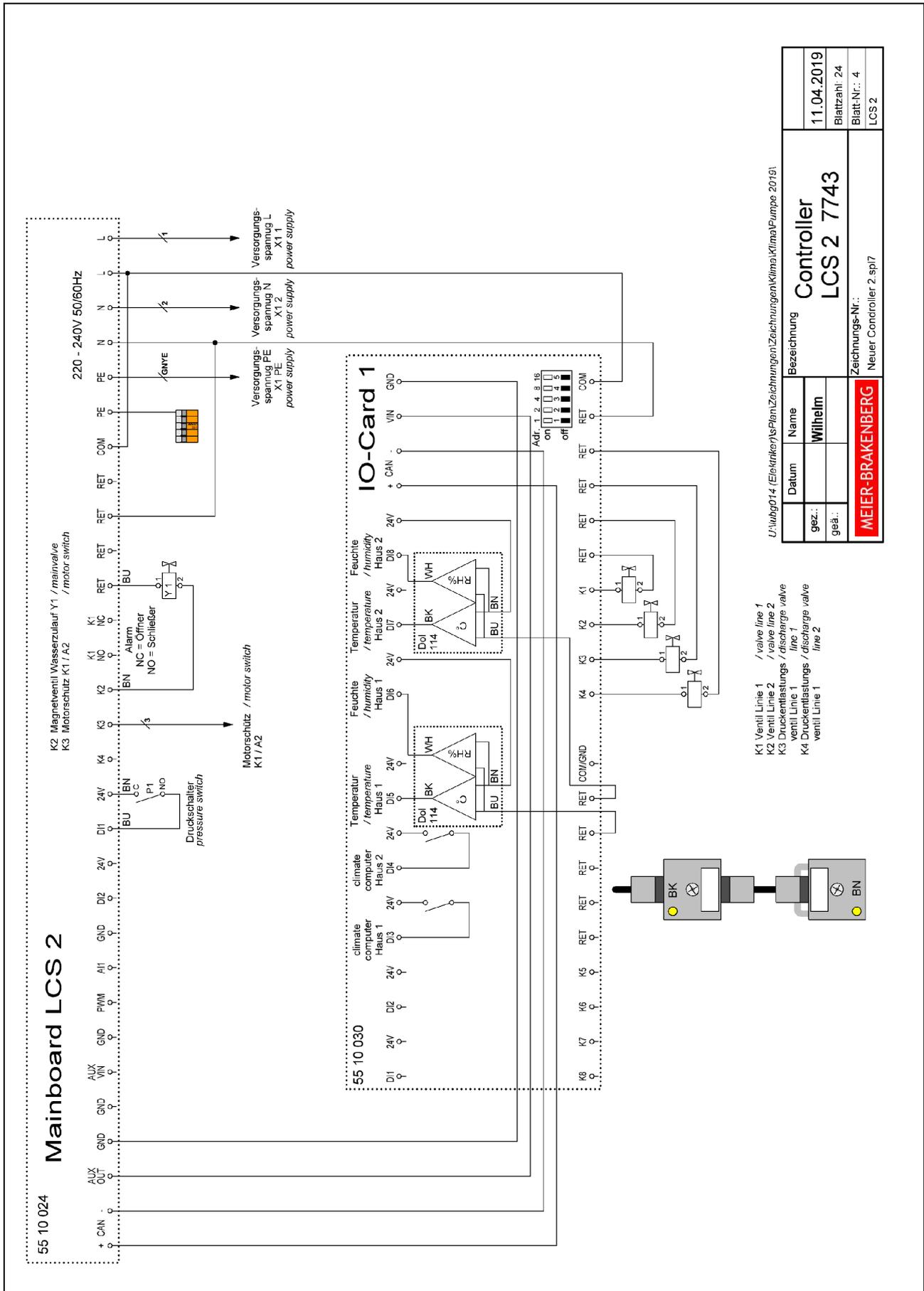
<b>Problem</b>	<b>Possible causes</b>	<b>Procedure/repair work</b>
Valve does not open	<ul style="list-style-type: none"> <li>- Solenoid of high pressure valve is too hot</li> <li>- Solenoid of high-pressure valve defective</li> <li>- Voltage too low</li> <li>- Power supply faulty</li> <li>- Valve blocked by deposits</li> <li>- The top of the high-pressure valve was mounted rotated by 180° (the relief bore in the housing and cover must be aligned).</li> </ul>	<ul style="list-style-type: none"> <li>- Ensure adequate ventilation and ventilation.</li> <li>- Replace solenoid</li> <li>- Check voltage and increase if necessary</li> <li>- Repair electrical system</li> <li>- Replace or clean valve</li> <li>- Mount top correctly</li> </ul>
Valve does not close while pump is running	<ul style="list-style-type: none"> <li>- Seals in the valve worn out</li> <li>- Valve seat damaged in housing or top</li> <li>- Valve installed upside down (arrow must point in direction of flow)</li> <li>- Broken spring</li> <li>- Bores clogged / deposits in valve</li> <li>- Power supply faulty</li> </ul>	<ul style="list-style-type: none"> <li>- Replace valve</li> <li>- Replace valve</li> <li>- Install the valve correctly</li> <li>- Replace valve</li> <li>- Clean holes/valve or replace valve</li> <li>- Repair electrical system</li> </ul>
Leakage at the valve	<ul style="list-style-type: none"> <li>- Seals worn or damaged</li> <li>- Parts of the valve damaged</li> <li>- Valve incorrectly mounted</li> </ul>	<ul style="list-style-type: none"> <li>- Replace valve</li> <li>- Replace valve</li> <li>- Install the valve correctly</li> </ul>
Large amount of water during each pressure relief process	<ul style="list-style-type: none"> <li>- compressed air pushes the water out of the pipes</li> <li>- Main valve does not close properly (permanent pressure at pressure gauge behind main valve)</li> </ul>	<ul style="list-style-type: none"> <li>- Vent lines</li> <li>- Check membrane and valve seats of main valve; clean or replace membrane/main valve</li> </ul>







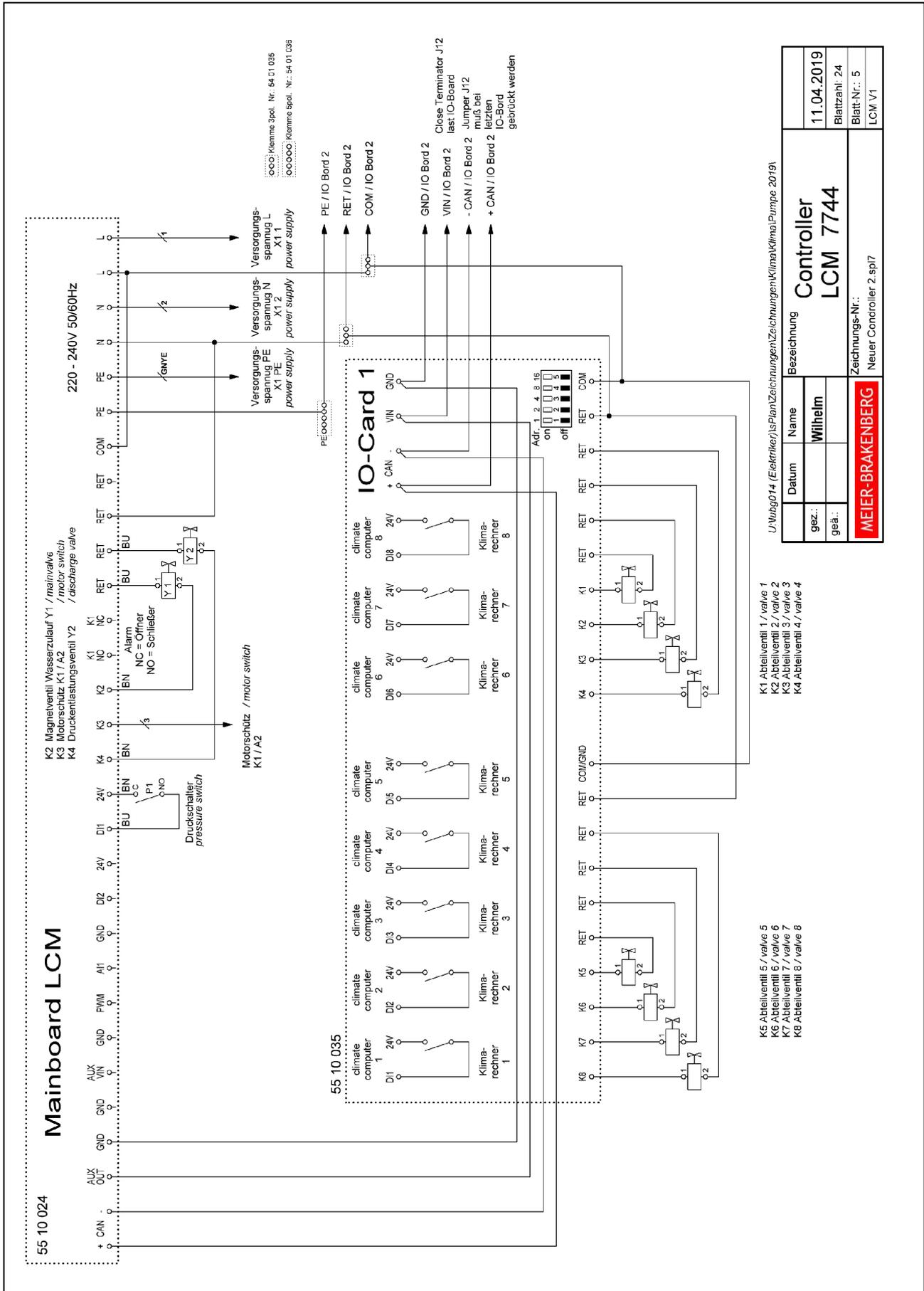
# 7.4 Touch Controller LCS-2



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Datum		11.04.2019	
Name		Controller	
Name		LCS 2 7743	
gez.:		Blattzahl: 24	
geä.:		Blatt-Nr.: 4	
Zeichnungs-Nr.:		LCS 2	
Zeichnungs-Nr.:		Neuer Controller 2.sp17	
<b>MEIER-BRAKENBERG</b>			

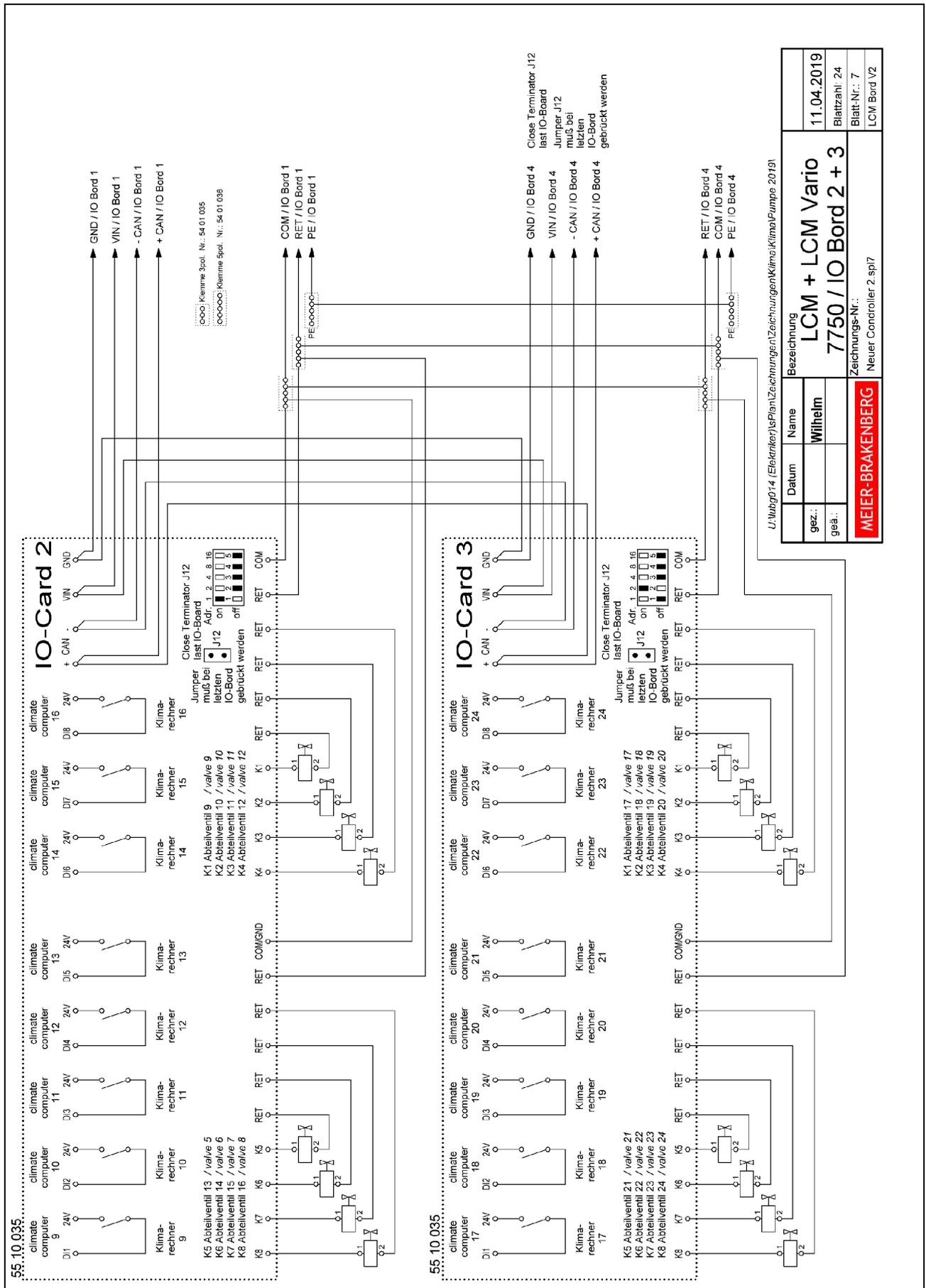
# 7.5 Touch Controller LCM



Bezeichnung		11.04.2019	
Controller		Blattzahl: 24	
LCM 7744		Blatt-Nr.: 5	
Zeichnungs-Nr.: Neuer Controller 2.sp7		LCM V1	
Name		Datum	
Wilhelm			
gez.:			
geäd.:			
<b>MEIER-BRAKENBERG</b>			



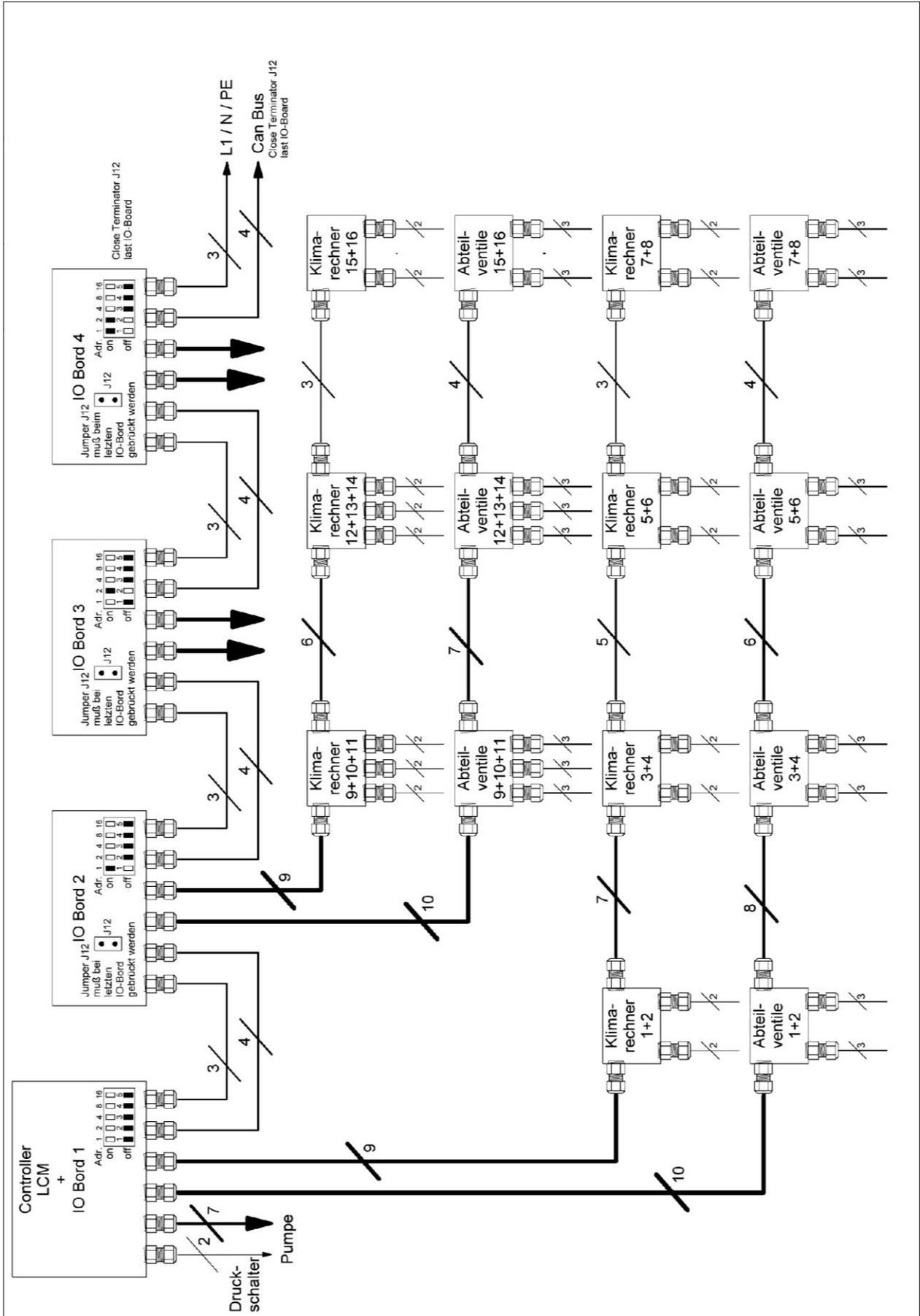
# 7.7 Erweiterungsboxen/Extension boxes



U:\hubg014 (Elektriker)\sPlan\Zeichnungen\Zeichnungen\Klima\KlimaPumpe 2019\

gez.:	Name	Bezeichnung	11.04.2019
geal.:	Wilhelm	LCM + LCM Vario	Blattzahl: 24
		7750 / IO Bord 2 + 3	Blatt-Nr.: 7
	Zeichnungs-Nr.: Neuer Controller 2.sp17		LCM Bord V2
	<b>MEIER-BRAKENBERG</b>		

## 7.8 Anschlussschema Vario-System/Connection scheme Vario-system









## 8 Technische Daten/Technical data

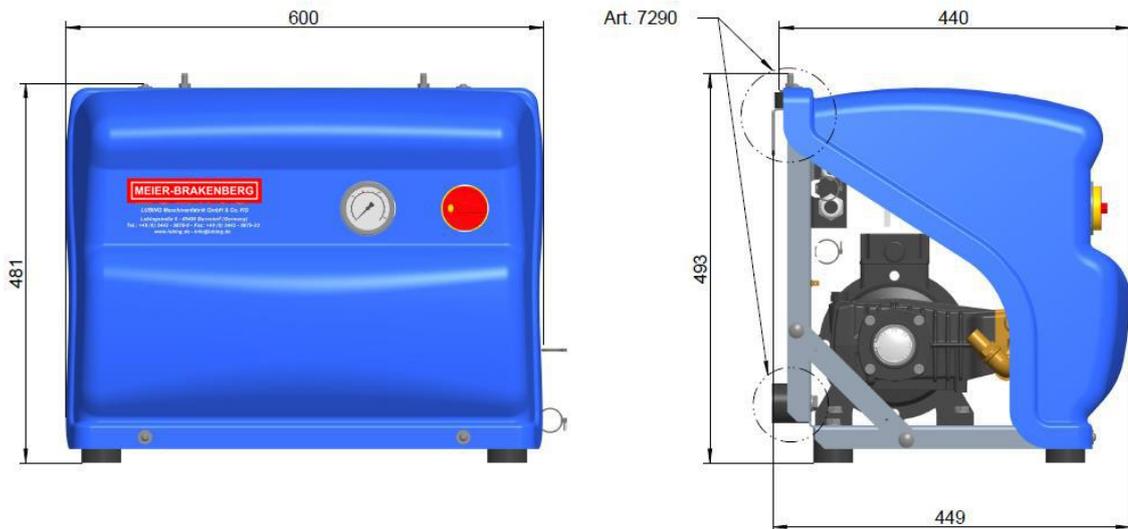
Nenndruck aller Pumpeneinheiten: 70 bar

Rated pressure of all pump units: 70 bar (1000 psi)

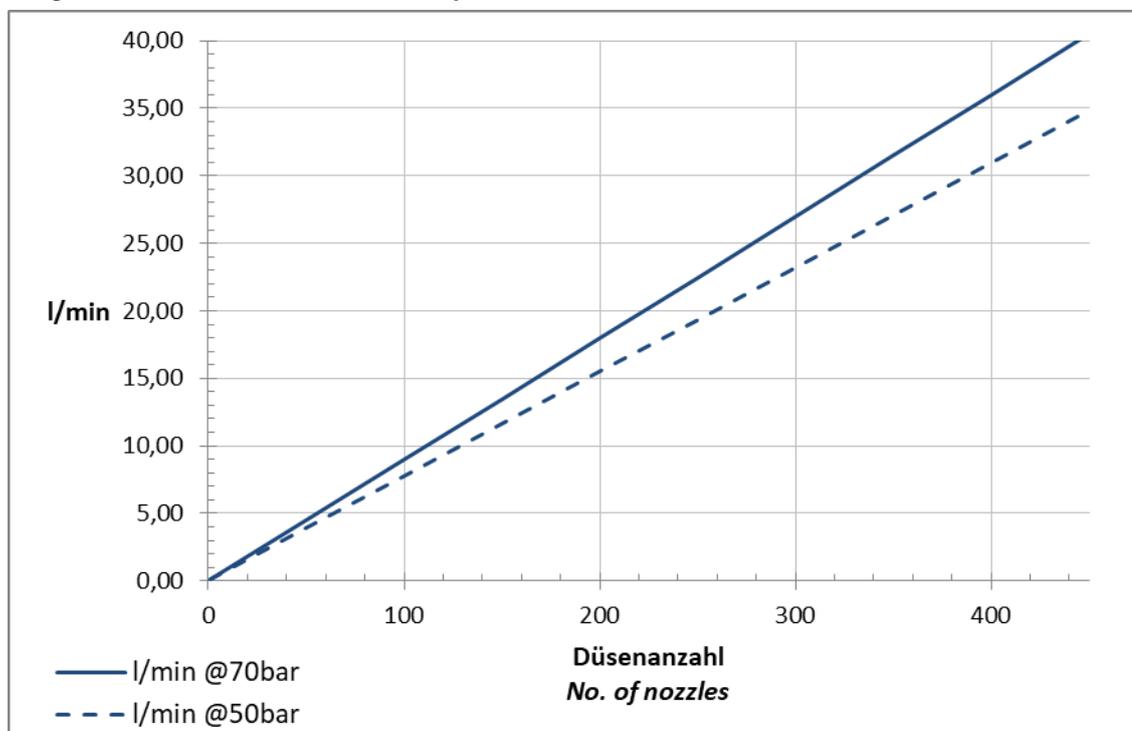
Art.-Nr.	Spannung voltage	Frequenz frequency	Motorleistung motor power	Nennstrom rated current	max. Fördermenge * max. flow rate *	min. Fördermenge ** min. flow rate **	empfohlene Düsenanzahl *** (min. - max.) recommended no. of nozzles *** (min. - max.)	Öfüllmenge (SAE 30 / 15W-40) Oil volume	Gewicht weight
	[V]	[Hz]	[kW]	[A]	[l/min]	[l/min]		[l]	
7211	3x400	50/60	1,5	3,8	6 (50Hz) 7 (60Hz)	2 (50Hz) 2,3 (60Hz)	20-60 (50Hz) 23-70 (60Hz)	0,3	42
7211-1	1x230	50	1,5	9,5	6	2	20-60		43
7211-2	3x230	50/60	1,5	6,5	6 (50Hz) 7 (60Hz)	2 (50Hz) 2,3 (60Hz)	20-60 (50Hz) 23-70 (60Hz)		42
7211-60-1	1x230	60	1,5	9,5	7	2,3	23-70		43
7212	3x400	50/60	2,2	5,4	12 (50Hz) 14 (60Hz)	4 (50Hz) 4,6 (60Hz)	50-140 (50Hz) 55-160 (60Hz)	0,45	45
7212-1	1x230	50	2,2	14	12	4	50-140		50
7212-2	3x230	50/60	2,2	10	12 (50Hz) 14 (60Hz)	4 (50Hz) 4,6 (60Hz)	50-140 (50Hz) 55-160 (60Hz)		45
7212-60-1	1x230	60	2,2	14	14	4,6	55-160		50
7213	3x400	50	3,0	7	21	7	90-250	0,47	52
7213-2	3x230	50	3,0	11,6	21	7			52
7213-60	3x400	60	3,0	7	18	6	80-220		52
7213-60-2	3x230	60	3,0	11,6	18	6			52
7214	3x400	50	4,0	9,1	30	10	140-350	1,04	60
7214-60	3x400	60	4,0	9,1	28	9,3	120-320		60
7215	3x400	50	5,5	12,2	38	12,6	180-440		72
7215-60	3x400	60	5,5	12,2	36	12	170-420	72	
7217	3x400	50/60	2,2	5,4	14	0,5	6-160	0,47	51
7217-2	3x230	50/60	2,2	9,1	14	0,5			52
7218	3x400	50/60	4,0	9,1	25	1	10-280	1,04	61
7218-2	3x230	50/60	4,0	15,8	25	1			64
7222	3x400	50/60	2,2	5,4	13 (50Hz) 15 (60Hz)	4,3 (50Hz) 5 (60Hz)	50-150 (50Hz) 55-165 (60Hz)	0,37	48
7223	3x400	50/60	4,0	9,1	21 (50Hz) 25 (60Hz)	7 (50Hz) 8,3 (60Hz)	90-250 (50Hz) 105-280 (60Hz)	1,1	61
7227	3x400	50/60	2,2	5,4	15	0,5	6-160	0,37	50
7228	3x400	50/60	4,0	9,1	25	1	10-280	1,1	68

- \* Ohne Verluste über das Druckregelventil (Bypass).  
*Without losses over pressure regulator (bypass).*
- \*\* Bei Unterschreitung kann dies zum Überhitzen und zu einem Schaden an der Pumpeneinheit führen.  
*Flow rates below the lower limit can cause overheating and damage the pump unit.*
- \*\*\* Ungefähre Werte: gelten für die Sprühdüsen 7340/7341/7344 bei 70 bar (ca. 5,3 l/h pro Düse). Wird der angegebene Bereich unterschritten, kann dies zu Schäden führen.  
*Approximate values: applicable for the nozzles 7340/7341/7344 at 70 bar (ca. 5,3 l/h per nozzle). Values below this range can cause damages.*

**Abmessungen D-Line Pumpeneinheit**  
**Dimensions D-Line pump unit**



**Diagramm Düsenanzahl – erforderliche Fördermenge**  
**Diagram No. Of nozzles – necessary flow rate**



(Die Düsen funktionieren im Druckbereich von 50-70 bar. Je geringer der Druck, desto geringer der Wasserverbrauch pro Düse. Der Druckverlust in den Leitungen führt zu geringeren Drücken am Linienende.)  
*(The nozzles can work with 50-70 bar. The lower the pressure, the smaller is the water consumption per nozzle. The pressure loss in the pipes results in lower pressures at the end of the line.)*

## Technische Daten MEIER-BRAKENBERG Touch Controller

### Technical data MEIER-BRAKENBERG Touch Controller

<b>Elektrische Daten / Electrical data</b>	
Versorgungsspannung / Power supply	85-264 V
Nennfrequenz / Frequency	50/60 Hz
Leistungsaufnahme / Power consumption	max. 20 VA
Ausgänge / Outputs (Mainboard)	max. 4 Relais 250 V, 1 A; 1 PWM Ausgang 0-10V
Eingänge / Inputs (Mainboard)	2 Digitale Eingänge, 1 Analogeingang 0-10V
Optionen / Options	erweiterbar über IO-Cards via CAN-bus

<b>Umwelt / Environment</b>	
Temperatur Betrieb / Working temperature	- 10-+50°C
Temperatur Lagerung / Temperature of storing	- 20-+60°C
Feuchtigkeit Betrieb / Working humidity	0-80 %
Schutzart / Protection class	IP 54

<b>Maße und Gewicht / Weight and dimensions (MBWEICH3, LC-2, MBWEICH4, LCS-2)</b>	
B x H x T	252 x 162 x 90 mm
Gewicht / Weight	ca. 1,1 kg
<b>Maße und Gewicht / Weight and dimensions (LCM vario)</b>	
B x H x T	302 x 232 x 90 mm
Gewicht / Weight	ca. 1,9 kg

### Software-Versionsübersicht

#### Software overview

<b>Einführung/ Launch</b>	<b>Software-Version/ software version</b>	<b>Bemerkung/ Comment</b>