Risk of electrical shock!
Hazardous electrical voltage.
All electrical work to be performed by certified expert staff (electricians or expert personnel with equivalent training) only.
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1. Introduction

Dear Customer,

Thank you for choosing a HygroMatik steam humidifier.

HygroMatik steam humidifiers represent the latest in humidification technology.

In order to operate your HygroMatik steam humidifier safely, properly and efficiently, please read these operating instructions.

Employ your steam humidifier only in sound condition and as directed. Consider potential hazards and safety issues and follow all the recommendations in these instructions.

If you have additional questions, please contact your expert dealer.

For all technical questions or spare parts orders, please be prepared to provide unit type and serial number (see name plate on the unit).

1.1 Typographic Distinctions

• preceded by a bullet: general specifications

» preceded by an arrow: Procedures for servicing or maintenance which should or must be performed in the indicated order

☑ Installation step which must be checked off.

italics Terms used with graphics or drawings

1.2 Documentation

Retention

Please retain these operating instructions in a secure, always accessible location. If the product is resold, turn the documentation over to the new operator. If the documentation is lost, please contact HygroMatik.

Versions in Other Languages

These operating instructions are available in several languages. If interested, please contact HygroMatik or your HygroMatik dealer.

1.3 Symbols in Use

1.3.1 Specific Symbols related to Safety Instructions

According to ANSI Z535.6, the following signal words are used within this document:

⚠️ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠️ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠️ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

⚠️ NOTICE

NOTICE is used to address practices not related to physical injury.

1.3.2 General Symbols

Please note

This symbol is used whenever a situation requires special attention beyond the scope of safety instructions.
1.4 Intended Use

HygroMatik electrode steam humidifiers serve for steam production based on tap water or partially softened water. Only use supply water featuring a conductivity of 125 to 1250 µS/cm.

![Conductivity Chart]

- **D1**: Lower threshold
- **C1**: Range of reduced conductivity (adjustment required)
- **A**: Normal Tap water
- **B**: Range of increased conductivity
- **C2**: Range of high conductivity (adjustment required)
- **D2**: Upper threshold

In the C1 and C2 ranges, adaptation of the periodic blow-down frequency may be required. Please refer to parameter „2-1“ and „2-2“ explanations given in the „Detailed parameter descriptions“ section.

Proper usage also comprises the adherence to the conditions specified by HygroMatik for:

- installation
- dismantling
- reassembly
- commissioning
- operation
- maintenance
- disposal.

Only qualified and authorised personnel may operate the unit. Persons transporting or working on the unit must have read and understood the corresponding parts of the Operation and Maintenance Instructions and especially the chapter 2. „Safety Notes“. Additionally, operating personnel must be informed of any possible dangers. You should place a copy of the Operation and Maintenance Instructions at the unit's operational location (or near the unit).

**By construction, HygroMatik steam humidifiers are not qualified for exterior application.**

⚠️ **WARNING**

**Risk of scalding!**
Steam with a temperature of up to 100 °C (212°F) is produced. Do not inhale steam directly!
2. Safety Instructions

These safety instructions are required by law. They promote workplace safety and accident prevention.

2.1 Guidelines for Safe Operation

2.1.1 Scope
Comply with the accident prevention regulation „DGUV Regulation 3“ to prevent injury to yourself and others. Beyond that, national regulations apply without restrictions.

2.1.2 Unit control
Do not perform any work which compromises the safety of the unit. Obey all safety instructions and warnings present on the unit.

In case of a malfunction or electrical power disruption, switch off the unit immediately and prevent a restart. Repair malfunctions promptly.

⚠️ WARNING

Restricted use.
IEC 60335-1 stipulates as follows:
This device may be used by children of eight years of age and above as well as by persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge so long as they are supervised or have been instructed regarding the safe use of the device and understand the hazards that may result from it. Cleaning and user maintenance of the unit must not be undertaken by children without supervision.

2.1.3 Unit Operation

⚠️ WARNING

Risk of scalding!
Uncontrolled hot steam escape in case of leaking or defective components possible. Switch off unit immediately.

---

NOTICE

Risk of material damage!
The unit may be damaged if switched on repeatedly following a malfunction without prior repair.

Rectify defects immediately!

The unit must not be operated on a DC power supply.
The unit may only be used connected to a steam pipe that safely transports the steam.

Regularly check that all safety and monitoring devices are functioning normally. Do not remove or disable safety devices.
2.1.4 Mounting, dismantling, maintenance and repair of the unit

**NOTICE**

The HygroMatik steam humidifier is IP20 protected. Make sure that the unit is not object to dripping water in the mounting location.

Installing a humidifier in a room without water discharge requires safety devices to protect against water leakages.

- Use genuine spare parts only
- After any repair work, have qualified personnel check the safe operation of the unit
- Attaching or installing of additional components is permitted only with the written consent of the manufacturer

2.1.5 Electrical

**WARNING**

Risk of electrical shock!
Hazardous electrical voltage!

Any work on the electrical system to be performed by certified expert staff (electricians or expert personnel with comparable training) only.

Disconnect unit components from electrical power supply prior to work.

After electrical installation or repair work, test all safety mechanisms (such as grounding resistance).

**NOTICE**

Use only original fuses with the appropriate amperage rating.

Regularly check the unit’s electrical equipment. Promptly repair any damage such as loose connections or burned wiring.

Responsibility for intrinsically safe installation of the HygroMatik steam humidifiers is incumbent on the installing specialist company.

2.2 Disposal after dismantling

**NOTICE**

The operator is responsible for the disposal of unit components as required by law.
3. Transport

3.1 Overview

Please note
Proceed carefully when transporting the steam humidifier in order to prevent damage due to stress or careless loading and unloading.

3.2 Packing

Please note
Pay attention to the icons affixed to the packing box.

3.3 Interim Storage

Store the unit in a dry place and protect from frost and strong sunlight.

3.4 Check for Complete and Correct Delivery of Goods

Upon receipt of the unit, confirm that:

- model and serial number on the name plate match those specified in the order and delivery documents
- the equipment is complete and all parts are in perfect condition

Please note
In case of damage from shipment and/or missing parts, immediately notify the carrier or supplier in writing.

Time limits for filing freight claims with shipping companies are*:

<table>
<thead>
<tr>
<th>Shipping company</th>
<th>After receipt of goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carriers</td>
<td>no later than 4 days</td>
</tr>
<tr>
<td>Parcel service</td>
<td>immediately</td>
</tr>
</tbody>
</table>

* Time limits for some services subject to change.
4. Functional Description and Device Composition

4.1 Mode of Action
Making use of the frictional heat caused by current flow in a water tank

The HygroMatik humidifier utilizes the conductivity normally present in tap water for steam production. Electrodes inside an enclosed steam cylinder are immersed directly into the tap water. They are connected to the alternating current.

The conductivity of the water generates an electric current between the electrodes. In this way, the electric power supplied is converted directly into heat without energy loss. The steam produced has a temperature of about 100°C (212°F) with minimal excess pressure ("pressureless steam"). It is largely free of minerals and germ-free. Mineral deposits typically remain behind in the cylinder.

4.2 Mechanical construction
The StandardLine humidifiers are designed for wall mounting. For maintenance purposes, the steam cylinders are separable in the middle.

Please note
Starting with the manufacturing date of 11/2018, the steam humidifiers SLE45 and SLE65 make use of a modified steam cylinder that are separable in the upper part of the wall. When replacing the steam cylinder, the new cylinders with the designation „CY45/2“ may be incorporated in the older units as well. With the steam cylinder modification also the electrodes have changed. The new electrodes only fit in the new steam cylinders.

The cylinders CY45/2 allow for unit operation without a cylinder star even in case of high conductivity of the cylinder water.
4.3 Operating sequence

By pressing the control switch („Pos. 1”) the humidifier is turned on. When the controller specifies an increase in humidity, the main contactor is switched on and the electrodes (48)\(^*\) are supplied with power. The water inlet solenoid valve (25)\(^*\) feeds water into the steam cylinder (16)\(^*\).

As soon as the electrodes are immersed, the current begins to flow. The water is now heated. When the pre-selected output is reached, the control turns off the solenoid valve and interrupts the water supply.

After a short period of heating up, the water between the electrodes starts boiling and then vaporizes. The vaporization lowers the water level in the steam cylinder, reducing the output provided. To compensate for that, fresh water is fed into the steam cylinder every now and then by opening the intake solenoid valve.

Humidifier power usage is continuously monitored. With a cold start-up, the nominal current increases to 128% in order to achieve quick-start output parameters. This activates the electronic overflow limiter which causes a partial draining of the cylinder. This reduces the immersed surface area of the electrodes, lowering power usage.

The concentration of dissolved salts increases over time, which can lead to a rise in the conductivity of the water. If this continues, conductivity may increase until a short circuit occurs. This could damage the unit, but in any case would significantly reduce the life span of the electrodes.

For this reason, regular, periodic blow-downs of some of the concentrated water are very important. Following this procedure as recommended provides stable cylinder water conductivity as well as minimal water loss for the expected service life of the cylinder.

Water blow-down is performed by a blow-down pump 32)\(^*\). The functioning of the blow-down pump is continuously monitored during operation. If the pump is damaged, the steam humidifier shuts down.

With normal water quality the blow-down loss rate lies between 7 and 15 % of the amount of steam produced. Depending on water quality, a full steam cylinder blow-down is run every 3 to 8 days.

Mineral deposits settle in the open area below the electrodes and are removed through periodic maintenance. The blow-down pump itself has wide openings and can flush out smaller pieces of mineral deposit. This extends the service life of the unit and reduces the required maintenance interval.

On blow-down, water flows from the pump into the drainage system.

For maintenance purposes, the cylinder water may be pumped out by pressing and holding the control switch in the „II“ position.

Monitoring max. level

A sensor electrode (10)\(^*\) monitors the maximum water capacity of the cylinder. When the water level reaches the sensor electrode, the water supply is interrupted. This can occur when the water has low conductivity or when the electrodes are worn out. In the case of low water conductivity, however, this state usually lasts only a short time. The built-in control and the large area electrodes combine to produce a rapid rise in conductivity by increasing the concentration of the water.

\(^*\) numbers indicated correspond with those in the exploded view in the „Exploded view“ chapter.
5. Mechanical installation

**WARNING**

Risk of foot injuries!
Prevent unit from dropping during installation!
Helping hand of a second person is advisable.

**WARNING**

Risk of electrical shock!
Hazardous electrical voltage.
During installation, the unit must be disconnected from power supply.

5.1 Environment Parameters to be met and Mounting Recommendations

When selecting the installation site for the steam humidifier, take the following into account:

- The minimum clearances indicated in the fitting measures section must be observed in order to ensure adequate unit ventilation and allow for unobstructed access in case of maintenance
- Protection class IP20
- By design, HygroMatik steam humidifiers are not qualified for outdoor installation (electroinical components and water-bearing parts may be damaged)
- Ambient temperature must lie between +5 and +40 °C (+41 and +104 °F) in order to protect the unit electronics against damage; frost may damage the steam cylinder, the solenoid valve and pump, as well as make hoses burst
- Relative humidity must not exceed 80 % r.h., since values beyond may lead to electronic malfunction or damage
- Installation in a closed room requires aeration and, eventually, temperature conditioning in order to meet the a.m. environmental conditions
- The steam humidifier should be installed as close as possible to the steam manifold. Optimum performance is only guaranteed when steam and condensate hoses are kept short
- Make use of existing water connections for supply and draining
- Hoses must be laid at a consistent 5 to 10 % incline/decline; sagging and kinking prevention is a must
- Mount the unit on a stable, preferably solid wall offering the bearing capacity required (s. unit technical specifications). If such a wall is not at hand, the unit may be attached to a stand bracket firmly bolted to the floor
- For proper functioning of the level control, plumb and level installation of the unit is required
- The steam humidifier rear panel heats up during operation to a maximum of 70 °C (158 °F). Take care that the construction on which the unit is to be mounted is not made of temperature-sensitive material
5.1.1 Dimensions and Mounting Directions

Table of dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>X [mm/inch]</th>
<th>Y [mm/inch]</th>
<th>Z [mm/inch]</th>
<th>A [mm/inch]</th>
<th>B [mm/inch]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLE 02</td>
<td>350/13.8</td>
<td>375/14.8</td>
<td>245/9.6</td>
<td>295/11.6</td>
<td>372/14.7</td>
</tr>
<tr>
<td>SLE05-SLE10</td>
<td>350/13.8</td>
<td>535/21</td>
<td>245/9.6</td>
<td>295/11.6</td>
<td>535/21</td>
</tr>
<tr>
<td>SLE15-SLE30</td>
<td>425/16.7</td>
<td>695/27.4</td>
<td>320/12.6</td>
<td>370/14.6</td>
<td>695/27.4</td>
</tr>
<tr>
<td>SLE45-SLE65</td>
<td>590/23.2</td>
<td>790/31.1</td>
<td>415/16.3</td>
<td>535/21</td>
<td>787/31</td>
</tr>
</tbody>
</table>

Wall clearances

When mounting the steam humidifier, the wall clearances shown in the fig. below must be obeyed:

![Wall clearance diagram]

For wall mounting drill measures, please consult the table above (measure A). In case of no suitable wall available for mounting the unit, it is recommended that installation is made on brackets firmly anchored in the floor.

» mark the holes for the upper suspension brackets screws.
» drill holes and dowel.
» screw in the supplied mounting screws; let the screws protrude approx. 12 mm/.5 inch from wall.
» ensure firm fixation and load-carrying capacity of the mounted screws!
» hook in the unit and ensure safe suspension.
» mark the holes for the lower suspension brackets screws.
» remove the unit.
» drill holes and dowel.
» hook in the unit and mount the lower screws firmly.

Mounting principle

To function properly, the steam humidifier must hang level and plumb.

Please note
Device connections:

steam outlet

water inlet

cable entries

waste water connection
5.2 Unit Installation Check

Before start-up, pls. check proper unit installation following the list below:

☑ Unit perpendicularly aligned in both the vertical and horizontal axis?
☑ All clearances obeyed?
☑ Steam hose installed with 5 - 10 % minimum incline/decline (see chapter "Steam line")?
☑ Condensate hose features a loop functioning as a steam barrier (see chapter „Condensate hose“)?
☑ Steam manifold(s) properly positioned?
☑ All bolts and clamps properly tightened?
☑ Steam manifold(s) horizontally mounted and suspended on the free end, if required?
☑ All seals (o-rings) in place?
☑ All ventilation slots on housing top unobscured?
5.3 Absorption Distance $B_N$

The "absorption distance" ($B_N$) is defined as the distance from the steam feed to where the steam is completely absorbed in the treated air. Within the absorption distance, steam is visible as mist in the air stream.

Condensation may occur on anything installed within the absorption distance.

Although steam outside the absorption distance ($B_N$) is completely absorbed, it is not yet evenly diffused in the duct. If you plan to install any parts or devices inside the absorption distance, such as sensors or elbows, we recommend increasing the absorption distance using the formulae below. The absorption distances required for certain installed fittings are distinguished by separate symbols and calculated as a multiplier of the absorption distance $B_N$.

The absorption distance has no fixed value, but depends on many factors. These are depicted in the absorption distance nomogram below.

5.3.1 Determining the Absorption Distance

To determine the absorption distance, the following parameters are required:

- quantity of steam introduced $m_D^\circ$ in kg/h.
- air speed $w_L$ in m/s in air duct
- Total length $l_D$ of the steam manifold installed in the air duct

Length $l_D$ of the usable steam manifold depends on the dimensions of the air duct. The length of the absorption distance can be reduced by using multiple steam manifolds (also see section on the steam manifold).

Method:

Graphically determine absorption distance $B_N$ using the absorption distance nomogram (also see Section "Absorption Distance Nomogramm"). Enter the value of the parameters enumerated above into the respective quadrants. The resulting point of intersection indicates the value of the desired absorption distance $B_N$.

Notes:

Air humidity before humidification $x_1$:[g/kg]
Air temperature after humidification $t_2$:[°C]
Specific increase in humidity $\triangle x$:[g/kg]
Quantity of steam introduced $m_D^\circ$:[kg/h]
Air speed $w_L$:[m/s]
Total length of steam manifold $l_D$:[mm]

<table>
<thead>
<tr>
<th>Absorption Distance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$B_N$</td>
<td>for normal obstructions such as sensors, ventilators, outlets</td>
</tr>
<tr>
<td>$B_c = (1.5...2) \times B_N$</td>
<td>for fine filters, heat registers</td>
</tr>
<tr>
<td>$B_s = (2.5...3) \times B_N$</td>
<td>for particle filters</td>
</tr>
<tr>
<td>$B_d = (3...5) \times B_N$</td>
<td>for humidity sensors, duct humidistats</td>
</tr>
</tbody>
</table>

The absorption distance has no fixed value, but depends on many factors. These are depicted in the absorption distance nomogram below.
5.3.2 Absorption Distance Nomogram

5.4 Steam Manifold

5.4.1 General installation guidelines

When installing steam manifolds, pls. follow these guidelines:

Positioning within duct

- Install the steam manifold as close as possible to the steam humidifier in order to minimize steam loss through condensation.
- Steam manifold placement on the supply side of the air duct is preferable.
- Install steam manifold strictly horizontal in order to ensure proper condensate drain.
- Shown installation and positioning dimensions are based on empiric values. Special environmental conditions may require adjustments. Pay special attention to avoid condensate generation in air duct.

Allowable pressures

- Max. allowable pressure in air duct is 1500 Pa/.218 PSI (exemption: SLE02 only allows for 1200 Pa/.174 PSI).
- On the suction side, max. -500 Pa (.07 PSI) is tolerable.
- With high-pressure air conditioning systems, modifications of the unit’s drain hose system may possibly be required depending on the overall pressure situation. These modifications must be coordinated with your expert dealer.

Water drain

- It is advisable to provide a water drain within the absorption distance inside the air duct. Though not of relevance here, we point out that this is a must when the accordance to the German Association of engineers (VDI) guideline VDI 6022 is to be met.

When increased airflow speed is encountered

- Air flow rates beyond 3m/s (9.84 ft/s) may lead to condensate drainage problems at the steam manifolds due to vacuum built-up. A possible remedy is twisting the steam manifold in its horizontal axis by few angular degrees. In case of problems, pls. consult your expert dealer.

5.4.2 Recommendations for dimensioning

The recommendations given below are based on homogenous air flow in the duct.

Horizontal installation of steam manifold

Standard steam manifold arrangement:

![Horizontal assembly position in duct diagram](image)

- An even distribution of steam manifolds ensures a uniform steam distribution. Please use the total height of the duct!

*) s. table of manifold lengths

Horizontal assembly position in duct
Steam manifold arrangement for special air duct shapings

| Flat steering | Lmin = 210mm/8.3 inch: “Steam manifold - Next steam manifold” distance |
| L4min = 120mm/4.7 inch: “Lowest steam manifold - Duct bottom plane” distance |
| L5min = 120mm/4.7 inch: “Highest steam manifold - Duct ceiling plane” distance |

flat
steam manifold laterally staggered (with respect to air flow direction) in case of Lmin (s. above) not to be met

very flat
by tilting the steam manifold 30 - 45° towards the air flow direction, the minimum upper clearance can be reduced to 70mm/2.8 inch.

<table>
<thead>
<tr>
<th>Min[mm/inch]</th>
<th>H1</th>
<th>H2</th>
</tr>
</thead>
<tbody>
<tr>
<td>30°</td>
<td>182/7.2</td>
<td>168/6.6</td>
</tr>
<tr>
<td>45°</td>
<td>193/7.6</td>
<td>179/7.2</td>
</tr>
</tbody>
</table>

narrow, high
identical lengths one on top of the other, staggered laterally if possible

square
identical lengths, staggered vertically and laterally

low, very wide
facing each other
Vertical steam manifold installation

Steam manifold arrangement

Air flow direction

Steam supply

Horizontal installation of the steam manifolds is preferable. However, vertical installation into the air duct from below is also possible.

Standard manifold dimensions [mm]/[inch]***:

| 220/ 8.7 | 400/15.7 | 600/23.6 | 900/35.4 | 1200/47.2 | 1450****/57.1 |

*** Special lengths on demand.

**** will be replaced in 2019 by 1500 mm / 59.1 inch long steam distributors

Number and size of the steam manifolds available as well as the nominal diameter of the respective steam and condensate hoses may be taken from the table below:

<table>
<thead>
<tr>
<th>Model</th>
<th>Steam manifold</th>
<th>Steam hose</th>
<th>Condensate hose</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLH03-T to FLH15-T</td>
<td>1x DN25/1&quot;</td>
<td>1x DN25/1&quot;</td>
<td>1x DN12/1/2&quot;</td>
</tr>
<tr>
<td>FLH25-T</td>
<td>1x DN40/1 1/2&quot;</td>
<td>1x DN40/1 1/2&quot;</td>
<td>1x DN12/1/2&quot;</td>
</tr>
<tr>
<td>FLH40-T to FLH50-T</td>
<td>2x DN40/1 1/2&quot;</td>
<td>2x DN40/1 1/2&quot;</td>
<td>2x DN12/1/2&quot;</td>
</tr>
<tr>
<td>FLH80-T to FLH100-T</td>
<td>4x DN40/1 1/2&quot;</td>
<td>4x DN40/1 1/2&quot;</td>
<td>4x DN12/1/2&quot;</td>
</tr>
<tr>
<td>FLH03-TSPA to FLH25-TSPA</td>
<td>1x DN40/1 1/2&quot;</td>
<td>1x DN40/1 1/2&quot;</td>
<td>1x DN12/1/2&quot;</td>
</tr>
<tr>
<td>FLH40-TSPA to FLH50-TSPA</td>
<td>2x DN40/1 1/2&quot;</td>
<td>2x DN40/1 1/2&quot;</td>
<td>2x DN12/1/2&quot;</td>
</tr>
<tr>
<td>FLH80-TSPA to FLH100-T</td>
<td>4x DN40/1 1/2&quot;</td>
<td>4x DN40/1 1/2&quot;</td>
<td>4x DN12/1/2&quot;</td>
</tr>
<tr>
<td>SLE02-SLE15</td>
<td>1x DN25/1&quot;</td>
<td>1x DN25/1&quot;</td>
<td>1x DN12/1/2&quot;</td>
</tr>
<tr>
<td>SLE20/SLE30</td>
<td>1x DN40/1 1/2&quot;</td>
<td>1x DN40/1 1/2&quot;</td>
<td>1x DN12/1/2&quot;</td>
</tr>
<tr>
<td>SLE45/SLE65</td>
<td>2x DN40/1 1/2&quot;</td>
<td>2x DN40/1 1/2&quot;</td>
<td>2x DN12/1/2&quot;</td>
</tr>
</tbody>
</table>
5.5 Steam line and condensate hose layout

**Please note**
Because of the high requirements on hose material under the operating conditions given, it is recommended to use genuine HygroMatik hoses only.

5.5.1 Guide lines for steam line design
- Steam hose nominal diameter must not be smaller than the steam outlet of the HygroMatik steam humidifier (do not restrict the cross-section, otherwise back pressure will increase)
- Steam hoses must be laid without sags and kinks and with a continuous slope of 5-10% (otherwise sags may result).
- Steam hoses must be supported every 20 inches by clamp brackets
- Steam hoses should be kept as short as possible. Implement lengths beyond 16 ft. as insulated fixed piping to keep energy loss and condensate generation to a minimum. Fixed piping is generally recommended for straight steam line segments
- When 2 steam manifolds are in use (other than with a standard implementation), place steam Y piece as close as possible to the steam manifolds. Such, for the main part of the piping just one steam hose is required and condensate loss is minimized
- Allow easy access to the steam pipe/steam hose installation
- Pressure conditions within the duct are influenced by device steam output, steam line layout and the duct composition itself. In some rare situations it may become necessary to optimize steam line layout for achieving the results intended
- Respect minimum bending radii:
  - DN 25 Steam hose: $R_{\text{min}} = 8$ inch
  - DN 40 Steam hose: $R_{\text{min}} = 16$ inch

5.5.2 Condensate hose layout
The condensate hose may be run from the steam manifold back to the steam cylinder, as depicted in the schematic drawing below with concern to installation type 1. Alternatively, the condensate hose may be fed directly in a wastewater pipe or a drain (s. installation type 2).

**Please note**
Should condensate return into the steam cylinder be intended, the connection stub on the cylinder upper part must be drilled out first with an ANSI drill size "O" drill. To do so, the steam cylinder must be removed from the housing (s. maintenance chapter, section "Steam cylinder removal and reinstallation").

Drill out condensate hose connection stub with ANSI drill size "O" drill, if required

Steam cylinder top view
5.5.3 Steam line and condensate hose installation types

Installation type 1

Steam manifold is positioned more than 20 inch above device upper edge:

» Run steam hose to a height of 16 inch minimum above the steam humidifier and then to the steam manifold with a continous incline of 5 to 10 %.

Please note

If the intension is to feed the condensate hose back to the steam cylinder (s. next step), the connection stub on the cylinder top must be drilled-out first using ANSI drill size „O“ drill.

» Feed condensate hose from steam manifold with a decline through the steam humidifier housing bore to steam cylinder and affix on connection stub with clamp. Alternatively, feed condensate directly into waste-water pipe or drain.

» As a steam barrier, lay out a 200mm min. loop (s. schematic representation below). Minimum distance from steam manifold to loop must be 20 inch. Fill loop with water prior to steam humidifier commissioning.

Installation type 2

Steam manifold is positioned less than 20 inch above or below device upper edge:

Please note

In this arrangement the condensate hose cannot be fed back to the steam humidifier.

» Run steam hose to a height of 16 inch minimum above the steam humidifier and then to the steam manifold with a continous decline of 5 to 10 %.

» Feed condensate hose to a waste-water pipe/drain with a 8 inch diameter loop as a steam barrier. Minimum distance from steam manifold to loop must be 20 inch. Fill loop with water.

Installation type 2, schematic representation
6. Water connection

**WARNING**

Risk of scalding!
Very hot water to be found in and around the steam humidifier during and after operation.

Have all installation work done by expert staff in order to avoid scalding hazards due to improper water guidance.

**WARNING**

Risk of electrical shock!
Hazardous electrical high voltage!
Before starting installation work ensure that the unit is not yet connected to the power supply.

General Rules

- Obey local water utility regulations
- Verify that necessary safety measures have been taken – in compliance with either German Technical and Scientific Association for Gas and Water (DVGW) guidelines (DIN EN1717) or local regulations – to eliminate backflow of polluted water into drinking water treatment facilities. This may require the installation of a system separator and free discharge into the drainage system. Within the humidifier, a double check valve (58) is located in the water supply line. It prevents - in accordance with DIN EN 61770 - the backflow of water. As an option for installation by the customer, the DVGW-conform HyFlow system separator or a after market system separator of the BA/CA type are available from HygroMatik.
- Use feed water without chemical additives and with a conductivity between 200 and 800 µS/cm only. Beyond conductivity levels of 800µS/cm up to a maximum of 1250µS/cm and below conductivity levels of 200µS/cm to a minimum of 125µS/cm, special adjustments are required. In this case please contact your specialist dealer
- Supply water must not exceed 40 °C (104 °F)
- Allowable range of water pressure: 100000 to 1000000 Pa (14.5 to 145 psi)
- For connection to the water supply pipe, make use of a water hose
- Blow-down water must drain freely

6.1 Operation with softened water

**NOTICE**

Do not use softened water unless special measures are taken!

When feeding softened water into the HygroMatik steam humidifier, the aspects outlined below must be taken into account.

Softened water may cause

- unacceptably high conductivity
- the formation of salt bridges between the electrodes and the electrode leads on the inner surface of the steam cylinder upper part
- foaming in the steam cylinder

Salt bridges may cause electrical arcs. These are indicated by the presence of black grooves in the top part of the cylinder. The cylinder must then be replaced to prevent further damage to the cylinder material, as well as short circuits which may trip main circuit breaker.

Foam may come into contact with the maximum level sensor electrode and trigger the max. level status message despite the cylinder not being full yet and the nominal current not yet established.

With softened water, at operating temperature conductivity level usually is higher than is the case with tap water.

If using a water softening system, we recommend diluting the softened water with normal tap water to produce an overall hardness between 4-8°gH. This value can be set lower if the water does not foam.
6.2 Water supply

**NOTICE**

Foreign material in water supply pipe may cause premature wear of the solenoid valve.
Flush the water supply pipe before making connection to the solenoid valve. This is of particular importance in case of a newly installed pipe.

» Install a shut-off valve (AV) in the supply line.
» Install a water filter (WF) if required due to bad water quality.

**Please note**

In case of no safety device for drinking water protection according to DIN EN 1717 present in the house installation system, a system separator at least of the CA type or use of the Hyflow retrofit option is mandatory.

**Please note**

Shut-off valve (SV) and water filter (WF) are not included in the delivery.

For connection to the water supply line, the water hose (56) with cap nuts on both ends supplied with the unit may be used.

Make connection as follows:

» Attach cap nut with inner seal ring to inlet screw joint on the humidifier housing and tighten.

**NOTICE**

**Do not overtighten the cap nut!**
Excessive tightening will destroy the fitting.

**Please note**

Strainer must be placed inside the solenoid valve.

» Screw the other hose end cap nut with its inner seal on a customer-provided water tap (cap nut internal thread is ¾”).

6.3 Water discharge

**WARNING**

Risk of scalding!
During blow down up to 0.3 l/sec (.08 gal./sec) are being drained with a temperature of about 95 °C (203 °F). Ensure that the drain hose is reliably fastened and wastewater can drain freely and pressureless.

**Please note**

Humidifier installation location and wastewater discharge must be on the same pressure level.
Guidelines for water discharge composition

- Use flexible water hose
- Do not buckle drain hose
- Discharge line and drain pipe material must be temperature resistant up to 95°C (203 °F)

How to proceed

» Run a 1 1/4 " drain hose of 250 to 1000 mm (10 to 40 inch) length into a pressure-free outlet according to DIN EN 1717. The hose must be guided sideways of the humidifier to prevent ascending vapor from condensing on the humidifier’s housing.  

» Fit drain hose to connection stub on humidifier housing bottom side.

Grounding clip functioning

The two grounding clips attached to the inner surface of the housing drain stub are in direct contact with water and shunt potential residual electric currents away from the housing during blow-down and in case of a cylinder water overflow.  

Between the pump drain hose jacket and the inner surface of the cabinet drain connection, a gap exists due to the diverging diameters. If water collects on the base plate, it will flow through this gap into the drain hose and then into the drainage system.  

Please note

With the optional wastewater cooling system HyCool, HygroMatik offers an option for limiting the steam humidifier wastewater temperature in order to protect thermosensitive wastewater pipe lines. By blending with tap water during blow-down and rinse processes, wastewater temperature is below 60 °C (140 °F) as long as inlet water temperature does not exceed 30 °C (86 °F).

6.4 Water connections final check

Go down the following water installation checklist:

✓ All screws and clamps properly tightened?
✓ Water supply line flushed before making connections?
✓ Water connection properly installed?
✓ Water discharge properly installed?
✓ Does blow-down water drain freely?
✓ Water supply line and water discharge leakage-free?
7. Electrical connection

**WARNING**
Danger of electric shock!
Dangerous electric voltage!
All work relating to the electrical installation may only be carried out by designated specialist personnel (electrician or qualified person with equivalent training).

**Please note**
The customer is responsible for monitoring the qualifications of the specialist personnel.

General installation rules
- All local rules concerning the implementation of electrical installations must be obeyed
- Electric connector cables to be laid professionally
- Install the electrical connections according to the wiring diagram
- With units of a nominal power output > 33 kW electrical connection to a permanent line is mandatory (according to VDE 0700 Part 98, IEC 60335-2-98)

**NOTICE**
Potential component damage due to electrostatic discharge!
To protect the sensitive electronic components, measures to prevent damage due to electrostatic discharge must be taken before the start of the installation work.

7.1 Electrical installation approach
Do not connect the steam humidifier to the live power supply before all installation work has been completed.

» Provide fuses with a contact gap of at least .12 inch (3mm) per pole.
» Install a separate main connection for each steam cylinder including main circuit breaker, main switch etc.
» Make main connection according to the table below.

Main connections, current draw and fusing
The table on the next page shows the respective values relevant for the various models of the FLE steam humidifier series.

**Please note**
HygroMatik recommends the use of slow blowing up to middle time-lag main fuses (only applies to the a.m. mains supply voltage).
Steam humidifier installations should incorporate an individual resilient current circuit breaker.
7.2 Cable connections

The table below shows the quantities and dimensioning of the cable connections provided by the various StandardLine housing types.

<table>
<thead>
<tr>
<th>Model</th>
<th>M16 PG9</th>
<th>M25 PG 16</th>
<th>M25 with MSI (*)</th>
<th>M32 PG 21</th>
<th>M40 PG 36</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLE02</td>
<td>1x</td>
<td>1x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLE05</td>
<td>1x</td>
<td>1x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLE10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLE15</td>
<td>1x</td>
<td>1x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLE20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLE30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLE45</td>
<td>1x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLE65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*) Multiple seal insert

### Characteristics of metric cable connections

<table>
<thead>
<tr>
<th>Thread</th>
<th>Wrench size [mm/in.]</th>
<th>Cable diameter supported [mm/in.]</th>
</tr>
</thead>
<tbody>
<tr>
<td>M16x1.5</td>
<td>20/~ .79</td>
<td>4.5 - 10/~ .18 -.39</td>
</tr>
<tr>
<td>M25x1.5</td>
<td>30/~ 1.2</td>
<td>9 - 17/~ .35 -.67</td>
</tr>
<tr>
<td>M25x1.5 with MSI (*)</td>
<td>30/~ 1.2</td>
<td>6/~ .24 (3x)</td>
</tr>
<tr>
<td>M32x1.5</td>
<td>36/~ 1.4</td>
<td>13 - 21/~ .51 -.83</td>
</tr>
<tr>
<td>M40x1.5</td>
<td>46/~ 1.6</td>
<td>16 - 28/~ .63 - 1.1</td>
</tr>
</tbody>
</table>

*) Multiply power input by 1.1 after full blow-down. Consider overload capacity of automatic breakers. If necessary, select the next higher rating.

<table>
<thead>
<tr>
<th>Model</th>
<th>SLE02</th>
<th>SLE05</th>
<th>SLE10</th>
<th>SLE15</th>
<th>SLE20</th>
<th>SLE30</th>
<th>SLE45</th>
<th>SLE65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data at 208-240 VAC/1/N/50-60 Hz</td>
<td>Rated Current [A]</td>
<td>6.5</td>
<td>15</td>
<td>28.2</td>
<td>1x10</td>
<td>1x20</td>
<td>1x35</td>
<td></td>
</tr>
<tr>
<td>Circuit Protection [A] (*)</td>
<td>1x10</td>
<td>1x20</td>
<td>1x35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data at 208-240 VAC/3/50-60 Hz</td>
<td>Rated Current [A]</td>
<td>9.4</td>
<td>15</td>
<td>28.2</td>
<td>56.5</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circuit Protection [A] (*)</td>
<td>3x15</td>
<td>3x15</td>
<td>3x35</td>
<td>3x60</td>
<td>3x100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data at 440-480 VAC/350-60 Hz</td>
<td>Rated Current [A]</td>
<td>4.7</td>
<td>9.4</td>
<td>14.1</td>
<td>18.8</td>
<td>28.1</td>
<td>42.4</td>
<td>61.0</td>
</tr>
<tr>
<td>Circuit Protection [A] (*)</td>
<td>3x10</td>
<td>3x10</td>
<td>3x20</td>
<td>3x20</td>
<td>3x35</td>
<td>3x60</td>
<td>3x80</td>
<td></td>
</tr>
</tbody>
</table>

(*) Multiply power input by 1.1 after full blow-down. Consider overload capacity of automatic breakers. If necessary, select the next higher rating.
7.3 Connection of interlock (safety) system

⚠️ WARNING
Risk of electrical shock!
Hazardous electrical voltage!
When standard wiring was made, terminal 1 shows 230 VAC after commissioning.

Across terminal 1 and 2 the so-called safety interlock is wired. This wiring allows for integration of safety devices. In case of an open safety interlock the steam humidifier does not operate.

Please note
Factory setting leaves the safety interlock open!

Install contact interlocks, e.g. a max. hygrostat, vane relays, pressure controllers, air interlock devices etc. in series across terminal 1 and 2.

CONTACT
Contacts across terminals 1 and 2 must be potential free and properly rated!
Rating must comply with the control voltage in use.

Best practice implies the integration of a max. hygrostat in the safety interlock wiring to protect against over-humidification due to a r.h. sensor malfunction.

7.4 Control signal
As described in the „Unit Control“ chapter, section „Provider level submenue and its parameters“, the unit control type is determined by parameter „1-2“, „control signal“. In accordance with the control type selected, terminal wiring of the connection terminal (s. „Unit control“ chapter, section „Mainboard connections“ is to be made.

7.4.1 1-step operation
Steam humidifier operation is controlled by the contact across terminals 3 and 5 provided by the customer. This contact needs only to be low voltage proof.

Customer-provided contact for 1-step operation

7.4.2 Operation with an active humidity sensor or external controller
When driving the steam humidifier by an active r.h. sensor or external controller (e.g. a PLC), control signals in the range of 0...10 V, 0...20 mA or 0...140 Ohm may be applied. Each one of the signal types is connected to a dedicated terminal (see „Unit control“ chapter, section „Mainboard connections“). Reference is always to terminal 4, GND.

Terminals for control signals

| 0...140 Ohm | 67 |
| 0...20 mA | 5 |
| 0...10 V | 1 |
| GND | 4 |
| 20 VDC | 3 |
**Please note**

Active r.h. sensors need an external supply voltage. For that purpose, terminal 3 has a +20 VDC offering.

---

7.4.3 Wiring for control signal and safety (interlock) system for multiple devices

In the case of multiple units, separate humidifiers work together. The control signal and the safety (interlock) system are connected to the master unit as described above. In addition, connecting cables are established between the guiding unit and the succeeding unit(s) (provided on-site). These provide the succeeding unit with a control signal from the guiding unit and the transmitted (potential free) safety (interlock) system.

The wiring for the control signal and the safety (interlock) system must be implemented as follows for multiple units:

![Exemplary 0...10V humidity sensor connection](image)

7.5 Connection diagram

Pls. find the full wiring diagram in the „Unit control“ chapter, section „Mainboard connections“ of this manual.

7.6 Electrical installation check list

Check electrical installation with respect to customer-site requirements and local power supply regulations.

- Safety interlock properly wired across terminals 1 and 2?
- Supply voltage in accordance with name plate voltage rating?
- All electrical connections made according to the wiring diagram?
- R.h. sensor properly connected with respect to signal type and supply voltage (only when r.h. sensor is in use)?
- All screw terminal connections properly tightened?
- Have all electrical cable and plug connections been properly tightened?
- Proper unit grounding made?

![Guiding unit and succeding unit diagram](image)

1) „ST0x“ designates connector plugs on the mainboard
2) „K21“ is the relay used for the connection of the succeeding unit
8. Commissioning

**WARNING**

Risk of operating error!
Start-up of the unit is restricted to expert staff only (electricians or expert personnel with equivalent training).

---

**Step 1: Check of mechanical integrity and wiring**
- Open housing cover.
- Check cylinder seating.
- Check steam, condensate and drainhose clamps.
- Check that all electrical wire connections (including steam cylinder wiring) are tight and secure.

**Step 2: Switching on the steam humidifier**
- Switch on main breaker.
- Open water supply stopcock (operating pressure should be 1 bar min., 10 bar max./14.5 psi min., 145 psi max.).
- Switch on unit by setting control switch to "I".

**Step 3: The unit performs a self-test and, then, commences normal operation**
- During self-test, the display flashes for a couple of seconds
- On completion of the test, the software version is displayed for a short moment. Consequently, normal operation is commenced. However, steam is not produced without a demand pending

**Step 4: Trigger steam demand**
- Set control to 1-step operation, i.e. permanent steam demand, and close safety interlock.

**Step 5: Monitor unit function and check for leakage**
- Let unit operate for 15 to 30 minutes.
- If leaks appear, switch off the unit

**Step 6: Repair leaks**
- Find leaks and eliminate
- Check again for leaks
- When everything is o.k., reattach housing cover

**Please note**

Steamp production may show a delay of up to 20 mins.

- Allow all electrical functions to terminate in their programmed order.

**WARNING**

Risk of electrical shock!
Hazardous electrical voltage!
Follow safety instructions for work on live components.

**Additional checks:**
- All electrical functions must be executable
9. Maintenance

9.1 General

For achievement of a long unit life span, regular maintenance is a must. Maintenance works to be performed refer to unit assemblies that underlie either mechanical or electrical wear and tear, or may be impeded by residues in their proper functioning.

The steam humidifier's performance and maintenance intervals primarily depend on the water quality encountered and the amount of steam produced. A particular water quality may shorten or lengthen maintenance intervals. The amount of residues found in the steam cylinder allows for a hint on future maintenance intervals.

Another scenario influencing the unrestricted unit availability refers to the main contactor that has a maximum number of switch cycles as indicated by its manufacturer. Unit control monitors the number of switch cycles and produces a maintenance message as soon as the max. number is reached.

Need for maintenance is indicated by illumination of the service icon in the unit control panel display. Depending on the trigger, reading value „Status“ then shows a „271“ (Service Steam Amount) when a certain produced steam amount threshold preset was exceeded, or „272“ (Service Main Contactor).

In the latter case, the main contactor should be replaced and the counter be reset (s. parameter „3-2“).

In case of „Service Steam Amount“, maintenance work mainly encompasses checking and cleaning all of the unit parts including the steam cylinder inside, and a unit test run. Steam humidifier electrodes are prone to burn-off during steam production and must, consequently, be replaced in a regular time frame.

As part of the maintenance work, screw terminals and plug connections must be checked every time. If required, retightening the terminal screws is a must as well as ensuring tight fit of all of the plug connections.

Since steam and condensate hoses are subject to wear as well, hoses must also be checked regularly.

Seals are wear parts. As such, seal integrity checks and replacement, if required, is also a part of the regular maintenance work.

9.1.1 Safety instructions for maintenance

**WARNING**

Risk of electrical shock!
Hazardous electrical voltage.
Unit must be switched off and protected against restart by expert staff (electricians or expert personnel with equivalent training) before any maintenance work is commenced.

**WARNING**

Risk of skin burning!
Hot steam cylinder during operation and for some time afterwards.
Drain steam cylinder before any maintenance work is commenced. After that, wait approx. 10 mins before starting maintenance work. Check steam cylinder temperature by cautious approximation with hand (do not touch!).

**WARNING**

Risk of scalding!
Water pumped or drained from the steam cylinder may have a temperature of up to 203 °F.
Wear proper PPE (Personal Protection Equipment)!

**NOTICE**

Take care of ESD protection!
The electronic components of the humidifier control are very sensitive to electrostatic discharges. In order to protect these components during maintenance, steps must be taken to guard against damage from electrostatic discharge.
9.2 Maintenance frame work

Mineral deposits precipitate and crystallize very differently in different types of water, even when two types have the same conductivity and hardness levels (the various constituents in the water interact differently).

Instructions on maintenance and cleaning intervals, or on electrode service life, are based entirely on empirical data.

In most cases, the conductivity levels given in the “Directions for Use” section of this manual may be considered as typical values. Individual parameter settings as part of the control software may be necessary.

Very seldomly, water pretreatment may be necessary (softening by dilution to approx. 4 - 8 °gH; decarbonization/partial desalination to achieve target reductions in carbonate hardness).

For any questions with regard to water treatment systems pls. contact your expert dealer.

<table>
<thead>
<tr>
<th>Cycle time</th>
<th>Maintenance work</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 weeks after commissioning</td>
<td>Visual inspection of electrical and mechanical connections</td>
</tr>
<tr>
<td>(with normal water quality)</td>
<td>Remove mineral deposits from steam cylinder, water drain hose and blow-down pump</td>
</tr>
<tr>
<td></td>
<td>Check electrodes for burn-off</td>
</tr>
<tr>
<td></td>
<td>Re-tighten electrode hand nuts and all screw terminals</td>
</tr>
<tr>
<td>semiannually</td>
<td>Visual inspection of electrical and mechanical connections</td>
</tr>
<tr>
<td>(with normal water quality and &quot;normal&quot; operation, i.e. 8 hours per day)</td>
<td>Remove mineral deposits from steam cylinder, water drain hose and blow-down pump</td>
</tr>
<tr>
<td></td>
<td>Check electrodes for burn-off and replace, if required. Re-tighten electrode hand</td>
</tr>
<tr>
<td></td>
<td>nuts and all screw terminals</td>
</tr>
</tbody>
</table>
9.3 Removal and reinstallation of the steam cylinder

**CAUTION**

Risk of eye injuries!
The clips that fix the steam cylinder halves have sharp edges and can jump off during dismantling. Eye injuries are possible. Wear proper PPE (Personal Protection Equipment)!

Steam cylinder removal

- Set control switch to „II“ position for residual water draining
- When cylinder is empty, set control switch to „0“ position
- Disconnect unit from power supply and secure against reconnection
- Remove unit housing cover
- Remove hose from Super Flush solenoid (if applicable) from cylinder bottom
- Remove steam hose from steam hose adapter

If the steam hose is not to be disconnected, the steam hose adapter with the steam hose still attached may be detached from the steamcylinder as shown in the next figure.
Remove clip from steam hose adapter

Push clip onto adapter outside of unit housing

Disconnect cabling

Remove cylinder flange clamps

Lift steam cylinder from cylinder base

Separate cylinder halves

Remove O-ring in use
Reinstallation

Insert new O-ring

Insert new O-rings in steam hose adapter and cylinder base positions

Place cylinder vertically into cylinder base

Join cylinder halves and affix with clamps

Reconnect electrode cabling

Remove o-rings in use from steam cylinder top and cylinder base

Please note

When re-assembling the cylinder, brackets and reinforcement joints of the two cylinder parts must be aligned.
**Please note**

The electrode connections must not show any signs of corrosion. Replace plugs, if required. Plugs must sit firmly on the electrode pins and must be pushed down as far as they will go.

» Reattach Super Flush solenoid hose (if applicable) to steam cylinder bottom stub.

» Attach steam hose adapter to cylinder

» Affix steam hose adapter with clip

» Open water supply

» Activate main circuit breaker

» Check for leakage in relevant areas

» Reattach unit housing
9.4 Steam cylinder, electrodes and cylinder base cleaning

For cleaning, mechanical removal of the deposits is usually sufficient.

**NOTICE**

**Risk of functional disruption!**

When using acids or other chemicals for cleaning, thoroughly flushing and rinsing is essential otherwise cylinder water conductivity may be impaired.

Steam cylinder cleaning

» Check the inside of the top part of steam cylinder for crust build-up and possible salt bridges (black grooves between the electrode leads). If present, wash away/scrape off completely.

Looking at the material, if electrical arcs have burned deep grooves into the material, the complete cylinder must be replaced.

**Electrode cleaning**

» Clean the sensor electrode until metallically bright.

» Clean electrodes and check electrode wear (s. „Changing electrodes“ section).

**Cylinder base cleaning**

» Just as the cylinder, the cylinder base and its connection joints must be checked for deposits and be cleaned, if required.

Reinstallation of the steam cylinder is to be performed as described in the „Cylinder removal and reinstallation“ section.

9.5 Checking cable connections

**NOTICE**

**Risk of functional disruption!**

**Risk of material damage!**

Loose cable connections may result in increased transition resistance and contact area overheating.

» Check all cabling terminals and plugs for tight seating. Plugs must sit on their respective contacts as far as they will go.
9.6 Solenoid valve removal/reinstallation and fine filter cleaning

Removal

» Shut off water supply and disconnect tap water hose cap screw connection.

» Remove connecting hose (20) from cylinder base.

» Detach electrical cable connector from solenoid valve (25).

» Unscrew solenoid valve mounting screws.

» Remove solenoid valve from housing bore.

Fine filter cleaning

» Remove fine filter from solenoid valve tap water connection side and clean under running water.

Reinstallation

» Reinsert fine filter into solenoid valve.

» Reinsert solenoid valve with seal in unit housing bore.

» Bolt-down solenoid valve.

» Reestablish tap water connection.

» Reconnect electrical cable to solenoid valve.

» Reattach connecting hose (20) to cylinder base using clamp.

» Turn on water tap.

» Switch on unit and check for leakages after 15 to 30 mins of operation.

**WARNING**

Risk of electrical shock!
Hazardous electrical voltage!
Follow safety instruction for work on live components.
Leakages may invoke leak currents.

» In case of leakage turn off power supply and secure against being switched on again.

» Find leakage and eliminate.

» Check again.
9.7 Cleaning of blow-down pump

Removal and cleaning

» Remove steam cylinder as described in „Removal and reinstallation of steam cylinder“ section.
» Detach adapter (30) from pump (32).
» Detach electrical cable from pump.
» Unscrew mounting screws from housing bottom plate (safe vibration buffer, bolts and washers for reinstallation) and pull pump out of cylinder base (37).
» Open pump bayonet lock.
» Remove residues from pump and drain hoses (replace O-ring if required).

Reassembly

» Moisten O-ring (33, green) and insert into cylinder base (37) horizontal stub.
» Push pump back into cylinder base and bolt to bottom plate incorporating the vibration buffer and washers saved during removal.
» Moisten O-ring (31, green) and insert into adapter.
» Slide adapter (30) onto pump stub.
» Refit electrical cable to pump connector (no polarisation).
» Let unit run for 15 to 30 mins, then check for leakages.

⚠️ WARNING

Risk of electrical shock!
Hazardous electrical voltage.
Follow safety instruction for work on live components.
Leakages may invoke leak currents.

» In case of leakage turn off power supply and secure against being switched on again.
» Find leakage and eliminate.
» Check again.
9.8 Check of hoses
Since steam and condensate hoses are prone to wear as well, those hoses should undergo regular checks as well.

9.9 Electrode replacement
» Remove and open cylinder, as described in section "Removal and reinstallation of the steam cylinder".

Please note
When mounting the electrodes, make sure that the hand nut colours corresponding with the wiring colours remain in the same position as before in order to omit any unwanted shift of electrical potential. Hence, the hand nut positions must be recorded before they are removed. During reassembly, particular care must be taken to ensure that no grey wire is connected to the electrode plug next to the (grey) sensor electrode hand nut.

» Unscrew hand nuts (49)

» Remove electrodes (48)
» Install new electrodes (48). Make sure that the electrodes are positioned correctly (see exploded view).
Genuine electrode length

Hygromatik large area electrodes made from stainless steel have the following genuine lengths:

<table>
<thead>
<tr>
<th>Model</th>
<th>SLE05, SLE10</th>
<th>SLE20</th>
<th>SLE30</th>
<th>SLE45, SLE65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length [mm]</td>
<td>155</td>
<td>210</td>
<td>235</td>
<td>310*)</td>
</tr>
</tbody>
</table>

*) The electrodes installed in the new CY45/2 steam cylinder feature a length of 300 mm

Electrode wear

Electrode wear depends on:

- composition and conductivity of the supply water
- the amount of steam produced

In case of the electrodes being burned-off to less than one third to half of their genuine length, electrode replacement should be made.

9.10 Functional check

- Run the system with maximum output for a couple of minutes
- Check all safety devices.
- Check hose connections and seals for leakage.

9.11 Finishing maintenance

After finishing substantial maintenance work, the service interval „Steam amount“ must be reset (s. sections 11.5.2 and 11.8).

To do so, follow the procedure below (use the ▲/▼ keys for changing the values displayed):

- from standard display, select „P00“.
- confirm with SET key.
- input code „010“.
- confirm with SET key.
- change display from „1--“ to „3--“ (select parameter group „Service“).
- confirm with SET key.
- „3-1“ is displayed
- confirm with SET key.
- change display from „0“ to „1“ („Reset service interval“).
- Confirm with SET key.
- return to standard display by touching the ESC key twice.

The steam amount counter now again holds the value preset (s. „3-3“ parameter, „Service interval [t]“), that determines the next time for maintenance when met.

Please note

In case of water maximum level is detected for a period of 60 mins, an error message (s. unit control chapter) is generated and unit operation is cut. At the latest, electrode replacement should then be made.
10. Dismantling

Once the steam humidifier will no longer be used, dismantle (demolish or scrap) it by following the installation procedures in reverse order.

⚠️ WARNING ⚠️

Warning: Dismantling of the unit may only be performed by qualified personnel. Electrical dismantling may only be performed by trained electricians.

---

**Please note**

Obey the safety guidelines in section “Safety Instructions,” especially the guidelines for disposal.
11. Unit Control

11.1 General description

Operation of the HygroMatik steam humidifier is under microprocessor control.

A control switch can be found on the device front panel featuring two positions besides the „Zero“-position for a switched-off device.

„Pos. I“ : The unit is switched on
„Pos. II“ : Cylinder water is manually drained

For controlling the unit a control panel featuring a 3-digit display and 10 icons plus 4 touch keys is integrated in the unit front panel. Controlling the unit by software using the modbus RTU protocol is also possible. On request, modbus documentation is available from your expert dealer.

Electrode current is directly switched by one or two main contactors designed to fit the respective unit power.

Mainboard

The complete control logic including the relays for basic operation is realised on a compact PCB that is mounted on the vertical separating wall between the unit chambers. All connections on the PCB are distinctive in order to allow for easy exchange of the board in case of maintenance.

On the mainboard, two vertically mounted fuse holders with bayonet fitting encorporate 1.6 A fast-blow fine wire fuses (F1 and F2 for L and N, s. section „Basis PCB connections“ in this chapter).

Intrinsic safety

StandardLine steam humidifiers comply with intrinsic safety requirements in that electrical power supply may be cut by two devices, namely the main contactor and the automatic circuit breaker.

Please note

For electrical connection of the steam humidifier a residual current circuit breaker is recommended.
11.1.1 Wiring Diagrams
SLE 05-10

heating voltage 380 - 480V; see name plate
L1
L2
L3
Heizspannung 380 - 480V; siehe Typenschild
Tension de chauffage 380 - 480V; note plaque d'identification

only for units with 6 electrodes
nur für Geräte mit 6 Elektroden
Utiliser uniquement des conducteurs en cuivre. AWG selon la valeur actuelle sur la plaque d'identification

SLE 20-30

heating voltage 380 - 480V; see name plate
L1
L2
L3
Heizspannung 380 - 480V; siehe Typenschild
Tension de chauffage 380 - 480V; note plaque d'identification

SLE 45-65

heating voltage 380 - 480V; see name plate
L1
L2
L3
Heizspannung 380 - 480V; siehe Typenschild
Tension de chauffage 380 - 480V; note plaque d'identification

Voltage according name plate
Tension conforme à la plaque d'identification
Use copper conductors only. AWG size according current values on the name plate
Leitungsquerschnitt gemäß Stromangaben auf dem Typenschild
Utiliser uniquement des conducteurs en cuivre. AWG selon la valeur actuelle sur la plaque d'identification

C  SLE02  22.10.19  Luxe  Datum  06.11.19
O  12VDC option  23.01.19  Luxe  Beards
Gpc
Rev.  Anmerkung  Datum  Name  Norm

SLE 05-65 UL/CSA
heating voltage: 380 - 480V / 3

S-42-001D.041

Weitbruchstr. 3
24589 Herford-Uslungen
Tel: +49 (0) 541 903 89-0
Fax: +49 (0) 541 903 89-33
11.1.2 Main PCB inputs and outputs

11.1.2.1 Customer side interfaces

Inputs
ST08:
• Control signal 0…10 VDC
• Control signal 0…20 mA
• Control signal 0…140 Ohm

Outputs
ST03:
• Potential-free programmable NC and NO contacts, (factory assignment is „collective fault“)

ST10.1:
• Connection option für 1 additional relay on separate PCB (ordering option)

ST07:
Control signal 0…10 VDC (max. 8 mA)

ST08:
• +20 VDC humidity sensor supply voltage (max. 20 mA)

11.1.2.2 System interfaces

Power supply and safety interlock

ST01:
• 4-pin plug connection with screw terminal adaptor for L and N power connection and safety interlock („Terminals 1/2“)

Inputs
ST09:
• Current transducer connection

ST04-B:
• Galvanically isolated sensor electrode input (via optical coupler)
• Dielectric strength 600 VAC

Outputs
ST04-A:
• Main contactor(s)
ST05:
• Blow-down pump
ST04:
• Intake solenoid valve

Bidirectional

ST12.1:
• Control panel serial interface
ST 13:
• RS485 interface adapter PCB socket
11.2 Control operation

11.2.1 Principal user guidance

On powering up the steam humidifier, the software version is shown in the display for a few seconds. In normal operation, the display then shows actual steam output as a standard display. When a key is pressed, the first reading in a list of reading and input values is indexed. The complete list may be visualized by scrolling using the "A/V" keys. Control-wise, the unit is in „user level“ (see next section).

By means of inputting a 3 digit code, access to „provider level“ is possible (for input code see table in section „Provider level submenus and relating parameters“). The provider level parameters are functionally grouped in submenus (1) to (6). The code input is reset to its standard („000“), should no keystroke occur within 3 minutes.

11.2.2 Menu structure

Overview on menu structure

User level

From standard display (actual steam output) user level may be accessed by pressing any key on the control panel. On user level, among other information reading values r01 to r12 are available. After a certain time span with no keystroke control switches the display back to standard display. Factory setting for this time out is „10 minutes“.

Besides showing the reading values, user level also features „P00“ for code input allowing provider level access (s. „Menu tree section“).

Provider level

On provider level, the control parameters of functional groups (1) to (6) (s. „Overview on menu structure“) may be individually changed. A tabular list of the provider level parameters and a more detailed description may be found in the sections „Provider level submenus and their parameters“ and „Detailed parameter descriptions“, respectively, further down in this chapter.

Menu tree

The detailed menu tree with all of the reading values and settable values as well as all of the parameters is depicted in the next section.

*) numbers in parenthesis are group numbers
11.2.3 Menu tree

User level

Provider level

1-1 Power reduction
1-2 Control signal
1-3 Correction of input stage
1-4 Filter input stage

1-2 Corr. part. blow-down
1-3 Switch stand-by blow dwn
1-4 Duration stand-by bl. dwn
1-5 Switch dead leg flushing
1-6 Interval dead leg flushing
1-7 Duration dead leg flushing
1-8 Blow-down without K1

2-1 Corr. part. blow-down
2-2 Correction full blow-down
2-3 Switch stand-by blow dwn
2-4 Duration stand-by bl. dwn
2-5 Switch dead leg flushing
2-6 Interval dead leg flushing
2-7 Duration dead leg flushing
2-8 Blow-down without K1

3-1 Reset service interval
3-2 Reset K1 service interval
3-3 Service interval
3-4 Service interval

3-1 Reset service interval
3-2 Reset K1 service interval
3-3 Service interval
3-4 Service interval

4-1 Set point r.h. 3)
4-2 Gain PI controller 3)
4-3 Integral PI controller3)
4-4 Control curves

4-1 Set point r.h. 3)
4-2 Gain PI controller 3)
4-3 Integral PI controller3)
4-4 Control curves

5-1 Switch stand-by heating
5-2 Stand-by heating interval
5-3 Stand-by heating on
5-4 Basic relay
5-5 Relay_K20
5-6 Modbus address
5-7 Relay_K21

5-1 Switch stand-by heating
5-2 Stand-by heating interval
5-3 Stand-by heating on
5-4 Basic relay
5-5 Relay_K20
5-6 Modbus address
5-7 Relay_K21

6-1 Buzzer
6-2 Time-out
6-3 Activate imperial units

6-1 Buzzer
6-2 Time-out
6-3 Activate imperial units

r01 Status
r02 Error
r03 Act. steam output [kg/h] 1)
r04 Act. steam output [lbs/h] 2)
r05 Actual current [A]
r07 Internal demand [%]
r08 External demand [%]
r09 Power limitation [%]
r10 Set point r.h. [%] 3)
r11 R.h. actual value [%] 3)
r12 External signal [%]
r13 V-Signal
r14 mA-Signal
r15 Ω-Signal

P00 Code level (3-stellig)
PAr Parameter selection

1) only when SI system was selected
2) only when imperial system was selected
3) only when „PI controller“ was selected
4) only shown after code „010“ input
5) direct access when on provider level

Λ V designates scrolling with control panel keys
11.3 The control panel

The control panel comprises 3 sections:

- the ESC, SET, ▲,▼ control keys
- the 3-digit 7-segment display
- dedicated icons for operating status indication

Please note

A flashing icon always indicates a faulty situation!

Exception: When switching the unit on, the complete display flashes 4 times. Then, the power-on-LED blinks while the device self test is run.

The **control keys** enable navigation in the menus and submenus. Their function is as follows:

„ESC“: cancellation or return to previous level

„▲/▼“: move up/down within a menu, sub-menu or selection list.

„SET“: accept and store a selected setting.

The **3-digit 7-segment-display** serves for outputting of operational and input data as well as error code presentation. When control software expects an input the digits are blinked. Display semantics are determined by lightening-up of one or more icons related to a specific operational situation or device control environment.

<table>
<thead>
<tr>
<th><strong>Icons state table</strong></th>
<th>permanently lit</th>
<th>flashing</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Steam production active" /></td>
<td>Fault steam production</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Main contactor active" /></td>
<td>Fault main contactor</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Filling active" /></td>
<td>Fault filling</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Blow-down active" /></td>
<td>Fault blow-down</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Maintenance required" /></td>
<td>(State not possible)</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Demand" /></td>
<td>Fault control signal</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Safety interlock closed" /></td>
<td>(State not possible)</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Virtual safety interlock closed by software enabling" /></td>
<td>(State not possible)</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Control active" /></td>
<td>Control self test after cold start</td>
<td></td>
</tr>
</tbody>
</table>
11.4 Navigation within a menu

User level entry

Standard display during normal operation is actual steam output in the selected dimension ([kg/h] or [lbs/h], respectively. By pressing any key, user level comprising a reading value index (pointer) selection level and the reading values as such is entered.

„r01“ is displayed indexing the first reading value.

Reading value display

By scrolling using the „∧/∨“ keys, the reading value indexes „r01“ to „r12“, code entry „P00“ (s. below) and parameter selection „PAr“*) may be addressed. The actual reading value content is output on pressing the SET key after selection of one of the reading value pointers r01 to r12.

Use the ESC key for return to the reading value index level that allows for addressing further readings values.

„P00“ allows for inputting a code for provider level entry that supports changing of the parameters (s. next section). This function is not meant for usage by the steam humidifier user.

*) „PAr“ ist only presented when a „10“ was input as the „P00“ setting value for access to provider level. When „PAr“ is confirmed with the SET key, parameter group selection is supported without the need for inputting the access code again.

Provider level code entry and setting a parameter

» Using the „∧/∨“ keys, scroll until „P00“ is displayed and confirm with the SET key. „.00“ is displayed.

» Increase the display to „10“ using the „∧/∨“ keys and confirm with the SET key („10“ is the access code for the provider level). „1-“ is now displayed for selection of one of the parameter groups (1) to (6).

» Confirm parameter group (1) with the SET key or make an other selection with the „∧/∨“ keys and then confirm. The display will now show a „1“ in the right digit position for addressing the parameter index (e.g., „2-1“).

» Confirm selection with the SET key or vary selection with the „∧/∨“ keys and then confirm.

Use the ESC key for return to the previous input level.
11.5 Tabular representation of reading value list and provider level submenus

For a detailed description, pls. refer to the respective sections within this chapter.

11.5.1 The reading value list

From normal operation, the user may access the reading value index „r01“ (Status) by pressing any key.

By scrolling using the „▲▼“ keys, the reading and setting values indicated in the table below may be addressed. To output the value content, the SET key must be pressed first.

<table>
<thead>
<tr>
<th>Reading value index</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>r01</td>
<td>Status</td>
</tr>
<tr>
<td>r02</td>
<td>Fault</td>
</tr>
<tr>
<td>r03</td>
<td>Actual steam output [kg/h] 1)</td>
</tr>
<tr>
<td>r04</td>
<td>Actual steam output [lb/h] 2)</td>
</tr>
<tr>
<td>r05</td>
<td>Actual current [A]</td>
</tr>
<tr>
<td>r07</td>
<td>Internal demand [%]</td>
</tr>
<tr>
<td>r08</td>
<td>External demand [%]</td>
</tr>
<tr>
<td>r09</td>
<td>Power limitation [%]</td>
</tr>
<tr>
<td>r10</td>
<td>Set value r.h. [%] (only when PI controller was selected)</td>
</tr>
<tr>
<td>r11</td>
<td>Actual value r.h. [%] (only when PI controller was selected)</td>
</tr>
<tr>
<td>r12</td>
<td>External signal [%]</td>
</tr>
<tr>
<td>r13</td>
<td>V-Signal</td>
</tr>
<tr>
<td>r14</td>
<td>mA-Signal</td>
</tr>
<tr>
<td>r15</td>
<td>Ω-Signal</td>
</tr>
<tr>
<td>P00</td>
<td>Code level („0“, „10“)</td>
</tr>
<tr>
<td>PAr</td>
<td>Parameter group selection</td>
</tr>
</tbody>
</table>

1) only when SI system was selected
2) only when imperial units were selected
11.5.2 Provider level submenus and relating parameters

Detailed parameter descriptions may be found in the section „Detailed parameter description“ further down in this chapter. The „Setting options“ column indicates the presettings available or the range of values to be chosen from. „Fs“ stands for „Factory setting“.

Non-permissible entries are ignored.

Submenu „Control“ (Group1)

<table>
<thead>
<tr>
<th>Par.</th>
<th>Denomination</th>
<th>Setting options</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>Power limitation [%]</td>
<td>25 ... 100</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fs*) = 100</td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>Control signal</td>
<td>0= not valid, 1= ext. controller, 0 ... 10 V, 2= ext. contr., 0 ... 20 mA, 3= ext. contr., 0 .. 140 Ω, 4= PI controller, 0 ... 10 V, 5= PI controller, 4 ... 20 mA, 6= PI controller, 0 ... 140 Ω, 7= 1-step, 8= Modbus</td>
<td>10</td>
</tr>
<tr>
<td>1-3</td>
<td>Correction input stages [%]</td>
<td>-5.0 ... +5.0</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fs = 0</td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td>Filter input stage</td>
<td>0=light, 1=strong</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fs = 0</td>
<td></td>
</tr>
</tbody>
</table>

*) Fs = Factory setting
### Submenu „Blow-down“ (Group 2)

<table>
<thead>
<tr>
<th>Par.</th>
<th>Denomination</th>
<th>Setting options</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>Correction partial blow-down</td>
<td>-5...+5 Fs = 0</td>
<td>10</td>
</tr>
<tr>
<td>2-2</td>
<td>Correction full blow-down</td>
<td>-5...+5 Fs = 0</td>
<td>10</td>
</tr>
<tr>
<td>2-3</td>
<td>Switch stand-by blow-down</td>
<td>0=off, 1=on Fs = 1</td>
<td>10</td>
</tr>
<tr>
<td>2-4</td>
<td>Waiting time stand-by blow-down [h]</td>
<td>0.1...48.0 Fs = 24.0</td>
<td>10</td>
</tr>
<tr>
<td>2-5</td>
<td>Switch dead leg flushing</td>
<td>0=off, 1=on Fs = 0</td>
<td>10</td>
</tr>
<tr>
<td>2-6</td>
<td>Interval dead leg flushing [h]</td>
<td>0.1...96.0 Fs = 24.0</td>
<td>10</td>
</tr>
<tr>
<td>2-7</td>
<td>Duration dead leg flushing [s]</td>
<td>1...600 Fs = 90</td>
<td>10</td>
</tr>
<tr>
<td>2-8</td>
<td>Blow-down without K1</td>
<td>0=no, 1=yes Fs = 0</td>
<td>10</td>
</tr>
</tbody>
</table>

### Submenu „Service“ (Group 3)

<table>
<thead>
<tr>
<th>Par.</th>
<th>Denomination</th>
<th>Setting options</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1</td>
<td>Reset service interval steam amount</td>
<td>0=no, 1=yes Fs = 0</td>
<td>10</td>
</tr>
<tr>
<td>3-2</td>
<td>Reset K1 service interval</td>
<td>0=no, 1=yes Fs = 0</td>
<td>10</td>
</tr>
<tr>
<td>3-3</td>
<td>Service interval [t]</td>
<td>0...90.0 Fs = device dependant</td>
<td>10</td>
</tr>
<tr>
<td>3-4</td>
<td>Service interval [tn. sh.]</td>
<td>0...90.0 Fs = device dependant</td>
<td>10</td>
</tr>
</tbody>
</table>

### Submenu „Governning“ (Group 4)

<table>
<thead>
<tr>
<th>Par.</th>
<th>Denomination</th>
<th>Setting options</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-1</td>
<td>Set point r.h. [%] (PI controller only)</td>
<td>5...99.9 Fs = 50.0</td>
<td>10</td>
</tr>
<tr>
<td>4-2</td>
<td>Gain [%] (PI controller only)</td>
<td>0.1...99.9 Fs = 5.0</td>
<td>10</td>
</tr>
<tr>
<td>4-3</td>
<td>Integral [%] (PI controller only)</td>
<td>0...500.0 Fs = 0.1</td>
<td>10</td>
</tr>
<tr>
<td>4-4</td>
<td>Control curve</td>
<td>0 = energy optimisation 1 = load optimisation Fs = 1</td>
<td>10</td>
</tr>
</tbody>
</table>
### Submenu „Functions“ (Group 5)

<table>
<thead>
<tr>
<th>Par.</th>
<th>Denomination</th>
<th>Setting options</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-1</td>
<td>Switch stand-by heating</td>
<td>0=off, 1=on</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(\text{Fs} = 0)</td>
<td></td>
</tr>
<tr>
<td>5-2</td>
<td>Interval stand-by heating [min]</td>
<td>1...999</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(\text{Fs} = \text{device dependant})</td>
<td></td>
</tr>
<tr>
<td>5-3</td>
<td>Stand-by heating [s]</td>
<td>1...999</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(\text{Fs} = \text{device dependant})</td>
<td></td>
</tr>
<tr>
<td>5-4</td>
<td>Basic relay</td>
<td>0 = Collective fault</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 = Stand-by</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 = No demand</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 = Humidifying</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 = Remote off</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 = Filling off</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>31 = Filling on</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>37 = HyCool</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>60 = Blow-down off</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>61 = Blow-down on</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>62 = Partial blow-down</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>63 = Full blow-down</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>64 = Dilution</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>65 = Overcurrent blow-down</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>67 = Stand-by blow-down</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>68 = Dead leg flushing</td>
<td></td>
</tr>
<tr>
<td>5-5</td>
<td>Relay_K20 (optionally)</td>
<td>same as basic relay</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(\text{Fs} = 270)</td>
<td></td>
</tr>
<tr>
<td>5-6</td>
<td>Modbus address</td>
<td>1...255</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(\text{Fs} = 1)</td>
<td></td>
</tr>
<tr>
<td>5-7</td>
<td>Relay_K21 (optionally)</td>
<td>same as basic relay</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(\text{Fs} = 270)</td>
<td></td>
</tr>
</tbody>
</table>

### Submenu „Settings“ (Group 6)

<table>
<thead>
<tr>
<th>Par.</th>
<th>Denomination</th>
<th>Setting options</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-1</td>
<td>Buzzer</td>
<td>0=off, 1=on</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(\text{Fs} = 0)</td>
<td></td>
</tr>
<tr>
<td>6-2</td>
<td>Time-Out (return to standard display) [min]</td>
<td>0 ... 60</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(\text{Fs} = 2)</td>
<td></td>
</tr>
<tr>
<td>6-3</td>
<td>Activate imperial units</td>
<td>0 = SI units</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 = imperial units</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(\text{Fs} = 0)</td>
<td></td>
</tr>
</tbody>
</table>
11.6 Exemplary variation of a parameter setting

Example: Control signal is to be changed from „Ext. controller, 0 ...10V“ („1-2“ = „1“) to „PI controller, 0 ...10V“ („1-2“ = „4“).

**Please note**

The steps below make an essential change to a control parameter. If this is not intended, be sure to reestablish the original setting after changing it for exercising purposes.

- In normal operation, press any key to access the reading value list. „r01“ is displayed.
- Scroll from „r01“ to „P00“ (Code input).
- Press SET key. Display now shows a flashing „Zero“ for code level „0“ (user level) and input readiness.
- Using the „Δ/∇“ keys, change the display to „10“.
- Press the SET key. Provider level is now entered. „1-“ is displayed as the first parameter group to be changed.
- Since the parameter is in this group, group confirmation can be made immediately with the SET key.
- Scroll with the „Δ/∇“ keys to the „1-2“ position and confirm with the SET key. The parameter setting „1“ (external controller, 0...10V) is displayed and may be changed.
- Change the setting to „4“ (PI controller, 0...10V) with the „Δ/∇“ keys and confirm with the SET key.
- Pressing the ESC key twice brings the display back to standard display (i.e. actual steam output).

These steps are exemplary. In the same way, selection and variation of all of the parameters may be accomplished.
### 11.7 Detailed description of the user level reading values and settings

<table>
<thead>
<tr>
<th>Reading value pointer</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>r01 Status</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Code</strong></td>
<td>Denomination</td>
</tr>
<tr>
<td><strong>Main functions category</strong></td>
<td></td>
</tr>
<tr>
<td>00</td>
<td>Start</td>
</tr>
<tr>
<td>01</td>
<td>Stand-by</td>
</tr>
<tr>
<td>02</td>
<td>No demand</td>
</tr>
<tr>
<td>03</td>
<td>Humidify</td>
</tr>
<tr>
<td>05</td>
<td>Remote off</td>
</tr>
<tr>
<td>06</td>
<td>No Modbus</td>
</tr>
<tr>
<td>07</td>
<td>Stand-by heating interval</td>
</tr>
<tr>
<td>08</td>
<td>Stand-by heating pause</td>
</tr>
<tr>
<td><strong>Filling category</strong></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Filling</td>
</tr>
<tr>
<td><strong>Blow-down category</strong></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>Initial blow-down</td>
</tr>
<tr>
<td>61</td>
<td>Partial blow-down</td>
</tr>
<tr>
<td>Reading value pointer</td>
<td>Explanation</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>Blow-down category (ctd.)</strong></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>Full blow-down</td>
</tr>
<tr>
<td>63</td>
<td>Dilution</td>
</tr>
<tr>
<td>64</td>
<td>Overcurrent blow-down</td>
</tr>
<tr>
<td>66</td>
<td>Stand-by blow-down</td>
</tr>
<tr>
<td>67</td>
<td>Dead leg flushing</td>
</tr>
<tr>
<td>80</td>
<td>Partial blow-down waiting</td>
</tr>
<tr>
<td>81</td>
<td>Full blow-down waiting</td>
</tr>
<tr>
<td><strong>Monitoring category</strong></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>Cylinder full</td>
</tr>
<tr>
<td><strong>Service category</strong></td>
<td></td>
</tr>
<tr>
<td>271</td>
<td>Service steam amount</td>
</tr>
<tr>
<td>272</td>
<td>Service main contactor K1 switching cycles</td>
</tr>
<tr>
<td><strong>Fault category</strong></td>
<td></td>
</tr>
<tr>
<td>999</td>
<td>Fault</td>
</tr>
<tr>
<td>Reading value pointer</td>
<td>Explanation</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>r02 Error</strong> (only shown when a fault has occurred)</td>
<td>The error code related to the fault is displayed (steam production is stopped whenever a fault occurs). Error codes are described in the „Trouble shooting“ chapter of this manual.</td>
</tr>
<tr>
<td><strong>r03 Actual steam output</strong> (SI units)</td>
<td>Amount of current steam production value [kg/h]</td>
</tr>
<tr>
<td><strong>r04 Actual steam output</strong> (imperial units)</td>
<td>Amount of current steam production value [lb/h]</td>
</tr>
<tr>
<td><strong>r05 Actual current</strong></td>
<td>Current electrode amperage value [A]</td>
</tr>
<tr>
<td><strong>r07 Internal control signal</strong></td>
<td>The internal signal for controlling the steam humidifier electrical power delivery to the electrodes is displayed. [%]. This reading is influenced by the control curve and a power limitation preset</td>
</tr>
<tr>
<td><strong>r08 External demand</strong> (only with ext. controller)</td>
<td>External controller control signal is displayed [%]</td>
</tr>
<tr>
<td><strong>r09 Power limitation</strong></td>
<td>Power limitation as a percentage of max. output as preset in parameter „1-1“ is displayed [%]</td>
</tr>
<tr>
<td><strong>r10 Set point r.H.</strong> (only when PI controller was preset)</td>
<td>R.h. nominal value as preset in parameter 4-1 is displayed [%]</td>
</tr>
<tr>
<td><strong>r11 Actual value r.h.</strong> (only when PI controller was preset)</td>
<td>Actual value of r.h. is displayed [%].</td>
</tr>
<tr>
<td><strong>r12 External signal</strong></td>
<td>External signal [%]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P00 Code level</strong></td>
<td>Allows provider level access by code input (Code „010“) or limitation to user level (Code „0“). Provider level is exited automatically after 10 mins without a keystroke.</td>
</tr>
<tr>
<td><strong>PAr Parameter selection</strong></td>
<td>Allows selection of parameter group and of a specific parameter within a group.</td>
</tr>
</tbody>
</table>
### 11.8 Detailed parameter descriptions

<table>
<thead>
<tr>
<th>Group</th>
<th>Par.</th>
<th>Denomination</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>1-1</td>
<td>Power limitation</td>
<td>Power limitation allows scaling down the max. (steam) output within a range of 25 to 100 %, which may be necessary for a better control performance. The actual steam output is determined by the control signal.</td>
</tr>
<tr>
<td></td>
<td>1-2</td>
<td>Control signal</td>
<td>This parameter tells the unit control software what kind of control signal is wired. Also, the control characteristic is defined. These are the setting options:</td>
</tr>
</tbody>
</table>
|              |      |                                   | 1 = external controller, 0...10 V  
|              |      |                                   | 2 = external controller, 0...20 mA  
|              |      |                                   | 3 = external controller, 0...140 Ω  
|              |      |                                   | 4 = PI controller, 0...10 V         
|              |      |                                   | 5 = PI controller, 4...20 mA        
|              |      |                                   | 6 = PI controller, 0...140 Ω        
|              |      |                                   | 7 = 1-step                          
|              |      |                                   | 8 = Modbus                          |
|              | 1-3  | Correction of input stages        | This parameter allows for an active humidity sensor calibration in the range from -5% r.h. to +5% r.h. .                                                                                           |
|              | 1-4  | Filter input stage                | This parameter allows for switching the damping of the input low pass filter from „light“ to „strong“. With a capacitive humidity sensor, increasing the input damping is meaningful for improving the signal-to-noise ration and for reducing the oscillating tendency. |
| Blow-down    | 2-1  | Correction partial blow-down      | In case of high electrical conductivity of water or excessive maintenance effort, increasing the blow-down frequency may be meaningful. When conductivity is low, however, a lower blow-down frequency may be adequate. To cope with different water qualities, blow-down rates may be adapted within a range of 10 stages (factory presetting is „0“).                                                                 |
|              |      |                                   | Increase blow-down rate: settings up to +5.  
<p>|              |      |                                   | Decrease blow-down rate: setings up to -5.                                                                                                     |
|              |      |                                   | A blow-down rate too low will lead to significant wear and tear and will also increase the maintenance effort required.                                                                                     |
|              |      |                                   | <strong>Pls. note:</strong> a „-5“ setting will shut off blow-down completely!                                                                                  |</p>
<table>
<thead>
<tr>
<th>Group</th>
<th>Par.</th>
<th>Denomination</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blow-down</td>
<td>2-2</td>
<td>Correction full blowdown</td>
<td>see correction partial blow-down</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>Switch stand-by blow-down</td>
<td>Should steam humidifier operation be prospectively halted for a longer period of time, blowing-down the cylinder water is advisable in order to comply with the VDI 6022 hygiene regulations prescribing the prevention of microbial contamination of residual water. Parameter 2-3 is the switch to activate and de-activate the stand-by blow-down function. When activated, a full blow-down is run after a waiting time that was determined by setting parameter 2-4 to the value in question. For stand-by blow-down to become effective, the unit control switch must remain in the „On“- postion („I“).</td>
</tr>
<tr>
<td></td>
<td>2-4</td>
<td>Waiting time stand-by blow-down</td>
<td>Determines the waiting time until the cylinder water is fully drained to counteract contamination when no steam is produced for a lengthy period of time (factory setting is 24 hours).</td>
</tr>
<tr>
<td></td>
<td>2-5</td>
<td>Switch „dead leg flushing“</td>
<td>When parameter 2-5 = „1“, for flushing of the supply line, solenoid and blow-down pump are simultaneously activated after the time preset in parameter 2-6 and for the duration of time preset in 2-7. In order for this to work, the safety interlock must be closed.</td>
</tr>
<tr>
<td></td>
<td>2-6</td>
<td>Interval dead leg flushing</td>
<td>Waiting time [h] until dead leg flushing is activated when switch 2-5 = „1“.</td>
</tr>
<tr>
<td></td>
<td>2-7</td>
<td>Duration dead leg flushing</td>
<td>Duration of dead leg flushing [s].</td>
</tr>
<tr>
<td></td>
<td>2-8</td>
<td>Blow-down without main contactor K1</td>
<td>During blow-down, leakage currents may flow towards ground through cylinder water. In order to avoid the activation of the leakage sensor circuit-breaker, the main contactor K1 may be switched off during pumping (2-8 = „1“ is designated to „main contactor is switched off during pumping“).</td>
</tr>
<tr>
<td>Group</td>
<td>Par.</td>
<td>Denomination</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>------</td>
<td>---------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Service</td>
<td>3-1</td>
<td>Reset steam-service interval</td>
<td>On finishing maintenance work, the service interval is to be reset (the service icon is blanked if it was illuminated before).</td>
</tr>
<tr>
<td></td>
<td>3-2</td>
<td>Reset K1 service interval</td>
<td>Main contactor switching cycles are monitored and compared to the life expectancy figure supplied by the part’s manufacturer. On a match, reading value r01 is set to „270“ (and the service icon LED flashes). After changing the main contactor, parameter 3-2 must be set to „1“ for a reset of the status message.</td>
</tr>
<tr>
<td></td>
<td>3-3</td>
<td>Service interval [t]</td>
<td>same as 3-4 (only relevant when the SI system was selected)</td>
</tr>
<tr>
<td></td>
<td>3-4</td>
<td>Service interval [tn.sh.]</td>
<td>Unit control monitors the actual steam amount produced and compares it with the service steam amount that was determined by the parameter 3-4 setting. When the two data match, the service icon is lit. Steam humidifier operation is not disrupted. Service rate highly dependents on water quality (conductivity, hardness) and on the amount of steam produced since the last service. By varying parameter 3-4, the service interval may be adjusted to water quality.</td>
</tr>
<tr>
<td>Governing</td>
<td>4-1</td>
<td>Set point r.h.</td>
<td>Parameter 4-1 determines the r.h. set point for control.</td>
</tr>
<tr>
<td></td>
<td>4-2</td>
<td>Gain PI controller</td>
<td>Sets the PI controller gain (Xp) [%].</td>
</tr>
<tr>
<td></td>
<td>4-3</td>
<td>Integral PI controller</td>
<td>Sets the PI controller resetting time (Xn).</td>
</tr>
<tr>
<td></td>
<td>4-4</td>
<td>Control curves</td>
<td>By setting this parameter, electrode driving may be varied between energy-optimised (4-4 = „0“) and load-optimised (4-4 = „1“). In the first case, when a cold start is run, current is increased to 1.28 times the nominal current. When „load-optimised“ was selected, the increasing factor is only 1.1 in order to not overload the power supply.</td>
</tr>
</tbody>
</table>
### Functions

<table>
<thead>
<tr>
<th>Group</th>
<th>Par.</th>
<th>Denomination</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functions</td>
<td>5-1</td>
<td>Switch stand-by heating</td>
<td>Stand-by heating is enabled or not (0= off, 1=on).</td>
</tr>
<tr>
<td></td>
<td>5-2</td>
<td>Interval stand-by heating</td>
<td>Parameter 5-2 determines the interval time between heating phases when stand-by heating was enabled.</td>
</tr>
<tr>
<td></td>
<td>5-3</td>
<td>On-time Stand-by heating</td>
<td>Parameter 5-3 sets the heating on-time when stand-by heating was enabled.</td>
</tr>
<tr>
<td></td>
<td>5-4</td>
<td>Basic relay allocation</td>
<td>The basic relay offers potential-free NC and NO contacts across terminals 28,29 and 29,30, respectively on the ST03 connector (contact capacity is 250 VAC/8A). The relay is activated when a certain operating status is achieved. Parameter 5-4 allows for allocating a logical function, i.e. the relay is energised when a certain operating status occurs. Factory setting is „0“ defined as „collective fault“ The following allocations are supported: (0) Collective fault: Relay is energised in case of any fault. (1) Stand-by: Relay is energised when the unit is in stand-by. (2) No demand: Relay is energised when input signal creates no demand. (3) Humidifying: Relay is energised when humidifying is active. (5) Remote off: Relay is energised when safety interlock was opened under software by means of the building control system. (30) Filling off: Relay is energised when filling is not active. (31) Filling on: Relay is energised when filling.</td>
</tr>
<tr>
<td>Group</td>
<td>Par.</td>
<td>Denomination</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>------</td>
<td>--------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Functions   | 5-4  | Basic relay allocation (ctd.) | (37) HyCool: Relay is energised for switching on HyCool-function solenoid valve. 
(60) Blow-down off: Relay is energised when not pumping.  
(61) Blow-down on: Relay is energised when pumping takes place.  
(62) Partial blow-down: Relay is energised when a partial blow-down is run. 
(63) Full blow-down: Relay is energised when a full blow-down is run.  
(64) Dilution: A partial blow-down is run due to a water conductivity too high.  
(65) Overcurrent blow-down: Relay is energised when an overcurrent blow-down is run.  
(67) Stand-by blow down: Relay is energised when a stand-by blow-down is run. 
(68) Dead leg blow-down: Relay is energised when a dead leg blow-down is run.  
(270) Collective Service: Relay is energised when a service message status („Service steam amount“, „Service main contactor K1 switching cycles“) is active. |
|             | 5-5  | Relay_K20 allocation | Defines logical function of relay K20 contacts (in the same way as 5-4 does for the basic relay). Factory preset is „270“ = „Max. level“.
|             | 5-6  | Modbus address | The control electronics may optionally be equipped with a RS485 serial interface for running data communication with the Modbus RTU protocol. 5-6 then holds the Modbus RTU address. |
| Settings    | 6-1  | Buzzer | The control panel features a buzzer for prompting key strokes. Parameter 6-1 allows for muting the prompt. |
|             | 6-2  | Time-Out | Unit control switches the display back to actual steam output presentation after the time set in 6-2. Factory setting is „2 minutes“ |
|             | 6-3  | Imperial units | This parameter enables a switch between SI units and imperial units. Actual steam output e.g. will then be in „lb/h“ instead of „kg/h“.
|
12. Trouble shooting

12.1 Error handling

On occurrence of a fault, steam production is stopped. The control panel display is switched to error code output. In the same instance, the general fault icon starts flashing.

On „Steam production“, „Main contactor“, „Filling“ and „Blow-down“ faults, the respective icon is additionally blinked.

12.1.1 Table of possible faults and related error codes

<table>
<thead>
<tr>
<th>Icons</th>
<th>Code</th>
<th>Error message</th>
<th>Possible cause</th>
<th>Counter measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>No error</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>![Icon]</td>
<td>001</td>
<td>Current sensor plug</td>
<td>Plug not attached or loose</td>
<td>Check plug</td>
</tr>
</tbody>
</table>
| ![Icon] | 020-021 *) | Min./max. reference for voltage control signal not correct Software has detected implausibility | • Sensor, input wiring or signal source not correct  
• Input stage defective |
| ![Icon] | 022-023 *) | Min./max. reference for current control signal not correct Software has detected implausibility | • Sensor, input wiring or signal source not correct  
• Input stage defective |
| ![Icon] | 024-025 *) | Min./max. reference for resistive control signal not correct Software has detected implausibility | • Sensor, input wiring or signal source not correct  
• Input stage defective |
| ![Icon] | 029 | System failure | • Main PCB is defective |

*) When a PI controller is in use, errors 020-025 relate to the sensor output signals. With an external controller the controller output signal is concerned.
<table>
<thead>
<tr>
<th>Icons</th>
<th>Code</th>
<th>Error message</th>
<th>Possible cause</th>
<th>Counter measure</th>
</tr>
</thead>
</table>
| ![Alert](image) ![Error](image) | 030  | Filling       | • Solenoid valve or water supply line contaminated or defective  
• Solenoid valve defective  
• Water supply not opened  
• Solenoid valve electrically not driven  
- electrical cabling not o.k.  
- Main PCB relay not energised  
• Steam hose not laid with sufficient incline/decline resulting in a water bag obstructing steam flow. Steam builds up pressure in steam cylinder and pushes water towards drain  
• L3 phase break-down  
• Main contactor does not switch L3 phase | • Clean water supply line and/or solenoid valve; replace solenoid valve, if defective  
• Make measurement on solenoid; replace solenoid valve, if defective  
• Open water supply  
- Check electrical cable and replace, if required  
- Measure voltage on main PCB terminal 11 against N; replace PCB, if required  
• Check steam hose layout. Eliminate water bag.  
• Reestablish L3 phase feeding  
• Replace main contactor |
<table>
<thead>
<tr>
<th>Icons</th>
<th>Code</th>
<th>Error message</th>
<th>Possible cause</th>
<th>Counter measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Icon]</td>
<td>061 062 063 064</td>
<td><strong>Blow-down fault</strong>, relates to:  Partial blow-down</td>
<td>- Blow-down pump not driven  - Electrical wiring not o.k.  - Main PCB relay not energised</td>
<td>- Check wiring and replace, if required  - Measure voltage on main PCB terminal 10 against N; replace PCB, required if</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Full blow-down</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dilution</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overcurrent blow-down</td>
<td></td>
<td>- Replace blow-down pump</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A partial/full/overcurrent/dilution blow-down was not successful</td>
<td>- Blow-down pump defective</td>
<td>- Clean cylinder and cylinder base carefully to ensure that no blocking will occur in the near future</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Blow-down pump working but water is not drained (i.e. cylinder drain is blocked)</td>
<td>- Check blow-down pump, drainage system and steam cylinder for hardeners and clean</td>
</tr>
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<td></td>
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<td></td>
<td>- Blow-down pump blocked by hardeners</td>
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</tr>
<tr>
<td>![Icon]</td>
<td>090</td>
<td><strong>Cylinder full</strong></td>
<td>- Check blow-down pump, drainage system and steam cylinder for hardeners and clean</td>
<td>- Check feed water quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sensor electrode continuously signals full cylinder for 60 mins</td>
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<td>- Replace electrodes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Electrodes used up</td>
<td>- Run one phase through current transducer</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>- No electrode cable run through current transducer</td>
<td>- Clean</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Salt bridges in steam-cylinder upper part</td>
<td>- Increase blending rate</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>- Foaming (when softened water is used)</td>
<td></td>
</tr>
<tr>
<td>![Icon]</td>
<td>091</td>
<td><strong>Current measurement</strong></td>
<td>- Plug is not seated properly on main PCB</td>
<td>- Check plug seating</td>
</tr>
<tr>
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<td>Current transducer supplies faulty measurement</td>
<td>- Current transducer defective</td>
<td>- Replace current transducer</td>
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<tr>
<td>Icons</td>
<td>Code</td>
<td>Error message</td>
<td>Possible cause</td>
<td>Counter measure</td>
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<tr>
<td>-------</td>
<td>------</td>
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</table>
| ![Alert](https://via.placeholder.com/15) ![Lightning](https://via.placeholder.com/15) | 092 | **Main contactor current**  
Current measured though the main contactor is not driven | • Main contactor contact sticks | • Replace main contactor |
| ![Alert](https://via.placeholder.com/15) ![Lightning](https://via.placeholder.com/15) | 093 | **Main contactor cylinder full**  
„Cylinder full“ is detected though main contactor is not driven | • Main contactor contact sticks | • Replace main contactor |
| ![Alert](https://via.placeholder.com/15) ![Humidity](https://via.placeholder.com/15) | 210 | **R.h. sensor**  
Humidity sensor signal implausibility | • Sensor cable defective  
• Sensor defective | • Check sensor cable  
• Replace sensor |
| ![Alert](https://via.placeholder.com/15) ![ErL](https://via.placeholder.com/15) | ErL | **Error Link**  
no communication between mainboard and display | • Mainboard or display unit defective | • Replace mainboard or display unit |
# 12.2 Table of functional disruptions

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause for faulty situation</th>
<th>Counter measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set humidity level not reached</td>
<td>• Output limitation parameter setting impedes full power output&lt;br&gt;• Nominal unit output insufficient&lt;br&gt;• Phase failure&lt;br&gt;• Lengthy steam hose layout crossing cold and drafty rooms may lead to increased condensate formation&lt;br&gt;• Improper steam manifold installation may cause condensate formation within air duct&lt;br&gt;• Control signal not properly selected or software setting mismatch&lt;br&gt;• Water quality requires water concentration for full steam output&lt;br&gt;• Excessive pressure in duct system caused by e.g. water bags or partly blocked steam pipes (max. overpressure is 1200 Pa)</td>
<td>• Check 1-1 parameter setting&lt;br&gt;• Check unit technical data, airflow and secondary airflow&lt;br&gt;• Check circuit breakers&lt;br&gt;• Change unit installation location allowing for shorter steam hose. Insulate steam hose&lt;br&gt;• Check steam manifold position within total system and installation correctness&lt;br&gt;• Check control signal and 1-2 parameter setting&lt;br&gt;• Wait&lt;br&gt;• Eliminate particular cause(s)</td>
</tr>
<tr>
<td>Excessive humidity</td>
<td>• A steam output limitation setting that is too high may result in poor control performance and even condensate formation in ducts&lt;br&gt;• Control signal not properly selected or software setting mismatch</td>
<td>• Check 1-1 parameter setting&lt;br&gt;• Check control signal and 1-2 parameter setting</td>
</tr>
<tr>
<td>Water collects on bottom plate</td>
<td>• Cylinder improperly reassembled following maintenance:&lt;br&gt;- O-ring not replaced, defective or not in place&lt;br&gt;- Flange (tongue and groove) damaged&lt;br&gt;- Flange improperly composed&lt;br&gt;- Mineral deposits in flange area&lt;br&gt;• Cylinder improperly inserted in cylinder base&lt;br&gt;• Water cannot drain freely when pumped from cylinder</td>
<td>• Clean cylinder and assemble / install properly&lt;br&gt;• Using moistened new O-ring, insert steam cylinder properly into cylinder base&lt;br&gt;• Make sure drain is unobstructed</td>
</tr>
<tr>
<td>Problem</td>
<td>Possible cause for faulty situation</td>
<td>Counter measure</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Water leaks from steam cylinder upper part</td>
<td>• Hose clamps on steam and/or condensate hose not tightened &lt;br&gt; • Steam hose adapter not properly fit or O-ring not replaced</td>
<td>• Tighten clamps &lt;br&gt; • Replace O-ring (if required) and ensure proper adapter installation</td>
</tr>
<tr>
<td>No steam production despite the steam humidifier being switched on. Display not illuminated.</td>
<td>• Defective F1 and/or F2 fuses (1.6 A each) &lt;br&gt; • L3 phase failure (ext. circuit breaker has tripped or is defective) &lt;br&gt; • device load circuit breaker has tripped</td>
<td>• Check micro fuses and replace, if required &lt;br&gt; • Replace breaker and investigate possible causes &lt;br&gt; • Switch on breaker. If problem persists, check for reason</td>
</tr>
<tr>
<td>Blow-down pump works but not water is drained</td>
<td>• Steam cylinder and/or drainage system blocked</td>
<td>• Clean cylinder base and/or drainage system, respectively</td>
</tr>
<tr>
<td>Cylinder is fully drained after partial blow-down despite pump being switched off</td>
<td>• Vent pipe is blocked</td>
<td>• Clean venting bore or replace vent pipe adapter</td>
</tr>
<tr>
<td>No steam exit from steam manifold. Water exits periodically from drain hose without pump switched on</td>
<td>• Steam pipe improperly laid (water bag). &lt;br&gt; • Excess pressure in duct system (max. overpressure is 1200 Pa)</td>
<td>• Rerun steam hose according to guide lines &lt;br&gt; • Consult your expert dealer if problem persists</td>
</tr>
<tr>
<td>Uneven electrode wear</td>
<td>• One or more electrodes not supplied with power &lt;br&gt; • Circuit breaker tripped &lt;br&gt; • Main contactor contact not functional &lt;br&gt; • Phase loading not symmetric &lt;br&gt; • Electrode immersion depth differs. Unit not mounted plumb</td>
<td>• Check power supply and wiring &lt;br&gt; • Check circuit breaker. Replace, if required &lt;br&gt; • Check main contactor. Replace, if required &lt;br&gt; • Ensure power supply phase balance by measurement &lt;br&gt; • Check installation and correct positioning, if required</td>
</tr>
<tr>
<td>Problem</td>
<td>Possible cause for faulty situation</td>
<td>Counter measure</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------</td>
<td>-----------------</td>
</tr>
</tbody>
</table>
| Flashover/sparks in cylinder | • Very high water conductivity resulting in massive electrode burn-off as indicated by brown-black deposits | • Deactivate unit immediately to prevent material damage  
Perform maintenance:  
- replace electrodes  
- clean steam cylinder  
- check water quality and conductivity (also s. „Intended use“ section)  
If problem persists, increase blow-down frequency and/or blow-down volume  
Consult your expert dealer, if required |
|         | • Blow-down pump not working properly or defective | • Check blow-down pump functioning and replace pump, if required. See also „**Blow down fault**“ error message |
13. CSA Certificate of Compliance

Certificate of Compliance

Certificate: 1887098                         Master Contract: 238708 (238708)
Project: 70115693                             Date Issued: 2016-12-30
Issued to: Hygromatik GmbH
Lise-Meitner Strasse 3
Henstedt-Ulzburg, D-24558
GERMANY
Attention: Michael Lutkemann

The products listed below are eligible to bear the CSA Mark shown
with adjacent indicators 'C' and 'US' for Canada and US or with adjacent
indicator 'US' for US only or without either indicator for Canada only.

Issued by: Nitin Bhople
Nitin Bhople

PRODUCTS
CLASS - C121106 - COMFORT CONDITIONING EQUIPMENT-Humidifiers and Evaporative Coolers
CLASS - C121186 - COMFORT CONDITIONING EQUIPMENT-Humidifiers and-Evaporative Coolers -
Certified to U.S. Standards

Humidifiers, electrode type, stationary, industrial or commercial, rated 600V or less, 60Hz, 1 ph or 3 ph, as
follows:

Models MS05, MS10, 3.5 kW max. (1 ph) and 7.5 kW max (3 ph).
Models C01, C02, C06, C10, C17, C22, C30, C45, C58; 14.4 kW max. (1 ph) and 43.5 kW max (3 ph).
Models HY05, HY08, HY13, HY17, HY23, HY30, HY45, HY60, HY90, HY116; 28.8 kW max (1ph) and
87 kW max (3 ph).
Models FLE01, FLE02, FLE05, FLE10, FLE15, FLE20, FLE25, FLE30, FLE45, FLE65, FLE80, FLE100,
FLE130; 14.4 kW max. (1 ph) and 50.8 kW max (3 ph) per cylinder.
Models SLE01, SLE02, SLE05, SLE10, SLE15, SLE20, SLE30, SLE45, SLE65; 14.4 kW max (1ph) and
50.8 kW max (3 ph).
Notes:
1. Model designation may be followed by suffix letters and numbers denoting type of control, supply voltage, number of phases.
2. Installation of the equipment in the field is subject to acceptance by the local inspection authority.

APPLICABLE REQUIREMENTS

CSA Std C22.2 No. 104-11 (4th Ed) (R2016) - Humidifiers
UL Std No. 998 (5th Ed) - Humidifiers
Supplement to Certificate of Compliance

Certificate: 1887098

Master Contract: 238708 (238708)

*The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.*

### Product Certification History

<table>
<thead>
<tr>
<th>Project</th>
<th>Date</th>
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<tbody>
<tr>
<td>70115693</td>
<td>2016-12-30</td>
<td>Update Report 1887098 to add new models series FLE and SLE, those are similar to existing models.</td>
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<tr>
<td>70027121</td>
<td>2015-03-23</td>
<td>Update report 1887098 to add new model Series MS and add 230 V Control option.</td>
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<tr>
<td>2479304</td>
<td>2011-11-29</td>
<td>Update Report 1887098 to add new models C01 and 02, those are similar to the existing models.</td>
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<tr>
<td>1887098</td>
<td>2007-08-31</td>
<td>Transfer Report LR 86547-3 and add alternate Class 2 ELV controller board &amp; UL Recognized transformers to Certified HY &amp; C line models.</td>
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14. Spare Parts

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<th>Article No.</th>
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<tbody>
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<td>B-3204047</td>
<td>Sensor electrode compl. with hand nut</td>
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<tr>
<td>B-3204027</td>
<td>Sensor electrode compl. with hand nut</td>
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<tr>
<td>B-2204075</td>
<td>Sensor electrode compl. with hand nut</td>
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<tr>
<td>B-3216021</td>
<td>Flange clamp set, 24 pc</td>
</tr>
<tr>
<td>E-3220002</td>
<td>Cylinder base</td>
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<tr>
<td>E-3220002</td>
<td>Cylinder base</td>
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<tr>
<td>E-3221000</td>
<td>Adapter for steam hose ID20 - OD25</td>
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<tr>
<td>E-2209018</td>
<td>Adapter for steam hose ID40 - OD25</td>
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<tr>
<td>E-2209008</td>
<td>Adapter for steam hose ID40 - OD25</td>
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<td>E-3221004</td>
<td>Clip for adapter steam hose DN25</td>
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<td>E-2209002</td>
<td>Clip for adapter steam hose DN40</td>
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<td>Steam cylinder CY8 DN40 GRP</td>
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<td>SP-03-00002</td>
<td>Steam cylinder CY17 DN40 GRP</td>
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<tr>
<td>SP-04-00000</td>
<td>Steam cylinder CY17 DN40 GRP</td>
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<tr>
<td>SP-04-00100</td>
<td>Steam cylinder CY45 2xDN40 GRP</td>
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<td>B-2204021</td>
<td>Electrodes EL8/4V</td>
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<td>B-2204087</td>
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<td>B-2204089</td>
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<td>Electrodes EL65/4V for CY45/2 (from 11/2018)</td>
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<td>AC-04-00000</td>
<td>O-ring set for SLE15/20 with 3 electrodes</td>
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<td>AC-04-00100</td>
<td>O-ring set for SLE30 with 6 electrodes</td>
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For ordering spare parts, a template can be found on the www.hygromatik.com website under the „Contact“ tab. Your spare parts order may as well be directed per e-mail to the HygroMatik main office using the address hy@hygromatik.de.

Please make sure to specify your unit model and serial number.

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<tr>
<th></th>
<th>SLE02</th>
<th>SLE05 SLE10</th>
<th>SLE15</th>
<th>SLE20</th>
<th>SLE30</th>
<th>SLE45</th>
<th>SLE65</th>
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<td>E-2510010</td>
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<td>Main contactor 32A AC1</td>
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Control, electrical supply between 380V and 480V

| 1   | E-2510000 | Main contactor 20A AC1 |
| 1   | E-2510010 | Main contactor 25A AC1 |
| 1   | E-2510020 | Main contactor 32A AC1 |
| 1   | E-2510030 | Main contactor 50A AC1 |

Control, electrical supply between 208V and 240V

| 1   | WR-03-0001 | Connecting cable for electrodes |
| 1   | WR-04-0010 | Connecting cable for electrodes |
| 1   | WR-06-0010 | Connecting cable for electrodes |

Control, general

| 1   | CN-07-0000 | Mainboard |
| 2   | E-0510020 | Current transducer |

Accessories

| x   | E-2604012 | Steam hose DN25, per m |
| x   | E-2604013 | Steam hose DN40, per m |
| x   | E-2420423 | Drain hose 1 1/4", per m |
| x   | E-2604002 | Condensate hose DN12, per m |

| x   | E-2404004 | Steam hose clamp DN25 |
| x   | E-2604016 | Steam hose clamp DN40 |
| x   | E-2404010 | Drain hose clamp 1 1/4" |
| x   | E-8501064 | Condensate Hose clamp |

| x   | E-2604042 | T-piece DN25, stainless steel |
| x   | E-2604023 | T-piece DN40, stainless steel |
| x   | E-2604021 | T-piece for condensate DN12 |
### 15. Technical specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>SLE02</th>
<th>SLE05</th>
<th>SLE10</th>
<th>SLE15</th>
<th>SLE20</th>
<th>SLE30</th>
<th>SLE45</th>
<th>SLE65</th>
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<tbody>
<tr>
<td><strong>Data at 208-240 VAC/1/N/50-60 Hz</strong></td>
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<tr>
<td>Steam Output [lb/h]</td>
<td>4.8...4.6</td>
<td>9.3...10.6</td>
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<td>17.2...19.8</td>
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<td>Rated Power Input [kW]</td>
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<td>3.1...3.6</td>
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<td>5.9...6.8</td>
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<td><strong>Data at 208-240 VAC/3/50-60 Hz</strong></td>
<td></td>
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</tr>
<tr>
<td>Steam Output [lb/h]</td>
<td>9.9...11.4</td>
<td>15.9...18.3</td>
<td>29.7...34.3</td>
<td></td>
<td></td>
<td>59.6...69</td>
<td>84.5...97.5</td>
<td></td>
</tr>
<tr>
<td>Rated Power Input [kW]</td>
<td>3.4...3.9</td>
<td>5.4...6.2</td>
<td>5.9...6.8</td>
<td></td>
<td></td>
<td>20.4...23.4</td>
<td>28.8...33.1</td>
<td></td>
</tr>
<tr>
<td>Rated Current [A]</td>
<td>9.4</td>
<td>15</td>
<td>28.2</td>
<td></td>
<td></td>
<td>56.5</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Circuit Protection [A]</td>
<td>3x15</td>
<td>3x15</td>
<td>3x35</td>
<td></td>
<td></td>
<td>3x60</td>
<td>3x100</td>
<td></td>
</tr>
<tr>
<td><strong>Data at 440-480 VAC/350-60 Hz</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Steam Output [lb/h]</td>
<td>10.6...11.5</td>
<td>21.2...23</td>
<td>31.5...34.3</td>
<td>42.1...45.9</td>
<td>63...68.6</td>
<td>94.6...103.4</td>
<td>136.4...149.5</td>
<td></td>
</tr>
<tr>
<td>Rated Power Input [kW]</td>
<td>3.6...3.9</td>
<td>7.2...7.8</td>
<td>10.7...11.7</td>
<td>14.3...15.6</td>
<td>21.4...23.4</td>
<td>32.2...35.1</td>
<td>46.5...50.8</td>
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</tr>
<tr>
<td>Rated Current [A]</td>
<td>4.7</td>
<td>9.4</td>
<td>14.1</td>
<td>18.8</td>
<td></td>
<td>28.1</td>
<td>42.4</td>
<td>61.0</td>
</tr>
<tr>
<td>Circuit Protection [A]</td>
<td>3x10</td>
<td>3x10</td>
<td>3x20</td>
<td>3x20</td>
<td>3x35</td>
<td>3x60</td>
<td>3x80</td>
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<tr>
<td><strong>Steam Hose</strong></td>
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<td></td>
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<td></td>
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<tr>
<td>Connection [inch]</td>
<td>1x1</td>
<td>1</td>
<td>1</td>
<td>1x1</td>
<td>1</td>
<td>1x1</td>
<td>1</td>
<td>2 x 1.6</td>
</tr>
<tr>
<td>Empty Weight [lb]</td>
<td>20.0</td>
<td>26.5</td>
<td>44.1</td>
<td>44.1</td>
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<td>90.4</td>
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<tr>
<td>Operational Weight [lb]</td>
<td>26.5</td>
<td>37.5</td>
<td>84.0</td>
<td>75.0</td>
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<tr>
<td>Dimensions</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height [inch]</td>
<td>15.7</td>
<td>22.6</td>
<td></td>
<td>29.3</td>
<td></td>
<td></td>
<td>33.5</td>
<td></td>
</tr>
<tr>
<td>Width [inch]</td>
<td>13.8</td>
<td>13.8</td>
<td></td>
<td>16.7</td>
<td></td>
<td></td>
<td>23.2</td>
<td></td>
</tr>
<tr>
<td>Depth [inch]</td>
<td>9.6</td>
<td>9.6</td>
<td></td>
<td>12.6</td>
<td></td>
<td>16.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Installation</td>
<td>Water/Tap water (different qualities)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 to 10 bar (100 x 10⁵ to 1000 x 10⁵ Pa), with 3/4&quot; connection for external thread</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

1) Multiply power input by 1.1 after full blow-down. Consider overload capacity of automatic breakers. If necessary, select the next higher rating.
2) Outer dimensions of width and depth. Height incl. drain connection.
16. Exploded view
17. View of housing