HYGROMATIK®

member of CAREL group

StandardLine

Electric Heater Steam Humidifiers

Manual

SLH.EN
E-8881160

⚠WARNING

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

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

Please note

In addition to this manual, the appropriate FlexLine Control documentation is mandatory for the operation of the unit. This is not applicable to StandardLine devices, here the documentation of the controller is included in the operation manual.

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 EN 82079-1 (and 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 electric heater steam humidifiers serve for steam production based on tap water, partially softened water or fully desalinated water/cleaned condensate.

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

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

Only qualified 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 by the provider. A copy of this manual is to be placed at the unit‘s operational location.

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 inhalate 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. This way you can protect yourself and others from harm.

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.

The following applies to the HygroMatik installation kits:

Please note

Ensure that the system/machine in which the HygroMatik installation kit will be installed fully complies with the provisions of the directives (2006/42/EC) and the EMC directive 2014/30/EU and that all safety-relevant functions have been implemented in the control system.

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.

⚠WARNING

For Ministeam devices applies:

Risk of scalding!
No persons may be under the cloud of steam blowing out (at a distance of approx. 1 m/40 inch in the direction of blowing out and 0.5 m/20 inch on both sides of the device).

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 (not valid for MiniSteam units).
- Regularly check that all safety and monito-ring devices are functioning normally. Do not remove or disable safety devices.
- Steam operation is only allowed when the unit cover is closed.

NOTICE

Water leaks caused by defective connections or malfunctions are possible.

Water is constantly and automatically filled and drained in the humidifier. Connections and water-carrying components must be checked regularly for correct operation.

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

NOTICE

Do not install HygroMatik steam generators above electrical equipment such as fuse boxes, electrical appliances, etc. In the case of a leakage, leaking water can damage the underlying electrical equipment

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.

Steam operation may only be started when the unit cover is closed.

During maintenance or installation work, the device must be disconnected from the power supply and secured against being switched on again. The absence of voltage must be ensured by a measurement.

Leaks can cause leakage currents. Observe safety regulations on working with voltage parts (applies to electrode steam humidifies).

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.

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*:

Shipping company	After receipt of goods
Carriers	no later than 4 days
Parcel service	immediately

* Time limits for some services subject to change.

4. Functional Description and Device Composition

4.1 Mode of Action

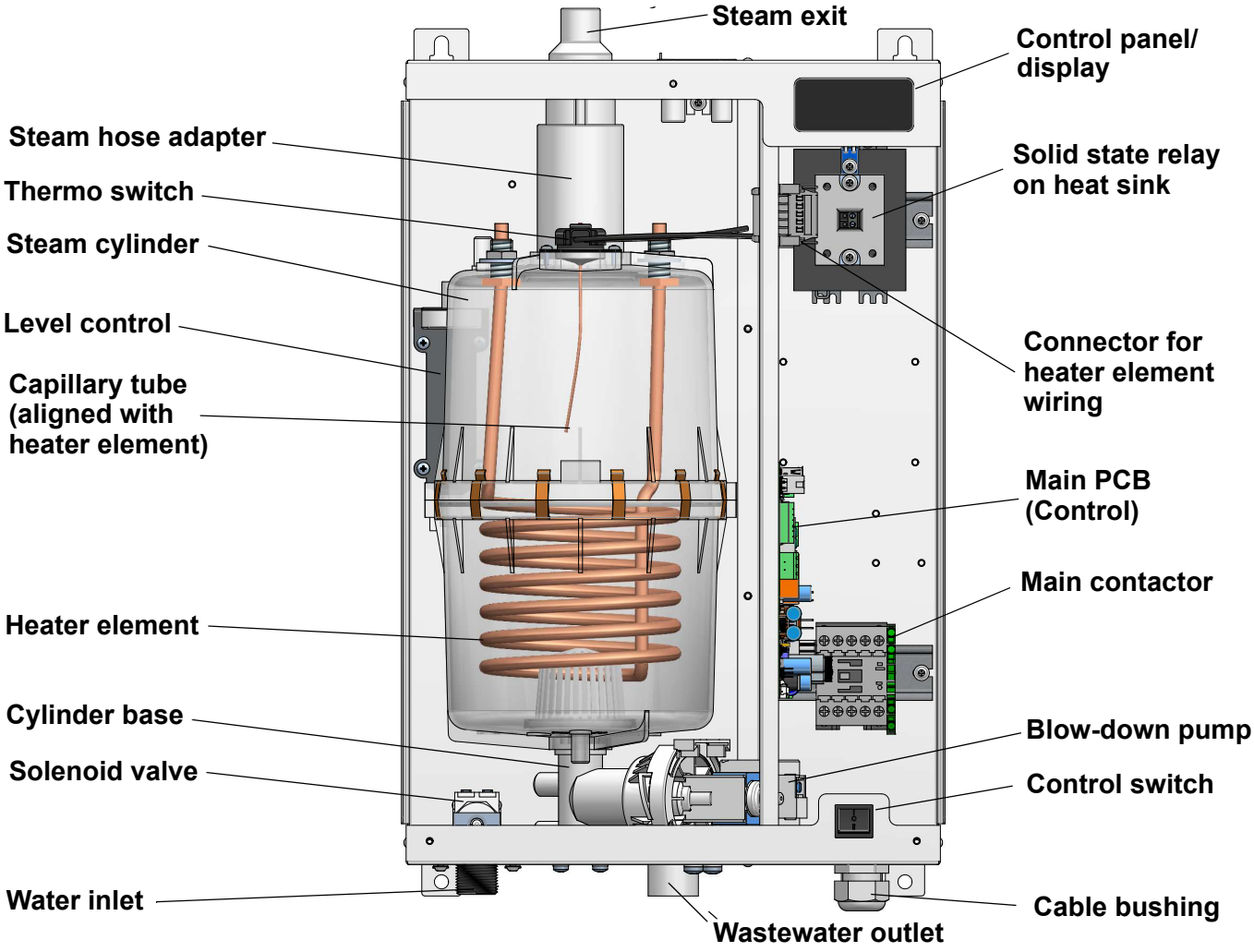
The immersion heater principle

Depending on the output rating, up to six heater elements are arranged within a closed cylinder. Examplary given, the figure below shows the heater element and other main components of the SLH09 steam generator model.

The cylinder(s) are filled with either tap water of varying quality, fully desalinated water or partially softened water. The heat introduced by the heater element(s) heats up the cylinderwater to approx. 100 °C, transforming the water into steam with a temperature of approx. 100 °C and very little positive pressure (so called pressureless steam). This steam is virtually mineral-free and germ-free.

When fully desalinated water is used, the cylinder water is almost totally clear of minerals. This situation guarantees a long lifetime of the cylinder(s) and the heater element(s), since virtually no hardeners will fall-out and no mineral deposits will occur. Such, the number of inspections and/or maintenance operations required will be reduced to a minimum.

When tap water is used for operation, some of the minerals dissolved in the water are likely to settle in the cylinder in form of solids of various compositions. However, most of the solids are flushed out by cyclic blow-down with the help of a heavy-duty blow-down pump.



4.2 Operational Sequence

The steam humidifier is switched on by pressing the control switch on the front panel to the „I“ position. When a demand for humidification is signalled by a hygrostat, a humidity sensor or an external controller (depending on the implementation), the inlet solenoid valve (25)* opens and water is fed into the steam cylinder.

Filling level in the cylinder is controlled by a level control device (27)*) . In a plastic cylinder, connected to the steam cylinder via hoses in the way communicating tubes are connected, a sensor for continous proportional water level survey is located.

The cylinder water is periodically blown down. For usage of the unit with fully desainated water, the blow-down function may be blocked.

Water blow-down is achieved by means of the blow-down pump (32)*) that is continously monitored during unit operation. In case of pump disruption, the HygroMatik steam humidifier is shut off.

With normal water quality, blow-down loss is in the range of 7 to 15% of the steam amount 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 heater element(s) 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 drain hose system.

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

*) numbers indicated correspond with those in the exploded view in the „Exploded view“ chapter.

4.3 Internal Output Setting

4.3.1 Continous control

for units with 1...3 heater elements

4.3.2 Combination of 1-step switching and continous control

for units with 6 heater elements

If the humidifier features more than 3 heater elements, service provision is accomplished in 2 steps. As long as a certain threshold is not reached, the heating power demanded is delivered exclusively via the solid state relay and 3 heater elements by using continous control (stage 1). If the output power demand exceeds the power available in stage 1, 3 more heater elements are additionally switched on in a 1-step mode (stage 2). The power demand beyond what is available in stage 2 is then covered in stage 1 by the solid state relay driven in proportional mode.

4.4 Mechanical Construction

The StandardLine heater steam humidifiers are designed for wall mounting.

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 and secured against being switched on again. The absence of voltage must be ensured by a measurement.

5.1 Environment Parameters to be met and Mounting Recommendations

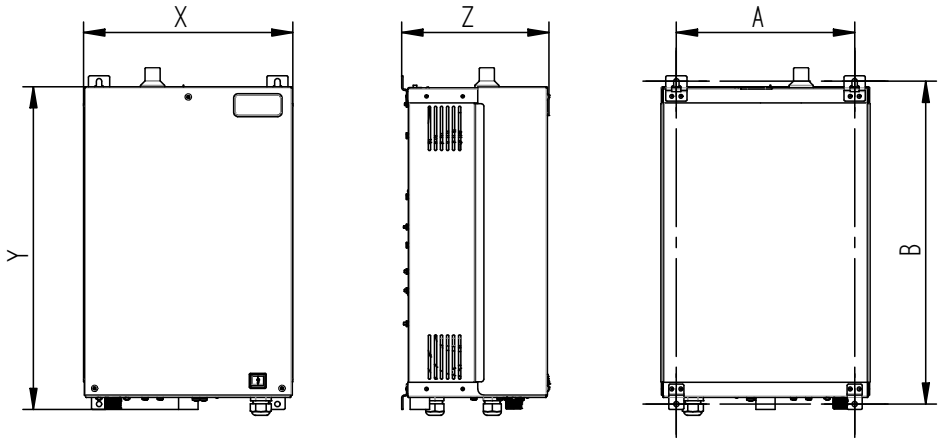
When selecting the installation site for the steam humidifier, take the following into account:

- 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 (electronical 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 and the solenoid valve , 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

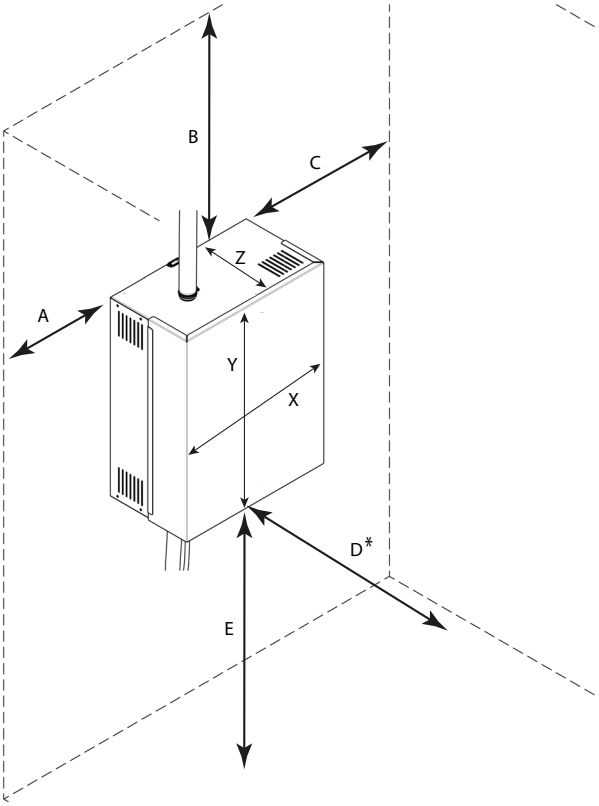
5.1.1 Dimensions and Mounting Directions

Table of dimensions

Model	X [mm/inch]	Y [mm/inch]	Z [mm/inch]	A [mm/inch]	B[mm/inch]
SLH03-SLH09	350/~13.8	535/~21	245/~9.6	295/~11.6	535/~21
SLH15-SLH25	425/~16.7	695/~27.4	320/~12.6	370/~14.6	695/~27.4
SLH40-SLH50	590/~23.2	790/~31.1	415/~16.3	535/~21	787/~31



Detailed measurements under
https://www.hygromatik.com/files/pdf/hygromatik-standardline-dimensionsv11.pdf .
3D models under https://www.hygromatik.com/en/downloads



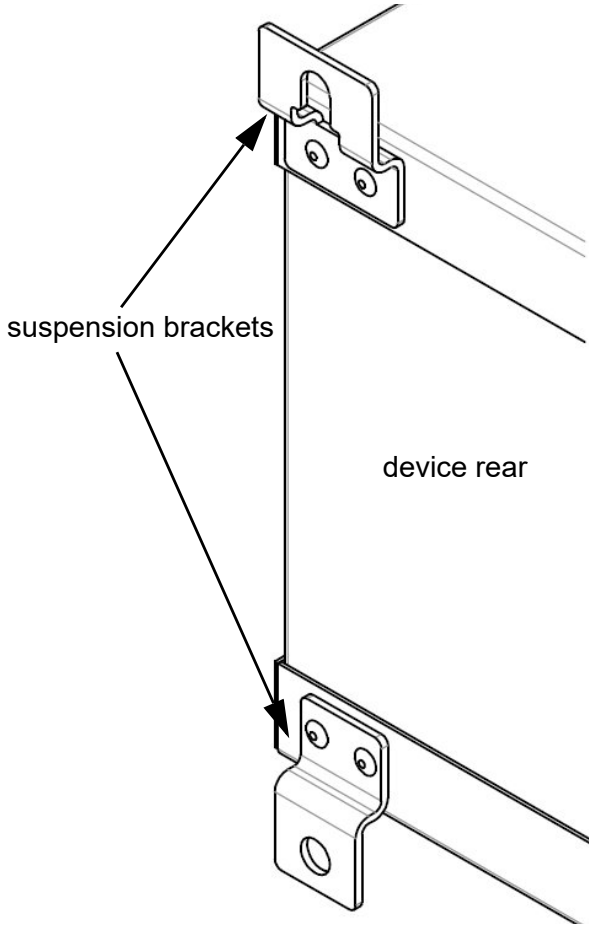
Wall clearances

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

A	5 cm / 2,0 inch
B	50 cm / 19,7 inch
C	20 cm / 7,8 inch
D	60 cm / 23,6 inch
E	30 cm / 11,8 inch

* distance to designated paths

Mounting principle



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

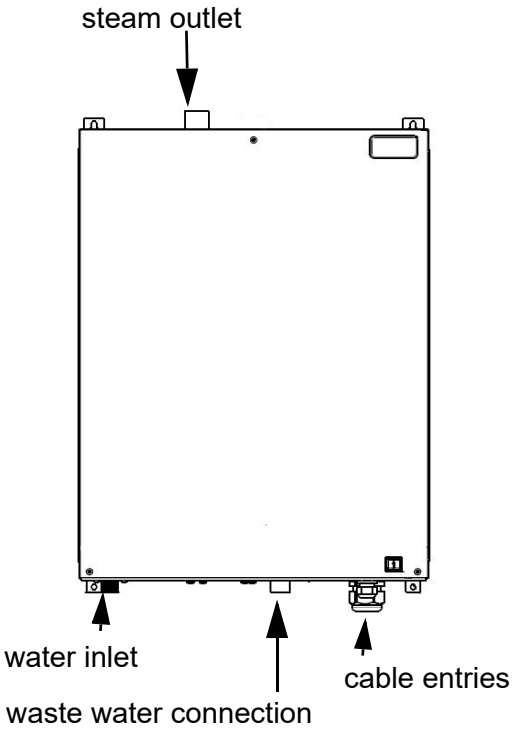
» drill holes and dowel

» hook in the unit and mount the lower screws firmly

Please note

- To function properly, the steam humidifier must hang level and plumb.
- When choosing the installation location, consider the necessary distance between the unit and existing designated paths. This should be at least 60 cm.
- The mounting wall must be made of a temperature-resistant material, as the enclosure can heat up to 70°C/ 158°F.

Device connections:



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 a 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 monted and suspended on the free end, if required ?
- ☑ All seals (o-rings) in place?
- ☑ All ventilation slots on housing top unobscured?

5.3 Steam line and condensate hose layout

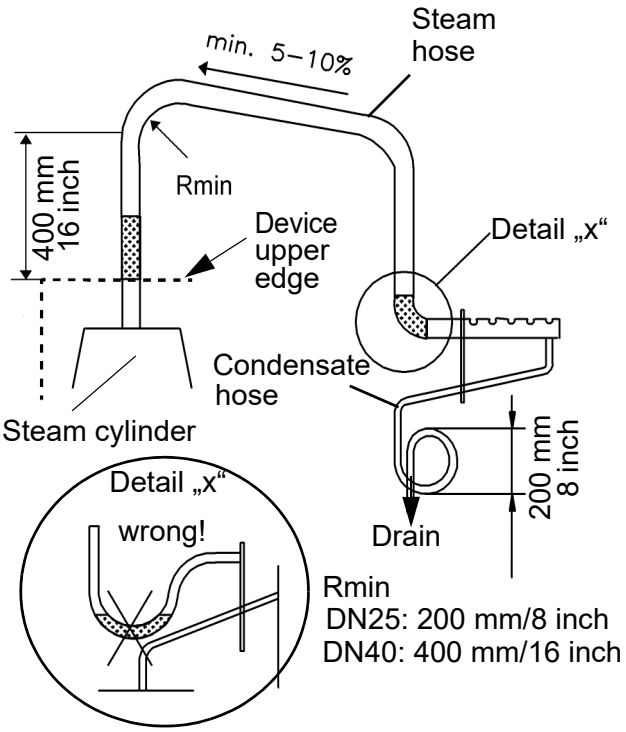
Please note

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

5.3.1 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). Select the steam hose that fits the unit.
- 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 500 mm (20 inches) by clamp brackets.
- Steam hoses should be kept as short as possible. Implement lengths beyond 5 m (16 ft.) as insulated fixed piping to keep energy loss and condensate generation to a minimum. Beyond 10 m (32 ft.) insulated installation is a must. Fixed piping is generally recommended for straight steam line segments.
- If the steam output is divided between two steam distributors (different from the standard design), install the Y-piece for the steam hose as close as possible to the steam distributors. This way, only one steam hose is used for the majority of the distance and condensate losses are reduced. Certain unit types in the HygroMatik steam humidifier portfolio (e.g. FLE40 and FLE80), on the other hand, require the Y-piece to be installed as close as possible to the steam outlet and the steam line to be routed via 2 ways.
- Allow easy access to the steam pipe/ steam hose installation
- Respect minimum bending radii:

  DN 25 Steam hose: Rmin = 200 mm/8“
  DN 40 Steam hose: Rmin = 400 mm/16“



schematic representation

» Run steam hose to a height of 400 mm/16 inch minimum above the steam humidifier and then to the steam manifold with a continuos decline of 5 to 10 %.

» Feed condensate hose to a waste-water pipe/drain with a 200 mm/8 inch diameter loop as a steam barrier. Minimum distance from steam manifold to loop must be 500 mm/20 inch. Fill loop with water.

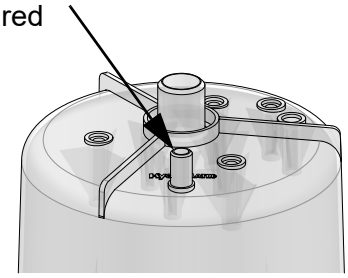
5.3.2 Condensate recirculation

The condensate hose may be run from the steam manifold back to the steam cylinder, as depicted in the schematic drawing below . Alternatively, the condensate hose may be fed directly in a wastewater pipe or a drain.

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 a ANSI drill size „O“ drill. To do so, the steam cylinder must be removed from the housing (s. maintenance chapter). In case of a console instead of a housing, the cylinder is to be lifted off the cylinder base for drilling the stub or may even remain in place.

Drill out condensate hose connection stub with an 8 mm (ANSI drill size „O“) drill, if required



Steam cylinder top view

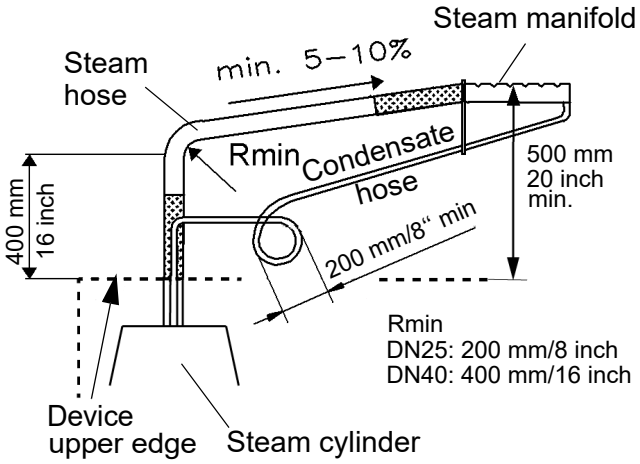
For heater element humidifiers:

Condensate return is only possible for the FLH 30-50 and all FLP unit sizes. Please contact the HygroMatik hotline.

Condensate hose guide

» Lay the condensate hose from the steam distributor with a gradient through the housing bore to the steam cylinder and fasten it there to the connection pipe.

» Lay the condensate hose with a loop of 200mm/ 8 inch diameter as a steam barrier.



Installation type 1, schematic representation

Please note

If the steam distributor is positioned lower than 500 mm above the top edge of the unit, the condensate hose cannot be fed back into the steam humidifier..

5.4 Steam Manifold

5.4.1 General installation guidelines

When installing steam manifolds, pls. follow these guidelines:

Positioning within duct

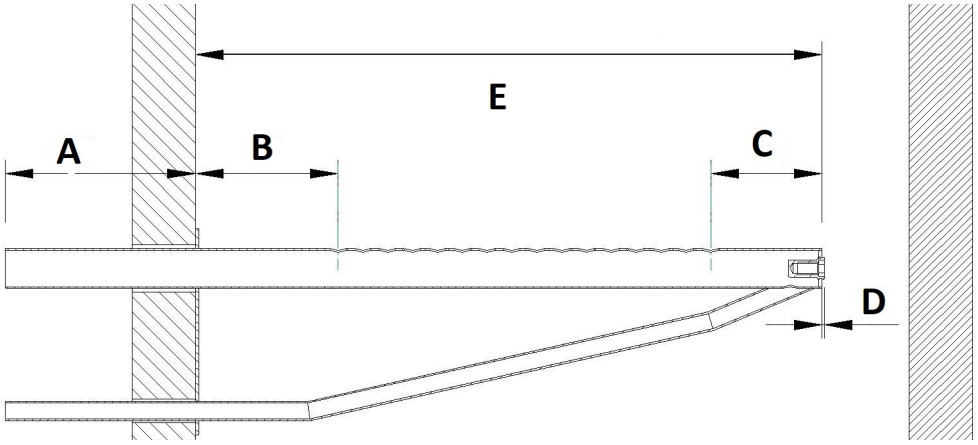
- Install the steam manifold as close as possible to the steam humidifier in order to minimize steam loss through condensation.
- Steam manifold placement on the supply side of the air duct is preferable.
- Install steam manifold strictly horizontal in order to ensure proper condensate drain.
- A minimum distance of 0,3 m (11,81 inch) in the direction of the air flow in front of the steam manifold(s) must be maintained to other installations.

Allowable pressures

- Max. allowable pressure in air duct is 1500 Pa/.218 PSI (exemption: SLE02, SLH02, KIT E02 and KIT H02 only allow for 1200 Pa/.174 PSI)
- On 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

- We point out that according to the German Association of engineers (VDI) guideline VDI 6022, a water drain must be provided within the absorption distance inside the air duct



dimensions [mm/inch]
A: 120 /4,7
B: 90 / 3,5
C: 70 / 2,8
D: 1,5 / 0,6

Length steam manifold (E)

Please note

The length of the steam manifold connection piece is constant and always increases the total length of the steam manifold by exactly 120 mm.

Example: The total length of a 600 steam distributor is 720 mm.

Number and size of the steam manifolds available as well as the nominal diameter of the repective steam and condensate hoses may be taken from the tables shown in chapter „Technical Data“.

Available steam distributor lengths:

	until end of 2024	from beginning of 2025
	length [mm]	lenght [mm]
DN40	220	220
	400	400
		500
	600	800
	900	1100
	1200	1400
	1450	1700
	1800/2000	2000
	2350	2300
	2700	2600
DN25	220	220
	400	400
		500
	600	800
	900	1100
	1200	1400

5.4.2 Recommendations for dimensioning

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

Please note

Start by arranging the steam distributors in the lower third of the air-conditioning duct (as low as possible, observing the minimum distances).

Minimum distance for condensation avoidance:

L_{min} = 200 mm/ 7.9 inch: „Steam manifold - Next steam manifold“ distance

$L1_{min}$ = 150 mm/ 5.9 inch: „Lowest steam manifold - Duct bottom plane“ distance

$L2_{min}$ = 250 mm/ 9.8 inch: „Highest steam manifold - Duct ceiling plane“ distance

$L3_{min}$ = 80 mm / 3.2 inch : Recommended distance:100 mm / 3.9 inch

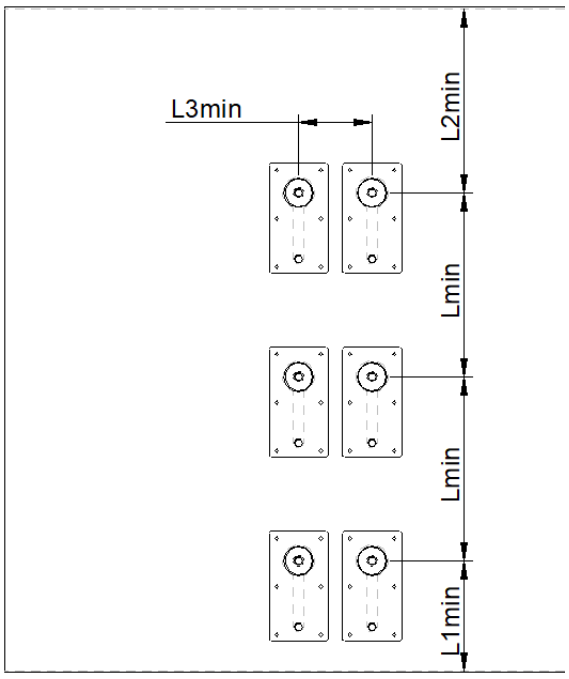


Fig: Distances of the steam distributors

Standard steam manifold arrangement:

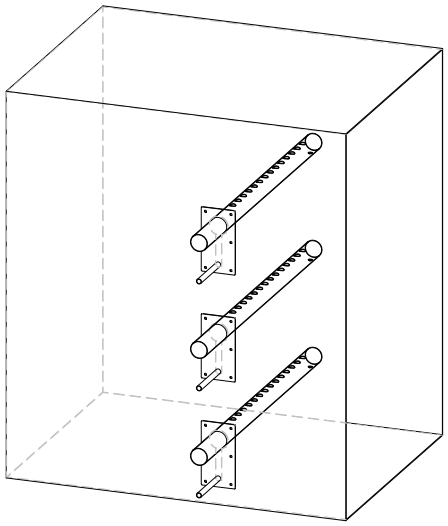


Fig: Standard configuration

Steam manifold arrangement for special air duct shapings:

Height of the air-conditioning duct is too flat for the number of steam distributors:

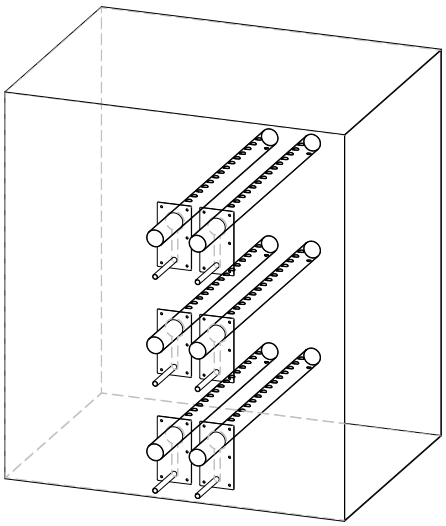


Fig: parallel arrangement of the steam distributors

Narrow, high air duct:

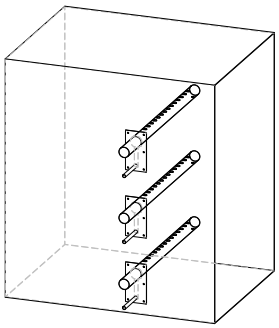


Fig: vertical arrangement of the steam distributors

Flat air duct

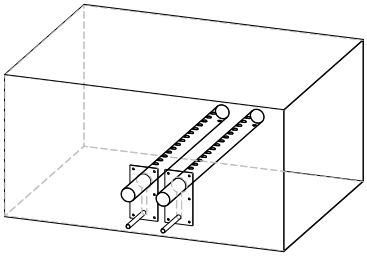


Fig: parallel arrangement of the steam distributors

NOTICE

If several steam distributors are fed from one manifold, make sure that the flow velocity of max. 12 m/s is not exceeded.

Example: 4xDN 40 pipes (120 kg/hour) require at least 1x DN 76 manifold.

NOTICE

When using several steam humidifiers on one manifold, ensure (constructively, e.g. by means of a shut-off valve) that no steam is forced into switched-off steam humidifiers during steam production.

Connection of the steam distributors / steam accesses

The distance of the steam distributors to subsequent obstacles (if their placement behind the steam distributor is unavoidable) such as filters depends on the humidification distance and is described in more detail on the following pages.

5.5 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.

Absorption Distance	
B_N	for normal obstructions such as sensors, ventilators, outlets
B_c = (1.5...2) x B_N	for fine fiters, heat registers
B_s = (2.5...3) x B_N	for particle filters
B_d = (3...5) x B_N	for humidity sensors, duct humidistats

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

5.5.1 Determining the Absorption Distance

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

- Air humidity before humidification x_1 in g/kg
- Air temperature after humidification t_2 in °C (with steam humidifiers the change in air temperature due to humidification may be disregarded t_1 or t_2)
- Specific increase in humidity $\triangle x$ in g/kg (can be determined in the h,x diagram)
- quantity of steam introduced $\dot{m}_D$ 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]

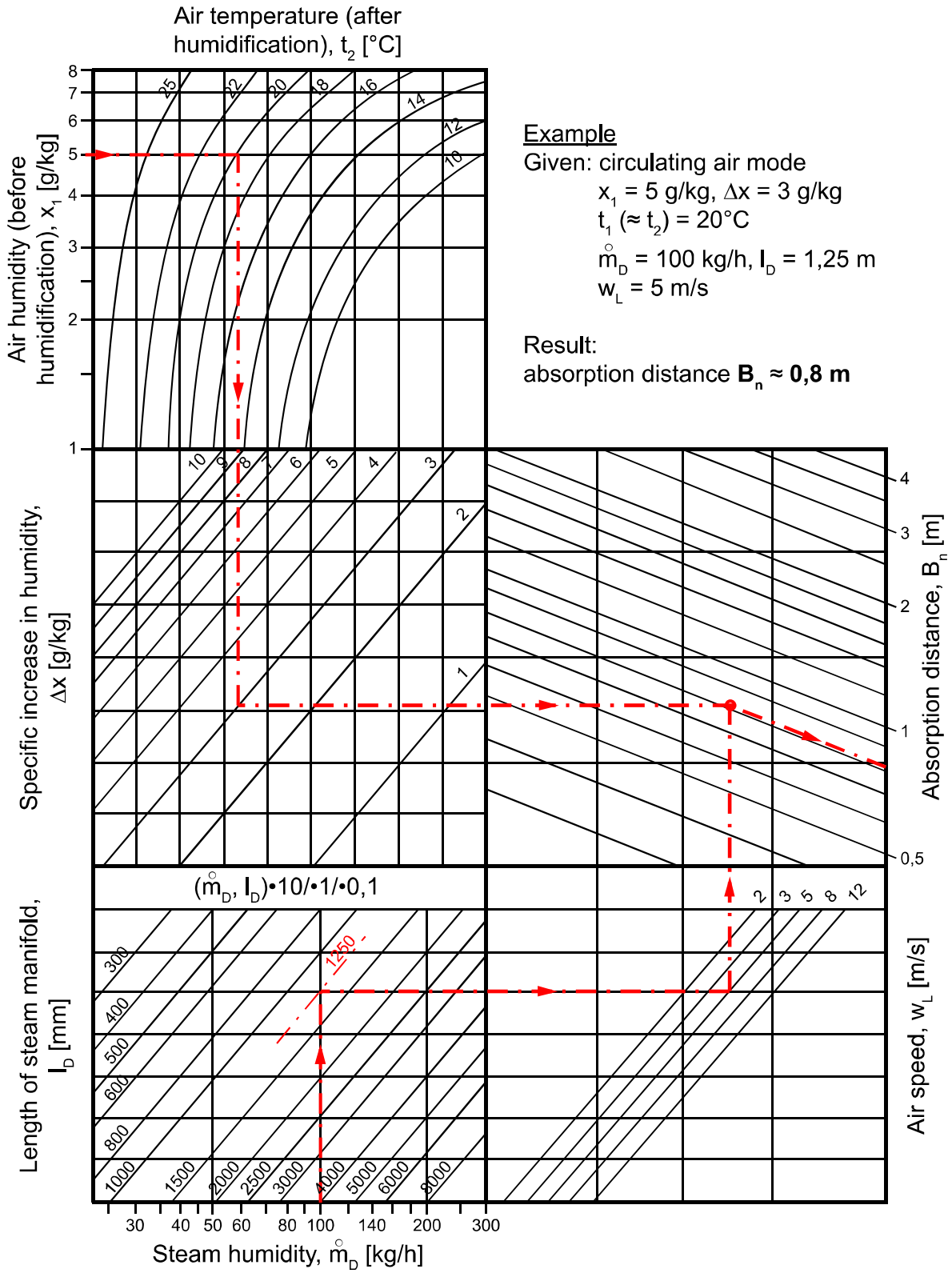
Specific increase in humidity $\triangle x$:.....[g/kg]

Quantity of steam introduced $\dot{m}_D$:.....[kg/h]

Air speed W_L:.....[m/s]

Total length of steam manifold l_D:.....[mm]

5.5.2 Absorption Distance Nomogram



Source: Henne, Erich: Luftbefeuchtung (Air Humidification), 3rd Edition 1984 (Page 101), Oldenbourg Industrieverlag, Munich

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 voltage!
Before starting installation work ensure that the unit is not yet connected to the power supply.

General Rules

- Obey local water utility regulations
- When using fully demineralised water, we recommend the use of stainless steel or plastic pipes.
- 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 – that eliminate backflow of polluted water into drinking water treatment facilities. This may require the installation of a system separator of the CA type (minimum measure, allowable only when free discharge into the drainage system is given). 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.
- Supply water must not exceed 40°C (104°F)
- Allowable range of water pressure: 1 to 10 bar /14.5 to 145 psi (100 x 10^3 to 100 x 10^4 Pa)
- For connection to the water supply pipe, make use of a water hose
- Blow-down water must drain freely
- As installation or retrofit option, the DVGW-conform **HyFlow** system separator is available for the HygroMatik electrode steam humidifiers (except SLE 02).
- You can also use a standard BA/CA system separator for the corresponding fluid category.

6.1 Feed water quality

HygroMatik heater steam humidifiers are designed for operation

- with drinking water* or

or treated drinking water like

- partially or fully softened water
- cleaned condensate
- mixed or normal demineralised water

without chemical additives.

- When using deionised water, there must be a minimum conductivity of 3µS/cm.
- Do not use copper or brass for the humidifier inlet and outlet pipes. These materials can be destroyed by the deionised water/ condensate. Suitable materials are, for example, stainless steel or plastic pipes.
- From a water hardness of 15°dH, we recommend upstream water treatment.
- The feed water that is used (independent of the type of treatment) must have a minimum pH value of 6.0.
- FLP-TPRO units may only be operated with softened water
- Operation with fully softened water (0°dH) is possible

* according to the drinking water regulation

6.2 Operation with softened water

NOTICE

Do not use softened water unless special measures are taken!

- Operation with partially or fully softened water makes it necessary to adjust the blowdown parameters to a higher blow-down frequency.
- Even if the HygroMatik steam humidifier is supplied with partially softened water, the remaining hardness builders can cause fine crystalline deposits. These can be set down in the sieve area of the steam cylinder bottom part and cause blocking of the sieve.
- Operation with fully softened water (0°dH) is possible

6.3 Water supply

NOTICE

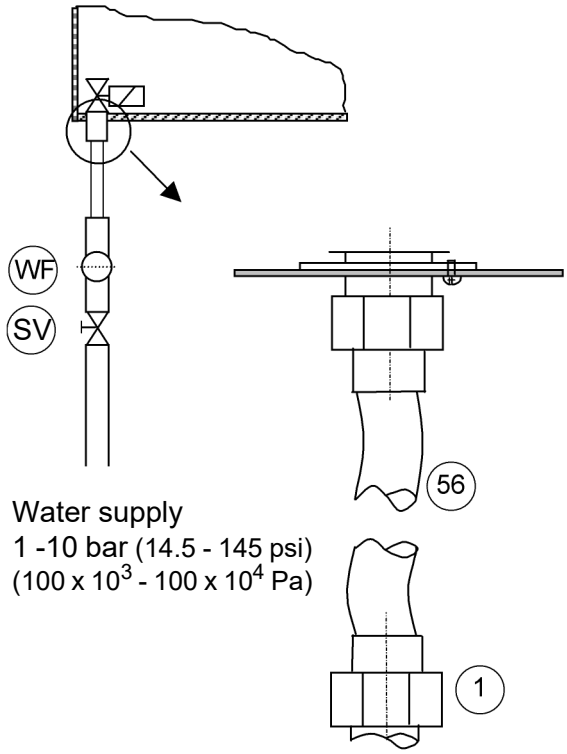
Foreign material in water supply pipe may cause premature wear of the solenoid valve.
Flush the water supply pipe before making connection to the solenoid valve. This is of particular importance in case of a newly installed pipe.

» Install a shut-off valve (SV) in the supply line.

» Install a water filter (WF) if required due to bad water quality.

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 (1) on both ends supplied with the unit may be used.
- 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 is mandatory.



*) the numbers refer to the exploded view in the chapter with the same name.

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

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

» Strainer must be placed inside the solenoid valve

6.4 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. In case of a drain connection on positive pressure, pls. consult your expert dealer.

Guidelines for water discharge composition

- Use original HygroMatik water drain hose
- Do not buckle drain hose
- Use a drain pipe and outlet pipe made of suitable material (temperature resistant up to 95°C (203°F); with waste water cooling HyCool up to 60°C)
- In case of a free outlet according to DIN EN 1717, a system separator for liquid category 3 is required for the water connection.
- In all other cases, use a system separator for liquid category 5.

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.

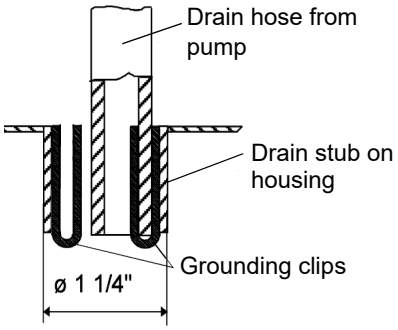
Valid for all steam humidifiers (KITS are not included):

» Position the hose to the side of the humidifier to prevent rising steam from hitting the housing.

» Slide pump drain hose onto one of the grounding clips.

» Slide overflow hose of the HyFlow system separator (if present) onto the other grounding clip.

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** (not available for FLP-XX-TPRO units), 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, wastewater temperature is below 60°C (140°F) as long as inlet water temperature does not exceed 30°C (86° F).

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

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

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

Possible electronical components destruction through electrostatical discharge!
Prior to commencing electrical installation work, steps must be taken to guard the sensitive electronical components of the unit control against damage from electrostatical discharge.

7.1 Electrical installation approach

» Provide fuses with a contact gap of at least 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 connection

For the StandardLine steam humidifiers in the standard version, main connection can be found in the Technical Data (in the chapter of the same name).

Other operating voltages on request.

Fusing

HygroMatik recommends the use of slow blowing up to middle time-lag main fuses.

Please note

Steam humidifier installations should encorporate an individual resiliant current circuit breaker (type A-RCD).

The maximum current consumption and the resulting required fuse protection of the individual standard unit types can be found in the technical data table (chapter Technical data at the end of this manual).

7.2 Cable connections

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

Housing type	M16	M25	M25 with MSI*)	M32	M40
SLE02	1	0	1	0	0
SLE05/10 SLH03/ SLH06/09	0	1	1	0	0
SLE15/ 20/30 SLH15/25	0	0	1	1	0
SLE45/65 SLH40/50	0	0	1	0	1

*) Multiple seal insert

Characteristics of metric cable connections

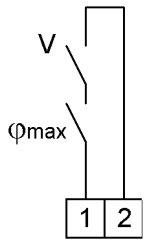
Thread	Wrench size [mm]	Cable diameter supported [mm]
M16X1.5	20	4.5 - 10
M25x1.5	30	9 - 17
M25x1.5 with MSI*)	30	6 (3x)
M32x1.5	36	13 - 21
M40x1.5	46	16 - 28

7.3 Safety interlock

⚠WARNING

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

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.



Safety interlock terminals 1/2

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.

NOTICE

Contacts across terminals 1 and 2 must be potential free and properly rated!

Rating must comply with the control voltage in use.

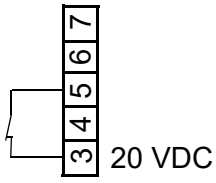
Best practice implies the integration of a max. hygrostat in the safety interlock wiring to protect against over-humidification due to a r.h. sensor malfunction.

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 „Main PCB connections“ is to be made.

7.4.1 1-step operation

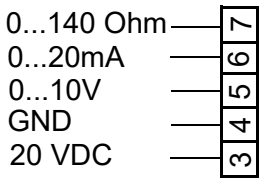
Steam humidifier operation is controlled by the contact across terminals 3 and 5 provided by the customer. This contact needs only to be low voltage proof.



Customer-provided contact for 1-step operation

7.4.2 Operation with an active humidity sensor or external controller

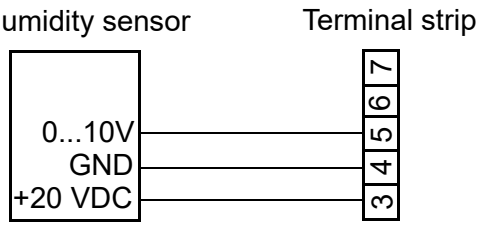
When driving the steam humidifier by an active r.h. sensor or external controller (e.g. a PLC), control signals in the range of 0...10 V, 0...20 mA or 0...140 Ohm may be applied. Each one of the signal types is connected to a dedicated terminal (see „Unit control“ chapter, section „Main PCB connections“).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



Terminals for control signals

Please note

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



Exemplary 0...10V humidity sensor connection

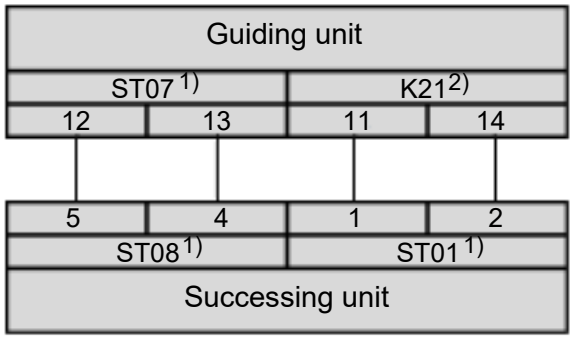
Humidity sensor with higher current requirement:

The circuit board provides a maximum of 30mA. If this is not sufficient for the connected humidity sensor, use the option of a transformer to supply the sensor with power.

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

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 successing unit(s) (provided on-site). These provide the successing 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:



1) „ST0x“ designates connector plugs on the mainboard

2) „K21“ is the relay used for the connection of the successing unit

7.5 Wiring diagram

The device-specific wiring diagrams are included in the scope of delivery. Please use them for the installation and keep them in a safe place.

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 ectrical 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 gounding made?

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 1bar min., 10bar 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.

Step 4: Trigger steam demand

» Set control to 1-step operation, i.e. permanent steam demand, and close safety interlock.

- The water inlet solenoid valve opens and feeds water into the steam cylinder.

Step 5: Monitor unit function and check for leakage

» Let unit operate for 15 to 30 minutes.

» If leaks appear, switch off the unit.

⚠WARNING

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

Step 6: Repair leaks

» Find leaks and eliminate.

» Check again for leaks.

» When everything is o.k., reattach housing cover.

9. Maintenance

9.1 General

For the 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).

Maintenance work mainly encompasses checking and cleaning all of the unit parts including the steam cylinder inside and the level control device, and a unit test run. As part of the maintenance work, screw terminals and plug connections must be checked each and every time and retightened, if required. Also, the tight fit of all of the plug connections must be ensured.

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.

9.2 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 95 °C (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.

9.3 Maintenance frame work when unit is operated with fully demin. water and condensate

Instructions on maintenance and cleaning intervals are entirely based on empirical data.

Cycle time	Maintenance work
4 weeks after commissioning **(also after installation of a new steam cylinder)**	• Visual inspection of electrical and mechanical connections • Remove mineral deposits from steam cylinder, water drain hose and blow-down pump • Visual inspection of level control. • Visual inspection of the steam cylinder interior.
annually	• Visual inspection of electrical and mechanical connections • Remove mineral deposits from steam cylinder, water drain hose and blow-down pump. • Visual inspection of level control. • Visual inspection of the steam cylinder interior. • Removal of used O-rings between the cylinder halves, in the base and in the steam hose adapter • Cleaning the vent hole in the pipe bend • Cleaning the fine filter of the solenoid valve • Checking the hoses

9.4 Maintenance when unit is operated with tap water or partially softened water

No precise maintenance intervals can be specified because these always depend on water quality and the amount of steam generated. It is advisable to adjust the frequency of maintenance to the specific operational experience. HygroMatik recommends to check the opened steam cylinder 1 or 2 weeks after initial commissioning in order to quantify the amount of residue produced so far, allowing for determining future maintenance intervals and/or the adjustment of blow-down cycles possibly required.

Blow-down cycles

The vaporisation process causes hardness builders (calcium) in form of solids of various compositions to fall out within the steam cylinder. Cyclic blow-down by means of a powerful blow-down pump followed by fresh water refills remove parts of this solid built-up.

Water quality

When tap water is used, it must be taken into account that cleaning intervals shorten as the carbonate hardness level increases. As a general rule, it is preferable to operate the unit with fully demineralized water since operation will not be affected by mineral deposits and flushing loss will be minimized.

Please note

Possibly, maintenance intervals may be extended by moderately increasing the blow-down cycle rate. Please consult your expert dealer.

9.5 Removal and reinstallation of the steam cylinder

9.5.1 Removal of the steam cylinder

» Hold the control switch in position II to pump the rest of the water out of the cylinder.

» Set the control switch to position 0 to switch off the unit.

» Disconnect unit from power supply

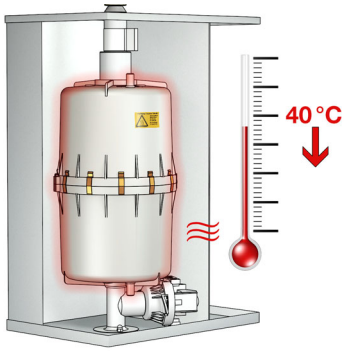
» and secure against reconnection.

» Remove unit housing cover.

» Check the unit again to ensure no voltage is present.

» Shut off the water supply.

» Wait 10 minutes so that the possibly hot cylinder can cool down.



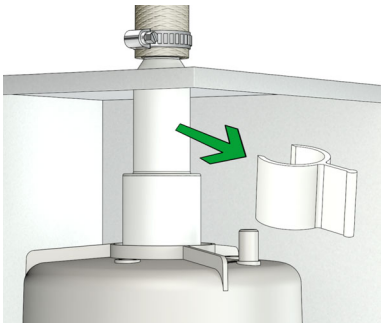
» Check the temperature by carefully approaching it with your hand, do not touch the cylinder if the rest heat should be too strong.

» Remove Super Flush solenoid hose from cylinder bottom (if applicable).

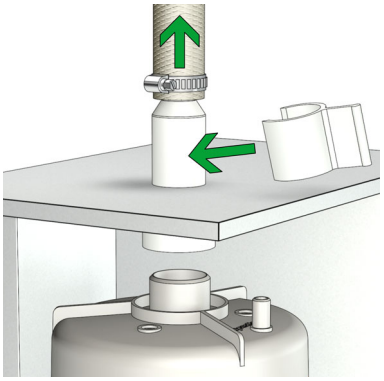
» Remove the steam hose from the steam hose adapter.

If the steam hose is not to be disconnected, the steam hose adapter with the steam hose still attached may be detached from the steam cylinder as shown in the next figures.

» Remove the clip from the steam hose adapter.

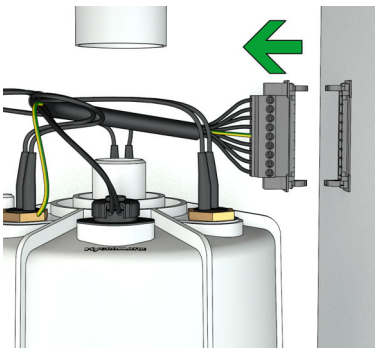


» Pull the steam hose together with the steam hose adapter upwards. This will disconnect it from the steam cylinder.

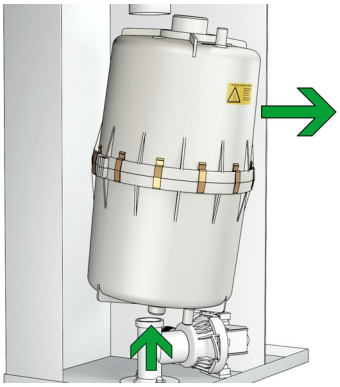


» Push the clip onto the adapter outside of the unit housing.

» Separate connector halves.



» Lift steam the cylinder from the cylinder base.



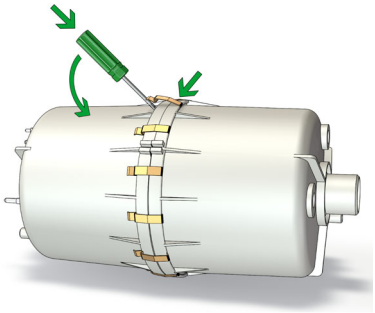
9.5.2 Cylinder cleaning / O-ring replacement

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

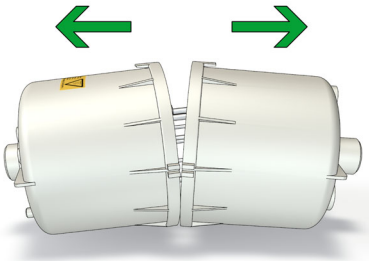
⚠CAUTION

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)!

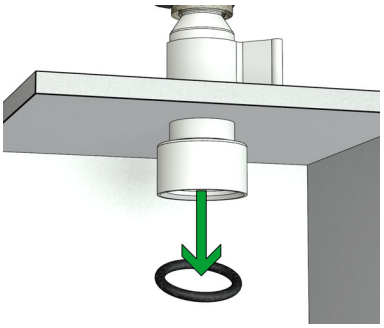
» Remove the cylinder flange clamps.

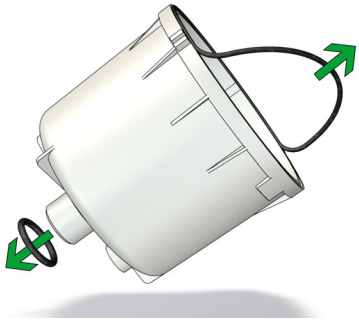


» Separate cylinder halves.



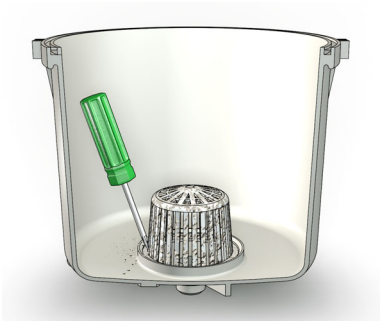
» Remove the used O-rings between the cylinder halves, in the base and in the steam hose adapter.





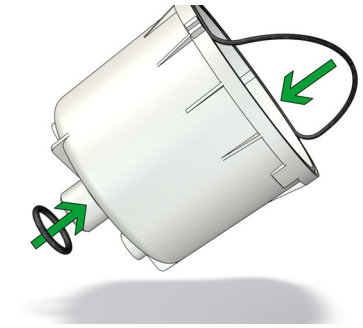
» Clean the cylinder inside.

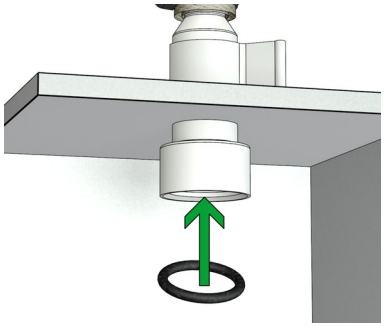
» Clean both strainer.



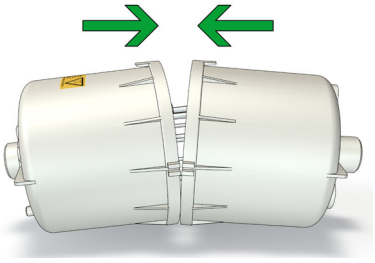
» Check the base and its connections for limescale deposits and clean if necessary.

» Insert new O-rings between the cylinder halves, in the base and in the steam hose adapter.





» Put the cylinder halves together and reconnect them with the flange clamps.



NOTICE

Risk of functional disruption!

Use descaler or cleaning detergents only for cylinder and heater element cleaning. Do not introduce in cylinder base or apply to hoses!

Prior to restarting the unit, make sure that the device assemblies in question are thoroughly flushed or rinsed.

NOTICE

Possible damage to the unit!

Excessive use of force during mechanical cleaning of the cylinder or heating element can damage these parts of the unit.

9.5.3 Cleaning the connecting hoses, base connections, fine filter and drain pump

» Check the connection hoses for condition and free passage.

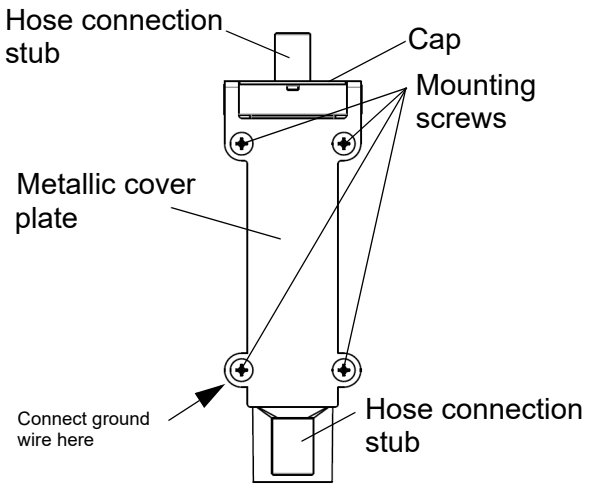
» Check all connections of the cylinder base for free passage.

» Clean the hoses and connections if necessary.

» Remove the fine filter on the water connection side from the solenoid valve and clean it under running water.

» Clean the drain pump as described in the section of the same name..

9.5.4 Level control device cleaning



Water sensor

The level control device is accessable only after removal of the steam cylinder.

» Disconnect hoses from level control device connection stubs on upper and lower side

» Remove the 4 screws securing the metallic cover plate of the level control device and the device as such against the unit rear wall. Memorize ground wire attachment position (under lower left hand side screw).

» Unclip level control device enclosure cap with a flick of the thumb and remove.

» Take out o-ring and dispose of.

» Make visual inspection of level control device enclosure interior and clean, if required. Scratch out any deposits, if present.

» Inspect both level control connection hoses and clean, if required.

» Insert new o-ring.

» Re-attach enclosure cap.

» Align metallic plate with level control device enclosure mounting holes and insert screws in upper left and lower right position. Reintroduce level control device into humidifier housing and loosely affix to unit rear wall with the 2 screws.

» Insert the 2 screws remaining into the open level control device enclosure mounting holes while positioning the ground wire connection eyelet under the lower left screw.

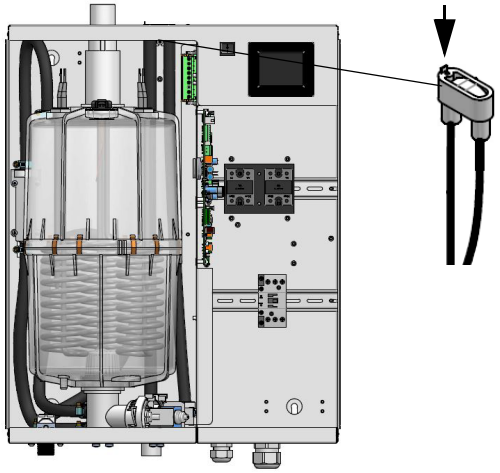
» Handtighten all of the screws.

Please note

A functional check of the level control device may only be accomplished while the device is installed into the unit!

9.5.5 Cleaning the vent hole on the pipe elbow

The pipe elbow is only accessible when the steam cylinder is removed.



» Remove the pipe elbow from the back wall of the housing by unscrewing the fixing screw of the pipe elbow.

» Check the small opening on the top of the pipe elbow for dirt.

» Remove any dirt, e.g. with a small screwdriver.

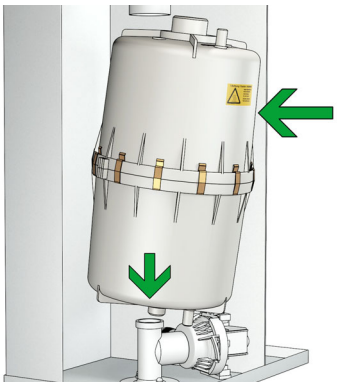
» Reattach the pipe elbow to the back wall of the housing with the screw.

Please note

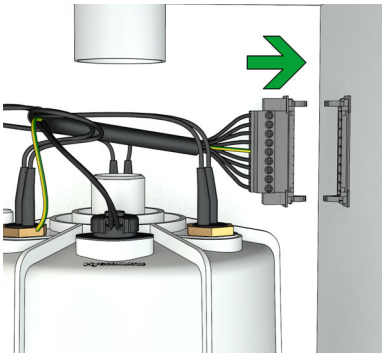
The vent hole should be checked for free circulation during every maintenance. A blocked vent hole has a negative effect on the drainage process (see also chapter "Trouble shooting" in the manual of the control).

9.5.6 Reinstallation of the steam cylinder

» Place the cylinder vertically in cylinder base.



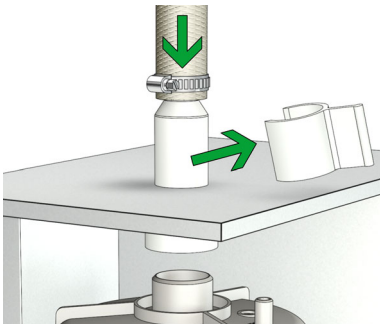
» Reconnect connector halves.



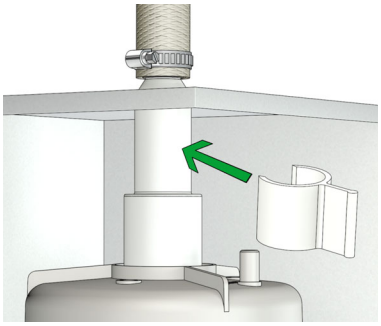
» Reattach Super Flush solenoid hose (if applicable) to steam cylinder bottom stub.

» Reattach level control hose to cylinder cover.

» Attach steam hose adapter to cylinder.



» Affix the steam hose adapter with the clip.



» Follow the handling instructions in the section **Leakage test.**

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.

» Check heater element wiring for damaged insulation

9.6 Removal and installation of unit components

9.6.1 Blow-down pump (removal, cleaning, reinstallation)

Removal and cleaning

» Remove steam cylinder as described in „Removal and reinstallation of steam cylinder“ section.

» Detach adapter (30*) from pump (32).

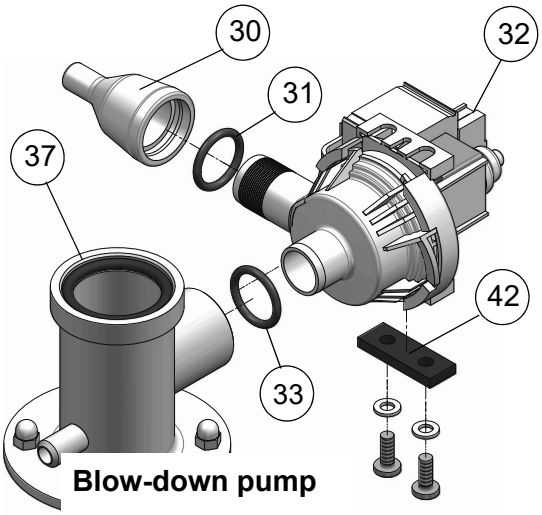
» Detach electrical cable from pump.

» Unscrew mounting screws from housing bottom plate. Safe vibration buffer (42), bolts and washers for reinstallation.

» Pull out the pump of the cylinder base (37).

» Remove residues from pump and drain hoses.

» Remove the used o-Ring (33).



Blow-down pump

Reinstallation

» Moisten the new O-ring (33) and insert into cylinder base (37) horizontal stub.

» Push pump back into cylinder base and bolt to bottom plate encorporating the vibration buffer (42) and washers saved during removal.

» Moisten O-ring (31) and insert into adapter.

» Slide adapter (30) onto pump stub.

» Refit electrical cable to pump connector (no polarisation).

» Reinstall the steam cylinder (see chapter Reinstallation of the steam cylinder).

» Follow the handling instructions in the section **Leakage test.**

9.6.2 Solenoid valve (removal, reinstallation)

Removal

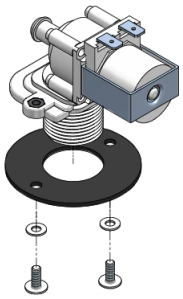
» Shut off water supply and disconnect tap water hose cap screw connection.

» 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.



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 solenod valve.

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

» Follow the handling instructions in the section **Leakage test.**

*) the numbers refer to the exploded view in the same named chapter

9.6.3 Heater element replacement

Removal

» Remove and open steam cylinder as described in the **Removal of the steam** cylinder section.

» Separate thermo switch capillary tube from heater element(s) by detaching the retainer clips.

» Remove wiring of the heater element(s) in question from connector terminals (mark positions for reclamping).

» Unscrew heater element fixing nut(s) from cylinder cover.

» Remove adjusting washer and grounding lug/lock washer (if present) and pull heater element/s downward out of steam cylinder cover.

» Clean the sealing surface on the underside of the cover around the area where the new heater element will be installed.

Reinstallation

» Install replacement heater element(s) (with new sealing) while considering the correct sequence of all of the mounting parts. Ensure proper grounding and tighten nut(s).

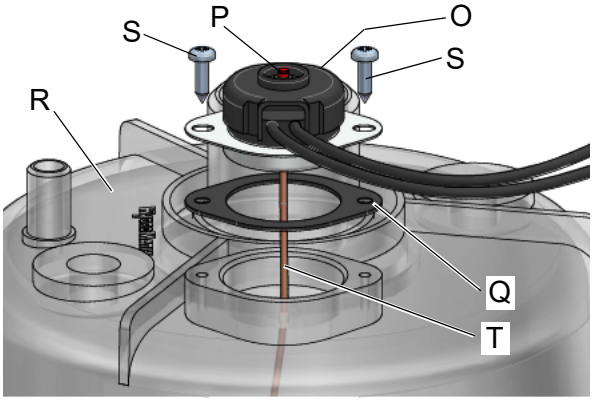
» Insert heater element wires into the terminals of the wiring connector following the markings made when dissembling. Polarity is not an issue.

» Refit thermo switch capillary tube to heater element(s) using retainer clips.

» Reassemble steam cylinder and reinstall in humidifier housing as described in the **Reinstallation of the steam cylinder** section.

» Follow the handling instructions in the section **Leakage test.**

9.6.4 Thermo switch replacement (for heater elements)



O:Thermo switch
P: Thermo sensor release button
Q: Seal
R: Steam cylinder
S: Screw
T: Capillary tube

Removal

» Remove and open the steam cylinder as described above in “Removing and cleaning the steam cylinder” section.

» Remove wiring of the thermo switch from connector terminals (mark positions for reclamping).

» Detach capillary tube (T) retainer clips from heater element(s).

» Separate capillary tube from heater element(s) (4).

» Unscrew the two screws holding thermo switch (S) in place.

» Pull out thermo switch (O) upwards off steam cylinder cover (R).

NOTICE

Risk of material damage!
Do not buckle the thermo switch capillary tube!

Reinstallation

» Install replacement thermo switch with a new sealing.

» Properly connect the capillary tube to the heater element. In case of humidifiers with several heating elements, the capillary tube is attached to three heating elements.

» Insert thermo switch wires into the terminals of the wiring connector following the markings made when dissembling.

» Reassemble steam cylinder and reinstall in humidifier housing as described in the „Removing and cleaning the steam cylinder“ section.

9.6.5 Releasing a thermo switch that has triggered

To protect the steam humidifier against thermal overload, the unit is equipped with one or two thermo switches, depending on the unit capacity. Mounting positions for the thermo switches are on the cylinder cover. One of the thermo switches (or „the“ one, in case of only one thermo switch present) features a capillary tube for thermal coupling to the heater element. Additionally, the solid state relay is protected with a bi-metal switch attached to the heat sink to prevent damages caused by inadequate ventilation through e.g. covered vents.

From an electrical point of view, all of the thermo switches are connected in series. In case of one of the thermo switches triggering due to a temperature too high, the main contactor K1 drops, while the electronic control enters fault state „120“, i. e. „Thermoswitch“.

In case of one of the thermo switches triggering repeatedly, the reason for this must be identified prior to further unit usage.

Thermo switch(es) on steam cylinder cover.

After the unit has cooled down, the thermo switch that has triggered may be identified by passage measurement, as long as it is a thermo switch on a steam cylinder. Unblocking the thermo switch is accomplished as follows:

Slightly push down the red button (s. above section) protruding a few milimeters from its holder. This will make the button return to its original position and unblock the mechanism.

Relasing a thermo switch does not erase the fault message in the control fault memory.

Thermo switch on solid state relay

The thermo switch attached to the solid state relay is a bi-metal switch without an unblocking feature. Instead, after cool-down, the switch will be unblocked automatically. Restarting the steam humidifier is only possible after cool-down.

9.6.6 Inspection of wiring connections and heater element wiring

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.

» Check heater element wiring for damaged insulation.

9.7 Leak test

⚠WARNING

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

The leak test described below must be done after all maintenance work that affects the water circuit inside the unit. If work has been done at several points, the final leak test is enough, although this work step is listed for all parts of the work.

The leak test must be done with the unit open, paying particular attention to the warning above.

» Open the water supply.

» Switch on the unit and check the inside for leaks (hose connections, O-rings, seals) after 15-30 minutes of operation.

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

» Find leakage and eliminate.

» Check again.

» Follow the instructions in the section **funktional check**.

9.8 Functional check

» Run the system with maximum output for a couple of minutes

» Check hose connections and seals for leakage.

9.9 Finishing maintenance

» Reattach unit housing cover

» Reset service interval

Reset service interval:

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

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

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

Disposal after dismantling

The humidifier is made up of metal parts and plastic parts. In reference to European Union directive 2012/19/EU issued on 4 July 2012 and the related national legislation, please note that:

The components of the electrical and electronic devices must not be disposed of as municipal waste, and therefore the method of waste separation must be applied. The public or private waste collection systems defined by local legislation must be used.

NOTICE

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

11. Unit Control

11.1 General description

The standard controller can be used for both electrode steam humidifiers and heater type steam humidifiers.

Operation of the HygroMatik steam humidifier is under microprocessor control.

For steam humidifiers with unit housing, a control switch is located on the front panel of the unit 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

Control switch

For controlling the unit a control panel featuring a 3-digit display and a number of 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.

Control panel

For control signal processing inputs are available whose properties may be defined by parameter settings. Activating of the intake solenoid valve, the blow-down pump and the main contactor is achieved through relays on the main PCB. Another relay serves for signalling purposes (factory setting is „collective fault“).

As an ordering option, for provision of 2 additional switching functions, a pair of top-head rail relays is available for the plugable connection to the mainboard.

With heater type steam humidifier, the power is controlled via a single-phase or two-phase solid state relay (for devices with higher power).

With electrode steam humidifier, the electrode current is switched directly via one or two main contactor(s) designed for the respective device power.

Mainboard

The entire control logic, including the relays for basic operation, is implemented on a compact printed circuit board which, in the case of steam humidifiers with device housings, is attached to the vertical partition wall between the housing chambers.

All connections on the PCB are distinctive in order to allow for easy exchange of the board in case of maintenance.

On the main PCB, 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).

Safety systems

Besides the common external safety interlock (implemented by means of a switching contact or a through a building control system), the following safety is encorporated in the unit:

An electric heater type steam humidifier is thermically controlled at two spots minimum. Besides the thermo switch located on top of the steam cylinder and meant for overheating avoidance of the electrical heater element, the solid state relay also is equipped with a thermo switch (higher output units feature 2 thermo switches in the cylinder cover). In

case of one of the thermo switches being triggered, the main contactor is deenergized. The thermo switches on the steam cylinders may be reset mechanically after cool-down. The thermo switch attached to the solid state relay heatsink, however, is a bi-metal device. As such, it is released automatically afer cool-down.

An other safety measure is the steam cylinder minimum water level control. For heater element protection and thermical overload risk avoidance, no heater element drive enabling is issued in case of minimum water level underrun.

Intrinsic safety

HygroMatik steam humidifiers comply with intrinsic safety requirements in that the electrical power supply may be cut by two devices.
In case of the electric heater type steam humidfier, these devices are the main contactor and the solid state relay.
In addition to the main contactor, an electrode steam humidifier is also equipped with a circuit breaker.

Please note

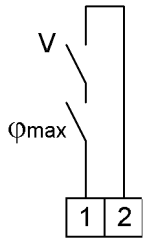
For electrical connection of the steam humidifier a residual current circuit breaker is recommended.

11.2 Safety interlock

⚠WARNING

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

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.



Safety interlock terminals 1/2

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.

NOTICE

Contacts across terminals 1 and 2 must be potential free and properly rated!

Rating must comply with the control voltage in use.

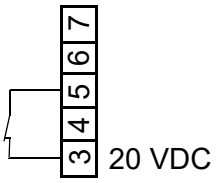
Best practice implies the integration of a max. hygrostat in the safety interlock wiring to protect against over-humidification due to a r.h. sensor malfunction.

11.3 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 „Main PCB connections“ is to be made.

11.3.1 1-step operation

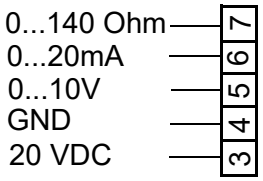
Steam humidifier operation is controlled by the contact across terminals 3 and 5 provided by the customer. This contact needs only to be low voltage proof.



Customer-provided contact for 1-step operation

11.3.2 Operation with an active humidity sensor or external controller

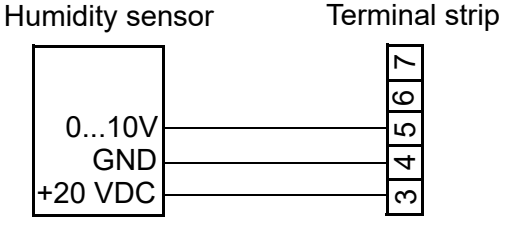
When driving the steam humidifier by an active r.h. sensor or external controller (e.g. a PLC), control signals in the range of 0...10 V, 0...20 mA or 0...140 Ohm may be applied. Each one of the signal types is connected to a dedicated terminal (see „Unit control“ chapter, section „Main PCB connections“).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



Terminals for control signals

Please note

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



Exemplary 0...10V humidity sensor connection

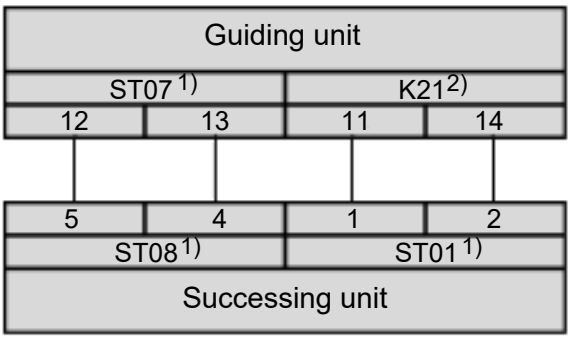
Humidity sensor with higher current requirement

The circuit board provides a maximum of 30mA. If this is not sufficient for the connected humidity sensor, use the option of a transformer to supply the sensor with power.

11.3.3 Wiring for control signal and safety (interlock) system for multiple units

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 successing unit(s) (provided on-site). These provide the successing unit with a control signal from the guiding unit and the transmitted (potential free) safety (interlock) system.

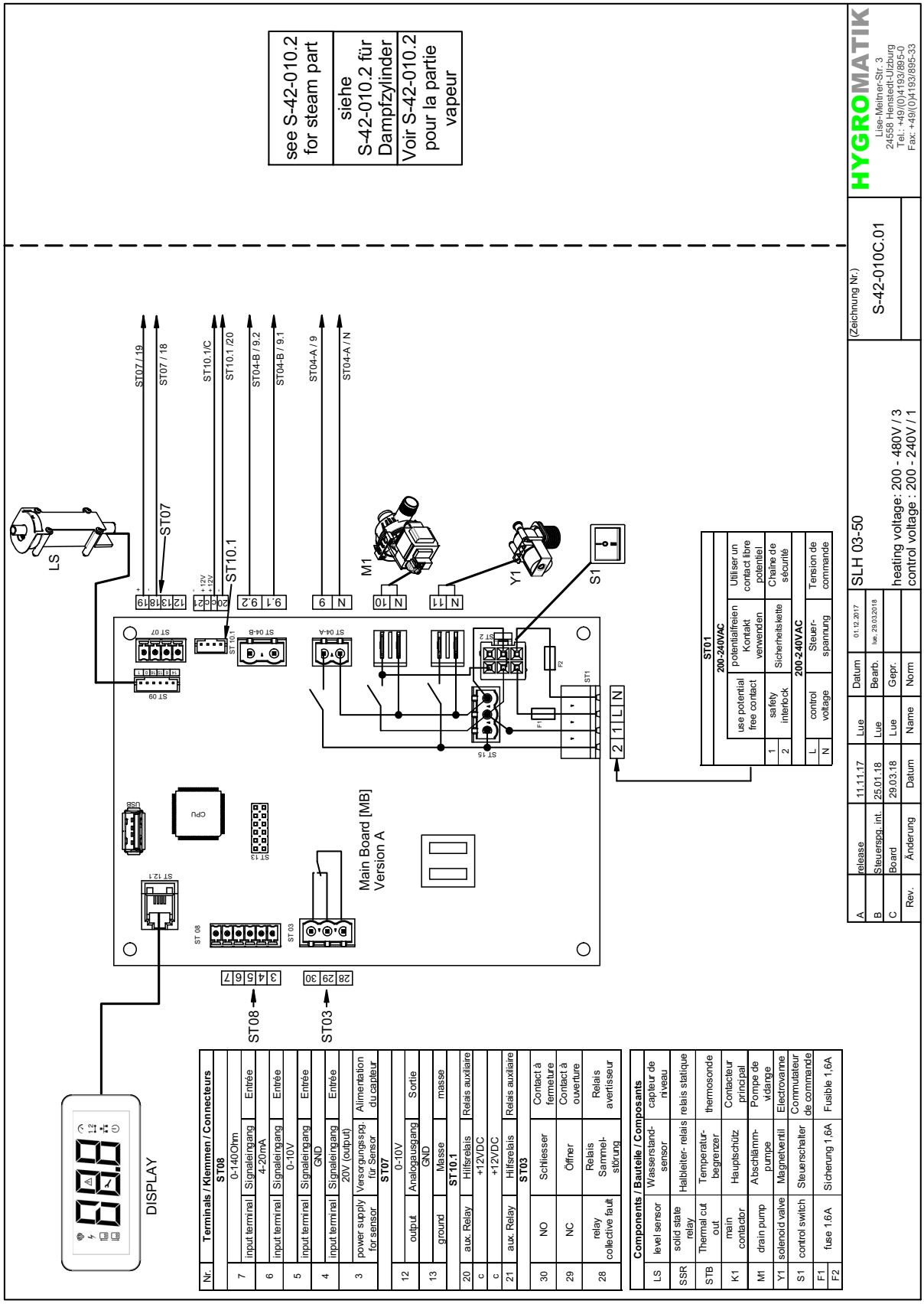
The wiring for the control signal and the safety (interlock) system must be implemented as follows for multiple units:



1) „ST0x“ designates connector plugs on the mainboard

2) „K21“ is the relay used for the connection of the successing unit

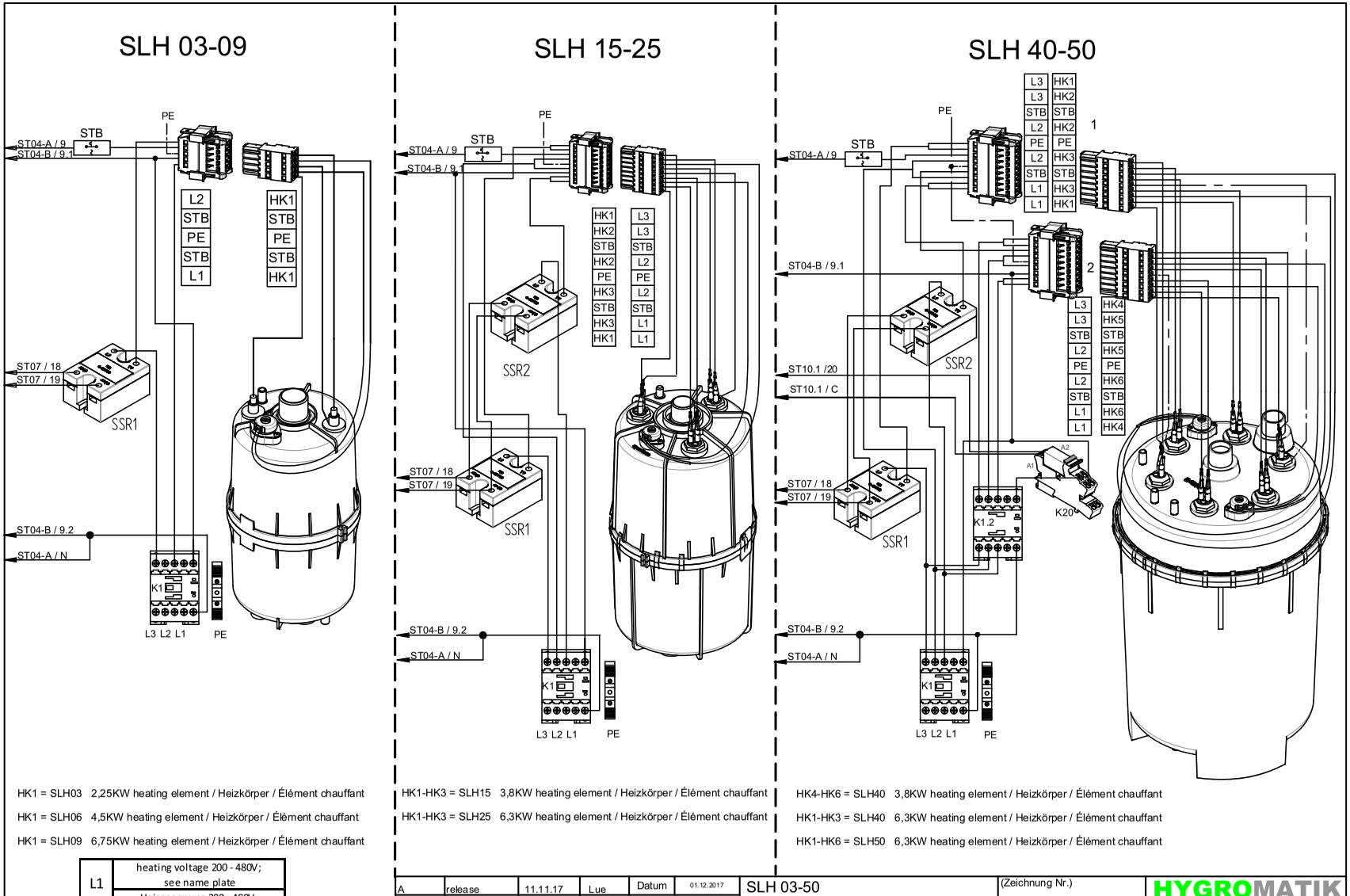
11.3.4 Wiring Diagrams SLH



Nr.	Terminals / Klemmen / Connecteurs		
	ST08		
7	0-140Ohm		
	input terminal	Signaleingang	Entrée
6	4-20mA		
	input terminal	Signaleingang	Entrée
5	0-10V		
	input terminal	Signaleingang	Entrée
4	GND		
	input terminal	Signaleingang	Entrée
3	20V (output)		
	power supply for sensor	Versorgungsspg. für Sensor	Alimentation du capteur
	ST07		
12	0-10V		
	output	Analogausgang	Sortie
13	GND		
	ground	Masse	masse
	ST10.1		
20	aux. Relay	Hilfsrelais	Relais auxiliaire
c	+12VDC		
c	+12VDC		
21	aux. Relay	Hilfsrelais	Relais auxiliaire
	ST03		
30	NO	Schliesser	Contact à fermeture
29	NC	Öffner	Contact à ouverture
28	relay collective fault	Relais Sammel-störung	Relais avertisseur

	Components / Bauteile / Composants		
LS	level sensor	Wasserstand-sensor	capteur de niveau
SSR	solid state relay	Halbleiter- relais	relais statique
STB	Thermal cut out	Temperatur-begrenzer	thermosonde
K1	main contactor	Hauptschütz	Contacteur principal
M1	drain pump	Abschlämm-pumpe	Pompe de vidange
Y1	solenoid valve	Magnetventil	Electrovanne
S1	control switch	Steuerschalter	Commutateur de commande
F1	fuse 1,6A	Sicherung 1,6A	Fusible 1,6A
F2			

Rev.	Änderung	Datum	Name	Norm
A	release	11.11.17	Lue	Datum 01.12.2017
B	Steuerspg. int.	25.01.18	Lue	Bearb. Aus. 28.03.2018
C	Board	29.03.18	Lue	Gepr.



HK1 = SLH03 2,25KW heating element / Heizkörper / Élément chauffant

HK1 = SLH06 4,5KW heating element / Heizkörper / Élément chauffant

HK1 = SLH09 6,75KW heating element / Heizkörper / Élément chauffant

HK1-HK3 = SLH15 3,8KW heating element / Heizkörper / Élément chauffant

HK1-HK3 = SLH25 6,3KW heating element / Heizkörper / Élément chauffant

HK4-HK6 = SLH40 3,8KW heating element / Heizkörper / Élément chauffant

HK1-HK3 = SLH40 6,3KW heating element / Heizkörper / Élément chauffant

HK1-HK6 = SLH50 6,3KW heating element / Heizkörper / Élément chauffant

L1	heating voltage 200 - 480V; see name plate
L2	Heizspannung 200 - 480V; siehe Typenschild
L3	Tension de chauffage 200 - 480V; note plaque d'identification

Rev.	Änderung	Datum	Name	Norm	
A	release	11.11.17	Lue	Datum	01.12.2017
B	Steuerspg. int.	25.01.18	Lue	Bearb.	lue, 29.03.2018
C	Board	29.03.18	Lue	Gepr.	

SLH 03-50

heating voltage: 200 - 480V / 3

(Zeichnung Nr.)

S-42-010C.02

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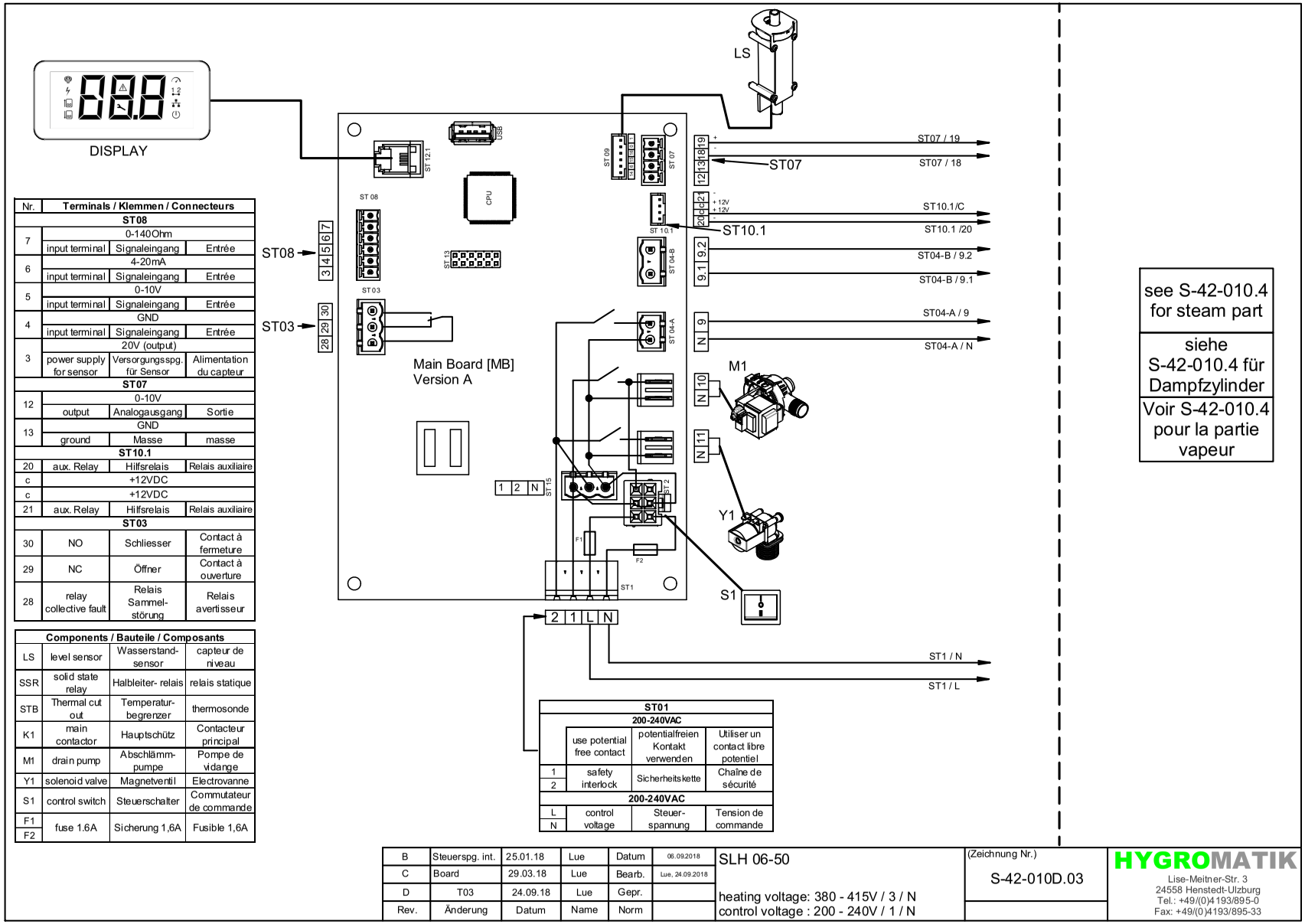

Nr.	Terminals / Klemmen / Connecteurs		
	ST08		
7	0-140Ohm		
	input terminal	Signaleingang	Entrée
6	4-20mA		
	input terminal	Signaleingang	Entrée
5	0-10V		
	input terminal	Signaleingang	Entrée
4	GND		
	input terminal	Signaleingang	Entrée
3	20V (output)		
	power supply for sensor	Versorgungsspg. für Sensor	Alimentation du capteur
	ST07		
12	0-10V		
	output	Analogausgang	Sortie
13	GND		
	ground	Masse	masse
	ST10.1		
20	aux. Relay	Hilfsrelais	Relais auxiliaire
c	+12VDC		
c	+12VDC		
21	aux. Relay	Hilfsrelais	Relais auxiliaire
	ST03		
30	NO	Schliesser	Contact à fermeture
29	NC	Öffner	Contact à ouverture
28	relay collective fault	Relais Sammel-störung	Relais avertisseur

Components / Bauteile / Composants			
LS	level sensor	Wasserstand-sensor	capteur de niveau
SSR	solid state relay	Halbleiter- relais	relais statique
STB	Thermal cut out	Temperatur-begrenzer	thermosonde
K1	main contactor	Hauptschütz	Contacteur principal
M1	drain pump	Abschlämm-pumpe	Pompe de vidange
Y1	solenoid valve	Magnetventil	Electrovanne
S1	control switch	Steuerschalter	Commutateur de commande
F1	fuse 1.6A	Sicherung 1,6A	Fusible 1,6A
F2			

ST01			
	200-240VAC		
	use potential free contact	potentialfreien Kontakt verwenden	Utiliser un contact libre potentiel
1	safety interlock	Sicherheitskette	Chaîne de sécurité
2			
	200-240VAC		
L	control voltage	Steuer-spannung	Tension de commande
N			

see S-42-010.4 for steam part

siehe S-42-010.4 für Dampfzylinder

Voir S-42-010.4 pour la partie vapeur

B	Steuerspg. int.	25.01.18	Lue	Datum	06.09.2018	SLH 06-50
C	Board	29.03.18	Lue	Bearb.	Lue, 24.09.2018	
D	T03	24.09.18	Lue	Gepr.		heating voltage: 380 - 415V / 3 / N
Rev.	Änderung	Datum	Name	Norm		control voltage : 200 - 240V / 1 / N

(Zeichnung Nr.) S-42-010D.03

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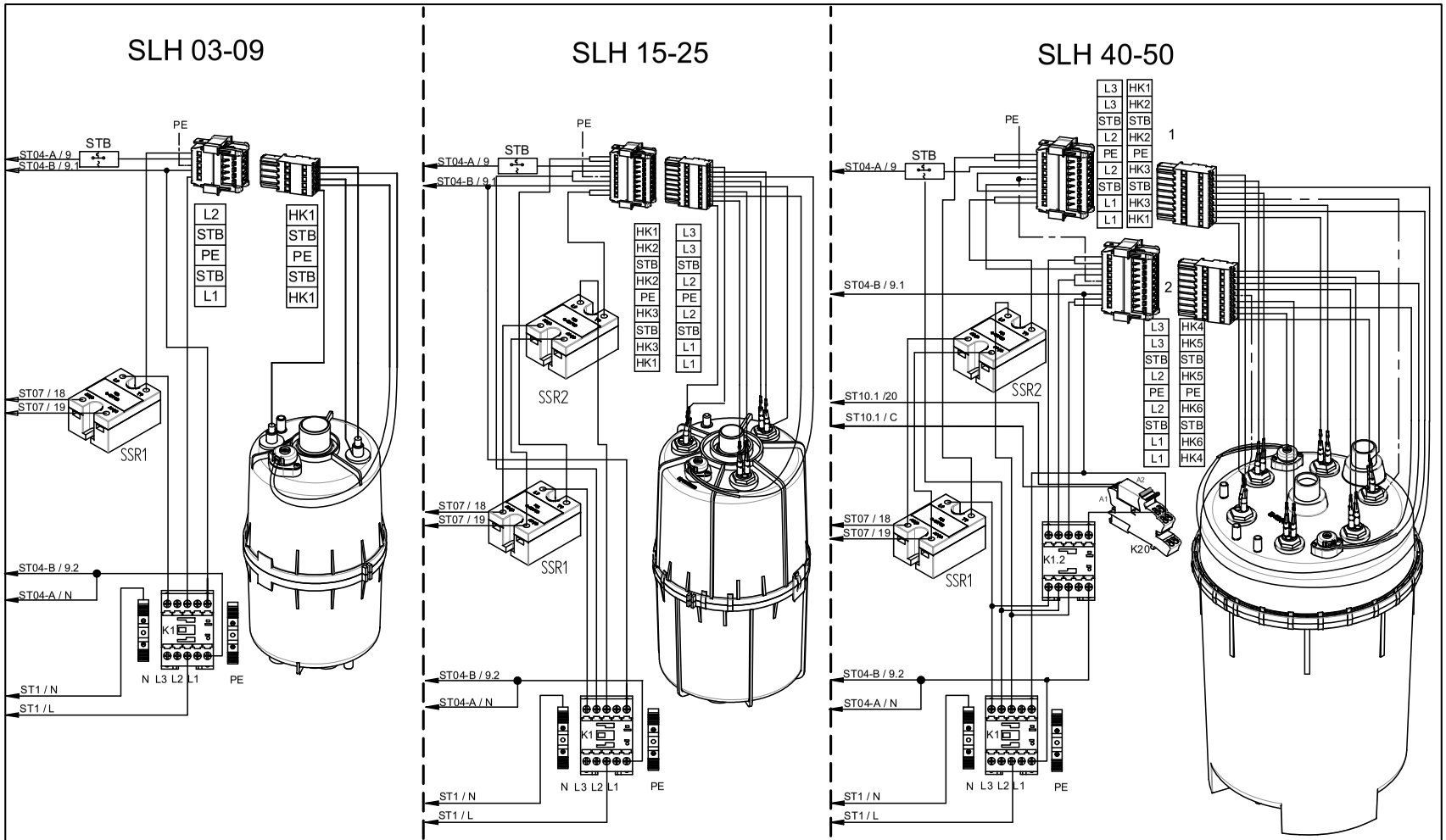

HK1 = SLH03 2,25KW heating element / Heizkörper / Élément chauffant

HK1 = SLH06 4,5KW heating element / Heizkörper / Élément chauffant

HK1 = SLH09 6,75KW heating element / Heizkörper / Élément chauffant

HK1-HK3 = SLH15 3,8KW heating element / Heizkörper / Élément chauffant

HK1-HK3 = SLH25 6,3KW heating element / Heizkörper / Élément chauffant

HK4-HK6 = SLH40 3,8KW heating element / Heizkörper / Élément chauffant

HK1-HK3 = SLH40 6,3KW heating element / Heizkörper / Élément chauffant

HK1-HK6 = SLH50 6,3KW heating element / Heizkörper / Élément chauffant

N	heating voltage 380 - 415V; see name plate
L1	Heizspannung 380 - 415V; siehe Typenschild
L2	Tension de chauffage 380 - 415V; note plaque d'identification
L3	

B	Steuerspg. int.	25.01.18	Lue	Datum	06.09.2018
C	Board	29.03.18	Lue	Bearb.	Lue, 24.09.2018
D	T03	24.09.18	Lue	Gepr.	
Rev.	Änderung	Datum	Name	Norm	

SLH 06-50

heating voltage: 380 - 415V / 3 / N

(Zeichnung Nr.)

S-42-010D.04

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11.3.5 Mainboard inputs and outputs

Customer side interfaces

Inputs

ST08:

Possible external controller signals	
0(2) - 5 V DC	min. 0,1 mA**
0(2) - 10 V DC	min. 0,2 mA**
0(4) - 20 V DC	min. 0,3 mA**
0(4) - 20 mA DC	min. 3 V**
0 - 140 Ohm*	

* only for operating mode external controller
** minimum power of the control signal

Outputs

ST03:

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

ST10.1:

- Connection option für 2 additional relays of the top head type (K20, K21) (ordering option).

ST07:

Control signal 0...10 VDC (max. 8 mA)

ST08:

- +20 VDC humidity sensor supply voltage (max. 20 mA)

ST15:

- Tap for 1,2 and N (unsecured) for customer use

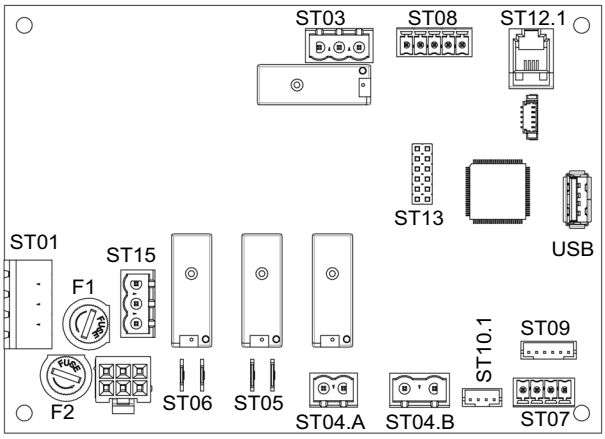
USB:

Connection for USB stick for use as a data logger and for parameter updates

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 (only for heater steam humidifiers)**:**

- Filling level sensor

ST09 (only for electrode steam humidifiers)**:**

- Current transducer connection

ST04-B (only for heater steam humidifiers)**:**

- Galvanically isolated thermo switch input (via optical coupler)
- Dielectric strength 600 VAC

ST04-B (only for electrode steam humidifiers)**:**

- Galvanically isolated sensor electrode input (via optical coupler)
- Dielectric strengh 600 VAC

Outputs

ST04-A:

- Main contactor(s)

ST05:

- Blow-down pump

ST06:

- Inlet solenoid valve

ST07 (only for heater steam humidifiers)**:**

- Solid state relay control signal (PWM), 20 mA max.

Bidirectional

ST12.1:

- Control panel serial interface

ST 13:

- RS485 interface adapter PCB socket

11.4 Control operation

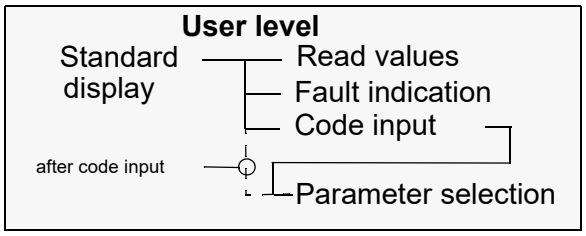
11.4.1 Principal user guidance

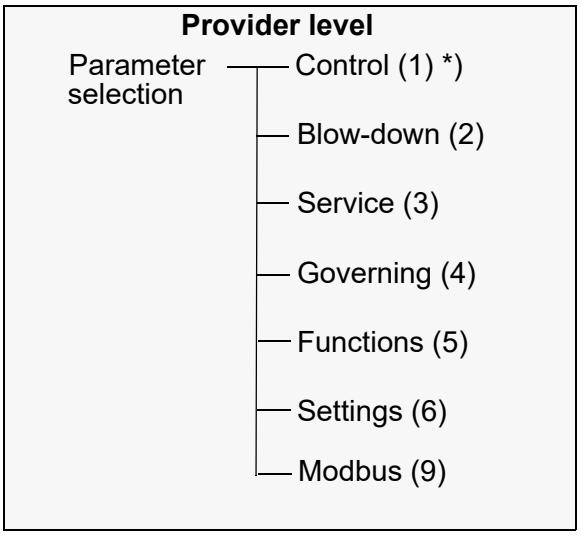
On powering up the steam humidifier, the software version is shown in the display for a few seconds. In normal operation the display then shows actual steam output as a standard display. When a key is pressed the first reading in a list of reading and input values is output. The complete list may be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

By means of inputting a 2-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.

11.4.2 Menu structure

Overview on menu structure





*) numbers in parenthesis are group numbers

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 r15 are available. After a certain time span with no keystroke, control switches the display back to standard display. Factory setting for this timeout is „10 minutes“.

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

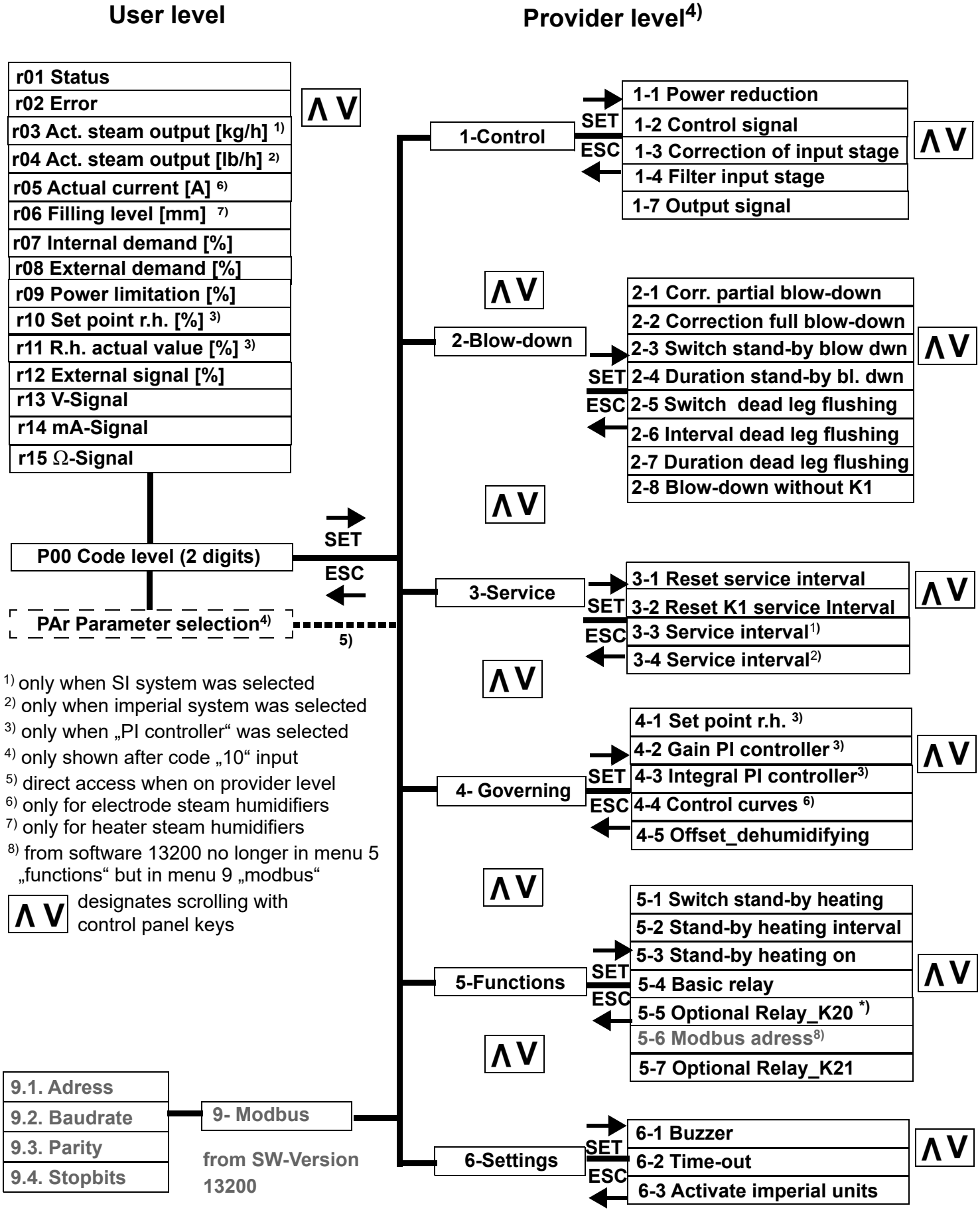
Provider level

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.

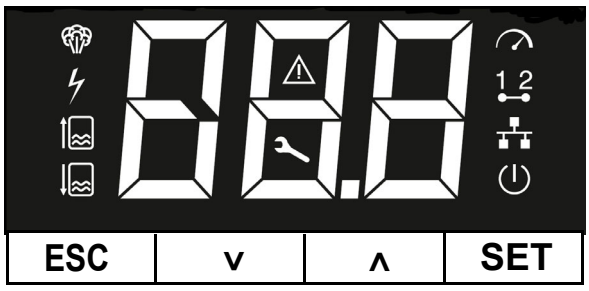
Menu tree

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.

11.4.3 Menu tree



11.5 The control panel



The control panel comprises 3 sections:

- the ESC, SET, ^,v 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

„^/v“ : move up/down within a menu, submenu 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.

Icons state table

	permanently lit	flashing
	Steam production active	Cylinder full In conjunction with error icon: Fault steam production
	Main contactor active	Fault main contactor
	Filling active	Fault filling
	Blow-down active	Fault blow-down
	(State not possible)	Error s. error codes
	Maintenance required	(State not possible)
	Demand	Fault control signal
	Saftey interlock closed	(State not possible)
	Virtual safety interlock closed by software enabling	(State not possible)
	Control active	Control self test after unit start

11.6 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 „Λ/V“ keys, the reading value indexes „r01“ to „r15“ , 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 r15.

Use the ESC key for return to the reading value index level that allows for addressing further reading 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 „Λ/V“ keys, scroll until „P00“ is displayed and confirm with the SET key. „00“ is displayed.

» Increase the display to „10“ using the „Λ/V“ 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 „Λ/V“ 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 „Λ/V“ keys and then confirm.

Use the ESC key for return to the previous input level.

11.7 Tabular representation of reading value list and provider level submenus

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

11.7.1 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 „**Λ**/**V**“ 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.

Reading value index	Description
r01	Status
r02	Fault
r03	Actual steam output [kg/h]
r04	Actual steam outpt [lb/h] (only when imperial units were selected)
r05	Actual current [A] (only for electrode steam humidifiers)
r06	Filling level [mm] (only for heater steam humidifiers)
r07	Internal demand [%]
r08	External demand [%]
r09	Power limitation [%]
r10	Set value r.h. [%] (only when PI controller was selected)
r11	Actual value r.h. [%] (only when PI controller was selected)
r12	External signal [%]
r13	V-Signal
r14	mA-Signal
r15	Ω-Signal
r16	Service_Status
P00	Code level („0“, „10“)
PAr	Parameter group selection

11.7.2 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“.

Submenu „Control“ (Group1)

Par.	Denomination	Setting options	Code
1-1	Steam output max. [%]	25 ... 100 **Fs*) = 100**	10
1-2	Control signal	0= not valid 1= ext. controller, 0 ... 10 V 2= ext. controller, 0 ... 20 mA 3= ext. 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 **Fs = 1**	10
1-3	Correction input stages [%]	-5.0 ... +5.0 **Fs = 0**	10
1-4	Filter input stage	0=light, 1=strong **Fs = 0**	
1-7	Output signal	0= Off 1= Actuator signal_extern 2= Actuator signal_intern 3= Humidity actual value	

*) Fs = Factory setting

Submenu „Blow-down“ (Group 2)

Par.	Denomination	Setting options	Code
2-1	Correction partial blow-down	-5...+5 **Fs = 0**	10
2-2	Correction full blow-down	-5...+5 **Fs = 0**	10
2-3	Switch stand-by blow-down	0=off, 1=on **Fs = 1**	10
2-4	Waiting time stand-by blow-down [h]	0.1...48.0 **Fs = 24.0**	10
2-5	Switch dead leg flushing	0=off, 1=on **Fs = 0**	10
2-6	Interval dead leg flushing [h]	0.1...96.0 **Fs = 24.0**	10
2-7	Duration deadleg flushing [s]	1...600 **Fs = 90**	10
2-8	Blow-down without K1 (only for electrode steam humidifiers)	0=no, 1=yes **Fs = 0**	10

Submenu „Service“ (Group 3)

Par.	Denomination	Setting options	Code
3-1	Reset service interval steam amount	0=no, 1=yes **Fs = 0**	10
3-2	Reset K1 service interval	0=no, 1=yes **Fs = 0**	10
3-3	Service interval [t]	0...90.0 **Fs = device dependant**	10
3-4	Service interval [tn. sh.]	0 ...90.0 **Fs = device dependant**	10

Submenu „Governing“ (Group 4)

Par.	Denomination	Setting options	Code
4-1	Set point r.h. [%] (PI controller only)	5...99.9 **Fs = 50.0**	10
4-2	Gain [%] (PI controller only)	0.1...99.9 **Fs = 5.0**	10
4-3	Integral [%] (PI controller only)	0...100.0 **Fs = 10**	10
4-4	Control curve (only for electrode steam humidifiers)	0 = energy optimisation 1 = load optimisation **Fs = 1**	10
4-5	Offset_dehumidifying	Hysteresis for dehumidifying [%] **Fs=10**	10

Submenu „Functions“ (Group 5)

Par.	Denomination	Setting options	Code
5-1	Switch stand-by heating	0=off, 1=on **Fs = 0**	10
5-2	Interval stand-by heating [min]	1...999 **Fs = device dependant**	10
5-3	Stand-by heating [s]	1...999 **Fs = device dependant**	10
5-4	Basic relay	0 = collective fault 1 = stand-by 2 = no demand 3 = humidifying 5 = remote off 30 = filling off 31 = filling on 37 = HyCool 60 = Blow-down off 61 = Blow-down on 62 = Partial blow-down 63 = Full blow-down 66 = max. level 67 = Stand-by blow-down 68 = Dead leg flushing 69 = Start-up blow-down 270 = Collectice Service **Fs = 0**	
5-5	Relay_K20	same as for basic relay **Fs = 270**	10
5-6	Modbus address	0..255 **Fs = 1**	10
5-7	Relay_K21	same as for basic relay **Fs = 270**	

Submenu „Settings“ (Group 6)

Par.	Denomination	Setting options	Code
6-1	Buzzer	0=off, 1=on **Fs = 0**	10
6-2	Time-Out (return to standard display) [min]	0 ... 60 **Fs = 2**	10
6-3	Activate imperial units	0 = SI units 1 = imperial units **Fs = 0**	10

11.8 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 readyness.
» Using the „Λ/V“ 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 to be changed is in this group already, group confirmation can be made immediately with the SET key.
» Scroll with the „Λ/V“ keys to the „1-2“ position and confirm with the SET key. The parameter setting „1“ (external controller, 0...10 V) is displayed and may be changed.
» Change the setting to „4“ (PI controller, 0...10 V) with the „Λ/V“ 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 other parameters may be accomplished.

11.9 Detailed description of the user level reading values and settings

Reading value		Explanation	
r01 Status	**Code**	**Denomi-nation**	**Description**
Main functions category	00	Start	Humidifier is in startup phase after a cold start. The Power-ON-LED flashes.
	01	Stand-by	Safety interlock is open (safety interlock icon in display is not lit). No steam is produced. In case of the safety interlock beeing opened by software, status „05“ (Remote off) is displayed instead of „01“.
	02	No demand	Demand from external controller or active humidity sensor is below switch-on threshold of the steam humidifier. No steam is produced (while the safety interlock is closed). The demand icon in the display is not lit.
	03	Humidify	Steam is produced when demand is generated by a Hygrostat or an external controller. With a PI controller setting, an input signal from the active humidity sensor is required. (Safety interlock must be closed).
	05	Remote off	Safety interlock was opened via Modbus (e.g. by a building control system instruction).
	06	No Modbus	When 1-2 = „Modbus“ is selected, demand messages are required on a regular base. In case of no demand within a 20 s time frame, „No Modbus“ is shown as the device status and steam production is stopped (for details, see dedicated Modbus documentation available from HygroMatik GmbH).
	07	Stand-by heating interval	When in stand-by heating mode, status code 07 is displayed during steam production.
	08	Stand-by heating pause	When in stand-by heating mode, status code 08 is displayed when no steam is produced.
Filling category	30	Filling	Filling is active via solenoid valve. The filling icon in the display is lit.

Reading value		Explanation	
Blow-down category	60	Initial blow-down	After switching the device on, a blow-down sequence is run with the parameter set for partial blow-down.
	61	Partial blow-down	A partial blow-down is run in order to achieve cylinder water concentration reduction. In order to dilute the concentration of the cylinder water, the control performs regular partial blow-downs.The blow-down icon in the display is lit.
Blow-down category (contd.)	62	Full blow-down	Full blow-down is run (steam cylinder is completely drained). The blow-down icon in the display is lit.
	63	Dilution (only for electrode steam humidifiers)	A partial blow-down is run (with the parameter set for partial blow-down) due to a water conductivity too high. The blow-down icon in the display is lit.
	64	Overcurrent blow-down (only for electrode steam humidifiers)	An overcurrent blow-down is run since an electrode current too high was detected by the device. Reducing water level also reduces electrode current.The blow-down icon in the display is lit.
	65	Max. level (only for heater steam humidifiers)	Max. allowable water level in steam cylinder was overrun.
	66	Stand-by blow-down	In case of a safety interlock open for a longer period of time, a full blow-down is run automatically after a time preset in order to avoid stagnant water in the steam cylinder. The blow-down icon in the display is lit.
	67	Dead leg flushing	Special blow-down mode for flushing dead leg tubing. Solenoid valve and blow-down pump are activated simultanously in case of a no demand situation for a certain period of time. The blow-down icon in the display is lit.
	80	Partial blow-down waiting	Device will start partial blow-down with next filling step.
	81	Full blow-down waiting	Device will start full blow-down with next filling step.
Monitoring category	90	Cylinder full (only for electrode steam humidifiers)	On detection of a an electrical potential at the sensor electrode, cylinder full is reported. In this situation cylinder water level is so high that an electrical bridge between one of the power electrodes and the sensor electrode has built up. The steam icon in the display flashes.

Reading value		Explanation	
Service category	271	Service steam amount	The service threshold for the steam amount produced as preset in 3-3 (SI units) or 3-4 (imperial units) was exceeded. The service icon in the display is permanently lit for the time the message is active. The status message may be reset by setting parameter 3-1 to „1“.
	272	Service main contactor K1 switching cycles	The number of main contactor switching cycles predefined by the manufactorer was met. A main contactor replacement is advisable. The service icon in the display is permanently lit for the time the message is active. For resetting the status message, parameter 3-2 must be set to „1“.
Fault category	999	Fault	A fault was detected. Operation has ceased. An error code may be read out. Some certain faults also make an icon in the display blink.
r02 Error (only shown when a fault has occured)		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.	
r03 Actual steam output (SI units)		Amount of current steam production value [kg/h]	
r04 Actual steam output (imperial units)		Amount of current steam production value [lb/h]	
r05 Actual current (only for electrode steam humidifiers)		Current electrode amperage value [A]	
r06 Filling level (only for heater steam humidifiers)		Filling level [mm] measured by the water level sensor	
r07 Internal control signal		The internal signal for controlling the steam humidifier electrical power delivery is displayed. [%]. This reading is influenced by the control curve and a power limitation preset	
r08 External demand (only with ext. controller)		External controller control signal is displayed [%]	
r09 Power limitation		Power limitation as a percentage of max. output as preset in parameter „1-1“ is displayed [%]	
r10 Set point r.H. (only when PI controller was preset)		R.h. nominal value as preset in parameter 4-1 is displayed [%]	
r11 Actual value r.h. (only when PI controller was preset)		Actual value of r.h. is displayed [%].	
r12 External signal		External signal [%]	
r13 V-Signal		Input signal measured at terminal ST805 [V]	

Reading value		Explanation	
r14 mA-Signal		Input signal measured at terminal ST806 [mA]	
r15 Ω-Signal		Input signal measured at terminal ST807 [Ω]	
r16 Service_ Status	**Code**	**Bezeichnung**	**Bedeutung**
	0	No message	There is no service message.
	1	Steam_amou nt counter	The maintenance interval has expired.
	2	Cycles_main_ contactor K1	The maximum number of operating cycles for the main contactor K1 has been reached (the device can contain several main contactors. „x“ represents the designation number of the main contactor concerned).
	3	Cycles_main_ contactor K2	The maximum number of operating cycles for the main contactor K2 has been reached (the device can contain several main contactors. „x“ represents the designation number of the main contactor concerned).
	12	Warning_- cyl._full (only ELDB)	The sensor electrode continuously reports a full cylinder level for 60 minutes (possibly electrode wear is very advanced).
	13	Warn- ing_pump	A performance capability decrease is detected in the area of the blow-down pump and its hosing.
	14	Warning_- valve	A performance capability decrease is detected in the area of the solenoid valve, cylinder base and its hosing.
	30	Warning_cy- linder_full_le- vel	The sensor electrode continuously signals a full cylinder for 60 minutes (electrode burnout may be far advanced).

Set value	Explanation
P00 Code level	Allows provider level access by code input (Code „10“) or limitation to user level (Code „0“). Provider level is exited automatically after 10 mins without a keystroke.
PAr Parameter selection	Allows selection of parameter group and of a specific parameter within a group.

11.10 Detailed parameter descriptions

Group	Par.	Denomination	Description
Control	1-1	Steam output limitation	Steam output 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.The steam output can be set to a value between 25% and 100% of nominal output using the steam generation output limitation. The actual steam output released depends on the control signal. Limitation of the steam output may be needed for better control.
	1-2	Control signal	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: 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. .Using this parameter, you can calibrate the active humidity sensor at terminals 3-5 in a range from -15% RH to +15% RH.
	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.
	1-7	Output_Signal	This parameter sets the output value for the 0-10V analogue output. 0= Off 1= Actuator signal_extern 2= Actuator signal_intern 3= Humidity actual value

Group	Par.	Denomination	Description
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. Decrease blow-down rate: settungs up to - 5. A blow-down rate too low will lead to significant wear and tear and will also increase the maintenance effort required. **Pls. note:** a „-5“ setting will shut off blow-down completely!
	2-2	Correction full blowdown	see correction partial blow-down
	2-3	Switch stand-by blow-down	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“).
	2-4	Waiting time stand-by blow-down	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).
	2-5	Switch dead leg flushing	When parameter 2-5 = „1“, for flushing of the supply line, solenoid valve and blow-down pump are simultanously 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.
	2-6	Interval dead leg flushing	Waiting time [h] when there is no steam production until dead leg flushing is acivated; only valid if switch 2-5 = „1“.
	2-7	Duration dead leg flushing	Duration of dead leg flushing [s].
	2-8	Blow-down without main contactor K1 (only for electrode steam humidifiers)	This setting could be useful if the power supply line is routed through a sensitive residual-current circuit breaker.During blow-down, leakage currents may flow towards ground through cylinder water. In order to avoid the activation of the leakage sensor circuitbreaker, the main contactor K1 may be switched off during pumping (2-8 = „1“ is designated to „main contactor is switched off during pumping“).

Group	Par.	Denomination	Description
Service	3-1	Reset steam-service interval	On finishing maintenance work, the service interval is to be reset (the service icon is blanked if it was illuminated before).After maintenance, reset the service interval as shown below (green LED is still blinking):
	3-2	Reset K1 service interval	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.
	3-3	Steam service interval	Unit control monitors the actual steam amount produced and compares it with the service steam amount that was determined by the parameter 3-3 setting. When the two data match, the service icon is lit. Steam humidifier operation is not disrupted. Service rate highly depends on water quality (conductivity, hardness) and on the amount of steam produced since the last service. By varying parameter 3-3, the service interval may be adjusted to water quality.
Governing These parameters are only effective when parameter 1-2 (control signal) holds a setting encorporating the PI controller.	4-1	Set point r.h.	Parameter 4-1 determines the r.h. set point for control.
	4-2	Gain PI controller	Sets the PI controller gain (Xp) [%].Boosting PI-controller (Xp = 100/E1) [%]
	4-3	Integral PI controller	Sets the PI controller resetting time (Xn).Boosting PI-controller (Xp = 100/E1) [%]
	4-4	Control curves (only for electrode steam humidifiers)	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.
	4-5	Offset_dehumidifying	The switchover point between humidification and dehumidification is determined by parameter 4-1 Relative humidity setpoint and 4-5 Offset for dehumidifier. The hysteresis of 1% for dehumidification cannot be changed.

Group	Par.	Denomination	Description
Functions	5-1	Switch stand-by heating	Stand-by heating is enabled or not (0= off, 1=on).
	5-2	Interval stand-by heating	Parameter 5-2 determines the interval time between heating phases when stand-by heating was enabled.
	5-3	On-time Stand-by heating	Parameter 5-3 sets the heating on-time when stand-by heating was enabled.
	5-4	Basic relay allocation	The basic relay features potential-free NC and NO contacts across terminals 28,29 and 29,30, respectively (contact capacity is 250 VAC/8A). The base relay provides a potentialfree two-way contact at terminals 28, 29 and 30 (rated load: 250V/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 energized when a certain operating status occurs. Factory setting is „0“ defined as „collective fault“It is activated if certain operational conditions apply. The operational condition “collective fault” is preset. The following allocations are supported: (0) Collective fault: Relay is energized in case of any fault. (1) Stand-by: Relay is energized when the safety interlock was opened .It is possible to associate another operational condition with the base relay circuit, also see Section: “Summary Table of Parameters” on Page 56, “Parameter E5.” (2) No demand: Relay is energized when input signal creates no demand. (3) Humidifying: Relay is energized when humidifying is active. (5) Remote off: Relay is energized when safety interlock was opened under software by means of the building control system. (30) Filling off: Relay is energized when filling is not active. (31) Filling on: Relay is energized when filling.

Group	Par.	Denomination	Description
Functions	5-4	Basic relay allocation (contd.)	(60) Blow-down off: Relay is energized when not pumping. (61) Blow-down on: Relay is energized when pumping takes place. (62) Partial blow-down: Relay is energized when a partial blow-down is run. (63) Full blow-down: Relay is energized when a full blow-down is run. (66) Max. level: Relay is energized when the max. allowable water level is overrun. (67) Stand-by blow down: Relay is energized when a stand-by blow-down is run. (68) Dead leg blow-down: Relay is energized when a dead leg blow-down is run. (69) Start-up blow-down: relay is energized when a start-up blow-down is run. (270) Collective Service: Relay is energized 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 the optional relay K20 (in the same way as 5-4 does for the basic relay). Factory preset is „270“ (Collective service). Connectionis to the ST10.1 plug on the mainboard. **Exception:** For the units SLH40 and SLH50 the relay_K20 is used as standard to switch the level 2 (i.e. the single-level control of 3 heaters).. The relay assignment is set to "120" at the factory and cannot be changed.
	5-6	Modbus address	The control electronic 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.
	5-7	Relay_K21 allocation	Defines logical function of the optional relay K21 (in the same way as 5-4 does for the basic relay). Factory preset is „270“ (Collective service). Connectionis to the ST10.2 plug on the mainboard.
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 occurance 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.

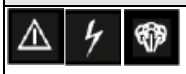
12.1.1 Table of possible faults and related error codes

Icons	Code	Error message	Possible cause	Counter measure
	000	**No error**		
⚠	**001**	**Sensor plug (ST09)**	• Plug not attached or loose	• Check plug
⚠	**022 *)**	**Input_current_min** The min. value of the input signal is no plausibel	• Sensor, wiring or signal source defective • Input stage defective	• Check sensor, wiring and signal source, if relevant • Replace mainboard
⚠	**024 025 *)**	**Input_resistance_OC** **Input_resistance_SC** The resistance measured is not correct („infinite“ or „zero“, resp.)	• Sensor, input wiring or signal source not correct • Input stage defective	• Check sensor, signal cable and signal source, if applicable • Replace main PCB
*) When a PI controller is in use, errors 022-025 relate to the sensor output signals. With an external controller the controller output signal is concerned.				
⚠	**029**	**System failure**	• Main PCB is defective	• Replace main PCB

Icons	Code	Error message	Possible cause	Counter measure
	**030**	**Filling** Filling was not successful, i.e. the expected filling level was not achieved after a device-specific time (15 - 45 min)	• 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 energized • 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 • Blockage in steam pipe impedes the steam flow.	• 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. • Remove blockage in steam pipe
			• L3 phase break-down	• Reestablish L3 phase feeding
			• Main contactor does not switch L3 phase	• Replace main contactor

Icons	Code	Error message	Possible cause	Counter measure
		**Blow-down fault**, relates to:	• Blow-down pump not driven	
	061	**Partial blow-down**	• electrical wiring not o.k.	- Check wiring and replace, if required
	062	**Full blow-down**	• Main PCB relay not energized	- Measure voltage on main PCB terminal 10 against N; replace PCB, if required
	063	**Dilution** (only for electrode steam humidifiers)		
	064	**Overcurrent blow-down** (only for electrode steam humidifiers)	• Blow-down pump defective	• Replace blow-down pump
	065	**Max level blow-down** (only for heater steam humidifiers)	• Blow-down pump working but water is not drained (i.e. cylinder drain is blocked)	• Clean cylinder and cylinder base carefully to ensure that no blocking will occur in the near future
	066	**Stand-by blow-down**		
	067	**Start_blow-down** (only for heater steam humidifiers)	• Blow-down pump blocked by hardeners	• Check blow-down pump, drainage system and steam cylinder for hardeners and clean
		Indicated blow-down was not successful	• Water sensor defective (only for heater steam humidifiers)	• Replace water sensor
	**090**	**Cylinder full** Sensor electrode continously signals full cylinder for 60 mins (only for electrode steam humidifiers)	• low or strongly fluctuating water conductivity	• Check feed water quality
			• Electrodes used up	• Replace electrodes
			• No electrode cable run through current transducer	• Run one phase through current transducer
			• Salt bridges in steamcylinder upper part	• Clean
			• Foaming (when softened water is used)	• Increase blending rate
	**091**	**Current measurement** Current transducer supplies faulty measurement (only for electrode steam humidifiers)	• Plug is not seated properly on main PCB	• Check plug seating
			• Current transducer defective	• Replace current transducer
	**092**	**Main contactor current** Current measured though the main contactor is not driven (only for electrode steam humidifiers)	• Main contactor contact sticks	• Check main contactor, replace it if required
				• Measure voltage across terminal 9 and N. Replace PCB, if required

Icons	Code	Error message	Possible cause	Counter measure
	**093**	**Main contactor cylinder full** „Cylinder full“ is detected though main contactor is not driven (only for electrode steam humidifiers)	• Main contactor contact sticks	• Replace main contactor • Measure voltage across terminal 9 and N. Replace PCB, if required
	**120**	**Thermo switch** One of the thermo switches has triggered (only for heater steam humidifiers)	• Thermo switch on steam cylinder cover has triggered due to lime coating on heating element • Capillary tube defective • Thermo switch on solid state relay has triggered due to blocked ventilation • Blockage in a connection hose (see no. 21/22 in the exploded view) leads to incorrect water level detection, which can cause the thermal switch to trip.	• Switch off power supply. Remove lime coating. Allow cool-down of steam cylinder. Push-back unblocking pin on thermo switch with needle-nose pliers or a screwdriver • Replace thermo switch • Switch off unit. Allow cool-down of heat sink. Restart humidifier operation. • Replace the blocked connection hose. Switch the device on again.
	**121**	**Water sensor** Water sensor output signal not plausible	• Water sensor is defective • Connecting hoses blocked	• Replace water sensor • Clean hoses
	**122**	**Max. level** Maximum water level was achieved 5 times (only for heater steam humidifiers)	• Excessive air pressure in duct has impact on water in steam cylinder via steam hose. Water is pressed into drainage • Solenoid valve closing action imperfect. Cylinder water level rises though solenoid valve is not energized • Solenoid valve is permanently energized (water intake stops when unit is switched off) • Large amounts of residues influence or restrict cyclic blow-down. The additional water introduction caused by the optional SuperFlush rinse device may cause the max. level fault	• Reduce air pressure • Check steam pipe for blockage • Check solenoid valve • Relay on main PCB stuck. Measure voltage across terminal 11 and N. Replace PCB, if required • Clean steam cylinder, cylinder base, water sensor tubing and drainage system

Icons	Code	Error message	Possible cause	Counter measure
	**123**	**Steam down time** Heater element (s) is/are driven but water level remains constant (only for heater steam humidifiers)	• Heater element is defective	• Measure heater element resistance, replace heater element, if rquired. Typical resistance values are: **SLH03** - 2,25kW/230V - 21,3-26,1Ω **SLH06** – 4,5kW/400V – 32,3-39,5Ω **SLH09** – 6,75kW/400V - 21,5-26,3Ω **SLH15** – 3,8kW/400V – 38,2-46,8Ω (3x) **SLH25** – 6,3kW/400V – 23,1-28,2Ω (3x) **SLH40** – 6,3kW/400V – 23,1-28,2Ω (3x) + 3,8kW/400V – 38,2-46,8Ω (3x) **SLH50** – 6,3kW/400V – 23,1-28,2Ω (6x) **KIT H02** - 1.5 KW/230V/ 32-39.2 Ω **KIT H03** - 2.25 kW/230V - 21.3-26.1 Ω **KIT H06** – 4.5 kW/400V – 32.3-39.5 Ω **KIT H09** – 6.75 kW/400V - 21.5-26.3 Ω **KIT H15** – 3.8 kW/400V – 38.2-46.8 Ω (3x)
			• Phase loss (external circuit breaker has tripped or is defective)	• Check circuit breaker, find reason for tripping
			• No voltage supplied to heater element(s)	• Check wiring, measure voltage
			• No proper main contactor switching action	• Check and replace main contactor, if required
			• Main contactor is not energized by PCB	• Verify voltage across PCB terminal 9 and N. Replace PCB, if required

Icons	Code	Error message	Possible cause	Counter measure
	**124**	**Main contactor coil** Voltage detected across coil though main contactor is not driven by control logic (only for heater steam humidifiers)	• Relay K4 on main PCB is stuck	• Check main contactor, replace it if required • Measure voltage across terminal 9.1 and 9.2. Measure voltage across terminal 9 and N. Replace PCB, if required
	**210**	**R.h. sensor** Humidity sensor signal implausibility	• Sensor cable defective • Sensor defective	• Check sensor cable • Replace sensor
	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

Problem	Possible cause for faulty situation	Counter measure
Set humidity level not reached	• Output limitation parameter setting impeds full power output	• Check 1-1 parameter setting
	• Nominal unit output insufficient	• Check unit technical data, airflow and secondary airflow
	• Phase failure or defective heater element(s)	• Check circuit breakers and heater element(s)
	• Thermo switch has triggered	• Switch off power supply. Push-back unblocking pin on thermo switch with needle-nose pliers or a screwdriver
	• Lengthy steam hose layout crossing cold and drafty rooms may lead to increased condensate formation	• Change unit installation location allowing for shorter steam hose. Insulate steam hose
	• Improper steam manifold installation may cause condensate formation within air duct	• Check steam manifold position within total system and installation correctness
	• Control signal not properly selected or software setting mismatch	• Check control signal and „1-2“ parameter setting
	• Excessive pressure in duct system caused by e.g. water bags or partly blocked steam pipes (max. overpressure is 1200 Pa)	• Eleminate particular cause(s)
Excessive humidity	• Water quality requires salt concentration of the water for full steam output (only for electrode steam humidifiers)	• Wait
	• A steam output limitation setting that is too high may result in poor control performance and even condensate formation in ducts	• Check „1-1“ parameter setting
	• Control signal not properly selected or software setting mismatch	• Check control signal and „1-2“ parameter setting
Water collects on bottom plate	• Cylinder improperly reassembled following maintenance: - O-ring not replaced, defective or not in place - Flange (tongue and groove) damaged - Flange improperly composed - Mineral deposits in flange area	• Clean cylinder and assemble / install properly
	• Cylinder improperly inserted in cylinder base	• Using moistened new O-ring, insert steam cylinder properly into cylinder base
	• Water cannot drain freely when pumped from cylinder	• Make sure drain is unobstructed

Problem	Possible cause for faulty situation	Counter measure
Water leaks from steam cylinder upper part	• Hose clamps on steam and/or condensate hose not tightened	• Tighten clamps
	• Steam hose adapter not properly fit or o-ring not replaced	• Replace O-ring (if required) and ensure proper adapter installation
No steam production despite the steam humidifier being switched on. Display not illuminated.	• Defective F1 and/or F2 fuses (1.6 A each)	• Check micro fuses and replace, if required
	• L3 phase failure (ext. circuit breaker has tripped or is defective)	• Replace breaker and investigate possible causes
	• device load circuit breaker has tripped	• Switch on breaker. If problem persists, check for reason
No steam production despite the steam generator being switched on and an illuminated display	• The interlock (safety) system is open	• Close interlock (safety) system
	• The humidity set value has been reached. The control receives no demand for steam production.	• Check humidity set value and plausibility of actual humidity value
	• A fault has occurred	• Check unit status
No steam production. Voltage across electrodes exist, but no water is fed into the cylinder (only EL-DB)	• Water supply not opened or solenoid valve electrically not driven	• Open water supply (s. also **Filling** fault messages 030)
Blow-down pump works but not water is drained	• Steam cylinder and/or drainage system blocked	• Clean cylinder base and/or drainage system, respectively
Cylinder is fully drained after partial blow-down despite switched-off pump	• Vent pipe is blocked	• Clean venting bore or replace vent pipe adapter

Problem	Possible cause for faulty situation	Counter measure
No steam exit from steam manifold	• Steam pipe improperly laid (water bag).	• Rerun steam hose according to guide lines
Water exits periodically from drain hose without pump switched on	• Excess pressure in duct system (max. overpressure is 1200 Pa/.17 psi)	• Consult your expert dealer if problem persists
Uneven electrode wear	(only for electrode steam humidifiers)	
	• One or more electrodes not supplied with power	• Check power supply and wiring
	• Circuit breaker tripped	• Check circuit breaker. Replace, if required
	• Main contactor contact not functional	• Check main contactor. Replace, if required
	• Phase loading not symmetric	• Ensure power supply phase balance by measurement
	• Electrode immersion depth differs. Unit not mounted plumb	• Check installation and correct positioning, if required
Flashover/sparks in cylinder	(only for electrode steam humidifiers)	
	• 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. Declaration of conformity

EU Konformitätserklärung
EU Declaration of Conformity

Hersteller / *Manufacturer*:	HygroMatik GmbH
Anschrift / *Address*:	Lise-Meitner-Straße 3, D-24558 Henstedt-Ulzburg, Germany
Produktbezeichnung: */ Product description*	**StandardLine Heizkörper (SLH):** SLH03, SLH06, SLH09, SLH15, SLH25, SLH40, SLH50

Die bezeichneten Produkte stimmen in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender Europäischer Richtlinien überein:
The products described above in the form as delivered are in conformity with the provisions of the following European Directives:

2014/30/EU Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit.
Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility.

2014/35/EU Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen.
Council Directive on the approximation of the laws of the Member States related to electrical equipment designed for use within certain voltage limits.

Die Konformität mit den Richtlinien wird nachgewiesen durch die Einhaltung folgender Normen:
Conformity to the Directives is assured through the application of the following standards:

Referenznummer: *Reference Number:*	**Ausgabedatum:** *Edition:*	**Referenznummer:** *Reference Number:*	**Ausgabedatum:** *Edition:*
DIN EN IEC 61000-6-2	2019-11	DIN EN 60335-1	2020-08
DIN EN IEC 61000-6-3	2022-06	DIN EN 60335-1 A15	2012/A15:2021
DIN EN 62233	2008-11	DIN EN 60335-2-98	2020-05
DIN EN 62233 Ber.1	2009-04		

Das Produkt entspricht den Anforderungen des deutschen Produktsicherheitsgesetzes ProdSG hinsichtlich der Gewährleistung von Sicherheit und Gesundheit. Produktänderungen nach Auslieferung können zum Verlust der Konformität führen.
The requirements of the German Product Safety Law ProdSG regarding the ensurance of safety and health are met. Product modifications after delivery may result in a loss of conformity.

Henstedt-Ulzburg, den / *the* 27.02.2023

HygroMatik GmbH

Rolf F.Oberhaus
Geschäftsführer / *General Manager*

i.V. Frank Michaelsen
Leitung Technik / Head of Engineering

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety documentation accompanying the product shall be considered in detail.

14. Spare parts

*	SLH03	SLH06	SLH09	SLH15	SLH25	SLH40	SLH50	Article No.	Description
									Steam generation 208-240 V
4	1							SP-03-01100	Heating element CY08 3kg 208-240 V, incl. gaskets
4		1						SP-03-01101	Heating element CY08 6kg 208-240 V, incl. gaskets
4				3				SP-07-01100	Heating element CY17/45 5kg 208-240 V, incl. gasket
									Steam cylinder **without** SuperFlush nozzle
16	1							SP-03-01010	Steam cylinder SLH03 CY08 208-240 V, compl. incl. O-ringset
16		1						SP-03-01040	Steam cylinder SLH06 CY08 208-240 V, compl. incl. O-ringset
				1				SP-04-01010	Steam cylinder SLH15 CY08 208-240 V, compl. incl. O-ringset
16									Steam cylinder **with** SuperFlush nozzle
16	1							SP-03-01015	Steam cylinder SLH03 CY08 208-240 V, compl. incl. O-ringset
16		1						SP-03-01045	Steam cylinder SLH06 CY08 208-240 V, compl. incl. O-ringset
				1				SP-04-01015	Steam cylinder SLH15 CY08 208-240 V, compl. incl. O-ringset
									Steam generation 380-415 V
4		1						SP-03-01102	Heating element CY08 6kg 380-415 V, incl. gaskets
4			1					SP-03-01105	Heating element CY08 9kg 380-415 V, incl. gaskets
4				3		3		SP-07-01101	Heating element CY17/45 5kg 380-415 V, incl. gasket
4					3	3	6	SP-07-01104	Heating element CY17/45 8,4kg 380-415 V, incl. gasket
									Steam cylinder **without** SuperFlush nozzle
16		1						SP-03-01041	Steam cylinder SLH06 CY08 380-415 V, compl. incl. O-ringset
16			1					SP-03-01070	Steam cylinder SLH09 CY08 380-415 V, compl. incl. O-ringset
16				1				SP-04-01011	Steam cylinder SLH15 CY17 380-415 V, compl. incl. O-ringset
16					1			SP-04-01040	Steam cylinder SLH25 CY17 380-415 V, compl. incl. O-ringset
16						1		SP-06-01010	Steam cylinder SLH40 CY45 380-415 V, compl. incl. O-ringset
16							1	SP-06-01040	Steam cylinder SLH50 CY45 380-415 V, compl. incl. O-ringset
16									Steam cylinder **with** SuperFlush nozzle
16		1						SP-03-01046	Steam cylinder SLH06 CY08 380-415 V, compl. incl. O-ringset
16			1					SP-03-01075	Steam cylinder SLH09 CY08 380-415 V, compl. incl. O-ringset
16				1				SP-04-01016	Steam cylinder SLH15 CY17 380-415 V, compl. incl. O-ringset
16					1			SP-04-01045	Steam cylinder SLH25 CY17 380-415 V, compl. incl. O-ringset
16						1		SP-06-01015	Steam cylinder SLH40 CY45 380-415 V, compl. incl. O-ringset
16							1	SP-06-01045	Steam cylinder SLH50 CY45 380-415 V, compl. incl. O-ringset
									Steam generation 440-480 V
4		1						SP-03-01103	Heating element CY08 6kg 440-480 V, incl. gaskets
4			1					SP-03-01106	Heating element CY08 9kg 440-480 V, incl. gaskets
4				3		3		SP-07-01102	Heating element CY17/45 5kg 440-480 V, incl. gasket
4					3	3	6	SP-07-01105	Heating element CY17/45 8,4kg 440-480 V, incl. gasket
									Steam cylinder **without** SuperFlush nozzle
16		1						SP-03-01042	Steam cylinder SLH06 CY08 440-480 V , compl. incl. O-ringset
16			1					SP-03-01071	Steam cylinder SLH09 CY08 440-480 V , compl. incl. O-ringset
16				1				SP-04-01012	Steam cylinder SLH15 CY17 440-480 V , compl. incl. O-ringset
16					1			SP-04-01041	Steam cylinder SLH25 CY17 440-480 V , compl. incl. O-ringset
16						1		SP-06-01011	Steam cylinder SLH40 CY45 440-480 V , compl. incl. O-ringset
16							1	SP-06-01041	Steam cylinder SLH50 CY45 440-480 V , compl. incl. O-ringset
16									Steam cylinder **with** SuperFlush nozzle
16		1						SP-03-01047	Steam cylinder SLH06 CY08 440-480 V , compl. incl. O-ringset
16			1					SP-03-01076	Steam cylinder SLH09 CY08 440-480 V , compl. incl. O-ringset
16				1				SP-04-01017	Steam cylinder SLH15 CY17 440-480 V , compl. incl. O-ringset
16					1			SP-04-01046	Steam cylinder SLH25 CY17 440-480 V , compl. incl. O-ringset
16						1		SP-06-01016	Steam cylinder SLH40 CY45 440-480 V , compl. incl. O-ringset
16							1	SP-06-01046	Steam cylinder SLH50 CY45 440-480 V , compl. incl. O-ringset
									Steam generation general
	1	1	1					AC-03-01000	O-ringset (Pos. 3, 17, 31, 33, 35)
				1	1			AC-04-01000	O-ringset (Pos. 3, 17, 31, 33, 35)
						1	1	AC-06-01000	O-ringset (Pos. 3, 17, 31, 33, 35)
	1	1	1	1	1	1	1	AC-07-01010	O-ring water level sensor
5	1	1	1	1	1	2	2	B-2205031	Thermal circuit breaker steam cylinder incl. incl. gasket, clips
27	1	1	1	1	1			CN-07-01010	Water level sensor complete with cable
27						1	1	CN-07-01012	Water level sensor complete with cable
1	1	1	1					E-2209018	Adapter for steam hose, cylinder DN40, steam hose DN25
1				1	1	2	2	E-2209008	Adapter for steam hose, cylinder DN40, steam hose DN40
2	1	1	1					E-2209016	Clip for adapter DN40 short, grey
2				1	1	2	2	E-2209002	Clip for adapter DN40 white
									Water feed
25	1	1	1					WF-03-00010	Solenoid valve
25				1	1			WF-04-00010	Solenoid valve
25						1	1	WF-06-00010	Solenoid valve
	1	1	1	1	1	1	1	WF-07-00030	Mounting kit solenoid valve incl. seals and screws
	1	1	1					WF-03-01001	Water feed hose system incl. Cylinder base and mounting set
				1	1			WF-04-01001	Water feed hose system incl. Cylinder base and mounting set
						1	1	WF-06-01001	Water feed hose system incl. Cylinder base and mounting set
58	1	1	1	1	1	1	1	WF-07-00002	Double check valve
56	1	1	1	1	1	1	1	B-2304031	Water inlet hose connection, 0.6m 3/4"

Spare parts (2)

*)	SLH03	SLH06	SLH09	SLH15	SLH25	SLH40	SLH50	Article No.	Description
									Water drain
	1	1	1					B-2425005	Pump-drain-hose-system (Pos. 6, 14, 15, 30, 31)
				1	1	1	1	B-2425009	Pump-drain-hose-system (Pos. 6, 14, 15, 30, 31)
	1	1	1	1	1	1	1	B-2404027	Drain pump without mounting set, with 2 o-rings
	1	1	1	1	1	1	1	B-2424014	Mounting set for drain pump
									Electrics
									Main contactor 208-240 V
	1	1						E-2507040	Main contactor 20A, K1 - SLH03-06
				1				E-2507060	Main contactor 35A, K1 - SLH15 **when connected to 200-240 V 3ph
									Main contactor 380-480 V
	1	1	1					E-2507040	Main contactor 20 A, K1.1 - SLH03-09
				1	1			E-2507060	Main contactor 35 A, K1.1 - SLH15-25
						1	1	E-2507060	Main contactor 35 A, K1.2 - SLH40-50
						1		B-2507071	Main contactor 50A, K1.1 - SLH40
							1	B-2507081	Main contactor 65 A, K1.1 - SLH50
	1	1	1					CN-03-01000	Solid state relay for SLH03-09 incl. heatsink & temp. limiter
				1	1	1	1	CN-07-01000	Solid state relay for SLH15-50 incl. heatsink & temp. limiter
	1	1	1					WR-03-01000	Connector e-compartment - water comparment, plug + socket
				1	1	2	2	WR-07-01000	Connector e-compartment - water comparment, plug + socket
	1	1	1	1	1	1	1	CN-07-00000	Mainboard, fuse 1.6A
		1	1	1	1	1	1	CN-07-00005	Mainboard, fuse 0.5A (used when power supply for the mainboard is generated by a transformer)
59	1	1	1	1	1	1	1	CN-07-00001	Display
	1	1	1	1	1	1	1	E-0510012	Clip for display
51	1	1	1	1	1	1	1	E-2502412	Control switch, double pole, middle position = "0"
									Accessories
70								SP-07-26000	Steam hose DN25, per m
70								SP-07-26001	Steam hose DN40, per m
57								E-2420423	Drain hose 1 1/4", per m
								E-2604002	Condensate hose DN12, per m
								E-2404004	Steam hose clamp DN25
								E-2604016	Steam hose clamp DN40
								E-2404010	Clamp for drain hose 1 1/4"
								E-8501064	Condensate hose clamp
								E-2604042	Connectors for steam distribution T-piece DN25, stainless steel
								E-2604023	Connectors for steam distribution T-piece DN40, stainless steel
								E-2604021	Connectors for condensate T-piece DN12

*) see item no. in exploded view

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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15. Technical specifications

	Technical specifications StandardLine heater						
Unit type	**SLH03**	**SLH06**		**SLH09**	**SLH15**	**SLH25**	**SLH40**	**SLH50**
Steam output [kg/h]	2,7 - **3,0** - 3,3	5,5 - **6,0** - 6,5	5,4 - **6,0** - 6,5	8,1 - **9,0** - 9,7	13,7 - **15,0** - 16,4	22,7 - **25,0** - 27,1	36,5 - **40,0** - 43,5	45,5 - **50,0** - 54,3
Electrical connection[1]	220 - **230** - 240V /1Ph /N /50-60Hz		380 - **400** - 415V /3Ph /N /50-60Hz					
Rated power [kW]	2,1 - **2,3** - 2,4	4,1 - **4,5** - 4,9	4,1 - **4,5** - 4,8	6,1 - **6,8** - 7,3	10,3 - **11,4** - 12,3	17,1 - **18,9** - 20,3	27,3 - **30,3** - 32,6	34,1 - **37,8** - 40,7
Nominal current [A]	9,4 - **9,8** - 10,2	18,7 - **19,6** - 20,4	10,7 - **11,3** - 11,7	16 - **16,9** - 17,5	15,6 - **16,5** - 17,1	25,9 - **27,3** - 28,3	41,5 - **43,7** - 45,4	51,8 - **54,6** - 56,6
Fuse [A]	1 x 16	1 x 25	3 x 16	3 x 20		3 x 32	3 x 50	3 x 63
Terminals max. [mm²]	4			10		35		
Number of steam cylinder	1							
Control	StandardLine mainboard with capacitive touch display							
Separate control voltage[3]	220 - 240V 1,6A							
Steam hose connection [mm]	1 x 25					1 x 40	2 x 40	
Water consumption[7] [l/h]	3,96	7,8		11,64	19,68	32,52	52,2	65,16
Water flow rate[8] [l/min]	1,3 / 10,9				2,8 / 12,4		4,1 / 13,7	
Max. filling capacity [l]	4,8				14,0		36,0	
Empty weight [kg]	14,0				23,0		41,3	45,0
Operation weight [kg]	19,3				37,5		77,8	81,5
Width[9] [mm]	350				425		590	
Height[9] [mm]	535				695		790	
Depth[9] [mm]	245				320		415	
Water connection	fully demineralised water / cleaned condensate / partially softened tap water of varying qualities 1 to 10 bar, 1 to 10 bar, for 3/4" external thread							
Drain water connection	Connection Ø 1 1/4"							

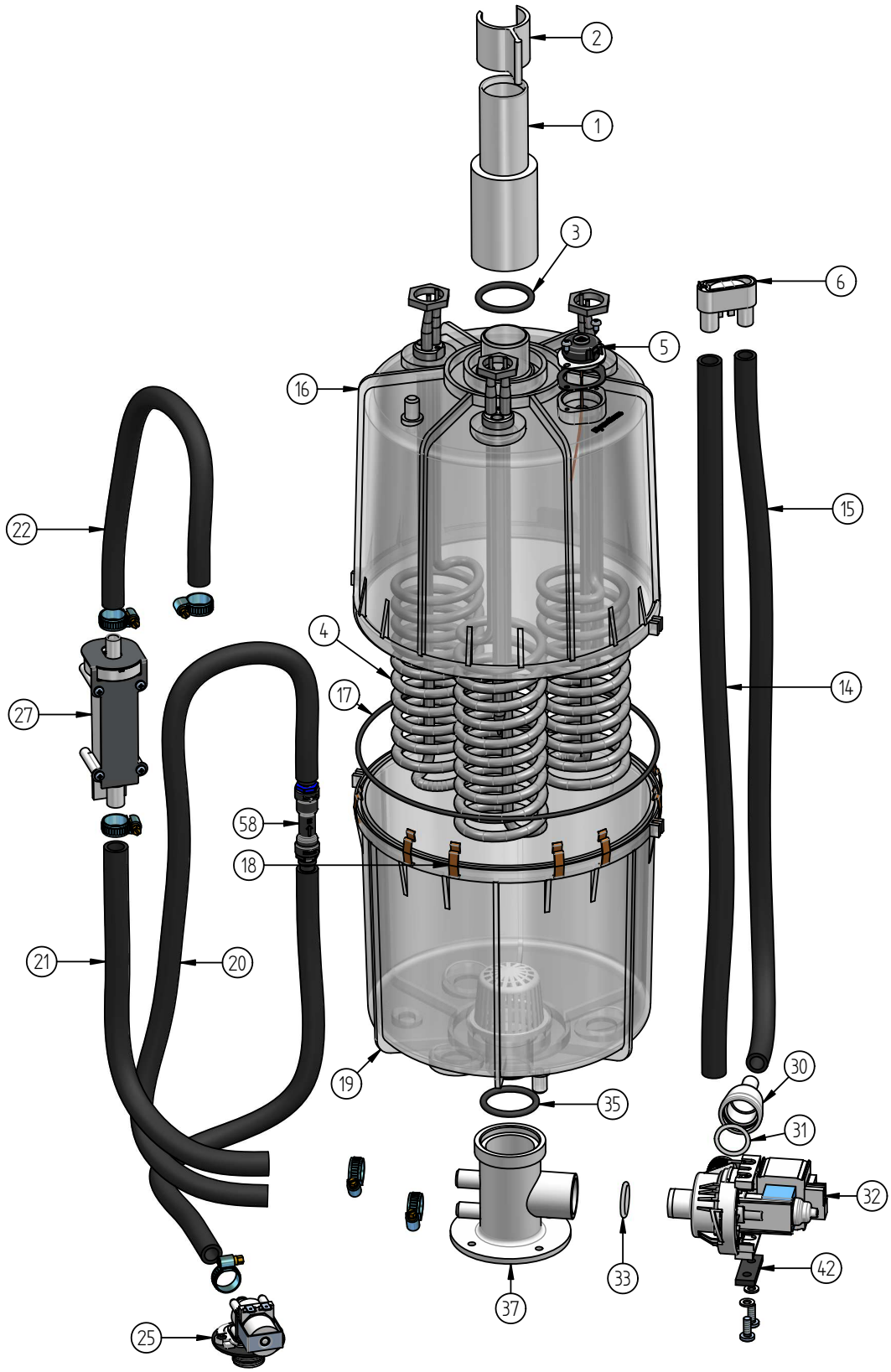
[1] Other voltages upon request.
[3] Internal control voltage upon request.
[7] Maximum water consumption at 100% demand plus blowdown losses. The water consumption depends on the water quality and installed options.
[8] Flow rate of the feed water during refilling or pumping out. Unit without options / maximum rate with options.
[9] Outer dimensions of width and depth. Hight incl.drain connection.

16. Exploded view

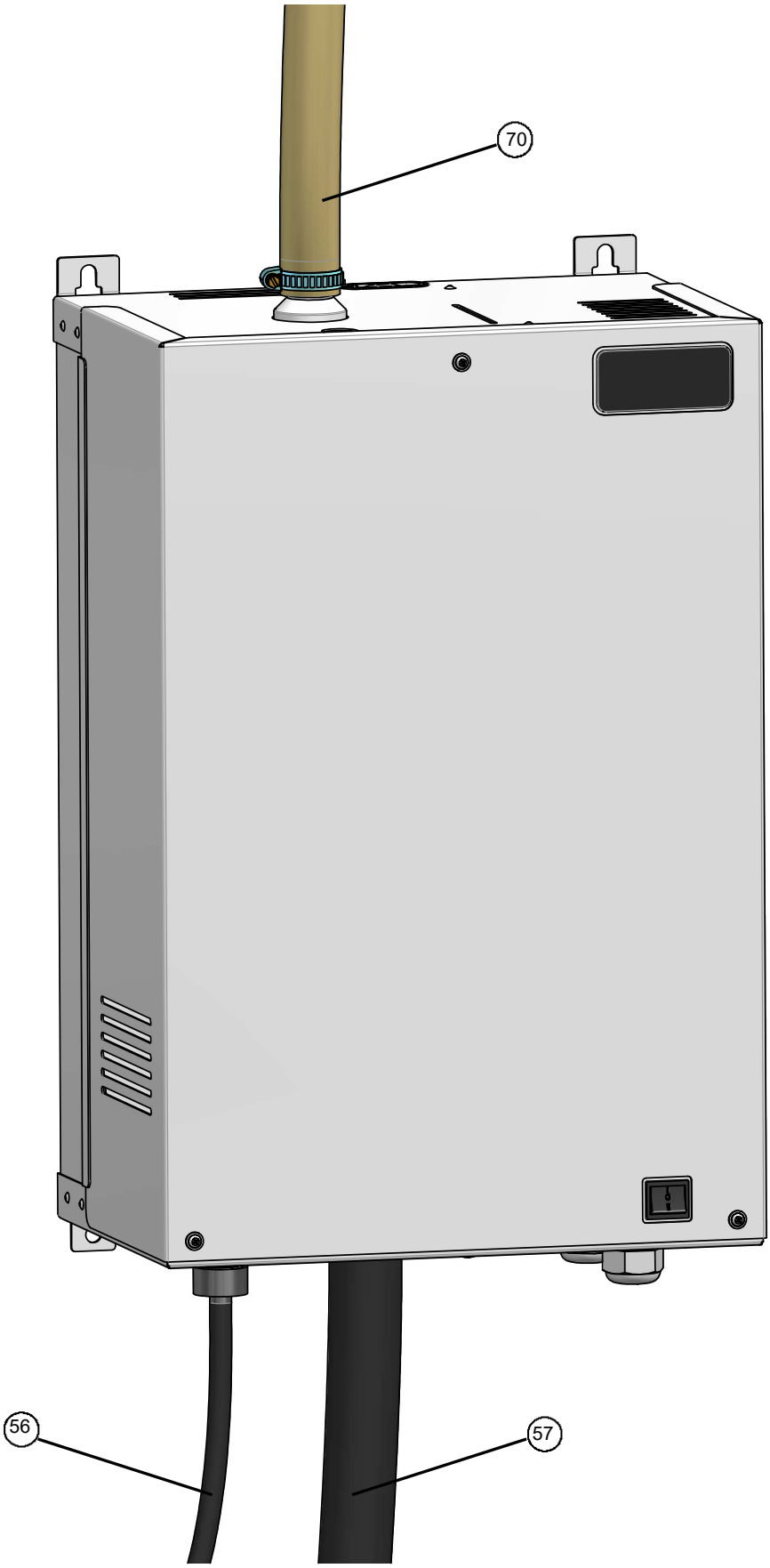
The figure following shows the SLH25 model composition. The number of cylinders and heater elements vary with respect to the complete SLH series.

The index numbers in the figure correspond to the spare parts list.

The number of steam outlets and the size of their connections can be found in the technical data.



17. View of housing



This figure shows an example of one of the smaller unit sizes of the StandardLine series.

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