



HygroMATIK®

FlexLine

Electrode Steam Humidifiers



Manual

IMPORTANT: READ AND SAVE THESE INSTRUCTIONS



FLE.CSA
E-8881762

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Information in this manual is subject to change or alteration without prior notice.

▲ WARNING**Risk of electrical shock!**

Hazardous electrical high voltage!

All electrical work to be performed by certified expert staff (electricians or expert personnel with equivalent training) only.

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1. Introduction

Dear Customer,

Thank you for choosing a HygroMatik steam humidifier.

HygroMatik steam humidifiers represent the latest in humidification technology.

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

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

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

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

1.1 Typographic Distinctions

- preceded by a bullet: general specifications
- » preceded by an arrow: Procedures for servicing or maintenance which should or must be performed in the indicated order
- ☑ Installation step which must be checked off.
- italics* Terms used with graphics or drawings

1.2 Documentation

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

▲ DANGER

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

▲ WARNING

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

▲ CAUTION

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

NOTICE

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

1.3.2 General Symbols

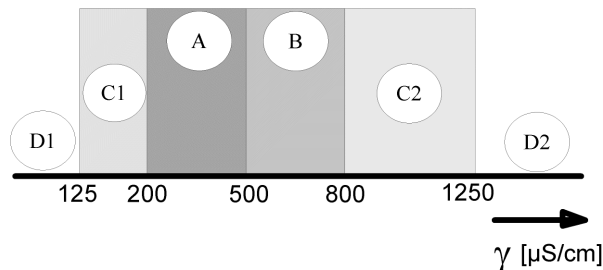
Please note

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

1.4 Intended Use

HygroMatik electrode steam humidifiers serve for steam production based on tap water or partially softened water.

Only use supply water featuring a conductivity of 125 to 1250 $\mu\text{S}/\text{cm}$.



D1: Lower threshold

C1: Range of reduced conductivity (adjustment required)

A: Normal Tap water

B: Range of increased conductivity

C2: Range of high conductivity (adjustment required)

D2: Upper threshold

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

The following applies to the **StandardLine** device series: Please read the explanations of parameters "2-1" and "2-2" in the section "Detailed parameter descriptions" in this manual.

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

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

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

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

⚠ WARNING

Risk of scalding!

Steam with a temperature of up to 100 °C (212° F) is produced.

Do not inhale steam directly!

NOTICE

When using feed water with a chloride content above 30mg/l, we recommend the use of galvanised electrodes to prevent the electrodes from burning out too quickly.

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 monitoring 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

Please note

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

3.1 Packing

Please note

Pay attention to the icons affixed to the packing box.

3.2 Interim Storage

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

3.3 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

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

The HygroMatik humidifier utilizes the conductivity normally present in tap water for steam production. Electrodes inside an enclosed steam cylinder are immersed directly into the tap water. They are connected to the alternating current. The conductivity of the water generates an electric current between the electrodes. In this way, the electric power supplied is converted directly into heat without energy loss. The steam produced has a temperature of about 100°C (212°F) with minimal excess pressure ("pressureless steam"). It is largely free of minerals and germ-free. Mineral deposits typically remain behind in the cylinder.

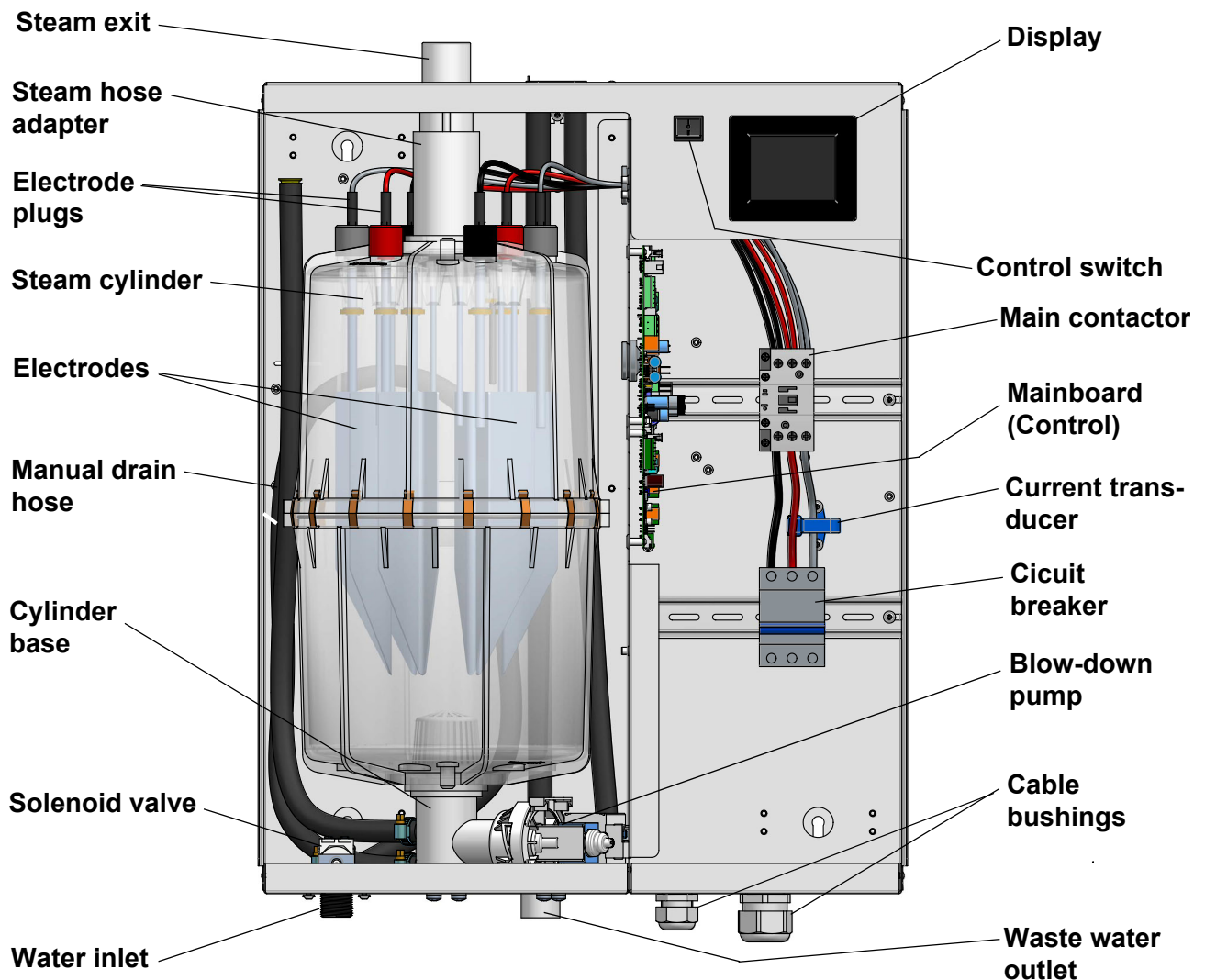
4.2 Mechanical Construction

The FlexLine humidifiers are designed for wall mounting. For maintenance purposes, the steam cylinders are separable in the middle.

Please note

Starting with the manufacturing date of 11/2018, the steam humidifiers FLE50/65/100/130 make use of a modified steam cylinder that are separable in the upper part of the wall. When replacing the steam cylinder, the new cylinders with the designation „CY45/2“ may be incorporated in the older units as well. With the steam cylinder modification also the electrodes have changed. The new electrodes only fit in the new steam cylinders.

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



4.3 Operating sequence

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

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

After a short heating up period, the water between the electrodes begins to boil and vaporize. The vaporization lowers the water level in the steam cylinder, reducing the output provided. The inlet solenoid valve, equipped with a fine mesh filter, intermittently admits fresh water.

Humidifier power usage is continuously monitored. With a cold start-up, the nominal current increases to 113% in order to achieve quick-start output parameters. This activates the electronic overflow limiter which causes a partial draining of the cylinder. This reduces the immersed surface area of the electrodes, lowering power usage.

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

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

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

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

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

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

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

Monitoring max. level

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

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

5. Mechanical installation

▲ WARNING

Risk of foot injuries!

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

▲ WARNING

Risk of electrical shock!

Hazardous electrical voltage. During installation, the unit must be disconnected from power supply 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

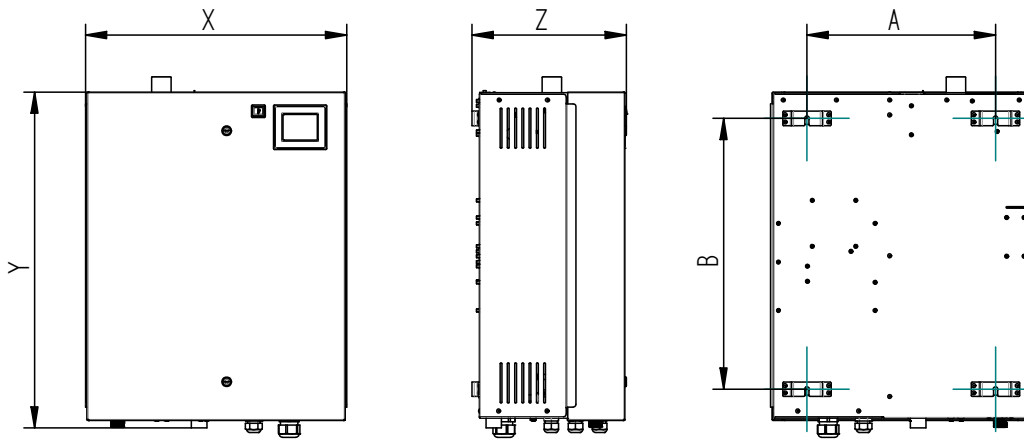
When selecting the installation site for the steam humidifier, take the following into account:

- 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, the solenoid valve and pump, as well as make hoses burst
 - Relative humidity must not exceed 80 % r.h., since values beyond may lead to electronic malfunction or damage
- Installation in a closed room requires aeration and, eventually, temperature conditioning in order to meet the a.m. environmental conditions
 - The steam humidifier should be installed as close as possible to the steam manifold. Optimum performance is only guaranteed when steam and condensate hoses are kept short
 - Make use of existing water connections for supply and draining
 - Hoses must be laid at a consistent 5 to 10 % incline/decline; sagging and kinking prevention is a must
 - Mount the unit on a stable, preferably solid wall offering the bearing capacity required (s. unit technical specifications). If such a wall is not at hand, the unit may be attached to a stand bracket firmly bolted to the floor
 - For proper functioning of the level control, plumb and level installation of the unit is required
 - The steam humidifier rear panel heats up during operation to a maximum of 70 °C (158 °F). Take care that the construction on which the unit is to be mounted is not made of temperature-sensitive material

5.1.1 Dimensions and Mounting Directions

Table of dimensions

Model	X [mm/inch]	Y [mm/inch]	Z [mm/inch]	A [mm/inch]	B [mm/inch]
FLE05-FLE10*	460/~18.1	535/~21	320/~12.6	310/~12.2	400/~15.7
FLE15-FLE25	540/~21.3	695/~27.4	320/~12.6	390/~15.4	560/~22
FLE30-FLE40	580/~22.8	750/~29.5	355/~14	425/~16.7	620/~24.4
FLE50-FLE65	640/~25	785/~30.9	420/~16.5	490/~19.3	650/~25.6
FLE80	1130/~43.1	750/~29.5	420/~16.5	870/~34,4	620/~24.4
FLE100-FLE130	1170/~46	785/~30.9	420/~16.5	1000/~39.4	660/~25.6

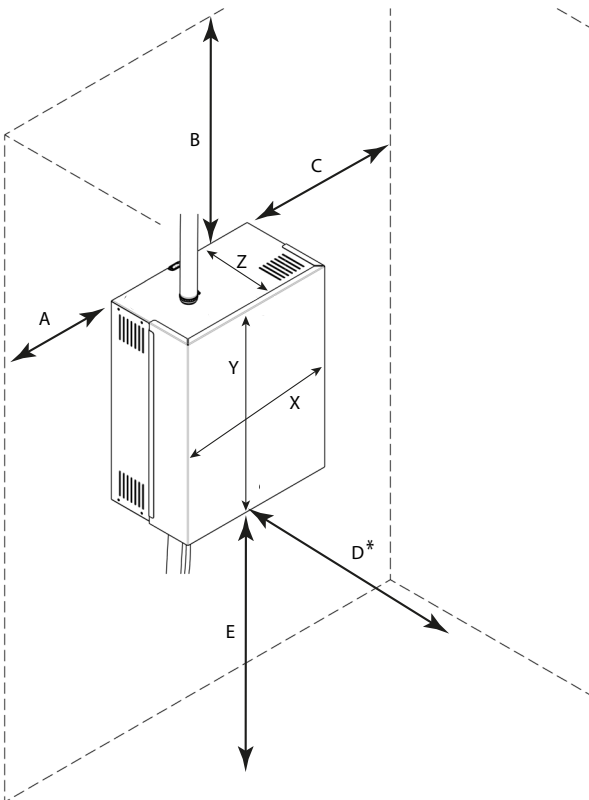


Detailed measurements under

<https://www.hygromatik.com/files/pdf/hygromatik-flexline-dimensionsv13.pdf> .

3D models under <https://www.hygromatik.com/en/downloads>

* Units with production date January 2022 and earlier: X:540 / A:390



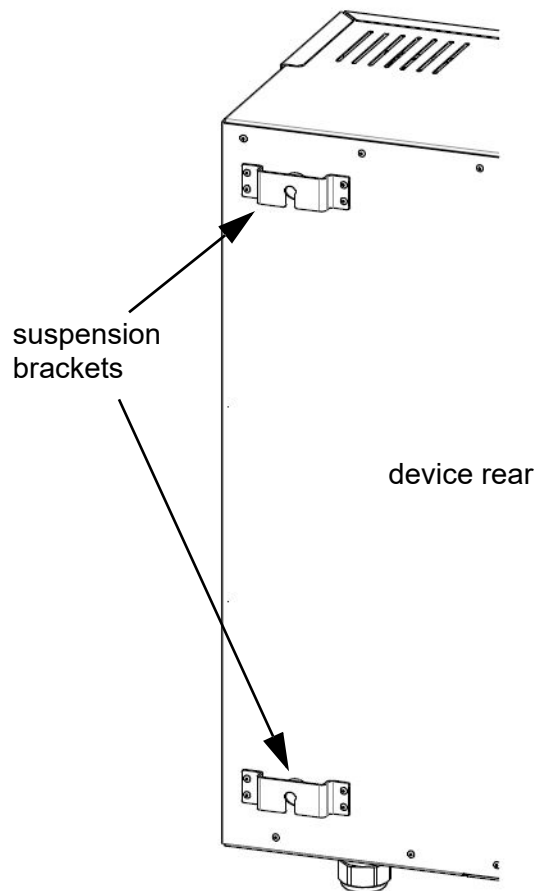
Wall clearances

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



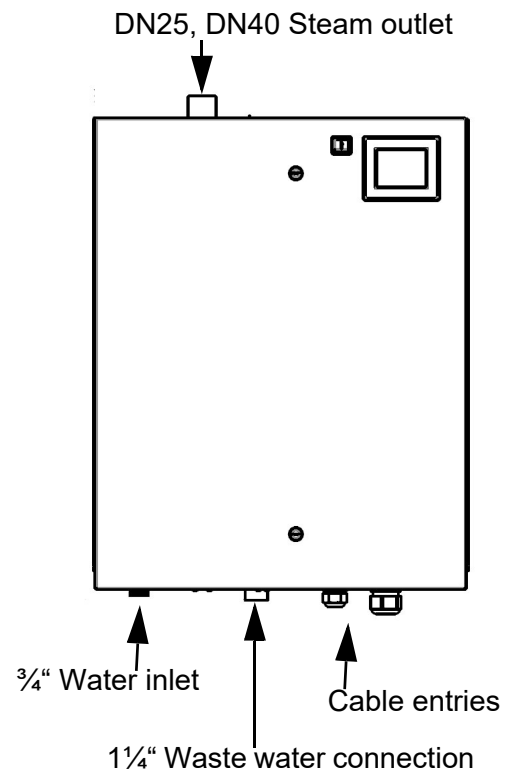
For wall mounting drill measures, please consult the table above (measure A). In case of no suitable wall available for mounting the unit, it is recommended that installation is made on brackets firmly anchored in the floor.

- » 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

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 mounted 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

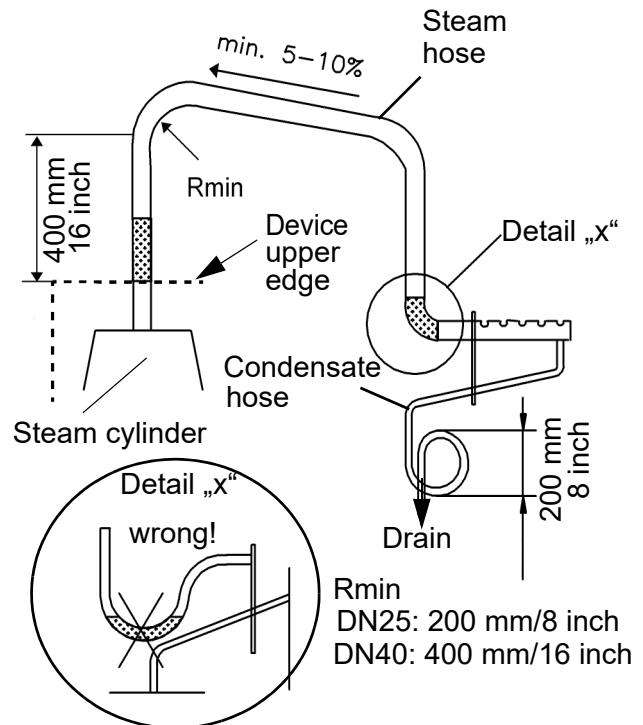
Please note

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: $R_{min} = 200 \text{ mm}/8''$
 DN 40 Steam hose: $R_{min} = 400 \text{ mm}/16''$



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 continuous decline of 5 to 10 %.
- » Feed condensate hose to a wastewater 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.

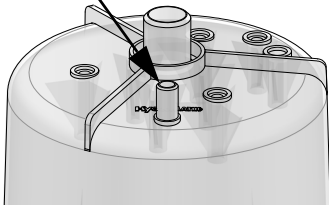
5.3.2 Condensate recirculation

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



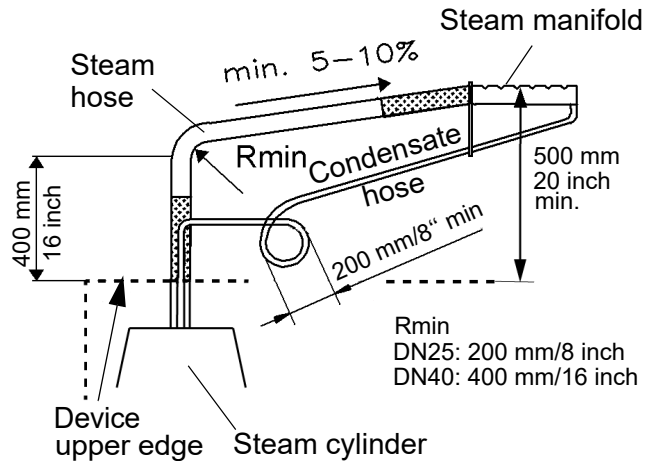
Steam cylinder top view

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

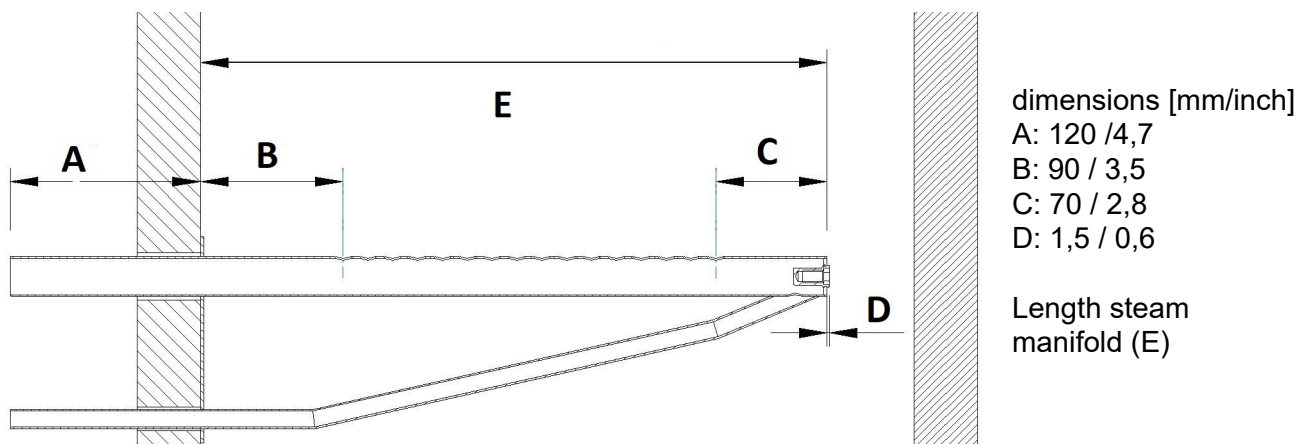
- Install the steam manifold as close as possible to the steam humidifier in order to minimize steam loss through condensation.
- Steam manifold placement on the supply side of the air duct is preferable.
- Install steam manifold strictly horizontal in order to ensure proper condensate drain.
- A minimum 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



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.

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

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

*** Special lengths on demand.

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

5.4.2 Recommendations for dimensioning

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

Please note

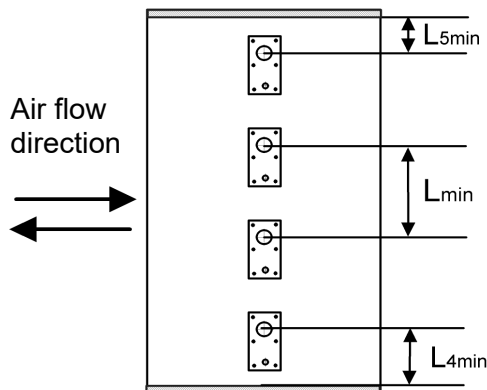
Start by arranging the steam distributors in the lower third of the air-conditioning duct (as low as possible, observing the minimum distances).

Minimum distance for condensation avoidance:

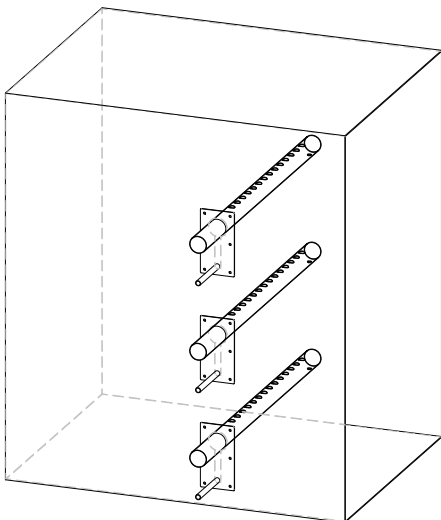
L_{min} = 210mm/8.3 inch: „Steam manifold - Next steam manifold“ distance

L_{4min} = 120mm/4.7 inch: „Lowest steam manifold - Duct bottom plane“ distance

L_{5min} = 120mm/4.7 inch: „Highest steam manifold - Duct ceiling plane“ distance



Standard steam manifold arrangement:



Steam manifold arrangement for special air duct shapings:

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

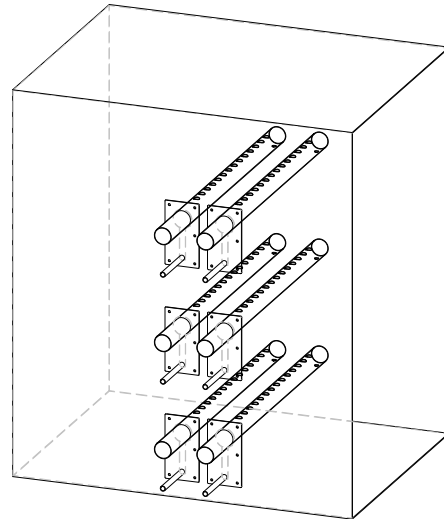


Fig: parallel arrangement of the steam distributors

Narrow, high air duct:

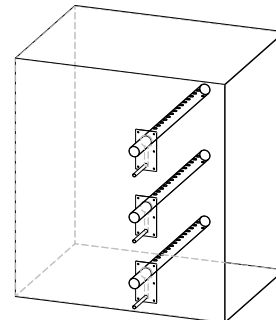


Fig: vertical arrangement of the steam distributors

Flat air duct

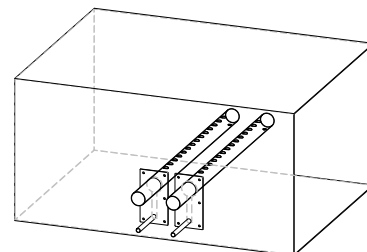


Fig: parallel arrangement of the steam distributors

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
$B_C = (1.5...2) \times B_N$	for fine filters, heat registers
$B_S = (2.5...3) \times B_N$	for particle filters
$B_d = (3...5) \times B_N$	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 Δx in g/kg (can be determined in the h,x diagram)
- quantity of steam introduced $\overset{\circ}{m}_D$ 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]

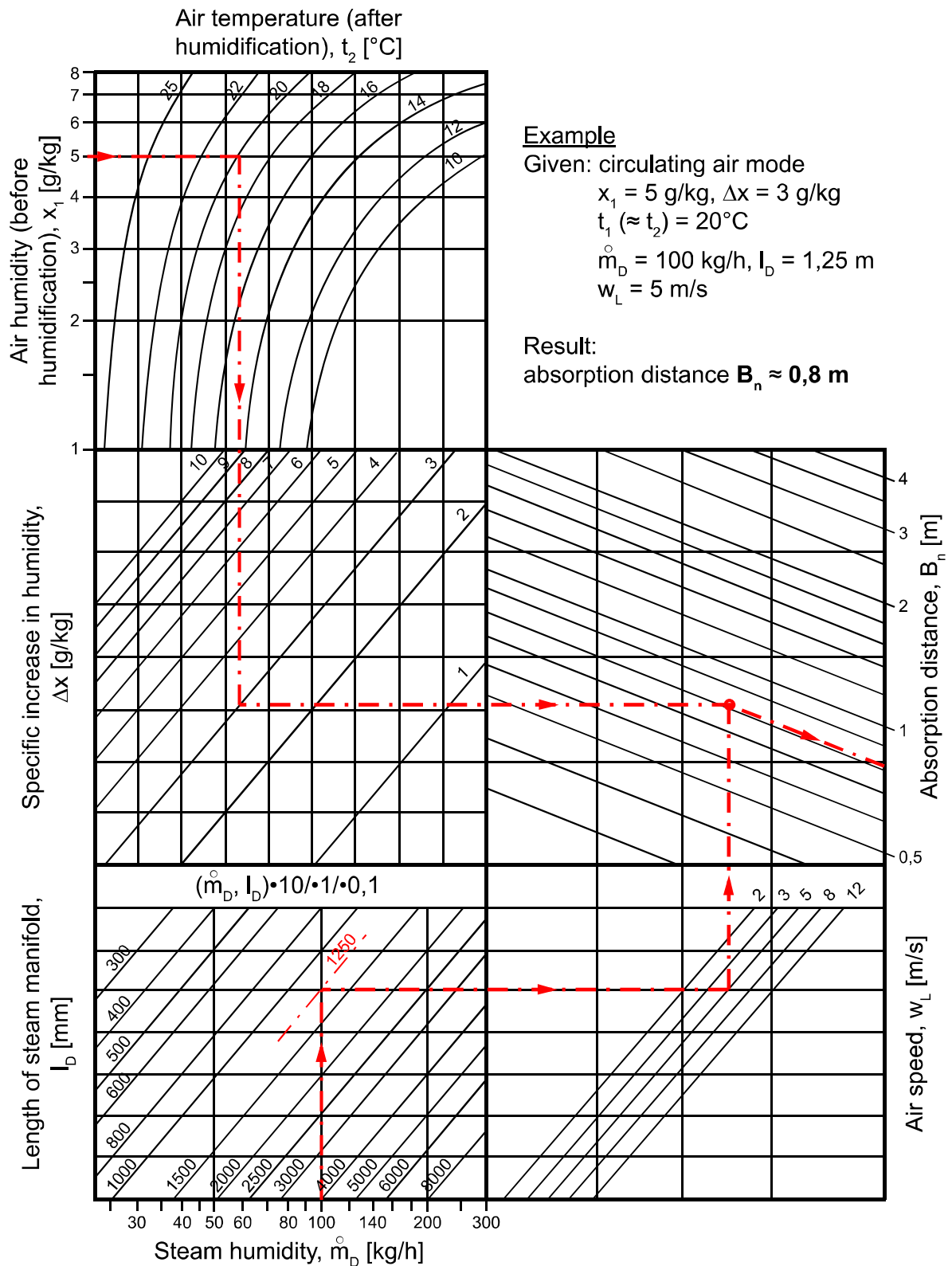
Specific increase in humidity Δx :.....[g/kg]

Quantity of steam introduced $\overset{\circ}{m}_D$:.....[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 10³ to 100 x 10⁴ 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 electronic steam humidifiers are designed for operation

- with drinking water* or
- treated drinking water (mixed deionised water) without chemical additives and with a conductivity between 200 and 800µS/cm.

Beyond conductivity levels of 800µS/cm up to a maximum of 1250µS/cm and below conductivity levels of 200µS/cm to a minimum of 125µS/cm, special adjustments are required. In this case please contact your specialist dealer.

* according to the drinking water regulation

In exceptional cases, HygroMatik electrode steam humidifiers can be operated with (partially) softened water.

The use of softened water requires special measures:

- Operation with partially or fully softened water makes it necessary to adjust the blowdown parameters to a higher blowdown 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.

Softened water may cause

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

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

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

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

If using a water softening system, we recommend diluting the softened water with normal tap water to produce an overall **hardness between 4-8°gH**.

6.2 Water supply

NOTICE

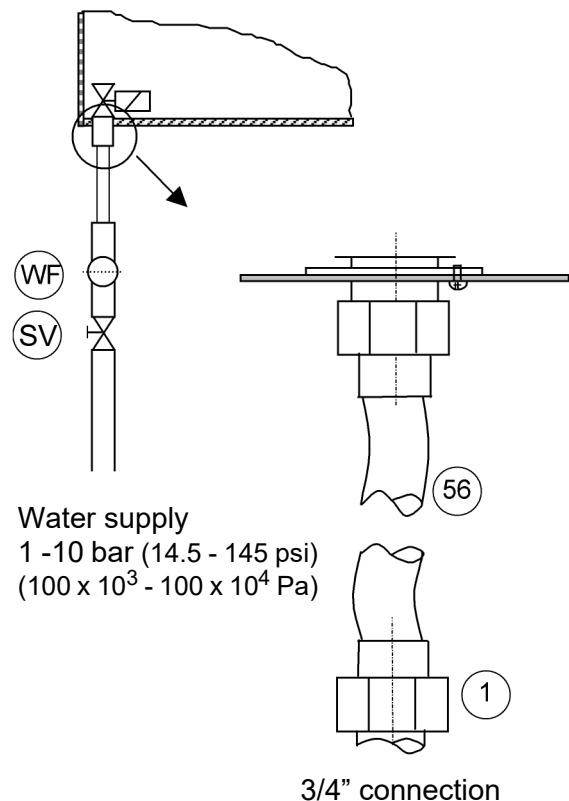
Foreign material in water supply pipe may cause premature wear of the solenoid valve.

Flush the water supply pipe before making connection to the solenoid valve. This is of particular importance in case of a newly installed pipe.

- » Install a shut-off valve (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 or use of the Hyflow retrofit option 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 3/4").
- » Strainer must be placed inside the solenoid valve

6.3 Water discharge

⚠ WARNING

Risk of scalding!

During blow down, up to 0.3 l/sec (08 gal./sec) are being drained with a temperature of about 95 °C (203°F).

Ensure that the drain hose is reliably fastened and wastewater can drain freely and pressureless.

Please note

Humidifier installation location and wastewater discharge must be on the same pressure level. 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.

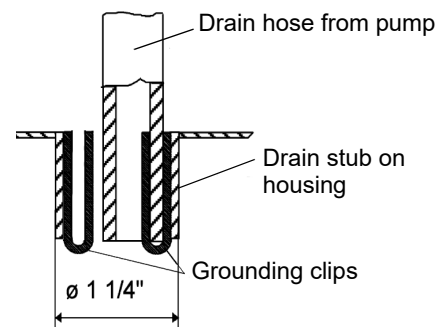
How to proceed

- » 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. The hose must be guided sideways of the humidifier to prevent ascending vapor from condensing on the humidifier's housing.

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

- » Fit drain hose to connection stub on humidifier housing bottom side.
- » Slide pump drain hose onto one of the grounding clips (s. fig. below).
- » 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).

6.4 Water connections final check

Go down the following water installation checklist:

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

7. Electrical connection

⚠ WARNING

Danger of electric shock!

Dangerous electric voltage!

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

Please note

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

General installation rules

- All local rules concerning the implementation of electrical installations must be obeyed
- Electric connector cables to be laid professionally
- Install the electrical connections according to the wiring diagram
- With units of a nominal power output > 33 kW electrical connection to a permanent line is mandatory

NOTICE

Potential component damage due to electrostatic discharge!

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

7.1 Electrical installation approach

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

- » Provide fuses with a contact gap of at least .12 inch (3 mm) 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 and Fusing

For the FlexLine 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.

Please note

HygroMatik recommends the use of slow blowing up to middle time-lag main fuses (only applies to the a.m. mains supply voltage).

Steam humidifier installations should incorporate an individual resilient current circuit breaker (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 quantities and dimensioning of the cable connections provided by the various FlexLine housing types.

Model	M25	M25 with MSI*)	M32	M40	Blind plug*)
FLE05/10 FLH03/06 FLH09	1	1	0	0	3
FLE15/20 FLE25 FLH15/25	1	1	0	0	3
FLE30/40	0	1	1	0	3
FLE50/65 FLH30/40 FLH50	0	1	0	1	3
FLE80	0	1	2	0	3
FLE100 FLE130 FLH80 FLH100	0	1	0	2	3

Model	M25	M25 MSI*)	M40	Blind plug**)
FLP05/08	1	1	0	3
FLP15/25	1	1	0	3
FLP30/40/50	0	1	1	3

*) MSI = Multiple seal insert

**) \varnothing 25 mm/~ 1.0 inch

Characteristics of metric cable connections

Thread	Wrench size [mm/in.]	Cable diameter supported [mm/in.]
M25x1.5	30/~ 1.2	9 - 17/~ .35 - .67
M25 MSI*)	30/~ 1.2	6 (3x)/~ .24 (3x)
M32x1.5	36/~ 1.4	13 - 21/~ .51 - .83
M40x1.5	46/~ 1.6	16 - 28/~ .63 - 1.1

7.3 Connection of interlock (safety) system

▲ WARNING

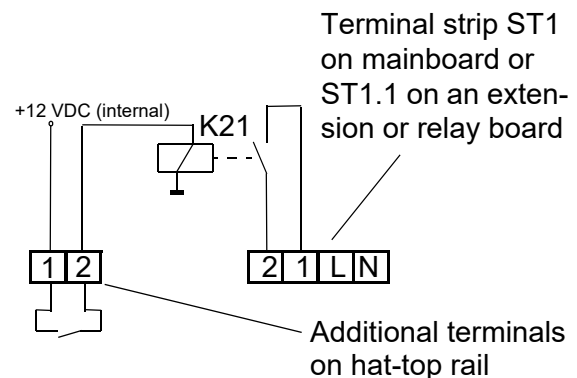
Danger of electric shock!

Dangerous electric voltage!

After the commissioning of the unit, a 230 VAC voltage is present at terminal 1 when standard wiring is used.

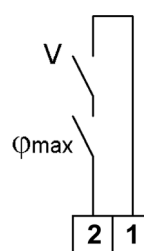
The so-called interlock (safety) system is located between terminals 1 and 2 with terminal 1 holding 230 VAC. For closing the interlock, a make contact is required across terminals 1 and 2. This contact is supplied by relay K21. For energising the relay, a make contact or a bridge is required across the additional terminals on the hat-top rail.

If the interlock (safety) system is open, the humidifier does not start or the operation is interrupted.



Terminals 1/2 for connection of the interlock (safety) system made accessible via relay K21

Safety equipment can be wired (also in series) into the interlock (safety) system, as shown in the fig. below:



Please note

The interlock (safety) system is not closed when delivered ex-factory!

In air conditioning, it is standard to incorporate a max. hygostat in the interlock (safety) system. The max. hygostat is used as a safety feature in case of a malfunction of the humidity sensor.

7.4 Full wiring diagrams

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.

7.5 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 of relay K21?
- Supply voltage in accordance with name plate voltage rating?
- All electrical connections made according to the wiring diagram?
- R.h. sensor properly connected with respect to signal type and range (Climate applications only making use of a r.h. sensor)?
- Temperature sensor properly connected (SPA applications only)?
- All screw terminal connections properly tightened?
- Have all electrical cable and plug connections been properly tightened?
- Proper unit grounding 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 On/Off button icon  flashes for a couple of seconds
- After the self-test of the controller, the display shows the setup view for the basic device settings (language, date, time and control settings). Refer to the chapter "Commissioning" in the operating instructions for the control system.
- Consequently, normal operation is commenced. However, steam is not produced without a demand pending

Step 4: Trigger steam demand

- » Set control to 1-step operation, i.e. permanent steam demand, and close safety interlock.
- » Allow all electrical functions to terminate in their programmed order.

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.

A steam humidifier's optimal performance and the maintenance intervals required 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 is the main contactor lifetime in terms of a maximum number of switch cycles allowed, as indicated by its manufacturer. Unit control monitors the number of switch cycles and produces a service message when the max. number is reached.

9.1.1 Service messages

In case of a service message produced, the HygroMatik logo in the main section of the touch display (for explanation s. „FlexLine controls“ manuals) is blanked. Instead, a frame is shown with the service icon  in it and a „Service message (xx)“ („xx“ indexes the message code). When the message frame is touched, the service message is displayed in clear language.

The service messages are listed in detail in the „FlexLine controls“ manuals. Following hereafter, pls. find 2 service messages denoted as examples:

- „*Steam_amount_counter*“ is output when the pre-set produced steam amount is reached
- „*Cycles_main_contactor x*“ is indicated when the number of cycles pre-set for main contactor „x“ (x = 1...5) is reached. The main contactor should then be replaced and the counter reset (s. „Service“ submenu in the „FlexLine controls“ manuals).

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

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

Since steam and condensate hoses are subject to wear as well, hoses must also be checked regularly for tightness, flexibility and firm seating.

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

9.1.2 Service messages for preventive maintenance

HygroMatik steam humidifiers continuously monitor the performance of the following functional areas:

- Electrode condition (wear control by means of cylinder full monitoring)
- Blow-down operations
- Cylinder filling

When reaching pre-set trigger levels, unit control outputs preventive service messages that relate to the corresponding functional area.

The functional area addressed should then be checked at short term and maintained, if required (s. „FlexLine controls“ manuals, „Faults and service messages“ chapter“).

9.1.3 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.

9.2 Maintenance frame work

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

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

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

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

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

Cycle time	Maintenance work
4 weeks after commissioning (also after installation of a new steam cylinder) (with normal water quality)	<ul style="list-style-type: none"> • Visual inspection of electrical and mechanical connections • Remove mineral deposits from steam cylinder, water drain hose and blow-down pump • Check electrodes for burn-off • Re-tighten electrode hand nuts and all screw terminals
semi annually* (with Normal Tap water quality (please refer to chapter 1.4 „Intended use“ and “normal“ operation, i.e. 8 hours per day)	<ul style="list-style-type: none"> • Visual inspection of electrical and mechanical connections • Remove mineral deposits from steam cylinder, water drain hose and blow-down pump. • Check electrodes for burn-off and replace, if required. • Re-tighten electrode hand nuts and all screw terminals • 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

* If the water quality differs, this could result in a more frequent need for maintenance.

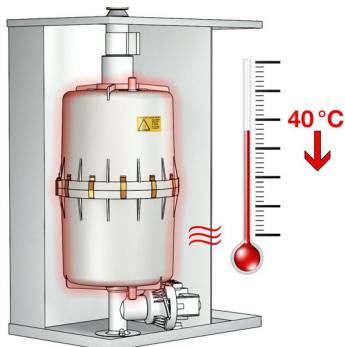
9.3 Removal and reinstallation of the steam cylinder

9.3.1 Removal of the steam cylinder

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



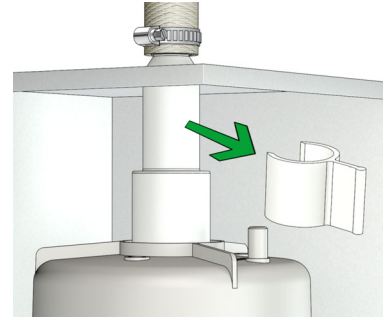
- » Set the control switch to position 0 to switch off the unit.
- » Disconnect unit from power supply and secure against reconnection.
- » Remove unit housing cover.
- » Check the unit again to ensure no voltage is present.
- » Shut off the water supply.
- » Wait 10 minutes so that the possibly hot cylinder can cool down.



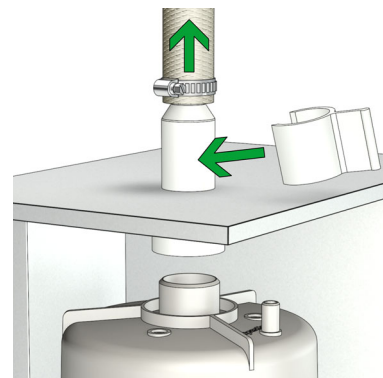
- » Check the temperature by carefully approaching it with your hand, do not touch the cylinder if the rest heat should be too strong.
- » Remove Super Flush solenoid hose from cylinder bottom (if applicable).
- » Remove the steam hose from the steam hose adapter.

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.

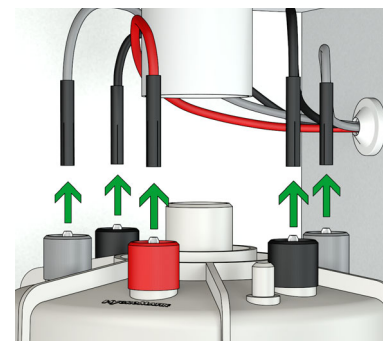


- » Pull the steam hose together with the steam hose adapter upwards. This will disconnect it from the steam cylinder.

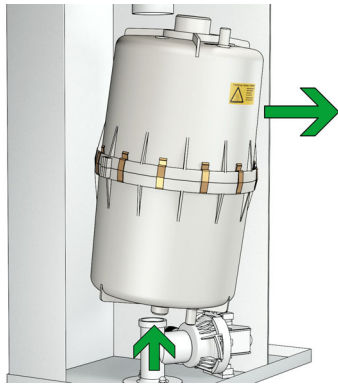


- » Push the clip onto the adapter outside of the unit housing.

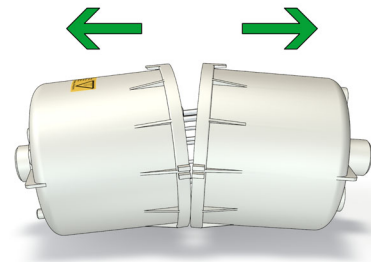
- » Disconnect the cabling.



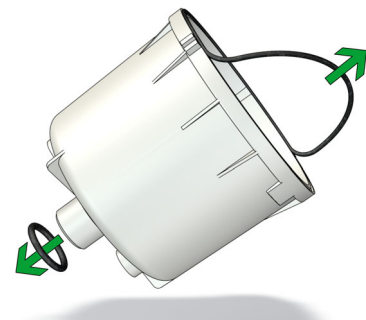
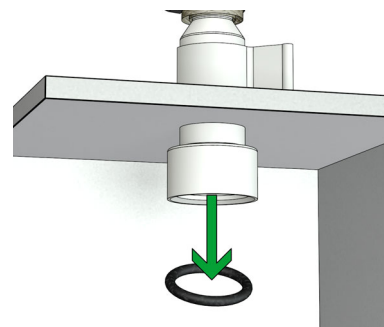
- » Lift steam the cylinder from the cylinder base.



- » Separate cylinder halves.



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



9.3.2 Cylinder cleaning / O-ring replacement

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

CAUTION

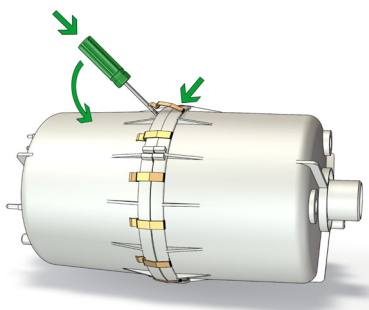
Risk of eye injuries!

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)!

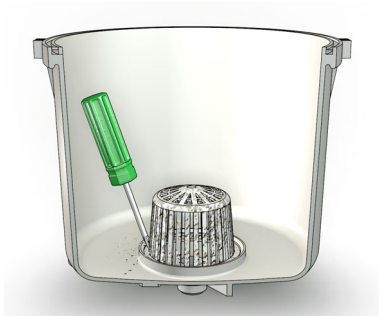
- » Remove the cylinder flange clamps.



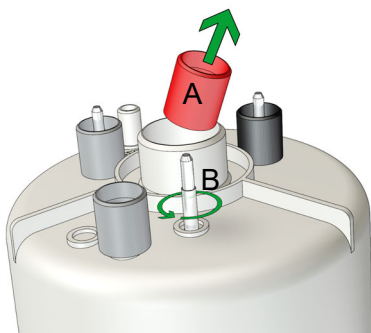
- » Clean the cylinder inside.



- » Clean the strainer.



- » Unscrew the hand nuts (A).



- » Remove electrodes (B).
- » Clean electrodes and check electrode wear (s. „Changing electrodes“ section).
- » Check sensor electrode for salt deposits and remove them if necessary (until metallically bright).
- » Check the inside of the top part of steam cylinder for crust build-up and possible salt bridges (black grooves between the electrode leads).



- » Remove the deposits by scraping / scrubbing them off.

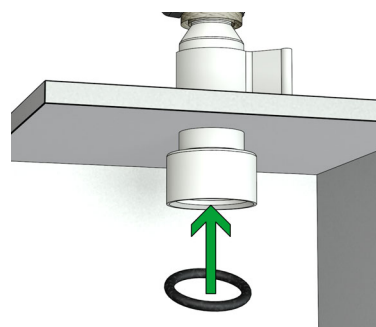
- » Replace the O-rings of the electrodes.
- » Install new electrodes (48). Make sure that the electrodes are positioned correctly (see exploded view).

NOTICE

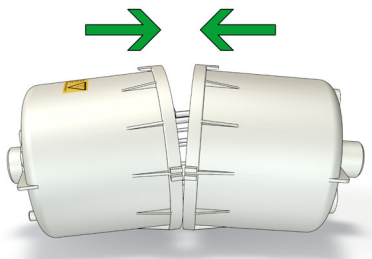
The deposits in the upper part of the cylinder can be conductive and lead to unwanted currents between the electrode connections and the sensor electrode and thus to the message "cylinder full".

If electrical bridges have penetrated deep into the material, the steam cylinder must be replaced.

- » Check the base and its connections for limescale deposits and clean if necessary.
- » Insert a new O-ring in the base.
- » 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.



- » When assembling the cylinder, make sure that the brackets and reinforcements are on top of each other.

NOTICE

Risk of functional disruption!

We generally advise against using limescale removers or other cleaners. If these are nevertheless used to clean the cylinder and the electrodes, rinse the parts cleaned with them thoroughly before putting the unit back into operation. The cleaners may impair the conductivity of the cylinder water.

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

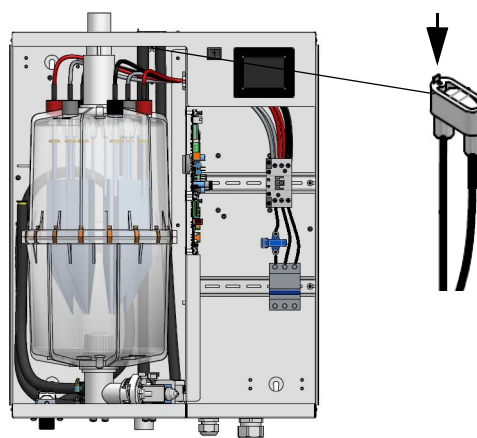
- » Check the connection hoses for condition and free passage.
- » Check all connections of the cylinder base for free passage.
- » Clean the hoses and connections if necessary.
- » Remove the fine filter on the water connection side from the solenoid valve and clean it under running water.
- » Clean the drain pump as described in the section of the same name..

NOTICE

When operating with partially softened water or tap water, scale may be discharged with the steam flow and may settle in the nozzle positioned in steam hose adapter. Therefore, this nozzle should be inspected regularly as part of the general maintenance review and cleaned if necessary.

9.3.4 Cleaning the vent hole on the pipe elbow

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



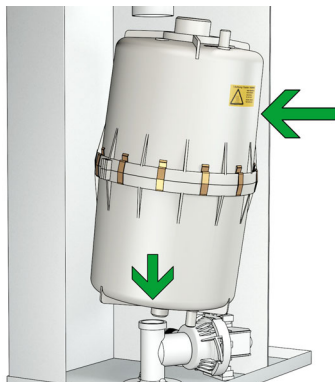
- » Remove the pipe elbow from the back wall of the housing by unscrewing the fixing screw of the pipe elbow.
- » Check the small opening on the top of the pipe elbow for dirt.
- » Remove any dirt, e.g. with a small screwdriver.
- » Reattach the pipe elbow to the back wall of the housing with the screw.

Please note

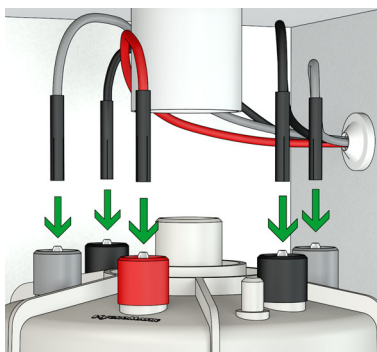
The vent hole should be checked for free circulation during every maintenance. A blocked vent hole has a negative effect on the drainage process (see also chapter "Trouble shooting" in the manual of the control).

9.3.5 Reinstallation of the steam cylinder

- » Place the cylinder vertically in cylinder base.



- » Reconnect the electrode cabling.



Please note

The colour of the respective connection cable must match the colour of the respective electrode hand nut.

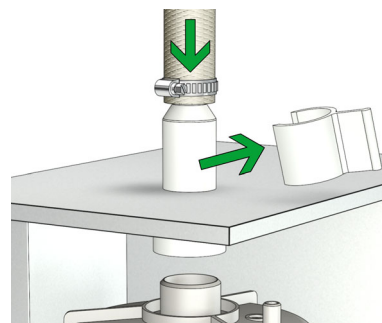
- » Check all cabling screw terminals and plugs for tight seating. Plugs must sit on their respective contacts as far as they will go.
- » Check electrode plugs for corrosion. Replace, if stained.

NOTICE

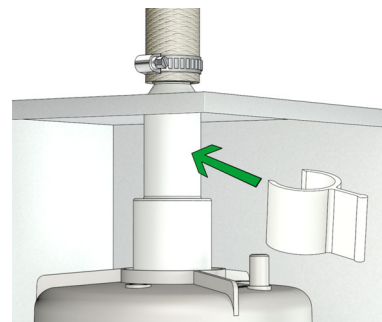
Risk of functional disruption!
Risk of material damage!

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

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



- » Affix the steam hose adapter with the clip.



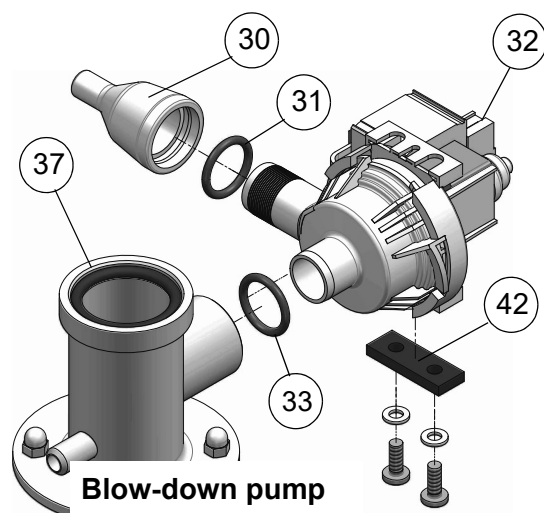
- » Follow the handling instructions in the section **Leakage test**.

9.4 Removal and installation of unit components

9.4.1 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. Save vibration buffer (42), bolts and washers for reinstallation.
- » Pull out the pump of the cylinder base (37).
- » Open the pump bayonet lock.
- » Remove residues from pump and drain hoses.
- » Remove the used o-Ring (33).



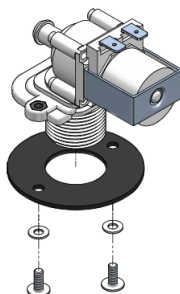
Reinstallation

- » 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 incorporating 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**.

9.4.2 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 solenoid 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

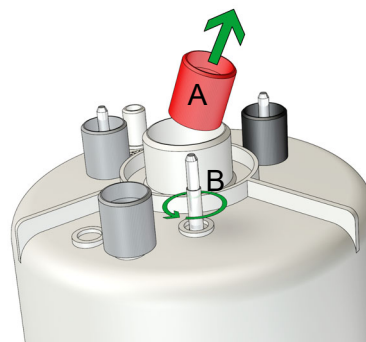
9.4.3 Electrode replacement

- » Remove the cylinder and open it (see also chapter Removal of the steam cylinder).

Please note

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

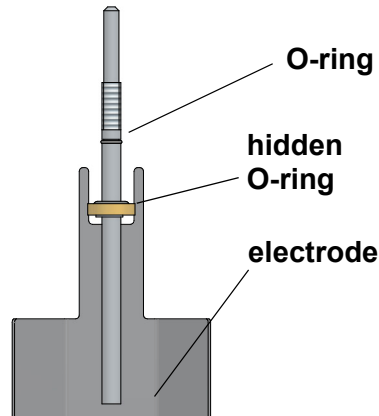
- » Unscrew hand nuts (A).



- » Remove electrodes (B).
- » Install new electrodes (48). Make sure that the electrodes are positioned correctly (see exploded view)
- » When installing the new electrodes, make sure that there is a new o-ring in the cup-like holder.

Please note

The electrodes for use with the CY45/2 steam cylinder feature a two-fold sealing (s. following fig.) In order to allow for the problem-free electrode installation, moisten the upper o-ring with water or soap solution.



Two-fold sealing of the electrodes for the steam cylinder CY45/2 (FLE50/65/100/130)

- » Hand tighten the nuts.
- » Reassemble the cylinder and insert it into the unit (see chapter **Reinstallation of the steam cylinder**).
- » Follow the instructions in the section **Leak test**.

Genuine electrode length

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

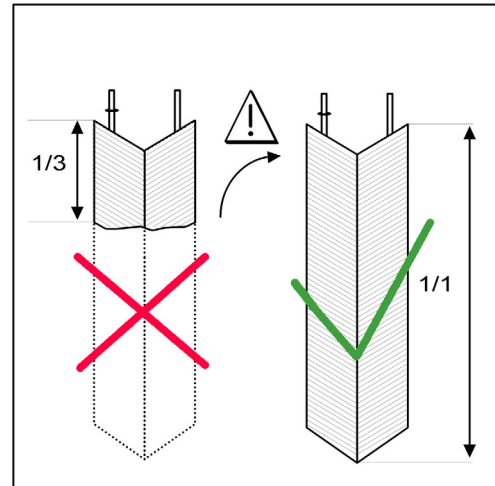
Model	Length [mm]
FLE05/10	155
FLE15	235
FLE20	210
FLE25	235
FLE30/40	265
FLE50/65	310 ^{*)}
FLE80	265
FLE100/130	310 ^{*)}

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

Electrode wear

Electrode wear depends on:

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



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

Please note

When cylinder water maximum level is detected for a period of 60 mins, an error message (s. FlexLine control manual, „Faults and warnings“ section) is generated and unit operation is cut. At the latest, electrode replacement should then be made.

9.5 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**.
-

9.6 Functional check

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

9.7 Finishing maintenance

- » Reattach unit housing cover
- » Reset service interval

Reset service interval:

After finishing substantial maintenance work, the service interval must be reset by means of the „Service-reset_cyl. 1“ or „Service-reset_cyl. 2“ parameters (only with double cylinder units), s. „FlexLine controls“ manual, „Service“ submenu.

The steam amount counter now again holds the value preset that determines the next maintenance requirement when reached.

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. CSA Certificate of Compliance



Certificate of Compliance

Certificate: 1887098 **Master Contract:** 238708 (238708)

Project: 70115693 **Date Issued:** 2016-12-30

Issued to: Hygromatik GmbH
Lise-Meitner Strasse 3
Henstedt-Ulzburg, D-24558
GERMANY
Attention: Michael Lutkemann

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



Issued by: Nitin Bhople
Nitin Bhople

PRODUCTS

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

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

Models MS05, MS10, 3.5 kW max. (1 ph) and 7.5 kW max (3 ph).

Models C01, C02, C06, C10, C17, C22, C30, C45, C58; 14.4 kW max. (1 ph) and 43.5 kW max (3 ph).

Models HY05, HY08, HY13, HY17, HY23, HY30, HY45, HY60, HY90, HY116; 28.8 kW max (1ph) and 87 kW max (3 ph).

Models FLE01, FLE02, FLE05, FLE10, FLE15, FLE20, FLE25, FLE30, FLE45, FLE65, FLE80, FLE100, FLE130; 14.4 kW max. (1 ph) and 50.8 kW max (3 ph) per cylinder.

Models SLE01, SLE02, SLE05, SLE10, SLE15, SLE20, SLE30, SLE45, SLE65; 14.4 kW max (1ph) and 50.8 kW max (3 ph).



Certificate: 1887098
Project: 70115693

Master Contract: 238708
Date Issued: 2016-12-30

Notes:

1. Model designation may be followed by suffix letters and numbers denoting type of control, supply voltage, number of phases.
2. Installation of the equipment in the field is subject to acceptance by the local inspection authority.

APPLICABLE REQUIREMENTS

CSA Std C22.2 No. 104-11 (4th Ed) (R2016) - Humidifiers
UL Std No. 998 (5th Ed) - Humidifiers



Supplement to Certificate of Compliance

Certificate: 1887098

Master Contract: 238708 (238708)

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

Product Certification History

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

12. Spare Parts

* FLE05 FLE10	FLE15	FLE20	FLE25	FLE30	FLE40	FLE50	FLE65	FLE80	FLE100	FLE130	Article No.	Description
Steam generation												
8	1										B-3204029	Sensor electrode
8		1	1	1	1	1	1	1	1	1	B-2204073	Sensor electrode
	1	1	1	1	1	1	1	1	1	1	E-2204202	Hand nut M6, grey, for sensor electrode
18	1	1	1	1	1	1	1	1	1	1	B-3216021	Cylinder flange clamps, set=24pc
37	1										E-3220000	Cylinder base
37		1	1	1	1	1	1	2	2	2	E-2206086	Cylinder base
	1										B-2214023	Mounting set for Cylinder base
		1	1	1	1	1	1	2	2	2	B-3216023	Mounting set for Cylinder base
1	1	1									E-2209018	Adapter for Steam hose, HVAC
1	1	1									E-2209008	Adapter for Steam hose, SPA
1			1	1	1	1	2	2	2	2	E-2209008	Adapter for Steam hose, HVAC + SPA
2	1	1	1	1	1	1	2	2	2	2	E-2209002	Clip for adapter
Steam generation, operating voltage above 240V up to 480V												
	1										SP-03-00000	Steam Cylinder CY08 compl.
		1									SP-04-00002	Steam Cylinder CY17 compl. with 3 electrodes
			1								SP-04-00000	Steam Cylinder CY17 compl. with 3 electrodes
				1							SP-04-00100	Steam Cylinder CY17 compl. with 6 electrodes
					1	1		2			SP-05-00000	Steam Cylinder CY30 compl.
						1	1		2	2	SP-06-00000	Steam Cylinder CY45/2 compl.
48	1										B-3204021	Electrodes without hand nuts, set=3pc.
48		1									B-2204087	Electrodes without hand nuts, set=3pc.
48			1								B-2206221	Electrodes without hand nuts, set=3pc.
48				1							B-2204089	Electrodes without hand nuts, set=6pc.
48					1	1		2			B-2204093	Electrodes without hand nuts, set=6pc.
48						1	1		2	2	B-2204091	Electrodes w/o hand nuts, set=6pc., for cylinder CY45 (until 10/2018)
48						1	1		2	2	SP-06-00010	Electrodes w/o hand nuts, set=6pc., for cylinder CY45/2 (from 11/2018)
49	1										B-2207101	Hand nuts M6 for Cylinder CY08, set=3pc.
49		1	1								B-2207103	Hand nuts M8 for Cylinder CY17, set=3pc.
49				1	1	1		2			B-2207105	Hand nuts M8 for Cylinder CY17/CY30, set=6pc.
49						1	1		2	2	B-2207107	Hand nuts M10 for Cylinders CY45 and CY45/2, set=6pc.
	1										AC-03-00000	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38)
		1	1								AC-04-00000	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38)
				1							AC-04-00100	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38)
					1	1		2			AC-05-00000	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38)
						1	1		2	2	AC-06-00000	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38) for cylinders until 10/2018
						1	1		2	2	AC-06-00002	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38) for cylinder CY45/2 from 11/2018
Steam generation, special voltage 208V to 240V												
	1										SP-03-00000	Steam Cylinder CY08 compl.
		1									SP-04-00000	Steam Cylinder CY17 compl. with 3 electrodes
			1								SP-04-00101	Steam Cylinder CY17 compl. with 6 electrodes
				1				2			SP-05-00001	Steam Cylinder CY30 compl.
						1			2		SP-06-00001	Steam Cylinder CY45/2 compl. (from 11/2018)
48	1										B-3204007	Electrodes without hand nuts, set=3pc.
48		1									B-2206221	Electrodes without hand nuts, set=3pc.
48			1								B-2206223	Electrodes without hand nuts, set=6pc.
48				1	1			2			B-2204063	Electrodes without hand nuts, set=6pc.
48						1			2	2	B-2206225	Electrodes without hand nuts, set=6pc. For cylinders until 10/2018
48						1	1		2		SP-06-00011	Electrodes without hand nuts, set=6pc. For cylinder CY45/2 (from 11/2018)
	1										AC-03-00000	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38)
		1	1								AC-04-00000	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38)
				1							AC-04-00100	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38)
					1	1		2			AC-05-00000	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38)
						1	1		2	2	AC-06-00000	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38) for cylinders until 10/2018
						1	1		2	2	AC-06-00002	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38) for cylinder CY45/2 from 11/2018
Steam generation, special voltage from 500V												
	1										SP-03-00004	Steam Cylinder CY08 compl.
		1	1								SP-04-00004	Steam Cylinder CY17 compl. with 3 electrodes
				1							SP-04-00014	Steam Cylinder CY17 compl. with 6 electrodes
					1	1		2			SP-05-00004	Steam Cylinder CY30 compl.
						1	1		2	2	SP-06-00004	Steam Cylinder CY45/2 compl.
48	1										B-3204015	Electrodes without hand nuts, set=3pc.
48		1	1								B-2204087	Electrodes without hand nuts, set=3pc.
48				1							B-2204089	Electrodes without hand nuts, set=6pc.
48					1	1		2			B-2204093	Electrodes without hand nuts, set=6pc.
48						1	1		2	2	B-2298007	Electrodes without hand nuts, set=6pc. for cylinders until 10/2018
48						1	1		2	2	SP-06-00012	Electrodes without hand nuts, set=6pc. for cylinder CY45/2 (from 11/2018)
	1										AC-03-00001	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38)
		1	1								AC-04-00001	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38)
				1							AC-04-00101	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38)
					1	1		2			AC-05-00001	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38)
						1	1		2	2	AC-06-00001	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38) for cylinders until 10/2018
						1	1		2	2	AC-06-00003	O-ring set (Pos. 3, 17, 31, 33, 34, 35, 36, 38) for cylinder CY45/2 from 11/2018

Spare Parts (continued)

* FLE05 FLE10	FLE15	FLE20	FLE25	FLE30	FLE40	FLE50	FLE65	FLE80	FLE100	FLE130	Article No.	Description	
Water feed													
25	1										WF-03-00010	Solenoid valve, 1,1l/min, 220-240V, 0,2 - 10bar, with mounting set	
25		1	1	1							WF-04-00010	Solenoid valve, 2,3l/min, 220-240V, 0,2 - 10bar, with mounting set	
25					1	1	1	1	2	2	2	WF-06-00010	Solenoid valve, 3,4l/min, 220-240V, 0,2 - 10bar, with mounting set
20	0,9	1,6	1,6	1,6	1,6	1,6	1,6	1,6	3,2	3,2	3,2	E-2604002	Connecting hose solenoid valve - CYLinder base [m]
	1	1	1	1	1	1	1	1	2	2	2	E-2304080	Bush for earthing
58	1	1	1	1	1	1	1	1	2	2	2	E-2604094	Double check valve
18	6	6	6	6	6	6	6	6	12	12	12	E-8501064	Hose clamp 12-22mm
28	1	1	1	1	1	1	1	1	2	2	2	E-2604066	Closing plug
56	1	1	1	1	1	1	1	1	1	1	1	B-2304031	Hose for water connection, 0,6m, 3/4" cap nuts on both sides
29	0,5	0,7	0,7	0,7	0,7	0,7	0,8	0,8	2x0,7	2x0,8	2x0,8	E-2604004	Manual drain hose [m]
Water drain													
	1	1	1	1	1	1	1	1	2	2	2	B-2425009	Pump-drain-hose-system (Pos. 6, 14, 15, 30, 31)
32	1	1	1	1	1	1	1	1	2	2	2	B-2404027	Drain pump without mounting set, with 2 o-rings
42	1	1	1	1	1	1	1	1	2	2	2	B-2424014	Mounting set for drain pump
Electronics in general													
	1	1	1	1	1	1	1	1	1	1	1	CN-07-00020	Mainboard incl. Plug (please note serial no. of unit for order)
	1	1	1	1	1	1	1	1				CN-07-00025	Mainboard with fuse 0.5A (used when power supply for the mainboard is generated by a transformer)
								1	1	1		CN-07-00028	Mainboard with fuse 1 A (used when power supply for the mainboard is generated by a transformer)
								1	1	1		CN-07-00030	Extension board for double units
	1	1	1	1	1	1	1	1	1	1	1	CN-07-00040	Relay board
	1	1	1	1	1	1	1	1	1	1	1	CN-07-00021	Display FlexLine
	1	1	1	1	1	1	1	1	1	1	1	E-2502412	Control switch, double pole, middle position = "0"
Electronics, operating voltage over 240V to 480V													
	1	1										CN-07-00066	Main contactor 20A
			1	1	2	2			4	4		B-2507061	Main contactor 35A
							2				4	B-2507071	Main contactor 50A
	1											WR-03-00001	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
		1	1									WR-04-00001	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
			1									WR-04-00101	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
				1	1				1			WR-05-00001	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
									1			WR-05-00002	Connecting cables for electrodes and sensor electrode with plugs, right cylinder (Pos. 4, 5)
						1	1		1	1		WR-06-00101	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
									1	1		WR-06-00102	Connecting cables for electrodes and sensor electrode with plugs, right cylinder (Pos. 4, 5)
Electronics, special voltage 208V to 240V													
	1											CN-07-00066	Main contactor 20A
		1		2	2	2			4			B-2507061	Main contactor 35A
							2			4		B-2507071	Main contactor 50A
	1											WR-03-00001	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
		1		1								WR-04-00101	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
				1	1				1			WR-05-00001	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
									1			WR-05-00002	Connecting cables for electrodes and sensor electrode with plugs, right cylinder (Pos. 4, 5)
						1	1		1	1		WR-06-00101	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
									1	1		WR-06-00102	Connecting cables for electrodes and sensor electrode with plugs, right cylinder (Pos. 4, 5)
Electronics, special voltage from 500V													
	1											CN-07-00066	Main contactor 20A
		1	1	1	1	2	2	2	4	4	4	B-2507061	Main contactor 35A
	1											WR-03-00001	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
		1	1									WR-04-00001	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
			1									WR-04-00101	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
				1	1				1			WR-05-00001	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
									1			WR-05-00002	Connecting cables for electrodes and sensor electrode with plugs, right cylinder (Pos. 4, 5)
						1	1		1	1		WR-06-00001	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
									1	1		WR-06-00002	Connecting cables for electrodes and sensor electrode with plugs, right cylinder (Pos. 4, 5)

Spare Parts (continued)

*	FLE05 FLE10	FLE15	FLE20	FLE25	FLE30	FLE40	FLE50	FLE65	FLE80	FLE100	FLE130	Article No.	Description
													Accessories
70	x	x										SP-07-26000	Steam hose DN25, per m
70	x	x	x	x	x	x	x	x	x	x	x	SP-07-26001	Steam hose DN40, per m
57	x	x	x	x	x	x	x	x	x	x	x	E-2420423	Drain hose 1 1/4", per m
	x	x	x	x	x	x	x	x	x	x	x	E-2604002	Condensate hose DN12, per m
	x	x										E-2404004	Steam hose clamp DN25
	x	x	x	x	x	x	x	x	x	x	x	E-2604016	Steam hose clamp DN40
	x	x	x	x	x	x	x	x	x	x	x	E-2404010	Clamp for drain hose 1 1/4"
	x	x	x	x	x	x	x	x	x	x	x	E-8501064	Condensate hose clamp
	x											E-2604042	Connectors for steam distribution T-piece DN25, stainless steel
	x	x	x	x	x	x	x	x	x	x	x	E-2604023	Connectors for steam distribution T-piece DN40, stainless steel
	x	x	x	x	x	x	x	x	x	x	x	E-2604021	Connectors for condensate T-piece DN12
	x	x	x	x	x	x	x	x	x	x	x	B-2604091	Essence pump
	x	x	x	x	x	x	x	x	x	x	x	E-2604070	Hose, 6x1.5, for essence injection
	x	x	x	x	x	x	x	x	x	x	x	B-2604069	T-piece for essence injection, 2xDN40, 1xDN6

* position number 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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13. Technical specifications

HVAC

Technical data FlexLine Electrodes					
Unit type	FLE05		FLE10	FLE15	
Steam output [lb/h]	9,3 - 9,3 - 10,6	9,9 - 9,9 - 11,5	15,9 - 15,9 - 18,3	17,2 - 17,2 - 19,8	29,8 - 29,8 - 34,4
Electrical connection ⁽¹⁾	208 - 208 - 240V /1Ph /N /50-60Hz		208 - 208 - 240V /3Ph /50-60Hz	208 - 208 - 240V /1Ph /N /50-60Hz	
Rated power [kW]	3,1 - 3,1 - 3,6	3,4 - 3,4 - 3,9	5,4 - 5,4 - 6,2	5,9 - 5,9 - 6,8	10,2 - 10,2 - 11,7
Nominal current [A]	15 - 15 - 15	9,4 - 9,4 - 9,4	15 - 15 - 15	28,2 - 28,2 - 28,2	
Fuse [A] ⁽²⁾	1 x 15	3 x 15	3 x 15	1 x 35	3 x 35
Connection terminals max. [in ²]	0,2			0,4	
Number of steam cylinder	1				
Control	FlexLine mainboard with capacitive 3.5" touch colour display				
Control voltage ⁽³⁾	208 - 240V 2,5A				
Steam hose connection [in]	1 x 1,0				
Water consumption ⁽⁷⁾ [usgal/h]	5,76	6,24	9,96	10,8	18,72
Water flow rate ⁽⁸⁾ [usgal/min]	0,34 / 5,42			0,74 / 5,81	
Max. filling capacity [usgal]	1,3			3,5	
Empty weight [lb]	35,3			57,3	
Operation weight [lb]	47,0			87,5	
Width ⁽⁹⁾ [in]	18,1 ⁽¹¹⁾			21,3	
Height ⁽⁹⁾ [in]	21,1			27,4	
Depth ⁽⁹⁾ [in]	12,6				
Water connection	tap water of varying qualities 1 to 10bar, 1 to 10 bar, for 3/4" external thread				

Technical data FlexLine Electrodes							
Unit type	FLE25		FLE30	FLE40	FLE50	FLE80	FLE100
Steam output [lb/h]	36,6 - 36,6 - 42,3	50,9 - 50,9 - 58,6	61,7 - 61,7 - 71,2	63,5 - 63,5 - 73,4	84,7 - 84,7 - 97,7	127,0 - 127,0 - 146,6	169,5 - 169,5 - 195,6
Electrical connection ⁽¹⁾	208 - 208 - 240V /1Ph /N /50-60Hz		208 - 208 - 240V /3Ph /50-60Hz				
Rated power [kW]	12,5 - 12,5 - 14,4	17,3 - 17,3 - 20	21 - 21 - 24,2	21,6 - 21,6 - 24,9	28,8 - 28,8 - 33,3	2 x 21,6 - 21,6 - 24,9	2 x 28,8 - 28,8 - 33,3
Nominal current [A]	60 - 60 - 60	48 - 48 - 48	58,2 - 58,2 - 58,2	60 - 60 - 60	80 - 80 - 80	2 x 60 - 60 - 60	2 x 80 - 80 - 80
Fuse [A] ⁽²⁾	1 x 70	3 x 60	3 x 60	3 x 65	3 x 100	2 x 3 x 65	2 x 3 x 100
Connection terminals max. [in ²]	0,4			1,0			
Number of steam cylinder	1					2	
Control	FlexLine mainboard with capacitive 3.5" touch colour display						
Control voltage ⁽³⁾	208 - 240V 2,5A						
Steam hose connection [in]	1 x 1,6			2 x 1,6 ⁽⁶⁾	2 x 1,6	4 x 1,6 ⁽⁶⁾	4 x 1,6
Water consumption ⁽⁷⁾ [usgal/h]	23,04	31,92	38,76	39,96	53,16	79,8	106,44
Water flow rate ⁽⁸⁾ [usgal/min]	0,74 / 5,81		1,08 / 6,16			2 x / 1,08 / 6,16	
Max. filling capacity [usgal]	3,5		5,5		9,4		11,0
Empty weight [lb]	57,3		63,9		77,2		152,1
Operation weight [lb]	87,5		111,1		157,0		245,4
Width ⁽⁹⁾ [in]	21,3		22,8		25,2		44,5
Height ⁽⁹⁾ [in]	27,4		29,5		30,9		29,5
Depth ⁽⁹⁾ [in]	12,6		14,0		16,5		
Water connection	tap water of varying qualities 1 to 10bar, 1 to 10 bar, for 3/4" external thread						
Drain water connection	Connection Ø 1 1/4"					2x Connection Ø 1 1/4"	

⁽¹⁾ Other voltages on request

⁽²⁾ 1.1 times the current consumption after full blowdown. Observe tripping characteristics of circuit breakers. If necessary, select next higher circuit breaker level

⁽³⁾ Separate control voltage on request

⁽⁶⁾ Including Y-piece DN40

⁽⁷⁾ Maximum water consumption at 100% demand plus blow down losses. Water consumption depends on the water quality and options installed.

⁽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. Height including drain connection

⁽¹¹⁾ Units with production date January 2022 and earlier: 540 mm

SPA units (FLE05-FLE15) will be delivered with a steam hose connection of 1x1,6 inch.

460 V

Technical data FlexLine Electrodes						
Unit type	FLE05	FLE10	FLE15	FLE20	FLE25	FLE30
Steam output [lb/h]	10,6 - 11,0 - 11,5	21,2 - 22,0 - 22,9	31,5 - 33,1 - 34,4	42,1 - 44,1 - 45,9	52,7 - 55,1 - 57,5	63,3 - 66,1 - 69,0
Electrical connection ⁽¹⁾	440 - 460 - 480V /3Ph /50-60Hz					
Rated power [kW]	3,6 - 3,7 - 3,9	7,2 - 7,5 - 7,8	10,7 - 11,2 - 11,7	14,3 - 15 - 15,6	17,9 - 18,7 - 19,5	21,5 - 22,5 - 23,4
Nominal current [A]	4,7 - 4,7 - 4,7	9,4 - 9,4 - 9,4	14,1 - 14,1 - 14,1	18,8 - 18,8 - 18,8	23,5 - 23,5 - 23,5	28,2 - 28,2 - 28,2
Fuse [A] ⁽²⁾	3 x 10		3 x 20		3 x 35	
Connection terminals max. [in ²]	0,2		0,4			
Number of steam cylinder	1					
Control	FlexLine mainboard with capacitive 3.5" touch colour display					
Control voltage ⁽³⁾	208 - 240V 0,5A					
Steam hose connection [in]	1 x 1,0			1 x 1,6		
Water consumption ⁽⁷⁾ [usgal/h]	6,24	12,48	18,72	24,96	31,32	37,56
Water flow rate ⁽⁸⁾ [usgal/min]	0,34 / 5,42		0,74 / 5,81		1,08 / 6,16	
Max. filling capacity [usgal]	1,3		3,5		5,5	
Empty weight [lb]	44,1		57,3		63,9	
Operation weight [lb]	55,8		87,5		111,1	
Width ⁽⁹⁾ [in]	18,1 ⁽¹¹⁾		21,3		22,8	
Height ⁽⁹⁾ [in]	21,1		27,4		29,5	
Depth ⁽⁹⁾ [in]	12,6				14,0	
Water connection	tap water of varying qualities 1 to 10bar, 1 to 10 bar, for 3/4" external thread					
Drain water connection	Connection Ø 1 1/4"					

Technical data FlexLine Electrodes						
Unit type	FLE40	FLE50	FLE65	FLE80	FLE100	FLE130
Steam output [lb/h]	84,4 - 88,2 - 92,2	105,6 - 110,2 - 115,1	137,1 - 143,3 - 149,5	168,7 - 176,4 - 184,1	211,0 - 220,5 - 229,3	273,4 - 286,6 - 297,6
Electrical connection ⁽¹⁾	440 - 460 - 480V /3Ph /50-60Hz					
Rated power [kW]	28,7 - 30 - 31,3	35,9 - 37,5 - 39,2	46,6 - 48,8 - 50,9	2 X 28,7 - 30 - 31,3	2 X 35,9 - 37,5 - 39,2	2 X 46,6 - 48,7 - 50,8
Nominal current [A]	37,7 - 37,7 - 37,7	47,1 - 47,1 - 47,1	61,2 - 61,2 - 61,2	2 X 37,7 - 37,7 - 37,7	2 X 47,1 - 47,1 - 47,1	2 X 61,2 - 61,2 - 61,2
Fuse [A] ⁽²⁾	3 x 50	3 x 60	3 x 65	2 x 3 x 50	2 x 3 x 60	2 x 3 x 65
Connection terminals max. [in ²]	1,0					
Number of steam cylinder	1			2		
Control	FlexLine mainboard with capacitive 3.5" touch colour display					
Control voltage ⁽³⁾	208 - 240V 0,5A			208 - 240V 1A		
Steam hose connection [in]	2 x 1,6 ⁽⁶⁾	2 x 1,6		4 x 1,6 ⁽⁶⁾	4 x 1,6	
Water consumption ⁽⁷⁾ [usgal/h]	50,16	62,64	81,36	100,2	124,8	162
Water flow rate ⁽⁸⁾ [usgal/min]	1,08 / 6,16			2 x 1,08 / 6,16		
Max. filling capacity [usgal]	5,5	9,4		11,0	18,9	
Empty weight [lb]	63,9	75,0		152,1	176,4	
Operation weight [lb]	111,1	154,8		245,4	334,9	
Width ⁽⁹⁾ [in]	22,8	25,2		44,5	46,1	
Height ⁽⁹⁾ [in]	29,5	30,9		29,5	30,9	
Depth ⁽⁹⁾ [in]	14,0	16,5				
Water connection	tap water of varying qualities 1 to 10bar, 1 to 10 bar, for 3/4" external thread					
Drain water connection	Connection Ø 1 1/4"			2x Connection Ø 1 1/4"		

⁽¹⁾ Other voltages on request

⁽²⁾ 1.1 times the current consumption after full blowdown. Observe tripping characteristics of circuit breakers.
If necessary, select next higher circuit breaker level.

⁽³⁾ Separate control voltage on request

⁽⁶⁾ Including Y-piece DN40

⁽⁷⁾ Maximum water consumption at 100% demand plus blow down losses. Water consumption depends on the water quality and options installed.

⁽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. Height including drain connection

⁽¹¹⁾ Units with production date January 2022 and earlier: 540 mm

SPA units (FLE05-FLE15) will be delivered with a steam hose connection of 1x1,6 inch.

600 V

Technical data FlexLine Electrodes						
Unit type	FLE05	FLE10	FLE15	FLE20	FLE25	FLE30
Steam output [lb/h]	10,8 - 11,2 - 11,2	21,6 - 22,7 - 22,7	32,2 - 33,5 - 33,5	43,0 - 45,0 - 45,0	53,8 - 56,2 - 56,2	64,6 - 67,5 - 67,5
Electrical connection ⁽¹⁾	575 - 600 - 600V /3Ph /50-60Hz					
Rated power [kW]	3,7 - 3,8 - 3,8	7,4 - 7,7 - 7,7	11 - 11,4 - 11,4	14,6 - 15,3 - 15,3	18,3 - 19,1 - 19,1	22 - 23 - 23
Nominal current [A]	3,7 - 3,7 - 3,7	7,4 - 7,4 - 7,4	11 - 11 - 11	14,7 - 14,7 - 14,7	18,4 - 18,4 - 18,4	22,1 - 22,1 - 22,1
Fuse [A] ⁽²⁾	3 x 6	3 x 10	3 x 16	3 x 20		3 x 35
Connection terminals max. [in ²]	0,2			0,4		
Number of steam cylinder	1					
Control	FlexLine mainboard with capacitive 3.5" touch colour display					
Control voltage ⁽³⁾	208 - 240V 0,5A					
Steam hose connection [in]	1 x 1,0			1 x 1,6		
Water consumption ⁽⁷⁾ [usgal/h]	6,12	12,36	18,24	24,48	30,6	36,72
Water flow rate ⁽⁸⁾ [usgal/min]	0,34 / 5,42		0,74 / 5,81			1,08 / 6,16
Max. filling capacity [usgal]	1,3		3,5		5,5	
Empty weight [lb]	44,1		57,3		63,9	
Operation weight [lb]	55,8		87,5		111,1	
Width ⁽⁹⁾ [in]	18,1 ⁽¹¹⁾		21,3		22,8	
Height ⁽⁹⁾ [in]	21,1		27,4		29,5	
Depth ⁽⁹⁾ [in]	12,6				14,0	
Water connection	tap water of varying qualities 1 to 10bar, 1 to 10 bar, for 3/4" external thread					
Drain water connection	Connection Ø 1 1/4"					

Technical data FlexLine Electrodes						
Unit type	FLE40	FLE50	FLE65	FLE80	FLE100	FLE130
Steam output [lb/h]	86,4 - 90,2 - 90,2	107,8 - 112,4 - 112,4	140,2 - 146,4 - 146,4	172,6 - 180,3 - 180,3	211,4 - 220,5 - 220,5	280,0 - 293,2 - 293,2
Electrical connection ⁽¹⁾	575 - 600 - 600V /3Ph /50-60Hz					
Rated power [kW]	29,4 - 30,7 - 30,7	36,7 - 38,2 - 38,2	47,7 - 49,8 - 49,8	2 X 29,4 - 30,7 - 30,7	2 X 36 - 37,5 - 37,5	2 X 47,7 - 49,8 - 49,8
Nominal current [A]	29,5 - 29,5 - 29,5	36,8 - 36,8 - 36,8	47,9 - 47,9 - 47,9	2 X 29,5 - 29,5 - 29,5	2 X 36,1 - 36,1 - 36,1	2 X 47,9 - 47,9 - 47,9
Fuse [A] ⁽²⁾		3 x 40	3 x 50	2 x 3 x 35	2 x 3 x 40	2 x 3 x 50
Connection terminals max. [in ²]	1,0					
Number of steam cylinder	1			2		
Control	FlexLine mainboard with capacitive 3.5" touch colour display					
Control voltage ⁽³⁾	208 - 240V 0,5A			208 - 240V 1,0A		
Steam hose connection [in]	2 x 1,6 ⁽⁶⁾	2 x 1,6		4 x 1,6 ⁽⁶⁾	4 x 1,6	
Water consumption ⁽⁷⁾ [usgal/h]	49,08	61,2	79,68	98,16	120	159,6
Water flow rate ⁽⁸⁾ [usgal/min]	2 x 1,08 / 6,16					
Max. filling capacity [usgal]	5,5	9,4		11,0	18,9	
Empty weight [lb]	63,9	75,0		152,1	176,4	
Operation weight [lb]	111,1	154,8		245,4	334,9	
Width ⁽⁹⁾ [in]	22,8	25,2		44,5	46,1	
Height ⁽⁹⁾ [in]	29,5	30,9		29,5	30,9	
Depth ⁽⁹⁾ [in]	14,0	16,5				
Water connection	tap water of varying qualities 1 to 10bar, 1 to 10 bar, for 3/4" external thread					
Drain water connection	Connection Ø 1 1/4"			2x Connection Ø 1 1/4"		

⁽¹⁾ Other voltages on request

⁽²⁾ 1.1 times the current consumption after full blowdown. Observe tripping characteristics of circuit breakers. If necessary, select next higher circuit breaker level.

⁽³⁾ Separate control voltage on request

⁽⁶⁾ Including Y-piece DN40

⁽⁷⁾ Maximum water consumption at 100% demand plus blow down losses. Water consumption depends on the water quality and options installed.

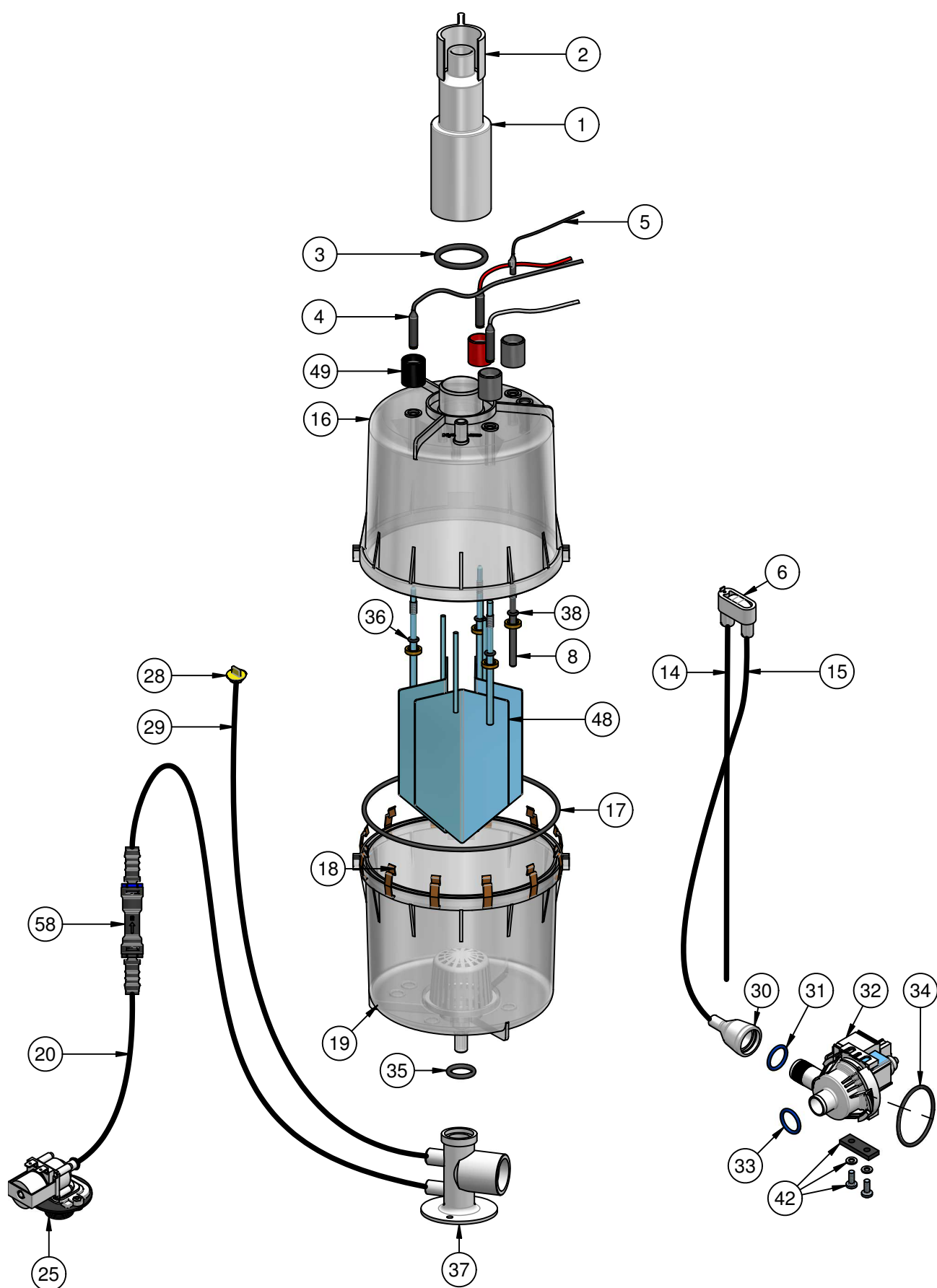
⁽⁸⁾ Flow rate of the feed water during refilling or pumping out. Unit without options / maximum rate with options.

⁽⁹⁾ Outer dimensions of width and depth. Height including drain connection

⁽¹¹⁾ Units with production date January 2022 and earlier: 540 mm

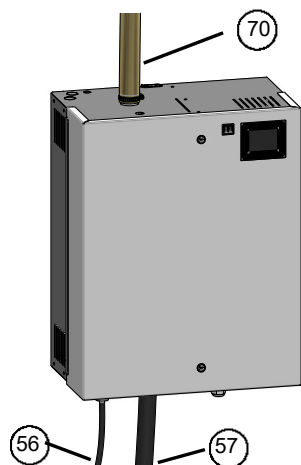
SPA units (FLE05-FLE15) will be delivered with a steam hose connection of 1x1,6 inch.

14. Exploded view

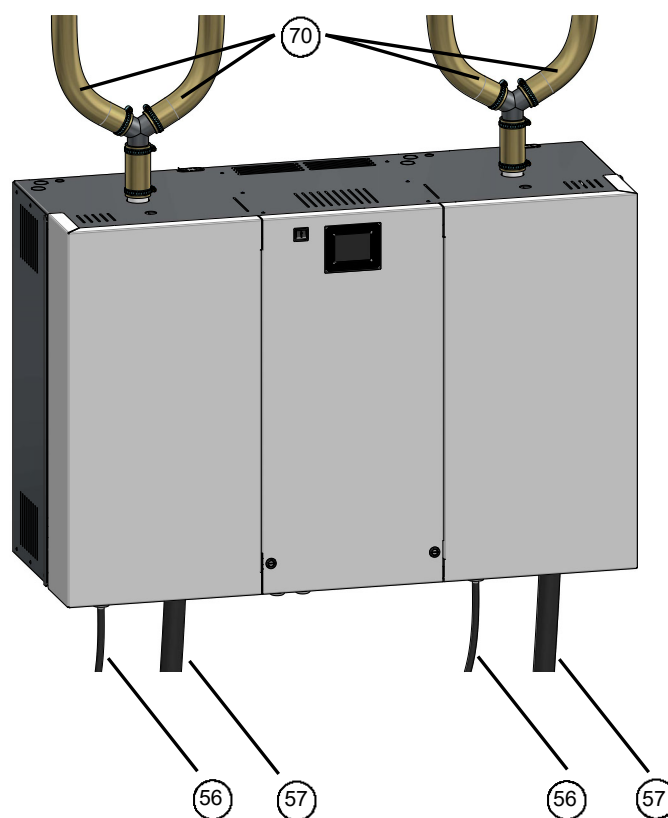


15. View of housing

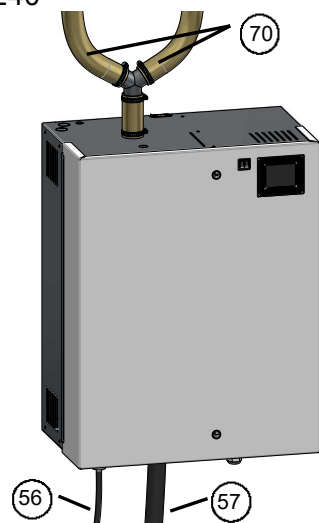
FLE05 - FLE30



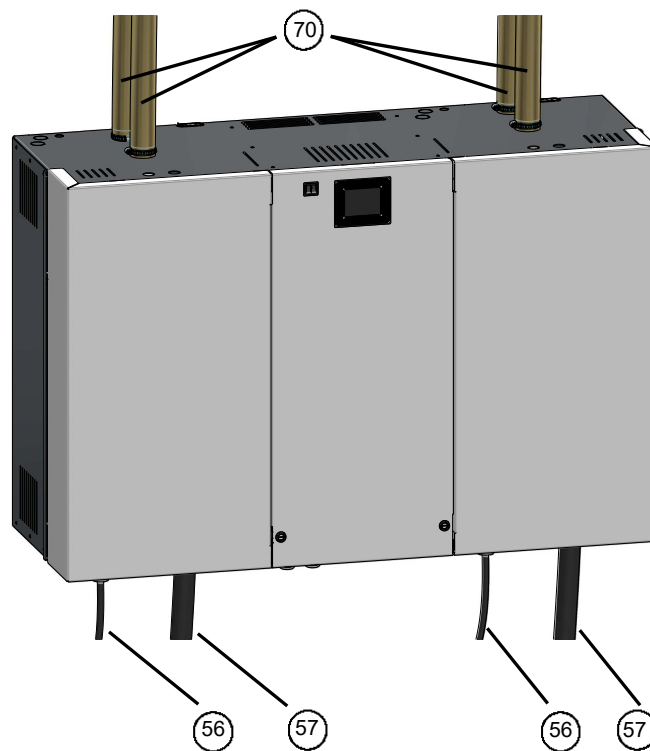
FLE80



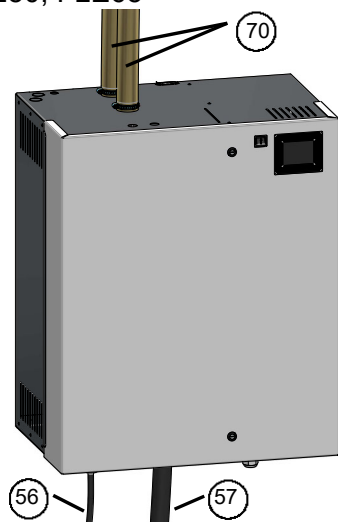
FLE40



FLE100, FLE130



FLE50, FLE65



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