



FlexLine

Electrode Steam Humidifiers







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AWARNING

Risk of electrical shock!

Hazardous electrical high voltage!

All electrical work to be performed by certified expert staff (electricians or expert personnel with eqivalent 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 indicates a hazardous situation which, if not avoided, will result in death or serious injury.

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

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 μ S/cm.



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.

Risk of scalding!

Steam with a temperature of up to 100 °C (212° F) is produced. Do not inhalate 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.

- 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.

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.

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

Risk of scalding!

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

For Ministeam devices applies:

Risk of scalding!

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

NOTICE

Risk of material damage!

- The unit may be damaged if switched on repeatedly following a malfunction without prior repair. Rectify defects immediately!
- The unit must not be operated on a DC power supply.
- The unit may only be used connected to a steam pipe that safely transports the steam (not valid for MiniSteam units).
- Regularly check that all safety and monito-ring devices are functioning normally. Do not remove or disable safety devices.
- Steam operation is only allowed when the unit cover is closed.

NOTICE

Water leaks caused by defective connections or malfunctions are possible.

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

2.1.4 Mounting, dismantling, maintenance and repair of the unit

NOTICE

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

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

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

NOTICE

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

2.1.5 Electrical

AWARNING

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 maintainance 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.

The power consumption of a humidifier type **FLExx-T** is continuously monitored per steam cylinder by means of a current transducer. Devices up to and including 30kg/h steam output are single-cylinder devices. For higher steam outputs, the humidifiers are equipped with two steam cylinders.

FLExx-TPRO humidifiers are only available as single-cylinder units (starting from a steam output of 15kg/h) and are always equipped with 6 electrodes. The power supply is divided into the supply of two electrode packs with 3 electrodes each. The two electrode packs can be controlled separately, which provides a wider range for regulating the steam output. The current consumption of the two electrode packs is monitored by two separate current transducers.

With a cold start-up, the nominal current increases to 113% in order to achieve quickstart 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 blowdown 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 blowdown 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 maintainence 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

AWARNING

Risk of foot injuries!

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

Risk of electrical shock!

Hazardous electrical voltage.

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

5.1 Environment Parameters to be met and Mounting Recommendations

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

- The minimum clearances indicated in the fitting measures section must be observed in order to ensure adequate unit ventilation and allow for unobstructed access in case of maintenance
- Protection class IP20
- By design, HygroMatik steam humidifiers are not qualified for outdoor installation (electronical components and water-bearing parts may be damaged)
- Ambient temperature must lie between +5 and +40 °C (+41 and +104 °F) in order to protect the unit electronics against damage; frost may damage the steam cylinder and the solenoid valve, as well as make hoses burst.
- Relative humidity must not exceed 80 % r.h., since values beyond may lead to electronic malfunction or damage

- Installation in a closed room requires aeration and, eventually, temperature conditioning in order to meet the a.m. environmental conditions
- The steam humidifier should be installed as close as possible to the steam manifold. Optimum performance is only guaranteed when steam and condensate hoses are kept short
- Make use of existing water connections for supply and draining
- Hoses must be laid at a consistent 5 to 10 % incline/decline; sagging and kinking prevention is a must
- Mount the unit on a stable, preferably solid wall offering the bearing capacity required (s. unit technical specifications). If such a wall is not at hand, the unit may be attached to a stand bracket firmly bolted to the floor
- For proper functioning of the level control, plumb and level installation of the unit is required
 - The steam humidifier rear panel heats up during operation to a maximum of 70 °C (158 °F). Take care that the construction on which the unit is to be mounted is not made of temperaturesensitive 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* Units with production date January 2022 and earlier: X:540 / A:390https://www.hygromatik.com/files/pdf/hygromatik-flexline-dimensionsv13.pdf.3D models under https://www.hygromatik.com/en/downloads.



Wall clearances

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

А	5 cm / 2,0 inch
В	50 cm / 19,7 inch
С	20 cm / 7,8 inch
D	60 cm / 23,6 inch
Е	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 monted and suspended on the free end, if required ?
- ☑ All seals (o-rings) in place?
- All ventilation slots on housing top unobscured?

5.3 Steam Manifold

5.3.1 General installation guidelines

When installing steam manifolds, pls. follow these guidelines:

Positioning within duct

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

Allowable pressures

- Max. allowable pressure in air duct is 1500 Pa/.218 PSI (exemption: SLE02, SLH02, KIT E02 and KIT H02 only allow for 1200 Pa/.174 PSI)
- On suction side, max. -500 Pa (.07 PSI) is tolerable
- With high-pressure air conditioning systems, modifications of the unit's drain hose system may possibly be required depending on the overall pressure situation. These modifications must be **coordinated with your expert dealer.**

Water drain

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



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

Length steam manifold (E)

Please note

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

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

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

Available steam distributor lengths:

	until end of 2024	from beginning of 2025
	length [mm]	lenght [mm]
	220	220
	400	400
		500
	600	800
	900	1100
DIN40	1200	1400
	1450	1700
	1800/2000	2000
	2350	2300
	2700	2600
	220	220
	400	400
		500
DINZU	600	800
	900	1100
	1200	1400

5.3.2 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:

Lmin = 200 mm/ 7.9 inch: "Steam manifold -Next steam manifold" distance

L1min = 150 mm/ 5.9 inch: "Lowest steam manifold - Duct bottom plane" distance

L2min = 250 mm/ 9.8 inch: "Highest steam manifold - Duct ceiling plane" distance

L3min = 80 mm / 3.2 inch : Recommended distance:100 mm / 3.9 inch



Fig: Distances of the steam distributors

Standard steam manifold arrangement:



Fig: Standard configuration

Steam manifold arrangement for special air duct shapings:

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



Fig: parallel arrangement of the steam distributors

Narrow, high air duct:



Fig: vertical arrangement of the steam distributors

Flat air duct



Fig: parallel arrangement of the steam distributors

NOTICE

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

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

NOTICE

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

Connection of the steam distributors / steam accesses

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

5.4 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.

5.4.1 Guide lines for steam line design

- Steam hose nominal diameter must not be smaller than the steam outlet of the HygroMatik steam humidifier (do not restrict the cross-section, otherwise back pressure will increase). Select the steam hose that fits the unit.
- Steam hoses must be laid without sags and kinks and with a continuous slope of 5-10% (otherwise sags may result).
- Steam hoses must be supported every 500 mm (20 inches) by clamp brackets.
- Steam hoses should be kept as short as possible. Implement lengths beyond 5 m (16 ft.) as insulated fixed piping to keep energy loss and condensate generation to a minimum. Beyond 10 m (32 ft.) insulated installation is a must. Fixed piping is generally recommended for straight steam line segments.
- If the steam output is divided between two steam distributors (different from the standard design), install the Y-piece for the steam hose as close as possible to the steam distributors. This way, only one steam hose is used for the majority of the distance and condensate losses are reduced. Certain unit types in the HygroMatik steam humidifier portfolio (e.g. FLE40 and FLE80), on the other hand, require the Y-piece to be installed as close as possible to the steam outlet and the steam line to be routed via 2 ways.
- Allow easy access to the steam pipe/ steam hose installation

Respect minimum bending radii:

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



schematic representation

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

5.4.2 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.



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..

5.5 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 .

Absorp	tion Distance
B _N	for normal obstructions such as sensors, ventila- tors, outlets
$B_{c} = (1.52) \times B_{N}$	for fine fiters, heat regis- ters
$B_s = (2.53) \times B_N$	for particle filters
$B_{d} = (35) \times B_{N}$	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 x₁ 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 ingrease in humidity ∆ x in g/kg (can be determined in the h,x diagram)
- quantity of steam introduced m_D in kg/h.
- air speed w_L in m/s in air duct
- Total length I_D of the steam manifold installed in the air duct

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

Method:

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

Notes:

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

AWARNING

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.

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 $(100 \times 10^3 \text{ to } 100 \times 10^4 \text{ Pa})$
- 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 800μ S/cm up to a maximum of 1250μ S/cm and below conductivity levels of 200μ S/cm to a minimum of 125μ S/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 conducivity
- 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.



3/4" connection

^{*)} 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 customerprovided water tap (cap nut internal thread is ³/₄").
- » Strainer must be placed inside the solenoid valve

6.3 Water discharge

AWARNING

Risk of scalding!

During blow down, up to 0.3 l/sec (08 gal./ sec) are being drained with a temperature of about 95 $^{\circ}$ C (203 $^{\circ}$ 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 (140°F).
- 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 condensating 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

Risk of electrical shock!

Hazardous electrical voltage.

All work related to electrical installation to be performed by expert staff (electricians or expert personnel with equivalent training) only. Do not connect the reverse osmosis unit to the live power supply before all installation work has been completed.

Please note

The customer is responsible for checking expert staff qualification.

General installation rules

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

NOTICE

Possible electronical components destruction through electrostatical discharge!

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

7.1 Electrical installation approach

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 3mm per pole.
- » Install a separate main connection for each steam cylinder including main circuit breaker, main switch etc.
- » Make main connection according to the table below.

Main connection 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.

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

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

7.2 **Cable connections**

The table below shows the number and dimensioning of the cable connections provided by the various 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 PG	M25 with MSI*)	M40 PG	Ø 25 filler plug
FLP 05/08	1	1	0	3
FLP15/25	1	1	0	3
FLP30/40/50	0	1	1	3

*) Multiple seal insert **) Ø 25 mm/~ 1.0 inch

Characteristics of metric cable connections

Thread	Wrench size [mm/ in.]	Cable diameter suppor- ted [mm/in.]
M25x1,5	30/~ 1.2	9 - 17/ ~0,35 - 0,67
M25x1.5 with MSI*)	30/~ 1.2	6 (3x)/ ~0,24 (3x)
M32x1,5	36/~ 1.4	13 - 21/ ~0,51 - 0,83
M40x1,5	46/~ 1.6	16 - 28/ ~0,63 - 1.1

7.3 Safety interlock

AWARNING

Risk of electrical shock!

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

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



Safety interlock terminals 1/2 on

Please note

Factory setting leaves the safety interlock open!

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

NOTICE

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

Rating must comply with the control voltage in use.

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

7.4 Connection diagram

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

7.5 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?
- Supply voltage in accordance with name plate voltage rating?
- All ectrical connections made according to the wiring diagram?
- ✓ Is the sensor (temperature sensor or r.h. sensor, depending on the application scenario) properly connected to the main p.c.b. ? (make sure that the input selected is adequate for the type of sensor installed with respect to the signal type and range specified).
- All screw terminal connections properly tightened?
- Have all electrical cable and plug connections been properly tightened?
- Proper unit gounding made?

8. Commissioning

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.

AWARNING

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.

The maintenance steps described below are shown for standard devices. HygroMatik devices with built-in special options may deviate from this.

9.1.1 Service messages

In case of a service message produced, the HygroMatik logo in the main section of the touch display (for explantion s. "FlexLine controls" manuals) is blanked. Instead, a frame is shown with the service icon \Join 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 teminal 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 continously 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 maintenanced, if required (s. "FlexLine controls" manuals, "Faults and service messages" chapter").

9.1.3 Safety instructions for maintenance

AWARNING

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.

AWARNING

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!).

AWARNING

Risk of scalding!

Water pumped or drained from the steam cylinder may have a temperature of up to $95 \degree C (203 \degree F)$.

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	Visual inspection of electrical and mechanical connections
commissioning	 Remove mineral deposits from steam cylinder, water drain hose and blow down nump
(also after installa-	
tion of a new steam	Check electrodes for burn-off
cylinder)	 Re-tighten electrode hand nuts and all screw terminals
(with normal	
water quality)	
semi annually*	 Visual inspection of electrical and mechanical connections
(with Normal Tap water quality	 Remove mineral deposits from steam cylinder, water drain hose and blow-down pump.
(please refer to	 Check electrodes for burn-off and replace, if required.
chapter 1.4	 Re-tighten electrode hand nuts and all screw terminals
and "normal" operation, i.e. 8	 Removal of used O-rings between the cylinder halves, in the base and in the steam hose adapter
hours per day	 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.

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

30 31 37 42 33 Blow-down pump

Reinstallation

- » Moisten the new O-ring (33) and insert into cylinder base (37) horizontal stub.
- » Push pump back into cylinder base and bolt to bottom plate encorporating the vibration buffer (42) and washers saved during removal.
- » Moisten O-ring (31) and insert into adapter.
- » Slide adapter (30) onto pump stub.
- » Refit electrical cable to pump connector (no polarisation).
- » Reinstall the steam cylinder (see chapter Reinstallation of the steam cylinder).
- » Follow the handling instructions in the section Leakage test.

9.4.2 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 solenod valve.
- » Reattach connecting hose (20) to cylinder base using clamp.
- » Follow the handling instructions in the section Leakage test.

 $^{\ast})$ 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 problemfree 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**.

Electrode wear

Eelctrode 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.

Genuine electrode length

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

Model	Lenght [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

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

AWARNING

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 bereset 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.

AWARNING

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. Declaration of Conformity

	EU Konformitätserklärung EU Declaration of Conformity										
Hersteller / Ma	nufacture	r: HygroMatik	GmbH								
Anschrift / Ada	ress:	Lise-Meitner	-Straße 3, D-24558 Henster	dt-Ulzburg, Germany							
Produktbezeic / Product desci	hnung: iption	FlexLine Ele FLE04*, FL FLE40**, FL *(sowie Aus **(sowie Aus	FlexLine Elektrode (FLE): FLE04*, FLE05*, FLE10*, FLE15**, FLE20**, FLE25*, FLE30** FLE40**, FLE50**, FLE65**, FLE80*, FLE100*, FLE130* *(sowie Ausführungen / <i>Product Versions</i> -T, oder -TSPA) **(sowie Ausführungen / <i>Product Versions</i> -T, -TSPA, oder TPRO)								
Die bezeichnet Vorschriften fo The products descri Directives:	Die bezeichneten Produkte stimmen in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender Europäischer Richtlinien überein: The products described above in the form as delivered are in conformity with the provisions of the following European Directives:										
2014/30/EU	2014/30/EU Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit. <i>Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility.</i>										
2014/35/EU	2014/35/EU Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen. Council Directive on the approximation of the laws of the Member States related to electrical equipment designed for use within certain voltage limits.										
Die Konformität Conformity to the Di	Die Konformität mit den Richtlinien wird nachgewiesen durch die Einhaltung folgender Normen: Conformity to the Directives is assured through the application of the following standards:										
Referenznumn Reference Number DIN EN IEC 6100 DIN EN IEC 6100 DIN EN 62233 DIN EN 62233 B Das Produkt ent	ner: A 200-6-2 20 200-6-3 20 200-6-3 20 20 er.1 20 spricht de	usgabedatum: dilion: 019-11 022-06 008-11 009-04 en Anforderungen dea	Referenznummer: Reference Number: DIN EN 60335-1 DIN EN 60335-1 A15 DIN EN 60335-2-98 s deutschen Produktsicherho	Ausgabedatum: Edition: 2020-08 2012/A15:2021 2020-05 eitsgesetzes ProdSG							
Auslieferung kör Auslieferung kör The requirements are met. Product	Sewannen nen zum of the Ger modificatio	stung von Sicherheit Verlust der Konform man Product Safety La ns after delivery may re	und Gesundheit. Produktan ität führen. w ProdSG regarding the ensura esult in a loss of conformity.	derungen nach ance of safety and health							
Henstedt-Ulzbur	g, den / <i>tl</i>	ne 27.02.2025									
HygroMatik Gmt	ын		Frank Michaeler	A							
Geschäftsführer	l General	Manager	Leitung Technik / H	lead of Engineering							
Diese Erklärung b von Eigenschafter This declaration cert documentation acco	escheinigt . Die Siche ifies the con mpanying th	die Übereinstimmung n erheitshinweise der mit formity to the specified dir e product shall be conside	nit den genannten Richtlinien, is gelieferten Produktdokumentati ectives but contains no assurance ered in detail.	st jedoch keine Zusicherung on sind zu beachten. of properties. The safety							

12. Spare Parts

*	FLE05	FLE15	FLE20	FLE25	FLE30	FLE40	FLE50	FLE65	FLE80	FLE100	FLE130	Article No.	Description
	FLEIU												Steam generation
8	1											B-3204029	Sensor electrode
8	4	1	1	1	1	1	1	1	1	1	1	B-2204073	Sensor electrode
18	1	1	1	1	1	1	1	1	1	1	1	E-2204202 B-3216021	Hand nut Mb, grey, for sensor electrode CYlinder flange clamps, set=24pc
37	1											E-3220000	CYlinder base
37	4	1	1	1	1	1	1	1	2	2	2	E-2206086	CYlinder base
	1	1	1	1	1	1	1	1	2	2	2	B-2214023 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	1	1	2	2	2	2	2	E-2209008 E-2209002	Adapter for Steam hose, HVAC + SPA Clin for adapter
-							-		-			L 2200002	Steam generation, operating voltage above 240V up to 480V
	1											SP-03-00000	Steam CYlinder CY08 compl. with 3 electrodes;
		1										SP-04-00002	Steam CYlinder CY17 compl. with 3 electrodes
		1^^										SP-04-00100	Steam CYlinder CY17 compl. with 6 electrodes; only for FlexLine-TPRO
			1									SP-04-00000	Steam CYlinder CY17 compl. with 3 electrodes
			1**									SP-04-00100	Steam CYlinder CY17 compl. with 6 electrodes; only for FlexLine-TPRO
\vdash				1								SP-04-00100	Steam CVIInder CV17 compl. with 6 electrodoc
\vdash					1	1			2			SP-05-00000	Steam CYlinder CY30 compl. with 6 electrodes
							1	1		2	2	SP-06-00000	Steam CYlinder CY45/2 compl. with 6 electrodes
48	1											B-3204021	Electrodes without hand nuts, set=3pc.
48 48		1 1**										B-2204087 B-2204089	Electrodes without hand huts, set=3pc. Electrodes without hand huts, set=6pc.; only for ElexI ine-TPRO
48		•	1									B-2204000	Electrodes without hand nuts, set opc., only for hexane in rec
48			1**									B-2204089	Electrodes without hand nuts, set=6pc.; only for FlexLine-TPRO
48				1					0			B-2204089	Electrodes without hand nuts, set=6pc.
48					1	1	1	1	2	2	2	B-2204093 B-2204091	Electrodes without hand huts, set=6pc. Electrodes w/o band huts, 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.
		1^^	1**									B-2207105	Hand nuts M8 for CYlinder CY17/CY30, set=6pc.; only for FlexLine-TPRO
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	1	1									AC-03-00000	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38)
		1**	1**									AC-04-00000	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38) O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38) only for ElexLine-TPRO
			•										
				1								AC-04-00100	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38)
					1	1	1	1	2	2	2	AC-05-00000	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38) O ring set (Pos. 3, 17, 31, 33, 35, 36, 38)
							1	1		2	2	AC-00-00000	0-ning set (Pos. 3, 17, 31, 33, 35, 36, 36) for cylinders until 10/2016
							1	1		2	2	AC-06-00002	O-ring set (Pos. 3, 17, 31, 33, 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. with 3 electrodes
\vdash		1										SP-04-00000	Steam CYIInder CY17 compl. with 3 electrodes
												U10101	estant cynnedi o'r rr compr. mar o cioca ddos, onry for rickEine-rr rto
				1								SP-04-00101	Steam Cylinder CY17 compl. with 6 electrodes
\vdash					1	<u> </u>	4		2			SP-05-00001	Steam CYlinder CY30 compl.
48	1									2		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., only for FlexLine-TPRO
48				1								B-2206223	Electrodes without hand nuts, set=6pc.
48					1	1			2			B-2204063	Electrodes without hand nuts, set=6pc.
48						L	1			2		B-2206225	Electrodes without hand nuts, set=6pc. For cylinders until 10/2018
48	4						1	1		2		SP-06-00011	Lectrodes without hand nuts, set=6pc. For cylinder CY45/2 (from 11/2018)
\vdash	1	1										AC-03-00000	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 36)
		1**										AC-04-00100	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38), only for FlexLine-TPRO
\vdash				1								AC-04-00100	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38)
					1	1			2			AC-05-00000	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38)
							1	1		2	2	AC-06-00000	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38) for cylinders until 10/2018
							1	1		2	2	AC-06-00002	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38) for cylinder CY45/2 from 11/2018

Spare Parts (continued)

*	FLE05	FLE15	FLE20	FLE25	FLE30	FLE40	FLE50	FLE65	FLE80	FLE100	FLE130	Article No.	Description
	1 22 10												Steam generation, special voltage from 500V
	1											SP-03-00004	Steam Cylinder CY08 compl. with 3 electrodes
		1	1									SP-04-00004	Steam Cylinder CY17 compl. with 3 electrodes
		1**	1**									SP-04-00014	Steam Cylinder CY17 compl. with 6 electrodes; only for FlexLine-TPRO
-				1	1	1			2			SP-04-00014 SP-05-00004	Steam Cylinder CY17 compl. with 6 electrodes Steam Cylinder CY30 compl
-					-		1	1	2	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^^	1**	1								B-2204089 B-2204089	Electrodes without hand nuts, set=6pc., only for FlexLine-TPRO
48					1	1			2			B-2204003 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, 35, 36, 38)
		1	1									AC-04-00001	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38)
				1								AC-04-00101 AC-04-00101	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 36), only for FlexLine-TERO
					1	1			2			AC-05-00001	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38)
							1	1		2	2	AC-06-00001	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38) for cylinders until 10/2018
							1	1		2	2	AC-06-00003	O-ring set (Pos. 3, 17, 31, 33, 35, 36, 38) for cylinder CY45/2 from 11/2018
_													We for all
25	1											WE-03 00010	Water reed
20	- '	1	4	1								WE 04 00040	Solonoid valve, 1, 1/11111, 220-240 v, 0,2 - 100al, With Hounding Set
20					4		4	4		2		WE 06 00040	Colonoid valve, 2,5//11111, 220-240V, 0,2 - 100ar, with mounting set
25	4	1	4	1	1	1	1	1	2	2	2	WE 07 00020	Solenolu valve, S,41/IIIII, Z20-Z40V, U,2 - 'IUDAF, WITH MOUNTING SET
	1	1	1	1	-	1	1	1	2	2	2	WE 02 00003	mounting kit solehold valve incl. seals and screws
-	1	1	1	1	1	1			2			WF-04-00003	main group waterfeed
							1	1	-	2	2	WF-06-00004	main group waterfeed
58	1	1	1	1	1	1	1	1	2	2	2	WF-07-00002	Double check valve
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]
	1	-										WD 03 00003	Water drain
		1	1	1								WD-04-00002	Pump-drain-hose-system (Pos. 6, 14, 15, 30, 31)
					1	1			2			WD-05-00000	Pump-drain-hose-system (Pos. 6, 14, 15, 30, 31)
							1	1		2	2	WD-06-00000	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	WD-07-00040	Mounting set for drain pump
	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
_											4	01.07.00000	by a transformer)
		1**	1**	1**	1**	1**	1**	1**	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	2			4			CN-07-00066	Main contactor 20A
						2	2	2	4	4		CN-07-00067	Main contactor 35A
	1						_					WR-07-00003	Wiring harness solenoid valve
\square		1	1	1	1	1						WR-04-00003	Wiring harness solenoid valve
\vdash	1						1	1	2	2	2	WR-06-00003	vviring narness solenoid valve Wiring harness ring measuring transformer
\vdash		1	1	1	1	1	1	1	2	2	2	WR-06-00020	Wiring harness ring measuring transformer
		2**	2**	2**	2**	2**	2**	2**				WR-06-00020	Wiring harness ring measuring transformer, only for FlexLine-TPRO
\square	1	1	1	1	1	1	1	1	2	2	2	CN-07-00050	Ring measuring transformer incl. holder, for current measurement 0-50A
		2*	2*	2-*	2*	2	2*	2				UN-07-00050	Rang measuring transformer incl. notder, for current measurement 0-50A, only for Elext ine-TPRO
	1	1	1	1	1	1	1	1	1	1	1	WR-07-00102	Cable display- PCB
	1	1	1	1	1	1	1	1				WR-07-00004	Wiring harness control switch incl. control switch
\vdash	4	<u> </u>							1	1	1	WR-06-00030	Wiring harness control switch
\vdash		1	1	1	1	1	1	1				WR-06-00005	Pump wining harness
									1	1	1	WR-06-00015	Wiring harness pump right cylinder
	1	1	1	1	1							WR-07-00006	Wiring harness main contactor
\vdash	1					1	1	1	2	2	2	WR-06-00006	Wiring harness main contactor
\vdash		1	1									WR-04-00001	Connecting cables for electrodes and sensor electrode with plugs (ros. 4, 5) Connecting cables for electrodes and sensor electrode with plugs, right cylinder
		1**	1**									WR-04-00101	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5), only
													for FlexLine-TPRO
\square				1								WR-04-00101	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
\vdash					1				1			WR-05-00001 WR-05-00002	Connecting cables for electrodes and sensor electrode with plugs, right cylinder
									'				(Pos. 4, 5)
\vdash							1	1		1	1	WR-06-00101	Connecting cables for electrodes and sensor electrode with plugs (Pos. 4, 5)
\vdash										1	1	WR-06-00102	Connecting cables for electrodes and sensor electrode with plugs, right cylinder
													(Pos. 4, 5)
	1	1	1	1	1	1	1	1	1	1	1	E-2502412	Control switch, double pole, middle position = "0"

Spare Parts (continued)

*					EI E20							Antiolo No	No. Description	
	FLE05	FLEIS	FLEZU	FLE25	FLESU		FLESU	FLE05	FLEOU	FLEIUU	FLEISU	Article No.	Description	
													Electronics, operating voltage over 240V to 480V	
	1	1					Ì					CN-07-00066	Main contactor 20A	
			1	1	1	2	2		4	4		B-2507061	Main contactor 35A	
							Î.	2			4	CN-07-00067	Main contactor 40A	
	1											CN-07-00214	Circuit breaker B 20A, 480V, 3-pole, 10kA	
		1										CN-07-00215	Circuit breaker B 32A, 480V, 3-pole, 10kA	
			1	1		2	2		4	4		CN-07-00216	Circuit breaker B 32A, 480V, 3-pole, 10kA	
					1	1		2			4	CN-07-00217	Circuit breaker B 40A, 480V, 3-pole, 10kA	
													Electronics, special voltage 208V to 240V	
	1											CN-07-00066	Main contactor 20A	
		1		2	2				4			B-2507061	Main contactor 35A	
							2			4		B-2507071	Main contactor 50A	
	1											CN-07-00210	Circuit breaker B 16A, 1+N, 10kA	
	1											CN-07-00214	4 Circuit breaker B 16A, 3+N, 10kA	
		1		2								CN-07-00211	1 Circuit breaker B 32A, 1+N, 10kA	
		1		2	2				4			CN-07-00216	Circuit breaker B 32A, 3+N, 10kA	
							2			4		CN-07-00218	Circuit breaker B 50A, 3+N, 10kA	
													Electronics, special voltage from 500V	
		1	1	1	1	2	2	2	4	4	4	B-2507061	Main contactor 35A	
		1	1	1	1	2	2	2	4	4	4	CN-07-00230	Motor protection relay	
													Accessories	
70	х	х										SP-07-26000	Steam hose DN25, per m	
70	х	х	х	х	х	х	х	х	х	х	х	SP-07-26001	Steam hose DN40, per m	
57	х	х	х	х	х	х	х	х	х	х	х	E-2420423	Drain hose 1 1/4", per m	
	х	х	х	х	х	х	х	х	х	х	х	E-2604002	Condensate hose DN12, per m	
	х	х										E-2404004	Steam hose clamp DN25	
	х	х	х	х	х	х	х	х	х	х	х	E-2604016	Steam hose clamp DN40	
	х	х	х	х	х	х	х	х	х	х	х	E-2404010	Clamp for drain hose 1 1/4"	
	х	х	х	х	х	х	х	х	х	х	х	E-8501064	Condensate hose clamp	
	х											E-2604042	Connectors for steam distribution T-piece DN25, stainless steel	
	х	х	х	х	х	х	Х	х	х	х	х	E-2604023	Connectors for steam distribution T-piece DN40, stainless steel	
	х	х	х	х	х	х	Х	х	х	х	х	E-2604021	Connectors for condensate T-piece DN12	
	х	х	х	х	х	х	Х	х	х	х	х	B-2604091	Essence pump	
	х	х	х	х	х	х	Х	х	х	х	х	E-2604070	Hose, 6x1.5, for essence injection	
	х	х	х	х	х	х	х	х	х	х	х	B-2604069	T-piece for essence injection, 2xDN40, 1xDN6	

* position number in exploded view

** only valid for device type FLExx-TPRO

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.

Spare parts for devices with built-in special options may differ from the spare parts list above.

13. Technical specifications FLE-T

Technical specifications FlexLine electrodes										
Unit type	FLE05-T	FLE10-T	FLE15-T	FLE20-T	FLE25-T	FLE30-T				
Steam output [kg/h]	4,7 - 5,0 - 5,2	9,5 - 10,0 - 10,4	14,2 - 15,0 - 15,5	19,0 - 20,0 - 20,8	23,8 - 25,0 - 26,0	28,5 - 30,0 - 31,1				
Electrical connection ⁽¹⁾			380 - 400 - 415	/ /3Ph /N /50-60Hz						
Rated power [kW]	3,6 - 3,7 - 3,9	7,1 - 7,5 - 7,8	10,7 - 11,2 - 11,6	14,3 - 15 - 15,6	17,8 - 18,8 - 19,5	21,4 - 22,5 - 23,4				
Nominal current [A]	5,4 - 5,4 - 5,4	10,8 - 10,8 - 10,8	16,2 - 16,2 - 16,2	21,7 - 21,7 - 21,7	27,1 - 27,1 - 27,1	32,5 - 32,5 - 32,5				
Fuse [A] ⁽²⁾	3 x 10	3 x 16	3 x 20	3 x	: 32	3 x 40				
Terminals max. [mm²]		4 10								
Number of steam cylinder		1								
Control	FlexLine mainboard with capacitive 3.5" touch colour display									
Separate control voltage ⁽³⁾	220 - 240V 2,5A									
Steam hose connection [mm]		1 x 25								
Water consumption ⁽⁷⁾ [l/h]	6,2	12,5	18,6	25,0	31,2	37,3				
Water flow rate ⁽⁸⁾ [l/min]	1,3 /	20,5		2,8 / 22,0		4,1 / 23,3				
Max. filling capacity [l]	4	,8		20,9						
Empty weight [kg]	10	6,0	22	22,0 23,0						
Operation weight [kg]	2	1,3	35	5,7	36,7	47,4				
Width ⁽⁹⁾ [mm]	460	D ⁽¹¹⁾		540						
Height ⁽⁹⁾ [mm]	5	35		750						
Depth ⁽⁹⁾ [mm]			320			355				
Water connection		1 to	tap water of va 10bar, 1 to 10 bar,	arying qualities for 3/4" external th	read					
Drain water connection			Connectio	n Ø 1 1/4"						

Technical specifications FlexLine electrodes											
Unit type	FLE40-T	FLE50-T	FLE65-T	FLE80-T	FLE100-T	FLE130-T					
Steam output [kg/h]	38,0 - 40,0 - 41,5	47,5 - 50,0 - 51,8	61,8 - 65,0 - 67,5	76,0 - 80,0 - 83,0	95,0 - 100,0 - 104,0	124,0 - 130,0 - 135,0					
Electrical connection ⁽¹⁾	380 - 400 - 415V /3Ph /N /50-60Hz										
Rated power [kW]	28,5 - 30 - 31,1	35,6 - 37,5 - 38,9	46,3 - 48,8 - 50,6	2 x 28,5 - 30 - 31,1	2 x 35,6 - 37,5 - 38,9	2 x 46,3 - 48,8 - 50,6					
Nominal current [A]	43,3 - 43,3 - 43,3	54,1 - 54,1 - 54,1	70,4 - 70,4 - 70,4	2 x 43,3 - 43,3 - 43,3	2 x 54,1 - 54,1 - 54,1	2 x 70,4 - 70,4 - 70,4					
Fuse [A] ⁽²⁾	3 x 50	3 x 63	3 x 80	2 x 3 x 50	2 x 3 x 63	2 x 3 x 80					
Terminals max. [mm²]	16	25 16 25									
Number of steam cylinder	1 2										
Control	FlexLine mainboard with capacitive 3.5" touch colour display										
Separate control voltage ⁽³⁾	220 - 240V 2,5A										
Steam hose connection [mm]	2 x 40 ⁽⁶⁾	2 x 40 ⁽⁶⁾ 2 x 40			4 x	40					
Water consumption ⁽⁷⁾ [I/h]	49,8	62,2	81	99,6	124,8	162,0					
Water flow rate ⁽⁸⁾ [l/min]		4,1 / 23,3			2 x 4,1 / 23,3						
Max. filling capacity [I]	20,9	35	5,7	41,8	71,4						
Empty weight [kg]	25,0	33,0	34,0	66,0	75	5,0					
Operation weight [kg]	46,4	69,2	70,2	108,3	14	6,9					
Width ⁽⁹⁾ [mm]	580	64	40	1130	11	70					
Height ⁽⁹⁾ [mm]	750	7	85	750	78	35					
Depth ⁽⁹⁾ [mm]	355			420							
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					

⁽¹⁾ Other voltages upon request. ⁽³⁾ Internal control voltage upon request. ⁽⁶⁾ Incl. Y-piece DN40

⁽²⁾ 13/28% above nominal power consumption after full blowdown. Observe actuation characteristics of automatic circuit-breakers.

If necessary, select the next highest circuit-breaker level.

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

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

 $^{(9)}$ Outer dimensions of width and depth. Hight incl.drain connection.

 $^{(11)}$ Units with production date January 2022 and earlier: 540 $\rm mm$

FLE-TPRO

	Technical specifications FlexLine electrodes									
Unit type	FLE05-TPRO	FLE10-TPRO	FLE15-TPRO	FLE20-TPRO	FLE25-TPRO	FLE30-TPRO				
Steam output [kg/h]	4,7 - 5,0 - 5,2	9,5 - 10,0 - 10,4	14,2 - 15,0 - 15,5	19,0 - 20,0 - 20,8	23,8 - 25,0 - 26,0	28,5 - 30,0 - 31,1				
Electrical connection ⁽¹⁾			380 - 400 - 415	/ /3Ph /N /50-60Hz						
Rated power [kW]	3,6 - 3,7 - 3,9	7,1 - 7,5 - 7,8	10,7 - 11,2 - 11,6	14,3 - 15 - 15,6	17,8 - 18,8 - 19,5	21,4 - 22,5 - 23,4				
Nominal current [A]	5,4 - 5,4 - 5,4	10,8 - 10,8 - 10,8	16,2 - 16,2 - 16,2	21,7 - 21,7 - 21,7	27,1 - 27,1 - 27,1	32,5 - 32,5 - 32,5				
Fuse [A] ⁽²⁾	3 x 10	3 x 16	3 x 20	3 x	3 x 40					
Terminals max. [mm²]		4 10								
Number of steam cylinder	1									
Control	FlexLine TPRO mainboard with capacitive 3.5" touch colour display									
Separate control voltage ⁽³⁾	220 - 240V 2,5A									
Steam hose connection [mm]		1 x 25 1 x 40								
Water consumption ⁽⁷⁾ [l/h]	6,2	12,5	18,6	25,0	31,2	37,3				
Water flow rate ⁽⁸⁾ [I/min]	1,3 /	20,5		2,8 / 22,0		4,1 / 23,3				
Max. filling capacity [l]	4	,8		20,9						
Empty weight [kg]	16	5,0	22,0 23,0			26,0				
Operation weight [kg]	21	1,3	35	5,7	36,7	47,4				
Width ⁽⁹⁾ [mm]	460) (11)		540						
Height ⁽⁹⁾ [mm]	5	35		695						
Depth ⁽⁹⁾ [mm]			320			355				
Water connection		tap water of varying qualities 1 to 10bar, 1 to 10 bar, for 3/4" external thread								
Drain water connection			Connectio	on Ø 1 1/4"						

	Technical specifications FlexLine electrodes							
Unit type	FLE40-TPRO	FLE50-TPRO	FLE65-TPRO					
Steam output [kg/h]	38,0 - 40,0 - 41,5	47,5 - 50,0 - 51,8	61,8 - 65,0 - 67,5					
Electrical connection ⁽¹⁾		380 - 400 - 415V /3Ph /N /50-60Hz						
Rated power [kW]	28,5 - 30 - 31,1	35,6 - 37,5 - 38,9	46,3 - 48,8 - 50,6					
Nominal current [A]	43,3 - 43,3 - 43,3	54,1 - 54,1 - 54,1	70,4 - 70,4 - 70,4					
Fuse [A] ⁽²⁾	3 x 50	3 x 63	3 x 80					
Terminals max. [mm²]	16	25						
Number of steam cylinder		1						
Control	FlexLine TPRO r	mainboard with capacitive 3.5" to	uch colour display					
Separate control voltage ⁽³⁾	220 - 240V 2,5A							
Steam hose connection [mm]	2 x 40 ⁽⁶⁾ 2 x 40							
Water consumption ⁽⁷⁾ [I/h]	49,8	62,2	81					
Water flow rate ⁽⁸⁾ [l/min]		4,1 / 23,3						
Max. filling capacity [I]	20,9	3	5,7					
Empty weight [kg]	25,0	33,0	34,0					
Operation weight [kg]	46,4	69,2	70,2					
Width ⁽⁹⁾ [mm]	580	6	40					
Height ⁽⁹⁾ [mm]	750	7	85					
Depth ⁽⁹⁾ [mm]	355	4	20					
Water connection	1 to 10	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"							

⁽¹⁾ Other voltages upon request.

⁽³⁾ Internal control voltage upon request.

(6) Incl. Y-piece DN40

(2) 13/28% above nominal power consumption after full blowdown. Observe actuation characteristics of automatic circuit-breakers.
 If necessary, select the next highest circuit-breaker level.

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

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

 $^{\left(9\right)}$ Outer dimensions of width and depth. Hight incl.drain connection.

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

FLE-TSPA

Technical specifications FlexLine electrodes										
Unit type	FLE05-TSPA	FLE10-TSPA	FLE15-TSPA	FLE20-TSPA	FLE25-TSPA	FLE30-TSPA				
Steam output [kg/h]	4,7 - 5,0 - 5,2	9,5 - 10,0 - 10,4	14,2 - 15,0 - 15,5	19,0 - 20,0 - 20,8	23,8 - 25,0 - 26,0	28,5 - 30,0 - 31,1				
Electrical connection ⁽¹⁾			380 - 400 - 415\	/ /3Ph /N /50-60Hz						
Rated power [kW]	3,6 - 3,7 - 3,9	7,1 - 7,5 - 7,8	10,7 - 11,2 - 11,6	14,3 - 15 - 15,6	17,8 - 18,8 - 19,5	21,4 - 22,5 - 23,4				
Nominal current [A]	5,4 - 5,4 - 5,4	10,8 - 10,8 - 10,8	16,2 - 16,2 - 16,2	21,7 - 21,7 - 21,7	27,1 - 27,1 - 27,1	32,5 - 32,5 - 32,5				
Fuse [A] ⁽²⁾	3 x 10	3 x 16	3 x 20	3 x	: 32	3 x 40				
Terminals max. [mm²]	4 10									
Number of steam cylinder	1									
Control	FlexLine mainboard with capacitive 3.5" touch colour display									
Separate control voltage ⁽³⁾	220 - 240V 2,5A									
Steam hose connection [mm]		1 x 40		1 x 40						
Water consumption ⁽⁷⁾ [l/h]	6,2	12,5	18,6	25,0	31,2	37,3				
Water flow rate ⁽⁸⁾ [l/min]	1,3 /	20,5		2,8 / 22,0		4,1 / 23,3				
Max. filling capacity [l]	4	,8		20,9						
Empty weight [kg]	16	6,0	22	2,0	23,0	26,0				
Operation weight [kg]	2	1,3	35	5,7	36,7	47,4				
Width ⁽⁹⁾ [mm]	460	D ⁽¹¹⁾		540						
Height ⁽⁹⁾ [mm]	5	35		695		750				
Depth ⁽⁹⁾ [mm]			320			355				
Water connection		tap water of varying qualities 1 to 10bar, 1 to 10 bar, for 3/4" external thread								
Drain water connection			Connectio	n Ø 1 1/4"						

Technical specifications FlexLine electrodes										
Unit type	FLE40-TSPA	FLE50-TSPA	FLE65-TSPA	FLE80-TSPA	FLE100-TSPA	FLE130-TSPA				
Steam output [kg/h]	38,0 - 40,0 - 41,5	47,5 - 50,0 - 51,8	61,8 - 65,0 - 67,5	76,0 - 80,0 - 83,0	95,0 - 100,0 - 104,0	124,0 - 130,0 - 135,0				
Electrical connection ⁽¹⁾	380 - 400 - 415V /3Ph /N /50-60Hz									
Rated power [kW]	28,5 - 30 - 31,1	28,5 - 30 - 31,1 35,6 - 37,5 - 38,9 46,3 - 48,8 - 50,6			2 x 35,6 - 37,5 - 38,9	2 x 46,3 - 48,8 - 50,6				
Nominal current [A]	43,3 - 43,3 - 43,3	54,1 - 54,1 - 54,1	70,4 - 70,4 - 70,4	2 x 43,3 - 43,3 - 43,3	2 x 54,1 - 54,1 - 54,1	2 x 70,4 - 70,4 - 70,4				
Fuse [A] ⁽²⁾	3 x 50	3 x 63	3 x 80	2 x 3 x 50	2 x 3 x 63	2 x 3 x 80				
Terminals max. [mm²]	16	2	25	16	25					
Number of steam cylinder	1 2									
Control	FlexLine mainboard with capacitive 3.5" touch colour display									
Separate control voltage ⁽³⁾	220 - 240V 2,5A									
Steam hose connection [mm]	2 x 40 ⁽⁶⁾	2 >	< 40	4 x 40 ⁽⁶⁾	4 x	: 40				
Water consumption ⁽⁷⁾ [l/h]	49,8	62,2	81	99,6	124,8	162,0				
Water flow rate ⁽⁸⁾ [l/min]		4,1 / 23,3			2 x 4,1 / 23,3					
Max. filling capacity [I]	20,9	35	5,7	41,8	71,4					
Empty weight [kg]	25,0	33,0	34,0	66,0	75	5,0				
Operation weight [kg]	46,4	69,2	70,2	108,3	14	6,9				
Width ⁽⁹⁾ [mm]	580	6	40	1130	11	70				
Height ⁽⁹⁾ [mm]	750	7	85	750	78	85				
Depth ⁽⁹⁾ [mm]	355			420						
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				
⁽¹⁾ Other voltages upon request.		(3) Internal control	voltage upon reque	st.	(6) Incl. Y-piece DN40					

⁽²⁾ 13/28% above nominal power consumption after full blowdown. Observe actuation characteristics of automatic circuit-breakers.
 If necessary, select the next highest circuit-breaker level.

⁽⁷⁾ Maximum water consumption at 100% demand plus blowdown losses. The water consumption depends on the water quality and installed options. ⁽⁸⁾ Flow rate of the feed water during refilling or pumping out. Unit without options / maximum rate with options.

⁽⁹⁾ Outer dimensions of width and depth. Hight incl.drain connection.
 ⁽¹¹⁾ Units with production date January 2022 and earlier: 540 mm

14. Exploded view



15. View of housing



FLE40







FLE100, FLE130





Lise-Meitner-Str.3 • D-24558 Henstedt-Ulzburg Phone +49(0)4193/ 895-0 • Fax -33 eMail hy@hygromatik.de • www.hygromatik.com member of **CAREL Group**

