



miniClima *Manual EBC*

Topic: Complete instructions for the application, installation, usage, maintenance & care, deinstallation, storage and packing-up of the respective devices.

Valid for: miniClima Constant Humidity Devices, Series EBC10/11/12 (Rev.3), Types EBC10, EBC11, EBC12. The series is indicated on the back of the device, the type on the front behind the handle. Optional accessories or extras are described in their respective supplement manuals.



THIS MANUAL CONTAINS IMPORTANT INFORMATION - PLEASE READ IT CAREFULLY BEFORE USING OR INSTALLING YOUR DEVICE!

The devices covered by this manual are not destined for being used by persons (including children) with limited physical, sensory or intellectual abilities and/or by persons lacking the required experiences/skills, except such persons are going to be supervised by a person that is responsible for their safety or such persons have been thoroughly briefed beforehand about the usage of the device and it can be expected that the persons will have comprehended the explanations and that they will also follow them. Children have to be kept well away from the devices, ensuring that they will not play with them.



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1 GENERAL INFORMATION

1.1 What can be expected from the work of an EBC, what can't

1.1.1 Primary purpose

The miniClima Constant Humidity Devices EBC are built for the regulation of the relative air-humidity in both air- and steam-tight enclosed museum showcases, switchboards, deposit cupboards, containers and similar applications (hereinafter only referred to as "cases"). The devices help in reaching and keeping a desired level of relative air-humidity inside the cases. They are not built for the purpose of influencing or changing any other state or condition of the air being processed (e.g. temperature, pollution, etc.), but further equipment¹ can be added to an EBC for filtering dust and particles out of the system air.

1.1.2 Characteristic features

Once set up correctly, the EBC, the case and the interconnections between EBC and case (hosepipes) together form a tight air circulation system. As long as the EBC is turned on, the air circles continuously through these three parts of the system. More in detail: The air is exhausted from the case, led to the EBC, where it is going to be either humidified, dehumidified or left unchanged - depending on the set and actual RH values. The conditioned air is then led back into the case. During all these times a digital sensor measures the values for relative air humidity and temperature within the case. The EBC receives these values and compares the measured RH value with the setpoint, the hysteresis and the threshold values, which can all be set via the menu prompts on the front panel of the EBC.

Through the work of the EBC, the desired level of the air humidity in the case is constantly approached - duration and speed depending on the initial values, on the conditions (temperature, humidity) the case is exposed to, and on a number of further variables (like the temperature at the EBC's place of installation, the size and shape of the case, the air/steam tightness of the case, the kind of materials stored inside the case, the length of the hosepipes, whether or not the hosepipes are laid in many bends and turns etc). After the setpoint range (=setpoint +/- hysteresis) has been reached, the RH is going to be kept on a constant level. A negligible movement around the setpoint might be observed - the higher the setpoint the more distinct. This behaviour is technically induced and does not constitute an error.

¹ See www.miniclima.com for our current products and available optional accessories.



1.2 Risk of use, recommendations

Our devices are first and foremost used for the regulation of the relative humidity of the air surrounding precious and/or irreplaceable works of art or artefacts. It is therefore necessary to cover all possible imponderables, when installing and using the EBCs. For this purpose, please do bear in mind the following recommendations and risks of use.

A clean installation, carried out according to the instructions found in this manual, is the basis for a working system. In particular essential are:

- ✓ The use of a climate-ready case (air-tight, steam-tight).
- ✓ The positioning of the miniClima RH/T sensor on a spot that features the same environmental conditions as the one where the exhibit is placed (see section 3.3.2 "RH/T sensor", p. 19).
- ✓ The design and positions of the air inlets and outlets on the case (see section 3.2 "Setting up the EBC, establishing the hosepipe connections", p. 12).
- ✓ That the air resistance within the air circuit is kept low (short hosepipe connections, avoidance of too many bends and turns when laying the hosepipes etc. - see section 3.2 "Setting up the EBC, establishing the hosepipe connections", p. 12).
- ✓ Preventing different temperatures inside the case (light installations, solar radiation,...). The miniClima RH/T sensor and the exhibit in particular need to be exposed to the very same temperature.
- ✓ The temperature surrounding the EBC and the hosepipes (see section 3.2 "Setting up the EBC, establishing the hosepipe connections", p. 12).
- ✓ Regular visual inspection of the EBCs, regular maintenance and care of the EBCs (see section 7 "Maintenance and care", p. 47).

We recommend a beforehand verification by the user/customer that our product is going to be able to fulfil the individual expectations and needs required for the specific case. Please don't hesitate to get in touch for any questions.

It is further recommended to test the function of a completely installed system (consisting of the case, the interconnections and the EBC(s)) before using it to control the relative air-humidity of sensitive exhibits or components. In doing so, possible errors (i.e. wrong installations) can be discovered early enough to have them corrected.

Please bear in mind that every technical device can break. So, to be on the safe side with respect to the



lasting integrity of your sensitive and valuable exhibits or components, further actions should be considered:

- ✓ Regular inspections of the case and the EBC through skilled personnel probably provide for the highest possible safety against technical failures or breakdowns.
- ✓ Installation of external signal devices for every EBC, to be alarmed in time when one of our devices needs attention (see section 3.3.4 "Wirings for the external signals (Composite error alarm and on-off status)" on p. 20).
- ✓ Having a spare unit at hand if need be or when the regular inspection at our workshop becomes due. You can save time and avoid delays during which your case might remain without humidity control. Those who decide for this option should actually best have their EBCs rotate in regular intervals.

Please mind to install, use, maintain, deinstall, pack up, store and ship your EBC and all accessories correctly and in accordance to the instructions.

1.3 Permissible ambient conditions

- ✓ 5-35°C, 15-80%RH, non-condensing (applies to the storage of the EBC as well as to the operation of the completely installed system as a whole).
- ✓ 10-50°C, 20-60%RH, non-condensing (applies to the storage of the RH/T sensor).

⚡ **NOTE:** The values 5-35°C and 15-80%RH refer to the air-conditions surrounding the EBC and the case which are generally obligatory for operation (or damage-free storage) of the EBC. They do not refer to the surrounding air-conditions were the full capacity with respect to the achievable setpoint range (inside the case) will be given (see also section 9 "Technical data", p. 53).

1.4 Further requirements for using EBCs

- ✓ Electric supply through a fuse-protected standard socket-outlet with earthing contact. Possible range of voltage & frequency: 100-240VAC, 50-60Hz.
- ✓ No pipework is required for the use of an EBC (all water is taken from and stored in the unit's own bottle).

1.5 Available types

EBC10 - device for air volumes of up to approx. 3m³.

EBC11 - device for air volumes of up to approx. 5m³.



EBC12 - device for air volumes of up to approx. 10m³.

NOTE: The capacity of an EBC will differ depending on the ambient conditions, the tightness and constitution of the case, the tightness and constitution of the connections between case and device, the kind and consistency of the materials stored/presented inside the case, and the like.

Every EBC of the current series can be used as both a master unit and a slave. The decision for one of the two hierarchic states is selected automatically dependant upon the type of cable connected to the EBC. If it is the cable of a miniClima RH/T sensor then the EBC becomes a master controller; if it is the control line coming from another EBC then the unit becomes a slave and will duplicate the function of the EBC that is the first in the line (chain of EBCs).

With this it is possible to increase the max. volume of the air that can be conditioned: Every added EBC10 increases the capacity by approx. 3m³, every added EBC11 by about 5m³ and every added EBC12 by about 10m³. Mixing different types of EBCs (EBC10, EBC11, EBC12) within one chain is permissible. Furthermore it does not matter which of those types is going to be used as the master of the chain and which as slave(s).

2 IDENTIFYING YOUR UNIT AND ITS ACCESSORIES/OPTIONS

2.1 Delivered items (per EBC)

- ✓ 1 EBC.. (packed extra in order to avoid transport damages: 1 6pin plug-in connector).
- ✓ 1 Water bottle, 0.5l (default for EBC10/11) or 2.0l (option for EBC10/11, default for EBC12).
- ✓ 1 Flexible hosepipe (length as ordered or by default 3m for each EBC10, 5m for each EBC11 and 6m for each EBC12).
- ✓ 2 Hosepipe fittings for affixing the hosepipes to the case. Depending on the make² each hosepipe fitting consists of 1 connector, 1 counter nut, 1 gasket ("GD.."), 1 slotted clamping ring³, 1 union nut⁴.
- ✓ 1 Mains connection cable (1.8m) with plugs on either side.
- ✓ Either (for EBCs sold as master units): 1 RH/T sensor with housing, cable (2.5m resp. 5.0m), RJ45 plug and a ferrite core (**IMPORTANT:** Please see the printed note that has been added your delivery before handling the sensor). Usually packed with the sensor: 1 free clip and screw for mounting the sensor.
- ✓ Or (for EBCs sold as slave units): 1 control line (2.0m resp. 5.0m; category-5e patch cable, twisted pair/non-crossed, with RJ45 plugs and ferrite cores on either end).

² Current models are shipped with fittings of type 3 ("VE.._V3"). Type 2 (and partly its predecessor type 1) is still available, though.

³ Type 1 only ("VE.._V1").

⁴ Type 1 and type 2 only ("VE.._V1" and "VE.._V2").



- ✓ CD-ROMs (1 set per order) with the relevant user manuals, information and the miniClima software (further copies of the CDs on request).
- ✓ Tool for unlocking a type-3-fitting⁵ (1 per order, more on request).

2.2 Possibly delivered other (optional) accessories (excerpt)

- ✓ Aluminium flanges for fixing the hosepipe fittings on a case wall of more than 6mm thickness.
- ✓ Air circulation filters FLT25/-32/-40 (require EBCs equipped with ULV+/ULV++; see the additionally delivered manual).
- ✓ Air distribution boxes LVB25/-32/-40 (see the additionally delivered manual).
- ✓ Detached operating unit (cable-bound remote control; see the additionally delivered manual).
- ✓ Serial data cable RS232 for plugging the EBC to a PC.
- ✓ "Serial2USB" adapter with cable and driver⁶ for plugging the EBC to a PC without RS232 interface.
- ✓ I²C Expander for enhancing the signal of the RH/T sensor if the latter is installed more than 7.5m away from the EBC⁷ (see the additionally delivered manual).
- ✓ Serial2IP converter for hooking the EBC to your local LAN or WiFi (see the additionally delivered manual).
- ✓ Extern LED unit for displaying the alarm/on-off status of the EBC (see the additionally delivered manual).
- ✓ Add. control lines and/or RH/T sensors.

2.3 Verifying the series

The series is indicated on the rating plate on the backside of the unit (see Fig. 1). It should read "EBC10/11/12 (Rev.3)" or "EBC10/11 (Rev.3)". If not, please note the actual series and get in touch with us, so that we can provide you with the appropriate manual.

⁵ Orders with accordingly equipped EBCs only.

⁶ **CAUTION:** The driver CD might have a diameter of <12 cm. Such Mini-CDs are not applicable for slot-loading disc drives. Do check with your hardware documentation if uncertain!

⁷ Admissible max. length of the sensor cable (as of processor version V121107.02): 5+2.5=7.5m (earlier versions: 5m). The mentioned expanders are required for greater distances.

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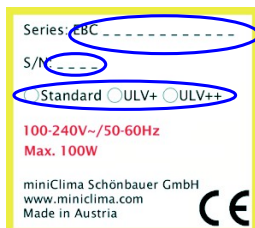


Fig. 1 - Rating plate with series ID, S/N and indication of the built-in air circulation fan (Standard-ULV, ULV+ or ULV++).

2.4 Identifying the type (EBC10, EBC11, EBC12)

The type is provided on the front side behind the handle:



Fig. 2 - Indication of the EBC type on the front side, behind the handle.

2.5 Identifying the serial number (S/N)

The serial number (four digits labelled S/N) is indicated on the rating plate on the backside of the EBC (see Fig. 1).

2.6 Verifying the strength of the circulation fan

Your EBC can be equipped with a standard fan (ULV) or with one of the stronger fans (ULV+ and ULV++). The latter are used with units that shall work in installations with an increased air resistance inside the air circuit system. The fan type built into the unit is marked on the EBC's rating plate. (see Fig. 1).

2.7 Identifying the kind and number of the water level sensors for the bottle

By default every EBC is equipped with one water level sensor for the bottle high mark. Once the bottle becomes full, the sensor provides for the respective alarm to be issued. The devices can optionally also be ordered to be equipped with a second sensor for the low mark of the bottle, so that the user can be alarmed

before the bottle becomes empty, too. Where neither of these alarms is required both sensors can be left away and the EBC will be delivered without any bottle alarm.

The bottle sensors are turquoise rectangular plates mounted to aluminium brackets on the side (default for EBC10 and -11) or front (option for EBC 10 and -11; by default the only option for EBC12⁸) of the EBC (see Fig. 3). The top bracket also holds the black hook-and-loop-fastener ("Velcro®") for securing the bottle. If you see a sensor on the top bracket, your unit is equipped with a water level sensor that issues an alarm before the bottle can overflow. If you see a second aluminium bracket with a turquoise sensor below, your unit will also recognise it when the bottle needs to be refilled.



Fig. 3 - Water level sensors for the high and for the low level alarm. In the sample image, the brackets, that hold the sensors and the hook-and-loop-fastener for securing the bottle, are mounted to the left side of an EBC10 or -11. They can also be mounted to the front of any EBC10 or -11, whereas on EBC12 they are always positioned on the front plate; if you need to have them mounted to the side of an EBC12 additional parts need to be ordered for that purpose.

3 INSTALLATION

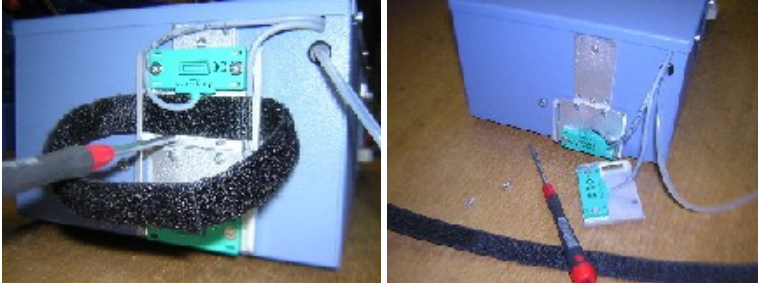
3.1 Positioning the bottle

The bottle (0.5l or 2.0l) can be positioned to the left of the EBC10/11 as well as to the front of it (EBC12: By default to the front only, with optional accessories to the side as well). By default the bottle holder(s) with the water level sensor(s) (if any; see section 2.7 "Identifying the kind and number of the water level sensors" on p. 9) and the hook-and-loop-fastener for securing the bottle are mounted on the side of any EBC10/11. If that assembly shall not be changed, continue with section 3.2 "Setting up the EBC, establishing the hosepipe connections" on p. 12.

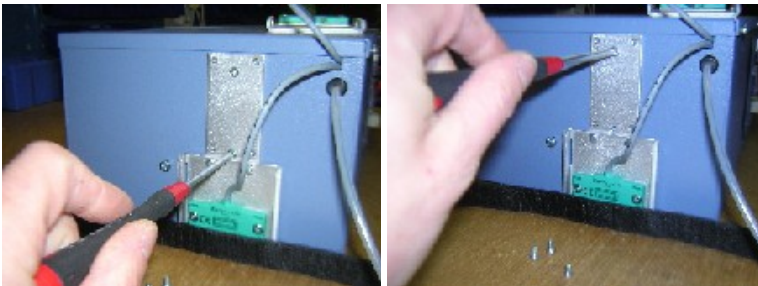
If, on the other hand, you plan to put the bottle (0.5l or 2.0l) to the front of your EBC10 or -11, follow these steps:

⁸ Additional parts for mounting the bottle holder to the side of an EBC12 are available.

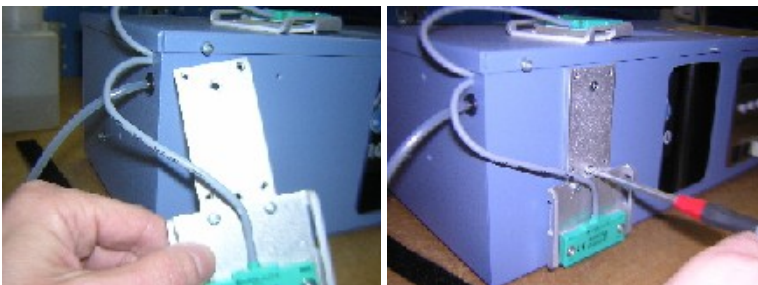
- 1) For units with 0.5l bottles: Unscrew the upper sensor holder (keep the screws) and pull off the hook-and-loop-fastener:



- 2) Unscrew the anchor element (keep the screws):



- 3) Screw the anchor element to the two threaded holes (M3) on the front of the housing:



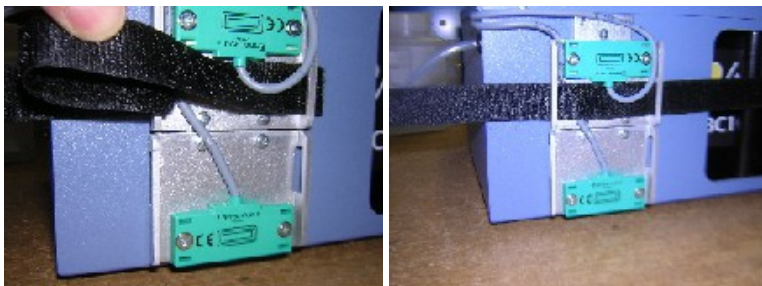
- 4) Where applicable: Screw the upper sensor holder back onto the anchor element and lead the cables (for 0.5l bottles) as shown. If the cables are too short, they can be pulled out of the EBC housing a bit (⚠️

CAUTION: Do not pull too hard and/or too far - stop pulling as soon as you can feel a higher resistance!):



- 5) Where applicable: Put the hook-and-loop-fastener back on the bracket as shown (the cable of the upper sensor should be in front of the hook-and-loop-fastener; the one of the lower sensor (if any) underneath it

- or anyway, laid in a way so that the bottle will still touch the sensor, once fixed with the hook-and-loop fastener):



Rearranging the holders back to the left side of the EBC is done likewise.

⚠ **IMPORTANT:** Beware to not squeeze any cable or the silicone pipe when rearranging the holders! Also, do not yet fill the bottle. Please continue with the installation as follows.

3.2 Setting up the EBC, establishing the hosepipe connections

🔧 **NOTE:** If you have ordered air-distribution-boxes (LVB25, LVB32, LVB40), filter capsules (FLT25, FLT32, FLT40), or other accessories relevant for the hosepipe connections, do also regard their additional installation manuals at this point.

The EBC should be positioned as close as possible to the case, to keep the air resistance, which increases with the length of the used hosepipes, low. The EBC should not be located in the air-conditioned part of the case itself, though⁹. The device has to be installed horizontally and firm in order to permit correct water level control, and to avoid water running out of the inner evaporation tub during operation. The device has to be given the possibility to emit its self-produced heat during the operation. It is therefore necessary to ensure, that...

- 1) ...the device's place of installation (mostly the plinth of the case) is aired (e.g. by means of ventilation holes in the plinth¹⁰, or by ventilation fans, if necessary);
- 2) ...the EBC is placed on a plain surface (no carpets or other materials that could block the cooling air slits on the bottom of the EBC);

⁹ Users do report that this has been done successfully, still, we do not recommend it. If you intend to place your EBC inside the conditioned part of your case, you should be aware of the fact that the EBC has to and will emit its self-produced heat. Furthermore you will have to take care against a shortcut of the air flow between the EBC's air inlet and outlet, which are very close to each other. Finally it would become necessary to open the conditioned part of the showcase every time the EBC has to be handled (filling/emptying the bottle, changing settings or reading out data via the menu, connecting a PC to the EBC, maintaining the cooling air slits/grills/filter,...).

¹⁰ Recommended sizes and positions for the ventilation holes: 2x150cm² per EBC10 or -11, 4x150cm² per EBC12; top & bottom panel of the plinth and/or both side panels of it.



- 3) ...neither the cooling air grill on the right side (EBC10/11/12), nor the one on the left side (EBC12 only), nor any of the slits (top, bottom) are blocked in any other fashion and that edge distances of min. 50mm (EBC10/11: top, right side; EBC12: top, right side, left side) are kept for an adequate ventilation;
- 4) ...the air slits (top, bottom) are vacuum cleaned regularly and the dust filter(s) behind the air grill(s) on the right and/or left side are regularly checked/vacuum cleaned/washed/replaced (see section 7 "Maintenance and care", p. 47).

⚠ **CAUTION:** Absence of ventilation at the device's place of installation or blocked cooling air in-/outlets of the device might overheat the device, as well as reduce the dehumidification capacity of the device.

Two hosepipe connections for the air circulation have to be established between each EBC and the case. Follow the steps described below for each device that shall be connected to the case (includ. every slave unit, if any):

The device itself is already equipped with two hosepipe fittings. The hosepipe fittings on the case wall need to be affixed now. You need two hosepipe fittings for every EBC - one for the air inlet, one for the air outlet. Firstly define the ideal positions of the air in-/outlets on the case so as to best enable an equal distribution of the conditioned air.

📌 **NOTE:** The positions shown in Fig. 4 do not represent a general solution or recommendation.

Mind the following rules before deciding:

- 1) As already mentioned above, all used EBCs should be positioned as close as possible to their respective cases, though they can also be placed some meters away, if necessary. Due to the growing air resistance the efficiency of the EBCs diminishes a little with the length of the tubes. Mind the total length of the hosepipe provided with your EBC.
- 2) The hoses must not be laid next to heat-emitting parts.
- 3) In- and outlets (even those of different EBCs) must not be located directly next to each other on the case wall (you may position inlets next to inlets and outlets next to outlets). If they need to be positioned close to each other, anyway, the inner construction of the case should be realised along the ideas presented in Fig. 4.
- 4) The constructions on the inside of the case should be realised in a way that enables the air to stream over the whole volume of the case. Should i.e. some air in- and outlets be located behind the same partition wall or divider, the inlets need to be sealed off from the outlets even if much space is left

between those in- and outlets - see Fig. 4.

- 5) For partition walls / dividers / sealed off separations between in- and outlets: The overall surface of the openings between each partition / separated part and the rest of the case should at least be of the same size as the sum of the cross-sections of all hosepipes connected to this partition / separated part, thus ensuring that the air does not need to overcome a higher air resistance there than it does inside the hosepipes.
- 6) There is no universally valid figure for the permissible max. total length of the hosepipe connections per air circuit between EBC and case but the length that is usually delivered with a device (3, 5 resp. 6m) can be taken as a reference.

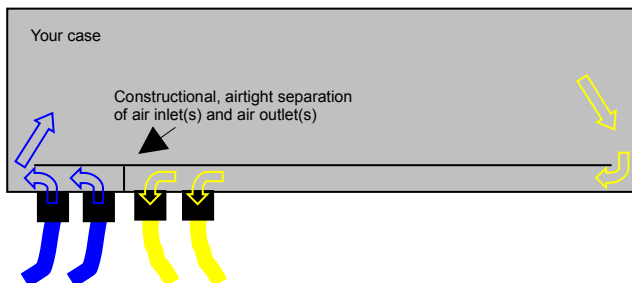


Fig. 4 - The shown positions of the hose fittings do not represent a general solution or recommendation.

As soon as the positions are fixed, you need to clarify whether the thickness of the case walls exceeds 6mm on those positions where you want to bring on the hosepipe fittings. If the thickness is 6mm or less you may cut, drill, or crack the holes for the hosepipe fittings directly in the case wall¹¹: EBC10: Ø 25mm, EBC11: Ø 32mm, EBC12: Ø 40mm. If the thickness is above 6mm on the other hand, you need to use intermediate pieces (not part of the delivery by default) whose thicknesses actually are max. 6mm, e.g. metal plates like our flanges. The necessary diameters for the boreholes when using flanges or the like result from the size of the counter nut and gasket of the respective hosepipe fitting: VE25.. (EBC10): Ø 37-42.5mm; VE32.. (EBC11): Ø 42-49mm; VE40.. (EBC12): Ø 54-60mm (always depending on the make of the counter nut - please take measurements on the delivered parts.)

⚠ **IMPORTANT:** Mind the necessity that every air in-/outlet on the case has to be carried out airtight. Hosepipe fittings, which are fitted directly to the case wall with the delivered gasket, need no further sealing. For intermediate pieces that come without gaskets the additional use of silicone will be required.

¹¹ Mind that purpose-made models might be equipped differently. Always measure off the delivered parts before cutting/drilling/cracking. Also, EBCs that shall be used together with LVBs will need different boreholes on the case walls - see the delivered installation manual for the LVBs.

3.2.1 Handling the hosepipe fittings

Currently three different types are in use: VE.._V1 (partly discontinued) and VE.._V2 are both for use along to our robust PVC hosepipes UFX.._V1. The newest model is VE.._V3. It is now the standard fitting used on new builds and fits to our PA wave tube UFX.._V2. The gaskets (GD..) used along to all these fittings are always of the same type.

3.2.1.1 Handling VE25_V1, VE32_V1 and VE40_V1

- 1) Slide the union nut (A) over the hosepipe (F). Then, press or "screw" the clamping ring (B) over the end of the hosepipe:



- 2) The screw joint (C), the rubber gasket (D) and the counter nut (E) have to be brought into either the case wall or the intermediate piece/flange (G) (ensure this connection to be tight):



- 3) Finally, push the hosepipe with the clamping ring in the screw joint and fix the connection with the union nut (again making sure that this connection is tight):



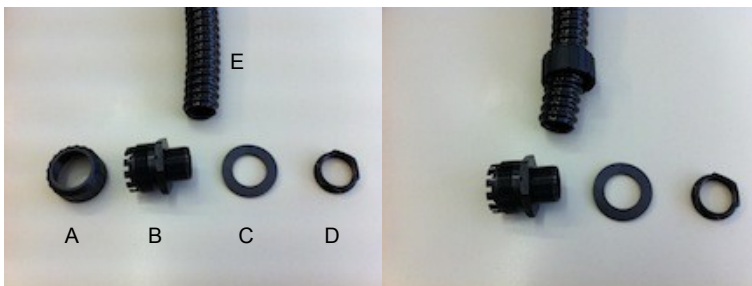
3.2.1.2 Handling VE25_V2, VE32_V2 and VE40_V2

Handling the second model is almost identical: The slotted clamping ring is now built into the joint screw as slats. Please do take good care to not fold over these slats as well as to position the hosepipe inside all of the slats when inserting it into the joint screw. Always cut the hosepipe as even as possible, in order to make it possible for the hosepipe to be seated solidly inside the screw joint (relevant for the tightness). We recommend the use of appropriate hosepipe nippers.

Furthermore, please do always push the hosepipe up to the stop inside the joint screw. Fix the connection by use of the union nut only when the pipe has been pushed fully inside. The union nut should be tied up well but do not over-tighten it.

Proceed like this:

- 1) Slide the union nut (A) over the hosepipe (E):



- 2) The joint screw (B), the rubber gasket (C) and the counter nut (D) have to be brought into either the case wall or (as seen here) into the intermediate piece/flange (F) (ensure this connection to be tight):



- 3) Finally, push the hosepipe up to the stop inside the joint screw and do fix the connection after that with the union nut. The union nut should be tied up well but beware to not over-tighten it. **IMPORTANT:** All slats of the joint screw have to remain outside the hosepipe, do not fold them over:



3.2.1.3 Handling VE25_V3, VE32_V3 and VE40_V3

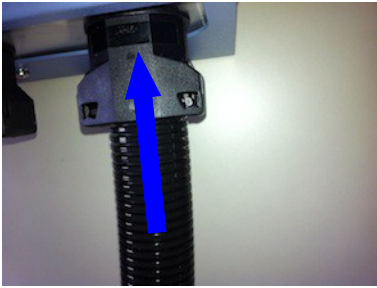
Handling these fittings is somewhat different as compared to the way the two other models are operated, whereat the new fittings offer significant advantages:

- ✓ It is by far easier to establish an air-tight connection between hosepipe and connector.
- ✓ Less effort is required for affixing the hosepipe in the connector (no clamping ring, no union nut).

The only downside of the new parts can immediately be spotted as their most prominent distinction: The necessity of tools or means of aid for loosening the connection once the hosepipes have been put inside the connectors. A suiting tool (VEOPENER) will of course always be part of our deliveries. No tools are required, on the other hand, for the establishment of the connection of hosepipe and connector.

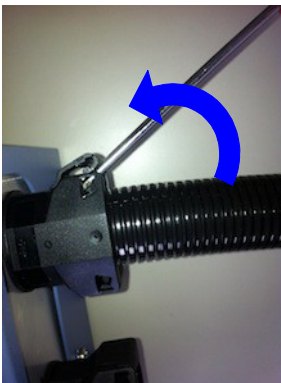
The handling in detail:

- 1) Again, cut the hosepipe as straight and even as possible. We recommend the use of nippers built for that purpose (can be ordered with us).
- 2) Also like above (see there), the connectors have to be affixed to either the showcase wall or to an intermediate piece/flange using the rubber gasket and the counter nut (make sure that this connection is air-tight).
- 3) Finally, simply press the delivered hosepipe into the connector until it stops. Have the fixing clips of the connector closed while doing so. There is no need to open them up in the beginning. There is also no need for the use of any tools for this process.



4) Use a tool (i.e. a screw driver or the one originally delivered by us) for opening up the connection again.

Push the latches on both sides to the outside in order to do so:



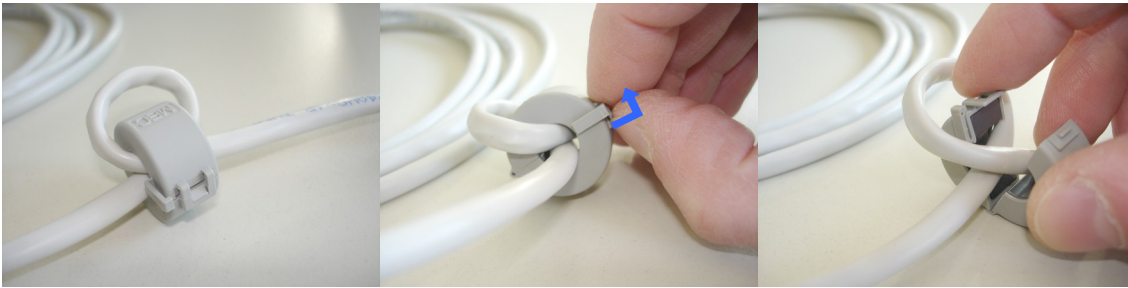
3.2.2 Connecting the hosepipes to the EBC

Dispose of the protective coverings on the hosepipe fittings of the EBC, if any. After that, proceed as described above in order to attach the hosepipes to the EBC's fittings. Mind the different types of fittings mentioned above.

3.3 Electrical connections

3.3.1 Handling the ferrite core

In case you need to take off the ferrite core(s) of the RH/T sensor cable or the control line temporarily, this can be done easily (kind and colours of the cores vary):



⚠ **IMPORTANT:** Do not forget to put the core(s) back on the cable before using the EBC: Wind the cable through each core once - see the pictures above. The core(s) should be positioned next to the RJ45 plug of the sensor cable or next to each of the RJ45 plugs of the control line respectively.

3.3.2 RH/T sensor

(Applies to EBCs used as master units only.)

Please see the printed note that has been added your delivery before handling the sensor.

⚠ **IMPORTANT:** The RH/T sensor has to be affixed at a suitable point inside the case, which ideally is in the close surrounding of the humidity sensitive objects stored/presented in the case. The sensor does not necessarily have to be placed in the visible part of the case, but even so, it has to be positioned on a spot and under conditions that are comparable to those of the exhibit in the case. Especially lighting installations and their effect on the temperature of the air surrounding the sensor may have a heavy impact on the functioning of a correct humidity control. Do not cover, wrap, or in any other fashion separate the sensor from the air that surrounds the exhibit.

By default the sensor comes complete with housing, a 2.5m or 5m cable, a RJ45 plug and a ferrite core. As neither all parts of the sensor housing nor the plug can be detached from the cable, you need a borehole of min. Ø 13mm in the case wall so as to be able to lead the cable (sensor sided) through. ⚠ **IMPORTANT:** The chip of sensor is an easily damageable electronic component and it juts out a bit from the housing. Therefore it is important to take good care to not harm it when leading it through the wall! It is also essential to take care for an airtight lead-through of the sensor cable through the wall of the case.

Once the sensor is positioned and mounted inside the case, verify that the EBC is still not plugged to the mains connection. Then plug the sensor cable to its jack on the front plate of your EBC, labelled **Sensor & Control in**. With the sensor plugged in, the EBC is already defined to be a master unit.

⚠ **IMPORTANT:** Do not plug or unplug the sensor to/from the EBC during operation! Always turn the EBC off,



wait for the completion of the pumping process (if any) and then pull the mains connection before handling the sensor cable. Otherwise the electronics of the EBC might be harmed and/or unexpected malfunctions might occur.

3.3.3 Control lines

(Applies to master/slave-systems only.)

⚡ **IMPORTANT:** Do not plug or unplug the control line to/from any affected EBC master or slave set as long as they are operating! Always turn the master off (all slaves follow automatically), wait for the completion of the pumping process (if any) and then and pull the mains connection cables of the affected EBCs before handling the control line(s) interconnecting the EBCs. Otherwise the electronics of the EBCs might be harmed and/or unexpected malfunctions might occur.

Every EBC that is ordered as a slave unit is going to be delivered with a 2m or 5m control line - a customary category-5e patch cable, twisted pair/non-crossed, with RJ45 plugs and ferrite cores on either end. Verify all EBCs are still not plugged to the mains connection, then plug one RJ45 to the master unit's jack labelled **Control out** and the other to **Sensor & Control in** on your slave. In case two or more slave units shall be controlled by one master unit, continue by always leading the control lines from **Control out** of the first/previous slave unit to **Sensor & Control in** of the following one.

3.3.4 Wirings for the external signals (Composite error alarm and on-off status)

Every miniClima Constant Humidity Device is equipped with two potential-free changeover contacts that can be used for the installation of external signals, i.e. red/green lights in a control room, or sirens. One signal indicates whether the EBC is turned on or off, the other switches whenever the EBC issues an alarm.

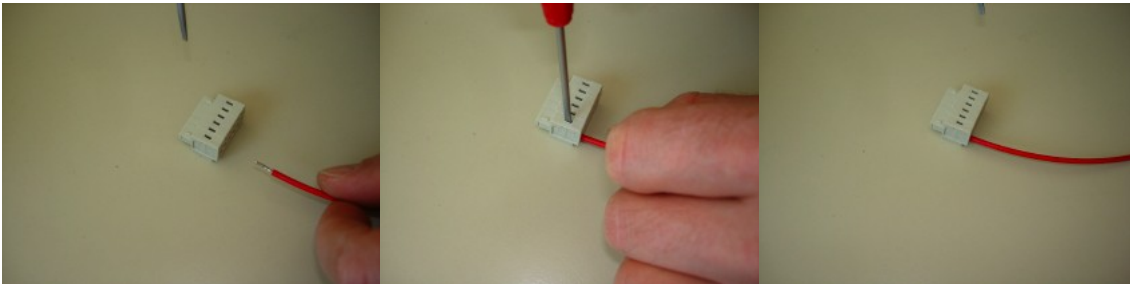
⚡* **CAUTION:** Max. voltage/ampereage for using of the changeover contacts: 48V/4A.

The wires that shall be connected to the changeover contacts of the EBC have to be put to the EBC's 6pin plug-in connector. Proceed as follows for handling the plug-in connector:

- 1) Grip the plug-in connector on its sides with index and thumb and pull it off from its connection plug. Hold the EBC with your free hand when doing so, to keep it from being torn away (⚡ **IMPORTANT:** The connector has to be pulled off the EBC for all works that shall be done on it):



- 2) For removing or adding wires to the 6pin plug-in connector, press a small screwdriver into the hole to open the according clamp beneath and pull/push the wire out/in at the same time:



- 3) It is best to accomplish all wished cable connections at once. For putting the plug-in connector back on the device it has to be pressed onto the connection plug. Do hold the EBC with your free hand when doing so, to keep it from slipping away.

Clamp positions: The live wire for each external signal has to be plugged to the resp. leftmost clamp, which is clamp 1 for the on-off signal and clamp 4 for the alarm signal (left to right; see the diagram below).

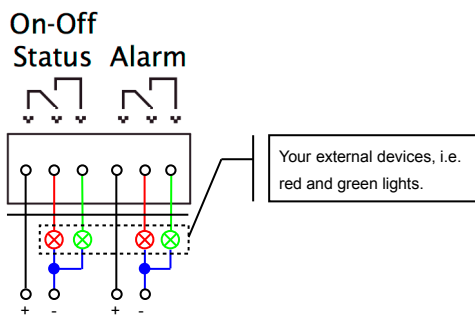


Fig. 5 - Wiring diagram and clamp positions for the external signals on the front plate of the EBC (max. voltage/ampereage: 48V/4A).

The changeover contacts of the EBC, the EBC's display and the status LED react to the following circumstances as noted here:



Status of the EBC		Display text	LED	Changeover contact for the external display of the EBC's on-off status			Changeover contact for the external display of any alarm currently issued by the EBC		
				Clamp 1, Live Wire	Clamp 2, Break Contact	Clamp 3, Make Contact	Clamp 4, Live Wire	Clamp 5, Break Contact	Clamp 6, Make Contact
No mains connection		(Off)	(Off)	+	+		+	+	
Stand by		Stand By	Green	+	+		+		+
On	No alarm	50% Humidify (or) 50% Dehumidify (or) 50% In Range	Green	+		+	+		+
On	Bottle alarm	50% BottleALARM	Red	+		+	+	+	
On	Reset bottle alarm, but persistent cause	50% BottleALARM	Green	+		+	+		+
On	Signal error alarm	Signal ERROR	Red	+		+	+	+	
On	Reset signal error alarm, but persistent cause	Signal ERROR	Green	+		+	+		+
On	Pump alarm	50% PumpALARM	Red	+		+	+	+	
On	Reset pump alarm, but persistent cause (EBC retries and in case of failure issues the pump alarm again)	50% Humidify (or) 50% Dehumidify (or) 50% In Range	Green	+		+	+		+
On	Humidity alarm	50% HumidityALARM	Red	+		+	+	+	
On	Reset humidity alarm, but persistent cause (EBC retries and in case of failure issues the humidity alarm again after 30 minutes)	50% Humidify (or) 50% Dehumidify (or) 50% In Range	Green	+		+	+		+

Table 1 - Possible alarm and status messages/signals (50% is used an exemplary value).

4 INITIAL AND CONTINUED OPERATION

As soon as all hosepipe connections and all required cable connections on the front panel are established, you can continue with setting the device into operation. Proceed as follows:

4.1 Initial step 1 - bottle

⚠ **IMPORTANT:** Do only use distilled water for the bottle. Demineralised water has proven to be insufficient as a substitute. Using it consequently led to the necessity of sending in the EBCs for service far too soon.

⚡* **CAUTION:** Do not spill water on the device! Keep distance from the EBC (or any other electric devices/installations) when filling/emptying/cleaning the bottle!

Unscrew the cover of the bottle to fill the bottle halfway at first - in order to reserve space for the condensate, which will be added to the distilled water in the bottle, every time the EBC is dehumidifying. On the other hand, it is necessary to always leave at least some cm of water in the bottle, so as to avoid the pump alarm



being issued during humidification.

Place the bottle next to the turquoise water level sensor(s) on the side or front of the device (if any; see section 3.1 "Positioning the bottle" on p. 10) and secure the bottle with the hook-and-loop-fastener. Push the transparent silicone hosepipe (which comes out on the left side of the EBC10 or -11, and on the front side of the EBC12) through the 5mm-hole in the bottle's cover.

⚠ **IMPORTANT:** When securing the bottle with the hook-and-loop-fastener, ensure that the bottle touches the water level sensor(s), otherwise the according alarm might not be issued correctly. Also mind, that the end of the hosepipe reaches the bottom of the bottle, so that all the distillate/condensate in the bottle is available for the humidification processes.

⚠ **IMPORTANT:** For units with only one or no water level sensors: Visually control the water level of the operating device regularly (see also section 4.7 "Controlling, feeding, emptying and cleaning the bottle" on p.37)!

4.2 Initial step 2 - mains connection

Use the delivered mains connection cable. At first plug the cable to the socket-inlet (backside) of the device. Then plug the cable to an appropriate (see section 1.4 "Further requirements", p. 6) socket-outlet with earthing contact. If necessary, you can use any common and approved international mains plug adapter - still, voltage and frequency of the mains connection have to be within the above (p. 6) mentioned range, and the connection has to be fuse protected and earthed.

⚡ **NOTE:** In case of a power outage (or when the mains connection has been cut in any other way), the EBC will always return to the last mode it had been working in (Stand-by or humidity control) as soon as the power supply becomes reestablished. Also, all settings that had been taken on the EBC will remain intact despite of any power outage.

4.3 Stand-by mode

Once a working mains connection has been established the EBC's LED lights up green and the display indicates the software version programmed into the EBC's processor. After some seconds the display switches to:



S t a n d B y

Fig. 6 - Display message during stand-by mode (Master sets).

→ S t a n d B y

Fig. 7 - Same message on a slave unit. Slave mode requires an established connection to the master and both the slave and the master have to be plugged to the mains supply.

While in stand-by mode, an EBC will neither circulate the air between case and EBC, nor will it start/continue with any pumping, humidifying or dehumidifying processes. Also no data will be logged or provided live on the RS232 interface at this stage. Previously recorded data can be read out during stand-by, though, and the menu on the EBC's front panel is accessible, too (see section 4.5 "Settings and read-outs - working with the menu", p. 25).

4.4 Switching on and off

⚠ **IMPORTANT:** An EBC should not be moved once it has been set into operation. Also, after having switched off again, always wait for the completion of the possibly following final pump process before moving or unplugging the unit.

Push the **On-Off/Reset** button for about a second to set the device into operation. Slave sets are switched automatically with the master, they can neither be switched on nor off separately.

Depending on the actual settings and the values in the case the unit (or chain of units) will immediately switch into the respective mode of operation, and so the message on the display of the master unit can now be one of these ("50%" being an exemplary value):

5 0 % H u m i d i f y

5 0 % D e h u m i d i f y

5 0 % I n R a n g e

Fig. 8 - Possible display messages during normal operation (Master sets).

The humidity value displayed to the left resembles the actual humidity in the case as measured by the miniClima RH/T sensor.

EBCs used as slave units will always copy the display of the chain's master unit, except for an arrow symbol



on the leftmost display element. This arrow marks any slave unit for better recognisability (the arrow is not prompted in menu mode):



Fig. 9 - Possible display messages during normal operation (Slave sets).

🔗 **NOTE:** In case the messages on your display are in German please turn to section 4.5.6 "Menu entry for the display and menu language" on p. 31 to see how to change the menu language.

If wished, press **On-Off/Reset** (on the master unit) again for about a second to set the device (or chain) back into stand-by mode. Depending on the latest processes, the unit(s) might pump down before going into stand-by. In that case the display would indicate it with this message:



Fig. 10 - Display message when pumping down after the EBC has been turned off (Master sets).



Fig. 11 - Display message when pumping down after the EBC has been turned off (Slave sets).

Please let the unit(s) always perform this pump process before unplugging or moving it/them.

4.5 Settings and read-outs - working with the menu

🔗 **NOTE:** The menu can be used both during operation and while the EBC is in stand-by mode.

The following variables can be set with the menu on the EBC front panel:

- ✓ The setpoint for the desired level of the relative humidity inside the case (%RH) - Menu entry 1.
- ✓ The upper and lower thresholds for the humidity alarm (%RH) - Menu entries 2 & 3.
- ✓ The acoustic alarm (On/Off) - Menu entry 4.
- ✓ The delay for the first humidity alarm (Days) - Menu entry 5.
- ✓ The menu and display language (English/German) - Menu entry 6.



- ✓ The correction for the interpretation of the data coming from the RH/T sensor (Calibration; %RH) - Menu entry 11.
- ✓ The hysteresis - Menu entry 12

Furthermore the following data can be read out from within the menu:

- ✓ The temperature inside the case as read from the RH/T sensor (°C) - Menu entry 7.
- ✓ The temperature on the condenser inside the EBC (°C) - Menu entry 8.
- ✓ The temperature on the heat sink inside the EBC (°C) - Menu entry 9.
- ✓ The hours of operation of the EBC (Hrs) - Menu entry 10.

⚠ **IMPORTANT:** Note down the current hours of operation of your EBC for future reference (cp. section 7.5 "General service" on p. 51).

⚠ **NOTE:** The menu is identical at masters and slaves, but some settings can only be taken on masters. If you i.e. try to alter the setpoint or one of the alarm thresholds within the menu of a slave unit, the software will switch back to the value set in the master shortly after.

⚠ **NOTE:** Any EBC will cancel the menu mode after a few seconds of inactivity. All changes that have been made and then confirmed with ↵ Enter will remain intact. All changes that have not been confirmed before will be rejected.

4.5.1 Menu entry Setpoint

With this entry you can set the desired level for the relative humidity inside your case (master units only) - this is the core function of an EBC (or a chain of EBCs). Default setting is 50%RH (might also be factory-set to a client-specific value). The EBC master unit always compares the value it receives from the RH/T sensor inside your case to the one defined here. It then starts/continues with its work to bring the measured value inside the case in line with the one set by you. All connected slaves will duplicate this work.

Press Menu/Esc to call up the menu of the master unit. The display reads:




Fig. 12 - Display message in menu mode, 1st menu entry.




4.5.1.1 Description/options

Setpoint is the variable that can be altered with this menu entry; **50%** (example) is the currently set value of this variable (in %RH).

Press **Menu/Esc** once more to leave the menu mode without changing any values.

 indicates that you can move up the menu to go to the next menu entry by pressing **▲ Up**. No changes will be made to the setpoint value by doing so.

 indicates that this variable can be set by pressing **↵ Enter**.

Press **↵ Enter** to alter the value for Setpoint (possible range: 15-85%). The two digits resembling the value on the display start to blink. Use the **▲ Up** and **▼ Down** buttons to make your changes, and confirm the new value with **↵ Enter**. The value will not be stored as long as you do not press this button.

4.5.2 Menu entry AlarmMax

With this entry you can define an upper threshold value for the humidity alarm to go off (master units only). If the relative humidity inside the case rises beyond this value and if it remains there for at least 30 minutes (standard alarm delay), an alarm will be issued from your EBC. Depending on the settings taken via the menu entry for the first Alarm (see p. 30) the first humidity alarm can additionally be delayed for 1 to 99 days.

By default the AlarmMax value is usually stored 10 points above the value for the setpoint. The minimum spacing required between AlarmMax and the setpoint is five points. Every time the setpoint is altered the upper threshold value will be moved analogously to keep the same spacing that has been set before. If you have, for instance, set an upper threshold value of 60% and you alter the setpoint from 50% to 55%, the value for AlarmMax will be moved to 65% automatically. **NOTE:** If the setpoint is put to its highest possible value (85%), the distance to AlarmMax is automatically reduced to 5 points, as otherwise the highest possible value for AlarmMax (90%) would have been crossed. Once the difference came to rest at 5 points by this it will be kept there - even if you chose a lower value for the setpoint shortly after. With a setpoint chosen low enough, AlarmMax can of course be raised again manually, though.

Press **Menu/Esc** to call up the menu, then press **▲ Up** once to move to the menu entry for the upper threshold value (AlarmMax). The display reads:



Fig. 13 - Display message in menu mode, 2nd menu entry.

4.5.2.1 Description/options

AlarmMax is the variable that can be altered with this menu entry; **65%** (example) is the currently set value of this variable (in %RH).

Press **Menu/Esc** once more to leave the menu mode without changing any values.

↑ indicates that you can move up and down the menu to go to the next/previous menu entries by pressing

▲ Up or ▼ Down. No changes will be made to the AlarmMax value by doing so.

↵ indicates that this variable can be set by pressing ↵ Enter.

Press ↵ Enter to alter the value for AlarmMax (possible range: min. 5 points above the setpoint; max. 90%).

The two digits resembling the value on the display start to blink. Use the ▲ Up and ▼ Down buttons to make your changes, and confirm the new value with ↵ Enter. The value will not be stored as long as you do not press this button.

4.5.3 Menu entry AlarmMin

With this entry you can define a lower threshold value for the humidity alarm to go off (master units only). If the relative humidity inside the case falls beyond this value and if it remains there for at least 30 minutes (standard alarm delay), an alarm will be issued from your EBC. Depending on the settings taken via the menu entry for the first alarm (see p. 30) the first humidity alarm can additionally be delayed for 1 to 99 days.

By default the AlarmMin value is usually stored 10 points below the value for the setpoint. The minimum spacing required between AlarmMin and the setpoint is five points. Every time the setpoint is altered the lower threshold value will be moved analogously to keep the same spacing that has been set before. If you have, for instance, set a lower threshold value of 40% and you alter the setpoint from 50% to 55%, the value for AlarmMin will be moved to 45% automatically. **NOTE:** If the setpoint is put to its lowest possible value (15%), the distance to AlarmMin is automatically reduced to 5 points, as otherwise the lowest possible value for AlarmMin (10%) would have been crossed. Once the difference came to rest at 5 points by this it will be kept there - even if you chose a higher value for the setpoint shortly after. With a setpoint chosen high enough, AlarmMin can of course be lowered again manually, though.

Press **Menu/Esc** to call up the menu, then press ▲ Up twice to move to the menu entry for the lower



threshold value (AlarmMin). The display reads:



Fig. 14 - Display message in menu mode, 3rd menu entry.

4.5.3.1 Description/options

AlarmMin is the variable that can be altered with this menu entry; **45%** (example) is the currently set value of this variable (in %RH).

Press **Menu/Esc** once more to leave the menu mode without changing any values.

indicates that you can move up and down the menu to go to the next/previous menu entries by pressing **Up** or **Down**. No changes will be made to the AlarmMin value by doing so.

indicates that this variable can be set by pressing **Enter**.

Press **Enter** to alter the value for AlarmMin (possible range: min. 10%; max. 5 points below the setpoint).

The two digits resembling the value on the display start to blink. Use the **Up** and **Down** buttons to make your changes, and confirm the new value with **Enter**. The value will not be stored as long as you do not press this button.

4.5.4 Menu entry AlarmBeep

With this entry you choose to be alarmed not only visually on the front panel of the EBC but also acoustically by a beeper that is built into the EBC (masters and slaves likewise). With an issued alarm and an activated beeper a clearly audible tone will be issued every three minutes by the EBC. The default setting for the acoustic alarm is "Off".

NOTE: The three minutes interval is constantly counted down in the background, even if no alarm is due. Therefore it can take up to three minutes before the beeper goes off for the first time after an alarm has been prompted visually via the LED and the display. You can test the alarm sound by activating it as described below and by then lifting the bottle up the upper water level sensor (turquoise plate), so that the water level in the bottle is above the sensor. Wait for up to three minutes to hear the sound.

Press **Menu/Esc** to call up the menu, then press **Up** three times to move to the menu entry for the acoustic alarm (AlarmBeep). The display reads:



Fig. 15 - Display message in menu mode, 4th menu entry.

4.5.4.1 Description/options

AlarmBeep is the variable that can be altered with this menu entry; **Off** (example) is the currently set value of this variable.

Press **Menu/Esc** once more to leave the menu mode without changing any values.

↑ indicates that you can move up and down the menu to go to the next/previous menu entries by pressing

▲ Up or **▼ Down**. No changes will be made to the AlarmBeep value by doing so.

↵ indicates that this variable can be set by pressing **↵ Enter**.

Press **↵ Enter** to alter the value for AlarmBeep (possible values: Off, On). The letters resembling the value on the display start to blink. Use the **▲ Up** or **▼ Down** buttons to make your changes, and confirm the new value with **↵ Enter**. The value will not be stored as long as you do not press this button.

4.5.5 Menu entry 1. Alarm

With this entry you define whether or not you want the EBC to delay its first humidity alarm (master units only). This function is useful i.e. for newly installed systems or after the doors of the controlled case have been opened for redecorations or the like. Default setting is "01D" (=one day, 24 hrs). At a set value of 00D the first humidity alarm will be issued after the usual delay of 30 minutes. This minimum delay is always kept for the EBCs to have some time for balancing the system air.

⚠ NOTE: If you intend to use this function and the EBC has possibly already issued a humidity alarm since it was last pulled from the mains connection, you should now turn the EBC off, wait for the completion of the possibly following pumping process, and then pull the mains plug. Wait for some minutes before plugging the EBC back on. Then continue as intended.

Press **Menu/Esc** to call up the menu, then press **▲ Up** four times to move to the menu entry for the delay of the first humidity alarm (1. Alarm). The display reads:



Fig. 16 - Display message in menu mode, 5th menu entry.



4.5.5.1 Description/options

1. Alarm is the variable that can be altered with this menu entry; **01D** (example) is the currently set value of this variable (in Days).

Press **Menu/Esc** once more to leave the menu mode without changing any values.

↑ indicates that you can move up and down the menu to go to the next/previous menu entries by pressing **▲ Up** or **▼ Down**. No changes will be made to the 1. Alarm value by doing so.

↵ indicates that this variable can be set by pressing **↵ Enter**.

Press **↵ Enter** to alter the value for 1. Alarm (possible range: 0 to 99 days). The digits resembling the value on the display start to blink. Use the **▲ Up** or **▼ Down** buttons to make your changes, and confirm the new value with **↵ Enter**. The value will not be stored as long as you do not press this button.

4.5.6 Menu entry for the display and menu language

With this entry you choose the preferred display and menu language for the EBC (masters and slaves likewise). Default setting is "English" (might also be factory-set differently).

Press **Menu/Esc** to call up the menu, then press **▲ Up** five times to move to the menu entry for the display and menu language. Depending on the set value the display will now issue one of these texts:

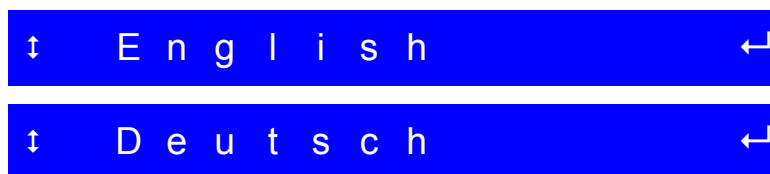


Fig. 17 - Possible display messages in menu mode, 6th menu entry.

4.5.6.1 Description/options

English or **Deutsch** is the currently set value of this variable.

Press **Menu/Esc** once more to leave the menu mode without changing any values.

↑ indicates that you can move up and down the menu to go to the next/previous menu entries by pressing **▲ Up** or **▼ Down**. No changes will be made to the set language by doing so.

↵ indicates that this variable can be set by pressing **↵ Enter**.

Press **↵ Enter** to alter the menu language (possible values: English, German ("Deutsch")). The letters



resembling the value on the display start to blink. Use the ▲ Up or ▼ Down buttons to make your changes, and confirm the new value with ↵ Enter. The value will not be stored as long as you do not press this button.

4.5.7 Menu entry t@Sensor

With this entry you can check for the present temperature (in °C) inside the case as measured from the RH/T sensor (possible with masters and slaves likewise - the value is always taken from the RH/T sensor in the case, thus identical).

Press Menu/Esc to call up the menu, then press ▲ Up six times to move to the menu entry for the temperature at the RH/T sensor (t@Sensor). The display reads:



Fig. 18 - Display message in menu mode, 7th menu entry.

4.5.7.1 Description/options

t@Sensor is the variable that can be read out with this menu entry; 20°C (example) is the currently present value of this variable.

Press Menu/Esc once more to leave the menu mode.

↑ indicates that you can move up and down the menu to go to the next/previous menu entries by pressing ▲ Up or ▼ Down.

A missing ↵ symbol indicates that this is a read out menu entry, where no variables can be set.

4.5.8 Menu entry t@Cond

With this entry you can check for the present temperature (in °C) at the specific EBC's (master or slave) intern condenser.

Press Menu/Esc to call up the menu, then press ▲ Up seven times to move to the menu entry for the temperature at the condenser (t@Cond). The display reads:



Fig. 19 - Display message in menu mode, 8th menu entry.



4.5.8.1 Description/options

t@Cond is the variable that can be read out with this menu entry; **-05°C** (example) is the currently present value of this variable.

Press **Menu/Esc** once more to leave the menu mode.

↑ indicates that you can move up and down the menu to go to the next/previous menu entries by pressing **▲ Up** or **▼ Down**.

A missing **↔** symbol indicates that this is a read out menu entry, where no variables can be set.

4.5.9 Menu entry **t@H-Sink**

With this entry you can check for the present temperature (in °C) at the specific EBC's (master or slave) intern heat sink.

Press **Menu/Esc** to call up the menu, then press **▲ Up** eight times to move to the menu entry for the temperature at the heat sink (**t@H-Sink**). The display reads:



Fig. 20 - Display message in menu mode, 9th menu entry.

4.5.9.1 Description/options

t@H-Sink is the variable that can be read out with this menu entry; **30°C** (example) is the currently present value of this variable.

Press **Menu/Esc** once more to leave the menu mode.

↑ indicates that you can move up and down the menu to go to the next/previous menu entries by pressing **▲ Up** or **▼ Down**.

A missing **↔** symbol indicates that this is a read out menu entry, where no variables can be set.

4.5.10 Menu entry **OpHours**

With this entry you can check for the time (in hrs) your specific EBC (master or slave) has been in operation.

⚠ NOTE: Due to thorough test runs before delivery, even new units will have been in use for some hours.



Press **Menu/Esc** to call up the menu, then press **▲ Up** nine times to move to the menu entry for the hours of operation (OpHours). The display reads:

Fig. 21 - Display message in menu mode, 10th menu entry.

4.5.10.1 Description/options

OpHours is the variable that can be read out with this menu entry; **000200** (example) is the currently present value of this variable (in hrs).

Press **Menu/Esc** once more to leave the menu mode.

↑ indicates that you can move up and down the menu to go to the next/previous menu entries by pressing **▲ Up** or **▼ Down**.

A missing **↵** symbol indicates that this is a read out menu entry, where no variables can be set.

4.5.11 Menu entry rH Corr

With this entry the EBC's interpretation of the data for the present RH value that is measured from the RH/T sensor can be corrected (master units only). This function is required for calibrating the system in case a metered (third party) instrument, which is positioned on the very same spot as the miniClima RH/T sensor, provides clearly different values than the EBC does (via its display). Default setting is "+00%" (=no correction of the signal).

⚠ NOTE: The value in the menu entry rH Corr can be altered on a slave unit, too, but this won't have any effect as long as this EBC is used as a slave. Once the unit is plugged to a RH/T sensor (and thus becomes a master), the EBC will use the last alteration for the interpretation of the incoming RH value, even if the alteration has been made during slave mode. You can check and alter the setting at any time.

Press **Menu/Esc** to call up the menu, then press **▲ Up** ten times to move to the menu entry for the correction of the RH value as it is measured in the case (rH Corr). The display reads:

Fig. 22 - Display message in menu mode, 11th menu entry.



4.5.11.1 Description/options

rH Corr is the variable that can be altered with this menu entry; **-01%** (example) is the currently set value of this variable (in %RH). This value will be added to or subtracted from the read out value that comes in from the RH/T sensor (i.e. 50%RH - 1%RH = 49%RH). Therefore, in the example the EBC will display and consider 49% to be the current relative humidity during normal operation.

Press **Menu/Esc** once more to leave the menu mode without changing any values.

↑ indicates that you can move up and down the menu to go to the next/previous menu entries by pressing **▲ Up** or **▼ Down**.

↵ indicates that this variable can be set by pressing **↵ Enter**.

Press **↵ Enter** to alter the value for rH Corr (possible range: -5 to +5%RH). The digits resembling the value on the display start to blink. Use the **▲ Up** or **▼ Down** buttons to make your changes, and confirm the new value with **↵ Enter**. The value will not be stored as long as you do not press this button.

4.5.12 Menu entry Hyst.

With this entry you can set the value for the hysteresis (masters and slaves likewise). The hysteresis defines a setpoint range around the setpoint chosen in menu entry 1. At a setpoint of i.e. 50% and a hysteresis of i.e. 2% the EBC will delay switching between its modes of operation (humidification, being in range, dehumidification), so that for instance humidification will only start when the humidity level has fallen to 50-2=48%. On the other hand, dehumidification would only start once the humidity level has reached 50+2=52%. Altogether, the hysteresis helps in flattening the curve for the relative air humidity inside the case. As of Revision 2 all units out of series EBC10/11/12 offer this menu entry, enabling the user to choose a value from 1 to 4% for the hysteresis, rather than to have this value being fixed at 2%, as it was the case with all previous models of series EBC10/11/12. The factory-set value remains to be at "02%".

⚠ NOTE: Due to technical reasons the hysteresis has to be chosen for every single unit being part of a chain of EBCs. So, changing the hysteresis on the master unit does not change the respective setting in any of the slaves. Please do check the menu of all slaves, so that the different EBCs will not eventually work against each other.

Press (one after the other on all EBCs, starting with the Master) **Menu/Esc** to call up the menu, then press **▲ Up** eleven times to move to the menu entry for the hysteresis (Hyst.). The display reads:



Fig. 23 - Display message in menu mode, 12th menu entry.

4.5.12.1 Description/options

Hyst. is the variable that can be altered with this menu entry; **02%** (example) is the currently set value of this variable (in %RH).

Press **Menu/Esc** once more to leave the menu mode without changing any values.

indicates that you can move down the menu to go to the previous menu entry by pressing **▼ Down**. No changes will be made to the rH Corr value by doing so.

indicates that this variable can be set by pressing **↵ Enter**.

Press **↵ Enter** to alter the value for Hyst. (possible range: 1-4%). The digits resembling the value on the display start to blink. Use the **▲ Up** or **▼ Down** buttons to make your changes, and confirm the new value with **↵ Enter**. The value will not be stored as long as you do not press this button.

4.6 Procedures during operation

During normal operation every EBC (master or slave) always displays the currently present humidity level (in %RH) and whether this level is in range (=setpoint plus/minus hysteresis) or not. If not, the display prompts the kind of process that is currently activated in order to approach the setpoint (humidification or dehumidification) - see Fig. 8 and Fig. 9 (p. 24). Slave units additionally prompt a rightwards arrow in the display (leftmost symbol), in order to be immediately recognised as working in slave mode.

The LED on the front plate is on and gleaming green, signalling that the system works properly. The changeover contacts for your (possibly installed) external status display devices are both switched ("make contact"; cp. Table 1, p. 22) according to the EBC's status of being switched on and having not issued any alarm. During all times the intern fan for the circulation of the air between EBC and case is running with a silent buzz.

From time to time short pumping processes can be heard: During dehumidification the collected condensate is transported to the bottle every now and then. When humidifying the EBC's intern pump repeatedly forwards little amounts of distillate/condensate from the bottle to the inside of the EBC in order to keep the water in the tub at the required level. To keep the intern condenser from getting covered in ice with an EBC constantly working in dehumidification mode, the unit will execute short defrosting processes every 30



minutes. At continuous humidification, on the other hand, every EBC (as of processor version V121107.01) is going to empty its intern tub completely every six hours, thus avoiding deposits being built up on the tub's surface (mind to empty and clean the bottle in regular intervals - see further below).

In dehumidification mode (and, if cooling of the inner electronics is required, also during humidification mode) a second fan inside the EBC (EBC10/11) or a pair of them (EBC12) will be turned on to cool the EBC's heat sink(s) and inner parts. The cooling fan(s) is/are somewhat louder than the above-mentioned circulation fan (see section 9 "Technical data" on p. 53). A warm air stream coming out from the cooling slits on the EBC's cover and bottom can now be felt. The cooling air is sucked to the inside of the EBC on the unit's right-hand (EBC12: right and left-hand) cooling air grill(s). All those passages for the cooling air (cover, bottom, right and, where appropriate, left side) have to be kept clean and an edge distance of about 5cm shall be left from any air grill on the side and from the slits on the cover.

NOTE: In case of a power outage (or when the mains connection has been cut in any other way), the EBC will always return to the last mode it had been working in (Stand-by or humidity control) as soon as the power supply becomes reestablished. Also, all settings that had been taken on the EBC will remain intact despite of any power outage.

4.7 Controlling, feeding, emptying and cleaning the bottle

EBCs with sensors for both the water high mark and the water low mark will issue the corresponding alarm as soon as it becomes necessary to alter the water level in the bottle (given the bottle is positioned and maintained correctly). The water level in the bottles of all other EBCs should be controlled from time to time (the interval depending on the overall conditions).

After some weeks or months of operation it might become necessary to clean the bottle of any unit, as dust and particles from within the case will finally have been transported to the bottle. Deposits on the inside of the bottle might also lead to a situation where the water level sensors are incapable of detecting the water anymore.

NOTE: Do only use distilled water for the bottle, otherwise the EBC might need to be sent in for intern cleaning ahead of time. Also, if uncertain, fill the bottle only halfway at first, so as to leave space for the condensate that will be added to the distilled water in the bottle when the EBC is dehumidifying.

Proceed as follows to feed/empty/clean the bottle:



- 1) Turn the EBC off (by pushing and holding **On-Off/Reset** for about a second). Slaves are switched automatically with their master. Then, wait for the pump process to be completed (if any), and (**IMPORTANT**) pull the mains plug.
- 2) Pull out the silicone pipe from the bottle and open the hook-and-loop-fastener.
- 3) Clean, feed or empty the bottle as required and close the bottle again. Mind that the bottle should always be filled with at least some cm of distilled water so as to avoid the pump alarm being issued during humidification. **CAUTION:** Do not spill water on the device! Danger of electric shock! Keep distance from the device or any other, third party electric parts/installations when handling the bottle!
- 4) Put the bottle back on its place, secure it with the hook-and-loop-fastener (the bottle should touch the sensor(s)), and push the silicone pipe inside again (the end of the pipe should reach the bottom of the bottle). Make sure to not having spilled water on the device, then push the mains plug in again.

5 ALARMS - WHAT THEY MEAN AND HOW TO REACT

miniClima Constant Humidity Devices are equipped with several alarms that go off when an intervention by the user is needed. In the event of an alarm the EBC's LED turns red and the display provides immediate information about the kind of problem. Additionally any alarm switches the potential-free contact for the external display of the alarm status (see section 3.3.4 "Wirings for the external signals (Composite error alarm and on-off status)" on p. 20. Pushing the **On-Off/Reset** button next to the LED shortly resets the alarms according to the rules provided in Table 1 (p. 22).

5.1 Humidity alarm



Fig. 24 - Display message for the humidity alarm. The digits highlighted in red blink. The words "Humidity" and "ALARM" light up rotationally.

5.1.1 Description of the alarm

This alarm does not necessarily point to any sort of malfunction, but first of all provides the user with the information that the desired humidity level has not (yet) been reached. The EBC will continue with its work uninterrupted. The alarm appears when the actual RH value inside the case remains for at least 30 minutes beyond one of the predefined thresholds (see sections 4.5.2 "Menu entry AlarmMax" on p. 27 and 4.5.3



"Menu entry AlarmMin" on p. 28).

⚡ **NOTE:** In case the mains connection has recently been pulled (i.e. newly installed EBCs, power outage,...), the humidity level inside your case might not have been in range over a longer period of time than those 30 minutes. It might in fact have been outside that range for up to the time span set in the menu for the first humidity alarm, instead (see section 4.5.5 "Menu entry 1. Alarm", p. 30).

5.1.2 Remaining EBC functions during this alarm

- ✓ Humidify: Yes
- ✓ Dehumidify: Yes
- ✓ Air circulation between case and EBC: Yes
- ✓ Pump: Yes
- ✓ Fan(s) for the device cooling: Yes
- ✓ Slave control: Yes

5.1.3 Possible reasons and solutions

- ✓ Absence of ventilation for the device's self-produced heat. Check the dust filter(s) at the cooling air inlet(s) - it/they might need cleaning/washing or replacement (see section 7 "Maintenance and care", p. 47). Keep the device's cooling air grills/slits always free and provide for enough ventilation at the device's place of installation! Beware that the EBC might overheat otherwise! See also section 3.2 "Setting up the EBC, establishing the hosepipe connections", p. 12.
- ✓ No or not enough water in the bottle - in this case the pump alarm would be issued, too, after some time. Refill the bottle (see section 4.7 "Controlling, feeding, emptying and cleaning the bottle", p. 37).
- ✓ Faulty water handling system (pump, silicone pipe,...). See the reasons and solutions outlined for the pump alarm (p. 40).
- ✓ Case doors are open or have recently been open (i.e. for works within the case). Reset the alarm and let the system balance for some more time. See also section 4.5.5 "Menu entry 1. Alarm" on p. 30.
- ✓ The alarm delay is chosen too short for the concrete system (i.e. due to exceptionally humid artefacts). Reset the alarm and let the system balance for some more time. See also section 4.5.5 "Menu entry 1. Alarm" on p. 30.
- ✓ Inappropriate application/installation/handling of the device, especially regarding airtight hosepipe connections, an airtight lead-through of the sensor cable through the case wall and the position of the sensor in the case. Please read the manual again section by section and check/change the realised



application/installation/handling.

- ✓ Broken case sealing/unqualified case. Please get in touch with the manufacturer/distributor of your case.
- ✓ Chosen setpoint is too ambitious - see section 9 "Technical data", p. 53.
- ✓ Due general service or faulty device - see section 7 "Maintenance and care", p. 47.

5.2 Pump alarm



Fig. 25 - Display message for the pump alarm. The words "Pump" and "ALARM" light up rotationally.

5.2.1 Description of the alarm

The EBC's water handling system is troubled or broken, and the water can not be transported in and/or out of the EBC anymore, or the intern sensor detects water where there should not be some (anymore). In order to protect the pump from overheating the unit will block the pump until the alarm has been reset. The alarm might also be set back automatically once the intern sensor has dried up (i.e. if the alarm came because the unit was been moved during operation).

5.2.2 Remaining EBC functions during this alarm

- ✓ Humidify: Not unconditionally
- ✓ Dehumidify: Not unconditionally
- ✓ Air circulation between case and EBC: Yes
- ✓ Pump: Not unconditionally
- ✓ Fan(s) for the device cooling: Yes
- ✓ Slave control: Yes (succeeding slaves continue to work normally - includ. humidification and dehumidification)

5.2.3 Possible reasons and solutions

Please investigate in the outlined order:

- 1) At first try whether resetting (short push on **On-Off/Reset**) resolves the problem lastingly. If not continue as follows.



- 2) Turn the EBC off (by pushing and holding **On-Off/Reset** for about a second). Slaves are switched automatically with their master. Wait for the completion of the pump process (if any), then **⚠ IMPORTANT** pull the mains plug. Check whether you can spot puddles or drops of water on the outside close around or underneath the EBC, which are not caused i.e. by having handled the bottle unwarily, and/or whether you can spot any leaks on the bottle or on the outside part of the silicone pipe. If the bottle and/or the silicone pipe are damaged, make a photo of the pipe/the bottle and send it to [<office@miniclima.com>](mailto:office@miniclima.com) along to your contact data and a brief description of the problem. Leave the EBC plugged off meanwhile and do not use it yet. We'll be getting in touch asap to discuss the next steps. Should both the bottle and the pipe be in order but still some water, which you think has come out of the EBC, is found outside the EBC, so please make a photo of this and send it to [<office@miniclima.com>](mailto:office@miniclima.com) along to your contact data and a brief description of the problem. Leave the EBC plugged off meanwhile, not yet using it again. We'll be getting in touch asap to discuss the next steps. If none of the above has applied, continue with the next step, leaving the EBC turned off and pulled from the mains.
- 3) Check the water level in the bottle and whether the silicone pipe reaches to the bottom of the bottle. If the end of the pipe is not under water, put it inside. Plug your EBC back on and restart it (long push on **On-Off/Reset**). The unit will be pumping again and should manage this time. If not, or if the pipe has been and still is inside the bottle correctly anyway, and if also the bottle has been and still is filled correctly, continue with the next step.
- 4) Plug the EBC back on and restart it. Listen whether you can hear the pump working now. If no sound from the pump could be heard after the EBC had been switched on again, put the setpoint to a value well above the currently measured RH level in the case (see section 4.5.1 "Menu entry " on p. 26; this setting will not be needed for a long time, so no relevant changes to the relative humidity inside your case will be made). If you still can not hear any sound from the pump over the next 10 seconds once the new setpoint had been saved, then the EBC needs to be sent in - see section 8 "Deinstalling / packing up / storing / shipping" on p. 51. If, on the other hand, the pump can be heard, put the setpoint back to your preferred value and continue with the next step.
- 5) Turn the EBC off again. Slaves are switched automatically with their master. **⚠ IMPORTANT:** Pull the mains plug. Loosen the screws that fix the cover of the EBC. Lift the cover (**⚡ CAUTION:** Do not tear the earthing wire!). Check whether one of the inside parts of the silicone pipe is kinked, so that no water would be able to pass it. If yes, please make a photo of it and send it to [<office@miniclima.com>](mailto:office@miniclima.com) along to your contact data and a brief description of the problem. We'll be getting in touch asap to discuss the next steps. Do close the cover in this case (**⚠ IMPORTANT:** Take care to not squeeze any pipes or wires!), but leave the EBC plugged off, not yet using it again. In case the pipe is not kinked, leave the cover open and continue with the next step.
- 6) Check whether you can spot any puddles or drops of water on the inside at the bottom of the housing

and/or whether one of the inside parts of the silicone pipe is loose or leak. If either of those two questions has to be answered with a yes, make a photo of the insides of the EBC and send it to

<office@miniclima.com> along to your contact data and a brief description of the problem. We'll be getting in touch asap to discuss the next steps. Do close the cover in this case (⚠ **IMPORTANT:** Take care to not squeeze any pipes or wires!), but leave the EBC plugged off, not yet using it again. If neither the pipe is broken nor any water can be seen on the bottom of the housing, leave the cover open and continue with the next step.

- 7) If the pump issues or has issued an odd sound unlike the usual one, see for the pump head (see Fig. 26, p. 42) and try snapping it in by pushing it down a bit. If the pump head can be felt and/or heard snapping in, the problem is probably solved and you can use your EBC again. In this case, as well as in all other: Do now close the cover of the EBC again (⚠ **IMPORTANT:** Take care to not squeeze any pipes or wires!). Fasten all screws of the cover and put the EBC back to work again.
- 8) If the odd sound from the pump can still or again be heard, or if the pump head hasn't been loose at all and the pump alarm is soon reissued, despite of having gone through all the possibilities listed here, the EBC needs to be sent in - see section 8 "Deinstalling / packing up / storing / shipping" on p. 51.



Fig. 26 - Pump head (here as built into the housing of an EBC10/11).

5.3 Bottle alarm

50 % B o t t l e
A L A R M

Fig. 27 - Display message for the bottle alarm. The words "Bottle" and "ALARM" light up rotationally.

5.3.1 Description of the alarm

This alarm goes off when (one of) the water level sensor(s) of the bottle detects that the water level is becoming too high (or too low respectively). Humidification is possible despite this alarm, but as soon as all water is used up, actual humidification cannot take place anymore. In consequence the EBC's next attempt



to pump water inside will fail and so the pump alarm will additionally be issued (see above).

⚠ **NOTE:** By default any EBC is equipped with one water level sensor for the high mark of the bottle. Some accordingly ordered units also have a sensor for the low mark, and some have been ordered without any means for monitoring the water level in the bottle.

5.3.2 Remaining EBC functions during this alarm

- ✓ Humidify: Yes (until the remaining water in the bottle is used up)
- ✓ Dehumidify: Yes, partly (☁️ **CAUTION:** In case the max. level has been reached, mind to empty the bottle in time! There will be enough time for this after the alarm has been issued. For safety reasons and in case the alarm had been triggered by the max.-level sensor, the EBC will stop dehumidifying after four hours.)
- ✓ Air circulation between case and EBC: Yes
- ✓ Pump: Yes
- ✓ Fan(s) for the device cooling: Yes
- ✓ Slave control: Yes

5.3.3 Possible reasons and solutions

Please investigate in the outlined order:

- 1) Is the bottle either too full or is it becoming empty? -See section 4.7 "Controlling, feeding, emptying and cleaning the bottle" on p. 37 on how to handle the bottle.
- 2) The bottle should actually touch the water level sensor in order to enable the sensor to issue the alarm. The water level sensor is a turquoise rectangular plate mounted to the aluminium bottle holder, cp. Fig. 3 on p. 10). Use the black hook-and-loop-fastener for pulling the bottle towards the sensor for as much as possible.
- 3) If the water level is in order, the surface of the bottle might have become soiled over the time. Verify the function of your upper water level sensor by first pulling the bottle away from the sensor (alarm shall go away with this) and by then putting a finger on the centre of the sensor. If the alarm comes back with your finger on the upper sensor, cleaning the bottle should solve the matter. See section 4.7 "Controlling, feeding, emptying and cleaning the bottle" on p. 37 on how to handle the bottle.
- 4) If neither of the above helps, do get in touch to discuss the next steps.

5.4 Signal error alarm



S i g n a l E R R O R

Fig. 28 - Display message for the signal error alarm.

5.4.1 Description of the alarm

The unit in question receives no or a too weak signal from the RH/T sensor (if it's a masters) or from the foregoing EBC (if it's a slave) for its operations.

5.4.2 Remaining EBC functions during this alarm

- ✓ Humidify: No
- ✓ Dehumidify: No
- ✓ Air circulation between case and EBC: Yes
- ✓ Pump: Will once pump down with the occurrence of the alarm
- ✓ Fan(s) for the device cooling: No
- ✓ Slave control: No

5.4.3 Possible reasons and solutions

🔔 **NOTE:** If the measured humidity inside the case reaches 5%RH or 95%RH respectively, the EBC master unit interprets this signal as being incorrect and issues the signal error alarm. In consequence the EBC stops conditioning the air and will only continue once the measured value comes back to the permissible range again (see section 9 "Technical data" on p. 53). This is not a failure, but an intended safety reaction programmed into the EBC, as with humidity levels measured to be so extreme, it is anticipated that the sensor is actually broken, delivering false values.

For master units issuing the alarm: the controller does not receive a correct or any signal from the RH/T sensor. If the actual humidity level in the case is not beyond the permissible values (see above), continue as follows (investigating in the outlined order):

- 1) Check the cable, the RJ45 plug on the front of the EBC and whether it is plugged to the correct jack (Sensor & Control in).
- 2) If all seems to be in order, check the sensor inside the case for any obvious flaws (damages on the cable, damages on the sensor housing or on the sensor chip that juts out on the end of the housing,...).



- 3) If you have a spare miniClima RH/T sensor (of the same kind) at hand (i.e. from other installations), try if the alarm goes away with another sensor plugged on (not forgetting to turn off, to wait for the possible pumping process to be finished and to pull the mains before handling any sensor cables). If the alarm goes away with another sensor, do get in touch to receive a replacement.
- 4) If the alarm remains/comes again even with a second miniClima sensor, and in those cases where a second sensor is not at hand for this test at all, do please get in touch to discuss the next steps.

On EBCs in slave mode, the controller does not receive a correct or any signal from the foregoing unit (the master or another slave in the chain). If the foregoing unit does not issue any alarm, continue as follows (investigating in the outlined order):

🔧 **NOTE:** Always treat the first unit of a chain of EBCs that issues an alarm first.

- 1) See whether the foregoing master and/or the foregoing slave(s) are turned on and if yes, whether any of them issues an alarm, too (in which case this unit, that is to say: the very first in the line, that issues an alarm, has to be examined first).
- 2) Check the cable connection between the affected EBC and the foregoing one, check both RJ45 plugs and whether they are plugged to the correct jacks: **Sensor & Control in** on the affected unit, **Control out** on the foregoing one.
- 3) If all seems to be in order, you might need to replace the cable. Do get in touch or try replacing the control line with a common category-5e patch cable, twisted pair/non-crossed, with RJ45 plugs on either end. Please do take off the ferrite cores from the original cable and use them with the new cable. Please do also remember the necessity to turn the chain of EBCs off (via the master unit), to wait for the possible pumping processes to be finished and to pull the mains of the affected units before handling a control line.
- 4) If a new cable doesn't help get in touch to discuss the next steps.

6 TROUBLESHOOTING

6.1 The unit stops dehumidifying before it reaches the setpoint

At certain conditions and a setpoint of 50%RH or less, it might become necessary to choose the setpoint even lower than required. The EBC tries to slow down its work before it reaches the setpoint, so that it won't overshoot the desired value. Especially at low setpoints this can lead to a situation where the setpoint is actually constantly missed disregarding the fact that the EBC could easily do it. Choose a setpoint somewhat



beneath your desired value and see whether the sought condition in the case will now be met.

6.2 The desired humidity level is not reached at all

Please read the comments on the humidity alarm (p. 38ff).

6.3 The humidity level displayed on the EBC is different to the one of a third party instrument that has been put inside the case

Please do only use metered instruments to verify the humidity level measured by the EBC. Third party instruments for measuring/verifying the humidity level might display different levels when positioned differently (not exposed to the very same conditions). Also the accuracy of all used sensors (even metered ones) has to be taken into account. Please, mind that measuring the relative humidity is never 100% accurate. If you still feel the miniClima sensor gives out false values, consider using the correction menu on the EBC front (see section 4.5.11 "Menu entry rH Corr" on page 34) or give us a call.

6.4 A red LED lights up on the front panel

The unit displays an alarm. Note the kind of the alarm (display messages) and turn to p. 38ff (section 5 "Alarms - what they mean and how to react") for further investigation.

6.5 When pulling or plugging in the sensor cable or the control line the EBC reacts in an unexpected way

Never plug or unplug a sensor or control line during operation. Your EBC can become seriously damaged through electrostatic discharges. Always turn all interconnected units off (via the master), wait for the completion of the possibly following pump process and pull their mains connections before pulling or plugging in those signal cables.

6.6 The bottle sensor for the high mark issues its alarm, despite the water level being far below the sensor

This can happen when the inside of the bottle has been soiled over the time, so the sensor can't detect the water anymore. See the possible reasons and solutions for the bottle alarm on p. 43.



6.7 The bottle sensor for the low mark won't issue its alarm, despite the water level being far below the sensor

This can happen when the inside of the bottle has been soiled over the time, so the sensor can't detect the water anymore. Please check by pulling away the bottle from the sensor. If the bottle alarm is issued by doing so, cleaning the bottle should solve the problem. See section 4.7 "Controlling, feeding, emptying and cleaning the bottle" on p. 37 on how to handle the bottle. If the problem cannot be solved as described, get in touch to discuss the next steps.

6.8 The device won't react in any sort of way anymore, neither the LED nor the display are on, despite of the device being plugged on correctly

This behaviour points at a blown fuse. Other possible sources of error: A broken mains connection cable (please verify by using a different (known to be working) cable with the affected EBC); a broken or non-powered socket outlet (please verify by using a different (known to be working) socket outlet). In order to replace the fuse, do please turn to section 7.2 "Replacing the miniature fuses" on p. 49. If neither of the above applies and your EBC still won't react, the EBC needs to be sent in for inspection/repair (see section 8 "Deinstalling / packing up / storing / shipping" on p. 51).

7 MAINTENANCE AND CARE

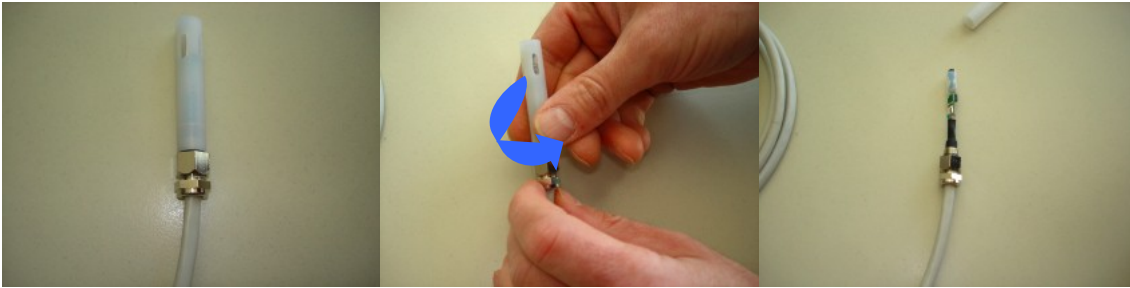
7.1 Replacing the chip of the RH/T sensor

Even if it happens rarely, it might one day become necessary to replace the sensing part of the RH/T sensor (hereinafter referred to as "chip")¹². To do so, neither the housing, nor the cable, nor other parts need to be dismantled, just the chip itself.

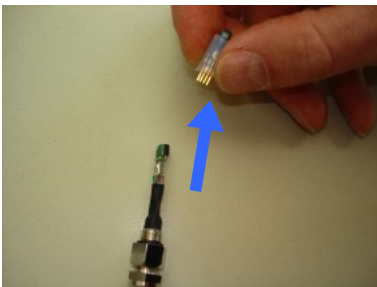
At first, please do turn the EBC off and pull the mains plug once the possible pump process has been finished. Then continue as outlined:

- 1) Unscrew the plastic part of the housing:

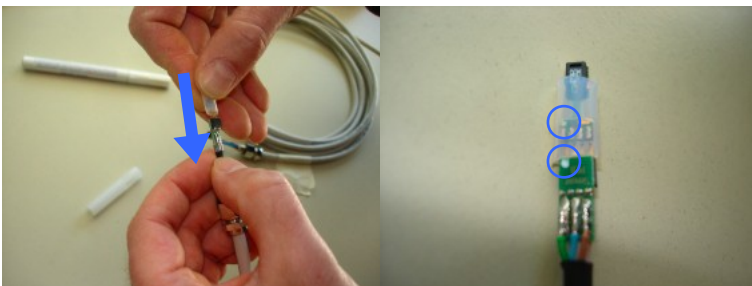
¹² A new chip can be ordered via your EBC supplier or directly with us.



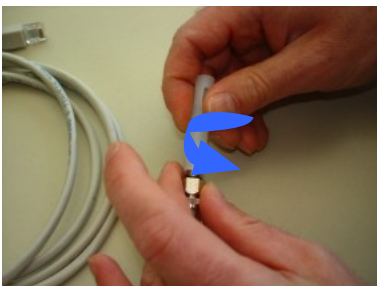
2) Pull the old chip off¹³:



3) Push the new chip cautiously onto the socket. **! IMPORTANT:** Note the markings for the correct polarity - a white dot on both the chip and socket. The two white dots have to be on the same position and side (see the blue circles in the picture below):



4) Screw the plastic part of the housing back on:



5) Once done, you can set your EBC back to work.

¹³ Please do put the old chip in a padded envelope (along with your contact data, the S/N and/or type number of your EBC, as well as with a brief description of the reason for the exchange) and return it to our address.

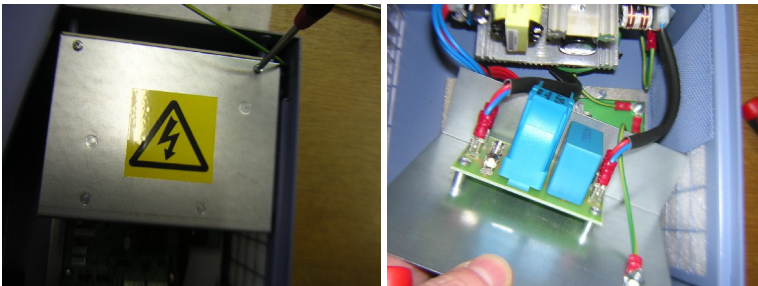
7.2 Replacing the miniature fuses

⚡* **CAUTION:** These works should be carried out by skilled personnel only!

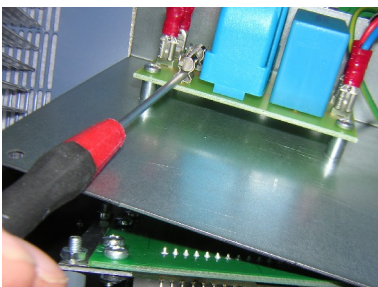
Every EBC of series EBC10/11/12 (Rev.3) is protected by two miniature fuses: one (3.15A/250V; Ø 5mm; length: 20mm) is part of the line filter, the other (4A/250V; Ø 5mm; length: 20mm) is part of the switching power supply unit. If an EBC suddenly stops working and even the LED or the display on the front of the device won't light up despite of a correct installation and despite of having plugged the device to a working socket outlet, the fuse might have been blown.

⚡ **IMPORTANT:** Let the fuse be replaced by skilled personnel and provide them with the following guidelines:

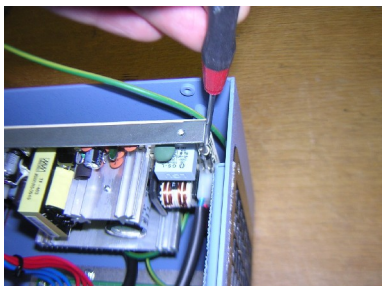
- 1) If the affected EBC is in slave mode: Turn off the master unit of the chain (by pushing and holding **On-Off/Reset** for about a second). Slaves are switched automatically with their master.
- 2) ⚡ **IMPORTANT:** It is very likely that there is still water in the evaporation tub of the device with the blown fuse. You need to ensure that this EBC is moved very cautiously (if at all) during the following operation.
- 3) ⚡* **CAUTION:** Pull the mains plug of the affected EBCs.
- 4) Open the cover of the device by loosening the screws (⚡* **CAUTION:** Beware to not tear away the earthing wire!).
- 5) Unscrew the protective cover:



- 6) The line filter is mounted to the back of that cover. Take out the fuse (using a small screw driver with insulation):



- 7) Check if the fuse broken. If yes, replace it with a new one (⚡ **CAUTION:** For a continued protection against fire replace only with a fuse of the same type and rating!) and continue with step 10). If not, put the fuse back on its holder and continue with the next step.
- 8) Take out the fuse of the switching power supply unit (using a small screw driver with insulation):



- 9) Check if this fuse is broken and snap a working fuse back in (⚡ **CAUTION:** For a continued protection against fire replace only with a fuse of the same type and rating!)
- 10) Put the protective cover back on its place and fix it with its screws (⚡ **IMPORTANT:** Beware to not squeeze any wire!)
- 11) Close the cover (⚡ **IMPORTANT:** Beware to not squeeze any wire or the silicone pipe!) and fasten the screws again. Plug the mains connection back on (both the LED and display should light up now).

7.3 Cooling air in-/outlets

Dust on the air grill(s) or air slits blocks the cooling airflow, which might in consequence overheat the device and/or reduce its dehumidification capacity. Therefore, and depending on the condition of the surrounding air, especially the cooling air inlet on the right side (EBC10/11/12) as well as the one on the left side (EBC12) has to be checked/cleaned regularly: Vacuum clean the mounted grill(s) from the outside regularly. From time to time you should take the filter(s) out for washing or for replacing it/them:

- 1) Turn the EBC off by pushing and holding **On-Off/Reset** for about a second. Slaves are switched automatically with their master. Then, wait for the pump process to be completed (if any) and (⚡ **IMPORTANT**) pull the mains plug.
- 2) Unscrew the respective grill, take out the dust filter, and wash or replace it with a new one.
- 3) Put the new or washed (and dried) filter back on its place and fix the grill on the device again.
- 4) Plug the mains back on and put the EBC back to work.

From time to time you should also check the cooling air outlets (top and bottom), whether or not they need cleaning with a vacuum cleaner, too. Mind to not move the operating device, though: Turn it off (slaves are switched via their master), let it finish with its pumping process (if it comes after having turned off), and pull



the mains plug before moving the device for inspecting the air slits.

Finally, do check regularly whether adequate ventilation is still given at the device's place of installation (see section 3.2 "Setting up the EBC, establishing the hosepipe connections", p. 12).

7.4 Bottle

See section 4.7 "Controlling, feeding, emptying and cleaning the bottle" (p. 37).

7.5 General service

A general service of the device carried out by the manufacturer is recommended after 15,000-20,000 hours of operation (equals approx. two years when permanently in use; see section 4.5.10 "Menu entry OpHours" on p. 33 to see how to check for the hours of operation your EBC has been in use so far). Please contact us to make an appointment (see page header). Please also read and follow the instructions on how to deinstall, pack up, and store the device below.

8 DEINSTALLING / PACKING UP / STORING / SHIPPING

🔧 **NOTE:** If the device in question is to be shipped for service/repair, it is enough to send the EBC alone - all other parts and installations (bottles, hosepipes, case-sided hosepipe fittings, RH/T sensors with their cables and plugs, control lines, 6pin plug-in connectors, RS232 cables, Serial2USB adapters includ. cables, mains connection cables, optional accessories) can stay in place.

- 1) Turn the EBC off (by pushing and holding **On-Off/Reset** for about a second). Slaves are switched automatically with their master. Then, wait for the pump process to be completed (if any), so that no water remains inside the EBC.
- 2) Pull the mains plug off the socket outlet, then pull the mains plug from the mains connection on the backside of the device.
- 3) Loosen the hook-and-loop-fastener that fixes the bottle and pull the silicone pipe out of the bottle. Empty and clean the bottle, if necessary. If the bottle is going to be stored over a longer period of time, tape the small borehole on top of the bottle. 🚫 **IMPORTANT** for transporting/packing devices with 2 litre bottles: Reduce the risk of transport damages by mounting the bottle holder to some of the lower boreholes of the anchor element on the front or side panel of the unit.
- 4) Pull all cables from the front plate of the EBC and dismantle the hosepipes on the backside. Models with



hosepipe adapters of type 1 or 2: Put the clamping rings (if any) and union nuts of the EBC's hosepipe fittings back on the device, affixing together with them some kind of protective covering (e.g. a small piece of foil) so as to prevent that dust or particles soil the air conditioning part of the device (the latter is only necessary if the device is not going to be packed dust/particle protected as a whole). Models with hosepipe adapters of type 3: If the device is not going to be packed dust/particle protected as a whole, use rubber bands to fix small pieces of foil for covering the openings of the adapters.

- 5) Pack up and store/ship the device in a way that protects it against external hazards. Do label every parcel plainly visible as being "Fragile".

⚠ **IMPORTANT:** If the device in question has been in use on showcases and/or objects containing hazardous substances - in particular but not limited to Asbestos - do not send in this device prior to informing us on the matter in detail. We will require exact information on the kind of dangers we might be exposed to and on how to effectively protect us. Mind that for service and repair, your EBC is going to be dismantled completely and that all air and water handling parts will usually lay open in our hands. Furthermore, please do not at all send in units that have been exposed to a relevant level of radioactivity.

⚠ **IMPORTANT:** An EBC has to be stored in a non-condensing environment at max./min. 5-35°C, 15-80%RH. The RH/T sensors need a non-condensing environment at max./min. 10-50°C, 20-60%RH when being stored.

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9 TECHNICAL DATA

9.1 Figures

	EBC10	EBC11	EBC12
Recommended max. volume of the case (per connected EBC) ¹⁴	3m ³	5m ³	10m ³
Exemplarily achievable min. dehumidification capacity at ambient conditions of 25°C, 50%RH ^{14,15}	4,0g/h	6,0g/h	7,0g/h
Exemplarily achievable min. humidification capacity at ambient conditions of 25°C, 50%RH ^{14,15}	4,0g/h	6,0g/h	7,0g/h
Exemplarily achievable setpoint range at ambient conditions of 22°C, 50%RH ^{14,16}	30-75%RH		
Theoretical (adjustable) setpoint range	15-85%RH		
Permissible highest value for the rel. humidity inside the case (the EBC issues a signal error if beyond)	94%RH		
Permissible lowest value for the rel. humidity inside the case (the EBC issues a signal error if beyond)	6%RH		
Airflow at the air inlet of the case ^{14,17}	2,00m/s	2,30m/s	3,00m/s
Permissible ambient conditions for operation and storage of an EBC ¹⁸	5-35°C, 15-80%RH, non-condensing		
Permissible ambient conditions for the storage of the RH/T sensor	10-50°C, 20-60%RH, non-condensing		
Tolerance ^{14,19} - at a setpoint of 30%RH	typically achievable +/-2%RH, max. +/-3%RH		
- at a setpoint of 75%RH	typically achievable +/-3%RH, max. +/-5%RH		
Mains connection ²⁰	100-240VAC, 50-60Hz		
System voltage	12VDC		
Power consumption	max. 100W		max. 200W
Weight (device without accessories, bottle, hoses/pipes or cables etc)	6,6kg		8,8kg
Max. noise emission ^{14,21} - free-standing, measured from 1m	48,1dB(A)		50dB(A)
- built-in ²² , measured from 1m	37,0dB(A)		38dB(A)
Housing material and colour	coated steel sheet (1.5mm), pigeon-blue (RAL5014)		

9.2 Dimensions

EBC10			
With 0.5l bottle (default)		With 2.0l bottle (option)	
Width (mm)			
EBC	378,50	378,50	EBC
Edge dist. (right) includ. silicone pipe & cable (left)	50,00	50,00	Edge dist. (right) includ. silicone pipe & cable (left)
Total=Required space with bottle on the front	428,50	428,50	Total=Required space with bottle on the front
Bottle with sensor holder & belt (left)	83,00	115,00	Bottle with sensor holder & belt (left)
Total=Required space with bottle on the left	511,50	543,50	Total=Required space with bottle on the left
Height (mm)			
EBC	133,50	133,50	EBC
Edge distance (top)	50,00	50,00	Edge distance (top)
Required space	183,50	183,50	Total without bottle
Bottle (apart; highest point)	138,00	215,00	Bottle (apart; highest point)
Space for silicone pipe (top)	5,00	5,00	Space for silicone pipe (top)
Total with bottle, without required edge distance	143,00	220,00	Required space
Depth (mm)			
EBC (includ. hosepipe fittings & screws)	233,00	233,00	EBC (includ. hosepipe fittings & screws)
Space for hoses/pipes (back), plugs & cables (front) ²³	106,00	106,00	Space for hoses/pipes (back), plugs & cables (front) ²³

¹⁴ Approximately.¹⁵ Condensed/evaporated water in grammes per hour. Used build up for the tests: EBCs with respective standard accessories and standard lengths for the hoses/pipes.¹⁶ The actual setpoint range in a given specific situation can be both bigger and smaller, as it depends on a variety of further variables - additionally to the ambient conditions (such as the kind of materials stored in the case or the quality of the case sealing etc).¹⁷ At typical installations using the hosepipe lengths that are usually delivered (3m/5m/6m) and without any other accessories that may have an impact on the airflow, like air filters FLT.¹⁸ Applies to the conditions generally obligatory for operation or damage-free storage, but not to the conditions were the full capacity with respect to the achievable setpoint range is given.¹⁹ The tolerance rises with the chosen setpoint.²⁰ Has to be fuse-protected and earthed.²¹ Disregarding the noise during the pump processes (sporadic occurrences). The values were measured on units with standard fans and during the dehumidification process (increased noise emission through the work of the cooling air fan(s)). The units remain almost noiseless when humidifying (except device cooling becomes necessary) or once the setpoint has been reached.²² In the plinth of a wooden showcase with air slots, without sound insulation.²³ Additional space might be required for the plug of an RS232 cable, where applicable.

Applies analogously to the individual products of series EBC10/11/12 (Rev.3). As of 24.11.2014. Subject to modification.


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EBC10			
With 0.5l bottle (default)		With 2.0l bottle (option)	
Total=Required space with bottle on the left	339,00	339,00	Total=Required space with bottle on the left
Add. for bottle, sensor holder & belt (front)	54,00	86,00	Add. for bottle, sensor holder & belt (front)
Total=Required space with bottle on the front	393,00	425,00	Total=Required space with bottle on the front

EBC11			
With 0.5l bottle (default)		With 2.0l bottle (option)	
Width (mm)			
EBC	378,50	378,50	EBC
Edge dist. (right) includ. silicone pipe & cable (left)	50,00	50,00	Edge dist. (right) includ. silicone pipe & cable (left)
Total=Required space with bottle on the front	428,50	428,50	Total=Required space with bottle on the front
Bottle with sensor holder & belt (left)	83,00	115,00	Bottle with sensor holder & belt (left)
Total=Required space with bottle on the left	511,50	543,50	Total=Required space with bottle on the left
Height (mm)			
EBC	133,50	133,50	EBC
Edge distance (top)	50,00	50,00	Edge distance (top)
Required space	183,50	183,50	Total without bottle
Bottle (apart; highest point)	138,00	215,00	Bottle (apart; highest point)
Space for silicone pipe (top)	5,00	5,00	Space for silicone pipe (top)
Total with bottle, without requ. edge distance	143,00	220,00	Required space
Depth (mm)			
EBC (includ. hosepipe fittings & screws)	238,00	238,00	EBC (includ. hosepipe fittings & screws)
Space for hosepipes (back), plugs & cables (front) ²³	126,00	126,00	Space for hosepipes (back), plugs & cables (front) ²³
Total=Required space with bottle on the left	364,00	364,00	Total=Required space with bottle on the left
Add. for bottle, sensor holder & belt (front)	54,00	86,00	Add. for bottle, sensor holder & belt (front)
Total=Required space with bottle on the front	418,00	450,00	Total=Required space with bottle on the front

EBC12			
With 0.5l bottle (option)		With 2.0l bottle (default)	
Width (mm)			
EBC	482,00	482,00	EBC
Edge distances (right & left)	100,00	100,00	Edge distances (right & left) includ. protruding bottle
Total=Required space	582,00	582,00	Total=Required space
Height (mm)			
EBC	138,00	138,00	EBC
Edge distance (top)	50,00	50,00	Edge distance (top)
Required space	188,00	188,00	Total without bottle
Bottle (apart; highest point)	138,00	215,00	Bottle (apart; highest point)
Space for silicone pipe (top)	5,00	5,00	Space for silicone pipe (top)
Total with bottle, without requ. edge distance	143,00	220,00	Required space
Depth (mm)			
EBC (includ. hosepipe fittings & screws)	238,00	238,00	EBC (includ. hosepipe fittings & screws)
Space for hoses (back), plugs, cables, silicone pipe (front) ²³	156,00	156,00	Space for hoses (back), plugs, cables, silicone pipe (front) ²³
Add. for bottle, sensor holder & belt (front)	54,00	86,00	Add. for bottle, sensor holder & belt (front)
Total=Required space	448,00	480,00	Total=Required space

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