

Huminator II

Precision humidity generator

Version: 1.2

Operating instructions



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1. Introduction

Dear customers.

Congratulations to the purchase of your new Huminator II, the humidity and temperature generator of the Testo Industrial Services GmbH. We are glad that you decided to purchase the Huminator II. It represents a relief in performing the daily calibration tasks and convinces by its precision and long service life.

However, before using the Huminator II for calibration tasks, you should thoroughly read the present operating instructions and make yourself familiar with the use of the generator. By the gathered know-how you can ensure an exact and rapid temperature/humidity calibration and profit from the versatile scope of supply of the Huminator II .

For any further questions or if problems occur, please contact our after sales service or your dealer. Here you will find professional help.

1.1 Service contact of the Testo Industrial Services GmbH

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Fax:	+49 7661 90901-8010
E-Mail:	info@testotis.de
Homepage:	www.testotis.de

2. Safety guidelines

Important notes before commissioning

Warnings and particularly important information are highlighted in these operating instructions with the following symbols:



Notes and particularly important information



Tips from experts of the company Testo Industrial Services



Warnings

Important

- Only operate the Huminator II in perfect, functional condition
- Transport the Huminator II under no circumstances while the humidifier is filled (please also refer to Chapter 4.4)
- Check before each measurement if the connection to the plug is correctly connected and if the sensor is correctly inserted. Otherwise it is not possible to guarantee the protection category indicated in the technical data.
- Make sure that no foreign matters get into the inside of the housing or that parts of the housing are not removed since this might cause damages on the electronic system.
- The Huminator should be operated only with distilled water and the original dry granulate (KC dry granulate orange CHAMELEON). To protect the internal circulation from pollution, the charcoal pad should be replaced after 6 month if the system is used frequently. If required, the granulate and charcoal pads can be reordered at Testo.

Safety notes/Warranty

- Keep the ventilation slots at the rear of the housing free in order to guarantee a proper circulation of the air inside the housing. Therefore, never use the Huminator II without feet.
- Do not use the Huminator II in wet weather and with high humidity.
- The proper and safe operation of the Huminator II requires proper transportation, professional storage, installation, assembly and the intended use as well as careful operation and regular maintenance.
- The Huminator II is supplied via the mains cable with a tension which is dangerous for persons. Damages to persons may occur in case of improper use.
- The Huminator II must only be used as intended. All technical specifications need to be observed.
- If it is not possible to eliminate faults, the Huminator II must be decommissioned immediately and protected against accidental commissioning.
- Only the company Testo Industrial Services is allowed to perform repairs. Independent interventions and modifications on the Huminator II automatically result in a forfeit of guarantee.
- Make sure that the operators of the Huminator II are instructed in regular intervals with regard to all corresponding questions about occupational health and safety and environmental protection and that they know the operating instructions of the Huminator II and in particular the safety notes contained therein.
- Always make these operating instructions available legibly and completely at the place of use of the Huminator II.
- For an optimum long-term stability, the company Testo Industrial Services recommends to recalibrate the reference sensor once per year and to verify in the humidity fixed points in shorter time intervals.

- Never use the Huminator II in vertical position
- Warning: The Huminator II must NOT be used in an explosive atmosphere.
- Never measure the device on or nearby live parts.
- Risk of burns

Supply voltage

110...230 V \pm 10 %; 50/60 Hz alternating current (AC)

Disposal

Please deliver the empty batteries at the provided collection points. You may directly return the device to us when the service life has expired. We ensure an environmentally friendly disposal.

2.1 Warranty

The warranty claim on construction defects or faulty materials of the Huminator II lasts for a term of 18 months, starting from the delivery date.

The warrant is limited to repair or replacement of the device and does not apply for wearing parts such as for instance the seal rings of the sealing cover or the desiccant cartridge.

The Huminator II was designed as calibration unit. When using the device for applications which are not expressly provided in these operating instructions, it is necessary to take additional protective measures.

If a malfunction of the Huminator II causes personal or material damages, it is necessary to secure the system with additional electromechanical protections.

3. Field of application

The Huminator II may be used stationary as well as mobile. It is equipped with an automatic control for the parameters temperature and humidity. By Peltier elements, a stable, integrated temperature control is guaranteed in the range from 5 to 50 °C. The relative humidity may be generated in the range from 5 to 95 %rF and can be rapidly varied. Please find technical data in the chapter 12 "Technical data"

By means of the Huminator II, it is possible to perform a rapid and easy temperature/humidity calibration of measuring devices (e.g. hygrometers), sensors and data loggers made by the company Testo and other manufacturers. Thus it may be used flexibly and is used for different industrial and laboratory tasks and can be used simultaneously for different service purposes.

Calibrations may be performed conveniently in two different ways. There is the option to make settings directly on the resistive touch display of the Huminator II or to control them on a PC via the existing USB or Ethernet interfaces (settings via Ethernet are possible in a limited scope) (please find more detailed instructions regarding remote controlled calibration in the chapters 8 and 9).

In order to ensure exact handling and thus a long-term usage of the Huminator II, please always observe the safety notes when using the Huminator II (refer to chapter 2 Safety notes) as well as to the limit values indicated in chapter 12. They must not be exceeded in any way.

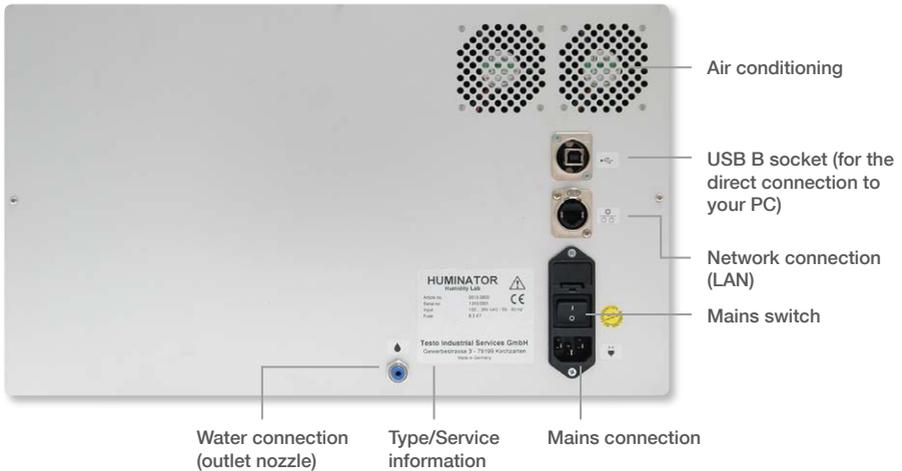
User-specific instruments have to be selected independently, correctly connected and maintained by the user and the user has to perform the necessary tests on all used components.

3.1 Description and system components

3.1.1 Front side

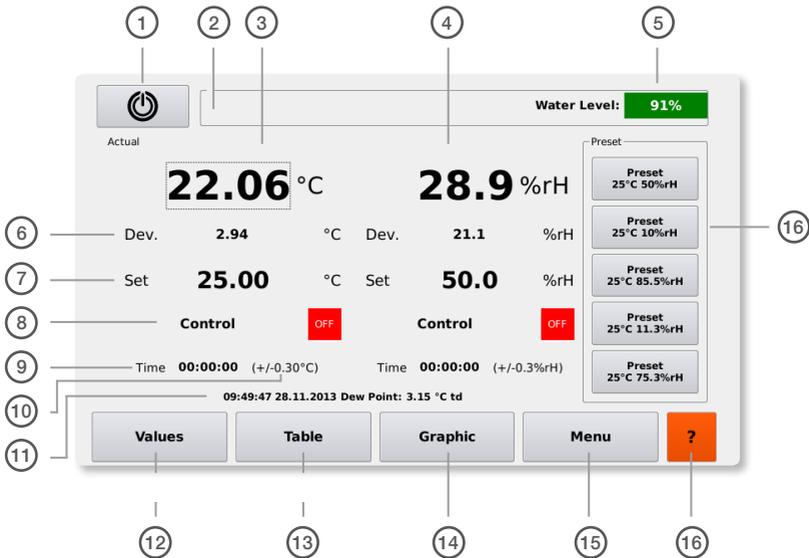


3.1.2 Rear side



3.1.3 Display

The Huminator II is equipped with a resistive four-wire multifunction touch display which allows to control all functions of the humidity generator. It is constructed as follows:



1. Button to shut down the Huminator II (keep it pressed for about 3 seconds in order to shut down the Huminator and to transfer it to a transportable condition)
2. Field “Measuring program” here the data for a measuring program are displayed when it was activated
3. Display of the current temperature in the measurement chamber
4. Display of the current humidity in the measurement chamber

5. Display of the percentage water level in the tank
The items 6–10 refer to the temperature control on the left
The corresponding values for the humidity control can be found on the right
6. Difference to the set point
7. Set point (touch for setting)
8. Button to start the control → when pressing the button, the control is switched on or switched off when touching it again
9. Time display (the timer starts as soon as the entered tolerance is attained by the current temperature or humidity value)
10. Tolerance (touch for setting)
11. Display of the current time, current date as well as the dew point in the chamber
12. Button Measured values (return from all menu fields to the welcome page by touching this button)
13. Button Table (the display changes over to the tabular view by touching this button)
14. Button Graphic (the display changes over to the graphic view by touching this button)
15. Button Menu (the menu changes by touching this button)
16. Help texts (the corresponding help texts are displayed by touching this button)
17. Presetting keys (the displayed presetting value is taken over and adjusted by pressing this button)

4. Commissioning

4.1 Unpacking and installing the Huminator II

Basic equipment

Take the Huminator II from its packaging and check if the contents is complete The basic equipment includes:

- 1 Huminator II
- 1 desiccant cartridge (filled with orange silicate pearls – KC dry pearls orange CHAMELEON; grain size > 2mm)
- 5 charcoal pads (MN 728, Ø 60 mm, REF 481006)
- 1 power supply line (2m, black)
- 1 sensor and control sensor (testo 6613 0555 6610-L13)
- 1 calibration certificate for the control and reference sensor, (factory calibration by default, optionally DAkkS calibration certificate)
- 1 Measuring chamber lid
- 1 urethane hose to fill/drain the Huminator II
- 1 clamping ring (12mm, plastic material)
- 15 replacable plugs
- 1 operating instructions (CD-ROM)

Visible damages

Thoroughly check if there are any visible damages on the Huminator II before commissioning it. Possible visible damages are e.g.

- on the packaging. These damages indicate that the Huminator II suffered damages during transportation.
- on the housing or on the power supply line.

If a damage is identified or if the above mentioned contents is not complete, please immediately contact our after sales service or your dealer.

Warning: If there are damages of any kind on the Huminator II, it must not be commissioned!



Tip: Store the high-quality original packaging of the Huminator II. You may use it in order to transport or dispatch the device.



Installation site (calibration site)

Different aspects need to be observed for the installation site of the Huminator II:

- The Huminator II should be installed at a dry and dust-free place, without direct sun radiation.
- For the best possible measurement, select an installation site with a constant room temperature of 23°C (\pm 3°C). This is the optimum operating temperature for the Huminator II.
The Huminator II must be installed in reach of a power outlet suitable for the power supply line included in the delivery.
- If you would like to connect the Huminator II to a PC, a suitable network socket (LAN) should be nearby the desired installation site or the Huminator II should be connected directly to the PC using a USB 2.0 cable (separately available in the specialized trade).
- The rear side of the Huminator II should be at a minimum distance of 10 cm to other objects in order that the aeration is not disturbed.
- The plastic feet provide for a sufficiently large gap between the Huminator II and the floor space. Ensure the necessary air supply.

Tip: Choose a robust, plane footprint for the Huminator II. The surface of pieces of furniture and laboratory facilities is generally coated with numerous lacquers and plastic materials and is treated with different care products. Aggressive varnishes or care products can corrode the plastic feet of the Huminator II and durably damage the plastic feet as well as the selected footprint. Moreover, due to operational heat generation of the Huminator II damages may arise on temperature-sensitive surfaces.



4.2 Connecting the Huminator II and first commissioning

4.2.1 Connecting the Huminator II

At the rear of the Huminator II beside the mains switch to switch the device on and off there are other connection options (refer to Illustration 2: Rear side of the Huminator II):

- Power supply
- Water connection (blue connection): to fill and empty the water tank integrated in the Huminator II
- Network connection (LAN): with the help of this socket, it is possible to connect the Huminator II to your Intranet (also refer to chapter 8)
USB-B: allows a direct connect to a PC (refer to chapter 9)



Illustration 4: Connections of the Huminator II

Water connection

Network connection (LAN)

4.2.2 Checking the desiccant cartridge

The functional principle of the Huminator II is based on the principle of a generator of two quantities. Generally, a balance is generated by continuous pumping in and sucking off of the air humidity contained in the measurement chamber. In this way, it is possible to constantly adjust the preset measured value. This functional principle conditions a drying of the air humidity contained in the measurement chamber.

This drying is performed by means of a desiccant cartridge which is filled with the desiccant silicate.

The silicate pearls absorb the water molecules contained in the air. In this process there is a humidity saturation which increases with the progressing calibration and the duration of the performed measurements. In the long-term this leads to extended equalization times for humidity measuring points under ambient humidity however it can be avoided by the regeneration of the silicate pearls. Therefore, the desiccant cartridge filled with silicate should be checked in regular intervals.

To do so, open the service cover at the top of the device (refer to Illustration 5: Desiccant cartridge inserted in the Huminator II).



Illustration 5: Desiccant cartridge inserted in the Huminator II

In Illustration 5: Desiccant cartridge inserted in the Huminator II you can see the desiccant cartridge including the desiccant in form of silicate pearls. When delivered the desiccant included in the desiccant cartridge is almost completely orange. With the time and frequency of the measurements performed on the Huminator II the desiccant absorbs more and more humidity and slowly discolours until it finally becomes completely white. If the colour of the granulate is orange when performing a visual inspection you may use the cartridge further on. If the major part of the cartridge is colourless you should dry the desiccant in order to reuse it (also refer to chapter 10.1).

! **Note:** When the part of orange coloured silicate pearls in the desiccant cartridge decreases it is becoming more and more difficult to attain low humidity values using the Huminator II.

4.3 Switching on the Huminator II

In order to be able to switch on the Huminator II it is necessary to connect it to a suitable current source:

1. Firstly, check if the mains switch on the device is switched off.
2. Connect the device by plugging one end of the power supply line included in the delivery into the provided power outlet and the other end into a suitable power grid.
3. Only then switch on the Huminator II by switching on the mains switch at the rear of the device.

As soon as you press the mains switch, a green control LED will flash at the front side (refer to Illustration 6: Huminator II at the bottom left) and the system starts up. Then, the Huminator II performs a self-test which takes a view seconds. Finally the welcome page is displayed. The Huminator II can be controlled by touching the touch-display. All performed settings are saved by the Huminator II and are automatically available when switching the Huminator II on again.



Illustration 6: Huminator II

4.4 Filling and draining the water tank

On the welcome page you will find the display for the filling level of the internal water tank. When delivered it is coloured red and shows a water level of almost 0%. In order to place the Huminator II in a operational status it has to be filled with distilled water. Only if the water tank is filled with water the first measurements might be started.

Note: When the device is switched on for the first time the water tank is empty and the message „Error. Water level below 10%“ is displayed. The message can be closed by touching the message (text). !

If the Huminator II is transported or dispatched at an outside temperature of less than 5°C it is necessary to empty the water tank beforehand.

The Huminator II must neither be transported nor stored at less than 0°C. Otherwise there is a risk that the hose and pump system might freeze. If one or several components of the Huminator II freeze it might result in damages of the device.

The Huminator II is correctly filled as follows:

1. For filling only use the PVC hose included in the scope of delivery. The water inlet and outlet nozzles are at the rear of the Huminator II. Push the hose as far as possible into the blue nozzle; to do so, push the outer ring on the nozzle back and push the end of the hose into the opening under slight pressure.
The internal water tank has a capacity of about 200 ml.
2. Press on the icon "Menu" at the right bottom of the welcome page in order to open the different levels of the submenu.
3. Using the arrow keys on the left you may open the submenu "System" (refer to Illustration 7: Submenu "System") Optionally you may call the submenu overview by touching the icon "Menu" between the arrow keys and directly selecting the submenu "System". Then among others the icon with the labelling "Fill tank" and "System safe for transport below 5 degree" are displayed
4. Connect the PVC hose included in the delivery to the water inlet and outlet nozzles.

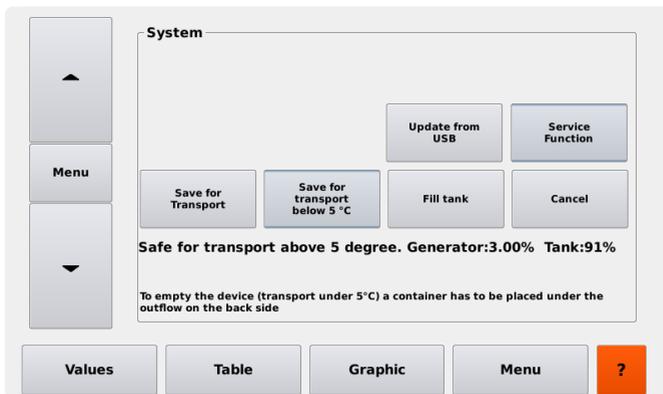


Illustration 7: Submenu "System"

5. In order to fill the tank the free end is submerged into a suitable vessel with distilled water (refer to Illustration 8: Rear side of the Huminator II with connected hose to fill the system).
6. By pressing the key "Fill tank" a slightly audible internal pump is starting up which pumps the water from the vessel into the Huminator II via the connected hose. You can interrupt this process by clicking on the icon "Cancel". As soon as the internal water tank is completely filled the pump will automatically switched off. The filling level on the display should amount to almost 100 % and be displayed in green. Remove the PVC hose before starting the measurement.
7. In order to empty the tank the free end of the hose is plunged into a suitable empty vessel.
8. By pressing the key "System safe for transportation below 5 degree" the water is pumped out of the internal water tank and the Huminator II is emptied. You can interrupt this process by clicking on the icon "Cancel". The display of the filling level should approach 0% and be displayed in red. In this status the device is transportable even below 5°C.

The filling as well as the emptying might take a view minutes.

After having removed the hose it is possible to take up the work with the Huminator II.



Illustration 8: Rear side of the Huminator II with connected hose to fill the system).



Tip: Please note that the temperatures in most cargo holds of aeroplanes is less than 5°C. The Huminator II should never be transported below 5°C. Therefore use a tempered means of transportation in order to transport the device by plane.

At temperatures above 5°C the Huminator II can also be transported with water filled in the tank. The Huminator II is equipped with a water tank with a capacity of about 200 ml and a humidifier which generates the humidity. By pressing the icon "System safe for transportation" or "Standby" on the welcome page the system is requested to pump the water from the humidifier into the water tank. As soon as this process is completed it is possible to switch off the Huminator II and to transport it at temperatures of more than 5°C.

When the number and duration of the measurement increases the tank of the Huminator II is emptying. It is possible to read the filling level from the display. Before performing a measurement always make sure to have sufficient water in the tank. In particular for longer measuring sequences it is necessary to make sure that the tank is sufficiently filled.

Only use distilled water and make sure that the PVC hose is stored free from dirt particles. Check if there are any deposits in the hose. The hose must only be used in perfect condition otherwise dirt and limescale deposits might be conveyed into the device and reduce the service life of the Huminator II.

Make sure that the hose is installed as described and check if water is pumped in or out. If the hose is not correctly seated the water might not be conveyed in or out which might result in damages of the system.

At the beginning of the filling process please ensure, that no air is inside the PVC-tube. This can be easily achieved by producing a little over pressure to the water bottle.

4.4.1 Switching off the Huminator II and putting it in a condition safe for transportation

By pressing the standby key at the left top of the welcome page the Huminator II is shut down; hold the standby key for about three seconds (refer to Illustration 9: Cut out of the welcome page showing the button to shut down the system).

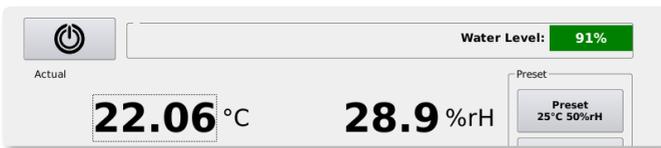


Illustration 9: Cut out of the welcome page showing the button to shut down the system

The display of the Huminator II changes over to the system menu and a pump noise is audible. The pump conveys water from the humidifying system back to the tank. This process is visualized in the system menu by means of a percentage display (refer to Illustration 10: Percentage display of the water level in the generator and tank).



Illustration 10: Percentage display of the water level in the generator and tank in the service menu

The percentage display of the generator is reduced and the percentage display of the water tank is increased. As soon as the message "Safe for transportation above 5°C" is displayed in the system menu you can switch off the Huminator II by pressing the mains switch at the rear side of the device. In this condition the Huminator II is ready-for-transportation and can be displaced to another location or despatched.

Warning: The above written procedure to shut down the Huminator is mandatory. Before switching off the Huminator, it needs to be shut down. Turning off the Huminator without the shutdown can lead to failures in the Huminator.





Warning: If the Huminator II is transported or dispatched at outside temperatures of $< 5\text{ }^{\circ}\text{C}$ the water of the water tank must be pumped out first. (To do so refer to Filling and Emptying of the water tank chapter 8). Due to the residual moistures of the device the Huminator II should generally not be transported at less than 0°C .



Tip: When transporting, storing or despatching the Huminator II the lid of the measurement chamber should always be opened or one or several plugs should be unplugged. Thus the formation of condensed water in the measurement chamber and on the reference sensor is being avoided. The formation of condensed water may lead to the fact that unnecessary measuring errors and long adaptation times occur when calibrating the system subsequently.

5. Menu structure

Generally the menu structure of the Huminator II is subdivided into two levels. The main menu is on the first level and under the different items there are submenus available (refer to Illustration 11: Menu levels). On the welcome page you may open the second level, the submenu by touching the icon "Menu". The icon "Menu" is at the right bottom of the welcome page.



Illustration 11: Menu levels

The arrow keys on the left serve to navigate through the different submenus. Optionally an overview of the menu contents opens up by pressing the icon "Menu" between the two arrow keys (refer to Illustration 12. Menu overview). Here you can directly access the different submenus.

By pressing the icon "Measured value" you may return to the welcome page at any time. It can be found on the left bottom of the display.

All settings which are performed in the submenus are maintained even when switching the Huminator II off and on.

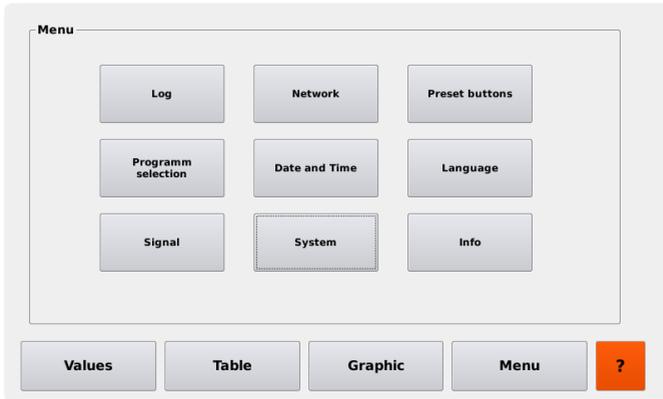


Illustration 12. Menu overview

Tip: On each level of the menu in the right bottom you can find an orange question mark. By clicking on this question mark a help text opens up which describes the corresponding menu as well as the individual keys.



5.1 Language selection

The menu guiding can be displayed in different languages. English is preset at the factory. In order to change the language please perform the following steps:

1. Press the icon "Menu" on the right bottom of the top menu in order to open the level of the submenu.
2. In the submenu press the arrow keys on the left to open the menu item Language. Optionally by pressing the icon "Menu" on the left between the arrow keys a menu overview is called up and the menu item Language can be directly opened up.
3. In the submenu Language (refer to Illustration 13: menu item Language) you may select the desired language. Select the language by pressing the icon of the corresponding country code.
4. The Huminator II switches the whole menu guiding over to the desired language. By pressing the icon "Measured values" you return to the welcome page.

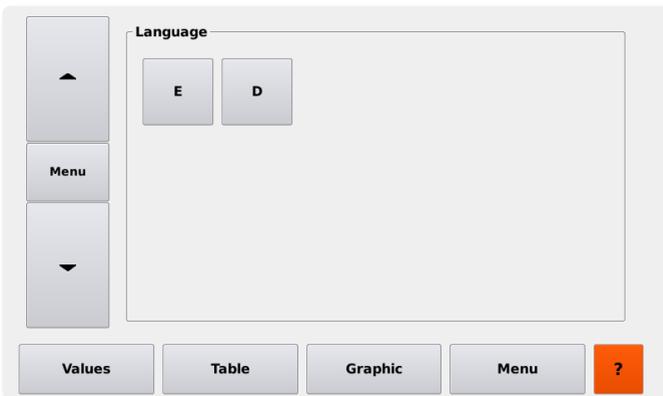


Illustration 13: Menu item Language

5.2 Date and time setting

The Huminator II is equipped with a date and time display. The entries for time and date are particularly important if the measuring process of the Huminator II is programmed or measuring sequences which require a timely reference shall be evaluated. The proceeding to set date and time is similar to the proceeding of the language selection.

1. Press the icon "Menu" on the right bottom of the top menu in order to open the level of the submenu.
2. In the submenu press the arrow keys on the left to open the menu item Date and Time. Optionally you can call up the menu overview by touching the icon "Menu" on the left between the arrow keys and the menu item Date and Time can be directly opened up.
3. In the submenu Date and time (refer to Illustration 14: menu item Date and time) it is possible to set the current time and date. To do so select the corresponding time or date designations (e.g. year, day or second). After having selected the individual designations the entry mask opens up in which you can set the values for date and time. By touching the icon "Save" the preset values are taken over for all fields of the Huminator II.
4. By pressing the icon "Measured values" you may return to the welcome page.

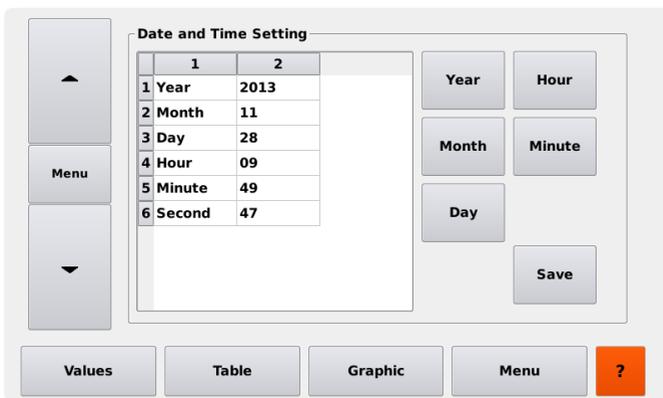


Illustration 14: Menu item Date and Time

6. Preparing and performing a first measurement

6.1 Measuring chamber

After having checked the desiccant and the water level you may start the measurement.

The measurement chamber of the Huminator II is on the right beside the display. Here you can measure and/or inspect sensors and data loggers of different type and form. Due to the large capacity also small weather stations or loggers of different sizes can be measured in the measurement chamber.



Illustration 15: Opened measurement chamber with weather station

A uniform distribution of the air humidity is ensured by the fans built in the measurement chamber.

Furthermore a highly precise humidity sensor is integrated in the chamber. This humidity sensor is equipped with a so-called capacitive polymer sensor. It measures the relative humidity in % rh. The relative humidity (% rh) is the percentage ratio between the

actual vapour pressure of the water and the saturation vapour pressure. This portion is depending on the temperature. The humidity sensor takes over on the one hand the control for the internal control of the Huminator II and on the other hand it is used as reference sensor for the temperature and air humidity measured values indicated on the display. It can be disassembled and return to the factory before instance for recalibration. Thus it is not necessary to return the complete device to the factory if a calibration of the reference sensor is required. You should calibrate the sensor in regular intervals in particular if you are using the sensor as reference sensor. Only if the sensor is calibrated in regular intervals it is possible to guarantee a uniform accuracy over many years. Moreover, you should verify the reference sensor at little time intervals by means of humidity fix points.

Tip: If you purchase a second reference sensor there will be no downtimes when recalibrating your reference sensor. If a calibration of the reference sensor is due you may simply install the other reference sensor (refer to chapter 10.2).



The measurement chamber is closed by means of the abatable measurement chamber lid. There are five removable and replaceable plugs in the measurement chamber lid. Up to five sensors of different types and forms can be inserted into the measurement chamber of the Huminator II through these plugs and perform the measurements in parallel.

6.2 Equipment of the measuring chamber

The functionality of the used measuring equipment should be checked before use. In the frame of such a functionality check you should clarify at least the following items beforehand:

- Is the measuring equipment suitable for the measurement of air humidity and temperature?
- Is there any technical defect?
- Is the battery capacity sufficient in order to guarantee a flawless measuring sequence?

Data loggers:

A sufficient battery capacity is particularly important for data loggers such as measurement data loggers in order to avoid an interruption of a measuring sequence. The loggers are positioned into the measurement chamber during the whole measuring sequence. Therefore, check the battery capacity of the data logging program it and adapt the time to the measuring sequence before starting the data logging.

When equipping the measurement chamber with a data logger also make sure that the measurement chamber is not overloaded. If too many data loggers are positioned in the measurement chamber it might lead to measuring errors. By overloading the measurement chamber the internal sensors of the data loggers are covered and the free access to the climate of the measurement chamber is obstructed. The suitable scope of the equipment is depending on the size and form of the data loggers. The suitable quantity avoids possible measuring errors and reduces the equalization time of the data loggers to the climate of the measurement chamber.

Furthermore, when equipping the measurement chamber make sure that the circulation of the climate of the measurement chamber is not blocked. There are holes on the left side of the measurement chamber in order to ensure the circulation; these holes imperatively have to be unobstructed.

Sensor:

If the measurement chamber is equipped with sensors they must close the provided opening as dense as possible and the lid of the measurement chamber must be properly closed. If the sensor is not properly sealed or if the measurement chamber is not properly closed it might result in an undesired exchange between the climate of the measurement chamber and the ambient climate. This might lead to instabilities during the measurement.



Tip: The plugs included in the delivery generally seal the different sizes of the sensors. If this is not the case and if the plug does not fit to the sensor housing it is possible to additionally use easily removable sealing materials such as modelling material to seal the gap.

6.3 Manual setting and starting a first measurement

After having equipped and properly closed the measurement chamber it is possible to start the measurement.

To do so please perform the following steps:

1. Set the temperature and the relative humidity separately. Touch the corresponding setpoint value on the welcome page for the manual setting of the temperature and of the relative humidity. An entry mask opens up.
2. Set the desired temperature and relative humidity in the entry mask.
3. Confirm your entry by pressing "OK". The system will automatically return to the welcome page and the desired measuring point is displayed as numerical value beside the icon "Setpoint".
4. Start the temperature and humidity control in the Huminator II by touching the icon "Control".
5. Stop the temperature and humidity control by touching the icon "Control" once again.

Note: If you select the measuring points outside the measuring range of the Huminator II the entry is displayed in RED and it is not possible to enter values on the Huminator II. !

After having started the temperature and humidity control the icon "Control" is displayed in green and the Huminator II adjusts the preset values.

The current values can be viewed on the welcome page on the display. The differential display (between the display of the setpoint and actual values) indicates in how far the currently measured value differs from the setpoint value.

Beside the date and time indications it is also possible to view the dew point temperature (...°C tp) "Dew point". This dew point temperature is calculated following the so-called Magnus formula and indicates at which temperature the currently measured humidity would condense in the measurement chamber. The dew point display is required in order to calibrate measuring devices which additionally or only indicate the dew point temperature.

As soon as the measured values attain the preset values the stabilizing phase is being started. Humidity and temperature are assigned to stop watches. They can be found on the welcome page below the icon "Control". The stop watches indicate how long the climate of the measurement chamber is within certain stability criteria. The stability criteria also called tolerance limits may vary and thus influence the starting time of the stop watch.



Tip: The time indication of the stop watch is important in order to determine the equalization time of the sensors to the climate of the measurement chamber. This equalization time may differ depending on the type of the corresponding sensors. In order to avoid measuring errors the equalization time should imperatively be kept before starting the measurement.

6.4 Setting the tolerance limits (stability criteria)

If the tolerance limits are absolutely observed they determine how much the actually measured value in the measurement chamber may maximum deviate from the determined setpoint value. You may set this deviation on the welcome page of the Huminator II:

1. Touch the time indication below the setpoint values for temperature or relative humidity on the welcome page. An entry field opens up.
2. You may enter the tolerance limits for the temperature in the range from ± 0.1 to 10.0 ° C and for the relative humidity in the range from ± 0.1 to 10.0 % rh in this entry field.
3. By touching "OK" the entry will be saved and the value is displayed as tolerance limit (in brackets).

If the measured value deviates from the preset setpoint value by less than the determined tolerance limit the climate of the measurement chamber is within the tolerance limits which you indicated and the stop watches which are assigned to temperature and humidity will start the measuring sequence. The stop watch interrupts the measurement

sequence as soon as there are any changes in the climate of the measurement chamber exceeding the tolerance limits. Such changes may for instance be caused by opening the measurement chamber while the measurement is under way or by changing the measuring point. As soon as the climate in the measurement chamber attains the preset tolerance limits again the stop watches will resume the time measurement.

6.5 Changing the measuring point

Changing the measuring point:

1. Touch the setpoint value which is assigned to the temperature or humidity on the welcome page. The entry field opens up again.
2. Enter the desired value and confirm with "OK".
3. The system automatically returns to the welcome page on which the new values are displayed.

The Huminator II takes over the values and adjusts the desired climate in the climate chamber.

Tip: The relative humidity is depending on the temperature. The air can absorb less humidity at lower temperatures. In order to avoid a possible water outage (condensate) in case of of temperature change you should preset the relative humidity to a lower value (< 20 % rh) before a temperature change. 

Firstly, the device should adapt to the new temperature. Start the adjustment of the relative humidity only when the display of the Huminator II and of the measuring devices are almost equal.

It is reasonable to start at a low humidity value and to increase it.

6.6 Graphic and tabular representation and saving of the measuring sequence

On the welcome page of your Huminator II you can represent the performed measuring sequence graphically or tabular by pressing on the icons "Table" or "Graphic". Activate the log setting in order to tabularly represent the values (refer to chapter 6.6.2).

6.6.1 Graphic representation

The measurement is automatically started by switching on the control. In parallel also the graphic recording of the measuring sequence is being started. It can be visualized on the display by pressing on the icon "Graphic". The window below opens up.

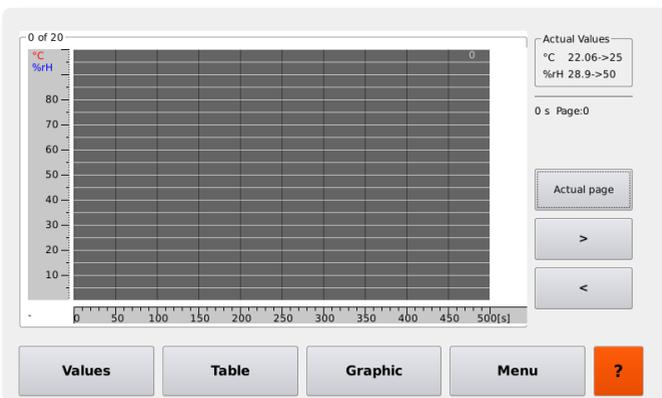


Illustration 16: Graphic representation of the recorded values

A line graph is represented in this window. The temperature (red °C) and the humidity (blue % rh) are displayed on the vertical Y axis. The division of time is on the horizontal X axis and is indicated in seconds (s).

The recorded measuring sequence is graphically displayed and continuously updated by two lines for temperature (red) and humidity (blue). The graphic recording allows you to graphically represent a measuring sequence with a duration of about 2.8 hours in form of a ring buffer. To do so 20 diagram windows of 500 seconds each are created.

At the right top of the display you will see the number of diagram windows which already include recorded values. At the top right of the display the currently measured values and the determined setpoint values are displayed. As soon as the recording time of about 2.8 hours is expired the graphic display of the measured data restarts with the first window. By pressing on the arrow keys on the right of the display you may visualize the whole measuring sequence and graphically display possible deviations during the measurement in this way. By pressing the icon "Current page" you can return to the currently recorded values.

6.6.2 Tabular representation

It is also possible to represent and record the measuring sequence tabularly. With the help of the Huminator II you may save up to 10'000 measured values separated in 10 files of 1'000 measured values each in an internal memory. The saved data can be transferred to and read from a USB 2.0 stick.

For the tabular recording and saving of the measured data it is first necessary to determine a so-called log file. The measured data are saved in this log file and the recording rate is determined. To do so open the submenu "Log". Press the icon "Menu" on the right bottom of the top menu in order to open the level of the submenu.



Illustration 17: Submenu to set the log parameter

The log file can be numbered for differentiation. Touch the icon "..." behind the file name in order to assign a numeric designation to the log. Then an entry field opens up in which you may enter the value for the designation. A time stamp with the current date and time is displayed as default. If the preset time stamp is used you may assign the data to the point in time of the start of recording.

The recording interval by which the measured data shall be saved can be determined by touching the icon "..." behind the currently displayed interval. It is possible to define an interval between 2 seconds and 15 minutes.

Start the recording of the data by pressing the "Start Log" button. Under "Interval" the system displays how many measured values are already included in the current log file. After 1'000 measured values the index in the file name is increased by one and the counting is restarted. The recording of the measured data can be interrupted by pressing on the icon "Stop Log". In order to delete the measured data of the current recording press the icon "Stop Log/Delete Log". Then the last recording is stopped and deleted. Previous recordings are maintained. By pressing on "Start Log" the recording is continued.

As soon as 10 x 1'000 values are recorded the recording stops automatically. The control remains unaffected from the end of the recording. The measurement is further executed but the data are no longer recorded.

If you would like to record further measured data you have to delete the saved values by pressing on the icon "Format memory Stop Log" of the internal memory. At this the current recording is interrupted and all data which are on the internal memory of the device are deleted (refer to the note below).

Note: You should save the measured data before deleting them if you need them for an evaluation later on. To do so, the current measurement has to be terminated by clicking on the icon "Stop Log" and the recorded measured data have to be saved on a USB-2.0 stick (refer to chapter) or via you internal network (refer to chapter 8). 

After having started to log file, it is possible to call up to tabular records. It is possible to call up the recording window from the submenu "Log" or the start menu on the welcome page by clicking on the icon "Table".

A consecutive numerical index is put on the measured values displayed in the table during recording. The index is represented in the first column. Please find the corresponding date and time in the second column. The following four columns represent the target values and the currently recorded actual values for time and temperature (refer to Illustration 17: Display to set and view the recording).

It is not necessary to interrupt the recording in order to make modifications on the measuring points or on the recording interval. These changes are included in the current recording and represented in the table.

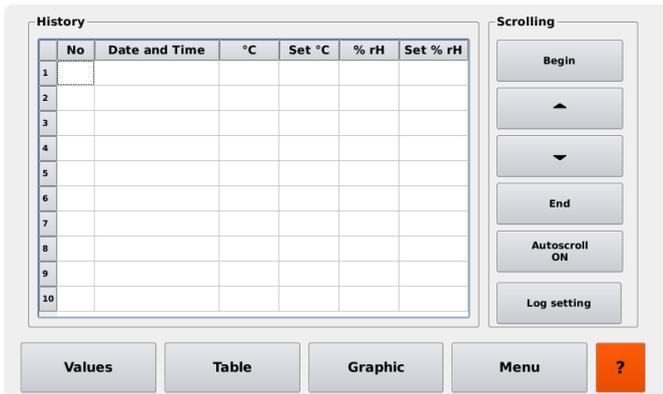


Illustration 18: Display to set and view the recording

The preset function “Auto Scroll” ensures that the last recorded values can always be viewed in the current view. If you click on “Auto Scroll Off” the ongoing update is switched off and the view is fixed.

The recording of the measured data is continued in the background. If you reactivate the “Auto Scroll”, the view changes over to the last recorded value and will be updated further on. By clicking on the icon “Beginning” you get to the first and by clicking on the icon “End” you will get to the last recorded values. By means of the arrow keys you may “scroll” the records up or down.

6.7 Saving the measured data on a USB stick

The saved measured data can be transferred to a USB 2.0 stick.

Generally, it is possible to use any USB 2.0 stick. Only make sure that it is formatted in the FAT 32 file format. You may perform such a formatting by means of a suitable operating system such as Windows or Linux. Please find information in the corresponding user manuals or contact your IT service. In order to copy the measured data saved on the SD card on a USB 2.0 please observe the following steps:

1. Connect the USB 2.0 stick to the suitable interface at the front of the Huminator II
2. The icon “Copy to USB” can be found in the submenu “Log”. If you click on the icon, the write process will be started automatically.
3. After a successful transfer, the status message “OK” is displayed.
4. The icon “Copy to USB” can be found in the submenu “Log”. If you click on the icon, the write process will be started automatically.

When calling up the measured data, a directory with all log files and the corresponding measured data opens up. You get to the saved measured data by opening the log file. They are numerically arranged and include the date and time of each measured point as well as the setpoint value and the measured actual value separated by a semicolon.

6.8 Presetting of measuring points

You have the option to define five fixed measuring points. They can be directly selected via the welcome page. Thus, in particular for repeated measuring points an enormous time saving is resulting.

At the welcome page on the right there are five icons with the designation “Presetting” and a fixed saved measuring point. It is consisting of a temperature and humidity value. If you click on one of these icons, the Huminator II automatically takes over the values as setpoint values and adjusts it for the measurement.

You also have the option to select preset values during an ongoing measurement and to include them in the ongoing measurement in this way.

You may adapt the presetting depending on the requirements:

1. Select “Menu” on the welcome page in order to get to the level of the submenu
2. Select the submenu “Presettings”, the abbreviations V1-V5 stand for the five defined measuring points.

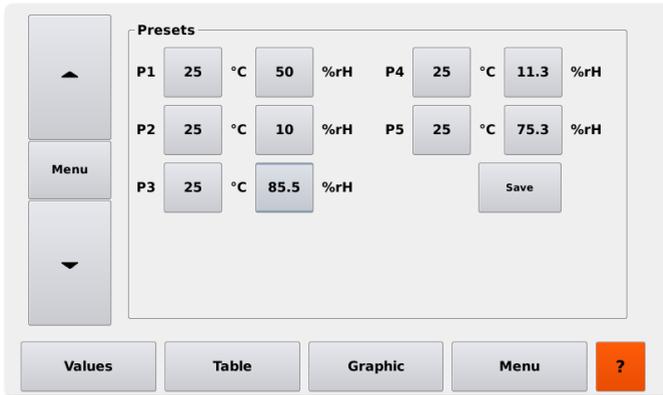


Illustration 19: Presettings

3. In order to change the measuring point, either click on temperature or on relative humidity. The input window opens up
4. You may enter the corresponding value in the input mask. Confirm your entry by pressing "OK".
5. You automatically jump to the submenu "Presettings" and the value is update
6. If all measuring points meet you expectations, the changes have to be saved by pressing the icon "Save".

After the successful entry and saving you will find the defined measuring points on the welcome page on the right under "Presettings".

6.9 Creating a measuring program

Beside the definition of 5 measuring values (presettings) you have the option to create up to 10 measuring programs with 10 measuring points each and to have them automatically performed by the Huminator II.

In order to call up a measuring program and to change it, if required, select the icon “Program selection” in the submenu. A tabular overview with 10 measuring programs is displayed. (MP001-MP010). Date, time and the included measuring points are indicated behind the name.

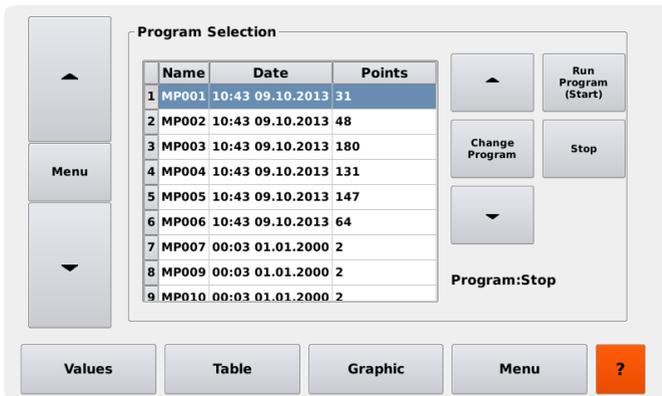


Illustration 20: Submenu program selection

You can change over between the measuring programs by pressing the arrow keys on the right. Optionally, you may also directly select the desired program with the help of the touch display. If a measuring program is highlighted (in blue), it can be changed, started and stopped by clicking on the icons on the right.

If a measuring program is selected and started, the Huminator II will start the measurement. The first defined measuring point will be automatically set and displayed on the welcome page.



Illustration 21: Displaying with activated measuring program

As soon as the Huminator II starts the measurement, a counter is displayed beside the program number. It indicates at which point the Huminator II is working and how many points are still need to be measured. The measuring program can be terminated by pressing the icon „Stop“ program selection menu.

The Huminator II truncates the current measuring program and maintains the last measuring point. The adjustment is not switched off since condensate may form when switching off the control at high temperature/humidity values. Therefore, when working at high values, the control should be manually set to moderate values (25°C; 30% rF) before switching it off and only then be switched off after a few minutes.

The measuring program can be adapted in the program selection menu by clicking on the icon “Change program”. The window with the title “Program settings”.

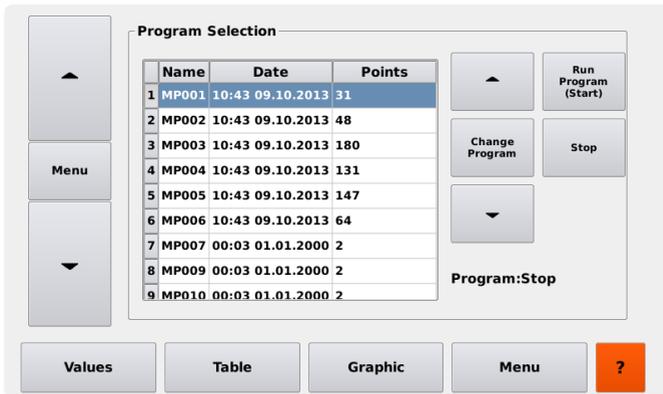


Illustration 22: Submenu program setting

In the window “Program setting” a table is displayed which shows the measuring points of the selected measuring program.

Here you can select and change a measuring program:

- Defining the sequence of the measuring points
- Completing or deleting measuring points
- Determining tolerance limits for measuring points
- Determining chronological sequence of the measuring program

You can change the sequence of the measuring program by selecting a measuring point and shift it by clicking on the icons “Downward” or “Upward”. A measuring program consists of at least two and maximum ten measuring points.

Subsequently you can renumber the individual measuring points in the order by clicking on the button “Renumber”.

Delete individual measuring points by clicking on the icon “Delete”.

In turn it is possible to define new measuring points by clicking on “Add”. An additional row is displayed with a proposal of a measuring point and the counter on the table is increased by the factor one.

If you would like to change this or an already existing measuring point of the measuring program, select the desired point. Then you can adapt the values by clicking on the icons “Temp” and “Humidity”. The corresponding tolerance limits are defined by clicking on the icon “Tolerance % rh” (refer to chapter 7.4). The stability time determines during which period of time the Huminator II shall attain the tolerance limits.

They are determined by clicking on the icon “Stability time”. If the Huminator II does not attain the determined limits within the preset stability time, the control truncates and the following measuring point is triggered. If the tolerance limit is attained within the defined period of time, the hold time follows subsequently. It can be controlled by pressing the icon “Hold time”. The hold time describes the period of time during which the Huminator II shall hold the current measuring point, before the following measuring point is triggered.

When the measuring program is completely passed, the control stops at the last measuring point included in the measuring program.

Then, it is possible to switch off the Huminator II by clicking on the control buttons. Optionally the Huminator II can be manually driven to a low humidity value and switched off (this step is particularly recommended at high temperature and humidity values). The measuring program is finished and can be transferred to a memory media and evaluated if it was recorded.

During the measurement you have to option to interrupt the program and to have the remaining measuring points measured at a later point in time. In the submenu “Program selection” you may stop the ongoing measuring program by clicking on the icon “Stop” and manually take over the control of the Huminator II.

Tip: Before starting a measuring program, you should check the water level as well as the desiccant cartridge. There is a risk, that too little distilled water is available in the water tanks or that the desiccant is used up. Then, the Huminator II is no longer able to use its full scope of power.



7. Signal tones

During the ongoing measurement of the individual measuring points or of a measuring program, the different signal tones (e.g. stability time or end of the measuring program) can be included. In order to set the signal tones, click on the icon “Signal” in the sub-menu and select the desired signal.

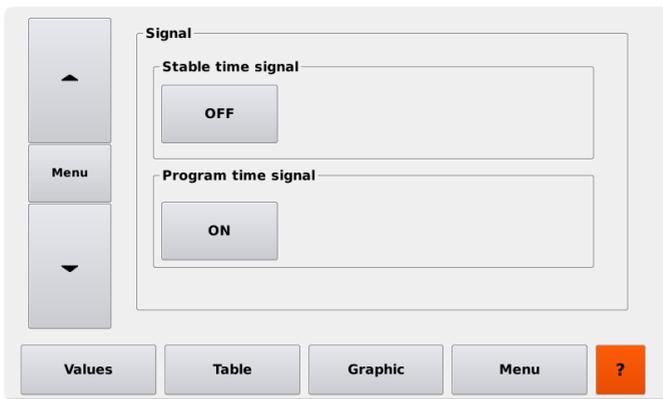


Illustration 23: Submenu to set the signal tones

The signal tones will be activated/deactivated by pressing the respective button. The signal for the stable time will sound when the measurement value has been within tolerance range for 5 minutes. The tolerance can be set on the main screen. If the measurement value deviates outside of the set tolerance, the timer stops and starts to count again when the tolerance is again reached.

Using the Program Signal, a tone will sound when the Huminator reaches the end of a program.

8. Controlling and reading the measured data via the Intranet

Beside the manual control, there is the option to remote control the Huminator II via an Internet browser within your network:

- Connect the Huminator II to your internal network connection via a network cable by means of the provided interface at the rear of the device.
- Then, assign an IP address to the Huminator II. This IP address serves to clearly identify the Huminator II and is stored by default and can be called up by clicking on the icon “Network”.
- Click on the icon “Automatically assign IP address”. The IP address which is saved in the Huminator II is displayed in the grey field.
- Then click on the icon “Standard” and the Huminator II assigns the corresponding so-called subnet mask and the standard gateway, visible in the fields “Netmask” and “Gateway”.

Optionally you have the option to manually assign an IP address to your Huminator II. You can enter it either via the network settings of the submenu “Network” or directly via the network configuration of your PC. Please find information in the corresponding manuals or contact you IT service.

After the successful entry, the IP address has to be confirmed by clicking on the icon “Save”. You can enter the defined IP address with the help of the Internet browser and call up the welcome page of the Huminator II.

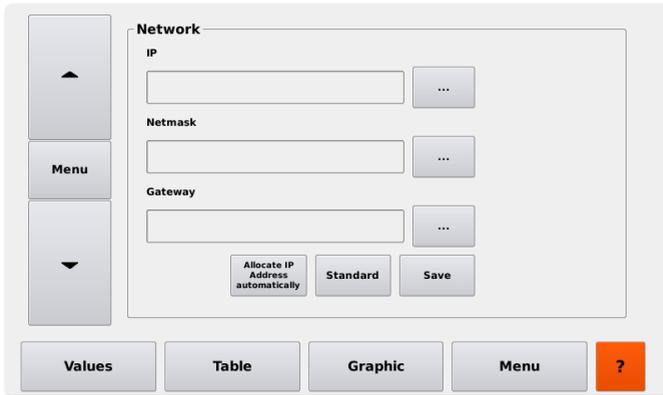


Illustration 24: Submenu to enter the network settings

If you enter the IP address indicated in the field "IP" for instance in the Internet Explorer the following screen is displayed:

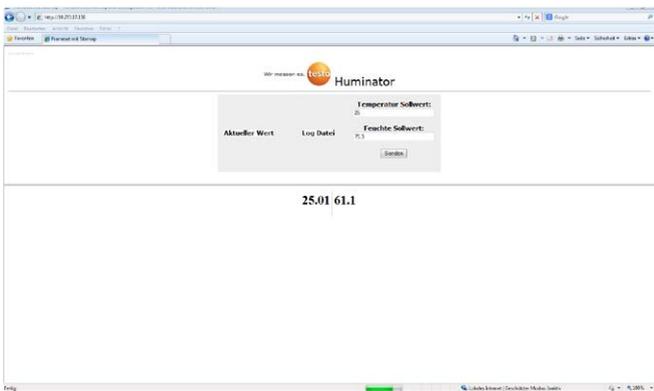


Illustration 25: View of the current measured values on the Internet Explorer

You can see the current measured data on the welcome page of the Huminator II. The data are automatically updated. They may also be manually updated by clicking on the icon “Current value” (Aktueller Wert).

In the fields “Temperature setpoint value” (Temperatur Sollwert) and “Humidity setpoint value” (Feuchte Sollwert) you can enter measuring points and transfer them to the Huminator II by clicking on “Send” (Senden).

The Huminator II starts measuring, if the control had been switched on on the device beforehand.

By clicking on the icon “Log file” (Log Datei) you can access the internal “memory” of the Huminator II. Here the log files are saved (refer to Illustration 26: Viewing the log files saved on the Huminator) This allows you direct access to the measured values. You can update this overview of the log files by clicking on “Refresh”.

Just click on it in order to open a log file. The overview of the measuring points opens up. They are assigned to the corresponding recording date and time and indicate the correspondingly preset setpoint value and the measured actual value separated by a semicolon. The measured data can be directly saved from the internal memory onto your PC.

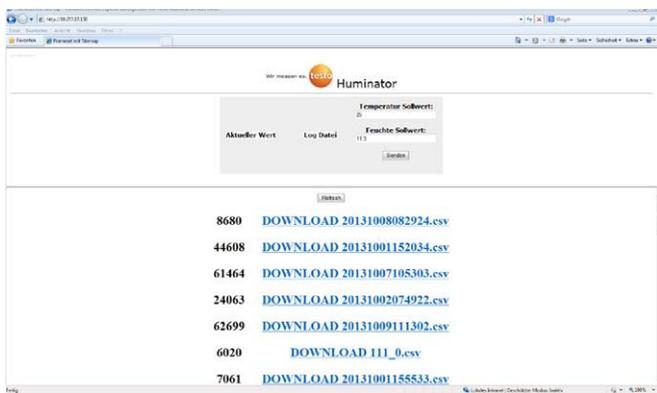


Illustration 26: Viewing the log files saved on the Huminator

9. Reading and saving the Huminator II via interface commands

Beside reading the measured data via your Intranet, you also have the option to read out and control the Huminator II via interface commands. To do so, connect the Huminator II at the rear of the device to your PC. Connect the USB-B connector at the front of the Huminator II to a USB-A connection of your PC.

Call a suitable terminal emulation program on your PC.

First configure a suitable interface in order to communicate with your PC. To do so, take over the interface configuration of the Huminator II which is preset at the factory:

- Transfer rate: 115200 bauds
- 8 data bits
- 1 stop bit
- No parity

The communication with your Huminator II is performed in telegraphic style. A telegram consists of at least two parameters. They are separated by a separator. Each telegram starts with a start character and ends with an end character. In general for the structure of the telegram this results in:

```
[START] [;] [PARAMETER1] [;] [PARAMETER2] <;PARAMETER3> <;PARAMETERn-1>  
<;PARAMETERn> [END]
```

Fixed part of the telegram are entered into square brackets [].

Optional or changing parameters are entered in pointed brackets < >. The parameters themselves are determined at the factory by so-called register numbers which you may find in the register table in the annex. At this, even register numbers stand for read access and uneven register numbers stand for write access. A function is assigned to each register in the table. If applicable, you may influence them by entering an additional parameter in form of a variable.

- Start character: !
- Separator: ;
- Number (n) of entered parameters: [PCount=n]
- End character: [CR]
- Check sum describes a sum of 8 bits which is made up by all characters between the start character and the check sum: [Checksum]

This results in the following telegram structure:

- For a read command without check sum:

[!] [PCount=2] [[:]Register] [CR]

- For a write command without check sum:

[!] [PCount=3] [[:]Register] [[:]Value] [CR]

- For a read command with check sum:

[!] [PCount=3] [[:]Register] [[:]Checksum] [CR]

- For a write command with check sum:

[!] [PCount=4] [[:]Register] [[:]Value] [[:]Checksum] [CR]

- For a cyclic output of the measured values: ! 3 ; 23 ; 1 [CR]

- Stop output ! 3 ; 23 ; 0 [CR]

- Temperature change, example 20.0°C: ! 3 ; 31 ; 2000 [CR]

- Humidity change, example 25.0 % rh: ! 3 ; 41 ; 2500 [CR]

Tip: At this, observe that it is necessary to shift the decimal place by two places to the right when entering the temperature and the humidity values.

I.e. do not use a comma when entering the value.

Please find the complete list of interface commands in the annex.



10. Maintenance instructions

10.1 Disassembly and assembly of the desiccant cartridge

If the desiccant included in the desiccant cartridge is used up and mostly discoloured (almost completely white) you should replace and regenerate it. To do so, you have to replace the desiccant cartridge with the used desiccant.

1. Switch off the Huminator II by clicking on the icon “Standby”
2. Switch off by pressing the mains switch at the rear of the Huminator II
3. Disconnect the power supply line from the Huminator II
4. Open the flap at the top of the Huminator II
5. Then the desiccant cartridge is open, it is fixed with a quick-disconnect coupling on both ends (refer to Illustration 27: Desiccant cartridge with quick-disconnect coupling on both ends)



Illustration 27: Desiccant cartridge with quick-disconnect couplings on both ends

6. Release the two quick-disconnect couplings by pulling the outer ring of the fixture to the top (refer to Illustration 29: Quick-disconnect coupling on the device and on the cartridge)
8. Remove the whole desiccant cartridge from the Huminator II (refer to 28 Removing the desiccant cartridge)



Illustration 28: Removing the desiccant cartridge

9. Open the bayonet catch of the cartridge and pour the used granulate into a suitable container
10. There are two options:
 - a. Fill in new granulate
 - b. Dry the used granulate in a furnace
11. Fill the desiccant cartridge with the new/regenerated granulate up to the level indicator.
12. Close the bayonet catch and reinsert the desiccant cartridge into the Huminator II
13. Make sure to work in a clean environment, in particular there must be no dirt particles between the inside of the housing of the desiccant cartridge and the seal rings.

14. In addition, when inserting the desiccant cartridge make sure that the lid is installed towards the front side of the device. This increases the degree of efficiency, in particular when adjusting very little humidity values.
15. Connect the flap of the Huminator II and connect it to the power supply.

Then it is possible to reuse the Huminator II.

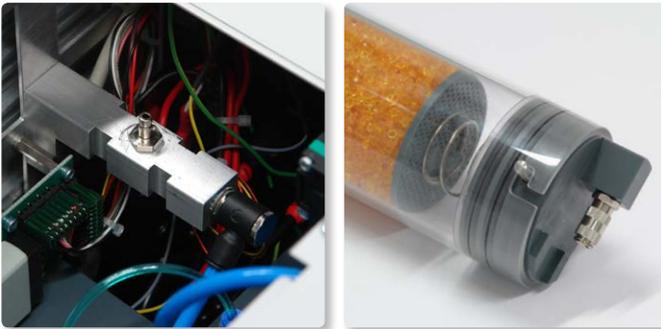


Illustration 29: Quick-disconnect coupling on the device and on the cartridge

 **Tip:** The granulate can be dried in the furnace as described in 9b. Fill the used granulate into an open, heat resistant container in which you may spread the granulate. It can be dried in the furnace at about 130°C. It can be used as soon as the pellets are orange coloured.

10.2 Replacing the reference sensor

The installed reference and control sensors (testo 6613 0555 6610-L13) should be periodically cleaned and calibrated. Only in this way it is possible to attain a durable accuracy.

 **Tip:** For an optimum long-term stability, the company Testo Industrial Services recommends to recalibrate the reference sensor once per year and to verify in the humidity fixed points in shorter time intervals.

1. Switch off the Huminator II by clicking on the icon “Standby”
2. Switch off by pressing the mains switch at the rear of the Huminator II
3. Disconnect the power supply line from the Huminator II
4. Open the flap at the top of the Huminator II
5. Disassemble the desiccant cartridge as described in chapter 11.1.
6. The control and reference sensors are located laterally on the measuring chamber.
Disconnect the plug at the end of the sensor line from the measuring chamber (refer to Illustration 30: Removing the sensor from the measuring chamber and the sensor plug)
7. Remove the protecting cap in order to clean the control and reference sensor and clean the mirror surface carefully with an easily volatile alcohol without residues.
To do so, use cotton sticks or a thin cotton cloth soaked with alcohol
8. Send the sensor to a calibration laboratory for calibration.
9. Put the sensor back into the measuring chamber and reconnect the sensor cable (the push button on the plug always has to point to the outside of the housing) and reinstall the detector (refer to chapter 11.1).
10. Connect the flap of the Huminator II and connect it to the power supply.

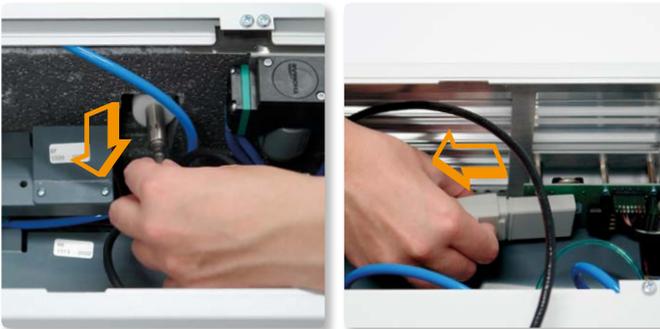


Illustration 30: Removing the sensor from the measuring chamber and the sensor plug)

Tip: If the sensors are calibrated, a long downtime may be avoided by procuring a spare sensor.



10.3 Insert of the charcoal pad

As described in the beginning the internal cycle needs to be protected from contamination. Therefore the use of charcoal pads is foreseen. The pads should be renewed after 6 month if the system is used frequently.

To change the charcoal pad the cartridge has to be disassembled 1 and emptied as described in chapter 10.1. After that, the insert the charcoal pad as shown in Illustration 31: Cartridge without and with charcoal pad. The cartridge can now be filled and closed as described in chapter 10.1. after the charcoal pad is now on the ground of the cartridge.

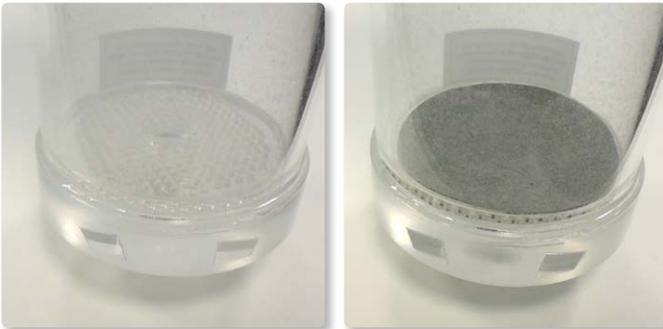


Illustration 31: Cartridge without (left) and with charcoal pad (right)

10.4 Performing an update

The Huminator II is enhanced by Testo Industrial Services and novelties are included.

The update files can be transferred to the customer in different ways. The data can be transferred to a USB 2.0 formatted with FAT 32 and uploaded to the Huminator II.

To do so, switch on the Huminator II and call up the submenu "System" by clicking on the icon "Menu". Then, plug the USB 2.0 stick with the update into the USB interface at the front of the device and click on the icon "Update from USB" in the menu "System" (refer to Illustration 7: Submenu "System")

The update is available after the restart. Shut down the system by clicking on the icon "Standby" and switch off the Huminator II by pressing on the mains switch and then restart it after a few seconds.

Then the update is only effective and all changes made by the update can be used.

11. Registration table

Even register: Read access, uneven register: Write access.

Register	Description	Type	Unit / Format	Parameter / Meaning
2	Firmware Version	String		
4	Hardware Identifier	String		
6/7	Serial number MRE	Int32	PROJECT IDENTIFIER KKSSPP	13500V<KK=COP-PER><SS=SLP><PP=P-CB
8	Device and manufacturer information	String		
12/13	Master	Uint8		0 -> NONE -> DISPLAY -> USB
14/15	Temperature control mode			0 -> OFF 1 -> ON
16/17	Humidity control mode			0 -> OFF 1 -> ON
18/19	Summer Status Register		Masked bit by bit	0x0001 -> SUMMER ENABLED 0x0002 -> Switch on 0x0004 -> Switch on 1 Hz 0x0008 -> Switch on 5 Hz 0x0010 -> Current status (0 Off, 1 On)
20/21	Status Cyclic output display			0 -> OFF 1 -> ON (D1)
22/23	Status Cyclic output USB			0 -> OFF 1 -> User Log 1 (L1)
30/31	Temperature setpoint value	Int16		Setpoint temperature [0.01 °C]
40/41	Humidity setpoint value	Int16		Setpoint [0.01 %rh]
70/71	Serial number Humi			

Register	Description	Type	Unit / Format	Parameter / Meaning
80	Current date and time	String	YYMMDD HH:MM:SS	YY -> Year MM -> Month DD -> Day HH -> Hour MM -> Minute SS -> Second
82	Complete Date and time	Int32	YYMMWWDD HH:MM:SS	
83	Set date	Int32	YYMMWWDD	YY -> Year MM -> Month WW -> Weekday (0 = Sunday, ...) DD -> Day
84	Time		HHMMSS	
85	Set time		HHMMSS	HH -> Hour (24-hour format) MM -> Minute SS -> Second
10001	Customer Special Function Register 1	Uint16		1 -> Enter boot loader (waiting for USB with 115k 8,N,1 for new firmware)

12. Log outputs

Display standard log output D1

Parameter	Meaning	Unit
1	Parameter Count	Number of parameters in the telegram
2	Register	String "D1"
3	Date	YYMMDD
4	Time	HH:MM:SS
5	Operating mode	
6	Master mode	
7	Temperature control mode	String (T0 -> Off, T1 -> On)
8	Temperature setpoint value	°C
9	Temperature measuring value	°C
10	Humidity control mode	String (H0 -> Off, H1 -> On)
11	Humidity setpoint value	% rh
12	Humidity measured value	% rh
13	Water level tank	%
14	Water level of humidifier	%
15	Summer Status Register	Don't care

13. Technical data

Specifications		
Control range	5...50 °C	5...95% rh
Measuring range	5...50 °C	5...95% rh
Stability	± 0,02 °C (at 25°C; 50% rh)	± 0,3% rh (10...80%rh at 10 ...40°C) ± 0,5% rh (typ. remaining area)
Sensor accuracy at 25°C	± 0.15 °C (0.27 °F) with slope PT1000 class AA	± (1.0 % rh + 0.007 x measured value) for 0 ... 90 % rh String (T0 -> Off, T1 -> On)
Homogeneity (typical)	± 0,2 °C	± 0,5% rh
Stabilizing time	3 min (of 35 at 80%rh at 25°C)	
Conditions of use	20 ± 5°C	
Typical total measuring inaccuracy of the calibration (k=2)	± 0.2 °C (10...85%rh at 25°C) ± 0,5 °C (remaining area)	± 1,5%rh (10...85%rh at 25°C) ± 2,0%rh (remaining area)
General data		
Display	Touch screen	
Number of the sensor slots	5	
Interfaces	USB, LAN	
Power input (typical)	30 W...250 W, max: 500 W	
AC Input voltage/frequency	110...230 V ± 10% 50/60 Hz	
Tank volume	Tank with a capacity of 200 ml	
Water filling level	Fully automatic via graphic display	
Representation of measured values	Tabular and graphic	
Control	Manually or automatically programmable	
General data		

Technical data

Stabilizing time	Optical an acoustical
Dimensions (DxWxH)	451 mm x 448 mm x 266 mm 482 mm x 448 mm x 290 mm (incl. add-on parts)
Dimensions of the measuring chamber	Diameter: 160 mm, Depth: 320mm
Useful volume	4.2 litres (Inlet: 154 mm, Depth to the cooling element 230 mm)
Weight	19 kg
Scope of delivery	
Desiccate cartridge	Desiccate with colouring depending on the
Operating material	Plug (15 pcs), hose, water bottle
Line for non-heating apparatus	
ISO calibration certificate	
Optional	
Transport case	For safe transportation
Recirculation	DAkKS calibration certificate
2. Reference	For continuous usage even when recalibrating a reference
Other certificates	
CE approval	
BGV A3 tested	

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