

Instruction Manual

GROWBASE PRO

- Multifunctional digital climate controller with timer functions and CO₂ control
- Inrush current limitation and 2-pole switching for the 4th power socket
- Multi-sensor-function
- For AC and EC fans



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GROWBASE PRO

Dear customer,

Thank you for choosing one of our products. Our name stands for innovative and reliable products that always guarantee the best conditions for your plants. We know how closely the environmental conditions in which you grow your plants are associated with the end result.

We hope that you enjoy using this product!

- Please read these instructions carefully and observe the relevant information.
- Store this instruction manual and make it accessible to all users.
- Ensure that you include this instruction manual when handing over the device to third parties.

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With kind regards,
GrowControl

Changes in the device's firmware can cause changes in the manual.

Please make sure to use the manual that suits to the firmware that is installed on your device.

A list of the changes is published with a new firmware version.

If firmware changes cause changes in the manual, this will be mentioned in this list.

An overview of the history of this manual can be found at the end of the document.

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1. Safety instructions

Please observe the following information besides the safety instructions of this manual. As with all electrical devices, use this digital environmental controller carefully and cautiously to avoid hazards due to electric shock.

Electric shock

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Warning!

- Please note that the integrated power sockets of the device are enabled once the device is connected to an electrical supply.
- Only operate the device at the voltage indicated on the device.
- Do not connect defective equipment to the device.
- Protect yourself from electric shock by avoiding body contact with earthed or grounded surfaces such as pipes or radiators.
- Check all device parts including the power cable and extension cables as well as plug connections for their proper condition prior to each use. Check the proper status of all parts connected to the device. Do not use the device if it is damaged.
- Do not pull on the cables to disconnect the plug from the power socket. Hold the device plug sockets with one hand while removing electrical equipment by pulling the plug.
- Do not use the device if it has sustained a fall or if water has penetrated the device interior.
- Do not use the unit during a thunderstorm.
- In the event of defects or operational faults, switch off the device immediately and disconnect it from the power socket.
- Never hold or carry the device by the power or sensor cable.
- Maintain a distance between all device parts and warm surfaces.
- Only use the unit in dry and heated rooms.
- Never reach for a device that has been submerged in water. In such cases, pull the plug out of the power socket immediately.
- Do not subject the device to any impact or drop the device.

Repairs



Warning!

- Do not open the device.
- Only specialist personnel may perform repairs on electrical devices. Improper repairs may subject users to considerable danger. For repairs, please contact our customer service or an authorized customer service point.
- If the device or parts of it are damaged, it must be repaired by the manufacturer or an authorized customer service point.

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Risk of fire



Warning!

- There is a risk of fire if the device is used improperly or these instructions for use are ignored!
- Never use the device near highly flammable substances.

Operation



Warning!

- The device is only intended for the purpose described in these instructions. The manufacturer is not liable for damage resulting from improper or careless use.
- Do not connect any technical equipment that exceeds the maximum output indicated on the device or according to this instruction manual.
- Specifications concerning maximum power output are meant to be nominal power output (no "dimmed power" at controlled outputs).
- Do not place any objects on the device.
- Do not expose the device to high temperatures.

2. Specified normal operation

This digital environmental controller is designed for speed controlling of fans and switching a number of other devices. In addition, lights with a 1-10V/1-10V input can be dimmed. Depending on the mode of operation, the controller's power sockets may be used for connecting devices below:

- Power sockets „Multifunctional Out 1-4“:
 - humidifier/ dehumidifier
 - lights*
 - irrigation pumps
 - circulation fans
 - CO₂ valves/ generators (230V)
 - heating mats
 - chillers
 - heaters
- Power sockets „Multifunctional Out 1-3“:
 - Regular duct fans with running capacitor*

The following devices can be connected to the laterally RJ45 jacks:

- RJ45 jacks „In/Out“:
 - humidity and temperature sensor (shipped with the controller)
 - CO₂ sensor (CarbSense)
 - negative pressure sensor (PresSense)
 - temperature sensor for heating matt
 - PowerExtender (output extender)
- RJ45 jacks „EC-Fans“:
 - voltage controlled EC fans
- RJ45 jack „Lights 0-10V“:
 - lights with 0-10V/1-10V input
 - relays/ contactors 12-24V

The device is not suitable for controlling any other equipment.

⚠ The mains cable of an EC fan may not be connected to a power socket on the controller. It should be connected to a standard power socket that is always on. The speed control and switch off is done with the signal from the corresponding RJ45 jack.

⚠ Warning!

If the "intake" mode is selected for the "Multifunctional Out 1-3" output, only standard fans may be connected. Other devices may be damaged in the "intake" mode. When shipped, the functions of "Multifunctional Out 1 and 2" are set to "intake" and "exhaust".

⚠ To meet the European EMC directive, the technique used to control the regular duct fans may be used up to a maximum 600W. Do not connect devices with a power above 600W in "intake" or "exhaust" mode.

⚠ Always ensure that the maximum output power of the individual outputs is not exceeded. Please find further information on the device's label or chapter 11 of this manual.

ⓘ Avoid exposing the temperature and humidity sensor to humidity above 95% RH as the sensor may become damaged.

⚠ Do not connect fans with an integrated rpm control. (e.g. temperature controlled)

*The power sockets Multifunctional Out 1-3 are **not** optimized for switching LED lights or energy saving bulbs. To guarantee that a light is switched off fully, Multifunctional Out 4 should be used for switching LED lights or energy saving bulbs.

3. Device description

The digital climate controller **GROWBASE PRO**

- is the control station for the ambitious indoor gardener. A number of different devices and sensors can be connected, which guarantees maximum flexibility.
- is similarly able to control standard duct fans as well as EC fans, offering maximum flexibility.
- keeps the grow room temperature at the desired value by varying the air flow of the fans.
- keeps the humidity in the grow room at the designed value by switching a humidifier or dehumidifier.
- can additionally reduce the humidity in the grow room by increasing the air flow and/or by switching on the heater.
- can be updated via the USB port.
- brings a 24h timer for switching lights, an interval timer with separate settings for day and night as well as multiple event timers.
- has a battery powered real time clock to keep track of time even if the controller is not connected to the mains supply.
- can dim compatible lights using a 0-10V/1-10V signal. Ramps for sunrise and sunset can be configured.
- is equipped with four programmable power sockets. One of the power sockets brings an inrush current limitation as well as 2-pole switching and can be loaded with up to 2300VA(W). (Multifunctional Out 4). Two pole switching is recommended for switching LED lights. Limitations due to the high inrush current of LED lights are removed. The number of sockets can be increased with one or more additional **POWEREXTENDER**.
- has a transistor output (MOSFET) that can be used for switching external DC relays or contactors.
- can read the measurements of multiple sensors of the same type. Depending on the settings, the average, minimum or the maximum value can be used.
- is able to control the CO₂ level in the grow room with a CO₂ sensor **CARBSENSE** connected.
- is able to calibrate the connected CO₂ sensors.
- ensures a constant negative pressure in the grow room, avoiding the escape of odours from the grow room. To maintain an accurate negative pressure, a pressure sensor **PRESSENSE** can also be connected.
- uses the current sensor values to calculate the values expected in the future. This enables the controller to react precociously to changing sensor readings.
- is able to regulate the temperature and humidity as precisely as $\pm 0.5^{\circ}\text{C}/\pm 1\% \text{ RH}$. *

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- uses well-tuned PID algorithms for controlling the environmental conditions.
- can control the temperature of a heating mat. The temperature can be set to a certain value or a temperature relative to the room temperature.
- is equipped with an easy-to-use multilingual (English, German) menu. Many different setups can be achieved, e.g. adjusting the minimum and maximum fan speed separately for day and night. It offers a range of information including the current temperature, CO₂ concentration, current humidity, min/max temperature values and humidity, current fan speeds and other information regarding the operating condition.
- saves the settings permanently to ensure that they remain available after a power breakdown or after the controller has been temporarily out of use.
- can be mounted to a wall with the included screws, dowels and drilling template.

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*Provided that the sizing of the connected utilities is appropriate and the fresh air temperature is sufficiently low. The tolerance is related to the repeat accuracy rather than the absolute accuracy. The absolute accuracy is $\pm 2\%$.



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- 1 Display
- 2 Rotary switch
- 3 RJ45 jack for 0-10V/1-10V dimming of lights and Multifunctional Out 5
- 4 RJ45 jack for exhaust EC fan
- 5 RJ45 jack for intake EC fan
- 6 5xRJ45 jack for sensors and PowerExtenders
- 7 USB-A Port for firmware updates
- 8, 9, 11 Programmable power socket Multifunctional Out 1-3
- 10 Programmable power socket Multifunctional Out 4
- 12 Mains cable for Multifunctional Out 4
- 13 Mains cable for the controller and power sockets Multifunctional Out 1-3
- 14 Hanger for the sensor
- 15 Digital sensor for humidity and temperature



4. Initial use

Warning!

If "intake AC" or "exhaust AC" mode is selected for an "Multifunctional Out 1-3" output, only standard duct fans may be connected. Other devices may be damaged in the modes "intake AC" or "exhaust AC". When shipped, the functions of "Multifunctional Out 1 and 2" are set to "intake AC" and "exhaust AC".

1. Place the humidity and temperature sensor **(15)** in an appropriate position inside the grow room, usually at the top ends of your plants. Please use the sensor hanger supplied **(14)**. The sensor should not be exposed directly to the fog stream of the humidifier. Connect the humidity and temperature sensor to any of the RJ45 jacks labelled "In/Out" **(6)**.
2. Connect the mains plugs **(12), (13)** to the power supply (regular power socket). The device has two mains plugs, offering the option to share the load/current of "Multifunctional Out 4" to two different circuits.
3. Set the function of the "Multifunctional Out 1-5" outputs and set up all other functions according to your requirements.
4. Connect the EC fans to the RJ45 jacks labelled "intake" and "exhaust" **(4), (5)** using a suitable cable.
5. Connect other accessories (sensors, lights with 0-10/1-10V, *POWEREXTENDER* etc) to the RJ45 jacks.
6. Connect appropriate devices to the other power outputs.

For a working inrush current limitation (applies for Multi Out 4 only), the external devices (e.g. lights) must be connected to the power socket on the controller before the controller starts. The inrush current limitation will also work if the second (lower) mains cable of the controller is connected after the external device is connected.

For AC fans, we recommend disconnecting the mains plug **(13)** first. Subsequently, connect the fans to the corresponding power sockets on the controller and then reconnect the mains plug.

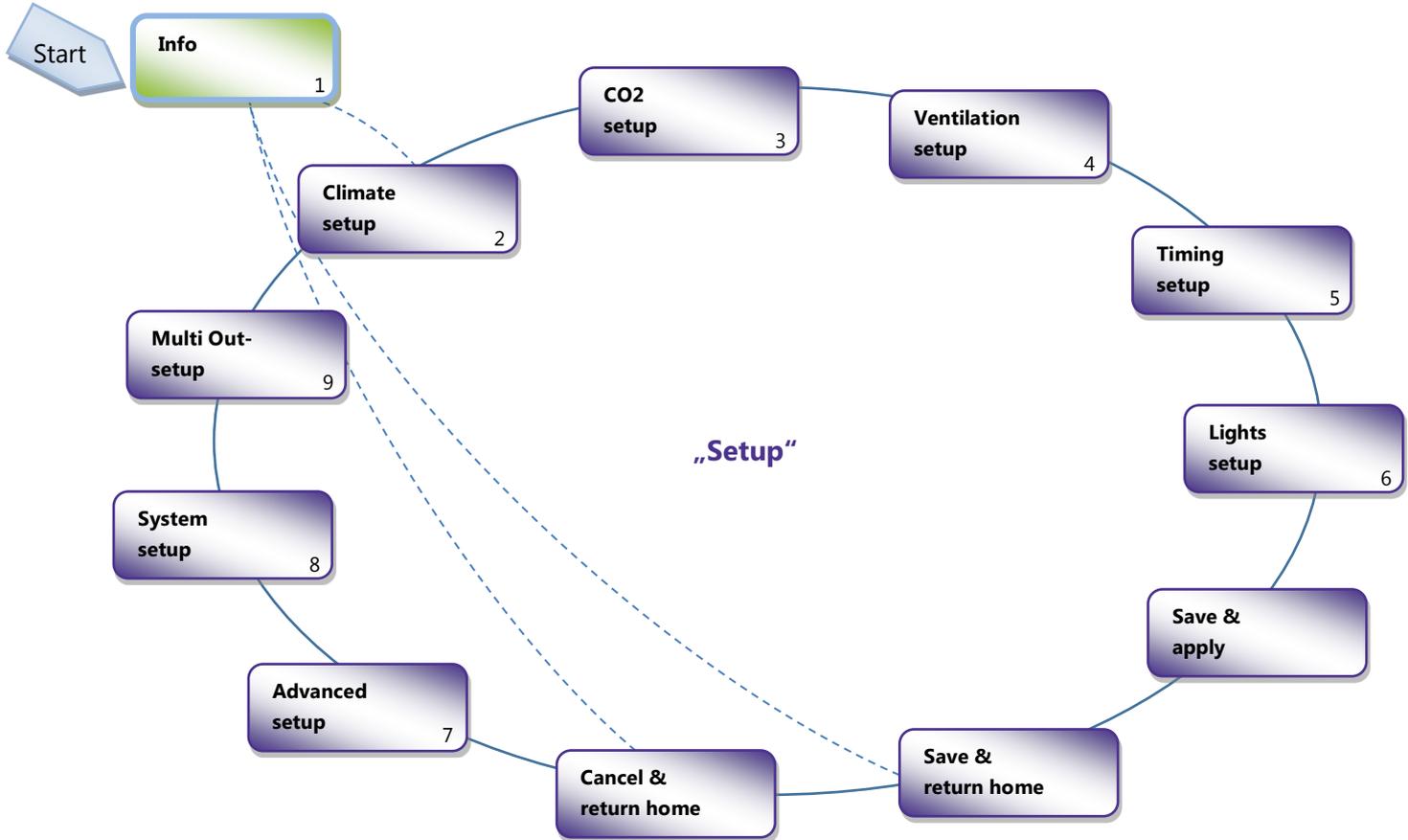
 Always ensure that the maximum output power of the individual outputs is not exceeded. Please find further information on the device's label or section 11 (Page 33) of this manual.

 Avoid exposing the temperature and humidity sensor to moisture and humidity above 95% RH as the sensor may become damaged.

 **EC fans have their own power supply cable, which should be plugged to a regular power socket (always on). It should not be connected to a power socket on the climate controller. The fan's rpm control and turn off is made via the signal cable from the RJ45 jack on the controller to the EC fan.**

If more than five RJ45 jacks "In/out" are required for your setup, the number can be increased to up to ten RJ45 jacks by using splitters. Splitters are available as accessory.

5. Menu overview



6. Operation

The controller is operated via a menu, which is divided into two levels. It is controlled by turning or pressing the rotary switch (2).

- On level **"Info"**, different information is displayed.
- On level **"Setup"**, all settings can be configured. This level is grouped in different topics.

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In the right area of the display, currently available menu options are displayed by these symbols:

-  Enter (press)
-  Go to next menu page (rotate)
-  Change value (rotate)
-  Info screen

Press the rotary switch a bit longer* and then release it in order to jump from any "setup screen" to the screen **„Save&Apply“**.

If the rotary switch is pressed again, the changed settings will be saved and applied and the previous screen will be displayed.

To jump from the level **"Info"** directly to the level **"Setup"** press the rotary switch a bit longer* and then release it while an **"Info"** screen is displayed.

*Longer than half a second but shorter than 4 seconds.

The changing of a certain setting is explained below with the desired humidity value during daytime as an example:

1. In the menu in section "climate setup", choose the screen **"Set desired RH day"**. In order to get to this screen starting at the home screen, follow these steps:
 - a. Rotate the rotary switch one step CCW (counter clock wise). "Press to enter setup" is displayed.
 - b. Press the rotary switch. „Climate setup" is displayed.
 - c. Press the rotary switch. The following screen is displayed:



2. Press the rotary switch. Now the symbol  appears and the value to be set blinks.



3. Choose the desired value by turning the rotary switch.



4. Enter the chosen value by pressing the rotary switch.



In order to save the changes made, there are two options:

1. Press the rotary switch a bit longer* and then release it in order to jump to the screen **"Save & Apply"**. If the rotary switch is pressed again, the changed settings will be saved and applied and the previous screen will be displayed.

*Longer than half a second but shorter than 4 seconds.

2. Go to the screen **"Save & return home"**, and press the rotary switch in order to save the changes. Afterwards **"Home-Screen"** will be displayed.

7. The particular functions and menu sections in detail

7.1 Info level

In this section different information like current sensor readings, fan speeds and information regarding the operation condition is displayed.

Home screen



This screen is the home screen. It shows the current temperature (Temp) and relative humidity (RH).

CO2 concentration



This screen shows the current CO₂ concentration detected by the CO₂ sensor (available as an accessory).

ppm = parts per million

Negative pressure



This screen shows the current negative pressure (vacuum) detected by the pressure sensor (available as an accessory).

Pa = Pascal.

Temperature heating mat



This screen shows the current temperature detected by the additional temperature sensor. This function is designed for controlling a heating mat. It also can be used for controlling the temperature of a water tank (this temperature sensor is achievable as an accessory).

RH MIN/MAX



This screen shows the minimum and maximum humidity values (RH) that have occurred since the last reset.

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T MIN/MAX

```
T MIN: 24.6°C i
T MAX: 26.3°C ◀▶
```

This screen shows the minimum and maximum temperature values (T) that have occurred since the last reset.

Reset MIN/MAX

```
Press for
reset MIN/MAX ◀▶
```

To reset the saved minimum and maximum values, press the rotary switch while this display is shown. After resetting, the home screen will be displayed.

Reset CO2 warning

```
Press to reset ◀
CO2 warnine ◀▶
```

If the desired CO₂ concentration cannot be achieved within 45 minutes, this suggests that there is a problem with the CO₂ supply, such as an empty CO₂ bottle. The higher temperature in CO₂ mode could be harmful for your plants without a sufficient CO₂ concentration. Therefore, the controller will switch to the regular "day mode" without CO₂ dispensing and the warning "check CO₂ supply" will be displayed.

To delete the warning and return to operation in CO₂ mode, press the button while this screen is displayed.

Current fan speeds EC

```
Intake EC: i
2510rpm 62%◀▶
```

```
Exhaust EC: i
2139rpm 72%◀▶
```

These screens show the current fan speed of the EC fans. The "percent value" represents the power transmitted to the fan. The "rpm value" represents the fan's actual rpm. The rpm value is not transmitted from all EC fans. The rpm value can only be displayed if the corresponding signal is transmitted by the EC fan and is supported by the cable. The cable must have at least 4 wires to support this function. The rpm value is for information only and has no influence to the function. rpm = revolutions per minute

Info Multifunctional Out

```
Multi Out 1: i
Intake AC 62%◀▶
```

The screens Multi Out 1 to Multi out 5 display the function that is assigned to each power socket or the DC output (Multi Out 5). Also, the current state of each output is displayed. If one or more PowerExtenders are connected, the number of available outputs is increased accordingly.

Interval info

```
Interval ON i
in: 00:07:56 ◀▶
```

This display informs about the current state of the interval timer. It indicates whether the next switching is ON or OFF

and how long it takes until the next switching.

Info lights



This display shows the current percentage with which a light, that is controlled via the 0-10/1-10V interface, is lit. (dimming)

Info clock time/ mode



This display shows the system's current time and whether it is "day" or "night". This is determined by the times "Start of day" and "End of day".

If the CO₂ control is active, "CO₂" is displayed here. The CO₂ mode is only active during the day.

Info date



This display shows the remaining time for switching an output for which the function "interval" is selected to switch-on or switch-off.

Set point temp. info



This screen shows the current desired value for the room temperature. When a change between day/night/CO₂ occurs, the transition to the new temperature setpoint is done slowly following a ramp.

Additional information can be found in the appendix in chapter 9.

Enter menu level „Setup“



To enter menu level "setup", press the rotary switch while this screen is displayed

7.2 Climate

In this section all setpoints (desired values) associated with temperature or humidity can be configured. For each temperature or humidity setpoint, a separate value for day and night is available. The current clock time and the times for "start of day" and "end of day" in section "timing setup" determine when the controller is working in day mode or in night mode.

RH (Relative humidity): These settings define when a humidifier or dehumidifier is switched on or off. Depending on the settings for the dehumidification mode, the exhaust airflow can be increased and a heater can be switched on in order to decrease humidity.

Setpoint temperature: These values set here define the desired temperature values for controlling the air temperature by the exhaust (and intake) fans.

Temperature Heater: These values define when a heater is switched on or off.

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The sensor readings that are relevant for previously mentioned functions are captured by the supplied sensor for relative humidity and temperature. It is possible to connect more than one sensor of the same type.

Temperature heating mat: These values define the setpoint for the temperature control of a heating mat. The sensor reading relevant for this function is captured by a sensor available as accessory.

Chiller: An output configured as "Chiller" (Multifunctional Out 1-5) is switched on if the desired room temperature is exceeded by 2°C and is switched off if the room temperature is 1°C below the desired room temperature.

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Setpoint humidity



Set the desired humidity value (RH). Separate values for day and night are available.

Setpoint room temperature



Set the desired temperature values (T) for the room air. Separate values for day and night are available.

Setpoint temperature Heater



If this temperature is undercut, a connected heater is switched on. Separate values for day and night are available. Set the temperature values (T) for the room air. Separate values for day and night are available. The accepted temperature range is 5°C to "room temperature" minus 1°C. Example:

Setpoint room temperature day: 27°C
Accepted range: 5°C to 26°C

Temperature heating mat



Set the temperature for a heating mat here. You can set a fix temperature or a temperature relative to the ambient temperature.

"fix" means a fixed temperature
"amb +" means a temperature relative to the ambient temperature.

Separate values for day and night can be set.

Dehumidification mode



When the desired humidity (RH) is exceeded, depending on the selected mode the fan speeds can be increased. This will extract the humidity from the grow room, given that the humidity of the fresh air is lower when inside the grow room. This function is independent of whether a humidifier or dehumidifier is connected to one of the power outputs.

Three modes are available:

Medium – When the desired humidity is exceeded by 10% RH, the air flow will be increased. A deviation of 1.5°C compared

to the desired temperature will be tolerated.

High - When the desired humidity is exceeded by 5% RH, the air flow will be increased. A deviation of 3°C compared to the desired temperature will be tolerated.

High&heating – In addition to the “high” mode, the connected heater will

be turned on when the desired humidity is exceeded by 5% RH as long as the current temperature is below the desired temperature.

The relative humidity is physically coupled to the temperature in the way that the RH drops when heating.

Off – The airflow will not be increased when the desired humidity is exceeded.

7.3 CO2

In this section the settings for the CO₂ control can be configured.

With our CO₂ sensor **CARBSENSE**, the CO₂ concentration of the room air can be controlled. The CO₂ dosing can be done by using a CO₂ bottle or by using a CO₂ generator. The CO₂ dosing is done during daytime only.

On basis of the settings, the control algorithm calculates how long the CO₂ valve has to be opened or how long a CO₂ generator has to be switched on in order to reach the desired CO₂ level. In addition, the algorithm is continuously learning from the previous cycles to reach the desired CO₂ as precise as possible.

The settings “room volume” and “CO₂ flow” are used as a starting point.

The minimum and maximum fan speeds for the CO₂ period can be set individually. It is recommended to keep the airflow low to avoid wasting CO₂. In addition, the room should be well sealed.

To ensure an even distribution of CO₂, good air circulation inside the room should be maintained.

CO₂ control on/off



Here the CO₂ function can be enabled or disabled.

CO₂ concentration



Set the desired CO₂ concentration here. (ppm = parts per million)

Room volume



Set the room volume here.

Unit: (length * height * width) m*m*m = m³

CO₂ flow



Enter the flow set on the CO₂ armature or specified for your CO₂ generator. Unit: l/min = litres / minute

The table below can be used as rough reference for the CO₂ flow.

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| Room volume | CO ₂ flow |
|-----------------------|----------------------|
| < 10 m ³ | 8 l/min |
| 10-20 m ³ | 10 l/min |
| 20-50 m ³ | 15 l/min |
| 50-100 m ³ | 20 l/min |
| > 100 m ³ | 25 l/min |

Exhaust @ 100%



Exhaust @ 100% ↓
1450m³/h

Enter the specified maximum air flow of your exhaust fan(s) according to the manufacturer.

With this setting the controller knows how much air is extracted from the room in a certain period of time at the current fan speed. The CO₂ amount is increased accordingly.

Setpoint temperature CO₂



Set desired ↓
temp CO₂ 32.0 °C

Set the desired temperature for CO₂ mode. When this temperature is exceeded, the fan speeds will be increased as long the following MIN/MAX settings allow.

Exhaust fans CO₂ MAX



Set exhaust ↓
CO₂ MAX: 15%

Set the maximum fan speed of the exhaust

fans during the "CO₂ period". This fan speed will never be exceeded.

Set the desired temperature for CO₂ mode. When this temperature is exceeded, the fan speeds will be increased until this value is reached.

Exhaust fans CO₂ MIN



Set exhaust ↓
CO₂ MIN: OFF

Set the minimum airflow of the exhaust fan during the "CO₂ period". This fan speed will never* be undercut.

*during pressure, sensor calibration is in process, all fans are turned off.

The minimum fan speed is 10%. Additionally, "OFF" can be selected. This means that the intake fan will be switched off as long as the measured temperature is below the desired temperature.

⚠ Ensure that the fan is still rotating at the set minimum fan speed and the airflow is sufficient for cooling the motor. This applies for standard duct fans (AC) only.

Intake fan CO₂ MAX



Set intake ↓
CO₂ MAX: OFF

Set the maximum fan speed of the intake fan during the CO₂ period. The specified value will never be exceeded.

7.4 Ventilation

In this section the minimum and maximum fan speeds and the negative pressure can be set. Separate values for day and night are available.

The factory settings are a good starting point for many setups. Considerations for the optimum settings are:

- Reasonable noise of the ventilation system
- Required air exchange to reach the desired temperature
- Recommended operating range of your (carbon) filters

- The balance between intake and exhaust fans regarding the size/flow. This is relevant for the negative pressure.

Principle of operation:

The fan speed of the exhaust fans is controlled in order to maintain the desired room temperature. Optionally one or more intake fans can be used in order to forward additional air into the room. The fan speed of the intake fans is controlled in order to maintain the desired negative pressure.

If the intake fans run faster at a certain speed of the exhaust fans, the negative pressure decreases. If the intake fan runs slower, the negative pressure increases.

Without a pressure sensor **PRES^{SENSE}**, the speed difference between exhaust and intake fans is given by the setting "negative pressure %".

Example: Current exhaust fan speed: 50%

Negative pressure %: 10%

Current intake fan speed = 40%

With a pressure sensor **PRES^{SENSE}**, the speed of the intake fans is controlled by a PID controller to always maintain the desired negative pressure in pascal (Pa).

In this case the value "negative pressure %" provides a limitation of the intake fan speed. (upper boundary)

Example: Negative pressure in %: 5%

The intake fans will never run faster than "current exhaust fan speed" minus 5% even if the currently measured negative pressure is above the desired negative pressure (Pa).

EC fans are turned off if they are driven below 10%.

The fan speed of AC fans can't be decreased without limits. When a certain value is undercut the fan would not run reliable. How low the fan speed can be reduced, is depending on the particular AC fan.

To avoid driving the AC fan to low, a value for switch off is defined. This value can be set in section "advanced setup" at "intake AC turnoff" and "exhaust AC turnoff". If at "intake/exhaust MIN/MAX" a value below this setting is entered, the message "AC intake/exhaust OFF<##!" is displayed. In order to not turn off the corresponding fan, the value for "intake/exhaust MIN/MAX" must be greater than the corresponding value "AC turnoff".

If only EC fans are used, "intake AC turnoff" and "Exhaust AC turnoff" can be set to 10% to disable the message described above.

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The minimum fan speed can't be greater than the maximum fan speed.

Examples:

- If for "exhaust MAX" a value smaller than "exhaust MIN" is entered, "exhaust MIN" is set to the same value as "exhaust MAX" by the controller. The message "Fan MIN updated" is displayed.
- If for "exhaust MIN" a value greater than "exhaust MAX" is entered, "exhaust MAX" is set to the same value as "exhaust MIN" by the controller. The message "Fan MAX updated" is displayed.

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Exhaust fan MAX



Set the maximum fan speed of the exhaust fans. This fan speed will never be exceeded. Separate values for day and night are available.

Exhaust fan MIN



Set the minimum airflow of the exhaust fans. Separate values for day and night are available.

Please pay attention to the explanations regarding "AC turnoff" at the beginning of this chapter.

- ⚠ Ensure that the fan is still rotating at the set minimum fan speed and the airflow is sufficient for cooling the motor. This applies for standard duct fans (AC) only.

Intake fan MAX



Set the maximum fan speed of the intake fans. Separate values for day and night are available.

Deviation for reduced rpm



To avoid the fans running on full speed with only a small exceedance of the desired temperature, an allowed deviation can be set.

The actual fan speed within this allowed deviation depends on the minimum and maximum fan speeds set on the previous screens.

Some other manufacturers call this function hysteresis.

Negative pressure in %



This setting has two different meanings depending on whether a pressure sensor is connected:

Without a pressure sensor connected:

With different fan speeds of the intake and exhaust fans, a negative pressure is maintained inside the room, which avoids the escape of odours from the grow room. With this value, the amount of negative pressure can be set. Furthermore, the intake and exhaust fans can be balanced if different fans are used. For example, if a value of 10% is set, this means that the intake fan will always turn 10% less compared to the exhaust fan.

With a pressure sensor connected:

The setting limits the speed of the intake fan compared to the exhaust fan. For example, with a value of 0%, the intake fan will at a maximum go as fast as the exhaust fan. With this setting, having positive pressure can be avoided in case of an inappropriately calibrated pressure sensor.

Negative pressure in Pa

Set the desired negative pressure in Pa. This setting is only relevant when a pressure sensor is connected.

Pa = Pascal

One Pa is equivalent to the pressure difference of approximately 7cm altitude in the earth atmosphere.

Pressure sensor calibration

Press the button while this screen is shown to calibrate the pressure sensor. During calibration (which takes about one minute_ all fans will be turned off. Further information can be found in the pressure sensor's manual.

Auto calibration pressure sensor

If "ON" is selected, the pressure sensor will be automatically calibrated 10 minutes before the "day period" starts (only when a pressure sensor **PRESSENSE** is connected)

7.5 Timing

GROWBASE^{PRO} has got three different types of timers:

- Clock timer (24h)
- Interval timer with separate settings for the day/night periods
- 4 Event timers

The clock timer is designed to switch the lights.

In addition, the "current clock time", "start of day" and "end of day" are relevant for determining if the controller is currently working in day (or CO₂) or night mode.

The interval timer is suitable to switch irrigation pumps or circulation fans on and off to the split second. (e.g. 15 seconds ON and 10 minutes OFF at daytime and 10 seconds ON and 30 minutes OFF at night)

After one cycle is finished, the next cycle will start over. (recycling timer)

The interval timer is suitable to switch an external device continuously ON and OFF. It is not suitable to switch a device ON or OFF at a certain clock time.

For every **Event-Timer**, times "event start" and "event duration" can be set. (e.g. event 1 start 14:30 hh:mm, event 1 duration 00:10:00 hh:mm:ss). One or more events can be assigned to one power socket. (e.g. function out 1: event 2, function out 1: Event 1&2&3 or function out 1: Event 3&4). Additional information can be found in the description for „Multifunctional Out“.

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Clock time



The clock can be set on this menu screen.

Tipp: To set the clock to the split second, choose the current time + 1 minute and press the rotary switch (enter) when the next minute starts

Date



Set the current date here.

The date format can be altered in section "system settings".

Start of day



Set the time to switch the lights on. An output associated with the function "clock timer" will switch on according to the set time. The controller is working in "day mode" after this time.

End of day



Set the time to switch the lights off. An output in "clock timer" mode will switch off according to the set time. The controller is working in "night mode" after this time.

7.6 Lights

In this section the settings for dimming compatible lights can be configured (0-10V/1-10V). The maximum brightness in % and the duration for sunrise and sunset can be set. In addition, the times for "start of day" and "end of day" can be set. This are the same time settings as in section "Clock time".

The controller is equally able to control lights with a 0-10V or 1-10V input.

Interval ON



Set the interval time (period) to switch on the output that is configured for "interval timer".

Separate values for day and night are available.

Interval OFF



Set the interval time (period) to switch off the output that is configured for "interval timer".

Separate values for day and night are available.

Event start time



Set the time for the corresponding event to start. (hh:mm)

Four events are available. In menu section "Multi Out setup" one power socket can be associated with one or more events.

Event duration



Set the duration for the individual events. (hh:mm:ss)

For lights with a **0-10V input**, the brightness control as well as the turnoff is done with the 0-10V signal. The mains supply of the lights doesn't have to be switched off in order to switch off the lights. The lights are turned off if the 0-10V signal is below a voltage of 1V.

For lights with a **1-10V input**, the mains supply of the lights must be switched off in order to switch off the lights completely. Lights with 1-10V input are dimmed to 10% if the Voltage is below 1V. Power socket "Multifunctional Out 4" of **GROWBASE^{PRO}** is optimized for switching LED lights.

Lights Max



Set the maximum intensity of the lights, controlled with the 0-10/1-10V interface.

Duration sunrise & sunset



Enter the duration for sunrise and sunset

here. The voltage is increased or decreased continuously during sunrise and sunset.

Lights with a 0-10/1-10V input can be connected with a cable that can be purchased as accessory. Information regarding the used pins or the RJ45 jack can be found in the appendix in chapter 9.2.

7.7 Advanced setup

Some settings in this section influence the control algorithms of the controller.

These settings are designated to experienced users. If you do not understand a particular setting, leave it unchanged.

Here only two settings of the section are mentioned. Additional information can be found in the appendix in chapter 8.

The fan speed of AC fans can't be decreased without limits. When a certain value is undercut the fan would not run reliable. How low the fan speed can be reduced, is depending on the particular AC fan.

To avoid driving the AC fan to low, a value for switch off is defined.

In order to not turn off the corresponding fan, the value for "intake/exhaust MIN/MAX" must be greater than the corresponding value "AC turnoff".

⚠ Ensure that the fan is still rotating at the set minimum fan speed and the airflow is sufficient for cooling the motor. This applies for standard duct fans (AC) only.

Intake AC turnoff



Exhaust AC turnoff



7.8 System setup

In this section, settings such as display contrast and date format can be configured or, for example, all settings can be reset to the factory settings. In addition, CO₂ sensors can be calibrated.

Temperature unit



Choose the preferred temperature unit (°C/°F).

Date format



Choose the preferred date format. The following options are available: DD:MM:YYYY und YYYY-MM-DD

Language



Choose the preferred language for the menu (English/German).

Display timeout



Here you can set the display timeout. The time set for the display timeout determines the time to switch off the display illumination. The home screen is displayed 20 seconds after this time has expired without turning or pressing the rotary switch. When "ON" is set, the display illumination will be on at all times. After a period of 180 seconds, the home screen will be displayed.

Display contrast



Set the display contrast. The display contrast is updated instantly according to the current value. In order to keep the new contrast value even after a restart, it has to be saved via "Save & apply" or "Save & return home"

Multi sensor



Multiple sensors of the same type can be connected to the controller. For every measured value one of the following options can be chosen: average, minimum, maximum. It defines which value is used for the corresponding function.

For these values settings are available:

- „RH“ (Humidity captured by sensors RH/T)
- „T“ (Temperature captured by sensors RH/T)
- „H mat“ (Temperature captured by sensors for heating mat)
- „Press“ (Negative pressure sensors)
- „CO₂“ (CO₂ sensors)

Calibration value CO₂



Set the calibration value for the CO₂ sensors here.

Apply calibration CO₂ sensors



To send the previously set calibration value to the CO₂ sensors, choose "OK" and confirm the action by pressing the button.

To gain a good calibration, the sensors should be stored for some time in a known CO₂ concentration. (e.g. 15 minutes).

In addition, we recommend to set the filter value to the highest value (7) in order to minimize the impact of noise. After the calibration the filter value should be restored to the former value. (Recommended: 0)

After a successful calibration, this screen is shown:



The "1" on the screen indicates the number of successfully calibrated sensors. Please make sure that the displayed number is matching the number of actual connected CO₂ sensors.

The calibration feature is supported by CO₂ sensors of the new design:



CO₂ sensor filter



The sensors with the design shown above have a configurable filter.

Filter value 1-7:

With a small filter value, the sensor is reacting quicker to changing conditions compared to a high value. The noise also increases with a small filter value.

Filter value 0:

With this filter value the filter is automatically adjusted to the prevailing conditions. This setting usually is the best choice.

Apply filter CO₂ sensor



In order to send the previously set filter value to the CO₂ sensors, choose "OK" and confirm the action by pressing the button. After a successful transfer of the filter value, a message similar to the "Apply calibration".

Restore factory settings



In order to restore all factory settings, choose "OK" and confirm by pressing the rotary switch.

Please note that this action also resets the functions of the power sockets on the

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controller. We recommend to remove all devices that are connected to the power sockets prior the reset.

Functions associated with the individual power sockets on the controller with factory default:

Multi Out 1: Intake AC

Multi Out 2: Exhaust AC

Multi Out 3: Humidifier

Multi Out 4: Lights

Multi Out 5: Lights

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Firmware version info



This screen shows the currently installed firmware version.

Restart controller



This function is intended to be used for updating the firmware. To update the firmware, the rotary switch has to be pressed while the controller is starting. A detailed description for the firmware update can be found in chapter "firmware update".

7.9 Multifunctional Out

A function can be assigned to every power socket on the controller. This also applies to Multifunctional out 5, which is a transistor output (MOSFET). Multifunctional Out 5 is connected to the RJ45 jack "Lights 0-10V".

For all power sockets/outputs these functions can be selected:

- Humidifier
- Dehumidifier
- Lights
- Interval
- Heating mat
- Chiller
- CO2 valve
- CO2&Heating (CO2-Generator)
- Heater
- Event 1
- Event 2
- Event 3
- Event 4
- Event 1&2
- Event 3&4
- Event 1&2&3
- Event 1&2&3&4
- Deactivated

For the power sockets Multifunctional Out 1-3 these functions are available in addition:

- Intake AC
- Exhaust AC

The mains cable of an EC fan may not be connected to a power socket that is set to intake/exhaust AC!

- ⚠ Always ensure that the maximum output power of the individual outputs is not exceeded. Please find further information on the device's label or section 10 of this manual.

The power socket "Multifunctional Out 4" has an inrush current limitation and two poles are switched.

Especially LED drivers but sodium vapor lamps as well have a high inrush current which is way higher than the operation current. (e.g. 60 times higher)

This means that the fuse of the electrical installation can trip while switching on the lights. This means that the number of lights per fuse/circuit can be very limited.

For a working inrush current limitation, the external devices (lights) must be connected to the power socket on the controller before the controller starts. The inrush current limitation will also work if the second (lower) mains cable of the controller is connected after the external device is connected.

If for LED drivers or energy saving lamps just one pole is switched, it can happen that the lights are still illuminated or flashing when the power socket is switched off. In addition, the LED driver can be damaged if just one pole is switched.

Information regarding the DC output (MOSFET) Multi Out 5 can be found in the appendix in chapter 8.

When small inductive loads (contactors, small pumps) are switched by sockets Multi Out 1-3, in particular cases it can happen that the external device is not switched off correctly with the standard configuration of the output. If you are experiencing this kind of behaviour, please contact our support. info@growcontrol.de

7.10 Firmware update

With an USB memory stick you can update the controller's firmware.

Please note: All power sockets on the controller and the EC fans are turned off during a reboot or a firmware update.

The following steps explain how to do a firmware update:

1. Copy the firmware file to an USB stick, formatted in FAT32 format. The firmware file must be placed on the top level of the folder structure. It may not be saved inside a folder. If there is more than one firmware file on the USB memory, write down the filename.
2. Connect the USB memory containing the firmware file to the USB port on the controller.
3. Keep the rotary switch pressed while the controller restarts.

There are two options to restart the controller:

- a. Go to the menu entry "restart controller" in section "system". Select "OK" by pressing and turning the rotary switch. When "OK" is displayed, hold down the rotary knob until the controller reboots and the display shows "USB BL #.#.#" and the controller's name.
 - b. Pull the mains plug (13) out of the socket and reconnect it.
4. If you have multiple firmware files on the USB memory, choose the preferred file by turning and pressing the rotary switch. Confirm the question "Update firmware?" with "OK". Alternatively, you can cancel the process with "CANCEL" at this point.
 5. After a successful firmware update the controller starts normal. The previously saved settings remain unchanged after a firmware update.

Summary of the requirements for the USB-stick:

- The USB memory has to be formatted in FAT32 format.
- The firmware file has to be on the top level of the folder structure. It may not be saved inside a folder.
- The number of firmware files, saved on one USB drive, is limited to 20 files.
- The name of a firmware file for GROWBASE PRO must start with "fw5045" and should not be longer than 12 characters, in order to be displayed on the display including the file extension ".bin".
- Read the notes in the text file published with the firmware update carefully.

8. Appendix

8.1 Appendix advanced settings

Introduction advanced settings:

These settings are designated to experts. If you do not understand a particular setting, leave the value unchanged.

A "P controller" only considers the difference between setpoint and actual value.

A "PD controller" additionally considers the speed with which the actual value changes.

A "PID controller" additionally compensates for small deviations that occur over a longer period of time.

The "fuzzy CO₂ controller" makes an assumption for the required CO₂ dose based on the set values. It learns from the following CO₂ dispensations to compensate for inaccuracies.

Regulation type CO₂



Choose the preferred control method for the CO₂ regulation. In most cases "fuzzy" is the best option. If "P" or "PD" is selected, the settings for "room volume", "CO₂ flow" and "exhaust @ 100%" have no effect.

Regulation CO₂ Kp



This is the factor that is multiplied by the P term of the CO₂ P or PD controller.

Regulation CO₂ Kd



This is the factor that is multiplied by the D term of the CO₂ PD controller.

CO₂ hysteresis


Set hysteresis ↓
CO₂: 15◀▶

At a small hysteresis value, a CO₂ valve or a CO₂ generator are switched on or off more often than at a high value. At a smaller value the setpoint value is maintained more precisely.

Negative pressure regulation Kd


Res. Kd ↓
Pressure: 8◀▶

The value set here influences the behaviour of the negative pressure control algorithm. It is the differential proportion/factor of the PID negative pressure control.

Which value is the optimum for your setup depends primarily on the room size and the responsiveness of the connected supply air fans.

With a higher value, the negative pressure control reacts more strongly to changes in the currently measured negative pressure value. If the value is too high, the speed of the supply air fan will oscillate.

With a small value, the negative pressure control reacts less responsive to changes in the currently measured pressure value.

With small values the control becomes more stable (no oscillation) and at the same time the control becomes slower.

Factory setting: 8

Temperature Regulation Kd


Res. Kd ↓
Temp.: 15◀▶

Here you can set the differential factor for the PID-temperature control if necessary. (room temperature/ ventilation)

Time constant temperature transition


Time constant ↓
T trans: 13s◀▶

When a change between day/night/CO₂ occurs, usually the desired temperature is changing since different values are set for the different modes.

The set point for the room temperature regulation is increased or decreased slowly.

This has an advantage especially for the following scenarios:

1. Without the slow changing of the set point, a chiller would try to cool instantly to the desired night temperature after the change from day to night time occurred.
2. With a slow transition of the set point, the regulation will react early to the increasing temperature after a change from day to night before the measured temperature is reaching the "desired day temperature".

Which value is the best for your setup, is depending on your setup. Especially how quick your room is heating up due to the heat of the lights. With the perfect value the temperature regulation(fans) will react early and appropriate to the increasing temperature after a change from night to day.

The value defines the period in seconds after the internal set point is increased by 0.1°C. A small value results in a fast transition. A higher value results in a slower transition. Factory setting: 13 seconds.

The internal set point is instantly updated in the following cases:

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1. If the desired temperature for the current mode (day/night/CO2) is manipulated by the user.
2. If a change between the modes (day/night/CO2) occurs because user interaction. (e.g. Changing of the clock time from night to day)

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Regulation type humidifier



Define if the regulation of a humidifier is following a PD or a P algorithm.

Hysteresis humidifier



Set the hysteresis for the control of a humidifier here. The hysteresis determines how often the humidifier is switched on and off and how exactly the setpoint value is reached or how large the fluctuations of the actual value are. If the control operates as a P controller, a setting value of 15 means " $\pm 1.5\%RH$ ". No exact statement can be made for a PD controller, since the rate of change is also included in the control.

Regulation type dehumidifier



Define if the regulation of a dehumidifier is following a PD or a P algorithm.

Hysteresis dehumidifier



Set the hysteresis for controlling a dehumidifier here. If the control works as P controller, a value of 50 means " $\pm 5\%RH$ ".

Offset dehumidifier



To avoid that humidifiers and dehumidifiers work against each other, you can set a distance between the setpoints of the humidifier and dehumidifier here.

Example:

RH set point = 60%RH

Offset dehumidifier = 9%RH

→The setpoint for a humidifier is 60%RH, the setpoint for a dehumidifier is 69%RH.

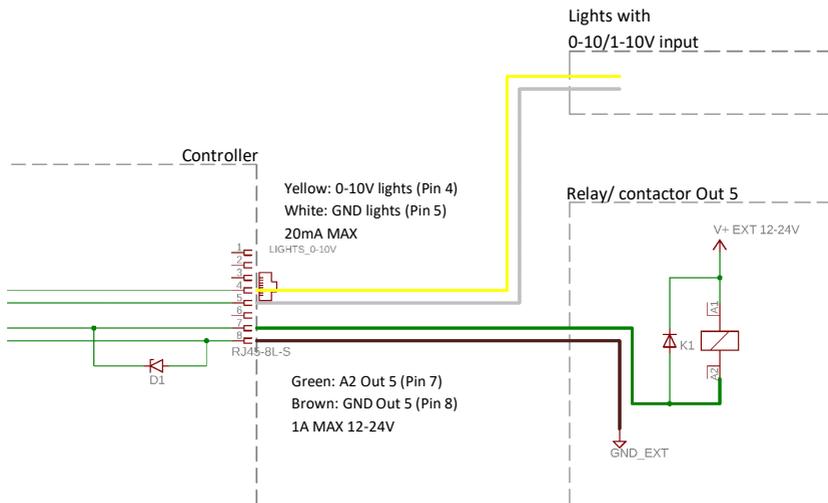
Log data



The displayed values are log data. Please inform our customer service about the displayed values if required.

8.2 Port Lights 0-10V / Multi Out 5

To connect lights with an 0-10V/ 1-10V input or DC relays/ contactors, use a suitable cable available as an accessory. The assignment of the RJ45 jack labelled "Lights 0-10V" is shown in the following figure.



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8.3 Pin connection for EC fans

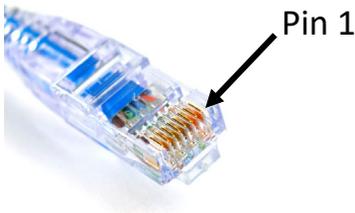
We offer suitable cables for the control of all common EC fans. We recommend to use a ready-made cable. Fans according to the "RJEC" standard can be connected with a standard RJ45 cable.

If you still want to make your own wiring, you can find the pin configuration in the table at the end of this section.

The current fan speed can only be displayed if the rpm signal is transmitted from the EC fan to the controller. When connecting an EC fan with a jack (3.5/6.3mm) cable, this signal is not transmitted. The display of the actual fan speed is for information only and has no influence on the control or function.

| Function / colour EC standard | Pin RJ45 |
|-------------------------------|----------|
| +10V / red | 3 |
| 0-10V / yellow | 4 |
| GND (0V) / blue | 5 |
| Pulse rpm / white | 6 |

Table 1



9. What to do if there are problems?

| Problem | Reason | Advise/ Workaround |
|--|---|---|
| No display | The mains plug is not connected to a power socket. | Connect the mains plug to a power socket. |
| One or more power outlets on the controller are not activated, even if the display is illuminated. | The power output was overloaded by a faulty or unsuitable device. | The controller must be repaired. Please contact customer service or an authorized customer service point. |
| The display is frequently or permanently showing "Sensor error RHT" | No temperature and humidity sensor is connected or the sensor is broken | Attach the temperature and humidity sensor or the sensor should be replaced |

| | | |
|---|---|---|
| A small inductive load (e.g. contactors, small pumps) connected to one of the Multi Out 1-3 sockets will not switch off | The standard configuration is not suitable for the connected equipment | Contact our support to get information on how to solve the problem |
| An EC fan connected to the controller is not running correctly | The mains cable of the EC fan is incorrectly connected to a socket set to supply air/exhaust air AC | Connect the power cord of the EC fan to a normal power outlet. Never connect the mains cable of an EC fan to a socket on the controller that is set to supply air/exhaust air AC! |
| The socket Multifunctional Out 4 is not switched on | The 2nd power cable for the 4th socket is not connected | Connect both power cables to the controller |

Table 2

10. Technical data

| | |
|---|--------------------------------------|
| Dimension (LxWxH) without cables | 190mm x 170mm x 120mm |
| Length of sensor cable temperature (T)/ relative humidity (RH) | ca. 5m |
| Length of mains cables | ca. 2m |
| Power supply 1 (for the controller and Multifunctional Out 1-3) | 100-240V~ 7A 50-60Hz |
| Power supply 2 (for "Multifunctional Out 4") | 100-240V~ 10A 50-60Hz |
| Maximum power per output "Multifunctional Out 1, 2, 3" | 1200VA(W)@230V 620VA(W)@120V 5.2A |
| Maximum power "Multifunctional Out 1+2+3" | 1600VA(W)@230V 840VA(W)@120V 7A |
| Maximum power "Multifunctional Out 4" | 2300VA(W)@230V 1200VA(W)@120V 10A |
| Output Multifunctional Out 5 | 12-24V DC 1A max. |
| Output 0-10V outputs max. | 20mA |
| International protection marking/Protection class | IP42/□ |
| Repetitive sensor accuracy T/RH | ±0.1%RH/±0.2°C |
| Absolute sensor accuracy T/RH | ±2%RH/±0.2°C |
| Range for setpoint temperature | 10-50°C |
| Allowed ambient temperature | 10-40°C |

Table 3

11. Disposal

Observe the local regulations for material disposal. Dispose of the device in accordance with EC Directive 2002/96/EC – WEEE (Waste Electrical and Electronic Equipment). If you have any questions, please contact the local authorities responsible for waste disposal.



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12. Service

GrowControl wants to provide you the best level of service. To contact the customer service, please send an email to **info@growcontrol.de**.

13. Warranty

This product is guaranteed against manufacturing defects for one (1) year from the original date of purchase. GrowControl's sole obligation in the event of such defects during this period is to repair or replace the defective part or product with a comparable part or product at GrowControl's sole discretion. Except for such replacement, the sale, or other handling of this product is without warranty, condition or other liability even though the defect or loss is caused by negligence or other fault. Damage resulting from use, accident, or normal wear and tear is not covered by this or any warranty. GrowControl assumes no liability for any accident, injury, death, loss, or other claim related to or resulting from the use of this product. In no event shall GrowControl be liable for incidental or consequential damages relating to or resulting from the use of this product or any of its parts.

Please consider the laws and regulations of the respective country.

Translated with www.DeepL.com/Translator (free version)

14. Revision history

Version 1.0.0 rev1 en - created on 26.10.2021

English translation

Version 1.0.0 - created on 13.06.2020

First release (German version)

Refers to firmware version 5045.0.00.04 and higher

Version 1.0.0 rev0 en - created on 30.11.2020

English translation – pre-release

