Instruction Manual
GROW*BASE*

- Multifunctional digital climate controller with timer functions and CO₂ control
- For AC and EC fans

•GROW**CONTROL**

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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.

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

4 ⚠️ **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.

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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.

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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
    - CO_2 valves/ generators (230V)
    - heating mats
    - chillers
    - Regular duct fans with running capacitor*

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

- RJ45 jacks „In/Out":
    - humidity and temperature sensor (shipped with the controller)
    - CO_2 sensor (CarbSense)
    - negative pressure sensor (PresSense)
    - temperature sensor for heating matt
- 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 socked on the controller. It should be connected to a standard power socked 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 1-4" 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 11of this manual.

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

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

*The sockets of *GROW**BASE*** are not optimized for switching LED luminaires or energy-saving lamps. To guarantee that the luminaires are completely switched off, the 4th socket of the *GROW**BASE*** *PRO* controller should be used for LED luminaires or energy-saving lamps.

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3. Device description

The digital climate controller *GROWBASE*

- 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.
- 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.
- has a transistor output (MOSFET) that can be used for switching external DC relays or contactors.
- is able to control the CO_2 level in the grow room with a CO_2 sensor *CARBSENSE* connected.
- is able to calibrate the connected CO_2 sensor.
- 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 ±0.5°C/±1% RH. *
- 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. (individual for day/night)
- 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, CO_2 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.

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- can be mounted to a wall with the included screws, dowels and drilling template.

*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 ±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
8-11 Programmable power socket Multifunctional Out 1-3
12 Mains cable
13 Hanger for the sensor
14 Digital sensor for humidity and temperature

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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 **(14)** in an appropriate position inside the grow room, usually at the top ends of your plants. Please use the sensor hanger supplied **(13)**. 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).**

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2. Connect the mains plug **(12)** to the power supply (regular power socket).
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 etc) to the RJ45 jacks.
6. Connect appropriate devices to the other power outputs.
For AC fans, we recommend disconnecting the mains plug **(12)** 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 10 (Page 32) of this manual.

🔴 Avoid exposing the temperature and humidity sensor to moisture and humility 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.**

5. Menu overview

Start

Info
1

CO2
setup
3

Ventilation
setup
4

Climate
setup
2

Timing
setup
5

Multi Out-
setup
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„Setup"

Lights
setup
6

System
setup
8

Save &
apply

Advanced
setup
7

Cancel &
return home

Save &
return home

11
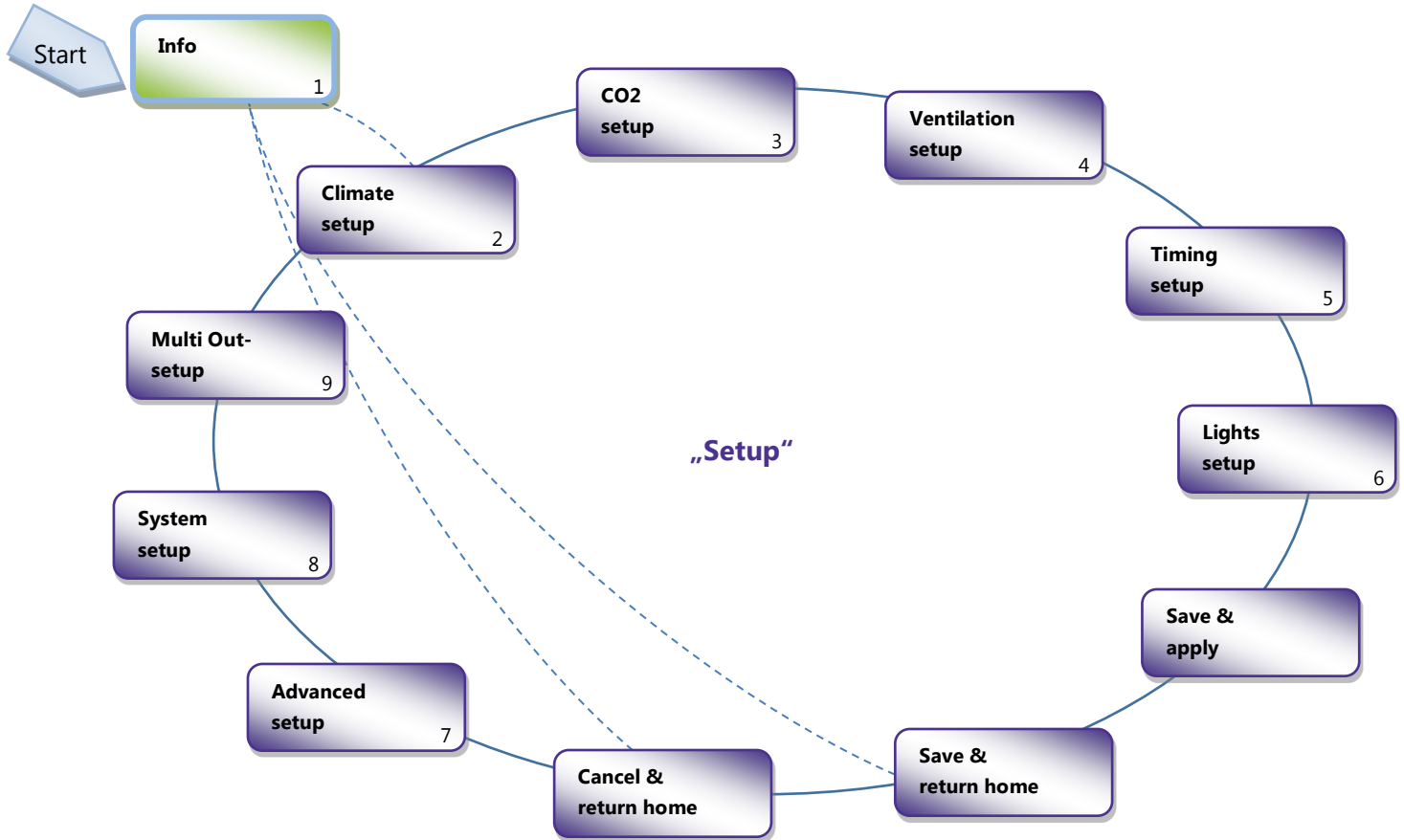
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6. Operation

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)

i   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:

```
Set desired RH ⤶
day:      65%  ◀▶
```

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

```
Desired      ⤶
RH:       65%  ↕
```

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

Desired ⤒⏎
RH: 72% ▼

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

Desired   ⏎
RH: 72% ◆▶

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.

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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

RH: 60.7% i
Temp: 24.8°C◆▶

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

CO2 concentration

CO2 concentr.: i
1589ppm   ◆▶

This screen shows the current CO_2 concentration detected by the CO_2 sensor (available as an accessory).
ppm = parts per million

Negative pressure

Neg. Pressure: i
7pa   ◆▶

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

Temperature heating mat

T heating mat: i
28.8°C   ◆▶

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

RH MIN: 58.4% i
RH MAX: 61.8%◆▶
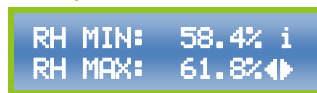
This screen shows the minimum and maximum humidity values (RH) that have occurred since the last reset.

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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

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```
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 warning    ◀▶
```

If the desired CO_2 concentration cannot be achieved within 45 minutes, this suggests that there is a problem with the CO_2 supply, such as an empty CO_2 bottle. The higher temperature in CO_2 mode could be harmful for your plants without a sufficient CO_2 concentration. Therefore, the controller will switch to the regular "day mode" without CO_2 dispensing and the warning "check CO2 supply" will be displayed.

To delete the warning and return to operation in CO_2 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 socked 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

```
Lights info:    i
            62%◀▶
```

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

```
12:34:56        i
Mode: day     ◀▶
```

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 CO_2 control is active, "CO2" is displayed here. The CO_2 mode is only active during the day.

Info date

```
Date:           i
02.05.2020    ◀▶
```

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

```
Desired temp    i
info:    27.0°C◀▶
```

This screen shows the current desired value for the room temperature. When a change between day/night/CO_2 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"

```
Press to        ↵
enter setup   ◀▶
```

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

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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.

The sensor readings that are relevant for previously mentioned functions are captured by the supplied sensor for relative humidity and temperature.

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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 desired RH ↵
day:        65%
```

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

Setpoint room temperature

```
Set desired T  ↵
day:        65%
```

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

Temperature heating mat

```
T h-mat day:   ↵
fix        28°C◀▶
```

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

```
Set dehumid    ↵
mode:      low◀▶
```

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

7.3   CO2

In this section the settings for the CO_2 control can be configured.
With our CO_2 sensor *CARBSENSE*, the CO_2 concentration of the room air can be controlled.
The CO_2 dosing can be done by using a CO_2 bottle or by using a CO_2 generator. The CO_2 dosing is done during daytime only.
On basis of the settings, the control algorithm calculates how long the CO_2 valve has to be opened or how long a CO_2 generator has to be switched on in order to reach the desired CO_2

level. In addition, the algorithm is continuously learning from the previous cycles to reach the desired CO_2 as precise as possible.

The settings "room volume" and "CO_2 flow" are used as a starting point.

The minimum and maximum fan speeds for the CO_2 period can be set individually. It is recommended to keep the airflow low to avoid wasting CO_2. In addition, the room should be well sealed.

To ensure an even distribution of CO_2, good air circulation inside the room should be maintained.

CO_2 control on/off

```
CO2 function:  ↵
ON at daytime ◀▶
```

Here the CO_2 function can be enabled or disabled.

CO_2 concentration

```
Concentration  ↵
CO2:    1200ppm◀▶
```

Set the desired CO_2 concentration here. (ppm = parts per million)

Room volume

```
Room volume:   ↵
        18.0m^3◀▶
```

Set the room volume here.
Unit: (length * height * width) m*m*m = m^3

CO_2 flow

```
Flow           ↵
CO2: 10.0l/min◀▶
```

Enter the flow set on the CO_2 armature or specified for your CO_2 generator. Unit: l/min = litres / minute

The table below can be used as rough reference for the CO_2 flow.

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 CO_2 amount is increased accordingly.

Setpoint temperature CO_2

```
Set desired    ↵
tempCO2 32.0°C◀▶
```

Set the desired temperature for CO_2 mode. When this temperature is exceeded, the fan speeds will be increased as long the following MIN/MAX settings allow.

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Exhaust fans CO_2 MAX

```
Set exhaust    ↵
CO2 MAX:   15%◄►
```

Set the maximum fan speed of the exhaust fans during the "CO_2 period". This fan speed will never be exceeded.

Set the desired temperature for CO_2 mode. When this temperature is exceeded, the fan speeds will be increased until this value is reached.

Exhaust fans CO_2 MIN

```
Set exhaust    ↵
CO2 MIN:   OFF◄►
```

Set the minimum airflow of the exhaust fan during the "CO_2 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 CO_2 MAX

```
Set intake     ↵
CO2 MAX:   OFF◄►
```

Set the maximum fan speed of the intake fan during the CO_2 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%

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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 grater then 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.

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.

Exhaust fan MAX


```
Set exhaust    ↵
day MAX:  100%◄►
```

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 exhaust    ↵
day MIN:   50%◄►
```

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

Pleas 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

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airflow is sufficient for cooling the motor. This applies for standard duct fans (AC) only.

Intake fan MAX

```
Set intake      ↵
day MAX:    50%◀▶
```

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

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Deviation for reduced rpm

```
Deviation rpm   ↵
reduced: 0.2°C◀▶
```

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 %

```
Set negative    ↵
pressure:  10%◀▶
```

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 negative    ↵
pressure:  5Pa◀▶
```

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

```
Cal. pressure   ↵
sensor         ◀▶
```

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

```
Auto calibr.:   ↵
ON             ◀▶
```

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

7.5 Timing

GROW**BASE** 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 CO_2) 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".

Clock time

```
Set clock:      ↵
12:34           ◀▶
```

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 date:       ↵
25.05.2020      ◀▶
```

Set the current date here.
The date format can be altered in section "system settings".

Start of day

```
Start of day:   ↵
06:00           ◀▶
```

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

```
End of day:     ↵
06:00           ◀▶
```

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.

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Interval ON


```
♪‾‾♪Day AN:        ↵
00:15:30          ◀▶
```

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

Separate values for day and night are available.

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Interval OFF


```
♪__♪Day OFF:       ↵
00:15:00          ◀▶
```

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


```
Event 1 Start    ↵
14:06            ◀▶
```

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


```
Event 1 length ↵
00:03:10         ◀▶
```

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

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.

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.

The sockets of GROW**BASE** are not optimized for switching LED luminaires or energy-saving lamps. To guarantee that the luminaires are completely switched off, the 4th socket of the GROW**BASE** ᴾᴿᴼ controller should be used for LED luminaires or energy-saving lamps.

Lights Max


```
Lights MAX:       ↵
             100%◀▶
```

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

Duration sunrise & sunset


```
Time sunrise & ↵
sunset:    5min◀▶
```

Enter the duration for sunrise and sunset here. The voltage is increased or decreased continuously during sunrise and sunset.

Lights with a 0-10/-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.

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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 grater then 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

```
Intake AC     ↵
turnoff < 25%◄►
```

Exhaust AC turnoff

```
Exhaust AC    ↵
turnoff < 25%◄►
```

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, CO_2 sensors can be calibrated.

Temperature unit

```
Temperature   ↵
unit:      °C ◄►
```

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

Date format

```
Date format   ↵
DD:MM:YYYY    ◄►
```

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

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Language

```
Language:      ↵
English        ◄►
```

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

Display timeout

```
Display        ↵
timeout:  100s◄►
```

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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

```
Display        ↵
contrast   80%◄►
```

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

```
Multi Sensor   ↵
RH:     Avrage◄►
```

Multiple sensors of the same type can be connected to the controller. For every measured vale 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" (CO_2 sensors)

Calibration value CO_2

```
Calibrate CO2  ↵
sensor: 400ppm◄►
```

Set the calibration value for the CO_2 sensors here.

Apply calibration CO_2 sensors

```
Apply calib.   ↵
CO2            ◄►
```

To send the previously set calibration value to the CO_2 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 CO_2 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:

```
Calibration CO2
to  500 1x   OK↵
```

The "1" on the screen indicates the number off successfully calibrated sensors. Please make sure that the displayed number is matching the number of actual connected CO_2 sensors.

The calibration feature is supported by CO_2 sensors of the new design:

CO₂ Sensor filter

```
Filter CO2    ↵
sensor:     0◄▶
```

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

```
Apply filter  ↵
CO2         ◄▶
```

In order to send the previously set filter value to the CO_2 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

```
Restore fact. ↵
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 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

Firmware version info

```
Firmware info: i
5045.0.00.04 ◄▶
```

This screen shows the currently installed firmware version.

Restart controller

```
Restart       ↵
device      ◄▶
```

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".

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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)

- 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 1-4 these functions are available in addition:

- Intake AC
- Exhaust AC

The mains cable of an EC fan may not be connected to a power socked 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 sockets of *GROW**BASE*** are not optimized for switching LED luminaires or energy-saving lamps. To guarantee that the luminaires are completely switched off, the 4th socket of the *GROW**BASE**PRO* controller should be used for LED luminaires or energy-saving lamps.

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.

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Regulation type CO$_2$

```
Set res. type  ↵
CO2:      fuzzy◀▶
```

Choose the preferred control method for the CO$_2$ regulation. In most cases "fuzzy" is the best option. If "P" or "PD" is selected, the settings for "room volume", "CO$_2$ flow" and "exhaust @ 100%" have no effect.

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Regulation CO$_2$ Kp

```
Res. Kp        ↵
CO2:         2◀▶
```

This is the factor that is multiplied by the P term of the CO$_2$ P or PD controller.

Regulation CO$_2$ Kd

```
Res. Kd        ↵
CO2:         5◀▶
```

This is the factor that is multiplied by the D term of the CO$_2$ PD controller.

CO$_2$ hysteresis

```
Set hysteresis ↵
CO2:        15◀▶
```

At a small hysteresis value, a CO$_2$ valve or a CO$_2$ 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

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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:
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)

Regulation type humidifier

```
Set res type    ↵
humidify:    PD◀▶
```

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

Hysteresis humidifier

```
Set hysteresis ↵
humidify:    15◀▶
```

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 "±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

```
Set res type    ↵
dehumidify:   P◀▶
```

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

Hysteresis dehumidifier

```
Set hysteresis ↵
dehumidify: 15◀▶
```

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

Offset dehumidifier

```
Set offset      ↵
dehumid:   3.0%◀▶
```

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.

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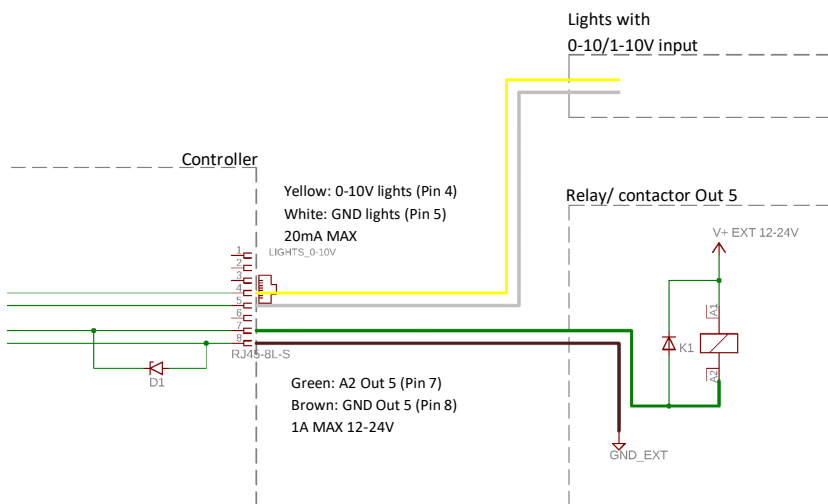
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Log data

inform our customer service about the displayed values if required.

The displayed values are log data. Please

8.2 Port Lights 0-10V / Multi Out 5

To connect lights with an 0-10/ 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.
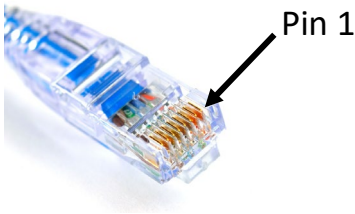
8.3 Pin connection for EC fans

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.

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

Table 1

Pin 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

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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

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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 cable	ca. 2m
Power supply	100-240V~ 7A 50-60Hz
Maximum power per output "Multifunctional Out 1-4"	600VA(W)@230V 310VA(W)@120V 2.6A
Maximum power "Multifunctional Out 1+2+3+4"	1600VA(W)@230V 840VA(W)@120V 7A
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

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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.

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)

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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

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V1.0.0 rev1 en

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