



Fact Sheet Growth Chamber M-4



At a glance

Your benefits

- ✓ **Made in Germany** - parts and construction of high quality for high durability.
- ✓ **Energy efficiency** - refrigeration plant and lighting provide optimal energy efficiency.
- ✓ **Non corrosive** - all metal materials are galvanized and durable plastic-coated.
- ✓ **High level of standard fitting:**
 - Each lamp bank is dimmable separately in 0,5% steps as a standard.
 - Chamber parameters can be controlled and programmed with an industry-standard touch panel.
 - Each chamber comes with LAN connectivity as a standard for remote programming, parameter control and data logging. This also enables remote diagnosis und -service.
- ✓ **Sophisticated construction** - We build the chambers at site out of 6 single pieces if necessary. Therefore, low or narrow doors are no issue.

Technical

- ✓ **Overall dimension** - 870 x 1.060 x 2.100 mm (D x W x H).
- ✓ **Inner dimensions** - 2,40 m² working area on 4 tiers, 27 cm growing height per tier, given an equal lamp bank- and shelf-distribution.
- ✓ **Temperature** - from +7°C (without light) resp. +12°C (with light) up to +40°C, with a maximum temperature variance of ±0,5°C.
- ✓ **Air conditioning** - energy-efficient refrigeration system with electronically controlled hot-gas bypass-control and RPM-controlled ventilation fans.
- ✓ **Flexible lighting:** the lamp banks are dimmable in 0,5%-steps and fitted with
 - True Daylight white-LED
 - True Daylight dual white LED
 - True Daylight PLUS white-LED
 - True Daylight dual PLUS white-LED
 - Fluorescent lamps with various light intensities
 - Optional spectrum enrichment with red- and far-red-LEDs or LEDs pickable from a broad nanometer range.
 - Multichannel LED-panels with the light colors blue, white, red and far-red or many other nanometer ranges to choose from.
- ✓ **Intuitive and comfortable operation** - industry-standard 12"-touchscreen at the chamber or remotely via standard network connection.



General

poly klima®, a young and innovative company, designs and builds custom-made climatic walk-in rooms and growth chambers for environmental simulation for various research fields at universities and institutes.

Our team of experts benefits from many years of experience in conception and manufacturing of climatic- and lighting solutions for plant biological research.

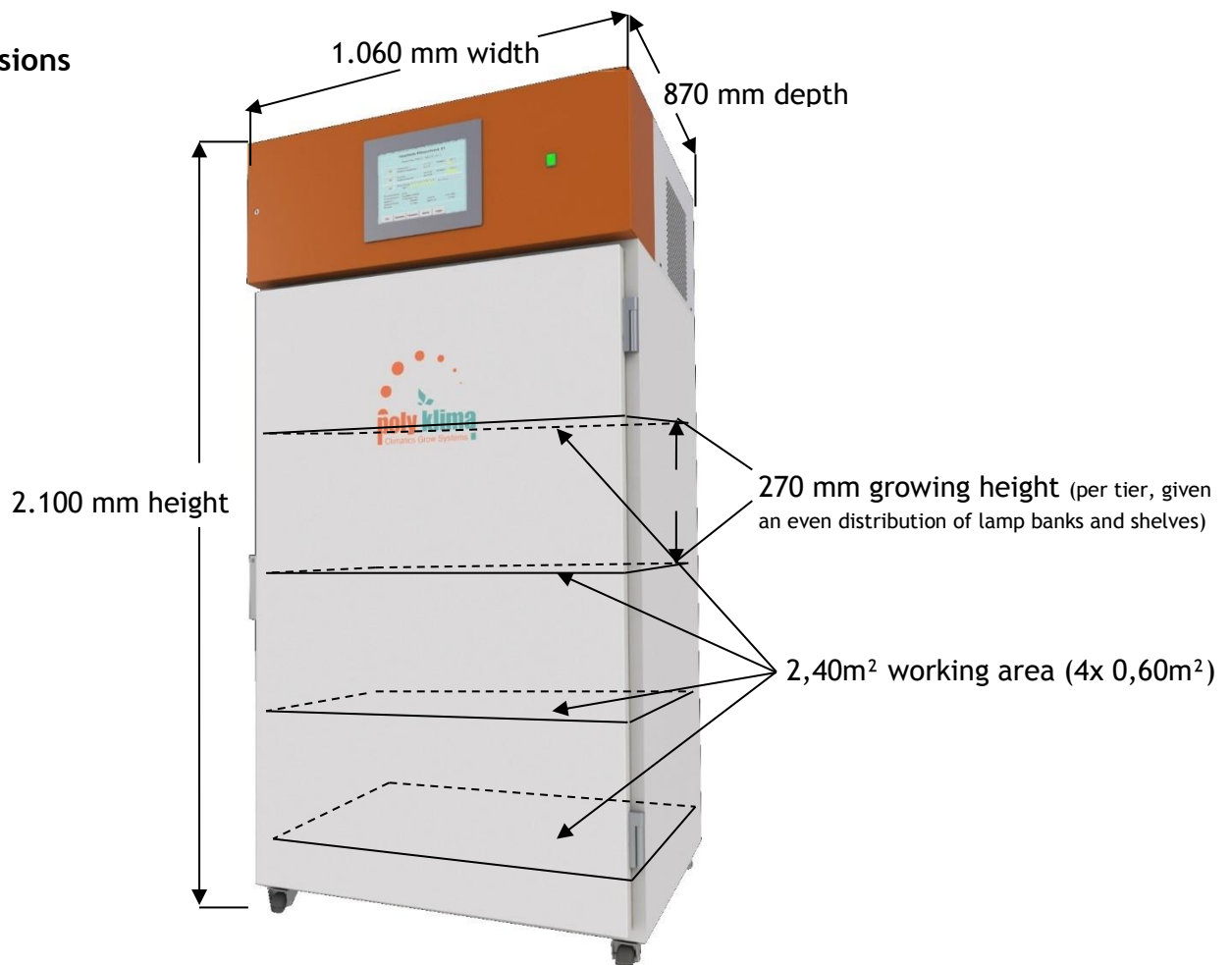
The M-series growth chambers from poly klima® excel with their spacious inside in conjunction with their compact overall dimensions.

poly klima® growth chamber M-4

The poly klima® growth chamber M-4 was developed for biological applications like the research with plants like Arabidopsis or Physcomitrella. But it is also perfect for entomological application. Due to its flexibility this chamber is also good for materials research and other similar fields of application. It provides ideal and stable conditions for scientific research and various other thinkable applications.

Model M-4 is loaded with 4 lamp banks and 4 shelves, both vertically adjustable. The shelf consists of grating which can be drawn out on drawer rails.

Dimensions



Design

All metal parts used are galvanized and coated with white, reflective durable plastic. Therefore, corrosion is not possible. The inside of the chamber is coated with white, reflective plastic. This guarantees an optimal light distribution.

The chamber walls, the floor, the top cover and the door are made of steel sheet metal which is polyurethane foamed without any thermal bridges. Placed on the chamber floor there is a steel trough with a condensate drain. The chamber door is lockable.

The shelves consist of white coated grating. Their vertical position can be changed easily without the help of any tools. The growing area is fixed on drawer rails and can be drawn out completely.

The chamber is made of 6 single pieces and can be built at site easily if necessary. Therefore, narrow or low doors are no issue.

The chamber is placed on (braked) casters and can be moved easily.

Air Conditioning

Air-cooled or water-cooled refrigeration system, extremely energy-efficient with electronically controlled hot-gas bypass control and RPM-regulated ventilation fans, which minimizes energy consumption of the chamber and wind stress for your experiments.

The air inside is travelling horizontal over the shelf and is led back to the evaporator. This way an optimal air circulation is being created.

The airflow is adjustable in every tier with the help of moveable steel sheets assembled to the back wall. As a result, you get best possible temperature uniformity in the entire chamber.

For a free airflow through the compressor ventilation grill there should be at least 20 cm free space left/right to and behind the chamber. We also are ready to adjust the ventilation grills placement to the local conditions. Furthermore, it is important that the chambers heat load and the heat load of other machines probably also placed in the room can be led away. As an alternative the room can be climatized, because ambient temperatures above 30°C will be critical to the chambers functionality and may result in a chamber shut-down.

Condensation water is being collected in the drain pan below the evaporator and led out of the chamber through the back wall. Also, a stainless-steel drain is placed on the chamber floor. From the integrated ¾" hose fitting there it can be led away to a floor drain or a condensate pump.

Temperature

Standard temperature range: +7/+12 °C (without/with* lighting) up to 40°C, given a maximum temperature variance of ±0,5°C. *Valid for LED-lighting

Dehumidification

Dehumidification with the evaporator in conjunction with an additional heating as a standard for rel. humidity values from ambient down to 45% r.H. (± 5%; rel. humidity values valid in an ambient temperature range from 15°C bis 30°C; depending from ambient air humidity and light level inside the chamber).

Lighting

The thorough and equidistant arrangement of the lamps on the light fixtures in conjunction with the white plastic coating inside the compartment ensures excellent light homogeneity over the whole growing area. There is no “fall-off” in the margin areas.

You have the choice between several lighting solutions: various white-LED-systems, fluorescent-lamps or multichannel-LED solutions.

The spectrum of all below shown white-LED- and fluorescent-solutions can be enriched with further LEDs, selectable from a broad range of nanometers here (280 nm - 830 nm), like separate dimmable red-LED (e.g. 660nm) or far-red-LEDs (e.g. 730 nm).

White-LED-Solutions:

- *True Daylight Standard White-LED*

- White-LEDs with 3.000 K color-temperature.
- Up to 400 $\mu\text{mol}/\text{m}^2/\text{s}^{-1}$ intensity (measured at 15 cm distance)
- Dimmable in 0,5%-steps from 100% to 1%.
- Color rendering index CRI=94.
- 120° radiation angle per LED.
- Very harmonic spectral response, ideal for plants like Arabidopsis.

- *True Daylight dual White-LED*

- White-LEDs with 2.700 K and 6.500 K color-temperature.
- Each light color controllable separately.
- Up to 1.000 $\mu\text{mol}/\text{m}^2/\text{s}^{-1}$ intensity (measured at 15 cm distance)
- Dimmable in 0,5%-steps from 100% to 1%.
- Color rendering index CRI=95.
- 120° radiation angle per LED.
- Very harmonic spectral response, ideal for applications that require a higher light intensity or variable light quality.

- *True Daylight PLUS White-LED*

- White-LEDs with 4.000 K color-temperature.
- Up to 1.200 $\mu\text{mol}/\text{m}^2/\text{s}^{-1}$ intensity (measured at 15 cm distance)
- Dimmable in 0,5%-steps from 100% to 1%.
- Newest LED-technology
- Color rendering index CRI=96,7.
- 120° radiation angle per LED.
- Very harmonic and full spectral response, ideal for many applications.

- *True Daylight dual PLUS white-LED*

- Two types of white-LEDs with 3.000 K and 6.500K color-temperature.
- Each light color controllable separately.
- Up to 1.200 $\mu\text{mol}/\text{m}^2/\text{s}^{-1}$ intensity (measured in 15 cm distance)
- Dimmable in 0,5%-steps from 100% to 1%.
- Newest LED-technology
- Color rendering index CRI=96,6.
- 120° radiation angle per LED.
- Very harmonic and full spectral response, ideal for many applications, variable light-quality.



Multichannel-LED-Solutions

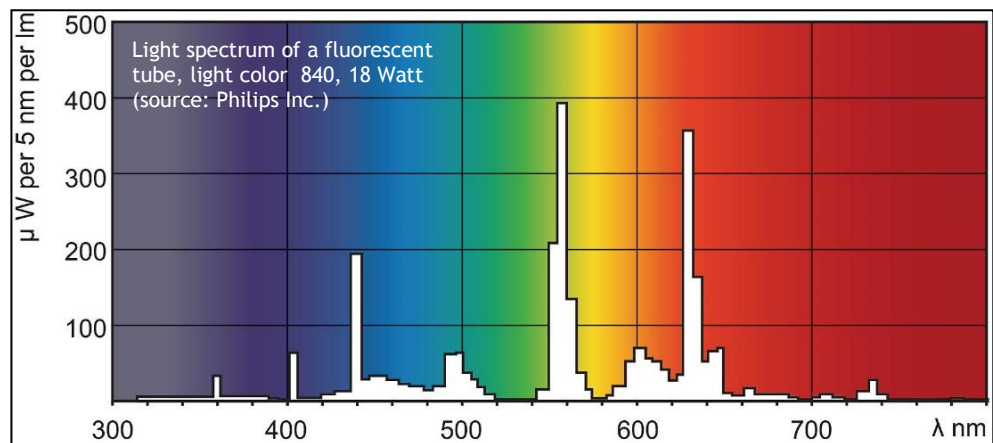
For plant-biological applications that require the control of different spectral parts or for other special applications, we offer our polyphoLED multichannel-LED Panels. Up to 12 different color channels can be addressed and controlled separately. There is a broad palette of narrow-banded LEDs available from 285nm up to 830nm. The resulting spectral response and light intensity are depending on the print configuration.



Fluorescent tubes

TL-D fluorescent tubes, light color 840 (neutral white) with good performance and energy efficiency over the chamber's temperature range.

The lamp banks are dimmable in 0,5% steps as a standard.



There are 5 intensity groups to choose from (intensities measured at 15 cm distance):

- a.) 5 to 250 $\mu\text{mol}/\text{m}^2/\text{s}$ b.) 8 to 400 $\mu\text{mol}/\text{m}^2/\text{s}$ c.) 15 to 650 $\mu\text{mol}/\text{m}^2/\text{s}$

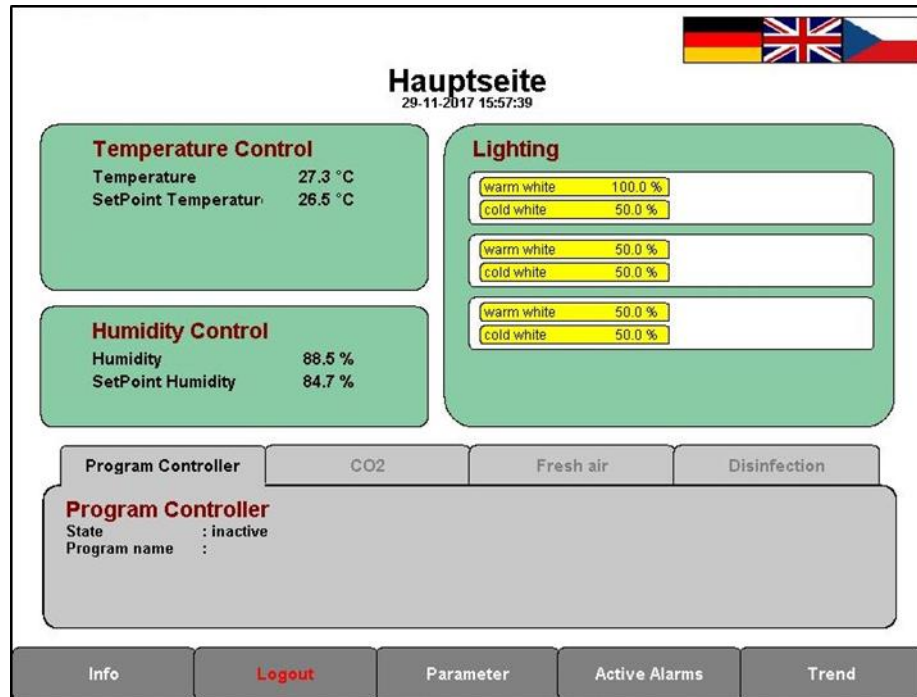
Of course, light intensities are customizable according customer wishes!

Operation

Chamber parameters can be controlled and programmed with a high-grade industry-standard touch panel on the chamber or a remote computer. The 12" graphic display ensures a quick and intuitive programming and shows all actual and nominal values.

With the visualizing software on every access-authorized Windows-based computer in the network all parameters can be displayed, edited and programmed comfortably from your desk, just as you would be standing in front of the chamber.

All alarm messages will be shown in text-messages on the touch panel and additionally be forwarded via email or SMS.



Options

- Ultrasonic humidification for humidity levels inside the chamber up to 85% r.H.* ($\pm 5\%$, depending on ambience humidity and light level inside the chamber). *The figures given for the relative humidity control are valid in an ambient temperature range from $+15^{\circ}\text{C}$ to $+30^{\circ}\text{C}$.
- Reservoir humidification for Entomology, to avoid interfering of ultrasonic on reared insects.
- Gas application for chamber inside with CO_2 or O_2 .
- Entomology package: chamber specially designed for rearing insects.
- Door-window with or without light-tight cover.
- Glass door, e.g. for passive illumination of the rearing compartment.
- See-through inner doors for thermal cording off of the chamber inside, even with doors open.

This is just an extract of the most important options. Our chambers are practically customizable to every requirement. We look forward to your challenge!

Contact

We appreciate your interest and your questions!
Just give us a phone call or drop us an email.

We are glad to offer advice and help at any time!

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