

Illumination Test Chambers.

LC/TB-LC/TS Series

FDM Environment Makers Products

Climatic and Thermostatic Chambers

Growth Chambers

Environmental Chambers

Custom Products

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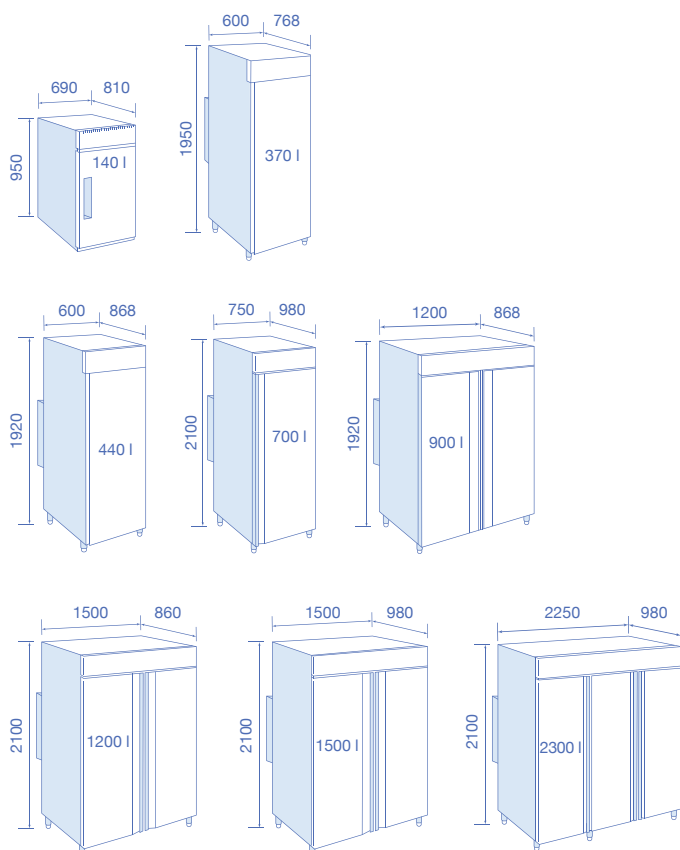
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*Technical specifications are subject to change.
Images for illustrative purposes. Non-binding renderings.*

Sizes



Description

The Growth test chamber or the illumination chamber reproduces natural conditions without unpredictability, with lighting, temperature and homogeneous humidity, according to different test requirements.

Its features make the growth chamber an essential tool for agricultural and chemical research, and generally for scientific purposes.

FDM manufactures climatic growth chambers for photostability testing of all types, both standard and customized, for the laboratories of companies, universities and institutes.

Based on the type of light intensity, hence on the specific area of application, there are four different types of FDM growth chambers from the LCB-LCS series:

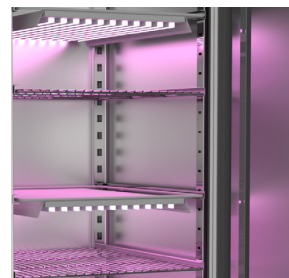
- **Daylamp** - which reproduces full spectrum sunlight.
- **Biolamp** - selected spectrum, specific for insect growth.
- **Fluolamp** - reproduces a light with a specific spectrum for plants.
- **Arablamp** - for Arabidopsis, a particular type of plant.
- **ICHlamp** - applicable according to ICH guidelines for photostability testing.

Advantages

| |
|--|
| Capacity from 140 to 2300 liters |
| Adjustable temperature range -10°C...+55°C |
| Humidity range 10...80%. |
| LED and neon lighting, vertical or horizontal disposition |
| Programmable controller revoFACE or for stillFACE stable tests |
| Internal forced and homogeneous ventilation |
| High and low temperature and humidity alarms |
| Electrical power 220-240V /50Hz or 110V |



Led lamps placed on the walls and homogeneity of light throughout the climatic environment.



Horizontal Led lighting, placed on single shelf with a concentrated blue and red light.

Configuration examples



LDC700BXPRO
DAY-ILD200LED



LDC700BXPRO
DAY-IRD200LED



LFC1500BXPRO
FLUO-IRD200LED

| | | | | | | | | | |
|---|-----------|------|---------|---------|--|---------|----------|----------|----------|
| Positive Range (S) | C/T140S | | C/T370S | C/T440S | C/T700S | C/T900S | C/T1200S | C/T1500S | C/T2300S |
| Negative Range (B) | C/T140B | | C/T370B | C/T440B | C/T700B | C/T900B | C/T1200B | C/T1500B | C/T2300B |
| Temperature performance | | | | | | | | | |
| Temperature range without humidity [°C] | Light off | | | | 0...+55 (S) -10...+55 (B) | | | | |
| | Light on | | | | +5...+50 (S) -5...+50 (B) | | | | |
| Temperature uniformity depending on setpoint [± K] | | | | | 0.5..2.5 | | | | |
| Temperature fluctuation depending on setpoint [± K] | | | | | 0.1..0.5 | | | | |
| Average heating-up rate according to EN 60068-3-5 [K/min] | Light off | | | | +2 | | | | |
| Average cooling down rate according to EN 60068-3-5 [K/min] | Light off | -1 | -0.6 | -1 | -0.6 | -1 | | | |
| Performance Data Climate | | | | | | | | | |
| Temperature range [°C] with humidity on | | | | | 10/55 | | | | |
| Humidity range in according to Chart*1 [% r.h.] | Light off | | | | 10/90 | | | | |
| | Light on | | | | 10/80 | | | | |
| Humidity fluctuation depending on setpoint [± %] | | | | | ≤ 3 | | | | |
| Humidification system | | | | | Ultrasonic humidification system | | | | |
| Water filter | | | | | Water softening filter and replaceable cartridge equipped*2 | | | | |
| Max Water hardness permitted | | | | | 600 ppm CaCO ₃ | | | | |
| Water inlet | | | | | Pressure 0.2÷5 BAR - Temperature 10÷40°C - Pipe connection 3/4" | | | | |
| Outer dimensions | | | | | | | | | |
| Width net [mm] | 690 | 600 | 600 | 750 | 1200 | 1500 | 1500 | 2250 | |
| Depth net [mm] | 810 | 768 | 868 | 980 | 868 | 860 | 980 | 980 | |
| Height net [mm] | 950 | 1920 | 1920 | 2100 | 1920 | 2100 | 2100 | 2100 | |
| Doors | | | | | | | | | |
| Unit doors | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | |
| Internal Dimensions | | | | | | | | | |
| Width [mm] | 450 | 500 | 500 | 600 | 1090 | 1340 | 1300 | 2090 | |
| Depth [mm] | 540 | 480 | 580 | 670 | 580 | 570 | 670 | 670 | |
| Height [mm] | 520.5 | 1257 | 1257 | 1340 | 1257 | 1350 | 1340 | 1340 | |
| Measures | | | | | | | | | |
| Interior net volume [L] | 130 | 310 | 370 | 530 | 810 | 1020 | 1180 | 1830 | |
| Net weight of the unit (empty) [kg] | 78 | 100 | 110 | 167 | 197 | 212 | 215 | 367 | |
| Permitted load per rack [kg] | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | |
| *3Fixtures | | | | | | | | | |
| Number of shelves (std./max.) | 2/3 | 3/5 | 3/5 | 3/6 | 6/10 | 6/12 | 6/12 | 9/14 | |
| Shelf Width [mm] | 400 | 460 | 460 | 530 | 460 | 530 | 530 | 530 | |
| Shelf Depth [mm] | 500 | 470 | 570 | 650 | 570 | 550 | 650 | 650 | |
| stillFACE Controller | | | | | | | | | |
| Controller | | | | | Constant monitoring temperature and humidity controllers | | | | |
| Interface port | | | | | Optional: RS485 | | | | |
| revoFACE Programmer | | | | | | | | | |
| Set-up Display | | | | | Programme status, set up temperature and humidity, date, time and language | | | | |
| Programmer | | | | | 10 programs and 50 segments each, adjustable from 1 min. to 999 hrs. | | | | |
| Calibration | | | | | Possibility to calibrate all parameters | | | | |
| Interface port | | | | | Optional: RS485 - Optional: Ethernet - Wifi - Dedicated mobile app | | | | |

*2The cartridge should be change every 4÷6 months at most.

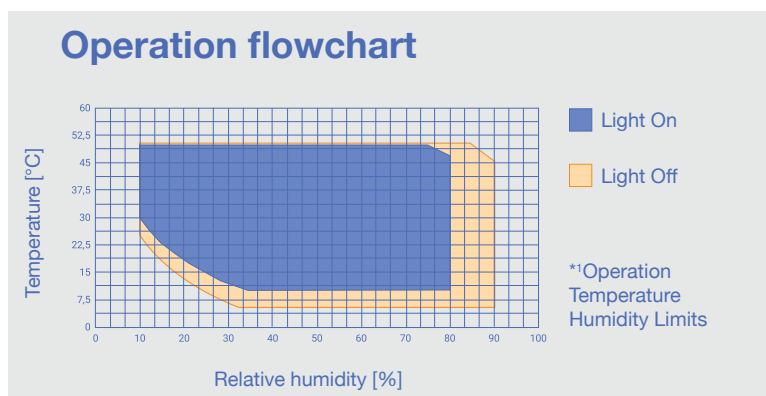
*3The installation of fluoresent walls illumination reduces the useful width of the shelves: for 140,370,440,900 liters size is reduced of 160 mm for 700, 1200, 1500 liters volume size is reduced of 100 mm. The led walls illumination reduces the useful width of the shelves: for 370, 440, 900 liters is reduced of 40 mm.

All technical data are specified for units with standard equipment at an ambient temperature of +24 °C and a voltage fluctuation of ±10 %.

| | | | | | | | | |
|------------------------------|---|---------|---------|---------|----------|----------|----------|----------|
| Positive Range (S) | C/T140S | C/T370S | C/T440S | C/T700S | C/T1200S | C/T1200S | C/T1500S | C/T2300S |
| Negative Range (B) | C/T140B | C/T370B | C/T440B | C/T700B | C/T900B | C/T1200B | C/T1500B | C/T2300B |
| Environment-specific data | | | | | | | | |
| Sound-pressure level [dB(A)] | 60 | | | | | | | |
| Refrigerant gas | R290 | | | | | | | |
| Structure and insulation | | | | | | | | |
| Exterior material | White coated galvanized steel or full Stainless steel AISI 304 | | | | | | | |
| Internal material | AISI 304 Stainless Steel | | | | | | | |
| Insulation | CFC and HCFC free | | | | | | | |
| Shelf grill | Removable and height adjustable stainless steel plastic coated | | | | | | | |
| Ventilation | | | | | | | | |
| Fan | forced ventilation | | | | | | | |
| Safety | | | | | | | | |
| Temperature | Class 2 independent adjustable temperature safety devices (DIN 12880) | | | | | | | |
| Alarm | Audio-Visual | | | | | | | |
| Electrical data | | | | | | | | |
| Rated Voltage [V] | 220/240 | | | | | | | |
| Power frequency [Hz] | 50 | | | | | | | |
| *4Nominal power [kW]] | 1.85 | 1.65 | 1.65 | 2.18 | 2.4 | 2.4 | 2.6 | 5.0 |
| Unit fuse [A] | 16 | | | | | | | |
| Phase (nominal voltage) | 1 ~ | | | | | | | |

Main Options

- ETH100 - Ethernet interface for remote connection
- PE100 - Interior socket coverable universal 220-230 V
- IR000 - Interior neon lighting
- IR000LED - Interior LED lighting
- SPS100 - Interior compartment glass doors
- IS200 - Dimmable adjusting light for individual lamp
- IR000LED - Interior LED lighting
- TE110 - Power supply 110 V 50-60 Hz
- CO200 - CO2 Regulation System for EN 12390-10



- FD100 Cable hole installed on the side of the chamber that allows the passage of cables inside without loss of performance.



- UDB100 USB port for downloading test data with the possibility of viewing them on a PC in Excel format.



- GP100R The reinforced stainless steel shelf differs from the standard one (pictured above) in that it has a higher supported load capacity.



- RT100 Swivel castors with chamber lock for easy movement.



- PV101* The touch-screen interface allows you to program segments autonomously and view the test progress in real time.



- WTO16 System of supply demineralized water tank 16 liters.

*4 The nominal power with light ON varies, depending on the number and types of lamps installed.

All technical data are specified for units with standard equipment at an ambient temperature of +24 °C and a voltage fluctuation of ±10 %.

Click and go to Online Configurator

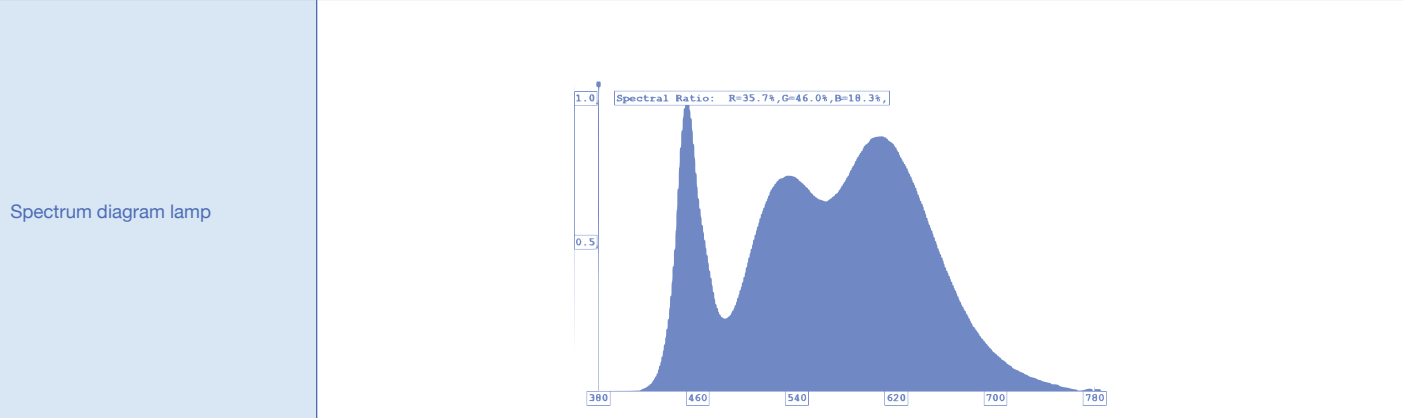
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DAYLAMP | SUNLIGHT SIMULATION

| | | | | | | | | |
|------------------------------------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|
| Positive Range (S) | LDC/T140S | LDC/T370S | LDC/T440S | LDC/T700S | LDC/T900S | LDC/T1200S | LDC/T1500S | LDC/T2300S |
| Negative Range (B) | LDC/T140B | LDC/T370B | LDC/T440B | LDC/T700B | LDC/T900B | LDC/T1200B | LDC/T1500B | LDC/T2300B |
| *5Temperature performance Light on | | | | | | | | |
| At 0% light [°C] | (S) | | | | 0...+55 | | | |
| | (B) | | | | -10...+55 | | | |
| At 100% light [°C] | (S) | | | | 5...+50 | | | |
| | (B) | | | | -5...+50 | | | |

| **Horizontal Shelf Illumination | | | | | | | | |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Illumination on Shelf [W/m²] | 45 | 52 | 43 | 47 | 43 | 47 | 47 | 47 |
| Illumination on Shelf [LUX] | 10.500 | 13.000 | 13.000 | 16.000 | 13.000 | 16.000 | 16.000 | 16.000 |

| | | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|--------|--------|
| **Vertical Walls Illumination | | | | | | | | |
| Lateral inner walls illumination [LUX] | 10.000 | 12.000 | 15.000 | 18.000 | 15.000 | 15.000 | 18.000 | 18.000 |

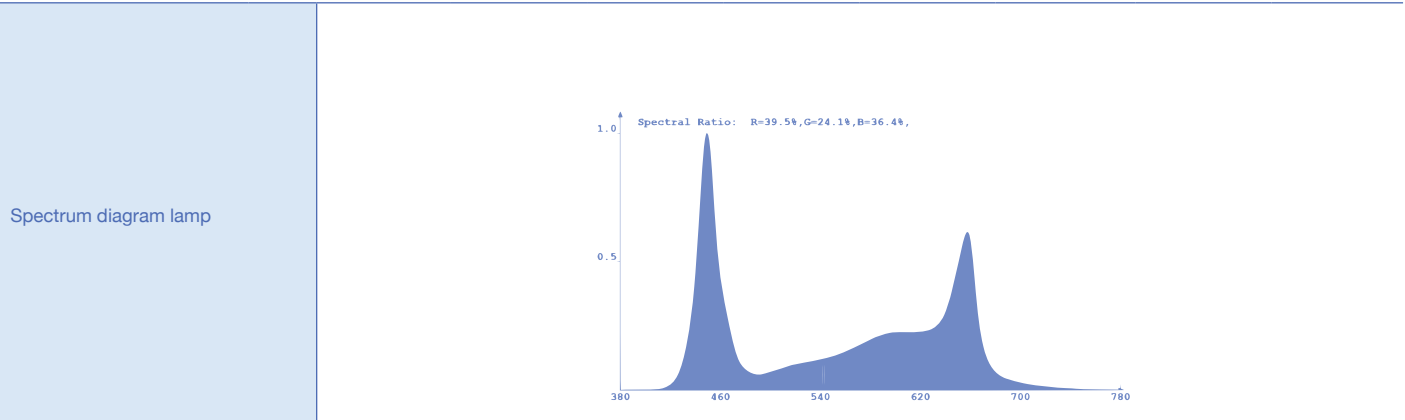


FLUOLAMP | ACCELERATED PLANT GROWTH

| | | | | | | | | |
|--------------------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|
| Positive Range (S) | LFC/T140S | LFC/T370S | LFC/T440S | LFC/T700S | LFC/T900S | LFC/T1200S | LFC/T1500S | LFC/T2300S |
| Negative Range (B) | LFC/T140B | LFC/T370B | LFC/T440B | LFC/T700B | LFC/T900B | LFC/T1200B | LFC/T1500B | LFC/T2300B |

| *5)Temperature performance Light on | | |
|-------------------------------------|-----|-----------|
| At 0% light [°C] | (S) | 0...+55 |
| | (B) | -10...+55 |
| At 100% light [°C] | (S) | 5...+50 |
| | (B) | -5...+50 |

| | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|
| *6Horizontal Shelf Illumination | | | | | | | | |
| Illumination on Shelf [W/m²] | 45 | 52 | 43 | 47 | 43 | 47 | 47 | 47 |
| Illumination on Shelf [LUX] | 4.500 | 4.500 | 5.000 | 6.500 | 5.000 | 6.500 | 6.500 | 6.500 |
| PPFD [µmol/m2s] | 150 | 150 | 170 | 230 | 170 | 230 | 230 | 230 |
| *7Vertical Walls Illumination | | | | | | | | |
| Lateral inner walls illumination [LUX] | 4.000 | 5.000 | 6.000 | 7.000 | 6.000 | 6.000 | 7.000 | 7.000 |
| PPFD [µmol/m2s] | 120 | 150 | 190 | 220 | 190 | 190 | 220 | 220 |

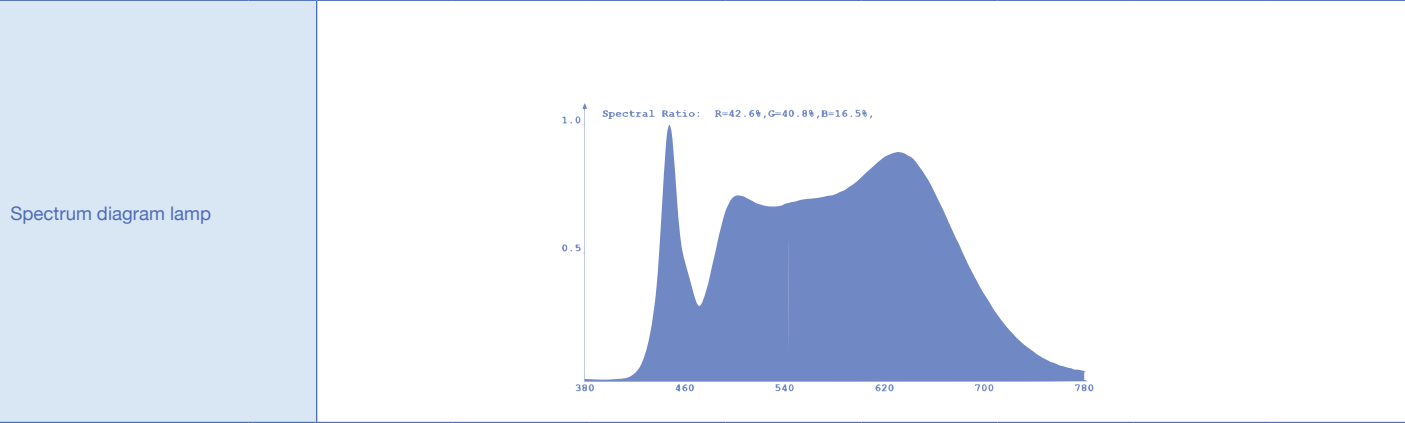


BIOLAMP | INSECT AND BACTERIA INCUBATION

| | | | | | | | | |
|------------------------------------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|
| Positive Range (S) | LBC/T140S | LBC/T370S | LBC/T440S | LBC/T700S | LBC/T900S | LBC/T1200S | LBC/T1500S | LBC/T2300S |
| Negative Range (B) | LBC/T140B | LBC/T370B | LBC/T440B | LBC/T700B | LBC/T900B | LBC/T1200B | LBC/T1500B | LBC/T2300B |
| *5Temperature performance Light on | | | | | | | | |
| At 0% light [°C] | (S) | | | | 0...+55 | | | |
| | (B) | | | | -10...+55 | | | |
| At 100% light [°C] | (S) | | | | 5...+50 | | | |
| | (B) | | | | -5...+50 | | | |

| **Horizontal Shelf Illumination | | | | | | | | |
|---------------------------------|------|------|------|--------|------|--------|--------|--------|
| Illumination on Shelf [W/m²] | n.d. | n.d. | n.d. | 47 | n.d. | 47 | 47 | 47 |
| Illumination on Shelf [LUX] | n.d. | n.d. | n.d. | 12.000 | n.d. | 12.000 | 12.000 | 12.000 |

| | | | | | | | | |
|--|-------|-------|--------|--------|--------|--------|--------|--------|
| **Vertical Walls Illumination | | | | | | | | |
| Lateral inner walls illumination [LUX] | 7.000 | 8.000 | 10.000 | 13.000 | 10.000 | 10.000 | 13.000 | 13.000 |



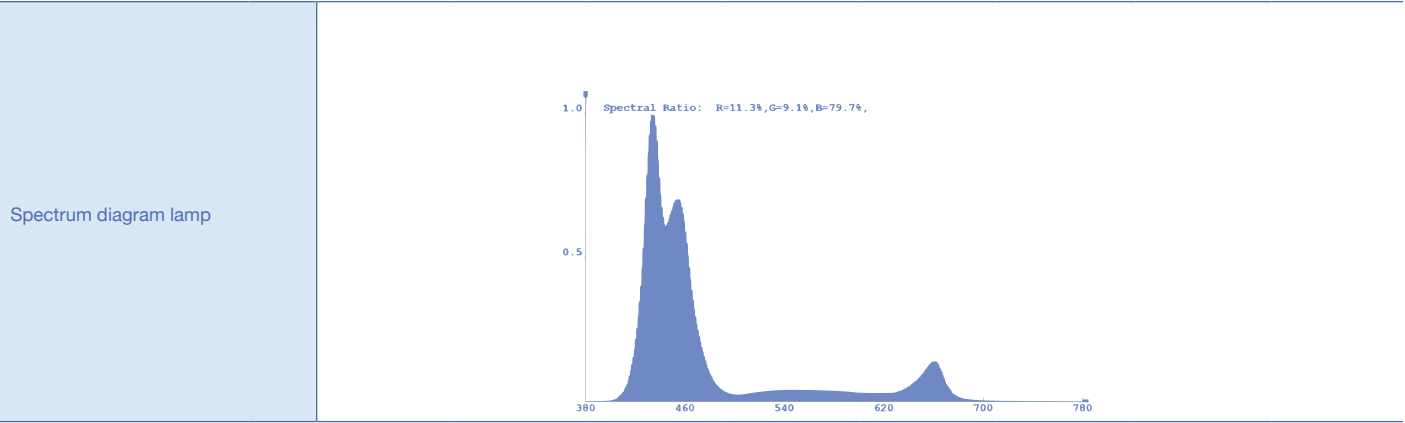
ARABLAMP | ARABIDOPSIS GROWTH ACCELERATION

| | | | | | | | | |
|------------------------------------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|
| Positive Range (S) | LAC/T140S | LAC/T370S | LAC/T440S | LAC/T700S | LAC/T900S | LAC/T1200S | LAC/T1500S | LAC/T2300S |
| Negative Range (B) | LAC/T140B | LAC/T370B | LAC/T440B | LAC/T700B | LAC/T900B | LAC/T1200B | LAC/T1500B | LAC/T2300B |
| *5Temperature performance Light on | | | | | | | | |
| At 0% light [°C] | (S) | 0...+55 | | | | | | |
| | (B) | -10...+55 | | | | | | |
| At 100% light [°C] | (S) | 5...+50 | | | | | | |
| | (B) | -5...+50 | | | | | | |

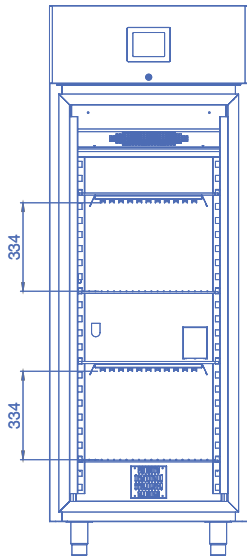
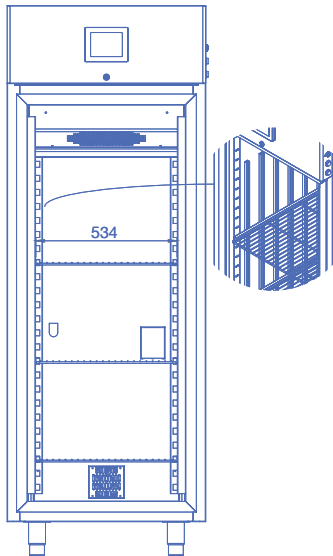
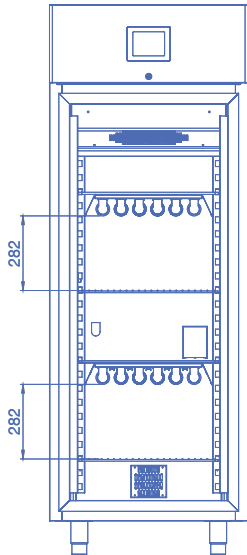
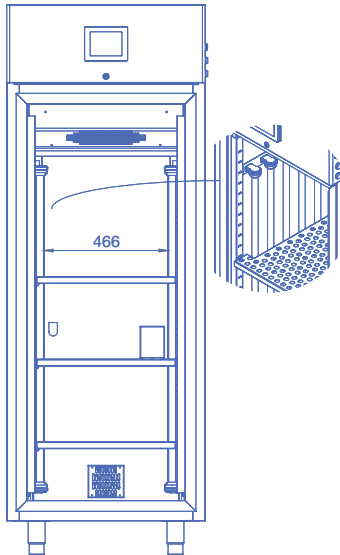
| *Horizontal Shelf Illumination | | | | | | | | |
|--------------------------------|------|------|------|--------|------|--------|--------|--------|
| Illumination on Shelf [W/m²] | n.d. | n.d. | n.d. | 44 | n.d. | 44 | 44 | 44 |
| Illumination on Shelf [LUX] | n.d. | n.d. | n.d. | 12.000 | n.d. | 12.000 | 12.000 | 12.000 |

| | | | | | | | | |
|---|------|------|------|-----|------|-----|-----|-----|
| PPFD [$\mu\text{mol}/\text{m}^2\text{s}$] | n.d. | n.d. | n.d. | 440 | n.d. | 440 | 440 | 440 |
| *Vertical Walls Illumination | | | | | | | | |

| | | | | | | | | |
|---|-------|--------|--------|--------|--------|--------|--------|--------|
| Lateral inner walls illumination [LUX] | 8.000 | 10.000 | 12.000 | 14.000 | 12.000 | 12.000 | 14.000 | 14.000 |
| PPFD [$\mu\text{mol}/\text{m}^2\text{s}$] | 230 | 280 | 350 | 420 | 350 | 350 | 420 | 420 |



| PRODUCT CODE GENERATO | | | |
|--|---|---|---|
| L-D/F/B/A | T/C | 140 | S/B |
| D- Daylamp F- Fluolamp B- Biolamp A- Arablabb | Temperature (T) or Climate (C) Control | Internal volume from 140 up to 2300 liters | S- T.range 0°/55°C B- T.range -10°/+55°C |

| LAYOUT AND DIMENSIONS WITH LAMPS NEON OR LED | | |
|--|---|---|
| | Horizontal Shelf Lamps | Vertical Wall Lights |
| 700 liters chamber with LED lamps |  |  |
| 700 liters chamber with FLUORESCENT lamps |  |  |

^{*5}This data are specified with Fluorescent Lamps. With LED lamps installed the lux and PPFD values could vary by ± 10%. The W/m² decrease around 20%.

^{*6}This data are for shelf illumination at a distance of 15 cm from the lamps. Data are valid for new lamps at a temperature of 20°C. Please consider that illuminance power of lamps will decrease over time.

^{*7}The installation of fluoresecent walls illumination reduces the useful width of the shelves: for 140,370,440,900 liters size is reduced of 160 mm for 600, 700, 1200, 1500 liters volume size is reduced of 100 mm. The led walls illumination reduces the useful width of the shelves: for 370, 440, 900 liters is reduced of 40 mm.

For all type of lamp the humidity data is: Humidity range [% RH] 10 to 80, Humidity fluctuation ≤ 3 ± % RH

n.d. = not available