FDM Environment Makers Products
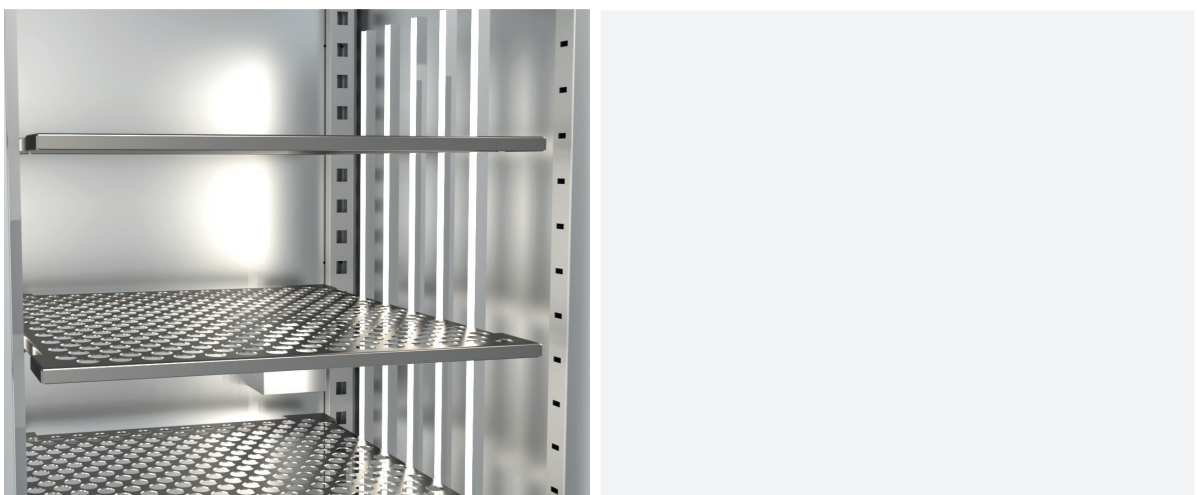Climatic & Termostatic Chambers
Growth Chambers
Environmental Chambers
Ultrafreezers
Customised Solution

FDM
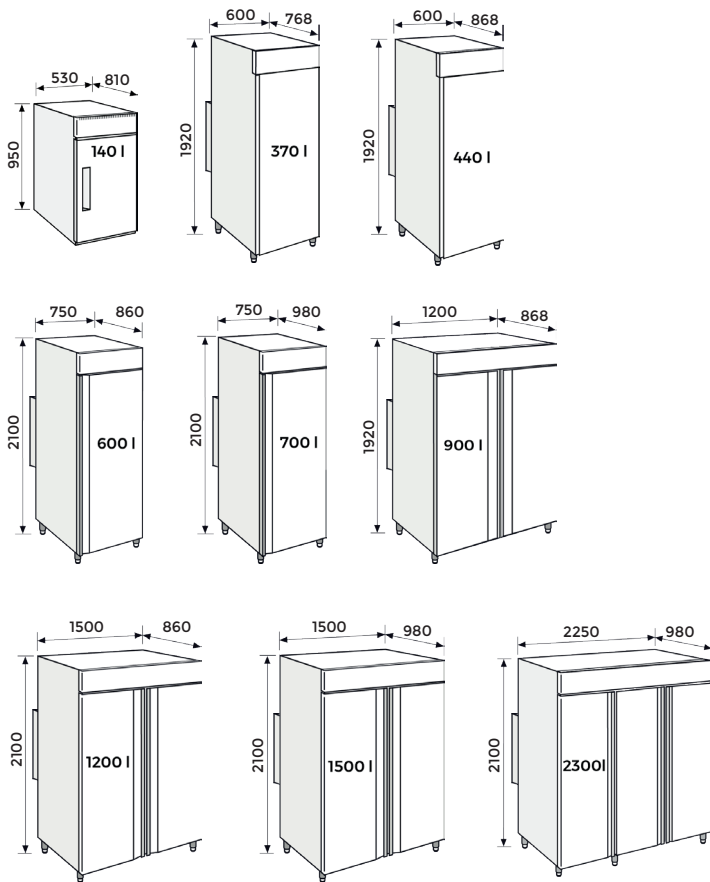*Environment Makers*

Growth Test Chambers

LCB-LCS Series

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Technical specifications are subject to change

Sizes

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 – towards the yellow area of the spectrum, specific 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)		140S	370S	440S	600S	700S	900S	1200S	1500S	2300S
Negative Range (B)		140B	370B	440B	600B	700B	900B	1200B	1500B	2300B
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					
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 humidifcation 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]		530	600	600	750	750	1200	1500	1500	2250
Depth net [mm]		810	768	868	860	980	868	860	980	980
Height net [mm]		950	1920	1920	2100	2100	1920	2100	2100	2100
Doors										
Unit doors		1	1	1	1	1	2	2	2	3
Internal Dimensions										
Width [mm]		450	500	500	600	600	1090	1340	1300	2090
Depth [mm]		540	480	580	570	670	580	570	670	670
Height [mm]		520.5	1257	1257	1340	1340	1257	1350	1340	1340
Measures										
Interior net volume [L]		130	310	370	450	530	810	1020	1180	1830
Net weight of the unit (empty) [kg]		78	100	110	132	167	197	212	215	367
Permitted load per rack [kg]		20	20	20	20	20	20	20	20	20
*[3]**Fixtures**										
Number of shelves (std./max.)		2/3	3/5	3/5	3/6	3/6	6/10	6/12	6/12	9/14
Shelf Width [mm]		400	460	460	530	530	460	530	530	530
Shelf Depth [mm]		500	470	570	550	650	570	550	650	650
*still***FACE Controller**										
Controller					Constant monitoring temperature and humidity controllers					
Interface port					Optional: RS485					
*revo***FACE 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					

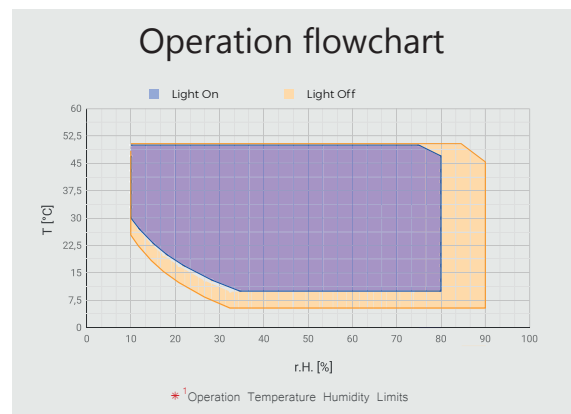*[2]The cartridge should be change every 4÷6 months at most.

*[3]The installation of fluorescent 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.

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*)		140*S*	370*S*	440*S*	600*S*	700*S*	900*S*	1200*S*	1500*S*	2300*S*
Negative Range (*B*)		140*B*	370*B*	440*B*	600*B*	700*B*	900*B*	1200*B*	1500*B*	2300*B*
Environment-specific data										
Sound-pressure level [dB(A)]						60				
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 steel grid					
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]	Light off (S)	1.4	1.5	1.4	1.8	1.8	2.2	2.4	2.6	2.7
	Light off (B)	1.6	1.7	1.7	2.2	2.3	2.6	2.7	2.9	3.1
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
- 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

Operation flowchart

Light On   Light Off

*1Operation Temperature Humidity Limits

· FD100

Cable hole installed on the side of the chamber that allows the passage of cables inside without loss of performance.
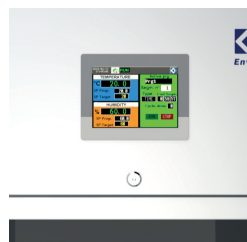
· UDB100

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.

· revoFACE

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

· WTO16

System of supply demineralizzate water tank 16 liters.

*4The 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

Daylamp | Sunlight Simulation

Positive Range (S)		LDC140S	LDC370S	LDC440S	LDC600S	LDC700S	LDC900S	LDC1200S	LDC1500S	LDC2300S
Negative Range (B)		LDC140B	LDC370B	LDC440B	LDC600B	LDC700B	LDC900B	LDC1200B	LDC1500B	LDC2300B
*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				
*6**Horizontal Shelf Illumination**										
Illumination on Shelf [W/m²]		45	52	43	39	47	43	47	47	47
Illumination on Shelf [LUX]		10.500	13.000	13.000	12.000	16.000	13.000	16.000	16.000	16.000
*7**Vertical Walls Illumination**										
Lateral inner walls illumination [LUX]		10.000	12.000	15.000	15.000	18.000	15.000	15.000	18.000	18.000
Spectrum diagram lamp										

Fluolamp | Accelerated Plant Growth

Positive Range (S)		LFC140S	LFC370S	LFC440S	LFC600S	LFC700S	LFC900S	LFC1200S	LFC1500S	LFC2300S
Negative Range (B)		LFC140B	LFC370B	LFC440B	LFC600B	LFC700B	LFC900B	LFC1200B	LFC1500B	LFC2300B
*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				
*6**Horizontal Shelf Illumination**										
Illumination on Shelf [W/m²]		45	52	43	39	47	43	47	47	47
Illumination on Shelf [LUX]		4.500	4.500	5.000	5.000	6.500	5.000	6.500	6.500	6.500
PPFD [µmol/m2s]		150	150	170	170	230	170	230	230	230
*7**Vertical Walls Illumination**										
Lateral inner walls illumination [LUX]		4.000	5.000	6.000	6.000	7.000	6.000	6.000	7.000	7.000
PPFD [µmol/m2s]		120	150	190	190	220	190	190	220	220
Spectrum diagram lamp										

Biolamp | Insect and bacteria incubation

Positive Range (S)		LBC140S	LBC370S	LBC440S	LBC600S	LBC700S	LBC900S	LBC1200S	LBC1500S	LBC2300S
Negative Range (B)		LBC140B	LBC370B	LBC440B	LBC600B	LBC700B	LBC900B	LBC1200B	LBC1500B	LBC2300B
*5Temperature 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]		n.d.	n.d.	n.d.	n.d.	47	n.d.	47	47	47
Illumination on Shelf [LUX]		n.d.	n.d.	n.d.	n.d.	12.000	n.d.	12.000	12.000	12.000
*7Vertical Walls Illumination										
Lateral inner walls illumination [LUX]		7.000	8.000	10.000	10.000	13.000	10.000	10.000	13.000	13.000
Spectrum diagram lamp										

Arablamp | Arabidopsis Growth Acceleration

Positive Range (S)		LAC140S	LAC370S	LAC440S	LAC600S	LAC700S	LAC900S	LAC1200S	LAC1500S	LAC2300S
Negative Range (B)		LAC140B	LAC370B	LAC440B	LAC600B	LAC700B	LAC900B	LAC1200B	LAC1500B	LAC2300B
*5Temperature 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]		n.d.	n.d.	n.d.	n.d.	44	n.d.	44	44	44
Illumination on Shelf [LUX]		n.d.	n.d.	n.d.	n.d.	12.000	n.d.	12.000	12.000	12.000
PPFD [μmol/m2s]		n.d.	n.d.	n.d.	n.d.	440	n.d.	440	440	440
*7Vertical Walls Illumination										
Lateral inner walls illumination [LUX]		8.000	10.000	12.000	12.000	14.000	12.000	12.000	14.000	14.000
PPFD [μmol/m2s]		230	280	350	350	420	350	350	420	420
Spectrum diagram lamp										

ICHlamp | Photostability Test

Positive Range (S)	LHT140S	LHT370S	LHT440S	LHT600S	LHT700S	LHT900S	LHT1200S	LHT1500S	LHT2300S
*5 **Temperature performance Light on**									
At 0% light [°C] (S)					0...+55				
At 100% light [°C] (S)					5...+50				
*6 **Horizontal Shelf Illumination**									
Illumination on Shelf for UV-A lamps [W/m²]	130	140	110	100	100	110	100	100	100
Illumination on Shelf for White lamps [LUX]	8.000	8.000	10.000	10.000	13.000	10.000	13.000	13.000	13.000
Exposition time to reach 1,2 million of lux [Hours]	153	157	118	122	92	118	92	92	92
Exposition time to reach 200 W/m² of UV-A [Hours]	1,3	1,4	1,7	1,9	1,9	1,7	1,9	1,9	1,9

*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 fluorescent 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

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		