

TECHNICAL SPECIFICATION

The Large-Scale Photobioreactor 25 l

The Large-Scale Photobioreactor 100 l

Cultivation Vessel		
Volume	25 or 100 l	
Shape	Flat, rectangular	
Material	Glass	
Lid	Stainless steel, silicon gaskets, gas and electronics fittings	
Aeration tube	Plastic U-tube with porous polyethylene sparger (pore size 50 μm)	
Sterilization	Hot steam or chemical sterilization possible	
Thermoregulation		
Thermoregulation system	1.000 and 2.500 W heater for 25 l and 100 l PBR, respectively	
Cooling Unit (optional)	Water cooling coil + cooling unit	
Range	30 - 50 $^{\circ}\text{C}$ with ambient temperature around 20 $^{\circ}\text{C}$ 15 - 60 $^{\circ}\text{C}$ ambient temperature not exceeding 30 $^{\circ}\text{C}$ (with optional Cooling Unit)	
Illumination – LED Lighting		
Light panel	Bi-color with separately controllable channels	
Color version	Cool White - Red or Cool White - Blue Other color combination on request	
Total intensity	Up to 500, 200 $\mu\text{mol. m}^{-2} \cdot \text{s}^{-1}$ for White and Red light, respectively	Up to 2.000 $\mu\text{mol. m}^{-2} \cdot \text{s}^{-1}$ (with optional Light Upgrade) Available for 25 l PBR
Light path	6.5 cm \pm 5 %	
Light regime	Light / dark cycles Constant, Linear, Sinusoid light mode Cycles from seconds up to days	Java scripting
Aeration System		
Air sparging	Aeration pump	
Aeration tube	Plastic U-tube with porous polyethylene sparger (pore size 50 μm)	
Bubble interruption valve	Bubbling interruption before OD and Chlorophyll-a fluorescence measurement automatically	
Gas Mixing System GMS 150	For precise concentration and flow rate of the required gases, input pressure 3 – 5 bar, gas cylinders not included	
OD and Chlorophyll-a Fluorescence Monitoring (optional)		
Optical module	For OD and Chl-a fluorescence monitoring	
Optical density	Real time measurement of OD at 680 and 720 nm	
Double-modulation fluorometer	Chl-a fluorescence monitoring induced by blue and red excitation light $F_0, F_T, F_M, F'_M, (F'_M - F_T/F'_M)$	
Optical path	10 mm	

Sensors (optional)	
Electrode module	Enables connecting up to four measuring sensors to the Photobioreactor
Temperature sensor	Platinum Pt 1000 sensor
pH module	Digital pH sensor InPro 3253i/SG/325, cable, SW control
dO ₂ module	Digital optical O ₂ sensor InPro 6860i/325, cable, SW control
dCO ₂ module	Digital CO ₂ sensor InPro 5000i/325, cable, SW control
Accessories (optional)	
Light Upgrade	For high-illumination cultivation up to 2.000 μmol. m ⁻² . s ⁻¹ Available for 25 l PBR
Gas Mixing System GMS 150	For precise concentration and flow rate of the required gases, input pressure 3 – 5 bar (optional), gas cylinders not included
Turbidostat Module	For fully controlled automatic turbidostatic cultivation Two diaphragm pumps and supporting control software
Chemostat Module	For fully controlled automatic pH-stat cultivation Two peristaltic pumps + one diaphragm pump and supporting control software
Pumps	Up to 8 peristaltic pumps + up to 2 diaphragm pumps
Control Unit	
Photobioreactor control software	For online monitoring and visualization of all measured data as well as creation of user-defined protocols through a user-friendly graphical interface
Java scripting	Allows creation of additional user-defined specific protocols
Remote access	Wi-Fi, Ethernet
Others	
Material	Glass cultivation vessel, stainless steel (lid, cooling spiral), aluminum frame, silicon gaskets, plastic fluorometer, polyethylene sparger
Dimension (h x l x d)	25 l cultivator: ca. 115 x 90 x 70 cm 100 l cultivator: ca. 145 x 185 x 80 cm Storing rack: ca. 200 x 60 x 60 cm
Weight	25 l cultivator: 100 kg 100 l cultivator: 300 kg Storing rack: 150 kg
Electrical	90 – 240 V AC