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	Chemical sterilization possible	
Thermoregulation		
Temperature sensor	Platinum Pt 1000 sensor	
Thermoregulation system	1 000 and 2 500 W heater for 25 l and 100 l PBR, respectively	
Range	30 - 60 °C with ambient temperature around 20 °C 15 - 60 °C with ambient temperature not exceeding 30 °C (with optional Cooling Unit)	
Illumination – LED Lighting		
Light panel	Bi-color with separately controllable channels	
Color version	Cool White - Red Other color combination on request	
Total intensity	Up to 500, 300 µmol. m^{-2}. s^{-1} for White and Red light, respectively	Up to 2 200 µmol. m^{-2}. s^{-1} (with optional Enhanced illumination module) Available for 25 l PBR
Light path	6.5 cm ± 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 SECOH MKC-510V	
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	
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 (455 nm) and orange-red (620 nm) 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
pH module	Digital pH sensor InPro 3253i/SG/325, cable, SW control
dO_2 module	Digital optical O_2 sensor InPro 6860i/320, cable, SW control
dCO_2 module	Digital CO_2 sensor InPro 5000i/320, cable, SW control
Accessories (optional)	
Cooling module	For temperature range 15 - 60 °C with ambient temperature not exceeding 30 °C Cooling unit with water chiller Hailea Ultra Ti 1500 HC-500A, stainless-steel water-cooling coil, supporting control software
Gas Mixing System GMS 150	For precise concentration and flow rate of the required gases, input pressure 3 – 5 bar, 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	Ethernet
Others	
Material	Glass cultivation vessel, stainless steel (lid, cooling spiral), aluminum frame, silicone gaskets, plastic fluorometer, polyethylene sparger
Dimension (l x d x h)	25 l cultivator: ca. 103 x 70 x 120 cm 100 l cultivator: ca. 202 x 80 x 160 cm Cooling unit: ca 56 x 68 x 144 cm Control unit: ca. 66 x 64 x 202 cm
Weight	25 l cultivator: 100 kg 100 l cultivator: 300 kg Control unit:150 kg
Power consumption	25 l cultivator + standard illumination: 450 W 25 l cultivator + Enhanced illumination: 850 W 100 l cultivator: 900 W Heating 25 l: 1 000 W Heating 100 l: 2 500 W Cooling unit: 500 W Control unit: 100 W
Electrical	90 – 240 V AC