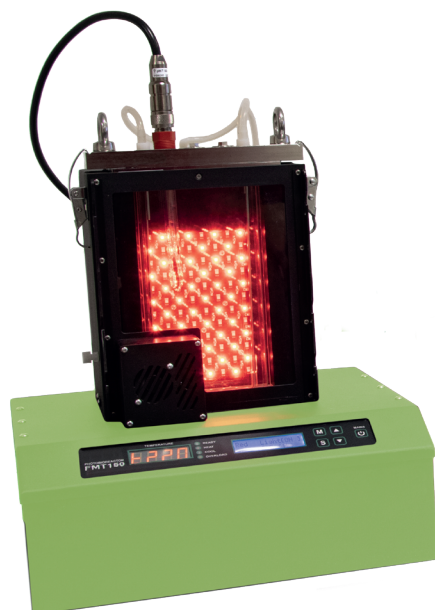


Photobioreactor

FMT 150



FMT 150/400



FMT 150/1000



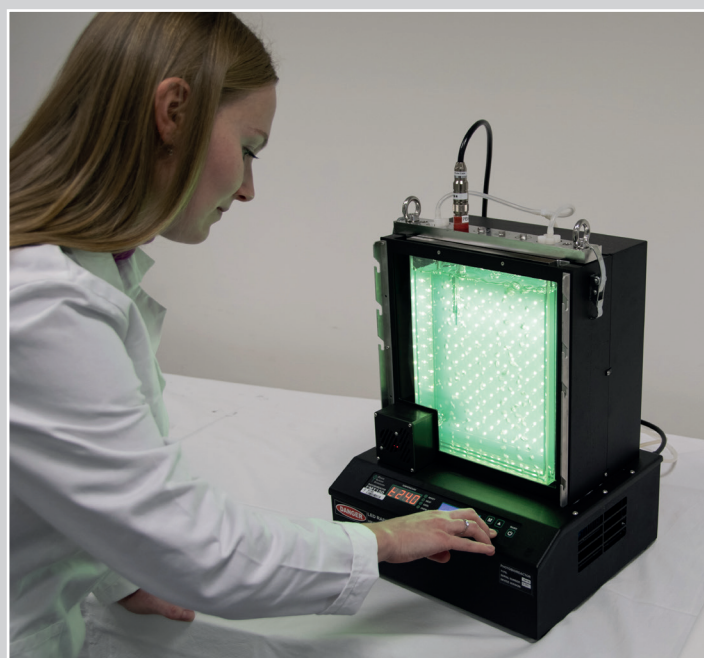
FMT 150/3000

Photobioreactor FMT 150 features a unique combination of the bench-top cultivator and computer-controlled monitoring device designed for precise phototrophic cultivation of algae, cyanobacteria and bacteria.

The Photobioreactor FMT 150 combines a flat cultivation vessel with the inbuilt densitometer, fluorometer, thermoregulation and air-lift aeration system. The FMT 150 product line comprises three versions of instrument that differ in the cultivation vessel capacity – 400 ml, 1000 ml and 3000 ml. The illumination is provided by bi-color light panel with separately controllable channels. The growth of the cultures is monitored by the integrated densitometer at wavelengths of 680 and 720 nm. The instantaneous physiological state of the culture (F_v/F_m) is measured by double-modulated fluorometer.

The basic setup can be supplemented with many optional modules. Continuous-flow turbidostatic cultivation can be used for the stabilization of the suspensions and optical density control. In addition to the turbidostatic pump, up to 7 peristaltic pumps for different chemostat or pH-stat cultivation can be linked to the Photobioreactor for highly precise control of cultivation conditions. Photobioreactor function can be enhanced by the additional **Gas Mixing System GMS 150** providing optimal control of input gas concentration. Additional sensors, magnetic stirrer or external light panel can be added to the basic configuration.

All cultivation conditions can be dynamically varied according to user-defined protocol and continuously monitored online in real time via Photobioreactor Control Software.



Specifications

FMT 150/400 | FMT 150/1000 | FMT 150/3000

CULTIVATION VESSEL

Volume	FMT 150/400 400 ml FMT 150/1000 1000 ml FMT 150/3000 3000 ml
Shape	Flat, rectangular
Dimension (h x l x d) /Weight	FMT 150/400 23.9 x 19.3 x 3.7 cm / 2.8 kg FMT 150/1000 23.9 x 19.3 x 7.4 cm / 3.8 kg FMT 150/3000 31.7 x 30.3 x 7.4 cm / 6.2 kg
Material	Glass, stainless steel bottom, silicon gasket, autoclavable
Lid	Stainless steel FMT 150/400 and FMT 150/1000 3 big ports for sensors, 4 small Luer connectors for tubing (Ø 6/3 mm) FMT 150/3000 4 big ports for sensors, 8 small Luer connectors for tubing (Ø 6/3 mm)
Aeration tubes	Stainless steel U-tube with aeration holes (Ø 1 mm) + silicon connection
Humidifier	Moistening of the sparging air to avoid evaporation from the cultivation vessel
Sampling	Through the inlet or outlet tubes



THERMOREGULATION

Thermoregulation system	FMT 150/400 and FMT 150/1000 200 W Peltier element FMT 150/3000 400 W Peltier
Range (ambient temperature around 23°C)	FMT 150/400 5 - 75 °C FMT 150/1000 10 - 75 °C FMT 150/3000 10 - 75 °C

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 1 500 $\mu\text{mol.m}^{-2}.\text{s}^{-1}$	Up to 3 000 $\mu\text{mol.m}^{-2}.\text{s}^{-1}$ (optional with Light Upgrade)
Light path	FMT 150/400 24 mm FMT 150/1000 61 mm FMT 150/3000 61 mm	
Light regime	Light / dark cycles Constant, Linear, Sinusoid light mode Cycles from seconds up to days	Java scripting (advanced PBR control SW)
External light panel	Mounted on the front side, up two colors (optional)	



AERATION SYSTEM

Air sparging	Aeration pump
Aeration tubes	Stainless steel U-tube with aeration holes (Ø 1 mm) + silicon connection
Bubble interruption valve	Connectors for silicone tubing (Ø 6/3 mm) Automatic bubbling interruption during OD and Chlorophyll-a fluorescence measurement
Gas Mixing System GMS 150	For precise concentration and flow rate of the aeration gases, gas cylinders not included (optional)

Specifications

FMT 150/400 | FMT 150/1000 | FMT 150/3000

MIXING (OPTIONAL)

Magnetic stirrer	FMT 150/400 V-200 FMT 150/1000 V-200 FMT 150/3000 V-230 Mounted on the front side
Teflon-coated magnetic bar	FMT 150/400 35 mm long (Ø 6 mm) FMT 150/1000 35 mm long (Ø 6 mm) FMT 150/3000 60 mm long (Ø 10 mm) Placed at the front glass panel inside the cultivation vessel Adjustable speed of rotation 60 - 600 rpm
Stepper motor	12 V DC / 2 A

OD AND CHLOROPHYLL-A FLUORESCENCE MONITORING

Optical module	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	Ca. 24 mm

SENSORS (OPTIONAL)

pH / Temperature module	Analogue pH sensor InPro 3253SG/120/PT1000, cable, electronic module, SW control
dO ₂ module	Analogue O2 sensor InPro 6800/12/120, cable, electronic module, SW
dCO ₂ module	Digital CO2 sensor InPro 5000/12/120, cable, electronic module, SW



ACCESSORIES (OPTIONAL)

Light Upgrade	High-illumination and homogenous cultivation up to 3 000 $\mu\text{mol.m}^{-2}.\text{s}^{-1}$
External Light Panel	Mounted on the front side, up two colors
Turbidostat Module	For fully controlled automatic turbidostatic cultivation One Peristaltic Pump PP 600 and supporting control software Upgrade)
Chemostat Module	For fully controlled automatic pH-static cultivation Two Peristaltic Pumps PP 600 and supporting control software
pH-stat / Turbidostat Module	For fully controlled automatic pH-stat that is driven by gaseous CO ₂ OR for turbidostatic cultivation. One Peristaltic Pump PP 600 with one gas valve and supporting control software.
Peristaltic Pump PP 600	Up to 8 Peristaltic Pumps in total, each with a range 0.2 - 50 ml/min
PWM Pump (air or liquid)	For pumping gas or liquid into the cultivation vessel
Enhanced Cultivation Vessel	Bottom from nickel-plated brass covered with ceramic layer
Pipetting Insert to the Top Port	An additional small Luer inlet port for tubing (Ø 6/3 mm) placed into the sensor port

Specifications

FMT 150/400 | FMT 150/1000 | FMT 150/3000

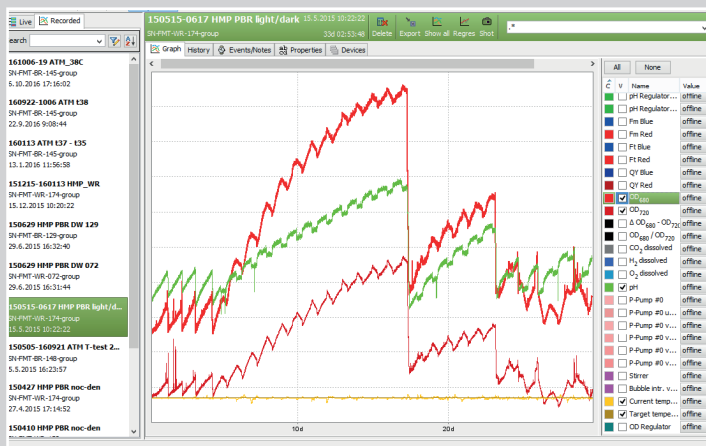
CONTROL UNIT

Photobioreactor control software

For online monitoring and visualization of all measured data as well as for creation of user-defined protocols. Advanced / Basic version

Remote access

Wi-Fi, Ethernet



OTHERS

BIOS

Upgradeable firmware

Communication port

USB A-B

Material

Glass, stainless steel, silicon gasket

Dimension (h x l x d)

FMT 150/400 42 x 35 x 31 cm
FMT 150/3000 42 x 35 x 31 cm

Weight

FMT 150/400 15.5 kg
FMT 150/1000 17.5 kg
FMT 150/3000 28 kg

Electrical

90 - 240 V AC

Max. power consumption

FMT 150/400 500 W
FMT 150/1000 750 W
GMS 150 50 W
PP 600 30 W

