

## QUALITY CERTIFICATE

This document certifies that, according to the manufacturer, the product described meets the specifications set forth herein:

### **Fermenter Bioreactor LAMBDA MINIFOR:**

**Power:** Universal power supply for mains 100-245 V AC/50-60Hz, 560W, CE conform

**Dimensions:** 22 x 40 x 38 cm (W x D x H)

**Display:** LCD 4 x 40 digits with backlight illumination

**Fermentor vessel:** Pyrex glass with 6 to 8 side necks

**Temperature control:** High efficiency 150 W infrared (IR) radiation heat source with gilded parabolic reflector

**Regulation:** from 5°C over RT to 70°C

**Measurement:** from 0 to 99.9°C in 0.1°C steps

**Precision:** +/- 0.2°C (0 to 60°C)

**Sensor:** Pt 100 incorporated in the glass electrode of the pH probe

**pH control:** sterilisable pH electrode pH 0-14 with automatic temperature correction, two-point semiautomatic calibration and Variopin connector

**Resolution:** 0.01 pH unit

**Precision:** +/- 0.02 pH unit

**pO<sub>2</sub> control:** sterilisable Clark type oxygen sensor with fast response, automatic temperature correction, two-point semiautomatic calibration, dissolved oxygen (DO) control through regulation of the airflow rate

**Range:** 0 to 25 mg oxygen/ l, in 0.1 mg/l steps

**Air flow:** 0 to 5 l/min in 0.01 l/min steps, measured by precise mass flow meter, linearity +/- 3%, reproducibility +/- 0.5%

**Control:** proportional valve controlled by microprocessor

**For supplied air pressure:** 0.05 – 0.2 MPa (0.5 - 2 atm)

**Agitation:** 50 W vibromixer 0 to 20 Hz (0 to 1200 rpm) in 0.1 Hz steps (6 rpm) with 1 or more stirring discs; Sterility similar to magnetic coupling

**Selectable parameter 'X':** an additional parameter can be controlled by the instrument (foaming control, weight (for continuous cultures), pCO<sub>2</sub>, redox potential, conductivity, optical density, etc.); with standard 0-10V or 0-20mA output

**Ports / side necks:** One large quadruple sampling or additions port with four needles with LAMBDA PEEK double-seal connections, used for sampling, inoculation, antifoam, feeds, harvest, addition of correction solutions etc., additional double ports are available.

**Pumps:** up to 4 independent pumps (PRECIFLOW, MULTIFLOW, HIFLOW or MAXIFLOW) with speed variation from 0 to 100 % can be used with MINIFOR lab fermenter-bioreactor

**Working temperature:** 0 – 40 °C

**Working humidity:** 0 - 90 % RH, not condensing

**Weight:** 7.5 kg

**PC control:** complete PC control and data processing using the fermentation software FNet (for up to 6 MINIFOR fermenters) or SIAM (for an even higher number of instruments)

### **LAMBDA Peristaltic PUMPS**

**Type:** Microprocessor-controlled programmable laboratory peristaltic pump

**Programming:** up to 99 steps of speed and time (except for PRECIFLOW model)

**Time resolution:** 0 to 999 minutes in 1 minute steps; 0 to 99.9 minutes in 0.1 minute steps

**Accuracy:**  $\pm 1\%$

**Reproducibility:**  $\pm 0.2\%$  (electronics)

**Flow rate range:**

**PRECIFLOW & MULTIFLOW:** 0.2  $\mu\text{l}/\text{min}$  - 600 ml/h

**Tubing:** Silicone tubing or other materials having similar elasticity

**Non-volatile memory:** storage of all settings

**Maximum pressure:**

**PRECIFLOW, MULTIFLOW, HIFLOW & MAXIFLOW:** approx. 0.1 MPa in clockwise rotation;  
approx. 0.15 MPa in counter-clockwise rotation

**Motor :**

**PRECIFLOW & MULTIFLOW:** microprocessor controlled stepping motor

**Speed control range:** 0 - 999

**Interface:** RS-485 or RS-232 (optional)

**Remote control :** 0-10 V; (option 0-20 or 4-20 mA); foot switch; ON/OFF; ! For safety reasons the voltage of the remote signal to earth must not exceed 48 V DC

**Dimensions:** 10.5 (W)  $\times$  9.5 (H)  $\times$  10.5 (D) cm (PRECIFLOW, MULTIFLOW, HIFLOW & MAXIFLOW)

**Weight:** <1 kg (PRECIFLOW & MULTIFLOW); 1.2 kg (HIFLOW & MAXIFLOW)

**Safety:** CE, meets IEC 1010/1 norm for laboratory instrument

**Operation temperature:** 0 – 40 °C

**Operation humidity:** 0-90% RH, not condensing

### **MASSFLOW controller:**

**Type:** LAMBDA MASSFLOW – microprocessor-controlled gas flow controller (controller only) and gas flow meter

**Accuracy:**  $\pm 3\%$  reading or 1 digit

**Repeatability:**  $\pm 0.5\%$  reading or 1 digit

**Flow range:**

**MASSFLOW 5000:** 0 - 5.00 l/min in 0.01 l/min steps (controller)

**Calibration:** N<sub>2</sub>/Air (pre-calibrated sensors for other gases available on request)

**Non-volatile memory:** storage of all settings

**Maximum pressure:** 0.2 MPa (2 bar)

**Power supply:** 90–240 V/50–60 Hz AC plug-in power supply with DC 12V/24W output; possible field operation on 12 V accumulator (Plug types: AU, CH, EU, UK, US)

**Interface:** RS-485 or RS-232 (optional)

**Remote control:** 0-10 V; (option 0-20 or 4-20 mA); ON/OFF (controller only)

**Dimensions:** 10.5 (W)  $\times$  8 (H)  $\times$  17 (D) cm

**Weight:** 800 g

**Safety:** CE, meets IEC 1010/1 norm for laboratory instrument

**Operation temperature:** 0 – 40 °C

**Operation humidity:** 0-90% RH, not condensing

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