



## PERISTALTIC PUMPS PRECIFLOW-MULTIFLOW-HIFLOW-MAXIFLOW

LAMBDA PRECIFLOW, MULTIFLOW, HIFLOW and MAXIFLOW peristaltic pumps have been developed for continuous cultures as the result of twenty years of laboratory experience and involved the systematic elimination of the imperfections found in other pumps on the market.

The result is a **practical, precise and reliable pump, which is the most compact in its class:**

- Flow rates from 0.01 to 10'000 ml/hour
- Digital speed setting from 0 to 999
- New motor technology
- Extensive remote controls
- Greatly extended tubing life and decreased pulsation
- Flow rate programming (up to 99 steps)
- By programming zero flow rates the pump can be switched on and off without using a timer
- Very economic in use while using low cost tubing without stoppers
- Most compact pump of its class on the market
- Access to reaction kinetics by using the LAMBDA pump-flow INTEGRATOR
- Low voltage plug-in power supply for maximum safety
- RS-485 interface (optional)
- Control software PNet (optional)



The **special mechanics** of LAMBDA peristaltic pumps has been developed because no pump could be used for continuous fermentation lasting up to eight weeks.

The most frequent problems of traditional peristaltic pumps are:

- Aspiration of the tubing by the mechanics
- Rupture of the tubing and leaking of the solution
- Flow rate decrease over time
- When a continuous process is interrupted a lot of time and money are lost

During the development of the new LAMBDA peristaltic pump mechanics all aspects of existing peristaltic pumps have been analyzed and finally an efficient solution has been found.

## What makes these new pumps so efficient?

- Rollers of small diameter apply a high strain onto the tubing and push the tubing in the direction of the sense of rotation. Therefore, the tubing has to be fitted with stoppers. We use **rollers of very large diameter** – this leads to the elimination of such strains and prevents tubing motion. A larger portion of tubing is compressed with better pressure distribution. The **elasticity of the tubing is protected**.
- Instead of rollers we use **special plastic ball bearings with glass beads**. The gliding of such rollers requires only a minimal force and the corrosion resistance in the case of spill is excellent.
- A special off-centre lever using a spring of non-corrosive material applies the compression force on the tubing **softly and gradually**.
- The final pressure of the liquid is reduced by the spring to 0.1–0.2 MPa (according to the tubing used). **The pressure does not increase even when the line is blocked**.
- The **pump head is large** and has two centers of asymmetry, which **reduces pulsation** several times. The head is made of hard, chemically stabilized material
- The stepping motor or BLDC motor, driven by quartz-controlled electronics, assures a **high precision of the flow rate**. The **ratio of speed control is 1:1000**.
- **Several possibilities of remote control**.
- The unique **flow integrator LAMBDA INTEGRATOR** makes the LAMBDA peristaltic pumps **excellent for the use in automatically controlled systems** e.g. fermentation, bio cultures, chemical synthesis, fraction collection and many more.
- The laboratory space is very expensive, therefore we have made our peristaltic pumps as compact as possible (all have just 1 l of volume). They are **several times smaller than other peristaltic pumps on the market** and therefore so **handy in use**.



## Benefits of great importance for your laboratory

- Since the lateral forces on the tubing have been eliminated, no stoppers are required. Even without any fixation **the tubing will not move at all in and out of the head**.
- Since the tubing compression is kept in the range of elasticity of the tubing the **tubing life increases considerably and flow rates remain constant**.
- **Low cost tubing can be used** with good results. The tubing economy is very important, e.g. **the LAMBDA PRECIFLOW peristaltic pump will be paid back after consumption of about 80 m of tubing**.

## PROPERTIES OF LAMBDA PERISTALTIC PUMPS

	PRECIFLOW	MULTIFLOW	HiFLOW	MAXIFLOW
Flow rate (ml/hour)*	0-600	0-600	0-3'000	0-10'000
Programming	No	up to 99 steps	up to 99 steps	up to 99 steps
Motor	Stepping motor	Stepping motor	BLDC	BLDC
Power (max. W)	5	5	30	60
Weight (kg)	1.2	1.2	1.5	1.6

\* tubing made of silicone or other material with similar elasticity (internal diameter 0.5 to 4 mm, wall thickness ~1 mm)

All LAMBDA peristaltic pumps have the same following characteristics:

- Digital speed control in the range 0:1000
- Analog remote control ON/OFF and full range speed control (0–10 V)
- RS 485 interface (optional)
- Very small dimensions: 10.5 (W) × 9.5 (H) × 10.5 (D) cm
- Very quiet operation
- Plug in switching power supply for mains 90–240 V/AC, 50–60 Hz, output 12 V/DC
- Long life even with low cost tubing without stoppers
- Safety conform to CE and IEC 1010/1
- Warranty 2 years

## Electronic integrator LAMBDA INTEGRATOR



The use of the electronic flow integrator LAMBDA INTEGRATOR together with the LAMBDA peristaltic pumps allows a **simple but precise integration of the amount of liquid, which has been transported by the pump.**

The electric impulses, which move the motor, are registered and transformed into a direct current. The voltage can be measured or recorded by common recorders or voltmeters. The **RS 485 interface allows the connection to a PC.**

In processes where the pump is controlled e.g. by a pH-stat during a fermentation (to keep the pH of the medium constant), it is frequently important to know when and how much acid or base were added. **This data yields important information about the process, its kinetics and time of completion.**

The Integrator can also be used for **measuring enzyme activity** (e.g. esterases, amidases, acylases, lipases, proteases, lactamases and other enzymes).

The pump-flow integrator can be conveniently placed under the peristaltic pump. The Integrator connected to LAMBDA peristaltic pumps **allows new and unusual applications of peristaltic pumps** (gradient making, counter flow elution, liquid chromatography, electronic burette, etc.) as shown in the following figure:

# Utilization of the LAMBDA peristaltic pumps

