FULLY AUTOMATED

BIOREACTORS

Froilabo

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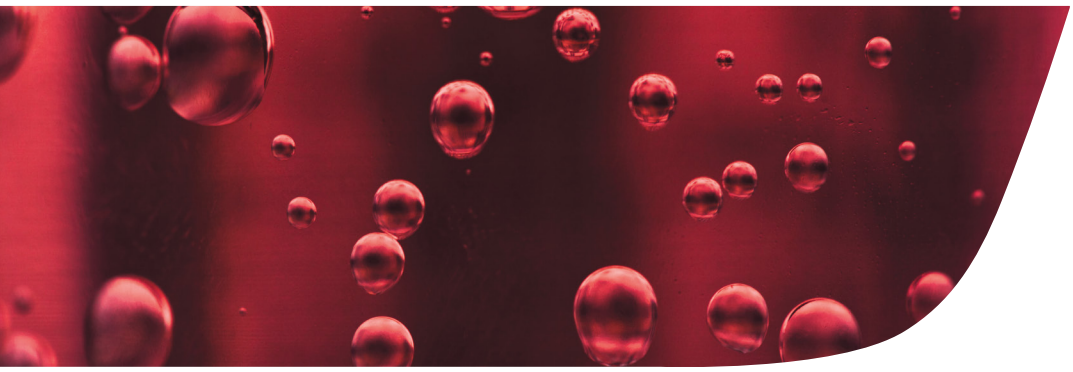
FULLY AUTOMATED LAB-SCALE **BIOREACTORS AND FERMENTERS**

The Froilabo stirred-tank bioreactors have a wide range of application possibilities including academia, research, process development & optimisation, scale up and production.



3 vessel volumes available for microbial fermentations and cell cultures.

Froilabo benchtop bioreactors have been designed to enable adaptations and variations to suit specific customer requirements. We test our bioreactor solutions in our fermentation laboratory under real conditions.

Intuitive 15" touch screen interface.

Robust construction

Constructed from 316L Stainless Steel and borosilicate glass.

Easy tank cleaning

Autoclavable vessels and non-welded lid makes cleaning simple.

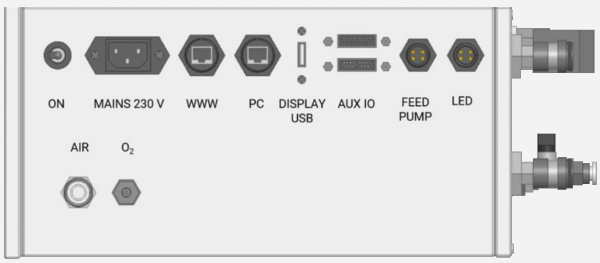
Adjustable condenser

Compact system with collapsible condenser to decrease the vessel size during autoclaving.

Convenient sampling

Sterilizable sampling port in base of the bioreactor to facilitate operational activities during a process.

BIOPROCESS CONTROLLER



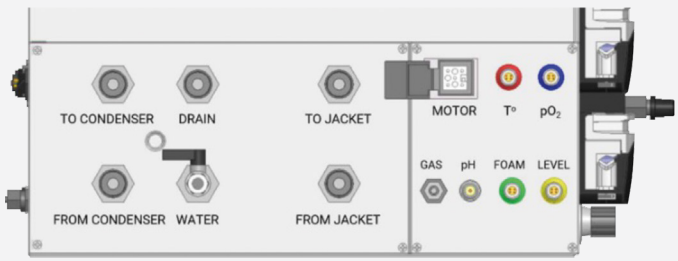


Figure 1. Bioprocess controller service connections

An intuitive touchscreen enables convenient control of all aspects of the bioprocess. The bioprocess controller is equipped with a peristaltic pump system, power control unit, gas supply system and a thermostat and ensures:

1. Temperature regulation by supplying a control signal either to the heating element (Peltier element on 1 L bioreactor) or the electro-magnetic cooling water valve of the thermostat (5 L & 15 L).
2. pH control by supplying base or acid solutions to the bioreactor medium using the bioprocess controller's peristaltic pumps;
3. pO_2 control by automatic adjustments of the stirrer's rotational speed. The actual pO_2 value is monitored using a pO_2 electrode;
4. Foam control by supplying an antifoam agent to the bioreactor's medium using the bioprocess controller's peristaltic pumps. The foam level is monitored using a conductivity sensor.
5. Feeding of a substrate by using the bioprocess controller's peristaltic pump and the respective feeding rate/volume is controlled by the feeding profile, which is set in the bioprocess controller.
6. Level control by using the bioprocess controller's peristaltic pump. The medium level is monitored using a conductivity sensor (5 L & 15 L);
7. Mixing by using a magnetic drive, the agitator is driven by a motor which is mounted on the top lid of the bioreactor.

To ensure the compliance with GMP rules, we are using SCADA software according to the requirements of 21 CFR Part 11. Additionally, we can provide our instrumentation with Installation Qualification (IQ) and Performance Qualification (PQ).

The service connections on the controller are clearly designated and many feature quick connect fittings (Figure 1).

Novel Mixing Technology

Our bioreactors are suitable for microbial fermentation (fungi, yeast, or bacteria) and cell cultivation (mammalian or plant cells) processes. Compact and robust, the bioreactors are available with 3 different vessel volumes making process scaling simple (Table 1). The vessels feature a novel magnetic mixer and non-welded lid and are ideal for bioprocesses which require high-grade aseptic conditions.

Our novel magnetically coupled mixer uses a non-traditional rotation axle (Figure 2). The patented magnetic drive is superior to other analogues as it provides clean and stable rotation, even at high agitation rates and power inputs.

The design of the mixers enables numerous customisation options for the rotor layout. This means impeller placements, amount and type can be adjusted to best suit the application. The impellers may be welded or detachable as required.

Lab-scale bioreactors and fermenters require adequate sterilisation between uses. The 5 L & 15 L Froilabo bioreactors feature a condenser which can be folded to make the reactor assembly more compact so that it may be conveniently placed within an autoclave (Figure 3).

VESSEL VOLUME OPTIONS	
1 L Twin Bioreactor (for microbial fermentations)	
Total Volume (L)	0.9
Working Volume (L)	0.4 – 0.7
5 L Bioreactors (for microbial fermentations or cell cultivation)	
Total Volume (L)	6.2
Working Volume (L)	2 – 4.5
15 L Bioreactors (for microbial fermentations or cell cultivation)	
Total Volume (L)	16
Working Volume (L)	5 – 11

Table 1. Vessel volumes

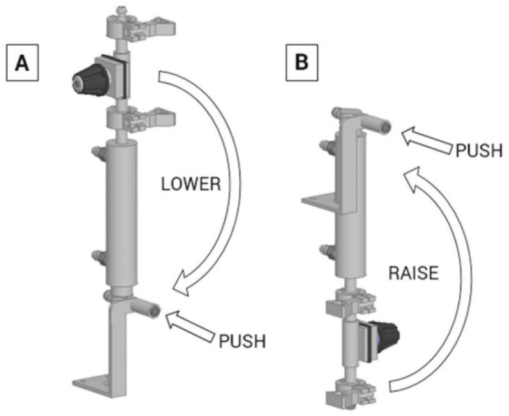


Figure 3. Condenser raised (A), condenser lowered (B)

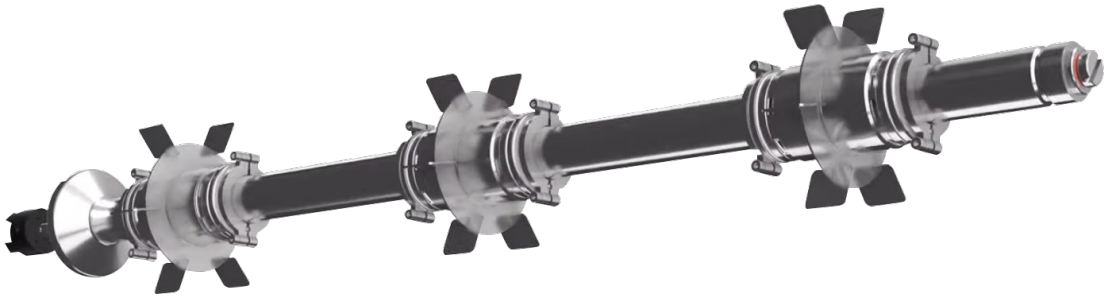


Figure 2. Magnetically coupled mixer

1 L TWIN BIOREACTOR

Developed for microbial fermentations the 1 L bioreactor consists of two functional parts:

- Autoclavable vessels equipped with an upper lid and ports, mixer with magnetic drive, impellers, baffles, sparger and bottle holder
- Control unit equipped with peristaltic pump system, power control unit, gas supply system and thermostat

Novel magnetically coupled drive

Eliminates the risk of contamination within the vessel since there is no mechanical seal.

Powerful Peltier temperature control

The Peltier element provides accurate temperature control from 10-50°C.

Mixing and aeration

Tailored for microorganisms (fungi, yeast or bacteria).

Uniform lid construction

No welded components within the lid for easy maintenance and sterility.

Flexible working volume

1 L bioreactor with working volume of 0.4 – 0.7 L.

Our innovative twin bioreactor is designed for R&D and process development. It has a robust design, yet it is compact and ergonomic.

A Peltier element efficiently controls the temperature of the bioreactor vessel without the need for a water source. Tough construction and fan-driven heat exchange develop sufficient power to cool and condense even high-temperature processes.

The uniform non-welded lid features all the necessary ports and sensors that might be required for bioprocesses (Figure 4).

The magnetically coupled drive ensures excellent sterility within the vessel since it eliminates the need for a mechanical seal. It can provide a mixing rate from 40 rpm to 1000 rpm.

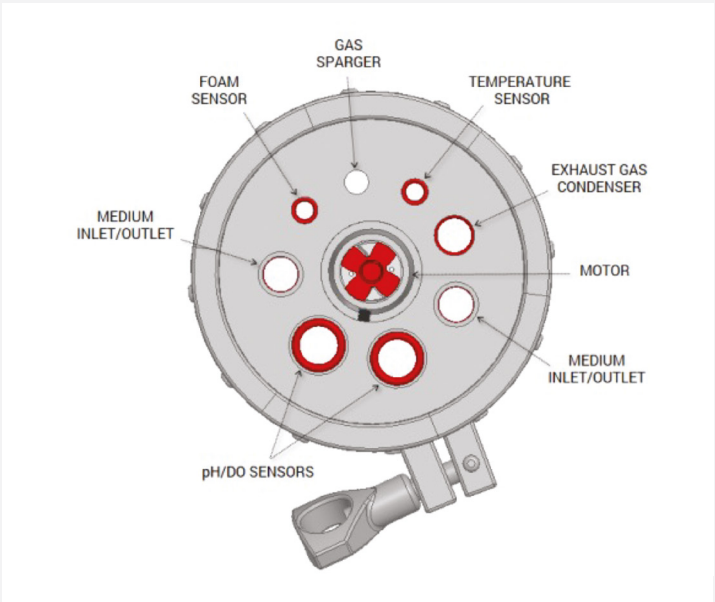


Figure 4. Diagram of non-welded lid from 1L Twin Bioreactor.

5 L BIOREACTORS

Developed for microbial fermentations or cell cultivation the 5 L bioreactors consist of two functional parts:

- Autoclavable vessel equipped with an upper lid and ports, mixer with magnetic drive, impellers, baffles, sparger and jacketed base.
- Control unit equipped with peristaltic pump system, power control unit, gas supply system and thermostat.

Novel magnetically coupled drive

Eliminates the risk of contamination within the vessel since there is no mechanical seal.

Mixing and aeration

Tailored for microorganisms (fungi, yeast or bacteria) or for cell cultivation (plant and mammalian cells).

Autoclavable sampling port

The sterilisable port facilitates operational activities.

Uniform lid construction

No welded components within the lid for easy maintenance and sterility.

Flexible working volume

5 L bioreactor with working volume up to 4.5 L.

Our fully automated and autoclavable bioreactor is designed for R&D and process development. It has a robust design, yet it is compact and ergonomic. The vessel is mounted between a jacketed base and a non-welded lid.

The uniform lid features all the necessary ports and sensors that might be required for cultivation processes (Figure 5).

There is a sterilisable sampling port conveniently located in the base of the vessel to facilitate operational activities during a process.

The magnetically coupled drive which can reach up to 1500 rpm ensures excellent sterility within the vessel.

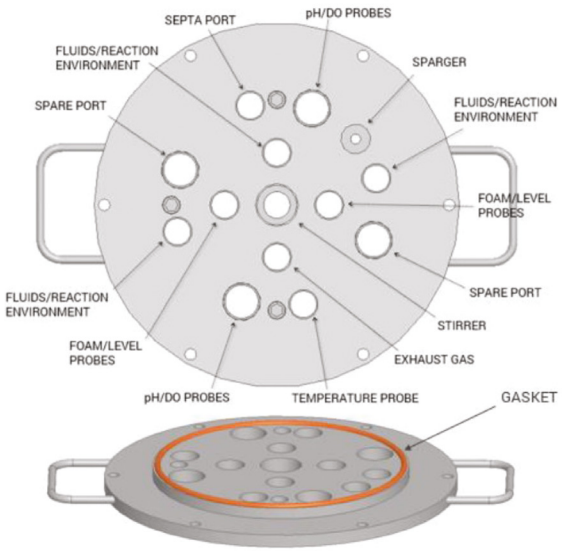


Figure 5. Diagram of non-welded lid from 5L and 15L Bioreactors.

15 L BIOREACTORS

Developed for microbial fermentations or cell cultivation the 15 L bioreactors consist of two functional parts:

- Autoclavable vessel equipped with an upper lid and ports, mixer with magnetic drive, impellers, baffles, sparger and jacketed base
- Control unit equipped with peristaltic pump system, power control unit, gas supply system and thermostat.

Novel magnetically coupled drive

Eliminates the risk of contamination within the vessel since there is no mechanical seal.

Mixing and aeration

tailored for microorganisms (fungi, yeast or bacteria) or for cell cultivation (plant and mammalian cells).

Autoclavable sampling port

The sterilisable port facilitates operational activities.

Uniform lid construction

No welded components within the lid for easy maintenance and sterility.

Flexible working volume

15 L bioreactor with working volume up to 11 L.

Our 15 L autoclavable bioreactor is ideal for use within R&D and process development. The borosilicate glass vessel is mounted between a jacketed base and a non-welded lid.

The uniform lid features all the necessary ports and sensors that might be required for bioprocesses and features a convenient carrying handle. Featuring twelve ports comprising of five ports for sensor connections, three ports for bioreactor's liquid supply, two ports for gas sparger and gas output and two spare ports that can be user defined.

There is a sterilisable sampling port conveniently located in the base of the vessel to facilitate operational activities during a process.

The magnetically coupled drive which can reach up to 700 rpm ensures excellent sterility within the vessel throughout fermentation.

Froilabo

TECHCOMP GROUP

In addition to Froilabo, Techcomp Europe comprises of the following companies:

Dynamica · Edinburgh Sensors · Edinburgh Instruments · Isotopx · Precisa · Scion Instruments

Contact us

Froilabo
8 rue de Lamirault, 77090 Collégien, Paris, France
Tel: +33 478 047 575
froilabo.com

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