

EQUIPMENT DESCRIPTION:



Sterilizable in situ.

The basic equipment installed on bench.

Overall size of the fermenter installed on the workbench and cabinet with commanded controllers: 600x1200x1275 mm (width x length x height).

The **basic equipment** has the following features and endowments:

- total volume = 16 liters;
- volum work = 11 liters;
- inner diameter vessel = 200 mm;
- useful length = 400 mm;
- stainless steel 316L;
- inner surface finished to Ra 0,8 μm ;
- window, lighting longitudinal vessel through a port in the lid;
- the light is supplied from a 100W halogen lamp, the power lamp 24 V is equipped with emergency stop;
- Three port side diameter 25 mm and file G $\frac{3}{4}$;
- Operating temperature max. 150°C;
- Operating pressure max. 2,5 bar;
- EPDM seals

Cover: Stainless steel AISI 316L, with 12 ports sterile and resistant to pressure, diameter 19 mm, port with a hypodermic needle for inoculum and sterile manometer.

Bearing: mechanical shaft cuff and cup.

Driven: electric drive motor, drive down with belt drive 740W, 100-1400 rpm.

Agitation: shaft with 6 agitator blades adjustable in height, with the deflector.

Aeration: Pressure control valve, flow meter, closing valve, aeration filter (ceramic) in the housing of stainless steel, hypodermic needle and the aeration tube or ring cluster required air pressure 2-7 bar, flow of aeration 2 m³/h. It included oil-free compressor for air pressure above.

The circuit of temperature for sterilization and cultivation is provided by an electric resistance heating unit of 4.5 kW, circulation pump, piping, all necessary valves, filters, to be connected to the water supply. The necessary pressure for the water source 4 bar.

The supply voltage for all electrical circuits 3x400/230V, 50Hz.

Temperature control is done using a sterilizable probes, the temperature measured 0-150°C. Contains temperature controller with temperature set two points for cultivation and sterilization.

Stirrer speed control is provided by an AC motor with frequency converter and speed controller. Stirrer speed range: 0...1400 rpm. Accuracy: +/- 2% of the nominal speed of stirring. Display graph with speed stirring local function of time.

pH control is achieved by means of a pH electrode gel sterilized in the fermenter connection cable with pH controller. Integrated PID controller for activating the peristaltic metering pump acid and base to maintain the pH value within the limits set by the user. pH controller displays pH, pH variation chart during fermentation and consumption base and acid. The measuring range 0.00 ... 14.00 pH.

pO2 control is achieved through a pO2 amperometric probe, sterilizable in situ, connection cable with controller pO2. pO2 controller to activate the final elements. Allows a cascade control with an additional unit IFM (agitation, pressure, flow of gas). Controller displays the pO2 pO2, chart pO2 variation in fermentation, monitoring consumption.

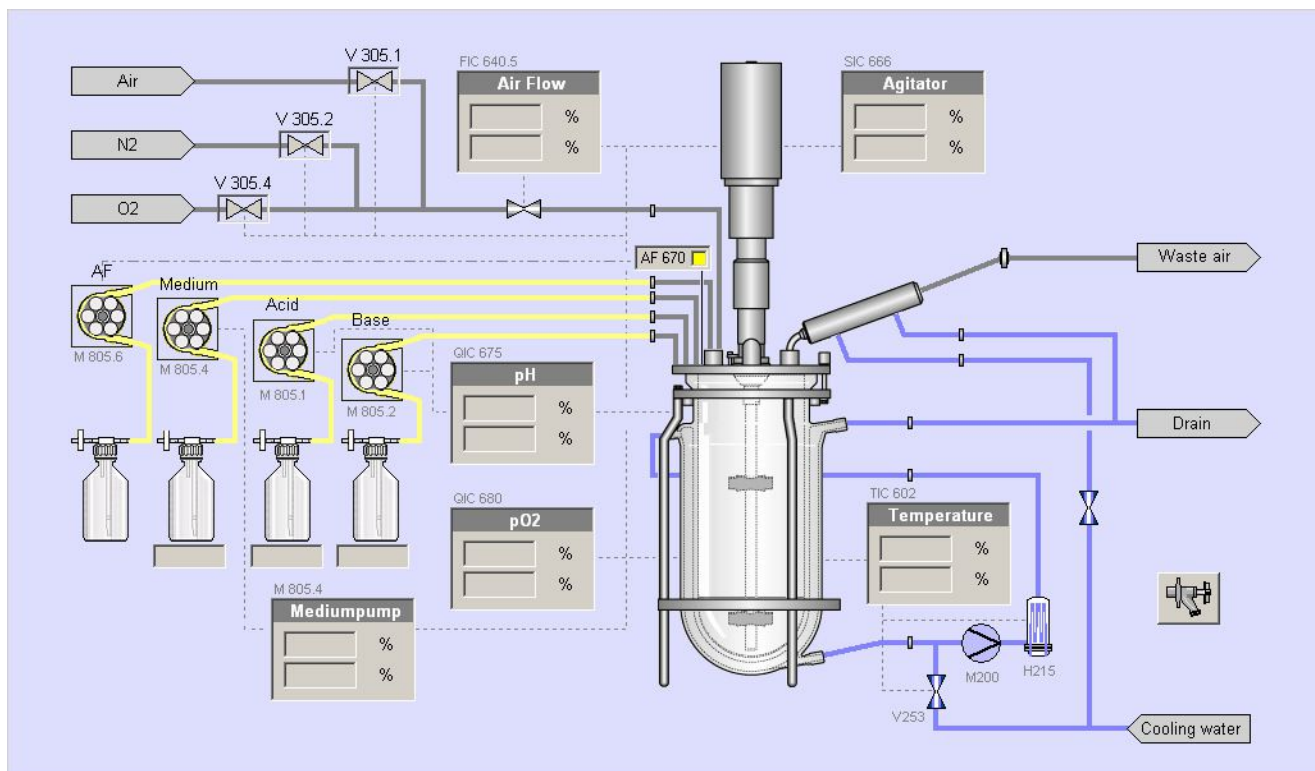
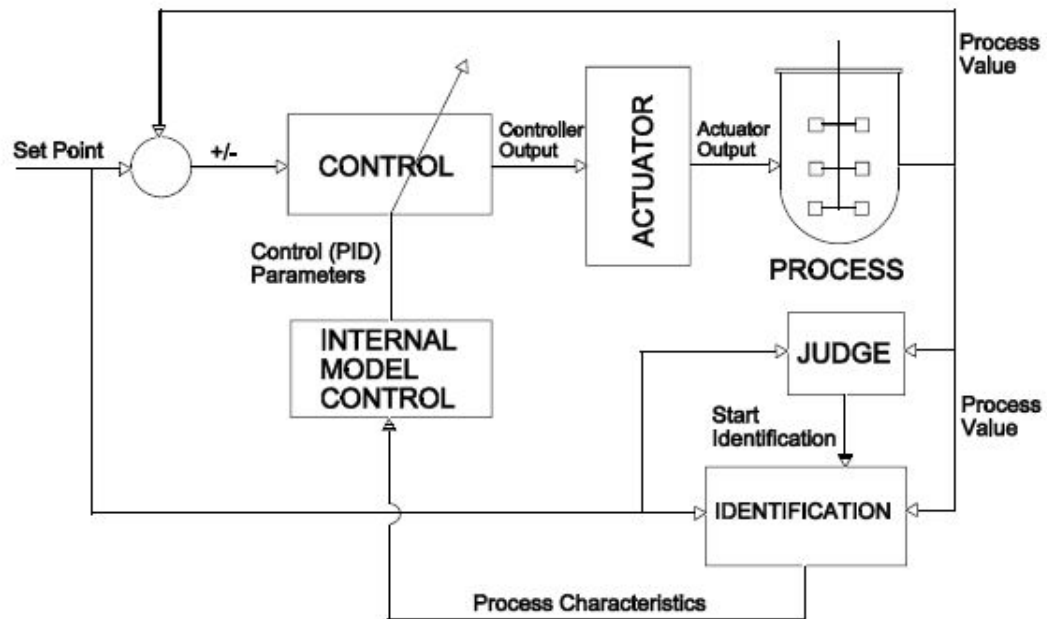
Turbidity control includes turbidimeter monitoring of increase in biomass expressed in dry matter up to 30g/l, sterilizable, cable connection and transmission of turbidity. Turbiditate indicator consists of: transmitter, sensor, sensor support housing, instrument calibration laboratory turbidity. Turbidity sensor works in the range of 5 ... 4000 FTU, from 0 to 30 g / l of dry matter.

Antifoam control consists of probe a height-adjustable sterilizable in situ, cable connection and antifoam controller to activate antifoam chemicals dosing.

The bioreactor presents a mixing station for 4 gas: O2, N2, CO2, air. Each line consists of a pressure control valve, flow meter and valve closure. The lines are combined into one line connected to the input of air in the bioreactor.

Software process control allows viewing of the system according to user requirements, display graphics process calibration digital measurement, display of all process parameters and setpoint, command and control pH, CO2, O2, temperature, stirring speed, recording real-time data in Microsoft Excel file format.

PROCESS PRINCIPLES:



Few implemented projects:

- license works and dissertation students
- doctoral and postdoctoral work
- research in projects (Zeelandia)
- Cultures of microorganisms have been made for the production of probiotics (*Lactobacillus* spp., *Corynebacterium* spp) and enzymes (xylanases with fungus and streptomyces)