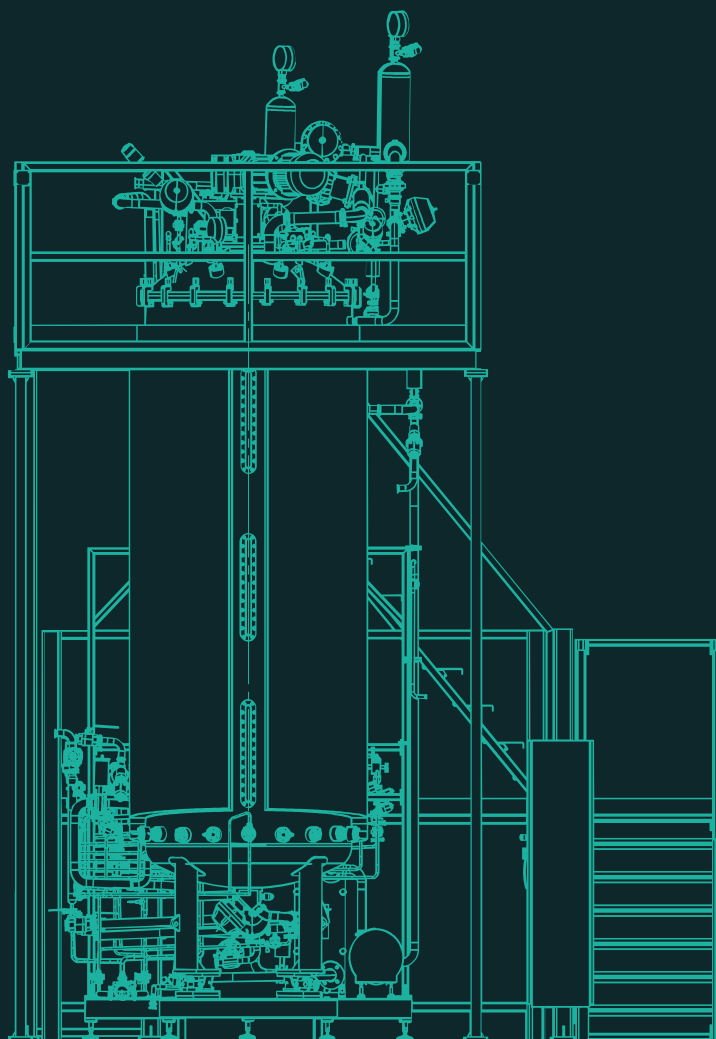


# eProd® bioreactor

Unlock the power of bioprocess  
production. Designed for  
maximum efficiency and results



# ePROD® Bioreactor

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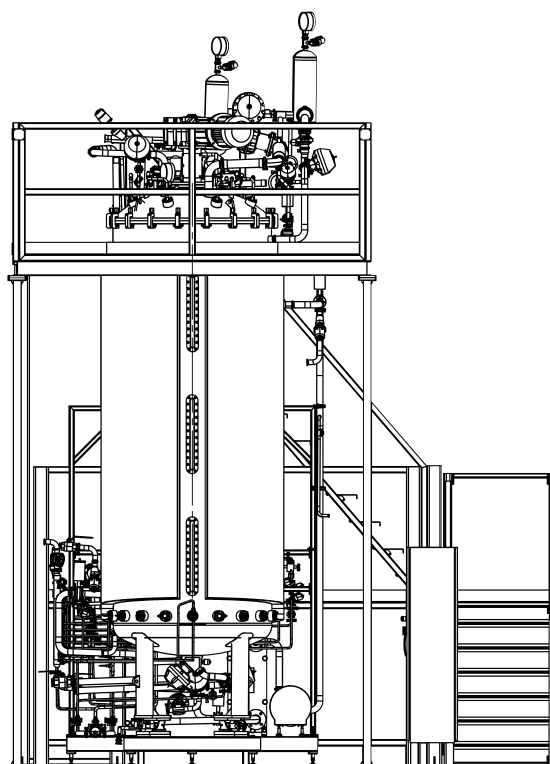
The ePROD® bioreactors are a versatile solution for your stirred tank bioreactor needs, engineered with a diameter-to-height ratio of 1:2 or 1:3 to provide optimal growth conditions for cell culture and microbial fermentation, leading to increased efficiency and better results. These stirred tank bioreactors have been designed for various applications, including as a stirred tank fermenter and as continuous stirred tank bioreactors.

These stirred tanks reactors are built with high-quality 316L stainless steel, designed to withstand the demands of the production process and available in working volumes ranging from 100 to 5.000 liters, or can be customized to meet specific needs. Such flexibility in the design makes these stirred bioreactors ideal for a wide range of stirred tank bioreactor applications and stirred tank bioreactor uses. With pH, pO<sub>2</sub>, temperature, and foam/level digital sensors included, ePROD® stirred bioreactors provide real-time monitoring and analysis of the bioprocess, helping you make informed decisions and improve production outcomes.

This feature is especially important in simple stirred tank bioreactor operations and in continuous stirred tank fermenter systems where maintaining optimal conditions is crucial. Additional optional digital sensors for redox, conductivity, total and viable cell density, biochemical parameters, and pCO<sub>2</sub> are also available, offering even more insight into your production process.

Invest in ePROD® stirred tank bioreactors for a reliable and efficient solution to your bioprocessing needs. The advanced capabilities of our stirred type bioreactor and sparged stirred tank bioreactor systems can significantly enhance your production efficiency.

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## Basic configuration - Microbial

<b>Control configuration</b>	
Temperature control	Included
DO control (advanced cascade controller)	Included
Stirrer speed control	Included
pH control via addition of acid or base	Included
Foam control	Included
Mass flow controller for air addition	Included
Mass flow controller for O <sub>2</sub> addition	Included
Advanced gas performance (total gas management)	Included
Automatic sequence for bioreactor sterilization	Included
Integrated peristaltic pumps	4x for acid, base, antifoam and media addition
Automatic pressure control	Included
eSCADA ADVANCED	Included
Recipes management (included in eSCADA Advanced)	Included
Advanced pO <sub>2</sub> control with addition pumps / N <sub>2</sub>	Optional
Advanced pH control with addition pumps / CO <sub>2</sub>	Optional
Reports	Included
21CFR Part 11 Compliant (included with Advanced)	Included
User's management	Included
<b>Heating system</b>	
Process temperature control	Recirculation loop with pump and double heat exchanger for cooling and heating
SIP with external steam	Included
Piping system with valves and steam traps for SIP	Included
Temperature measurement of condensate traps	Included
<b>Culture vessel</b>	
Jacketed	Included
Sight glass	Included
Asynchronous motor stirrer with frequency variator	Included
3x 6-blade rushton impeller	Included
Inlet gas line with filter housing including 0.2 µm cartridges	Included
Outlet gas line with filter housing including 0.2 µm cartridges	Included
Inlet gas through overlay or sparger	Included
Aeration through ring sparger	Included
Burst disk	Included
Sanitary safety valve	Included
4 baffles for mixing performance	Included
Exhaust condenser	Included
3x CIP balls	Included
5x addition ports	Included
1x transferring port	Included
Double position sampling valve for sterile sampling	Included
Sterilizable bottom valve for harvesting/transferring	Included
pH sensor with cable	Included
DO sensor with cable	Included
Foam sensor with cable	Included
Double temperature measurement	Included
Pressure measurement	Included

Weight measurement, 3 or 4 load cell	Included (depending on volume)
Double wall insulated	Included (depending on volume)
2nd transferring port	Optional
Off-gas analysis	Optional
External CIP unit	Optional
Biomass sensor (optical or permittivity)	Optional
ORP sensor	Optional
External pump for additional feeding	Optional
N <sub>2</sub> MFC	Optional
CO <sub>2</sub> MFC	Optional
Auxiliary vessels for storage solutions	Optional
Aseptic sampling device	Optional
External balance	Optional
Certificate 3.1	Optional
Electropolishing	Optional

## Basic configuration - Cellular

<b>Control configuration</b>	
Temperature control	Included
DO control (Advanced cascade controller)	Included
Stirrer speed control	Included
pH control via addition of acid or base	Included
Foam control	Included
Mass flow controller for air addition	Included
Mass flow controller for O <sub>2</sub> addition	Included
Mass flow controller for CO <sub>2</sub> addition	Included
Mass flow controller for N <sub>2</sub> addition	Included
Advanced gas performance (total gas management)	Included
Overlay / sparger parallel flow: air	Included
Automatic sequence for bioreactor sterilization	Included
Integrated peristaltic pumps	4x for acid, base, antifoam and media addition
Automatic pressure control	Included
eSCADA ADVANCED software	Included
TECNIC OPC server	Included
Recipes management	Included
Advanced pO <sub>2</sub> control with addition pumps / N <sub>2</sub>	Included
Advanced pH control with addition pumps / CO <sub>2</sub>	Included
2nd overlay / sparger simultaneous flow: other gas	Optional (with MFC)
Overlay / sparger alternate flow: other gas	Optional (with 3-way valves)
PAT	Optional
Reports	Included
21CFR Part 11 Compliant (included with Advanced)	Included
User's management	Included
<b>Heating system</b>	
Process temperature control	Recirculation loop with pump and double heat exchanger for cooling and heating

SIP with external steam	Included
Piping system with valves and steam traps for SIP	Included
Temperature measurement of condensate traps	Included
<b>Culture vessel</b>	
Jacketed	Included
Sight glass	Included
Asynchronous motor stirrer with frequency variator	Included
2x pitched-blade impeller	Included
Inlet gas line with filter housing including 0.2 µm cartridges	Included
Outlet gas line with filter housing including 0.2 µm cartridges	Included
Overlay gas line with filter housing including 0.2 µm cartridges	Included
Aeration through ring sparger	Included
MFC for overlay air	Included
Burst disk	Included
Sanitary safety valve	Included
Exhaust condenser	Included
3x CIP balls	Included
5x addition ports	Included
1x transferring port	Included
Double position sampling valve for sterile sampling	Included
Sterilizable bottom valve for harvesting/transferring	Included
pH sensor with cable	Included
DO sensor with cable	Included
Foam sensor with cable	Included
Double temperature measurement	Included
Pressure sensor	Included
Weight measurement, load cell	Included
Double wall insulated	Included (depending on volume)
Off-gass analysis	Optional
Microsparger	Optional
External CIP unit	Optional
Biomass sensor (permittivity)	Optional
DCO <sub>2</sub> sensor	Optional
MFC for overlay gas (other than air)	Optional
3-way valves for overlay gases (other than air)	Optional
External pump for additional feeding	Optional
Harvest port for continuous / perfusion operation	Optional
Perfusion TFF based system	Optional
Auxiliary vessels for storage solutions	Optional
Aseptic sampling device (4 bags)	Optional (SU solution)
External balance	Optional

## Technical specifications

<b>Dimensions information</b>						
Bioreactor volumes (other volumes on request)	100L	200L	400L	1000L	2000L	4000L
H:D ratio	Microbial 3:1 / Cellular 2:1					
Total volume	125L	250L	500L	1250L	2500L	5000L
Minimum working volume	15L	30L	60L	150L	300L	600L
Process stirrer speed (rpm) MB / CC	680   120	560   100	480   85	391   70	335   60	290   50
Motor type	Asynchronous					
Motor power (kW) MB / CC	0.75   0.19	1   0.25	2   0.55	4.75   1.3	9.5   2.5	19   5
Impeller type MB / CC	6-blade rushton turbine / 3-pitched blade					
Number of impellers MB / CC	3   2					
Impeller to culture vessel diameter	0.3					
Lower port connections	5 x hygienic connectin for process sensors 1 x hygienic connection for sampling Spare hygienic connection (number depending on vessel size)					
Impeller to culture vessel diameter	1x bottom valve					
Upper port connections	1x TC connection for Sparger 1x TC connection for Overlay					
Lid ports	5x HC for solutions addition 1x HC for water addition 1x HC for venting 1x HC for transferring 1x HC for pressure sensor 1x HC for pressure indicator 3x 1-1/2" TC connection for CIP balls 1x HC for foam sensor 1x HC for safety valve 1x stirrer connection					
Jacket	Circulation loop with deflectors					
Vessel design	0 - 3.5 barg @ 130°C					
Jacket design	0 - 3 barg @ 150°C					
Material (product contact)	Stainless steel AISI 316L   Borosilicate glass   EPDM (FDA approved)					
Material (not product contact)	Stainles steel AISI 304 minimum					
Surface finished (product contact)	Ra < 0.5 µm					
Advanced software	Compatible with Qubicon and Lucullus					

## Utility requirements

Process air	Max 6 barg, class 2, ISO 8573 (see flows in dedicated section)
O <sub>2</sub>	Max 6 barg, prefiltered (see flows in dedicated section)
CO <sub>2</sub>	Max 6 barg, prefiltered (see flows in dedicated section)
N <sub>2</sub>	Max 6 barg, prefiltered (see flows in dedicated section)
Utility steam	Max 3.0 barg (get in contact for design details)
Clean steam	Max 3.0 barg (get in contact for design details)
Cooling water	2.0-4.0 barg (get in contact for design details)
Tap water	3-4 barg (get in contact for design details)
CIP cleaning	0.5-2.5 barg   4.5-17 m <sup>3</sup> /h
Instrument air	6-8 barg, controlled
Power supply	3x phase, 1x neutral, 1x ground   400 VAC

## Control system

Culture vessel	100L	200L	400L	1000L	2000L	4000L
Number of MFCs	Up to 4 different gases					
Air aeration (NL/min) MC / CC	0-150 / 0-100	0-300 / 0-200	0-600 / 0-400	0-1250 / 0-1000	0-2000 / 0-2000	0-4000 / 0-4000
O <sub>2</sub> addition (NL/min) MC / CC	0-150 / 0-50	0-300 / 0-100	0-600 / 0-200	0-1250 / 0-500	0-2000 / 0-1000	0-4000 / 0-2000
N <sub>2</sub> addition (NL/min) MC / CC	0-150 / 0-50	0-300 / 0-100	0-600 / 0-200	0-1250 / 0-500	0-2000 / 0-1000	0-4000 / 0-2000
CO <sub>2</sub> addition (NL/min) MC / CC	0-50 / 0-50	0-100 / 0-100	0-200 / 0-200	0-500 / 0-500	0-1000 / 0-1000	0-2000 / 0-2000
Mass flow controller	Factory calibration					
Flow range	From +- 2% of maximum value up to (see previous values)					
Accuracy	± (1% MV +0.5% FS)					
Maximum working pressure	6 barg					
Interfaces	Sterile gas filtration with filter cartridges (0.2 µm)					

## Pumps

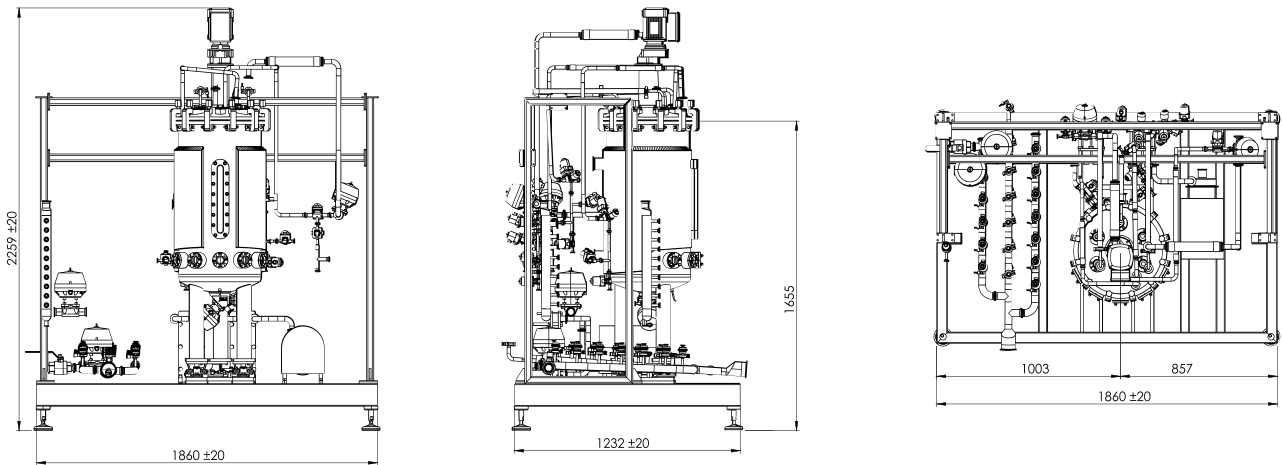
Pumps	100L and 400L	1000L, 2000L and 4000L
Pumps type	2x Integrated variable speed pumps 2x integrated fix speed pumps	
Pump head	For 1.6 mm wall thickness tubing Bore: ID 0.5-8 mm	For 2.4 mm wall thickness tubing Bore: ID 0.5-9.6 mm
Speed	Variable speed: 190 rpm Fix speed: 90 rpm	Variable speed: 220 rpm Fix speed: 230 rpm
Flow rate variable speed (ml/min)	ID 0.5 mm - 6.5 ml/min ID 0.8 mm - 14 ml/min ID 1.6 mm - 52 ml/min ID 3.2 mm - 190 ml/min ID 4.8 mm - 420 ml/min ID 6.4 mm - 685 ml/min ID 8.0 mm - 950 ml/min	ID 0.5 mm - 9.5 ml/min ID 0.8 mm - 24 ml/min ID 1.6 mm - 97 ml/min ID 3.2 mm - 390 ml/min ID 4.8 mm - 870 ml/min ID 6.4 mm - 1500 ml/min ID 8.0 mm - 2400 ml/min ID 9.6 mm - 3500 ml/min
Flow rate fix speed (ml/min)	ID 0.5 mm - 3 ml/min ID 0.8 mm - 6.4 ml/min ID 1.6 mm - 24 ml/min ID 3.2 mm - 90 ml/min ID 4.8 mm - 198 ml/min ID 6.4 mm - 325 ml/min ID 8.0 mm - 450 ml/min	ID 0.5 mm - 9.4 ml/min ID 0.8 mm - 24 ml/min ID 1.6 mm - 96 ml/min ID 3.2 mm - 390 ml/min ID 4.8 mm - 870 ml/min ID 6.4 mm - 1570 ml/min ID 8.0 mm - 2400 ml/min ID 9.6 mm - 3450 ml/min

## Sensors

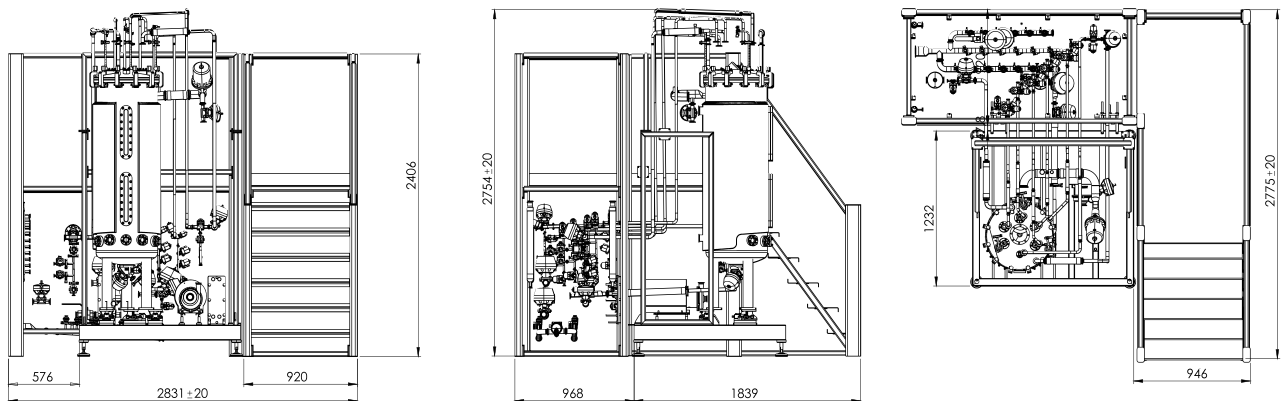
Control configuration	
pH	Biocompatible (FDA) electrolyte filled   0 -14 pH
Dissolved O <sub>2</sub>	Optical DO sensor   0-300%-sat
pCO <sub>2</sub>	Solid-state NDIR measurement   0.5-100% vol   0-1000 mbar   7.5-1500 ppm
Total cell density	Abs. 860 nm   0-200 g/l CDW yeast   0-30000 NTU
Viable cell density	Permittivity measurement   0-700 pF/cm equivalent to 5·10 <sup>5</sup> to 8·10 <sup>9</sup> cells/ml (mammalian)
ORP (redox)	ORP potential measured against reference   -1500 mV to +1500 mV

Foam / level sensor	Conductive probe - sensitivity regulation, stainless steel ceramic isolated
Temperature sensors	Pt100   0-150°C
Pressure sensor	Ceramic measurement cell   -1; 5 barg
Off-gas analyzer	Microbial: O <sub>2</sub> : 0.1-25% CO <sub>2</sub> : 0-25% Cellular: O <sub>2</sub> : 0-100% CO <sub>2</sub> : 0-25% Accuracy < +0.2% FS* +/- 3% value

### 100L CC (measurements in mm)

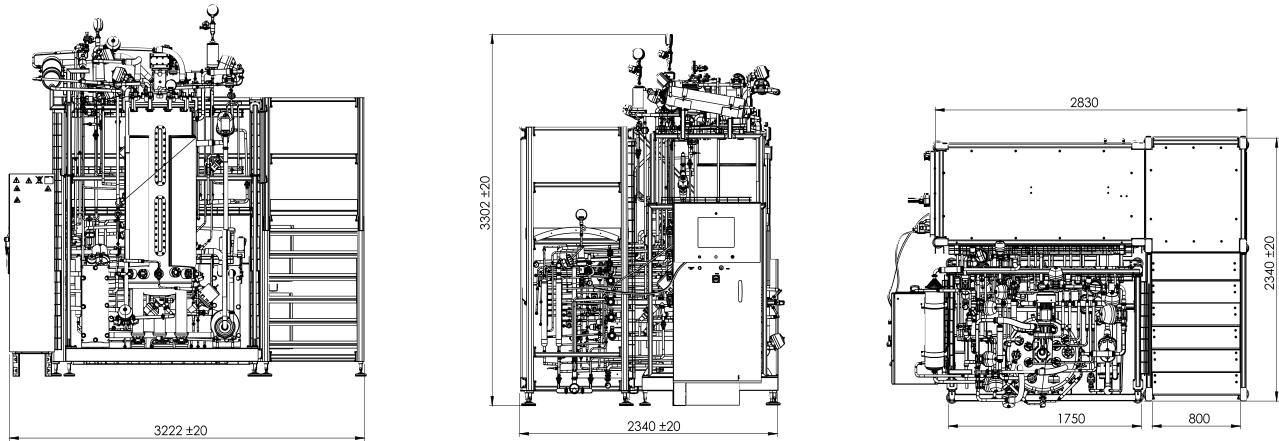


### 200L MB (measurements in mm)

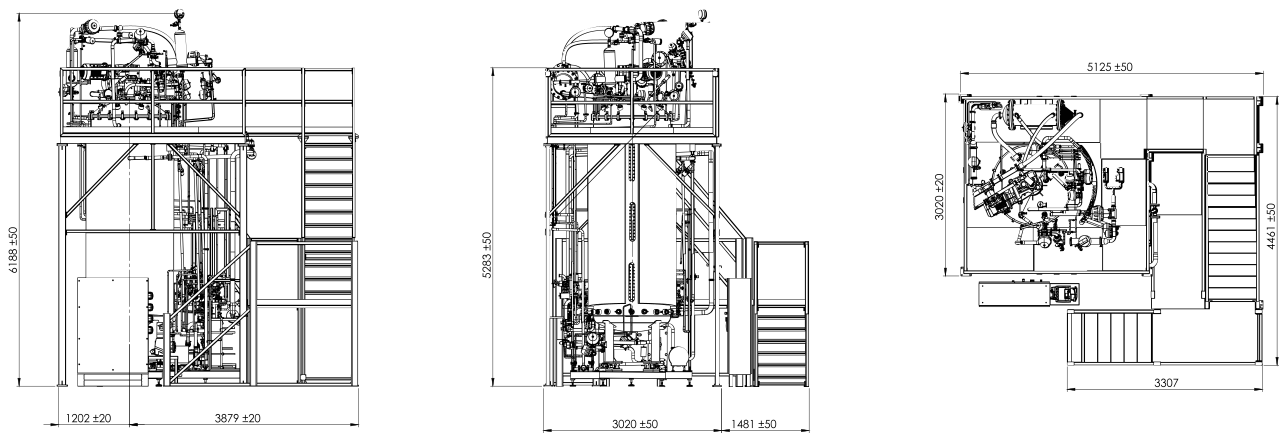




### 400L MB (measurements in mm)



### 4000L MB (measurements in mm)



## Partnerships

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## Regulation

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Do you need more information?  
We are here to help you

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