INFORS HT
We bring life to your laboratory

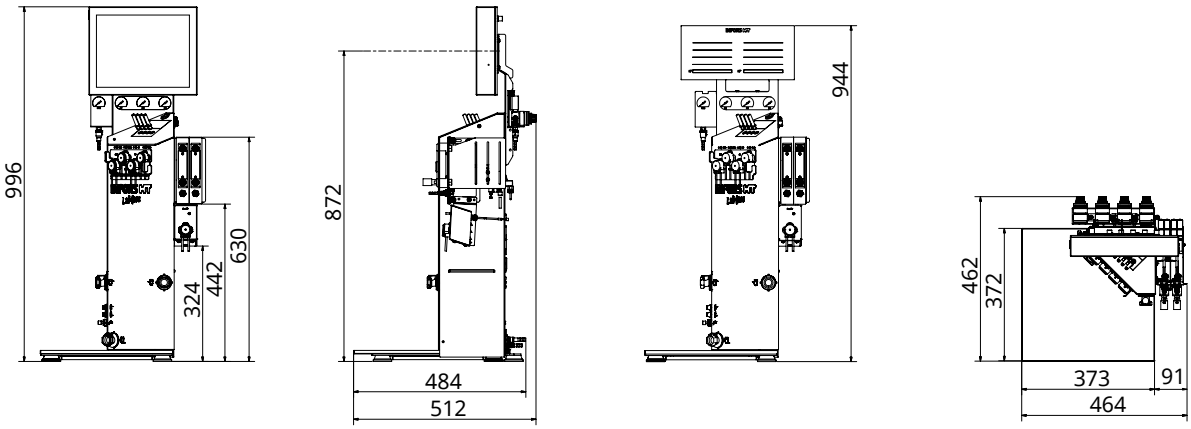
Labfors 5

Version for Solid Substrates and Enzymatic Bioprocesses

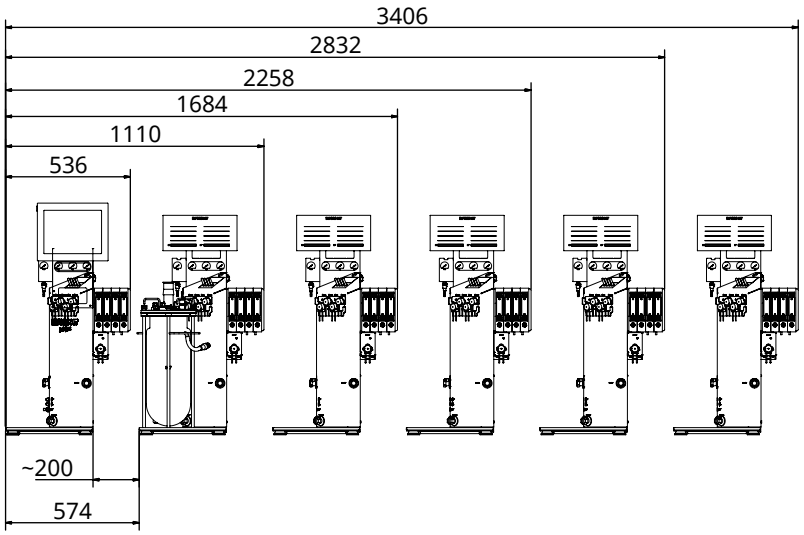
The Labfors 5 comes in two different versions which cover a wide range of microbial applications through to bioprocesses containing solids. Each version of Labfors 5 can be configured to your needs. The present data sheet contains all relevant data on the version for solid substrates and enzymatic bioprocesses.

Dimensions and Weights

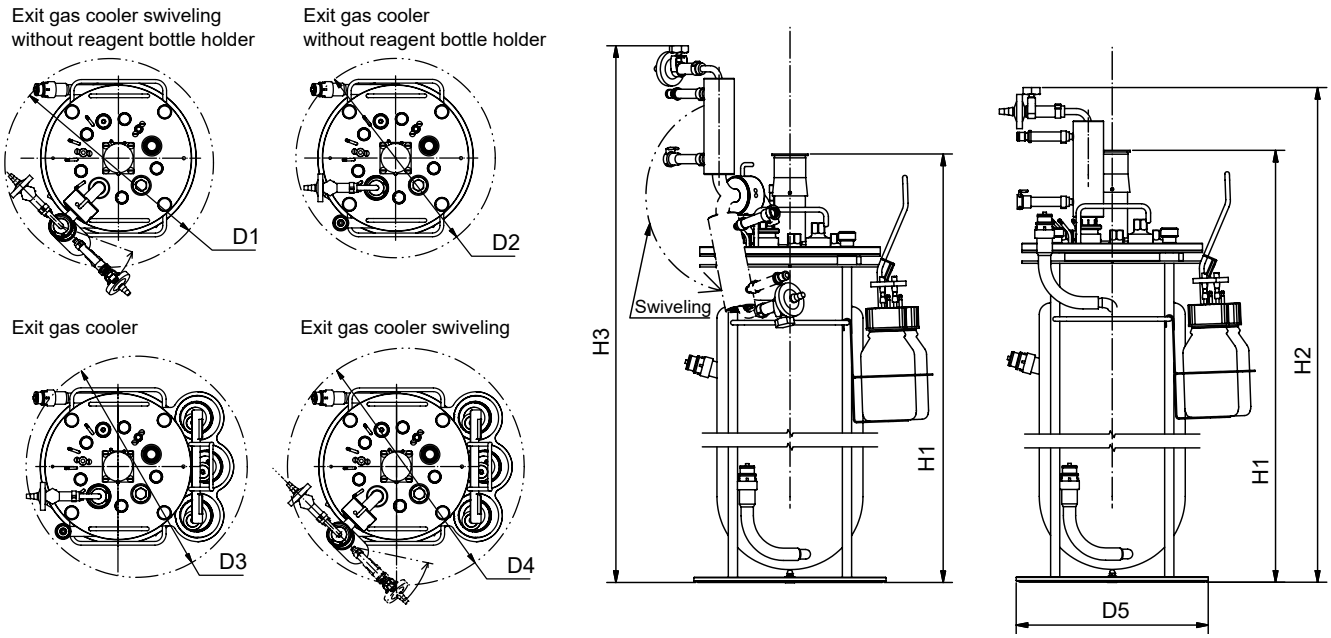
Dimensions Single Unit



Dimensions Master Unit with 2 Satellite Units



Dimensions of Culture Vessels



D1	335 mm	H1	405 mm
D2	320 mm	H2	487 mm
D3	355 mm	H3	546 mm
D4	380 mm		
D5	250 mm		

Weight	
Touch screen operating panel	5 kg
Basic unit	25 kg

Culture Vessel

General	
Form	Cylindrical with flat bottom
Model	Double walled
Material glass vessel	Borosilicate glass
Material top plate and built-in-parts	AISI 316L, electropolished
Material O-rings (in contact with product)	EPDM

Ports in top plate		
Diameter	Thread	Quantity
10 mm	None	2
12 mm	Pg13.5	3
19 mm	None	4
40 mm	None	1

Vessel size	
Total volume	3.6 L
Max. working volume	2.5 L
Min. working volume	1.0 L
Nominal diameter (DN, inner diameter vessel)	150 mm
Height	220 mm
Weight [1]	15 kg

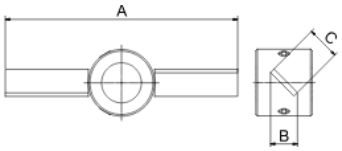
[1] *empty weight culture vessels in delivery state (equipped with default built-in-parts)*

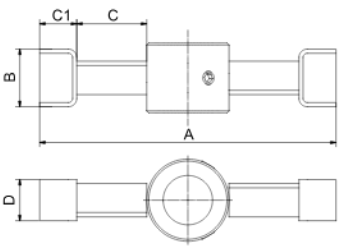
Stirrer

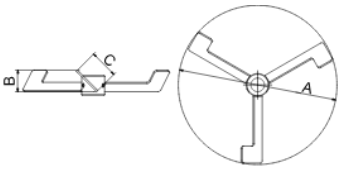
General	
Drive	Shaft with mechanical seal
Direction of rotation of stirrer shaft	Counter-clockwise (top view)
Bearing	Outside vessel, in drive hub
Motor type	DC, brushless with gearbox
Nominal power of motor	140 W
Nominal torque of motor	2.8 Nm
Transmission ratio	3:1
Nominal system torque [1]	3 Nm
Min. rotation speed	10 min^{-1}
Max. rotation speed [1]	1000 min^{-1}
Accuracy measurement	± 5 min^{-1}
Accuracy control	≤ ± 5 min^{-1}

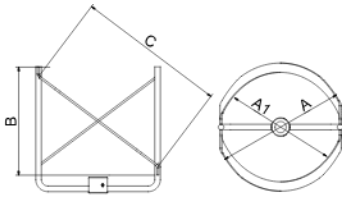
[1] *valid for liquid and homogen medium, viscosity ≤ glycerine at 37 °C*

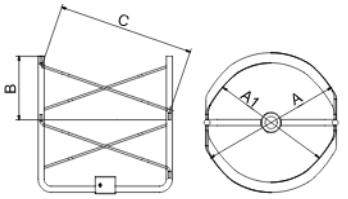
Impellers	
Material	AISI 316L, electropolished
Quantity	1 of each type

Dimensions angle-bladed impeller		
	A	70 mm
	B	8 mm
	C	10 mm

Dimensions fork impeller		
	A	72 mm
	B	14 mm
	C	17 mm
	C1	9 mm
	D	10 mm

Dimensions anchor impeller		
	A	140 mm
	B	19 mm
	C	25 mm

Dimensions single helix impeller		
	A	140 mm
	A1	118 mm
	B	117 mm
	C	161 mm

Dimensions double helix impeller		
	A	140 mm
	A1	118 mm
	B	63 mm
	C	136 mm

Temperature Control System

Heating		Water circulation in jacket, pump and heating 500 W integrated in basic unit
Cooling		With tap water via water circuit into vessel jacket Option: with chiller
Sensor		Pt100 1/3 DIN-B
Measurement range		0 °C to 145 °C
Control range		From 5 °C above inlet temperature to 70 °C
Accuracy measurement and control	at ≤ 60 °C	± 0.3 °C
	at > 60 °C	± 0.5 °C

Gassing System

General specifications	
Gas entry	Sparger or head space
Specific gassing rate [1]	2 min^{-1}
Gas(ses)	Air, N_2

[1] *Calculated for the max. working volume of the vessel.*

Gassing with rotameter	
Gas flow control	Rotameters, one per gas
Accuracy rotameter	± 5 %
Measurement range Air and N_2	0.3 L min^{-1} to 4.7 L min^{-1}

Gassing with mass flow controller (MFC)	
Gas flow control	MFCs, one per gas
Accuracy measurement	± 1.5 % FS
Accuracy control	≤ ± 1.5 % FS
Measurement range Air and N_2	0.05 L min^{-1} to 5 L min^{-1}

pH Control

General	
Control	Peristaltic pumps *Acid* and *Base*
Control range	pH 2 to 12
Accuracy measurement	pH ± 0.1

Measurement system HAMILTON (digital)	
Sensor type	Easyferm Plus ARC
Measurement range	pH 0 to 14

Measurement system METTLER (digital)	
Sensor type	InPro 3253i, ISM
Measurement range	pH 0 to 12

Measurement system METTLER (analogue)	
Sensor type	405-DPAS-SC-K8S/120
Measurement range	pH 2 to 12

Antifoam Control

Sensor	Conductive with dosing needle
Control	Peristaltic pump *Antifoam*
Display	0 % (no foam) / 100 % (foam)

pO_2 Control

General	
Control via cascade	Stirrer, gas flow, gas mixture (addition of O_2)
Control range	0 %-sat. to 100 %-sat.
Accuracy measurement	± 1 %

Measurement system HAMILTON (digital)	
Sensor type	Visiferm DO ARC / RS485-ECS
Measurement range	0 %-sat. to 300 %-sat.

Measurement system METTLER (digital)	
Sensor type	InPro6860i, ISM
Allowed temperature range	0 °C to 60 °C
Measurement range	0 %-sat. to 285 %-sat.

Measurement system METTLER (analogue)	
Sensor type	InPro 6820/25/080
Measurement range	0 %-sat. to 150 %-sat.

Pumps

Integrated pumps		
Type		Peristaltic
Quantity	Digital	3 (Acid, Base, Antifoam)
	Analogue	Standard: 1 (Feed) Option: 2 additionally (Feed 2 and Feed 3)
Rotation speed	Digital	74 min^{-1} / fixed rotation speed
	Analogue	0 min^{-1} to 74 min^{-1} / adjustable within range of 0 % to 100 % (increment 0.1 %)
Accuracy		± 1 % FS

External pump(s) (option)	
Type	Watson Marlow 120U/DV, peristaltic
Rotation speed	Adjustable within range of 0 % to 100 %

Hoses	Standard	Option 1	Option 2
Inside diameter	1.0 mm	0.5 mm	2.5 mm
Wall thickness	1.1 mm	1.15 mm	1.0 mm
Delivery rate min., mL min^{-1}	0.0034	0.0012	0.017
Delivery rate max., mL min^{-1}	3.52	1.12	16.13
Material	PharMed BPT		

Operating Panel

HMI	12" colour touch screen
Protection	IP 66

Permissive Measurement (Optional)

Sensor type	ABER Futura
Measurement range permittivity	0 pF cm^{-1} to 400 pF cm^{-1}
Measurement range conductivity	0 mS cm^{-1} to 40 mS cm^{-1}

Exit Gas Analysis (Optional)

		CO_2	O_2
Ranges, Vol. %	BlueInOne Ferm	0 to 10	1 to 50
		0 to 25	1 to 50
	BlueInOne Cell	0 to 10	0 to 100
	BlueVary (cartridge ZrO_2)	0 to 10	0.1 to 50
		0 to 25	0.1 to 50
	BlueVary (cartridge eC)	0 to 10	0 to 100
		0 to 25	0 to 100
		0 to 25	0 to 25

Sensor accuracy	BlueInOne Ferm, BlueInOne Cell	< ± 0.2 % FS, ± 3 % of value
	BlueVary CO_2	± 3 % of value, ± 0.2 % of range; ± 5 % of value, ± 0.5 % of range for 50 % range
	BlueVary O_2 (eC and ZrO_2)	± 3 % of value, ± 0.2 % of range
Sensor drift	BlueInOne Ferm, BlueInOne Cell	< ± 2 % value / year
	BlueVary	0.2 % value / month

Conductivity Measurement (Optional)

Sensor type	Conducell 4USF ARC with built-in electronics
Measurement range	1 µS cm^{-1} to 300000 µS cm^{-1}
Accuracy	± 3 % at 1 µS cm^{-1} to 100000 µS cm^{-1} ± 5 % at 100 µS cm^{-1} to 300000 µS cm^{-1}

Pressure Control (Optional)

Sensor	Piezo-resistive pressure sensor
Control	Solenoid valve
Control range	0 mbar to 400 mbar

Balances (Option)

A: Mettler MA6002
B: Mettler MA32001L
C: Kern FKB 6K0.02-B
D: Kern DS 30K0.1-A

	A	B	C	D
Max. capacity, kg	6.2	32.2	6	30
Readability, g	0.1	0.1	0.02	0.1
Power supply	100 to 240 V, 50/60 Hz, 0.3 A			

Note: In order to use one of the supported balances, the balance must be prepared and configured by INFORS HT.

Operating Conditions

Ambient temperature	5 °C to 40 °C
Ambient humidity	20 % to 90 %
Altitude operating location	max. 2000 m.a.s.l
Pollution degree as per EN 61010-1	2
Minimum distance	150 mm

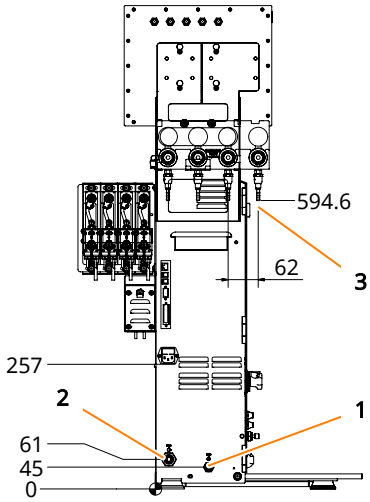
Interfaces

25 pin Dsub Multi I/O	analog	4 x IN (0/4 mA to 20 mA) 6 x OUT (0/4 mA to 20 mA)
	digital	2 x OUT
9-pin D-SUB, RS232		Balance input
USB 2.0		Backups/service purposes
Ethernet, RJ45		To integrate the device into a network

Electrical Connection and Power Values

	Type 230 V	Type 115 V
Mains voltage	230 VAC	115 VAC
Mains frequency	50 / 60 Hz	60 Hz
Max. current consumption	4 A	8 A
Fuse (two 5 x 20 mm fuses, time lag)	4 A	8 A

Connections/Utilities



Pos.	Connection	Size	Pressure	Requirements
1	Water inlet	Hose nozzle 8.3 mm	2 bar ± 1 bar	■ Inlet temperature: 10 °C to 20 °C ■ Max. flow cooling vessel and exit gas cooler: 1.6 L min^{-1} ■ Water quality: $CaCO_3$ concentration 0 mmol L^{-1} to 1.5 mmol L^{-1} ■ The heating system has a protection against dry running, which is based on measurement of conductivity. The heating will not work when using demineralised or distilled water as cooling agent.
2	Water outlet	Hose nozzle 10 mm	No back pressure	■ Designed to withstand water temperatures of up to 80 °C
3	Gas inlets	Hose nozzle 7 mm	2 bar ± 0.5 bar	■ Dry, clean and free of oil and dust ■ Compressed air: Class 1,2,3,4 as per DIN ISO 8573-1
	Exit Gas	Hose nozzle 8 mm	No back pressure	

eve®

eve® is a platform software for planning, execution and analysis of bioprocesses. eve® allows you to record bioprocess data and store it in a central database. The software offers workflows from simple bioprocesses to the planning and execution of complex strategies with various phases.

eve® makes it possible to generate and store bioprocess knowledge. Various libraries for storing information on organisms and culture media are available. Thanks to soft-sensors, additional knowledge can be generated.

In addition to INFORS HT products, biotech machines and analysis devices from third-part manufacturers can be connected. This makes it possible to holistically control, monitor and analyse bioprocesses using a single software.

eve® is installed on a centralised server. Access takes place via a browser, no client side installation is required. Bioprocess data is therefore available directly via the browser and independent of the operating system.

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