INFORS HT
We bring life to your laboratory

Minifors 2

The Minifors 2 is a compact and easy-to-use bioreactor with a full range of application possibilities. It is a complete package that enables both, beginners and experienced users to easily perform applications. The Minifors 2 is available in two versions, one dedicated for microorganisms (M) and one dedicated for cell cultures (C).
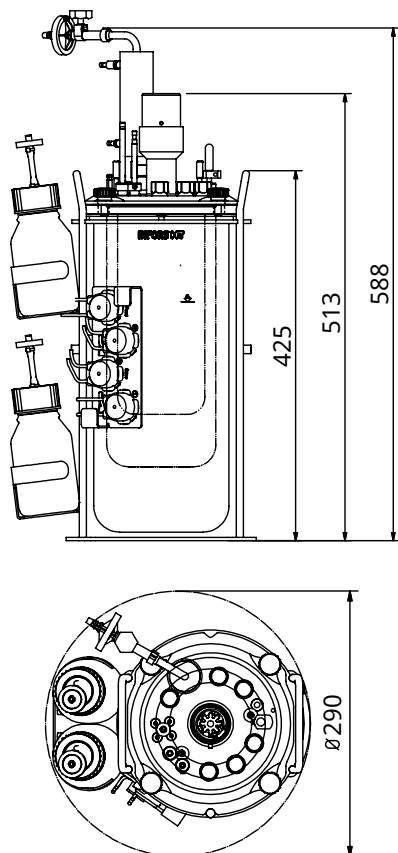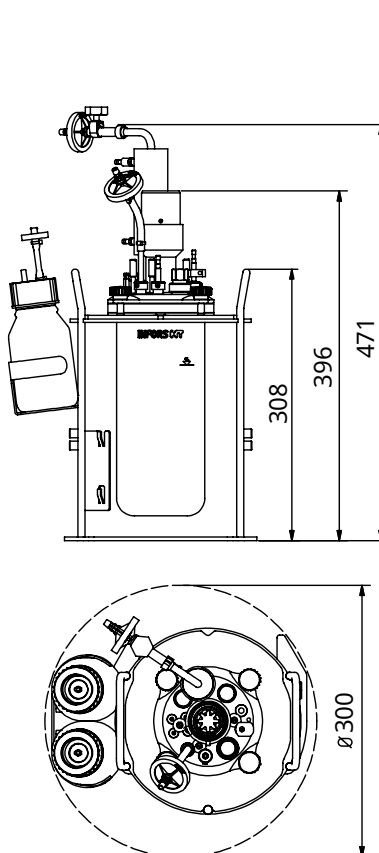
Dimensions and Weight Basic Unit
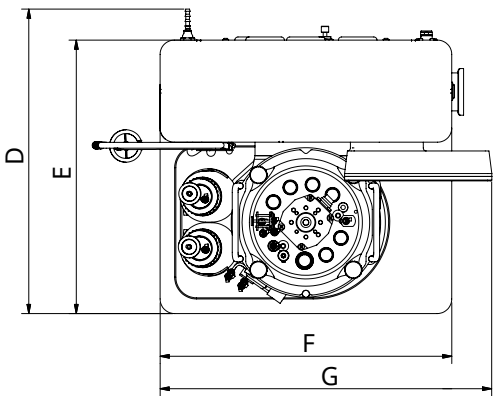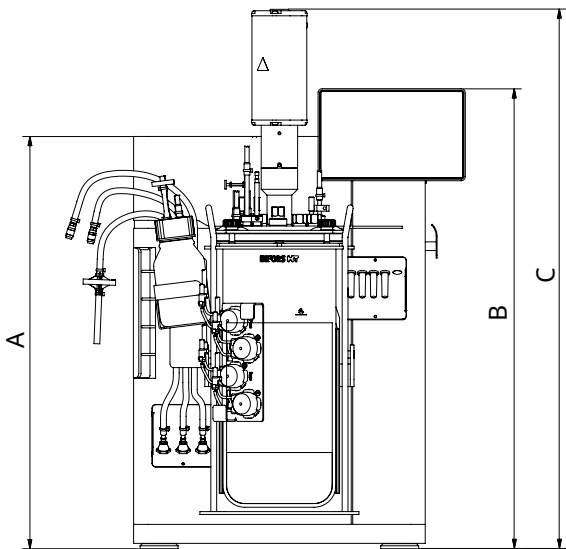
Dimensions			Microorganisms (M)	Cell cultures (C)
A		Height basic unit without operating panel	565 mm	565 mm
B		Height basic unit incl. operating panel	631 mm	631 mm
C		Height incl. motor, vessels DN 115 and DN 145	740 mm	815 mm
		Height incl. motor, vessels DN 90	770 mm	815 mm
D		Depth basic unit including hose nipples	415 mm	415 mm
E		Depth basic unit without hose nipples	375 mm	375 mm
F		Width basic unit without operating panel	400 mm	400 mm
G		Width basic unit incl. operating panel	455 mm	455 mm

Weight	
Basic unit (without vessel)	23.5 kg ± 0.5 kg

Device release: 2.1
Publication: D032, 4, en_GB / 01.04.2025 – May be subject to technical changes.
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Culture Vessel
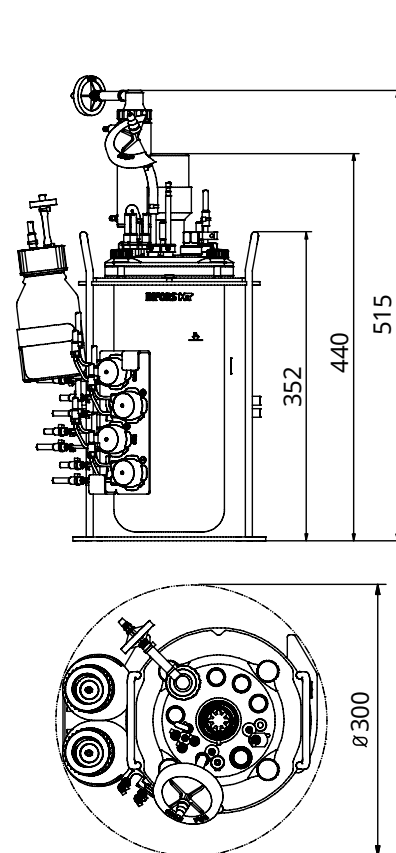
Standard vessel holder (all vessel sizes)   Compact vessel holder (vessel DN90)   Compact vessel holder (vessel DN115)

General	
Operating pressure in culture vessel	Pressureless
Form	Cylindrical with flat bottom
Material glass vessel	Borosilicate glass
Material top plate and built-in parts	AISI 316L, electropolished [1]
Material O-rings (in contact with product)	EPDM

[1] Exception: impellers in culture vessel 1.5 L / DN 90 for microorganisms are made of PEEK.

Vessel sizes			
Total volume	1.5 L	3.0 L	6.0 L
Max. working volume	1.0 L	2.0 L	4.0 L
Min. working volume version M	0.3 L	0.6 L	1.1 L
Min. working volume version C	0.3 L	0.7 L	1.5 L
Nominal diameter (DN, inner diameter vessel)	90 mm	115 mm	145 mm
Height	235 mm	295 mm	370 mm
Weight, kg [1]	6 ± 0.5	7 ± 0.5	9 ± 0.5
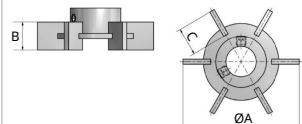
[1] Equipped culture vessel, without medium, with standard vessel holder. The actual weight depends on design and allocation.

Ports in top plate		Quantity acc. to vessel DN		
Diameter	Thread	DN 90	DN 115	DN 145
7.5 mm	None	4	4	4
10 mm	None	4	4	4
12 mm	Pg13.5	4	6	7

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Stirrer

General	M	C
Drive	Shaft with mechanical seal	
Direction of rotation of stirrer shaft	Counter-clockwise (top view)	
Bearing	Outside vessel, in drive hub	
Motore type	DC, brushless	
Nominal power of motor — DN 90	102 W	74 W
DN 115	260 W	74 W
DN 145	260 W	74 W
Min. rotation speed	150 min^{-1}	24 min^{-1}
Max. rotation speed	1600 min^{-1}	600 min^{-1}
Accuracy measurement — at ≤ 500 min^{-1}	± 5 min^{-1}	---
at > 500 min^{-1}	1 % setpoint	---
Accuracy control	1 % Full Scale	---
Accuracy measurement and control — at ≤ 300 min^{-1}	---	± 2 min^{-1}
at > 300 min^{-1}	---	± 4 min^{-1}

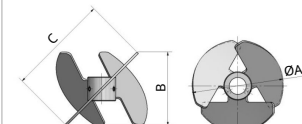| Impellers for microorganisms	
Type	Rushton impellers, 6 blades
Material impellers DN 145 and DN 115	AISI 316L, electropolished
Material impellers DN 90	PEEK
Quantity	2

Dimensions impellers for microorganisms		DN 90	DN 115	DN 145
	A	38 mm	46 mm	54 mm
	B	9 mm	11 mm	11 mm
	C	11 mm	11 mm	11 mm

Impellers for cell cultures	
Type	Pitched blade impeller with 3 blades, angled 45°
Material	AISI 316L, electropolished
Quantity	Standard: 1, option: 2
Flow direction blades	Standard: downwards, option: upwards

Dimensions impellers for cell cultures		DN 90	DN 115	DN 145
	A	50 mm	65 mm	85 mm
	B	30 mm	52 mm	65 mm
	C	40 mm	72 mm	90 mm

Temperature Control System

Heating	Electrical, thermal block 630 W
Cooling	Tap water [1] via thermal block and adapter
Sensor	Type: Pt100 1/3 DIN-B
Measurement range	0 °C to +145 °C
Control range	Min. flow temperature + 5 °C to 60 °C
Accuracy measurement [2]	± 0.1 °C
Accuracy control [2]	± 0.2 °C

[1] A circulating cooler can be used instead of tap water.

[2] +20 °C to +60 °C

Gassing System

General specifications	M	C
Gas entry	Sparger	Sparger or head space (air and/or CO_2 possible)
Specific gas flow rate [1]	8 L min^{-1}	2000 mL min^{-1}
Gas(ses)	Air, Air + O_2, Air + N_2	Air, O_2, N_2, CO_2
Flow control, mass flow controllers	2 pieces	5 pieces
Accuracy mass flow controllers	± 0.05 L min^{-1}	± 4 mL min^{-1}

[1] Calculated for the max. working volume for all vessel sizes.

Control ranges of gas flow	M	C
Vessel 1.5 L TV / DN 90	0.05 L min^{-1} to 2.0 L min^{-1}	1.5 mL min^{-1} to 150 mL min^{-1}
Vessel 3.0 LTV / DN 115	0.05 L min^{-1} to 4.0 L min^{-1}	3.0 mL min^{-1} to 300 mL min^{-1}
Vessel 6.0 LTV / DN 145	0.05 L min^{-1} to 8.0 L min^{-1}	6.0 mL min^{-1} to 600 mL min^{-1}

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pH Control

Control	
Control via cascade	Addition of acid and base via peristaltic pumps Version for cell cultures only: Addition of CO_2 instead of acid possible
Control range	pH 2 to 12

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

Measurement system METTLER	
Sensor type	InPro3253i
Measurement range	pH 0 to 12

pO$_2$ Control

Control	
Control via cascade	Stirrer, gas flow, gas mixture (addition of O_2 or N_2)
Control range	0 % to 150 % O_2 saturation

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

Measurement system METTLER	
Sensor type	InPro6860i, ISM
Measurement range	0 %-sat. to 285 %-sat.

Antifoam Control

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

Pumps

General		
Type		Peristaltic
Quantity		4 pieces
Control (operating modes)	Analogue	Continuous operation with variable speed
	Digital	OFF/ON operation with fixed speed

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 [1]	3.5 ml min^{-1}	1.1 ml min^{-1}	16.1 ml min^{-1}
Material	PharMed BPT		

[1] *Typical figure with water measured at max. rotation speed.*

Operating Panel

HMI	7" colour touch screen
Operating system	Embedded Linux
OPC server	OPC UA

Turbidity Measurement (Optional)

Variant ASD12-N	
Optical path lengths	OPL05 (higher cell densities) OPL10 (lower cell densities)
Measurement range absorption	0 CU to 4 CU

Variant CGQ BioR	
Measurement modes	Green (521 nm) (low cell densities), Infrared (940 nm) (high cell densites)
Measurement range	0 to 1000

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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
		0 to 25	0 to 100
	BlueVary (cartridge eC)	0 to 10	0 to 100
		0 to 25	0 to 100

Sensor accuracy	BlueInOne Ferm, BlueInOne Cell	$< \pm 0.2$ % 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	$< \pm 2$ % value / year
	BlueVary	0.2 % value / month

Redox Measurement (Optional)

Sensor type	Easyferm Plus ORP ARC
Measurement range	-1500 mV to +1500 mV

Balances (Option)

A: Mettler MA6002 *C: Kern FKB 6K0.02-B*
B: Mettler MA32001L *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

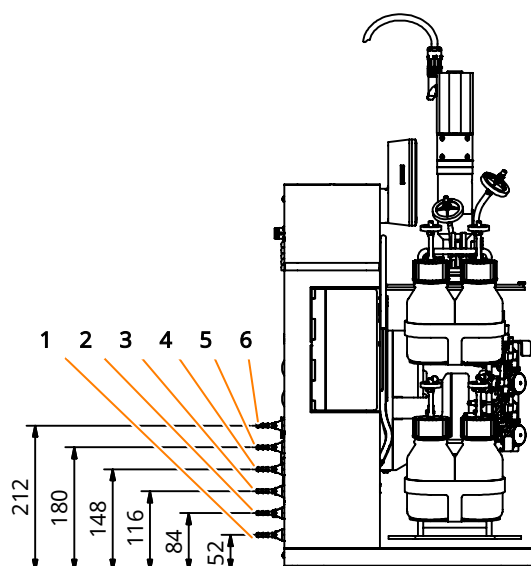|	
USB	USB 2.0 Type A Jack
Analog I/O	2x Input 4 mA to 20 mA 2x Output 4 mA to 20 mA
LAN	RJ45
Balance input	9-pin D-SUB, RS232
Service interface	9-pin D-SUB, RS232

Various

IP rating	IP22
Sound pressure	< 70 dB (A)

Electrical Connection and Power Values

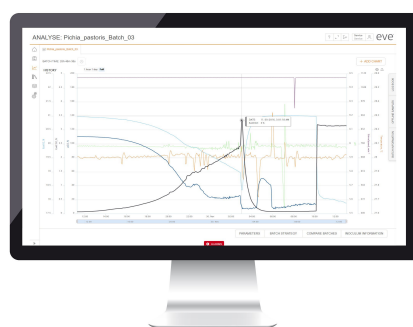|	
Mains voltage	120 / 230 VAC
Mains frequency	50 / 60 Hz
Max. power consumption [1]	~ 800 W
Max. current consumption	8 A
Fuse (two 5 x 20 mm fuses, time lag)	8 A

[1] *During heating phase, vessel with max. 4 L working volume, at max. rotation speed.*

Connections/Utilities

Pos.	Connection	Size	Pressure	Requirements
1	Water outlet	Hose nozzle 6 mm	No back pressure	
2	Water inlet	Hose nozzle 6 mm	2 bar ± 1 bar	▪ Water hardness very soft or soft ($CaCO_3$ concentration 0 mmol L^{-1} to 1.5 mmol L^{-1}) ▪ Min. flow temperature: 10 °C
3	Air In	Hose nozzle 6 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
4	O_2/Gas2 In			
5	N_2 In (C only)			
6	CO_2 In (C only)			

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.

Various packages of the software are available. This makes it possible to adapt it to the individual needs and requirements of its users. eve® (in the premium version) is also suitable for working in a validated environment as per FDA CFR 21 Part 11.