

# KLF – At a glance

## Bioengineering KLF essentials

### General

- In situ sterilizable small benchtop glass reactor - no need to move around for sterilization
- The standard bottom drive in the stainless steel bottom provides plenty of space on the lid for comfortable handling of numerous lid connections and allows easy lid removal for maintenance and cleaning
- Bottom drain valve available for easy and sterile sampling and harvest
- Wide variety of options available

### Bioengineering KLF for microbial culture (KLFM)

- Provides best in class oxygen transfer rates due to powerful agitator
- Several gas lines available
- Optional pressure control
- Full sterilization in place with stirred media enables fast sterilization of media with minimal negative impact to media components

### Bioengineering KLF for cell culture (KLFC)

- Gentle heating during cultivation by heating jacket
- Low shear force agitation system adapted for cell culture
- Rounded stainless steel bottom supports mixing even at low rotational speed
- Efficient and careful aeration system with several gas lines
- Individual drives for rotor filter (perfusion system) and agitator available

## Technical data

General	2.4 L	3.1 L	3.7 L
Ambient temperature		5-40 °C	
Relative humidity (non-condensing)		85%	
Operating temperature (cultivation)		Max. 80 °C	
Operating temperature (sterilization)		Max. 130 °C	
Operating pressure		Max. 1.5 barg   21 psig	
Net weight [kg   lbs], 1 unit	75   165.4	76   167.5	76   167.5
Gross weight [kg   lbs], 1 unit wrapped	98   216.1	99   218.3	99   218.5

### Utility requirements

Power supply	CEE 7/7, 1x 230 V, 50/60 Hz, 10 A fused   NEMA 5-12, 1x 110 V, 50/60 Hz, 16 A fused		
Max. power consumption (110 V)   (230 V) [W]	800   1400		
Cooling water supply: connection   flow   pressure	Hose nipples 6/1 mm   2-4 L/min   0.6-2 bar (8.7-29.0 psig)		
Cooling water return: connection   flow   pressure	Hose nipples 6/1 mm   2-4 L/min   pressureless		
Peak water consumption during cooling at 2 bar, with exhaust cooler	Max. 250 L/h		
Average water consumption during cultivation mode	Approx. 60 L/h		
Gas (dry, particle- and oil-free): connection   flow   pressure	Pneumatic plug connection 8/1 or 6/1 mm   5-500 L/h   2.5-10 barg (36.3-145.0 psig)		
Gas consumption	Depending on process parameters		

Vessel	2.4 L	3.1 L	3.7 L
Recommended working volume [L], max.	1.6	2.0	2.5
Recommended working volume [L], min. microbial	1.06	1.4	1.66
Recommended working volume [L], min. cell (with heating blanket)	0.4	0.52	0.61

### Process connections

12 mm lid ports	9	9	15
12 mm bottom ports	4	4	4
Bottom port for agitator	1	1	1

### Motor type

Motor torque [Nm]	0.8
Motor power [W]	250

### Agitator diameter, standard [mm]

Flat-blade disc agitator (2x)	40	48	48
Propeller agitator (1x)	48	66	66
Segment pitched blade agitator (1x)	48	66	66

Material glass vessel (product contacted)	Borosilicate
Material steel parts (product contacted)	316L
Steel parts surface roughness (product contacted)	Ra ≤ 0.8 μm
Material polymer (product contacted)	EPDM, PTFE, silicone

Temperature control	2.4 L	3.1 L	3.7 L
Temp. control range with cooling water (chilled) [°C]		4-125	
KLFM: electrical heater in vessel, bottom port [W]		800	
KLFC: heating blanket (cultivation)   heater in vessel (sterilisation) [W]	300   800	400   800	400   800
Heating-up time (full sterilization)	Approx. 2.4 min/°C		
Cooling-down time	Depending on cooling water temperature		

Requirements for external chiller

Cooling water supply: connection   pressure	Hose to nipples 6/1 mm   0.6-2 bar (8.7-29.0 psig)
Cooling water return: connection   pressure	Hose to nipples 6/1 mm   pressureless
Cooling capacity up to 3 units   6 units	400 W, 30 L water tank capacity   600 W, 50 L water tank capacity

Aeration	2.4 L	3.1 L	3.7 L
Rotameter Air for KLFM	0-250 Ln / h	0-250 Ln / h	0-500 Ln / h
Rotameter Air   O2   CO2 for KLFC	0-8   8   5 Ln / h	0-16   16   8 Ln / h	0-16   16   8 Ln / h
Flow meter Air for KLFM	0-250 Ln / h [±1.0%, 1:50]		0-500 Ln / h [±1.0%, 1:50]
Flow meter Air   O2   CO2 for KLFC	0-8   8 Ln / h [±1.0%, 1:50]	0-16   16 Ln / h [±1.0%, 1:50]	0-16   16 Ln / h [±1.0%, 1:50]
In- and outlet filter	Stainless steel housing. Cut off rate 99.999% for particles and drops of size 0.1		

Addition/Transfer	2 L	3.7 L	5 L
Peristaltic pumps			
Pump head		BioE/Oina	
Fix rpm   flow rate hose Di 2.0 mm   3.5 mm		130   35 mL/min   60 mL/min	
Variable rpm   flow rate hose Di 2.0 mm   3.5 mm		0-130   0-35 mL/min   0-60 mL/min	
Storage bottles, volume [mL]		250	

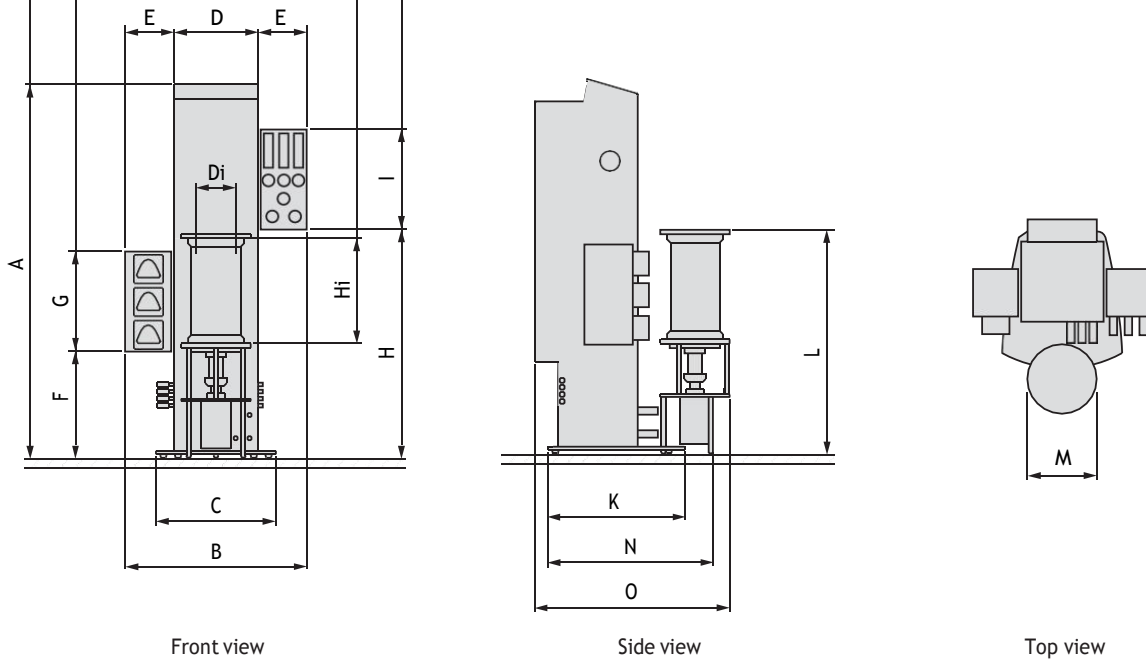
Control unit	2 L	3.7 L	5 L
Communication to Laptop		USB	
Temperature, Pt100 , bottom port		0-150 °C ± 0.1 °C	
Agitator speed controlled		60-2800 rpm ± 2 rpm	
pH, gel electrode		2-12 ± 0.05 pH	
pO2, amperometric		6 ppb to saturation ± [±6 + 6 ppb]	
Foam and level, conductive on / off		On/off, reaction time	
Free I/Os, RS232 in   4-20 mA in   4-20 mA out   24 V out		1   3   4   2	

Minimum requirements for external PC

Processor   RAM   HD   optical drive   ports   OS	PIII, 1.2 GHz   512 MB   20 GB   CD   USB 2.0   Windows 7
Screen	Min. 15"   color

Material control tower	Stainless steel AISI 304 + steel 37, varnished
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## Dimensions



Front view

Side view

Top view

A	B	C	D	E	F	G	H	I	K	L	M	N	O
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
1065	510	342	240	135	307	285	652	285	390	638	198	471	555

Di	Hi
[mm]	[mm]

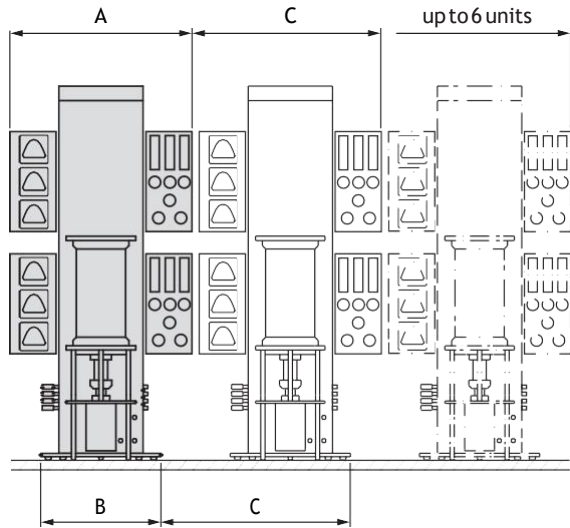
KLF 2.4 L	96	300
KLF 3.1 L	115	300
KLF 3.7 L	125	300

A	B	C	D	E	F	G	H	I	K	L	L	L	L
[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]
41.93	20.16	13.46	9.45	5.35	12.17	11.22	25.67	11.22	15.35	25.12	7.80	18.54	21.85

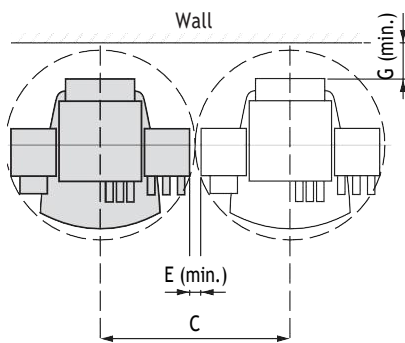
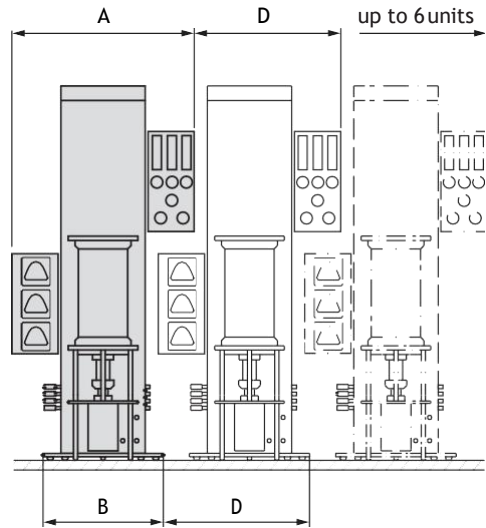
Di	Hi
[inch]	[inch]

KLF 2.4 L	3.78	11.81
KLF 3.1 L	4.53	11.81
KLF 3.7 L	4.92	11.81

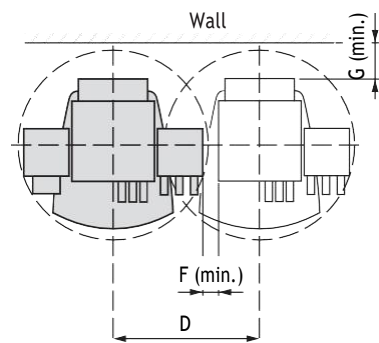
Installation type 1



Installation type 2



Top view (installation type 1)



Top view (installation type 2)

A [mm]	B [mm]	C [mm]	D [mm]	E* [mm]	F* [mm]	G* [mm]
512	342	550	426	35	50	130

A [inch]	B [inch]	C [inch]	D [inch]	E* [inch]	F* [inch]	G* [inch]
20.157	13.464	21.653	16.771	1.378	1.968	5.118

\* Minimum dimension for maintenance