

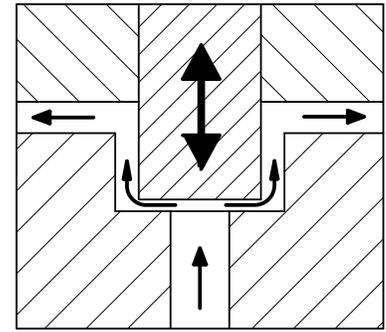
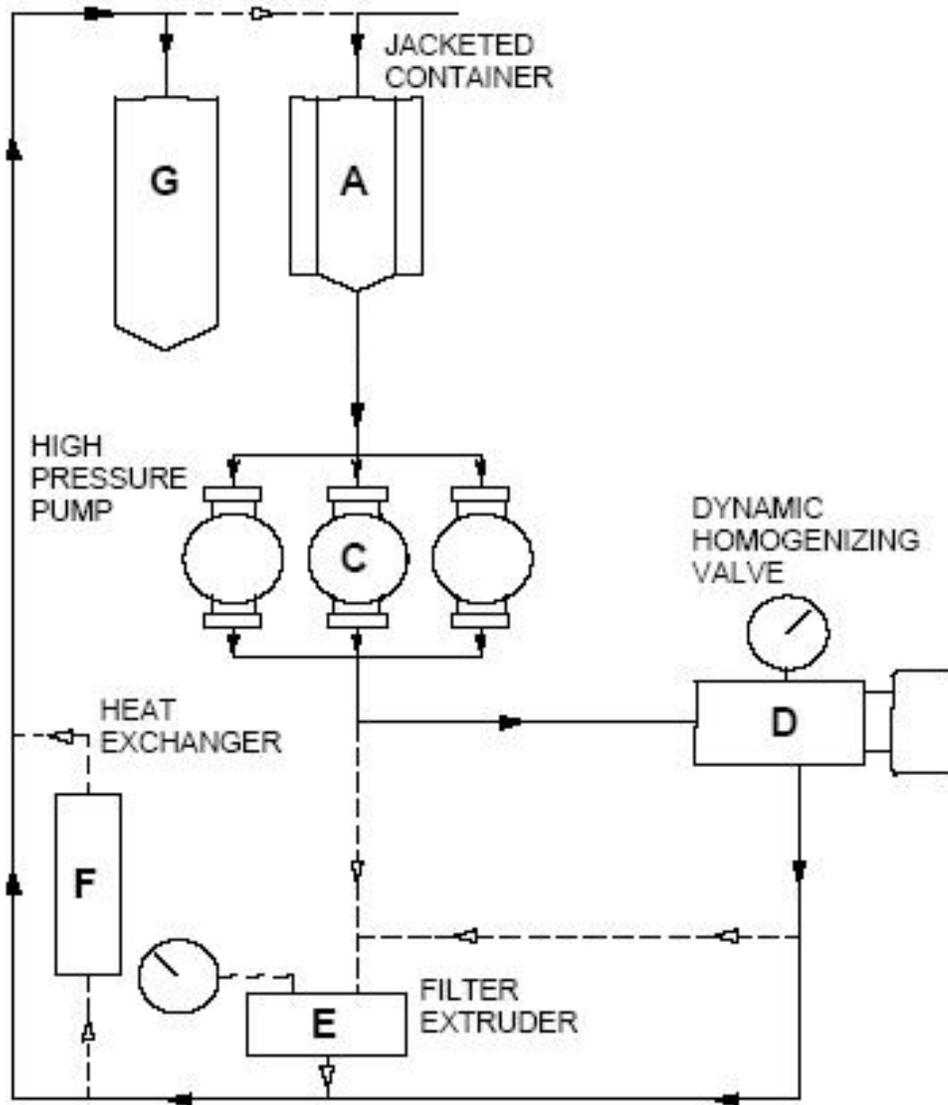
Cell Rupture Nanoparticles Emulsions Liposomes

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High Pressure Homogenizers



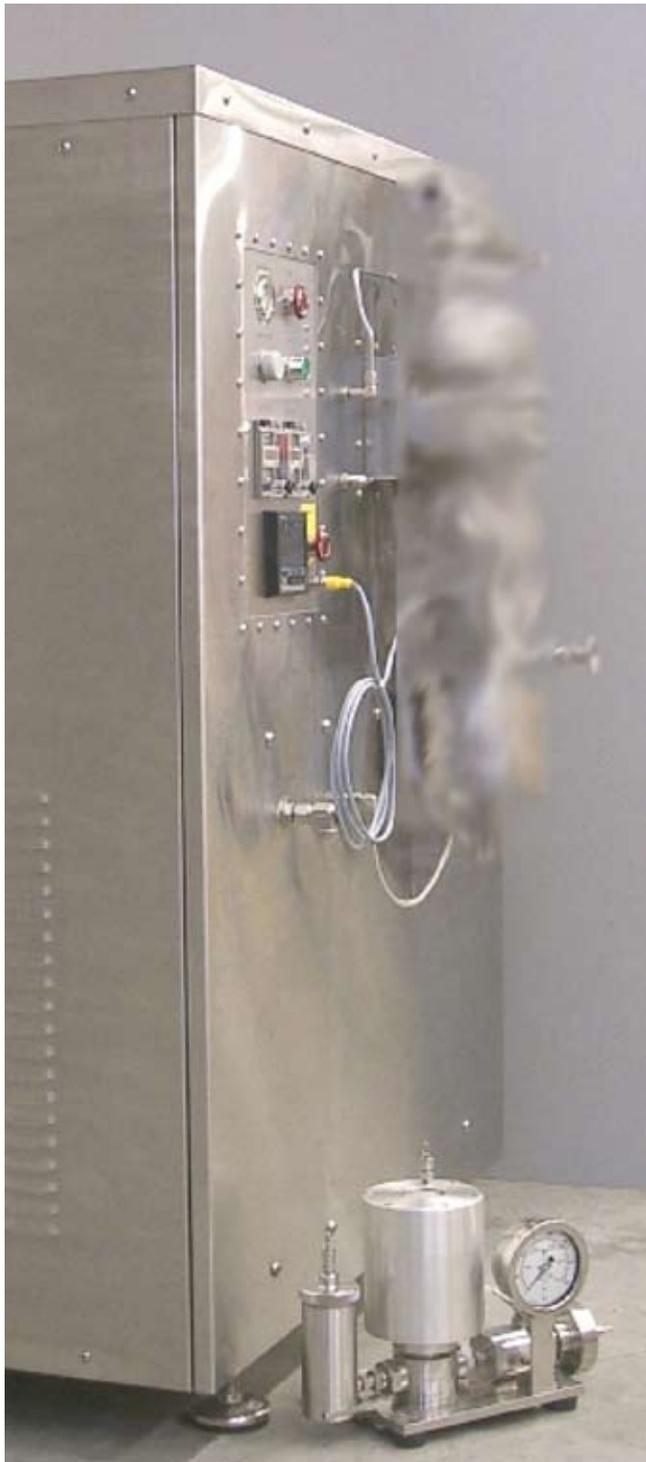
Inside schematic of dynamic homogenizing valve

EmulsiFlex™ Principle of Operation

A high pressure pump (C) pushes the product through dynamic homogenizing valve (D). The product can also be passed through a membrane (E). It can be collected (G) or recycled to the reservoir (A) via tubing/pipes or heat exchanger (F).

EmulsiFlex equipment can be delivered as:

- 1-High pressure homogenizers (A, C, D, F, G)
- 2- High pressure filter/extruder (A, C, E, G)
- 3-Homogenizer/filter/extruder combination (A, C, D, E, G)



The EmulsiFlex™-C1000, AVESTIN's largest high-pressure homogenizer, next to the EmulsiFlex™-C5, AVESTIN's smallest high-pressure homogenizer.

EmulsiFlex™ General Information

Capacity: AVESTIN manufactures homogenizers in many sizes, from a capacity of 1L/hr up to 1000L/hr. Samples as small as 3mL can be processed using the EmulsiFlex™-B15, which has a hold back volume of less than 1mL.

Pressure: Adjustable between 500-30,000psi/34-2,070 bar, which is high enough for virtually every homogenization application. Dynamic homogenizing valve is controlled pneumatically; automatic homogenizing pressure control as well as transducers for precision pressure measurement are available as options.

Unique Design: There are no "o"-rings and no gaskets in the product path of AVESTIN homogenizers. All face seals are precision-machined metal to metal to ceramic.

Temperature Control: AVESTIN provides stainless steel heat exchangers to control inlet and outlet temperatures. The entire EmulsiFlex™-C5 can be immersed in a water bath for temperature control.

Filter/Extruder: Most AVESTIN homogenizers can be equipped with a high-pressure filter/extruder. Applications include the extrusion of emulsions or liposome through membranes and sterile filtration at high pressure.

Homogenizing Valve: AVESTIN homogenizers feature dynamic homogenizing valves. These valves can be easily disassembled for cleaning or inspection. Submicron particles or droplets with diameters less than 50nm and extremely narrow size distributions can be achieved.

Cleaning/Sterilization: The equipment is Steam-In-Place (SIP) sterilizable. It is suitable for clean room and GMP manufacturing. All wetted parts are autoclavable. For inspection, all wetted parts can be disassembled and reassembled in a short time.

Application: Pharmaceuticals, chemicals, cosmetics, coatings, inks, food, etc.

EmulsiFlex™ Product Line

Model	Minimum Sample Volume	Maximum Flow Rate	Holdback Volume	Maximum Homogenizing Pressure	Pump Type
B15	3 mL	15mL batch	< 1mL	45,000 psi 3,000 bar	Pneumatic intensifier
C5	7 mL	1~5 L/hr	< 1 mL	30,000 psi 2,070 bar	Single-acting air driven pump
C3	7 mL	3 L/hr	< 1 mL	30,000 psi 2,070 bar	Single-acting electric pump
C50	25 mL	15~50 L/hr	< 4 mL	30,000 psi 2,070 bar	Double-acting air driven pump
D20	50mL	20 L/hr	< 4 mL	D20A: 15,000 psi (1,035 bar) D20B: 30,000 psi (2,070 bar)	Double-acting electric pump
C55	100 mL	55 L/hr	< 6 mL	C55A: 20,000 psi (1,380 bar) C55B: 30,000 psi (2,070 bar)	Electric motor driven triplex pump
C160	250 mL	160 L/hr	< 8 mL	C160A: 20,000 psi (1,380 bar) C160B: 30,000 psi (2,070 bar)	Electric motor driven triplex pump
C500	5 L	500 L/hr	< 15 mL	C500A: 20,000 psi (1,380 bar) C500B: 30,000 psi (2,070 bar)	Electric motor driven triplex pump
C1000	5 L	1000 L/hr	< 15 mL	C1000A: 20,000 psi (1,380 bar) C1000B: 30,000 psi (2,070 bar)	Electric motor driven triplex pump



EmulsiFlex™-B15

- Capacity: 3-15mL batch
- Pressure: Up to 45,000psi/3,000bar
- Minimum Sample Volume: 3mL
- Power: Electric power not required
- Air: 80-150psi/5-10bar
- Dimensions:
mm: 335(L) x 280(W) x 650(H)
in: 13.3(L) x 11(W) x 25.5(H)
- Weight: 37kg/81lbs



EmulsiFlex™-C5

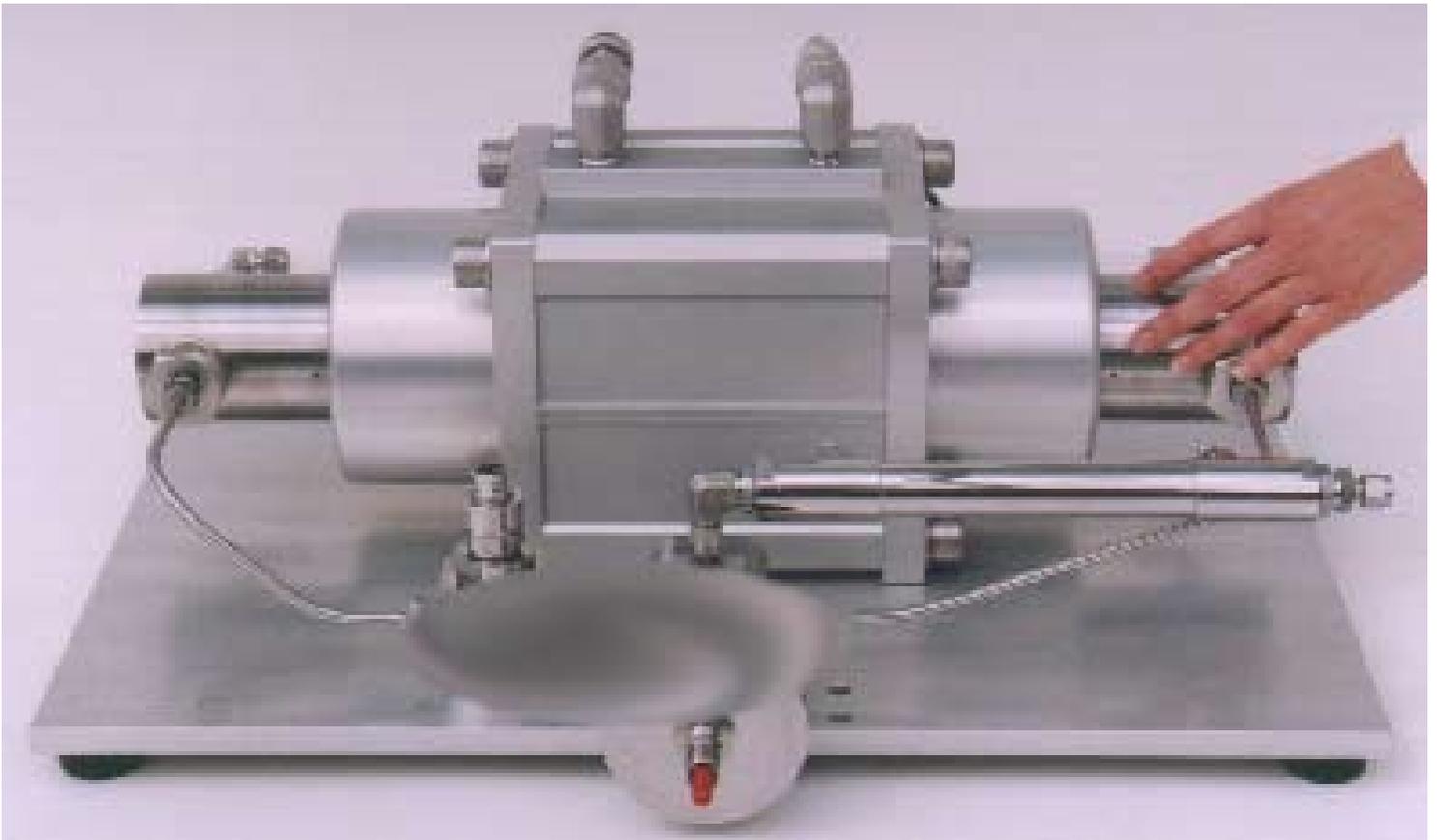
- Capacity: 1~5L/hr, depending on pressure and air supply.
- Pressure: Up to 30,000psi/2,070bar
- Minimum Sample Volume: 7mL
- Power: electrical power is not required
- Air: 7.0CFM@100psi (7bar)
- Dimensions:
mm: 430(L) x 160(W) x 320(H)
in: 17(L) x 6.3(W) x 12.6(H)
- Weight: 25kg/55lbs





EmulsiFlex™-C3

- Capacity: 3L/hr (at 60Hz)
- Pressure: Up to 30,000psi/2,070bar
- Minimum Sample Volume: 7mL
- Power: 110~220V, 50/60Hz, 1hp/0.75kW
- Air: 60-120psi, virtually no air consumption
- Dimensions:
mm: 530(L) x 460(W) x 760(H)
In: 21(L) x 18(W) x 30(H)
- Weight: 95kg/210lbs



EmulsiFlex™-C50

- Capacity: 15~50L/hr, depending on pressure and air supply
- Pressure: Up to 30,000psi/2,070bar
- Minimum Sample Volume: 25mL
- Power: 110~230V, 50/60Hz (for control panel)
- Air: 45CFM@100psi (7bar)
- Dimensions:
mm: 610(L) x 530(W) x 260(H)
In: 24(L) x 20.8(W) x 10.2(H)
- Weight: 80kg/176lbs



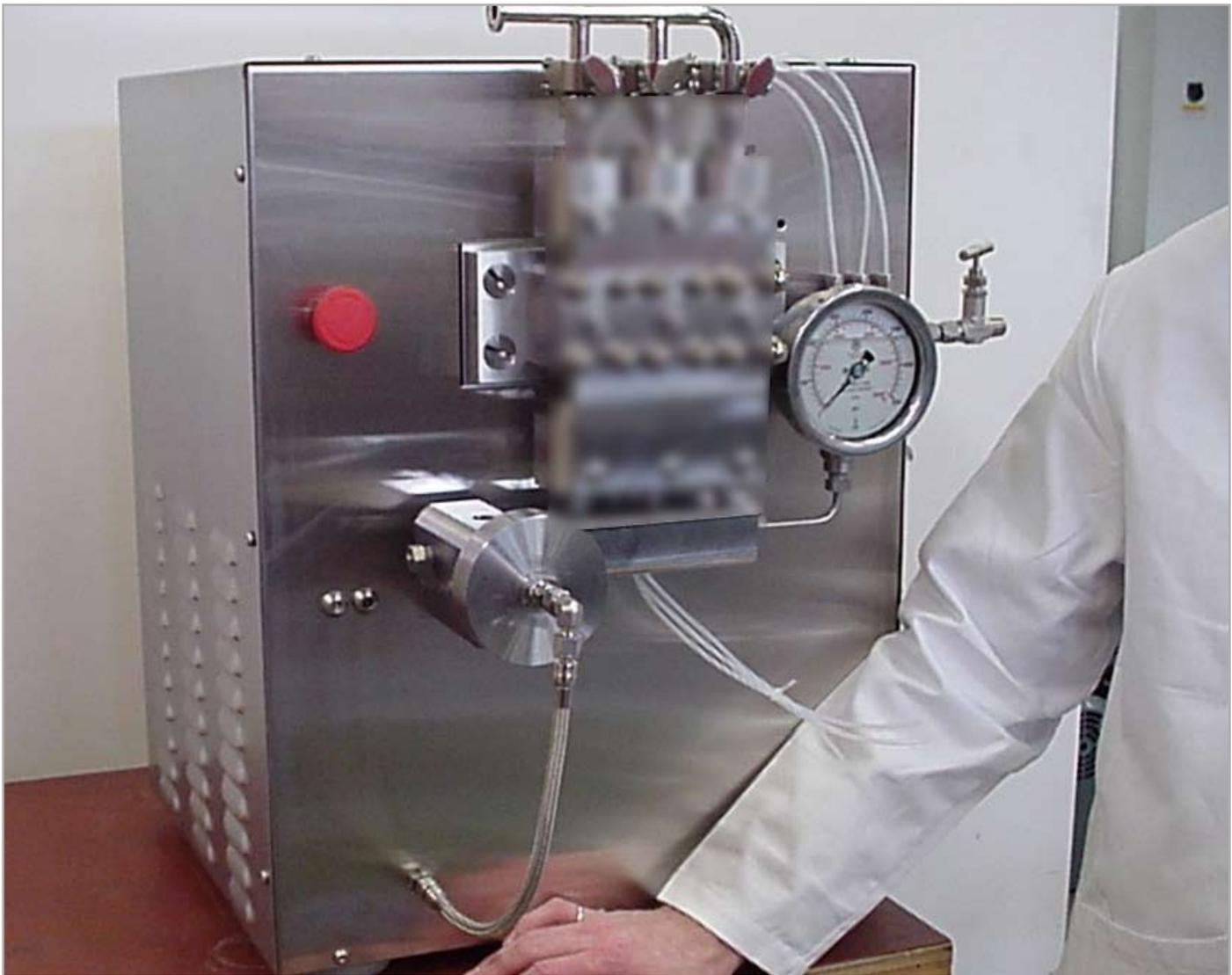
EmulsiFlex™-D20

- Capacity: 20L/hr, independent of pressure.
- Pressure: Two models available
 - A - Fully adjustable up to 15,000psi/1,035bar
 - B - Fully adjustable up to 30,000psi/2,070bar
- Minimum Sample Volume: 50mL
- Power: Electrical motor driven duplex pump.
3-phase, 50/60Hz, 230/400VAC.
- Dynamic, fully ceramic homogenizing valve with pneumatic control. Virtually no air consumption.
- Steam-in-place sterilizable (SIP).
- Wetted parts are autoclavable.
- Dimensions:
 - mm: 730(L) x 600(W) x 640(H)
 - In: 29(L) x 24(W) x 25(H)
- Weight: 120kg/55lbs



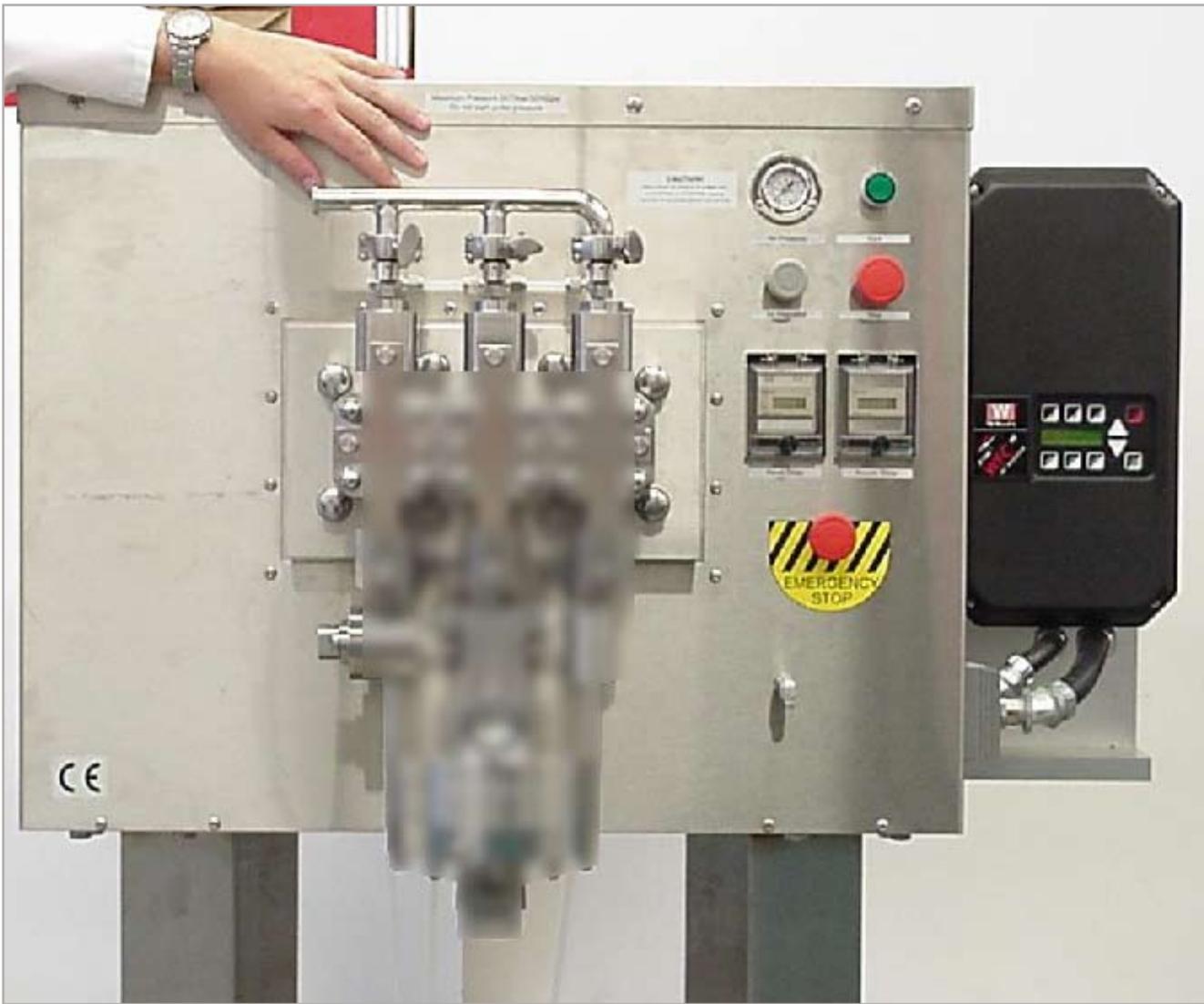


Example of a production scale EmulsiFlex™ high-pressure homogenizer.



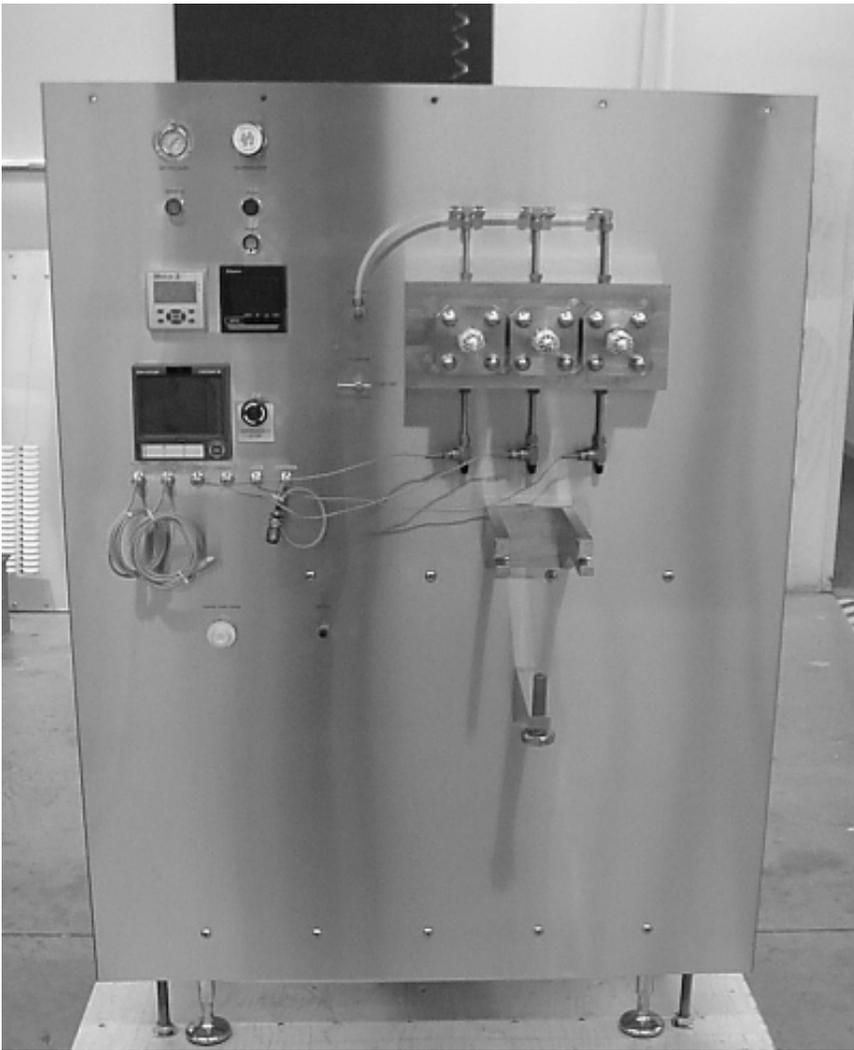
EmulsiFlex™-C55

- Capacity: 55L/hr (at 60Hz)
- Pressure: Up to 30,000psi/2,070bar
- Minimum Sample Volume: 100mL
- Power: 208/230/460V, 50/60Hz, 3-phase, 7.5hp/5.5kW
- Air: 60-120psi, virtually no air consumption
- Dimensions:
 - mm: 480(L) x 530(W) x 780(H)
 - in: 18.9(L) x 20.8(W) x 30.7(H)
- Weight: 220kg/485lbs



EmulsiFlex™-C160

- Capacity: 160L/hr (at 60Hz)
- Pressure: Up to 30,000psi/2,070bar
- Minimum Sample Volume: 250mL
- Power: 208/230/380/460V, 50/60Hz, 3-phase, 15hp/11kW
- Air: 60-120psi, virtually no air consumption
- Dimensions:
 - mm: 1250(L) x 750(W) x 820(H)
 - in: 49(L) x 30(W) x 32.2(H)
- Weight: 500kg/1,100lbs



EmulsiFlex™-C500 & C1000

- Capacity: 500 or 1000L/hr (at 60Hz)
- Pressure: Up to 30,000psi/2,070bar
- Minimum Sample Volume: 5L
- Power: 208/230/380/460V, 50/60Hz, 3-phase, 60hp/75kW
- Air: 60-120psi, virtually no air consumption
- Dimensions:
mm: 1110(L) x 838 (W) x 1550(H)
in: 44(L) x 33(W) x 61(H)
- Weight: 1,000kg/2,200lbs

EmulsiFlex™ Accessories



Heat Exchanger

Avestin provides a range of heat exchangers which can be used to control product temperatures. Heat transfer fluids in the range of -25 to 200°C / -13 to 400°F can be used. Simple cooling coils can be fitted where less stringent temperature control is acceptable.

All heat exchangers are made of stainless steel to a high quality standard. Heat exchangers are easily and rapidly removed or replaced as required.



Peak Reset Meter & Transducer

AVESTIN manufactures a unique, electronic peak reset meter to process the signals generated by an autoclavable pressure transducer for sterile applications.

The peak pressure is displayed and reset every three seconds. Provisions are made to output pressure measurements to a recorder for monitoring or automating processing.

EmulsiFlex™ Accessories (Continued)



Sample Containers

Avestin provides a variety of sample containers for particular applications.



Syringe Fittings

Avestin provides syringe fittings for High Pressure Homogenizers. Run your machine with large number of samples easily.



EmulsiFlex™ Accessories (Continued)



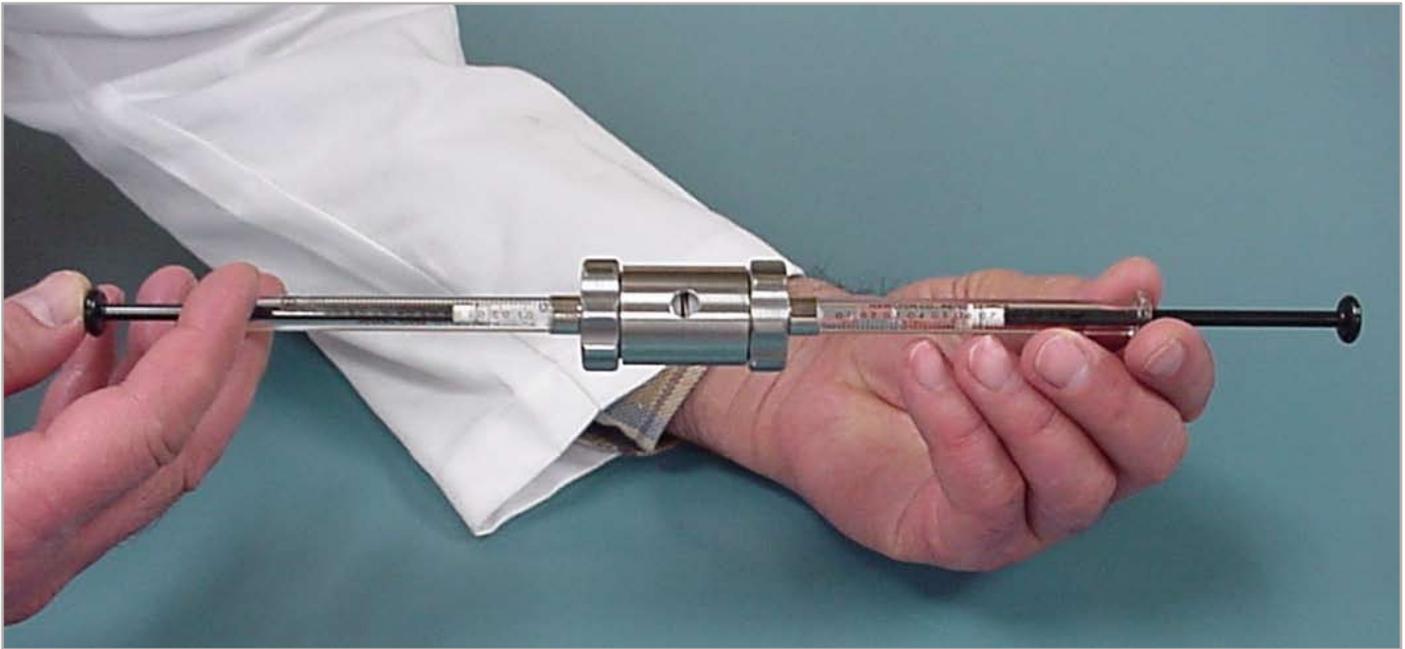
Automatic Pressure Control

Simple system. Attaches to any lab scale Avestin High Pressure Homogenizer without modification. User sets the pressure once and the pressure will be maintained during the entire process time. The set pressure maintains even if the product property changes during the homogenization.



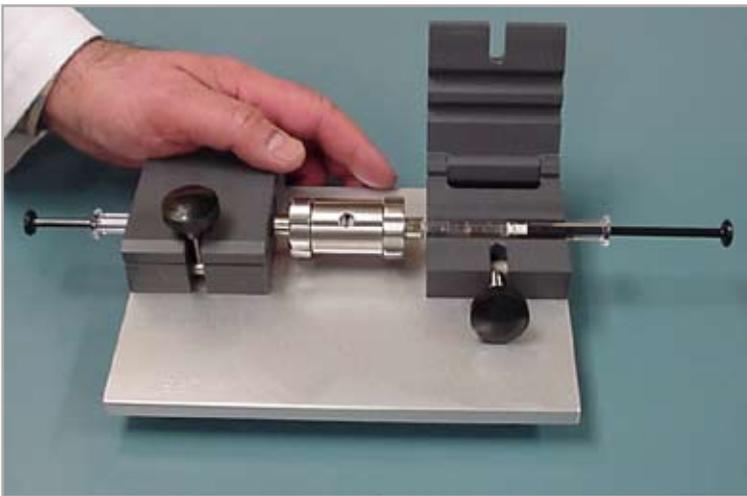
Filter/Extruder

- For most Avestin homogenizers
- Diameter: 47mm or 90mm
- Pressure: Up to 6500psi/450bar



LiposoFast™-Basic

- Extrusion of unilamellar, homogeneous liposomes in minutes
- Capacity: 0.2mL to 1.0mL
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- Extrusion as simple one-step procedure
- Lipid suspensions are forced through a membrane with a fixed pore size
- Produces homogeneous unilamellar liposomes
- Temperature control jacket
- 5-50 mL capacity



Production Facility

- 16,000ft²/1500m² of floor space
- Located in Ottawa, a 15 minute drive from the Parliament of Canada

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