EQUIPMENT DESCRIPTION:

Performance data	ALPHA 1-4 LSC	ALPHA 2-4 LSC
Ice condenser capacity:	4 kg max.	4 kg max.
Ice condenser performance[1)]:	4 kg/24 h max.	4 kg/24 h max.
Ice condenser temperature[1)]:	approx. –55°C	approx. –85°C
Possible shelf temperatures when freezing and drying inside the ice condenser chamber (process A) [1)]:	approx. -25 °C to +99°C	approx. -50°C to +99°C
Possible shelf temperatures when drying outside the ice condenser chamber (process B) [1)]:	room temperature to +99°C	room temperature to +99°C
Max. shelf surface area when drying inside the ice condenser chamber (process A):	1 shelf Ø200mm ≙ 0.031 m^2	1 shelf Ø200mm ≙ 0.031 m^2
Max. shelf surface area when drying outside the ice condenser chamber (process B):	10 shelves, Ø200mm ≙ 0.031 m^2 or 5 shelves, Ø375mm ≙ 0.110 m^2	10 shelves Ø200mm ≙ 0.031 m^2 or 5 shelves, Ø375mm ≙ 0.110 m^2
Max. shelf surface area when drying in glass vials with sealing under vacuum or nitrogen atmosphere outside the ice condenser chamber (process B):	4 shelves, Ø250mm ≙ 0.045 m^2	4 shelves, Ø250mm ≙ 0.045 m^2

Performance data	ALPHA 1-4 LSC	ALPHA 2-4 LSC
Drying in round-bottom flasks; please notice that the max. ice condenser capacity is 4 kg (process B):	12 pieces or 24 pieces	12 pieces or 24 pieces
Physical data (without vacuum pump):		
Dimensions of the unit:	width: 390 mm height: 415 mm depth: 555 mm (incl. vacuum flange connection)	width: 390 mm height: 415 mm depth: 555 mm (incl. vacuum flange connection)
Weight:	approx. 48 kg	approx. 60 kg
Noise emissions according to DIN 45635:	54 dB(A)	54 dB(A)
Electromagnetic compatibility according to EN 55011:	class B	class B
Filling quantities:		
Refrigerant:	see label on the back of the unit	see label on the back of the unit
Connection requirements with vacuum pump 0.4 KVA:		
Supply voltage:	230 V / 50 Hz (others upon request)	230 V / 50 Hz (others upon request)
Power rating:	1.6 KW	1.8 KW
Max. current consumption:	8.0 A	11.0 A

Performance data	ALPHA 1-4 LSC	ALPHA 2-4 LSC
Main fuse rating:	10.0 A	12.0 A
Ambient temperature[1)]:	+10°C to +25°C (higher temperatures upon request)	+10°C to +25°C (higher temperatures upon request)
Equipment connections:		
Vacuum connection:	Small flange connection DN 25KF (ISO 28403, DIN 2861)	Small flange connection DN 25KF (ISO 28403, DIN 2861)
Drain valve:	Hose nozzle DN10 (outside diameter 12 mm)	Hose nozzle DN10 (outside diameter 12 mm)
Aeration valve:	Hose nozzle DN4 (outside diameter 8 mm) max. 0.2 bar overpressure	Hose nozzle DN4 (outside diameter 8 mm) max. 0.2 bar overpressure

[1)] All machine specifications (especially for temperatures, power and capacity) refer to the nominal ambient temperature of 20°C

PROCESS PRINCIPLES:

Freeze drying means: Extraction of water from frozen material. The drying process takes place by avoiding the liquid state through sublimation, i.e. direct conversion from ice to vapor. This happens under vacuum and the temperature in the product is normally less than -10°C.

The aim of freeze drying is to obtain a readily water-soluble product which has the same characteristics as the original product after addition of water. As the drying process takes place in the frozen state at very low temperatures it is possible, for example, to dry proteins which will not denature. Also most of the other chemical compounds will be qualitatively and quantitatively unchanged.
Through freeze drying the product, mainly of biological origin - such as tissues, tissue extracts, bacteria, vaccines and sera – is transformed into a dry product. During this process enzymatic, bacterial and chemical changes are largely avoided freeze drying (lyophilisation) is the gentlest process for preserving
the biological properties of sensitive tissue and tissue components. Lyophilisation is also the best method when drying inorganic products – e.g. nanoscale dispersions the particle surfaces of which should remain unchanged.
The freeze dryer **ALPHA 1-4 LSC** is a highperformance universal laboratory and pre-production unit for freeze drying of solid or liquid products in ampoules, vials, glass flasks, plasma bottles or dishes. All operations necessary for freeze drying can be realized in one and the same unit:
• Freezing of the products
• Freeze drying (sublimation) of the products at user-defined temperature limit values and pressure limit values
• Final drying of the products at user-defined temperature limits and high final vacuum for the removal of capillarily or molecularly bound water.
The freeze dryer **ALPHA 1-4 LSC** is suitable for drying bacteria and virus cultures, blood plasma, serum fractions, antibodies, sera, vaccines and pharmaceutical products such as chloramphenicol, streptomycin, vitamins, ferments as well as plant extracts for biochemical tests (http://www.martinchrist.de/en/freeze-drying/basics.html)

Few implemented projects:

- license works and dissertation students
- doctoral and postdoctoral work
- research in projects