



Accessories
for perfect freeze drying

CHRIST ®

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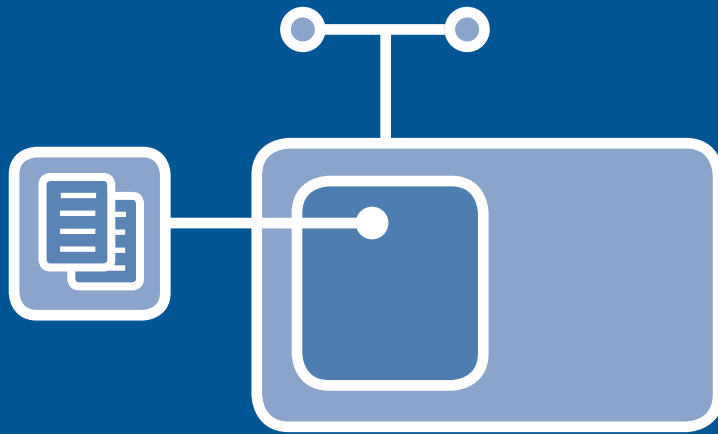
CHRIST ®

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Freeze drying / Lyophilisation

* Freeze drying or lyophilisation from the solid state is the method of choice for the long-term preservation of a wide range of materials or for the preparation of samples for modern analytical techniques. The process is also used by taxidermists and in museums in order to preserve the original form of the materials.

More recent applications relate to drying nanoparticles, where capillary forces or surface tension are unlikely to have any effects.

Freeze drying is used for more than 30 various substance categories or materials, with the most important markets are the pharmaceutical industry and biotechnology as well as for the preservation of foodstuffs.

1 Freeze drying / Lyophilisation



1 Freeze drying / Lyophilisation

Freeze drying or lyophilisation protects products because the material is dried by sublimation. This involves the transition directly from the solid to the gaseous phase, without passing through the liquid phase. The frozen product is dried under vacuum, without melting. The process finds a wide range of applications:

- Preserving product characteristics of the initial substances (e.g. pharmaceutical products, milk)
- Preserving the original form (e.g. taxidermy, archaeological finds, flowers)
- Conditioning materials (e.g. freeze dried fruit in yoghurt)
- Chemical analysis (e.g. analysis of foodstuffs, slurry, soil)

Generally, a distinction is made between continuously operating systems and freeze dryers used batchwise. We are specialists in this product group and are the only manufacturer worldwide to offer both laboratory series appliances as well as pilot freeze dryers through to large-scale production machines.



Laboratory freeze drying systems

- Ice condenser capacities from 2 to 24 kg
- Mostly air-cooled refrigeration systems
- A wide range of accessories for various applications



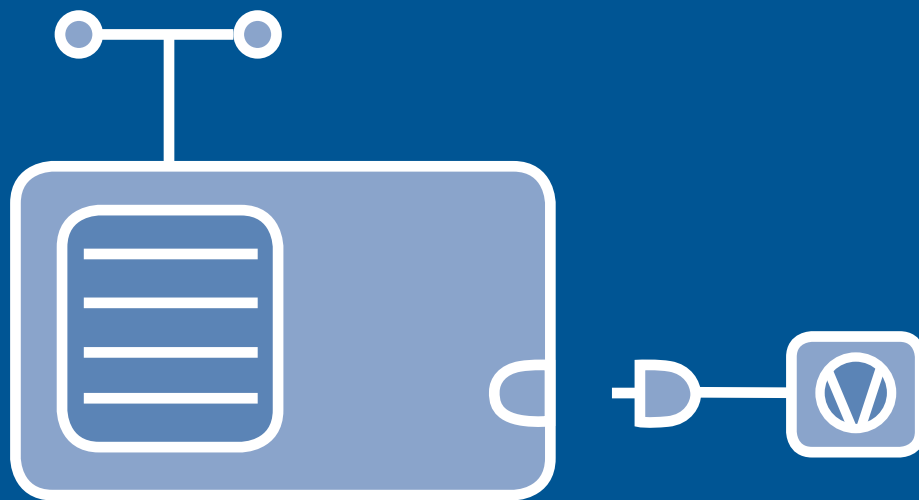
Pilot freeze drying systems

- Ice condenser capacities from 6 to 16 kg
- Air- or water-cooled refrigeration systems
- Freezing and drying in the drying chamber
- On liquid temperature-controlled shelves



Production freeze drying systems

- Ice condenser capacities from 20 to > 1000 kg
- Water-cooled refrigeration systems
- Freezing and drying in the drying chamber
- On liquid temperature-controlled shelves
- One or two chamber systems
- Customized special systems, SIP/H₂O₂ disinfection, CIP, IQ/OQ, ...
- Process integration (loading systems, peripheral equipment)



Example applications

* Our accessories program allows tailor-made solutions for each particular application.

The modular system means that at any time after acquisition, the basic appliance can easily be adapted to changing requirements.

The products in the ›Advanced‹ Series with LSC control – with the appropriate accessories – can be operated using either the one-chamber or two-chamber method.

Many accessories, e. g. acrylic glass chambers, can be used with basic appliances with between 4 kg and 24 kg ice capacity. In the following we present some solutions.

2 Example applications

Product package ›Start-up‹

Accessories for the smallest laboratory freeze dryer ALPHA 1–2LD plus for drying in round-bottom flasks, wide neck flasks, ampoules or on unheated shelves.



Product package ›Start-up‹ ALPHA 1–2LD plus

Start-up

3 shelves, $d = 200 \text{ mm} = 920 \text{ cm}^2$, distance between shelves = 85 mm, additional connections for 8 round-bottom flasks, wide neck flasks, or distributor (Figure 3 in the folder ›Routine Processes‹)

System	ALPHA 1–2LD plus (Art.no. 101521)		
Description	Article number	Quantity	Page
1 Vacuum sensor	125478	1	71
2 Vacuum hose	125702	1	70
3 Base plate	120890	1	36
4 3 unheated shelves	120893	1	29
5 Drying chamber of acrylic glass with 8 connections	121455	1	20
6 Rubber valve	121860	8	53
7 Vacuum pump RZ-2.5 (2.25m ³ /h)	125302	1	68
8 Exhaust filter	125501	1	71

Product package ›Routine‹

Accessories for the BETA series for drying in round-bottom flask, wide neck flasks, ampoules or on unheated shelves, for larger-volume sample volumes.



Product package ›Routine‹ BETA 2–8LD plus

Routine

Drying chambers with 24 connections for round-bottom flasks, wide neck flasks or distributor for ampoules (Figure 12 in the folder ›Routine Processes‹)

System	BETA 2–8LD plus (Art. no. 101582)		
Description	Article number	Quantity	Page
1 Vacuum sensor	125478	1	71
2 Vacuum pump RZ-6	125307	1	69
3 Exhaust filter	125501	1	71
4 Vacuum hose	125702	1	70
5 Base plate	120900	1	36
6 3 shelves with rim	120903	1	29
7 Drying chamber, acrylic glass	121550	1	21
8 Additional acrylic glass drying chamber	121850	1	21
9 Rubber valve for connection of flasks	121860	24	53
10 Drip tray for acrylic glass drying chamber	121360	1	37

Product package ›Pharmacy 1‹

Accessories for the ALPHA-LSC-Series for the complete freeze drying process including stoppering of vials under vacuum or inert gas.



Product package ›Pharmacy 1‹ ALPHA 2–4 LSC

Pharmacy 1

Freezing and drying inside the ice condenser chamber (Method A) temperature controlled shelf with sealing device (d = 200 mm, total area = 0.031 m²) (Figure 2 in the folder ›Advanced Processes‹)

System	ALPHA 2–4 LSC (Art. no. 102042)		
Description	Article number	Quantity	Page
1 Extension unit HED-16 LSC	125040	1	78
2 Vacuum pump RZ-2.5 (2.25 m ³ /h)	125302	1	68
3 Exhaust filter	125501	1	71
4 Vacuum hose and standard flange connections	125702	1	70
5 Electromagnetic pressure control valve	125910	1	70
6 Sealing device integrated in the acrylic glass lid	121009	1	26

Product package ›Shelf drying1‹

Accessories for the ALPHA, GAMMA and DELTA-LSC series for drying of larger sample quantities in dishes or vessels (also in aluminium blocks).



Product package ›Shelf drying1‹ ALPHA 1–4 LSC

Shelf drying 1

10 heatable shelves (d = 200 mm, total area = 0.31 m², distance between shelves = 25 mm – can be increased by removing shelves) (Figure 6 in the folder ›Advanced Processes‹)

System	ALPHA 1–4 LSC (Art.no. 102041)		
Description	Article number	Quantity	Page
1 Extension unit HED-16 LSC	125040	1	78
2 Vacuum pump RZ-6	125307	1	69
3 Exhaust filter	125501	1	71
4 Vacuum hose with standard flange connections	125702	1	70
5 Electromagnetic pressure control valve	125910	1	70
6 Base plate	120900	1	36
7 Rack for up to 10 shelves	120910	1	34
8 Shelf with rim, D = 200 mm, with Sensor PT 100	120950	1	35
9 Additional shelf with rim, D = 200 mm	120951	9	35
10 Acrylic glass	121505	1	21

Product package ›Pharmacy 2‹

Accessories for the ALPHA, GAMMA and DELTA-LSC series for drying larger amounts of products in vials including stoppering under vacuum or inert gas.



Product package ›Pharmacy 2‹ ALPHA 2–4 LSC

Pharmacy 2

4 heatable shelves with sealing device (d = 250 mm, total area = 0.18 m², distance between shelves = 50 mm, can be increased by removing shelf) (Figure 9 in the folder ›Advanced Processes‹)

System	ALPHA 2–4 LSC (Art. no. 102042)		
Description	Article number	Quantity	Page
1 Extension unit HED-16 LSC	125040	1	78
2 Vacuum pump RZ-6	125307	1	69
3 Exhaust filter	125501	1	71
4 Vacuum hose with standard flange connections	125702	1	70
5 Electromagnetic pressure control valve	125910	1	70
6 Base plate	120900	1	36
7 Sealing device with a shelf	121011	1	27
8 Shelf with rim	120960	3	28
9 Acrylic glass	121505	1	21

Product package ›Flask drying / Solvents‹

Accessories for the GAMMA (and DELTA) LSC-Serie for drying in round-bottom flask, wide neck flasks or ampoules. Optional also for organic solvents.



Product package ›Flask drying / Solvents‹ GAMMA 2–16 LSC

Flask drying / Solvents

Manifold for 24 round-bottom flasks, wide neck flasks or distributor for ampoules

System	GAMMA 2–16 LSC (Art. no. 102162)		
Description	Article number	Quantity	Page
1 Vacuum pump RC-6	125295	1	68
2 Exhaust filter	125501	1	71
3 Vacuum hose with standard flange connections	125702	1	70
4 Electromagnetic pressure control valve	125910	1	70
5 Manifold with 24 rubber valves	112237	1	39
6 Drip tray	121360	1	37

Product package ›Shelf drying 2‹

Accessories for the DELTA (and GAMMA) series for drying large amount of bulk material (up to 16 litres) in dishes.

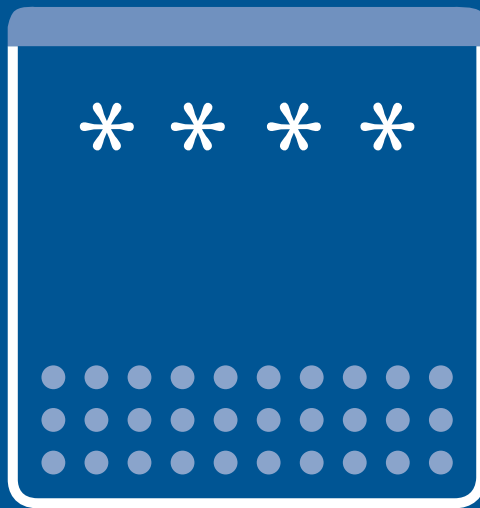


Product package ›Shelf drying 2‹ DELTA 1–24 LSC

Shelf drying 2

8 heatable shelves (d = 375 mm, total area = 0.88 m², distance between shelves = 48 mm)

System	DELTA 1–24 LSC (Art. no. 102241)		
Description	Article number	Quantity	Page
1 Vacuum pump DUO 20 (20 m ³ /h)	125318	1	69
2 Exhaust filter	125502	1	71
3 Electromagnetic pressure control valve	125910	1	70
4 Rack with 3 shelves (electric temperature control)	120920	1	32
5 Additional shelves	120975	5	32
6 Stainless steel distance pieces	120985	7	32
7 Acrylic glass	121523	1	24
8 Electrical lifting hoist for acrylic glass drying chamber	121903	1	



Drying chambers

* Drying chambers and manifolds are often required accessories for the basic units if large volumes of samples have to be handled. Both unheated and heated shelves can be positioned in the chambers. For long-term storage of the freeze-dried samples under vacuum or in an inert gas atmosphere, sealing devices can be used.

Manifolds made of stainless steel are the favourite choice for customers who exclusively work with flasks or wide-neck flasks. As with security glass, our acrylic chambers have a foil coating (registered as a utility model) in order to meet work safety requirements for vacuum instruments.

3 Drying chambers ALPHA to DELTA

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- 3.4 Shelves, heated 31
- 3.5 Manifolds 38

3.1 Drying chambers

Drying chambers 240 mm diameter (for ALPHA 1–2 LD plus)

The drying chamber is set directly onto each laboratory system.
If shelves and racks are used, then in addition a base plate will be required.



Drying chamber, acrylic glass		Order number	121450
Diameter	240 mm		
Clear height	285 mm		
Weight approx.	3.6 kg		
Feature	including ground stoppers NS 45 / 40		
Remark	ALPHA 1–2 LD plus		

Drying chamber, acrylic glass		Order number	121455
Diameter	240 mm		
Clear height	285 mm		
Weight approx.	3.6 kg		
Feature	With 8 connections for individual rubber valves, including ground stoppers NS 45 / 40		
Remark	ALPHA 1–2 LD plus		

Overview

240 mm diameter only for ALPHA 1–2 LD plus

Article number	Height in mm	Connections	Weight in kg
121450	285	–	3.6
121455	285	8	3.6



Drying chamber, stainless steel		Order number	121536
Diameter	240 mm		
Clear height	295 mm		
Weight	4 kg		
Feature	including adapter ring, can only be used with glass lid 121398		
Remark	ALPHA 1–2 LD plus		



Connection ring, stainless steel		Order number	121534
Diameter	240 mm		
Clear height	55 mm		
Weight	1.1 kg		
Feature	with 8 connections for rubber valves, including adapter ring, only for use in connection with glass lid 121398 and stainless steel drying chamber 121536		
Connections	for use with vessels with ground inner surface (DIN) NS 29 / 32: 8x100 ml, 8x250 ml, 8x500 ml, 8x1000 ml, 8x2000 ml round-bottom flasks 8x75 ml, 8x150 ml, 8x300 ml, 8x600 ml, 8x1200 ml wide neck filter bottles		
Remark	ALPHA 1–2 LD plus		

Drying chambers 300 mm diameter (not for ALPHA 1-2 LD plus)

Drying chamber, acrylic glass		Order number	121500
Diameter	300 mm		
Clear height	305 mm		
Weight approx.	4.5 kg		
Feature	including stopper and implosion protection LCG (Lyo Chamber Guard)		
Remark	for use with ALPHA 1/2-4LD plus / LSC, BETA 1/2-8 LD plus, GAMMA 1/2-16 LSC and DELTA 1/2-24 LSC		

Drying chamber, acrylic glass		Order number	121505
Diameter	300 mm		
Clear height	470 mm		
Weight approx.	6 kg		
Feature	including stopper and implosion protection LCG (Lyo Chamber Guard)		
Remark	for use with ALPHA 1/2-4LD plus / LSC, BETA 1/2-8 LD plus, GAMMA 1/2-16 LSC and DELTA 1/2-24 LSC		

Drying chamber, acrylic glass		Order number	121509
Diameter	300 mm		
Clear height	600 mm		
Weight approx.	6.8 kg		
Feature	including stopper and implosion protection LCG (Lyo Chamber Guard)		
Remark	for use with ALPHA 1/2-4LD plus / LSC, BETA 1/2-8 LD plus, GAMMA 1/2-16 LSC and DELTA 1/2-24 LSC		



Drying chamber, acrylic glass		Order number	121550
Diameter	300 mm		
Clear height	295 mm		
Weight approx.	4.6 kg		
Connections	with 12 connections for individually operable rubber valves extra including stopper and implosion protection		
Feature	including stopper and implosion protection LCG (Lyo Chamber Guard)		
Remark	for use with ALPHA 1/2-4LD plus / LSC, BETA 1/2-8 LD plus, GAMMA 1/2-16 LSC and DELTA 1/2-24 LSC		

Additional chamber, acrylic glass		Order number	121850
Diameter	300 mm		
Clear height	295 mm		
Weight approx.	4.8 kg		
Connections	with 12 connections for individually operable rubber valves		
Feature	including implosion protection LCG (Lyo Chamber Guard)		
Remark	for use with ALPHA 1/2-4LD plus / LSC, BETA 1/2-8 LD plus, GAMMA 1/2-16 LSC and DELTA 1/2-24 LSC		

Drying chamber, acrylic glass		Order number	121555
Diameter	300 mm		
Clear height	460 mm		
Weight approx.	5.1 kg		
Connections	with 12 connections for individually operable rubber valves		
Feature	including stopper and implosion protection		
Remark	for use with ALPHA 1/2–4LD plus / LSC, BETA 1/2–8LD plus, GAMMA 1/2–16 LSC and DELTA 1/2–24 LSC		

Overview

Acrylic glass chamber, diameter 300 mm for ALPHA 1/2–4LD plus / LSC, BETA 1/2–8 LD plus, GAMMA 1/2–16 LSC and DELTA 1/2–24 LSC

Article number	Height in mm	Connections	Weight in kg
121500	295		4.5
121550	295	12	4.6
121850	295	12	4.8
121505	470		6
121555	460	12	5.1
121509	600		6.8



Drying chamber, stainless steel		Order number	121537
Diameter	300 mm		
Clear height	295 mm		
Weight approx.	5.4 kg		
Connection	only usable with glass lid 121411		
Feature	including adapter ring		
Remark	for use with ALPHA 1/2–4LD plus / LSC, BETA 1/2–8LD plus, GAMMA 1/2–16 LSC and DELTA 1/2–24 LSC		

Drying chamber, stainless steel		Order number	121538
Diameter	300 mm		
Clear height	460 mm		
Weight approx.	8.6 kg		
Connection	only usable with glass lid 121411		
Feature	including adapter ring		
Remark	for use with ALPHA 1/2–4 LDplus/LSC, BETA 1/2–8 LDplus, GAMMA 1/2–16 LSC and DELTA 1/2–24 LSC		



Connection ring, stainless steel		Order number	121535
Diameter	300 mm		
Height	55 mm		
Weight	2 kg		
Connections	to connect vessels with DIN ground inner surface NS 29/32: 12x100 ml, 12x250 ml, 12x500 ml, 12x1000 ml, 12x2000 ml round-bottom flask 12x75 ml, 12x150 ml, 12x300 ml, 12x600 ml, 12x1200 ml wide neck filter bottle		
Feature	only usable in combination with glass lid 121411 and stainless steel drying chamber 121537 or 121538, including adapter ring		
Remark	for use with ALPHA 1/2–4 LD plus/LSC, BETA 1/2–8 LD plus, GAMMA 1/2–16 LSC and DELTA 1/2–24 LSC		

Drying chambers Ø 457 mm (not for ALPHA 1–2 LD plus; for ALPHA 1–4/2–4 and BETA 1/2–8 LD plus an Adapter 120901 is required)



Drying chamber, acrylic glass		Order number	121511
Diameter	457 mm		
Clear height	340 mm		
Weight approx.	12.7 kg		
Feature	including connection for lifting device and LCG (Lyo Chamber Guard)		
Remark	for use with GAMMA 1/2–16 LSC to DELTA 1/2–24 LSC; with ALPHA 1/2–4 LD plus/LSC to BETA 1/2–8 LD plus an adapter (120901) is required		

Drying chamber, acrylic glass		Order number	121515
Diameter	457 mm		
Clear height	340 mm		
Weight approx.	12.7 kg		
Feature	with 18 individually operable rubber valves including connection for lifting device and LCG (Lyo Chamber Guard)		
Remark	for use with GAMMA 1/2–16 LSC to DELTA 1/2–24 LSC; with ALPHA 1/2–4 LD plus/LSC to BETA 1/2–8 LD plus an adapter (120901) is required		

Drying chamber aus acrylic glass		Order number	121517
Diameter	457 mm		
Clear height	460 mm		
Weight approx.	14.3 kg		
Feature	including connection for lifting device and LCG (Lyo Chamber Guard)		
Remark	for use with GAMMA 1/2–16 LSC to DELTA 1/2–24 LSC; with ALPHA 1/2–4 LD plus/LSC to BETA 1/2–8 LD plus an adapter (120901) is required		



Drying chamber, acrylic glass

Order number 121521

Diameter	457 mm
Clear height	460 mm
Weight approx.	14.3 kg
Feature	with 18 connections for rubber valves, including connection for lifting device and LCG (Lyo Chamber Guard)
Remark	for use with GAMMA 1/2-16LSC to DELTA 1/2-24 LSC; with ALPHA 1/2-4LD plus/LSC to BETA 1/2-8LD plus an adapter (120901) is required



Drying chamber, acrylic glass

Order number 121523

Diameter	457 mm
Clear height	565 mm
Weight approx.	15.8 kg
Feature	including connection for lifting device and LCG (Lyo Chamber Guard)
Remark	for use with GAMMA 1/2-16LSC to DELTA 1/2-24 LSC; with ALPHA 1/2-4LD plus/LSC to BETA 1/2-8LD plus an adapter (120901) is required

Drying chamber, acrylic glass

Order number 121527

Diameter	457 mm
Clear height	565 mm
Weight approx.	15.8 kg
Feature	with 18 connections for rubber valves, including connection for lifting device and LCG (Lyo Chamber Guard)
Remark	for use with GAMMA 1/2-16LSC to DELTA 1/2-24 LSC; with ALPHA 1/2-4LD plus/LSC to BETA 1/2-8LD plus an adapter (120901) is required

Drying chamber, acrylic glass

Order number 121529

Diameter	457 mm
Clear height	693 mm
Weight approx.	17.6 kg
Feature	including connection for lifting device and LCG (Lyo Chamber Guard)
Remark	for use with GAMMA 1/2-16LSC to DELTA 1/2-24 LSC; with ALPHA 1/2-4LD plus/LSC to BETA 1/2-8LD plus an adapter (120901) is required

Drying chamber, acrylic glass

Order number 121531

Diameter	457 mm
Clear height	693 mm
Weight approx.	17.6 kg
Feature	with 18 connections for rubber valves, including connection for lifting device and LCG (Lyo Chamber Guard)
Remark	for use with GAMMA 1/2-16LSC to DELTA 1/2-24 LSC; with ALPHA 1/2-4LD plus/LSC to BETA 1/2-8LD plus an adapter (120901) is required

Overview

Acrylic glass chamber, diameter 457 mm for ALPHA to DELTA

Article number	Height in mm	Connections	Weight in kg
121511	340		12.7
121515	340	18	12.7
121517	460		14.3
121521	460	18	14.3
121523	565		15.8
121527	565	18	15.8
121529	693		17.6
121531	693	18	17.6



Stopper for acrylic glass chamber

Order number 121410

NS	45/40
Colour	black
Remark	also for use with acrylic glass lid (121401) and glass lid (121411)



Rubber stopper

Order number 492299

Function	to seal connections on the acrylic glass chambers
Colour	grey



Silicon cap

Order number 492300

Function	for the connections on the acrylic glass chambers
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3.2 Sealing devices

Sealing devices



Sealing device with 1 shelf with rim		Order number
Diameter	200 mm	121015
Temperature control system	none	
Capacity	up to 2 shelves. Spacing 70 mm, with only one shelf 152 mm	
Feature	only together with base plate 120890	
Remark	for ALPHA 1–2 LD plus	

Sealing device with 1 shelf with rim		Order number
Diameter	250 mm	121020
Temperature control system	none	
Capacity	with shelf (120959) up to 2 shelves	
Remark	for ALPHA 1/2–4 and BETA with LD plus control system	

Sealing device with 1 shelf with rim		Order number
Diameter	250 mm	121021
Temperature control system	none	
Capacity	up to 4 shelves (120959)	
Remark	for ALPHA 1/2–4 and BETA with LD plus control system	



Sealing device integrated in acrylic glass lid Ø 300 mm		Order number
Function	to seal injection vials with rubber stoppers under vacuum or inert gas, variable seal spacing	121009
Shelf diameter	200 mm	
Temperature control system	with sensor PT 100	
Weight approx.	6 kg	
Feature	including connection cable	
Remark	for ALPHA 1/2–4 LSC used for freezing and drying inside ice condenser chamber (process A)	

Number of vessels for sealing device part no. 121009 and part no. 121015

Part no. of drying vessel	Size designation of Injection vial	Diameter (mm)	Height (mm)	Contents for 1 cm layer		Quantity
				Static (ml)	Dynamic (ml) *	
127572	2R	16	35	1.2		116
127576	6R	22	40	3.0		60
127580	10R	24	45	4.5		48
127582	20R	30	55	6.0		29
127585	50H	42.5	73	12.0	35-40 (Sp.F.)	15
127000		65	20	28.0		5
127001		65	20	28.0		5
127126		63	20	28.0		5
127010		75	20	45.0		4
127011		75	20	45.0		4

* Sh. F. = Shell-Freezing, Sp. F. = Spin-Freezing



Sealing device with 1 shelf with rim

Order number 121010

Diameter	250 mm
Function	to close injection vials with rubber stoppers under vacuum or inert gas
Temperature control system	electrical heating with built-in sensor PT 100
Capacity	up to 2 shelves (120960)
Feature	height of pressure plate adjustable
Weight approx.	9 kg
Remark	for LSC control

Variations for part no. 121010 and 121020

Shelf arrangement	Clear spacing (mm)	Useful area (cm ²)
1	110 bis 35	450
2	2 x 45 bis 35	900



Sealing device with 1 shelf

Order number 121011

Diameter	250 mm
Function	to close injection vials with rubber stoppers under vacuum or inert gas
Temperature control system	electrical heating with built-in sensor PT 100
Capacity	up to 4 shelves (120960)
Feature	height of pressure plate adjustable
Weight approx.	10 kg
Remark	for LSC control

Variations for part no. 121011 and 121021

Shelf arrangement	Clear spacing (mm)	Useful area (cm ²)
1	290 bis 35	450
1 + 3	2 x 135 bis 35	900
1 + 2 + 3	3 x 83 bis 35	1350
1 bis 4	4 x 50 bis 35	1800



Shelf, aluminium with rim

Order number 120959

Diameter	250 mm
Surface	black anodized
Temperature control system	none
Combination	für 121020 and 121021

Shelf, aluminium with rim

Order number 120960

Diameter	250 mm
Surface	black anodized
Temperature control system	electrical heating
Combination	for 121010 and 121011



Shelf, aluminium with rim

Order number 120961

Diameter	250 mm
Surface	black anodized
Temperature control system	electrical heating with built-in sensor PT 100

Number of drying vessels per shelf part no. 120960 and 120961 and 120959

Part no. of drying vessel	Size designation of injection vial/ Capacity (ml)	Diameter (mm)	Height (mm)	Contents for 1 cm layer		Quantity	Spacing of min. no. of trays
				Static (ml)	Dynamic (ml) *		
127502	2 ml	12	121	0.6	1.2 (Sh. F.)	280	125
127505	5 ml	12	156	0.6	2.5 (Sh. F.)	280	160
127510	10 ml	16	156	1.2	3.5 (Sh. F.)	154	160
127572	2R	16	35	1.2		154	50
127576	6R	22	40	3.0		80	55
127580	10R	24	45	4.5		67	60
127582	20R	30	55	6.0		45	70
127585	50H	42.5	73	12.0	35–40 (Sp. F.)	19	88
127590	100H	51.6	94.5	18.0	65–70 (Sp. F.)	14	110
127603	300	78	140	38.0	125–135 (Sp. F.)	6	162
127605	500	78	207	38.0	250–300 (Sp. F.)	6	229
127000		65	20	28.0		8	25
127001		65	20	28.0		8	25
127126		63	20	28.0		8	25
127010		75	20	45.0		6	25
127011		75	20	45.0		6	25

* Sh. F. = Shell-Freezing, Sp. F. = Spin-Freezing

3.3 Shelves, unheated

Shelves, unheated



3 shelves, aluminium with rim

Order number 120893

Diameter	200 mm
Temperature control system	unheated
Feature	spacing between shelves variable
Remark	only for ALPHA 1-2

3 shelves, aluminium with rim

Order number 120903

Diameter	265 mm
Height approx.	270 mm
Temperature control system	unheated
Feature	Spacing between shelves 79 mm
Remark	for ALPHA and BETA LD plus

Number of drying vessels per shelf part no. 120903 and 120902

Part no. of drying vessel	Size designation of injection vial/ Capacity (ml)	Diameter (mm)	Height (mm)	Contents for 1 cm layer		Quantity	Spacing of min. no. of trays
				Static (ml)	Dynamic (ml) *		
127502	2 ml	12	121	0.6	1.2 (Sh. F.)	345	125
127505	5 ml	12	156	0.6	2.5 (Sh. F.)	345	160
127510	10 ml	16	156	1.2	3.5 (Sh. F.)	185	160
127572	2 R	16	35	1.2		185	50
127576	6 R	22	40	3.0		100	55
127580	10 R	24	45	4.5		88	60
127582	20 R	30	55	6.0		54	70
127585	50 H	42.5	73	12.0	35-40 (Sp. F.)	25	88
127590	100 H	51.6	94.5	18.0	65-70 (Sp. F.)	16	110
127603	300	78	140	38.0	125-135 (Sp. F.)	7	162
127605	500	78	207	38.0	250-300 (Sp. F.)	7	229
127000		65	20	28.0		11	25
127001		65	20	28.0		11	25
127126		63	20	28.0		11	25
127010		75	20	45.0		8	25
127011		75	20	45.0		8	25
127070		200	22	300.0		1	25
127071		200	22	300.0		1	25
127128		200	18	300.0		1	25

* Sh. F. = Shell-Freezing, Sp. F. = Spin-Freezing



5 shelves, aluminium with rim		Order number	120902
Diameter	265 mm		
Temperature control system	unheated		
Feature	spacing between shelves 79 mm		
Remark	for ALPHA and BETA LD plus (Method B) not for ALPHA 1-2		

5 shelves, aluminium with rim		Order number	120916
Diameter	360 mm		
Temperature control system	unheated		
Feature	spacing between shelves 70 mm		
Remark	for ALPHA and BETA LD plus (Method B) not for ALPHA 1-2		



1 shelf, unheated, aluminium with rim and feet		Order number	112279
Spacing	33 mm		
Diameter	265 mm		
Feature	can be stacked up to 10 shelves		
Remark	for use with ALPHA-GAMMA, not for ALPHA 1-2		

1 shelf, unheated, aluminium with rim and feet		Order number	112318
Diameter	200 mm		
Temperature control system	unheated		
Remark	for use with ALPHA 1-2 and BETA		



Rack		Order number	127202
Function	for 10 (11) micro-titre plates (no deep-well plates)		
Spacing	20 mm		
Material	anodized aluminium plates and stainless steel spacers		
Feature	if the plates are already placed in the racks for the (external) freezing, then the specially-formed anodized aluminium plates act as a »temperature buffer« at the start of the process.		
Remark	for ALPHA to DELTA		

Rack		Order number
Function	for 1 deep-well plate or 1 microtiter plate	
Spacing	50 mm	
Material	anodized aluminium plates and stainless steel spacers	
Feature	If the microtitre plates are already placed in the racks for the (external) freezing, then the specially-formed anodized aluminium plates act as a »temperature buffer« at the start of the process.	
Remark	for ALPHA to DELTA	



Rack		Order number
Function	for 6 microtitre plates or 6 deep-well plates	
Spacing	85 mm	
Material	anodized aluminium and stainless steel spacers in three levels	
Feature	cannot be stacked	
Remark	for ALPHA 1–2 LD plus	



Rack		Order number
Function	for 5 microtitre plates	
Spacing	25 mm	
Material	stainless steel with PDVF feet	
Feature	can be stacked	
Remark	also for ALPHA 1–2 LD plus	

3.4 Shelves, heated

Shelves, heated



Rack with 5 electrically-heated shelves		Order number
Diameter	375 mm	
Spacing	67 mm	
Material	aluminium	
Surface	black anodized	
Feature	shelves with electrical heating, precision connections, Connection cable, monitoring by LED supply	
Capacity	up to 8 shelves	
Remark	suitable for ALPHA LSC, GAMMA and DELTA	



Rack with 3 electrically-heated shelves		Order number	120920
Diameter	375 mm		
Material	aluminium, black anodized		
Temperature control system	shelves with base heating, sensor PT 100		
Feature	precision connections, cable, LED display		
Capacity	up to 8 shelves		
Remark	suitable for GAMMA and DELTA		



Additional shelves for rack 120920		Order number	120975
Diameter	375 mm		
Material	aluminium, black anodized		
Temperature control system	shelf with base heating		
Feature	monitoring via LED display		
Usage	to expand rack 120920		
Remark	shelf thickness 2 cm		

Selection of the drying chambers part no. 121511 to 121529 and spacers depending on the number and spacing of shelves

Part no. 121511 / 515 Clear height: 380			Part no. 121517 / 521 Clear height: 500			Part no. 121523 / 527 Clear height: 605			Part no. 121529 / 531 Clear height: 693			Useful area ø 375 (cm ²)
Part no.	Spacing	No. of shelves	Part no.	Spacing	No. of trays	Part no.	Spacing	No. of shelves	Part no.	Spacing	No. of shelves	
121000	138	2	121003	196	2	121005	251	2	121006	314	2	2208
120988	86*	3	120999	124	3	121002	161	3	121004	202	3	3313
120987	60*	4	120995	89	4	120998	116	4	121001	148	4	4417
			120992	67	5	120995	89	5	120997	114	5	5522
			120986	53*	6	120993	71	6	120996	92	6	6626
						120990	58	7	120994	76	7	7731
						120985	48*	8	120991	64	8	8835

* = Standard



Spacers, stainless steel (1 set)		Order number	120985
Distance between shelves	48 mm		
Weight approx.	0.3 kg		

Spacers, stainless steel (1 set)		Order number	120986
Distance between shelves	53 mm		
Weight approx.	0.3 kg		

Spacers, stainless steel (1 set)		Order number	120987
Distance between shelves	60 mm		
Weight approx.	0.4 kg		

Spacers, stainless steel (1 set)		Order number	120988
Distance between shelves	86 mm		
Weight approx.	0.5 kg		

Spacers, stainless steel (1 set)		Order number	120996
Distance between shelves	92 mm		

Spacers, stainless steel (1 set)		Order number	120997
Distance between shelves	114 mm		

Spacers, stainless steel (1 set)		Order number	120999
Distance between shelves	124 mm		

Number of drying vessels per shelf ø 375mm in connection with the drying chambers part nos. 121511–121531

Part no. of drying vessels	Size designation of injection vial/ Capacity (ml)	Dimensions		Contents for 1 cm layer freezing		Quantity		Min. spacing (mm)
		Diameter (mm)	Height (mm)	Static (ml)	Dynamic* (ml)	a	b	
127502	2 ml	12	121	0.6	1.2 (Sh.F.)	700	330	125
127505	5 ml	12	156	0.6	2.5 (Sh.F.)	700	330	160
127510	10 ml	16	156	1.2	3.5 (Sh.F.)	395	215	160
127572	2R	16	35	1.2		395		50
127576	6R	22	40	3.0		205		55
127580	10R	24	45	4.5		170		60
127582	20R	30	55	6.0		110		70
127585	50H	42.5	73	12.0	35–40 (Sp.F.)	50	40	88
127590	100H	51.6	94.5	18.0	65–70 (Sp.F.)	32	27	110
127603	300	78	140	38.0	125–135 (Sp.F.)	13	12	162
127605	500	78	207	38.0	250–300 (Sp.F.)	13	12	229
127000		65	20	28.0		21		25
127001		65	20	28.0		21		25
127126		63	20	28.0		21		25
127010		75	20	45.0		16		25
127011		75	20	45.0		16		25
127070		200	22	300.0		1		25
127071		200	22	300.0		1		25
127128		200	18	300.0		1		25
127110		360	40	1000.0		1		48
127111		360	40	1000.0		1		48
127130		360	32	1000.0		1		48
127170		340	35	auf Anfrage		1		48

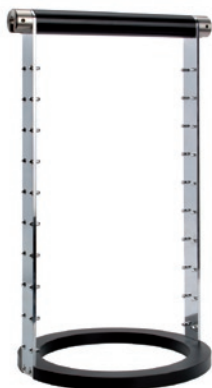
* Sh. F. = Shell-Freezing, Sp. F. = Spin-Freezing, a = without thermo-block, b = with thermoblock



Rack		Order number	120905
Capacity	up to 5 shelves Ø 200 mm		
Temperature control system	heated (with two connection cables)		
Height ca.	295 mm		
Steuerung	for LSC control		

120905: Variations

Shelf array	Clear spacing (mm)	Useful area (cm²)
1	200	314
1+5	145+35	628
1+4	105+75	628
1+3+5	65+65+35	942
1 bis 5	4 x 25+35	1570



Rack		Order number	120910
Capacity	up to 10 shelves Ø 200 mm		
Temperature control system	heated (with two connection cables)		
Height ca.	435 mm		
Control	for LSC control		

120910: Variations

Shelf array	Clear spacing (mm)	Useful area (cm²)
1	360	314
1+10	320+35	628
1+9	280+70	628
1+8	245+110	628
1+7	210+145	628
1+6	170+180	628
1+5+9	2 x 135+70	942
1+4+7+10	3 x 99+35	1256
1+3+5+7+9	4 x 62+70	1570
1 to 10	9 x 25+35	3140



Connection cable for rack		Order number	141328
Length	700 mm		

Connection cable for rack		Order number	141327
Length	500 mm		

Connection cable for rack		Order number	141322
Length	700 mm		
Surface	teflon-coated		



Extension cable with precision connectors

Order number 122020

Length	500 mm
Function	to connect an electrically heated shelf



Extension cable with precision connectors

Order number 122021

Length	500 mm
Function	to connect a product sensor (124802)



Extension cable with precision connectors

Order number 122022

Length	500 mm
Function	for the power supply to the temperature controlled racks
Connection	to connect carrying rack no. 120905 or 120910, sealing device 121010 or 121011 and plate rack 120920

Extension cable with precision connectors

Order number 141315

Length	500 mm
Surface	teflon-coated
Function	to provide a connection through the base plate of the intermediate valve for the electrically-heated shelf
Feature	to connect an electrically heated shelf



Shelf, aluminium with rim

Order number 120950

Diameter	200 mm
Temperature control system	base heating, Sensor PT 100 and connection cable
Combination	the shelf can be placed in the carrying rack or on the floor of the ice condenser chamber
Control	for LSC control
Remark	for rack 120905 and 120910



Shelf, aluminium with rim

Order number 120951

Diameter	200 mm
Temperature control system	with base heating
Remark	for rack 120905 and 120910

Number of drying vessels per shelf part no. 120950 and 120951

Part no. of drying vessels	Size designation of injection vial/ Capacity (ml)	Dimensions		Contents for 1 cm layer freezing		Quantity		Min. spacing (mm)
		Diameter (mm)	Height (mm)	Static (ml)	Dynamic* (ml)	a	b	
127502	2 ml	12	121	0.6	1.2 (Sh. F.)	240	104	125
127505	5 ml	12	156	0.6	2.5 (Sh. F.)	240	104	160
127510	10 ml	16	156	1.2	3.5 (Sh. F.)	115	80	160
127572	2R	16	35	1.2		115		50
127576	6R	22	40	3.0		57		55
127580	10R	24	45	4.5		50		60
127582	20R	30	55	6.0		30		70
127585	50H	42.5	73	12.0	35-40 (Sp. F.)	16	13	88
127590	100H	51.6	94.5	18.0	65-70 (Sp. F.)	8	8	110
127603	300	78	140	38.0	125-135 (Sp. F.)	4	4	162
127605	500	78	207	38.0	250-300 (Sp. F.)	4	4	229
127000		65	20	28.0		7		25
127001		65	20	28.0		7		25
127126		63	20	28.0		7		25
127010		75	20	45.0		5		25
127011		75	20	45.0		5		25
127070		200	22	300.0		1		25
127071		200	22	300.0		1		25
127128		200	18	300.0		1		25

* Sh. F. = Shell-Freezing, Sp. F. = Spin-Freezing, a = without thermoblock, b = with thermoblock



Base plate, plastic		Order number	120890
Diameter	240 mm		
Feature	the base plate is also required if shelves are used		
Remark	only for ALPHA 1-2 LD plus		

Base plate, plastic		Order number	120900
Diameter	280 mm		
Feature	the base plate is also required if shelves are used		
Remark	ALPHA to DELTA		

Base plate for Deep Well Rack		Order number	120906
Diameter	280 mm		
Feature	for 6 Racks 127202		

Flange adapter		Order number	120901
Function	for the drying chamber Ø 457		
Remark	for ALPHA 1-4/2-4 and BETA 1-8/2-8		



Drip tray		Order number	121350
Function	protects the freeze drying system, collects condensation dropping from the drying vessels		
Remark	ALPHA to GAMMA, for manifold 121226, 110538 and 121280		

Drip tray		Order number	121355
Diameter	575 mm		
Internal diameter	260 mm		
Function	protects the freeze drying system, collects condensation dropping from the drying vessels		
Remark	for ALPHA 1–2LD plus		



Drip tray		Order number	121360
Diameter	650 mm		
Function	protects the freeze drying system, collects condensation dropping from the drying vessels		
Weight approx.	2 kg		
Remark	for drying chamber Ø 300 mm		

Drip tray		Order number	121365
Function	protects the freeze drying system, collects condensation dropping from the drying vessels		
Remark	for drying chamber Ø 457 mm, external 800 mm		

Glass lid		Order number	121398
Diameter	240 mm		
Feature	with central DIN-ground inner surface NS 45/40 including stopper NS 45/40		
Remark	only for ALPHA 1–2		



Lid, acrylic glass		Order number	121401
Diameter	300 mm		
Weight approx.	3.1 kg		
Feature	with central DIN-ground inner surface NS 45/40 including stopper NS 45/40		

Lid, safety glass		Order number	121411
Diameter	300 mm		
Feature	solvent resistant with central stainless steel DIN-ground inner surface NS 45/40 including stopper		

3.5 Manifolds

Manifolds

Vertical manifold		Order number	110538
Material	stainless steel with DIN-external ground surface NS 45/40		
Width	372 mm		
Height	1030 mm		
Function	for connection with acrylic- or mineral-glass lid, with ground inner surface and 12 rubber valves, for substances containing solvents		
Connections	for connections with vessels with DIN-inner-ground NS 29/32: 12x100 ml, 12x250 ml, 12x1000 ml, 12x 2000 ml, round-bottom flask 12x75 ml, 12x150 ml, 12x300 ml, 12x600 ml, 12x1200 ml, 8x2000 ml wide neck filter bottle		
Feature	the connections can be opened and closed individually		
Remark	3 levels x 4 connections, ALPHA 1/2-4, BETA 1/2-8, GAMMA 1/2-16 and DELTA 1/2-24		



Vertical manifold		Order number	121224
Material	stainless steel, with DIN-external ground surface		
Width	650 mm		
Height	1170 mm		
Weight approx.	18 kg		
Function	With attached acrylic glass lid Ø 300 mm and 24 rubber valves, for aqueous solutions		
Connections	for connection of vessels with DIN internal ground surface NS 29/32: 24x100 ml, 24x250 ml, 24x500 ml, 24x1000 ml, 16x2000 ml round-bottom flask 24x75 ml, 24x150 ml, 24x300 ml, 24x600 ml, 24x1200 ml, 8x2000 ml wide neck filter bottle		
Feature	the connections can be opened and closed individually		
Remark	3 levels x 8 connections, ALPHA 1/2-4, BETA 1/2-8, GAMMA 1/2-16 and DELTA 1/2-24		



Vertical manifold		Order number	121226
Material	stainless steel, DIN external ground surface NS 45/40		
Width	380 mm		
Height	755 mm		
Function	for connection to acrylic- or mineral-glass lid with ground inner surface and 8 rubber valves for substances containing solvents		
Connections	for connections of vessels, DIN internal ground surface NS 29/32: 8x100 ml, 8x250 ml, 8x500 ml, 8x1000 ml, 4x2000 ml round-bottom flask 8x75 ml, 8x150 ml, 8x300 ml, 8x600 ml, 8x1200 ml, 4x2000 ml wide neck filter bottle		
Feature	the connections can be opened and closed individually		
Remark	2 levels x 4 connections, ALPHA 1-2 LD plus, ALPHA 1/2-4, BETA 1/2-8, GAMMA 1/2-16, DELTA 1/2-24 and EPSILON 2-6 D LSC		



Vertical manifold

Order number 112237

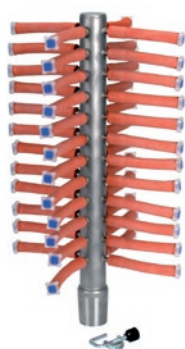
Material	stainless steel, with DIN external ground surface NS45/40
Width	650 mm
Height	946 mm
Function	with attached mineral glass lid Ø 300 mm and 24 rubber valves for substances containing solvents
Extra	connection DN10KF for hot-water defrosting
Connections	for connections of vessels, DIN internal ground surface NS 29/32: 8x100 ml, 8x250 ml, 8x500 ml, 8x1000 ml, 4x2000 ml round-bottom flask 8x75 ml, 8x150 ml, 8x300 ml, 8x600 ml, 8x1200 ml, 4x2000 ml wide neck filter bottle
Feature	the connections can be opened and closed individually
Remark	3 levels x 8 connections, ALPHA 1–2 LD plus, ALPHA 1/2–4, BETA 1/2–8, GAMMA 1/2–16 and DELTA 1/2–24



Vertical manifold

Order number 112306

Material	stainless steel
Width	650 mm
Height	876 mm
Function	with attached mineral-glass lid Ø 300 mm and 16 rubber valves for substances containing solvents
Extra	connection DN10KF for hot-water defrosting
Connections	for connection of vessels with DIN internal ground surface NS 29/32: 16x100 ml, 16x250 ml, 16x500 ml, 16x1000 ml, 16x2000 ml round-bottom flask 16x75 ml, 16x150 ml, 16x300 ml, 16x600 ml, 16x1200 ml, 8x2000 ml wide neck filter bottle
Feature	the connections can be opened and closed individually
Remark	2 levels x 8 connections, ALPHA 1/2–4, BETA 1/2–8, GAMMA 1/2–16 and DELTA 1/2–24



Ampoule manifold

Order number 121280

Material	stainless steel, with DIN external ground surface NS 45/40
Width	108 mm
Height	450 mm
Weight	3 kg
Function	for connection to acrylic- or mineral-glass lid with ground inner surface and 48 rubber hoses, for aqueous solutions, for connection of ampoules
Feature	the connections can be opened and closed individually
Remark	ALPHA 1–2, 1/2–4, BETA 1/2–8, GAMMA 1/2–16 and DELTA 1/2–24

Vertical manifold

Order number 110280

Material	stainless steel, with DIN external ground surface NS 45/40
Width	108 mm
Height	440 mm
Function	for connection to acrylic- or mineral-glass lid with ground inner surface and 60 rubber hoses for substances containing solvents, for connection of ampoules
Feature	the connections can be opened and closed individually
Remark	ALPHA 1/2–4, BETA 1/2–8, GAMMA 1/2–16 and DELTA 1/2–24

Overview

Drying manifolds, vertical

Article no.	Connections	Solvent	Water	Fixing	Width (mm)	Height (mm)	Weight (kg)	Connections ₁	Systems
121226	8	yes	yes	ground-glass connection	380	755	4	4 x 2000 ml round-bottom flasks and wide neck filter bottles	ALPHA- EPSILON
110538	12	yes	yes	ground-glass connection	372	1030		8 x 2000 ml wide neck filter bottles	BETA- DELTA
112306	16	yes	yes	mineral glass lid Ø 300 mm	650	876		8 x 2000 ml wide neck filter bottles	ALPHA- DELTA
121224	24		yes	acrylic glass lid Ø 300 mm	650	1170	18	16 x 2000 ml round-bottom flasks 8 x 2000 ml wide neck filter bottles	ALPHA- DELTA
112237	24	yes	yes	mineral glass lid Ø 300 mm	650	946		4 x 2000 ml round-bottom flasks and/ or wide neck filter bottles	ALPHA- DELTA
121280	48		yes	ground-glass connection	108	450	3	ampoules	ALPHA- DELTA
110280	60	yes	yes	ground-glass connection	108	440		ampoules	ALPHA- DELTA

With individually closable rubber valves for connection of round-bottom flasks and wide neck flasks with a DIN-ground inner surface NS 29/32

¹ the maximal number for large-volume bottles

Horizontal manifold		Order number	110005
Material	stainless steel		
Width	1070 mm		
Height	550 mm		
Weight approx.	6 kg		
Function	with attached acrylic glass lid Ø 300 mm and 16 rubber valves, for aqueous solutions		
Connections	for connections of vessels, DIN internal ground surface NS 29/32: 16x100 ml, 16x250 ml, 16x500 ml, 8x1000 ml, 8x2000 ml round-bottom flask 16x75 ml, 16x150 ml, 16x300 ml, 16x600 ml, 16x1200 ml, 16x2000 ml wide neck filter bottle		
Feature	the connections can be opened and closed individually		
Remark	ALPHA 1/2-4, BETA 1/2-8, GAMMA 1/2-16 and DELTA 1/2-24		



Horizontal manifold		Order number	121290
Material	stainless steel, with DIN external ground surface NS45/40		
Width	687 mm		
Height	320 mm		
Weight approx.	5.7 kg		
Function	for connection to acrylic- or mineral-glass lid mit ground inner surface and 20 rubber valves, for aqueous solutions		
Connections	injection vials		
Feature	the connections can be opened and closed individually		
Remark	ALPHA 1-2 LD plus, ALPHA 1/2-4, BETA 1/2-8, GAMMA 1/2-16 and DELTA 1/2-24		

Horizontal manifold		Order number	110367
Material	stainless steel, with DIN external ground surface NS45/40		
Width	301 mm		
Height	611 mm		
Function	for connection to acrylic- or mineral-glass lid with ground inner surface and 40 rubber hoses, for substances containing solvents, for connections of ampules		
Feature	the connections can be opened and closed individually		
Remark	ALPHA 1-2 LD plus, ALPHA 1/2-4, BETA 1/2-8, GAMMA 1/2-16 and DELTA 1/2-24		

Horizontal manifold		Order number	110528
Note	wall-mounting required		
Material	stainless steel, with DIN external ground surface NS45/40		
Width	1076 mm		
Height	1327 mm		
Function	with clamp connections DN 65 ISO, S and 20 rubber valves, for substances containing solvents		
Connections	for connections of vessels, DIN internal ground surface NS 29/32: 20x100 ml, 20x250 ml, 20x500 ml, 20x1000 ml, 11x2000 ml round-bottom flask 20x75 ml, 20x150 ml, 20x300 ml, 20x600 ml, 20x1200 ml, 14x2000 ml wide neck filter bottle		
Feature	the connections can be opened and closed individually		
Remark	DELTA 2-24 LSC		

Horizontal manifold (multiple row)		Order number	121227
Material	stainless steel with DIN-external ground surface NS 45/40		
Width	860 mm		
Height	1054 mm		
Function	for connection to acrylic- or mineral-glass lids with ground inner surface and 21 Rubber valves, for aqueous solutions		
Connections	for connections of vessels, DIN internal ground surface NS 29/32: 21 x 100 ml, 21 x 250 ml, 21 x 500 ml, 21 x 1000 ml, 21 x 2000 ml round-bottom flask 21 x 75 ml, 21 x 150 ml, 21 x 300 ml, 21 x 600 ml, 21 x 1200 ml wide neck filter bottle		
Feature	the connections can be opened and closed individually		
Remark	GAMMA 1/2–16 LSC and DELTA 1/2–24 LSC		

Horizontal manifold (T-Form, multiple row)		Order number	112209
Material	stainless steel		
Width	865 mm		
Height	918 mm		
Function	with clamp connections DN 50 ISO, S and 24 rubber valves, for substances containing solvents		
Connections	for connecting vessels, DIN internal ground surface NS 29/32: 24 x 100 ml, 24 x 250 ml, 24 x 500 ml, 24 x 1000 ml round-bottom flask 24 x 75 ml, 24 x 150 ml, 24 x 300 ml, 24 x 600 ml, 24 x 1200 ml, 12 x 2000 ml wide neck filter bottle		
Feature	The connections can be opened and closed individually		
Remark	GAMMA 1/2–16 LSC and DELTA 1/2–24 LSC		

Overview

Horizontal drying manifolds

Article no.	Connections	Solvent	Water	Fixings	Width (mm)	Height (mm)	Weight (kg)	Connection ₁	Systems
110005	16		yes	acrylic glass lid Ø 300 mm	1070	550	6	8 x 1000 ml round-bottom flasks 8 x 2000 ml wide neck filter bottle	ALPHA-DELTA
121290	20		yes	ground-glass connection	687	320	5.7	injection vials	ALPHA-DELTA
110367	40	yes	yes	ground-glass connection	301	611		ampoules	ALPHA-DELTA
110528	20	yes	yes	wall mounted clamp	1076	1327		multiple row	DELTA
121227	21		yes	ground-glass connection	860	1054		multiple row	GAMMA-DELTA
112209	24	yes	yes	clamp	865	918		multiple row 12 x 2000 ml wide neck filter bottle	GAMMA-DELTA

With individually operable rubber valves for attaching round-bottom flask and wide neck flasks with a DIN-ground inner surface NS 29/32

¹ the maximal number for large-volume bottles



Distributor for ampoules

Order number 121870

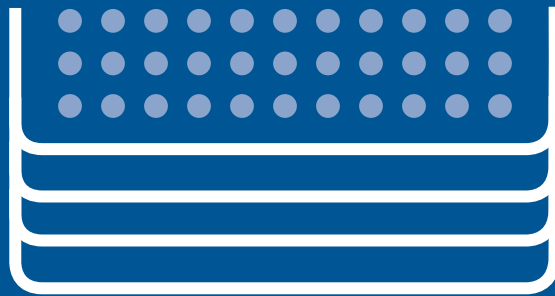
Connections 15



Ball tap with small flange DN 10KF and accessories

Order number 112271

Function for hot water defrosting from manifold



Drying accessories

* This is where you can find those essential little things that play a big role in deciding the success of your daily work with freeze dryers. Product sieves, for example, can hinder the loss of very light or fine-grain material.

Wide neck filter bottle allow the near-continual use of the equipment by the connection to rubber valves, which function as a three-way tap. Ampoules and injection flasks are containers for the long-term storage under exclusion of oxygen.

4 Drying accessories

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4.1 Product dishes

Product dishes



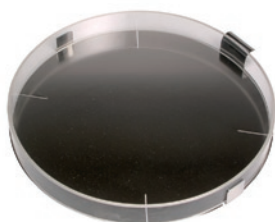
Product dish		Order number	127000
Material	stainless steel		
Diameter	65 mm		
Rim height	20 mm		

Product dish		Order number	127010
Material	stainless steel		
Diameter	75 mm		
Rim height	20 mm		



Product dish		Order number	127070
Material	stainless steel		
Diameter	200 mm		
Rim height	18 mm		

Product dish		Order number	127111
Material	stainless steel		
Diameter	360 mm		
Rim height	32 mm		



Product dish		Order number	127170
Material	stainless steel and acrylic glass rim		
Diameter	340 mm		
Rim height	35 mm		
Feature	with removable base		



Product dish teflon coated		Order number	127001
Material	stainless steel teflon coated		
Diameter	65 mm		
Rim height	20 mm		

Product dish teflon coated		Order number	127011
Material	stainless steel teflon coated		
Diameter	75 mm		
Rim height	20 mm		



Product dish teflon coated

Order number 127071

Material	stainless steel teflon coated
Diameter	200 mm
Rim height	18 mm

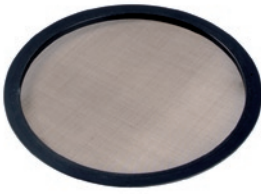
Product dish teflon coated

Order number 127110

Material	stainless steel teflon coated
Diameter	360 mm
Rim height	32 mm

4.2 Product sieves

Product sieves



Product sieve

Order number 127075

Diameter	200 mm
Mesh size	0.2 mm

Product sieve

Order number 127115

Diameter	360 mm
Mesh size	0.2 mm

Product dishes, aluminium



Product dish

Order number 127126

Material	aluminium
Diameter	63 mm
Rim height	20 mm

Product dish

Order number 127127

Material	aluminium
Diameter	140 mm
Rim height	18 mm



Product dish		Order number	127128
Material	aluminium		
Diameter	200 mm		
Rim height	18 mm		

Product dish		Order number	127130
Material	aluminium		
Diameter	360 mm		
Rim height	32 mm		

4.3 Thermoblocks

Thermoblocks, aluminium



Thermoblock		Order number	127211
Material	aluminium		
Diameter	195 mm		
Small tubes	for 110 small tubes Ø 11 mm (Eppendorf vials)		



Thermoblock		Order number	112316
Material	aluminium		
Surface	black anodized		
Diameter	195 mm		
Small tubes	für 58 Eppendorf vials 1.5 ml bis 2.2 ml		
Feature	including 3 distance pieces, stackable, 30 mm spacing between thermoblocks, 3 distance pieces required for each thermoblock		
Remark	a shelf 112318 is required		



Shelf		Order number	112318
Diameter	200 mm		
Features	with rim and feet for thermoblocks		
Temperierung	unheated		
Remark	also suitable for ALPHA 1-2		

Distance pieces for thermoblock 112316		Order number	112315
Spacing	30 mm between the thermoblocks		
Feature	3 distance pieces required for each thermoblock		



Thermoblock	Order number	127213
Diameter	195 mm	
Small tubes	for 104 small tubes Ø 13 mm	

Thermoblock	Order number	127215
Diameter	195 mm	
Small tubes	for 86 small tubes Ø 15 mm	



Thermoblock	Order number	110281
Diameter	195 mm	
Infusion bottles	for 27 small tubes Ø 29 mm x 115 mm (Falcon)	

Thermoblock	Order number	110311
Diameter	195 mm	
Small tubes	for 24 small tubes Ø 24,5 x 150 mm, with round bottom	

Thermoblock	Order number	110530
Diameter	195 mm	
Small tubes	for 100 small tubes Ø 12 x 75 mm, with round bottom	

Thermoblock	Order number	112218
Diameter	195 mm	
Small tubes	für 44 Small tubes Ø 20x30 mm long, with round bottom	

Thermoblock	Order number	112223
Diameter	195 mm	
Small tubes	for 37 small tubes Ø 23.5 x 49.5 mm, with flat bottom	

Thermoblock	Order number	112224
Diameter	195 mm	
Small tubes	for 37 small tubes Ø 25 x 100 mm, with flat bottom	

Thermoblock	Order number	112225
Diameter	195 mm	
Small tubes	für 50 small tubes Ø 19 x 40 mm, with flat bottom	

Thermoblock	Order number	112241
Diameter	195 mm	
Small tubes	for 39 small tubes Ø 16.5 x 35 mm, with flat bottom	
Remark	divided thermoblock, but not suitable for sealing device	

Thermoblock	Order number	112242
Diameter	195 mm	
Small tubes	for 21 small tubes Ø 22.5 x 46 mm, with flat bottom	
Remark	divided thermoblock, but not suitable for sealing device	

Thermoblock	Order number	112243
Diameter	195 mm	
Small tubes	for 14 small tubes Ø 27.5 x 57 mm, with flat bottom	
Remark	divided thermoblock, but not suitable for sealing device	

Thermoblock	Order number	112246
Diameter	195 mm	
Small tubes	for 91 small tubes Ø 18 x 110 mm, with flat bottom	

Thermoblock	Order number	112274
Diameter	240 mm	
Small tubes	for 39 small tubes Ø 29 x 115 mm, with conical bottom (Falcon, 50 ml)	

Distance pieces for thermoblock 112274	Order number	112275
Spacing	30 mm between thermoblocks	
Feature	3 spacers required for each thermoblock	



Shelf with rim and feet for thermoblock 112274	Order number	112279
Diameter	265 mm	
Temp. control	unheated	

Thermoblock	Order number	127223
Diameter	360 mm	
Infusion bottles	for 12 infusion bottles à 300 ml	

Thermoblock	Order number	127225
Diameter	360 mm	
Infusion bottles	for 12 infusion bottles à 500 ml	

Overview

Thermoblocks, aluminium

Article no.	Diameter of the Block/mm	Capacity of vials	Diameter vessels (mm)	Comment
127211	195	110	11	Eppendorf caps
127213	195	104	13	
127215	195	86	15	
110281	195	27	29 x 115	Falcon
110311	195	24	24.5 x 150	with round bottom
110319	195	70	11.5 x 32	with flat bottom
110530	195	100	12 x 75	with round bottom
112218	195	44	20 x 30	with flat bottom
112223	195	37	23.5 x 49.5	with flat bottom
112224	195	37	25 x 100	with flat bottom
112225	195	50	19 x 40	with flat bottom
112241	195	39	16.5 x 35	with flat bottom
112242	195	21	22.5 x 46	with flat bottom
112243	195	14	27.5 x 57	with flat bottom
112246	195	91	18 x 110	with flat bottom
112274	240	39	29 x 115	50 ml Falcon
127223	360	12	78 x 140	300 ml infusion bottles
127225	360	12	78 x 207	500 ml infusion bottles

Thermoblocks, aluminium for sealing device

Thermoblock Order number 110200

Material	aluminium
Surface	black anodized
Diameter	250 mm
Capacity	for 136 vessels Ø 12 mm x 30 mm

Thermoblock Order number 110308

Material	aluminium
Surface	black anodized
Diameter	192 mm
Form	divided
Function	For sealing device 121009, for 64 vessels 2 R (Ø 16 mm x 35 mm)

Thermoblock Order number 112200

Material	aluminium
Surface	black anodized
Diameter	192 mm
Form	divided
Function	for sealing device 121009, for 32 x Ø 22.5 mm x 45 mm

Thermoblock divided

Order number 112288

Material	aluminium
Surface	black anodized
Diameter	192 mm
Form	divided
Function	for sealing device 121009, for vessels 72 x Ø 14.8 mm x 35.5 mm



Thermoblock

Order number 112302

Material	aluminium
Surface	black anodized
Diameter	192 mm
Form	divided
Function	for sealing device 121009 for vessels 92 mm x Ø 13 mm

Thermoblock

Order number 112339

Material	aluminium
Diameter	195 mm
Form	divided
Function	for sealing device 121015 for 70 vessels 2R (Ø 16 mm x 35 mm)

Thermoblock

Order number 110064

Material	aluminium
Surface	black anodized
Diameter	240 mm
Form	divided
Size	for 48 x Ø 24 mm x 50 mm, with flat bottom
Function	for sealing device 121010 and 121020



Thermoblock

Order number 110159

Material	aluminium
Surface	black anodized
Diameter	240 mm
Form	divided
Function	for sealing device 121010 and 121020, for 94 injection flasks 2R (Ø 16 mm x 35 mm)

Thermoblock		Order number	112240
Material	aluminium		
Surface	black anodized		
Diameter	240 mm		
Form	divided		
Function	for sealing device 121011, for 48 vessels 10R (Ø 24.5 mm x 45 mm)		

Overview

Thermoblocks, for sealing device, aluminium, divided

Article no.	Diameter of Block/mm	Capacity of vials	Diameter vessels /mm	Comment	Sealing device
110308	192	64	16 x 35	2R	121009, 121015
112200	192	32	22.5 x 45	with flat bottom	121009, 121015
112288	192	72	14.8 x 35.5		121009, 121015
112302	192	92	13	with flat bottom	121009, 121015
110200	240	136	12 x 30		121010, 121011, 121020, 121021
110064	240	48	24 x 50	with flat bottom	121010, 121011, 121020, 121021
110159	240	94	16 x 35	2R	121010, 121011, 121020, 121021
112240	240	48	24.5 x 45	10R	121010, 121011, 121020, 121021

4.4 Rubber valves

Rubber valves



Rubber valve		Order number	121860
Sterilisation	can be fully sterilised at +121°C		
Function	for connection to drying chamber or as spare rubber valve for drying racks		
Feature	the rubber valve is provided with a DIN external ground surface NS 29/32 for connection with e.g. round-bottom flasks, injection vials 5–100 ml or wide neck filter bottles can be attached after removing the rubber ground connection from the valve		



Rubber valve		Order number	121861
Features	Rubber valve with screw stopper, stainless steel, solvent-resistant		
Function	for connection of vessels, DIN internal ground surface 29/32		



Spare rubber end-piece		Order number	121865
Sterilisation	can be sterilised at +121°C		
Features	for Rubber valve NS29/32		



Screw stopper	Order number	121862
Material	plastic	
Connection	for rubber valve 121860	
Sterilisation	can be sterilised at +121°C	



Stainless steel screw stopper	Order number	163542
Function	for rubber valve 121861	



Adapter	Order number	121880
Combination	for rubber valve NS 14.5	

4.5 Round-bottom flasks

Round-bottom flasks



Round-bottom flask	Order number	127350
Size	100 ml	
Round-bottom flask	Order number	127355
Size	250 ml	
Round-bottom flask	Order number	127360
Size	500 ml	
Round-bottom flask	Order number	127365
Size	1000 ml	
Round-bottom flask	Order number	127370
Size	2000 ml	

4.6 Filter inserts

Filter inserts and spare parts for filter inserts



Filter insert	Order number	121891
Features	with fine filter for rubber valves	



Filter insert	Order number	121892
Material	stainless steel	
Features	with fine filter for rubber valves, solvent resistant	



Filter paper	Order number	127444
Diameter	18 mm	
Quantity	100 pieces	
Function	for retention filter	

4.7 Wide neck filter bottles

Wide neck filter bottles



Wide neck filter bottle	Order number	127400
Size	75 ml	



Wide neck filter bottle	Order number	127405
Size	150 ml	

Wide neck filter bottle	Order number	127410
Size	300 ml	

Wide neck filter bottle	Order number	127415
Size	600 ml	

Wide neck filter bottle	Order number	127420
Size	1200 ml	

Wide neck filter bottle	Order number	127425
Size	2000 ml	

Part number of wide neck filter bottle	Capacity (ml)	External diameter (mm)	Height (mm)	Flask opening diameter	Contents for 1cm layer	
					Static (ml)	Dynamic (ml) *
127400	75	60	87	49	25	45
127405	150	70	87	49	35	115
127410	300	70	151	49	35	226
127415	600	105	130	77	78	302
127420	1200	105	222	77	78	560
127425	2000	105	352	77	78	945



Spare rubber cap

Order number 127430

Size for flask size 75 ml to 300 ml



Spare rubber cap

Order number 127431

Size for flask size 600 ml to 2000 ml



Filter paper

Order number 127440

Diameter 30 mm

Quantity 100 pieces

Pore size 70 µm

Size for flask size 75 ml to 300 ml



Filter paper

Order number 127442

Diameter 47 mm

Quantity 100 pieces

Pore size 70 µm

Size for flask size 600 ml to 2000 ml

4.8 Protection nets

Protection nets



Protection net

Order number 127380

Ø vessels 80–120 mm

Function for round-bottom flask and wide neck filter bottle

Length 250 mm



Protection net		Order number	127381
Ø vessels	100–200 mm		
Function	for round-bottom flask and wide neck filter bottle		
Length	250 mm		



Protection net		Order number	127382
Ø vessels	150–230 mm		
Function	for round-bottom flask and wide neck filter bottle		
Length	250 mm		

4.9 Ampoules

Ampoules



Long neck ampoules		Order number	127502
Volume	2 ml		
Diameter	12 mm		
Length	121 mm		
Neck diameter	8 mm		
Quantity	100 pieces		

Long neck ampoules		Order number	127505
Volume	5 ml		
Diameter	12 mm		
Length	156 mm		
Neck diameter	8 mm		
Quantity	100 pieces		

Long neck ampoules		Order number	127510
Volume	10 ml		
Diameter	16 mm		
Length	156 mm		
Neck diameter	8 mm		
Quantity	100 pieces		



Ampoule sealing torch		Order number	127695
Remark	For operation either with a mixture of gas and oxygen, or with gas, air, and oxygen. A flame stabilisation system means that the burner can be operated with a higher proportion of air to cool the flame.		

4.10 Injection Vials

Vials (Crimp neck vials) in accordance with DIN/ISO 8362-4

Vial-Type	Total volume (ml)	Diameter (mm)	Height (mm)	Volume filled to 1 cm (ml)
2 R	4	16	35	1.4
4 R	6	16	45	1.4
6 R	10	22	40	3.0
8 R	11.5	22	45	3.0
10 R	13.5	24	45	3.7
15 R	19	24	60	3.7
20 R	25	30	55	5.8
25 R	30.5	30	65	5.8
30 R	36	30	75	5.8
5 H	7	20.8	41.3	2.7
7 H	9	22.1	40.8	3.1
8 H	10	23	46.8	3.4
10 H	15	25.4	53.5	4.2
15 H	17	26.5	58.8	4.7
20 H	26	32	58	6.6
25 H	32	36	58	8.5
30 H	38	36	62.8	8.5
50 H	60	42.5	73	11.6
100 H	119	51.6	94.5	17.7

Injection vials Order number 127572

Type	2 R
Quantity	352 pieces

Injection vials Order number 127576

Type	6 R
Quantity	192 pieces

Injection vials Order number 127580

Type	10 R
Quantity	160 pieces

Injection vials Order number 127582

Type	20 R
Quantity	99 pieces

Injection vials Order number 127585

Type	50 H
Quantity	130 pieces

Injection vials	Order number	127590
Type	100H	
Quantity	88 pieces	



Rubber stopper, serrated	Order number	127650
Diameter	19 mm	
Function	for injection vials 2 R	
Quantity	100 pieces	

Rubber stopper, serrated	Order number	127651
Diameter	20 mm	
Function	for injection vials 6 R–100 H	
Quantity	100 pieces	



Crimp caps	Order number	127660
Diameter	6.8 mm	
Function	for injection vials 2 R	
Quantity	100 pieces	

Crimp caps	Order number	127661
Diameter	7.5 mm	
Function	for injection vials 6 R–100 H	
Quantity	100 pieces	



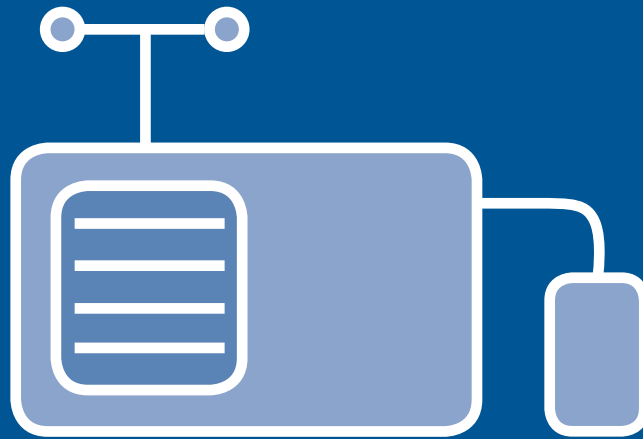
Hand crimper	Order number	127670
Remark	for 2 R	

Hand crimper	Order number	127671
Remark	for 6 R–100 H	



Decrimper	Order number	127680
Remark	for 2 R	

Decrimper	Order number	127681
Remark	for 6 R–100 H	



EPSILON Accessories

* The name EPSILON is traditionally used by the Christ company for its products with a rectangular drying chamber. Usually the shelves themselves are either heated or cooled, depending on the process stage. And here too the right accessories can play a decisive role. The spectrum ranges from product dishes for bulk-material, through frame solutions which allow the direct shelf contact with vials, to the drying manifolds for the EPSILON systems which allow drying in flasks or wide neck filter bottles.

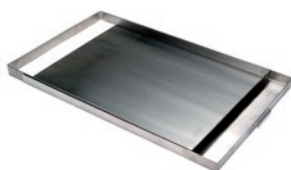
5 EPSILON Accessories

5 Epsilon Accessories

Product dishes



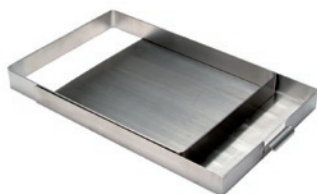
Product dish		Order number	127280
Material	stainless steel		
Size	225 x 300 x 30 mm (B x T x H)		
Remark	für EPSILON 2-6 D		



Product dish		Order number	127281
Material	stainless steel		
Size	225 x 300 x 30 mm (B x T x H)		
Feature	with removable bottom		
Remark	für EPSILON 2-6 D		



Product dish		Order number	127230
Material	stainless steel		
Size	227 x 400 x 20 mm (B x T x H)		
Rim height	20 mm		
Remark	für EPSILON 1-4/2-4 D		



Product dish		Order number	127231
Material	stainless steel		
Size	227 x 400 x 20 mm (B x T x H)		
Feature	with removable bottom		
Remark	für EPSILON 1-4/2-4 D		

Product dish		Order number	127290
Material	stainless steel		
Size	350 x 450 x 30 mm (B x T x H)		
Weight approx.	2.3 kg		
Remark	für EPSILON 2-12 D		

Product dish		Order number	127291
Material	stainless steel		
Size	350 x 450 x 30 mm (B x T x H)		
Weight approx.	2.3 kg		
Feature	with removable bottom		
Remark	für EPSILON 2-12 D		

Spring-loaded frame

Order number 127293

Material	stainless steel
Size	350 x 450 x 30 mm (B x T x H)
Weight approx.	1.5 kg
Remark	for EPSILON 2–12 D

Removable base

Order number 127295

Function	for spring frame 127293
Weight approx.	1.8 kg
Remark	for EPSILON 2–12 D



Product sensor

Order number 124801

Series	PT 100
Cable length app.	2 m

Product sensor

Order number 124806

Series	2 x PT 100
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Product sensor

Order number 124804

Series	PT 100 Mini-Epsilon
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Horizontal manifold (T-Form)

Order number 121202

Form	T-Form, multiple row
Width	575 mm
Height	753 mm
Material	stainless steel
Function	with connection via 2 x DN 40 KF-37 to the rear wall system and 12 rubber valves, for substances containing solvents
Connection	for connecting vessels with DIN internal ground surface NS 29/32: 12 x 100 ml, 12 x 250 ml, 12 x 500 ml, 12 x 1000 ml, 8 x 2000 ml round-bottom flask 12 x 75 ml, 12 x 150 ml, 12 x 300 ml, 12 x 600 ml, 12 x 1200 ml, 6 x 2000 ml wide neck filter bottle
Feature	the connections can be opened and closed individually
Remark	EPSILON 2–6 D

Vertical manifold		Order number	121204
Material	stainless steel		
Width	400 mm		
Height	524 mm		
Function	directly connected to drying chamber and 4 rubber valves for substances containing solvents		
Connection	for connecting vessels with DIN internal ground surface NS 29/32: 4 x 100 ml, 4 x 250 ml, 4 x 500 ml, 4 x 1000 ml, 4 x 2000 ml round-bottom flask 4 x 75 ml, 4 x 150 ml, 4 x 300 ml, 4 x 600 ml, 4 x 1200 ml wide neck filter bottle		
Feature	the connections can be opened and closed individually		
Remark	1 level, only with EPSILON 1/2–4 LSC		

Drip tray		Order number	121345
Dimensions	30 x 138 x 525 mm		
Function	for manifold		
Remark	for EPSILON 2–6		

Thermoblock		Order number	110245
Size	for 150 x Ø 10 mm x 45 mm, with round or flat bottom		
Remark	for EPSILON 2–10		
Dimension	400 mm x 99 mm x 25 mm (W x D x H)		



Holding block		Order number	110385
Size	for 50 x Ø 15 mm x 45 mm, with round or flat bottom		
Remark	for EPSILON 2–10		
Dimension	198 mm x 99 mm x 35 mm (W x D x H)		

Thermoblock		Order number	110296
Size	15,8 mm x 100 mm, with round bottom		
Remark	for EPSILON 2–12		
Dimension	290.5 mm x 89.2 mm x 90 mm (W x D x H)		

Sample rack		Order number	110303
Size	für 44 x Ø 16 mm x 100 mm, with round bottom		
Remark	für EPSILON 2–12		

Sample rack

Order number

110511

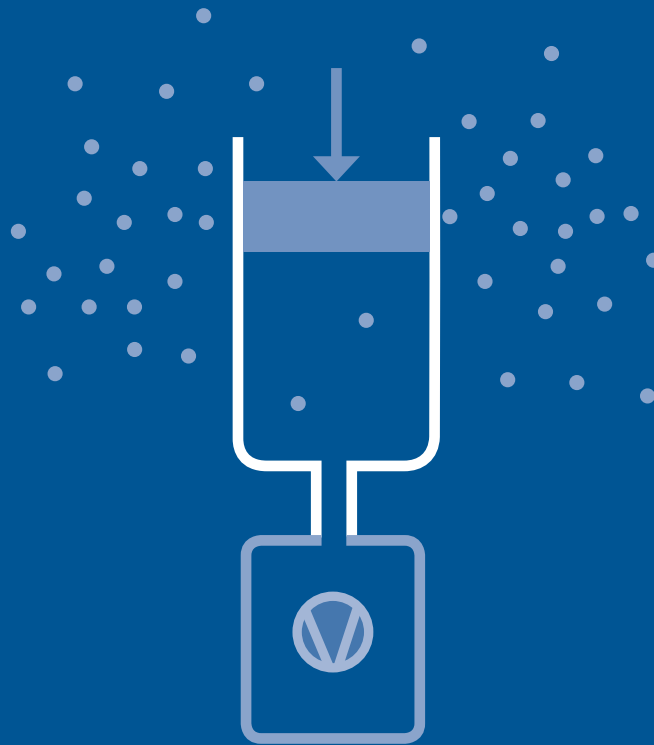
Size

for 35 x Ø 24 mm x 45 mm, with flat bottom, for 10R vials

Remark

for EPSILON 1-4/2-4 and 2-6





Vacuum

* The right vacuum gives the best possible freeze drying. For aqueous media or those with a low proportion of solvent, oil-sealed rotary vane pumps are used, and increasingly also oil-free, dry running pumps. Their advantage is that they do not need any oil changes and there is no old oil to dispose of.

If samples contain solvents, or are even completely dissolved in organic substances such as DMSO, acetonitrile or tertiary butanol, then the pump which is used must be able to withstand the actions of the chemicals. State of the Art are chemical-hybrid pumps. This is a combination of a rotary vane pump and a diaphragm pump which evacuates the oil stages of the rotary pump. This reduces the condensation of aggressive solvents in the vacuum pump oil. Lyophilisation requires final pressures of between 0.005 hPa (= mbar) and 0.01 hPa, and these have to be achieved under practical conditions.

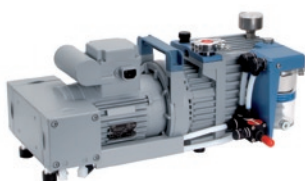
The vacuum sensors needed to monitor processes generally operate using the Pirani principle (hot-wire method, see general section) and are available in forms which can resist the actions of chemicals.

6 Vacuum

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6.1 Vacuum pumps

Vacuum pumps



Vacuum chemical hybrid pump

Order number 125295

Series	RC 6
Pumping speed	5.9 m ³ /h
Input	230V, 50/60 Hz
Feature	including quick flange connection DN 16
Remark	final vacuum 2 x 10 ⁻³ mbar

Vacuum chemical hybrid pump

Order number 125296

Series	RC 6
Features	emission condenser and collection flask, for substances containing solvent
Pumping speed	5.9 m ³ /h
Input	230V, 50/60 Hz
Feature	including quick flange connection DN 16
Remark	final vacuum 2 x 10 ⁻³ mbar



Vacuum chemical hybrid pump

Order number 125291

Series	CV 12 D
Pumping speed	11 m ³ /h
Input	230V, 60 Hz
Feature	including quick flange connection DN 25/25
Remark	final vacuum 2 x 10 ⁻³ mbar

Vacuum chemical hybrid pump

Order number 125292

Series	CV 23 D
Pumping speed	16 m ³ /h
Input	230V, 60 Hz
Feature	including quick flange connection DN 25/25
Remark	final vacuum 2 x 10 ⁻³ mbar



Vacuum pump (rotary vane pump)

Order number 125302

Series	RZ 2.5
Pumping speed	2.3 m ³ /h
Input	230V, 50/60 Hz
Feature	including quick flange connection DN 16
Remark	final vacuum 2 x 10 ⁻³ mbar



Vacuum pump (rotary vane pump)		Order number	125307
Series	RZ 6		
Pumping speed	5.7 m ³ /h		
Input	230 V, 50/60 Hz		
Feature	including quick flange connection DN 16		
Remark	final vacuum 2 x 10 ⁻³ mbar		



Vacuum pump		Order number	125317
Series	DUO 10		
Pumping speed	11.1 m ³ /h		
Input	230 V, 50/60 Hz		
Feature	including quick flange connection DN 25/25		
Remark	final vacuum 2 x 10 ⁻³ mbar		

Vacuum pump		Order number	125318
Series	DUO 20		
Pumping speed	20 m ³ /h		
Input	230 V, 50/60 Hz		
Feature	including quick flange connection DN 25/25		
Remark	final vacuum 2 x 10 ⁻³ mbar		

6.2 Vacuum pump oil

Vacuum pump oil

Oil for pumps		Order number	126181
Contents	1 l canister		
Pumps	RZ / RC / DUO		

Oil for pumps		Order number	126185
Contents	5 l canister		
Pumps	RZ / RC / DUO		

Oil for pumps		Order number	126200
Contents	20 l canister		
Pumps	RZ / RC / DUO		

6.3 Vacuum hoses

Vacuum hoses



Vacuum hose	Order number	125702
Length	1 m	
Connections	including standard flange connections DN 16/DN 25	
Remark	for vacuum pumps 125295, 125296, 125302, 125307	

Vacuum hose	Order number	125704
Length	1 m	
Feature	including standard flange connections DN 25/DN 25	
Remark	for vacuum pumps 125291, 125292, 125317, 125318	

6.4 Vacuum accessories

Vacuum accessories



Micro aeration valve	Order number	125931
Feature	with flange connection DN 25	



Micro aeration valve	Order number	125932
Feature	with hose coupling and angle pipe with DN 25/DN 25	



Electromagnetic pressure control valve	Order number	125910
Function	for attaching to the suction hose of the vacuum pump	
Feature	including DN 25/DN 25	
Remark	ALPHA and BETA LD plus, and ALPHA-GAMMA system with LSC and EPSILON 1-4/2-4	



Manual stop valve	Order number	125920
Function	for vacuum hose between the freeze drying systems of the LD plus-Series and the vacuum pump (instead of the electromagnetic pressure control valve 125910)	
Feature	with standard flange DN 25/DN 25	



Exhaust filter	Order number	125501
Remark	for vacuum pumps 125302, 125307	



Replacement filter cartridge	Order number	125509
Remark	for 125501	



Exhaust filter	Order number	125502
Series	ONF 25 L	
Feature	with automatic oil return	

Replacement filter cartridge	Order number	125510
Remark	for 125502	



Vacuum sensor	Order number	125478
Series	A VSP 62 MV	
Connection	with integrated measurement circuitry for direct connection to the freeze drying system with LD-control, already included in units with LSC-controller	
Feature	with connection cable and locking centre ring and a T-Form piece	
Warranty	6 months	
Note	these sensors are subject to wear, and to ensure a long working life it is important to use the freeze dryer carefully	

Spare sensor	Order number	125468
Series	A VSP 62 MV	
Warranty	6 months	
Note	these sensors are subject to wear, and to ensure a long working life it is important to use the freeze dryer carefully	



Chemically resistant vacuum sensor

Order number 125476

Series	TPR 281
Connection	with integrated measurement circuitry for direct connection to the freeze drying system
Range	1000–0.01 mbar
Type	Pirani
Feature	with connection cable, centre and locking rings, and a T-form piece DN 25/25 ISO-KF
Warranty	6 months
Note	these sensors are subject to wear, and to ensure a long working life it is important to use the freeze dryer carefully

Replacement sensor

Order number 125466

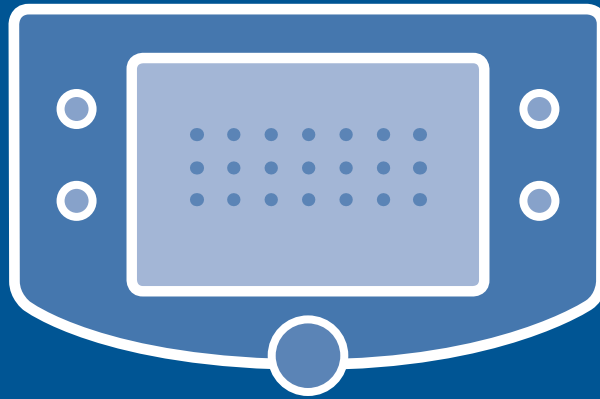
Series	TPR 281
Connection	for connection to system control, resistant to chemicals
Warranty	6 months
Note	these sensors are subject to wear, and to ensure a long working life it is important to use the freeze dryer carefully



High vacuum grease

Order number 126210

Remark	
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Process control & data acquisition

* In this chapter we present software developed by the Christ company for process acquisition. In addition to a basic version, there is also a ›Full version‹ with many additional control functions, as well as an optional software module.

And finally there are also other accessories such as product sensors for temperature and electrical resistance, data cables etc.

7 Process control & data acquisition

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- 7.3 Others 78

7.1 Software and hardware

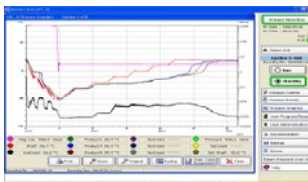
Software and hardware



Programmer module		Order number	125099
Series	PGM-30		
Function	to extend the system control LSC for 30 individual programs		
Control	control of temperature and pressure profiles as well as the process steps ›Freezing-Main drying-Secondary drying‹		
Feature	integration in the system control and processor-guided user entries makes this very easy to use, and individual steps can be added or deleted		

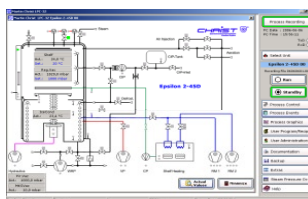
Lyocontrol		Order number	125118
Function	to determine the eutectic point		
Feature	including sensors for temperature and resistance		
Note	only in combination with LSC system control and documentation software LyoLog		
Remark	ALPHA 1–4/2–4 LSC		

Lyocontrol		Order number	125119
Function	to determine the eutectic point		
Feature	with sensor for temperature and resistance		
Note	only with LSC system control and LyoLog documentation software		
Remark	GAMMA, DELTA and EPSILON-Systems		

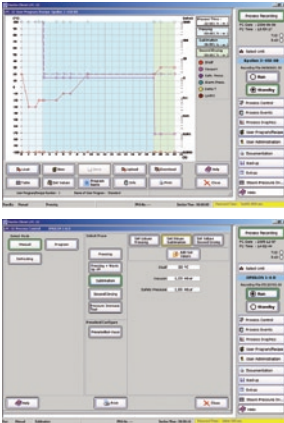


Documentation software LyoLog LL-1		Order number	125035
Function	WIN-based software to record relevant process parameters ›Ice condenser temperature, ›Product temperature, ›Shelf temperatures, ›Vacuum‹, ›Lyo-Rx‹ (depending on the type of freeze dryer)		
Feature	can be exported as pdf-file or EXCEL-file		

Extension set		Order number	125036
Function	Serial interface LD plus for freeze dryers with LD plus controller		



Process visualisation		Order number	125161
Series	LPC-32 LSC Software		
Function	software for standard PC for data registration and operation of a freeze drying system in combination with LSC system control		
Includes	LPC-32 software, 1 connection cable, installation manual and user's instructions		
Remark	without hardware		



Process visualisation		Order number	125166
Series	LPC-32		
Function	software for standard-PC for data transfer and supervision of a freeze drying system in connection with LSC system control		
Includes	LPC-32 software, 1 connection cable, instructions for installation and use, PC with operating system, colour monitor and colour graphics printer		
Note	including PC hardware		

7.2 Sensor

Sensor



Product temperature sensor		Order number	124802
Series	PT 100		
Cable length approx.	0.6 m		
Feature	with precision connections for use in system control		
Remark	ALPHA-DELTA		

Product temperature sensor		Order number	124799
Series	PT 100		
Cable length approx.	0.8 m		
Feature	with precision connections for use in system control		
Remark	ALPHA-DELTA		



Product temperature sensor		Order number	124800
Series	PT 100		
Cable length approx.	1.3 m		
Feature	with precision connections for use in system control		
Remark	ALPHA-DELTA		

Product sensor Mini Laboratory		Order number	124805
Remark	short		



Lyontrol sensor

Order number 125130

Function	combined sensor for temperature and resistance
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7.3 Others

Others

Extension unit

Order number 125040

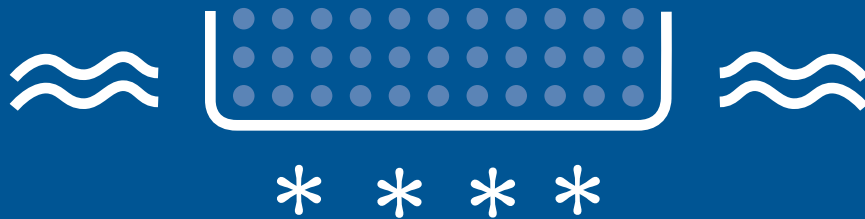
Series	HED-16 M LSC
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Function	to up-grade ALPHA 1–4 LSC and ALPHA 2–4 LSC for electrical heating of trays, and for measuring the product temperature
----------	--

Interface cable USB-RS 232

Order number 125173

Function	for connection of the freeze dryer with serial data interface to a PC via USB
----------	---



Cooling baths and freezing equipment

* The accessories for the routine use of round-bottom flask or wide neck filter bottles which have to be frozen externally are presented in this chapter. By freezing relatively thin ice layers under rotation, the drying time can be reduced dramatically (see separate booklet ›Principles and applications of freeze drying‹). And of course we also offer the necessary liquids for the cooling baths.

8 Cooling baths and freezing equipment

8 Cooling baths and freezing equipment

Cooling baths and freezing equipment



Cooling bath		Order number	101840
Series	CB 18-40		
Dimensions	410 x 450 x 460 mm		
Bath depth	200 mm		
Bath aperture	300 x 327 mm (B x L)		
Characteristics	air-cooled		
Features	stainless steel container with integrated condensation outlet, digital display of ice condenser temperature		
Contents	18 litre		
Bath temp.	approx. -40 °C		
Power input	230 V, 50/60 Hz		
Note	for connection of 1 or 2 rotating elements		
Feature	free of halogenated refrigerants		

Rotator with support rod		Order number	120720
Function	for freezing liquids in round-bottom flasks		
Weight approx.	3.8 kg		
Power input	230 V, 50 Hz		
Feature	rotational speed variable from 60 to 2000 min ⁻¹		

Horizontal Roller-device		Order number	120726
Material	stainless steel		
Weight approx.	11.5 kg		
Application	for 1 or 2 wide-neck flasks, 1200 ml		
Power input	220 V, 50 Hz		
Feature	rotational speed variable from 60 to 2000 min ⁻¹ with transparable acrylic lid		

Therminol D 12 bath liquid		Order number	130345
Quantity	5l canister		

Therminol D12 bath liquid		Order number	130350
Quantity	10l canister		

Therminol D12 bath liquid		Order number	130360
Quantity	20l canister		

Service and representatives

Our products are marketed successfully in more than 50 countries worldwide. In order to be available for our customers at all times, we have a well-organised international network of representatives who are able to provide advice and the necessary support. We also have trained system specialists in our head offices.

We are available all year round (24 hours/365 days hotline), see www.martinchrist.de



Selected countries in which the Christ company has representatives

For further information about contacts for representatives go to:

www.martinchrist.de/contact/foreignagencies

Questionnaire for freeze dryers

.....
 Your name and address

.....
 1 How many kilograms or litres should be freeze dried per batch?

.....
 2 What are the requirements about the size of the individual batches (if any)?

.....
 3 What is to be dried?

.....
 4 What is the ratio (% by weight) of the dry substances to the initial overall weight?

.....
 5 What is the consistency of the matter to be dried? (very fluid, fluid, viscous, solid) If solid, what size are the pieces?

.....
 6 Does the substance to be dried contain other solvents apart from water? If so, what percentages of which solvents?

.....
 7 What residual moisture level is permissible in the dried good?

.....
 8 Do you already have relevant experience with freeze drying and do you have preferences regarding
 a) the final quality of the dried good?
 b) the apparatus to be used?

.....
 9 Which vessels should be used for drying? What are the shapes and dimensions of the vessels? Can you provide a sample?
 How many ml of the undried substance will be in each container? How many vessels should be used per batch?
 (These details are important to help us to use the freeze drying equipment as economically as possible).

.....
 10 Should the substance be stored in the drying vessels or should it be transferred?

.....
 11 Is sealing under vacuum required?



.....
12 Is preservation under nitrogen required?

.....
13 Available power supply:

Alternating current Volt Hertz

3-phase current Volt Hertz

.....
14 Have you got any other comments or requests?

.....
A laboratory is available to carry out tests on drying methods.

.....
Date

.....
Signature

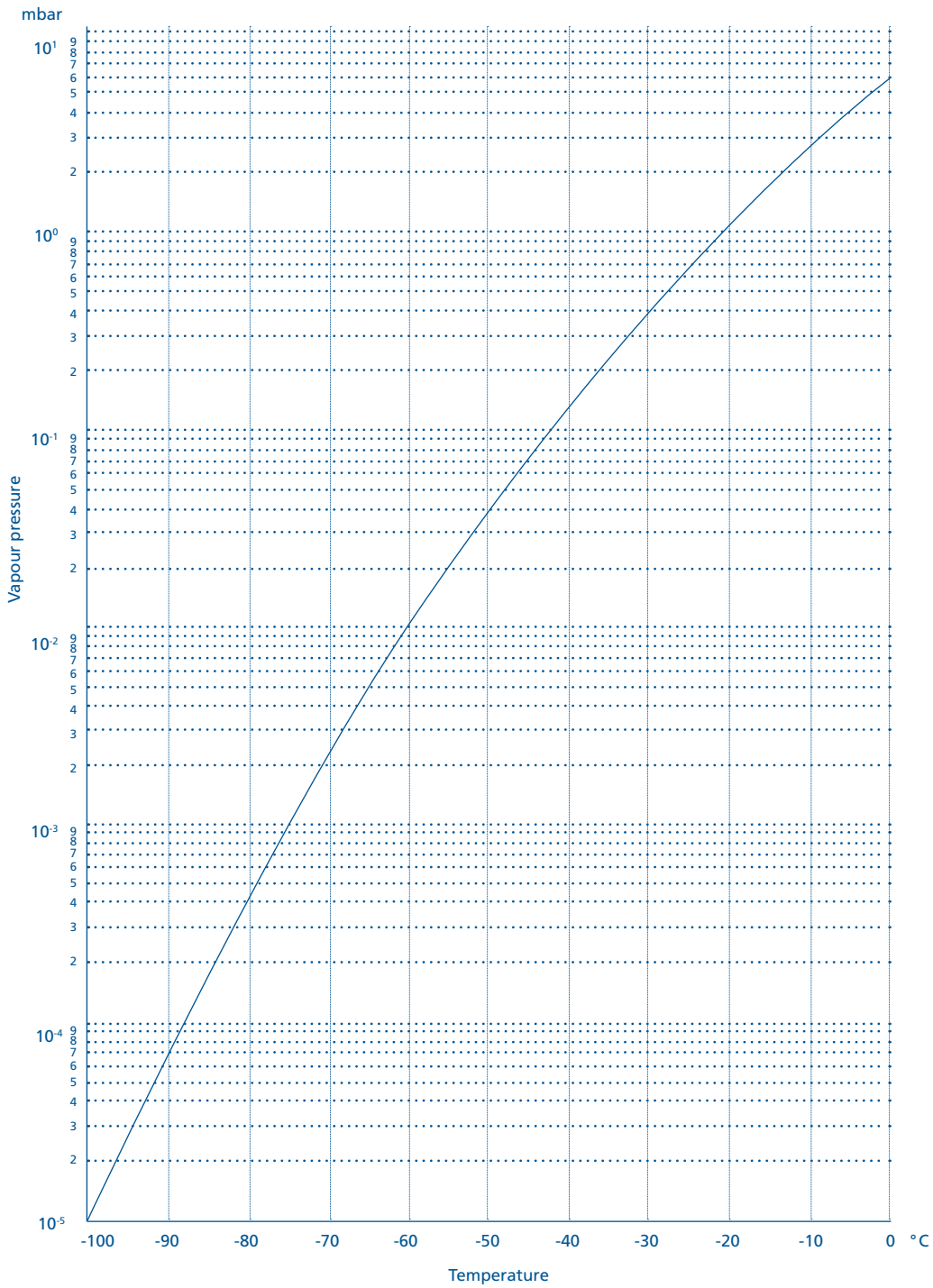
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Vapour pressure above ice



1 mbar $\hat{=}$ 1 hPa = 10² Pa

1 mbar $\hat{=}$ 10⁵ Pa = 0,1 N/mm²

1 Pa = 1 N/m²

1 Torr = 1,3332 mbar

Conversion table

Conversion table ›Vapour pressure above ice‹ (ice temperature (°C) $\hat{=}$ pressure (mbar))

°C	$\hat{=}$ mbar	°C	$\hat{=}$ mbar	°C	$\hat{=}$ mbar	°C	$\hat{=}$ mbar
0	6.110	-20	1.030	-40	0.120	-60	0.011
-1	5.620	-21	0.940	-41	0.110	-61	0.009
-2	5.170	-22	0.850	-42	0.100	-62	0.008
-3	4.760	-23	0.770	-43	0.090	-63	0.007
-4	4.370	-24	0.700	-44	0.080	-64	0.006
-5	4.020	-25	0.630	-45	0.070	-65	0.0054
-6	3.690	-26	0.570	-46	0.060	-66	0.0047
-7	3.380	-27	0.520	-47	0.055	-67	0.0047
-8	3.010	-28	0.470	-48	0.050	-68	0.0035
-9	2.840	-29	0.420	-49	0.045	-69	0.0030
-10	2.560	-30	0.370	-50	0.040	-70	0.0026
-11	2.380	-31	0.340	-51	0.035	-71	0.0023
-12	2.170	-32	0.310	-52	0.030	-72	0.0019
-13	1.980	-33	0.280	-53	0.025	-73	0.0017
-14	1.810	-34	0.250	-54	0.024	-74	0.0014
-15	1.650	-35	0.220	-55	0.021	-75	0.0012
-16	1.510	-36	0.200	-56	0.018	-76	0.0010
-17	1.370	-37	0.180	-57	0.016	-77	
-18	1.250	-38	0.160	-58	0.014	-78	
-19	1.140	-39	0.140	-59	0.012	-79	

The product spectrum

With a unique, broadly based program of products and accessories we supply freeze dryers and vacuum concentrators for all applications.

- * Freeze drying systems for industrial production
- * Pilot systems for process development and/or optimisation
- * Freeze dryers for research and development
- * Rotation vacuum concentrators for solutions in four sizes, for routine laboratory applications through to evaporation in the high-end pharmaceutical research
- * Freeze dryer for routine applications





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