# Accessories Catalogue

For Perfect
Freeze Drying

www.martinchrist.de

CHRIST

# *Accessories*

for Perfect Freeze Drying

**Martin Christ**
**Gefriertrocknungsanlagen GmbH**

An der Unteren Söse 50
37520 Osterode am Harz

Phone +49 (0) 55 22 50 07-0
Fax +49 (0) 55 22 50 07-12

www.martinchrist.de
info@martinchrist.de

**1 Freeze Drying / Lyophilisation 5**

**2 Example Applications 9**

**3 Drying Chambers and shelves 19**
3.1 Drying chambers **20**
3.2 Unheated shelves **27**
3.3 Heated shelves **30**
3.3.1 LSC sealing device (wired) **30**
3.3.2 LSCplus sealing device (wireless) **32**
3.3.3 LSCplus shelves (wireless) **35**
3.3.4 LSC shelves (wired) **39**
3.4 Drying manifolds **46**

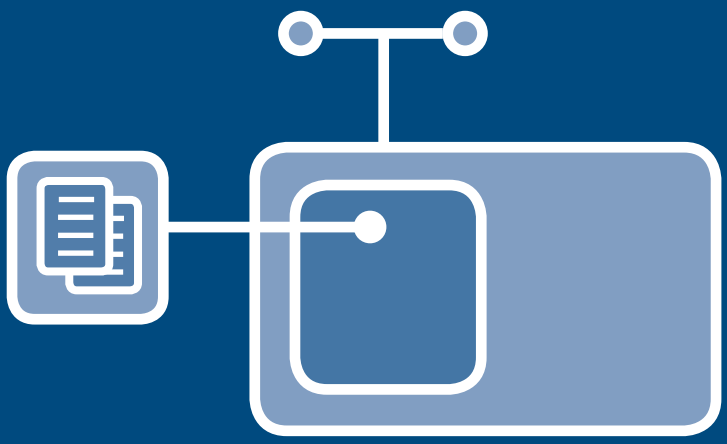
**4 Drying Accessories 53**
4.1 Product dishes **54**
4.2 Product sieves **55**
4.3 Thermoblocks, split **56**
4.4 Thermoblocks, not split **60**
4.5 Rubber valves **68**
4.6 Round-bottom flasks **69**
4.7 Filter inserts **69**
4.8 Wide-neck bottles **70**
4.9 Protective nets **71**
4.10 Ampoules **72**
4.11 Single vial sealing device **72**
4.12 Injection vials **73**

**5 Epsilon Accessories 77**

**6 Vacuum 91**
6.1 Vacuum pumps **92**
6.2 Vacuum pump oil **94**
6.3 Vacuum hoses **94**
6.4 Vacuum accessories **95**

**7 Process Data Acquisition 99**
7.1 Software and hardware **100**
7.2 Sensors **101**
7.3 Miscellaneous **102**

**8 Cooling Baths and Freezing Equipment 107**



## Freeze Drying / Lyophilisation

*Freeze drying or lyophilisation takes place in the solid (frozen) state and is the preferred means for the long-term preservation of a wide variety of substances and for specimen preparation for modern analytic methods.
It is also used in animal preparations and in museums to preserve the original material forms.
Relatively new applications involve the drying of nanoparticles, where it is important to avoid the effects of capillary forces and surface tension.
Freeze drying is used for more than 30 different substance categories or materials, with the pharmaceutical and biotechnology industries and food preservation being the most significant application areas.

# 1 Freeze Drying / Lyophilisation

# 1 Freeze Drying / Lyophilisation

Freeze drying or lyophilisation is by far the gentlest way to remove moisture from materials. The physical phenomenon of sublimation means a direct transition from the solid state to the vapour state without passing through the liquid state. The frozen material is dried under vacuum without thawing. This method can be used for a wide variety of applications:

- Preserving the characteristics of original substances in products (e.g. pharmaceutical products or milk)
- Preserving the original form (e.g. animal preparations, archaeological objects or flowers)
- Conditioning the material (e.g. freeze-dried fruit in yoghurt)
- Chemical analyses (e.g. trace element analyses of foods, sludge or soil)

Freeze dryers are generally divided into two categories: batch freeze dryers and continuous freeze dryers. Batch freeze dryers are available with capacities from 2 kg to approximately 1 tonne per batch. Christ specialises in this product category and is the only manufacturer worldwide offering products that cover the full spectrum from standard laboratory units to pilot freeze dryers and large production units.

## Laboratory freeze dryer systems

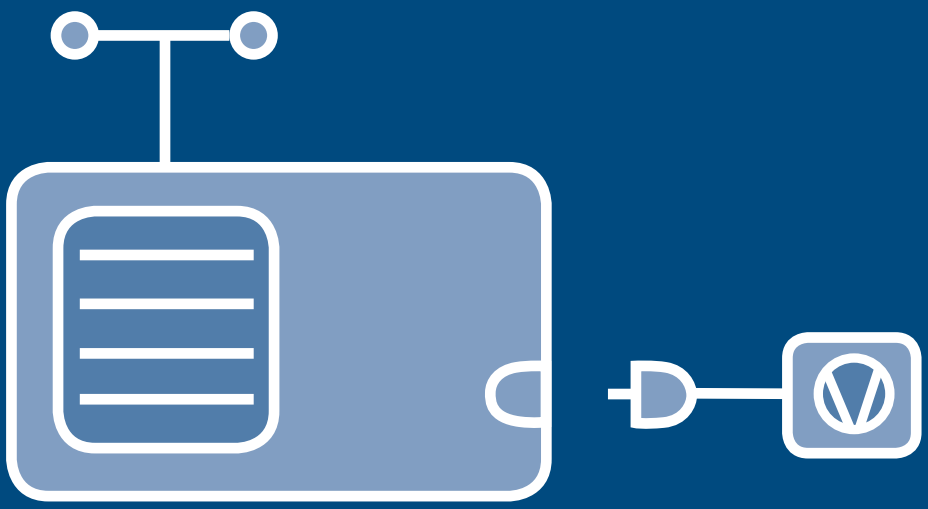
- Ice condenser capacity 2 to 24 kg
- Mainly air-cooled chilling systems
- Broad range of accessories for a wide variety of applications

## Pilot freeze dryer systems

- Ice condenser capacity 6 to 16 kg
- Air-cooled or water-cooled chilling systems
- Freezing and drying in the drying chamber
- on shelves with liquid temperature control

## Production freeze drying systems

- Ice condenser capacity 20 to more than 1000 kg
- Water-cooled chilling systems
- Freezing and drying in the drying chamber
- on shelves with liquid temperature control
- One-chamber and two-chamber systems
- Special custom systems, SIP/$H_2O_2$ disinfection, CIP, IQ/OQ, etc.
- Process integration (loading systems, auxiliary units)



## Example Applications

*Accessories from Christ enable tailored solutions for individual applications. The modular system architecture makes adaptation to altered requirements easy, even a long time after the basic unit was acquired.
The units in the Advanced series can be operated as one-chamber or two-chamber systems as desired with the appropriate accessories.
Many accessories, such as acrylic chambers, can be used on basic units with capacities from 4 kg to 24 kg (ice capacity). A number of example systems are described below.

# 2 Example Applications

## Starter package

Accessories for our smallest unit, Alpha 1–2 LDplus, for drying in round-bottom flasks, wide-neck bottles or ampoules or on unheated shelves.

Starter product package with Alpha 1–2 LDplus

Starter

| 3 shelves dia. 200 mm = 920 cm², distance between shelves 85 mm, additional ports for 8 flasks, round-bottom flasks and wide-neck bottles or distributor (Figure 3 in the Routine Processes folder) | | | |
|---|---|---|---|
| System | Alpha 1-2 LDplus (item no. 101521) | | |
| Description | Item number | Quantity | Page |
| 1 Vacuum sensor | 125478 | 1 | 97 |
| 2 Vacuum hose | 125702 | 1 | 96 |
| 3 Base plate | 120890 | 1 | 44 |
| 4 Three unheated shelves | 120893 | 1 | 27 |
| 5 Acrylic drying chamber with 8 ports | 121455 | 1 | 20 |
| 6 Rubber valves | 121860 | 8 | 68 |
| 7 Vacuum pump RZ-2,5 (2.25 m³/h) | 125302 | 1 | 94 |
| 8 Exhaust filter | 125501 | 1 | 97 |

Routine package

Accessories for the Beta series for drying in round-bottom flasks, wide-neck bottles or vials or on unheated shelves with relatively high specimen volume.

Routine product package with Beta 2–8 LSCbasic

Routine

| Drying chamber with 24 ports for bottles, round-bottom flasks and wide-neck bottles or distributor for ampoules (Figure 12 in the Routine Processes folder) | | | |
|---|---|---|---|
| System | Beta 2–8 LSCbasic | | |
| Description | Item number | Quantity | Page |
| 1 Vacuum sensor | 125478 | 1 | 97 |
| 2 Vacuum pump RZ-6 | 125307 | 1 | 95 |
| 3 Exhaust filter | 125501 | 1 | 97 |
| 4 Vacuum hose | 125702 | 1 | 96 |
| 5 Base plate | 120900 | 1 | 44 |
| 6 3 shelves with rim | 120903 | 1 | 27 |
| 7 Acrylic drying chamber | 121550 | 1 | 22 |
| 8 Extra acrylic drying chamber | 121850 | 1 | 22 |
| 9 Rubber valve for connecting vessels | 121860 | 24 | 68 |
| 10 Drip tray for acrylic drying chamber | 121360 | 1 | 45 |

## Pharmacy product package

Accessories for the Alpha LSCplus series for carrying out the complete freeze drying process, including connection of crimp-seal vials under vacuum or inert gas.

Pharmacy 1 product package with Alpha 2-4 LSCplus

Pharmacy 1

| Freezing and drying ice condenser chamber (method A) cooled shelves with sealing device (dia. 200 mm, total area 0.031 m²) (Figure 2 in Advanced Processes folder) | | | |
|---|---|---|---|
| System | Alpha 2-4 LSCplus (item no. 102142) | | |
| Description | Item number | Quantity | Page |
| 1 Extension unit HED-16 LSCplus | 125041 | 1 | |
| 2 Vacuum pump RZ-2,5 (2.25 m³/h) | 125302 | 1 | 94 |
| 3 Exhaust filter | 125501 | 1 | 97 |
| 4 Vacuum hose with standard flange couplings | 125702 | 1 | 96 |
| 5 Electromagnetic pressure control and stop valve | 125910 | 1 | 96 |
| 6 Sealing device integrated in acrylic lid | 120861 | 1 | 32 |

## Dish Drying 1 product package

Accessories for laboratory systems with LSCplus controller for drying relatively large specimen volumes in dishes or vessels (or in aluminium blocks if necessary).

Dish Drying 1 product package with Alpha 1-4 LSCplus

Dish Drying 1

| 10 heated shelves (dia. 200 mm; total area 0.31 m², distance between shelves 25 mm – can be adjusted by removing shelves) | | | |
|---|---|---|---|
| System | Alpha 1-4 LSCplus (item no. 102141) | | |
| Description | Item number | Quantity | Page |
| 1 Extension unit HED-16 LSCplus | 125041 | 1 | |
| 2 Vacuum pump RZ-6 | 125307 | 1 | 95 |
| 3 Exhaust filter | 125501 | 1 | 97 |
| 4 Vacuum hose with standard flange couplings | 125702 | 1 | 96 |
| 5 Electromagnetic pressure control and stop valve | 125910 | 1 | 96 |
| 6 Base plate | 120880 | 1 | 36 |
| 7 Frame for 10 shelves | 121160 | 1 | 37 |
| 8 Shelves with rim, dia. 200 mm, with LyoBus-Modul | 122576 | 10 | 37 |
| 9 Acrylic drying chamber | 121558 | 1 | 22 |

## Pharmacy 2 product package

Accessories for laboratory systems with LSCplus controller for drying relatively large product volumes in crimp-seal vials, including connection under vacuum or inert gas.

Pharmacy 2 product package with Alpha 2-4 LSCplus

Pharmacy 2

| 4 heated shelves with sealing device (dia. 250 mm, total area 0.18 m², distance between shelves 50 mm – can be adjusted by removing shelves) | | | |
|---|---|---|---|
| System | Alpha 2–4 LSCplus (item no. 102142) | | |
| Description | Item number | Quantity | Page |
| 1 Extension unit HED-16 LSCplus | 125041 | 1 | |
| 2 Vacuum pump RZ-6 | 125307 | 1 | 95 |
| 3 Exhaust filter | 125501 | 1 | 97 |
| 4 Vacuum hose with standard flange couplings | 125702 | 1 | 96 |
| 5 Electromagnetic pressure control and stop valve | 125910 | 1 | 96 |
| 6 Base plate | 120880 | 1 | 36 |
| 7 Sealing device with 1 shelf | 120841 | 1 | 33 |
| 8 Shelf with rim | 120830 | 3 | 33 |
| 9 Acrylic drying chamber | 121505 | 1 | 27 |

## Flask Drying / Solvent product package

Accessories for the Gamma (and Delta) LSCplus series for drying in round-bottom flasks, wide-neck bottles or ampoules. Optionally also for aggressive solvents.

Flask Drying / Solvent product package with Gamma 2–16 LSCplus

Flask Drying / Solvent

| Drying manifold for 24 round-bottom flasks / wide-neck bottles or distributor for ampoules | | | |
|---|---|---|---|
| System | Gamma 2–16 LSCplus (item no. 102211) | | |
| Description | Item number | Quantity | Page |
| 1 Vacuum pump RC-6 | 125295 | 1 | 94 |
| 2 Vacuum hose with standard flange couplings | 125702 | 1 | 76 |
| 3 Electromagnetic pressure control and stop valve | 125911 | 1 | |
| 4 Solvent-resistant manifold with 24 rubber valves | 112237 | 1 | 47 |
| 5 Drip tray | 121360 | 1 | 45 |

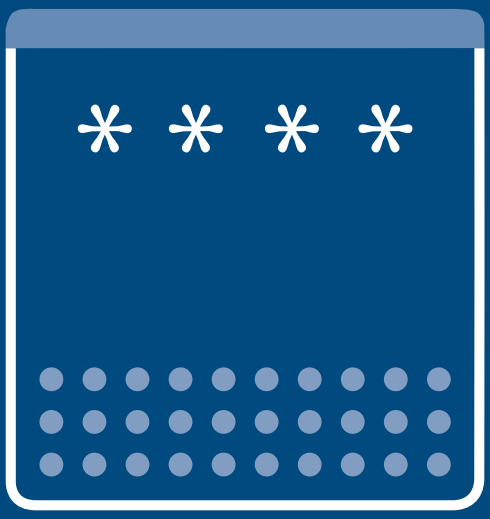
## Dish Drying 2 product package

Accessories for the Delta (and Gamma) LSCplus series for drying very large specimen volumes (up to 16 litres) in dishes.

Dish Drying 2 product package with Delta 1-24 LSCplus

Dish Drying 2

| 8 heatable shelves (dia. 375 mm, total area 0.88 m², distance between shelves 48 mm) | | | |
|---|---|---|---|
| System | Delta 1–24 LSCplus (item no. 102300) | | |
| Description | Item number | Quantity | Page |
| 1 Vacuum pump DUO 20 (20 m³/h) | 125322 | 1 | |
| 2 Exhaust filter | 125502 | 1 | 97 |
| 3 Electromagnetic pressure control and stop valve | 125911 | 1 | |
| 4 Plate frame with 8 electrically heatable shelves | 122826 | 1 | 38 |
| 5 Acrylic drying chamber | 121529 | 1 | 25 |
| 6 Lifting hoist for acrylic drying chamber, electronic control | 121914 | 1 | |



## Drying Chambers

* Drying chambers and manifolds are often desirable extensions to the basic unit for high specimen throughput. The chambers are recipients in which both heated and unheated shelves can be placed. Sealing devices can be used when long-term storage of the freeze-dried specimens under vacuum or under an inert gas atmosphere is desired.
Stainless steel manifolds are the ideal solution for users who work exclusively with flasks or wide-neck bottles.

# 3 Drying chambers and shelves – Alpha to Delta


3.1 Drying chambers **20**
3.2 Unheated shelves **27**
3.3 Heated shelves 30
3.3.1 LSC sealing device **30**
3.3.2 LSCplus sealing device **32**
3.3.3 LSCplus shelves **35**
3.3.4 LSC shelves **39**
3.4 Drying manifolds **46**

## 3.1 Drying Chambers

### Drying chambers Ø 240 mm (for Alpha 1–2 LDplus)

The drying chamber can be placed directly on top of any laboratory system. A base plate is additionally necessary when shelves and racks are used.

Acrylic drying chamber — Order number 121450

| | |
|---|---|
| Diameter | 240 mm |
| Clear height | 285 mm |
| Weight approx. | 3.6 kg |
| Features | With NS 45/40 ground joint stoppers |
| Remark | Alpha 1-2 LDplus |

Acrylic drying chamber — Order number 121454

| | |
|---|---|
| Diameter | 240 mm |
| Clear height | 285 mm |
| Weight approx. | 3.6 kg |
| Features | With 6 ports for individually closable rubber valves |
| Remark | Alpha 1-2 LDplus |

Acrylic drying chamber — Order number 121455

| | |
|---|---|
| Diameter | 240 mm |
| Clear height | 285 mm |
| Weight approx. | 3.6 kg |
| Features | With 8 ports for individually closable rubber valves, including NS 45/40 ground joint stoppers |
| Remark | Alpha 1-2 LDplus |

Overview

Ø 240 mm only for Alpha 1–2 LDplus

| Item number | Height [mm] | Connections | Weight [kg] |
|---|---|---|---|
| 121450 | 285 | | 3.6 |
| 121454 | 285 | 6 | 3.6 |
| 121455 | 285 | 8 | 3.6 |

Stainless steel drying chamber — Order number 121536

| | |
|---|---|
| Diameter | 240 mm |
| Clear height | 295 mm |
| Weight | 8 kg |
| Features | With adapter ring, only usable in combination with glass lid 121398 |
| Remark | Alpha 1-2 LDplus |

Connection ring, stainless steel — Order number 121534

| | |
|---|---|
| Diameter | 240 mm |
| Clear height | 55 mm |
| Weight | 2.7 kg |
| Features | With 8 ports for rubber valves including adapter ring; can only be used in combination with glass lid 121398 and stainless steel drying chamber 121536 |
| Connection | For connecting vessels with DIN female ground joint NS29/32:<br>8x 100 ml, 8x 250 ml, 8x 500 ml, 8x 1000 ml, 8x 2000 ml round-bottom flasks<br>8x 75 ml, 8x 150 ml, 8x 300 ml, 8x 600 ml, 8x 1200 ml wide-neck filter bottles |
| Remark | Alpha 1-2 LDplus |

## Drying chambers Ø 300 mm (not for Alpha 1–2 LDplus)

Acrylic drying chamber — Order number 121500

| | |
|---|---|
| Diameter | 300 mm |
| Clear height | 295 mm |
| Weight approx. | 4.5 kg |
| Features | With stoppers |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

Acrylic drying chamber — Order number 121505

| | |
|---|---|
| Diameter | 300 mm |
| Clear height | 460 mm |
| Weight approx. | 6 kg |
| Features | With stoppers |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

Acrylic drying chamber — Order number 121558

| | |
|---|---|
| Diameter | 300 mm |
| Clear height | 515 mm |
| Weight approx. | 6.4 kg |
| Features | Suitable for hoist |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

| Acrylic drying chamber | Order number 121550 |
|---|---|
| Diameter | 300 mm |
| Clear height | 295 mm |
| Weight approx. | 5.1 kg |
| Connection | With 12 ports for individually closable rubber valves |
| Features | With stoppers |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

| Additional acrylic chamber | Order number 121850 |
|---|---|
| Diameter | 300 mm |
| Clear height | 295 mm |
| Weight approx. | 4.8 kg |
| Connection | With 12 ports for individually closable rubber valves |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

| Acrylic drying chamber | Order number 121555 |
|---|---|
| Diameter | 300 mm |
| Clear height | 460 mm |
| Weight approx. | 6 kg |
| Connection | With 12 ports for individually closable rubber valves |
| Features | With stoppers |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

| Acrylic drying chamber | Order number 121557 |
|---|---|
| Diameter | 300 mm |
| Clear height | 515 mm |
| Weight approx. | 6.6 kg |
| Connection | With 12 ports for individually closable rubber valves |
| Features | Suitable for hoist |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

Overview

Ø 300 mm for Alpha to Delta

| Item number | Height [mm] | Connections | Weight [kg] |
|---|---|---|---|
| 121500 | 295 | | 4.5 |
| 121550 | 295 | 12 | 5.1 |
| 121850 | 295 | 12 | 4.8 |
| 121505 | 470 | | 6 |
| 121555 | 460 | 12 | 5.1 |
| 121558 | 515 | | 6.4 |
| 121557 | 515 | 12 | 6.6 |

Stainless steel drying chamber — Order number 121537

| | |
|---|---|
| Diameter | 300 mm |
| Clear height | 295 mm |
| Weight approx. | 5.4 kg |
| Related items | Only suitable for use with glass lid 121411 |
| Features | With adapter ring |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

Stainless steel drying chamber — Order number 121538

| | |
|---|---|
| Diameter | 300 mm |
| Clear height | 460 mm |
| Weight approx. | 8.6 kg |
| Related items | Only suitable for use with glass lid 121411 |
| Features | With adapter ring |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

Conection ring, stainless steel — Order number 121535

| | |
|---|---|
| Diameter | 300 mm |
| Height | 55 mm |
| Weight | 2 kg |
| Connection | For connecting vessels with DIN female ground joint NS29/32:<br>12x 100 ml, 12x 250 ml, 12x 500 ml, 12x 1000 ml, 12x 2000 ml round-bottom flasks ·<br>12x 75 ml, 12x 150 ml, 12x 300 ml, 12x 600 ml, 12x 1200 ml wide-neck filter bottles |
| Related items | Only usable for use with glass lid 121411 and stainless steel drying chamber 121537 or 121538 |
| Features | With adapter ring |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

## Drying chambers Ø 457 mm (not suitable for use with Alpha 1–2 LDplus)

- Adapter flange item no. 120901 required for Alpha 1/2–4 LSCbasic and Beta 1/2–8 LSCbasic
- Adapter flange item no. 120881 required for Alpha 1/2–4 LSCplus and Beta 1/2–8 LSCplus

Acrylic drying chamber — Order number 121511

| | |
|---|---|
| Diameter | 457 mm |
| Clear height | 340 mm |
| Weight approx. | 12.7 kg |
| Features | With hoisting eye including connection for lifting device |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

Acrylic drying chamber — Order number 121515

| | |
|---|---|
| Diameter | 457 mm |
| Clear height | 340 mm |
| Weight approx. | 12.7 kg |
| Features | With 18 individually closable rubber valves, hoisting eye including connection for lifting device |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

Acrylic drying chamber — Order number 121517

| | |
|---|---|
| Diameter | 457 mm |
| Clear height | 460 mm |
| Weight approx. | 14.3 kg |
| Features | With hoisting eye including connection for lifting device |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

Acrylic drying chamber — Order number 121521

| | |
|---|---|
| Diameter | 457 mm |
| Clear height | 460 mm |
| Weight approx. | 14.3 kg |
| Features | With18 ports for rubber valves, hoisting eye including connection for lifting device |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

Acrylic drying chamber — Order number 121523

| | |
|---|---|
| Diameter | 457 mm |
| Clear height | 565 mm |
| Weight approx. | 15.8 kg |
| Features | With hoisting eye including connection for lifting device |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

Acrylic drying chamber — Order number 121527

| | |
|---|---|
| Diameter | 457 mm |
| Clear height | 565 mm |
| Weight approx. | 15.8 kg |
| Features | With 18 ports for rubber valves, with hoisting eye including connection for lifting device |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

Acrylic drying chamber — Order number 121529

| | |
|---|---|
| Diameter | 457 mm |
| Clear height | 693 mm |
| Weight approx. | 17.6 kg |
| Features | With hoisting eye including connection for lifting device |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

Acrylic drying chamber — Order number 121531

| | |
|---|---|
| Diameter | 457 mm |
| Clear height | 693 mm |
| Weight approx. | 17.6 kg |
| Features | With 18 ports for rubber valves, hoisting eye including connection for lifting device |
| Remark | For all laboratory units except of Alpha 1-2 LDplus |

Overview

Ø 457 mm for Alpha to Delta

| Item number | Height [mm] | Connections | Weight [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 |

Stoppers for acrylic chambers — Order number 121410

| | |
|---|---|
| NS | 45/40 |
| Colour | Black |
| Remark | Also usable with acrylic lid (121404) and glass lid (121411) |

Rubber stoppers — Order number 492299

| | |
|---|---|
| Function | For closing ports in acrylic chambers |
| Colour | Grey |

Silicone cap — Order number 492300

| | |
|---|---|
| Function | For ports of acrylic chambers |

## 3.2 Unheated shelves

### Shelves

3 aluminium shelves with rim — Order number 120893

| | |
|---|---|
| Diameter | 200 mm |
| Heating/cooling | Unheated |
| Features | Spacing between shelves 80 mm |
| Remark | Only for Alpha 1–2 LDplus |

3 aluminium shelves with rim — Order number 120903

| | |
|---|---|
| Diameter | 265 mm |
| Height approx. | 270 mm |
| Heating/cooling | Unheated |
| Features | Spacing between shelves 79 mm |

5 aluminium shelves with rim — Order number 120902

| | |
|---|---|
| Diameter | 265 mm |
| Heating/cooling | Unheated |
| Features | Spacing between shelves 79 mm |

5 aluminium shelves — Order number 112229

| | |
|---|---|
| Diameter | 360 mm |
| Heating/cooling | Unheated |
| Features | Spacing between shelves 70 mm |
| Remark | Not for Alpha 1–2 LDplus |

1 aluminium shelf with rim and feet — Order number 112279

| | |
|---|---|
| Spacing | 33 mm |
| Diameter | 265 mm |
| Heating/cooling | Unheated |
| Features | Stackable up to 10 high |
| Remark | Not for Alpha 1–2 LDplus |

1 aluminium shelf with rim and feet — Order number 112318

| | |
|---|---|
| Diameter | 200 mm |
| Heating/cooling | Unheated |
| Remark | For use with Alpha 1–2 LDplus and other laboratory freeze dryers |

Number of drying vessels per shelf, order number 120902 and 120903

| Order number of drying vessels | ID code Nominal capacity (ml) | Dimensions Ø (mm) | Dimensions height (mm) | Content with 1 cm layer | | Number | Min. necessary spacing |
|---|---|---|---|---|---|---|---|
| | | | | 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 |
| 127010 | | 75 | 20 | 45.0 | | 8 | 25 |
| 127073 | | 200 | 18 | 300.0 | | 1 | 25 |

* sh.f. = shell freezing; sp.f. = spin freezing (see introduction)

Rack — Order number 127202

| | |
|---|---|
| Function | To hold 10 (11) microtiter plates (no deep-well plates) |
| Clearance | 20 mm |
| Material | Anodised aluminium plate holders and stainless steel spacers |
| Features | If the microtiter plates are placed in this rack for freezing (externally), the specially formed anodised aluminium plate holders act as cold buffers, which prevents partial or full thawing of the specimens at the start of the process |
| Remark | Use base plate 120906 for Alpha to Delta |
| Dimensions | Height 283.5 mm, depth 97.5 mm, width 133.5 mm |

Rack — Order number 127203

| | |
|---|---|
| Function | To hold 1 deep-well plate or 1 microtiter plate |
| Clearance | 50 mm |
| Material | Anodised aluminium plate holders and stainless steel spacers |
| Features | If the microtiter plates are placed in this rack for freezing (externally), the specially formed anodised aluminium plate holders act as cold buffers, which prevents partial or full thawing of the specimens at the start of the process. Shelves can be stacked up to 5 high |
| Remark | For Alpha to Delta |

| Rack | Order number 110394 |
|---|---|
| Function | To hold 6 microtiter plates or 6 deep-well plates |
| Clearance | 85 mm |
| Material | Anodised aluminium with stainless steel spacers in three levels |
| Features | Not stackable |
| Remark | Also for Alpha 1–2 LDplus |

| Rack | Order number 110527 |
|---|---|
| Function | To hold 5 microtiter plates |
| Clearance | 25 mm |
| Material | Stainless steel with PDVF feet |
| Features | Racks can be stacked up to 3 high |
| Remark | Also for Alpha 1–2 LDplus |
| Dimensions | Height 137 mm, depth 130.6 mm, width 89.5 mm |

## Sealing devices for LDplus / LSCbasic controller

| Sealing device with 2 shelf with rim | Order number 121015 |
|---|---|
| Diameter | 200 mm |
| Temperature control system | None |
| Extension | Shelves, separation 70 mm; with just one shelf 152 mm |
| Features | Only in combination with base plate 120890 |
| Remark | For Alpha 1–2 LDplus |
| Hood | 121450 or 121455 can be used |

| Sealing device with 1 shelf with rim | Order number 121020 |
|---|---|
| Diameter | 250 mm |
| Temperature control system | None |
| Extension | Can be extended to 2 shelves (max.) with shelf 120959 |
| Remark | For Alpha 1/2–4 LSCbasic and Beta 1/2-8 LSCbasic |
| Hood | 121500 or 121550 can be used |

| Sealing device with 1 shelf with rim | Order number 121021 |
|---|---|
| Diameter | 250 mm |
| Temperature control system | None |
| Extension | Can be extended to max. 4 shelves (120959) |
| Remark | For Alpha 1/2–4 LSCbasic and Beta 1/2-8 LSCbasic |
| Hood | 121505 or 121555 can be used |

## 3.3 Heated shelves

### Sealing devices for LSC system controller (wired)

Sealing device integrated into acrylic lid Ø 300 mm — Order number 121009

| | |
|---|---|
| Function | For sealing injection vials, sealing distance adjustable, under vacuum or inert gas with 1 shelf with rim Ø 200 mm |
| Temperature control system | Heatable with integrated PT 100 sensor |
| Weight approx. | 6 kg |
| Remark | For Alpha with LSC system controller |

Number of drying vessels per shelf, order number 120860 and 121009

| Order number of drying vessels | ID code Nominal capacity (ml) | Dimensions Ø (mm) | Dimensions height (mm) | Content with 1 cm layer | | Number |
|---|---|---|---|---|---|---|
| | | | | Static (ml) | Dynamic (ml) * | |
| 127572 | 2 R | 16 | 35 | 1.2 | | 116 |
| 127576 | 6 R | 22 | 40 | 3.0 | | 60 |
| 127580 | 10 R | 24 | 45 | 4.5 | | 48 |
| 127582 | 20 R | 30 | 55 | 6.0 | | 29 |
| 127585 | 50 H | 42.5 | 73 | 12.0 | 35–40 (sp. f.) | 15 |
| 127000 | | 65 | 20 | 28.0 | | 5 |
| 127010 | | 75 | 20 | 45.0 | | 4 |

* sh. f. = shell freezing; sp. f. = spin freezing (see introduction)

Sealing device with 1 shelf with rim — Order number 121010

| | |
|---|---|
| Diameter | 250 mm |
| Function | For sealing injection vials with serrated rubber stoppers under vacuum or inert gas |
| Temperature control system | Electrical heating with built-in sensor PT 100 |
| Extension | Can be extended to max. 2 shelves (120960) |
| Features | Height of pressure plate is adjustable |
| Weight approx. | 9 kg |
| Remark | For Alpha to Delta with LSC controller |

Options for order number 121010 and 121020

| Shelf arrangement | Clearance between shelves (mm) | Usable shelf area ($cm^2$) |
|---|---|---|
| 1 | 110 to 35 | 450 |
| 2 | 2x 45 to 35 | 900 |

Sealing device with 1 shelf — Order number 121011

| | |
|---|---|
| Diameter | 250 mm |
| Function | For sealing injection vials with serrated rubber stoppers under vacuum or inert gas |
| Temperature control system | Electrical heating with built-in sensor PT 100 |
| Extension | Can be extended to max. 4 shelves (120960) |
| Features | Height of pressure plate is adjustable |
| Weight approx. | 10 kg |
| Remark | For Alpha to Delta with LSC controller |

Options for order number 121011 and 121021

| Shelf arrangement | Clearance between shelves (mm) | Usable shelf area ($cm^2$) |
|---|---|---|
| 1 | 290 to 35 | 450 |
| 1 & 3 | 2x 135 to 35 | 900 |
| 1, 2 & 3 | 3x 83 to 35 | 1350 |
| 1 to 4 | 4x 50 to 35 | 1800 |

Aluminium shelf with rim — Order number 120959

| | |
|---|---|
| Diameter | 250 mm |
| Surface | Black anodised |
| Temperature control system | None |
| Use | For 121020 and 121021 |

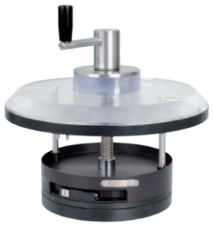
Aluminium shelf with rim — Order number 120960

| | |
|---|---|
| Diameter | 250 mm |
| Surface | Black anodised |
| Temperature control system | Electrical heating |
| Use | For 121010 and 121011 |

Aluminium shelf with rim — Order number 120961

| | |
|---|---|
| Diameter | 250 mm |
| Surface | Black anodised |
| Temperature control system | Electrical heating with built-in sensor PT 100 |
| Use | For 121010 and 121011 |

## Sealing devices for LSCplus controller (wireless)



Sealing device with 1 shelf — Order number 120860

| | |
|---|---|
| Diameter | 200 mm |
| Function | For sealing injection vials with serrated rubber stoppers under vacuum or inert gas |
| Temperature control system | Electrical heating with built-in sensor PT 100 and LyoBus-Modul |
| Weight approx. | 6.5 kg |
| Remark | Max. vessel height 70 mm; for LSCplus controller |

Fan — Order number 120862

| | |
|---|---|
| Diameter | 200 mm |
| Function | For circulation of cold air |
| Weight approx. | |
| Remark | For LSCplus controller; integrated into 120860, 120861 and 120761 |

Number of drying vessels per shelf, order number 120860 and 121009

| Order number of drying vessels | ID code Nominal capacity (ml) | Dimensions Ø (mm) | Dimensions height (mm) | Content with 1 cm layer | | Number |
|---|---|---|---|---|---|---|
| | | | | Static (ml) | Dynamic (ml) * | |
| 127572 | 2 R | 16 | 35 | 1.2 | | 116 |
| 127576 | 6 R | 22 | 40 | 3.0 | | 60 |
| 127580 | 10 R | 24 | 45 | 4.5 | | 48 |
| 127582 | 20 R | 30 | 55 | 6.0 | | 29 |
| 127585 | 50 H | 42.5 | 73 | 12.0 | 35–40 (sp. f.) | 15 |
| 127000 | | 65 | 20 | 28.0 | | 5 |
| 127010 | | 75 | 20 | 45.0 | | 4 |

* sh. f. = shell freezing; sp. f. = spin freezing (see introduction)

Sealing device with max. 2 shelves — Order number 120821

| | |
|---|---|
| Diameter | 250 mm |
| Function | For sealing injection vials with serrated rubber stoppers under vacuum or inert gas |
| Temperature control system | Electrical heating with built-in sensor PT 100 and LyoBus-Modul |
| Extension | Can be extended to max. 2 shelves (120830) |
| Weight approx. | 8 kg |
| Remark | For LSCplus controller |

Options

| Shelf arrangement | Clearance between shelves (mm) | Usable shelf area ($cm^2$) |
|---|---|---|
| 1 | 110 to 35 | 450 |
| 2 | 2x 45 to 35 | 900 |

## Sealing devices for LSCplus controller (wireless)

Sealing device with max. 4 shelves — Order number 120841

| | |
|---|---|
| Diameter | 250 mm |
| Function | For sealing injection vials with serrated rubber stoppers under vacuum or inert gas |
| Temperature control system | Electrical heating with built-in sensor PT 100 and LyoBus-Modul |
| Extension | Can be extended to max. 4 shelves (120830) |
| Features | Height of pressure plate is adjustable |
| Weight approx. | 8.4 kg |
| Remark | For LSCplus controller |

Options

| Shelf arrangement | Clearance between shelves (mm) | Usable shelf area ($cm^2$) |
|---|---|---|
| 1 | 290 to 35 | 450 |
| 2 | 2x 135 to 35 | 900 |
| 3 | 3x 83 to 35 | 1350 |
| 4 | 4x 50 to 35 | 1800 |

Shelf — Order number 120830

| | |
|---|---|
| Diameter | 250 mm |
| Surface | Black anodised |
| Temperature control system | Electrical heating with built-in sensor PT 100 and LyoBus-Modul |
| Use | For item 120821 and 120841 |

Fan — Order number 120801

| | |
|---|---|
| Diameter | 250 mm |
| Function | For circulation of cold air |
| Weight approx. | 1.1 kg |
| Remark | For LSCplus controller; integrated into 120821 and 120841 |

Number of drying vessels per shelf order number 120821, 120841 and 120830

| Order number of drying vessels | ID code Nominal capacity (ml) | Dimensions Ø (mm) | Dimensions height (mm) | Content with 1 cm layer | | Number | Min. necessary shelf area and spacing |
|---|---|---|---|---|---|---|---|
| | | | | 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 | 2 R | 16 | 35 | 1.2 | | 154 | 50 |
| 127576 | 6 R | 22 | 40 | 3.0 | | 80 | 55 |
| 127580 | 10 R | 24 | 45 | 4.5 | | 67 | 60 |
| 127582 | 20 R | 30 | 55 | 6.0 | | 45 | 70 |
| 127585 | 50 H | 42.5 | 73 | 12.0 | 35–40 (sp. f.) | 19 | 88 |
| 127590 | 100 H | 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 |
| 127010 | | 75 | 20 | 45.0 | | 6 | 25 |

* sh. f. = shell freezing; sp. f. = spin freezing (see introduction)

## Shelves for single-chamber method (“inside”) for LSCplus controller

Shelves with integrated acrylic lid — Order number 120861

| | |
|---|---|
| Diameter | 200 mm |
| Material | Aluminium, black anodised |
| Temperature control system | Electrical heating with built-in sensor PT 100 and LyoBus-Modul |
| Weight | |
| Remark | Max. vessel height 70 mm; for LSCplus controller |

Shelves with integrated acrylic lid — Order number 120761

| | |
|---|---|
| Diameter | 200 mm |
| Material | Aluminium, black anodised |
| Temperature control system | Electrical heating with built-in sensor PT 100 and LyoBus-Modul |
| Weight | |
| Remark | Max. vessel height 140 mm; only usable with 120755, for LSCplus controller |

Adapter / distance ring — Order number 120755

| | |
|---|---|
| Diameter | 300 mm |
| Material | PET |

Fan — Order number 120862

| | |
|---|---|
| Diameter | 200 mm |
| Function | For circulation of cold air |
| Weight | |
| Remark | For LSCplus controller; integrated into 120860, 120861 and 120761 |

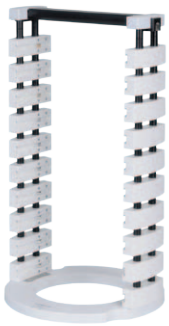
Support frame — Order number 121945

| | |
|---|---|
| Function | To hold max. 5 shelves Ø 200 mm |
| Use | Inside the ice condenser chamber |
| Height approx. | 295 mm |
| Weight | 2 kg |
| Remark | Suitable for Gamma and Delta with LSCplus controller |

Variations

| Shelf arrangement | Clearance between shelves (mm) | Usable shelf area (cm²) |
|---|---|---|
| 1 | 208 | 314 |
| 1+5 | 138+32 | 628 |
| 1+4 | 130+76 | 628 |
| 1, 3 + 5 | 2x 69 + 32 | 942 |
| 1 to 5 | 4x 25 + 32 | 1570 |

## Shelves for single-chamber method (“inside”) for LSCplus controller



| Support frame | Order number 121960 |
|---|---|
| Function | To hold max. 10 shelves Ø 200 mm |
| Use | Inside the ice condenser chamber |
| Height approx. | 514 mm |
| Weight | 3.3 kg |
| Remark | Suitable for Delta with LSCplus controller |

Variations

| Shelf arrangement | Clearance between shelves (mm) | Usable shelf area (cm²) |
|---|---|---|
| 1 | 428 | 314 |
| 1 + 10 | 377 + 32 | 628 |
| 1 + 9 | 330 + 76 | 628 |
| 1 + 8 | 289 + 120 | 628 |
| 1 + 7 | 245 + 164 | 628 |
| 1 + 6 | 201 + 208 | 628 |
| 1, 5 + 9 | 2x 157 + 76 | 942 |
| 1 + 4 + 7 + 10 | 3x 113 + 32 | 1256 |
| 1 + 3 + 5 + 7 + 9 | 4x 69 + 76 | 1570 |
| 1 to 10 | 9x 25 + 32 | 3140 |

| Shelf | Order number 122576 |
|---|---|
| Diameter | 200 mm |
| Material | Aluminium, black anodised |
| Temperature control system | Electrical heating with built-in sensor PT 100 and LyoBus-Modul |
| Weight approx. | 2.3 kg |
| Control | For LSCplus controller |

## Shelves for double-chamber method (“outside”) for LSCplus controller

| Base plate | Order number 120880 |
|---|---|
| Diameter | 300 mm |
| Function | The base plate is necessary when shelves are used |
| Control | For LSCplus controller |

| Adapter flange | Order number 120881 |
|---|---|
| Diameter | 457 mm |
| Function | For mounting drying chamber Ø 457 mm |
| Remark | Only for Alpha and Beta with LSCplus controller |

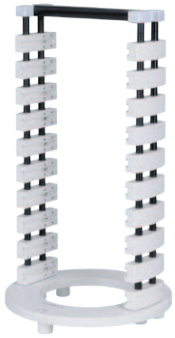
## Shelves for double-chamber method ("outside") for LSCplus controller

Support frame — Order number 121145

| | |
|---|---|
| Function | To hold max. 5 shelves Ø 200 mm |
| Use | Outside of ice condenser chamber |
| Height approx. | 295 mm |
| Weight | 2 kg |
| Control | For LSCplus controller |

Variations

| Shelf arrangement | Clearance between shelves (mm) | Usable shelf area (cm²) |
|---|---|---|
| 1 | 208 | 314 |
| 1+5 | 138 +32 | 628 |
| 1+4 | 130 +76 | 628 |
| 1 + 3 + 5 | 4x 69 + 32 | 942 |
| 1 to 5 | 4x 25 + 32 | 1570 |



Support frame — Order number 121160

| | |
|---|---|
| Function | To hold max. 10 shelves Ø 200 mm |
| Use | Outside of ice condenser chamber |
| Height approx. | 514 mm |
| Weight | 3.3 kg |
| Control | For LSCplus controller |

Variations

| Shelf arrangement | Clearance between shelves (mm) | Usable shelf area (cm²) |
|---|---|---|
| 1 | 428 | 314 |
| 1+10 | 377+32 | 628 |
| 1+9 | 330+76 | 628 |
| 1+8 | 289+120 | 628 |
| 1+7 | 245+164 | 628 |
| 1+6 | 201+208 | 628 |
| 1 + 5 + 9 | 2x 157 + 76 | 942 |
| 1 + 4 + 7 + 10 | 3x 113 + 32 | 1256 |
| 1 + 3 + 5 + 7 9 | 4x 69 + 76 | 1570 |
| 1 to 10 | 9x 25 + 32 | 3140 |

Shelf — Order number 122576

| | |
|---|---|
| Diameter | 200 mm |
| Material | Aluminium, black anodised |
| Temperature control system | Electrical heating with built-in sensor PT 100 and LyoBus-Modul |
| Weight approx. | 2.3 kg |
| Control | For LSCplus controller |

## Shelves for double-chamber method (“outside”) for LSCplus controller

Intermediate valve — Order number 122032

| | |
|---|---|
| Diameter | 300 mm |
| Control | For LSCplus controller |
| Remark | Base plate 120880 is necessary |

LyoCube Base frame — Order number 122557

| | |
|---|---|
| Dimensions | 424 x 334 x 360 mm (H x W x D) |
| Material | Stainless steel |
| Weight | Approx. 3 kg |
| Control | For LSCplus controller |

Shelf — Order number 122561

| | |
|---|---|
| Dimensions | 256 x 300 mm |
| Material | Aluminium, black anodised |
| Temperature control system | Electrical heating with built-in sensor PT 100 and LyoBus-Modul |
| Weight approx. | Approx. 2.5 kg |
| Control | For LSCplus controller |

Plate frame with 3 shelves, 86 mm between shelves — Order number 122872

Plate frame with 5 shelves, 67 mm between shelves — Order number 122857

Plate frame with 8 shelves, 48 mm between shelves — Order number 122826

| | |
|---|---|
| Diameter | 375 mm |
| Material | Aluminium, black anodised |
| Temperature control system | Electrical heating with built-in sensor PT 100 and LyoBus-Modul |
| Control | For LSCplus controller |

Spacer — Order number 122051

| | |
|---|---|
| Spacing | Shelf spacing:48 mm |

Spacer — Order number 122053

| | |
|---|---|
| Spacing | Shelf spacing:58 mm |

### 3.3.4 Heated shelves

#### Heated shelves for LSC controller

Plate frame with 5 electrically heatable shelves — Order number 120930

| | |
|---|---|
| Diameter | 375 mm |
| Spacing | Shelf spacing 67 mm |
| Material | Aluminium |
| Surface | Black anodised |
| Features | Each shelf is equipped with a base heater, precision connector, connecting cable and LED display for checking operation |
| Extension | Can be extended to max. 8 shelves |
| Remark | Suitable for Alpha, Gama and Delta with LSC controller |
| Weight | ~ 30 kg |

Plate frame consisting of 3 electrically heatable shelves — Order number 120920

| | |
|---|---|
| Diameter | 375 mm |
| Material | Aluminium, black anodised |
| Heating/cooling | Each shelf equipped with base heater and PT 100 sensor |
| Features | Precision connector, connecting cable, LED display for checking operation, distance adjustable with spacers (see page 40) |
| Extension | Can be extended to max. 8 shelves |
| Remark | Suitable for Gamma and Delta with LSC controller |
| Weight | ~ 5 kg |

Shelves — Order number 120975

| | |
|---|---|
| Diameter | 375 mm |
| Material | Aluminium, black anodised |
| Heating/cooling | Equipped with base heater |
| Features | LED display for checking operation |
| Extension | For extension of plate frame 120920 |
| Weight | ~ 5 kg |

Select a drying chamber order no. to 121511 to 121529 and select spacers according to number of shelves and shelf spacing

| Order no. 121511/515 Clear height: 340 | | | Order no. 121517/521 Clear heigh: 460 | | | Order no. 121523/527 Clear heigh: 565 | | | Order no. 121529/531 Clear heigh: 693 | | | Usable shelf area Ø 375 (cm²) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Order number | Spacing | Number of shelves | Order number | Spacing | Number of shelves | Order number | Spacing | Number of shelves | Order number | Spacing | Number 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

## Heated shelves for LSC controller

| Stainless steel spacers (1 set) | Order number 120985 |
|---|---|
| Spacing | Shelf spacing: 48 mm |
| Weight approx. | 0.3 kg |

| Stainless steel spacers (1 set) | Order number 120986 |
|---|---|
| Spacing | Shelf spacing: 53 mm |
| Weight approx. | 0.3 kg |

| Stainless steel spacers (1 set) | Order number 120987 |
|---|---|
| Spacing | Shelf spacing: 60 mm |
| Weight approx. | 0.4 kg |

| Stainless steel spacers (1 set) | Order number 120988 |
|---|---|
| Spacing | Shelf spacing: 86 mm |
| Weight approx. | 0.5 kg |

| Stainless steel spacers (1 set) | Order number 120996 |
|---|---|
| Spacing | Shelf spacing: 92 mm |

| Stainless steel spacers (1 set) | Order number 120997 |
|---|---|
| Spacing | Shelf spacing: 114 mm |

| Stainless steel spacers (1 set) | Order number 120999 |
|---|---|
| Spacing | Shelf spacing: 124 mm |

## Heated shelves for LSC controller

Number of drying vessels per shelf Ø 375 mm in combination with drying chamber order numbers 121511 to 121531

| Order number of drying vessels | ID code / nominal capacity | Dimensions | | Content with 1 cm layer Freezing | | Number | | Minimum necessary shelf 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 | 2 R | 16 | 35 | 1.2 | | 395 | | 50 |
| 127576 | 6 R | 22 | 40 | 3.0 | | 205 | | 55 |
| 127580 | 10 R | 24 | 45 | 4.5 | | 170 | | 60 |
| 127582 | 20 R | 30 | 55 | 6.0 | | 110 | | 70 |
| 127585 | 50 H | 42.5 | 73 | 12.0 | 35–40 (sp. f.) | 50 | 40 | 88 |
| 127590 | 100 H | 51.6 | 94.5 | 18.0 | 65–70 (sp. f.) | 32 | 27 | 110 |
| 127000 | | 65 | 20 | 28.0 | | 21 | | 25 |
| 127010 | | 75 | 20 | 45.0 | | 16 | | 25 |
| 127073 | | 200 | 18 | 300.0 | | 1 | | 25 |
| 127128 | | 200 | 18 | 300.0 | | 1 | | 25 |
| 127112 | | 360 | 32 | 1000.0 | | 1 | | 48 |

* sh. f. = shell freezing; sp. f. = spin freezing (see introduction) a = without thermoblock; b = with thermoblock

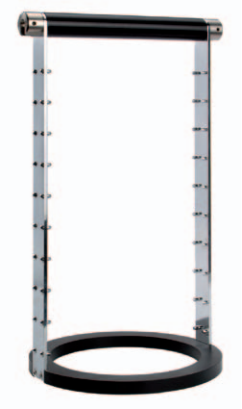
Shelf rack — Order number 120905

| | |
|---|---|
| Shelf holder | To hold max. 5 shelves Ø 200 mm |
| Temperature control system | Heated (including two connecting cables) |
| Height approx. | 295 mm |
| Control | For LSC controller |

120905: Variations

| Shelf arrangement | Clearance between shelves (mm) | Usable shelf area (cm²) |
|---|---|---|
| 1 | 200 | 314 |
| 1 + 5 | 145 + 35 | 628 |
| 1 + 4 | 105 + 75 | 628 |
| 1 + 3 + 5 | 65 + 65 + 35 | 942 |
| 1 to 5 | 4x 25 + 35 | 1570 |

## Heated shelves for LSC controller



Shelf rack — Order number 120910

| | |
|---|---|
| Shelf holder | To hold max. 10 shelves Ø 200 mm |
| Temperature control system | Heated (including two connecting cables) |
| Height approx. | 435 mm |
| Control | For LSC controller |

120910: Variations

| Shelf arrangement | Clearance between shelves (mm) | Usable shelf 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 | 2x 135 + 70 | 942 |
| 1 + 4 + 7 + 10 | 3x 99 + 35 | 1256 |
| 1 + 3 + 5 + 7 + 9 | 4x 62 + 70 | 1570 |
| 1 to 10 | 9x 25 + 35 | 3140 |

Connecting cable for rack — Order number 141328

| | |
|---|---|
| Length | 700 mm |

Connecting cable for rack — Order number 141327

| | |
|---|---|
| Length | 500 mm |

Connecting cable for rack — Order number 141322

| | |
|---|---|
| Length | 700 mm |
| Surface | Teflon encapsulated |

Extension cable with precision connector — Order number 122020

| | |
|---|---|
| Length | 500 mm |
| Function | For feeding the plug-and-socked connection through the base plate of the intermediate valve |
| Features | For connection of an electrically heated shelf |

Extension cable with precision connector — Order number 122021

| | |
|---|---|
| Length | 500 mm |
| Function | For feeding the connector through the base plate of the intermediate valve for connection of a process sensor (124802) |

## Heated shelves for LSC controller

Extension cable with precision connector — Order number 122022

| | |
|---|---|
| Length | 500 mm |
| Function | For power supply to shelves with electric heaters |
| Connection | For connection of rack no. 120905 or 120910 of sealing device 121010 or 121011 and plate frame 120920 |

Extension cable with precision connector — Order number 141315

| | |
|---|---|
| Length | 500 mm |
| Surface | Teflon encapsulated |
| Function | For feeding the plug-and-socked connection through the base plate of the intermediate valve |
| Connection | For connection of an electrically heated shelf |

Aluminium shelf with rim — Order number 120950

| | |
|---|---|
| Diameter | 200 mm |
| Temperature control system | Electrical heating with built-in sensor PT 100 and connecting cable |
| Connection | In the absence of a rack, the shelf can be placed directly on the floor of the ice condenser chamber |
| Control | For LSC controller |

Aluminium shelf with rim — Order number 120951

| | |
|---|---|
| Diameter | 200 mm |
| Temperature control system | Electrical heating with base heater |
| Remark | Usable with rack 120905 and 120910 |

## Heated shelves for LSC controller

Number of drying vessels per shelf order number 120951 and 120950

| Order number of drying vessels | ID code / nominal capacity | Dimensions | | Content with 1 cm layer Freezing | | Number | | Minimum necessary shelf 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 | 2 R | 16 | 35 | 1.2 | | 115 | | 50 |
| 127576 | 6 R | 22 | 40 | 3.0 | | 57 | | 55 |
| 127580 | 10 R | 24 | 45 | 4.5 | | 50 | | 60 |
| 127582 | 20 R | 30 | 55 | 6.0 | | 30 | | 70 |
| 127585 | 50 H | 42.5 | 73 | 12.0 | 35–40 (sp. f.) | 16 | 13 | 88 |
| 127590 | 100 H | 51.6 | 94.5 | 18.0 | 65–70 (sp. f.) | 8 | 8 | 110 |
| 127000 | | 65 | 20 | 28.0 | | 7 | | 25 |
| 127010 | | 75 | 20 | 45.0 | | 5 | | 25 |
| 127073 | | 200 | 18 | 300.0 | | 1 | | 25 |

* sh. f. = shell freezing; sp.f. = spin freezing (see introduction)  a = without thermoblock; b = with thermoblock

Base plate — Order number 120890

| | |
|---|---|
| Diameter | 240 mm |
| Features | The accessory base plate is necessary when shelves are used |
| Remark | Only for Alpha 1–2 LDplus |

Base plate — Order number 120900

| | |
|---|---|
| Diameter | 280 mm |
| Features | The accessory base plate is necessary when shelves are used |
| Remark | Alpha to Delta |

Base plate for 10 microtiter plate rack — Order number 120906

| | |
|---|---|
| Diameter | 280 mm |
| Features | To hold 6 racks no. 127202 in combination with transition flange no. 120908 |
| Remark | Only for Alpha and Beta |

Base plate — Order number 127204

| | |
|---|---|
| Diameter | 423 mm |
| Features | With large hood; Gamma and Delta |

Adapter flange — Order number 120901

| | |
|---|---|
| Function | For mounting drying chamber Ø 457 |
| Features | For Alpha 1/2–4 LSCbasic and Beta 1–8/2–8 LSCbasic |

Drip tray for manifold — Order number 121350

| | |
|---|---|
| Diameter | 500 mm |
| Function | For protection of the freeze dryer; collects the condensation water dripping from the drying vessels |
| Remark | Alpha to Gamma, for manifolds 121208, 110538 and 121280 |

Drip tray for drying chamber — Order number 121355

| | |
|---|---|
| Diameter | 575 mm |
| Inside diameter | 260 mm |
| Function | For protection of the freeze dryer; collects the condensation water dripping from the drying vessels |
| Remark | For Alpha 1–2 LDplus |

Drip tray — Order number 121360

| | |
|---|---|
| Diameter | 650 mm |
| Function | For protection of the freeze dryer; collects the condensation water dripping from the drying vessels |
| Weight approx. | 2 kg |
| Remark | Suitable for drying chamber Ø 300 mm |

Drip tray — Order number 121365

| | |
|---|---|
| Function | For protection of the freeze dryer; collects the condensation water dripping from the drying vessels |
| Remark | Suitable for drying chamber Ø 457 mm, outside 800 mm |

Glass lid — Order number 121398

| | |
|---|---|
| Diameter | 240 mm |
| Features | With central DIN female ground joint NS 45/40 and stopper NS 45/40 |
| Remark | Only for Alpha 1–2 LDplus |

Acrylic lid — Order number 121404

| | |
|---|---|
| Diameter | 300 mm |
| Weight approx. | 3.1 kg |
| Features | With central DIN female ground joint NS 45/40 and stopper NS 45/40 |
| Thickness | 40 mm |

Safety glass lid — Order number 121411

| | |
|---|---|
| Diameter | 300 mm |
| Features | Solvent resistant, with central stainless steel DIN female ground joint NS 45/40 and stopper |
| Thickness | 19 mm |

## 3.4 Drying manifolds

### Drying manifolds

| Vertical manifold | Order number 110538 |
|---|---|
| Material | Stainless steel with DIN male ground joint NS 45/40 |
| Width | 372 mm |
| Height | 1030 mm |
| Function | For connection to acrylic or glass lid with female ground joint and 12 rubber valves, **for substances containing solvents** |
| Connections | For connecting vessels with DIN female ground joint NS 29/32: 12x 100 ml, 12x 250 ml, 12x 1000 ml, 12x 2000 ml round-bottom flasks, 12x 75 ml, 12x 150 ml, 12x 300 ml, 12x 600 ml, 12x 1200 ml, 8x 2000 ml wide-neck filter bottles |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Three levels with four connections each; Alpha 1-2 LDplus, Alpha 1/2–4, Beta 1/2–8, Gamma 1/2–16 and Delta 1/2–24 |

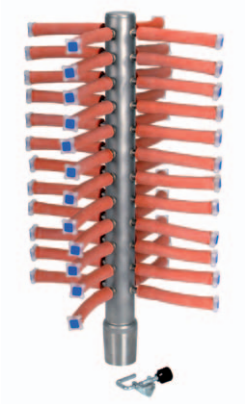
| Vertical manifold | Order number 121224 |
|---|---|
| Material | Stainless steel with DIN male ground joint NS 45/40 |
| Width | 650 mm |
| Height | 1170 mm |
| Weight approx. | 18 kg |
| Function | With flange-mounted glass lid Ø 300 mm and 24 rubber valves, for aqueous solutions |
| Connections | For connecting vessels with DIN female ground joint NS29/32: 24x 100 ml, 24x 250 ml, 24x 500 ml, 24x 1000 ml, 16x 2000 ml round-bottom flasks, 24x 75 ml, 24x 150 ml, 24x 300 ml, 24x 600 ml, 24x 1200 ml, 8x 2000 ml wide-neck filter bottles |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Three levels with eight connections each; 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 with DIN male ground joint NS 45/40 |
| Width | 380 mm |
| Height | 755 mm |
| Function | For connection to acrylic or glass lid with female ground joint and 8 rubber valves, **for substances containing solvents** |
| Connections | For connecting vessels with DIN female ground joint NS29/32: 8x 100 ml, 8x 250 ml, 8x 500 ml, 8x 1000 ml, 4x 2000 ml round-bottom flasks, 8x 75 ml, 8x 150 ml, 8x 300 ml, 8x 600 ml, 8x 1200 ml, 4x 2000 ml wide-neck filter bottles |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Two levels with four connections each; Alpha 1–2 LDplus, Alpha 1/2-4, Beta 1/2–8, Gamma 1/2–16, Delta 1/2–24 and Epsilon 2–6 D LSC/LSCplus |

| Vertical manifold | Order number 112237 |
|---|---|
| Material | Stainless steel with DIN male ground joint NS 45/40 |
| Width | 650 mm |
| Height | 946 mm |
| Function | With flange-mounted glass lid Ø 300 mm and 24 rubber valves, **for substances containing solvents** |
| Features | **With DIN10KF connector for hot water defrosting** |
| Connections | For connecting vessels with DIN female ground joint NS 29/32: 24x 100 ml, 24x 250 ml, 24x 500 ml, 24x 1000 ml, 8x 2000 ml round-bottom flasks, 24x 75 ml, 24x 150 ml, 24x 300 ml, 24x 600 ml, 16x 1200 ml, 8x 2000 ml wide-neck filter bottles |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Three levels with eight connections each; 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 | 903 mm |
| Function | With flange-mounted glass lid Ø 300 mm and 16 rubber valves, **for substances containing solvents** |
| Features | **With DN 10 KF connector for hot water defrosting** |
| Connections | For connecting vessels with DIN female ground joint NS 29/32: 16x 100 ml, 16x 250 ml, 16x 500 ml, 16x 1000 ml, 16x 2000 ml round-bottom flasks, 16x 75 ml, 16x 150 ml, 16x 300 ml, 16x 600 ml, 16x 1200 ml, 8x 2000 ml wide-neck filter bottles |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Three levels with eight connections each; Alpha 1/2–4, Beta 1/2–8, Gamma 1/2–16 and Delta 1/2–24 |

| Vertical manifold | Order number 112393 |
|---|---|
| Material | Stainless steel |
| Width | 650 mm |
| Height | 1129 mm |
| Function | With flange-mounted glass lid Ø 300 mm and 16 rubber valves, **for substances containing solvents** |
| Features | **With DN 10 KF connector for hot water defrosting** |
| Connections | For connecting vessels with DIN female ground joint NS 29/32: 16x 100 ml, 16x 250 ml, 16x 500 ml, 16x 1000 ml, 16x 2000 ml round-bottom flasks, 16x 75 ml, 16x 150 ml, 16x 300 ml, 16x 600 ml, 16x 1200 ml, 16x 2000 ml wide-neck filter bottles |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Three levels with eight connections each; Alpha 1/2–4, Beta 1/2–8, Gamma 1/2–16 and Delta 1/2–24 |



| Vertical manifold | Order number 121280 |
|---|---|
| Material | Stainless steel with DIN male ground joint NS 45/40 |
| Width | 108 mm |
| Height | 450 mm |
| Weight | 3 kg |
| Function | For connection to acrylic or glass lid with female ground joint and 48 hoses, for aqueous solutions, for connecting vials |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Alpha 1–2 and 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 male ground joint NS 45/40 |
| Width | 108 mm |
| Height | 440 mm |
| Function | For connection to acrylic or glass lid with female ground joint and 60 hoses, for connection of ampoules |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Alpha 1/2–4, Beta 1/2–8, Gamma 1/2–16 and Delta 1/2–24 |

| Vertical manifold | Order number 112322 |
|---|---|
| Material | Stainless steel with DIN KF 40 connection |
| Width | 520 mm |
| Height | 770 mm |
| Weight | Approx. 10 kg |
| Function | For connection to acrylic or glass lid and 96 hoses, for aqueous solutions, for connection of ampoules |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Alpha 1/2–4, Beta 1/2–8, Gamma 1/2–16 and Delta 1/2–24 |

Overview

Vertical manifolds

| Item number | Connec-tions | Solvent | Water | Mounting | Width (mm) | Height (mm) | Weight (kg) | Connections[1] | Systems |
|---|---|---|---|---|---|---|---|---|---|
| 121226 | 8 | Yes | Yes | Ground joint stubs | 380 | 755 | 4 | 4x 2000 ml round-bottom flasks and wide-neck bottles | Alpha–Epsilon |
| 110538 | 12 | Yes | Yes | Ground joint stubs | 372 | 1030 | | 8x 2000 ml wide-neck bottles | Beta–Delta |
| 112306 | 16 | Yes | Yes | Glass lid Ø 300 mm | 650 | 876 | | 8x 2000 ml wide-neck bottles | Alpha–Delta |
| 121224 | 24 | | Yes | Acrylic lid Ø 300 mm | 650 | 1170 | 18 | 16x 2000 ml round-bottom flasks and 8x wide-neck bottles | Alpha–Delta |
| 112237 | 24 | Yes | Yes | Glass lid Ø 300 mm | 650 | 946 | | 8x 2000 ml round-bottom flasks and wide-neck bottles and 8 x 1200 ml wide-neck filter bottles | Alpha–Delta |
| 112393 | 16 | Yes | Yes | Glass lid Ø 300 mm | 650 | 1129 | | 16x 2000 ml round-bottom flasks and wide-neck bottles | Alpha–Delta |
| 121280 | 48 | | Yes | Ground joint stubs | 108 | 450 | 3 | Ampoules | Alpha–Delta |
| 110280 | 60 | Yes | Yes | Ground joint stubs | 108 | 440 | | Ampoules | Alpha–Delta |
| 112322 | 96 | | Yes | Connection over KF40 | 520 | 770 | 10 | Ampoules | Alpha–Delta |

with individually closable rubber valves for connection of round-bottom flasks and wide-neck bottles with DIN female ground joint NS 29/32

[1] The maximum number of large-volume vessels

Horizontal manifold (T shape) — Order number 110005

| | |
|---|---|
| Material | Stainless steel |
| Width | 1070 mm |
| Height | 550 mm |
| Weight approx. | 6 kg |
| Function | With flange-mounted glass lid Ø 300 mm and 16 rubber valves, for aqueous solutions |
| Connections | For connecting vessels with DIN female ground joint NS29/32: 16x 100 ml, 16x 250 ml, 16x 500 ml, 8x 1000 ml, 8x 2000 ml round-bottom flasks 16x 75 ml, 16x 150 ml, 16x 300 ml, 16x 600 ml, 16x 1200 ml, 16x 2000 ml wide-neck filter bottles |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Alpha 1/2–4, Beta 1/2–8, Gamma 1/2–16 and Delta 1/2–24 |

Horizontal manifold (T shape) — Order number 121290

| | |
|---|---|
| Material | Stainless steel with DIN male ground joint NS 45/40 |
| Width | 687 mm |
| Height | 320 mm |
| Weight approx. | 5.7 kg |
| Function | For connection to acrylic or glass lid with female ground joint and 20 rubber valves, for aqueous solutions |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Alpha 1–2 LDplus, Alpha 1/2–4, Beta 1/2–8, Gamma 1/2–16 and Delta 1/2–24 |

Horizontal manifold (T shape) — Order number 110367

| | |
|---|---|
| Material | Stainless steel with DIN male ground joint NS 45/40 |
| Width | 301 mm |
| Height | 611 mm |
| Function | For connection to acrylic or glass lid with female ground joint and 40 hoses, for connection of ampoules |
| Features | The connections can be shut off individually and the drying vessels can be vented 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 (T shape), multi-row — Order number 110528

| | |
|---|---|
| Note | Wall fastening necessary |
| Material | Stainless steel with DIN male ground joint NS 45/40 |
| Width | 1076 mm |
| Height | 1327 mm |
| Function | Connection over clamp joint stubs DN65 ISO, S and 20 rubber valves, **for substances containing solvents** |
| Connections | For connecting vessels with DIN female ground joint NS29/32: 20x 100 ml, 20x 250 ml, 20x 500 ml, 20x 1000 ml, 11x 2000 ml round-bottom flasks 20x 75 ml, 20x 150 ml, 20x 300 ml, 20x 600 ml, 20x 1200 ml, 14x 2000 ml wide-neck filter bottles |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Delta 2–24 LSC |

Horizontal manifold (T shape) — Order number 121227

| | |
|---|---|
| Material | Stainless steel with DIN male ground joint NS 45/40 |
| Width | 860 mm |
| Height | 1054 mm |
| Function | For connection to glass lid and 21 rubber valves, for aqueous solutions |
| Connections | For connecting vessels with DIN female ground joint NS29/32: 21x 100 ml, 21x 250 ml, 21x 500 ml, 21x 1000 ml, 21x 2000 ml round-bottom flasks 21x 75 ml, 21x 150 ml, 21x 300 ml, 21x 600 ml, 21x 1200 ml wide-neck filter bottles |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Gamma 1/2–16 LSC and Delta 1/2–24 LSC |

Horizontal manifold (T shape), multi-row — Order number 112209

| | |
|---|---|
| Material | Stainless steel |
| Width | 865 mm |
| Height | 918 mm |
| Function | Connection over clamp joint stubs DN 50 ISO, S and 24 rubber valves, for substances containing solvents |
| Connections | For connecting vessels with DIN female ground joint NS29/32: 24x 100 ml, 24x 250 ml, 24x 500 ml, 24x 1000 ml round-bottom flasks 24x 75 ml, 24x 150 ml, 24x 300 ml, 24x 600 ml, 24x 1200, 12 x 2000 ml wide-neck filter bottles |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Gamma 1/2–16 LSC and Delta 1/2–24 LSC; requires connection kit 112429 |

Overview

Horizontal manifolds

| Item number | Connec-tions | Solvent | Water | Mounting | Width (mm) | Height (mm) | Weight (kg) | Connections | Systems |
|---|---|---|---|---|---|---|---|---|---|
| 110005 | 16 | | Yes | Acrylic lid Ø 300 mm | 1070 | 550 | 6 | 8x 1000 ml round-bottom flasks, 8x 2000 ml round-bottom flasks | Alpha–Delta |
| 121290 | 20 | | Yes | Ground joint stubs | 687 | 320 | 5.7 | | Alpha–Delta |
| 110367 | 40 | Yes | Yes | Ground joint stubs | 301 | 611 | | Ampoules | Alpha–Delta |
| 110528 | 20 | Yes | Yes | Wall attach-ment, clamp joint stubs | 1076 | 1327 | | Multi-row | Delta |
| 121227 | 21 | | Yes | Ground joint stubs | 860 | 1054 | | Multi-row | Gamma–Delta |
| 112209 | 24 | Yes | Yes | Clamp nipples | 865 | 918 | | Multi-row 12x 2000 ml wide-neck bottles | Gamma–Delta |

With individually closable rubber valves for connection of round-bottom flasks and wide-neck bottles with DIN female ground joint NS 29/32

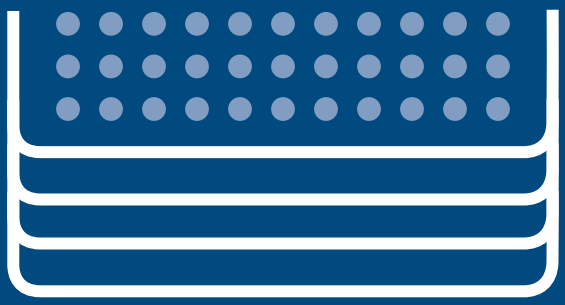
1 The maximum number of large-volume vessels

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 |



## Drying Accessories

* Here you can find the commonly used small items that can be essential for good results in your daily work with freeze dryers. For example, product sieves can prevent the loss of very light or fine-grain material.
Wide-neck filter bottles allow the equipment to be used almost continuously by connection to rubber valves, which act as three-way taps. Ampoules and injection vials are containers for long-term storage without contact with oxygen.

# 4 Drying Accessories


4.1 Product dishes 54
4.2 Product sieves 55
4.3 Thermoblocks, split 56
4.4 Thermoblocks, not split 60
4.5 Rubber valves 68
4.6 Round-bottom flasks 69
4.7 Filter inserts 69
4.8 Wide-neck filter bottles 70
4.9 Protective nets 71
4.10 Ampoules 72
4.11 Individual sealing device 72
4.12 Injection vials 73

## 4.1 Product dishes

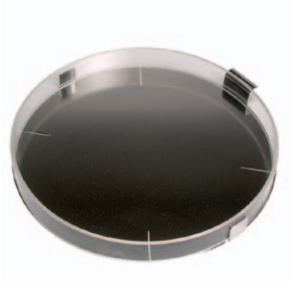
### Product dishes

| 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 127073 |
|---|---|
| Material | Stainless steel |
| Diameter | 200 mm |
| Rim height | 18 mm |

| Product dish | Order number 127113 |
|---|---|
| Material | Stainless steel |
| Diameter | 360 mm |
| Rim height | 32 mm |



| Product dish | Order number 127170 |
|---|---|
| Material | Stainless steel, acrylic rim |
| Diameter | 340 mm |
| Rim height | 35 mm |
| Features | With removable bottom |

| Product dish, Teflon coated | Order number 127001 |
|---|---|
| Material | Teflon-coated stainless steel |
| Diameter | 65 mm |
| Rim height | 20 mm |

| Product dish, Teflon coated | Order number 127011 |
|---|---|
| Material | Teflon-coated stainless steel |
| Diameter | 75 mm |
| Rim height | 20 mm |

Product dish, Teflon coated — Order number 127071

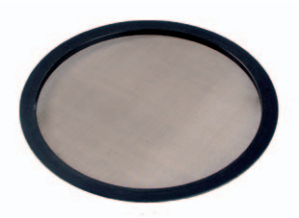
| | |
|---|---|
| Material | Teflon-coated stainless steel |
| Diameter | 200 mm |
| Rim height | 18 mm |

Product dish, Teflon coated — Order number 127111

| | |
|---|---|
| Material | Teflon-coated stainless steel |
| 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 127076

| | |
|---|---|
| Diameter | 200 mm |
| Mesh size | 0.25 mm |

Product sieve — Order number 127115

| | |
|---|---|
| Diameter | 360 mm |
| Mesh size | 0.2 mm |

Product sieve — Order number 127117

| | |
|---|---|
| Diameter | 360 mm |
| Mesh size | 0.25 mm |

### Aluminium product dishes

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, split

### Aluminium thermoblocks for sealing device, Ø 195 mm

| Thermoblock | Order number 110069 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 37 mm |
| Form | Two-piece |
| Function | For holding a total of 100 vessels Ø 10.2–10.8 x 42–49 mm with round bottom |

| Thermoblock | Order number 112288 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 33 mm |
| Form | Two-piece |
| Function | For holding a total of 72 vessels Ø 14–14.8 x 34–40 mm with flat bottom |

| Thermoblock | Order number 112302 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 30 mm |
| Form | Two-piece |
| Function | For holding a total of 92 vessels Ø 12–12.8 x 33–38 mm with flat bottom |

## Aluminium thermoblocks for sealing device, Ø 195 mm

| Thermoblock | Order number 112339 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 30 mm |
| Form | Two-piece |
| Function | For holding a total of 70 vessels Ø 16 x 35 mm (2R vials) |

| Thermoblock | Order number 112487 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 41 mm |
| Form | Two-piece |
| Function | For holding a total of 34 vessels Ø 21.5–22.6 x 44–51 mm (6R/8R vials) |

| Thermoblock | Order number 112243 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 45 mm |
| Form | Two-piece |
| Function | For holding a total of 14 vessels Ø 27.5 x 57 mm with flat bottom |

| Thermoblock | Order number 110308 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 192 mm |
| Height | 30 mm |
| Form | Two-piece |
| Function | For holding a total of 64 vessels Ø 16 x 35 mm (2R vials) |
| Remark | For sealing device 121009 (units with LSC controller) |

| Thermoblock | Order number 112200 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 192 mm |
| Height | 41 mm |
| Form | Two-piece |
| Function | For holding a total of 32 vessels Ø 22.5 x 45 mm (6R/8R vials) |
| Remark | For sealing device 121009 (units with LSC controller) |

| Thermoblock | Order number 112288 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 192 mm |
| Height | 33 mm |
| Form | Two-piece |
| Function | For holding a total of 72 vessels Ø 14.8 x 35.5 mm |
| Remark | For sealing device 121009 (units with LSC controller) |

## Thermoblock for shelves inside ice condenser chamber (120761)

| Thermoblock | Order number 113318 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 70 mm |
| Form | Two-piece |
| Function | For a total of 24 vessels Ø 27.8–29.2 x 77–90 mm (50 ml flask)<br>Only in combination with distance ring 120755 |

## Thermoblock for sealing device Ø 240 mm

| Thermoblock | Order number 110200 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 240 mm |
| Height | 20 mm |
| Form | Two-piece |
| Function | For holding a total of 136 vessels Ø 12 x 30 mm |

| Thermoblock | Order number 110159 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 240 mm |
| Height | 30 mm |
| Form | Two-piece |
| Function | For holding a total of 94 vessels Ø 15.4–16.3 x 31–36 mm (2R vials) |

| Thermoblock | Order number 110064 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 240 mm |
| Height | 30 mm |
| Form | Two-piece |
| Function | For holding a total of 48 vessels Ø 23–24.2 x 35–41 mm with flat bottom |

| Thermoblock | Order number 112240 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 240 mm |
| Height | 36 mm |
| Form | Two-piece |
| Function | For holding a total of 48 vessels Ø 23–24.2 x 41–48 mm (10R vials) |

## Thermoblock for sealing device Ø 240 mm

| Thermoblock | Order number 112370 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 240 mm |
| Height | 36 mm |
| Form | Two-piece |
| Function | For holding a total of 198 vessels Ø 10.5–11.1 x 41–48 mm with flat bottom |

| Thermoblock | Order number 112402 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 240 mm |
| Height | 41 mm |
| Form | Two-piece |
| Function | For holding a total of 112 vessels Ø 21.4–22.5 x 44–51 mm (6R/8R vials) |

| Thermoblock | Order number 112449 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 240 mm |
| Height | 43 mm |
| Form | Two-piece |
| Function | For holding a total of 32 vessels Ø 28.6–30.1 x 50–59 mm (20R vials) |

Overview

Aluminium thermoblocks

| Item number | Block diameter (mm) | Number of vials | Vial diameter (mm) | Comments |
|---|---|---|---|---|
| 110069 | 195 | 100 | 10.2–10.8 x 42–48 | with round bottom |
| 112288 | 195 | 72 | 14–14.8 x 34–40 | with flat bottom |
| 112302 | 195 | 92 | 12–12.8 x 33–38 | with flat bottom |
| 112339 | 195 | 70 | 16 x 35 | 2R vials |
| 112487 | 195 | 34 | 21.5–22.6 x 44–51 | 6R/8R vials |
| 112243 | 195 | 14 | 27.5 x 57 | with flat bottom |
| 113318 | 195 | 24 | 27.8–29.2 x 77–90 | 50 ml flask |
| | | | | |
| 110200 | 240 | 136 | 12 x 30 | |
| 110159 | 240 | 94 | 15.4–16.3 x 31–36 | 2R vials |
| 110064 | 240 | 48 | 23–24.2 x 35–41 | with flat bottom |
| 112240 | 240 | 48 | 23–24.2 x 41–48 | 10R vials |
| 112370 | 240 | 198 | 10.5–11.1 x 41–48 | with flat bottom |
| 112402 | 240 | 112 | 21.4–22.5 x 44–51 | 6R/8R vials |
| 112449 | 240 | 32 | 28.6–30.1 x 50–59 | 20R vials |
| | | | | |

## 4.4 Thermoblocks, not split

### Aluminium thermoblocks Ø 195 mm

| Thermoblock | Order number 110319 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 30 mm |
| Function | For holding a total of 70 vessels Ø 11.1–11.8 x 30–35 mm<br>or 27 vessels Ø 19.7–20.7 x 37–43 |

| Thermoblock | Order number 110007 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 30 mm |
| Function | For holding a total of 79 vessels Ø 15.4–16.3 x 31–36 mm with flat bottom |

| Thermoblock | Order number 110053 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 30 mm |
| Function | For holding a total of 118 vessels Ø 7.9–8.3 x 33–38 mm with round bottom |

| Thermoblock | Order number 110183 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 33 mm |
| Function | For holding a total of 50 vessels Ø 12.1–12.8 x 33–38 mm<br>with round or flat bottom or 50 vessels Ø 10.2–10.8 x 36–42 mm<br>with flat or round bottom |

| Thermoblock | Order number 127213 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 30 mm |
| Function | For holding a total of 104 vessels Ø 12.1–12.8 x 33–38 mm<br>with flat or round bottom |

## Aluminium thermoblocks Ø 195 mm

| Thermoblock | Order number 127215 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 30 mm |
| Function | For holding a total of 86 vessels Ø 14–-14.8 x 33–38 mm |

| Thermoblock | Order number 112218 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 30 mm |
| Function | For holding a total of 44 vessels Ø 19.7–20.7 x 35–41 mm with flat bottom |

| Thermoblock | Order number 112455 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 70 mm |
| Function | For holding a total of 22 vessels Ø 27.8–29.2 x 36.5–43 mm (designed for flasks or Eppendorf) or 21 vessels Ø 9.9–10.5 x 48–56 mm or 22 vessels Ø 14.9–15.8 x 50.5–59 mm |

| Thermoblock | Order number 112448 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 31 mm |
| Function | For holding a total of 69 vessels Ø 16.5–17.5 x 36–42 mm |

| Thermoblock | Order number 112225 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 32 mm |
| Function | For holding a total of 50 vessels Ø 18.1–19.2 x 36–42 mm with flat bottom |

| Thermoblock | Order number 112461 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 40 mm |
| Function | For holding a total of 16 strips with 8 tubes per strip |

## Aluminium thermoblocks Ø 195 mm

| Thermoblock | Order number 112367 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 35 mm |
| Function | For holding a total of 85 vessels Ø 15.1–16 x 40–47 mm with flat bottom |

| Thermoblock | Order number 110006 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 50 mm |
| Function | For holding a total of 43 vessels Ø 21.1–22.2 x 43–50 mm |

| Thermoblock | Order number 110011 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 50 mm |
| Function | For holding a total of 44 vessels Ø 14–14.8 x 41–48 mm (injection vials with crimp seal Ø 23 mm) |

| Thermoblock | Order number 112354 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 38 mm |
| Function | For holding a total of 140 vessels Ø 9.8–10.4 x 43–50 mm |

| Thermoblock | Order number 110282 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 40 mm |
| Function | For holding a total of 93 vessels Ø 13.5–14.3 x 43–50 mm with flat bottom |

| Thermoblock | Order number 112223 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 45 mm |
| Function | For holding a total of 37 vessels Ø 23.5–24.7 x 48–56 mm with flat bottom |

## Aluminium thermoblocks Ø 195 mm

| Thermoblock | Order number 112363 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 41.5 mm |
| Function | For holding a total of 36 vessels Ø 24.2–25.4 x 48.5–57 mm (10H vials) |

| Thermoblock | Order number 113307 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 45 mm |
| Function | For holding a total of 52 vessels Ø 10.2–10.8 x 48–56 mm (Eppendorf caps) |
| Remark | two pieces not for sealing device |

| Thermoblock | Order number 113345 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 44 mm |
| Function | For holding a total of 36 vessels Ø 22.8–24 x 51–60 mm (10R / 15R vials) |

| Thermoblock | Order number 112364 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 46 mm |
| Function | For holding a total of 23 vessels Ø 30.4–32 x 53–62 mm (20H vials) |

| Thermoblock | Order number 113344 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 55 mm |
| Function | For holding a total of 36 vessels Ø 28.5–30 x 63–74 mm (30R vials) |

| Thermoblock | Order number 110161 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 58 mm |
| Function | For holding a total of 86 vessels Ø 14.4–15.3 x 62–73 mm with round bottom (ampoules) |

## Aluminium thermoblocks Ø 195 mm

| Thermoblock | Order number 110010 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 60 mm |
| Function | For holding a total of 79 vessels Ø 15.4–16.3 x 63–74 mm with round bottom |

| Thermoblock | Order number 110050 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 70 mm |
| Function | For holding a total of 20 vessels Ø 32.1–33.7 x 65–75 mm with round bottom |

| Thermoblock | Order number 110530 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 60 mm |
| Function | For holding a total of 100 vessels Ø 11.1–11.8 x 63–74 mm with round bottom |

| Thermoblock | Order number 112246 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 60 mm |
| Function | For holding a total of 91 vessels Ø 16.8–17.8 x 63–74 mm with flat bottom |

| Thermoblock | Order number 110182 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 70 mm |
| Function | For holding a total of 22 vessels Ø 27.8–29.2 x 68–80 mm or 22 vessels Ø 15.8–16.8 x 70–82 mm |

| Thermoblock | Order number 112365 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 61 mm |
| Function | For holding a total of 13 vessels Ø 40.4–42.5 x 68–80 mm (50H vials) |

## Aluminium thermoblocks Ø 195 mm

| Thermoblock | Order number 112366 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 43 mm |
| Function | For holding a total of 7 vessels Ø 49.6–51.6 x 77.5–91 mm (100H vials) |

| Thermoblock | Order number 112317 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 85 mm |
| Function | For holding a total of 124 vessels Ø 6.9–7.3 x 80–94 mm or 124 vessels Ø 6.9–7.3 x 88–103 mm |

| Thermoblock | Order number 110193 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 85 mm |
| Function | For holding a total of 37 vessels Ø 23–25.1 x 84–99 mm with round bottom |

| Thermoblock | Order number 110023 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 80 mm |
| Function | For holding a total of 190 vessels Ø 7.9–8.3 x 83–97 mm with round bottom |

| Thermoblock | Order number 112224 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 85 mm |
| Function | For holding a total of 37 vessels Ø 23.9–25.1 x 90–106 mm with flat bottom |

| Thermoblock | Order number 110311 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 100 mm |
| Function | For holding a total of 37 vessels Ø 23.5–24.7 x 99–116 mm with flat bottom |

## Thermoblock. not split Ø 195 mm, stackable

| Thermoblock | Order number 127227 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 30 mm |
| Function | For holding a total of 354 vessels Ø 10.2–10.8 x 33–38 mm (Eppendorf caps) |
| Remark | Total height of three stacked blocks = 200 mm<br>Space between thermoblocks 55 mm |

| Thermoblock | Order number 112316 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 45 mm |
| Function | For holding a total of 58 vessels Ø 10.2–10.8 x 33–38 mm (Eppendorf caps) |
| Remark | Max. stacking height 4 blocks; spacers required (item no. 112315)<br>Space between thermoblocks 30 mm |

| Thermoblock | Order number 112346 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 70 mm |
| Function | For holding a total of 72 vessels Ø 15.8–16.8 x 70–82 mm (15 ml flask); spacers required (item no. 113316) |

| Thermoblock | Order number 110281 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 195 mm |
| Height | 70 mm |
| Function | For holding a total of 27 vessels Ø 27.8–29.2 x 77–90 mm (50 ml flask); spacers required (item no. 113316) |

## Thermoblock. not split Ø 360 mm

| Thermoblock | Order number 110057 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 356 mm |
| Height | 150 mm |
| Function | For holding a total of 12 vessels Ø 76.8–80 x 155–182 mm |

| Thermoblock | Order number 110055 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Diameter | 366 mm |
| Height | 220 mm |
| Function | For holding a total of 6 vessels Ø 104.2–108.5 x 227–267 mm |

Overview

Aluminium thermoblocks

| Item number | Block diameter (mm) | Number of vials | Vial diameter (mm) | Comments |
|---|---|---|---|---|
| 110319 | 195 | 70 / 27 | 11.1–11.8 x 30–35<br>19.7–20.7 x 37–43 | |
| 110007 | 195 | 79 | 15.4–16.3 x 31–36 | with flat bottom |
| 110053 | 195 | 118 | 7.9–8.3 x 33–38<br>12.1–12.8 x 33–38 | with round bottom |
| 110183 | 195 | 50 | 10.2–10.8 x 36–42 | Eppendorf caps |
| 127213 | 195 | 104 | 12.1–12.8 x 33–38 | Round or flat bottom |
| 127215 | 195 | 86 | 14–14.8 x 33–38 | with flat bottom |
| 112218 | 195 | 44 | 19.7–20.7 x 35–41 | with flat bottom |
| 112455 | 195 | 22/21 | 27.8–29.2 x 36.5–43<br>9.9–10.5 x 48–56 | |
| 112448 | 195 | 69 | 16.5–17.5 x 36–42 | |
| 112225 | 195 | 50 | 18.1–19.2 x 36–42 | with flat bottom |
| 112461 | 195 | 16 | Tube strips | |
| 112367 | 195 | 85 | 15.1–16 x 40–47 | with flat bottom |
| 110006 | 195 | 43 | 21.1–22.2 x 43–50 | |
| 110011 | 195 | 44 | 14–14.8 x 41–48 | Injection vials |
| 112354 | 195 | 140 | 9.8–10.4 x 43–50 | with flat bottom |
| 110282 | 195 | 93 | 13.5–4.3 x 43–50 | with flat bottom |
| 112223 | 195 | 37 | 23.5–24.7 x 48–56 | with flat bottom |
| 112363 | 195 | 36 | 24.2–25.4 x 48.5–57 | 10H vials |
| 113307 | 195 | 52 | 10.2–10.8 x 48–56 | Eppendorf caps/two pieces |
| 113345 | 195 | 36 | 22.8–24 x 51–60 | 10R/15R vials |
| 112364 | 195 | 23 | 30.4–32 x 53–62 | 20H vials |
| 113344 | 195 | 36 | 28.5–30 x 63–74 | 30R vials |
| 110161 | 195 | 86 | 14.4–15.3 x 62–73 | Ampoules |
| 110010 | 195 | 79 | 15.4–16.3 x 63–74 | with round bottom |
| 110050 | 195 | 20 | 32.1–33.7 x 65–75 | with round bottom |
| 110530 | 195 | 100 | 11.1–11.8 x 63–74 | with round bottom |
| 112246 | 195 | 91 | 16.8–17.8 x 63–74 | with flat bottom |
| 110182 | 195 | 22 | 27.8–29.2 x 68–80 | |
| 112365 | 195 | 13 | 40.4–42.5 x 68–80 | 50H vials |
| 112366 | 195 | 7 | 49.6–51.6 x 77.5–91 | 100H vials |
| 112317 | 195 | 124 | 6.9–7.3 x 80–94 | |
| 110193 | 195 | 37 | 23–25 x 84–99 | with round bottom |
| 110023 | 195 | 190 | 7.9–8.3 x 83–97 | with round bottom |
| 112224 | 195 | 37 | 23.9–25.1 x 90–106 | with flat bottom |
| 110311 | 195 | 37 | 23.5–24.7 x 99–116 | with flat bottom |

## 4.5 Rubber valves

### Rubber valves

Rubber valve — Order number 121860

| | |
|---|---|
| Function | For connection to drying chamber or as spare rubber valve for drying manifold |
| Features | The rubber valve is equipped with a DIN male ground joint NS29/32 for connection of round-bottom flasks, etc.; 5–100 ml injection vials or wide-neck filter bottles can be connected after removing the rubber ground joint from the valve |
| Sterilisation | Fully sterilisable at +121°C |

Rubber valve — Order number 121861

| | |
|---|---|
| Features | Rubber valve with stainless steel shut-off knob, solvent resistant version |
| Function | For connecting vessels with DIN female ground joint 29/32 |

Replacement rubber and piece — Order number 121865

| | |
|---|---|
| Features | For rubber valve, NS 29/32 |
| Sterilisation | Sterilisable at +121°C |

Screw stopper — Order number 121862

| | |
|---|---|
| Material | Plastic |
| Connection | For rubber valve |
| Sterilisation | Sterilisable at +121°C |

Shut-off knob — Order number 121863

| | |
|---|---|
| Material | Stainless steel |
| Connection | For rubber valve |
| Sterilisation | Sterilisable at +121°C |

Adapter — Order number 121880

| | |
|---|---|
| Connection | For rubber valve, NS 14.5 |

Adapter and filter — Order number 121890

| | |
|---|---|
| Connection | For rubber valve NS 29/32 |

## 4.6 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 127361

| | |
|---|---|
| Size | 500 ml |
| Features | With glass shard protection |

Round-bottom flask — Order number 127365

| | |
|---|---|
| Size | 1000 ml |

Round-bottom flask — Order number 127370

| | |
|---|---|
| Size | 2000 ml |

## 4.7 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 |
| Function | For retention filter |

## 4.8 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

| Order number of drying vessels | Nominal capacity (ml) | Dimensions Ø outside (mm) | Dimensions height (mm) | Bottle opening Ø | Content with 1 cm 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 Ø 75 ml to Ø 300 ml

Spare rubber cap — Order number 127431
Size: For Ø 600 ml to Ø 2000 ml

| Filter paper | Order number 127440 |
|---|---|
| Size | Ø 30 mm |
| Quantity | 100 |
| Pore size | 70 µm |
| Use | For wide-neck filter bottles 75 ml to 300 ml |

| Filter paper | Order number 127442 |
|---|---|
| Size | Ø 47 mm |
| Quantity | 100 |
| Pore size | 70 µm |
| Use | For wide-neck filter bottles 600 ml to 2000 ml |

## 4.9 Protective nets

### Protective nets

| Protective net | Order number 127380 |
|---|---|
| Vessel Ø | 80–120 mm |
| Function | For round-bottom flasks and wide-neck filter bottles |
| Length | 250 mm |

| Protective net | Order number 127381 |
|---|---|
| Vessel Ø | 100–200 mm |
| Function | For round-bottom flasks and wide-neck filter bottles |
| Length | 250 mm |

| Protective net | Order number 127382 |
|---|---|
| Vessel Ø | 150–230 mm |
| Function | For round-bottom flasks and wide-neck filter bottles |
| Length | 250 mm |

## 4.10 Ampoules

### Ampoules

| Long-neck ampoules | Order number 127502 |
|---|---|
| Capacity | 2 ml |
| Diameter | 12 mm |
| Overall length | 121 mm |
| Neck diameter | 8 mm |
| Neck length | 90 mm |
| Quantity | 100 |

| Long-neck ampoules | Order number 127505 |
|---|---|
| Capacity | 5 ml |
| Diameter | 12 mm |
| Overall length | 156 mm |
| Neck diameter | 8 mm |
| Quantity | 100 |

| Long-neck ampoules | Order number 127510 |
|---|---|
| Capacity | 10 ml |
| Diameter | 16 mm |
| Overall length | 156 mm |
| Neck diameter | 8 mm |
| Quantity | 100 |

| Ampoule sealing torch | Order number 127695 |
|---|---|
| Remark | For connection to gas and oxygen or to gas, air and oxygen<br>The torch has a special flame stabilisation system, which allows it to be operated with a high air ratio to cool the flame. |

## 4.11 Single vial sealing device

### Screw bottles

| Screw bottles | Order number 112488 |
|---|---|
| Remark | For screw bottles compliant with ISO 11418, with round fitting 18 x 3.0 |
| Function | For connection to rubber valve |

## 4.12 Injection vials

### Injection vials (crimp seal vials), DIN/ISO compliant

| Injection vials | Order number 127572 |
|---|---|
| Type | 2 R |
| Quantity | 352 |

| Injection vials | Order number 127576 |
|---|---|
| Type | 6 R |
| Quantity | 192 |

| Injection vials | Order number 127580 |
|---|---|
| Type | 10 R |
| Quantity | 160 |

| Injection vials | Order number 127582 |
|---|---|
| Type | 20 R |
| Quantity | 99 |

| Injection vials | Order number 127585 |
|---|---|
| Type | 50 H |
| Quantity | 130 |

| Injection vials | Order number 127590 |
|---|---|
| Type | 100 H |
| Quantity | 88 |

* Qvantity can vary

| Vial type | Maximum capacity (ml) | Diameter (mm) | Height (mm) | Capacity with 1 cm fill level (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 |

| Serrated rubber stopper | Order number 127650 |
|---|---|
| Diameter | 13 mm |
| Function | For injection vials 2 R |
| Quantity | 100 |

| Serrated rubber stopper | Order number 127651 |
|---|---|
| Diameter | 20 mm |
| Function | For injection vials 6 R–100 H |
| Quantity | 100 |

| Crimp caps | Order number 127660 |
|---|---|
| Dimensions | Ø 13 x 6.8 mm |
| Function | For injection vials 2 R |
| Quantity | 100 |

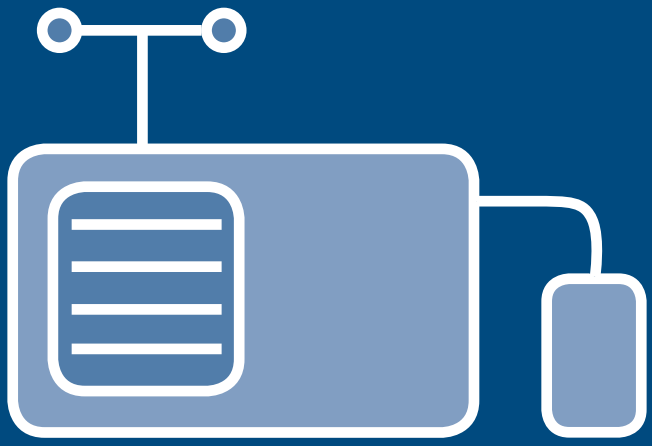
| Crimp caps | Order number 127661 |
|---|---|
| Dimensions | Ø 20 x 7.5 mm |
| Function | For injection vials 6 R–100 H |
| Quantity | 100 |

| 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

* Systems with rectangular drying chambers are traditionally designated Epsilon at Christ. The shelves are usually heated or cooled, depending on the process step. Here as well it is important to choose the right accessories. The available options include product dishes for bulk goods, frames for direct contact between shelf surfaces and crimp vials, and drying manifolds for drying in flasks or wide-neck bottles on Epsilon systems.

# 5 Epsilon Accessories

## 5 Epsilon Accessories

### Product dishes

Product dish — Order number 127280

| | |
|---|---|
| Material | Stainless steel |
| Size (mm) | 225 x 300 x 30 (W x D x HD) |
| Remark | For Epsilon 2-6 D |

Product frame — Order number 127286

| | |
|---|---|
| Material | Stainless steel |
| Size (mm) | 225 x 300 x 30 (W x D x HD) |
| Remark | For Epsilon 2-6 D |

Product base sheet — Order number 127285

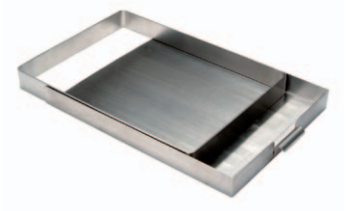
| | |
|---|---|
| Material | Stainless steel |
| Size (mm) | 225 x 300 |
| Function | For product frame 127286 |
| Remark | For Epsilon 2-6 D |

Product sieve — Order number 127282

| | |
|---|---|
| Size (mm) | 225 x 300 |
| Mesh size | 0.2 mm |

Product dish — Order number 127230

| | |
|---|---|
| Material | Stainless steel |
| Size (mm) | 227 x 400 x 20 (W x D x HD) |
| Rim height | 20 mm |
| Remark | For Epsilon 1-4 / 2-4 |



Product frame — Order number 127231

| | |
|---|---|
| Material | Stainless steel |
| Size (mm) | 227 x 400 x 20 (W x D x HD) |
| Remark | For Epsilon 1-4 / 2-4 |

Product base sheet — Order number 127229

| | |
|---|---|
| Material | Stainless steel |
| Size (mm) | 227 x 400 |
| Function | For product frame 127231 |
| Remark | For Epsilon 1-4 / 2-4 |

Product dish — Order number 127230

| | |
|---|---|
| Material | Stainless steel |
| Size (mm) | 227 x 400 x 20 (W x D x HD) |
| Remark | For Epsilon 1-4 / 2-4 |

Product dish — Order number 127290

| | |
|---|---|
| Material | Stainless steel |
| Size (mm) | 350 x 450 x 30 (W x D x HD) |
| Weight approx. | 2.3 kg |
| Remark | For Epsilon 2-12 D |

Product dish — Order number 127190

| | |
|---|---|
| Material | Stainless steel |
| Size (mm) | 350 x 400 x 30 (W x D x HD) |
| Weight approx. | 2.3 kg |
| Remark | For Epsilon 2-12 D |

Product frame — Order number 127293

| | |
|---|---|
| Material | Stainless steel |
| Size (mm) | 350 x 450 x 30 (W x D x HD) |
| Weight approx. | 1.5 kg |
| Remark | For Epsilon 2-12 D |

Product base sheet — Order number 127295

| | |
|---|---|
| Material | Stainless steel |
| Function | For product frame 127293 |
| Weight approx. | 1.8 kg |
| Remark | For Epsilon 2-12 D |

Overview

Product dishes

| Item number | Size in mm | Nominal volume Layer thickness 1 cm | Device |
|---|---|---|---|
| 127230 | 270 x 400 | 1080 ml | Epsilon 1-4/2-4 and Epsilon 2-20 |
| 127280 | 225 x 300 | 675 ml | Epsilon 2-6 D |
| 127260 | 300 x 400 | 1200 ml | Epsilon 2-16 D |
| 127190 | 350 x 400 | 1400 ml | Epsilon 2-10 D |
| 127290 | 350 x 450 | 1575 ml | Epsilon 2-12 D |
| 127300 | 300 x 300 | 900 ml | Production systems |
| 127310 | 300 x 450 | 1350 ml | Production systems |
| 127320 | 300 x 600 | 1800 ml | Production systems |

| Product sensor | Order number 124799 |
|---|---|
| Model | PT 100 |
| Cable length approx. | 0.8 m |

| Product sensor | Order number 124801 |
|---|---|
| Model | PT 100 |
| Cable length approx. | 2 m |

| Product sensor | Order number 124806 |
|---|---|
| Model | 2x PT 100 |

| Product sensor | Order number 124804 |
|---|---|
| Model | PT 100 Mini-Epsilon |

| Horizontal drying manifold | Order number 121202 |
|---|---|
| Width | 575 mm |
| Height | 753 mm |
| Material | Stainless steel |
| Function | With connection to rear wall of system via 2x DN 40 KF-37 and 12 rubber valves, **for substances containing solvents** |
| Connection | For connecting vessels with DIN female ground joint NS29/32: 12x 100 ml, 12x 250 ml, 12x 500 ml, 12x 1000 ml, 8x 2000 ml round-bottom flasks· 12x 75 ml, 12x 150 ml, 12x 300 ml, 12x 600 ml, 12x 1200 ml, 6x 2000 ml wide-mouth filter bottles |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | Epsilon 2-6 D |

| Vertical manifold | Order number 121204 |
|---|---|
| Width | 400 mm |
| Height | 524 mm |
| Material | Stainless steel |
| Function | Flange mounted directly on drying chamber, with 4 rubber valves, **for substances containing solvents** |
| Connection | For connecting vessels with DIN female ground joint NS29/32: 4x 100 ml, 4x 250 ml, 4x 500 ml, 4x 1000 ml, 4x 2000 ml round-bottom flasks 4x 75 ml, 4x 150 ml, 4x 300 ml, 4x 600 ml, 4x 1200 ml wide-mouth filter bottles |
| Features | The connections can be shut off individually and the drying vessels can be vented individually |
| Remark | 1 level; only for Epsilon 1/2–4 LSC |

| Drip tray | Order number 121345 |
|---|---|
| Size | 30 x 138 x 525 mm |
| Function | For drying manifolds |
| Remark | For Epsilon 2-6 D |

## Thermblocks for Epsilon

| Thermoblock | Order number 112428 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 30 (L x W x H) |
| Function | For holding a total of 30 vessels Ø 7.6–8 x 35–41 mm with flat bottom or holding a total of 20 vessels Ø 14.2–15.1 x 35–41 mm with flat bottom |

| Thermoblock | Order number 110382 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 48 (L x W x H) |
| Function | For holding a total of 40 vessels Ø 9.6–10.2 x 48.5–57 mm with flat bottom and crimp rim Ø 12.2 |

| Thermoblock | Order number 112290 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.7 x 31.5 (L x W x H) |
| Function | For holding a total of 40 vessels Ø 10–10.6 x 36.5–43 mm with bail crimp |

| Thermoblock | Order number 110534 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 43 (L x W x H) |
| Function | For holding a total of 30 vessels Ø 10.4–11 x 51–60 mm (Eppendorf caps) |

| Thermoblock | Order number 110535 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 23 (L x W x H) |
| Function | For holding a total of 48 vessels Ø 11–11.6 x 28–33 mm |

| Thermoblock | Order number 110356 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 72 (L x W x H) |
| Function | For holding a total of 48 vessels Ø 11.3–12 x 79.5–93 mm with round bottom |

## Thermblocks for Epsilon

| Thermoblock | Order number 113309 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 50 (L x W x H) |
| Function | For holding a total of 35 vessels Ø 12.1–12.8 x 55–64 mm with flat bottom |

| Thermoblock | Order number 110216 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.7 x 21 (L x W x H) |
| Function | For holding a total of 35 vessels Ø 12.6–13.3 x 27–31 mm with flat bottom |

| Thermoblock | Order number 110220 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 38 (L x W x H) |
| Function | For holding a total of 35 vessels Ø 13.8–14.6 x 44–51 mm with flat bottom |

| Thermoblock | Order number 110054 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 86 x 28 (L x W x H) |
| Function | For holding a total of 35 vessels Ø 14–14.8 x 33–38 mm with flat bottom |

| Thermoblock | Order number 110275 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 45 (L x W x H) |
| Function | For holding a total of 12 vessels Ø 14.1–15 x 43–50 mm with flat bottom |

| Thermoblock | Order number 110385 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 198 x 99 x 35 (L x W x H) |
| Function | For holding a total of 50 vessels Ø 15 x 45 mm with round or flat bottom |

## Thermblocks for Epsilon

| Thermoblock | Order number 110355 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 72 (L x W x H) |
| Function | For holding a total of 24 vessels Ø 15.1–16 x 72–84 mm with round bottom |

| Thermoblock | Order number 110191 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 44 (L x W x H) |
| Function | For holding a total of 24 vessels Ø 15.8–16.8 x 44–51 mm with round bottom |

| Thermoblock | Order number 110374 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 35 (L x W x H) |
| Function | For holding a total of 24 vessels Ø 16.1–17.1 x 41.5–48 mm |

| Thermoblock | Order number 110300 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 72 (L x W x H) |
| Function | For holding a total of 24 vessels Ø 16.3–17.3 x 72–84 mm with round bottom |

| Thermoblock | Order number 112344 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 30 (L x W x H) |
| Function | For holding a total of 24 vessels Ø 17.3–18.3 x 36–42 mm with flat bottom |

| Thermoblock | Order number 110364 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 38 (L x W x H) |
| Function | For holding a total of 18 vessels Ø 19.2–20.2 x 46–54 mm with flat bottom |

## Thermblocks for Epsilon

| Thermoblock | Order number 110370 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.7 x 25 (L x W x H) |
| Function | For holding a total of 18 vessels Ø 20.2–21.2 x 33–38 mm with flat bottom |

| Thermoblock | Order number 110305 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 61 (L x W x H) |
| Function | For holding a total of 12 vessels Ø 21.9–23 x 68–80 mm with flat bottom |

| Thermoblock | Order number 110219 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 38 (L x W x H) |
| Function | For holding a total of 12 vessels Ø 23.2–24.4 x 45–53 mm with flat bottom |

| Thermoblock | Order number 110322 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.7 x 31.5 (L x W x H) |
| Function | For holding a total of 12 vessels Ø 24–25.2 x 33.5–39 mm with flat bottom |

| Thermoblock | Order number 110321 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.7 x 31 (L x W x H) |
| Function | For holding a total of 10 vessels Ø 24–25.2 x 38–44 mm with flat bottom |

| Thermoblock | Order number 110511 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 187.5 x 134.5 x 20 (L x W x H) |
| Function | For holding a total of 35 vessels Ø 24 x 45 mm with flat bottom (10R vials) |

## Thermblocks for Epsilon

| Thermoblock | Order number 110368 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 38 (L x W x H) |
| Function | For holding a total of 10 vessels Ø 26.4–27.7 x 45–53 mm with flat bottom |

| Thermoblock | Order number 110304 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 61 (L x W x H) |
| Function | For holding a total of 10 vessels Ø 26.6–28 x 68–80 mm with flat bottom |

| Thermoblock | Order number 110301 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 93 x 65 (L x W x H) |
| Function | For holding a total of 12 vessels Ø 26.2–27.5 x 70–82 mm with flat bottom |

| Thermoblock | Order number 110533 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 63 (L x W x H) |
| Function | For holding a total of 11 vessels Ø 27.5–28.9 x 70–82 mm with flat bottom |

| Thermoblock | Order number 110376 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 38 (L x W x H) |
| Function | For holding a total of 8 vessels Ø 28.7–30.2 x 45–53 mm with flat bottom |

| Thermoblock | Order number 110190 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 44 (L x W x H) |
| Function | For holding a total of 6 vessels Ø 30.6–32.2 x 48–56 mm with flat bottom |

## Thermblocks for Epsilon

| Thermoblock | Order number 110197 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 61 (L x W x H) |
| Function | For holding a total of 6 vessels Ø 32.5–34.2 x 69–81 mm with round bottom |

| Thermoblock | Order number 110192 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 66.5 (L x W x H) |
| Function | For holding a total of 4 vessels Ø 42.3–44.5 x 51–60 mm with flat bottom |

| Thermoblock | Order number 110324 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 127.8 x 85.8 x 42 (L x W x H) |
| Function | For holding a total of 2 vessels Ø 57.2–59.5 x 42–49 mm with flat bottom |

Overview

| | | | | Number of thermoblocks per shelf | | | |
|---|---|---|---|---|---|---|---|
| Item number | Block dimensions (mm) | Number of vials | Vial diameter (mm) Height (mm) | Epsilon 1-4 LSCplus Epsilon 2-4 LSCplus 270 x 400 mm (W x L) | Epsilon 2-6D LSCplus 225 x 300 mm (W x L) | Epsilon 2-10D LSCplus 350 x 400 mm (W x L) | Epsilon 2-12D 350 x 400 mm (W x L) |
| 112428 | 127.8 x 85.8 x 30 | 30 | 7.6–8 x 35–41 | 9 | 5 | 12 | 12 |
| 110382 | 127.8 x 85.8 x 48 | 40 | 9.6-10.2 x 48.5-57 | 9 | 5 | 12 | 12 |
| 112290 | 127.8 x 85.7 x 31.5 | 40 | 10-10.6 x 36.5-43 | 9 | 5 | 12 | 12 |
| 110534 | 127.8 x 85.8 x 43 | 30 | 10.4-11 x 51-60 | 9 | 5 | 12 | 12 |
| 110535 | 127.8 x 85.8 x 23 | 48 | 11-11.6 x 28-33 | 9 | 5 | 12 | 12 |
| 110356 | 127.8 x 85.8 x 72 | 48 | 11.3-12 x 79-93 | 9 | 5 | 12 | 12 |
| 113309 | 127.8 x 85.8 x 50 | 35 | 12.1-12.8 x 55-64 | 9 | 5 | 12 | 12 |
| 110216 | 127.8 x 85.7 x 21 | 35 | 12.6-13.3 x 27-31 | 9 | 5 | 12 | 12 |
| 110220 | 127.8 x 85.8 x 38 | 35 | 13.8-14.6 x 44-51 | 9 | 5 | 12 | 12 |
| 110054 | 127.8 x 86 x 28 | 35 | 14-14.8 x 33-38 | 9 | 5 | 12 | 12 |
| 110275 | 127.8 x 85.8 x 45 | 12 | 14.1-15 x 43-50 | 9 | 5 | 12 | 12 |
| 110385 | 198 x 99 x 35 | 50 | 15 x 45 | 4 | 3 | 6 | 6 |
| 110355 | 127.8 x 85.8 x 72 | 24 | 15.1-16 x 72-84 | 9 | 5 | 12 | 12 |
| 110191 | 127.8 x 85.8 x 44 | 24 | 15.8-16.8 x 44-51 | 9 | 5 | 12 | 12 |
| 110374 | 127.8 x 85.8 x 35 | 24 | 16.1-17.1 x 41.5–48 | 9 | 5 | 12 | 12 |
| 110300 | 127.8 x 85.8 x 72 | 24 | 16.3-17.3 x 72-84 | 9 | 5 | 12 | 12 |
| 112344 | 127.8 x 85.8 x 30 | 24 | 17.3-18.3 x 36-42 | 9 | 5 | 12 | 12 |
| 110364 | 127.8 x 85.8 x 38 | 18 | 19.2-20.2 x 46-54 | 9 | 5 | 12 | 12 |
| 110370 | 127.8 x 85.7 x 25 | 18 | 20.2-21.2 x 33-38 | 9 | 5 | 12 | 12 |
| 110305 | 127.8 x 85.8 x 61 | 12 | 21.9-23 x 68-80 | 9 | 5 | 12 | 12 |
| 110219 | 127.8 x 85.8 x 38 | 12 | 23.2-24.4 x 45-53 | 9 | 5 | 12 | 12 |
| 110322 | 127.8 x 85.7 x 31.5 | 12 | 24-25.2 x 33.5-39 | 9 | 5 | 12 | 12 |
| 110321 | 127.8 x 85.7 x 31 | 10 | 24-25.2 x 38-44 | 9 | 5 | 12 | 12 |
| 110511 | 187.5 x 134.5 x 20 | 35 | 24 x 45 | 4 | 2 | 4 | 4 |
| 110368 | 127.8 x 85.8 x 38 | 10 | 26.4-27.7 x 45-53 | 9 | 5 | 12 | 12 |
| 110304 | 127.8 x 85.8 x 61 | 10 | 26.6-28 x 68-80 | 9 | 5 | 12 | 12 |
| 110301 | 127.8 x 93 x 65 | 12 | 26.2-27.5 x 70-82 | 8 | 4 | 8 | 8 |
| 110533 | 127.8 x 85.8 x 63 | 11 | 27.5-28.9 x 70-82 | 9 | 5 | 12 | 12 |
| 110376 | 127.8 x 85.8 x 38 | 8 | 28.7-30.2 x 45-53 | 9 | 5 | 12 | 12 |
| 110190 | 127.8 x 85.4 x 44 | 6 | 30.6-32.2 x 48-56 | 9 | 5 | 12 | 12 |
| 110197 | 127.8 x 85.8 x 61 | 6 | 32.5-34.2 x 69-81 | 9 | 5 | 12 | 12 |
| 110192 | 127.8 x 85.8 x 66.5 | 4 | 42.3-44.5 x 51-60 | 9 | 5 | 12 | 12 |

## Thermoblocks for Epsilon 2-4 / 2-10

| Thermoblock | Order number 110245 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 400 x 99 x 25 (L x W x H) |
| Function | For holding a total of 150 vessels Ø 9.7–10.3 x 28–33 mm with round or flat bottom |
| Remark | 6-row block |

| Thermoblock | Order number 112414 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 400 x 115.5 x 32 (L x W x H) |
| Function | For holding a total of 100 vessels Ø 10.2–10.8 x 34–40 mm or a total of 190 vessels Ø 9.1–9.6 x 36–42 mm |
| Remark | Two-sided, designed for two vessel sizes |

| Thermoblock | Order number 112411 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 400 x 63 x 45 (L x W x H) |
| Function | For holding a total of 50 vessels Ø 10.2–10.8 x 48–56 mm (Eppendorf caps) |

| Thermoblock | Order number 112413 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 400 x 113.8 x 45 (L x W x H) |
| Function | For holding a total of 100 vessels Ø 10.2–10.8 x 48–56 mm (Eppendorf caps) |
| Remark | Vials placed stepwise at an angle of 60° in four rows |

| Thermoblock | Order number 112220 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 296 x 219 x 5 (L x W x H) |
| Function | For holding a total of 88 vessels Ø 14.5–15.4 x 13–15 mm |

| Thermoblock | Order number 112434 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 200 x 270 x 30 (L x W x H) |
| Function | For holding a total of 108 vessels Ø 16 x 35 mm with flat bottom (2R vials) |

| Thermoblock | Order number 112435 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 225 x 300 x 30 (L x W x H) |
| Function | For holding a total of 130 vessels Ø 16 x 35 mm with flat bottom (2R vials) |

| Thermoblock | Order number 112483 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 400 x 80 x 62 (L x W x H) |
| Function | For holding a total of 11 vessels Ø 27.8–29.2 x 65–76 mm (50 ml flask) |
| Remark | 1-row block |

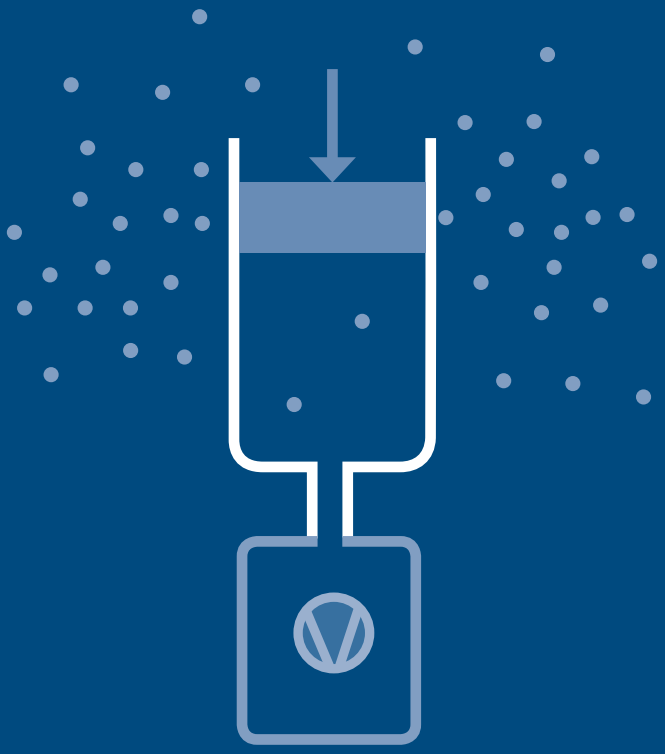
Overview

| | | | | Number of thermoblocks per shelf | | | |
|---|---|---|---|---|---|---|---|
| Item number | Block dimensions (mm) | Number of vials | Vial diameter (mm) Height (mm) | Epsilon 1-4 LSCplus Epsilon 2-4 LSCplus 270 x 400 mm (W x L) | Epsilon 2-6D LSCplus 225 x 300 mm (W x L) | Epsilon 2-10D LSCplus 350 x 400 mm (W x L) | Epsilon 2-12D 350 x 400 mm (W x L) |
| 110245 | 400 x 99 x 25 | 150 | 9.7-10.3 x 28-33 | 2 | 0 | 3 | 3 |
| 112414 | 400 x 115.5 x 32 | 100 | 10.2–10.8 x 34-40 | 2 | 0 | 3 | 3 |
| 112411 | 400 x 63 x 45 | 50 | 10.2–10.8 x 48-56 | 4 | 0 | 6 | 5 |
| 112413 | 400 x 113.8 x 45 | 100 | 10.2–10.8 x 48-56 | 2 | 0 | 3 | 4 |
| 112220 | 296 x 219 x 5 | 88 | 14.5-15.4 x 13-15 | 1 | 1 | 1 | 2 |
| 112434 | 200 x 270 x 30 | 108 | 16 x 35 | 2 | 1 | 2 | 2 |
| 112435 | 225 x 300 x 30 | 130 | 16 x 35 | 1 | 1 | 1 | 2 |
| 112483 | 400 x 80 x 62 | 11 | 27.8-29.2 x 65-76 | 3 | 0 | 4 | 5 |
| | | | | | | | |

## Thermoblocks for Epsilon 2-12D

| Thermoblock | Order number 110296 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 290.5 x 89.2 x 90 (L x W x H) |
| Function | For holding a total of 75 vessels Ø 14.5–15,2 x 100–115 mm |

| Thermoblock | Order number 110303 |
|---|---|
| Material | Aluminium |
| Surface | Black anodised |
| Dimensions (mm) | 231.3 x 80 x 85 (L x W x H) |
| Function | For holding a total of 44 vessels Ø 16 x 100 mm with round bottom |



## Vacuum

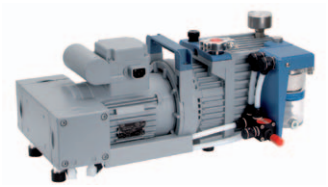
*The best drying results are obtained with the right vacuum. For aqueous media or media with low solvent content, oil-sealed rotary vane pumps are typically used, although oil-free dry-running pumps are increasingly being used. Their advantage is that there is no need for oil changes or disposal of used oil. Where specimens containing solvents or specimens fully dissolved in organic substances such as DMSO, acetonitryl or tertiary butanol are used, pumps that can withstand these chemicals must be used.
The state of the art here is chemistry hybrid pumps, which consist of a rotary vane pump with an auxiliary diaphragm pump that evacuates the oil space. This reduces the condensation of aggressive solvents in the vacuum pump oil. The vacuum range that pump systems for freeze drying must be able to achieve in practice is 0.005 to 0.01 millibar (hPa).
Most vacuum sensors used for process control are hot-wire types (Pirani sensors; see the general information section) and are also available in chemical-resistant versions.

# 6 Vacuum

6.1 Vacuum pumps 92
6.2 Vacuum pump oil 94
6.3 Vacuum hoses 94
6.4 Vacuum accessories 95

## 6.1 Vacuum pumps

### Vacuum pumps



Chemical hybrid vacuum pump — Order number 125295

| | |
|---|---|
| Model | RC 6 |
| Suction capacity | 5.9 $m^3/h$ |
| Power | 230 V, 50/60 Hz |
| Features | With small flange coupling DN 16 |
| Remark | Final vacuum $2 \times 10^{-3}$ mbar |

Chemical hybrid vacuum pump — Order number 125296

| | |
|---|---|
| Model | RC 6 |
| Features | Emissions condenser and trap, for substances containing solvents |
| Suction capacity | 5.9 $m^3/h$ |
| Power | 230 V, 50/60 Hz |
| Features | With small flange coupling DN 16 |
| Remark | Final vacuum $2 \times 10^{-3}$ mbar |

Vacuum pump (chemical-resistant rotary-vane pump) — Order number 125261

| | |
|---|---|
| Model | Pascal 2010 C1 |
| Suction capacity | 10 $m^3/h$ |
| Power | 230 V, 50/60 Hz |
| Features | With small flange coupling DN 16 |
| Remark | Final vacuum $2 \times 10^{-3}$ mbar |

Vacuum pump (chemical-resistant rotary-vane pump) — Order number 125263

| | |
|---|---|
| Model | Pascal 2021 C1 |
| Suction capacity | 21 $m^3/h$ |
| Power | 230 V, 50/60 Hz |
| Features | With small flange coupling DN 25 |
| Remark | Final vacuum $2 \times 10^{-3}$ mbar |

Vacuum pump (rotary-vane pump) — Order number 125302

| | |
|---|---|
| Model | RZ 2,5 |
| Suction capacity | 2.3 $m^3/h$ |
| Power | 230 V, 50/60 Hz |
| Features | With small flange coupling DN 16 |
| Remark | Final vacuum 2 x $10^{-3}$ mbar |

Vacuum pump (rotary-vane pump) — Order number 125307

| | |
|---|---|
| Model | RZ 6 |
| Suction capacity | 5.7 $m^3/h$ |
| Power | 230 V, 50/60 Hz |
| Features | With small flange coupling DN 16 |
| Remark | Final vacuum 2 x $10^{-3}$ mbar |

Vacuum pump: — Order number 125317

| | |
|---|---|
| Model | DUO 10 |
| Suction capacity | 11.1 $m^3/h$ |
| Power | 230 V, 50/60 Hz |
| Features | With small flange coupling DN 25/25 |
| Remark | Final vacuum 2 x $10^{-3}$ mbar |

Vacuum pump: — Order number 125318

| | |
|---|---|
| Model | DUO 20 |
| Suction capacity | 20 $m^3/h$ |
| Power | 230 V, 50/60 Hz |
| Features | With small flange coupling DN 25/25 |
| Remark | Final vacuum 2 x $10^{-3}$ mbar |

Vacuum pump: — Order number 125245

| | |
|---|---|
| Model | nXDS 10i |
| Suction capacity | 11.4 $m^3/h$ |
| Power | 200–240 V, 50/60 Hz |
| Remark | Final vacuum <0,01 mbar |
| Features | With small flange coupling DN 25/25 |

## 6.2 Vacuum pump oil

### Vacuum pump oil

| Pump oil | Order number 126181 |
|---|---|
| Contents | 1 l bottle |
| Pumps | RZ / RC / DUO |

| Pump oil | Order number 126185 |
|---|---|
| Contents | 5 l cannister |
| Pumps | RZ / RC / DUO |

| Pump oil | Order number 126200 |
|---|---|
| Contents | 20 l cannister |
| Pumps | RZ / RC / DUO |

## 6.3 Vacuum hoses

### Vacuum hoses

| Vacuum hose | Order number 125702 |
|---|---|
| Length | 1 m |
| Features | With standard flange couplings DN 16 / DN 25 |

| Vacuum hose | Order number 125706 |
|---|---|
| Length | 1.5 m |
| Features | With standard flange couplings DN 16 / DN 25 |

| Vacuum hose | Order number 125704 |
|---|---|
| Length | 1 m |
| Features | With standard flange couplings DN 25 / DN 25 |

| Vacuum hose | Order number 125705 |
|---|---|
| Length | 1.5 m |
| Features | With standard flange couplings DN 25 / DN 25 |

## 6.4 Vacuum accessories

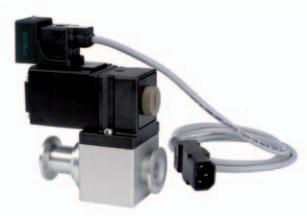
### Vacuum accessories

Micro aeration valve — Order number 125931

| | |
|---|---|
| Features | With hose fitting |

Micro vent valve — Order number 125932

| | |
|---|---|
| Features | With hose fitting and pipe bend, DN25 / DN25 |



Electromagnetic pressure control valve — Order number 125910

| | |
|---|---|
| Function | For installation in the suction line of the vacuum pump |
| Features | With DN 25 / DN25 |
| Remark | Alpha and Beta LDplus, as well as Alpha to Gamma systems with LSC and Epsilon 1–4/2–4 |

Manual stop valve — Order number 125920

| | |
|---|---|
| Function | For the vacuum hose between LDplus series freeze dryer systems and the vacuum pump (in place of the solenoid pressure control valve 125910) |
| Features | With standard flange DN 25 / DN25 |

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 |
|---|---|
| Model | ONF 25 L |
| Features | With automatic oil return |

| Exhaust filter | Order number 125503 |
|---|---|
| Model | ONF 25 L |
| Features | Without automatic oil return |

| Replacement filter cartridge | Order number 125510 |
|---|---|
| Remark | For 125502 and 125503 |

| Vacuum sensor | Order number 125478 |
|---|---|
| Model | VCP 63 MV |
| Connection | With integrated signal processing for direct connection to the freeze drying system |
| Measuring range | 1000 – 0.001 mbar |
| Measuring principle | Pirani |
| Features | With connecting cable, clamping/centring and T fitting |
| Warranty | 6 months |
| Note | These sensors are wear parts whose service life is largely dependent on the proper use and handling of the freeze dryer |

| Replacement sensor | Order number 125468 |
|---|---|
| Model | VCP 63 MV |
| Warranty | 6 months |

| Vacuum sensor | Order number 125491 |
|---|---|
| Connection | Preferably for pilot systems and for laboratory units |
| Measuring range | 10-0.01 hPa (mbar) or lower with reduced accuracy |
| Measuring principle | Capacitive |
| Warranty | 6 months |
| Note | These sensors are wear parts whose service life is largely dependent on the proper use and handling of the freeze dryer |

Chemical-resistant vacuum sensor — Order number 125476

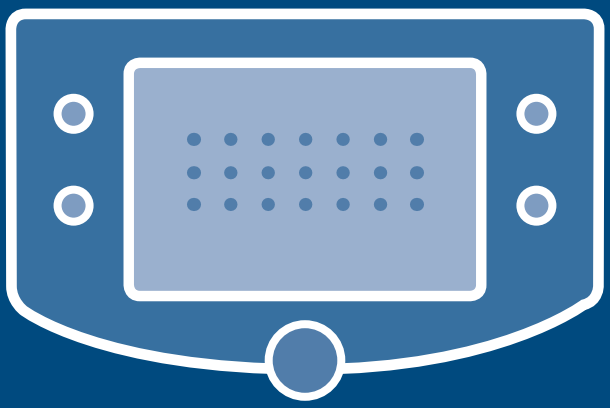
| | |
|---|---|
| Model | TPR 281 |
| Connection | With integrated signal processing for direct connection to the freeze drying system |
| Measuring range | 1000 – 0.001 mbar |
| Measuring principle | Pirani |
| Features | Complete with connecting cable, two centring and clamping rings and T fitting DN 25/25 ISO-KF |
| Warranty | 6 months |
| Note | These sensors are wear parts whose service life is largely dependent on the proper use and handling of the freeze dryer |

Replacement sensor — Order number 125466

| | |
|---|---|
| Model | TPR 281 |
| Connection | For connection to system controller; chemical resistant |
| Warranty | 6 months |
| Note | These sensors are wear parts whose service life is largely dependent on the proper use and handling of the freeze dryer |

High-vacuum grease — Order number 126210

| | |
|---|---|
| Remark | |



## Process Data Acquisition

* Our unique software for process documentation is described in this section. It is available in two versions: a basic version for data logging and a full version with extensive additional control functions. A software module for recipe generation and an extension unit for the utilisation of heated shelves are also available.
The related hardware accessories include product probes for temperature and electrical resistance, data cables, etc.

# 7 Process Data Acquisition

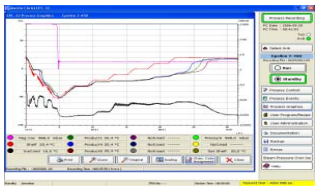
7.1 Software and hardware 100
7.2 Sensors 101
7.3 Miscellaneous 102

## 7.1 Software and hardware

### Software and hardware

| Program selection module | Order number 125099 |
|---|---|
| Model | PGM-30 |
| Function | LSCplus system controller extension module for 30 user-defined individual programs |
| Control | Control of temperature and pressure profiles and individual process steps (freezing, primary drying, secondary drying) |
| Features | Very easy to use thanks to integration into system controller and guided data entry; supports entry and deletion of individual steps |

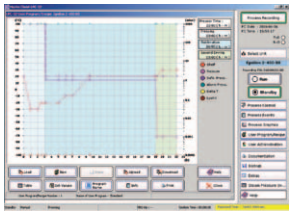
| LyoControlplus | Order number 125050 |
|---|---|
| Function | Determination of eutectic point |
| Features | Includes sensors for temperature and resistance |
| Note | For use in combination with LSCplus system controller and LyoLogplus documentation software |

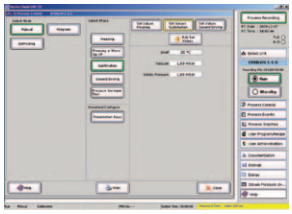


| Documentation software LyoLogplus | Order number 125025 |
|---|---|
| Function | Windows-based software for logging relevant process parameters: ice condenser temperature, product temperature, shelf temperature, vacuum, and/or Lyo-Rx (depending on freeze dryer configuration) |
| Features | Supports export in PDF and Excel file formats |

| Extension kit | Order number 125036 |
|---|---|
| Function | Serial interface for LD plus |

| USB | Order number 125037 |
|---|---|
| Model | Process data logging for equipment with LSCplus system controller |
| Function | For graphical process display |
| Includes | USB stick, LyoLogplus installation CD |





LPCplus process visualisation — Order number 125042

| | |
|---|---|
| Model | LPCplus |
| Function | Software for standard PCs for data transfer and freeze drying system monitoring in combination with LSCplus system controller |
| Includes | LPC software on diskettes, 1 connecting cable, installation and operation manual, PC with operating system, colour monitor and colour graphic printer |
| Note | PC hardware included |

## 7.2 Sensors

### Sensors

Product sensor — Order number 124802

| | |
|---|---|
| Model | PT 100 |
| Cable length approx. | 0.8 m |
| Features | With precision connector for use with LSC controller |
| Remark | Alpha–Delta |

Product sensor — Order number 124812

| | |
|---|---|
| Model | PT 100 |
| Cable length approx. | 0.26 m |
| Features | With precision connector for use with LSCplus controller |

| Product sensor | Order number 124799 |
|---|---|
| Model | PT 100 |
| Cable length approx. | 0.8 m |
| Features | With precision connector |
| Remark | Epsilon |

| Product sensor | Order number 124800 |
|---|---|
| Model | PT 100 |
| Cable length approx. | 1.3 m |
| Features | With precision connector |
| Remark | Epsilon |

| Product sensor | Order number 124801 |
|---|---|
| Model | PT 100 |
| Cable length approx. | 2 m |
| Features | With precision connector |
| Remark | Epsilon |

| Sensor for temperature and resistance | Order number 124809 |
|---|---|
| Function | For LyoControlplus |
| Remark | With precision connector for use with LSCplus system controller |
| Cable lenght | 0,26 m |

| Sensor for temperature and resistance | Order number 124811 |
|---|---|
| Function | For LyoControlplus |
| Remark | With precision connector for use with LSCplus system controller |
| Cable lenght | 0,8 m |

| Sensor for temperature and resistance | Order number 125130 |
|---|---|
| Function | For LyoControl and LyoControlplus |
| Remark | Epsilon |
| Cable lenght | 0,8 m |

## 7.3 Miscellaneous

| Interface cable | Order number 125173 |
|---|---|
| Model | USB-RS 232 |

## Cooling Baths and Freezing Equipment

* The accessories in this section can be used for routine external freezing of specimens in round-bottom flasks or wide-mouth bottles prior to drying. Freezing under rotation to form relatively thin frozen layers dramatically reduces drying time
(see separate booklet "Principles and Applications of Freeze Drying"). Suitable media for cooling baths are also available.

# 8 Cooling Baths and Freezing Equipment

## 8 Cooling Baths and Freezing Equipment

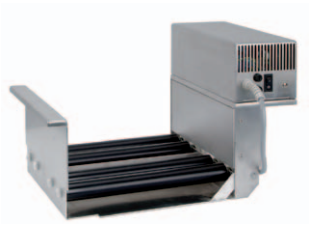
### Cooling Baths and Freezing Equipment

Cooling bath — Order number 101840

| | |
|---|---|
| Model | CB 18-40 |
| Dimensions (mm) | 410 x 450 x 460 |
| Bath depth | 200 mm |
| Bath opening (mm) | 300 x 327 (W x L) |
| Characteristics | Air cooled |
| Features | Stainless steel tank with integrated condensate drain, digital display and actual ice condenser temperature indication |
| Capacity | 18 litres |
| Bath temp. | Approx. -40 °C |
| Power | 230 V, 50 Hz |
| Note | For connection of 1 or 2 rotators |
| Features | Non-halogenated chilling media |

Rotator with support rod — Order number 120720

| | |
|---|---|
| Function | For freezing liquids in round-bottom flasks |
| Weight approx. | 3.8 kg |
| Power | 230 V, 50 Hz |
| Features | Speed continuously variable from 60 to 2000 rpm |



Horizontal roller rotator — Order number 120726

| | |
|---|---|
| Material | Stainless steel |
| Weight approx. | 11.5 kg |
| Application | For 1 or 2 1200-ml wide-neck filter bottles |
| Power | 220 V, 50 Hz |
| Features | Speed continuously variable from 60 to 2000 rpm |

Therminol D12 — Order number 130345

| | |
|---|---|
| Quantity | 5 l cannister |

Therminol D12 — Order number 130350

| | |
|---|---|
| Quantity | 10 l cannister |

Therminol D12 — Order number 130360

| | |
|---|---|
| Quantity | 20 l cannister |

## Service and Representatives

Christ systems are marketed in more than 70 countries worldwide.
To enable support for our customers at all times, we have an international network of representatives for advice and service.
At the national level, support and advice are provided by our representatives and by our trained system specialists directly from our head office.

*We are there for you all the time.*

**Selected international Christ representatives**

For information about our international representatives and contact data, visit www.martinchrist.de

## Questionnaire for requesting advice or a quotation

Your name and address

1 What is the maximum quantity (kilograms or litres) to be dried each day?

2 Are there any particular requirements regarding batch size? If so, please specify.

3 What has to be dried?

4 What is the ratio (weight percentage) of the dry substance to the initial overall mass?

5 What is the consistency of the substance to be dried (low viscosity, high viscosity, pasty, solid)? If solid, how big are the pieces?

6 Does the substance to be dried contain solvents other than water? If so, which ones and in what percentages?

7 What residual moisture level in the dried substance is considered acceptable?

8 If you already have experience with freeze drying, of the substance concerned, what is your opinion of:

a) the quality of the dried substance?

b) the equipment used?

9 What vessels are to be used for drying? What are the shapes and sizes of the vessels? Can you provide samples? How much undried substance should be present in each vessel? How many vessels per batch are necessary? (Note: These details are particularly important to help us determine the proper choice of freeze drying equipment for your application.)

10 Will the substance be stored in the drying vessels, or is transfer necessary?

11 Is sealing under vacuum necessary?

.....

12 Is preservation under nitrogen necessary?

.....

13 Available power:

AC ..... V ..... Hz

3-phase AC ..... V ..... Hz

.....

14 Do you have any other specific wishes or requirements?

.....

A laboratory is available for carrying out tests of drying methods.

..... .....

Date Signature

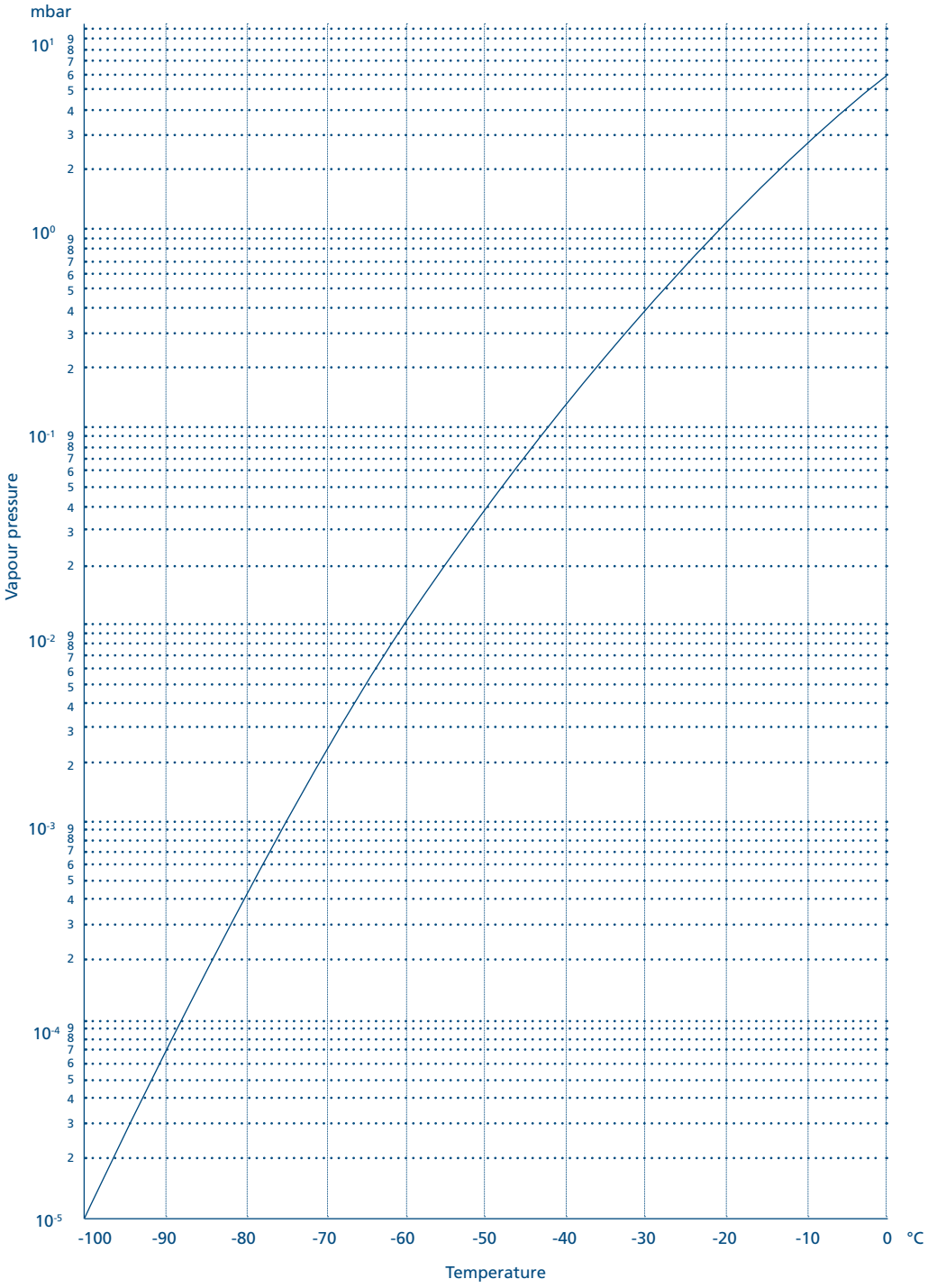
**Martin Christ**
**Gefriertrocknungsanlagen GmbH**

A der Unteren Söse 50
37507 Osterode am Harz

Phone +49 (0) 55 22 50 07-0
Fax +49 (0) 55 22 50 07-12

www.martinchrist.de
info@martinchrist.de

## Vapour pressure above ice




1 mbar ≙ 1 hPa = $10^{2}$ Pa  1 mbar ≙ $10^{5}$ Pa = 0.1 N/mm²

1 Pa = 1 N/m²

1 Torr = 1.3332 mbar

## Conversion table

Conversion table for vapour pressure above ice (ice temperature in °C and corresponding pressure in mbar)

| °C | ≙ mbar | °C | ≙ mbar | °C | ≙ mbar | °C | ≙ 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 | |

# Our Product Spectrum

With our unique and broad spectrum of equipment and accessories, we supply freeze drying systems and vacuum concentrators for every application. Let us show you what we can do!

1. Freeze drying systems for industrial production with ice condenser capacities from 20 to 500 kg; custom system engineering including loading and unloading systems.
2. Pilot freeze drying systems for process development or optimisation with ice condenser capacities from 4 to 16 kg.
3. Freeze drying systems for routine applications or R&D with ice condenser capacities from 2 to 24 kg.
4. Rotation vacuum concentrators for applications ranging from routine operations to evaporation concentration in advanced pharmaceutical research

**Martin Christ**
**Gefriertrocknungsanlagen GmbH**

An der Unteren Söse 50
37520 Osterode am Harz

Phone +49 (0) 55 22 50 07 0
Fax +49 (0) 55 22 50 07 12

info@martinchrist.de
www.martinchrist.de