Unopex S 15
Mini Spray Dryer

INTRODUCTION

S 15 Mini Spray Dryer

Unopex manufactures high quality spray dryers with a skilled team with specialized knowledge and experience.

Our Unopex S 15 Mini Spray Dryer, with its superior features, is ideal for spray drying, encapsulation, englobing and micronization applications in the lab.

It merges exceptional product design with distinctive instrument functionalities providing an enhanced user experience.

S 15 Mini Spray Dryer has complete compatibility with our prior spray dryers. It enables reproducing the results from older models without losing any valuable work, ensures seamless integration, transfer and usage.

With the Unopex S 15 Mini Spray Dryer, you can attain exceptionally consistent outcomes, accelerate the optimization of your formulation, and streamline the process of scaling up applications.

Monitoring the final product temperature provides better protection when spray drying heat-sensitive samples.

Laboratory Spray Drying with superior features

- 10" touchscreen panel with animated flow diagram
- Fast installation, quick and gentle spray drying
- Auto mode allowing fully automatic operation
- Method creation, duplication and PDF output
- Creating and editing SOP and job lists
- Display and easy setting of process parameters
- Live and historical graphical monitoring of all parameters, recording and exporting via usb (PDF, CSV report output)
- Regulation of parameters during operation
- Two different versions of the glass chambers, with double outlets and with a vertical outlet
- Open mode drying with aqueous solutions up to 20% organic solvents
- Product temperature sensor
- Safe operation with safety curtain
- Coated cyclone
- Second peristaltic pump for 3-fluid nozzle applications and nozzle cooling
- Sterile filter and decontamination glass set
- Touchscreen calibration of the pumps' flowrates with the products
- Remote access and control via mobile phone/tablet/PC with a free application
- QR code device pairing
- Outlet gas filter for protection of users and the environment
- IQ/OQ documentation
- Plug & play
- CE compliant

TECHNOLOGY

S 15 Mini Spray Dryer

Unopex offers the perfect solution for the first trial spray dry processing, feasibility studies, process development and product researches.

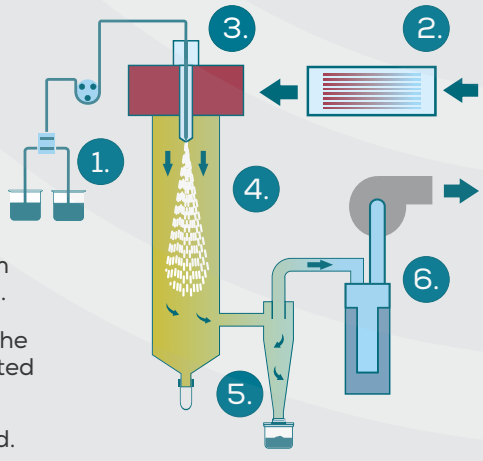
Unopex S 15 Mini Spray Dryer is a laboratory equipment for quick and gentle drying of products from water or organic solvent based feeds.

Technical Specifications

Model	Unopex S 15
Evaporating capacity	max. 1.5 L/h (water)
Drying gas inlet temperature	max. 220 °C (opt. 250 °C), adjustable
Feed pump	peristaltic, flow rate 0.1 ... 50 mL/min
Operating panel	10" LCD graphic display
Atomization system	2-fluid nozzle with automatic cleaning
Nozzle gas	20-2000 L/min, max. 7 bar
Blower	variable speed, max. 60 m3/h
Material of construction	3.3 borosilicate glass, 1.4404,1.4301
Sealing materials	FKM, FFKM, PTFE, silicone
Heating	electrical, 3 kW
Voltage	220 VAC, 50/60 Hz
Computer connection	ethernet and usb
Particle diameter range	1-25 µm

Working Principle

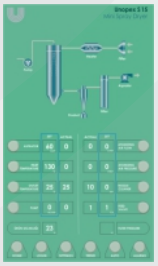
1. Solution or suspension is injected into the drying chamber through a nozzle.
2. Drying gas (air or N2) is heated and injected into the drying chamber.
3. The nozzle atomizes the solution into small droplets.
4. As the droplets of solution fall through the chamber, moisture evaporates from the droplets and they become particles.
5. The drying gas carries the particles to the cyclone where the particles are separated from the gas. Powder is collected.
6. The drying gas is filtered and exhausted.



Operating Panel

10" touchsreen for reliable operation

- indication and set of
  - aspirator flow rate (m3/h)
  - inlet temperature (°C)
  - nozzle gas flow rate (L/h)
  - feed flow rate (mL/min)
  - nozzle cleaning period (sec)
  - second peristaltic pump flow rate (mL/min)
  - feed selection (pure solvent / sample)
  - date & time



- indication of
  - outlet and product temperatures (°C)
  - outlet filter blockage (%)
  - outlet filter pressure (mbar)
  - outlet filter blockage alarm
  - O2 concentration (%)
  - alarm messages

KEY FEATURES

S 15 Mini Spray Dryer

Interchangable 2-fluid and 3-fluid spray nozzles with various exchange sets, made of stainless steel and titanium.

Nozzle Exchange Sets

Cap (mm)	Tip (mm)	Needle (mm)
1.4	0.5	0.4
1.5	0.7	0.5
1.6	1.4	0.7
2.2	2.0	1.0
2.8		1.4
		2.0

- 2-fluid nozzle with automatic de-blocking and cooling jacket
- 3-fluid nozzle for feeding of two liquids
- Nozzle head with ruby stone
- Ultrasonic nozzle with >20 kHz vibrations to achieve particles 10-60 µm size

Key Components

Precisely tailored to your needs

feed switch valve

high performance cyclone

brown glass

glass chambers

stainless steel chamber

oil-free air compressor with chemical dryer

outlet filter polyester/PTFE corrosion resistant

IQ/QQ documentation

chamber insulation

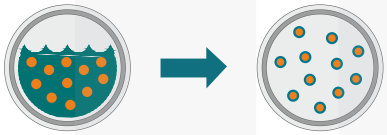
safety curtain

MICROENCAPSULATION

Microencapsulation

Spray drying can be used as a microencapsulation method.

In microencapsulation the product is mixed with a carrier and then spray-dried so that the carrier protects the product.



Reasons for the use of microencapsulation

- protection of the product from surrounding environment (temperature, moisture, etc), protection from degredation or flavour loss, extention of its shelf life
- masking of the undesired properties (taste, odour) of the active material
- decrease of the evaporation of the active material to the outside environment
- controlled release of the active material under desired conditions
- conversion of liquids and sticky solids to free-flowing powders

Process of encapsulation by spray drying

- The process starts with the preparation of a wall solution.
- The active core material is then added to the wall solution.
- The core/wall material mixture (emulsion or dispersion) occurs with a vigorous mixing.
- The mixture is fed into the spray dryer.
- In the spray dryer, the core/wall material mixture is transformed into droplets by nozzle atomizer and hot air flowing contacts the atomized particles and evaporates the water.
- The dried particles, consisting of dry matrices in which the core material is held in a micro dispersion, are separated from the gaseous medium in the cyclone and fall into the collection flask.

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Configuration

S 15 | S 45 | S 60

Closed cycle drying of mixtures up to 90% organic solvents under nitrogen

S 15 | S 45

Open mode drying with conditioned air for aqueous solutions with <20% organic solvents

S 15

Open mode drying with aqueous solutions up to 20% organic solvents

S 15 | S 60

Closed cycle drying of 90% ... 100% organic solvents under nitrogen

S 15 | S 45 | Chilling

Encapsulation from melts

COMPLEMENTARY PRODUCTS

S 45 Dehumidifier

Unopex S 45 Dehumidifier is a complementary accessory to condition drying air, to work continuously with water and organic solvent mixtures or inlet air cooling for the spray chilling operation.

Air humidity changes due to seasons and regions. The S 45 Dehumidifier guarantees drying under constant and reproducible humidity conditions.

Working with water/organic solvent mixtures in closed mode requires to use both S 45 Dehumidifier and S 60 Inert Cycle Organic Solvent Recovery Unit.

Unopex S 45 Dehumidifier is simply connected to S 15 Mini Spray Dryer with flexible tubes.

Benefits

- improved spray drying capacity, constant and reproducible humidity conditions
- removal of more water per hour
- measurement of relative humidity
- enables to work with water/solvent mixtures in combination with Unopex S 60 Inert Cycle

Technical Specifications

Cooling capacity	800 W @ 0 °C
Minimum outlet temperature	0 °C
Safety group	ASHRAE A1
Voltage - overvoltage category	220 VAC, 50/60 Hz - II
Pollution degree	2

S 60 Inert Cycle

Organic Solvent Recovery Unit

Unopex S 60 Inert Cycle Organic Solvent Recovery Unit is a complementary accessory. It is used to work in closed mode in combination with Unopex S 15 Mini Spray Dryer. S 60 Inert Cycle enables safe operation with 100% organic solvents under inert conditions.

S 15 Mini Spray Dryer can be placed next or on to the S 60 Inert Cycle and simply connected with flexible tubes to ensure their safe operation in closed mode.

Organic solvents are recovered, oxygen concentration and pressure is continuously controlled to protect the users and the environment.

Technical Specifications

Cooling capacity	1200 W @ 0 °C
Minimum process gas temperature	-30 °C
Safety group	ASHRAE A1 I IP20
Voltage - overvoltage category	220 VAC, 50/60 Hz - II
Pollution degree	2

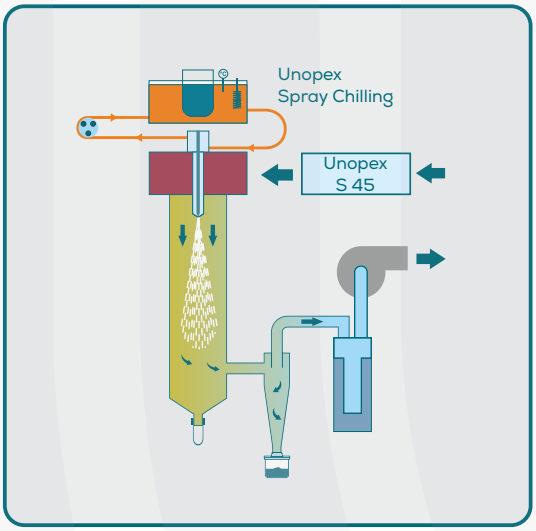
Benefits

- safe operation with 100% organic solvents under inert conditions
- minimal inert gas consumption due to closed mode
- safe and explosion free working conditions due to real time oxygen control
- hepa filter option
- enables to work with water/solvent mixtures in combination with S 15 Mini Spray Dryer and S 45 Dehumidifier

COMPLEMENTARY PRODUCTS

S 92 Spray Chilling

Unopex S 92 Spray Chilling Unit is the ideal complementary accessory that enables to make powders directly from molten feed samples by solidification.



It is used to work in combination with Unopex S 15 Mini Spray Dryer and S 45 Dehumidifier.

The cooled gas moves in co-flow with the atomized feed in the process chamber where the droplets transfer their heat energy to the gas.

Technical Specifications

Volume	0,5 L
Heating capacity	800 W
Temperature control	digital, (± 1 °C)
Melting temperature	max. 80 °C
Heating fluid	water
Voltage	220 VAC, 50/60 Hz

Benefits

- Spray chilling at laboratory scale
- Nozzle with heating jacket to prevent any blocking
- Electrical heater, temperature probe and metering valve
- Separate two feed vessels option for continuous work
- Digital control panel
- Easy installation on the top of the Unopex S 15 Mini Spray Dryer

Scale Up

Scale Up from Research to Pilot and Industrial Production Scale

A small spray dryer is particularly useful for initial trials.

Unopex S 15 Mini Spray Dryer is an ideal instrument for research and product development purposes in the lab.

The results from a succesful spray drying test conducted on the Unopex S 15 Mini Spray Dryer can be utilized in the scale up procedure to Unopex B 230 Pilot Scale Spray Dryer and to industrial production.

Unopex S 15

Unopex B 230

Model	Unopex S 15	Unopex B 230
Evaporation Capacity	max. 1.5 L/h (water)	max. 6 L/h (water)
Drying gas max. inlet temperature	220 °C (optional 250 °C)	250 °C (optional 350 °C)
Feed pump	peristaltic, variable speed	peristaltic, variable speed
Heater	electrical, 3 kW	electrical, 9 kW
Atomization system	nozzle	nozzle / rotary atomizer
Particle size range	1-25 µm	5-80 µm
Operating conditions	open, closed cycle	open, closed cycle

YERLİ ÜRETİM

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Achieving Together

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