



# Laboratory Rotary Evaporation Solutions Convincing solutions from the market leader

BUCHI offers dedicated solutions for laboratory rotary evaporation whether you operate in R&D or quality control. Based on our experience and knowledge we offer tailor-made solutions to cover a wide range of distinct needs and achieve highest convenience.

# Core messages to our customers

BUCHI creates added value with "Quality in your hands"

"Quality in your hands" is the guiding principle that shapes our philosophy and our actions. It challenges us to provide outstanding services that are precisely tailored to your needs. This means that we must stay in close contact with our customers. That is why we keep in touch and continue to work very hard to understand you and your business even better.

We help you by providing high-quality products, systems, solutions, applications and services that offer you added value. This allows you to focus entirely on your processes and your work.



# Easy

You handle complex processes, do challenging work and want to focus on what is essential. We support you by providing carefully designed solutions as well as instruments and systems that are easy to operate.



# Competent

You need products, systems, solutions, applications and services that are precisely tailored to your needs. We have the technological expertise and decades of experience needed to provide competent support and work with you to continually improve our market services.



#### Reliable

You want to be able to rely completely on your partner for products, systems, solutions, applications and services. We guarantee the quality and functionality of our equipment and will continue to help you quickly and efficiently whenever something does not operate to your satisfaction.



### Cost-effective

You want to achieve the best possible results using efficient solutions. We help you to handle your jobs and processes economically. We strive to create a high level of economic benefit and maximum added value for you.



#### Safe

You are working in an environment in which safety is a high priority. By collaborating closely with you, we do everything in our power to make our products, systems, solutions, applications and services as safe as possible for people and the environment.



#### Global

You value personalized service and short communication channels. As an international family-owned business with our own subsidiaries and qualified distributors, we have a presence wherever our customers are located. Our local staff and the large number of satisfied customers around the world give you the assurance that you are working with the right partner.



#### Sustainable

You prefer a partner who acts responsibly when it comes to current environmental challenges. We support environmentally friendly processes and manufacture products that have a long service life. We utilize advanced technologies in order to conserve energy and water and leave the smallest environmental footprint possible.

# Laboratory rotary evaporation solutions

Benefit from decades of expert knowledge

In 1957 BUCHI introduced the first commercial rotary evaporator. With the technological expertise and profound customer interaction, we further developed the Rotavapor® to an intelligent and fully integrated system. Our carefully conceived solutions meet the various needs whether you operate in R&D or quality control (QC) for a wide range of industries.

#### Pharmaceutical



For various applications in QC as well as for laboratory scale formulations in R&D departments:

- · Distillation
- · Concentration
- Drying

#### Chemical



For every day's application in QC and R&D laboratories:

- · Concentration
- · Reflux reaction
- · Re-crystallization

# Academia/Education



For a wide range of applications in academic education:

Full range of evaporation applications

# Food/Beverage



Used for QC in the food and beverage industry as well as for the development of new ingredients and components:

- · Distillation
- · Concentration
- · Drying

#### Feed



Used for QC in the feed industry as well as for the development of new ingredients and components:

- Distillation
- · Concentration
- · Drying

# Environmental Analysis

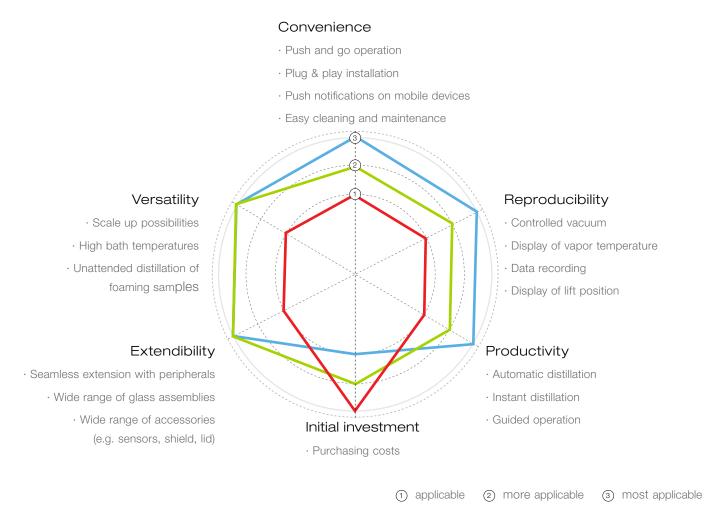


Required for sample preparation in order to monitor the environmental pollution:

- · Soxhlet extraction
- · Concentration

# Our dedicated solutions for your specific needs

Many criteria determine the choice of the most suitable rotary evaporator for you. BUCHI meets your specific needs with a wide range of tailor-made solutions covering essential needs, as well as highest demands in convenience and productivity. Assess your requirements with the web chart shown below.



Selection	Solution	Rotavapor	Interface	Pump	Chiller	Assessories
	Rotavapor® Dynamic Pro (p. 6, 8)	R-300	I-300 Pro	V-300	F-308	Included: Foam sensor,
			To the second se			AutoDest sen- sor, protection shield, lid
	Rotavapor® Dynamic (p. 6, 10)	R-300	1-300	V-300	F-305	Optional: Foam sensor,
			**************************************			AutoDest sensor, protection shield
	Dotovopor®	R-100	I-100	V-100	F-105	Optional:
	Rotavapor® Essential (p. 12)		100 M		/nw::	Protection shield, lid

# Platform «Rotavapor® Dynamic»

# Central control and flexible extension at any time

The Interface I-300 / I-300 Pro is the central control unit for all process parameters of a Rotavapor® R-300 system. Rotation speed, temperature (heating, cooling, vapor) and pressure are perfectly synchronized to optimize the distillation process while increasing efficiency and convenience.



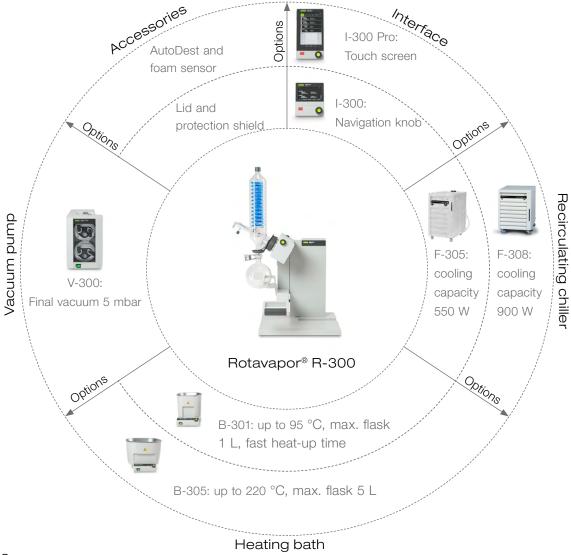


#### Less time in front of the Rotavapor®

The Rotavapor® App notifies the operator with push notifications and live view of all process parameters on mobile devices when manual interaction is required. This frees up valuable time for other tasks.

# Create your specific solution

The "Rotavapor® Dynamic" solution is a fully extendable system with intelligent, seamless integration of every product. Based on the Rotavapor® R-300 simply add the matching interface, heating bath, vacuum pump or recirculating chiller at any time. The most convenient plug & play concept does not require any further installation.



#### Examples

The following configurations exemplifies how a basic Rotavapor® R-300 can be extended continuously whenever it is needed.









Extendability

Solution «Rotavapor® Dynamic Pro»
The most convenient and efficient way of rotary evaporation

You expect the most convenient operation and high reproducibility. With the "Rotavapor® Dynamic Pro" solution we offer full automation, method-based guided operation, data recording and realtime charting.



Level sensor



Vacuum Pump V-300



Rotavapor® R-300 with Heating Bath B-305



Interface I-300 Pro



Recirculating Chiller F-308

### Your most important benefits

#### Convenient

- · Easy to use with touch screen providing all process parameters at a glance
- · Guided operation with programmable methods including push notifications on mobile devices when manual interaction is required
- · Unattended automatic operation thanks to the AutoDest and foam sensor
- · No harmful emissions due to post-pump secondary condenser with optional level sensor that alerts potential overflow of the receiving flask

#### Economical

- · Time saving due to:
  - · Instant start thanks to automatic and dynamic pressure adjustment without waiting until heating bath and chiller reach their set temperature
  - · Charting of all process parameters even remotely on mobile devices
- · Efficient operation and increased sustainability with centrally controlled recirculating chiller and speed controlled vacuum pump

#### Reproducible

- · Comprehensive recording of all process parameters on SD card for easy analysis on Microsoft Excel
- · Push notification in case of an unexpected event

# Your solution «Rotavapor® Dynamic Pro»



- · Rotavapor® R-300 with Heating Bath B-305
- · Interface I-300 Pro
- · Vacuum Pump V-300
- · Recirculating Chiller F-308
- · AutoDest, foam and level sensor
- Options: Heating Bath B-301, Recirculating Chiller F-305, protection shield, lid



- · Dedicated application support
- · Workshop trainings
- · Service hotline
- · Preventive maintenance
- · FDA compliant components
- · Service and documentation (IQ/OQ)
- "The method-based guided operation simplifies the evaporation task. Thus, we can entrust the lab assistants to safely perform a reproducible purification process using the Rotavapor® system and dedicate ourselves to other tasks."
- Dr. Yasuhiro Shirai, Group Leader Photovoltaic Polymer Materials, GREEN, Japan

# Solution «Rotavapor® Dynamic»

# Convenient rotary evaporation with full extendibility

You aim to conveniently evaporate your samples with the option to seamlessly extend your BUCHI rotary evaporator to a fully automated system at any time. The "Rotavapor® Dynamic" solution with a centrally controlled vacuum pump offers automatic evaporation and can be upgraded to a "Rotavapor® Dynamic Pro" solution.



### Your most important benefits

#### Convenient

- · Easy to use interface providing all process parameters and push notification on your mobile device
- · Unattended automatic operation thanks to the AutoDest and foam sensor
- · User-friendly and ergonomic design of all components of the system
- · Easy cleaning thanks to wide opening on the condenser

#### Versatile

- · Individual requirements are covered by a wide range of accessories:
  - · Seven different glass assemblies for various applicative demands
  - · Plastic coating (P+G) and protection shield for extended safety
  - · Optional heating bath for 5 L flask achieving high temperatures

#### Extendable

- · Intuitive plug & play extension for all components of the system
- · Seamless integration of the Recirculating Chiller F-305 / F-308 saves cooling water
- · Expandable to the Rotavapor® Dynamic Pro solution adding the Interface I-300 Pro and optional sensors

# Your solution «Rotavapor® Dynamic»



- · Rotavapor® R-300 with Heating Bath B-301
- · Interface I-300
- · Vacuum Pump V-300
- · Options: extendable to the full solution
- "Rotavapor® Dynamic Pro" including various accessories



- · Dedicated application support
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- · FDA compliant components
- · Service and documentation (IQ/OQ)

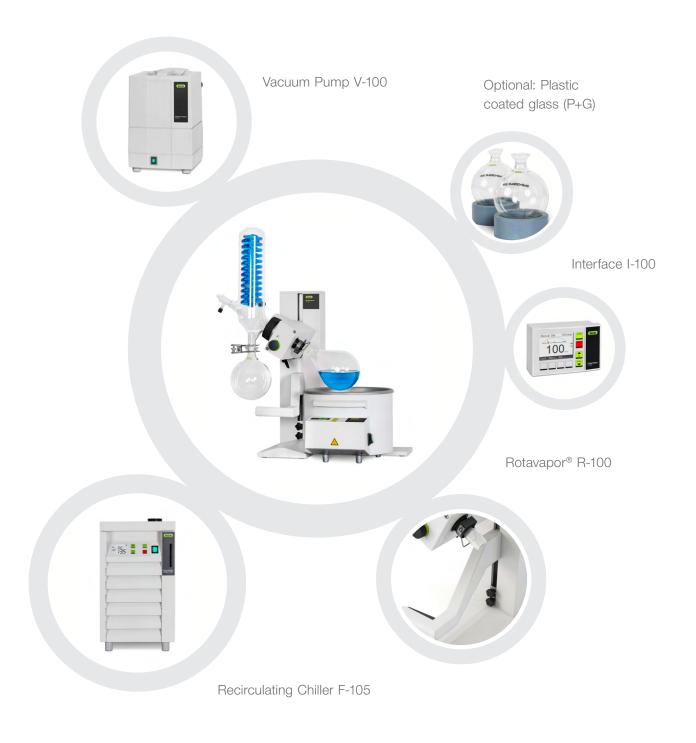
"I have been using BUCHI Rotavapor® for more than 10 years, ever since my postgraduate research. It's very user-friendly and a lot of thought has clearly been put into the design details."

Dr. Ella Xiang, Nu Skin Enterprise, China

# Solution «Rotavapor® Essential»

Evaporation covering essential needs

You are looking for an economical and complete high-quality evaporation solution. The "Rotvapor® Essential" solution integrates a Rotavapor®, an interface, a regulated vacuum pump and a recirculating chiller to cover the main evaporation applications efficiently.



### Your most important benefits

#### Economical

- · Unique and affordable system for essential needs
- · Small footprint saves valuable lab space
- · Saves resources thanks to integrated system

#### Efficient

- · Centrally regulated vacuum pump and recirculating chiller
- · Process control due to precise vacuum regulation
- · Reproducible yield thanks to stable parameters
  - · Heating bath temperature
  - · Vacuum pressure
  - · Cooling temperature

#### Convenient

- · Ease of use due to smooth and ergonomic handling
- · Maximum comfort thanks to integrated system

# Your solution «Rotavapor® Essential»



- · Rotavapor® R-100
- · Interface I-100
- · Vacuum Pump V-100
- · Recirculating Chiller F-105
- · Optional: Plastic coated glass (P+G)



- · Application support
- Workshop trainings
- · Service hotline
- · Preventive maintenance

Dr. Rungnaphar Pongsawatmanit, Associate Professor, Kasetsart University – Faculty of Agro-Industry, Thailand

<sup>&</sup>quot;The solution is easy to use. The equipment is very useful due to various applications for sample preparation or quality determination."

The best solution for your need Comparison by customer needs, application and characteristics

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		Rotavapor®			9	
Needs / Solutions	Page	R-100	R-300	I-100	1-300	I-300 Pro
«Rotavapor® Dynamic Pro»	8		•			•
«Rotavapor® Dynamic»	10		•		•	
«Rotavapor® Essential»	12	•		•		
Characteristics						
Temperature range [°C]*		20 – 95	20 – 95 20 – 220			
Lift mechanism		manual	manual/ automatic			
Available condensers		V/C	7 cond.			
Evaporating flask [mL]*		50 – 4000	50 – 1000 50 – 5000			
Receiving flask [mL]		50 - 3000	50 – 3000			
Integrated display for		heating temp.	heating temp., rotation, lift position			
ECO-mode bath			•			
Timer function				•	•	•
Compatible with Rotavapor® App					•	•
Solvent library					•	•
Dynamic distillation for instant start					•	•
Automatic distillation / foam detection					•	•
Guided operation (methods)						•
Data recording and charting						•

<sup>\*</sup> B-301: max. temperature: 95 °C / max. flask size: 1 L, B-305: max. temperature: 220 °C / max. flask size: 5 L

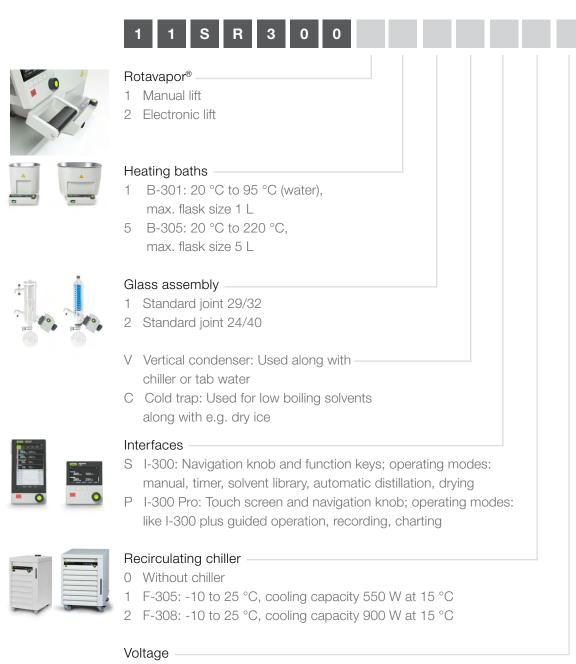


<sup>\*\*</sup> In combination with LegacyBox

# Rotavapor® Dynamic

# Configure your extendable solution for highest convenience

Your Rotavapor® Dynamic solution consists of: Rotavapor® R-300 (with P+G coated glassware), Interface I-300 or I-300 Pro, Vacuum Pump V-300 and a Recirculating Chiller F-305 or F-308 (optional).



- 1 220 240 V
- 2 100 120 V



#### Vacuum pump

The Vacuum Pump V-300 is an integrated part of every Rotavapor® R-300 system.

# Rotavapor® Essential

# Configure your solution covering essential needs

Your Rotavapor® Essential solution consists of: Rotavapor® R-100, Interface I-100, Vacuum Pump V-100, Recirculating Chiller F-100 or F-105 (optional).





#### Glass assembly

- V Vertical condenser: Used along with chiller or tab water
- C Cold trap: Used for low boiling solvents along with e.g. dry ice

#### Standard joint

- 1 Standard joint 29/32
- 2 Standard joint 24/40



#### Protective coating

Plastic coated glassware protects against mechanical damage and prevents sample loss.

- 0 Without
- 1 Safety coating



### Recirculating chiller

- 0 Without Chiller
- 1 F-100: fix 10 °C, cooling capacity 400 W at 15 °C
- 2 F-105: 0 to 25 °C, cooling capacity 500 W at 15 °C

#### Voltage

- 1 220 240 V
- 2 100 120 V



#### Vacuum pump and interface

The Vacuum Pump V-100 with Interface I-100 is an integrated part of every Rotavapor® R-100 system.

#### Benefit from the market leader

Valuable and facilitative features of the Rotavapor® Dynamic solution

Push notifications - Reduce your time in front of the rotary evaporator

The Rotavapor® App for iOS, Android and Windows 8 offers live view of all process parameters such as rotation speed, temperature (heating, cooling, vapor) and pressure. Push notifications alert you when required. In combination with the Interface I-300 Pro additional graphical representation of the parameters on the mobile device is possible.



# Methods - Improve reproducibility and free up your time

Until now a distillation process required regular supervision to guarantee smooth operation. The I-300 Pro now offers user-defined steps that automatically guide the operator through the process. Push notifications alert when manual interaction is required.

BUCHI's latest innovation, frees up your time by eliminating the need for on-site supervision.

### Example for a typical method:

#### Distillation

gradient, AutoDest or fixed pressure



#### Draining

alert user when distillation needs to be drained



#### Drying

clock and counterclockwise roation



#### Aeration

alert user when process is finished

#### Save time by using methods



# AutoDest - Distill automatically without supervision

The AutoDest sensor in conjunction with the Interface I-300 / I-300 Pro enables unattended automatic distillation. The vacuum is automatically optimized according to the cooling capacity of the condenser. Solvent emissions into the laboratory atmosphere are thus minimal as the condenser is not overloaded.



### Foam sensor - Handle foaming samples without manual interference

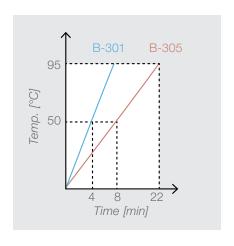
The foam sensor in conjunction with the Interface I-300 / I-300 Pro enables unattended distillation of foaming samples. The sensor automatically aerates the system temporarily to avoid extensive foam formation, while keeping the vacuum on a constant level.



### B-301 - Reduce the heat-up-time of the bath

The small Heating Bath B-301 consists of an similar heating power compared to the Heating Bath B-305. Since the volume of the B-301 is 2.5 times smaller, the bath reaches the set temperature within a very short period of time.

B-301	B-305
4 min to 50 °C	8 min to 50 °C
P <sub>max</sub> 1'100 W	P <sub>max</sub> 1'300 W
1 L flask	5 L flask
T <sub>max</sub> 95 °C	T <sub>max</sub> 220 °C



### Benefit from the market leader

Frequently asked questions

# Which is the right glass assembly for my application?

The glass assembly is chosen according to individual applicative requirements, solvent and sample properties as well as condenser characteristics.

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	Α	С	V	S	CR	E	BY
Applications	Diagonal	Cold trap	Vertical	Reflux	Cold trap reflux	Expansion	Double jacket
Distillation	•	•	•	•	•	•	•
Drying	•	•	•	•	•	•	•
Concentration	•	•	•	•	•	•	•
Reflux reaction				•	•		•
Soxhlet extraction				•			•
Re-crystallization	•	•	•	•	•	•	•
Solvent/Sample propertie	Solvent/Sample properties						
Boiling point range	M – H	L-M	M – H	M – H	L – M	M – H	M – H
Bumping or foaming	•1	•1	•1	• 1	•1	•	•1
Characteristics							
Cooling	CL	CM	CL	CL	CM	CL	CL
Cooling temperature range	Н	M	Н	Н	М	Н	Н
Suitable for high throughput	•		•	•		•	•
Vapor temperature sensor			Available	Available		Available	Available
Foam sensor		•	•	•	•		•
Automatic distillation			•2	•2			
Suitable for limited space	VS	HS	HS	HS	HS	HS	HS
Condenser surface max. [cm	<sup>2</sup> ] 1500	500	1500	1500	1500	500	1300
Available for R-300	•	•	•	•	•	•	•

H = High M = Medium L = Low VS = Limited vertical space HS = Limited horizontal space

●3

Available for R-100

CL = Cooling liquid CM = Coolant mixtures (e.g. dry-ice/acetone)

1 With Reitmeyer adapter Possible with AutoDest sensor only Limited features

# Where is the rotation speed displayed?

The rotation speed, as well as heating bath temperature and lift position, are shown on the integrated bath display. When using an interface those parameters are shown on both the bath and the interface.







# How can I reduce the noise emission of a vacuum pump?

By choosing a speed-controlled pump. The Vacuum Pump V-300 / V-710\* in conjunction with the Interface I-300 / I-300 Pro are operating only when required. This significantly reduces the noise emission and extends the lifetime of the pump.

\* V-710 requires the LegacyBox for speed-controlled operation



# Can I reduce the energy consumption of the evaporation system?

Yes, the ECO-mode is an integral part of the BUCHI Rotavapor® R-300 system. Both bath and chiller enter a stand-by mode after a pre-defined period of time and are restarted automatically when required.



### Why should I buy plastic coated glassware?

The transparent plastic coating (P+G) improves the durability and stability of the glass. It also protects the operator from broken bits of glass as well as chemicals in case of glass breakage.



#### Benefit from the market leader

### Our recommendations to increase the distillation efficiency

The following extract of the BUCHI Evaporation Guide help you to improve the efficiency of your evaporation process, to save time, to conserve energy and to reduce the environmental impact.

# Optimal temperatures

#### Δ 20 °C rule

· Heating temperature  $T_1 \ge 20$  °C vapor temperature  $T_2 \ge 20$  °C cooling temperature  $T_3$ 

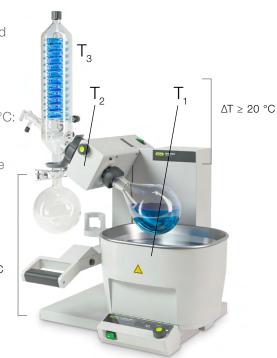
# Advantages

- · Condenser works at its optimum without being overloaded
- · Vapor emissions into the lab atmosphere are minimal



- · Bath temperature T<sub>1</sub>. 50 °C
- Vapor temperature T<sub>2:</sub> 30 °C ▶ select pressure for the vapor temperature to equal 30 °C (solvent library; example: for ethanol set pressure to 102 mbar)
- · Cooling temperature T<sub>3</sub>: 10 °C

 $\Delta T \geq 20 \, ^{\circ}C$ 



#### Immersion angle

#### Advantages of a flat angle (10°)

- · Larger percentage of rotating flask is wetted by heating medium
- · Produces maximum turbulence inside flask

#### Limitations of a flat angle

- · Flask cannot be as deeply immersed in the heating medium
- · Sample is more likely to bump or foam







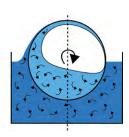
# Rotation speed

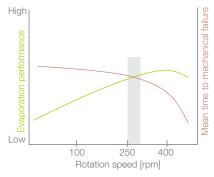
#### Advantage of high rotation speed

· Produces maximum turbulence inside flask and bath to achieve maximum evaporation output

#### Limitations of high rotation speed

- · More vibrations
- · More spillage of heating media







Recommendation: Use 250 to 280 rpm for maximum turbulence at high durability

# Evaporating flask size

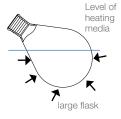
#### Advantages of large flasks

· Larger surface results in greater turbulence inside the flask and a higher evaporation performance

· Less bumping and foaming



- · More difficult to transfer
- · Less flexible for changing the immersion angle







Recommendation: Select a flask that accommodates approximately twice the starting sample volume

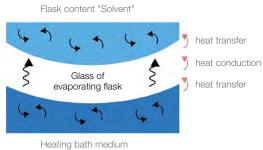
# Evaporating flask thickness

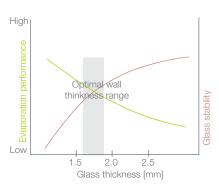
#### Advantage of thin walls

· Allows better heat transmission from the bath through the glass into the solvent

#### Limitation of thin walls

· Higher risk of breaking







Recommendation: Use 1.8 mm thick flasks (1 L) for best temperature exchange at high safety

# Complete your laboratory evaporation portfolio

Complementary and related products

# Vacuum Pump



The Vacuum Pump V-100, V-300 and V-710 are fully integrable into your evaporation solution. Benefit from the small footprint and quiet operation.

# Interface



I-100, I-300 and I-300 Pro are central control units for BUCHI evaporators, vacuum pumps and chillers. Different modes of operation optimize all process parameters.

# Recirculating Chiller



BUCHI recirculating chillers are fully integrable into any Rotavapor® system. They guarantee a sustainable operation of your sample preparation.

#### Glass Assemblies



Make use of the widest range of glass condensers and flasks to optimize your evaporation application.

### Plastic Coated Glass



For maximum safety BUCHI offers a high quality plastic coating for virtually every glass to prevent glass slivering.

# Industrial Rotavapor®



Use the BUCHI industrial Rotavapor® R-220 SE / R-250 for production scale.

# Parallel Evaporator



The Multivapor<sup>TM</sup> is a compact 6 or 12 position parallel vortex evaporator that is designed to optimize existing personal process workflows.

# Parallel Concentrator



The Syncore® Polyvap allows parallel evaporation of 4 to 96 samples, using six exchangeable racks, available as option.

# Glass Oven



Small amounts of solvents are best distilled on the B-585 Kugelrohr. The option B-585 Drying allows for temperatures of up to 300 °C.

# Chromatography



Purify your samples using flash as well as prep HLPC separations on the same system with PrepChrom C-700 or our modular Sepacore®.

# Spray Dryer



The Mini Spray Dryer B-290 is the product of choice for the quick and gentle drying of liquid solutions to powder.

# Melting Point



Check the purity of your compounds using the Melting Point M-560 or M-565 for melting point or boiling point determination.

# Support and customer service

### From feasibility to preventive maintenance

You value an efficient and personalized service. Our network of professional application specialists and service technicians as well as a large number of satisfied customers around the world give you the assurance that you are working with the right partner.



# BUCHI Product and system configurator

Compose your rotary evaporator with the BUCHI Rotavapor® Configurator according to your specific needs. Simply choose from various options and receive your Rotavapor® order code including a picture of your specific configuration. Share the result with others or easily get a quote.



# Learn about evaporation and concentration

Over more than 50 years of experience in the development of official and customized applications is summarized in practical guides. In addition, The Laboratory Assistant provides the theoretical background of essential sample preparation steps as well as practical tips. Profit from a myriad of information.



#### Discover our numerous case studies

BUCHI offers over 130 different case studies. By using real information, the online case studies bring to life the complexities of business and give you an understanding of the wide range of the applications supported by our products, systems, solutions and services.



# Profit from workshops, trainings and seminars

We regularly offer practical seminars and workshops, often in cooperation with other partners in the field of sample preparation and analysis. Customer contributions thereby underline how our solutions facilitate the daily routine. We also attend many local and international scientific and industrial congresses.



# Use your product most effectively

We help you to set your product properly into operation. We provide thorough Installation/Operation Qualification (IQ/OQ) services to ensure compliance with FDA, GLP/GMP standards or GAMP guidelines. Whether it is because of an initial installation, requalification or relocation, we provide professional compliance verification.



#### Minimize downtimes

Avoid products downtimes with preventative maintenance and tailored service packages. We offer a product warranty of two years and guarantee ten years of spare parts availability.



#### Global Network

Our subsidiaries and qualified distribution partners ensure proximity where ever you are. Since we are familiar with your requirements, we use our experience and knowledge to provide first-rate solutions.

# Votre revendeur:



info@cloup.fr www.cloup.fr

We are represented by more than 100 distribution partners worldwide.

