

Encapsulator

B-390 / B-395 Pro



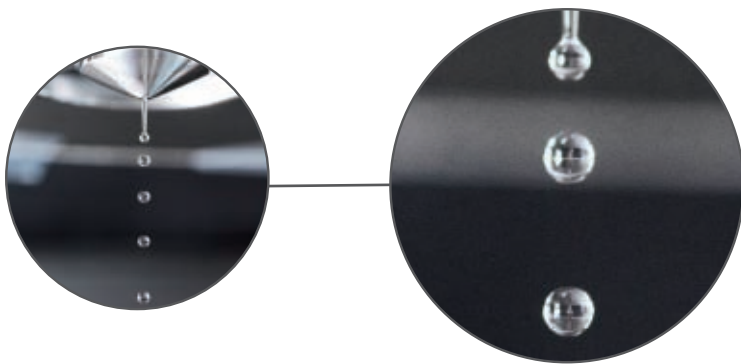
**Encapsulate your
precious active compound!**

What is Encapsulation?

Encapsulation is the immobilization of active ingredients in a polymer matrix. The active compounds which are immobilized are for example enzymes, drugs, flavours & fragrances, vitamins, oils, cells or microbes.

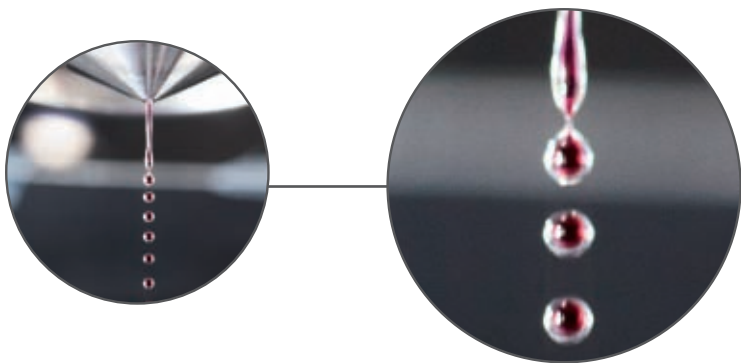
There is a wide range of polymer matrices which can be utilized such as alginate, carrageen, cellulose sulphate, chitosan, gelatine or pectin, as well as waxes. The polymer matrix is used as a protection shield or as a barrier through which only specific compounds can diffuse.

Uniform beads and capsules at a high reproducibility rate are produced with the sophisticated encapsulation technology provided by BUCHI. Their size is pre-selectable in the range of 0.15 mm to 2 mm with a spherical shape, a narrow size distribution (< 5% standard deviation) and a productivity of up to 6'000 beads per second.



Droplet formation

Formation of spherical droplets with a single nozzle system for matrix encapsulation



Capsule formation

Core/shell capsule formation with a concentric nozzle system in a one step procedure

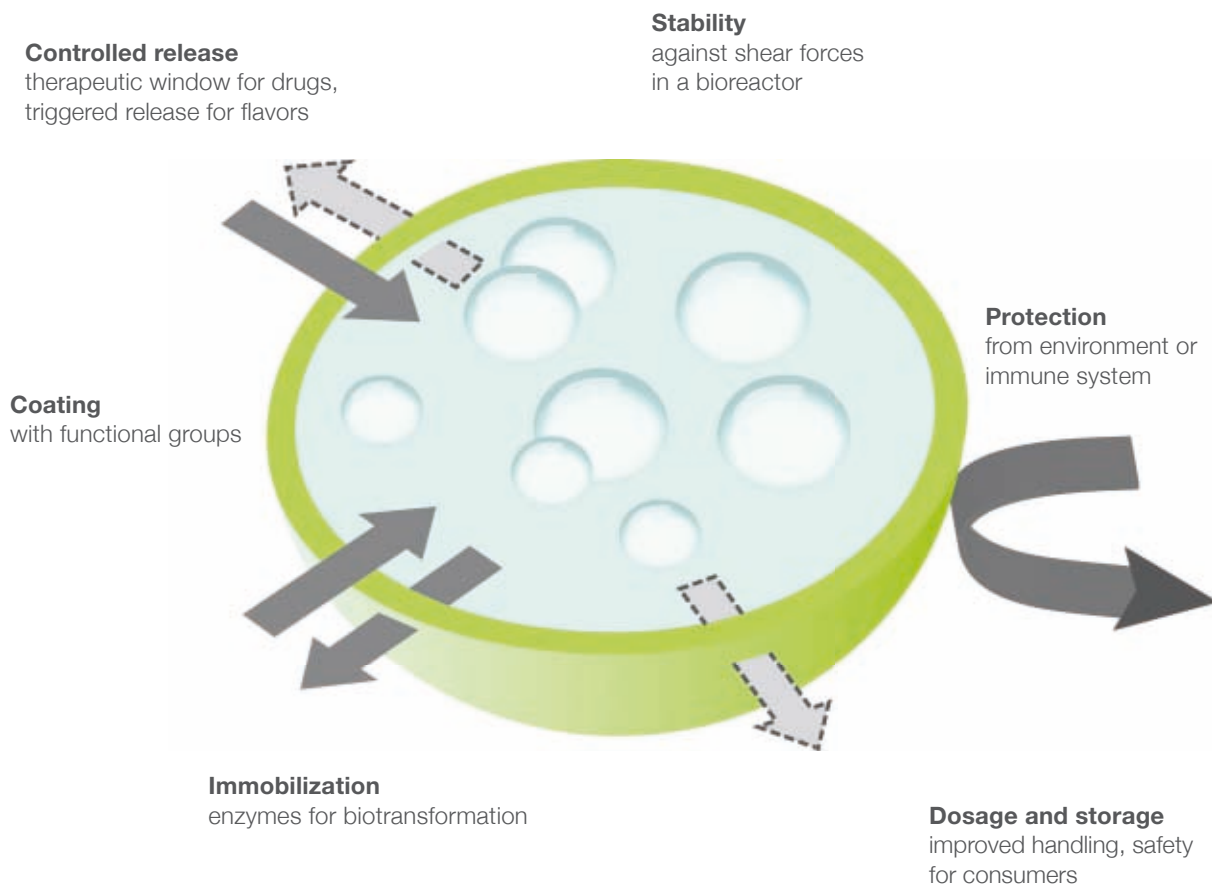
Why Encapsulation?

Encapsulation is gaining greater attention as a mild, continuous and scalable process. It is particularly used to protect or stabilize drugs, microorganisms, enzymes or cells in a polymeric matrix.

The wide variety of polymer matrixes allows the construction of beads with specific features. Hydrogel matrixes have an open pore structure so that small hydrophilic molecules like peptides diffuse freely in and out. However, small lipophilic molecules or large molecules like proteins remain immobilized in the matrix. The diffusion behaviour of molecules in and out the bead can be modified by the addition of a secondary membrane. This possibility is very helpful in cell transplanta-

tion to reject the host immune system on the bead surface. Therefore foreign implanted cells are protected against the host immune system.

Biodegradable polymers allow the construction of slow release formulations. The uniform bead size, which is especially achievable with the Encapsulator, offers better modification options of the release profile.

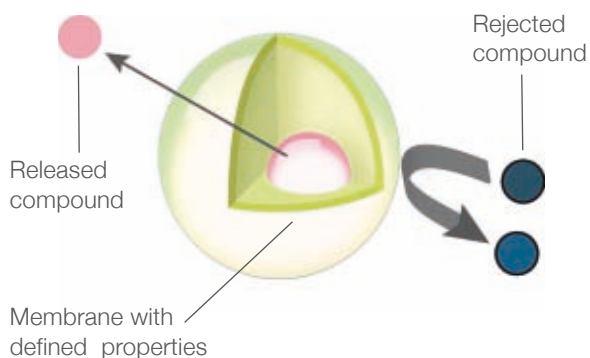


Market Segments – Pharma and Food

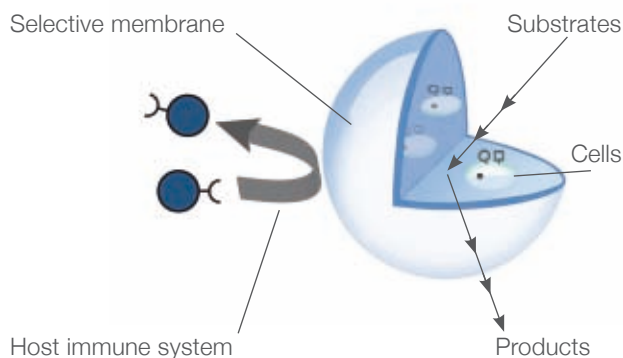
The Encapsulators B-390 and B-395 Pro are particularly designed to perform feasibility studies in R&D laboratories and academia. They are also ideally suited for small scale production.

Pharma

“Intelligent” beads / capsules



Encapsulation of living material



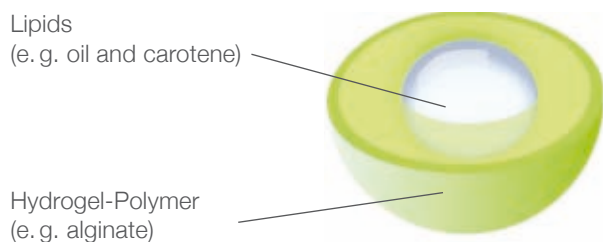
Topics of interest

- Encapsulation of active ingredients in a matrix material (e. g. poorly soluble drugs in polymeric microspheres)
- Drug delivery systems with controlled drug release (e. g. biodegradable poly-lactic-acid beads)
- Protection of active ingredients (e. g. reducing interaction with other agents during storage)
- Coating of particles with new functions (e. g. modulated release)

- Taste masking of bitter agents in capsules produced with concentric nozzles
- Sterile encapsulation of mammalian cells and thereby protection of cells against immune system for cell transplantation (e.g. treatment of gene deficiency or liver disease)
- Protection of cells against shear stress in stirred reactors
- Capsules as micro systems for cell retention with high cell density
- Immobilization of microbes and enzymes for biotransformation

Food

Encapsulation of lipids



Topics of interest

- Probiotic ingredients (e. g. lactic acid bacteria)
- Stabilization and protection of nutraceuticals (e. g. vitamins, oils)
- Optical enhancement of foodstuff
- Molecular kitchen

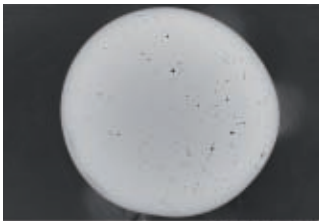
A Wide Variety of Applications

The Encapsulator immobilizes drugs, flavors & fragrances, enzymes, pigments, micro-organisms or animal and plant cells into hydrogel polymers at uniform size and at mild conditions.

Pharma



Drug delivery
Freeze-dried polymer with active ingredient



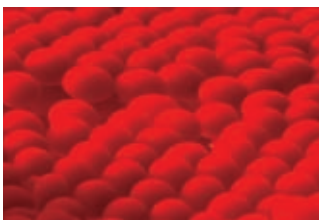
Drug delivery
Active ingredient encapsulated in biodegradable polymer



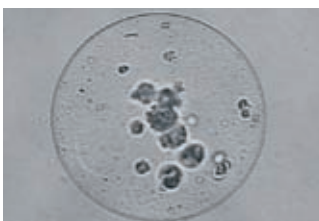
Drug delivery
Hard fat beads with immobilized active ingredient



Taste masking vitamin storage
Oil with active ingredients in gelatine capsules

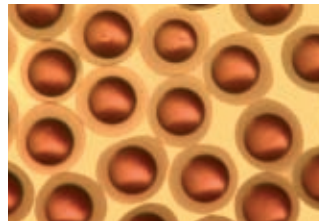


Biotransformation
Encapsulated micro-organisms and enzymes



Cell transplantation
Encapsulated animal cells

Food

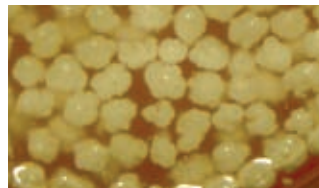


Food enrichment
Small alginate capsules containing sunflower oil and carotene



Probiotic food
Encapsulation of lactic acid bacteria

Others



Cosmetics
Encapsulated cream



Cosmetics
Large alginate capsule containing squalene

Polymers for bead matrices and membrane formation:

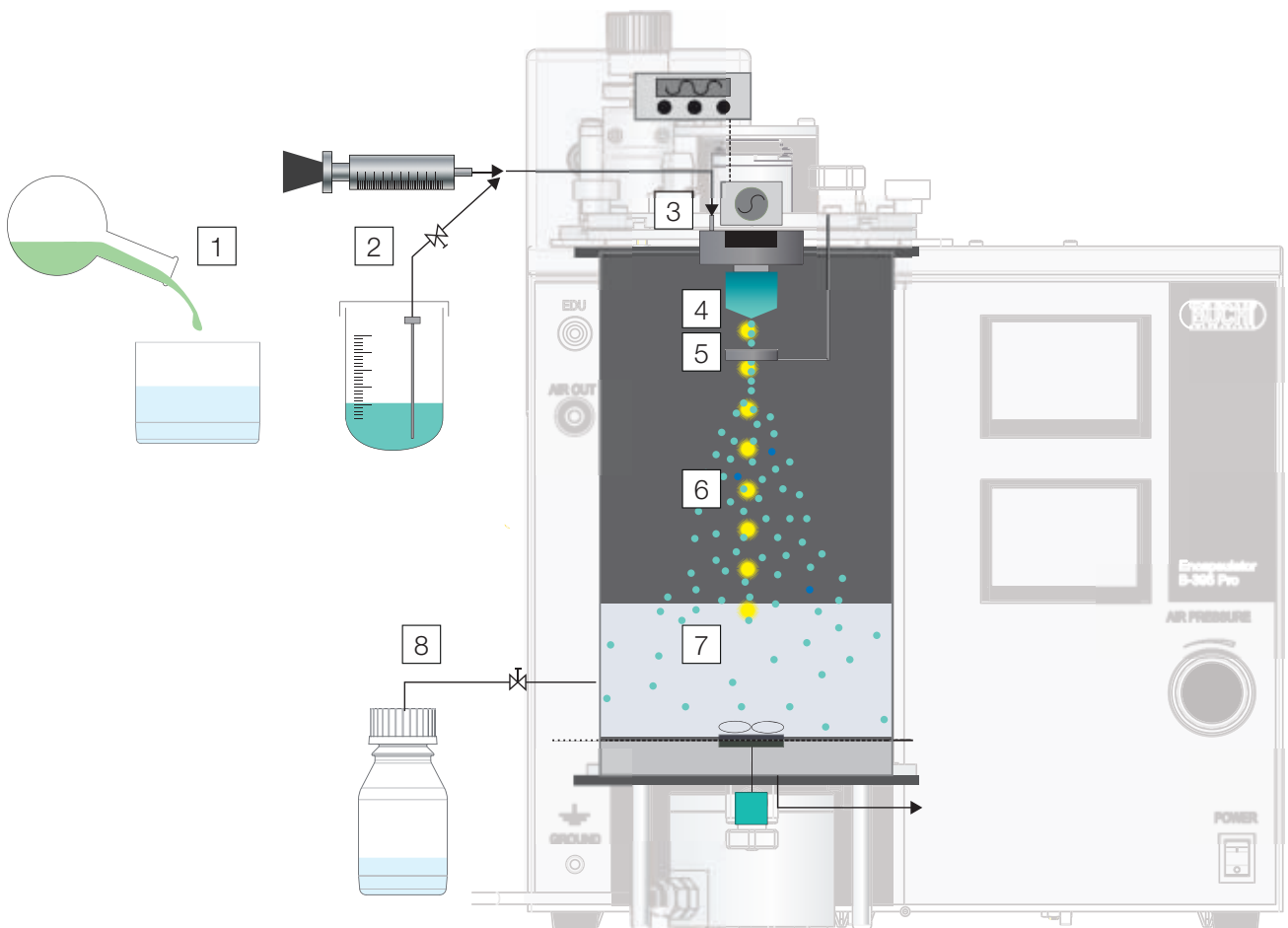
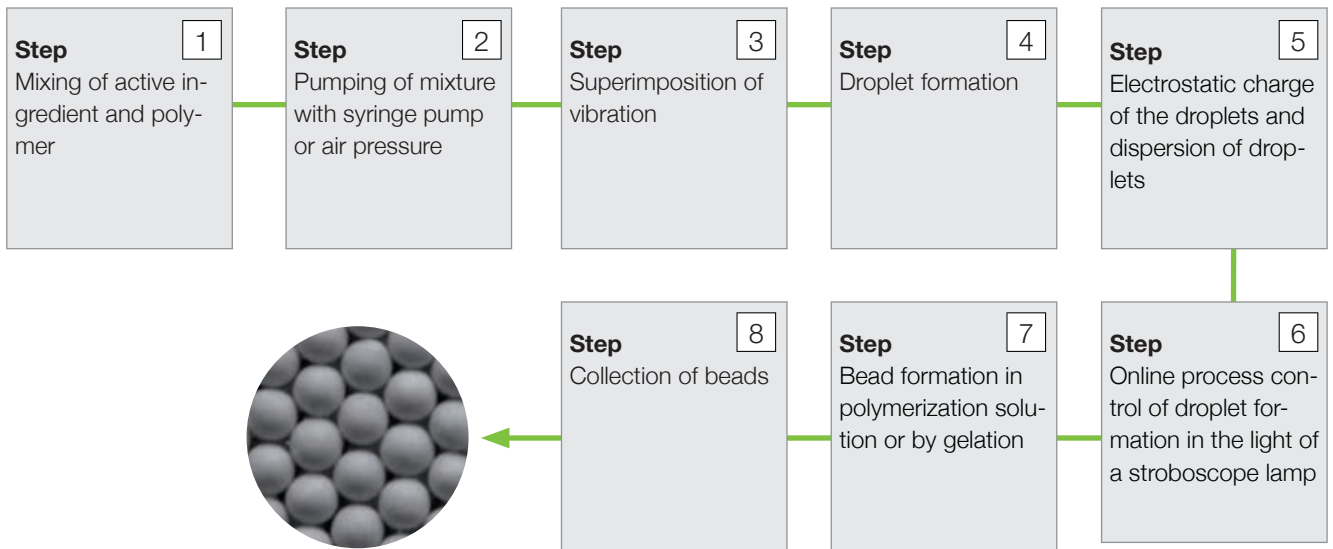
- Alginate
- Gelatine
- Carrageen
- Cellulose sulfate
- Chitosan
- Waxes

Encapsulated active agent:

- Drugs
- Vaccines
- Enzymes
- Microbes
- Cells
- Flavours
- Oils
- Pesticides
- Pigments

Functional Principle – Efficient Vibration Technique

The vibration nozzle technology is based on the principle that a laminar flowing liquid jet breaks up into equal sized droplets by a superimposed vibration. The selectable vibration frequency determines the quantity of droplets produced, for example a vibration frequency of 700 Hz generates 700 droplets per second.



Benefits at a Glance

The clever design and innovative technology make the Encapsulator especially suitable for R&D feasibility studies in laboratories and for versatile applications. You benefit from the continuous capsule generation, reproducibility and user friendliness.

User friendly

- Fast installation
 - Quickly learned operation
 - Simple and easy cleaning
 - Benchtop design
 - Parameter settings on touch screen
-

Flexible

- Wide variety of applications
 - Bead and capsule formation with the same instrument
-

Reproducible bead formation

- Selectable bead size from 0.15 mm to 2 mm
- Uniform and narrow size distribution (< 5% standard deviation is possible)

Real-time process control

- Stroboscope for online visualization and optimization of droplet production
-

Mild encapsulation conditions

- Encapsulation at room temperature and at physiological conditions possible
 - Full viability of encapsulated living material
 - Suitable for animal cell encapsulation
-

Sterile handling

- Parts in contact with the encapsulation mixture are autoclavable
- Reaction vessel for sterile containment

Key Features

The Encapsulators B-390 and B-395 Pro offer easy access to the technique of encapsulation. Features for high quality bead production are integrated such as stroboscope lamp and electrostatic dispersion. Further features are nozzle heating, sterile conditions and calibrated pumping.

Encapsulator B-390

The instrument offers microencapsulation under open working conditions. The liquid is pumped by air pressure. The nozzle can be warmed up to 70°C with the incorporated heating.

User group

- Education unit in academia
- Starter model in food and pharma R&D

Control unit

- Regulation of vibration frequency, electrostatic dispersion, heating and air pressure

Set of 8 single nozzles

- 0.08, 0.12, 0.15, 0.2, 0.3, 0.45, 0.75 and 1.0 mm
- Stainless steel

Nozzle heating

- Integrated heating of the bead production unit
- Up to 70°C

Bead producing unit

- For single nozzles

Pressure bottle

- 500 ml glass volume
- Working pressure up to 1.5 bar

Optional

- Concentric nozzle set for one step core/shell capsule production

Encapsulator B-390

Order no. 11058210



Encapsulator B-395 Pro

The instrument offers bioencapsulation of cells and microbes under mild and sterile conditions in a reaction vessel. Liquid pumping is done by the integrated syringe pump or by air pressure.

User group

- Pharma R&D
- Advanced research in academia

Control unit

- Regulation of vibration frequency, electrostatic dispersion, syringe pump and magnetic stirrer

Syringe pump

- For 1 to 60 ml syringes
- 0.01 to 50 ml/min flow rate
- Flow rate calibration

Set of 8 single nozzles

- 0.08, 0.12, 0.15, 0.2, 0.3, 0.45, 0.75 and 1.0 mm
- Stainless steel

Bead producing unit

- For single nozzles

Reaction vessel

- 2 liter working volume
- Autoclavable
- GMP compliant surface treatment of stainless steel

Pressure bottles

- 500 and 1000 ml glass volume
- Working pressure up to 1.5 bar

Magnetic stirrer

- Gentle stirring
- Fits under reaction vessel

Optional

- GMP compliant documentation for reaction vessel validation including sealing set
- Concentric nozzle set for one step core/shell capsule production

	Order no.
Encapsulator B-395 Pro	11058220
Encapsulator B-395 Pro (with GMP documentation)	11058230



Order Information

Recommended options and accessories



Concentric nozzle set

Set of 7 external nozzles with high precision opening of 0.2, 0.3, 0.4, 0.5, 0.6, 0.7 and 0.9 mm made of stainless steel incl. 1000 mL pressure bottle

	Order no.
Concentric nozzle set	11058051



Reaction vessel for sterile applications

Completely autoclavable reaction vessel made of glass and stainless steel for the sterile production and collection of microcapsules, 2 litre working volume; incl. bead producing unit and set of 8 single nozzles

	Order no.
Reaction vessel	11057890
Reaction vessel with GMP documentation	11057879



Set of 8 single nozzles

Set of 8 single nozzles with high precision opening of 0.08, 0.12, 0.15, 0.20, 0.30, 0.45, 0.75 and 1.00 mm, made of stainless steel including nozzle rack

	Order no.
Set of 8 nozzles	11057918



Pressure bottles

Glass bottles with fittings, tubes and air filter, working pressure up to 1.5 bar, autoclavable

	Order no.
500 mL (1 unit)	11058190
1000 mL (1 unit)	11058191



O-ring sets

	Order no.
O-ring set for single nozzle	11057954
O-ring set for concentric nozzle	11057955
O-ring set for reaction vessel	11057970



Filters

	Order no.
Prefilters for nozzle, diameter 7 mm (10 pieces)	11057957
Drain filters for reaction vessel, diameter 35 mm (10 pieces)	11057958

Technical Data

	Encapsulator B-390	Encapsulator B-395 Pro
Power consumption	max. 150 W	
Connection voltage	100 – 240 VAC	
Frequency	50/60 Hz	
Dimension (W x H x D)	32 x 29 x 34 cm	32 x 38 x 48 cm
Weight	7 kg	11 kg
Nozzle diameter of single (= core) nozzles	0.08, 0.12, 0.15, 0.2, 0.3, 0.45, 0.75 and 1.0 mm	
Nozzle diameter of shell nozzles for concentric system	0.2, 0.3, 0.4, 0.5, 0.6, 0.7 and 0.9 mm	
Droplet size range	0.15 to 2.0 mm	
Vibration frequency	40 to 6'000 Hz	
Electrode tension	250 to 2'500 V	
Heating	30 to 70 °C	–
Syringe pump rate	–	0.01 to 50 mL/min
Dead volume	approx. 2 mL	approx. 0.5 mL
Pump rate by air pressure	0.5 to 200 mL/min	
Maximal allowed air pressure in the system	1.5 bar	
Reactor gross volume	–	4.5 litre
Reactor working volume	–	2 litre
Parts in contact with medium	autoclavable	
Sterile working conditions	limited	full
Material in contact with sample	stainless steel, glass, silicone, PTFE	
Pollution degree	2	
Environmental conditions	For indoor use at temperature of 5 to 40 °C Max. relative humidity 80 % for temperatures up to 31 °C, and then linearly decreasing to 50% relative humidity at 40 °C	
Approvals	CE, UL/CSA	

BÜCHI Labortechnik AG

CH – 9230 Flawil 1
T +41 71 394 63 63
F +41 71 394 65 65
buchi@buchi.com
www.buchi.com

BÜCHI Labortechnik GmbH

DE – 45127 Essen
Freecall 0800 414 0 414
T +49 201 747 490
F +49 201 237 082
deutschland@buchi.com
www.buechigmbh.de

BUCHI Sarl

FR – 94656 Rungis Cedex
T +33 1 56 70 62 50
F +33 1 46 86 00 31
france@buchi.com
www.buchi.fr

BUCHI UK Ltd.

GB – Oldham OL9 9QL
T +44 161 633 1000
F +44 161 633 1007
uk@buchi.com
www.buchi.co.uk

BÜCHI Labortechnik GmbH

NL – 3342 GT
Hendrik-Ido-Ambacht
T +31 78 684 94 29
F +31 78 684 94 30
netherlands@buchi.com
www.buchi.nl

BUCHI Italia s.r.l.

IT – 20090 Assago (MI)
T +39 02 824 50 11
F +39 02 57 51 28 55
italia@buchi.com
www.buchi.it

BUCHI Hong Kong Ltd.

HK – Central
T +852 2389 2772
F +852 2389 2774
china@buchi.com
www.buchi.com.cn

BUCHI Shanghai

CN – 200052 Shanghai
T +86 21 6280 3366
F +86 21 5230 8821
china@buchi.com
www.buchi.com.cn

BUCHI (Thailand) Ltd.

TH – Bangkok 10600
T +66 2 862 08 51
F +66 2 862 08 54
bacc@buchi.com
www.buchi.com

Nihon BUCHI K.K.

JP – Tokyo 110-0008
T +81 3 3821 4777
F +81 3 3821 4555
nihon@buchi.com
www.nihon-buchi.jp

BUCHI India Private Ltd.

IN – Mumbai 400 055
T +91 22 667 18983 / 84 / 85
F +91 22 667 18986
india@buchi.com
www.buchi.in

PT. BUCHI Indonesia

ID – Tangerang 15321
T +62 21 537 62 16
F +62 21 537 62 17
indonesia@buchi.com
www.buchi.com

BUCHI Korea Inc

KR – Seoul 153-782
T +82 2 6718 7500
F +82 2 6718 7599
KR-Sales@buchi.com
www.buchi.com

BUCHI Canada Ltd.

CA – Thornhill, Ontario L4J 6Z2
T +1 416 277 7407
F +1 905 764 5139
canada@buchi.com
www.mybuchi.com

BUCHI Corporation

US – New Castle,
Delaware 19720
Toll Free: +1 877 692 8244
T +1 302 652 3000
F +1 302 652 8777
us-sales@buchi.com
www.mybuchi.com

We are represented by more than 100 distribution partners worldwide. Find your local representative at

www.buchi.com

Quality in your hands

