SpeedDry
Vacuum Concentrators

Fast and gentle

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CHRIST

Gentle evaporation

Samples are precious, and so is your time.
With rotational vacuum concentration (RVC), you can prepare samples quickly without sacrificing gentle handling. This method can be used for evaporation, drying, purification and concentration.

Rotational vacuum concentration can be a true alternative for anyone who has previously worked with distillation systems, rotary evaporators or freeze dryers. Distillation systems and rotary evaporators use high temperatures for evaporation and operate at nearly atmospheric pressure. They are fast, but not especially gentle.

Freeze drying systems operate at very low temperatures and high vacuum. The samples goes directly from the solid, icy state to the vapour state by sublimation. This is extremely gentle, but time consuming.

All this makes Christ rotational vacuum concentrators a good alternative. Rotational vacuum concentration occupies a position between the two methods mentioned above. At temperatures near room temperature and pressures of a few millibar, the samples (solvent) boils without freezing. This makes the method very fast.

Another advantage is that the samples is not subjected to thermal stress, which is especially important with thermally unstable biological and clinical samples.

During vacuum concentration the material is centrifuged at a moderate speed of about 1,350 to 1,750 rpm. The resulting centrifugal force prevents samples splashing from bumping. The solvent is collected in separators or cold traps. This makes disposal easy, and in some cases enables reuse.

Save time and money
Rotational vacuum concentration is especially economical in practice. The method is suitable for drying a wide variety of aqueous samples, and solvent-based samples in particular. The volume range extends from one millilitre to three litres. The samples is concentrated at the bottom of the vessel, unlike vortex shakers. This is especially advantageous with small volumes and thin solutions. The method also scores well for effectiveness: a large number of samples can be dried simultaneously, saving time.

The drying processes are also easily reproducible.
This enables controlled process parameters, such as rotor chamber temperature and vacuum level.

Example applications

- DNA/RNA (main solvents: water, ethanol, methanol)
- Oligosynthesis, peptides
- Polymerase chain reaction (PCR)
- HPLC (main solvents: water, acetonitrile)
- Isolation/synthesis of natural substances
- Storage and handling of substances (substance libraries)
- Combinational chemistry
- High throughput screening (HTS)
- Food and environmental analytics, toxicology
- Forensics
- General evaporation tasks in laboratories

Exemplary functions and performance

Our devices are distinguished by numerous functions and features that contribute to especially good performance.

Variable-speed magnetic drive
No bumping and no moving parts outside the rotor chamber. That way the chemicals stay inside the samples space. This reduces stress on the samples and on the device.

Extremely simple operation
The CDplus system controller is intuitive and especially user friendly. An automatic start/stop sequence independently controls vacuum application according to the rotor speed. Venting is also performed automatically to prevent samples splashing.

Fast evaporation
Cold traps reduce evaporation times with large sample volumes. Electric rotor chamber heating ensures high energy input. It can adjusted in 1°C steps from 30°C to 80°C.
Note: The RC 2-18 CDplus model has a temperature range of 30°C to 60°C.

Made in Germany
ISO 9001 certified series production, qualified service support (equipment and application).

High chemical resistance
All basic units have a chemical-resistant glass lid, a stainless steel rotor chamber and chemical-resistant seals. The rotors are anodised to increase their chemical resistance and durability. All devices are suitable for both aqueous and solvent-based samples.
Note: The RVC 2-18 CDplus model is also available as a HCl-resistant version.

Individually configurable system components
A variety of cold traps are available, with capacities from 2 to 4 litres and temperatures of -50°C, -55°C and -85°C. You can choose from several chemical-resistant membrane vacuum pumps with end vacuum from 2 to 7 mbar, or chemistry hybrid pumps with end vacuum below 0.1 mbar. The latter are also suitable for solvents with relatively high boiling points, such as DMSO, DMF and NMP.

Easy combination with your freeze drying system
Connection through a rubber shut-off valve.

Comprehensive line of rotors
From standard tubes to your special glassware, our in-house rotor production covers every need.

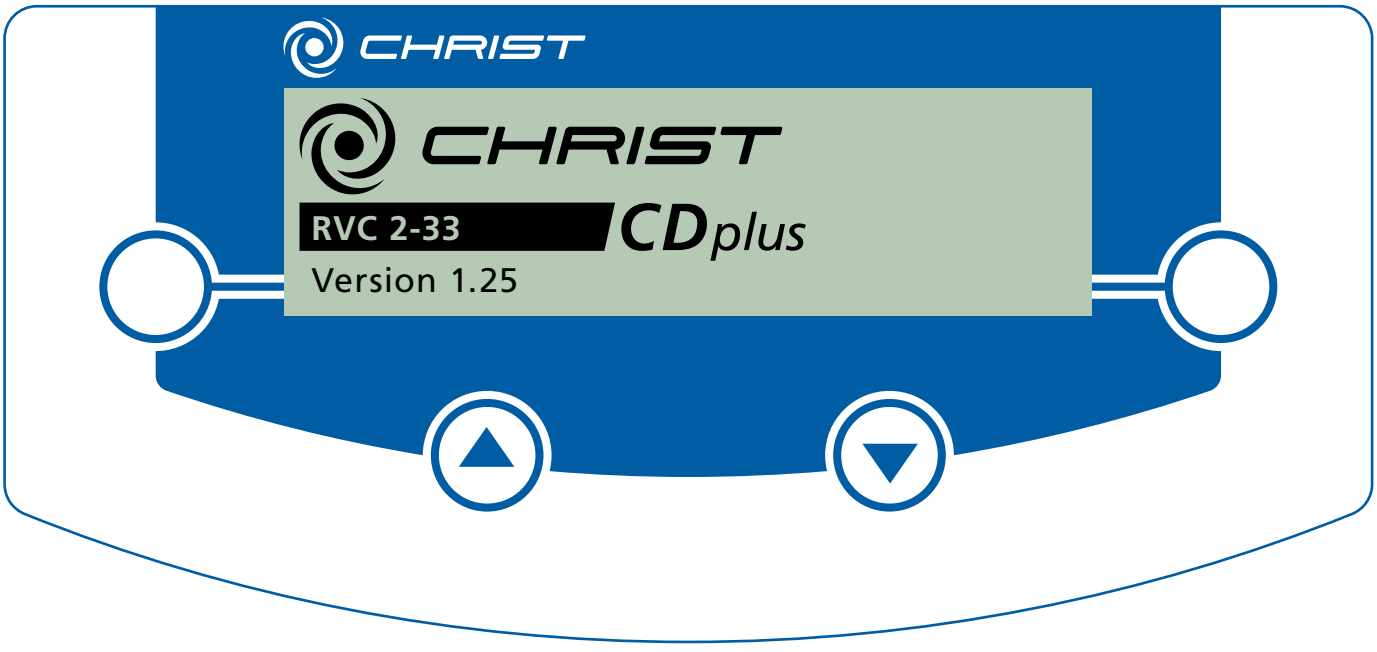
Intuitive system control

Convenient and flexible

Our SpeedDry vacuum concentrators have numerous user-configurable parameters for optimal process control and monitoring. Essential information, including time, vacuum, rotor speed and rotor chamber temperature, can be seen at glance on the well-organised graphical display. System parameters such as lid open/closed status and alerts with error codes are conveniently visualised.

CDplus controller features

- Well-organised graphical display
- Indication of important process parameters
- Large selection of languages
- Vacuum measurement and control
- Rotor speed control
- Rotor chamber heating adjustable in 1°C steps from 30°C to 60°C or 80°C
- Run time setting from 5 minutes to 12 hours



Mini concentrator

RVC 2-18 CDplus

The mini concentrator is economical and compact. This bench device is specifically designed for the concentration of relatively small sample volumes and fits on every laboratory bench. Quick analyses at the workstation are easy with this device. It is ideal for gentle handling of DNA/RNA, proteins and other liquid samples.

The mini concentrator is configured as standard with a chemical-resistant membrane pump with 2 m^3/h suction capacity and an end vacuum of 7 mbar. A membrane pump with a higher end vacuum can optionally be used instead. The device is also available in special DNA and HCl version. It adapts to your wishes to give you top flexibility.

The RVC system components can be combined for all common task configurations. Our application specialists will be pleased to advise you on this.

Product features

- Intuitive operation
- Compact, space-saving bench device
- Individually configurable with vacuum pump and cold trap
- Easy installation
- Suitable for various capacities, such as 72 x 1.5/2.2 ml or 6 x 50 ml

Comprehensive rotor lists on the RVC product pages at:
www.martinchrist.de

Recommended solvents
Acetonitrile
Methanol
Ethanol
Toluene
Isopropanol
Ammonium hydroxide
Methylene chloride
Acetone
Hexane
Ethyl acetate

HCl concentrator

RVC 2-18 CDplus HCl Version

Special samples need smart solutions. That's why we developed this mini concentrator with something extra: it can handle samples containing aggressive substances, such as commonly used in combinational chemistry or chemical decomposition methods. This model is a special version of the RVC 2-18 CDplus and has the same technical configuration as the basic device. It is compact and equipped with state-of-the-art technology. Users can choose from a wide range of rotors. The mini concentrator can be individually combined with a cold trap with glass insert.

Product features

- As RVC 2-18 CDplus

Additional features

- Special coating
- Magnetic drive
- Materials resistant to hydrochloric acid
- Long-life rotors made from special resistant material (PDVF)
- Suitable for various capacities, such as 48 x 1.5/2.2 ml or 6 x 50 ml

Comprehensive rotor lists on the RVC product pages at:
www.martinchrist.de

Recommended solvents
Acetonitrile
Methanol
Ethanol
Toluene
Isopropanol
Ammonium hydroxide
Methylene chloride
Acetone
Hexane
Ethyl acetate
Hydrochloric acid
Sulphuric acid 5%
Trichloro acetic acid 0.5%

Midi concentrator

RVC 2-25 CDplus

The midi concentrator is a general-purpose bench device for routine concentration tasks. Compact and efficient, it fits on every laboratory bench despite its high capacity. This device is suitable for gentle handling of DNA/RNA, proteins and other liquid samples. The composite stainless steel / glass lid with view window is made from corrosion-resistant materials.

The rotor capacity is impressive, covering the range from 108 x 1.5/2.2 ml vials to two microtiter plates The standard accessory membrane pump has a suction capacity of 2 m^3/h and an end vacuum of 7 mbar. On request, the midi concentrator can also be provided with a vacuum system with higher end vacuum. If more evaporation capacity is desired, the RVC 2-25 CDplus can be configured with cold traps (capacity 2 or 4 litres).

Product features

- Intuitive operation
- Compact, space-saving bench device
- Individually configurable with vacuum pump and cold trap
- Easy installation
- Automatic aeration valve
- Vacuum measurement and control
- Suitable for various capacities, such as 108 x 1.5/2.2 ml, 6 x 100 ml or microtiter plates.

Comprehensive rotor lists on the RVC product pages at:
www.martinchrist.de

Recommended solvents
Acetonitrile
Methanol
Ethanol
Toluene
Isopropanol
Ammonium hydroxide
Methylene chloride
Acetone
Hexane
Ethyl acetate

Maxi concentrator

RVC 2-33 CDplus

The maxi concentrator is highly versatile and ideally suited to large samples volumes. Virtually all commonly used solvents can be handled perfectly with this device. The CDplus controller provides simple operation and outstanding process overview. The high-performance 1,550 rpm drive system reliably prevents samples splashing. The maxi concentrator is virtually immune to imbalance.

The materials ensure long service life. The glass/steel composite lid with view window is corrosion resistant. The RVC 2-33 CDplus can be configured as standard with a chemical-resistant membrane pump with 4 m^3/h suction capacity and an end vacuum of 1.5 mbar. Higher end vacuum is optionally available. The chemistry hybrid pump is also suitable for solvents with high boiling points, such as DMSO or DMF. Due to the high evaporation volume, we recommend using the maxi concentrator with a Christ 4 litre cold trap.

Product features

- Intuitive operation
- Individually configurable with vacuum pump and cold trap
- Easy installation
- Automatic aeration valve
- Vacuum measurement and control
- Programmable pressure and temperature (up to 16 individual programs)
- Variable speed
- Suitable for various capacities, such as 216 x 1.5/2.2 ml, 12 x 100 ml, 12x microtiter plates or 4 deep well plates

Comprehensive rotor lists on the RVC product pages at:
www.martinchrist.de

Recommended solvents
Acetonitrile
Methanol
Ethanol
Toluene
Isopropanol
Ammonium hydroxide
Methylene chloride
Acetone
Hexane
Ethyl acetate

High-speed maxi concentrator

RVC 2-33 CDplus Infrared Version

This Christ vacuum concentrator is especially suitable for effective concentration of solvents with high boiling points. The wide variety of available rotors ensures high samples capacity. Thanks to efficient energy input with halogen IR lamps, large samples volumes for active ingredient screening (e.g. 100 ml tubes) can be processed quickly.

The innovative drive concept is especially noteworthy. The powerful external-rotor motor, contactless central rotary coupling and direct force transfer ensure safe operation, even under high imbalance conditions. The vacuum level can be preset anywhere within the operating range of the vacuum pump and the device can be combined with a freeze dryer system.

Product features

- As RVC 2-33 CDplus

Additional features

- Four infrared lamps accelerate samples evaporation by a factor of 2 to 3
- Product temperature measurement
- High-performance vacuum pumps with end vacuum under 0.1 mbar enable two-stage operation with concentration followed by freeze drying:
  - Concentration by rapid volume reduction
  - Freeze drying with low solvent content leads to better product quality
- Suitable for various capacities, such as 216 x 1.5/2.2 ml, 4 x 500 ml, 12x microtiter plates or 4 deep well plates

Comprehensive rotor lists on the RVC product pages at:
www.martinchrist.de

Recommended solvents
Acetonitrile
Methanol
Ethanol
Toluene
Isopropanol
Ammonium hydroxide
Methylene chloride
Acetone
Hexane
Ethyl acetate
DMSO
TFA

Efficient, high-performance cold traps

The evaporation rate is limited by two factors: the energy input (heating temperature and vacuum) and the suction capacity of the membrane pump. It is much more reasonable to use a cold trap as a cryogenic pump instead of a larger vacuum pump.
Cold traps accelerate the process, especially with aqueous solutions.

Cold traps

- Capacity 2 l (CT 02-50) / 4 l (CT 04-50)
- Condenser temperature -50°C
- Easy emptying through bottom drain valve

CT04-50 **CT02-50**

Freeze dryer used as a cold trap

- Capacity 2 (Alpha1-2 LDplus) / 4 l (Alpha 2-4 LDplus)
- Condenser temperature -55°C (Alpha 1-2 LDplus) / -85°C (Alpha 2-4 LDplus)
- Freeze dryer upgrade options

Alpha 1-2 LDplus **Alpha 2-4 LDplus**

Note: Although cold traps are not absolutely necessary when chemistry membrane pumps are used, they are recommended with samples volumes greater than 100 ml to reduce evaporation times.

Impressive package solutions

1 **Routine package for everyday tasks**
This package is a high-capacity all-in-one solution. It consists of an RVC 2-25 CDplus, a CT 02-50 and the MZ2C. This system is designed for the most common applications and for the efficient processing of a very wide variety of samples.

2 **Many hydrochloric acid samples – tandem system**
This economic tandem system consists of a single cold trap and a vacuum pump together with two special RVCs. This combination is reliable and versatile.

3 **Universal combination – RVC and freeze dryer**
An especially noteworthy feature of this package is the combination of a freeze dryer specifically suitable for solvents with an evaporator. They are joined through the drying manifold or the mineral glass chamber and a rubber shut-off valve. This combination enables efficient evaporation as well as gentle freeze drying

Specifications

	RVC 2-18 CDplus		RVC 2-25 CD-plus	RVC 2-33 CDplus	
	Standard	HCL Version		Standard	Infrared Version
Rotor speed [rpm], max.	1500	1500	1550	1550	1750
Relative acceleration (RCF), max.	210	210	235	415	530
Maximum permissible imbalance [g]	30	30	30	50	50
Temperature control range [°C]	+30 to +60	+30 to +60	+30 to +80	+30 to +80	+30 to +80
Maximum operating vacuum, depending on pump system [mbar]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dimensions of basic unit [W x H x D, mm]	240 x 240 x 355	240 x 240 x 355	315 x 255 x 460	390 x 315 x 536	550 x 315 x 536
Weight of basic unit [kg]	14	14	24	44	49
Power supply [V / Hz]Special voltages upon request	230 / 50–60	230 / 50–60	230 / 50–60	230 / 50–60	230 / 50–60
Noise level per DIN 45635 [dB(A)]	40	40	44	49	49
Vacuum port – small flange	DN 16 KF	DN 16 KF	DN 16 KF	DN 25 KF	DN 25 KF

These specifications relate to the basic unit with an ambient temperature range of +10°C to +25°C.

Subject to change without prior notice.

Our Product Spectrum

With a unique and broad graduated range of equipment and accessories, we can 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 capacity from 20 to 500 kg; custom system design including loading and unloading system (image shows inspection door).
2. Pilot freeze drying systems for process development or process optimisation with ice condenser capacity from 4 to 16 kg.
3. Freeze drying systems for routine applications or R&D with ice condenser capacity from 2 to 24 kg.
4. Rotational vacuum concentrators for applications extending from routine to evaporation concentration in the high-end range of pharmaceutical research.

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