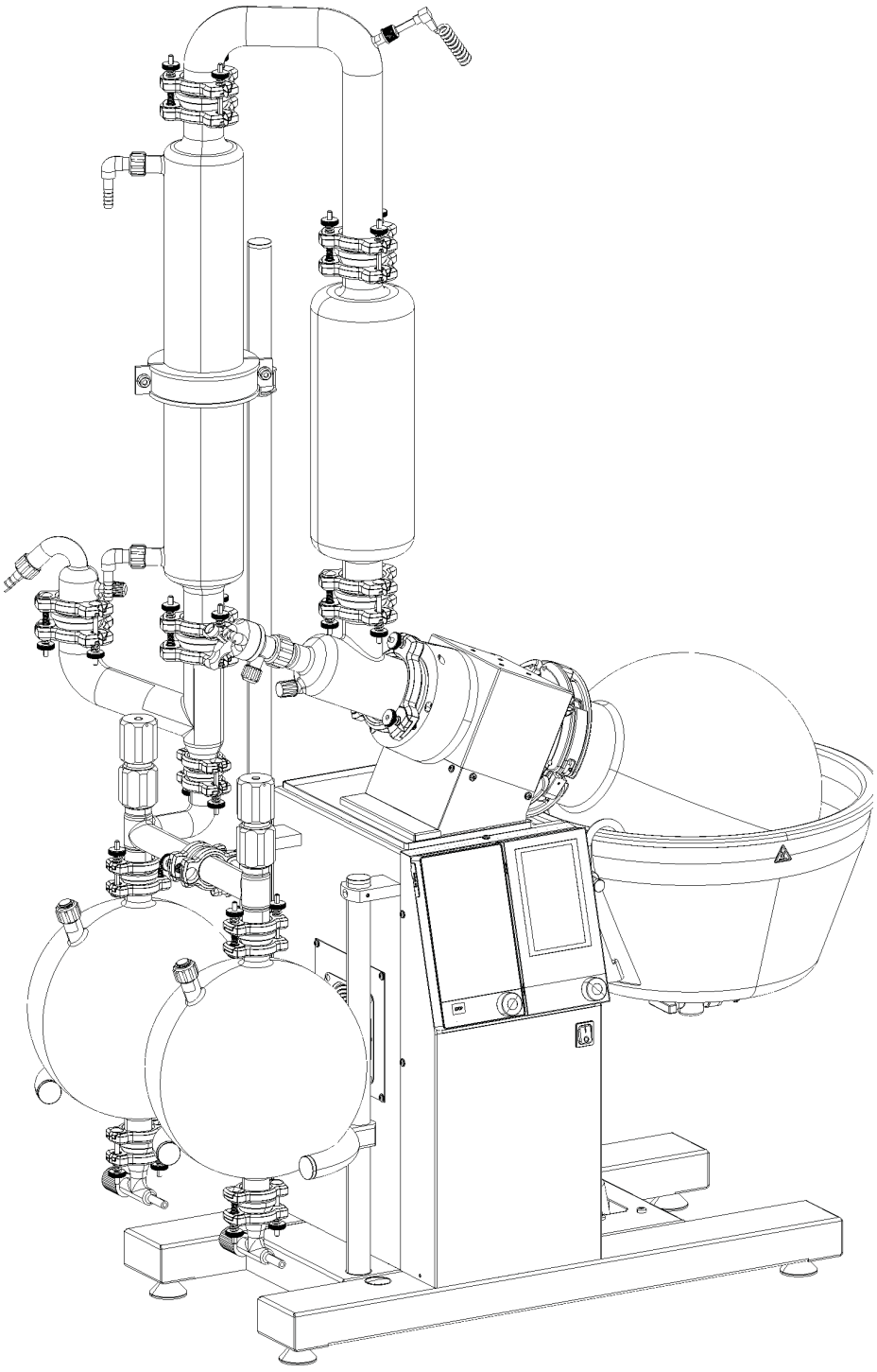
Rotavapor® R-220 Pro
Technical data sheet

The Rotavapor® R-220 Pro is designed to fulfill a wide range of distillation applications in the industrial environment. Safety, robustness and easy handling are the key benefits of this system. Seven different glass configurations and a wide range of accessories guarantees the perfect setup for maximum performance.



11595367G en Rotavapor® R-220 Pro 04.2021
Technical data are subject to change without notice
Quality Systems ISO 9001

Overview

The Rotavapor® R-220 Pro is available in different versions and configurations to cover a broad range of appli- cations. The following table provides a rough overview of the available versions.

Application	R-220 Pro Essential	R-220 Pro Basic	R-220 Pro High Performance	R-220 Pro Continuous
Including vacuum controller		•	•	•
Continuous distillation				•
High distillation rate (> 16 L Ethanol / h) *			•	
7 different glass configurations		•		

* For a comprehensive comparison of the distillation rates, see Section "Performance", page 13.

A wide range of applications can be performed with the R-220 Pro. Nevertheless some versions are specially designed to fulfill specific needs. The following table helps to choose the most suitable ver- sion.

Application	R-220 Pro Essential	R-220 Pro Basic	R-220 Pro High Performance	R-220 Pro Continuous
For easy distillable or drying products	++	++	+	-
Heat sensitive products	++	++	+	++
Reflux distillations (e.g. Recrystallization)	-	++	-	-
Continuous distillation (fully automated filling and draining process)	-	-	-	++
Solvent recycling	+	++	++	++
Foaming applications	-	++	+	-
Automatic distillation	-	++	+	-

Legend:

+ + : Recommended version that is specially designed for this application

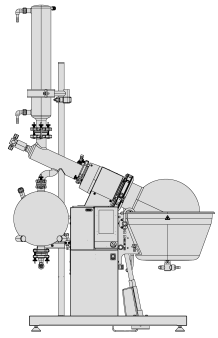
+ : Possible to perform this application, but not optimized for it.

— : not possible or recommended

Configurations

Each platform has its glass configuration according to their purpose

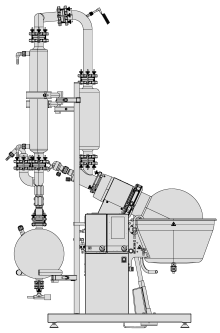
Rotavapor® R-220 Pro Essential



The “Essential” version is equipped with a vertical condenser and one receiving flask with a volume of 10 L. This configuration covers all the basic distillation needs. It is not recommended for bumping or foaming samples and also distillations under reflux are not possible.

Overall height incl. R-220 Pro: 1.70m

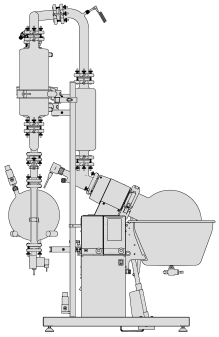
Rotavapor® R-220 Pro High Performance



The glass configuration of the ”High performance” version, consists of two parallel condensers to be able to condense the higher amount of evaporated solvent. Combined with two receiving flasks of 10 L each.

Overall height incl. R-220 Pro: 1.80 m

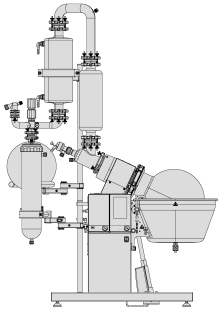
Rotavapor® R-220 Pro Continuous



The “Continuous” setup contains a shorter but equally efficient condenser and one receiving flask. It is based on the descending configuration.

Overall height incl. R-220 Pro: 1.75 m

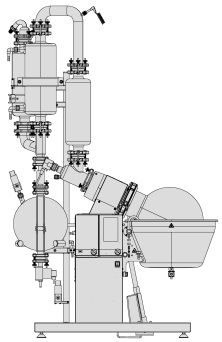
Rotavapor® R-220 Pro Extraction



The R-220 Pro Extraction is based on the Standard R-220 Pro with a descending condenser, 1 receiving flask and the special 4 liter extraction chamber. It is designed for continuous cold extraction of natural products.

Overall height incl. R-220 Pro: 1.75 m

Rotavapor® R-220 Pro high performance continuous (HP cont)



The R-220 Pro HP cont is the combination of the already well-known R-220 Pro HP and the R-220 Pro continuous. It offers the performance of the HP and the benefit of the continuous distillation.
Overall height incl. R-220 Pro: 1.80 m

Order code

Choose the configuration according to your needs:

Rotavapor® R-220 Pro

1	1	8	7		4				

Rotavapor® R-220 Pro

1 230 V, 3.6 kW, oil and water
2 200 V, 3.6 kW, oil and water
6 400 V, 3.6 kW, oil and water
9 400 V, 4.2 kW, water bath

Evaporating flask

B 10 L evaporating flask
C 20 L evaporating flask
X No flask
6L flask or drying flask (10 L or 20 L)
has to be ordered separately

Condenser assembly

21 R, reflux
22 RB, reflux reduced height
23 C, cold trap
24 D, descending
25 DB, descending reduced height
26 D2, descending with secondary condenser
27 DB2, descending reduced height with secondary condenser

Receiver assembly

1 One receiving flask
2 Two receiving flasks

Rotavapor® R-220 Pro Essential (without Interface I-300 Pro)

Voltage

1 230 V, 3.6 kW, oil and water
2 200 V, 3.6 kW, oil and water
6 400 V, 3.6 kW, oil and water

Rotavapor® R-220 Pro Continuous

Voltage

1 230 V, 3.6 kW, oil and water
2 200 V, 3.6 kW, oil and water
6 400 V, 3.6 kW, oil and water
9 400 V, 4.2 kW, water bath

Rotavapor® R-220 Pro High Performance (400 V / 6.3 kW)

Rotavapor® R-220 Pro high performance continuous (HP cont)

Rotavapor® R-220 Pro Extraction

Voltage

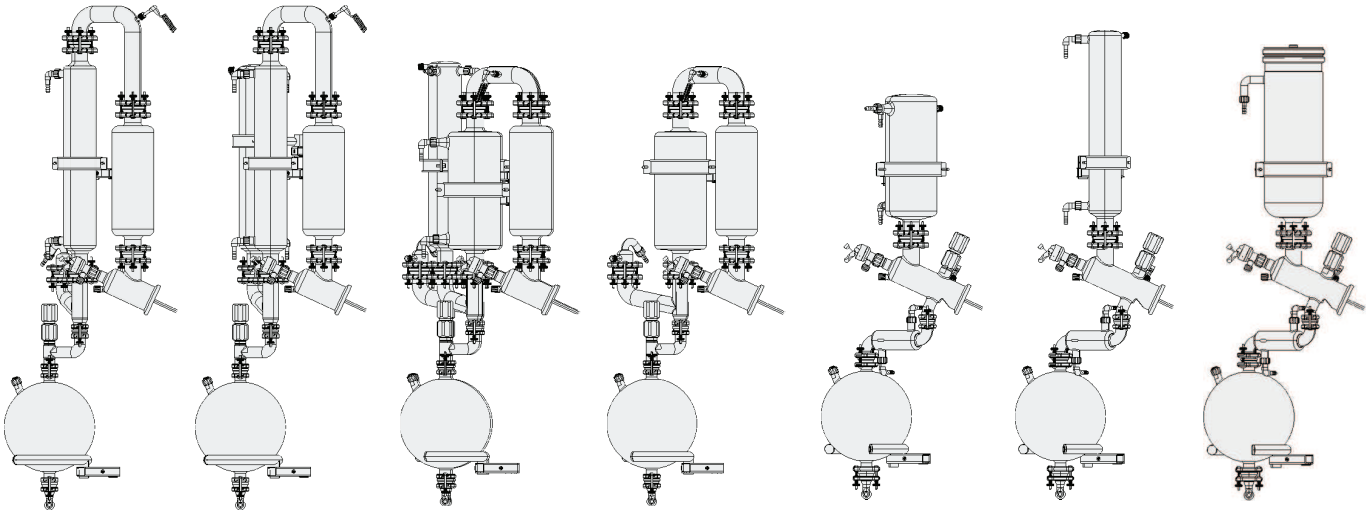
1 230 V, 3.6 kW, oil and water
2 200 V, 3.6 kW, oil and water
6 400 V, 3.6 kW, oil and water

Scope of delivery

All configurations are supplied ready to use.

Components	R-220 Pro
Glass configuration according to order configuration	1
Evaporating flask according to order configuration	1
All needed tubing's (vacuum and cooling)	1
Seal removing tool	1
Operation manual	1

Glassware



D	D2	DB2	DB	RB	R	C
Low boiling points and/or foaming products				High boiling points		Very low boiling point
	Minimum emissions			Reflux reactions		
		Reduced height				
175 cm	175 cm	150 cm	150 cm	143 cm	163 cm	158 cm

Technical data

Rotavapor® R-220 Pro

	R-220 Pro	R-220 Pro Essential	R-220 Pro Continuous	R-220 Pro High Performance
Dimensions (W x D x H)	1200 x 710 x 1750 mm	1100 x 560 x 1700 mm	1200 x 600 x 1750 mm	1200 x 710 x 1800 mm
Weight	100 kg	85 kg	100 kg	110 kg

	R-220 Pro	R-220 Pro Essential	R-220 Pro Continuous	R-220 Pro High Performance
Connection voltage	200 VAC (1Ph, N, G) ± 10 %	200 VAC (1Ph, N, G) ± 10 %	200 VAC (1Ph, N, G) ± 10 %	-
	220 - 240 VAC (1Ph, N, G) ± 10 %	220 - 240 VAC (1Ph, N, G) ± 10 %	220 - 240 VAC (1Ph, N, G) ± 10 %	-
	400 VAC (3Ph, N, G) ± 10 %	400 VAC (3Ph, N, G) ± 10 %	400 VAC (3Ph, N, G) ± 10 %	400 VAC (3Ph, N, G) ± 10 %
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Power consumption (3600 W heater)	5000 W	5000 W	5000 W	-
Power consumption (4200 W heater)	5500 W	-	5500 W	-
Power consumption (6300 W heater)	-	-	-	7500 W
Pollution degree	2	2	2	2
Overvoltage category	II	II	II	II
Approval (400 VAC Connection Voltage)	CE UL / CSA	CE UL / CSA	CE -	CE -
Approval (200 VAC Connection Voltage)	CE	CE	CE	CE
Rotation Motor	1-phase 0.6 A at 50 Hz 10 Nm	1-phase 0.6 A at 50 Hz 10 Nm	1-phase 0.6 A at 50 Hz 10 Nm	1-phase 0.6 A at 50 Hz 10 Nm
Rotation controlling	Electronically	Electronically	Electronically	Electronically
Rotation speed range	5 – 150 rpm	5 – 150 rpm	5 – 150 rpm	5 – 150 rpm
Rotation accuracy	± 1 rpm at 5 rpm to ± 5 rpm at 150 rpm	± 1 rpm at 5 rpm to ± 5 rpm at 150 rpm	± 1 rpm at 5 rpm to ± 5 rpm at 150 rpm	± 1 rpm at 5 rpm to ± 5 rpm at 150 rpm
Cooling consumption (adjustable via integrated needle valve)	120 – 200 L/h	120 – 200 L/h	120 – 200 L/h	120 – 200 L/h
Cooling restriction abs. without pulsation	max. 2.7 bar	max. 2.7 bar	max. 2.7 bar	max. 2.7 bar
Heating medium (3600 W heater)	Water or oil	Water or oil	Water or oil	-
Heating medium (4200 W heater)	Water	-	Water	-
Heating medium (6300 W heater)	-	-	-	Water

	R-220 Pro	R-220 Pro Essential	R-220 Pro Continuous	R-220 Pro High Performance
Heating capacity (3600 W heater)	Ambient to 180 °C	Ambient to 180 °C	Ambient to 180 °C	-
Heating capacity (4200 W heater)	Ambient to 100 °C	-	Ambient to 100 °C	-
Heating capacity (6300 W heater)	-	-	-	Ambient to 100 °C
Heating bath accuracy	± 2 °C	± 2 °C	± 2 °C	± 2 °C

Ambient conditions

For indoor use only.

Max. altitude above sea level	2000 m
Ambient and storage temperature	5 – 40 °C
Maximum relative humidity	80% for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C

Materials

Housing	Stainless steel 1.4301 (AISI 304)
Gear head	Aluminum cast (3.2373)
Painting	Powder coated with Epoxy (EPX)
Bath pan	Stainless steel 1.4404 (AISI 316L)
Heating element	Stainless steel 1.4404 (AISI 316L)
Glass	Borosilicate 3.3
In contact with product	FDA approved materials

Safety

Safety coated glassware	Yes, except the evaporating flask
Over temperature protection of the bath	Separate monitoring circuit with manual reset Error if temperature is 15 °C above set value
Rotation	Soft start Stop in case of blocked rotation
At any Error	Bath lowering, heater off, rotation off Type of error showed on display Reset with main switch

Display

Bath temperature	1 °C steps
Cooling temperature (option)	1 °C steps
Vapor temperature	1 °C steps
Set rotation speed	1 rpm steps

Set bath temperature	1 °C steps
Actual vacuum	1 mbar steps
Set vacuum	1 mbar steps

Sensors

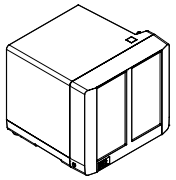
Vapor temperature	PT-1000, 2 wire
Bath temperature	PT-1000, 2 wire
Speed sensor	Hall-sensor
Vacuum	Ceramic, capacitive

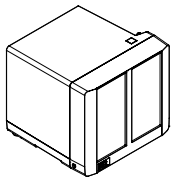
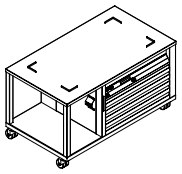
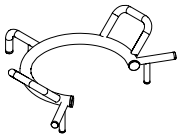
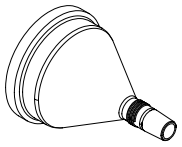
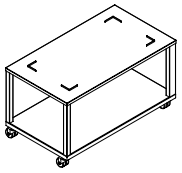
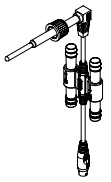
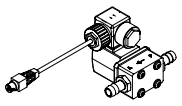
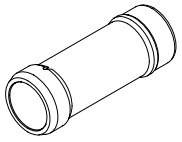
Features R-220 Pro

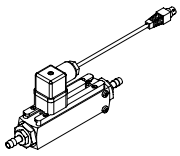
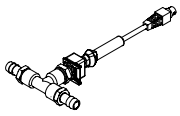
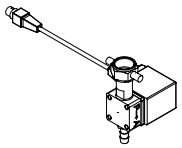
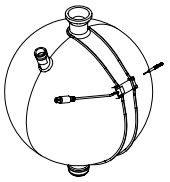
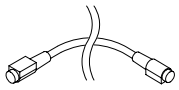
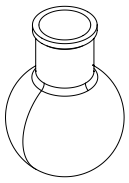
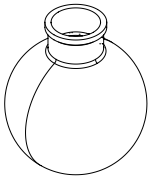
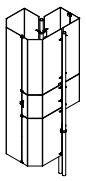
Two displays	All parameters at a glance on two large displays Always all information available and easy operation at the same time
Easy flask handling	Snap flask coupling to fix the evaporating flask Ensures the safe and easy mounting of the evaporating flask by a single person
Safety coated glass ware	All glass assemblies (except the evaporating flask) are coated with a robust and transparent safety coating To protect the operator from injuries in case of a glass breakage
Indication of process parameters of R-220 Pro	Displays all operating parameters Indicates set and actual values of heating bath, coolant temperature and rotation speed
Dynamic distillation	Distillation process starts immediately after choosing the solvent from the library Starts the distillation immediately and adjusts the vacuum dynamically – even if the chiller or bath have not reached their set temperatures.
Remote control	The Interface I-300 Pro can be removed and used in combi- nation with a 15 m communication cable to remotely control the complete system Enables the Rotavapor® to be operated from a distance or from behind a closed fume hood
Remote monitoring	BUCHI Monitor APP for iOS, Android and Windows offers push notifications and live view of all process parameters Allows to track current status of distillation remotely via smart- phones / tablets and informs user when process is terminated
Charting	All parameters are graphically displayed to facilitate the super- vision of distillation. With the BUCHI Monitor APP also on your mobile device

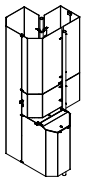
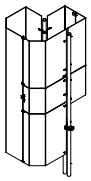
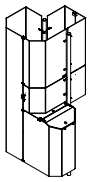
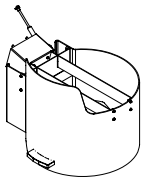
Data recording	Process can be exported on an SD card for further analysis and traceability purpose Enables the continuous recording of all process parameters
Wear part library	Internal library lists common wear parts inclusive of order code Allows a convenient replacing process of wear parts and alerts user to check vacuum seal
Rotavapor® OpenInterface	Open Interface allows to have an status overview of different BUCHI devices and to have communication between them. Full control on all parameters and functions via PC.
Leak test	Integrated test checks system for possible leaks and displays result Allows verifying tightness of the system automatically
Different operating modes	Manual vacuum control • Manual management of pressure settings and aeration Timer function • Manual vacuum control, stops process after preset time has elapsed AutoDest • Performs automatic multi-stage distillation with specific settings adjusted by the system Continuous pumping • Pump runs constantly Methods (SOP's) • Performs distillation according to a sequence of program- med steps with defined times and parameters and graphical illustration
Multi-languages	en, de, fr, it, es, zh, ja, ru, pt-br, id, ko
Overpressure prevention	Automatic aeration when pressure is above 1000 - 1300 mbar (adjustable)
ECO-mode	Shuts down activity of bath and chiller, hence lowers energy consumption if system remains inactive for a predefined time period

Accessories

	Order no.	Image
Vacuum Pump V-600 Chemically resistant 3-stage diaphragm pump. It impresses with its silent and economical operation. Capacity and final vacuum: 3.1 m^3/h, 1.5 mbar	11V600800	

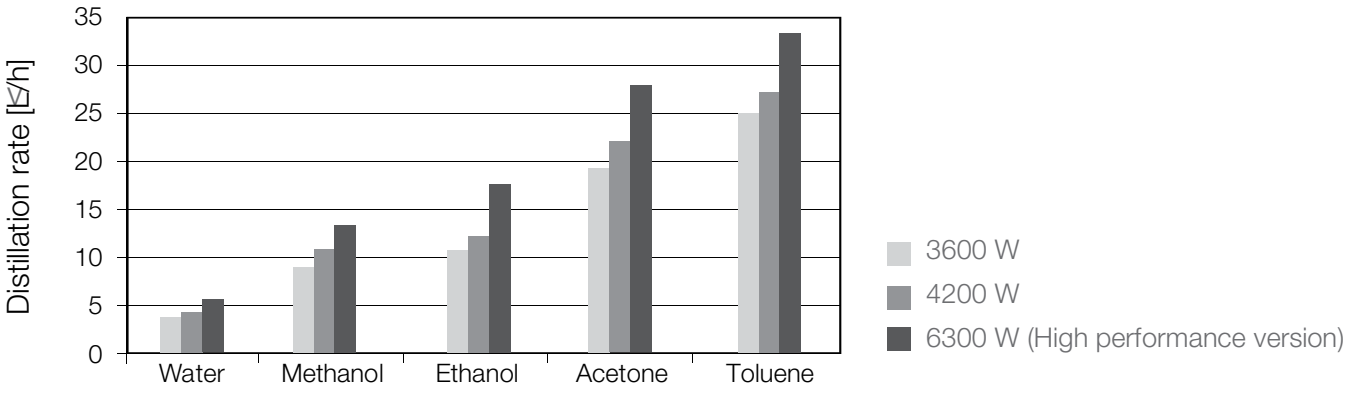
	Order no.	Image
Vacuum Pump V-600 Chemically resistant 3-stage diaphragm pump. It impresses with its silent and economical operation. With secondary condenser. Capacity and final vacuum: 3.1 m^3/h, 1.5 mbar	11V600810	
Recirculating Chiller F-325 Recirculating chiller with a cooling capacity of 2500 W at 15 °C. This chiller is not only cooling the Rotavapor® R-220 Pro but also operates as a trolley and host of the Vacuum Pump V-600. Dimensions are (WxDxH): 1100 x 660 x 560 mm	11F32501	
Manual flask handler for 20 L flask For easy mounting and removal of the flasks along with safe transport.	041400	
Flange adapter for flasks , SJ29.2/32 To use a 1, 2 or 3 L evaporating flask with SJ29.2/32	11058738	
Trolley Stainless steel trolley with extra space.	041257	
Foam detector assembly Internal sensor detects rising foam and triggers a short aeration pulse, eliminating foam. Only in combination with a descending glass assembly.	11056083	
AutoDest sensor cpl. For automatic distillation. Measures temperature of cooling media. Vacuum is adjusted according to cooling capacity of condenser.	11064486	
Vacuum valve, 4 mm, 24 V, connection piece 12.5 mm Electrical valve for vacuum regulation when operated with a non-BUCHI vacuum pump.	11055928	
Vapor duct with integrated sinter plate The integrated sinter plate P3 protects the condenser assembly against powder and dust during the drying process.	041100	

	Order no.	Image
Cooling water flow sensor Checks the flow of coolant, stopping operation when flow of coolant is insufficient or interrupted.	11055971	
Cooling water temperature sensor Needed to display the coolant temperature for optimal distillation settings.	11055988	
Cooling water valve Eliminates unnecessary water waste by stopping cooling water flow when not in use.	041191	
Level sensor for receiving flask For defined concentration of product or to prevent an overflow of the secondary condenser if combined with a Vacuum Pump V-600 with secondary condenser	11056192	
Stopper, PE, 120 mm To close the evaporating flask	11057349	
Communication cable. BUCHI COM, 15 m, 6p Enables connection between Rotavapor®, Interface, Vacuum Pump, Recirculating Chiller, VacuBox and LegacyBox.	11064090	
IQ/OQ R-220 Pro official BUCHI document	11064749	
Repeating OQ R-220 Pro	11064750	
Evaporation flask 10 L, amber 10 L flask with UV-protection, flange 150 mm	11069604	
Evaporation flask 20 L, amber 20 L flask with UV-protection, flange 150 mm	11069605	
Standard safety shield Safety shield for the following glass assemblies, with one receiving flask: D, D2, R, C	11055796	

	Order no.	Image
Standard safety shield, two flasks Safety shield for the following glass assemblies, with two receiving flask: D, D2, R, C	11055797	
Safety shield, Bullfrog Safety shield for the following glass assemblies, with one receiving flask: DB, DB2, RB	11055798	
Safety shield, Bullfrog, two flasks Safety shield for the following glass assemblies, with two receiving flask: DB, DB2, RB	11055799	
Bath shield cpl. Separate bath shield complete	11055364	
Protective grid cpl. Protects the glass assembly and the bath against falling objects (only in conjunction with corresponding safety shield)	11056081	

Performance

The following chart shows the maximum distillation rate of the different R-220 Pro versions



The maximum achievable distillation rate is not just related to the heating capacity, but also on rotation speed, flask size and temperature difference between bath and cooling.

To get a high distillation rate:

- set a high rotation speed
- choose a large evaporating flask (20 L)
- set a high temperature difference between bath and cooling
- The following chart shows the maximum distillation rate of the R-250 Pro

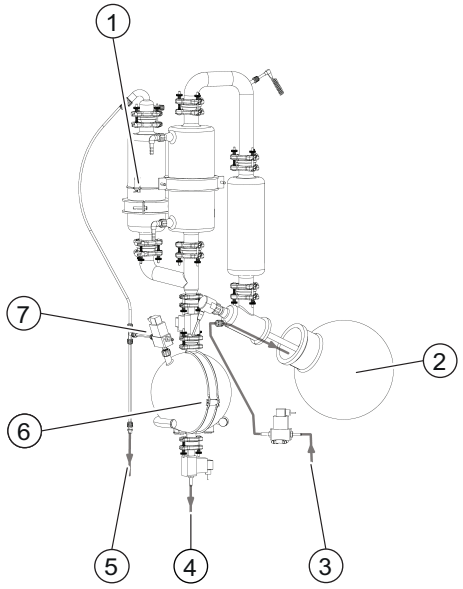
Functional principle - continuous distillation

The continuous version of the Rotavapor® R-220 Pro is based on the descending glass assembly. Four valves and three sensors are controlling the distillation process. This allows distillations of large volumes almost unattended.

This version is particularly suitable for solvent recycling or concentrations in industrial preparative chromatography.

The system controlls the followings functions:

- Automatically empties the receiving flask when full.
- Simultaneously refills the evaporation flask.
- Monitors fill levels in both the evaporating and receiving flasks.
- Controls valves for filling and draining.
- Safety shut down in case of flooding the system, empty product tank or blocked drain.



① Level sensor safety
② Level sensor evaporating flask
③ Product feed
④ Solvent outlet (drain)
⑤ Vacuum source
⑥ Level sensor receiving flask
⑦ Aeration receiving flask

Functional principle – extraction assembly

The unique extraction configuration allows a continuous cold extraction of up to 4 liter of sample.

Solvent evaporates in the evaporating flask ② and condenses in the condenser ①. The clean solvent flows into the extraction chamber ④ and from there back to the evaporating flask.

In a second step, the collected extract in the evaporating flask can be concentrated by closing the valve to the extraction chamber and opens the valve to the receiving flask ③.