

separlab

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COLUMNS FOR PREPARATIVE CHROMATOGRAPHY

separchrom_{PC01}

HPLC COLUMNS FOR PREP CHROMATOGRAPHY

High performance Columns with biaxial compression

Columns **Separchrom** PC01c correspond to the highest requirements of preparative liquid chromatography. PC01 columns are designed to be used in a mode of biaxial compression. Columns can be packed by dynamic slurry technique or by sedimentation method. They are equipped with identical pistons on input and output. Pistons are provided by Poremet® stainless steel (AISI 316 L) frits with porosity 3 µm and minimum hydraulic resistance. Liquid distributing system is installed under each frit. The design guarantees perfect piston flow and simple accessibility of frit for cleaning.

Separchrom PC01 columns are made of high quality stainless steel (AISI 316 or AISI 316L) and their inner surface is polished to reach $R_a < 0,3 \mu\text{m}$. Column flanges are not welded, but screwed on the column tube. It means that there is no temperature increasing during manufacture and thus no change of steel properties. Columns have input piston with large stroke (possibly through whole column length) when it is moved by a force generated by a hydraulic cylinder or by flange bolts tightening. Single hydraulic cylinders fitted on upper flange with manual oil pumps are offered as well as fully automated stands for columns' packing/unpacking procedure.

Separchrom PC01 column output pistons movement is provided mechanically by tightening the flange bolts. In this case is functional stroke of the piston approximately 15 % of the column I.D. Pistons are sectional, frit squeezed to the frit ring can be released from piston body and cleaned. Columns are delivered with legs made of stainless steel closed profiles and fitted to the upper tube flange. It means that output flange is fully accessible for disassembling and sorbent releasing.

PC 01 columns are completed by a broad scale of accessories as filling adapters, slurry mixing vessels, slurry transporting pumps etc. Sophisticated column systems are accomplished by automatic filling using dynamic slurry technique as well as automatic emptying procedure.

Columns for laboratory applications

Type of column	I.D. mm	Length mm	Pressure bar	Note
SEPARCHROM PC01 25/50	25	50	200	Delivered without legs
SEPARCHROM PC01 25/250	25	250	200	Delivered without legs
SEPARCHROM PC01 50/50	50	50	200	Delivered without legs
SEPARCHROM PC01 50/250	50	250	200	
SEPARCHROM PC01 50/500	50	500	200	
SEPARCHROM PC01 100/100	100	100	150	
SEPARCHROM PC01 100/250	100	250	150	
SEPARCHROM PC01 100/500	100	500	150	



Columns for industrial applications

Type of column	I.D. mm	Length mm	Pressure bar	Note
SEPARCHROM PC01-100/100	100	100	150	
SEPARCHROM PC01-100/250	100	250	150	
SEPARCHROM PC01-100/500	100	500	150	
SEPARCHROM PC01-150/150	150	150	150	
SEPARCHROM PC01-150/300	150	300	150	
SEPARCHROM PC01-150/600	150	600	150	
SEPARCHROM PC01-200/200	200	200	120	
SEPARCHROM PC01-200/400	200	400	120	
SEPARCHROM PC01-200/800	200	800	120	
SEPARCHROM PC01-300/300	300	300	100	
SEPARCHROM PC01-300/600	300	600	100	
SEPARCHROM PC01-300/900	300	900	100	
SEPARCHROM PC01-400/400	400	400	80	
SEPARCHROM PC01-400/800	400	800	80	



HPLC COLUMNS FOR PREP CHROMATOGRAPHY

Columns for Medium Pressure with axial bed compression

Medium pressure stainless steel column are intended for separation where high pressure is not necessary, but high efficiency can be still expected. **Separchrom** PC02 fill requirements of many users. They are made of cutted and polished stainless steel tubes and equipped with ultra high molecular weight polyethylene made pistons on input and Poremet® stainless steel (AISI 316 L) frits with porosity 5 µm and minimum hydraulic resistance. Flow distributors are incorporated in to the piston and output flange. Patented liquid distributing system guarantees perfect piston flow. Columns have functional stroke of the input piston approximately 60 % of the inner diameter of the column when working with flange bolts and higher when hydraulic cylinder is used.

Columns for laboratory applications

Type of column	I.D. mm	Length mm	Pressure bar	Note
SEPARCHROM PC02 -25/50	25	50	70	
SEPARCHROM PC02 -25/250	25	250	70	
SEPARCHROM PC02 -50/250	50	250	50	
SEPARCHROM PC02 -50/500	50	500	50	
SEPARCHROM PC02 -100/250	100	250	40	
SEPARCHROM PC02 -100/500	100	500	40	

Columns for industrial applications

Type of column	I.D. mm	Length mm	Pressure bar	Note
SEPARCHROM PC02-100/250	100	250	40	
SEPARCHROM PC02-100/500	100	500	40	
SEPARCHROM PC02-150/300	150	300	40	
SEPARCHROM PC02-150/600	150	600	40	
SEPARCHROM PC02-200/400	200	400	35	
SEPARCHROM PC02-200/800	200	800	35	
SEPARCHROM PC02-300/300	300	300	30	
SEPARCHROM PC02-300/600	300	600	30	
SEPARCHROM PC02-400/400	400	400	20	
SEPARCHROM PC02-400/800	400	800	20	
SEPARCHROM PC02-500/500	500	500	10	
SEPARCHROM PC02-500/1000	500	1000	10	
SEPARCHROM PC02-600/600	600	600	5	
SEPARCHROM PC02-600/1200	600	1200	5	

separchrom_{PC04}**HPLC COLUMNS FOR PREP CHROMATOGRAPHY****Columns for Medium Pressure with axial bed compression**

For flash chromatography are usually intended polyethylene cartridge columns. Separlab offers more sophisticated **separchrom** PC04 columns. Columns are made of high quality ultra high molecular weight polyethylene, have similar design like stainless steel columns PC01 and PC02 and are equipped with polypropylene made frits. Moving piston on the input increases their efficiency due an elimination of free space between upper sorbent layer and frit (non woven polypropylene 10 µm pores) with flow distributor. Output frit with flow distributor is incorporated in output flange. Columns are compatible with nearly all organic solvents and with all water solutions. Columns are designated for low pressure and medium pressure liquid chromatography.

Type of column	I.D. mm	Length mm	Pressure bar	Note
SEPARCHROM PC04-50/150	50	150	16	
SEPARCHROM PC04-50/250	50	250	16	
SEPARCHROM PC04-50/500	50	500	16	
SEPARCHROM PC04-100/250	100	250	16	
SEPARCHROM PC04-100/500	100	500	16	
SEPARCHROM PC 04-150/300	150	300	6	
SEPARCHROM PC 04-150/600	150	600	6	
SEPARCHROM PC 04-200/400	200	400	6	
SEPARCHROM PC 04-200/800	200	800	6	
SEPARCHROM PC 04-300/500	300	500	5	
SEPARCHROM PC 04-300/900	300	900	5	

separchrom^{PC06}

HPLC COLUMNS FOR PREP CHROMATOGRAPHY

Columns for Medium Pressure without bed compression

separchrom PC06 are intended for applications where sorbent does not change the volume during the use. Columns are equipped with frits and distributors incorporated in to input and output flanges. They are made of polished stainless steel tubes and equipped with non woven polypropylene frits with porosity 10 µm. Flow distributors are incorporated in to column flanges.

Columns for laboratory applications

Type of column	I.D. mm	Length mm	Pressure bar	Note
SEPARCHROM PC06 -25/50	25	50	100	
SEPARCHROM PC06 -25/250	25	250	100	
SEPARCHROM PC06 -50/250	50	250	50	
SEPARCHROM PC06 -50/500	50	500	50	
SEPARCHROM PC06 -100/250	100	250	40	
SEPARCHROM PC06 -100/500	100	500	40	

Columns for industrial applications

Type of column	I.D. mm	Length mm	Pressure bar	Note
SEPARCHROM PC06-100/250	100	250	40	
SEPARCHROM PC06-100/500	100	500	40	
SEPARCHROM PC06-150/300	150	300	40	
SEPARCHROM PC06-150/600	150	600	40	
SEPARCHROM PC06-200/400	200	400	35	
SEPARCHROM PC06-200/800	200	800	35	
SEPARCHROM PC06-300/300	300	300	30	
SEPARCHROM PC06-300/600	300	600	30	
SEPARCHROM PC06-400/400	400	400	20	
SEPARCHROM PC06-400/800	400	800	20	
SEPARCHROM PC06-500/500	500	500	10	
SEPARCHROM PC06-500/1000	500	1000	10	
SEPARCHROM PC06-600/600	600	600	5	
SEPARCHROM PC06-600/1200	600	1200	5	



separpress

Hydraulic systemS for prep chromatography columns

Hydraulic system SEPARPRESS for prep chromatographic columns. Used to compress the piston inside the column and to compact the sorbent. Supplied as a kit that includes a hydraulic cylinder - double action (D) or with spring (S) with connecting hoses, oil pump - manual (M) or driven by motor (E) with control device - mechanical manometer (M) or electronic system with pressure gauge (E).

Type and specification	Power t	Stroke mm	Note
SEPARPRESS S005 MM 080	5	80	
SEPARPRESS S005 MM 180	5	180	
SEPARPRESS S005 MM 240	5	240	
SEPARPRESS D005 MM 150	5	150	
SEPARPRESS D010 MM 150	10	150	
SEPARPRESS D010 MM 250	10	250	
SEPARPRESS D020 MM 150	20	150	
SEPARPRESS D020 MM 250	20	250	
SEPARPRESS D030 MM 150	30	150	
SEPARPRESS D030 MM 250	30	250	
SEPARPRESS D050 MM 150	50	150	
SEPARPRESS D050 MM 250	50	250	
SEPARPRESS D100 MM 150	100	150	
SEPARPRESS D100 MM 350	100	350	
SEPARPRESS D150 MM 330	150	330	
SEPARPRESS D010 EE 250	10	250	
SEPARPRESS D020 EE 250	20	250	
SEPARPRESS D030 EE 250	30	250	
SEPARPRESS D050 EE 250	50	250	
SEPARPRESS D100 EE 350	100	350	
SEPARPRESS D150 EE 330	150	330	
SEPARPRESS D030 EEB 250	30	250	
SEPARPRESS D050 EEB 250	50	250	
SEPARPRESS D010 AM 250	10	250	
SEPARPRESS D020 AM 250	20	250	
SEPARPRESS D030 AM 250	30	250	

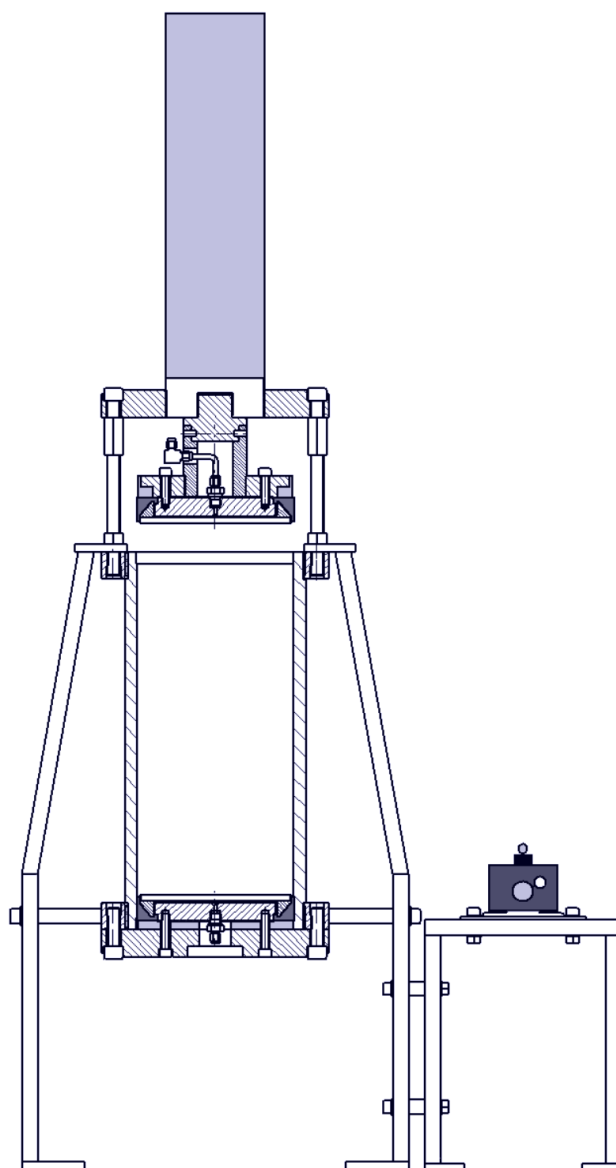
First three numbers defines the maximum compressive strength of the piston in tons, next three numbers define the maximum stroke of the piston in mm

EEB -supplied as a box UP, DOWN, HOLD buttons on the front panel, column is inserted in a frame on top side of the box.

AE – Electronic control of solenoid valves, oil pump driven by compressed air, electronic pressure gauge

AM - Mechanical valves control, oil pump driven by compressed air, mechanical gauge

All Separlab made columns are designed and manufactured in accordance with EU regulation for pressure vessels and can be delivered with PV certificate. All stainless steel columns can be delivered with ATEX certificate as well.



Separchrom PC 01 DS column, 150 mm I.D., hydraulic system with manual oil pump.

MOBILE PHASE DELIVERY SYSTEMS

separtrix^{PP03}

MULTI PISTON PUMPS

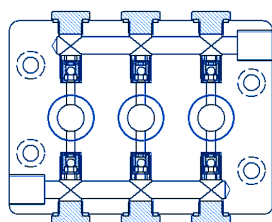
Triplex piston pumps

separtrix PP03 are pulse less triplex piston pumps designed for preparative chromatography applications nevertheless they can be used everywhere, where high pressure, precise flow without pulsations and high resistance against corrosion is needed. Pumps are equipped with unique three piston head for smooth flow and easy maintenance without a risk of leakage on connecting parts. Back flushed pistons are covered by hard and chemically resistant polycrystalline carbon layer. Pumps with different flow rate ranges differ only head type, pistons and tubing diameters.

Pistons pumps **separtrix** PP03 are usually supplied with an asynchronous motor and frequency converter but are also available with step motor which allows using the pump in extremely broad range of flow rates. Can be used both for analytical and preparative applications.

Special configurations of **separtrix** PP03 pumps are used both for high pressure gradient and low pressure gradient and as they offer nearly constant flow rate not only on the output but on the input too. Piston chambers have low dead volume and samples injected through the pump appear low spreading.

All **separtrix** PP03 pumps are equipped keyboard(s) and graphic display. There is a possibility to set flow rate, pressure limit and flow correction. A second keyboard is included for gradient programming in case of low pressure gradient pumps and high pressure gradient master pump.



Type	Description & technical parameters
SEPARTRIX PP03 A	Piston pulsless pump, three pistons O.D. 10 mm with diamond layer in one stainless steel head, ceramic ball valves, 620 W AC motor vector frequency converter, flow rate 25 ml/min. – 800 ml/min., 260 bar (3500 PSI), pressure measurement and limit, membrane keyboard, graphic display
SEPARTRIX PP03 B	Piston pulsless pump, three pistons O.D. 14 mm with diamond layer in one stainless steel head, ceramic ball valves, 620 W AC motor with vector frequency converter, flow rate 50 ml/min. – 1600 ml/min., 160 bar (2100 PSI), pressure measurement and limit, membrane keyboard, graphic display
SEPARTRIX PP03 C	Piston pulsless pump, three pistons O.D. 20 mm with diamond layer in one stainless steel head, ceramic ball valves, 620 W AC motor with vector frequency converter, flow rate 100 ml/min. – 3200 ml/min., 80 bar (1100 PSI), pressure measurement and limit, membrane keyboard, graphic display
SEPARTRIX PP03 AG	PP03 A pump, flow rate 25 ml/min. – 800 ml/min., max. 260 bar (3500 PSI), three phases low pressure gradient included, (3 x solenoid valves + connecting armature on own holder+3 x valve power supply in pump unit), second keyboard for gradient control
SEPARTRIX PP03 BG	PP03 B pump, three phases, flow rate 50 ml/min. – 1600 ml/min., max. 150 bar (2100 PSI), low pressure gradient included (3 x solenoid valves + connecting armature on own holder+3 x valve power supply in pump unit), second keyboard for gradient control
SEPARTRIX PP03 CG	PP03 C pump, flow rate 100 ml/min. – 3200 ml/min., 80 bar (1000 PSI), three phases low pressure gradient included, (3 x solenoid valves + connecting armature on own holder+3 x valve power supply in pump unit), second keyboard for gradient control
SEPARTRIX PP03S A	Piston pulsless pump, three pistons O.D 10 mm with diamond layer in one stainless steel head, ceramic ball valves, step motor, flow rate 1 ml/min. – 400 ml/min., 250 bar (3500 PSI), pressure measurement and limit
SEPARTRIX PP03S B	Piston pulsless pump, three pistons O.D 14 mm with diamond layer in one stainless steel head, ceramic ball valves, step motor, flow rate 1 ml/min. – 800 ml/min., 150 bar (2100 PSI), pressure measurement and limit, membrane keyboard, graphic display
SEPARTRIX PP03S C	Piston pulsless pump, three pistons O.D 20 mm with diamond layer in one stainless steel head, ceramic ball valves, step motor, flow rate 2 ml/min. – 1600 ml/min., 70 bar (800 PSI), pressure measurement and limit, membrane keyboard, graphic display
SEPARTRIX PP03S AG	PP03S A pump, flow rate 1 ml/min. – 400 ml/min., 250 bar (3500 PSI), three phases low pressure gradient included, (3 x solenoid valves + connecting armature on own holder+3 x valve power supply in pump unit), second keyboard for gradient control
SEPARTRIX PP03S BG	PP03S B pump, flow rate 1 ml/min. – 800 ml/min., 150 bar (2100 PSI), three phases low pressure gradient included, (3 x solenoid valves + connecting armature on own holder+3 x valve power supply in pump unit), second keyboard for gradient control
SEPARTRIX PP03S CG	PP03S B pump, flow rate 2 ml/min. – 1600 ml/min., 70bar (800 PSI), three phases low pressure gradient included, (3 x solenoid valves + connecting armature on own holder+3 x valve power supply in pump unit), second keyboard for gradient control
SEPARTRIX PP03SM A	PP03S A pump, flow rate 0,5 ml/min. – 400 ml/min., 250 bar (3500 PSI), master pump for binary high pressure gradient, second keyboard for gradient programming
SEPARTRIX PP03SM B	PP03S B pump, flow rate 1 ml/min. – 800 ml/min., 150 bar (2100 PSI), master pump for binary high pressure gradient, second keyboard for gradient programming
SEPARTRIX PP03SM C	PP03S C pump, flow rate 2 ml/min. – 1600 ml/min., 70 bar (800 PSI), master pump for binary high pressure gradient, second keyboard for gradient programming
SEPARTRIX PP03SS A	PP03SS A pump, flow rate 0,5 ml/min. – 400 ml/min., 250 bar (3500 PSI), slave pump for binary gradient, no display, no keyboard
SEPARTRIX PP03SS B	PP03SS B pump, flow rate 1 ml/min. – 800 ml/min., 150 bar (2100 PSI), slave pump for binary gradient, no display, no keyboard
SEPARTRIX PP03SS C	PP03SS C pump, flow rate 2 ml/min. – 1600 ml/min., 70 bar (800 PSI), slave pump for binary gradient, no display, no keyboard

SEPARTRIX PP03 pumps with asynchronous motors are available in variants Ex (ExG), where mechanical part – gearbox, cambox and pistons head with ATEX (T4) motor - is separated from remote box with frequency changer and electronic part of the pump. Remote box has to be placed out of the explosion environment place.

hydracell_{G03, G04, G10}

The piston-diaphragm pumps **hydracell** with multimembrane head provide smooth pulseless flow in a wide range of flow rates and delivery pressure with high repeatability and accuracy and are ideal for dosing mobile phase into large preparative units.

hydracell G03 is the piston-diaphragm pump with anti cavitation system "Kell-Cell". Special system of channels equalizing pressure on both sides of the membrane, which prevents cavitation damage of the pump. Stainless steel head and sturdy construction ensure long life and minimal maintenance costs, as well as double hydraulically balanced diaphragm and sealing free piston design. Checking the oil level stops the engine when the level drops to prevent mixing of oil into the mobile phase in the case of destruction of some of the membranes.

- Smooth pulse less flow
- Anti-cavitation system Kell-Cell
- "Heavy Duty" design
- Hydraulically balanced diaphragm on both sides
- Wide range of flows and delivery extrusion heights
- Repeatability and high accuracy - ideal for dosing
- Piston sealing free design - minimal maintenance costs



Wanner **hydracell** G10 with cam are used for different types of applications, usually involving liquids recycling. They provide smooth pulse less flow in a wide range of flow rates and pressures with high repeatability and accuracy and are ideal for dosing. Checking the oil level in the pump, followed by stopping the engine when the level drops, to prevent mixing of oil into the mobile phase in the case of destruction of some of the membranes.

- Smooth pulse less flow
- Anti-cavitation system Kell-Cell
- "Heavy Duty" design
- Hydraulically balanced diaphragm on both sides
- Wide range of flows and delivery extrusion heights
- Repeatability and high accuracy - ideal for dosing
- Piston sealing free design - minimal maintenance costs

The pumps are equipped with heads made of stainless steel (AISI 316). They are suitable for temperatures up to 70° C and are supplied with engine, clutch and durable metal frame for installation in industry. Both G03 and G10 pumps can be supplied also in a version for hazardous areas according to ATEX Ex de II T4.

Wanner **hydracell** G04 are used for high flow, high pressure application. They also can be used in higher temperature range. They are the piston-diaphragm pumps with anti cavitation system "Kell-Cell". Special system of channels equalizing pressure on both sides of the membrane, which prevents cavitation damage of the pump. Stainless steel head and sturdy construction ensure long life and minimal maintenance costs, as well as double hydraulically balanced diaphragm and sealing free piston design.

PRESSURE FILTERS on pump output

Pressure filters are closed pressure vessels made of two flanges with a frit (filter) between input and output. They are quite similar to prep chromatography columns in fact. **Separfil** XXX/YYY units are designed with a filter frit made either of stainless steel (3 µm pore size) or of non woven polypropylene fabric (10 µm pore size). Frit (filter) sealing is made of UHMWPE. Pressure filters make good service to save input column frit as samples under separation are a source of solid or gel particles. XXX numbers specify frit diameter and YYY number maximal pressure for filter use.

Type	Max. flow l/min.	Max. pressure bar	Note
HYDRACELL G-03-X	11,3	69	
HYDRACELL G-03-E	8,3	83	
HYDRACELL G-03-S	6,8	83	
HYDRACELL G-10-X	29,0	70	
HYDRACELL G-10-I	14,9	70	
HYDRACELL G-04 X	11,3	170	
HYDRACELL G-04-E	7,8	170	
HYDRACELL G-04-S	6,1	170	

GRADIENT FORMING DEVICES

separmix_{PX}

PROGRAMMING UNITS

Sepermix PX 1000 **Sepermix** PX 3000 are low pressure gradient programming units situated in a box with graphic display and membrane keyboard. They are used in combination with a set of solenoid valves to form a low pressure gradient of mobile phase on the pump input.

Gradient program consist of 10 linear steps for two (P2), three (P3) or four liquids (P4). Programming unit SEPARMIX is connected by a single cable to gradient valves box. SEPARMIX PX 1000 can be used to program and feed smaller systems (for flow rate 1000 ml/min.), large ones can use 3000 version with larger valves.

separmix_V

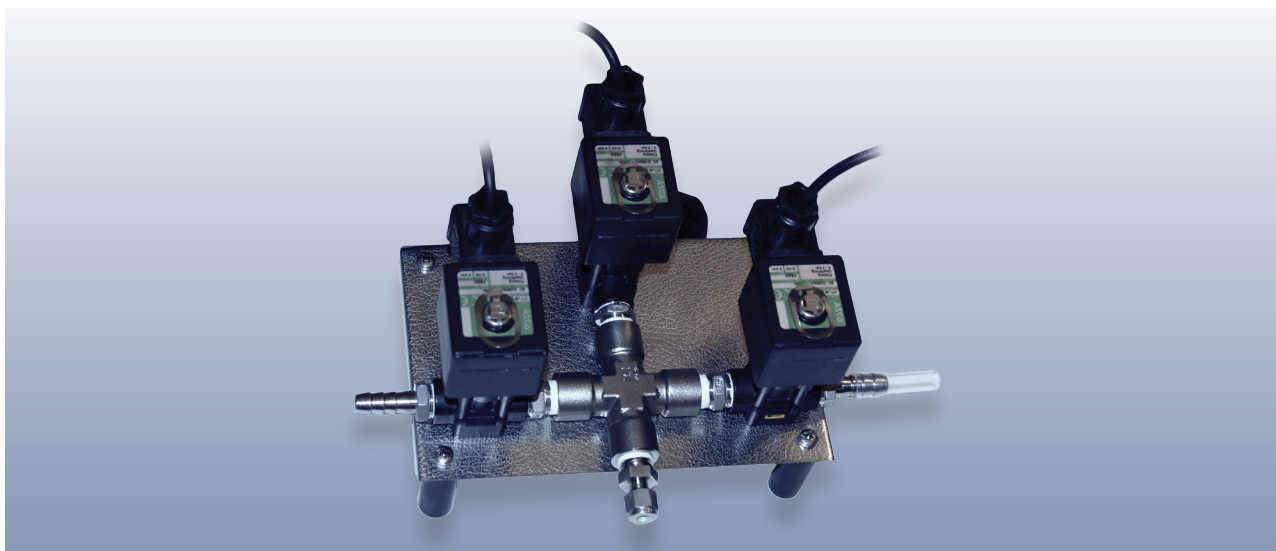
GRADIENT VALVES

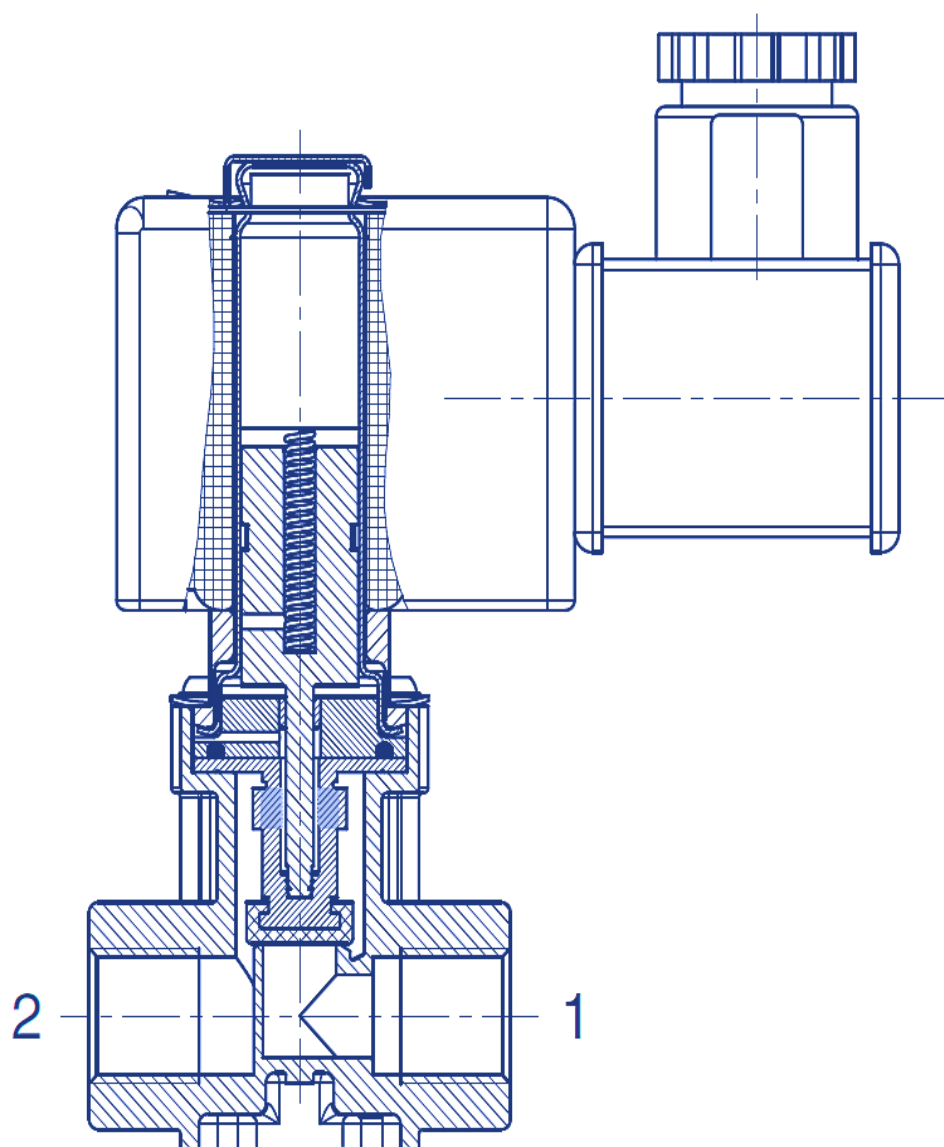
separmix V is a series of gradient valves different sizes and numbers for low pressure gradient forming. They are designed to be controlled either from a pump **separmix** PP03 G or from a single programming unit. Special solenoid valves made by ASCO SCIENTIFIC can be used for the control of even aggressive liquids in the pharmaceutical, chemical and biochemical industries. The valve is suited for all applications in which the fluids must not come into contact with the magnetic metal kern of the solenoid valve. Bellows system made of PTFE and FFPM (perfluorelastomere) seals with high functional reliability and long service life solves this problem in our case.

Each set of valves is completed by manifolds on the input and output to allow the connection to the liquid reservoirs on one side and to the chromatography pump on the opposite side. A set of valves is inserted into a stainless steel box with a cooling fan in order not to overheat valves and not to increase liquid temperature and to prevent bubbles generation.

There are three dimensions of gradient mixer valves sets depending on maximal flow rate. Maximum liquid viscosity to be used with mentioned valves systems is 40 cSt (mm²/s) and temperature range -10 °C to +90 °C. Material in contact with fluid are: PEEK (polyetheretherketone), stainless steel, FFPM and PTFE. Max. input pressure is 2 bars. Units are delivered with 3 or 5 valves. Other configurations are possible as an option.

Type	Flow rate ml/min.	Valves number	Note
SEPARMIX V3S	10 - 1000	3	
SEPARMIX V4S	10 - 1000	4	
SEPARMIX V3L	100 - 3000	3	
SEPARMIX V4L	100 - 3000	4	





Gradient valve with sealed electromagnetic kern.

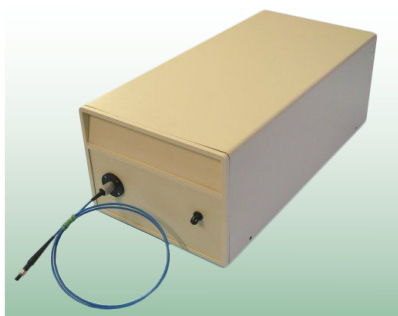
DETECTORS FOR PREP CHROMATOGRAPHY

photometric detectors Flash DAD

FOR PREPARATIVE CHROMATOGRAPHY

Flash DAD detectors are equipped with a diode array and can monitor up to 4 different wavelengths. They are controlled from ECOMAC software (06 DAD) or from own keyboard and display (10 DAD). Some of them can be equipped with remote cell as well.

Type	Specification
ECD2800	Detector with variable wavelength 190 up to 800 nm, high-speed sampling 100 Hz – only with analytical cell
ECD2600	Detector with variable wavelength 190 up to 600 nm, high-speed sampling 100 Hz – only with analytical cell
Flash 10 DAD 800	UV-VIS detector, 4 wavelengths simultaneously, keyboard, display, 4 analog outputs, scan of the spectrum 200 - 840 nm, delivered with prep. cell (anal. cell or remote cell available on request)
Flash 10 DAD 600	UV-VIS detector, 4 wavelengths simultaneously, keyboard, display, 4 analog outputs, scan of the spectrum 200 - 600 nm, delivered with prep. cell (anal. cell or remote cell available on request)
Flash 10 DAD 400	UV-VIS detector, 4 wavelengths simultaneously, keyboard, display, 4 analog outputs, scan of the spectrum of 200 – 400 nm, delivered with prep. cell (anal. cell volume 30 µl or remote cell available on request)
Flash 14 DAD 800	UV – VIS detector, 4 wavelengths simultaneously, continuous scan of whole spectrum 190 - 840 nm, delivered with prep. cell (anal. cell or remote cell available on request)
Flash 14 DAD 600	UV – VIS detector, 4 wavelengths simultaneously, continuous scan of whole spectrum 200 - 600 nm, delivered with prep. cell (anal. cell or remote cell available on request)
Flash 14 DAD 400	UV-VIS detector, 4 wavelengths simultaneously, scan of the entire spectrum 200 - 400 nm, control only from the computer (Ecomac), delivered with prep. cell (anal. cell or remote cell available)
Flash 10 DAD 800 EX	UV-VIS detector, 4 wavelengths simultaneously, scan of the entire spectrum 200 - 840 nm, different prep cells on optical wires available, additional specification necessary
Flash 10 DAD 600 EX	Detector with one fixed wavelength given by chosen interference filter in the range 200 - 600 nm, different prep cells on optical wires available, additional specification necessary
Flash 10 DAD 400 EX	Detector with one fix wavelength given by chosen interference filter in range 200 - 400 nm) different prep cells on optical wires available, additional specification necessary
APATIT	UV – VIS detector, one fixed wavelength given by chosen interference filter in the range of 200 - 600 nm. Interference filter is ordered separately.



refractometric detectors

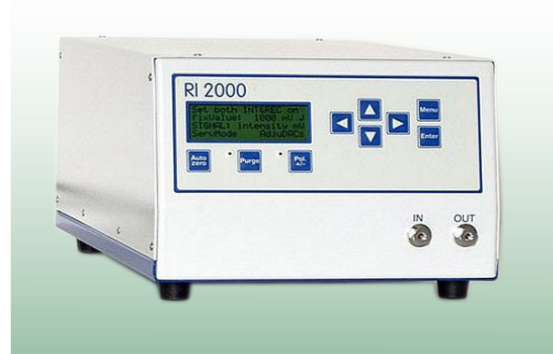
FOR PLC

The RI 2000 Differential Refractive Index Detector series offers the sensitivity, stability and reproducibility required for optimal RI detection. The thermal isolated optic with a counter current heat exchanger and with its programmable temperature control, results in an extremely stable baseline and an optimal Signal/Noise ratio. The RI 2000 series provide autopurge and autozero capabilities, as well as RS232 communication to acquire data directly without using any external signal interface.

	RI2000M/micro	RI2000A/analytical	RI2000P/semiprep
Detection Method	Deflection		
Refractive Index Range	1,00 to 1,75		
Flow Rate	0,2 - 1,2 ml/min.	0,2 - 3,0 ml/min.	1,0 - 50 ml/min.
Flow Cell Volume	4 µl, 45° angle	9 µl, 45° angle	7 µl, 5° angle
Max. Flow Cell Pressure	6 kg/cm ²		
Dead Volume	Into cell 6 µl	Into cell 24 µl	Into cell 88 or 353µl
Linearity Range	0-500 µl RIU	0-1000 µl RIU	0-20000 µl RIU
Noise Level	10 x 10 ⁻⁹ RIU	5 x 10 ⁻⁹ RIU	10 x 10 ⁻⁸ RIU
Autozero Range	Full Range	Full Range	Full Range
Drift with 1ml H ₂ O/min.	< 1 mV/hour	< 1 mV/hour	< 1 mV/hour
Purge Valve	yes	yes	Yes/No (depends on flow)
Integrator Output	+/- 1 Volt		
Recorder Output	+/- 10 mV / 100 mV / 1Volt		
Recorder Offset	0 mV/ 10 mV/ 100 mV		
Recorder Range	8 steps (1:8) - (16:1)		
Marker	Yes / No		
Digital Interface	RS232 bidirectional, Purge, Autozero, Start, Stop		
Digital Output	TTL: Intensity Alarm		
Digital Input	TTL: Purge, Autozero, Start/Marker		
Temperature Setting	Ambient, 35°C to 55°C in 1°C steps, Thermal Fuse 75°C		
Time Constant	RAW (0,0 sec), Fast (0,4sec), Medium (0,8 sec), Slow (1,2 sec)		
Power Source	AC 100-120/220-240V, 50/60 Hz, 50VA		
Dimensions in cm	220mm x 350mm x 155mm (W x D x H)		
Weight	12 kg		

RI 2000 detectors are available for:

- micro
- analytical
- semipreparative mode



cells**FOR PHOTOMETRIC DETECTORS**

Preparative cells for Ecom photometric detectors can be divided into two groups. Standard inner cells are situated inside the detector unit and connection with the column is made by stainless steel or PTFE made tubing. External cells are situated on the column output and are connected to the detector by optical fiber cables.

Type	Optical length mm	Cell volume μl	Flow rate ml/min.	Connection
PLCC 3L	0,3	80	3000	3/16", 5/16"- 24
	1,9 – 2,1	100		
	3,7 – 3,9	120		
PLCC 04	0,4	40	200	1/16" x 1mm
	1,3 – 1,4	55		
	2,3 – 2,4	70		
PLCC 05	0,3 – 0,4	40	500	1/8" x 1/16"
	1,3 – 1,4	55		
	2,3 – 2,4	70		
PLCC 14	0,1 +/- 0,05	40	500	1/8" or 1/16", 1/4"- 28
	1,3 – 1,4	55		
	2,3 – 2,4	70		
PLCC 15	0,3 +/- 0,05	40	500	1/8" or 1/16", 1/4"- 28
	1,3 – 1,4	55		
	2,3 – 2,4	70		
PLCC 15 EX	0,3 +/- 0,05	40	500	Customer
	1,3 – 1,4	55		
	2,3 – 2,4	40		
PLCC 20 High Flow			15 000	1/2", 1/4"- 18

AUTOMATIC FLOW SPLITTING

separpass is a device which enables to use detector cells for preparative liquid chromatography together with analytic detectors. Often older analytic detectors are available, but due the low flow rates and limited pressures on the cell cannot be used. **separpass** allows the small amount of liquid to flow through the detector, while a large number of phases bypasses the detector cell. An over-pressure for detector is generated by a spring force. Pressure drop for the detector can be changed by a control knob. The bypass eliminates any adjustment of the flow during separation - only on the beginning is set spring force by a rotating knob. The pressure on the detector cell can be set in the range 1 - 3 bar.

Type	Fitting on detector side	Fitting on main flow side
SEPARPASS 01	1/16"	1/8"
SEPARPASS 02	1/16"	1/4"
SEPARPASS 03	1/8"	1/2"
SEPARPASS 04	1/4"	3/4"



FRACTION COLLECTORS

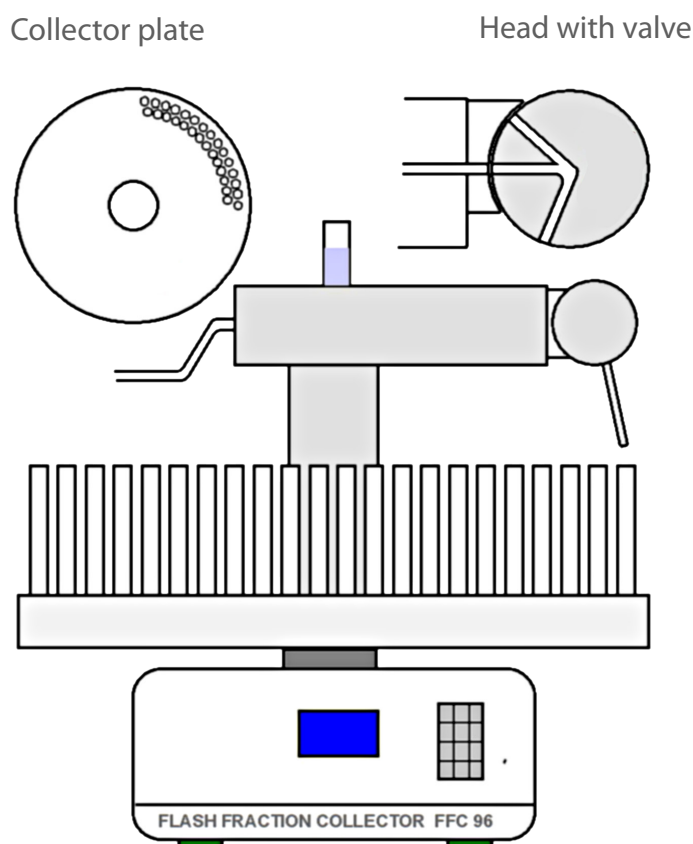
separflow FFC 96

LABORATORY FRACTION COLLECTOR FOR PLC

Flash fraction collector **separflow** FFC 96 is a portable turntable carousel collector with a plate diameter of 500 mm, which is equipped with two circles of glass tubes, each for 50 ml of a liquid (total of 96 tubes, i.e. up to 4800 ml).

Collector is designed for flow rates up to 400 ml/min. and therefore when it moves to the next position the fluid flow has to be closed. This is achieved in an original way. The collector head (see detail in figure) has to swing so that the outlet mouth moves from the outer to the inner row of tubes (and vice versa). During the movement is automatically closed flow of the liquid, which is collected in a cylindrical container on the top of the head beam. After re-opening the outflow channel drains fluid under its own weight into the next tube. The swinging motion of the collector head is provided by a separate servo mounted in the transverse head beam. Control collector (keypad and backlit graphic display) is located on the sloping front panel cabinets, which is located below the carousel. In the closet is also located step motor and gearbox. The casing is made of stainless steel. Head with a transverse beam is easily removable and allows removal or replacement carousel plate. Lines for connecting the servomotor for swinging motion is going through the central column of the head and is equipped with robust connector.

Collector plate is mounted on a rotating plate which is fixed to the gearbox step motor. The plate is equipped with pins for the precise location of the plates. Own plate is made of UHMW polyethylene, which has excellent chemical resistance. Bore tubes are placed in a deep groove, which is at one point provided with an outlet plug. If the (albeit small) amount of the liquid overflows outside the tube, the liquid can be easily captured and then drained. Electronics collectors enables both simple sequential programming (may be used a maximum number of positions), and by programming positions. Move to the next position can be controlled from an external source.



50 ml tube, 96 tubes, 4800 ml volume, 500 mm plate diameter

FRACTION COLLECTORS FOR INDUSTRY

Fraction collectors **separflow** FC X-Y are designed to capture fractions in prep liquid chromatography. However, they can be used in other facilities where programmed collecting of liquid volume is required. It is designed for liquids, which are resistant to stainless steel, PTFE (polytetrafluoroethylene) and UHMW polyethylene.

separflow FC X-Y typically consists of a box of electronics with the keyboard and the display on oblique front panel and a circular stainless steel segment with a radial groove which cross section is equivalent to a tube with I.D. X mm. The groove is connected to the liquid input and Y solenoid valves on output. Opening various valves is programmed. The outlet valves pipes are connected to flexible hose and to the liquid containers of proper size.

Collector can be controlled independently from the front panel keyboard or externally via RS232 serial port. In the external control is the keypad locked and it is possible only to display parameters. Always nevertheless works STOP button. Step time is 0,1 – 180 min. and pressure limit 2 bar.

Type	Channel I.D. mm	Fraction number	Flow rate ml/min.
SEPARFLOW 5-5	5	5 + waste	50 - 1500
SEPARFLOW 5-10	5	10+ waste	50 - 1500
SEPARFLOW 10-5	10	5+ waste	300 - 3000
SEPARFLOW 10-10	10	10+ waste	300 - 3000



TEMPERATURE CONTROL

separtherm_{TJ}

TEMPERATURE CONTROL COLUMN JACKETS

Thermostat column jackets **separtherm** TJ are universal acrylic glass jackets for heating or cooling of preparative liquid chromatography columns on temperatures between -10 °C and + 90 °C.

Water from circulating device is coming to a bottom input on the side of bottom circular plate and then is moving along the column up to the upper jacket plate where is an output. **separtherm** TJ jackets are designed to keep on the selected temperature the column itself. In some cases but, depending on column dimensions, mobile phase flow rate and temperature, may be necessary either to form a spiral exchanger from column input tubing sank in the jacket or to use a special exchanger to reach proper temperature inside the column.

separtherm TJ jackets are equipped with a simple stand.



Columns TJ jackets are equipped with a simple

Type	Jacket tube I.D. mm	Column I.D. mm	Column length mm
SEPARTHERM TJ 50/500	110	50	600
SEPARTHERM TJ 100/500	180	100	700
SEPARTHERM TJ 150/600	230	150	700
SEPARTHERM TJ 200/800	280	200	1000

separtherm_{WISD}

CYRCULATING BATHS

Type	Description
SEPARTHERM WCB 6	Thermostated heating bath, volume 6 l, robust circulation pump (5 l/min.), processor, foil keyboard control, graphic display, stainless steel cabinet
SEPARTHERM WCR P6	Thermostated heating and cooling bath, volume 6 l, robust circulation pump (5 l/min), cooling compressor, processor, foil keyboard control, graphic display, stainless steel cabinet



HPLC LABORATORY SYSTEMS

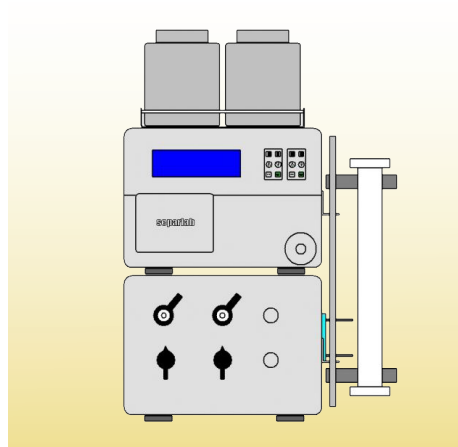
separpur^{PCS}

PEPTIDE PURIFICATION SYSTEM

separpur PCS chromatographs present compact universal and reliable units for laboratory scale prep HPLC. Modification of basic system is possible in broad range to tailor the final product according customer needs.

separpur PCS chromatographs are designed to operate with high pressure, high performance columns having inner diameter in a range 10 mm - 100 mm. They consist of:

- Pulse less pump **separtrix** PP03
- Photometric (UV or UV-VIS) detector
- Prep 6 port loop injector
- Carousel fraction collectors **separflow** FFC 96
- Keyboard and display
- Clarity chromatostation or/and with ECOMAC MS software
- Option accessories according demand



Type	Pump	Detector	Software	Additional
SEPARPUR PCS 400S	SEPARTRIX PP03SA	Flash 10 DAD 600	Clarity Lite Chromatostation	
SEPARPUR PCS 400SG				Set 3 gradient valves
SEPARPUR PCS 400SGC				Fraction collector

PROTEIN PURIFIERS

separpur PRO is an universal system for separation and purification of proteins and peptides by high performance & high pressure preparative liquid chromatography. System includes everything needed for the successful separation of proteins and peptides and their identification. It allows performing all known separation methods: absorption chromatography (mostly in reversed phase mode), affinity chromatography, size-exclusion chromatography and ion exchange chromatography.

separpur PRO allows performing separations at room and at elevated temperature but also at temperatures close to zero, which is needed when cleaning particularly sensitive substances. System is able to run high-performance chromatography column packed with microparticles (10 µm up to 15 µm) because of its high pump pressure (250 bar). System triplex pump PP03 is characterized by a compact stainless steel head with 3 pistons and pulse less flow. Thanks to the stepping motor it has a wide range of flow rates and allows the use wide range of column diameters starting with micropreparation columns (I.D. 10 mm) up to almost industrial scale ones with I.D. 150 mm.

On the pump head entry is installed a gradient mixing unit equipped with five-fast solenoid valves with PEEK made bodies. Three of them are used to produce gradient, remaining two can be programmed for on off function according a given time schedule.

separpur PRO exploits an excellent UV-VIS detector DAD 12, working parallel on four wavelengths and making fast spectral scan. The detector is compatible with 3D module of Clarity data station (part of supply) upholding the best possible overview of purity and uniformity of fraction. There are two next submodules for monitoring pH and conductivity of the mobile phase on column output. Monitors are characterized by high sensitivity and their data are automatically corrected on temperature dependence.

separpur PRO hardware is divided into three parts, which are placed in identical stainless steel made cabinets with rounded edges and sloping front panels (upper and bottom). In the bottom cabinet is located the pump; UV detector, gradient valves and a passive mixing cell are located in a middle one. On the slanted front panel of this module are mounted loop injection valve, a bypass valve and a valve for reversing the flow through the column. The panel allows easy installation of hydraulic connections among elements or install of new ones.

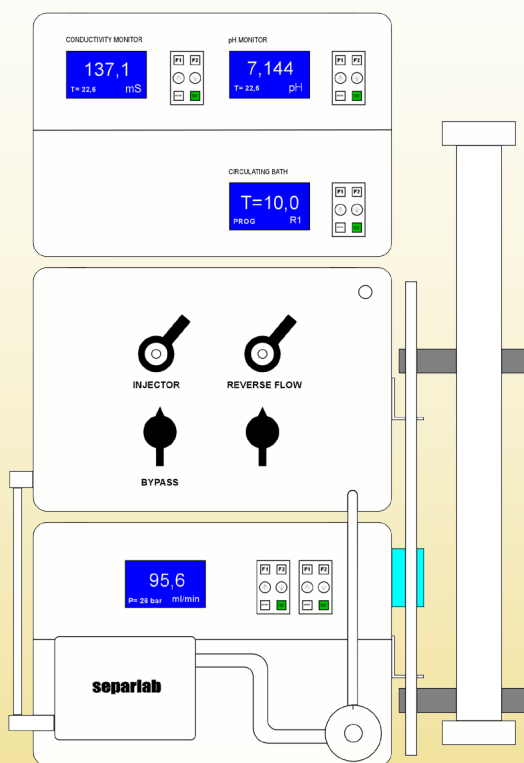
Chromatograph **separpur** PRO allows working with medium or low-pressure columns as well - which are typical for older methods of protein purification.

Nevertheless the use of high-efficiency microparticulate sorbents increase purifying performance as high molecular weight of proteins are characterized by low diffusion rate into sorbent particles.

separpur PRO can be completed either by rotating fraction collectors **separflow** FFC 96. In the case of large range of separations **separpur** FC 5-5 or **separpur** FC 5 -10 are recommended.

Technical parameters:

Pump flow rate:	0,2 ml/min. - 400,0 ml/min.
Pump pressure:	maximum 250 bar
Gradient system:	3 phase gradient + 2 valves programmed in time
Sample injection:	by programmed valve or by installed manual loop injector
Column flow reversion:	by manual valve
UV-VIS detector:	DAD type 190 – 800 nm, 4 parallel wavelengths
pH monitor calibration:	range 0 – 14 pH, resolution 0,001 pH, multipoint calibration, temperature compensation
Conductivity monitor:	2 electrodes or 4 electrodes cell, ranges from 0,05 µS/cm, temperature compensation
Integral circulating bath:	flow rate 1 l/min., temperature range +2°C - +80°C
Monitoring and control:	ECOMAC software (pH, conductivity, pressure)
Chromatostation:	Clarity with PDA module (4 wavelengths of UV detector)
Dimension (d x w x h):	600 mm x 380 mm x 840 mm
Weight:	59 kg
Input:	230 V, 1200 W



PLC INDUSTRIAL SYSTEMS

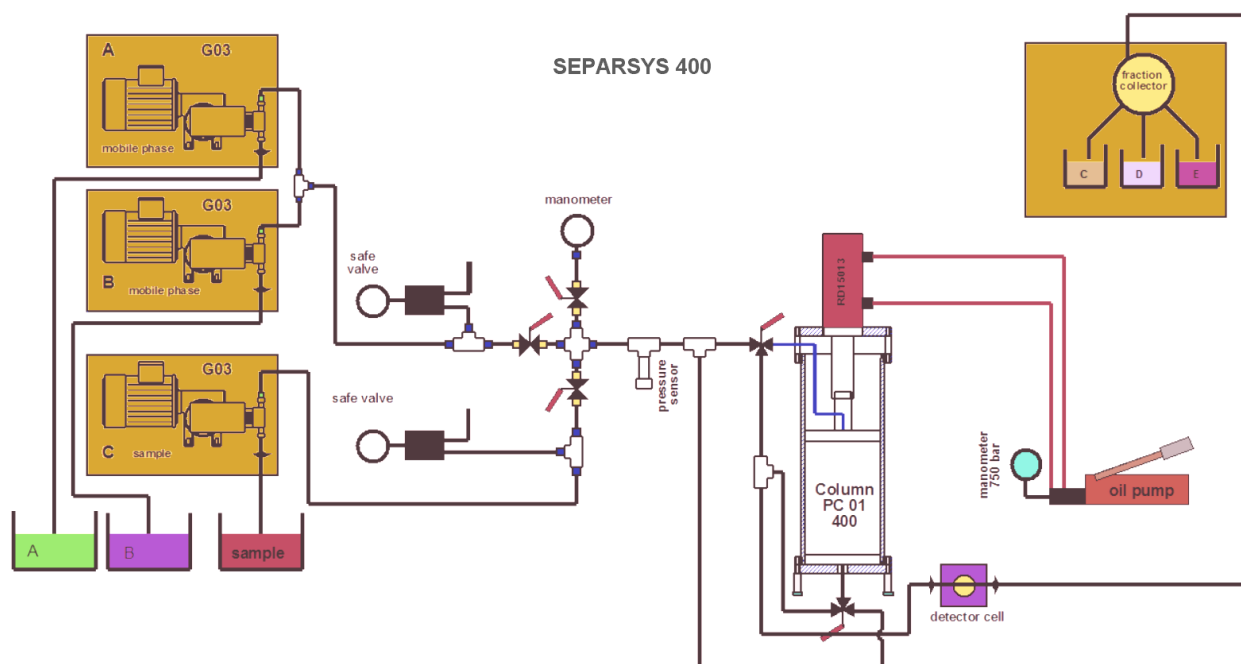
separsys HP 400, 800 FP, 300 DS

INDUSTRIAL SEPARATION UNITS - HIGH PRESSURE

Industrial preparative chromatographs are usually tailored according user's need. Therefore only an example of already delivered unit is introduced here. It is recommended to contact company specialists when a system specification is developed.

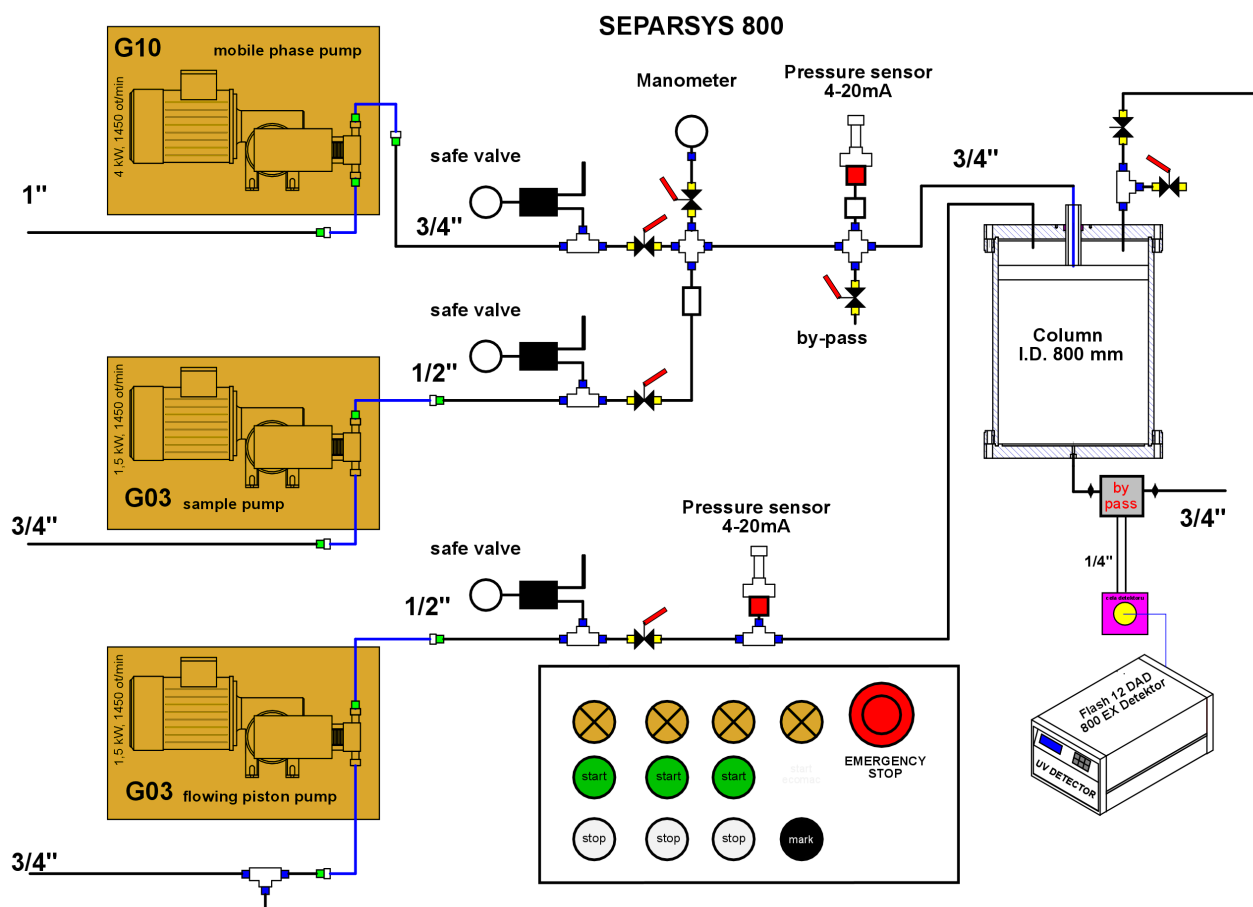
separsys HP 400 is an industrial unit for liquid high efficiency, high pressure preparative chromatography. It can be used for iso-cratic, high pressure, high performance chromatography. It is completely controlled by modified ECOMAC software only. The unit consists of (see schematic drawing):

- high-pressure column **separchrom** PC01 400 with an inside diameter 399 mm and length 1000 mm, column is packed with 15 μ spherical silica (sedimentation procedure of packing), maximum pressure 80 bar
- block of mobile phase delivery control (including bypass and flow reversing) provided with manual high-pressure ball valves and electronic pressure sensors
- to the output column fixed detector cell PLCC 15 Ex and a detector FLASH 06S DAD 600 EX
- three membrane pumps **hydracell** P3 (up to 8 l/min. and 70 bar each, oil level control) - two are in parallel and supply the mobile phase, the third delivers the mixture to be separated
- remote switchboard with three units of frequency converters ABB which supply power to pump motors and allow flow changes and electronic control unit **separel** 01
- PC computer using a modified software ECOMAC to set parameters of the separation process and to monitor both detector signal and column pressure



separsys 800 FP is an industrial unit for liquid high efficiency, high pressure preparative chromatography. It can be used for isocratic, high pressure, high performance chromatography. It is completely controlled by modified ECOMAC software only. The unit consists of (see schematic drawing):

- new high-pressure column **separchrom** PC05 800 with an inside diameter 799 mm and length 1000 mm, column is packed with 15 μ spherical silica (sedimentation procedure of packing) and equipped with a special floating piston, maximum pressure 50 bar.
- block of mobile phase delivery control (including bypass) provided with air controlled high-pressure ball valves and electronic pressure sensors.
- to the output column is connected detector cell PLCC 15 Ex through an automatic bypass system **separpass** 03 (cell is in 10 m distance from the column) and a detector FLASH 06S DAD 600 EX.
- three membrane pumps **hydracell** G3 and G10 (up to 8 l/min. and 70 bar each, oil level control, 27 l/min, 70 bar for G10) – G10 supplies the mobile phase, one G3 is injecting the sample and the second moves the column piston the third delivers the mixture to be separated.
- remote switchboard with three units of frequency converters ABB ACS 550-01-06A9-4, which supply power to pump motors and allow flow changes and electronic control unit **separel** 01.
- PC computer using a modified software ECOMAC to set parameters of the separation process and to monitor both detector signal and column pressure.



separsys 300 is an industrial unit for liquid high efficiency, high pressure preparative chromatography. It can be used for isocratic, high pressure, high performance chromatography. It is completely controlled by modified ECOMAC software only. The unit consists of (see schematic drawing):

- high-pressure column **separchrom** PC01 1300 with an inside diameter 299 mm and length 1300 mm, full column length piston stroke; column is packed with 10 μ spherical silica by dynamic slurry method, maximum pressure 100 bar.
- hydraulic system **separpress** D100 EE 1300 having a power 100 tons and stroke 1300 mm, fed by an electric motor driven oil pump with pressure control, maxim oil pressure 200 bar.
- block of mobile phase delivery control (including bypass) provided with manual controlled high-pressure ball valves and electronic pressure sensors.
- block of flow reversion which allow to change flow direction in the column.
- to the output column is connected detector cell PLCC 15 Ex through an automatic bypass system **separpass** 03 (cell is in 10 m distance from the column) and a detector FLASH 06S DAD 600 EX.
- two membrane pumps **hydracell** G04 (up to 8 l/min. and 120 bar each, oil level control) supply the mobile phase and the sample.
- remote switchboard with three units of frequency converters ABB, which supply power to pump motors and allow flow changes of mobile phase, sample and oil and electronic control unit **separel** 04.
- PC computer using a modified software ECOMAC to set parameters of the separation process and to monitor both detector signal and column pressure.

All industrial systems are delivered with ATEX certificate for hazardous environment if requested.

All industrial systems are delivered with pressure certificate for columns and whole system if requested.

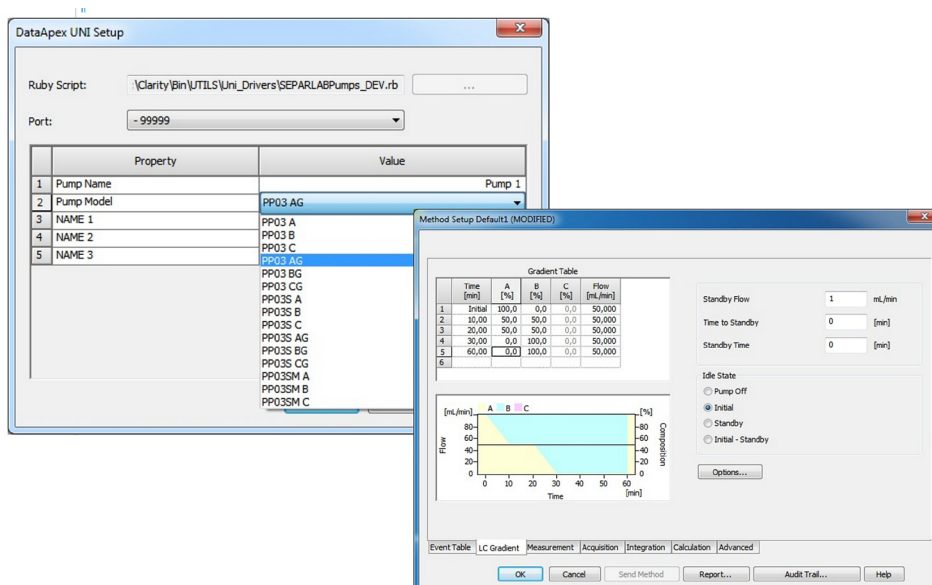
SOFTWARE FOR PLC

clarity

CLARITY ADVANCED CHROMATOGRAPHY DATA STATION (CDS) WITH SOFTWARE MODULE FOR CONTROL OF ALL SEPARLAB INSTRUMENTS AND DEVICES !

clarity can be used with any PLC system. It perfectly process chromatography data including all quantitative calculations, calibrations and problematic peaks integrating. Together with optional Control modules and Extensions it provides the possibility of complete chromatography handling system. The Control modules provide integrated control of selected instruments, Extensions provide functions for specific separation techniques such as PDA or GPC.

CLARITY DATASTATION SYSTEMS	
Specification	Identification
Clarity Extensible single instrument SW CFR21/GLP ready	C50
Clarity Lite simplified single instrument SW	C40
Specification	Identification
Extension modules for Clarity	
Clarity Add-on single instrument add-on	C55
SST SW module for system suitability test	A22
GPC SW module for GPC/SEC data processing	A28
PDA SW module for PDA data processing	A29
Specification	Identification
Control modules for Clarity	
LC Control SW module for HPLC control	A24
Specification	Identification
Hardware - A/D and D/A converters for Clarity	
Colibrick set external USB, 1 channel, cable	U31
Colibrick set external USB, 2 channels, cable	U32
Colibrick set external USB, 4 channels, cable	U34
Validation Kit peak generator and SW methods for OQ	CVK



UNIVERSAL CHROMATOGRAPHIC SOFTWARE FOR CONTROL AND MONITORING

Software **ecomac** is designed with maximal effort to do easy operation of chromatographic systems made by SEPARLAB and detectors made by ECOM. It is suited for units controlling and data collecting. Equipments are connected to the PC using RS232, or USB (by means of RS232/USB converter). Software detects automatically almost of all units, so there is no need complicated communication installation:

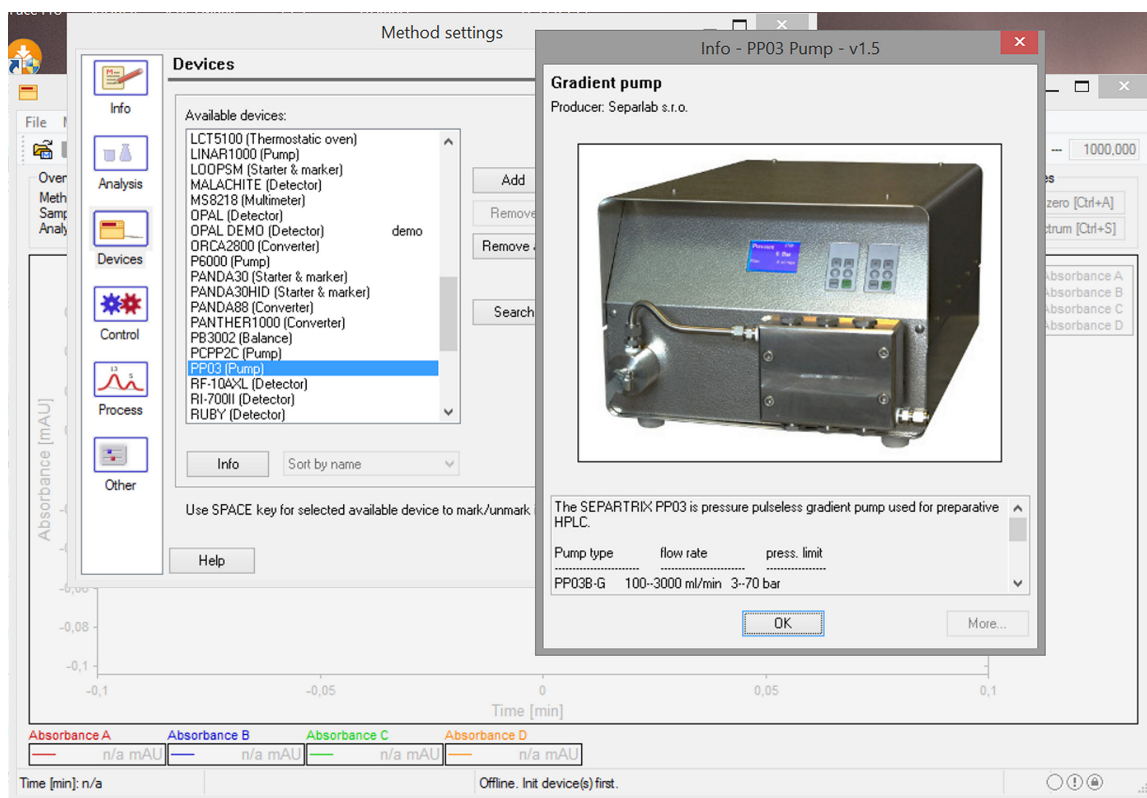
Program most important features:

- Easy installation
- Connecting using USB or RS232
- No need A/D converter
- Possibility to start up to 8 stations at the same time
- Data export in various formats
- Possibility of external start and external mark
- Secured access
- Unit controlling and data collecting from one place

On the screen we can watch parameters of all units for example detector absorbance, pump pressure and column oven temperature. It allow monitoring of whole system by stabilization or by problems searching. It is possible to record, print and export all data.

Supported formats by data export:

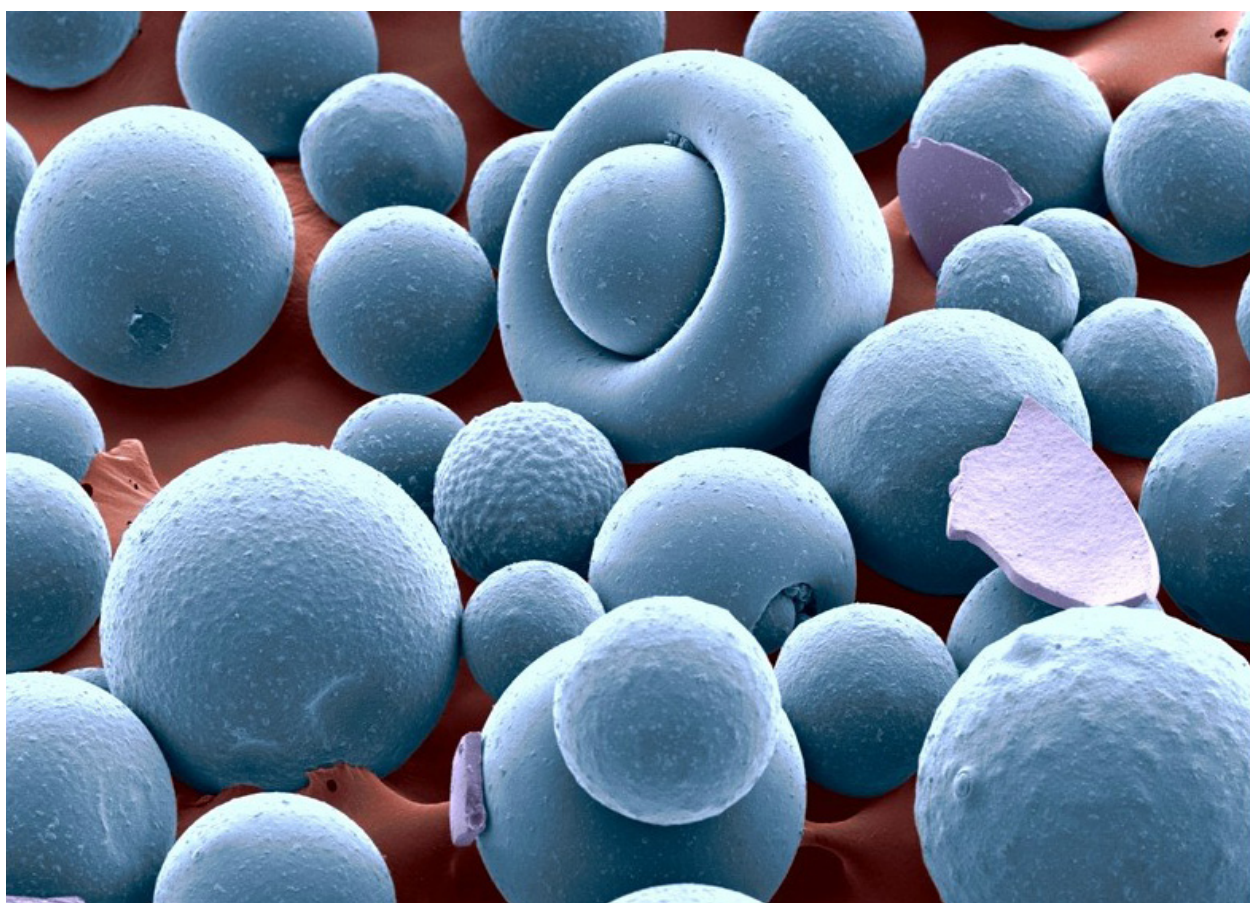
- Text formats: native text format, two column text format and CSW Clarity text format
- Binary: native binary CH-format, CSW (1.7) Raw format, Matlab 5.0(Octave) MAT format, AIA NETCDF



SORBENTS AND COLUMN PACKING

separspher sorbent

separspher is perfectly spherical highly pure silica with a high pressure resistance. Sorbents are made by standard procedures in a wide range of sizes of pores, so that both can be used for chromatography of low molecular weight and high molecular weight compounds including the SEC and GPC. Materials for reverse phase chromatography are characterized by effective endcapping. For chromatography, where the mobile phase which contains a very high percentage of water must be used RP sorbents which active layer is containing a small amount of polar groups (aqua) are delivered. Practically absolute endcapping is achieved by reaction in the gaseous phase and is used for sorbents labeled HE. These sorbents may therefore be successfully used for the SEC hydrophobic synthetic polymers. For SEC chromatography, hydrophilic polymers and biopolymers are useful materials labeled DIOL.



Sorbent	Particle diameter (µm)	Modification type
SEPARSPHER SI 70	5, 10, 15, 30	No modification
SEPARSPHER SI 100	5, 10, 15, 30	No modification
SEPARSPHER SI 200	5, 10, 15, 30	No modification
SEPARSPHER SI 300	5, 10, 15, 30	No modification
SEPARSPHER SI 100 C18	5, 10, 15, 30	Alkyl chain C18 and endcapping
SEPARSPHER SI 200 C18	5, 10, 15, 30	Alkyl chain C18 and endcapping
SEPARSPHER SI 300 C18	5, 10, 15, 30	Alkyl chain C18 and endcapping
SEPARSPHER SI 100 C18 aqua	5, 10, 15, 30	Alkyl chain C18 and polar groups
SEPARSPHER SI 200 C18 aqua	5, 10, 15, 30	Alkyl chain C18 and polar groups
SEPARSPHER SI 300 C18 aqua	5, 10, 15, 30	Alkyl chain C18 and polar groups
SEPARSPHER SI 100 C8	5, 10, 15, 30	Alkyl chain C8 and endcapping
SEPARSPHER SI 200 C8	5, 10, 15, 30	Alkyl chain C8 and endcapping
C8,SEPARSPHER SI 300 C8	5, 10, 15, 30	Alkyl chain C8 and endcapping
SEPARSPHER SI 100 C8 aqua	5, 10, 15, 30	Alkyl chain C8 and polar groups
SEPARSPHER SI 200 C8 aqua	5, 10, 15, 30	Alkyl chain C8 and polar groups
SEPARSPHER SI 100 C18 HE	5, 10, 15, 30	Alkyl chain C18 and HE endcapping
SEPARSPHER SI 200 C18 HE	5, 10, 15, 30	Alkyl chain C18 and HE endcapping
SEPARSPHER SI 300 C18 HE	5, 10, 15, 30	Alkyl chain C18 and HE endcapping
SEPARSPHER SI 100 C8 HE	5, 10, 15, 30	Alkyl chain C8 and HE endcapping
SEPARSPHER SI 200 C8 HE,	5, 10, 15, 30	Alkyl chain C8 and HE endcapping
SEPARSPHER SI 300 C8 HE	5, 10, 15, 30	Alkyl chain C8 and HE endcapping
SEPARSPHER SI 100 C4 HE,	5, 10, 15, 30	Alkyl chain C4 and HE endcapping
SEPARSPHER SI 200 C4 HE	5, 10, 15, 30	Alkyl chain C4 and HE endcapping
SEPARSPHER SI 300 C4 HE	5, 10, 15, 30	Alkyl chain C4 and HE endcapping
SEPARSPHER SI 500 C4 HE	5, 10, 15, 30	Alkyl chain C4 and HE endcapping
SEPARSPHER SI 1000 C4 HE	5, 10, 15, 30	Alkyl chain C4 and HE endcapping
SEPARSPHER SI 100 AMINE	5, 10, 15, 30	Primary amino groups
SEPARSPHER SI 100 DIOL	5, 10, 15, 30	Diol groups
SEPARSPHER SI 200 DIOL	5, 10, 15, 30	Diol groups
SEPARSPHER SI 300 DIOL	5, 10, 15, 30	Diol groups
SEPARSPHER SI 500 DIOL	5, 10, 15, 30	Diol groups
SEPARSPHER SI 1000 DIOL	5, 10, 15, 30	Diol groups

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