

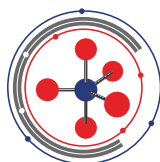
AVANPRO



AP-500

HPLC System

AVANPRO's **AP-500** Series is intended for all routine analysis as well as for the ambitious analyst. The system configuration is highly variable, and several upgrade options make this system suitable for the whole range of analytical applications.



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AP-1125 HPLC PUMP SYSTEM

AVANPRO's AP-1125 HPLC Pump System is a very flexible and powerful HPLC solvent delivery system. Its modular setup makes the AP-1125 one of the most versatile pump systems on the market. The possible configurations include an Isocratic or Quaternary Gradient Pump.



Stepper Motor

The AP-1125 is driven by a high-power stepper motor. The stepper motor has a much better resolution in the low-flow range than a conventional DC motor.

Active Mixer

The AP-1125 low pressure gradient module has an active mixer to achieve highly precise and accurate gradient results.

Lubrication

The AP-1125 camshaft is constantly lubricated within a sealed chamber to guarantee long lifetime and low maintenance.

Dual-Piston Pumphead

The AP-1125 pumps use a dual-piston pumphead for low pulsation. Together with electronic pressure compensation the AP-1125 pumps are suitable for all analytical tasks in HPLC and GPC.

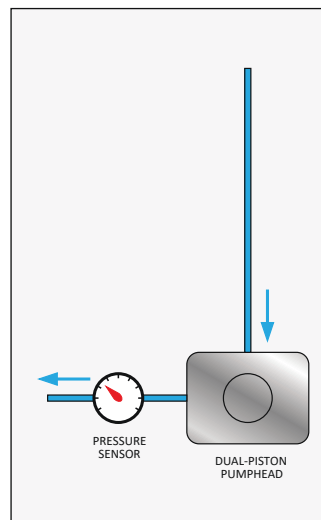


Figure: AP-1125 Isocratic Flowchart

One Pump - Two Configurations

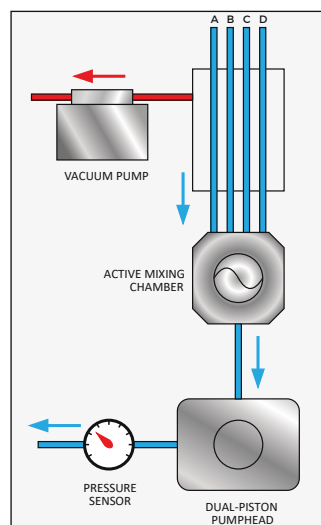


Figure: AP-1125 GLP Gradient Flowchart

Optional: Piston Backflushing

The AP-1125's pump head incorporates an optional active piston backflushing system; this system is interchangeable with older AVANPRO pumps and does not require an additional motor.

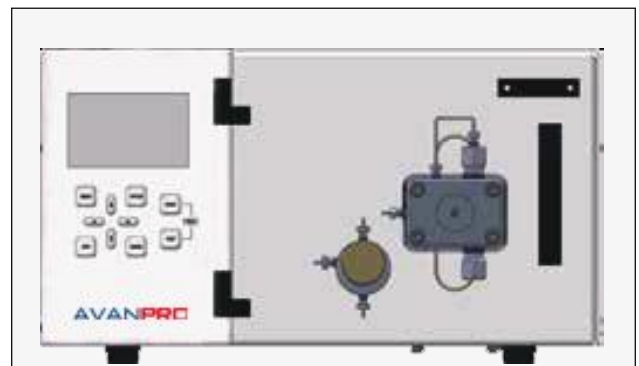


AP-1125 HPLC PUMP SYSTEM



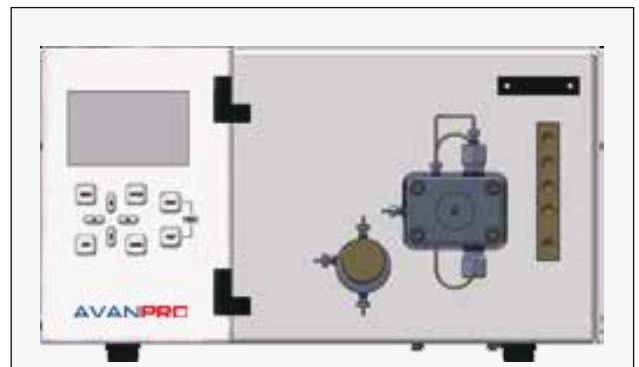
AP-1125 Isocratic HPLC Pump

The AP-1125 Isocratic Pump is a robust, lowpulsation solvent delivery system. The pumphead is easily accessible from the front panel to make routine maintenance, like changing pump seals, easy and fast. The system is available with Micro, Analytical or Semi-Preparative pumphead in Stainless Steel or PEEK.



AP-1125G Low-Pressure Quaternary Gradient Pump

The AP-1125G Low-Pressure Quaternary Gradient Pump incorporates an active low pressure mixer with adjustable mixing volume. The mixing chamber volume can be freely adjusted. An optional integrated vacuum degasser removes dissolved gases in the eluents and prevents air bubbles in the system. The system is available with Micro, Analytical or Semi-Preparative pumphead in Stainless Steel or PEEK.



Technical Specifications

Wetted Materials:	Stainless Steel / PEEK*, Teflon AF [®] , PVDF, Ceramics, Sapphire, Ruby
Flow Rate:	Programmable Micro: 0.001 - 4.000 ml/min Analytical: 0.001 - 10.000 ml/min Semi-Preparative: 0.1 - 40.000 ml/min
Flow Accuracy:	± 1.0 % 1.000 ml / min
Flow Precision:	± 0.1 % RSD 1.000 ml/min
Pressure Range:	0 - 40 MPa (0 - 6000 PSI) Semi-Preparative: 20 MPa (up to 20.000 ml/min); 10 MPa (up to 40.000 ml/min)
Pressure Pulsation:	typical < 0.1 MPa or < 1.0 %
Compressibility Compensation:	user-adjustable for different solvents
Dimensions: (W x H x D)	310 x 165 x 478 mm
Power Supply:	100 - 250 -V (47 - 63 Hz)

* depending on configuration

S 1125G Quaternary Gradient Pump

Vacuum Degassing:	optional: < 20% dissolved gases remaining in water @ 1.000 ml/min
Gradient Range:	0.0 - 100.0 %, 4 channels
Gradient Accuracy:	< 0.50 %
Gradient Mixing:	Active
Mixer Volume:	adjustable: 10 - 500 µl

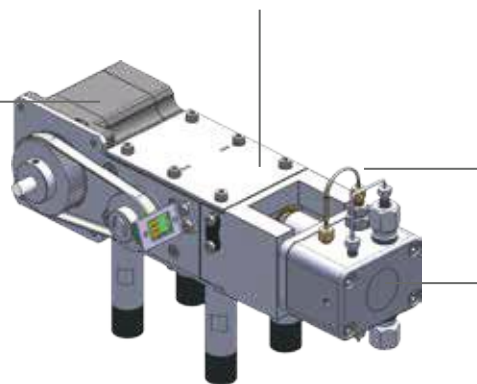
Pump Mechanic

Stepper Motor

The **AP-1125** is driven by a high-power stepper motor. The stepper motor has a much better resolution in the low flow range than a conventional DC motor.

Lubrication

The **AP-1125** camshaft is constantly lubricated within a sealed chamber to guarantee long lifetime and low maintenance.



Optional: Active Piston Backflushing

The **AP-1125's** pump head incorporates an automatic piston backflushing system; this system is interchangeable with old AVANPRO pumps and does not require an additional motor.

Dual-Piston Pumphead

The **AP-1125** pumps use a dual-piston pumphead for low pulsation. Together with electronic pressure compensation the **AP-1125** pumps are suitable for all analytical tasks in HPLC and GPC.



AP-5250 SAMPLE INJECTOR SYSTEM

Durable X/Y/Z-Sampling

The AP-5250 Sample Injector System features a mechanically durable X/Y/Z-Sampling-Mechanic designed for long life operation. The self-lubricating bearings keep the routine maintenance at a minimum and avoid troubles caused by dusty environments. High precision stepper motors drive the X/Y axis for accurate positioning. Microstepping mode enables a high resolution for the syringe dosing and vial positioning.



Robust Design

Durable X/Y/Z-Sampling

The AP-5250 Sample Injector System features a mechanically durable X/Y/Z-Sampling-Mechanic designed for long life operation. The self-lubricating bearings keep the routine maintenance at a minimum and avoid troubles caused by dusty environments. High precision stepper motors drive the X/Y axis for accurate positioning. Microstepping mode enables a high resolution for the syringe dosing and vial positioning.

Accessibility

The injection valve with sample loop and injection port can be accessed directly from the instrument front without removing any protective covers. The dosing syringe can be accessed from the side of the instrument through a hinged glass panel. The exchange of the syringe can be done without the requirement of any tools.

Dual-Needle Design

The Dual-Needle design of the AP-5250 Sample Injector System avoids system blockages caused by septum particles injected into the system. The ventilation needle pierces the septum before the injection needle moves into the sample vial (see figure on the right). As the more fragile injection needle does not need to pierce the vial septum, stronger vial caps or plastic vials can be used without problems.

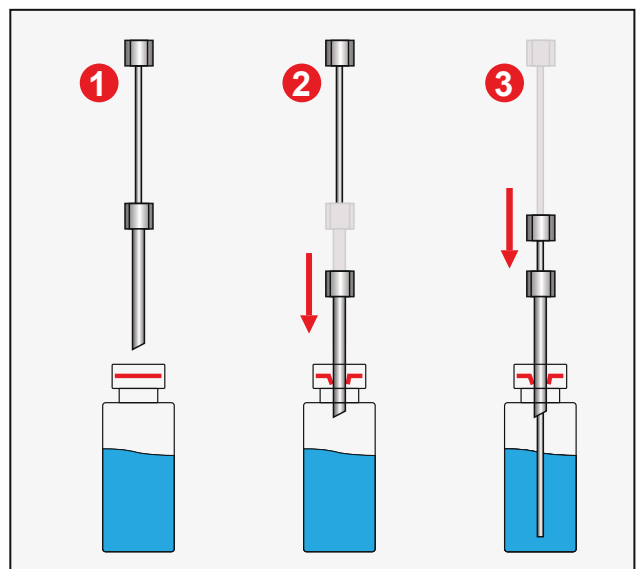


Figure: Dual-Needle Injection

Precision & Modularity

Performance

The AP-5250 Sample Injector System offers multiple injection modes depending on application and sample needs. Besides fixed loop overfilling and variable volume injection the instrument offers a Zero-Waste injection mode for injecting very small sample amounts by moving the sample into the middle of the sample loop.

Linearity and injection precision can be optimized for any volume by different sample loops and syringe sizes.

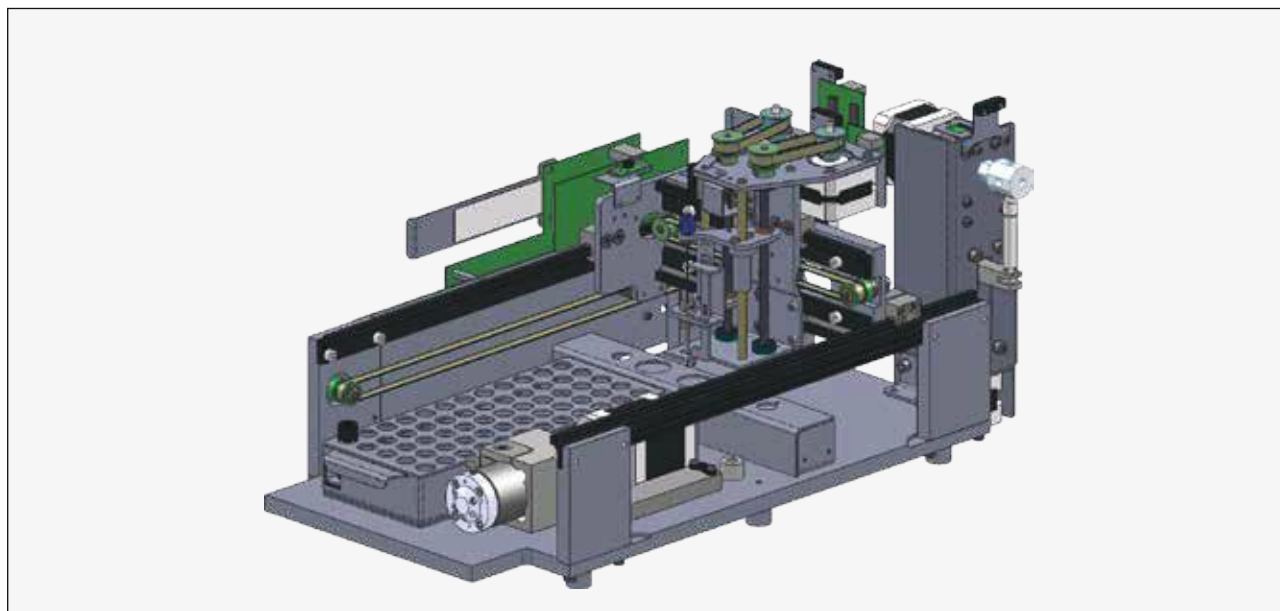
Modular Options

The modular nature of the AP-5250 Sample Injector System offers the possibility to “just buy what you need”. Modular options include sample heating/cooling for any sensitive sample material and derivatization for automatized pre-column derivatization tasks from reagent derivatization to automatic sample dilution.

Technical Specifications

Wetted Materials:	Stainless Steel / PEEK*, PPS, PVDF
Sample Capacity:	60/80 (1.5 ml), 98 (microtiter plates)
Injection Volume:	Programmable 0.1 - 999.9 μ l
Injection Precision:	< 0.5 % Variable Volume Injection (10 μ l; typically \sim 0.25 %)
Linearity:	Correlation Factor > 0.999 (10 μ l injection volume, 500 μ l Syringe)
Carry Over:	< 0.05 % with wash program
Dimensions: (W x H x D)	310 x 210 x 478 mm
Power Supply:	100 - 250 -V (47 - 63 Hz)

* depending on configuration



AP-3245 UV/VIS DETECTOR

The AP-3245 UV/Vis Detector is a variable wavelength UV/Vis detector for routine analysis and sophisticated research. The dual lamp design offers a wavelength range of 190 – 800 nm with a low baseline noise. The front-accessible flowcell can be easily exchanged, as well as the lamps which are accessible through a side panel in the instrument housing.

Integrated Wavelength Program

The AP-3245 UV/Vis Detector features a wavelength program to change the selected wavelength over time. With this feature the optimum wavelength can be selected for each analyzed substance according to its retention time.

Integrated Peak Detector

The integrated Peak Detector works as a basic fraction collector. The peak detection level can be freely programmed for peak start and peak end to enhance the collection purity. An integrated 24V output for switching a solenoid valve is used for the fraction collection, which is automatically operated with a selectable time delay.

Optional - Dual-Wavelength

The AP-3245 UV/Vis Detector is available with an optional second wavelength. This feature enhances the Wavelength Program feature that you can measure 2 different wavelengths at the same time. A second D/A converter output comes with this option to keep the system flexible to be used with any data acquisition software available.



Optional - Online-Scan

Another option for the AP-3245 UV/Vis Detector is the Online Scan. With the Online Scan whole spectrum information can be gathered at a certain time. This scan information is stored internally and can be accessed at any time. The Online Scan is a good alternative to a full UV PDA detector.

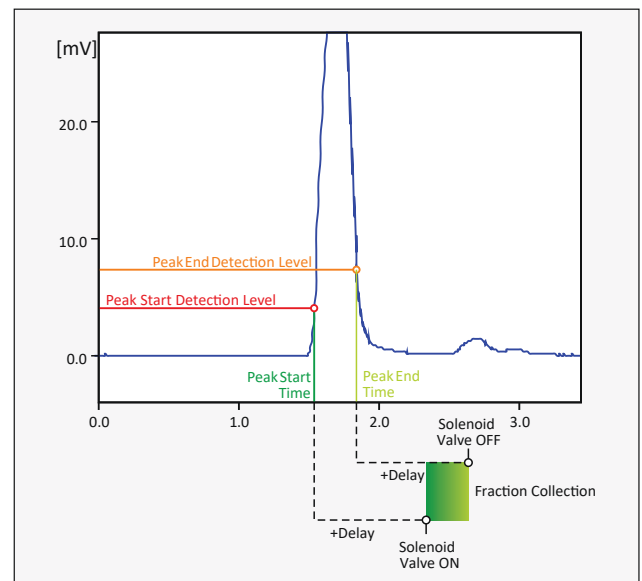
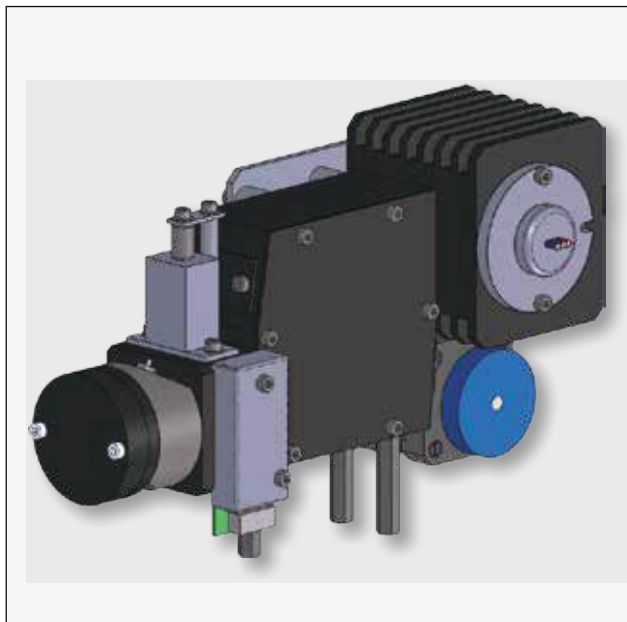


Figure: AP-3245 Peak Detector

Technical Specifications



Wetted Materials:	Stainless Steel / PEEK*
Baseline Noise:	$\pm 1 \times 10^{-5}$ AU (@240 nm, 2 sec. Risetime)
Baseline Drift:	$< 3 \times 10^{-4}$ AU/h
Wavelength Range:	190 - 800 nm
Wavelength Accuracy:	± 2 nm
Linearity:	> 2.0 AU
Light Source	Deuterium Lamp, Tungsten Lamp
Wavelength Program:	Programmable, 10 steps
Analog Output:	1x 1 V (optional: 2x 1V)
Control Features:	Internal Peak Detector with +24 V solenoid switching output.
Dimensions: (W x H x D)	310 x 165 x 478 mm
Power Supply:	100 - 250 -V (47 - 63 Hz)

Figure: AP-3245 Optical Module

* depending on configuration

Principle of Operation

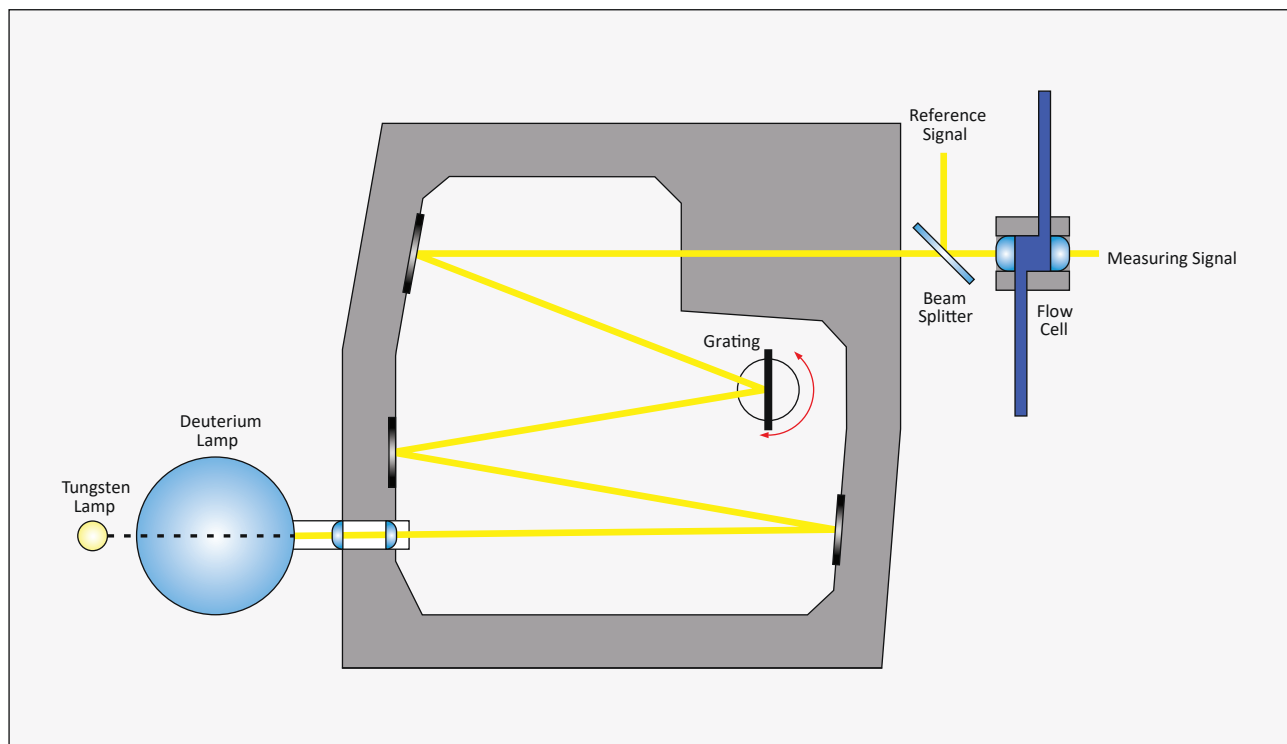


Figure: Principle of Operation



AP-3345 PDA DETECTOR

The AP-3345 UV/Vis Detector is a photodiodearray (PDA) detector for routine analysis and sophisticated research. The dual lamp design offers a wavelength range of 190 – 720 nm (256 Diodes) or 190 - 1015nm (1024 diodes) with a low baseline noise. The front-accessible flowcell can be easily exchanged as well as the lamps which are accessible through a side panel in the instrument housing.



4-Channel UV Detector

The AP-3345 PDA Detector features 4-Wavelength channels to measure chromatograms at 4 different wavelengths at the same time. With this feature the optimum wavelength can be selected for each analyzed substance.

Integrated Peak Detector

The integrated Peak Detector works as a basic fraction collector. The peak detection level can be freely programmed for peak start and peak end to enhance the collection purity. An integrated 24V output for switching a solenoid valve is used for the fraction collection, which is automatically operated with a selectable time delay.

Optional - Analog Output

The AP-3345 PDA Detector is available with an optional 4-Channel analog output. This D/A converter output option is offered to keep the system flexible to be used with any data acquisition software available.

Technical Specifications*

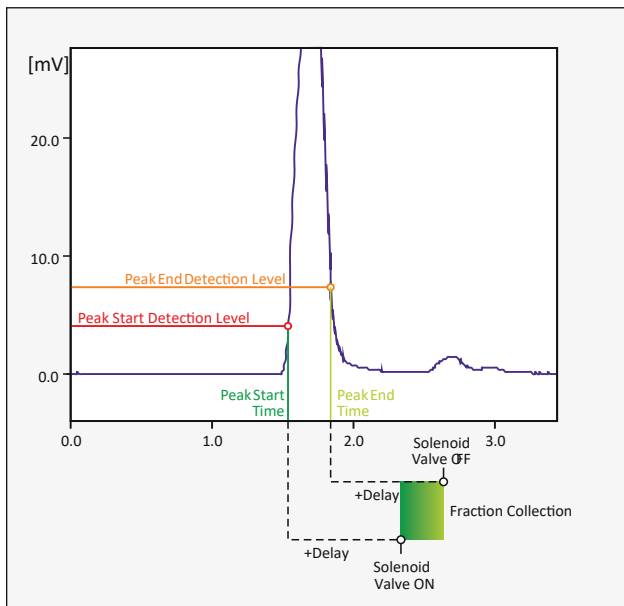


Figure: AP-3345 Peak Detector

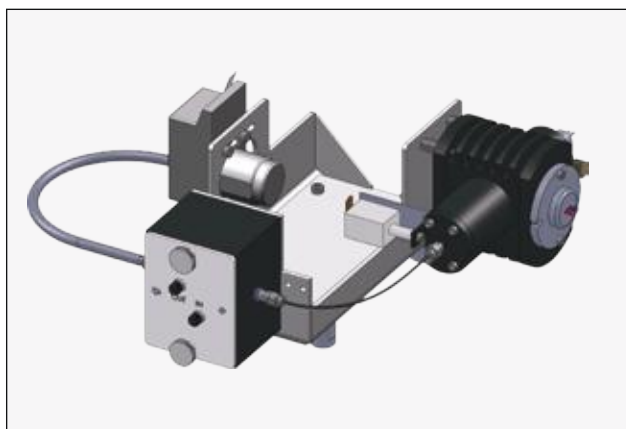


Figure: AP-3345 Optical Module

Wetted Materials:	Stainless Steel / PEEK*, Teflon, Glas
Baseline Noise:	$\pm 1 \times 10^{-5}$ AU (@240 nm, 1 sec. Risetime)
Baseline Drift:	$<3 \times 10^{-4}$ AU/h
Number of Diodes:	256 or 1024
Wavelength Range:	190 - 720 nm (256 Diodes) 190 - 1015 nm (1024 Diodes)
Wavelength Accuracy:	0.5 nm (256 Diodes); 0.3 nm (1024 Diodes)
Mean Pixel Pitch:	2.2 nm (256 Diodes), 0.8 nm (1024 Diodes)
Resolution (λ FWHM):	7 nm (256 Diodes), 3 nm (1024 Diodes)
Linearity:	> 2.0 AU
Light Source	Deuterium Lamp, Tungsten Lamp
Wavelength Program:	Programmable, 10 steps
Analog Output:	- (optional: 4x 1V)
Data Rate:	1 Hz - 100 Hz
Control Features:	Internal Peak Detector with +24 V solenoid switching output.
Dimensions: (W x H x D)	310 x 165 x 478 mm
Power Supply:	100 - 250 ~V (47 - 63 Hz)

* depending on configuration



AP-3585 REFRACTIVE INDEX DETECTOR



The AP-3585 Refractive Index Detector offers the sensitivity, stability and reproducibility required for optimal RI detection. The thermal isolated optic with a countercurrent heat exchanger and with its programmable temperature control, results in an extremely stable baseline and an optimal Signal /Noise ratio.

The AP-3585 Refractive Index Detector provides autopurge and autozero capabilities, as well as RS232 communication to acquire data directly without using any external signal interface.

AP-3585 Refractive Index Detectors are available for:

- Micro
- Analytical
- Semipreparative mode



Technical Specifications*

	Micro	Analytical	Semi-Preparative
Detection Method:		Deflection	
Refractive Index Range:		1.00 to 1.75	
Flow Rate:	0.2 - 3.0 ml/min	0.2 - 3.0 ml/min	1 - 50 ml/min
Cell Volume:	4 µl, 45° angle	9 µl, 45° angle	7 µl, 5° angle
Flow Cell Pressure:	6 kg/cm ²		
Dead Volume:	6 µl	24 µl	88 or 353 µl
Linearity Range:	0 - 500 µRIU	0 - 1000 µRIU	0 - 20000 µRIU
Noise Level:	10 x 10 ⁹ RIU	5 x 10 ⁹ RIU	10 x 10 ⁸ RIU
Drift with 1 ml H ₂ O/min	< 1mv/hour	< 1mv/hour	< 1mv/hour
Integrator Output:	± 1 V		
Recorder Output:	± 10 mV/ 100 mV/ 1 V		
Recorder Offset:	0 mV/ 10 mV/ 100 mV		
Recorder Range:	8 steps (1:8) - 16:1)		
Digital Interface:	RS232, Purge, Autozero, Start, Stop, DataOut: 1 Hz, 10 Hz		
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 (0.4 sec.), Medium (0.8 sec.), Slow (1.2 sec.)		
Weight:	13 kg		
Dimensions: (W x H x D)	310 x 165 x 478 mm		
Power Supply:	100-120/220-240 -V (50/60 Hz), 50 VA		

* All technical specifications may be subject to change.

AP-4120 COLUMN OVEN

The AP-4120 Column Oven is a contact heat transfer oven for high temperature stability and accuracy. The columns are mounted inside the column oven in optimized column holder which enclose the complete column to get the best temperature transfer between the heater and the column. Up to three 350mm columns can be mounted at the same time.

Heating

The AP-4120 Column Oven standard version features a high temperature controller for stable column temperatures of +30°C up to +150°C. The temperature accuracy is within 0.1 °C.

Heating / Cooling

The AP-4120 Column Oven is also available with active Heating/Cooling with Peltier technique. The temperature range is +5°C up to +100°C. The Heating/Cooling unit uses the same efficient controller as the basic version with temperature accuracy better than 0.1 °C.

Temperature Time Program

The Heating/Cooling variant offers an optional Temperature Time Program for stand-alone operation.

Integrated Valve

The AP-4120 Column Oven offers the option to include an automatic switching valve of the AP-6000 Valve Series, for example the AP-6070 Column Selection Valve, but all AP-6000 Valves can be integrated.



Leakage Sensor

The AP-4120 Column Oven offers a high sensitive Leakage Sensor which detects the vapors of organic solvents.

Temperature Fuse

Besides a Leakage Sensor the AP-4120 offers a temperature fuse which shuts down the unit when the temperature becomes too high, because of an electronic defect.

Temperature Time Program

The Heating/Cooling variant offers an optional Temperature Time Program for stand-alone operation.

Technical Specifications

Wetted Materials:	Stainless Steel / PEEK ¹ , PPS ¹
Temperature Range:	+30°C – +150°C (min.: ambient +5 °C) optional: +5°C – +100 °C (Peltier) ²
Temperature Accuracy:	< 0.1 °C
Switching Valve:	optional: any PA-6000 Series Valve
Temperature Program:	optional with Heating/Cooling (Peltier)
Safety Features:	Temperature Fuse; Leakage Sensor
Dimensions: (W x H x D)	183 x 566 x 270 mm
Power Supply:	100 - 250 -V (47 - 63 Hz)

1) Switching Valve: depending on configuration

2) Temperature range at 20°C ambient



Figure: AP-4120 Column Compartment

AP-7515 VACUUM DEGASSER

The AP-7515 Vacuum Degasser is an online degasser system with high efficiency. Dissolved gases are removed from the solvents by applying vacuum to a semi-permeable membrane.



High Efficiency

The high efficient Teflon-AF® capillary has a much higher efficiency than a normal Teflon capillary of similar size. This allows the usage of a smaller length of capillary to reduce the dead volume of the system considerably.

2 Operation Modes

The AP-7515 can be run either with constant speed or in Hysteresis Mode, which switches the vacuum pump on or off.

5-Year Membrane Warranty

The AP-7515 vacuum pump uses a membrane for creating the vacuum. This membrane is made of a specific Teflon material specifically designed for fast movements. AVANPRO offers a 5-year warranty on the lifetime of this membrane.

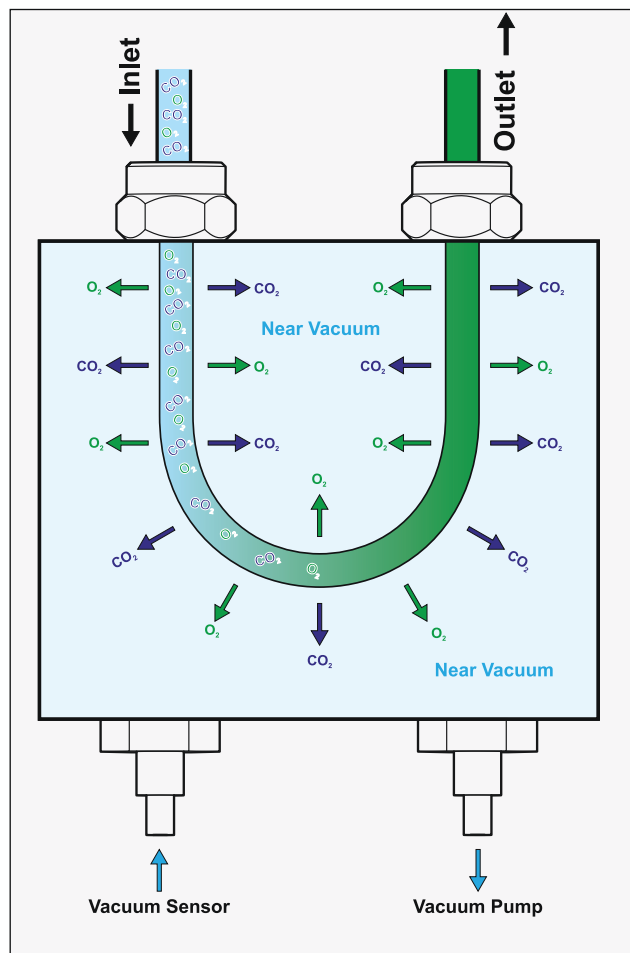
Multi-Channel

The AP-7515 Vacuum Degasser is available as 1-Channel, 2-Channel, 3-Channel, or 4-Channel version. Each solvent channel can be used for a different solvent. Several channels can be used in series to increase the efficiency even more.



WORKING PRINCIPLE

The solvent flows through a short length of Teflon AF® capillary inside a sealed chamber. This chamber (vacuum chamber) is completely sealed to the environment and vacuum is applied with a pump. Due to this vacuum any dissolved gases in the solvent running through the inner capillary are removed through its semi-permeable membrane wall. The high efficiency of the Teflon AF® material allows the usage of a very short length of capillary inside the vacuum chamber.



Technical Specifications

Wetted Materials:	Teflon AF [®] , Teflon, Stainless Steel, Aluminium, EPDM
Degassing Capacity:	< 20% dissolved gases remaining in water at 1.0 ml/min
Volume / Channel:	< 500µl
Dimensions: (W x H x D)	125 x 167 x 270 mm
Weight:	3.2 kg
Power Supply:	100 - 250 -V (47 - 63 Hz)



ORDER INFORMATION

AP-1125 HPLC Pump

Isocratic Version

Catalog No.	Instrument Description	Notes
S000037	AP-1125 HPLC Pump, isocratic	stainless steel, analytical
S000038	AP-1125 HPLC Pump, isocratic	stainless steel, micro
S000039	AP-1125 HPLC Pump, isocratic	stainless steel, semi-prep.
S000040	AP-1125 HPLC Pump, isocratic	Peek, analytical
S000041	AP-1125 HPLC Pump, isocratic	Peek, micro
S000042	AP-1125 HPLC Pump, isocratic	Peek, semi-prep.
S003493	AP-1125 HP HPLC Pump, isocratic	stainless steel, analytical, max. 600 bar
S003499	AP-1125 HP HPLC Pump, isocratic	stainless steel, micro, max. 600 bar
S003581	Integrated 1-Channel Vacuum Degasser	
S000043	Upgrade: Active Piston Flushing	only available with stainless steel, analytical pump head

Quaternary Gradient Version

Catalog No.	Instrument Description	Notes
S000044	AP-1125 HPLC Pump, Quaternary Gradient	stainless steel, analytical
S000045	AP-1125 HPLC Pump, Quaternary Gradient	stainless steel, micro
S000046	AP-1125 HPLC Pump, Quaternary Gradient	stainless steel, semi-prep.
S000047	AP-1125 HPLC Pump, Quaternary Gradient	Peek, analytical
S000048	AP-1125 HPLC Pump, Quaternary Gradient	Peek, micro
S000049	AP-1125 HPLC Pump, Quaternary Gradient	Peek, semi-prep.
S003498	AP-1125 HP HPLC Pump, Quaternary Gradient	stainless steel, analytical, max. 600 bar
S003500	AP-1125 HP HPLC Pump, Quaternary Gradient	stainless steel, micro, max. 600 bar
S000050	Integrated 4-Channel Vacuum Degasser	
S000043	Upgrade: Active Piston Flushing	only available with stainless steel, analytical pump head

AP-5250 Sample Injector

Catalog No.	Instrument Description	Notes
S000076	AP-5300 Sample Injector System	stainless steel, fix volume, 20 µl Sample Loop
S000083	Upgrade: Variable Volume	100 µl Sample Loop
S000161	Upgrade: Derivatisation	

AP-3245 UV/Vis Detector

Catalog No.	Instrument Description	Notes
S000171	AP-3245 UV/Vis Detector, 1-Channel	1-Channel
S000206	AP-3245 UV/Vis Detector, 2-Channel	2-Channel
S000197	AP-3245 UV/Vis Detector, 1-Channel, Scan	1-Channel, Online Scan
S000173	AP-3245/3250 Flowcell	stainless steel, analytical
S000205	AP-3245/3250 Flowcell	stainless steel, preparative
S001741	AP-3245/3250 Flowcell	stainless steel, micro
S000203	AP-3245/3250 Flowcell	Peek, analytical
S000204	AP-3245/3250 Flowcell	Peek, preparative
S005562	AP-3245/3250 Flowcell	Peek, micro

AP-3345 PDA Detector

Catalog No.	Instrument Description	Notes
S000164	AP-3345 PDA UV-Vis Detector	256-Diodes
S000165	AP-3345 PDA UV-Vis Detector	1024-Diodes *
S000169	AP-3345/3350 Flowcell	stainless steel, analytical
S002021	AP-3345/3350 Flowcell	stainless steel, preparative
S004371	AP-3345/3350 Flowcell	Stainless steel, micro
S000517	AP-3345/3350 Flowcell	Peek, analytical
S004370	AP-3345/3350 Flowcell	Peek, preparative
S004372	AP-3345/3350 Flowcell	Peek, micro

AP-3585 Refractive Index (RI) Detector

Catalog No.	Instrument Description	Notes
S005558	AP-3585 RI Detector	stainless steel, micro
S000167	AP-3585 RI Detector	stainless steel, analytical
S001819	AP-3585 RI Detector	stainless steel, semi-preparative



AP-4120 Column Oven

Catalog No.	Instrument Description	Notes
S000084	AP-4120 Column Oven	Heating only (30°C - 150°C) ¹
S000103	AP-4120 Column Oven	Heating/Cooling (5°C - 100°) ²
	Upgrade: Integrated Switching Valve	Notes: 1) min. ambient +5°C 2) at +20°C ambient

AP-7515 Degasser

Catalog No.	Instrument Description	Notes
S000119	AP-7515 Vacuum Degasser	1-Channel, stainless steel
S002871	AP-7515 Vacuum Degasser	1-Channel, metallfree
S000120	AP-7515 Vacuum Degasser	2-Channel, stainless steel
S000414	AP-7515 Vacuum Degasser	2-Channel, metallfree
S000121	AP-7515 Vacuum Degasser	3-Channel, stainless steel
S004366	AP-7515 Vacuum Degasser	3-Channel, metallfree
S000122	AP-7515 Vacuum Degasser	4-Channel, stainless steel
S004367	AP-7515 Vacuum Degasser	4-Channel, metallfree



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