

Performance Specifications

Table 44

Performance Specification Agilent 1100 Series Quaternary Pump

Type	Specification
Hydraulic system	Dual plunger in series pump with proprietary servo-controlled variable stroke drive, floating plungers and active inlet valve
Setable flow range	0.001 – 10 ml/min, in 0.001 ml/min increments
Flow range	0.2 – 10.0 ml/min
Flow precision	< 0.3 % RSD (typically 0.15 %), based on retention time, at 1 ml/min
Pressure	Operating range 0 – 40 MPa (0 – 400 bar, 0 – 5880 psi) up to 5 ml/min Operating range 0 – 20 MPa (0 – 200 bar, 0 – 2950 psi) up to 10 ml/min
Pressure pulsation	< 2 % amplitude (typically < 1 %), at 1 ml/min isopropanol, at all pressures > 1 MPa (10bar)
Compressibility compensation	User-selectable, based on mobile phase compressibility
Recommended pH range	1.0 – 12.5, solvents with pH > 2.3 should not contain acids which attack stainless steel
Gradient formation	Low pressure quaternary mixing/gradient capability using proprietary high-speed proportioning valve Delay volume 800 – 1100 µl, dependent on back pressure
Composition Range	0 – 95 % or 5 – 100 %, user selectable
Composition Precision	< 0.2 % SD, at 0.2 and 1 ml/min
Control and data evaluation	Agilent ChemStation for LC

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Performance Specification Agilent 1100 Series Quaternary Pump

Analog output	For pressure monitoring, 2 mV/bar, one output
Communications	Controller-area network (CAN), GPIB, RS-232C, APG Remote: ready, start, stop and shut-down signals, LAN optional
Safety and maintenance	Extensive diagnostics, error detection and display (through control module and Agilent ChemStation), leak detection, safe leak handling, leak output signal for shutdown of pumping system. Low voltages in major maintenance areas.
GLP features	Early maintenance feedback (EMF) for continuous tracking of instrument usage in terms of seal wear and volume of pumped mobile phase with user-settable limits and feedback messages. Electronic records of maintenance and errors.
Housing	All materials recyclable.

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Table 62

Performance Specifications Agilent 1100 Series Autosampler (G1313A) and Thermostatted Autosampler (G1329A). Valid when standard 100 µl metering head installed.

Type	Specification
GLP features	Early maintenance feedback (EMF), electronic records of maintenance and errors
Communications	Controller-area network (CAN). GPIB (IEEE-448), RS232C, APG-remote standard, optional four external contact closures and BCD vial number output
Safety features	Leak detection and safe leak handling, low voltages in maintenance areas, error detection and display
Injection range	0.1 – 100 µl in 0.1 µl increments Up to 1500 µl with multiple draw (hardware modification required)
Replicate injections	1 – 99 from one vial
Precision	Typically < 0.5 % RSD of peak areas from 5 – 100 µl, Typically < 1 % RSD of peak areas from 1 – 5 µl
Minimum sample volume	1 µl from 5 µl sample in 100 µl microvial, or 1 µl from 10 µl sample in 300 µl microvial
Carryover	Typically < 0.1 %, < 0.05 % with external needle cleaning
Sample viscosity range	0.2 – 50 cp
Replicate injections per vial	1 – 99
Sample capacity	100 × 2-ml vials in 1 tray 40 × 2-ml vials in ½ tray 15 × 6-ml vials in ½ tray (Agilent vials only)
Injection cycle time	Typically 50 s depending on draw speed and injection volume

Table 63

**Performance Specifications Agilent 1100 Series Autosampler (G1313A) and
Thermostatted Autosampler (G1329A).
Valid when standard 900 µl metering head installed.**

Type	Specification
Pressure	Operating range 0-20 MPa (0-200 bar, 0-2950 psi)
GLP features	Early maintenance feedback (EMF), electronic records of maintenance and errors
Communications	Controller-area network (CAN). GPIB (IEEE-448), RS232C, APG-remote standard, optional four external contact closures and BCD vial number output
Safety features	Leak detection and safe leak handling, low voltages in maintenance areas, error detection and display
Injection range	0.1 – 900 µl in 0.1 µl increments (recommended 1 µl increments) Up to 1800 µl with multiple draw (hardware modification required)
Replicate injections	1 – 99 from one vial
Precision	Typically < 0.5 % RSD of peak areas from 5 – 2000 µl, Typically < 1 % RSD of peak areas from 2000 – 5000 µl, Typically < 3 % RSD of peak areas from 1 – 5 µl
Minimum sample volume	1 µl from 5 µl sample in 100 µl microvial, or 1 µl from 10 µl sample in 300 µl microvial
Carryover	Typically < 0.1 %, < 0.05 % with external needle cleaning
Sample viscosity range	0.2 – 50 cp
Sample capacity	100 × 2-ml vials in 1 tray 40 × 2-ml vials in ½ tray 15 × 6-ml vials in ½ tray (Agilent vials only)
Injection cycle time	Typically 50 s, depending on draw speed and injection volume

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Table 10

Performance Specifications Agilent 1100 Series thermostatted autosampler

Type	Specification
Temperature range:	setable from 4°C to 40°C in 1° increments

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Table 2 Performance Specifications Agilent 1100 Series DAD and MWD

Type	Specification	Comments
Detection type	1024-element photodiode array	
Light source	Deuterium and tungsten lamps	The UV-lamp is equipped with I.D. tag that holds lamp typical information.
Wavelength range	190 – 950 nm	
Short term noise (ASTM) Single and Multi-Wavelength	$\pm 1 \times 10^{-5}$ AU at 254 and 750 nm	See note on page 17
Drift	2×10^{-3} AU/hr at 254 nm	See note on page 17
Linear absorbance range	> 2 AU (upper limit)	See note on page 17
Wavelength accuracy	± 1 nm	Self-calibration with deuterium lines, verification with holmium oxide filter
Wavelength bunching	1 – 400 nm	Programmable in steps of 1 nm
Slit width	1, 2, 4, 8, 16 nm	Programmable slit
Diode width	< 1 nm	
Flow cells	Standard: 13 μ l volume, 10 mm cell path length and 120 bar (1760 psi) pressure maximum Semi-Micro: 5 μ l volume, 6 mm cell path length and 120 bar (1760 psi) pressure maximum High pressure: 1.7 μ l volume, 6 mm cell path length and 400 bar (5880 psi) pressure maximum 500 nano: 0.5 μ l volume, 10 mm cell path length and 50 bar (725 psi) pressure maximum 80 nano: 0.5 μ l volume, 10 mm cell path length and 50 bar (725 psi) pressure maximum	See “ Optimization Overview ” on page 89 All flow cells are equipped with I.D. tags that hold cell typical information.
Control and data evaluation	Agilent ChemStation for LC (32-bit)	Revision B.01.03 or above

Table 2 Performance Specifications Agilent 1100 Series DAD and MWD, continued

Type	Specification	Comments
Analog outputs	Recorder/integrator: 100 mV or 1 V, output range 0.001 – 2 AU, two outputs	
Communications	Controller-area network (CAN), RS-232C, APG Remote: ready, start, stop and shut-down signals, LAN	
Safety and maintenance	Extensive diagnostics, error detection and display (through control module and ChemStation), leak detection, safe leak handling, leak output signal for shutdown of pumping system. Low voltages in major maintenance areas.	
GLP features	Early maintenance feedback (EMF) for continuous tracking of instrument usage in terms of lamp burn time with user-settable limits and feedback messages. Electronic records of maintenance and errors. Verification of wavelength accuracy with built-in holmium oxide filter.	
Housing	All materials recyclable.	

NOTE

ASTM: “Standard Practice for Variable Wavelength Photometric Detectors Used in Liquid Chromatography”.

Reference conditions: cell path length 10 mm, response time 2 s, flow 1 ml/min LC-grade Methanol, slit width 4 nm.

Linearity measured with caffeine at 265 nm.

For environmental conditions refer to “[Environment](#)” on page 13.



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Table 59 Performance Specifications Agilent 1100 Series Fluorescence Detector

Type	Specification	Comments
Detection type	Multi-signal fluorescence detector with rapid on-line scanning capabilities and spectral data analysis	
Performance Specifications	10 fg Anthracene, Ex=250 nm, Em=400 nm* RAMAN (H ₂ O) > 200 (FLF rev A) RAMAN (H ₂ O) > 400 (FLF rev >A) Ex=350 nm, Em=397 nm, dark value 450 nm, standard flow cell time constant=4 seconds (8 seconds responsetime)	see note below this table see "Raman ASTM Signal-to-Noise Test" on page 123
Light source	Xenon Flash Lamp, normal mode 20 W, economy mode 5 W	
Pulse frequency	296 Hz for single signal mode 74 Hz for spectral mode	
Excitation Monochromator	Range: 200 nm - 700 nm and zero-order Bandwidth: 20 nm (fixed) Monochromator:concave holographic grating, F/1.6, blaze: 300 nm	
Emission Monochromator	Range: 280 nm - 900 nm and zero-order Bandwidth: 20 nm (fixed) Monochromator:concave holographic grating, F/1.6, blaze: 400 nm	

Reference System: in-line excitation measurement

Timetable
programming: up to 4 signal wavelengths,
response time, PMT Gain,
baseline behavior (append, free,
zero), spectral parameters

Table 59 Performance Specifications Agilent 1100 Series Fluorescence Detector,

Type	Specification	Comments
Spectrum acquisition:	Excitation or Emission spectra Scan speed: 28 ms per datapoint (e.g. 0.6 s/spectrum 200-400 nm, 10 nm step) Step size: 1-20 nm Spectra storage: All	
Wavelength characteristic	Repeatability+/- 0.2 nm Accuracy+/- 3 nm setting	
Flow cells	Standard: 8 µl volume and 20 bar (2 MPa) pressure maximum, quartz Optional: Fluorescence cuvette for offline spectroscopic measurements with 1 ml syringe, 8 µl volume, quartz	
Control and data evaluation	Agilent ChemStation for LC, Agilent 1100 Control Module with limited spectral data analysis and printing of spectra	
Analog outputs	Recorder/integrator: 100 mV or 1 V, output range >10 ² luminescence units, two outputs	

Communications

Safety
and

maintenance

Controller-area network (CAN), GPIB, RS-232C, LAN, APG

Remote: ready, start, stop and shut-down signals

Extensive diagnostics, error detection and display (through control module and ChemStation), leak detection, safe leak handling, leak output signal for shutdown of pumping system. Low voltages in major maintenance areas.

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Table 59 Performance Specifications Agilent 1100 Series Fluorescence Detector,

Type	Specification	Comments
GLP features	Early maintenance feedback (EMF) for continuous tracking of instrument usage in terms of lamp burn time with user-settable limits and feedback messages. Electronic records of maintenance and errors. Verification of wavelength accuracy, using the Raman band of water.	
Housing	All materials recyclable.	
Environment:	0 to 40 °C constant temperature at <95% humidity (non-condensing)	
Dimensions:	140 mm x 345 mm x 435 mm (5.5 x 13.5 x 17 inches) (height x width x depth)	
Weight:	11.5 kg (25.5 lbs)	

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Table 47 Performance Specifications Thermostatted Column Compartment

Type	Specification	Comments
Temperature range	10 degrees below ambient to 80 °C	
Temperature stability	± 0.15 °C	
Temperature accuracy	± 0.8 °C ± 0.5 °C	With calibration
Column capacity	Three 30 cm	
Warm-up/cool-down time	5 minutes from ambient to 40 °C 10 minutes from 40 – 20 °C	
Dead volume	3 µl left heat exchanger 6 µl right heat exchanger	i.d. 0.17 mm
Dimensions (h × w × d)	140 × 410 × 435 mm (5.5 × 16 × 17 inches)	
Weight	10.2 kg (22.5 lbs)	
Communications	Controller-area network (CAN), GPIB, RS-232C, APG Remote: ready, start, stop and shut-down signals, LAN optional	
Safety and maintenance	Extensive diagnostics, error detection and display (through control module and Agilent ChemStation), leak detection, safe leak handling, leak output signal for shutdown of pumping system. Low voltages in major maintenance areas.	
GLP features	Column-identification module for GLP documentation of column type, see " Column-Identification System " on page 137	
Housing	All materials recyclable.	

Performance Specifications

Table 11

Performance Specifications Agilent 1100 Vacuum Degasser

Type	Specification
Maximum flow rate	0 - 10 ml/min per channel 5 - 10 ml/min at reduced degassing performance
Number of channels	4
Internal volume per channel	Typically 1 ml per channel
Materials in contact with solvent	PTFE, FEP, PEEK
pH range	1 – 14
Analog output (AUX)	For pressure monitoring, range 0 – 3 V

NOTE

The Agilent 1100 Series micro vacuum degasser has been tested for evaporation of solvents into the atmosphere by an independent institute with approved methods. The tests were performed with Methanol (BIA Nr. 7810) and Acetonitrile (NIOSH, Nr. 1606). Evaporation of these solvents into the atmosphere when operating the degasser was below the limits of detection.
