

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.

Performance Specifications

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



Performance Specifications

Table 62 Performance Specifications Agilent 1100 Series Variable Wavelength Detector

Type	Specification	Comments
Detection type	Double-beam photometer	
Light source	Deuterium lamp	
Wavelength range	190–600 nm	
Short term noise (ASTM)	$\pm 0.75 \times 10^{-5}$ AU at 254 nm	See NOTE on page 243 .
Drift	3×10^{-4} AU/hr at 254 nm	See NOTE on page 243
Linearity	> 2 AU (5%) upper limit	See NOTE on page 243
Wavelength accuracy	± 1 nm	Self-calibration with deuterium lines, verification with holmium oxide filter
Band width	6.5 nm typical	

Flow cells	<p>Standard: 14-μl volume, 10-mm cell path length and 40 bar (588 psi) pressure maximum</p> <p>High pressure: 14-μl volume, 10-mm cell path length and 400 bar (5880 psi) pressure maximum</p> <p>Micro: 1-μl volume, 5-mm cell path length and 40 bar (588 psi) pressure maximum</p> <p>Semimicro: 5-μl volume, 6-mm cell path length and 40 bar (588 psi) pressure maximum</p>	Can be repaired on component level
Control and data evaluation	Agilent ChemStation for LC	
Analog outputs	Recorder/integrator: 100 mV or 1 V, output range 0.001 – 2 AU, one output	

Table 62 Performance Specifications Agilent 1100 Series Variable Wavelength Detector (continued)

Type	Specification	Comments
Communications	<p>Controller-area network (CAN), GPIB, RS-232C, APG Remote:</p> <p>ready, start, stop and shut-down signals, LAN optional</p>	

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 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.

Linearity measured with caffeine at 265 nm.

Performance Specifications

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.
