



YL9100 HPLC Specifications

1. YL9101 Vacuum Degasser

- 1) Number of channel: 4 CHs
- 2) Maximum flow rate : 10ml/min per channel
> 0-2.0ml/min per channel for 70% Gas Removed from Methanol
- 3) Internal volume per channel : 925ul per channel
- 4) Materials in contact with solvent : Teflon AF, PEEK and Glass-filled PTFE
- 5) Safety & maintenance : Error detection
- 6) Dimensions : 385 X 80 X 565mm (width X height X depth)
- 7) Line Voltage : 100-240VAC, $\pm 10\%$, automatic voltage selection
- 8) Line frequency : 50/60Hz, $\pm 5\%$
- 9) Power consumption : 20W

2. Pump

2-1. YL9110 Quaternary Pump

- 1) Operating principle : Parallel dual-plunger pump, Low-pressure gradient
- 2) Control mode : Constant flow, Constant pressure
- 3) Compressibility compensation : Automatic
- 4) Flow range: 0.001-10ml/min
- 5) Flow rate accuracy : $\leq \pm 1\%$ at 1ml/min
- 6) Flow rate precision : $< 0.1\%$ RSD at 1ml/min
- 7) Maximum pressure : 6000 psi
> Operating range : 0-6000 psi up to 5ml/min
> Operating range : 0-3000 psi up to 10ml/min
- 8) Pressure pulsation : $\leq \pm 1\%$ at 1ml/min
- 9) Number of eluent lines : 4
- 10) Gradient formation : 4-channel mixing valve
- 11) Composition Precision : $< 0.1\%$
- 12) Composition Accuracy : $< 0.5\%$
- 13) Auto prime/purge
- 14) Communications : LAN
- 15) Safety & maintenance : Leak detection, Diagnostics, Error detection
- 16) Dimensions : 385 X 160 X 565mm (width X height X depth)



17) Line Voltage : 100-240VAC, $\pm 10\%$, automatic voltage selection

18) Line frequency : 50/60Hz, $\pm 5\%$

19) Power consumption : 70W

2-2. YL9111 Binary Pump

1) Operating principle : X 2 Parallel dual-plunger pump, High-pressure gradient

2) Flow range : 0.001-10ml/min

3) Compressibility compensation : Automatic

4) Number of eluent lines : 2

5) Communications : LAN

6) Flow range: 0.001-10ml/min

7) Flow rate accuracy : $\leq \pm 1\%$ at 1ml/min

8) Flow rate precision : $< 0.1\%$ RSD at 1ml/min

9) Maximum pressure : 6000 psi

> Operating range : 0-6000 psi up to 5ml/min

> Operating range : 0-3000 psi up to 10ml/min

10) Pressure pulsation : $\leq \pm 1\%$ at 1ml/min

11) Gradient formation : Static Mixer

12) Composition Precision : $< 0.1\%$

13) Composition Accuracy : $< 0.5\%$

14) Auto prime/purge

15) Safety & maintenance : Leak detection, Diagnostics, Error detection

16) Dimensions : 385 X 160 X 565mm (width X height X depth)

17) Line Voltage : 100-240VAC, $\pm 10\%$, automatic voltage selection

18) Line frequency : 50/60Hz, $\pm 5\%$

19) Power consumption : 140W

2-3 YL9112 Isocratic Pump

1) Operating principle : Parallel dual-plunger pump

2) Compressibility compensation : Automatic

3) Flow range : 0.001-10ml/min

4) Flow rate accuracy : $\leq \pm 1\%$ at 1ml/min

5) Flow rate precision : 0.1% RSD at 1ml/min

6) Maximum pressure : 6000 psi

> Operating range : 0-6000 psi up to 5ml/min



YOUNG LIN INSTRUMENT

◆ TEL: 82-31-428-8700
◆ FAX: 82-31-428-8779
◆ E-mail: kckim@younglin.com
◆ Homepage: //www.younglin.com
Young Lin Instrument Co., Ltd., 899-6 Hogye-dong, Anyang, 431-836, Korea

> Operating range : 0-3000 psi up to 10ml/min

- 7) Pressure pulsation : $\leq \pm 1\%$ at 1ml/min
- 8) Auto prime/purge
- 9) Communications : LAN
- 10) Safety & maintenance : Leak detection, Diagnostics, Error detection
- 11) Dimensions : 385 X 160 X 565mm (width X height X depth)
- 12) Line Voltage : 100-240VAC, $\pm 10\%$, automatic voltage selection
- 13) Line frequency : 50/60Hz, $\pm 5\%$
- 14) Power consumption : 70W

3. YL9120 UV/Vis Detector

- 1) Wavelength Range : 190-900 nm
- 2) Data collection rate : up to 50Hz
- 3) Light Source : Deuterium arc lamp & tungsten lamp
- 4) 2-Order filter : Automatic filter switching
- 5) Bandwidth : 5nm
- 6) Wavelength Accuracy : ± 1 nm
- 7) Wavelength Precision : ± 0.1 nm
- 8) Linearity : $>99.5\%$ at 2.5 AU (acetone, 254nm)
- 9) Noise level : $< \pm 0.35 \times 10^{-5}$ Abs/min , 254nm, dry cell(improved by January, 2013)
- 10) Drift : $< 1 \times 10^{-4}$ Abs/hour
- 11) Dispersion element : Concave grating
- 12) Warm-up period : 1 hour
- 13) Flow Cell Design : Cone type
- 14) Path Length : 10 mm (Analytical cell)
- 15) Cell Volume : 10 uL (Analytical cell)
- 16) Pressure limit : 1500psi (Analytical cell)
- 17) Wetted Materials : 316 stainless steel, Quartz, Teflon
- 18) Analog Outputs
 - > Two, software selectable : Absorbance Energy, Sample Energy, Reference Energy
- 19) Communications : LAN
- 20) Power-up Diagnostics : Optics and electronic diagnostic routine
- 21) Power-up Wavelength Verification : Automatic on power up via internal holmium filter and D2 lamp
- 22) 5-Point Wavelength Calibration : On demand via internal holmium filter and D2 lamp



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- 23) Safety & maintenance : Leak detection, Diagnostics, Error detection
- 24) Dimensions : 385 X 160 X 565mm (width X height X depth)
- 25) Line Voltage : 100-240VAC, $\pm 10\%$, automatic voltage selection
- 26) Line frequency : 50/60Hz, $\pm 5\%$
- 27) Power consumption : 100W

4. YL9131 Column Compartment

- 1) Temperature range : 4°C (Cooling) - 90 °C
- 2) Temperature stability : $\pm 0.05^\circ\text{C}$
- 3) Temperature accuracy : $\pm 0.5^\circ\text{C}$
- 4) Temperature programs : 40 Steps
- 5) Column capacity : Three columns up to 300mm length
Column switching (Option): max one automatically 6-port valve
When you specially install two column switching valves, the column length is max. 250mm and capacity is three columns(Option)
- 6) Heat-up time : 16 minutes from 4°C to 90°C
- 7) Cool-down time : 13 minutes from 90°C to 4°C
- 8) Preheat : 200mm heat exchanger, OD 1/16 inch
- 9) Communications: LAN
- 10) Safety & maintenance : Leak detection, Diagnostics, Error detection
- 11) Dimensions : 385 X 160 X 565mm (width X height X depth)
- 12) Line Voltage : 100-240VAC, $\pm 10\%$, automatic voltage selection
- 13) Line frequency : 50/60Hz, $\pm 5\%$
- 14) Power consumption : 150W

5-1. YL9150 Autosampler (Alias)

- 1) General
 - (1) Sound pressure level: LeAq < 70 dB
 - (2) Working temperature: 10 - 40°C
 - (3) Storage temperature: -25 - +60°C
 - (4) Humidity: 20 - 80% RH
 - (5) Safety and EMC compatibility: According to EC-directives; CSA (UL) approved



(6) Power requirements: 95 - 240 Volt AC \pm 10%; 50/60 Hz; 200VA

2) Sampling:

- (1) Sample capacity: 2 Micro Well Plates according to SBS standards; 96-well high/low
- (2) Loop volume: 1 - 5000 μ L programmable, 10 mL loop optional
- (3) Dispenser syringe: 500 μ L standard or 2500 μ L for Prep option
- (4) Vial detection: Missing vial/well plate detection by sensor
- (5) Headspace pressure: Built-in compressor, but only for vials with septa
- (6) Switching time injection valve: Electrically < 100 msec
- (7) Piercing precision needle: \pm 0.6mm
- (8) Wash solvent: External wash solvent bottle (bracket optional)
- (9) Wetted parts in flow path: SS316, PTFE (teflon), ETFE (tefzel), VESPEL, PCTFE (Kel-F).
Optional: PEEK
- (10) Injection cycle time: < 60 sec. in all injection modes for 1 injection \leq 100 μ L including 300 μ L wash / < 20 sec in partial loopfill mode for 1 injection of 10 μ L including 500 μ L wash

3) Analytical performance:

- (1) Injection modes: Full loop, partial loopfill and μ L pickup mode, PASA™ (pressure-assisted sample aspiration)
- (2) Reproducibility:
 - RSD \leq 0.3% for full loop injections
 - RSD \leq 0.5% for full partial loopfill injections, injection volumes > 10 μ L
 - RSD \leq 1.0% for μ L pickup injections, injection volumes > 10 μ L
- (3) Memory effect(Carry over): < 0.05% with programmable needle wash
- (4) Injection modes: Full loop, partial loopfill and μ L pickup mode, PASA™ (pressure-assisted sample aspiration)

4) Program

- (1) User interface: Xcalibur driver and Service Manager
- (2) Injection methods: Full loop, partial loopfill and μ L pickup
- (3) Injection volume: 1 μ L - 9999 μ L(depending on loop) / Full loop injection: max. 5000 μ L /
Partial loopfill injection: max 2500 μ L
- (4) μ L / Pickup injection: max. 2477 μ L
- (5) Injections per vial/well: max. 9 injections



- (6) Analysis time: max. 9 hr, 59 min, 59 sec
- (7) Wash: Programmable - Wash between injections, Wash between vials
- (8) Timed events: Programmable/ 4 x AUX ON/OFF
- (9) Priority sample: Programmable

6. YL9160 PDA Detector

- 1) PDA AD Resolution : 16bit
- 2) Slit Bandwidth : 1.7nm
- 3) Pixel Resolution : 0.9nm
- 4) No. of PDA Channel : 1024
- 5) Wavelength : 190~950
- 6) Shield Optics
- 7) Analytical Cell
 - Path-length : 10mm
 - Pressure : >1500psi
 - Volume : 13ul
- 8) Dimension W: 385mm H: 160mm D: 565mm
- 9) Weight : 15Kg
- 10) Noise Level : +/- 0.00002 AU (Empty Cell, 1sec Rise Time, 254nm)
+/- 0.00001 AU (Empty Cell, 2sec Rise Time, 254nm)
- 11) Drift : 0.0002AU/hr (Baseline Correction), 0.001AU/hr (Room Temp)
- 12) Wavelength Accuracy : <1nm (HY-1 Holmium Oxide Filter)
- 13) Sampling Rate : Max. 50Hz
- 14) 1~16 nm Spectral Bandwidth, Wide Spectral Range, Alternative Spectral Function
- 15) GLP Compliance:
 - Photometric Accuracy, Linearity, Noise Level, Drift
 - System Check,
- 16) Analog Output : 2 channel (Replaceable Dual Wavelength Detector)
- 17) Valve Output : 2ch, Programmable Sampling (Fraction Collector Function Available)
- 18) Trigger Input : 2ch
- 19) Communication : TCP/IP, RS232C
- 20) Simultaneous Data Channel : 8 or Full Scan
- 21) Filtering : Bessel, RC, Aver. 0.01~10Hz

7. YL9170 Refractive Index Detector



1) Detection method	Deflection
2) RI Range	1.00 to 1.75 RIU
3) Typical flow rate	0.2 ~ 3.0 ml/min
4) Noise	$\leq 5 \times 10^{-10}$ RIU
5) Auto zero range	40×10^{-5} RIU
6) Auto zero resolution	to 5×10^{-10} RIU
7) Recorder output	± 1 V
8) Linear dynamic range	80×10^{-5} RIU
9) Drift rate	4×10^{-8} RIU
10) Flow rate range	0.2 ~ 3.0 mL/min
11) Cell volume	9 μ l
12) Cell pressure	6 kg/cm ² (84 psi)
13) Volume into cell	24 μ l
14) Temperature control	35°C ~ 55°C
15) Digital interface	RS-232C
16) Digital input	Purge, Auto Zero
17) Dimension	385 X 160 X 565mm (width X height X depth)
18) Power requirement	110/220 \pm 10% VAC. 50-60 Hz.
19) Weight	17 kg

8. Evaporative Light Scattering Detector (ELSD)

8.1 YL9180 ELSD

- 1) Dimensions: 250 x 460x 290mm (width X height X depth)
- 2) Weight: 10.5 kg
- 3) Display: 2 line x 20 character per line VFDL
- 4) User Interface: Two multi-function buttons
- 5) Operating Conditions:
Intended for indoors operation only. 60°F to 85°F and <90% R.H. non condensing
- 6) Evaporative Zone Temperature: Ambient to 120°C
- 7) Nebulization Chamber Temperature: Ambient to 60°C
- 8) Gas Requirement: 65psi \pm 5 psi Nitrogen or other inert gas
- 9) Gas Consumption: Approximately 2.5 SLPM
- 10) Liquid Flow Rate: 0.25 ml/min. to 3 ml/min.
- 11) Electrical Requirement: 120 V AC, 50/60 Hz or 240 V AC, 50/60 Hz 600 Watts



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- 12) Wetted Materials: Stainless Steel, glass, Anodized Aluminum, Teflon
- 13) Light Source: 670 nM Laser Diode, <5 m W
- 14) Detector: Hermetically Sealed Photo-Diode/Operational Amplifier
- 15) Output Signal: 0-5 VDC
- 16) Communications: RS-232

8.2 YL9181 ELSD

- 1) Dimensions: 250 x 460x 290mm (width X height X depth)
- 2) Weight: 11.3 kg
- 3) Display: 2 Line x 20 Character per line VFD
- 4) User Interface: Four multi-function keys
- 5) Evaporative Zone Temperature: Ambient to 120°C
- 6) Thermo-Split™ Chamber Temperature: 10°C to 70°C
- 7) Liquid Flow Rate: 0.2mL/min to 5mL/min
- 8) Gas Requirements: 65psi ± 5 psi Nitrogen or other inert gas
- 9) Gas Consumption: ~ 2.5 SLPM
- 10) Operating Conditions:
Intended for indoor use only, 60°F to 85°F and <90% R.H. non condensing
- 11) Electrical Requirements: 120 VAC, 50/60 Hz or 240 VAC, 50/60 Hz; 600 watts
- 12) Wetted Materials: Stainless steel, glass, anodized aluminum, Teflon™
- 13) Light Source: 670 nm Laser Diode, <5mW
- 14) Detector: Hermetically sealed photo-diode/operational amplifier
- 15) Output Signal: 0 - 5 VDC
- 16) Communications: RS232

9. Fluorescence Detector

- 1) Performance: Single wavelength operation: 10 fg anthracene LOD, Ex 250 nm, Em 400 nm
H₂O >500 Raman, Ex 350 nm, Em 397 nm, dark value 450 nm, standard flow cell
Dual wavelength operation: H₂O > 300 Raman, Ex 350 nm, Em 397 nm and Ex 350, em 450 nm, standard flow cell
- 2) Light Source: 20 W Xenon flash lamp, normal mode: 20 W, economy mode: 5 W
- 3) Pulse frequency: 365 Hz for signal mode, 73 Hz for economy mode
- 4) Excitation monochromator: Concave holographic grating, F/1.6, blaze 300 nm, range 200-700 nm and zero-order, bandwidth 20 nm



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- 5) Emission monochromator: Concave holographic grating, F/1.6, blaze 400 nm, range 280-900 nm and zero-order, bandwidth 20 nm
- 6) Photomultiplier: 200-600 nm, exchangeable
- 7) Reference system: Inline excitation measurement
- 8) Time programming: Up to four signals, response time, PMT gain, baseline behavior (append, free, zero), spectral parameters
- 9) Spectral acquisition: Excitation or emission spectra, scan speed 28 ms per datapoint, e.g. 0.6 s per spectrum 200-400 nm, 10 nm step
- 10) Step size: 1-20 nm
- 11) Wavelength repeatability: ± 0.2 nm
- 12) Wavelength accuracy: ± 3 nm
- 13) Flow cells: Standard: 8 μ L volume, 20 bar (2 MPa) pressure maximum, quartz
- 14) Control and data evaluation: YL-Clarity software or Instant pilot control module without spectral data analysis

10. YL-Clarity Data System

- 1) Direct control of YL9100 HPLC and YL6100 GC.
- 2) Measuring: Simultaneous data acquisition from up to four independent chromatographs, each chromatograph can acquire data from up to 12 detectors.
- 3) Integration: There is extensive possibility to modify chromatograms. The chromatogram can be changed by entering global parameters or interactively, through direct graphic modification of the baseline.
- 4) Overlay: Simultaneously displays a virtually unlimited number of chromatograms and their mathematical modification; for example, mutual deductions or derivations of any order.
- 5) Calibration: Internal and external standard calculation methods, calibration of groups of peaks and reference peaks method for better identification.
- 6) Automated measuring support: Sequence tables for any set of samples with or without an autosampler.
- 7) Postrun: Automatically displays, prints, exports and starts other programs after the completion of a measurement.
- 8) Summary result tables: Displays and prints selected results from all simultaneously displayed chromatograms.
- 9) User settings: User selects parameters for peak display and the specification for axes, including color from an extensive array of color settings. Text labels and lines, either as part of



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the area or anchored to a chromatogram, may also be inserted.

10) Export: Optional exportation of all results, with or without the chromatogram, in various formats, into a file or clipboard.

11) Import: Imports chromatograms or mathematical curves, which have been saved in text or AIA formats, from other programs.

12) Method and calibration history: Each chromatogram can easily be displayed under the same conditions as when it was printed, exported or saved.

13) Column performance: Calculations of peaks in terms of symmetry, efficiency, resolution; all by several methods (tangent, moments, etc.).

14) Batch: Automatically batch processes, displays, exports or prints any number of chromatograms.

15) User calculations: Users can define custom calculations in the Result and Summary tables. Using the integrated editor you can create your own columns from original columns and individual mathematical functions.

16) User accounts: Sets up access rights and passwords (including their parameters e.g., minimum length, validity, etc.). Each user can define his or her own station appearance.

17) Audit trail: Records selected events and operations into a special file. Records selected operations directly into a chromatogram.

18) Electronic signature: Each chromatogram can be signed electronically. Signature selection is based on the username or the signature certificate.

19) Networked Solution: Clarity chromatography station files can be accessed from networked computers using Clarity software. This enables the offline evaluation of chromatograms, development of new methods and printing reports.

20) 21 CFR Part 11: Clarity Satisfies with the requirements of the 21 CFR Part 11 directive of the FDA.

21) Operating Windows: Microsoft Window 2000, XP and Vista (32 bit)