ACQUITY UPLC H-Class PLUS Bio System with 2D Technology

The biocompatible flowpath of the Waters™ ACQUITY™ UPLC™ H-Class PLUS Bio System with 2D Technology ensures robust and rugged operations in the most challenging biopharmaceutical applications such as ion exchange (IEX), size exclusion (SEC), hydrophilic interaction (HILIC), and reversed phase. This system configuration allows chemists to increase sensitivity and selectivity, eliminate unwanted interferences, characterize the most complex samples, and perform separations that are normally incompatible with a mass spectrometer by adding a second reversed-phase separation to the experiment. The system is comprised of one bioQuaternary Solvent Manager (Injection Pump), one Binary Solvent Manager (Analytical Pump), a bioSample Manager with Flow-Through Needle (bioSM-FTN-H) design, and a Column Manager.

BINARY SOLVENT MANAGER (BSM)

Number of solvents	Up to four, in any combination of two: A1 or A2 and B1 or B2
Solvent conditioning	Vacuum degassing: one channel per solvent, and one channel for Sample Manager wash solvent
Settable flow rate range	0.001 to 2.000 mL/min, in 0.001 mL increments
Compressibility compensation	Automatic and continuous
Plunger seal wash	Integral, active, programmable
Gradient profiles	11 gradient curves (including linear, step [2], concave [4], and convex [4])
Wet prime	Automatic
Maximum operating pressure	15,000 psi up to 1 mL/min, 9000 psi up to 2 mL/min per pump, not more than 15,000 psi total
Composition accuracy	±0.5% absolute (full scale) from 5% to 95% of flow rates from 0.50 to 2.00 mL/min
Composition precision	0.15% RSD or ±0.04 min SD, whichever is greater, based on retention time
Flow precision	0.075% RSD or ±0.02 min SD, or 1.00 s for run times less than 1.00 min based on retention time or volumetric measures (0.5 to 2.0 mL/min)
Primary wetted materials	316 stainless steel, UHMWPE, sapphire, ruby, FEP, PTFE, ETFE, diamond-like coating, PEEK and PEEK alloys, titanium alloys

bioQUATERNARY SOLVENT MANAGER (bioQSM)

Number of solvents	Blend up to four solvents in any combination (standard) Expanded solvent choices with optional six-port solvent select valve
Maximum operating pressure	15,000 psi up to 1.0 mL/min, 9000 psi up to 2.0 mL/min (firmware version 1.5x and earlier) 15,000 psi up to 1.0 mL/min, 7800 psi up to 2.2 mL/min (firmware version 1.6x and later)
Solvent degassing	Integrated vacuum degassing, four chambers One additional chamber for the SM-FTN-H purge solvent

Solvent blending	Automated, on-line pH, ionic strength, and organic modifier blending from pure solvents with Auto▪Blend Plus™ Technology
Gradient formation	Low-pressure mixing, quaternary gradient
Gradient profiles	11 gradient curves (including linear, step [2], concave [4], and convex [4])
Settable flow rate range	0.010 to 2.000 mL/min, in 0.001 mL increments (firmware version 1.5x and earlier) 0.010 to 2.200 mL/min, in 0.001 mL increments (firmware version 1.60) 0.001 to 2.200 mL/min in 0.001 mL increments (firmware version 1.65 and later)
Primary check valve	Intelligent Intake Valve (*i*²Valve) Passive check valve (optional)
Pressure pulsation†	≤1.0% or 25 psi, whichever is greater
Flow accuracy†	±1.0% at 0.5 to 2.0 mL/min using 100% A
Flow precision†	≤0.075% RSD or ±0.01 min SD, whichever is greater, based on six replicates (with *i*²Valve)
Composition ripple† (baseline noise)	≤1.0 mAu (≤0.1 mAU with optional 250 µL mixer) (with *i*²Valve)
Composition accuracy†	±0.5% absolute (full scale) from 5% to 90% from 0.5 to 2.0 mL/min (with *i*²Valve)
Composition precision†	≤0.15% RSD or ±0.02 min SD, whichever is greater, based on six replicate injections (with *i*²Valve)
Compressibility compensation	Automatic and continuous
Priming	Wet priming can run at flow rates up to 4 mL/min
Pump seal wash	Equipped with a wash system to flush the rear of the high pressure seal and the plunger
Flow ramping	Range: 0.01 to 30.00 min to reach 2.00 mL/min Default: 0.45 min to reach 2.00 mL/min
Primary wetted materials	Titanium, PPS, fluoropolymer, fluoroelastomer, UHMWPE blend, sapphire, ruby, zirconia, Nitronic 60, DLC, PEEK, PEEK blend

bioSAMPLE MANAGER-FTN (bioSM-FTN-H)

Injection volume range	0.1 to 10.0 µL as standard Up to 1000.0 µL with optional extension loops
Accuracy (aspiration)	±0.2 µL (measured by fluid weight removed from vial with 10 µL injections averaged over 20 injections using standard 100 µL syringe)
Linearity†	≥0.999 (standard needle)
Precision†	≤0.25% RSD, 5 to 100 µL
Number of sample plates	Any two of the following: ▪ 96 and 384 microtiter plates ▪ 48 position 2.00-mL vial plates ▪ 48 position 0.65-mL micro-centrifuge tube plates ▪ 24 position 1.50-mL micro-centrifuge tube plates

Maximum sample capacity	768 in two 384-well plates or 96 in 2-mL vial holders, additional positions for dilution functions
Sample compartment	4.0 to 40.0 °C, settable in 0.1 °C increment
Temperature accuracy	±0.5 °C at sensor
Temperature stability	±1.0 °C at sensor
Sample manager heat time	≤30 min ambient-40 °C
Sample manager cool time	≤60 min ambient-4 °C
Injection needle wash	Integral, active, programmable
Minimum sample required	3 µL residual, using total recovery 2-mL vials (zero offset)
Sample carryover†	≤0.002% caffeine (UV) ≤0.002% sulphadimethoxine (MS)
Advanced Sample Manager capabilities	Auto-dilution, auto-addition, and load-ahead
Primary wetted materials	MP35N, gold plated stainless steel, Vespel SCP, PEEK blend, DLC

COLUMN MANAGEMENT (CM-A)

Column capacity	CM-A: Two columns, as standard (maximum length of 150 mm with filter or guard column), or four columns (maximum length of 50 mm) can be supported with optional tubing kit, up to 4.6 mm internal diameter (I.D.)
Multidimensional valves	Two six-port, two-position valves (CM-A only)
Column compartment(s) temperature range	4.0 to 90.0 °C, settable in 0.1 °C increments Two independent heat/cool zones per module
Column compartment(s) temperature accuracy	±0.5 °C
Column compartment(s) temperature stability	±0.3 °C
Column compartment heat time	≤15 min ambient-60 °C
Column compartment cool time	≤15 min 60–20 °C
Solvent conditioning	Active pre-heating as standard
Column tracking	eCord™ Technology column information management tracks and archives column usage history for one column

INSTRUMENTAL CONTROL

External communication	Ethernet interfacing via RJ45 connection to host PC with BSM, or Column Manager and UPLC detectors and mass spectrometers
Event inputs/outputs	Rear panel contact closure and/or TTL inputs/outputs
External control	MassLynx™ version 4.1 with OpenLynx™ Open Access, with specific SCN releases

User diagnostics	Available through software on host PC; system control via console software
Unattended operation	Leak sensors on supported modules, full diagnostic data captured through console software
Connections INSIGHT™	Provides real-time monitoring and automatic notification of instrument performance and diagnostic information allowing for quicker problem resolution

ENVIRONMENTAL

Acoustic noise	<65 dB
Operating temperature range	4.0 to 40.0 °C (39.2 to 104.0 °F)
Operating humidity range	20% to 50%, non-condensing

POWER REQUIREMENTS

Voltage	100 to 240 VAC
Frequency	50 to 60 Hz

PHYSICAL DIMENSIONS

ACQUITY UPLC H-Class PLUS Bio System with 2D Technology: a bioSample Manager-FTN-H, one Binary Solvent Manager, one bioQuaternary Solvent Manager, and a Column Manager	Width: 83.8 cm (33 in.) Height: 103.4 cm (40.7 in.) Depth: 86.4 cm (34 in.)

Note: dimensions are listed with only components listed above

ORDERING INFORMATION	PART NUMBER
ACQUITY UPLC H-Class PLUS Bio System with 2D Technology	176015133

† For specific test conditions, contact your Waters sales representative.

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