

ACQUITY UPLC I-Class System (SM-FL)

The Waters® ACQUITY® UPLC® I-Class System's holistic design is targeted for investigative analysis where maximized peak capacity, throughput, and sensitivity are critical and is perfectly suited for running any MS based application. The system is comprised of a Binary Solvent Manager (BSM) and a Sample Manager with Fixed-Loop (SM-FL); this design offers lowest dispersion performance and is suitable for running 1.0 mm columns. The ACQUITY UPLC I-Class System is available with a choice of column management options.

ACQUITY UPLC I-CLASS SYSTEM FEATURES

Total system bandwidth, 5 σ	4 to 7 μ L (see ACQUITY UPLC I-Class System Specifications document for conditions)
Total system delay volume	<95 μ L, default configuration
Integrated leak management	Leak sensors, as standard, and safe leak handling
System synchronization	Injection synchronization between both pumps and the sample manager enhances retention time reproducibility
Operating flow rate range	0.010 to 2.000 mL/min, in 0.001 mL increments
Maximum operating pressure	18,000 psi up to 1 mL/min, 12,000 psi up to 2 mL/min
pH range	pH 2 to 12
Unattended operation	Leak sensors, full 96-hour diagnostic data display through console software
Injection cycle time	<15s inject to inject, with load ahead enabled (see ACQUITY UPLC I-Class System Specifications document for conditions)

BINARY SOLVENT MANAGER

Number of solvents	Up to four, in combination of two, A1 or A2 and B1 or B2
Solvent conditioning	Integrated vacuum degassing, six lines with two allocated for the injector needlewash/purge solvents
Gradient formation	High pressure mixing, binary gradient
Gradient profiles	11 gradient curves [including linear, step (2), concave (4), and convex (4)]
Primary check valves	Intelligent Intake Valves (<i>i</i> ² Valve)
Flow accuracy	\pm 1.0% of set flow rate at 0.500 mL/min as per SystemsQT™
Flow precision	0.075% RSD or 0.01 min SD, (0.2 to 2.0 mL/min), whichever is greater using premixed solvent
Composition ripple (baseline noise)	<1.0 mAu (see ACQUITY UPLC I-Class System Specifications document for conditions)
Pump compositional precision	<0.15% RSD, or 0.02 min SD, whichever is greater (from 0.2 to 2.0 mL/min)

Pump compositional accuracy	±0.5% absolute from 5% to 95%, 0.2 to 2.0 mL/min
Compressibility compensation	Automatic, no user intervention required
Priming	Wet priming runs at a flow rate of 4 mL/min
Pump seal wash	Equipped with a programmable active wash system to flush the rear of the high pressure seals and the plungers
Flow ramping	Automatic
Primary wetted materials	316L stainless steel, UHMWPE blend, MP35N, titanium alloy, gold, sapphire, ruby, zirconia, Nitronic 60, DLC, fluoropolymer PEEK, and PEEK blend
Mixing options	Standard: 50 µL Optional: 100 µL and 380 µL

SAMPLE MANAGER - FIXED LOOP (SM-FL)

Injection volume range	0.1 µL to 250.0 µL, in 0.1-µL increments. 10 µL loop standard with 1, 2, 5, 20, 50, 100, and 250 µL optional loops
Injection linearity	>0.999, (default needle) from 20% to 75% of loop, Partial Loop Uses Needle Overfill mode, (PLUNO), per SystemsQT protocol
Injection mode	Three – Full Loop mode, for optimal quantitation and dispersion, Partial Loop mode for fastest cycle time, and Partial Loop Uses Needle Overfill mode, default mode, for optimal quantitation using partial loop injection volumes
Sample manager precision	<1% area RSD 0.2 to 1.9 µL injection <0.5% area RSD 2 to 10 µL injection (See ACQUITY UPLC I-Class System Specifications document for conditions)
Number of sample plates	Any two of the following: <ul style="list-style-type: none"> ▪ 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, plus 4 additional positions for dilution functions
Sample compartment temperature range	4.0 to 40.0 °C, settable in 0.1 °C increments; maintains 19 °C below ambient with a tolerance range between -2 and +4 °C
Temperature accuracy	±0.5 °C at sensor (See ACQUITY UPLC I-Class Systems Specification Guide for conditions)
Temperature stability	±1.0 °C at sensor (See ACQUITY UPLC I-Class Systems Specification Guide for conditions)
Injection needle wash	Integrated, active, programmable, dual wash
Minimum sample required	3 µL residual, using Waters' total recovery 2-mL vials (zero offset)

Carryover (UV)	<0.004% <0.002% typical (See ACQUITY UPLC I-Class System Specifications document for conditions)
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Advanced sample manager capabilities	Load Ahead and Loop Offline mode, valve cycle timed event
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Primary wetted materials	316L stainless steel, UHMWPE blend, MP35N, DLC, titanium alloy, gold, sapphire, ruby, zirconia, Nitronic 60, fluoropolymer, PEEK and PEEK blend, fluoroelastomer
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COLUMN HEATERS (CH-A)

Column capacity	CH-A: Single column, up to 4.6 mm internal diameter (I.D.), up to 150 mm in length with filter or guard column Mounting extends out for use with MS based detector
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Fittings	18 K psi, low dispersion, with reusable column inlet fittings
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Column compartment temperature range	20.0 to 90.0 °C, settable in 0.1 °C increments
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Column compartment temperature accuracy	±0.5 °C at sensor (See ACQUITY UPLC I-Class Systems Specification Guide for conditions)
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Column compartment temperature stability	±0.3 °C at sensor (See ACQUITY UPLC I-Class Systems Specification Guide for conditions)
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Solvent conditioning	Active pre-heating as standard; passive pre-heating (for legacy method support)
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Column tracking	eCord™ Technology column information management tracks and archives column usage history
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COLUMN MANAGEMENT (CM-A)

Column capacity	CM-A: Two columns, as standard (maximum length of 150 mm with filter or guard column) up to 4.6 mm internal diameter (I.D.)
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Switching valves	Two nine-port, eight-position valves (CM-A only); provides programmable access switching, waste and bypass positions for rapid solvent changeover
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Column compartment(s) temperature range	4.0 to 90.0 °C, settable in 0.1 °C increments, two independent heat/cool zones (See ACQUITY UPLC I-Class Systems Specification Guide for conditions)
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Column compartment(s) temperature accuracy	±0.5 °C at sensor (See ACQUITY UPLC I-Class Systems Specification Guide for conditions)
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Column compartment(s) temperature stability	±0.3 °C at sensor (See ACQUITY UPLC I-Class Systems Specification Guide for conditions)
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Solvent conditioning	Active pre-heating as standard; passive pre-heating (for legacy method support)
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Fittings	18 Kpsi, low dispersion, with reusable column inlet fittings
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Column tracking	eCord Technology column information management tracks and archives column usage history
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2D Support	Optional
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SAMPLE ORGANIZER

Sample plate capacity	Sample plate capacity is configured based on the types and combinations of plates being used: <ul style="list-style-type: none"> ▪ Maximum of 19 standard microtiter plates, up to 15.5 mm high, or ▪ Maximum of 9 intermediate height plates (or 2-mL vial holders), up to 40.0 mm high, or ▪ Maximum of 6 deep well plates (or 4-mL vial holders), up to 47.0 mm high
Maximum sample capacity	Maximum of 7296 samples in nineteen 384-well plates
Sample compartment temperature range	4.0 to 40.0 °C, settable in 0.1 °C increments with a tolerance range between -2 and +4 °C
Temperature accuracy	±1 °C at the sensor
Temperature stability	±1 °C at the sensor

INSTRUMENTAL CONTROL

External control	Empower® Software, MassLynx® Software, UNIFI®, or standalone through console software
External communications	Ethernet interfacing via RJ45 connection to host PC
Event inputs/outputs	Rear panel contact closure and/or TTL inputs/outputs
Connections INSIGHT®	Provides real-time monitoring and automatic notification of instrument performance and diagnostic information, allowing for quicker problem resolution
Local control	ACQUITY UPLC Local Console Controller (LCC)

ENVIRONMENTAL SPECIFICATIONS

Acoustic noise	<65 dBA, system
Humidity – Operating	20% to 80%, non-condensing
Operating temperature range	4 to 40 °C

ELECTRICAL SPECIFICATIONS

Power requirements	100 to 240 VAC
Line frequency	50 to 60 Hz
Power consumption	BSM: 360 VAC FTN: 400 VAC CM-A: 400 VAC

PHYSICAL SPECIFICATIONS

ACQUITY UPLC I-Class System, BSM, (SM-FL): CH-A	Width: 34.3 cm (13.5 in.) Height: 71.1 cm (28.0 in.) Depth: 71.2 cm (28.0 in.)
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ACQUITY UPLC I-Class System, BSM, (SM-FL): CM-A	Width: 34.3 cm (13.5 in.) Height: 79.6 cm (31.4 in.) Depth: 71.2 cm (28.0 in.)
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Sample Organizer	Width: 25.4 cm (10.0 in.) Height: 96.5 cm (38.0 in.) Depth: 71.1 cm (28.0 in.)
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Waters

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