

Appendix A

Specifications

This appendix includes specifications for the following:

- Physical
- Environmental
- Electrical
- Solvent management system
- Sample management system
- Instrument control and communication

Table A-1 Physical Specifications

Item	Specification
Height	22.5 in. (57.1 cm)
Depth	22.5 in. (57.1 cm); 25.5 in. (64.8 cm) with optional sample heater/cooler
Width	18 in. (45.7 cm); 23.0 in. (58.4 cm) with optional column heater Optional bar code reader adds 1.5 in. (3.8 cm) to overall width
Weight	100 lb (45.5 kg) 130 lb (59.1 kg) with optional sample heater/cooler and column heater
Wetted Surface Materials	316 stainless steel, zirconia ceramic, UHMWPE, sapphire, ruby, Tefzel [®] (ETFE), Teflon [®] (FEP and PTFE), Teflon AF, Fluoroloy G, Fluoroloy-08R

Table A-2 Environmental Specifications

Item	Specification
Operating Temperature	4 to 40° C (39 to 104° F)
Relative Humidity	20 to 80%, noncondensing
Acoustic Noise	<65 dB(A)

Table A-2 Environmental Specifications (*Continued*)

Item	Specification
Solvent Compatibility (see Section Appendix C. Solvent Considerations)	Solvents consistent with materials of construction. Salts and buffers can reduce seal life, especially at pressures in excess of 3000 psi.

Table A-3 Electrical Specifications

Item	Specification
Power Requirements	950 VA (maximum)
Line Voltage	85 to 132 Vac or 180 to 250 Vac
Frequency	47 to 63 Hz
Time or user-controllable switch closures S1 – S4	<p>Four controllable contact closures (two terminals per closure).</p> <p>Maximum allowable current = 0.5 A per contact. Maximum allowable voltage = 30 Vdc. Contact resistance = 0.2 ohms. Outputs can be controlled from the I/O Events Table or directly from the front panel.</p> <p>Two modes available from front panel and I/O Events table: On = contact closed; Off = contact open. Additional modes available in the I/O Events table: Pulse = single contact closure for programmable period; Toggle = changes the current state.</p>
Stop Flow (input)	<p>Two terminals (+, –) that allow other LC devices to immediately stop solvent flow. User-selectable to halt flow on high or low signal.</p> <p>Input voltage range: ± 30 Vdc. Logic high = >3.0 Vdc $\pm 10\%$, logic low = <1.9 Vdc $\pm 10\%$. Minimum pulse width = 10 msec.</p>
Hold Inject (input)	<p>Two sets of (+, –) terminals that allow other LC devices to delay an injection. Boolean operator selects whether one or both inputs delay the injection.</p> <p>Input voltage range: ± 30 Vdc. Logic high = >3.0 Vdc $\pm 10\%$, logic low = <1.9 Vdc $\pm 10\%$. Minimum pulse width = 10 msec.</p>

Table A-3 Electrical Specifications (Continued)

Item	Specification
Chart Output	Two terminals (+, -) for recording the following user-selectable outputs: <ul style="list-style-type: none"> • Programmed flow rate • Sample loop pressure • System pressure • Primary head pressure • Programmed composition (%A, %B, %C, %D) • Sample temperature • Column temperature • Degasser vacuum
Run Stopped	Contact closure indicating: <ul style="list-style-type: none"> • Sample set is suspended • Current function is suspended Maximum allowable current = 0.5 A. Maximum allowable voltage = 30 Vdc. Contact resistance = 0.2 ohms.
Inject Start	Contact closure (across terminals 1 and 2) for 1 sec on injection. Maximum allowable current = 0.5A. Maximum allowable voltage = 30 Vdc. Contact resistance = 0.2 ohms.
Ground Terminals	Connected to signal ground and used as reference for outputs

Table A-4 Solvent Management System Specifications—2695 XE Configuration

Item	Specification
Number of Solvents	One to four
Solvent Conditioning	Vacuum degas, two (2) operating modes, four (4) chambers, ≈<500 uL internal volume per chamber
Programmable Flow Rate Range	0.000 and 0.010 to 10.000 mL/min in 0.001-mL/min. increments
Typical Operating Flow Rate Range	0.050 to 5.000 mL/min in 0.001-mL/min increments
Compressibility Compensation	Automatic and continuous

Table A-4 Solvent Management System Specifications–2695 XE
Configuration (Continued)

Item	Specification
Effective System Delay Volume	<650 μ L, independent of backpressure @ 1 mL/min
Plunger Seal Wash	Integral, active, programmable
Gradient Profiles	Eleven (11) gradient curves [including linear, step (2 curves), concave (4 curves), and convex (4 curves)]
Dry Prime/Wet Prime	Automatic, front panel control
Flow Ramping	Time (0.01 to 30.00 min in 0.01-min increments) to reach maximum flow rate
Maximum Operating Pressure	5000 psi (345 bar) (0.010 to 3.000 mL/min) Programmable upper and lower limits. Pressure fall-off at >3.000 mL/min.
Pressure Ripple	\leq 2.5% (1 mL/min, degassed methanol, at 1700 psi backpressure)
Composition Range	0.0 – 100.0 in 0.1% increments
Composition Accuracy	\pm 0.5% absolute, independent of backpressure (Proportioning Valve Pair Test [degassed methanol:methanol/propylparaben, 2 mL/min, 254 nm])
Composition Precision	\leq 0.15% RSD or \leq 0.02 min SD, whichever is greater, based on retention time. (Degassed methanol:water 60:40 Dial-a-Mix, 1 mL/min, six replicates, phenone mix, 254 nm.)
Flow Precision	\leq 0.075% RSD or \leq 0.02 min SD, based on retention time (N = 6) or volumetric measures (0.200 to 5.000 mL/min), isocratic premix
Flow Accuracy	\pm 1% or 10 μ L/min, whichever is greater, (0.200 to 5.000 mL/min), degassed methanol, at 600 psi backpressure

Table A-5 Sample Management System Specifications

Item	Specification
Number of Sample Vials	120 vials, configured in 5 carousels of 24 vials each
Number of Sample Injections	1 to 99 injections per sample vial

Table A-5 Sample Management System Specifications (Continued)

Item	Specification
Sample Delivery Precision	Typically <0.5% RSD, 5 to 80 μ L. (Degassed methanol:water 60:40 Dial-a-Mix, 1 mL/min, six replicates, phenone mix, 254 nm.)
Injector Needle Wash	Integral, active, programmable
Sample Carryover	<0.1% UV detection (254 nm) or 20 mL, whichever is greater
Injection Accuracy	± 1 μ L ($\pm 2\%$), 50 μ L, N = 6. Sample is degassed water, analytical solvent is degassed methanol.
Standard Sample Vial	2 mL
Sample Temperature Control (Optional)	4 to 40 $^{\circ}$ C, programmable in 1 $^{\circ}$ C increments
Advanced Operations	Stat runs, auto additions, auto standards
Injection Volume Range	0.1 to 100 μ L, standard; 0.1 to 2000 μ L, with optional sample loop
Injector Linearity	>0.999 coefficient of deviation (1 to 100 μ L)

Table A-6 Instrument Control and Communication Specifications

Item	Specification
Column Heater (Optional)	20 $^{\circ}$ C (5 $^{\circ}$ C above ambient) to 60 $^{\circ}$ C, in 1 $^{\circ}$ C increments
Column Selector Valves (Optional)	2- column (2 position, 6-port) 2- column with regeneration (2- position, 2- port) 3- column 6-column
IEEE-488 Interface	Control of Waters IEEE-488 equipped detectors; communication with Millennium [®] Chromatography Manager workstations or Micromass [®] detectors using MassLynx [™] software
RS-232 Interface (Ports A and B)	Output of ASCII text files to a printer/PC/integrator (Port A) Bidirectional ASCII communications with data systems (Port B)
BCD Output (optional)	At injection, sends vial position to an external LIMS

Table A-6 Instrument Control and Communication Specifications (*Continued*)

Item	Specification
Bar Code Reader (optional)	Sends vial data to a configured printer, integrator, or diskette with other 2695 Per-inject data. If the 2695 Separations Module is controlled by Millennium ³² software, vial data appears in a special bar code custom field.
Floppy Disk Drive	1.44 MB, 3.5-inch disk, for methods transfer and archiving; reportable GLP log

