

Příloha č. 2a

Technická specifikace předmětu plnění

Název veřejné zakázky	InoMed – Hmotnostní spektrometr typu trojitého kvadrupólu ve spojení s vysokoučinnou kapalinovou chromatografií
Zadavatel	Univerzita Karlova, Ovocný trh 560/5, 116 36 Praha 1 Jednající součást: Farmaceutická fakulta v Hradci Králové, Akademika Heyrovského 1203/8, 500 05 Hradec Králové IČ: 00216208, DIČ: CZ00216208
Druh řízení	Otevřené řízení veřejné zakázky na dodávky v nadlimitním režimu

Tabulka č. 1 – Technické parametry vybavení

Požadavek na funkcionalitu
1) Hmotnostní spektrometr:
Hmotnostní spektrometr typu trojitého kvadrupólu
Musí umožňovat připojení ke stávajícímu vysokoúčinnému kapalinovému chromatografu po jeho doplnění o nezbytné součásti (viz. bod 2) a být následně ovládán jediným softwarem
Rozsah hmot minimálně 10 – 2000 m/z
Lineární dynamický rozsah minimálně 6 řádů
Rychlost skenování kvadrupólů minimálně 30.000 amu/s
Pozorovací čas (dwell time) nižší než 1 ms
Přepínání polarity (polarity switching) nižší nebo rovno 5 ms
Rychlost MRM přechodů minimálně 550 kanálů/s
Vysoká citlivost v pozitivním i negativním modu ionizace: Při nástřiku 1 pg látky typicky používané k určení citlivosti hmotnostního spektrometru (např. reserpin, chloramfenikol) je poměr signálu k šumu minimálně 250.000:1
Zdroj ionizace: ESI sonda (s možností výměny za APCI sondu)
Možnost čištění vstupu do iontového zdroje bez přerušení vakua
Detektor na principu fotonásobiče uložený mimo osu
Vakuové čerpadlo s boxem pro snížení hluku
Generátor dusíku pro zajištění stálé dodávky dusíku dle parametrů přístroje
Dostupné režimy měření: Sken produktových iontů, sken prekurzorových iontů, sken neutrálních ztrát, multiple reaction monitoring, Q1 sken a Q3 sken
2) Vysokoúčinný kapalinový chromatograf
Doplnění stávající HPLC sestavy, která v současnosti obsahuje autosampler Shimadzu SIL-20AC, jedno čerpadlo mobilní fáze Shimadzu LC-20AD a UV detektor Shimadzu SPD-20A, o:
Druhé čerpadlo mobilní fáze se stejnými parametry – tlakový limit minimálně 40 MPa, rozsah průtoku minimálně 0,0001 – 10 ml/min, operační teplota minimálně 5 – 35 °C, pro izokratické i gradientové použití
Kontrolní jednotku umožňující propojení celého systému
3-kanálový vakuový degasser
Automatický oplach pístů stávající i nové pumpy

Kontakt: SHIMADZU Handels GmbH - organizační složka, Ocelářská 35/1354, 190 00 Praha 9, www.shimadzu.cz
 Tel.: +420 284 080 221, Fax: +420 284 080 225, cz@shimadzu.eu.com
 Bankovní spojení: UniCredit Bank Czech Republic a.s. č.ú. 4908901812700
 SWIFT code: BACX CZPP, IBAN: CZ462700000000000049089018
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Směšovač mobilních fází pro vysokotlaký binární gradient
Kolonový termostat s možností ohřevu i chlazení minimálně pro 6 kolon o délce minimálně 200 mm, vybaven čidlem úniku mobilní fáze
Modul pro umístění mobilních fází
Upgrade stávajícího autosampleru na pracovní tlak do 35 MPa
3) Ovládací počítač s monitorem
procesor: CPU o výkonu min. 10500 bodů v programu Passmark CPU Mark
pevný disk: dva HDD, každý o velikosti min. 1 TB s rozhraním SATA 3, podpora RAID1
operační paměť: min. 16384 MB ve dvou modulech, DDR4, min. 2133 MHz
grafická karta: výstup na 2 monitory
dvě síťové karty 10/100/1000, jedna integrovaná na základní desce
operační systém: Microsoft Windows Professional 10, 64bit OEM, předinstalovaný na HDD (požadováno z důvodu zajištění kompatibility se stávajícím přístrojovým vybavením zadavatele)
počet interních pozic pro HDD: min. 2x
počet PCIe x16 slotů: min. 1x v. 3.0
počet PCIe x8 slotů: min. 1x v. 3.0
další: optická mechanika, myš, klávesnice. Vstupně výstupní porty: Min. 6x USB 3.1, min. 2x digitální video výstup (DP nebo HDMI)
monitor s velikostí úhlopříčky min. 23,5", rozlišení min. 1920x1080, technologie IPS
4) Software
Jediný společný software musí ovládat jak hmotnostní spektrometr, tak stávající HPLC (po jeho doplnění o nezbytné součásti)
Možnost kvantifikace s využitím metod vnějšího a vnitřního standardu
Možnost určení parametru poměru signálu k šumu
Minimálně 1 akviziční licence a 1 vyhodnocovací licence

Požadavek na kompatibilitu - Specifikace současného vybavení

Čerpadlo mobilní fáze Shimadzu LC-20AD

Metoda čerpání rozpouštědla: Dvojitý paralelní píst

Kapacita pístu: 10 µl

Maximální plnicí tlak: 40 MPa

Rozmezí nastavení průtoku: 0,0001 až 10,0000 ml/min

Přesnost průtoku (accuracy): Ne více než 1% nebo 0,5 µl/min, kterýkoliv je větší (0,01 až 2 ml/min)

Přesnost průtoku (precision): Ne více než 0,06% RSD nebo 0,02 min SD, kterýkoliv je větší

Pulzace: 0,1 MPa (pro vodu při 1,0 ml/min a 7 MPa)

Čerpání rozpouštědla za konstantního tlaku: Podporováno

Mechanismus oplachu pístů: Manuální oplach nebo automatický oplach za použití volitelného produktu

Bezpečnostní opatření: Senzor úniku kapaliny, limity vysokého/nízkého tlaku

Rozsah pracovních teplot: 4 °C až 35 °C

Rozměry, hmotnost: 260 (šířka) x 140 (výška) x 420 (hloubka) mm, 10 kg

Požadavky na zdroj proudu: 100 VAC, 150 VA, 50/60 Hz

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Typ gradientu: Mísení za nízkého tlaku
Počet míchaných rozpouštědel: Maximálně 4

Autosampler Shimadzu SIL-20AC

Metoda nástřiku: Vstříknutí celého objemu vzorku, nastavitelný objem nástřiku
Rozsah objemu nástřiku: 0.1 až 100 µl (standard), 1 až 2,000 µl (volba)
Počet zpracovávaných vzorků: 175 (1 ml vialek), 70 (1,5 ml vialek), 50 (4 ml vialek), dva 96-jamkové MTPs, dva 384-jamkové MTPs, deset 1,5 ml vialek navíc k předchozímu
Přesnost objemu nástřiku (accuracy): 1% maximálně
Přesnost objemu nástřiku (precision): RSD: 0,3% max. (pro 10 µl nástřiku, za definovaných podmínek)
Zkřížená kontaminace: 0,005% max. (naftalen, chlorhexidin)
Počet opakování nástřiku: 30 max. pro vzorek
Oplach jehly: Nastaven volně před a po nástřiku vzorku
Chlazení vzorku: Blokové chlazení/zahřívání, použito společně s funkcí na odstranění vzdušné vlhkosti, 4 °C až 40 °C
Rozsah provozních hodnot pH: pH1 až pH14
Rozsah pracovních teplot: 4 °C až 35 °C
Rozměry, hmotnost: 260 (šířka) x 415 (výška) x 500 (hloubka), 30 kg
Požadavky na zdroj proudu: 100 VAC, 300 VA, 50/60 Hz

UV detektor Shimadzu SPD-20A

Zdroj světla: Deuteriová (D2) lampa
Počet diodových elementů: Žádný
Rozsah vlnových délek: 190 až 700 nm
Šířka pásma, šířka štěrbiny: 8 nm
Přesnost vlnové délky (accuracy): 1 nm max.
Přesnost vlnové délky (precision): 0,1 nm max.
Hlučnost: 0,5 x 10⁻⁵ AU (za definovaných podmínek)
Posun: 1 x 10⁻⁴ AU/h (za definovaných podmínek)
Linearita: 2,5 AU (ASTM standard)
Funkce: Duální detekce vlnové délky v rozmezí 190 až 370 nm a nad 371, poměrný výstup chromatogramu, skenování vlnové délky
Cela: Optická vlnová délka: 10 mm, kapacita: 12 µl, snese tlak 12 MPa
Rozsah kontroly teploty cely: 5 °C nad laboratorní teplotu do 50 °C
Kontrola sítě: Nastavení parametru, řízení protokolu, monitorování výstupu detektoru, řízení spotřebních částí, atd.
Paměť zásobníku: Stejná jako CBM-20A/Alite
Rozsah operačních teplot: 4 °C až 35 °C
Rozměry, hmotnost: 260 (šířka) x 140 (výška) x 420 (hloubka) mm, 13 kg
Požadavky na zdroj proudu: 100 VAC, 160 VA, 50/60 Hz

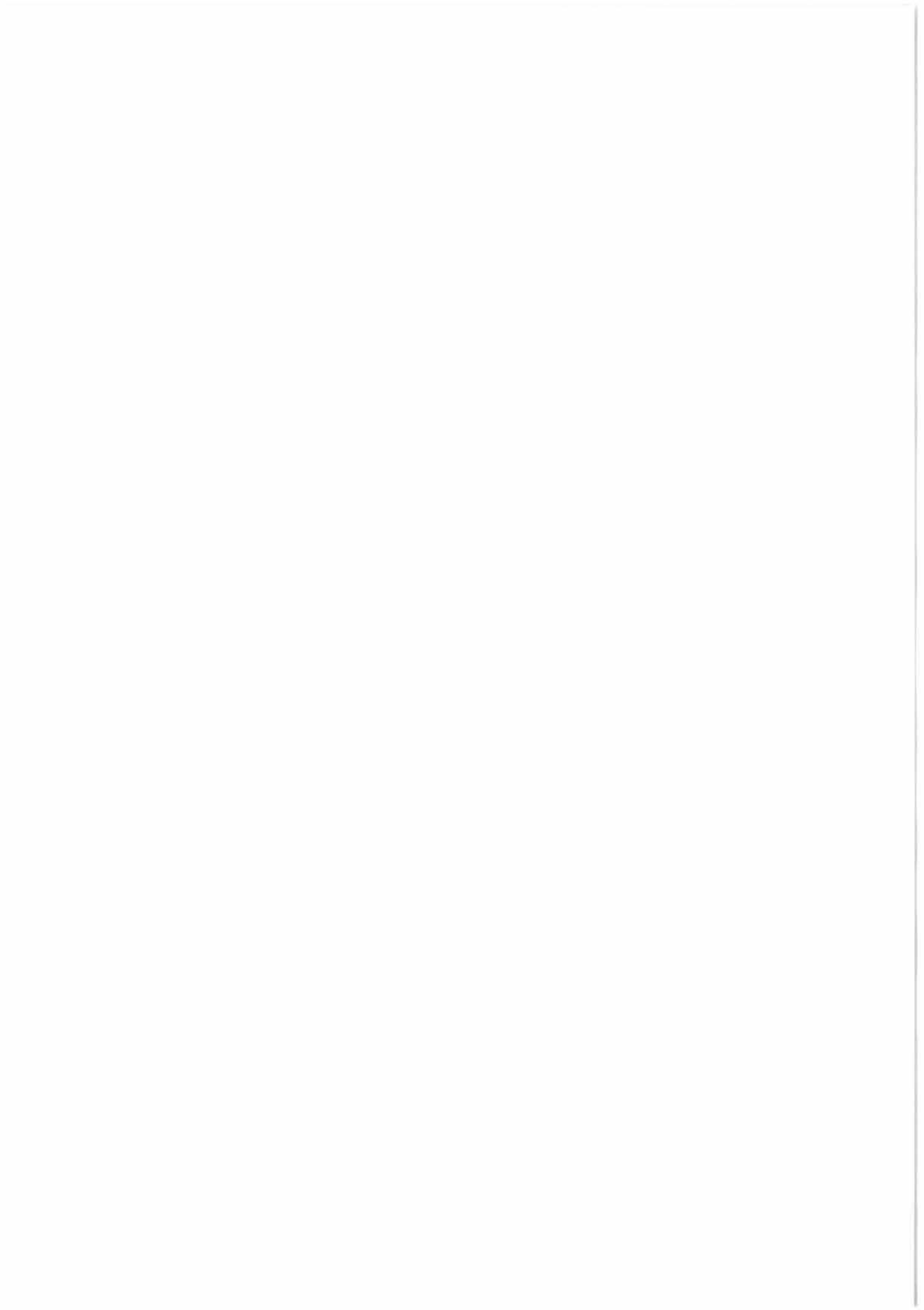
Jménem dodavatele prohlašuji, že splňujeme všechny požadované parametry této VZ a to včetně softwarové a hardwarové kompatibility s již instalovanými přístroji.

Toto je patrné z příložených technických specifikací nabízené sestavy.

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Stejně prohlašuji, že nabízené PC splňuje požadované parametry

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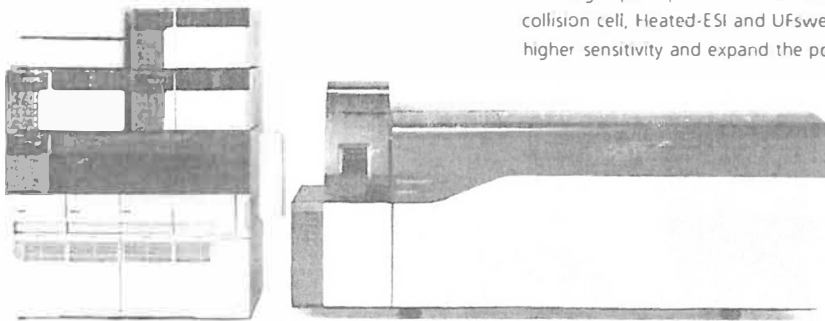




Specification Sheet

LCMS-8050

Triple Quadrupole Mass Spectrometry is the method of choice for definitive identification and reproducible quantification of trace-level analytes in complex samples for a variety of applications including clinical research, forensic toxicology, pharmacokinetics, environmental analysis, and food and beverage testing. Combined with the chromatographic resolving power of our world-leading UHPLC systems, and maintaining Shimadzu's proprietary ultrafast technologies (UF Technologies), which include high-speed MRM transitions, MS/MS acquisition, and ultra-high speed polarity switching, the LCMS-8050 can dramatically improve analytical throughput with ultra-high-speed performance. In addition, the newly designed ion source and collision cell, Heated-ESI and UFSweeper III collision cell technology, yield higher sensitivity and expand the potential range of LC/MS/MS applications.



Instrument

Model	LCMS-8050
Mass range	m/z 2 to 2,000
Sensitivity	ESI positive: 1 pg reserpine, S/N > 250,000:1 (RMS) ESI negative: 1 pg chloramphenicol, S/N > 250,000:1 (RMS)
Resolution	$R < 0.7 \mu$ FWHM
Mass stability	0.1 μ / 24 hr
Mass accuracy	$\pm 0.15 \mu$ or less (m/z 1,000)
Cross-talk	< 0.003 %
Minimum pause time	1 msec
Minimum dwell time	0.8 msec
Scan speed	Max 30,000 u/sec (in all modes of scanning) (0.1 μ step: 300,000 data points/sec)
Polarity switching time	5 msec
Interface	ESI (Standard), APCI (Optional), DUIS (Optional)
Applicable LC flow rate	ESI 1 μ L/min to 2 mL/min
MRM transition speed	Max 555 channels/sec
ESI desolvation temperature	More than 650 °C
APCI desolvation temperature	More than 500 °C

Analysis mode	Q1 Scan/SIM Q3 Scan/SIM MRM Precursor ion scan Product ion scan Neutral loss scan
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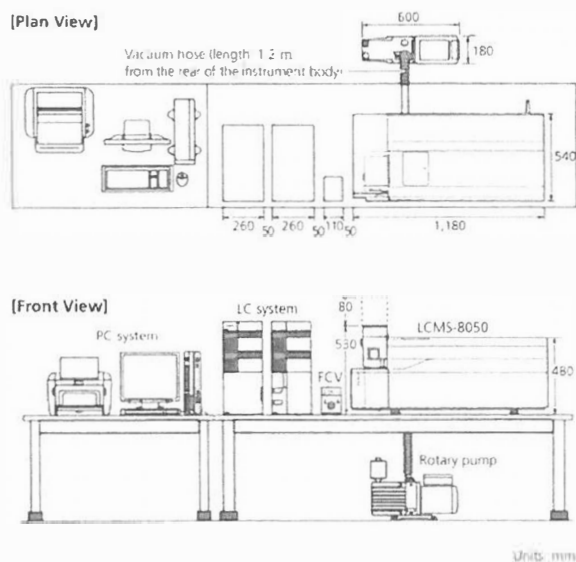
Mass Analyzers and Detector

Mass analyzers	Q1 & Q3 are molybdenum hyperbolic mass filters with pre-rods, Q1 includes post-rods
Collision cell	Tapered multipole type ultra-high-speed collision cell (UFSweeper III collision cell)
Detector	Secondary electron multiplier with off-axis conversion dynode
Ion optics	Q-ray/focus optics operating in Field-Flow mode, multipole transfer optics
Digital detection system	Operates in pulse counting mode for fastest operation
Detection mode	Ultra-fast positive/negative ion switching
Dynamic range (pulse counting)	2×10^8 cps
Vacuum system	Rotary pump: 1 unit Vacuum pumping speed: 28 m ³ /hr Triple-inlet turbo molecular pump: 1 unit 40 L/sec, 260 L/sec, 210 L/sec

Software

Workstation	LabSolutions LCMS
Instrument control	Prominence and Nexera series
MS acquisition mode	Scan (Max. 1,000 events), SIM (Max. 1,000 events × 32 channels)
MS/MS acquisition mode	MRM (Max. 1,000 events × 32 channels) Product ion scan Precursor ion scan Neutral loss scan
Auto-tuning	Possible to optimize sensitivity, resolution, and mass calibration in both positive and negative ionization mode

Installation Example



Installation Conditions

Temperature	18 to 28 °C
Humidity	20 to 70 % (Non-condensing)
Size	1,180 mm (W) × 540 mm (D) × 610 mm (H)
Weight	140 kg
Power supply	MS unit: AC 230 V 15 A (50/60 Hz) Single-phase
Gas requirements	Nitrogen gas Maximum 24.4 L/min, Purity greater than 97 % Argon Purity greater than 99.99% as CID gas Dry air Maximum 20 L/min, oil/water-free Total nitrogen plus air 25L/min maximum

The above are not standard installation specification. All LCMS-8050 instruments will be installed and tested in accordance with standard performance tests as detailed in the Shimadzu document ZEAH-0467, Shimadzu High-Performance Liquid Chromatograph Mass Spectrometer LCMS-8050 Installation Standard.



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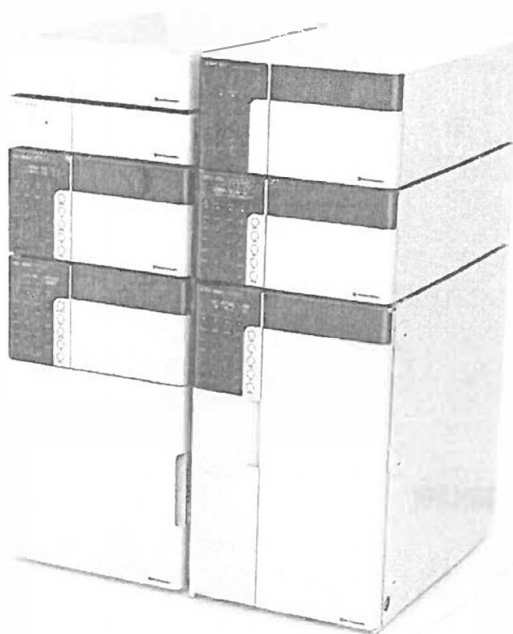
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High-Performance Liquid Chromatograph

Prominence Specifications



Specifications

Solvent Delivery Units LC-20AD / 20AT / 20AB



	LC-20AD (228 45000 XX)	LC 20AT (228 45001 XX)	LC 20AB (228 45002 XX)
Solvent delivery method	Parallel-type double plunger	Serial-type double plunger	Parallel-type double plunger (2 sets)
Plunger capacity	10 µL	Primary side: 47 µL Secondary side: 25 µL	10 µL
Maximum discharge pressure	40 MPa		
Flow rate setting range	0.0001 to 10,000 mL/min	0.001 to 10,000 mL/min	0.0001 to 10,000 mL/min
Flow rate accuracy	No more than ±1% or ±2 µL/min, whichever is greater (0.01 to 2 mL/min)	No more than ±2% or ±2 µL/min, whichever is greater (0.01 to 5 mL/min)	No more than ±1% or ±2 µL/min, whichever is greater (0.01 to 2 mL/min)
Flow rate precision	No more than 0.05% RSD or 0.02 min SD, whichever is greater		
Gradient type	High-pressure mixing / low-pressure mixing		High-pressure mixing
Mixing-concentration precision	0.1% RSD max		
Constant-pressure solvent delivery	Supported		Not supported
Plunger rinsing mechanism	Manual rinsing or automatic rinsing (using optional product)		
Safety measures	Liquid leakage sensor, high-pressure / low-pressure limits		
Operating temperature range	4 to 35°C		
Dimensions, weight	W260 × D420 × H140 mm, 10 kg	W260 × D420 × H140 mm, 11 kg	W260 × D420 × H140 mm, 13 kg
Power requirements	AC 110 V, 230 V, 150 VA, 50/60 Hz		

Inert Solvent Delivery Unit LC-20Ai



	LC 20Ai (228 45293 XX)
Solvent delivery method	Serial-type double plunger
Plunger capacity	Primary side: 4 µL Secondary side: 24 µL
Maximum discharge pressure	Water: 30 MPa (0.001 to 5,000 mL/min), 22 MPa (5,001 to 10,000 mL/min) Organic solvent: 22 MPa (0.001 to 10,000 mL/min)
Flow rate setting range	0.001 to 10,000 mL/min
Flow rate accuracy	No more than ±2% or ±2 µL/min, whichever is greater (0.1 to 5 mL/min / 0.1 to 20 MPa, Water)
Flow rate precision	No more than 0.06% RSD or 0.02 min SD, whichever is greater
Gradient type	High-pressure mixing
Constant-pressure solvent delivery	Supported
Plunger rinsing mechanism	Manual rinsing or automatic rinsing (using optional product)
Safety measures	Liquid leakage sensor, high-pressure limits, shield plate
Operating temperature range	4 to 35°C
Dimensions, weight	W260 × D420 × H140 mm, 11 kg
Power requirements	AC 100 V, 150 VA, 50/60 Hz

Preparative Solvent Delivery Units LC-20AR / 20AP



LC 20AR



LC 20AP

	LC 20AR (228 45275 XX)	LC 20AP (228 45150 4X)
Solvent delivery method	Parallel-type double plunger	
Plunger capacity	47 µL	250 µL
Maximum discharge pressure	40 MPa	12 MPa
Flow rate setting range	0.001 to 20,000 mL/min	0.01 to 100,00 mL/min (to 42 MPa) 100.01 to 150.05 mL/min (to 30 MPa) 0.01 to 50,000 mL/min (low-gradient unit)
Flow rate accuracy	No more than ±1% or ±10 µL, whichever is greater (0.1 to 5 mL/min)	±1% of higher: 10 MPa
Flow rate precision	No more than 0.1% RSD or 0.02 min SD, whichever is greater	No more than 0.1% RSD or 0.02 min SD, whichever is greater
Gradient type	High-pressure mixing	High-pressure mixing / low-pressure mixing
Constant-pressure solvent delivery	Supported	
Plunger rinsing mechanism	Manual rinsing or rinsing pump (228 35675 4X)	
Safety measures	Liquid leakage sensor, high-pressure / low-pressure limits	
Operating temperature range	4 to 35°C	
Dimensions, weight	W260 × D500 × H140 mm, 16 kg	W260 × D500 × H210 mm, 19 kg
Power requirements	AC 110 V, 230 V, 150 VA, 50/60 Hz	AC 110 V, 230 V, 400 VA, 50/60 Hz

Degassing Units DGU-20A3R / 20A5R

	DGU-20A3R (228-45018-XX)	DGU-20A5R (228-45019-XX)
Number of degassed solvents	3	5
Degassed flow-line capacity	400 µl	
Operating temperature range	4 to 35°C	
Dimensions, weight	W260 × D421 × H72 mm, 3.9 kg	W260 × D421 × H72 mm, 4 kg
Power requirements	Supplied from LC-204D / 210AT / 20AB / 20AR / 20A#	

Versatile Autosamplers SIL-10AF / 10AP Bio-inert Autosampler SIL-10Ai

	SIL-10AF (228-45056-XX)	SIL-10AP (228-45057-XX)	SIL-10Ai (228-45075-XX)
Injection method	Loop injection, variable injection volume		
Injection volume setting range	1 to 50 µl (standard) 1 to 400 µl (option) 1 to 2,000 µl (option) 1 to 5,000 µl (option)	1 to 5,000 µl (standard) 1 to 400 µl (option) 1 to 2,000 µl (option)	1 to 50 µl (standard) 1 to 250 µl (option)
Number of samples processed	100 with 1.5 mL vials (60 with optional cooler); 25 with 13 mL vials (not applicable to SIL-10Ai); 192 with two 96-well microtiter plates		
Injection volume accuracy	Not specified		
Injection volume precision	RSD: 0.5% max. (10 µl injection, standard mode)	RSD: 1% max. (10 µl injection)	RSD: 0.5% max. (10 µl injection, standard mode)
Sample carryover	Not specified		
Number of repeated injections	30 max. per sample		
Needle rinsing	Set freely before and after sample injection		
Sample cooler	Optional Sample Cooler S (228-45063-XX) or L (228-45064-XX); Bio-heat exchanger method, 4 to 10°C		
Operating pH range	pH 1 to pH 10		
Operating temperature range	4 to 35°C		
Dimensions, weight	Main unit: W260 × D420 × H280 mm, 19 kg	Syringe unit: W100 × D150 × H280 mm, 4 kg	
Power requirements	AC 110 V, 230 V, 100 VA, 50/60 Hz		

* SIL-10AF / 10AP / 10Ai can not control from CEM 20A4#

Autosamplers SIL-20A / 20AC / 20AHT / 20AHT

	SIL-20A (228-45006-XX)	SIL-20AHT (228-45119-XX)	SIL-20AC (228-45007-XX)	SIL-20AHT (228-45120-XX)
Injection method	Total volume sample injection, variable injection volume			
Maximum operating pressure	20 MPa	35 MPa	20 MPa	35 MPa
Injection volume setting range	0.1 to 100 µl (standard); 0.1 to 2,000 µl (option)			
Number of processed samples	175 (11 mL vials), 105 (1.5 mL vials), 50 (0.1 mL vials) 192 (two 96-well MTP/DWPs), 768 (two 384-well MTP/DWPs) Also, ten 1.5 mL vials in addition to each of the above	175 (11 mL vials), 105 (1.5 mL vials), 50 (0.1 mL vials) 192 (two 96-well MTP/DWPs), 768 (two 384-well MTP/DWPs) Also, ten 1.5 mL vials in addition to each of the above	175 (11 mL vials), 105 (1.5 mL vials), 50 (0.1 mL vials) 192 (two 96-well MTP/DWPs), 768 (two 384-well MTP/DWPs) Also, ten 1.5 mL vials in addition to each of the above	175 (11 mL vials), 105 (1.5 mL vials), 50 (0.1 mL vials) 192 (two 96-well MTP/DWPs), 768 (two 384-well MTP/DWPs) Also, ten 1.5 mL vials in addition to each of the above
Injection volume accuracy	1% max. (specified conditions)			
Injection volume precision	RSD: 0.3% max. (specified conditions), typically 0.2% RSD (max)			
Sample Carryover	0.005% max. (specified conditions), typically 0.0025% (max)			
Number of repeated injections	30 max. per sample			
Needle rinsing	Set freely before and after sample injection			
Sample cooler	None	60W cooling/heating unit together with refrigerating function, 4 to 30°C		
Operating pH range	pH 1 to pH 14			
Operating temperature range	4 to 35°C			
Dimensions, weight	W260 × D500 × H415 mm, 27 kg	W260 × D500 × H415 mm, 30 kg		
Power requirements	AC 110 V, 230 V, 100 VA, 50/60 Hz		AC 110 V, 230 V, 300 VA, 50/60 Hz	

* Prominence UFLC system uses SIL-20AHT UFLC version (228-45132-XX) or SIL-20AHT UFLC version (228-45133-XX), which has outlet piping optimized for UFLC (in standard SIL-20A or SIL-20AC)

Rack Changer II



Rack Changer II (228 45164 XX)	
Compatible plates	96-well MTP, 96-well DWP, 384-well MTP, 384-well DWP, 1.5 ml. vial plate (54 vial)
Number of processed plates	12
Sample cooler	Block cooling/heating (uses water) with dehumidifying function 4 to 40°C
Chelating temperature range	4 to 35°C
Dimensions, weight	W475 x D500 x H415 mm, 32 kg
Power requirements	AC 110 V, 230 V, 250 VA, 50/60 Hz

System Controllers CBM-20A / 20ALite



CBM 20A

	CBM-20A (228 45012 XX)	CBM 20ALite (228 45011 3B)
Connectable units	Solvent delivery units: 4 max. Autosamplers: 1, Column oven: 1, Detectors: 2 max., Fraction collector: 1, Sub-controllers: 2 max.	Solvent delivery units: 4 max., Autosamplers (50, 100, 110, 200 µl): 1, Column oven: 1, Detectors: 2 max.
Number of connectable units	8 (expansion possible up to 12)	5 (including the unit incorporating the system controller)
Data buffering	Approx. 24 hours for one analysis (at 500 ms sampling rate, available only with 1 C solution)	
Event I/O	4 inputs, 4 outputs	2 inputs, 2 outputs
Analog boards	Up to 2 boards can be mounted	Mounting not supported
Operating temperature range		4 to 35°C
Dimensions, weight	W260 x D420 x H140 mm, 5.5 kg	W260 x D400 x H200 mm, 0.5 kg
Power requirements	AC 110 V, 230 V, 100 VA, 50/60 Hz	Supplied from unit

Column Oven CTO-30A



CTO 30A (228 45160 XX)	
Type	Block heating system
Temperature setting range	4 to 150°C in 1°C steps
Temperature control precision	± 0.05°C (room temperature to 25°C)
Temperature control range	5°C above room temperature to 150°C
Column size and capacity	150 mm i.d. x 4.6 mm i.d., 200 mm x 2
Drains: 3/4 inch can be accommodated	Gradient mixer, High Pressure Flow Switching (HPFS), Post Column Cooler, etc.
Functions	Linear temperature programs supported
Safety measures	Solvent sensor, liquid leakage sensor, temperature fuse, temperature upper limit
Operating temperature range	4 to 35°C
Dimensions, weight	W260 x D550 x H270 mm, 10 kg
Power requirements	AC 110 V, 230 V, 300 VA, 50/60 Hz

Column Ovens CTO 20A / 20AC



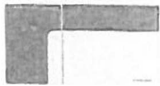
	CTO 20A (228 45009 XX)	CTO 20AC (228 45010 XX)
Temperature control method	Conduction (circulation)	Electronic cooling
Cooling method	Water	Electronic cooling
Temperature setting range		4 to 85°C
Temperature control precision	0.1°C (max. resolution), 0.04°C (max.)	
Temperature control range	10°C (at room temperature) to 85°C	10°C below room temperature to 85°C
Storage capacity		W220 x D95 x H365 mm
Storage devices	2 manual injectors, gradient mixer, 2 high-pressure flow rate selector valves, etc.	
Time program	Linear temperature programs supported	
Safety measures	Solvent sensor, temperature fuse, temperature upper limit	
Operating temperature range		4 to 35°C
Dimensions, weight	W210 x D420 x H415 mm, 20 kg	W260 x D420 x H415 mm, 23 kg
Power requirements		AC 110 V, 230 V, 600 VA, 50/60 Hz

Column Oven CTO-10ASvP



	CTO-10ASvP (228 45059 XX)
Type	Block heating
Cooling method	Electro-thermoelectric cooling
Temperature setting range	4 to 80°C
Temperature control precision	±0.1°C
Temperature control range	-15 to 60°C (room temperature)
Applicable columns	25 cm (2 columns max.)
Function	Change of temperature setting
Safety features	Leak sensor, temperature fuse, temperature upper limit
Dimensions, weight	W130 × D420 × H415 mm, 12 kg
Power requirements	AC 110 V, 230 V, 120 VA, 50/60 Hz

Photodiode Array Detector SPD-M30A



	SPD-M30A (226 45196 XX)
Light source	Deuterium (D ₂) lamp
Number of diode elements	1024
Wavelength range	190 to 700 nm
Slit width	1 mm, 8 μm
Wavelength accuracy	± 1 nm
Noise	0.4 × 10 ⁻¹¹ AU (under specified conditions)
Drift	0.5 × 10 ⁻¹¹ AU/h (under specified conditions)
Linearity	2.0 AU (ASTM standard)
Cell	Standard cell: Optical path length: 10 mm, Capacity: 1 μl, Pressure: 8 MPa Optional high-sensitivity cell: Optical path length: 85 mm, Capacity: 9 μl, Pressure: 8 MPa
Functions	Contour output, spectrum library, MAX plotting
Safety measures	Liquid-leakage sensor
Operating temperature range	4 to 35°C
Dimensions, weight	W260 × D500 × H440 mm, 12 kg
Power requirements	AC 110 V, 230 V, 150 VA, 50/60 Hz

UV-VIS Detectors SPD-20A / 20AV
Photodiode Array Detector SPD-M20A



SPD-20A



SPD-M20A

	SPD-20A (228 45003 XX)	SPD-20AV (228 45004 XX)	SPD-M20A (228 45005 XX)
Light source	Deuterium (D ₂) lamp	Deuterium (D ₂) lamp, tungsten (W) lamp	Deuterium (D ₂) lamp
Number of diode elements	None	None	512
Wavelength range	190 to 700 nm	190 to 900 nm	190 to 800 nm
Bandwidth, slit width	5 nm		1.2 nm (high-resolution mode), 8 nm (high-sensitivity mode)
Wavelength accuracy		± 1 nm (max)	
Wavelength precision		± 0.1 nm (max)	
Noise	0.6 × 10 ⁻¹¹ AU (under specified conditions)		0.6 × 10 ⁻¹¹ AU (under specified conditions)
Drift	1 × 10 ⁻¹¹ AU/h (under specified conditions)		5 × 10 ⁻¹¹ AU/h (under specified conditions)
Linearity	2.5 AU (ASTM standard)		2.0 AU (ASTM standard)
Function	Optical wavelength detector in the range 190 to 370 nm and specular of 274 nm, ratio (chromatogram) output, wavelength scanning		Contour output, spectrum library, MAX plotting
Cell	Optical wavelength: 10 mm, Capacity: 12 μl, Pressure: 12 MPa		Optical wavelength: 10 mm, Capacity: 10 μl, Pressure: 12 MPa
Cell temperature control range	5°C above room temperature to 50°C		
Web control	Yes	Yes	Parameter setting, log management, change and of consumable parts, etc.
Stability	Refer to the instructions for TBM-20A/20A Lite		Aprox. 20 minutes of drift at the entire wavelength range (only when using LabSolutions)
Operating temperature range		4 to 35°C	
Dimensions, weight	W260 × D420 × H440 mm, 13 kg		W260 × D420 × H440 mm, 12 kg
Power requirements	AC 110 V, 230 V, 150 VA, 50/60 Hz		AC 110 V, 230 V, 150 VA, 50/60 Hz

¹ Prominence UPLC and Prominence UPLC-e system use SPD-20A UPLC version (228 45130-XX) which has a semi-hermetic temperature controlled flow cell installed for optimization of fast analysis. (Standard type temperature-controlled flow cell is optional for SPD-20A UPLC version)

Conductivity Detector CDD-10A_{VF}



	CDD-10A _{VF} (228 45054 XX)
Temperature coefficient	25 µS cm / (°C) (at 25 µS/cm) 265 µS/cm (cell temperature 43°C)
Cell volume	0.25 µL
Cell constant	25 µS/cm
Material used in parts making contact with liquid	PEEK, SUS316
Maximum operating pressure	2.9 MPa (30 kgf/cm ²)
Response	0.05 to 10 sec. 10 steps
Zero adjustment	Autozero, baseline shift
Operating temperature range	4 to 35°C
Dimensions, weight	W260 × D420 × H140 mm, 6.0 kg
Power requirements	AC 110 VA, 230 V, 250 VA, 50/60 Hz

Fluorescence Detectors RF-20A / 20Axs



	RF-20A (228 45147 XX)	RF-20Axs (228 45148 XX)
Light source	Xenon lamp	Xenon lamp, low pressure mercury lamp (10-nm wavelength accuracy)
Wavelength range	0.200 to 650 nm	0.200 to 750 nm
Spectral bandwidth		20 nm
Wavelength accuracy		± 2 nm
Wavelength reproducibility		± 0.2 nm
S/N	Water Raman peak S/N 1200 min	Water Raman peak S/N 2000 min
Cell capacity, pressure resistance, material	12 µL, 2 MPa (approx. 20 kgf/cm ²), SUS316L, PTFE (fluoropolymer), quartz	
Cell temperature input range	—	4 to 40°C, 1°C step
Cell	—	(Room temperature +10°C) to +20°C (2 minute max. flow rate, 85°C max. over temperature)
Functions	Any two wavelengths between 200 and 650 nm	Any two wavelengths between 200 and 750 nm
Safety measures		0.5 s per wavelength
Operational temperature range		< 35°C
Dimension, weight	W260 × D420 × H210 mm, 16 kg	W260 × D420 × H210 mm, 18 kg
Power requirements		AC 110 V, 230 V, 150 VA, 50/60 Hz

Refractive Index Detector RID-20A



	RID-20A (228 45104 XX)
Refractive index range	1 to 1.75 RIU
Noise level	2.5 × 10 ⁻⁶ RIU max
Drift	1 × 10 ⁻⁶ RIU max
Range	A range: 0.01 × 10 ⁻⁶ to 500 × 10 ⁻⁶ RIU; Parallel modes: 1 × 10 ⁻⁶ to 5,000 × 10 ⁻⁶ RIU
Response	0.05 to 10 sec., 10 steps
Priority switching	Supported
Zero adjustment	Auto zero, optical zero, flow zero
Maximum operating flow rate	20 ml/min (150 ml/min with option)
Temperature control of cell and	30 to 60°C
Cell volume	8 µL
Cell burst pressure	2 MPa (cell unit)
Operating temperature range	4 to 35°C
Dimensions, weight	W260 × D420 × H140 mm, 6.2 kg
Power requirements	AC 110 V, 230 V, 150 VA, 50/60 Hz

Evaporative Light Scattering Detector ELSD-LT II



	ELSD-LT II (22B-45115-XX)
Nebulizing method	Siphon Splitting
Light source	LED
Detection	Fraction collector Tube
Temperature setting range	Ambient to 80°C
Nebulizer gas	Nitrogen (N ₂) or Air**
Gas flow rate, gas pressure	Max. 3.0 L/min, Max. 450 kPa
Mobile phase flow rate	0.2 to 2.5 mL/min
Analog output	0 to 1 V
Operating temperature range	5 to 40°C
Operating humidity range	Max. 80% (5 to 31°C, room temperature) Max. 50% (31 to 40°C, room temperature)
Dimensions, weight	W250 × D550 × H450 mm, 20 kg
Power supply	AC 115 V, 230 V, 150 VA, 50/60 Hz

* 1 Requires gas supply source, such as a gas line, nitrogen generator, or air compressor.

** Note

- An optional pressure regulator with filter is required to remove microscopic materials in gas.
- When using a nitrogen generator or an air compressor, please be careful that moisture, oil, dust, etc. should not be contained in nitrogen or air.
- Please use it in the room where exhaust equipment is available.

Fraction Collector FRC-10A



	FRC-10A (22B-45070-XX)
Drive system	Automatic X-ray system
Maximum number of fractions	16 to 143 (depending on the type of rack used)
Collection method	Solenoid valve (fraction collector head with valve) or direct through nozzle (fraction collector head)
Maximum flow rate	150 mL/min
Fraction modes	Basic mode (using initial parameters) and Time Program mode (14 different fractions available)
Cooling function	Possible with Sampler Cooler L (22B-45064-XX)
Ambient temperature range	4 to 35°C
Dimensions, weight	W260 × D420 × H280 mm, 15 kg
Power requirements	AC 110 V, 230 V, 100 VA, 50/60 Hz

Flow-Line Selection Valves FCV Series



	FCV-12AH FCV-12AH2	FCV-20AH FCV-20AH2	FCV-14AH	FCV-13AL FCV-14AH2	FCV-34AH	FCV-20AH2	FCV-13AL	FCV-11AL FCV-14ALS	FCV-15AL	FCV-230AL
Valve type	2-position valve, 6-port			6-position valve, 7-port			4-way solenoid valves			
Solvent pH usage range	1 to 10	1 to 14	1 to 10	1 to 10	1 to 14	1 to 10	2 to 12	1 to 14		
Maximum pressure	34.3 MPa (12AH) 19.6 MPa (12AH2)	130 MPa	34.3 MPa	34.3 MPa (12AH) 19.6 MPa (14AH2)	100 MPa	34.3 MPa				
Dimensions (mm)	W110 × D250 × H110		W110 × D250 × H150	W110 × D250 × H110	W127 × D115 × H110	W110 × D250 × H110	W110 × D250 × H110			
Weight	4.0 kg		5.0 kg	4.0 kg	850 g	5.0 kg	4.0 kg	2.0 kg	4.0 kg	2.7 kg

* 1 An Option Box VP or a Sub-controller VP is required for control of the FCV-12AL (or 13AL/14AH). This does not apply to the FCV-12AH/12AH2 when it is connected to the C.T.O. 28A/29AC. Only FCV-12AH units and a total of two FCV-15AL or FCV-14AH units can be controlled from the SCL-10A.

* 2 When using FCV-11AL/14ALS/15AL units for solvent selection, only one of these units can be controlled from the SCL-10A or a solvent delivery unit. The SCL-10A and Option Box VP or Sub-controller VP is required to use two of these units simultaneously.

Prominence Specifications



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