

Specification

Specifications of LC-Forte/R Series

FUNCTION	SPECIFICATION
LCD touch screen (on main body)	10.4 inch OS : Windows Embedded Standard 2009
Control	LCD touch screen or interlinked PC
Stacking injection	Suctioned by pump
Manual injection	By accompanying injector loop (10 mL as standard)
Manual/Auto mode	Operation for injection, recycle and fraction
Auto-replay	Log-expanding auto separation method
Cleanup	Auto-flushing for flow line, column-flushing
Recycle	By switching of electromagnetic-valve
(MPLC) simplified gradient operation	Low-pressured gradient system
(MPLC) control for gradient rate	By dedicated software (installed as standard)
PC control (* option)	By dedicated software, with LAN connection
Event marking	Any events (start, inject, fraction, etc.)
Timer for pump	Automatically start/stop at the input time
Pressure limiter function	Any setting braking
Display for chromatogram	On LCD or on monitor of interlinked PC
Storage of operation data	7 GB internal memory or flash device or interlinked PC
Port	LAN : 1, USB : 2
Sensor for leaking	Mounted
Storage of detector	In the enclosure (ALL IN ONE)
Column holder	Installed as standard
Dimension	660 (W) x 500 (D) x 430 (H) mm
Power supply	AC100 - 240V
Power consumption	400W
Weight	Approx. 35 kg

Specifications of Detector (selectable)

	YUV-3400	YUR-2540		YRI-8830	YRI-8800
	UV	UV	RI	RI	RI
Wavelength	200-400 nm (3 Variable wavelengths)	254 nm (Fixed wavelength)	-	-	-
Source of light	D2 lamp	Low pressure mercury lamp	LED	LED	LED
Range	0 - 2000 mAU	0 - 2000 mAU	-	-	-
Flow cell	Cell path length : 0.5 mm (standard) 1.0 mm (optional)	Cell path length : 0.5 mm	8 µL	8 µL	8 µL
Measuring Method	Single-beam transmissive-type	Double-beam intercomparison-type	Particular deflection	Particular deflection	Deflection
Temp. control	-	-	N/A	N/A	Available (fixed)
Purge process	-	Automatic	Automatic	Automatic	Automatic

※The standard YUV-3400 is downgradable to other detectors in accordance with the intended purpose. YRI-8800 is compatible only LC-Forte/R.

FUNCTION of PUMPING	SPECIFICATION	
Model	LC-Forte/R	LC-Forte/R100
Maximum flow rate	50.0 mL/min	100 mL/min
Minimum flow rate	0.1 mL/min	0.1 mL/min
Accuracy of flow rate	±2% (over 5 mL/min)	
Device pressure limit	30 MPa	30 MPa (0.1 - 50 mL/min) 20 MPa (50 - 90 mL/min)
Pressure limiting function	Available (lower and upper)	
Pump type	Side-motor double plunger	
Motor for pump drive	AC servomotor	
Wetted parts	SUS-316, Zirconia, PTFE, Ruby, Sapphire	
Value of pressure meter	Monitorable on touch screen	

Specifications of Fraction Collector for LC-Forte/R series Forte/FR (option)

FUNCTION	SPECIFICATION
Fraction	Replay, manual, peak (controlled by interlinked PC)
Number of fraction	Max. 65 fractions (standard rack: 21 fractions)
Rack size	φ18 x 65, φ40 x 21 (standard), φ105 x 6, customizable for other size
Dimension	300 (W) x 500 (D) x 300 (H) mm
Power supply	From system (LC-Forte/R, LC-Forte/R100)
Weight	15 kg

Software for LC-Forte/R Specifications of Forte Separa II (option)

	SPECIFICATION
OS	Windows XP, Windows 7 (32/64bit)
Connection	LAN
Operation	Automatic, manual, replay
Program for analyses	Peak process, comparison of chromatograms, calculation for quantity or GPC (MW), etc.
Data format	cdf, csv, etc.
Event mark	Recycle, fraction, injection

Worldwide Availability

YMC America, Inc.
www.ymcamerica.com

YMC Europe GmbH
www.ymc.de

YMC India Pvt. Ltd.
www.ymcindia.com

YMC Korea Co., Ltd.
www.ymckorea.com

YMC Shanghai Rep. Office
www.ymcchina.com

YMC Singapore Tradelinks Pte. Ltd.
www.ymc.sg

YMC Taiwan Co., Ltd.
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YMC CO., LTD.

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Distributor

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plus

Preparative Chromatography Systems

YMC

Multiple Preparative HPLC
LC-forte/R Series

Accurate, Agile, and Powerful



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PB-0073E

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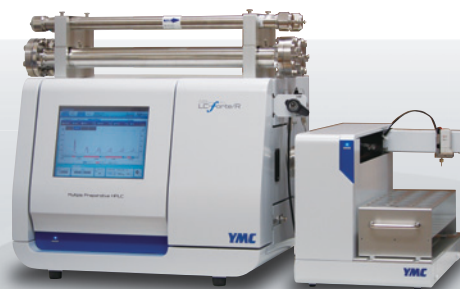
HPLC+MPLC

YES, YMC did it !! *Accurate, Agile, and Powerful*

LC-Forte/R is the world's first preparative device equipped with both recycling and low pressure gradient function. Two models of maximum flow-rate with 50 mL/min and 100 mL/min are available. Any purification from crude through to precise purification is covered by LC-Forte/R.

Features

- Preparative device designed for both high and low pressure chromatography
- Very versatile and applicable to various purification modes
- Providing the resolution corresponding to several coupled columns by one column under recycling mode
- Purification of several grams of target in one day on a lab-scale
- Low cost purification by decreasing of solvent consumption



Very Versatile and Applicable to Various Purification Modes

For Chiral Separation
CHIRAL ART

For Polymers/Oligomers Separation
YMC-GPC

For Achiral Compounds Separation
YMC-Actus Triart

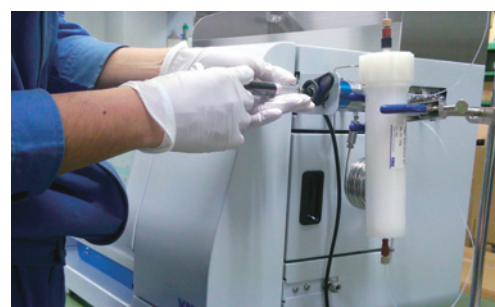
For Pesticide Residues Analysis
GPC clean up

For Flash Chromatography
YMC-DispoPackAT



Gradient Mode

By applying the function of suction injector and high performance gradient valve, LC-Forte/R can be used not only as the recycling system, but also for the gradient elution in both MPLC & HPLC.



Touch Screen Controller

Wide touch screen (10.4 inch) is simple to navigate and control for operation. Chromatograms can be displayed on the screen by the pre-installed software.

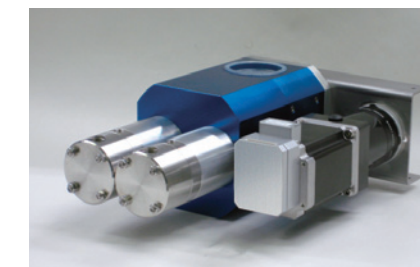


Compact & Sophistication

All functions necessary for preparative chromatography, like recycling, auto injection, auto-replay, automatic flushing, 4 chromatograms simultaneous display and PC control (option) are put into compact body.

Pump

Side-motor typed pump, newly developed by YMC, provides the stability for pumping performance and the durability for high pressure (up to 30 MPa). Therefore, LC-Forte/R is compatible with HPLC prep-size columns.



Injection

Two injectors are included as standard. The manual injector (by syringe) is for small-scale injection. The suction injector is effective for volume injection, especially for continuous injection with accuracy.

Detector *triple wavelengths monitorable (flexible)*

A variable wavelength UV detector (YUV-3400), newly designed and installed to LC-Forte/R, expands the range of choices without regard to the compatibility with column and eluent condition.

The sample is detected reliably in combination with refractive index (RI) detector.

*) YUV-3400 is interchangeable with other detectors like YUR-2540 (fixed-UV + RI), YUR-8800 (RI).



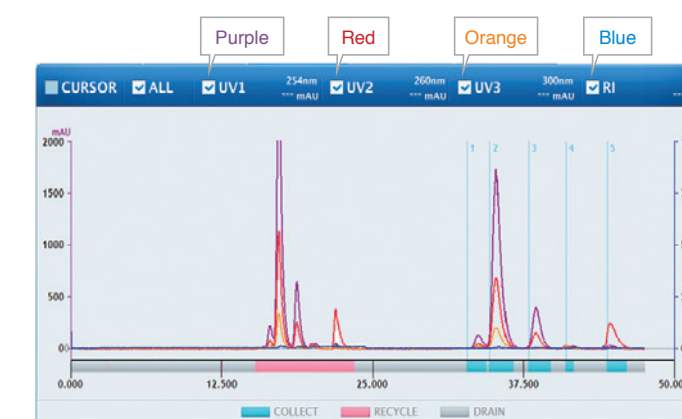
YUV-3400



YUR-2540



YUR-8800



Display of the chromatograms at 3 different wavelengths on UV and RI

Easy Maintenance

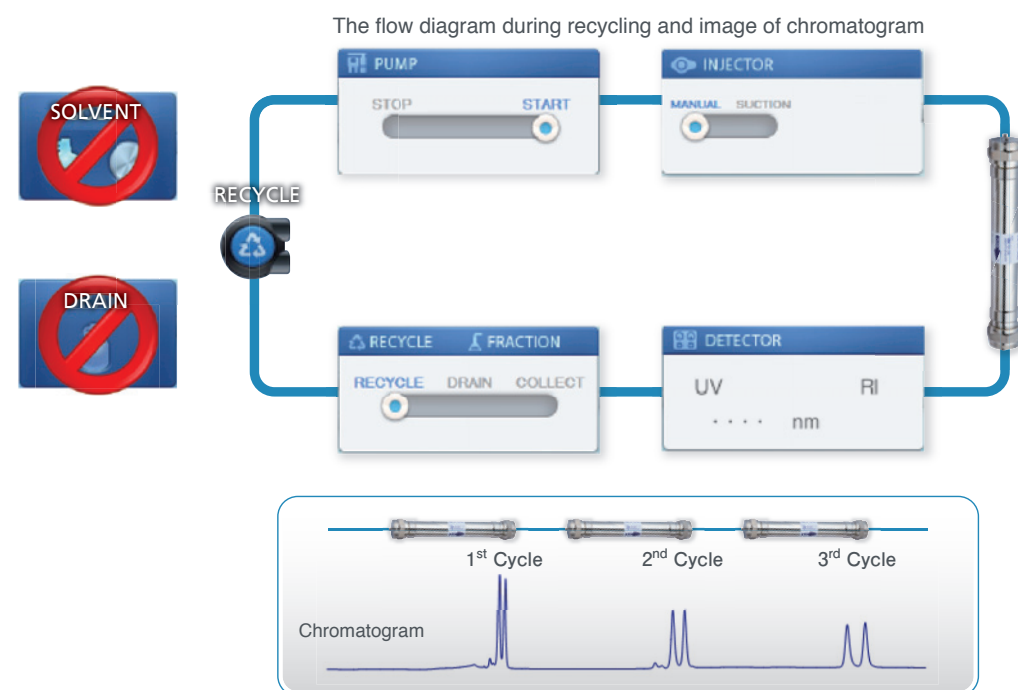
LC-Forte/R is designed for ease of maintenance. All equipments that require regular maintenance like pump and detector can be pulled out anteriorly. Therefore the maintenance work can be done at the front side without moving the system.

PC Control & Software

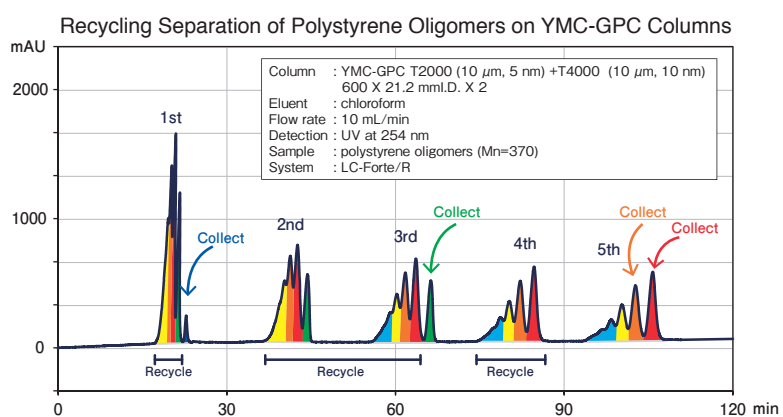
Operation by PC is available as option. Along with the operation via monitor on system, the dedicated program is able not only to control the system, but also to process the chromatogram data and to operate automatical purification.

Recycling Mode as a Standard Feature

LC-Forte/R is equipped with recycling function. Under recycling chromatographic separation, higher resolution can be achieved on a sample that is hardly separated, even without changing mobile phase or columns. The new flow path for the recycling system is adopted in LC-Forte/R, as the result, it is possible to reduce the extra-column diffusion and to achieve the high efficiency preparative separation. Furthermore, no solvent is consumed during recycling. It greatly contributes to reduction of solvent consumption on purification.



Recycling Chromatographic Separation of Polystyrene Oligomers and Features of YMC-GPC Columns



[Comparison of flow rates]

Conventional equivalent product

3.5 mL/min

YMC-GPC inner diameter 21.2 mm

10 mL/min (Max 15 mL/min)

Sample load is not required to change High-Speed Separation

YMC-GPC can be used under about three times faster flow rate without any changes in sample loading, compared to the conventional columns. Therefore it significantly shortens the purification time on recycling separation, which takes long time.

From the low polarity to high polarity Compatible with Various Organic Solvents

YMC-GPC has excellent solvent versatility. Solvent exchange can be conducted easily and rapidly between solvents with various polarity. It is possible to select the optimum mobile phase depending on the solubility and separation behavior of the sample.

[Compatible with Those Solvents Listed Below]

Dimethyl formamide (DMF)	Dichloroethane
Dimethyl sulfoxide (DMSO)	Dichloromethane
<i>n</i> -Methyl pyrrolidone (NMP)	Methyl ethyl ketone (MEK)
Dimethyl acetamide (DMAc)	Chloroform
Pyridine	Tetrahydrofuran (THF)
<i>o</i> -Chlorophenol (<i>o</i> -CP)	Ethyl acetate
<i>m</i> -Cresol	Toluene
Trichlorobenzene (TCB)	Cyclohexane
<i>o</i> -Dichlorobenzene (<i>o</i> -DCB)	Hexane
Acetone	Perfluoroalkane

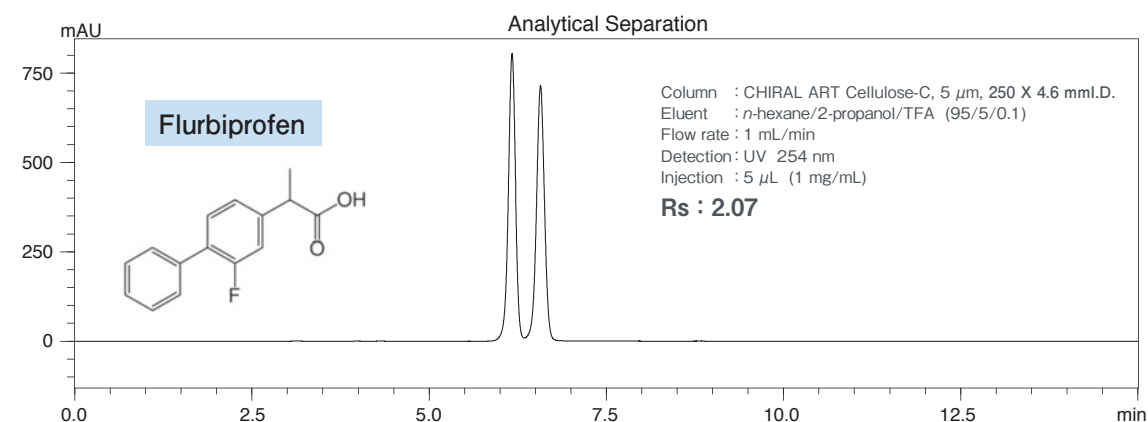
* YMC-GPC is normally supplied in ethylbenzene unless otherwise stated. The exchange procedure to other mobile phases is described in the instruction manual on our website.

Advantage of Recycling Preparative HPLC

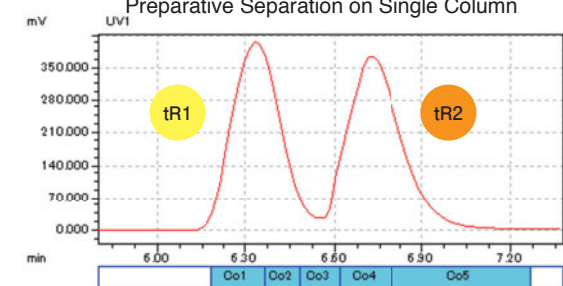
~ Comparison with Single Column and Stacking Injection ~

- About three times higher productivity
- About 90% reduction in solvent consumption
- Achievement of high purity preparative purification, even with small resolution in the analytical conditions

Enantioseparation of Flurbiprofen



Preparative Separation on Single Column

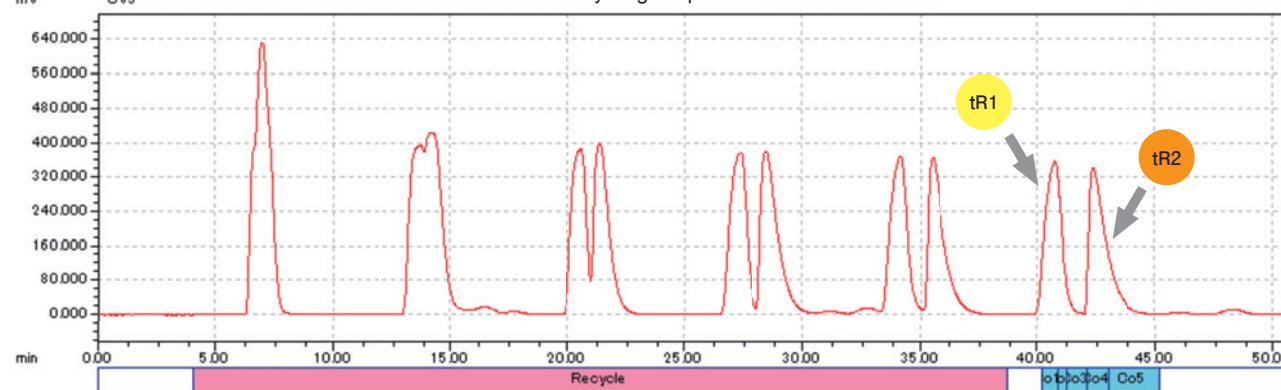


Scale Up to 5 μ m, 250 X 30 mm I.D. Preparative Column

12 mg Loading, based on the loading study

560 mg Loading, estimated from a single column loading

Recycling Preparative HPLC



	Single Column Prep.		Recycling Prep.	
	tR1	tR2	tR1	tR2
Enantiopurity (%ee)	>99	>97	>99	99
Recovery (%)	87	74	89	90
Productivity (mg racemate/hr)	226*		670	
Solvent Consumption (L/g-product)	48		4	

Productivity : about 3 times higher

Solvent Consumption : About 90% reduction

* Productivity of single column preparation is estimated based on the stacking injection of the sample every 2.5 minutes.

Ordering Information

Columns for HPLC

CHIRAL ART (Immobilized type) : HPLC Columns with Polysaccharide Derivatives Chiral Selector

Packing material	Particle size (μm)	Chiral selector	Column size inner diameter X length (mm)	Product number
Amylose-SA	5		10 X 250	KSA99S05-2510WT
			20 X 250	KSA99S05-2520WX
			30 X 250	KSA99S05-2530WX
Cellulose-SB	5		10 X 250	KSB99S05-2510WT
			20 X 250	KSB99S05-2520WX
			30 X 250	KSB99S05-2530WX
Cellulose-SC	5		10 X 250	KSC99S05-2510WT
			20 X 250	KSC99S05-2520WX
			30 X 250	KSC99S05-2530WX

CHIRAL ART (Coated type) : HPLC Columns with Polysaccharide Derivatives Chiral Selector

Packing material	Particle size (μm)	Chiral selector	Column size inner diameter X length (mm)	Product number
Amylose-C	5		10 X 250	KAN99S05-2510WT
			20 X 250	KAN99S05-2520WX
			30 X 250	KAN99S05-2530WX
Cellulose-C	5		10 X 250	KCN99S05-2510WT
			20 X 250	KCN99S05-2520WX
			30 X 250	KCN99S05-2530WX

YMC-Actus Triart : Versatile Hybrid Silica Based HPLC Columns

Packing material	Particle size (μm)	Pore size (nm)	C%	pH range	Features	Column size inner diameter X length (mm)	Product number
Triart C18	5	12	20	1 - 12	<ul style="list-style-type: none"> Highly durable column suitable as a first choice Usable with 100% aqueous mobile phase Superior peak shape 	20 X 150	TA12S05-1520WX
						20 X 250	TA12S05-2520WX
						30 X 150	TA12S05-1530WX
						30 X 250	TA12S05-2530WX
Triart C18 ExRS	5	8	25	1 - 12	<ul style="list-style-type: none"> Alternative selectivity to standard C18 columns Excellent selectivity of isomers and structural analogs Superior chemical durability 	20 X 150	TAR08S05-1520WX
						20 X 250	TAR08S05-2520WX
						30 X 150	TAR08S05-1530WX
						30 X 250	TAR08S05-2530WX
Triart C8	5	12	17	1 - 12	<ul style="list-style-type: none"> Alternative to the more widely-used C18 Effective for fast analysis of compounds with low polarity Ideal for separations of isomers or structural analogs 	20 X 150	TO12S05-1520WX
						20 X 250	TO12S05-2520WX
						30 X 150	TO12S05-1530WX
						30 X 250	TO12S05-2530WX
Triart Phenyl	5	12	17	1 - 10	<ul style="list-style-type: none"> Unique selectivity due to π-π interaction Ideal for separations of aromatic compounds or compounds having long conjugates system 	20 X 150	TPH12S05-1520WX
						20 X 250	TPH12S05-2520WX
						30 X 150	TPH12S05-1530WX
						30 X 250	TPH12S05-2530WX
Triart PFP	5	12	15	1 - 8	<ul style="list-style-type: none"> Alternative selectivity to C18/C8 due to unique polar interaction Superior shape recognition ability/steric selectivity Ideal for separations of polar compounds or isomers 	20 X 150	TPF12S05-1520WX
						20 X 250	TPF12S05-2520WX
						30 X 150	TPF12S05-1530WX
						30 X 250	TPF12S05-2530WX

YMC-Pack : Silica Gel Based Conventional HPLC Columns

Packing material	Particle size (μm)	Pore size (nm)	C%	pH range	Features	Column size inner diameter X length (mm)	Product number
ODS-A	5	12	17	2 - 7.5	<ul style="list-style-type: none"> Standard C18 (ODS) column Abundant use track record around the world 	20 X 150	AA12S05-1520WT
						20 X 250	AA12S05-2520WT
						30 X 150	AA12S05-1530WT
						30 X 250	AA12S05-2530WT
SIL	5	12	-	2 - 7.5	<ul style="list-style-type: none"> Standard normal-phase column High quality spherical porous silica gel 	20 X 150	SL12S05-1520WT
						20 X 250	SL12S05-2520WT
						30 X 150	SL12S05-1530WT
						30 X 250	SL12S05-2530WT
Diol-NP	5	12	-	2 - 7.5	<ul style="list-style-type: none"> Silica gel bonded with dihydroxypropyl groups Different separation characteristics from bare silica gel 	20 X 150	DN12S05-1520WT
						20 X 250	DN12S05-2520WT

Ordering Information

Columns for HPLC

YMC-GPC : Polymer Based Preparative GPC Columns

Product name	Particle size (μm)	Pore size (nm)	Molecular weight rang (g/mol)	Theoretical plate number	Column size inner diameter X length (mm)	Product number
YMC-GPC T2000	10	5	- 2,000	>20,000	21.2 X 600	GP05S10-6020PT
YMC-GPC T2000-40					40 X 600	GP05S10-6040WT
YMC-GPC T4000					21.2 X 600	GP10S10-6020PT
YMC-GPC T4000-40	40 X 600	GP10S10-6040WT				
YMC-GPC T30000	50	- 4,000	21.2 X 600		GP50S10-6020PT	
YMC-GPC T30000-40			40 X 600		GP50S10-6040WT	
YMC-GPC T60000	100	500 - 30,000	21.2 X 600		GPA0S10-6020PT	
YMC-GPC T60000-40			40 X 600		GPA0S10-6040WT	
YMC-GPC T10M	MIX	500 - 60,000	21.2 X 600		GP9BS10-6020PT	
YMC-GPC T10M-40			40 X 600		GP9BS10-6040WT	

YMC-GPC Guard Columns : Polymer Based Preparative GPC Guard Columns

Product name	Particle size (μm)	Column size inner diameter X length (mm)	Pack qty	Product number
Guard Column YMC-GPC-40G	10	25 X 25	1	GP99S10-G525PTG
YMC-GPC Guard Cartridge Column		20 X 10	1	GP99S10-0120CC
Cartridge holder (inner diameter : 20 mm)	-	-	1	XPCHSPW2

* Please purchase a cartridge holder when it comes to the first time you use a guard cartridge column

Flash Chromatography (MPLC) Columns

YMC-DispoPackAT (Spherical)

Packing material	Particle size (μm)	Product name	Pack qty	Product number
SIL	25	YMC-DispoPackAT SIL-25 12g	24	DPA12SLK08S2524
		YMC-DispoPackAT SIL-25 40g	12	DPA40SLK08S2512
		YMC-DispoPackAT SIL-25 120g	6	DPAA2SLK08S2506
		YMC-DispoPackAT SIL-25 300g	1	DPAC0SLK08S2501
NH2		YMC-DispoPackAT NH2-25 12g	24	DPA12NHK08S2524
		YMC-DispoPackAT NH2-25 40g	12	DPA40NHK08S2512
		YMC-DispoPackAT NH2-25 120g	6	DPAA2NHK08S2506
		YMC-DispoPackAT NH2-25 300g	1	DPAC0NHK08S2501
Diol		YMC-DispoPackAT Diol-25 12g	24	DPA12DLK08S2524
		YMC-DispoPackAT Diol-25 40g	12	DPA40DLK08S2512
		YMC-DispoPackAT Diol-25 120g	6	DPAA2DLK08S2506
		YMC-DispoPackAT Diol-25 300g	1	DPAC0DLK08S2501
ODS	YMC-DispoPackAT ODS-25 12g	24	DPA12ABK08S2524	
	YMC-DispoPackAT ODS-25 40g	12	DPA40ABK08S2512	
	YMC-DispoPackAT ODS-25 120g	6	DPAA2ABK08S2506	
	YMC-DispoPackAT ODS-25 300g	1	DPAC0ABK08S2501	

* Irregular 50 μm types are also available. More details are described in the general catalog or website.

YMC-DispoPackAT Reference Data

Available sizes (g)	Column size inner diameter (mm)	Column size outer diameter (mm)	Cap size outer diameter (mm)	Column size inside dimension (bed length, mm)	Column size outside dimension (full length, mm)	Pressure limit (MPa)	Recommended flow rate (mL/min)	Recommended sample load (g)
12	18	24	36	82	117	1.28	15	0.12 - 1.2
40	30	36	53	131	169	1.28	30	0.4 - 4.0
120	40	46	61	188	226	1.28	60	1.2 - 12
300	53	61	72	227	266	1.28	80	3.0 - 30

ECO PLUS Glass Columns with "Quick-Lock" Connection System

ECO PLUS glass columns are multi-purpose columns for almost all types of liquid chromatography applications (pressure limit 4 to 7 MPa). They are available in two forms; AB versions for aqueous buffer and SR versions for separations involving organic solvents. The "Quick-Lock" connection system makes it possible to open and seal the column simply and quickly.

Model	Inner diameter (mm)	Pressure limit (MPa)	Column length (mm)		
			125	250	500
TAC15	15	7.5	(10 - 13 g)	(28 - 32 g)	(58 - 62 g)
TAC25	25	5	(20 - 24 g)	(58 - 62 g)	(118 - 120 g)
TAC35	35	4	(42 - 46 g)	(120 - 124 g)	(238 - 242 g)

* In addition to this catalog products, we offer numerous columns/guard columns. Please see our general catalog or website.

* Values in parentheses are weight of packing materials that can be filled.