

High Performance Liquid Chromatograph

Prominence Bio-Inert LC System

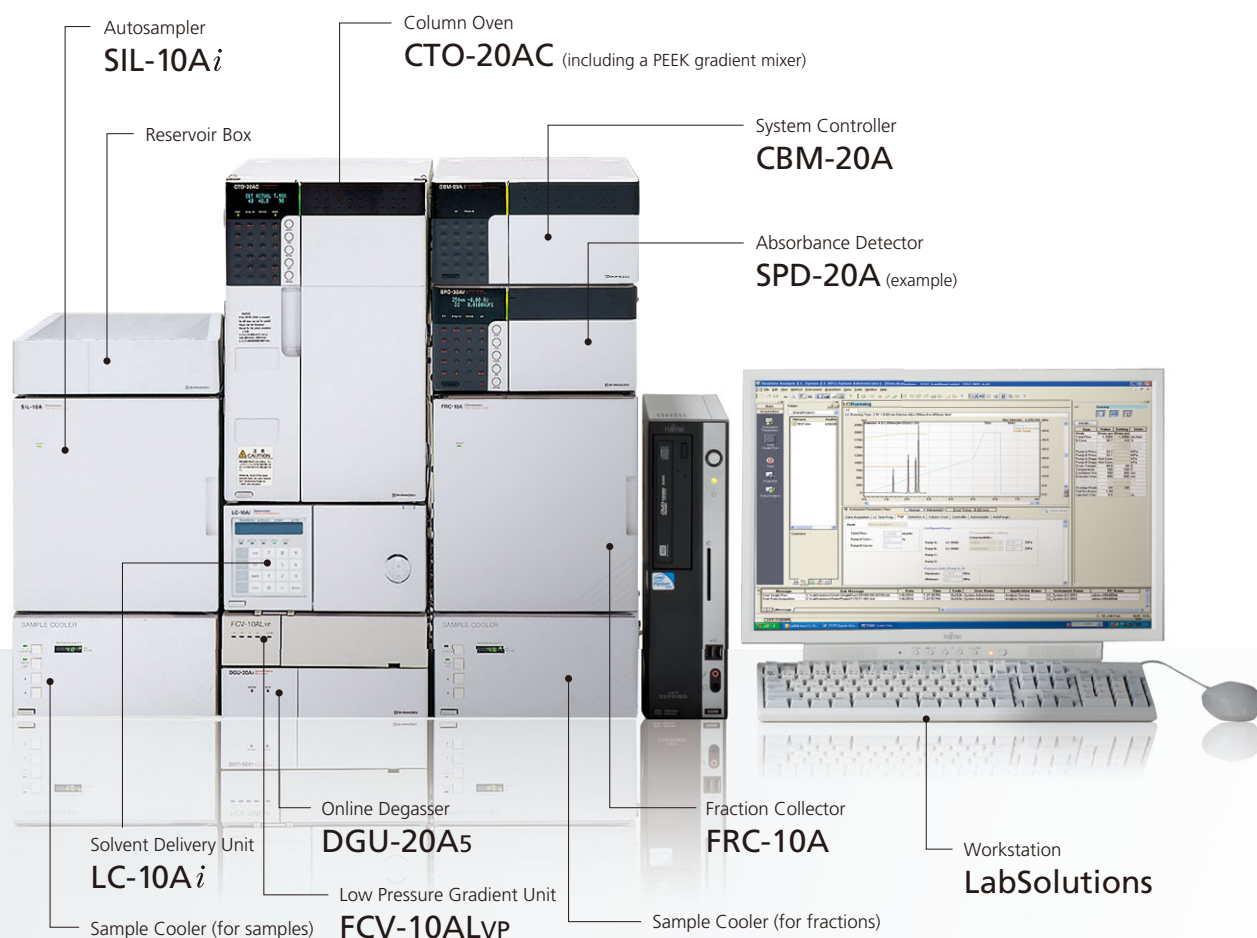


Prominence

Bio-Inert LC System

For Analytical or Preparative Purification of Biologically-Active Substances

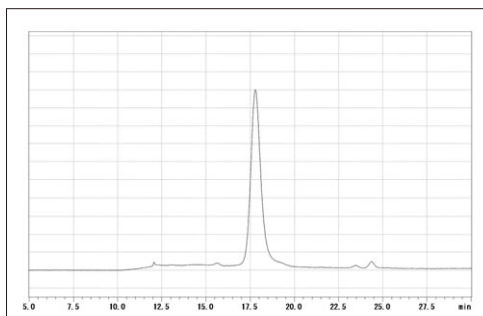
- This inert HPLC system provides the peace of mind of being highly resistant to corrosion from sodium chloride and other halogen ions used to analyze or fractionate biological macromolecules.
- It is ideal for analyzing components that could change in activity if exposed to metal materials.
- A high-sensitivity detector with a proven track record in general-purpose HPLC analysis is used, enabling analysis of impurities and trace components.
- The system can be operated at room temperatures as low as 4 °C.*
* Be careful to avoid condensation, such as from sudden changes in temperature.



The chromatogram displays five distinct peaks labeled 1 through 5. The x-axis represents time in minutes, with major tick marks every 2.5 minutes from 0.0 to 17.5. The baseline is relatively flat with minor noise. Peak 1 is the most prominent, occurring at approximately 9.0 minutes. Peak 5 is the second tallest, at approximately 11.5 minutes. Peaks 3 and 4 are smaller and occur close together at approximately 10.0 and 10.5 minutes, respectively. Peak 2 is the smallest, occurring at approximately 8.5 minutes.

Peak Number	Approximate Retention Time (min)	Relative Intensity
1	9.0	High
2	8.5	Low
3	10.0	Medium-Low
4	10.5	Medium-Low
5	11.5	High

- 1 : Mouse monoclonal antibody (5 μ g)
- 2 : IgG (bovine) (5 μ g)
- 3 : BSA (5 μ g)
- 4 : Myoglobin (5 μ g)
- 5 : Insulin (5 μ g)



Column	: Shodex IEC QA-825 (75 mmL. x 8.0 mmL.D.)
Mobile phase	: (A) 20 mmol/L Tris-HCl buffer (pH 8.6) (B) 20 mmol/L Tris-HCl buffer (pH 8.6) + 0.5 mol/L NaCl
Gradient	: (B) conc. ; 0 % (0 min) – 0 % (5 min) – 80 % (25 min) – 100 % (25.1 min) – 100 % (35 min)
Flow rate	: 1.0 mL/min
Detector	: UV (280 nm)
Column temp.	: 25 °C

Column : Superdex 200 10/300GL (300 mL. × 10.0 mm I.D.)
 Mobile phase : 50 mmol/L Tris-HCl buffer (pH 8.02) + 0.15 mol/L NaCl
 Flow rate : 0.5 mL/min
 Detector : UV (280 nm)
 Column temp. : 25 °C

Features and Specifications of Bio-Inert Units

LC-10A_i Non-Metal Solvent Delivery Unit



Featuring highly corrosion-resistant resin for all liquid contact surfaces, the unit also includes various features, such as a plunger rising function, that enable high salt mobile phase delivery.

Specifications

	LC-10Ai (P/N S228-45089-XX)
Pump type	Serial-type double plunger
Plunger capacity	Primary side: 47 μ L, secondary side: 23 μ L
Maximum discharge pressure	27.4 MPa
Flow rate setting range	0.001 to 9.999 mL/min
Flow rate accuracy	Within ± 2 % or 2 μ L/min, whichever is greater (0.1 to 5 mL/min)
Flow rate precision	Max. 0.3 % (Max. RSD: 0.1 %)
Plunger rinsing function (for buffer solutions)	Available using syringe rinsing or dedicated rinsing pump (P/N 228-39625-91)
Materials for liquid contact surfaces	Metal-free: polyethylene, Elgiloy, Karlez, PEEK, PTFE, ruby, sapphire, trifluoroethylene, alumina ceramic
Line filter	Yes (PEEK)
Operating temperature range	4 °C to 35 °C
Dimensions, Weight	W260 × D420 × H140 mm, 10 kg
Power requirements	AC 110 V, 230 V, 100 VA, 50/60 Hz

Other Peripherals

PEEK Gradient Mixer

- Mixing capacity : 400 μ L or 1.6 mL
- Max. operating pressure : 19.6 MPa
- Liquid contact surface materials : PEEK, trifluoroethylene, etc.

DGU-20A₃/20A₅ Online Degasser

- Number of degassed solvents : 3 (20A₃) or 5 (20A₅)
- Internal capacity : 400 μ L

Plunger Rinsing Pump P/N 228-39625-91

Low Pressure Gradient* Specifications

(requires an FCV-10ALv low-pressure gradient unit – P/N 228-34700-91)

Number of mixed solvents	4 max.
Program time	0.01 to 9999.9 min in 0.01 min steps
Mixture ratio setting range	0 % to 100 % in 0.1 % steps
Accuracy of concentration setting	± 1 % (under specified conditions)

* High-pressure gradient system (for up to 3 solutions) can be configured as well.

SIL-10A_i Bio-Inert Autosampler (with cooler)



Surfaces in contact with mobile phases are made of PEEK resin, making it easier to handle higher concentrations of halogen ions, which are not well tolerated by stainless steel flow lines.

(There are some limitations with respect to the organic solvents that can be used.)

Metal-free Manual Injector (Rheodyne)

- 9725/9725i General Purpose Type
Sample Loop : 2 μ L to 5 mL (standard is 20 μ L)
Sample Loop : 5 μ L to 5 mL
- 3725/3725i i Fraction Collection Type
Sample Loop : 2 mL to 20 mL (standard is 10 mL)

Models 9725i/3725i include a built-in position sensing switch

Specifications

	SIL-10Ai (P/N 228-45075-XX) With Cooler
Injection method	Variable sample injection (fixed loop injection possible)
Injection volume range	1 to 50 μ L (standard) or 1 to 250 μ L (optional)
Injection reproducibility	RSD < 0.5 % (under 10 μ L injection and specified conditions)
Needle rinsing function	Enables rinsing needle interior and exterior with a rinse port
Operating pH range	pH 1 to 10 (pHs of 10 or over can be handled using optional ETFE)
Number of processed samples	60 (using Sample Cooler S – P/N 228-45063-XX) 50 (using Sample Cooler L – P/N 228-45064-XX)
Sample temperature control method	Peltier element aluminum block cooling/heating method
Sample temperature control setting range	4 to 70 °C
Withstand pressure	19.6 MPa
Materials for liquid contact surfaces	PEEK, ceramics, Vespel, PTFE, FEP, CTFE, Pyrex glass, ETFE, and type 316 stainless steel (for needle only)
Operating temperature range	4 to 30 °C
Dimensions, Weight	Main unit: W260 × D420 × H280 mm, 18.5 kg Syringe unit: W100 × D150 × H280 mm, 4 kg Cooling controller unit: W260 × D420 × H140 mm, 6.5 kg Cooling rack unit (built-in): W135 × D220 × H150 mm, 3.6 kg
Power requirements	Main unit: AC 100-120 V, 100 VA, 50/60 Hz AC 220-240V, 100 VA, 50/60 Hz Cooling unit: AC 100-120 V, 200 VA, 50/60 Hz AC 220-240 V, 220 VA, 50/60 Hz AC 230 V, 220 VA, 50/60 Hz

Detections

Absorbance Detectors

SPD-20A/20AV/M20A detectors are high-sensitivity detectors designed for maximum sensitivity, linearity, and stability, with proven track record in general-purpose HPLC analysis. A low-pressure mercury lamp is included standard in all models for wavelength calibration.

SPD-20A/20AV Dual-Wavelength Absorbance Detector



SPD-M20A Photodiode Array Detector



Specifications

	SPD-20A (P/N 228-45003-XX)	SPD-20AV (P/N 228-45004-XX)	SPD-M20A (P/N 228-45005-XX)
Light source	D2 lamp	D2 lamp and W lamp	
Wavelength range	190 nm to 700 nm	190 nm to 900 nm	190 nm to 800 nm
Band width and slit width	8 nm		1.2 nm (high- resolution mode) or 8 nm (high- sensitivity mode)
Wavelength accuracy	± 1 nm or less		
Wavelength precision	± 0.1 nm or less		
Noise	0.5×10^{-5} AU (under specified conditions)		0.6×10^{-5} AU (under specified conditions)
Drift	1×10^{-4} AU/h (under specified conditions)		5×10^{-4} AU/h (under specified conditions)
Linearity	2.5 AU (ASTM standard)		2.0 AU (ASTM standard)
Functions	<ul style="list-style-type: none"> Simultaneous dual wavelength detection in 190 to 370 nm or over 371 nm range Ratio chromatogram output Wavelength scanning 		<ul style="list-style-type: none"> Contour line output Spectral library MAX plotting, etc.
Inert flow cell	Optical Path Length: 10 mm, Capacity: 16 μ L* (P/N 228-33338-91)		Optical Path Length: 10 mm, Capacity: 18 μ L* (P/N 228-34187-91)
Materials for liquid contact surfaces	Metal-free: PEEK, quartz, and PTFE		
Operating temperature range	4 to 35 $^{\circ}$ C		
Dimensions, Weight	W260 \times D420 \times H140 mm, 13 kg		W260 \times D420 \times H140 mm, 12 kg
Power requirements	AC110 V, 230 V, 160 VA, 50/60 Hz		AC110 V, 230 V, 150 VA, 50/60 Hz

* Not compatible with temperature control function.

Fluorescence Detectors

RF-20A/20AXs



These revolutionary spectrofluorescent detectors offer the world's highest levels of sensitivity, with water Raman S/N ratios over 2000 (RF-20AXs), and an easy-to-maintain design that allows lamps to be replaced easily.

Specifications

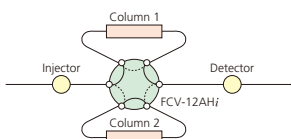
	RF-20A (P/N 228-45147-XX)	RF-20AXs (P/N 228-45148-XX)
Light source	Xenon lamp	Xenon lamp and low-pressure mercury lamp (for inspecting wavelength accuracy)
Wavelength range	Zero-order light, 200 to 650 nm	Zero-order light, 200 to 750 nm
Spectral bandwidth	20 nm	
Wavelength accuracy	± 2 nm	
Wavelength reproducibility	± 0.2 nm	
S/N	Water Raman peak S/N of 1200 or more	Water Raman peak S/N of 2000 or more
Inert flow cell	Capacity: 12 μ L* (P/N 228-51951-91)	
Materials for liquid contact surfaces	Metal-free: PEEK, PTFE, and quartz	
Simultaneous dual wavelength monitoring	Measured wavelengths	Any 2 wavelengths between 200 and 650 nm
	Sampling period	Any 2 wavelengths between 200 and 750 nm
Operating temperature range	4 to 35 $^{\circ}$ C	
Dimensions, Weight	W260 \times D420 \times H210 mm, 16 kg	W260 \times D420 \times H210 mm, 18 kg
Power requirements	AC110 V, 230 V, 400 VA, 50/60 Hz	

* Not compatible with temperature control function.

Flow Line Selection Valves

FCV-12AH_i High-Pressure Selection Valve

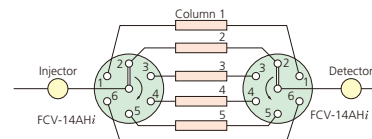
- 6-port, 2-position high-pressure valve



P/N 228-45013-94

FCV-14AH_i Column Switching Valve

- 7-port, 6-position high-pressure valve



P/N 228-45014-92

FRC-10A Fraction Collector

Compatible with a Wide Variety of Fractionation Modes

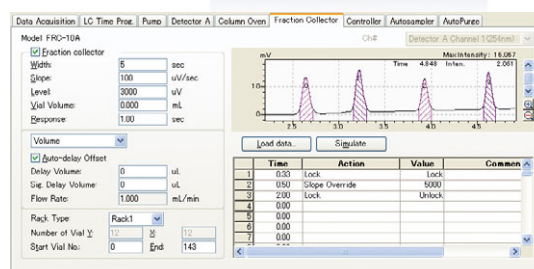
This versatile fraction collector can be used for a wide range of applications, from trace quantities to large volumes. From simple manual fractions while watching the chromatogram to sophisticated continuous automated fractions in combination with an autosampler, it can be used for a variety of applications.

Convenient Fraction Simulation






Being able to simulate fractions on screen in the LC workstation software, LcSolution, makes it especially easy to optimize fractionation parameters.

Reliable Fractions Even if Elution Times Vary

Even if elution times vary due to fluctuations in room temperature, variations in mobile phase composition, or other factors, unique parameters can be used to capture target components and accurately collect fractions. This feature is essential for continuous automated fractionation.



Optional Products (Fraction collector heads, racks, and collection tubes are optional. Please select these options according to objectives.)

	Fraction Collector Head	Racks	Collection Tubes		
Large Scale Fractions		Large-Capacity Kit (P/N 228-45116-91)	Enables using commercially-marketed reagent bottles (500 mL to 1000 mL). 		
Semi-Preparative Fractions	Fraction Collector Head with Valve (P/N 5228-24105-91)	Rack No. 3: 16 fractions (P/N 228-25313-91)	50 mL glass vials (box of 20) (P/N 228-25318-91) (78 mm long x 35 mm O.D.) 	50 mL polypropylene (PP) vials (box of 20) (P/N 228-25321-91) (75 mm long x 35 mm O.D.) 	
		Rack No. 2A: 64 fractions (P/N 228-25311-91)	20 mL glass test tubes (box of 100) (P/N 228-25316-91) (105 mm long x 18 mm O.D.)	32 mL glass test tubes (box of 100) (P/N 228-25317-91) (165 mm long x 18 mm O.D.)	25 mL PP test tubes (box of 100) (P/N 228-25320-91) (150 mm long x 18 mm O.D.)
Trace Fractions	Fraction Collector Head (P/N 228-25169-91)	Sample Cooler L: 50 fractions (P/N 228-45064-XX)	4 mL glass vials (box of 100) (P/N 228-21287-91) (45 mm long x 15 mm O.D.) 	5 mL PP vials (box of 100) (P/N 228-25322-91) (45 mm long x 15 mm O.D.) 	
		Rack No. 1: 144 fractions (P/N 228-25310-91)	3.5 mL glass test tubes (box of 350) (P/N 228-25315-91) (75 mm long x 10 mm O.D.)		
		Rack No. 5: 120 fractions (P/N 228-25314-91)			

Notes: *The fraction collector head with valve allows the eluent to be switched between the fraction side and the drain side, using its 3-way solenoid valve. Use it for routine fractionation to fully attain the functionality of the FRC-10A.
*Fraction collector heads are used to send eluent continuously to the fraction side without a solenoid valve. Use it to collect trace fractionation, for example.

Specifications

	FRC-10A (P/N 228-45070-XX)
Drive system	Arm movement X-Y system
Maximum number of fractions	16 to 144 (depending on rack used)
Fraction collection method	Solenoid valve (using a fraction collector head equipped with a valve) or nozzle (using a fraction collector head)
Maximum flow rate	150 mL/min
Fraction modes	Set as combination of basic mode (initial parameter mode) and time-program mode (14 types of parameters)
Cooling function	Enables using a large sample cooler (P/N 228-45064-XX) to control temperature between 4 °C to 70 °C
Operating temperature range	4 °C to 35 °C (or 4 °C to 30 °C if using a large sample cooler)
Dimensions, Weight	Main unit: W260 x D420 x H280 mm, 15 kg Cooling controller: W260 x D420 x H140 mm, 6.5 kg
Power requirements	AC 110 V, 230 V, 100 VA, 50/60 Hz

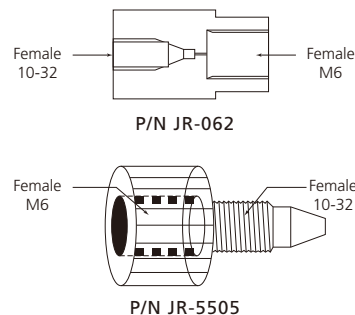
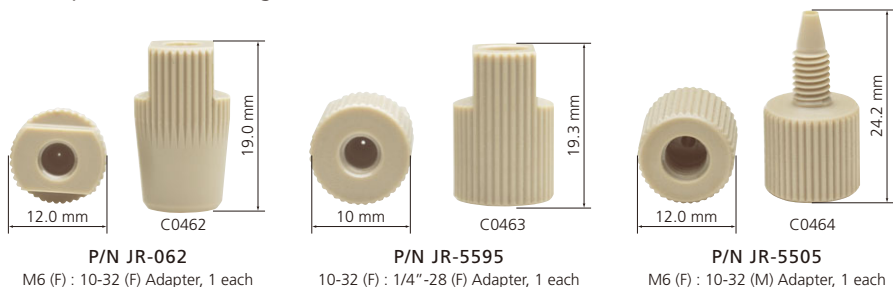
Resin Pipe Fittings

A line of various resin pipe fittings is available to enable connecting columns and other devices from other manufacturers (such as from GE Healthcare, Cheminert®, or Omnifit®) to Prominence instruments.

Products indicated with a  logo are available via Shimadzu GLC.

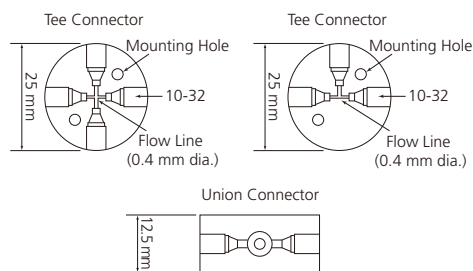
PEEK Adapters

- Adapters for connecting to M6 and 10-32 threads



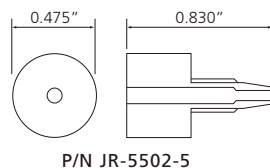
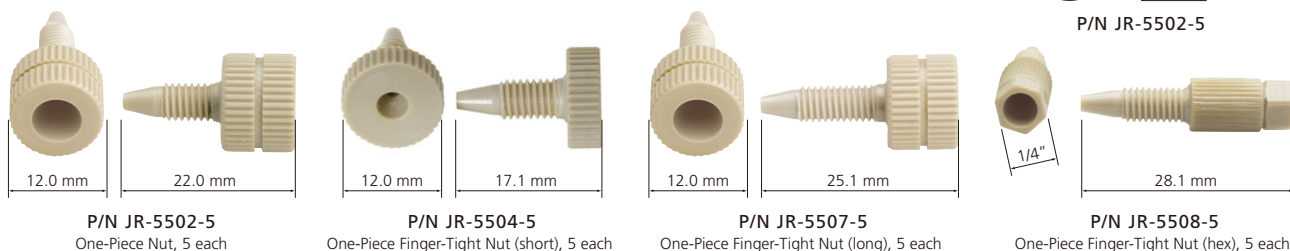
PEEK Connectors

- For connecting 1/16" tubing, pressure resistant to 350 bar (5000 psi)



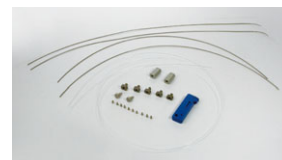
PEEK Nuts

- Integrated ferrule and nut (10-32 threads)
- Finger-tight types are for connecting 1/16" O.D. tubing and are pressure resistant to 350 bar (5000 psi)



Bio-Inert LC Pipe Fitting Kit (P/N 228-33285-91)

- This PEEK parts kit includes five male nuts, two stop joints, ten ferrules, two male connectors, a tube cutter, and tubing.



Tubing, flange forming tools, and other related resin products (PEEK, EFTE ETFE, FEP) are also available. For more details, please contact a Shimadzu sales representative.

Shimadzu Life Science Instruments

Nanoflow Liquid Chromatograph

Prominence nano

Shimadzu's outstanding ultra-micro solvent delivery performance technology contributes to more precise proteomic analysis.



Spectrophotometer for Life Sciences

BioSpec-nano

This spectrophotometer is designed specifically for laboratory needs in the quantitative analysis of nucleic acids and proteins.



Microchip Electrophoresis System for DNA/RNA Analysis

MultiNA

A next-generation microchip electrophoresis system that replaces conventional agarose-based electrophoresis methods.



Protein Sequencer

PPSQ-31A/33A

Instrument for protein expression analysis of N-terminal amino acids.



MALDI-QIT-TOF Matrix Assisted Laser Desorption Ionization Quadrupole Ion Trap Time-of-Flight Mass Spectrometer

AXIMA Resonance

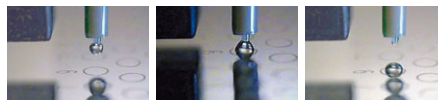
This system is designed not only for MS measurements, but also for the structural analysis and sequence analysis of biological macromolecules.



MALDI Plate Spotter

AccuSpot

This system automatically spots eluents separated by LC onto MALDI-TOF-MS target plates.



Immediately Before Spotting

During Spotting

Spotting



JQA-0376

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MCE-202 MultiNA is not available in the United States.

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