

## CONTRAST DELIVERY SYSTEMS

Company Name	Product	Applications	Flow Range (mL/s)	Volume Range (mL)	Delivery Pressure Range, Bar (psi)	Adjustable Rise Time	Syringes	Syringe Capacity (mL)	Disposable	Prefilled	Comments
Acist Medical Systems, Inc.	Cvi Contrast Delivery System	Angiography for coronary arteries, ventriculography, aortography, peripheral angiography	0.8–40 responsive variable rate in 0.1-mL increments	User-responsive variable range 0.8–99.9 in 0.1-mL increments	System limits of 200–1,200; user-defined program limits dependent on procedure parameter of choice	Yes, 0–1 sec in 0.1-sec increments	Up to 5-times use, disposable	100	Disposable multiuse syringe, patient kits with integrated pressure transducer, and hand controller	N/A	From the inventors of variable-rate technology, designed for coronary injections as well as large volume injections (LV, AO, etc.) and all peripheral procedures; air column detector distal to patient tubing connection, autocontrast refill, and air purge; tracks contrast delivered and used per injection and case; multiple sensors
	EmpowerCTA	CT	0.1–10	10–200	40–300	N/A	Single-use, disposable	200	Yes	No	New automated syringe initialization, syringe fill, and air purge features; arming at the injector; IRiS Viewer; extravasation detection technology; built-in Bracco protocols, open architecture; simple user interface; upgradeable; tilt sensor/lockout; voice prompts; fast shutdown; modular flexibility
	EmpowerMR	MRI	0.1–10 in user-specified increments of 0.1	Not provided	10–30			2–100			Hydraulic system does not require batteries; no motor-motor control system RF transients in MR suite during injection; fully MR compatible up to 7T; connectivity to IRiS contrast management tool
Covidien, Liebel-Flarsheim	Angiomat Illumena	Angiographic, CT	Angiography: 0.1–4; CT: 0.1–10	0.1–200	75–1200	Yes, 1–10 sec	Prefilled and disposable	150, 200	150, 200	50, 75, 100, 125	Versatile exam modes with just the touch of a button, you can switch between cardio, angio, and CT modes
	Optistar Elite	MRI	Side A: 60-mL syringe, 0.1–10; 1–0, 15-, 20-, 30-mL syringe, 0.1–8; side B: 0.1–10 mL in 0.1-mL increments	0.1–60	10-, 15-, 20-, 30-, 50-mL prefilled syringes at 200; 60-mL empty syringes at 150			60 on A and B (contrast and saline)	60 mL on A and B (contrast and saline)	Contrast: 10, 15, 20, 30 mL; saline: 50 mL	Battery-free power source patency check; status line indicator; color-coded push rods; auto retract; powerhead recessed start button; battery-free power source
	OptiVantage DH		0.1–10	1–125 or 1–200, depending on syringe size	25–325			200	200-mL front loading	Contrast: 50, 75, 100, 125 mL; saline: 125 mL	Optional Optibolus bolus shaping software improves CTA images and contrast agent utilization; RFID technology, an automatic identification technology that captures, stores and transmits data between the Ultraject syringe and the Optivantage DH power injector using devices called RFID transponders, or tags; prevents use of previously used syringe
LeMaitre Vascular, Inc.	LeverEdge Contrast Injector	Angiography	Variable	0.1–32	70–600	N/A	Disposable; single-use	35	Yes	N/A	Provides manual operator with complete control; patented design injects contrast at pressures six times greater than standard manual syringe
Medrad, Inc.	Stellant D	CT	0.1–10	Integral auto load allows user-defined contrast and saline volumes, based on procedure, to load automatically; 200 mL maximum per syringe	50–325 maximum	N/A	Disposable	Saline: 200; contrast: 200	200-mL syringes	Yes, exclusive compatibility with more than one contrast manufacturer	Patented P3T products offer personalized patient injection protocols; enables consistent vascular attenuation for CCTA images across a broad patient population and helps ease entry into CCTA by suggesting injection protocols; the DualFlow feature can enhance of both sides of the heart uniformly
	Stellant SX										
	Spectris Solaris EP	MRI	0.01–1 in 0.01 increments from 0.01–3.1; 0.1 increments from 3.1–10	0.5–65 mL in 0.1-mL increments up to 31 mL; 1-mL increments for ≥ 31 mL or 1–115 mL in 1-mL increments (saline)	Factory set not to exceed 325			Saline: 115; contrast: 65	Yes	N/A	
Medrad Interventional	Mark V ProVis	Angiography	0.3–10 in 0.1-mL increments; 10–50 in 1-mL increments	0.5–200	100–1,200	Yes, 0.0–9.9 sec in 0.1-sec increments	Single-use, disposable	60, 150, 200	60, 150, 200	No	Exclusive Mechanical Stop, patented FluiDots, Sentinel Air Check Reminder, 100% OEM compatibility, multiple configurations (table, pedestal, overhead mounts), 99.9% average up-time
	Mark 7 Arterion		0.1–45.0 mL/s in 0.01 increments; 0.1–59.9 mL/m in 0.1 mL increments	1–150 mL in 0.1 increments				150	Clear material, front-loading	Patented FluiDots, touch screen interface, sensor-guided Sentinel Air Check Reminder, simple protocol recall, injection history screen, multiple configurations (table, pedestal, overhead mount, dual display), head handle	

AO, aortography; CT, computed tomography; LV, left ventriculography; MRI, magnetic resonance imaging; OEM, original equipment manufacturer; RFID, radiofrequency identification.