Automation—the principles that guided the pioneers

Rodney S. Markin, MD, PhD

Twenty years ago, in March 1989, six months after we implemented our first laboratory information system at the University of Nebraska Medical Center, I read about the work of Masahide Sasaki, MD, PhD, of Kochi University Medical School in Kochi, Japan. Dr. Sasaki (1933–2005) had created a transportation system to move specimens from the specimen receiving station in his laboratory to instruments and workstations throughout. It was a marvelous demonstration project and the first successful attempt at comprehensive laboratory automation. Dr. Sasaki's approach was practical and functional but invasive beyond the limits of commercial viability: He cut holes in the instruments so that the track system could run through them and altered the instruments' electronics, hardware, and software.

Dr. Sasaki set the stage for automation technology to be developed for commercial implementation in the clinical laboratory. As advanced robotic and automation control technology became more readily available, those of us who had an interest in developing systems were able to acquire the tools to work with. Several development projects culminated in models of automation platforms. Paul Mountain at MDS worked with Labotix in Canada to automate processes in the MDS laboratory in Etobicoke, Ontario. David O'Bryan, PhD, at SmithKline Beecham Clinical Laboratories developed an automation platform for implementation in the SmithKline clinical laboratory operations. Steven Savitz and colleagues at Becton Dickinson worked on specimen labeling issues and specimen collection containers for automated processing. Cheryl Henderson, Steve Howlett, and Stuart Wills at Coulter Corp. worked on automation technology as it applied to hematology. And my group worked on automation systems that were based on the concept of computer-integrated manufacturing and process-control software, and subsequently founded Lab-InterLink.

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From our early "experimentation" with a variety of technologies, process models, and prototypes, our cordial but competitive group of experimentalists agreed on several principles for automation:

- Systems must meet the needs of patient care.
- Patient specimens should be handled individually, that is, single tube per carrier, so-called serial processing.
- A defined interface between instruments and automation systems must be developed.
- Specimen labeling must be standardized for machine handling.
- Software-based, patient-centered process control is the optimal process model.

From these principles the group formed the Clinical Testing Automation Standards Steering Committee, which was incorporated subsequently into the Clinical and Laboratory Standards Institute (then NCCLS) as the area committee for clinical laboratory automation. In the first six years of the committee's work we published four clinical laboratory automation standards (Auto-1A, Auto-2A, Auto-3A, and Auto-5A) and one guideline (Auto-4A). These standards and guidelines and the subsequent standards documents produced through the CLSI area committee have supported the infrastructure to implement clinical laboratory automation in today's clinical laboratory.

The first successful clinical laboratory automation systems were implemented in 1995 in New York and Omaha, and there were several subsequent automation implementations. Implementing automation in the clinical laboratory has been a challenging affair: In my experience, you either understand the laboratory and the processes or not, and if not, success is difficult to achieve. Automation of a complex process is an exercise in exception processing, the scope of which has not often been seen outside of the clinical realm. As a result of the complexity, many of the automation manufacturers and distributors have narrowed the scope of the implementation to manageable tasks with fewer variables. Automation technology can be acquired for chemistry with or without immunoassay, hematology, and coagulation. These implementations have limited numbers of instruments and usually have other devices for specimen processing, such as centrifugation, decapping, and storage and retrieval. A look at what's available today from the vendors of clinical laboratory automation begins on page 34.

In the past 20 years we have as an industry made significant and important improvements in the operations of the clinical laboratory. I would like to thank my early colleagues and competitors for their contributions to the field and for making the current state of clinical laboratory automation, as seen in the following pages, a reality. □

Dr. Markin is David T. Purtilo distinguished professor of pathology and microbiology, senior associate dean for clinical affairs—College of Medicine, board chair and president of UNMC Physicians, University of Nebraska Medical Center, Omaha.

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Education

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9–10	**SNOMED CT Training Class.** Classroom session, Deerfield, Ill.
14	**SNOMED CT Concept Model.** Web Teleconference.
16	**SNOMED CT: An Introduction to Nursing Content.** Web Teleconference.
16	**SNOMED CT Data Structure (Relational) Model.** Web Teleconference.
27	**SNOMED CT: Context Model for SNOMED CT Expressions.** Web Teleconference.
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Laboratory automation systems and workcells

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	Abbott Diagnostics Morné Herselman morne.herselman@abbott.com 1921 Hurd Drive, Irving, TX 75038 972-518-6735 www.abbottdiagnostics.com	Aim Lab (formerly Ai Scientific) Daron Green sales@aimlab.com 10-22 Hornibrook Esplanade, Clontarf, Qld, Australia 4019 +61 7 3105 5005 www.aimlab.com
Name of system/First year installed/No. of 2008 contracts signed	Accelerator APS/2005/19	PathFinder 350S/2008/4
No. of live sites installed in N. America/Europe/Asia-Australia	4/36/3	0/0/3
Automation products that are available		
• Pre-analytical processor/Total laboratory automation	yes/yes	yes/no
• Automated functions: Accessioning/Track load/Centrifugation/Decapping	yes/yes/yes/yes	yes/no/no/no
• Automated functions: Rack specific sort/Aliquot/Tube relabeling/Resealing	yes/no/—/yes	yes/no/no/no
• Automated functions: Storage-retrieval/Intelligent sample routing	yes/yes	yes/yes
• SW: Dedicated Process Control/Middleware control using LIS/Architecture	yes/yes/open	yes/yes/open
• Company has dedicated automation support team/Remote sys. monitoring	yes/yes	yes/yes
Software features/functionality		
• Patient demographics & insurance data/Rules-based architecture	automation SW feature/automation SW feature	LIS feature/automation SW feature
• Supports data retrieval/Internet connectivity	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Online real-time help system/QC/Stats & management reports	automation SW feature/automation SW feature/automation SW feature	automation SW feature/automation SW feature/automation SW feature
• Evaluates validity & releasability of results from automated analyzers	automation SW feature	LIS feature
• Specimen tracking/Priority processing/Random-access spec. movement	automation SW feature/automation SW feature/automation SW feature	automation SW feature/automation SW feature/—
• Supports accession No. redundancy (duplicate specimen ID)	automation SW feature	automation SW feature
• Supports specimen carrier & level identification	automation SW feature	automation SW feature
• Unique bar-code number per container required	automation SW feature	—
• Specimen routing/Multistop routing (one tube to multiple workstations)	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Specimen scheduling/Instrument scheduling	automation SW feature/automation SW feature	LIS feature/LIS feature
• Routes test to workstation/Automatic reflex, repeat, dilutions	automation SW feature/automation SW feature	automation SW feature/LIS feature
• Supports multiple HW config./Supports other proprietary transport. HW	automation SW feature/—	automation SW feature/automation SW feature
• Sample storage & retrieval SW/Supports approved CLSI standards	automation SW feature/automation SW feature	automation SW feature/automation SW feature
LIS(s) & versions interfaced & live w/LAS/How LIS(s) are interfaced w/your LAS	Cerner Classic, Cerner Millenium, Cortex, Delphic, Dianoema, GE Ultra, GLMIS by MIPS, Lab Track, Medisolution by Technidata, Meditech 5.4, Misys, Misys CPR (Cloverleaf Engine), Misys Smart, ModulabGold (Izasa), OSM, Roche Omega, SCS, Siemens, Soft/HL7, ASTM	GE Ultra, Iris, Apollo, Kestral, Instrument Manager/ASTM
Transportation systems available	yes	no
• Model/Dimen.* (H × W × D)*/Conforms to CLSI Stand. Auto 1-5	APS track section/40.2 × variable × 17.0 in/yes	—
• Containers device accommodates/Avg. throughput in cm per second	16, 13 × 100; 16, 13 × 75, others, multiple types simultaneously/13	—
• Supports automatic rerouting for reflex-repeat-dilutions	yes	—
• Modular HW/Installed options/Device can operate in track & manual mode	yes/floor mounted/yes	—
• Required utilities/Required maintenance	compressed air, electricity, water/—	—
• Carrier type/Scalable system	single specimen container per carrier/yes	—
Automated centrifugation available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5	centrifuge module/Hettich/58.5 × 32 × 42 in/yes	—
• Maximum throughput/Containers device accommodates	up to 320/16, 13×100; 16, 13×75, others, multiple types simultaneously	—
• Can identify tube types for custom programmed rate & spin times per run	no	—
• More than one centrif. can be connected to track system	yes	—
• For multi-unit centrif., each centrif. operates independently for rate & time	no	—
• Maintenance required	weekly, monthly	—
Automated input/accessioning available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	input-output module/54.3 × 77.6 × 39.6 in/yes/up to 600	PathFinder 350S/52 × 98 × 40 cm/yes/350+
• Containers device accommodates/Dedicated lanes for stat samples	16, 13 × 100; 16, 13 × 75, others, multiple types simult./yes	16, 13 × 100; 16, 13 × 75/yes
• Maximum No. of samples that can be loaded/Maintenance required	720/weekly, monthly	250/weekly, six months
Automated decapping available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	decapper module/46.7 × 34.7 × 17 in/yes/up to 600	—
• Containers device accommodates/Maintenance required	16, 13 × 100; 16, 13 × 75, others, multiple types simult./daily, weekly	—
• Removes multiple size tube caps per run/ Removes screw type sample caps	yes/yes	—
Automated sorting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	input output module/54.3 × 77.6 × 39.6 in/yes/up to 600	PathFinder 350S/52 × 98 × 40 cm/yes/350+
• Containers device accommodates/Software can sort by	16, 13 × 100; 16, 13 × 75, others, mult. types simult./specimen, method, ouput	16, 13 × 100; 16, 13 × 75, all stand. blood collection/specimen, method, output
Specimen integrity monitor available	no	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—	—
• Containers device accommodates/Maintenance required	—	—
Automated aliquotting available	no	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—	—
• Containers device accommodates	—	—
• Inspects samples for bar code/Detects & reports clots in specimen	—	—
• Detects & reports quantity not sufficient specimens/Maintenance required	—	—
Instrument (analyzer) interfaces		
• Rules-based instrument interface control subsystem	yes	no
• Process control of instrument via control subsystem	yes	no
Physical/hardware (instrument/specimen) interface		
• Hematology/Chemistry/Coagulation	no/point-of-reference sampling/no	—
• Immunoassay/Urinalysis	point-of-reference sampling/no	—
Instruments to which your system/product is interfaced	Architect c8000, c16000, i2000, i2000SR, Ortho Fusion 5.1, Diasorin Liaison	—
Other robotic products/components to which system, product is linked	—	—
Automated recapper or sealer available	sealer	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	resealer module/49.2 × 44.9 × 17 in/yes/up to 600	—
• Recaps-seals multiple size tubes simultaneously/Containers device accomm.	yes/16, 13 × 100; 16, 13 × 75, others, multiple types simultaneously	—
• Maintenance required	monthly	—
Automated storage & retrieval available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	tube storage module/95 × 89.2 × 70 in/yes/up to 600	PathFinder 350S/52 × 98 × 40 cm/yes/350+
• Containers device accommodates/Connects to the track	16, 13 × 100; 16, 13 × 75, others, multiple types simultaneously/yes	16, 13 × 100; 16, 13 × 75/yes
• Room temperature/Min. & max. No. of tubes stored per module	no/0 & 15,360	yes/250
• Multiple size tubes can be stored in the same module/Maintenance required	yes/daily, monthly	yes/weekly, six months
• Refrigerated storage & retrieval capability	yes	no
Longitudinal upgrade pathway or plan to protect users' investments	modular open architecture	multiple instruments can work together on the PathFinder 350S network
Avg. time to install/Who provides service, support/Hours support is available	depends on configuration/Abbott Diagnostics/business & extended hours	1 day/Aim Lab/24/7
On-site biomedical engineer required/User group meets regularly	no/yes	no/no
List price	varies by configuration	$55,000
Individual list prices for components		
• Process control SW/Transportation systems/Auto. centrifugation	—	included/—/—
• Auto. input, accession/Auto. decap/Auto. sort/Auto. storage & retrieval	—	included/—/included/included
• Specimen integrity monitor/Automated aliquot	—	—
• Instrument (analyzer) interfaces/Automated recap	—	—
Distinguishing features	flexibility: component-based design & high level of configurability; full functionality: refrigerated online storage & multiple tube types simultan.; advanced tech.: RFID, point-in-space sampling, heat soldering-resealing	small-footprint benchtop sorting with multi-tube type capability; interchangable trays allow for one-minute configuration changes; links with PathFinder 900 and other PathFinder 350S for network disseminated automation

** For basic bulding block unit*
*** Average throughput in specimen containers per hour per device*

Laboratory automation systems and workcells

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	Aim Lab (formerly Ai Scientific) Daron Green sales@aimlab.com 10-22 Hornibrook Esplanade, Clontarf, Qld, Australia 4019 +61 7 3105 5000 www.aimlab.com	Beckman Coulter Mary Beth Johnson mbjohnson@beckman.com 200 S. Kraemer Blvd., Brea, CA 92822 714-993-8438 www.beckmancoulter.com
Name of system/First year installed/No. of 2008 contracts signed	PathFinder 900/2008/2	LH 1500 Hematology Automation Series/2002/45
No. of live sites installed in N. America/Europe/Asia-Australia	0/2/2	95/11/20
Automation products that are available		
• Pre-analytical processor/Total laboratory automation	yes/no	yes/yes
• Automated functions: Accessioning/Track load/Centrifugation/Decapping	yes/yes/no/yes	yes/yes/no/no
• Automated functions: Rack specific sort/Aliquot/Tube relabeling/Resealing	yes/yes/yes/yes	yes/no/no/no
• Automated functions: Storage-retrieval/Intelligent sample routing	yes/yes	yes/yes
• SW: Dedicated Process Control/Middleware control using LIS/Architecture	yes/yes/open	yes/yes/open
• Company has dedicated automation support team/Remote sys. monitoring	yes/yes	yes/yes
Software features/functionality		
• Patient demographics & insurance data/Rules-based architecture	LIS feature/automation SW feature	—
• Supports data retrieval/Internet connectivity	automation SW feature/automation SW feature	automation SW feature/—
• Online real-time help system/QC/Stats & management reports	automation SW feature/—/automation SW feature	automation SW feature/LIS feature/—
• Evaluates validity & releasability of results from automated analyzers	LIS feature	—
• Specimen tracking/Priority processing/Random-access spec. movement	automation SW feature/LIS feature/—	automation SW feature/automation SW feature/automation SW feature
• Supports accession No. redundancy (duplicate specimen ID)	automation SW feature	—
• Supports specimen carrier & level identification	automation SW feature	—
• Unique bar-code number per container required	—	automation SW feature
• Specimen routing/Multistop routing (one tube to multiple workstations)	automation SW feature/ automation SW feature	automation SW feature/ automation SW feature
• Specimen scheduling/Instrument scheduling	automation SW feature/ automation SW feature	automation SW feature/ automation SW feature
• Routes test to workstation/Automatic reflex, repeat, dilutions	automation SW feature/LIS feature	automation SW feature/ automation SW feature
• Supports multiple HW config./Supports other proprietary transport. HW	automation SW feature/automation SW feature	automation SW feature/—
• Sample storage & retrieval SW/Supports approved CLSI standards	automation SW feature/ automation SW feature	automation SW feature/ automation SW feature
LIS(s) & versions interfaced & live w/LAS/How LIS(s) are interfaced w/your LAS	GE ULTRA, Iris, Apollo, Kestral, Instrument Manager/ASTM	Cerner, Sunquest, SCC, Meditech, others/LH 1500
Transportation systems available	no	yes
• Model/Dimen.* (H × W × D)*/Conforms to CLSI Stand. Auto 1-5	—	—/—/yes
• Containers device accommodates/Avg. throughput in cm per second	—	13 × 75/—
• Supports automatic rerouting for reflex-repeat-dilutions	—	yes
• Modular HW/Installed options/Device can operate in track & manual mode	—	yes/floor mounted/yes
• Required utilities/Required maintenance	—	compressed air, electricity/monthly
• Carrier type/Scalable system	—	single specimen container per carrier/yes
Automated centrifugation available	no	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5	—	—
• Maximum throughput/Containers device accommodates	—	—
• Can identify tube types for custom programmed rate & spin times per run	—	—
• More than one centrif. can be connected to track system	—	—
• For multi-unit centrif., each centrif. operates independently for rate & time	—	—
• Maintenance required	—	—
Automated input/accessioning available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	PathFinder 900/1.7 × 2.5 × 1.4 m/yes/900+	—
• Containers device accommodates/Dedicated lanes for stat samples	16, 13 × 100; 16, 13 × 75/yes	13 × 75/yes
• Maximum No. of samples that can be loaded/Maintenance required	1,000/weekly, monthly, annually	200/monthly
Automated decapping available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	PathFinder 900/1.7 × 2.5 × 1.4 m/yes/420	—
• Containers device accommodates/Maintenance required	16, 13 × 100; 16, 13 × 75, screw or pull cap/weekly, monthly, annually	—
• Removes multiple size tube caps per run/ Removes screw type sample caps	yes/yes	—
Automated sorting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	PathFinder 900/1.7 × 2.5 × 1.4 m/yes/900+	—/—/yes/425
• Containers device accommodates/Software can sort by	16, 13 × 100; 16, 13 × 75, all standard/specimen, method, output	13 × 75/method
Specimen integrity monitor available	no	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—	—
• Containers device accommodates/Maintenance required	—	—
Automated aliquotting available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	PathFinder 900/1.7 × 2.5 × 1.4 m/yes/480	—
• Containers device accommodates	16, 13 × 100; 16, 13 × 75	—
• Inspects samples for bar code/Detects & reports clots in specimen	yes/yes	—
• Detects & reports quantity not sufficient specimens/Maintenance required	yes/weekly, monthly, annually	—
Instrument (analyzer) interfaces		
• Rules-based instrument interface control subsystem	no	no
• Process control of instrument via control subsystem	no	yes
Physical/hardware (instrument/specimen) interface		
• Hematology/Chemistry/Coagulation	—	robotic arm interface/—/—
• Immunoassay/Urinalysis	—	—
Instruments to which your system/product is interfaced	—	LH 750, 755 and LH 780, 785
Other robotic products/components to which system, product is linked	—	—
Automated recapper or sealer available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	PathFinder 900/1.7 × 2.5 × 1.4 m/yes/600+	—
• Recaps-seals multiple size tubes simultaneously/Containers device accomm.	yes/16, 13 × 100; 16, 13 × 75, all plastic sample tubes	—
• Maintenance required	weekly, monthly, annually	—
Automated storage & retrieval available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	PathFinder 900/1.7 × 2.5 × 1.4 m/yes/900+	—/—/yes/340
• Containers device accommodates/Connects to the track	16, 13 × 100; 16, 13 × 75/yes	13 × 75/yes
• Room temperature/Min. & max. No. of tubes stored per module	yes/1,000 in standard format	yes/1,000
• Multiple size tubes can be stored in the same module/Maintenance required	yes/weekly, monthly, annually	no/weekly, monthly
• Refrigerated storage & retrieval capability	no	—
Longitudinal upgrade pathway or plan to protect users' investments	system is modular in nature and modules can be removed or added without framework alterations	expandable, as the lab grows
Avg. time to install/Who provides service, support/Hours support is available	2 weeks/Aim Lab/24/7	7–21 days/Beckman Coulter/24/7
On-site biomedical engineer required/User group meets regularly	no/no	no/yes
List price	$330,000, reductions where individual components are not required	varies by configuration
Individual list prices for components		
• Process control SW/Transportation systems/Auto. centrifugation	included/—/—	—
• Auto. input, accession/Auto. decap/Auto. sort/Auto. storage & retrieval	included/included/included/included	—
• Specimen integrity monitor/Automated aliquot	—/included	—
• Instrument (analyzer) interfaces/Automated recap	—/included	—
Distinguishing features	true modular system built on a common platform; patented cap color recognition and foil capping technology; full functionality with configuration flexibility to meet individual laboratory requirements, including direct analyzer rack loading and unloading	automatic hands-off rerun and reflex test from the stockyard to the analyzers; sorting of pending samples for secondary tests by test; automatically loads analyzers and is expandable

** For basic bulding block unit*
*** Average throughput in specimen containers per hour per device*

Tabulation does not represent an endorsement by the College of American Pathologists.

Laboratory automation systems and workcells

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	Beckman Coulter **Jeff Quint** jfquint@beckman.com **200 S. Kraemer Blvd., Brea, CA 92822** **714-961-4118** www.beckmancoulter.com	Beckman Coulter **Jeff Quint** jfquint@beckman.com **200 S Kraemer Blvd., Brea, CA 92822** **714-961-4118** www.beckmancoulter.com
Name of system/First year installed/No. of 2008 contracts signed	AutoMate 800/2006/42	Power Processor/1998/64
No. of live sites installed in N. America/Europe/Asia-Australia	5/77/9	352/101/92
Automation products that are available		
• Pre-analytical processor/Total laboratory automation	yes/no	yes/yes
• Automated functions: Accessioning/Track load/Centrifugation/Decapping	yes/no/yes/yes	yes/yes/yes/yes
• Automated functions: Rack specific sort/Aliquot/Tube relabeling/Resealing	yes/yes/yes/no	yes/yes/yes/yes
• Automated functions: Storage-retrieval/Intelligent sample routing	yes/yes	yes/yes
• SW: Dedicated Process Control/Middleware control using LIS/Architecture	yes/no/open	yes/yes/open
• Company has dedicated automation support team/Remote sys. monitoring	yes/—	yes/yes
Software features/functionality		
• Patient demographics & insurance data/Rules-based architecture	LIS feature/automation SW feature	LIS feature/auto SW feature
• Supports data retrieval/Internet connectivity	LIS feature/—	automation SW feature/ automation SW feature
• Online real-time help system/QC/Stats & management reports	automation SW feature/LIS feature/automation SW feature	automation SW feat./ automation SW feat./ automation SW feat.
• Evaluates validity & releasability of results from automated analyzers	LIS feature	automation SW feature
• Specimen tracking/Priority processing/Random-access spec. movement	automation SW feat./automation SW feat./automation SW feat.	automation SW feat./ automation SW feat./ automation SW feat.
• Supports accession No. redundancy (duplicate specimen ID)	automation SW feature	—
• Supports specimen carrier & level identification	automation SW feature	automation SW feature
• Unique bar-code number per container required	automation SW feature	automation SW feature
• Specimen routing/Multistop routing (one tube to multiple workstations)	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Specimen scheduling/Instrument scheduling	automation SW feature/—	automation SW feature/automation SW feature
• Routes test to workstation/Automatic reflex, repeat, dilutions	automation SW feature/—	automation SW feature/automation SW feature
• Supports multiple HW config./Supports other proprietary transport. HW	automation SW feature/—	automation SW feature/—
• Sample storage & retrieval SW/Supports approved CLSI standards	automation SW feature/automation SW feature	automation SW feature/automation SW feature
LIS(s) & versions interfaced & live w/LAS/How LIS(s) are interfaced w/your LAS	SCC, Siemens, Philips/ASTM, Power Processor	SCC, Siemens, Philips, Misys, Cerner, McKesson, GE, Meditech, PerSe, Molis, MIPS, Vista, Swiss Lab/Power Processor, Direct, HL7
Transportation systems available	no	yes
• Model/Dimen.* (H × W × D)*/Conforms to CLSI Stand. Auto 1-5	—	Power Processor II/—/yes
• Containers device accommodates/Avg. throughput in cm per second	—	16, 13 × 100; 16, 13 × 75, Sarstedt/—
• Supports automatic rerouting for reflex-repeat-dilutions	—	yes
• Modular HW/Installed options/Device can operate in track & manual mode	—	yes/floor & subfloor mounted/yes
• Required utilities/Required maintenance	—	compressed air, electricity/monthly
• Carrier type/Scalable system	—	single specimen container per carrier/yes
Automated centrifugation available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5	AutoMate 800/—/yes	Power Processor II/—/yes
• Maximum throughput/Containers device accommodates	300/16, 13 × 100; 16, 13 × 75, Sarstedt, Greiner, BD pediatric tubes	300–450/16, 13 × 100; 16, 13 × 75, Sarstedt
• Can identify tube types for custom programmed rate & spin times per run	no	no
• More than one centrif. can be connected to track system	no	yes
• For multi-unit centrif., each centrif. operates independently for rate & time	no	yes
• Maintenance required	daily	weekly
Automated input/accessioning available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	AutoMate 800/—/yes/420	Power Processor II/—/yes/900
• Containers device accommodates/Dedicated lanes for stat samples	16, 13 × 100; 16, 13 × 75, Sarstedt, Greiner, BD pediatric tubes/yes	16, 13 × 100; 16, 13 × 75, Sarstedt/yes
• Maximum No. of samples that can be loaded/Maintenance required	600/daily, monthly	200/monthly
Automated decapping available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	AutoMate 800/—/yes/420	Power Processor II/—/yes/600
• Containers device accommodates/Maintenance required	16, 13 × 100; 16, 13 × 75, Sarstedt, Greiner, BD pediatric/daily, monthly	16, 13 × 100; 16, 13 × 75, Sarstedt/monthly
• Removes multiple size tube caps per run/ Removes screw type sample caps	yes/yes	yes/no
Automated sorting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	AutoMate 800/—/yes/420	Power Processor II/—/yes/500
• Containers device accommodates/Software can sort by	16, 13 × 100; 16, 13 × 75, Sarstedt, Greiner, BD pediatric/method, output	16, 13 × 100; 16, 13 × 75, Sarstedt/method, output
Specimen integrity monitor available	no	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—	Power Processor II/—/yes/90
• Containers device accommodates/Maintenance required	—	16, 13 × 100; 16, 13 × 75, Sarstedt/monthly
Automated aliquotting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	AutoMate 800/—/yes/420	Power Processor II/—/yes/140 primary samples
• Containers device accommodates	16, 13 × 100; 16, 13 × 75, Sarstedt	16, 13 × 100; 16, 13 × 75, Sarstedt
• Inspects samples for bar code/Detects & reports clots in specimen	yes/yes	yes/yes
• Detects & reports quantity not sufficient specimens/Maintenance required	yes/daily, monthly	yes/daily, weekly
Instrument (analyzer) interfaces		
• Rules-based instrument interface control subsystem	no	yes
• Process control of instrument via control subsystem	no	yes
Physical/hardware (instrument/specimen) interface		
• Hematology/Chemistry/Coagulation	—/—/—	robotic arm interface/point-of-reference sampling & rob. arm interf./ pt-of-ref samp. & rob. arm interf.
• Immunoassay/Urinalysis	—/—	pt-of-ref sampling & robotic arm interface/pt-of-ref sampling
Instruments to which your system/product is interfaced	—	Abbott Architect, Axsym; Bayer Centaur, Atlas; Beckman Coulter LX 20, DxC, DxI; Ortho 950, 250, Eci; Roche Modular; Stago Star
Other robotic products/components to which system, product is linked	—	—
Automated recapper or sealer available	no	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	—	Power Processor III/—/yes/500
• Recaps-seals multiple size tubes simultaneously/Containers device accomm.	—	no/13 × 100; 13 × 75, Sarstedt
• Maintenance required		weekly
Automated storage & retrieval available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	AutoMate 800/—/yes/420	Power Processor III/—/yes/500
• Containers device accommodates/Connects to the track	16, 13 × 100; 16, 13 × 75, Sarstedt, Greiner, BD pediatric tubes/no	13 × 100; 13 × 75, Sarstedt/yes
• Room temperature/Min. & max. No. of tubes stored per module	yes/1 & 400	yes/1 & 6,000
• Multiple size tubes can be stored in the same module/Maintenance required	yes/daily, monthly	no/weekly
• Refrigerated storage & retrieval capability	no	yes
Longitudinal upgrade pathway or plan to protect users' investments	—/—	Power Processor is expandable for upgrades as lab needs grow
Avg. time to install/Who provides service, support/Hours support is available	7 days/Beckman Coulter/24/7	7–21 days/Beckman Coutler/24/7
On-site biomedical engineer required/User group meets regularly	no/no	no/yes
List price	—	depends on configuration
Individual list prices for components		
• Process control SW/Transportation systems/Auto. centrifugation	—	—
• Auto. input, accession/Auto. decap/Auto. sort/Auto. storage & retrieval	—	—
• Specimen integrity monitor/Automated aliquot	—	—
• Instrument (analyzer) interfaces/Automated recap	—	—
Distinguishing features	automatic rack layout can be reconfigured with another rack style; intelligent aliquotting; sample storage routing by duration and temperature	refrigerated storage with recapping and auto rerun; totally open system; intelligent aliquotting; proven consistent TAT results

** For basic bulding block unit*
*** Average throughput in specimen containers per hour per device*

Tabulation does not represent an endorsement by the College of American Pathologists.

Laboratory automation systems and workcells

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	Integrated Laboratory Automation Solutions, Inc. William Neeley, MD wneeleymd@lab-ilas.com 1237 Chicago Rd., Troy, MI 48083 866-825-3477 www.lab-ilas.com	LGP Consulting, Inc. Reda Iskarous riskarous@lgpconsulting.com 21 E. Ferguson Av., P.O. Box 18, Wood River, IL 62095 877-251-9246 www.lgpconsulting.com
Name of system/First year installed/No. of 2008 contracts signed	The Efficiency Series/2003/1	m.u.t HCTS2000 MK2 Automated Sorter/2007/19
No. of live sites installed in N. America/Europe/Asia-Australia	1/—/—	36/59/1
Automation products that are available		
• Pre-analytical processor/Total laboratory automation	yes/yes	yes/no
• Automated functions: Accessioning/Track load/Centrifugation/Decapping	yes/yes/yes/yes	yes/no/no/no
• Automated functions: Rack specific sort/Aliquot/Tube relabeling/Resealing	yes/yes/yes/yes	yes/no/no/no
• Automated functions: Storage-retrieval/Intelligent sample routing	yes/yes	no/yes
• SW: Dedicated Process Control/Middleware control using LIS/Architecture	yes/yes/open	yes/no/closed
• Company has dedicated automation support team/Remote sys. monitoring	yes/yes	yes/yes
Software features/functionality		
• Patient demographics & insurance data/Rules-based architecture	LIS feature/automation SW & LIS feature	LIS feature/automation SW feature
• Supports data retrieval/Internet connectivity	automation SW feature/automation SW feature	—
• Online real-time help system/QC/Stats & management reports	automation SW feature/LIS feature/automation SW feature	automation SW feature/—/—
• Evaluates validity & releasability of results from automated analyzers	automation SW feature	—
• Specimen tracking/Priority processing/Random-access spec. movement	automation SW feature/automation SW feature/automation SW feature	automation SW feature/automation SW feature/—
• Supports accession No. redundancy (duplicate specimen ID)	automation SW feature	automation SW feature
• Supports specimen carrier & level identification	automation SW feature	—
• Unique bar-code number per container required	automation SW & LIS feature	—
• Specimen routing/Multistop routing (one tube to multiple workstations)	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Specimen scheduling/Instrument scheduling	automation SW feature/automation SW feature	—
• Routes test to workstation/Automatic reflex, repeat, dilutions	automation SW feature/automation SW feature	—
• Supports multiple HW config./Supports other proprietary transport. HW	automation SW feature/automation SW feature	automation SW feature/—
• Sample storage & retrieval SW/Supports approved CLSI standards	automation SW feature/automation SW feature	—/automation SW feature
LIS(s) & versions interfaced & live w/ LAS/How LIS(s) are interfaced w/ your LAS	Misys (Smart)/direct LIS	Mysis, Soft, DI, VA, DHCP/ASTM
Transportation systems available	yes	no
• Model/Dimen.* (H × W × D)*/Conforms to CLSI Stand. Auto 1-5	The Efficiency Series/varies with instrument size/yes	—
• Containers device accommodates/Avg. throughput in cm per second	16, 13 × 100; 16, 13 × 75/2,300 tubes per hour	—
• Supports automatic rerouting for reflex-repeat-dilutions	yes	—
• Modular HW/Installed options/Device can operate in track & manual mode	yes/floor mounted, overhead mounted, subfloor mounted/yes	—
• Required utilities/Required maintenance	compressed air, electricity/bimonthly	—
• Carrier type/Scalable system	single specimen container per carrier/yes	—
Automated centrifugation available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5	Hettich Robotic/84 × 50 × 63 in./yes	—
• Maximum throughput/Containers device accommodates	280/16, 13 × 100; 16, 13 × 75	—
• Can identify tube types for custom programmed rate & spin times per run	yes	—
• More than one centrif. can be connected to track system	yes	—
• For multi-unit centrif., each centrif. operates independently for rate & time	yes	—
• Maintenance required	bimonthly	—
Automated input/accessioning available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	The Efficiency Series/can be customized/yes/2,300 (per hour)	HTS2000 MK2/48 × 56 × 31 in./yes/2,000
• Containers device accommodates/Dedicated lanes for stat samples	16, 13 × 100; 16, 13 × 75/yes	16, 13 × 100; 16, 13 × 75, 8–19 mm diameter × 75–120 mm height/no
• Maximum No. of samples that can be loaded/Maintenance required	2,300/bimonthly	550/daily, monthly
Automated decapping available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—/—/yes/1,000	—
• Containers device accommodates/Maintenance required	16, 13 × 100; 16, 13 × 75/bimonthly	—
• Removes multiple size tube caps per run/ Removes screw type sample caps	yes/yes	—
Automated sorting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	The Efficiency Series/can be customized/yes/2,300	HCTS2000 MK2/48 × 56 × 31 in./yes/2,000
• Containers device accommodates/Software can sort by	16, 13 × 100; 16, 13 × 75/specimen type, output priority	16, 13 × 100; 16, 13 × 75, 8–19 mm diameter × 75–120 mm height/ specimen type, method type, output priority
Specimen integrity monitor available	—	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—	—
• Containers device accommodates/Maintenance required	—	—
Automated aliquoting available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—/79 × 125 × 73 in./yes	—
• Containers device accommodates	16, 13 × 100; 16, 13 × 75	—
• Inspects samples for bar code/Detects & reports clots in specimen	yes/yes	—
• Detects & reports quantity not sufficient specimens/Maintenance required	yes/bimonthly	—
Instrument (analyzer) interfaces		
• Rules-based instrument interface control subsystem	yes	no
• Process control of instrument via control subsystem	yes	no
Physical/hardware (instrument/specimen) interface		
• Hematology/Chemistry/Coagulation	robotic arm interface/pt-of-ref sampling/robotic arm interface	no/no/no
• Immunoassay/Urinalysis	point-of-reference sampling/point-of-reference sampling	no/no
Instruments to which your system/product is interfaced	Ortho: Vitros 5,1, 950, & 250; Abbott: Architect i2000, AxSym; Olympus: DPC Immulite 2000; Roche Modular; Beckman Coulter: DXI 800	—
Other robotic products/components to which system, product is linked	—	—
Automated recapper or sealer available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	—/—/yes/800	—
• Recaps-seals multiple size tubes simultaneously/Containers device accomm.	yes/16, 13 × 100; 16, 13 × 75	—
• Maintenance required	bimonthly	—
Automated storage & retrieval available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	—/—/yes/1,200	—
• Containers device accommodates/Connects to the track	16, 13 × 100; 16, 13 × 75/yes	—
• Room temperature/Min. & max. No. of tubes stored per module	yes/up to 1,200	—
• Multiple size tubes can be stored in the same module/Maintenance required	no/—	—
• Refrigerated storage & retrieval capability	no	—
Longitudinal upgrade pathway or plan to protect users' investments	easily extendable	independent of analyzer company; module can be upgraded with options
Avg. time to install/Who provides service, support/Hours support is available	1-2 weeks/Integrated Laboratory Automation Solutions/24/7	<2 days/Excalibur Lab Specialists/24/7 on request
On-site biomedical engineer required/User group meets regularly	no/no	no/no
List price	depends on configuration and laboratory requirement	$116,000
Individual list prices for components		
• Process control SW/Transportation systems/Auto. centrifugation	—	included—/—
• Auto. input, accession/Auto. decap/Auto. sort/Auto. storage & retrieval	—	—/—/included/—
• Specimen integrity monitor/Automated aliquot	—	—/—
• Instrument (analyzer) interfaces/Automated recap	—	—/—
Distinguishing features	prioritizes stats; uses variety of tube sizes; provides smart sorting and delivery; totally flexible; interfaces with any track-ready instruments and wide range of LIS vendors; remote management; adaptable for all size labs	no robotic arms used, yielding high throughput and reliability with ease of operation and installation; pour sample tubes into hopper, eliminating shuffling of tubes in and out of racks in lab reception areas; simplicity and flexibility of sorting rules and methods

** For basic bulding block unit*
*** Average throughput in specimen containers per hour per device*

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Laboratory automation systems and workcells

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	Motoman, Inc. Craig Rubenstein craig.rubenstein@motoman.com 805 Liberty Lane, West Carrollton, OH 45449 949-263-2648 www.motoman.com/labauto/	Motoman, Inc. Craig Rubenstein craig.rubenstein@motoman.com 805 Liberty Lane, West Carrollton, OH 45449 949-263-2648 www.motoman.com/labauto/
Name of system/First year installed/No. of 2008 contracts signed	Autosorter II/2006/3	Autosorter III/2008/3
No. of live sites installed in N. America/Europe/Asia-Australia	16/—/—	16/—/—
Automation products that are available		
• Pre-analytical processor/Total laboratory automation	yes/no	yes/no
• Automated functions: Accessioning/Track load/Centrifugation/Decapping	yes/yes/yes/yes	yes/yes/yes/yes
• Automated functions: Rack specific sort/Aliquot/Tube relabeling/Resealing	yes/yes/no/yes (recapping)	yes/yes/no/yes (recapping)
• Automated functions: Storage-retrieval/Intelligent sample routing	no/no	no/no
• SW: Dedicated Process Control/Middleware control using LIS/Architecture	yes/yes/open	yes/yes/open
• Company has dedicated automation support team/Remote sys. monitoring	yes/yes	yes/yes
Software features/functionality		
• Patient demographics & insurance data/Rules-based architecture	—/automation SW feature	—/automation SW feature
• Supports data retrieval/Internet connectivity	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Online real-time help system/QC/Stats & management reports	automation SW feature/ automation SW feature/automation SW feature	automation SW feature/ automation SW feature/automation SW feature
• Evaluates validity & releasability of results from automated analyzers	—	—
• Specimen tracking/Priority processing/Random-access spec. movement	automation SW feature/ automation SW feature/automation SW feature	automation SW feature/ automation SW feature/automation SW feature
• Supports accession No. redundancy (duplicate specimen ID)	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Supports specimen carrier & level identification	automation SW feature	automation SW feature
• Unique bar-code number per container required	automation SW feature	automation SW feature
• Specimen routing/Multistop routing (one tube to multiple workstations)	automation SW feature/ automation SW feature	automation SW feature/ automation SW feature
• Specimen scheduling/Instrument scheduling	—/—	—/—
• Routes test to workstation/Automatic reflex, repeat, dilutions	automation SW feature/—	automation SW feature/—
• Supports multiple HW config./Supports other proprietary transport. HW	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Sample storage & retrieval SW/Supports approved CLSI standards	automation SW feature/automation SW feature	automation SW feature/automation SW feature
LIS(s) & versions interfaced & live w/ LAS/How LIS(s) are interfaced w/ your LAS	Cerner, Triple G, Surround/ODBC, HL7	Cerner, Triple G, Surround/ODBC, HL7
Transportation systems available	yes	yes
• Model/Dimen.* (H × W × D)*/Conforms to CLSI Stand. Auto 1-5	—/configuration dependent/yes	—/configuration dependent/yes
• Containers device accommodates/Avg. throughput in cm per second	16, 13 × 100; 16, 13 × 75, 9–16 mm diameter, 75–100 mm height/50	16, 13 × 100; 16, 13 × 75, 9–16 mm diameter, 75–100 mm height/50
• Supports automatic rerouting for reflex-repeat-dilutions	yes	no
• Modular HW/Installed options/Device can operate in track & manual mode	no/floor mounted/yes	no/floor mounted/yes
• Required utilities/Required maintenance	compressed air, electricity/daily, monthly, annually	electricity/daily, monthly, annually
• Carrier type/Scalable system	single and multiple (30) specimen container per carrier/yes	single specimen container per carrier/yes
Automated centrifugation available	no	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5	—	Hettich Rotanta/81 × 87 × 42 in., 9–16 mm dia, 75–100 mm height/yes
• Maximum throughput/Containers device accommodates	—	300+/16, 13 × 100; 16, 13 × 75, 9–16 mm dia, 75–100 mm height
• Can identify tube types for custom programmed rate & spin times per run	—	no
• More than one centrif. can be connected to track system	—	no
• For multi-unit centrif., each centrif. operates independently for rate & time	—	—
• Maintenance required	—	daily, monthly, annually
Automated input/accessioning available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	AutoSorter II/6 × 5 × 5 ft./yes/1,000	AutoSorter III/81 × 87 × 42 in. (enclosed within ASIII footprint)/yes/800
• Containers device accommodates/Dedicated lanes for stat samples	16, 13 × 100; 16, 13 × 75, 9–16 mm diameter, 75–100 mm height/yes	16, 13 × 100; 16, 13 × 75, 9–16 mm dia, 75–100 mm hgt/yes
• Maximum No. of samples that can be loaded/Maintenance required	1,000/daily, monthly, annually	300/daily, monthly, annually
Automated decapping available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—/fits within footprint of AutoSorter II/yes/1,000	AutoSorter III/81 × 87 × 42 in. (enclosed within ASIII footprint)/yes/800
• Containers device accommodates/Maintenance required	16, 13×100; 16, 13×75, 9–16 mm dia., 75–100 mm hgt./daily, monthly, annually	16, 13×100; 16, 13×75, 9–16 mm dia, 75–100 mm hgt/daily, monthly, annually
• Removes multiple size tube caps per run/ Removes screw type sample caps	yes/yes	yes/yes
Automated sorting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	AutoSorter II/6 × 5 × 5 ft./yes/1,000	AutoSorter III/81 × 87 × 42 in./yes/800
• Containers device accommodates/Software can sort by	16, 13×100; 16, 13×75, 9–16 mm dia., 75–100 mm hgt./specimen, method, output	16, 13×100; 16, 13×75, 9–16 mm dia, 75–100 mm hgt/specimen, method, output
Specimen integrity monitor available	—	—
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—	—
• Containers device accommodates/Maintenance required	—	—
Automated aliquotting available	yes	planned
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	Aloka APS/68 × 101 × 43 in./yes/500	Aloka module/to be determined/yes/100–200
• Containers device accommodates	16, 13 × 100; 16, 13 × 75	16, 13 × 100; 16, 13 × 75
• Inspects samples for bar code/Detects & reports clots in specimen	yes/yes	yes/yes
• Detects & reports quantity not sufficient specimens/Maintenance required	yes/daily, monthly, annually	yes/daily, monthly, annually
Instrument (analyzer) interfaces		
• Rules-based instrument interface control subsystem	no	no
• Process control of instrument via control subsystem	no	no
Physical/hardware (instrument/specimen) interface		
• Hematology/Chemistry/Coagulation	—	—
• Immunoassay/Urinalysis	—	—
Instruments to which your system/product is interfaced	Sysmex hematology automation	—
Other robotic products/components to which system, product is linked	MDS (now Innotek) single-specimen carrier transportation system	ILAS, MDS (now Innotek) single-specimen carrier transportation system
Automated recapper or sealer available	yes (recapper)	planned
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	AutoSorter II/6 × 5 × 5 ft./yes/>1,800	AutoSorter III/to be determined/yes/800
• Recaps-seals multiple size tubes simultaneously/Containers device accomm.	yes/16, 13 × 100; 16, 13 × 75	yes/16, 13 × 100; 16, 13 × 75
• Maintenance required	daily, monthly, annually	daily, monthly, annually
Automated storage & retrieval available	no	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	—	—
• Containers device accommodates/Connects to the track	—	—
• Room temperature/Min. & max. No. of tubes stored per module	—	—
• Multiple size tubes can be stored in the same module/Maintenance required	—	—
• Refrigerated storage & retrieval capability	—	—
Longitudinal upgrade pathway or plan to protect users' investments	flexible, open design permits change of tubes/racks as instrumentation changes; connectivity and functionality upgrades	flexible, open design permits change of tubes/racks as instrumentation changes; connectivity and functionality upgrades
Avg. time to install/Who provides service, support/Hours support is available	<1-2 weeks, more for complex systems/Motoman/24/7 hotline	<1 week/Motoman/24/7 hotline
On-site biomedical engineer required/User group meets regularly	no/no	no/no
List price	$250,000	$195,000
Individual list prices for components		
• Process control SW/Transportation systems/Auto. centrifugation	included/configuration dependent/—	included/configuration dependent/$39,500
• Auto. input, accession/Auto. decap/Auto. sort/Auto. storage & retrieval	included/configuration dependent/included/—	included/included/included/—
• Specimen integrity monitor/Automated aliquot	—/configuration dependent	—/to be determined
• Instrument (analyzer) interfaces/Automated recap	—/configuration dependent	—/to be determined
Distinguishing features	customization-friendly; designed and built in the U.S.; independent of IVD instrument manufacturers; free-standing, high-throughput instruments or integrated lines	customization-friendly; designed and built in the U.S.; independent of IVD instrument manufacturers; free-standing, small footprint, modular automation

** For basic bulding block unit*
*** Average throughput in specimen containers per hour per device*

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Laboratory automation systems and workcells

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Olympus America Inc.
Hiro Sekiya hiro.sekiya@olympus.com
3500 Corporate Parkway, Center Valley, PA 18034-0610
484-896-5229 www.olympusamerica.com

Olympus America Inc.
Hiroshi Sekiya hiro.sekiya@olympus.com
3500 Corporate Parkway, Center Valley, PA 18034-0610
484-896-5229 www.olympusamerica.com

Name of system/First year installed/No. of 2008 contracts signed	TCAutomation/2009/—	OLA2500 High Speed Sorter/2004/7
No. of live sites installed in N. America/Europe/Asia-Australia	—	50/200+/3
Automation products that are available		
• Pre-analytical processor/Total laboratory automation	yes/yes	yes/—
• Automated functions: Accessioning/Track load/Centrifugation/Decapping	yes/yes/yes/yes	yes/—/no/yes
• Automated functions: Rack specific sort/Aliquot/Tube relabeling/Resealing	yes/yes/no/yes	yes/yes/—/yes
• Automated functions: Storage-retrieval/Intelligent sample routing	no/yes	no/yes
• SW: Dedicated Process Control/Middleware control using LIS/Architecture	yes/yes/open	no/yes/open
• Company has dedicated automation support team/Remote sys. monitoring	yes/no	yes/yes
Software features/functionality		
• Patient demographics & insurance data/Rules-based architecture	LIS feature/LIS feature	LIS feature/automation SW feature
• Supports data retrieval/Internet connectivity	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Online real-time help system/QC/Stats & management reports	—/LIS feature/automation SW feature	automation SW feature/—/automation SW feature
• Evaluates validity & releasability of results from automated analyzers	LIS feature	—
• Specimen tracking/Priority processing/Random-access spec. movement	automation SW feature/automation SW feature/automation SW feature	auto. SW feature/auto. SW & LIS feature/auto. SW feature
• Supports accession No. redundancy (duplicate specimen ID)	automation SW feature and LIS feature	automation SW feature
• Supports specimen carrier & level identification	automation SW feature	automation SW feature
• Unique bar-code number per container required	automation SW feature	not necessary
• Specimen routing/Multistop routing (one tube to multiple workstations)	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Specimen scheduling/Instrument scheduling	automation SW feature/automation SW feature	automation SW feature/—
• Routes test to workstation/Automatic reflex, repeat, dilutions	LIS feature/LIS feature	automation SW feature/—
• Supports multiple HW config./Supports other proprietary transport. HW	automation SW feature/—	automation SW feature/automation SW feature
• Sample storage & retrieval SW/Supports approved CLSI standards	automation SW feature/—	automation SW feature/automation SW feature
LIS(s) & versions interfaced & live w/LAS/How LIS(s) are interfaced w/your LAS	—/HL7	Cerner, Misys, Modulus, Data Innovations, SCC, Atlas, McKesson/HL7, ASTM, Olympus format conforms to ASTM 1381
Transportation systems available	yes	no
• Model/Dimen.* (H × W × D)*/Conforms to CLSI Stand. Auto 1-5	—/various lengths between 800–2,400 mm/yes	—
• Containers device accommodates/Avg. throughput in cm per second	16, 13 × 100; 16, 13 × 75/—	—
• Supports automatic rerouting for reflex-repeat-dilutions	yes	—
• Modular HW/Installed options/Device can operate in track & manual mode	yes/floor mounted/yes	—
• Required utilities/Required maintenance	compressed air, electricity/annually	—
• Carrier type/Scalable system	single specimen container/yes, modular system reconfigured or expanded	—
Automated centrifugation available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5	—/1,300 × 1,200 × 1,375 mm/yes	—
• Maximum throughput/Containers device accommodates	up to 400/13 × 75; 13 × 100	—
• Can identify tube types for custom programmed rate & spin times per run	yes	—
• More than one centrif. can be connected to track system	yes	—
• For multi-unit centrif., each centrif. operates independently for rate & time	yes	—
• Maintenance required	quarterly	—
Automated input/accessioning available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—/1,900 × 1,200 × 965 mm/yes/500	OLA2500 HSS/64.6 × 73.2 × 52.8 in/yes/1,200
• Containers device accommodates/Dedicated lanes for stat samples	16, 13 × 100; 16, 13 × 75/yes	16, 13 × 100; 16, 13 × 75, others/—
• Maximum No. of samples that can be loaded/Maintenance required	720/annually	—
Automated decapping available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—/1,600 × 600 × 965 mm/yes/600	OLA2500 HSS/64.6 × 73.2 × 52.8 in/yes/1,200
• Containers device accommodates/Maintenance required	16, 13 × 100; 16, 13 × 75/annually	16, 13 × 100; 16, 13 × 75, others/weekly
• Removes multiple size tube caps per run/ Removes screw type sample caps	yes/yes	yes/yes
Automated sorting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—/1,900 × 1,200 × 965 mm/yes/500	OLA2500 HSS/64.6 × 73.2 × 52.8 in/yes/1,200
• Containers device accommodates/Software can sort by	16, 13 × 100; 16, 13 × 75/specimen, method, output	16, 13 × 100; 16, 13 × 75, others/specimen, method, output
Specimen integrity monitor available	no	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—	—
• Containers device accommodates/Maintenance required	—	—
Automated aliquotting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—/1,900 × 1,200 × 965 mm/yes/up to 200 secondary tubes per hour	—/—/yes/—
• Containers device accommodates	16, 13 × 100; 16, 13 × 75	—
• Inspects samples for bar code/Detects & reports clots in specimen	yes/yes	—
• Detects & reports quantity not sufficient specimens/Maintenance required	yes/quarterly	—
Instrument (analyzer) interfaces		
• Rules-based instrument interface control subsystem	—	no
• Process control of instrument via control subsystem	—	no
Physical/hardware (instrument/specimen) interface		
• Hematology/Chemistry/Coagulation	robotic arm interface/point-of-reference & robotic rack interface/robotic arm interface	—
• Immunoassay/Urinalysis	point-of-reference & robotic rack interface/—	—
Instruments to which your system/product is interfaced	Olympus AU680, AU2700, AU5400, AU3000i, other interfaces developed	—
Other robotic products/components to which system, product is linked	—	—
Automated recapper or sealer available	recapper	sealer
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	—/1,600 × 600 × 965 mm/—/500	OLA2500 HSS/64.6 × 73.2 × 52.8 in/yes/1,200
• Recaps-seals multiple size tubes simultaneously/Containers device accomm.	yes/16, 13 × 100; 16, 13 × 75	yes/16, 13 × 100; 16, 13 × 75, others
• Maintenance required	annually	—
Automated storage & retrieval available	in development	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	—	—
• Containers device accommodates/Connects to the track	—	—
• Room temperature/Min. & max. No. of tubes stored per module	—	—
• Multiple size tubes can be stored in the same module/Maintenance required	—	—
• Refrigerated storage & retrieval capability	—	—
Longitudinal upgrade pathway or plan to protect users' investments	expansion and reconfiguration possible for life of product	—
Avg. time to install/Who provides service, support/Hours support is available	1–2 weeks/Olympus America/24/7	1 week/Olympus America/M-F 8 AM to 5 PM & 24/7 available
On-site biomedical engineer required/User group meets regularly	no	no/no
List price	varies by configuration	$250,000 list price
Individual list prices for components		
• Process control SW/Transportation systems/Auto. centrifugation	—	—
• Auto. input, accession/Auto. decap/Auto. sort/Auto. storage & retrieval	—	—
• Specimen integrity monitor/Automated aliquot	—	—
• Instrument (analyzer) interfaces/Automated recap	—	—
Distinguishing features	modular, expandable, flexible track automation system with compatibility to many analytical units; capable service and support team; automation with high throughput clinical chemistry and immunoassay systems	economical, flexible, open, standalone; automates the most labor-intensive manual tasks with speed and flexibility; raises safety, quality, productivity, and efficiency without large investment

** For basic bulding block unit*
*** Average throughput in specimen containers per hour per device*

Laboratory automation systems and workcells

Part 7 of 13	**Olympus America Inc.** **Hiroshi Sekiya** hiro.sekiya@olympus.com **3500 Corporate Parkway, Center Valley, PA 18034-0610** **484-896-5229** www.olympusamerica.com	**Olympus America Inc.** **Hiroshi Sekiya** hiro.sekiya@olympus.com **3500 Corporate Parkway, Center Valley, PA 18034-0610** **484-896-5229** www.olympusamerica.com
Name of system/First year installed/No. of 2008 contracts signed **No. of live sites installed in N. America/Europe/Asia-Australia**	**OLA2500 Lab Automation System/2003/7** **50/200+/10**	**OLA2500 High Speed Sorter with Aliquotter (HSSA)/2006/—** **50/200+/3**
Automation products that are available		
• Pre-analytical processor/Total laboratory automation	**yes/—**	**yes/—**
• Automated functions: Accessioning/Track load/Centrifugation/Decapping	**yes/—/no/yes**	**yes/—/no/yes**
• Automated functions: Rack specific sort/Aliquot/Tube relabeling/Resealing	**yes/yes/—/yes**	**yes/yes/—/yes**
• Automated functions: Storage-retrieval/Intelligent sample routing	**no/yes**	**no/yes**
• SW: Dedicated Process Control/Middleware control using LIS/Architecture	**no/yes/open**	**no/yes/open**
• Company has dedicated automation support team/Remote sys. monitoring	**yes/yes**	**yes/yes**
Software features/functionality		
• Patient demographics & insurance data/Rules-based architecture	**LIS feature/automation SW feature**	**LIS feature/automation SW feature**
• Supports data retrieval/Internet connectivity	**automation SW feature/automation SW feature**	**automation SW feature/automation SW feature**
• Online real-time help system/QC/Stats & management reports	**automation SW feature/—/automation SW feature**	**automation SW feature/—/automation SW feature**
• Evaluates validity & releasability of results from automated analyzers	**—**	**—**
• Specimen tracking/Priority processing/Random-access spec. movement	**auto. SW feature/auto. SW & LIS feature/auto. SW feature**	**auto. SW feature/auto. SW & LIS feature/auto. SW feature**
• Supports accession No. redundancy (duplicate specimen ID)	**automation SW feature**	**automation SW feature**
• Supports specimen carrier & level identification	**automation SW feature**	**automation SW feature**
• Unique bar-code number per container required	**not necessary**	**not necessary**
• Specimen routing/Multistop routing (one tube to multiple workstations)	**automation SW feature/automation SW feature**	**automation SW feature/automation SW feature**
• Specimen scheduling/Instrument scheduling	**automation SW feature/—**	**automation SW feature/—**
• Routes test to workstation/Automatic reflex, repeat, dilutions	**automation SW feature/—**	**automation SW feature/—**
• Supports multiple HW config./Supports other proprietary transport. HW	**automation SW feature/automation SW feature**	**automation SW feature/automation SW feature**
• Sample storage & retrieval SW/Supports approved CLSI standards	**automation SW feature/automation SW feature**	**automation SW feature/automation SW feature**
LIS(s) & versions interfaced & live w/LAS/How LIS(s) are interfaced w/your LAS	**Cerner, Misys, Modulus, Data Innovations, SCC, Atlas, McKesson/HL7, ASTM, Olympus format conforms to ASTM 1381**	**Cerner, Misys, Modulus, Data Innovations, SCC, Atlas, McKesson/HL7, ASTM, Olympus format conforms to ASTM 1381-91**
Transportation systems available	**no**	**no**
• Model/Dimen.* (H × W × D)*/Conforms to CLSI Stand. Auto 1-5	**—**	**—**
• Containers device accommodates/Avg. throughput in cm per second	**—**	**—**
• Supports automatic rerouting for reflex-repeat-dilutions	**—**	**—**
• Modular HW/Installed options/Device can operate in track & manual mode	**—**	**—**
• Required utilities/Required maintenance	**—**	**—**
• Carrier type/Scalable system	**—**	**—**
Automated centrifugation available	**no**	**no**
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5	**—**	**—**
• Maximum throughput/Containers device accommodates	**—**	**—**
• Can identify tube types for custom programmed rate & spin times per run	**—**	**—**
• More than one centrif. can be connected to track system	**—**	**—**
• For multi-unit centrif., each centrif. operates independently for rate & time	**—**	**—**
• Maintenance required	**—**	**—**
Automated input/accessioning available	**yes**	**yes**
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	**OLA2500 LAS/64.6 × 100 × 52.8 in/yes/800**	**OLA2500 LAS/64.6 × 100.6 × 52.8 in/yes/1,200**
• Containers device accommodates/Dedicated lanes for stat samples	**16, 13 × 100; 16, 13 × 75, others/—**	**16, 13 × 100; 16, 13 × 75, others/—**
• Maximum No. of samples that can be loaded/Maintenance required	**—**	**—**
Automated decapping available	**yes**	**yes**
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	**OLA2500 LAS/64.6 × 100 × 52.8 in/yes/800**	**OLA2500 LAS/64.6 × 100.6 × 52.8 in/yes/1,200**
• Containers device accommodates/Maintenance required	**16, 13 × 100; 16, 13 × 75, others/weekly**	**16, 13 × 100; 16, 13 × 75, others/weekly**
• Removes multiple size tube caps per run/ Removes screw type sample caps	**yes/yes**	**yes/yes**
Automated sorting available	**yes**	**yes**
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	**OLA2500 LAS/64.6 × 100 × 52.8 in/yes/800**	**OLA2500 LAS/64.6 × 100.6 × 52.8 in/yes/1,200**
• Containers device accommodates/Software can sort by	**16, 13 × 100; 16, 13 × 75, others/specimen, method, output**	**16, 13 × 100; 16, 13 × 75, others/specimen, method, output**
Specimen integrity monitor available	**no**	**no**
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	**—**	**—**
• Containers device accommodates/Maintenance required	**—**	**—**
Automated aliquotting available	**yes**	**yes**
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	**OLA2500 LAS/64.6 × 100 × 52.8 in/yes/—**	**OLA2500 LAS/64.6 × 100.6 × 52.8 in/yes/—**
• Containers device accommodates	**16, 13 × 100; 16, 13 × 75, others**	**16, 13 × 100; 16, 13 × 75, others**
• Inspects samples for bar code/Detects & reports clots in specimen	**yes/yes**	**yes/yes**
• Detects & reports quantity not sufficient specimens/Maintenance required	**yes/daily**	**yes/daily, quarterly**
Instrument (analyzer) interfaces		
• Rules-based instrument interface control subsystem	**no**	**no**
• Process control of instrument via control subsystem	**no**	**no**
Physical/hardware (instrument/specimen) interface		
• Hematology/Chemistry/Coagulation	**—**	**—**
• Immunoassay/Urinalysis	**—**	**—**
Instruments to which your system/product is interfaced	**—**	**—**
Other robotic products/components to which system, product is linked	**—**	**—**
Automated recapper or sealer available	**sealer**	**sealer**
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	**OLA2500 LAS/64.6 × 100 × 52.8 in/yes/800**	**OLA2500 LAS/64.6 × 100.6 × 52.8 in/yes/1,200**
• Recaps-seals multiple size tubes simultaneously/Containers device accomm.	**yes/16, 13 × 100; 16, 13 × 75, others**	**yes/16, 13 × 100; 16, 13 × 75, others**
• Maintenance required	**—**	**—**
Automated storage & retrieval available	**no**	**no**
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	**—**	**—**
• Containers device accommodates/Connects to the track	**—**	**—**
• Room temperature/Min. & max. No. of tubes stored per module	**—**	**—**
• Multiple size tubes can be stored in the same module/Maintenance required	**—**	**—**
• Refrigerated storage & retrieval capability	**—**	**—**
Longitudinal upgrade pathway or plan to protect users' investments	**—**	**—**
Avg. time to install/Who provides service, support/Hours support is available	**1 week/Olympus America/M-F 8 AM to 5 PM & 24/7**	**1 week/Olympus America/M-F 8 AM to 5 PM & 24/7 available**
On-site biomedical engineer required/User group meets regularly	**no/no**	**no/no**
List price	**$350,000 list price**	**$400,000**
Individual list prices for components		
• Process control SW/Transportation systems/Auto. centrifugation	**—**	**—**
• Auto. input, accession/Auto. decap/Auto. sort/Auto. storage & retrieval	**—**	**—**
• Specimen integrity monitor/Automated aliquot	**—**	**—**
• Instrument (analyzer) interfaces/Automated recap	**—**	**—/$40,000 (optional)**
Distinguishing features	**economical, flexible, open, standalone; automates the most labor-intensive manual tasks with speed and flexibility; raises safety, quality, productivity, and efficiency without large investment**	**economical, flexible, open, standalone; automates the most labor-intensive manual tasks with speed & flexibility; raises safety, quality, productivity & efficiency without large investment**

** For basic bulding block unit*
*** Average throughput in specimen containers per hour per device*

Tabulation does not represent an endorsement by the College of American Pathologists.

Laboratory automation systems and workcells

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	Ortho-Clinical Diagnostics **Ernest Cheung** echeung2@its.jnj.com 1001 US Route 202, Raritan, NJ 08869 908-704-2781 www.orthoclinical.com	PVT LabSystems LLC **Miriam Hoelzel** info@pvtlabsystems.com 300 Town Park Dr., Kennesaw, GA 30144 877-788-5227 www.pvtlabsystems.com
Name of system/First year installed/No. of 2008 contracts signed	enGen Laboratory Automation System/2001/9	Aliquoting System RSA Pro/2002/59
No. of live sites installed in N. America/Europe/Asia-Australia	14/31/1	29 (plus 30 former versions)/153 (plus 100 former versions)/53
Automation products that are available		
• Pre-analytical processor/Total laboratory automation	yes/yes	yes/yes
• Automated functions: Accessioning/Track load/Centrifugation/Decapping	yes/yes/yes/yes	yes/no/yes (as option)/yes
• Automated functions: Rack specific sort/Aliquot/Tube relabeling/Resealing	yes/yes/no/—	yes/yes/yes/yes
• Automated functions: Storage-retrieval/Intelligent sample routing	in development/yes	yes/yes
• SW: Dedicated Process Control/Middleware control using LIS/Architecture	yes/yes/open	yes/yes/open
• Company has dedicated automation support team/Remote sys. monitoring	yes/yes	yes/yes
Software features/functionality		
• Patient demographics & insurance data/Rules-based architecture	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Supports data retrieval/Internet connectivity	automation SW feature/automation SW feature	automation SW feature/—
• Online real-time help system/QC/Stats & management reports	—/automation SW feature/automation SW feature	automation SW feature/automation SW feature/automation SW feature
• Evaluates validity & releasability of results from automated analyzers	automation SW feature	—
• Specimen tracking/Priority processing/Random-access spec. movement	automation SW feat./automation SW feat./automation SW feat.	automation SW feature/automation SW feature/automation SW feature
• Supports accession No. redundancy (duplicate specimen ID)	—	automation SW feature
• Supports specimen carrier & level identification	automation SW feature	automation SW feature
• Unique bar-code number per container required	automation SW feature	—
• Specimen routing/Multistop routing (one tube to multiple workstations)	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Specimen scheduling/Instrument scheduling	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Routes test to workstation/Automatic reflex, repeat, dilutions	automation SW feature/automation SW feature	automation SW feature/—
• Supports multiple HW config./Supports other proprietary transport. HW	automation SW feature/automation SW feature	automation SW feature/—
• Sample storage & retrieval SW/Supports approved CLSI standards	automation SW feature/—	automation SW feature/automation SW feature
LIS(s) & versions interfaced & live w/LAS/How LIS(s) are interfaced w/your LAS	enGen interfaces with many LIS programs via Data Innovations MW: Cerner, Misys, SCC, several others/HL7, ASTM	Cerner, MCS, LDS, Medat, Systek, MIPS, Providens, Bayer, Molis, Omega, Misys, Vertex, Zanacore, DI, Cirrus, SCC Soft, Nyantech, others/ASTM and system-specific dynamic interface
Transportation systems available	yes	yes
• Model/Dimen.* (H × W × D)*/Conforms to CLSI Stand. Auto 1-5	Covered Conveyor/600 to 2,400 mm sections/yes	—/—/yes
• Containers device accommodates/Avg. throughput in cm per second	16, 13 × 100; 16, 13 × 75/10	16, 13 × 100; 16, 13 × 75, 11.5 × 65.5 mm up to 15.5 × 108 mm/—
• Supports automatic rerouting for reflex-repeat-dilutions	yes	no
• Modular HW/Installed options/Device can operate in track & manual mode	yes/floor mounted/yes	yes/floor mounted/yes
• Required utilities/Required maintenance	compressed air, electricity/annually	compressed air, electricity/every four months
• Carrier type/Scalable system	single specimen container per carrier/yes	single specimen container per carrier/yes
Automated centrifugation available	yes	yes (as option)
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5	centrifuge module/1,900 × 1,200 × 1,375 mm/yes	EC1 or EC2/EC1: 83.07×61.42×67.71 in.; EC2: 83.07×85.83×67.71 in./yes
• Maximum throughput/Containers device accommodates	400; 96-tube capacity/13 × 100; 13 × 75	depends on config./16, 13×100; 16, 13×75; 11.5×65.5 to 15.5×108 mm
• Can identify tube types for custom programmed rate & spin times per run	yes	yes
• More than one centrif. can be connected to track system	yes	yes
• For multi-unit centrif., each centrif. operates independently for rate & time	yes	yes
• Maintenance required	quarterly	every 6 months
Automated input/accessioning available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	rack entry-exit module/1,900 × 1,200 × 965 mm/yes/500	input sorter/78.74 × 33.47 × 69.29 in./1,200 with sort & decap only
• Containers device accommodates/Dedicated lanes for stat samples	16, 13 × 100; 16, 13 × 75/yes	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 mm up to 15.5 × 108 mm/yes
• Maximum No. of samples that can be loaded/Maintenance required	600/annually	600/every 4 months
Automated decapping available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	decapper module/1,600 × 600 × 965 mm/yes/600	decapping module/14.96 × 12.60 × 5.90 in./1,200 with sort & decap only
• Containers device accommodates/Maintenance required	16, 13 × 100; 16, 13 × 75/annually	16, 13×100; 16, 13×75; 11.5×65.5 to 15.5×108 mm/every 4 months
• Removes multiple size tube caps per run/ Removes screw type sample caps	yes/yes	yes/yes
Automated sorting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	rack exit-entry module/1,900 × 1,200 × 965 mm/yes/500	output sorter/71.65 × 55.90 × 55.11 in./yes/1,200 with sort & decap only
• Containers device accommodates/Software can sort by	16, 13 × 100; 16, 13 × 75/specimen, method, output	16, 13×100; 16, 13×75; 11.5×65.5 to 15.5×108 mm/specimen, method, output
Specimen integrity monitor available	yes	yes (as option)
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	via Vitros 5,1 FS 3600, 5600/—/—/—	QS I module/62.99 × 30.71 × 43.31 in./yes/850
• Containers device accommodates/Maintenance required	16, 13 × 100; 16, 13 × 75/weekly, monthly, annually	16, 13×100; 16, 13×75; 11.5×65.5 to 15.5×108 mm/every 4 months
Automated aliquotting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	aliquoter & labeler module/1,900 × 1,500 × 965 mm/yes/200	aliquotting unit/66.92 × 30.70 × 46.10 in./yes/540
• Containers device accommodates	16, 13 × 100; 16, 13 × 75	16, 13×100; 16, 13×75; 11.5×65.5 to 15.5×108 mm
• Inspects samples for bar code/Detects & reports clots in specimen	yes/yes	yes/yes
• Detects & reports quantity not sufficient specimens/Maintenance required	yes/quarterly	yes/every 4 months
Instrument (analyzer) interfaces		
• Rules-based instrument interface control subsystem	yes	no
• Process control of instrument via control subsystem	—	no
Physical/hardware (instrument/specimen) interface		
• Hematology/Chemistry/Coagulation	robotic arm interface/point-of-reference sampling/in development	—
• Immunoassay/Urinalysis	point-of-reference sampling/—	—
Instruments to which your system/product is interfaced	Vitros 5600, 3600, 5,1 FS, 950, 250/350 Systems; enGen interfaces w/several non-Vitros IA systems	—
Other robotic products/components to which system, product is linked	—	—
Automated recapper or sealer available	recapper	recapper (as option)
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	recapper module/1,600 × 600 × 965 mm/yes/500	recapping module/13.39 × 12.20 × 8.66/yes/1,100
• Recaps-seals multiple size tubes simultaneously/Containers device accomm.	yes/16, 13 × 100; 16, 13 × 75	yes/16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 to 15.5 × 108 mm
• Maintenance required	annually	every 4 months
Automated storage & retrieval available	yes, in development	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	—	—/—/yes/1,200
• Containers device accommodates/Connects to the track	—	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 to 15.5 × 108 mm/no
• Room temperature/Min. & max. No. of tubes stored per module	—	yes/1,200
• Multiple size tubes can be stored in the same module/Maintenance required	—	yes/every 4 months
• Refrigerated storage & retrieval capability	—	no
Longitudinal upgrade pathway or plan to protect users' investments	customized automation offering, enGen can be reconfigured or upgraded as needs change; SW configuration updates available periodically	independent of any analyzer company and modules can be upgraded
Avg. time to install/Who provides service, support/Hours support is available	depends on config., custom./depends on service contract with Ortho	1-2 weeks/PVT LabSystems & partners/daily 8 AM–5 PM & 24/7 on request
On-site biomedical engineer required/User group meets regularly	no/no	no/no
List price	depends on configuration	$360,000
Individual list prices for components		
• Process control SW/Transportation systems/Auto. centrifugation	—	$15k–$45k/—/$170 or $240k
• Auto. input, accession/Auto. decap/Auto. sort/Auto. storage & retrieval	—	included/included/included/—
• Specimen integrity monitor/Automated aliquot	—	$80k/included
• Instrument (analyzer) interfaces/Automated recap	—	—/$50k–$80k
Distinguishing features	customizable: systems designed to fit in existing floor space while providing Lean workflow; configurable: systems designed to interface with several lab analyzers; systems grow with the lab	basic platform can be assembled with all modules for an all-in-one system; low consumable costs through standard products; quality module QS I for monitoring (specimen integrity monitor and volume measuring)

** For basic bulding block unit*
*** Average throughput in specimen containers per hour per device*

Tabulation does not represent an endorsement by the College of American Pathologists.

Laboratory automation systems and workcells

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	PVT LabSystems LLC Miriam Hoelzel info@pvtlabsystems.com 300 Town Park Dr., Kennesaw, GA 30144 877-788-5227 www.pvtlabsystems.com	PVT LabSystems LLC Miriam Hoelzel info@pvtlabsystems.com 300 Town Park Dr., Kennesaw, GA 30144 877-788-5227 www.pvtlabsystems.com
Name of system/First year installed/No. of 2008 contracts signed	Workstation/2003/3	Sorting System RSD Pro/2001/45
No. of live sites installed in N. America/Europe/Asia-Australia	4/22/2	14/95/16
Automation products that are available		
• Pre-analytical processor/Total laboratory automation	yes/yes	yes/yes
• Automated functions: Accessioning/Track load/Centrifugation/Decapping	yes/no/yes/yes	yes/no/yes (as option)/yes
• Automated functions: Rack specific sort/Aliquot/Tube relabeling/Resealing	yes/yes/yes/yes	yes/no/no/yes (as option)
• Automated functions: Storage-retrieval/Intelligent sample routing	yes/yes	yes/yes
• SW: Dedicated Process Control/Middleware control using LIS/Architecture	yes/yes/open	yes/yes/open
• Company has dedicated automation support team/Remote sys. monitoring	yes/yes	yes/yes
Software features/functionality		
• Patient demographics & insurance data/Rules-based architecture	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Supports data retrieval/Internet connectivity	automation SW feature/—	automation SW feature/—
• Online real-time help system/QC/Stats & management reports	automation SW feature/automation SW feature/automation SW feature	automation SW feature/automation SW feature/automation SW feature
• Evaluates validity & releasability of results from automated analyzers	—	—
• Specimen tracking/Priority processing/Random-access spec. movement	automation SW feature/automation SW feature/automation SW feature	automation SW feature/automation SW feature/automation SW feature
• Supports accession No. redundancy (duplicate specimen ID)	automation SW feature	automation SW feature
• Supports specimen carrier & level identification	automation SW feature	automation SW feature
• Unique bar-code number per container required	—	—
• Specimen routing/Multistop routing (one tube to multiple workstations)	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Specimen scheduling/Instrument scheduling	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Routes test to workstation/Automatic reflex, repeat, dilutions	automation SW feature/—	automation SW feature/—
• Supports multiple HW config./Supports other proprietary transport. HW	automation SW feature/—	automation SW feature/—
• Sample storage & retrieval SW/Supports approved CLSI standards	automation SW feature/automation SW feature	automation SW feature/automation SW feature
LIS(s) & versions interfaced & live w/LAS/How LIS(s) are interfaced w/your LAS	Cerner, MCS, LDS, Medat, Systek, MIPS, Providens, Bayer, Molis, Omega, Misys, Vertex, Zanacore, DI, Cirrus, SCC Soft, Nyantech, others/ASTM and system-specific dynamic interface	Cerner, MCS, LDS, Medat, Systek, MIPS, Providens, Bayer, Molis, Omega, Misys, Vertex, Zanacore, DI, Cirrus, SCC Soft, Nyantech, others/ASTM and system-specific dynamic interface
Transportation systems available	yes	yes
• Model/Dimen.* (H × W × D)*/Conforms to CLSI Stand. Auto 1-5	—/—yes	—/—/yes
• Containers device accommodates/Avg. throughput in cm per second	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 mm up to 15.5 × 108 mm/—	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 to 15.5 × 108 mm/—
• Supports automatic rerouting for reflex-repeat-dilutions	no	no
• Modular HW/Installed options/Device can operate in track & manual mode	yes/floor mounted/yes	yes/floor mounted/yes
• Required utilities/Required maintenance	compressed air, electricity/every 4 months	compressed air, electricity/every 6 months
• Carrier type/Scalable system	single and mult. (5) specimen container per carrier/yes	single specimen container per carrier/yes
Automated centrifugation available	yes	yes (as option)
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5	EC1 or EC2/EC1: 83.07×61.42×67.71 in.; EC2: 83.07×85.83×67.71 in./yes	EC1 or EC2/EC1: 83.07× 61.42×67.71 in.; EC2: 83.07×85.83×67.71 in./yes
• Maximum throughput/Containers device accommodates	depends on configuration/16, 13 × 100; 15, 13 × 75, others	depends on configuration/16, 13×100; 16, 13×75; 11.5×65.5 to 15.5×108 mm
• Can identify tube types for custom programmed rate & spin times per run	yes	yes
• More than one centrif. can be connected to track system	yes	yes
• For multi-unit centrif., each centrif. operates independently for rate & time	yes	yes
• Maintenance required	every 6 months	every 6 months
Automated input/accessioning available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	input sorter/78.74 × 33.47 × 69.29 in./ yes/1,200 with sort & decap only	input sorter/78.74 × 33.47 × 69.29 in./ yes/1,200 with sort & decap only
• Containers device accommodates/Dedicated lanes for stat samples	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 mm up to 15.5 × 108 mm/yes	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 mm up to 15.5 × 108 mm/yes
• Maximum No. of samples that can be loaded/Maintenance required	600/every 4 months	600/every 6 months
Automated decapping available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	decapping module/14.96×12.60×5.90 in./yes/1,200 with sort & decap only	decapping module/14.96 × 12.60 × 5.90 in. /yes/1,200 w/sort & decap only
• Containers device accommodates/Maintenance required	16, 13×100; 16, 13×75; 11.5×65.5 to 15.5×108 mm/every 4 months	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 mm up to 15.5 × 108 mm/every 6 mo.
• Removes multiple size tube caps per run/ Removes screw type sample caps	yes/yes	yes/yes
Automated sorting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	output/71.65 × 55.90 × 55.11 in./yes/1,200 with sort & decap only	output sorter/71.65 × 55.90 × 55.12 in./yes/1,200 wtih sort & decap only
• Containers device accommodates/Software can sort by	16, 13×100; 16, 13×75; 11.5×65.5 to 15.5×108 mm/specimen, method, output	16, 13×100; 16, 13×75; 11.5×65.5 to 15.5×108 mm/specimen, method, output
Specimen integrity monitor available	yes (as option)	yes (as option)
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	QS I module/62.99 × 30.71 × 43.31 in./yes/850	QS I module/62.99 × 30.71 × 43.31 in./yes/850
• Containers device accommodates/Maintenance required	16, 13×100; 16, 13×75; 11.5×65.5 to 15.5×108 mm/every 4 months	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 mm up to 15.5 × 108 mm/every 6 mo.
Automated aliquotting available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	aliquotting unit/66.92 x 30.70 x 46.10 in/ yes/540	—
• Containers device accommodates	16, 13×100; 16, 13×75; 11.5×65.5 to 15.5×108 mm	—
• Inspects samples for bar code/Detects & reports clots in specimen	yes/yes	—
• Detects & reports quantity not sufficient specimens/Maintenance required	yes/every 4 months	—
Instrument (analyzer) interfaces		
• Rules-based instrument interface control subsystem	no	no
• Process control of instrument via control subsystem	no	no
Physical/hardware (instrument/specimen) interface		
• Hematology/Chemistry/Coagulation	—/—/—	—/—/—
• Immunoassay/Urinalysis	—/—	—/—
Instruments to which your system/product is interfaced	—	—
Other robotic products/components to which system, product is linked	—	—
Automated recapper or sealer available	recapper (as option)	recapper (as option)
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	recapping module/13.39 × 12.20 × 8.66 in/yes/1,100 with sort & decap only	recapping module/13.39 × 12.20 × 8.66/yes/1,100
• Recaps-seals multiple size tubes simultaneously/Containers device accomm.	yes/16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 to 15.5 × 108 mm	yes/16, 13 × 100; 16, 13 × 75, 11.5 × 65.5 mm up to 15.5 × 108 mm
• Maintenance required	every 4 months	every 6 months
Automated storage & retrieval available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	—/—/—/1,200	—/—/yes/1,200
• Containers device accommodates/Connects to the track	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 to 15.5 × 108 mm/no	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 mm up to 15.5 × 108 mm/no
• Room temperature/Min. & max. No. of tubes stored per module	yes/1,200	yes/1,200
• Multiple size tubes can be stored in the same module/Maintenance required	yes/every 4 months	yes/every 6 months
• Refrigerated storage & retrieval capability	no	no
Longitudinal upgrade pathway or plan to protect users' investments	independent of any analyzer company; modules can be upgraded	independent of any analyzer company; modules can be upgraded
Avg. time to install/Who provides service, support/Hours support is available	1-2 weeks/PVT LabSystems & partners/daily 8 AM–5 PM & 24/7 on request	1 week/PVT LabSystems & partners/daily 8 AM–5 PM (EST); 24/7 on request
On-site biomedical engineer required/User group meets regularly	no/no	no/no
List price	—	$230,000
Individual list prices for components		
• Process control SW/Transportation systems/Auto. centrifugation	$530k–$600k/—/included	$15k–$45k/—/$170k–$240k
• Auto. input, accession/Auto. decap/Auto. sort/Auto. storage & retrieval	included/included/included/—	included/included/included/—
• Specimen integrity monitor/Automated aliquot	$80k/included	$80k/—
• Instrument (analyzer) interfaces/Automated recap	—/$50k–$80k	—/$50k
Distinguishing features	independent from any ID company; automated centrifuge works with tubes or racks; all kinds of tubes and racks can be used	recapping can be used for all kinds of tubes; effective solution for archiving; PVT offers customized solution

** For basic bulding block unit*
*** Average throughput in specimen containers per hour per device*

Laboratory automation systems and workcells

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	PVT LabSystems LLC **Miriam Hoelzel** info@pvtlabsystems.com 300 Town Park Dr., Kennesaw, GA 30144 877-788-5227 www.pvtlabsystems.com	Roche Diagnostics Corp. **Leslie Casciato** leslie.casciato@roche.com 9115 Hague Rd., Indianapolis, IN 46250 317-521-4011 www.us.labsystems.roche.com
Name of system/First year installed/No. of 2008 contracts signed	Small Sorting System ProV/2005/5	Modular Pre-Analytics/2000/28
No. of live sites installed in N. America/Europe/Asia-Australia	3/13/0	97/400+ worldwide
Automation products that are available		
• Pre-analytical processor/Total laboratory automation	yes/yes	yes/yes
• Automated functions: Accessioning/Track load/Centrifugation/Decapping	yes/no/no/yes	yes/—/yes/yes
• Automated functions: Rack specific sort/Aliquot/Tube relabeling/Resealing	yes/no/no/yes (as option)	yes/yes/yes/yes
• Automated functions: Storage-retrieval/Intelligent sample routing	yes/yes	yes/in development
• SW: Dedicated Process Control/Middleware control using LIS/Architecture	yes/yes/open	yes/yes/open
• Company has dedicated automation support team/Remote sys. monitoring	yes/yes	yes/yes
Software features/functionality		
• Patient demographics & insurance data/Rules-based architecture	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Supports data retrieval/Internet connectivity	automation SW feature/—	automation SW feature/automation SW feature
• Online real-time help system/QC/Stats & management reports	automation SW feature/automation SW feature/automation SW feature	automation SW feature/automation SW feature/automation SW feature
• Evaluates validity & releasability of results from automated analyzers	—	automation SW feature
• Specimen tracking/Priority processing/Random-access spec. movement	automation SW feature/automation SW feature/automation SW feature	automation SW feature/automation SW feature/automation SW feature
• Supports accession No. redundancy (duplicate specimen ID)	automation SW feature	automation SW feature
• Supports specimen carrier & level identification	automation SW feature	automation SW feature
• Unique bar-code number per container required	—	automation SW feature
• Specimen routing/Multistop routing (one tube to multiple workstations)	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Specimen scheduling/Instrument scheduling	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Routes test to workstation/Automatic reflex, repeat, dilutions	automation SW feature/—	automation SW feature/automation SW feature
• Supports multiple HW config./Supports other proprietary transport. HW	automation SW feature/—	automation SW feature/automation SW feature
• Sample storage & retrieval SW/Supports approved CLSI standards	automation SW feature/automation SW feature	automation SW feature/automation SW feature
LIS(s) & versions interfaced & live w/ LAS/How LIS(s) are interfaced w/ your LAS	Cerner, MCS, LDS, Medat, Systek, MIPS, Providens, Bayer, Molis, Omega, Misys, Vertex, Zanacore, DI, Cirrus, SCC Soft, Nyantech, others/ASTM and system-specific dynamic interface	Cerner, Misys, Cerner Millennium, Vista, Meditech, McKesson, Soft, DoD, others/LIS to LAS, ASTM, HL7
Transportation systems available	yes	yes
• Model/Dimen.* (H × W × D)*/Conforms to CLSI Stand. Auto 1-5	—/—/yes	Hitachi CTL/984 × 300 × 600–2,700 mm/yes
• Containers device accommodates/Avg. throughput in cm per second	16, 13×100; 16, 13×75; 11.5×65.5 to 15.5×108 mm/—	16, 13 × 100; 16, 13 × 75/16
• Supports automatic rerouting for reflex-repeat-dilutions	no	yes
• Modular HW/Installed options/Device can operate in track & manual mode	yes/floor mounted/yes	yes/floor mounted/yes
• Required utilities/Required maintenance	compressed air, electricity/every 6 months	electricity/—
• Carrier type/Scalable system	single specimen container per carrier/yes	multiple specimen (5) container per carrier/yes
Automated centrifugation available	no	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5	—	Hitachi ACU/1,250 × 750 × 1,045 mm/yes
• Maximum throughput/Containers device accommodates	—	250 for 1 unit, 400 for 2/16, 13 × 100; 16, 13 × 75
• Can identify tube types for custom programmed rate & spin times per run	—	no
• More than one centrif. can be connected to track system	—	yes
• For multi-unit centrif., each centrif. operates independently for rate & time	—	no
• Maintenance required	—	daily, 5 minutes
Automated input/accessioning available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	input sorter/78.74 × 33.47 × 49.60 in./yes/1,200	Hitachi IBM/1,065 × 970 × 1,045 mm/yes/600
• Containers device accommodates/Dedicated lanes for stat samples	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 mm up to 15.5 × 108 mm/yes	16, 13 × 100; 16, 13 × 75/yes
• Maximum No. of samples that can be loaded/Maintenance required	600/every 6 months	300/—
Automated decapping available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	decapping module/14.96 × 12.99 × 5.90 in./yes/1,200	Hitachi DSP/1,250 × 450 × 1,045/yes/400
• Containers device accommodates/Maintenance required	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 mm up to 15.5 × 108 mm/every 6 mo.	16, 13 × 100; 16, 13 × 75/—
• Removes multiple size tube caps per run/ Removes screw type sample caps	yes/yes	yes/yes
Automated sorting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	output sorter/78.74 × 33.47 × 74.40 in./yes/1,200	Histachi FSS/1,350 × 600 × 1,045 mm/yes/500
• Containers device accommodates/Software can sort by	16, 13×100; 16, 13×75; 11.5×65.5 to 15.5×108 mm/specimen, method, output	16, 13 × 100; 16, 13 × 75/specimen, method, output
Specimen integrity monitor available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	TTI/—/yes/1,200	—
• Containers device accommodates/Maintenance required	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 mm up to 15.5 × 108 mm/every 6 mo.	—
Automated aliquotting available	no	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—	Hitachi AQN/1,350 × 1,200 × 1,045 mm/yes/400p + 800a
• Containers device accommodates	—	16, 13 × 100; 16, 13 × 75
• Inspects samples for bar code/Detects & reports clots in specimen	—	yes/yes
• Detects & reports quantity not sufficient specimens/Maintenance required	—	yes/—
Instrument (analyzer) interfaces		
• Rules-based instrument interface control subsystem	no	yes
• Process control of instrument via control subsystem	no	yes
Physical/hardware (instrument/specimen) interface		
• Hematology/Chemistry/Coagulation	—	no/point-of-reference sampling/point-of-reference sampling
• Immunoassay/Urinalysis	—	point-of-reference sampling/no
Instruments to which your system/product is interfaced	—	Roche Hitachi Modular Analytics, Roche cobas 6000 analyzer series
Other robotic products/components to which system, product is linked	—	Stago coagulation
Automated recapper or sealer available	recapper (as option)	recapper
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	recapping module/13.39 × 12.20 × 8.66/yes/1,100	Hitachi RSP/1,280 × 450 × 1,045/yes/500
• Recaps-seals multiple size tubes simultaneously/Containers device accomm.	yes/16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 mm up to 15.5 × 108 mm	yes/13 × 100; 13 × 75
• Maintenance required	every 6 months	—
Automated storage & retrieval available	yes	yes (storage)
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	—/—/no/1,200	—/1,350 mm × 600 mm × 1,045 mm/yes/500
• Containers device accommodates/Connects to the track	16, 13 × 100; 16, 13 × 75; 11.5 × 65.5 mm up to 15.5 × 108 mm/no	16, 13 × 100; 16, 13 × 75/yes
• Room temperature/Min. & max. No. of tubes stored per module	yes/—	yes/300 tubes
• Multiple size tubes can be stored in the same module/Maintenance required	yes/every 6 months	yes/no
• Refrigerated storage & retrieval capability	no	in development
Longitudinal upgrade pathway or plan to protect users' investments	independent of any analyzer company and modules can be upgraded	system can be extended or modified on-site to upgrade/change config.
Avg. time to install/Who provides service, support/Hours support is available	1 week/PVT LabSystems & partners/daily 8 AM–5 PM (EST); 24/7 on request	<1 week/Roche/24/7
On-site biomedical engineer required/User group meets regularly	no/no	no/yes
List price	$220,000	system configuration and design dependant
Individual list prices for components		
• Process control SW/Transportation systems/Auto. centrifugation	$15k–$45k/—/—	—
• Auto. input, accession/Auto. decap/Auto. sort/Auto. storage & retrieval	included/included/included/—	—
• Specimen integrity monitor/Automated aliquot	$13k/—	—
• Instrument (analyzer) interfaces/Automated recap	—/$50k	—
Distinguishing features	hardware and software completely customized; high throughput; upgradable with more modules	PMI cert. proj. management driven installs; lab auto design/consult team analyzes workflow of appro. system; manufactured and designed by Roche/Hitachi for seamless integration/reliability; aliquoting/recapping/ bar-code labeling; small, flexible footprint; avg. 8–12 min. processing time

** For basic bulding block unit*
*** Average throughput in specimen containers per hour per device*

Tabulation does not represent an endorsement by the College of American Pathologists.

Laboratory automation systems and workcells

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	Sarstedt, Inc. Peter Rumswinkel, VP/GM sarstedt@bellsouth.net P. O. Box 468, Newton, NC 28658 800-257-5101 www.sarstedt.com	Siemens Healthcare Diagnostics Pamela Curtin 1717 Deerfield Road, Deerfield, IL 60015 914-524-3824 www.siemens.com/diagnostics
Name of system/First year installed/No. of 2008 contracts signed	Sarstedt PVS	Advia Solutions/1998/—
No. of live sites installed in N. America/Europe/Asia-Australia	—	>140 U.S./>390 worldwide
Automation products that are available		
• Pre-analytical processor/Total laboratory automation	yes/no	yes/yes
• Automated functions: Accessioning/Track load/Centrifugation/Decapping	yes/—/no/yes	yes/yes/yes/yes
• Automated functions: Rack specific sort/Aliquot/Tube relabeling/Resealing	yes/yes/yes/yes	yes/no/no/in development
• Automated functions: Storage-retrieval/Intelligent sample routing	no/yes	yes/yes
• SW: Dedicated Process Control/Middleware control using LIS/Architecture	yes/yes/open	yes/yes/closed
• Company has dedicated automation support team/Remote sys. monitoring	yes/yes	yes/yes
Software features/functionality		
• Patient demographics & insurance data/Rules-based architecture	—/automation SW feature	LIS feature/automation SW feature
• Supports data retrieval/Internet connectivity	automation SW feature/—	automation SW feat./LIS feature
• Online real-time help system/QC/Stats & management reports	—/—/automation SW feature	automation SW feature/automation SW feature/automation SW feature
• Evaluates validity & releasability of results from automated analyzers	—	automation SW feature
• Specimen tracking/Priority processing/Random-access spec. movement	automation SW feature/automation SW feature/—	automation SW feature/automation SW feature/automation SW feature
• Supports accession No. redundancy (duplicate specimen ID)	automation SW feature	automation SW feature
• Supports specimen carrier & level identification	automation SW feature	automation SW feature
• Unique bar-code number per container required	automation SW feature	automation SW feature
• Specimen routing/Multistop routing (one tube to multiple workstations)	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Specimen scheduling/Instrument scheduling	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Routes test to workstation/Automatic reflex, repeat, dilutions	automation SW feature/—	automation SW feature/automation SW feature
• Supports multiple HW config./Supports other proprietary transport. HW	automation SW feature/—	automation SW feature/automation SW feature
• Sample storage & retrieval SW/Supports approved CLSI standards	—/automation SW feature	automation SW feature/automation SW feature
LIS(s) & versions interfaced & live w/ LAS/How LIS(s) are interfaced w/ your LAS	—	Siemens, Cerner, Meditech, SCC Soft, Misys, Data Innovations, OSI, Telepath-iSoft, Netlab, LMX Labzis II, SCL 2000, others/ASTM
Transportation systems available	no	yes
• Model/Dimen.* (H × W × D)*/Conforms to CLSI Stand. Auto 1-5	—	—/950 × 2,000 × 530 mm/yes
• Containers device accommodates/Avg. throughput in cm per second	—	16, 13 × 100; 16, 13 × 75, others/71.6
• Supports automatic rerouting for reflex-repeat-dilutions	—	yes
• Modular HW/Installed options/Device can operate in track & manual mode	—	yes/floor and subfloor mounted/yes
• Required utilities/Required maintenance	—	compressed air, electricity, water/weekly, monthly, quarterly, annually
• Carrier type/Scalable system	—	single specimen container per carrier/yes
Automated centrifugation available	no	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5	—	—/1,900 × 1,570 × 860 mm/yes
• Maximum throughput/Containers device accommodates	—	240/16, 13 × 100; 16, 13 × 75, others
• Can identify tube types for custom programmed rate & spin times per run	—	no
• More than one centrif. can be connected to track system	—	yes
• For multi-unit centrif., each centrif. operates independently for rate & time	—	yes
• Maintenance required	—	weekly, monthly, quarterly, annually
Automated input/accessioning available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—/—/yes/1200	—/1,900 × 2,040 × 860 mm/yes/600
• Containers device accommodates/Dedicated lanes for stat samples	16, 13 × 100; 16, 13 × 75; 13 × 65 to 16 × 100/—	16, 13 × 100; 16, 13 × 75, others/yes
• Maximum No. of samples that can be loaded/Maintenance required	up to 600, configuration dependent/quarterly	1,000/weekly, monthly, quarterly, annually
Automated decapping available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—/configuration dependent/yes/1,200	—/included in centrifuge module/yes/240; independent module/550
• Containers device accommodates/Maintenance required	16, 13 × 100; 16, 13 × 75, multiple/quarterly	16, 13 × 100; 16, 13 × 75, others/weekly, monthly, quarterly, annually
• Removes multiple size tube caps per run/ Removes screw type sample caps	yes/yes	yes/yes
Automated sorting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—/configuration dependent/yes/1,200	—/1,900 × 2,040 × 860 mm/yes/600
• Containers device accommodates/Software can sort by	16, 13 × 100; 16, 13 × 75, multiple/specimen, method, output	16, 13 × 100; 16, 13 × 75, others/specimen, method, output
Specimen integrity monitor available	under development	onboard each instrument
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	quality audit in development/configuration dependent/—/700	integrated on chemistry instrument
• Containers device accommodates/Maintenance required	16, 13 × 100; 16, 13 × 75, multiple/quarterly	16, 13 × 100; 16, 13 × 75, others/—
Automated aliquotting available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—/configuration dependent/yes/dependent upon number of aliquots and their volumes	—
• Containers device accommodates	16, 13 × 100; 16, 13 × 75, multiple	—
• Inspects samples for bar code/Detects & reports clots in specimen	yes/yes	—
• Detects & reports quantity not sufficient specimens/Maintenance required	yes/quarterly	—
Instrument (analyzer) interfaces		
• Rules-based instrument interface control subsystem	no	yes
• Process control of instrument via control subsystem	no	yes
Physical/hardware (instrument/specimen) interface		
• Hematology/Chemistry/Coagulation	—	robotic arm interface/pt-of-ref. sampling/robotic arm interface
• Immunoassay/Urinalysis	—	pt.-of-ref. sampling & robotic arm interface/pt.-of-ref. sampling
Instruments to which your system/product is interfaced	—	Advia 120/2120, Advia Centaur/Centaur XP, Immulite 2000/2500, Advia 1650/1800/2400; Stago, Tosoh, Dade, RxL†, CA-7000‡, Dimension Vista‡
Other robotic products/components to which system, product is linked	—	Siemens: SMS; Dade: STM
Automated recapper or sealer available	recapper	recapper in development
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	—/configuration dependent/yes/1,200	—
• Recaps-seals multiple size tubes simultaneously/Containers device accomm.	yes/16, 13 × 100; 16, 13 × 75; 13 mm–16 mm in diameter	—/—/16, 13 × 100; 16, 13 × 75, others
• Maintenance required	quarterly	—
Automated storage & retrieval available	no	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	—	—/1,900 × 2,040 × 860 mm/yes/600
• Containers device accommodates/Connects to the track	—	16, 13 × 100; 16, 13 × 75, others/yes
• Room temperature/Min. & max. No. of tubes stored per module	—	yes/1 & 1,000
• Multiple size tubes can be stored in the same module/Maintenance required	—	yes/weekly, monthly, quarterly, annually
• Refrigerated storage & retrieval capability	—	in development
Longitudinal upgrade pathway or plan to protect users' investments	systems are upgradeable	flexible & expandable: can contain as few as 2 interfaced components-instruments and can expand to up to 16 interfaces
Avg. time to install/Who provides service, support/Hours support is available	2–3 weeks/Sarstedt or authorized Sarstedt service co./contract dependent	configuration dependent/Siemens Heathcare Diagnostics/24/7
On-site biomedical engineer required/User group meets regularly	no/no	no/yes
List price	configuration dependent	varies by configuration
Individual list prices for components		
• Process control SW/Transportation systems/Auto. centrifugation	—	—
• Auto. input, accession/Auto. decap/Auto. sort/Auto. storage & retrieval	—	—
• Specimen integrity monitor/Automated aliquot	—	—
• Instrument (analyzer) interfaces/Automated recap	—	—
Distinguishing features	bulk loading module: tubes are dumped into a hopper, eliminating need for pre-racking; modular design enables configuration based on individual requirements; manufacturer of instr. and corresponding consumables	high throughput core lab automation with broad menu, single LIS connection, flexible configurations

** For basic bulding block unit*
*** Average throughput in specimen containers per hour per device*
†available x-US, in development for US; ‡in development

Tabulation does not represent an endorsement by the College of American Pathologists.

Laboratory automation systems and workcells

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	Siemens Healthcare Diagnostics Tim Keating 1717 Deerfield Road, Deerfield, IL 60015 302-631-9482 www.siemens.com/diagnostics	Sysmex America Inc. Nilam Patel pateln@sysmex.com 1 Nelson C. White Parkway, Mundelein, IL 60060 800-379-7639 ext. 4309 www.sysmex.com/usa
Name of system/First year installed/No. of 2008 contracts signed	StreamLab Analytical Workcell/2002/—	HST-N/1991/50+
No. of live sites installed in N. America/Europe/Asia-Australia	>100 U.S./>230 worldwide	230/1,600+ (Europe, Asia, Latin America, Canada, & Australia)
Automation products that are available		
• Pre-analytical processor/Total laboratory automation	yes/yes	no/no
• Automated functions: Accessioning/Track load/Centrifugation/Decapping	yes/yes/yes/yes	yes/no/no/no
• Automated functions: Rack specific sort/Aliquot/Tube relabeling/Resealing	yes/no/no/in development	yes/no/—/no
• Automated functions: Storage-retrieval/Intelligent sample routing	yes/yes	no/yes
• SW: Dedicated Process Control/Middleware control using LIS/Architecture	yes/yes/open	yes/yes/closed
• Company has dedicated automation support team/Remote sys. monitoring	yes/yes	yes/yes
Software features/functionality		
• Patient demographics & insurance data/Rules-based architecture	automation SW & LIS feature/automation SW feature	automation SW feature/automation SW feature
• Supports data retrieval/Internet connectivity	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Online real-time help system/QC/Stats & management reports	automation SW feat./ automation SW feat./ automation SW feat.	automation SW feature /automation SW feature /LIS feature
• Evaluates validity & releasability of results from automated analyzers	automation SW feature	automation SW feature
• Specimen tracking/Priority processing/Random-access spec. movement	automation SW feat./ automation SW feat./ automation SW feat.	automation SW feature/automation SW feature/yes
• Supports accession No. redundancy (duplicate specimen ID)	automation SW feature	automation SW feature
• Supports specimen carrier & level identification	automation SW & LIS feature	automation SW feature
• Unique bar-code number per container required	automation SW & LIS feature	automation SW feature
• Specimen routing/Multistop routing (one tube to multiple workstations)	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Specimen scheduling/Instrument scheduling	automation SW & LIS feature/automation SW & LIS feature	—/—
• Routes test to workstation/Automatic reflex, repeat, dilutions	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Supports multiple HW config./Supports other proprietary transport. HW	automation SW feature/automation SW feature	automation SW feature/automation SW feature
• Sample storage & retrieval SW/Supports approved CLSI standards	automation SW feature/automation SW feature	automation SW feature/automation SW feature
LIS(s) & versions interfaced & live w/LAS/How LIS(s) are interfaced w/your LAS	Cerner, Meditech, SCC, Misys, CHCS, LabGem, Swiss Lab, Medicom, Izasa, Confidentia, others/DBASTM, Dimension Protocol, HL7, ASTM	Cerner (Classic and Millenium), Misys, SCC, Meditech, GE/HL7 & ASTM
Transportation systems available	yes	yes
• Model/Dimen.* (H × W × D)*/Conforms to CLSI Stand. Auto 1-5	StreamLab/60 × 70 × 35in/yes	HSTN/depends on configuration/yes
• Containers device accommodates/Avg. throughput in cm per second	16, 13 × 100; 16, 13 × 75/300 tubes per hour	16 × 75; 13 × 75/min throughput 150/hr; max as high as lab needs/hr
• Supports automatic rerouting for reflex-repeat-dilutions	yes	yes
• Modular HW/Installed options/Device can operate in track & manual mode	yes/floor mounted/yes	yes/floor mounted/yes
• Required utilities/Required maintenance	compressed air, electricity/weekly	—/—
• Carrier type/Scalable system	single specimen container per carrier/yes	rack/yes
Automated centrifugation available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5	StreamLab/31 × 23 × 29 in/yes	—
• Maximum throughput/Containers device accommodates	up to 400 per hr/16, 13 × 100; 16, 13 × 75, handles various sizes simultan.	—
• Can identify tube types for custom programmed rate & spin times per run	yes	—
• More than one centrif. can be connected to track system	no	—
• For multi-unit centrif., each centrif. operates independently for rate & time	—	—
• Maintenance required	weekly, monthly	—
Automated input/accessioning available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	StreamLab/60 × 70 × 35 in/yes/300 tubes	—/—/—/—
• Containers device accommodates/Dedicated lanes for stat samples	16, 13 × 100; 16, 13 × 75/yes	—/—
• Maximum No. of samples that can be loaded/Maintenance required	up to 600/daily, monthly	200 samples per input module/—
Automated decapping available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	StreamLab/integrated with input-output track/yes/300	—
• Containers device accommodates/Maintenance required	16, 13 × 100; 16, 13 × 75/daily, monthly	—
• Removes multiple size tube caps per run/ Removes screw type sample caps	yes/yes	—
Automated sorting available	yes	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	StreamLab/integrated with input-output track/yes/300	PVT TS-series: low-mid volume ~5 × 3 ft.; high volume ~6 × 5 ft.
• Containers device accommodates/Software can sort by	16, 13 × 100; 16, 13 × 75/specimen, method, output	3 × 75/specimen, method, output
Specimen integrity monitor available	yes	yes (located within the analyzers)
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	StreamLab/integrated with analyzer/yes/300	—/—/—/—
• Containers device accommodates/Maintenance required	16, 13 × 100; 16, 13 × 75/—	—/—
Automated aliquotting available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	StreamLab/integrated with sample transfer module/yes/300	—
• Containers device accommodates	16, 13 × 100; 16, 13 × 75	—
• Inspects samples for bar code/Detects & reports clots in specimen	yes/yes	—
• Detects & reports quantity not sufficient specimens/Maintenance required	yes/daily	—
Instrument (analyzer) interfaces		
• Rules-based instrument interface control subsystem	yes	yes
• Process control of instrument via control subsystem	yes	yes
Physical/hardware (instrument/specimen) interface		
• Hematology/Chemistry/Coagulation	no/pt-of-ref samp. & rob. arm interf./pt-of-ref samp. & rob. arm interf.	point-of-reference sampling/—/—
• Immunoassay/Urinalysis	pt-of-ref sampling & robotic arm interface/no	—/—
Instruments to which your system/product is interfaced	Dimension RxL Max, Dimension Vista, Immulite 2000 & 2500; Sysmex CA 7000; Abbott Architect i2000, Advia Centaur (avail. outside U.S. only)	Bio-Rad Variant II Turbo Link A1C analyzer
Other robotic products/components to which system, product is linked	—	Thermo automation, Lab Interlink/Labotix, IDS
Automated recapper or sealer available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	StreamLab/40 × 36 × 17 in/yes/300	—
• Recaps-seals multiple size tubes simultaneously/Containers device accomm.	yes/13 × 100; 13 × 75; 16 × 100; 16 × 75	—
• Maintenance required	daily, monthly	—
Automated storage & retrieval available	yes	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	StreamLab SW & input-output module/—/yes/—	—
• Containers device accommodates/Connects to the track	13 × 100; 13 × 75; 16 × 100; 16 × 75 (47,952 storage capacity)/no	—
• Room temperature/Min. & max. No. of tubes stored per module	yes/up to 576	—
• Multiple size tubes can be stored in the same module/Maintenance required	yes/—	—
• Refrigerated storage & retrieval capability	in development	—
Longitudinal upgrade pathway or plan to protect users' investments	StreamLab systems are scalable with open configurations	—
Avg. time to install/Who provides service, support/Hours support is available	5 days/Siemens/24/7	<3 days/Sysmex/24/7
On-site biomedical engineer required/User group meets regularly	no/yes	no/no
List price	contact Siemens representative	dependent upon configuration, contact Sysmex
Individual list prices for components		
• Process control SW/Transportation systems/Auto. centrifugation	—	—
• Auto. input, accession/Auto. decap/Auto. sort/Auto. storage & retrieval	—	—
• Specimen integrity monitor/Automated aliquot	—	—
• Instrument (analyzer) interfaces/Automated recap	—	—
Distinguishing features	integrated automation solution with open architecture allows custom configuration and reconfiguraton by incorporating a 90-degree track turn, which helps maintain a small footprint	scalable, flexible, and reliable automation and instrument systems; fast installation (<3 days); scalable multi-site, multi-system middleware solutions that are developed, tested, and supported by Sysmex

** For basic bulding block unit*
*** Average throughput in specimen containers per hour per device*

Laboratory automation systems and workcells

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Sysmex America Inc.
Krista Curcio curciok@sysmex.com
1 Nelson C. White Parkway, Mundelein, IL 60060
800-379-7639 ext. 4613 www.sysmex.com/usa

Name of system/First year installed/No. of 2008 contracts signed	XE-Alpha N/1991/30
No. of live sites installed in N. America/Europe/Asia-Australia	250/650+ (Europe, Asia, Latin America, Canada, Australia)
Automation products that are available	
• Pre-analytical processor/Total laboratory automation	—/—
• Automated functions: Accessioning/Track load/Centrifugation/Decapping	yes/—/no/no
• Automated functions: Rack specific sort/Aliquot/Tube relabeling/Resealing	yes/no/—/no
• Automated functions: Storage-retrieval/Intelligent sample routing	no/—
• SW: Dedicated Process Control/Middleware control using LIS/Architecture	yes/yes/closed
• Company has dedicated automation support team/Remote sys. monitoring	yes/yes
Software features/functionality	
• Patient demographics & insurance data/Rules-based architecture	—/automation SW feature
• Supports data retrieval/Internet connectivity	automation SW feature/LIS feature
• Online real-time help system/QC/Stats & management reports	automation SW feature /automation SW feature /LIS feature
• Evaluates validity & releasability of results from automated analyzers	automation SW feature
• Specimen tracking/Priority processing/Random-access spec. movement	automation SW feature/automation SW feature/—
• Supports accession No. redundancy (duplicate specimen ID)	automation SW feature
• Supports specimen carrier & level identification	automation SW feature
• Unique bar-code number per container required	automation SW feature
• Specimen routing/Multistop routing (one tube to multiple workstations)	automation SW feature/automation SW feature
• Specimen scheduling/Instrument scheduling	—/—
• Routes test to workstation/Automatic reflex, repeat, dilutions	automation SW feature/automation SW feature
• Supports multiple HW config./Supports other proprietary transport. HW	—/automation SW feature
• Sample storage & retrieval SW/Supports approved CLSI standards	—/—
LIS(s) & versions interfaced & live w/ LAS/How LIS(s) are interfaced w/ your LAS	Cerner (Classic and Millennium), Misys, SCC, Meditech, GE/HL7 & ASTM
Transportation systems available	yes
• Model/Dimen.* (H × W × D)*/Conforms to CLSI Stand. Auto 1-5	Alpha N/2 × 7.3 × 3.4 feet
• Containers device accommodates/Avg. throughput in cm per second	16 × 75; 13 × 75/based on No. of analyzers
• Supports automatic rerouting for reflex-repeat-dilutions	no
• Modular HW/Installed options/Device can operate in track & manual mode	yes/—/yes
• Required utilities/Required maintenance	—/—
• Carrier type/Scalable system	rack/no
Automated centrifugation available	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5	—
• Maximum throughput/Containers device accommodates	—
• Can identify tube types for custom programmed rate & spin times per run	—
• More than one centrif. can be connected to track system	—
• For multi-unit centrif., each centrif. operates independently for rate & time	—
• Maintenance required	—
Automated input/accessioning available	yes
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—
• Containers device accommodates/Dedicated lanes for stat samples	—/no
• Maximum No. of samples that can be loaded/Maintenance required	100 samples per input module/—
Automated decapping available	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—
• Containers device accommodates/Maintenance required	—
• Removes multiple size tube caps per run/ Removes screw type sample caps	—
Automated sorting available	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—/—/yes/—
• Containers device accommodates/Software can sort by	—/—
Specimen integrity monitor available	yes (located within the analyzers)
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—
• Containers device accommodates/Maintenance required	—
Automated aliquotting available	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput**	—
• Containers device accommodates	—
• Inspects samples for bar code/Detects & reports clots in specimen	—
• Detects & reports quantity not sufficient specimens/Maintenance required	—
Instrument (analyzer) interfaces	
• Rules-based instrument interface control subsystem	yes
• Process control of instrument via control subsystem	yes
Physical/hardware (instrument/specimen) interface	
• Hematology/Chemistry/Coagulation	—
• Immunoassay/Urinalysis	—
Instruments to which your system/product is interfaced	—
Other robotic products/components to which system, product is linked	—
Automated recapper or sealer available	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	—
• Recaps-seals multiple size tubes simultaneously/Containers device accomm.	—
• Maintenance required	—
Automated storage & retrieval available	no
• Model/Dimen. (H × W × D)/Conforms to CLSI Stand. Auto 1-5/Avg. throughput*	—
• Containers device accommodates/Connects to the track	—
• Room temperature/Min. & max. No. of tubes stored per module	—
• Multiple size tubes can be stored in the same module/Maintenance required	—
• Refrigerated storage & retrieval capability	—
Longitudinal upgrade pathway or plan to protect users' investments	—
Avg. time to install/Who provides service, support/Hours support is available	1 day/Sysmex/24/7
On-site biomedical engineer required/User group meets regularly	no/no
List price	dependent upon configuration, contact Sysmex
Individual list prices for components	
• Process control SW/Transportation systems/Auto. centrifugation	—
• Auto. input, accession/Auto. decap/Auto. sort/Auto. storage & retrieval	—
• Specimen integrity monitor/Automated aliquot	—
• Instrument (analyzer) interfaces/Automated recap	—
Distinguishing features	scalable and flexible configurations with proven history; 1-day installation; scalable middleware solutions are developed & supported by Sysmex

** For basic bulding block unit*
*** Average throughput in specimen containers per hour per device*

Tabulation does not represent an endorsement by the College of American Pathologists.