

Chemistry analyzers (for low-volume labs)

Part 1 of 9	Abaxis Inc. Ron Blasig ronblasig@abaxis.com 3240 Whipple Rd. Union City, CA 94587 800-822-2947 www.abaxis.com
Name of instrument/First year sold in U.S.	Piccolo/1995
List price/No. of analyzers sold in 2005	\$18,000/—
No. units in clinical use in U.S./Outside U.S.	1,500/1,500
Country where designed/Manufactured/Where reagents mftd.	U.S./U.S./U.S.
Operational type/Reagent type	self-contained disk with multi-test reagent panel
Sample handling system/Model type	disk loaded directly into instrument/benchtop
Dimensions in inches (H x W x D)/Instrument footprint	9.5 x 6 x 11.5/1 sq ft
Tests available on instrument in U.S.	ALP, ALT, AST, GGT, amylase, albumin, total protein, bilirubin total, BUN, creatinine, calcium, cholesterol, glucose, uric acid, sodium, creatine kinase, potassium, TCO ₂ , chloride, cholesterol, HDL ratio, HDL, LDL, triglycerides-VLDL, phosphorus, direct bilirubin, magnesium, LD
Tests cleared but not clinically released	—
Tests not available in U.S. but submitted for 510(k) clearance	—
Tests not available in U.S. but available in other countries	none
Research-use-only assays/Tests in development	—
User-defined methods implemented for what analytes	none
Methods supported/Immunoassay methods	enzymatic/n/a
No. of direct ion selective electrode channels	n/a
• Must load separate reagent pack for each specimen/No. of diff. assays in pack	yes/4–14 analytes (chemistries) for 12 diff. chem./elec. profiles; reagent self-contained with each disk
• Separate reagent pack for each test run	no
No. of different measured assays onboard simultaneously	26
No. of different assays programmed, calibrated at once	14
No. of user-definable (open) channels/No. active simultaneously	0/n/a
No. of different analytes for which system accommodates reagent containers onboard at once/Tests per container set	4–14/self-contained disk with reagents 4–12
Shortest/Median onboard reagent stability/Refrigerated onboard	6 months/12 months/n/a
Multiple reagent configurations supported	yes
Reagent container placed directly on system for use	yes
Instrument has same capabilities when 3rd-party reagent used	n/a
Reagent only cost per reportable result for standard chemistries/Therapeutic drugs/Special analytes	\$0.64/n/a/n/a
Walkaway capacity in minutes/No. of specimens/No. of tests-assays	<15/1/14
System is liquid, dry, or reconstituted onboard	reconstitutes onboard
Uses disposable cuvettes/Max. No. stored	no/n/a
Uses washable cuvettes/Replacement frequency	no/n/a
Minimum sample volume aspirated precisely at one time	~100 µL
Supplied with UPS (backup power)/Requires floor drain	no/no
Requires dedicated water system/Water consumption in L per hour	no/n/a
Noise generated in decibels	none
Dedicated pediatric sample cup/Dead volume	no
Primary tube sampling/Pierces caps on primary tubes	no/n/a
Sample bar-code reading capability/Autodiscrimination	yes/—
Reagent bar-code reading capability	yes
Bar-code placement per CLSI standard Auto2A	yes
Onboard test auto inventory (determines volume in container)	n/a
Measures No. of tests remaining/Short sample detection/Clot detection	n/a/yes/yes
Automatic detection of adequate reagent for aspir. & analysis	yes
Hemolysis/Turbidity detection-quantitation	yes/yes
Dilution of patient samples onboard/Automatic rerun capability	yes/no
Sample volume can be reduced to rerun out-of-linear-range high results/Increased to rerun out-of-linear-range low results	n/a/n/a
Autocalibration or autocalibration alert	yes
Calibrants stored onboard/Multipoint calibration supported	yes/yes
Typical calib. frequency for ISE/Metabolites/Ther. drugs/Drugs of abuse	self-calibrated onboard/disk/—/—
Automatic shutdown/Startup programmable	yes/yes
Stat time to completion of all analytes, throughput per hr. for:	
• Sodium, potassium, chloride, TCO ₂	15 min, 4 specimens
• Sodium, potassium, chloride, TCO ₂ , glucose, urea, creatinine	15 min, 4 specimens
• Albumin, direct & total bili., AST, ALT, ALP	15 min, 4 specimens
Typical time delay from ordering stat test to aspir. of sample	n/a
How often QC required/Onboard SW capability to review QC	automatic QC onboard/yes
Onboard real-time QC/Support multiple QC lot Nos. per analyte	yes/yes
QC results transferred automatically to LIS	yes
Data mgmt. capability/Instrument vendor supplies LIS interface	onboard/no
Interfaces up and running in active user sites with	15
Bidirectional interface capability	no
Test results transmitted to LIS as soon as chem. time complete	yes
LIS interface operates simultaneously with running assays	yes
Uses LOINC to transmit orders & results	no
How labs get LOINC codes for reagent kits	—
Lab can control analyzer remotely	no
Interface avail. (or will be) to automated specimen handling system	n/a
Modem servicing available/Can diagnose own malfunctions/Determine malfunctioning component	no/yes/yes
On-site time of svc. engineer/Onboard error codes for troubleshooting	24-hr loaner/yes
Mean time between failures/To repair failures	3 years/—
Average time to complete maintenance by lab personnel	daily: none; weekly: none; monthly: none
Onboard maintenance records/Maint. training demo module	n/a/yes
Training provided with purchase/Advanced oper. training avail.	yes/yes
Annual service contract cost (24 h/7 d)	1-year warranty, extended warranty—\$1,200
Distinguishing features (supplied by company)	compact chemistry system using a few drops of whole blood, serum, or plasma provides turnaround of results at point of care, including hands-on time, in 15 minutes

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

Survey editor: Raymond Aller, MD

Menu and other enhancements underway

Anne Ford

As any parent who's ever tried to make dinner with a toddler, a teenager, and the family dog around knows, productivity often declines in direct inverse proportion to the number of entities on hand (or underfoot). That principle could hold true in the laboratory, too.

"The trend in the small-volume marketplace continues to be focused on reducing the total number of analyzers while improving efficiencies in the laboratory," says Dade Behring's Joseph Meola, marketing manager of chemistry/immunochemistry systems.

In other words, if you want to maximize, minimize.

This month's instrumentation survey covers chemistry analyzers for the low-volume laboratory. Like their larger cousins in last month's survey of mid- to high-volume chemistry analyzers, many of these instruments perform immunochemistry testing as well. But integration isn't the only card up manufacturers' collective sleeve; some of them have enhanced (or are planning to enhance) their instruments with other new capabilities, too.

Here's the rundown:

✓ To its Piccolo instrument, Abaxis has added a basic metabolic panel plus, which includes the eight BMP analytes plus Mg and LD; marketing director Ron Blasig says the panel was "designed specifically for oncologists."

✓ Nova Biomedical plans to add total bilirubin to its Nova Stat Profile Critical Care Xpress analyzer "in the very near future," says marketing communications manager Harlan Polishook. Also known as the CCX, the analyzer measures chemistries and electrolytes such as glucose, BUN, creatinine, sodium, potassium, and chloride. It can also calculate and report TCO₂.

✓ Forthcoming from Hemagen Diagnostics later this year: a benchtop analyzer that, says James J. Miller, general manager in the company's automated clinical chemistries systems division, "will offer state-of-the-art features with our proven rotor technology and our legendary accuracy."

✓ In the last quarter of 2006, Dade Behring will introduce QCC PowerPak, "an efficiency enhancement package that brings exciting new calibration, QC, and data storage features to the Dimension Xpand Plus, a second-generation integrated chemistry/immunochemistry system," says Meola. James Meenan, Dade Behring's marketing manager for chemistry/immunochemistry methods, adds: "Low-volume NT-proBNP, Ecstasy, extended-range cyclosporine, and CardioPhase hsCRP have just been introduced on the Dimension Xpand Plus system. In addition, Dade Behring plans to expand its immunosuppressive drug menu."

✓ Finally, Beckman Coulter anticipates expanding its UniCel line, which comprises the DxC 600 and DxC 800 chemistry systems and the DxC 600i integrated workstation, into the low-volume laboratory market. Dave Heibel, director of product management marketing for chemistry and protein systems, says the UniCel analyzers "are designed to meet different testing volume requirements within a network. All systems, whether high-volume or low-volume, offer the same complete menu."

CAP TODAY's survey of chemistry analyzers for the low-volume laboratory includes systems from the manufacturers cited above and from Abbott Point of Care, Alfa Wassermann, Clinical Data, Ortho-Clinical Diagnostics, Randox Laboratories, Roche Diagnostics, and Thermo Electron Corp. Vendors supplied the information listed. Readers interested in a particular analyzer should confirm that it has the stated features and capabilities.

Anne Ford is a writer in Chicago.

SURVEY OF INSTRUMENTS

Chemistry analyzers (for low-volume laboratories)

<p>Part 2 of 9</p> <p><i>See accompanying article on page 19</i></p>	<p>Abbott Point of Care Glen Tinevez glen.tinevez@abbott.com 104 Windsor Center Dr. East Windsor, NJ 08520 800-827-7828 www.abbottpointofcare.com</p>	<p>Alfa Wassermann Diagnostic Technologies LLC info@alfawassermannus.com 4 Henderson Dr. West Caldwell, NJ 07006 800-220-4488 www.alfawassermannus.com</p>
<p>Name of instrument/First year sold in U.S. List price/No. of analyzers sold in 2005 No. units in clinical use in U.S./Outside U.S. Country where designed/Manufactured/Where reagents mftd. Operational type/Reagent type</p>	<p>i-STAT 1 Analyzer/2000 \$8,761/— 30,000+ worldwide U.S./U.S./Canada —/self-contained single-use cartridges packages-slides</p>	<p>ACE/1993; ACE Alera Clinical Chemistry System/2004 \$69,995/— 1,000+/600+ U.S./U.S./U.S. batch, random access, discrete, cont. random access, stat/closed reagent system with open reagent system channel ring with up to 5 segments (15 samples/seg.)/benchtop ACE: 15.75 x 27.25 x 22.50; ACE Alera: 18 x 27.5 x 22.5/4.3 sq ft</p>
<p>Sample handling system/Model type Dimensions in inches (H x W x D)/Instrument footprint</p>	<p>n/a/handheld 9.25 x 3.0 x 2.85/< 1 sq ft</p>	<p>ACE/1993; ACE Alera Clinical Chemistry System/2004 \$69,995/— 1,000+/600+ U.S./U.S./U.S. batch, random access, discrete, cont. random access, stat/closed reagent system with open reagent system channel ring with up to 5 segments (15 samples/seg.)/benchtop ACE: 15.75 x 27.25 x 22.50; ACE Alera: 18 x 27.5 x 22.5/4.3 sq ft</p>
<p>Tests available on instrument in U.S.</p>	<p>tropinin I, CK-MB, lactate, BUN, creatinine, glucose, ionized calcium, sodium, potassium, chloride, hematocrit, pH, PCO₂, PO₂, TCO₂, ACTc, ACTk, PT/INR; calculated: hemoglobin, HCO₃, BEecf, SO₂, anion gap</p>	<p>albumin, gamma GT, bilirubin direct & total, calcium, creatinine, glucose, in. phosphorus, total iron, magnesium, total protein, BUN, uric acid, amylase, AST (GOT), alkaline phosphatase, ALT (GPT), CK, LDH, cholesterol, HDL-C, LDL-C, triglycerides, sodium, potassium, chloride, CO₂, digoxin, T4, T-uptake, HbA1c, hsCRP</p>
<p>Tests cleared but not clinically released Tests not available in U.S. but submitted for 510(k) clearance Tests not available in U.S. but available in other countries Research-use-only assays/Tests in development User-defined methods implemented for what analytes</p>	<p>n/a BNP n/a n/a/n/a n/a</p>	<p>none none UIBC none/lipase, homocysteine, Lp(a), microalbumin, ApoAI, Apo B, TIBC open channel bottles are available for user-derived or third party reagents</p>
<p>Methods supported/Immunoassay methods</p>	<p>potentiometry, amperometric, conductometric/—</p>	<p>photometry, potentiometry, turbidimetric/homogeneous EIA</p>
<p>No. of direct ion selective electrode channels • Must load separate reagent pack for each specimen/No. of diff. assays in pack • Separate reagent pack for each test run No. of different measured assays onboard simultaneously No. of different assays programmed, calibrated at once No. of user-definable (open) channels/No. active simultaneously No. of different analytes for which system accommodates reagent containers onboard at once/Tests per container set Shortest/Median onboard reagent stability/Refrigerated onboard Multiple reagent configurations supported Reagent container placed directly on system for use Instrument has same capabilities when 3rd-party reagent used Reagent only cost per reportable result for standard chemistries/Therapeutic drugs/Special analytes Walkaway capacity in minutes/No. of specimens/No. of tests-assays System is liquid, dry, or reconstituted onboard Uses disposable cuvettes/Max. No. stored Uses washable cuvettes/Replacement frequency Minimum sample volume aspirated precisely at one time Supplied with UPS (backup power)/Requires floor drain Requires dedicated water system/Water consumption in L per hour Noise generated in decibels Dedicated pediatric sample cup/Dead volume Primary tube sampling/Pierces caps on primary tubes Sample bar-code reading capability/Autodiscrimination</p>	<p>10 yes/up to 13 yes n/a 18 n/a/n/a n/a/unit use n/a/14 days/no no n/a n/a based on volume/n/a/based on volume 2 min/1/up to 18 — no/— no/— 16 µL no/no no/n/a none no/n/a no/no yes, shortly before sample is aspirated, by handheld scanner as tubes are loaded, at the bedside (2 of 5 interleaved, Codabar, codes 39 & 128)/yes</p>	<p>3 no/n/a no 40 200 15/15 40/100–150 tests per bottle 120 hr/30 days/yes (10–14°C) yes yes yes \$0.16/\$3.50/\$3.50 75/75/248 liquid yes/248 no/n/a 3 µL yes/no no/n/a 55 no/n/a yes/yes yes, as sample is being aspirated (2 of 5 interleaved, Codabar, code 39, code 128 set B & C)/yes</p>
<p>Reagent bar-code reading capability Bar-code placement per CLSI standard Auto2A Onboard test auto inventory (determines volume in container) Measures No. of tests remaining/Short sample detection/Clot detection Automatic detection of adequate reagent for aspir. & analysis Hemolysis/Turbidity detection-quantitation Dilution of patient samples onboard/Automatic rerun capability Sample volume can be reduced to rerun out-of-linear-range high results/ Increased to rerun out-of-linear-range low results Autocalibration or autocalibration alert Calibrants stored onboard/Multipoint calibration supported Typical calib. frequency for ISE/Metabolites/Ther. drugs/Drugs of abuse Automatic shutdown/Startup programmable</p>	<p>yes yes n/a n/a/yes/yes yes no/no no/no no/no yes no/yes each test/each test/—/— yes/yes</p>	<p>yes, proprietary dot coding no yes yes/yes/no yes bichromatic correction for both yes/yes yes/no yes no/yes 3 hr/30 days/45 days with 48 hr updates/n/a n/a/n/a</p>
<p>Stat time to completion of all analytes, throughput per hr. for: • Sodium, potassium, chloride, TCO₂ • Sodium, potassium, chloride, TCO₂, glucose, urea, creatinine • Album., direct & total bili., AST, ALT, ALP Typical time delay from ordering stat test to aspir. of sample How often QC required/Onboard SW capability to review QC Onboard real-time QC/Support multiple QC lot Nos. per analyte QC results transferred automatically to LIS</p>	<p>2 min, n/a 2 min, n/a n/a, n/a none shortest interval: 24 hr; longest interval: each new lot or reagent/yes yes/yes yes</p>	<p>4 min, 35 specimens 8 min, 20 specimens 12 min, 12 specimens immediate response, as soon as 10 sec daily/yes yes/yes yes</p>
<p>Data mgmt. capability/Instrument vendor supplies LIS interface</p>	<p>optional add-on (<\$30,000, SW mfr: Abbott Point of Care)/yes (add'l cost)</p>	<p>onboard/no</p>
<p>Interfaces up and running in active user sites with</p>	<p>all systems</p>	<p>Schuyler House, Antek, LabPak, others</p>
<p>Bidirectional interface capability Test results transmitted to LIS as soon as chem. time complete LIS interface operates simultaneously with running assays Uses LOINC to transmit orders & results How labs get LOINC codes for reagent kits</p>	<p>yes (broadcast download & host query) yes yes yes customized on site</p>	<p>yes (broadcast download) yes, when requisition is done yes no n/a</p>
<p>Lab can control analyzer remotely Interface avail. (or will be) to automated specimen handling system</p>	<p>yes n/a</p>	<p>no no</p>
<p>Modem servicing available/Can diagnose own malfunctions/ Determine malfunctioning component On-site time of svc. engineer/Onboard error codes for troubleshooting Mean time between failures/To repair failures Average time to complete maintenance by lab personnel Onboard maintenance records/Maint. training demo module Training provided with purchase/Advanced oper. training avail. Annual service contract cost (24 h/7 d)</p>	<p>yes/yes/yes replacement within 24 hr/yes not determined/replacement within 24 hr daily: none; weekly: none; monthly: none n/a/n/a —/yes \$750</p>	<p>no/yes/yes 24 hr/yes 2 per yr/1 hr daily: 15 min; weekly: 45 min; monthly: 60 min yes/no 4.5 days at manufacturer's facility/yes varies, several programs available</p>
<p>Distinguishing features (supplied by company)</p>	<p>handheld portable analyzer, unit use system can perform chemistry, blood gas, cardiac marker, and coagulation tests on two drops of whole blood or plasma</p>	<p>easy-to-use, multitasking software; closed-tube sampling; stat interrupt capability; extensive test menu; onboard sample and reagent refrigeration; onboard reagent inventory management</p>

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Chemistry analyzers (for low-volume laboratories)

Part 3 of 9	Beckman Coulter Inc. 200 South Kraemer Blvd. P.O. Box 8000 Brea, CA 92822-8000 800-526-3821 www.beckmancoulter.com	Beckman Coulter Inc. 200 South Kraemer Blvd. P.O. Box 8000 Brea, CA 92822-8000 800-526-3821 www.beckmancoulter.com
See accompanying article on page 19		
Name of instrument/First year sold in U.S. List price/No. of analyzers sold in 2005 No. units in clinical use in U.S./Outside U.S. Country where designed/Manufactured/Where reagents mftd. Operational type/Reagent type Sample handling system/Model type Dimensions in inches (H x W x D)/Instrument footprint	Synchron CX3 Delta/1995 \$72,300/— —/— U.S./U.S./U.S. & Ireland continuous random access/open reagent system sectors, centrifugable/floor-standing 69 x 27 x 30/5.6 sq ft	Synchron CX4 Pro/2001 \$162,400/— —/— U.S./U.S./U.S. & Ireland continuous random access/open reagent system sectors, centrifugable/floor-standing 69 x 47 x 30/9.8 sq ft
Tests available on instrument in U.S.	sodium, potassium, chloride, CO ₂ , calcium, creatinine, BUN, glucose, total protein	alb, ALP, ALT, amylase, AST, BUN, calc., CO ₂ , chloride, cholest., CK-MB, creatinine, dir. bilirubin, GGT, glucose, HDLD, iron/TIBC, lipase, LD, LDLD, Mg, phosphorus, potassium, sodium, total protein, total bilirubin, triglyceride, triglyceride glycerol blanked, urea, uric acid; esoteric chemistries: ammonia, cholinesterase, hemoglobin A1c, lactate, micro-albumin, prealbumin, salicylate; drugs of abuse testing; therapeutic drug monitoring; proteins: anti-streptolysin O, IgA, IgM, IgG, rheumatoid factor, transferrin; thyroids: thyroxine, T-up, P-amylase, C-reactive protein, creatine kinase
Tests cleared but not clinically released Tests not available in U.S. but submitted for 510(k) clearance Tests not available in U.S. but available in other countries Research-use-only assays/Tests in development User-defined methods implemented for what analytes	none none none none/none none	none none none none/none UIBC, cyclosporine, homocysteine, lithium
Methods supported/Immunoassay methods No. of direct ion selective electrode channels • Must load separate reagent pack for each specimen/No. of diff. assays in pack • Separate reagent pack for each test run No. of different measured assays onboard simultaneously No. of different assays programmed, calibrated at once No. of user-definable (open) channels/No. active simultaneously No. of different analytes for which system accommodates reagent containers onboard at once/Tests per container set Shortest/Median onboard reagent stability/Refrigerated onboard Multiple reagent configurations supported Reagent container placed directly on system for use Instrument has same capabilities when 3rd-party reagent used Reagent only cost per reportable result for standard chemistries/Therapeutic drugs/Special analytes Walkaway capacity in minutes/No. of specimens/No. of tests-assays System is liquid, dry, or reconstituted onboard Uses disposable cuvettes/Max. No. stored Uses washable cuvettes/Replacement frequency Minimum sample volume aspirated precisely at one time Supplied with UPS (backup power)/Requires floor drain Requires dedicated water system/Water consumption in L per hour Noise generated in decibels Dedicated pediatric sample cup/Dead volume Primary tube sampling/Pierces caps on primary tubes Sample bar-code reading capability/Autodiscrimination Reagent bar-code reading capability Bar-code placement per CLSI standard Auto2A Onboard test auto inventory (determines volume in container) Measures No. of tests remaining/Short sample detection/Clot detection Automatic detection of adequate reagent for aspir. & analysis Hemolysis/Turbidity detection-quantitation Dilution of patient samples onboard/Automatic rerun capability Sample volume can be reduced to rerun out-of-linear-range high results/ Increased to rerun out-of-linear-range low results Autocalibration or autocalibration alert Calibrants stored onboard/Multipoint calibration supported Typical calib. frequency for ISE/Metabolites/Ther. drugs/Drugs of abuse Automatic shutdown/Startup programmable	photometry, potentiometry/turbidimetric, direct turbidimetric, particle-enhanced turbidimetric, enzyme immunoassay 4 no no 9 9 0 9/400–2,400 tests per container 168 hr/30 days/yes (2–8°C) yes yes yes assay dependent 400/63/1,827 liquid no/n/a yes/permanent–2-yr warranty 3 µL yes/no yes/7 L 70 yes/40 µL yes/no yes, on sample transport, shortly before sample is aspirated (2 of 5 interleaved, Codabar, codes 39 & 128)/yes yes yes yes yes/yes/yes yes yes/yes yes/no —/— yes no/yes 24 hr/n/a/n/a/n/a none required	photometry, potentiometry, turbidimetric/bidentate turbidimetric, direct turbidimetric, particle enhanced turbidimetric, enzyme immunoassay n/a no no 24 50 96/24 24/2,400–9,600 (100–900 tests per container) 168 hr/30 days/yes (2–8°C) yes yes yes assay dependent 400/63/1,512 liquid no/n/a yes/permanent–2-yr warranty (80 stored on instrument) 3 µL yes/no yes/7 L 70 yes/40 µL yes/no yes, on sample transport, shortly before sample is aspirated (2 of 5 interleaved, Codabar, codes 39 & 128)/yes yes yes yes yes/yes/yes yes yes/yes yes/no yes/no yes no/yes n/a/up to 90 days/60 days/14 days none required
Stat time to completion of all analytes, throughput per hr. for: • Sodium, potassium, chloride, TCO ₂ • Sodium, potassium, chloride, TCO ₂ , glucose, urea, creatinine • Album., direct & total bili., AST, ALT, ALP Typical time delay from ordering stat test to aspir. of sample How often QC required/Onboard SW capability to review QC Onboard real-time QC/Support multiple QC lot Nos. per analyte QC results transferred automatically to LIS	52 sec, 75 8 min, 75 n/a, n/a 45 sec 24 hr/yes yes/yes yes	n/a, n/a n/a, n/a 10 min, 32 specimens 45 sec 24 hr/yes yes/yes yes
Data mgmt. capability/Instrument vendor supplies LIS interface Interfaces up and running in active user sites with Bidirectional interface capability Test results transmitted to LIS as soon as chem. time complete LIS interface operates simultaneously with running assays Uses LOINC to transmit orders & results How labs get LOINC codes for reagent kits	onboard & optional add-on (SW mfr: Beckman Coulter DL2000)/yes (add'l cost) Cerner, Misys, Mediatech, Citation, MedLab, CHC, Siemens, McKesson, Labquest, CCA, VA-Mumps, others yes (broadcast download & host query) yes yes no —	onboard & optional add-on (SW mfr: Beckman Coulter DL2000)/yes (add'l cost) Cerner, Misys, Mediatech, Citation, MedLab, CHC, Siemens, McKesson, Labquest, CCA, VA-Mumps, others yes (broadcast download & host query) yes yes no —
Lab can control analyzer remotely Interface avail. (or will be) to automated specimen handling system	no no	no yes
Modem servicing available/Can diagnose own malfunctions/ Determine malfunctioning component On-site time of svc. engineer/Onboard error codes for troubleshooting Mean time between failures/To repair failures Average time to complete maintenance by lab personnel Onboard maintenance records/Maint. training demo module Training provided with purchase/Advanced oper. training avail. Annual service contract cost (24 h/7 d)	yes/yes/no metro: same day; rural: same or next day/yes n/a/n/a daily: 5 min; weekly: 15 min; monthly: 20 min no/no 1 day on site, 5 days at vendor offices/no n/a	yes/yes/no metro: same day; rural: same or next day/yes —/— daily: 5 min; weekly: 15 min; monthly: 20 min no/no 1 day on site, 5 days at vendor offices/no —
Distinguishing features (supplied by company)	fast stat chemistry analyzer; centrifugable sectors; bar-coded calibrations and controls; host query; reagent load while running; ready-to-use liquid reagents; ISE system; pulsed xenon light source; available DL2000 Sample Manager	serum indices; centrifugable sectors; clot detection; bar-coded calibrators and controls; host query; reagent load while running; ready-to-use liquid reagents; Peltier thermal ring; pulsed xenon light source; polychromatic correction; semipermanent glass cuvettes; available DL2000 Sample Manager

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Chemistry analyzers (for low-volume laboratories)

Part 4 of 9	Beckman Coulter Inc. 200 South Kraemer Blvd. P.O. Box 8000 Brea, CA 92822-8000 800-526-3821 www.beckmancoulter.com	Clinical Data Inc. 2 Thurber Blvd. Smithfield, RI 02917 800-345-2822 www.clda.com
See accompanying article on page 19		
Name of instrument/First year sold in U.S. List price/No. of analyzers sold in 2005 No. units in clinical use in U.S./Outside U.S. Country where designed/Manufactured/Where reagents mftd. Operational type/Reagent type Sample handling system/Model type Dimensions in inches (H x W x D)/Instrument footprint	Synchron CX5 Pro/2001 \$193,500/— —/— U.S./U.S./U.S. & Ireland continuous random access/open reagent system sectors, centrifugable/floor-standing 69 x 61 x 30/12.7 sq ft	Vitalab Selectra E/— —/— 7/5,000 Netherlands/Netherlands/U.S. random access/self-contained multi-use cartridges-packages-slides rotor/benchtop 19 x 45 x 22/8 sq ft
Tests available on instrument in U.S.	alb, ALP, ALT, amylase, AST, BUN, calc., CO ₂ , chloride, cholest., CK-MB, creatinine, dir. bilirubin, GGT, glucose, HDL, iron/TIBC, lipase, LD, LDL, Mg, phosphorus, potassium, sodium, total protein, total bilirubin, triglyceride, triglyceride glycerol blanked, urea, uric acid; esoteric chemistries: ammonia, cholinesterase, hemoglobin A1c, lactate, micro-albumin, prealbumin, salicylate; drugs of abuse testing; therapeutic drug monitoring; proteins: anti-streptolysin O, IgA, IgM, IgG, rheumatoid factor, transferrin; thyroids: thyroxine, T-up, P-amylase, C-reactive protein, creatine kinase	ALT, alkaline phosphatase, albumin, amylase, aspartate transaminase, bilirubin direct & total, calcium, CO ₂ , chloride, cholesterol, CPK, creatinine, digoxin, direct HDL & LDL, GGT, glucose, total iron, LDL, magnesium, phenobarbital, phenytoin, phosphorus, potassium, total protein, sodium, theophylline, triglycerides, BUN, uric acid, HbA1c
Tests cleared but not clinically released	none	—
Tests not available in U.S. but submitted for 510(k) clearance	none	—
Tests not available in U.S. but available in other countries	none	—
Research-use-only assays/Tests in development	none/none	none/hsCRP
User-defined methods implemented for what analytes	UIBC, cyclosporine, homocysteine, lithium	—
Methods supported/Immunoassay methods	photometry, potentiometry, turbidimetric/bidentate turbidimetric, direct turbidimetric, particle enhanced turbidimetric, enzyme immunoassay	photometry, potentiometry (ISE)/immunoturbidimetric
No. of direct ion selective electrode channels	5 (indirect)	4
• Must load separate reagent pack for each specimen/No. of diff. assays in pack	no	no
• Separate reagent pack for each test run	no	no
No. of different measured assays onboard simultaneously	29	26
No. of different assays programmed, calibrated at once	50	—
No. of user-definable (open) channels/No. active simultaneously	100/29	6/26
No. of different analytes for which system accommodates reagent containers onboard at once/Tests per container set	29/2,900-69,600 (100-2,400 tests per container)	31/—
Shortest/Median onboard reagent stability/Refrigerated onboard	168 hr/30 days/yes (2-8°C)	72 hr/7 days/yes (12°C below ambient)
Multiple reagent configurations supported	yes	yes
Reagent container placed directly on system for use	yes	yes
Instrument has same capabilities when 3rd-party reagent used	yes	yes
Reagent only cost per reportable result for standard chemistries/Therapeutic drugs/Special analytes	assay dependent	—/—/—
Walkaway capacity in minutes/No. of specimens/No. of tests-assays	400/63/1,827	120/50/~1,500
System is liquid, dry, or reconstituted onboard	liquid	liquid
Uses disposable cuvettes/Max. No. stored	no/n/a	no
Uses washable cuvettes/Replacement frequency	yes/permanent-2-yr warranty (80 stored on instrument)	yes/~10,000 tests
Minimum sample volume aspirated precisely at one time	3 µL	1 µL
Supplied with UPS (backup power)/Requires floor drain	yes/no	yes/no
Requires dedicated water system/Water consumption in L per hour	yes/7 L	no/~0.5 L
Noise generated in decibels	70	—
Dedicated pediatric sample cup/Dead volume	yes/40 µL	yes/20 µL
Primary tube sampling/Pierces caps on primary tubes	yes/no	yes/no
Sample bar-code reading capability/Autodiscrimination	yes, on sample transport, shortly before sample is aspirated (2 of 5 interleaved, Codabar, codes 39 & 128)/yes	yes, by handheld scanner as tubes are loaded onto instrument (2 of 5 interleaved, UPC, Codabar, codes 39 & 128)/—
Reagent bar-code reading capability	yes	no
Bar-code placement per CLSI standard Auto2A	yes	yes
Onboard test auto inventory (determines volume in container)	yes	yes
Measures No. of tests remaining/Short sample detection/Clot detection	yes/yes/yes	yes/yes/yes
Automatic detection of adequate reagent for aspir. & analysis	yes	—
Hemolysis/Turbidity detection-quantitation	yes/yes	no/no
Dilution of patient samples onboard/Automatic rerun capability	yes/no	yes/yes
Sample volume can be reduced to rerun out-of-linear-range high results/Increased to rerun out-of-linear-range low results	yes/no	yes/no
Autocalibration or autocalibration alert	yes	yes
Calibrants stored onboard/Multipoint calibration supported	no/yes	yes/—
Typical calib. frequency for ISE/Metabolites/Ther. drugs/Drugs of abuse	24 hr/up to 90 days/60 days/14 days	4 hr/7 days/—/—
Automatic shutdown/Startup programmable	none required	yes/yes
Stat time to completion of all analytes, throughput per hr. for:		
• Sodium, potassium, chloride, TCO ₂	52 sec, 75 specimens	8 min, —
• Sodium, potassium, chloride, TCO ₂ , glucose, urea, creatinine	8 min, 75 specimens	10 min, —
• Album., direct & total bili., AST, ALT, ALP	10 min, 32 specimens	10 min, —
Typical time delay from ordering stat test to aspir. of sample	45 sec	6 min
How often QC required/Onboard SW capability to review QC	24 hr/yes	4 hr/daily
Onboard real-time QC/Support multiple QC lot Nos. per analyte	yes/yes	yes/yes
QC results transferred automatically to LIS	yes	—
Data mgmt. capability/Instrument vendor supplies LIS interface	onboard & optional add-on (SW mfr: Beckman Coulter DL2000)/yes (add'l cost)	optional add-on/yes (add'l cost)
Interfaces up and running in active user sites with	Cerner, Misys, Meditech, Citation, MedLab, CHC, Siemens, McKesson, Labquest, CCA, VA-Mumps, others	—
Bidirectional interface capability	yes (broadcast download & host query)	yes
Test results transmitted to LIS as soon as chem. time complete	yes	yes
LIS interface operates simultaneously with running assays	yes	yes
Uses LOINC to transmit orders & results	no	—
How labs get LOINC codes for reagent kits	n/a	—
Lab can control analyzer remotely	no	no
Interface avail. (or will be) to automated specimen handling system	yes	no
Modem servicing available/Can diagnose own malfunctions/Determine malfunctioning component	yes/yes/no	no/yes/yes
On-site time of svc. engineer/Onboard error codes for troubleshooting	metro: same day; rural: same or next day/yes	within 24 hr/yes
Mean time between failures/To repair failures	—/—	6 months/4 hr
Average time to complete maintenance by lab personnel	daily: 5 min; weekly: 15 min; monthly: 20 min	daily: 10 min; weekly: 20 min; monthly: 60 min
Onboard maintenance records/Maint. training demo module	no/no	no/yes
Training provided with purchase/Advanced oper. training avail.	1 day on site, 5 days at vendor offices/no	5 days on site/yes
Annual service contract cost (24 h/7 d)	—	n/a
Distinguishing features (supplied by company)	serum indices; centrifugable sectors; clot detection; bar-coded calibrators and controls; host query; reagent load while running; ready-to-use liquid reagents; Peltier thermal ring; ISE system; pulsed xenon light source; polychromatic correction; semipermanent glass cuvettes; available DL2000 Sample Manager	reusable cuvette; dry ISE with CO ₂ ; 2-30 µL sample size; onboard wash system; ready-to-use liquid reagents

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

Chemistry analyzers (for low-volume laboratories)

Part 5 of 9	Dade Behring Inc. 1717 Deerfield Rd. Deerfield, IL 60015 800-242-3233 www.dadebehring.com	Hemagen Diagnostics Inc. sales@hemagen.com 9033 Red Branch Rd. Columbia, MD 21045 443-367-5500 www.hemagen.com
<i>See accompanying article on page 19</i>		
Name of instrument/First year sold in U.S.	Dimension Xpand Plus Integrated Chemistry System/2004	Analyst Benchtop Chemistry System/1986
List price/No. of analyzers sold in 2005	—/—	\$6,900/—
No. units in clinical use in U.S./Outside U.S.	1,200/800	—/—
Country where designed/Manufactured/Where reagents mftd.	U.S./U.S./U.S.	France/U.S./U.S.
Operational type/Reagent type	continuous random access/self-contained single-use & multi-use cartridges	batch/self-contained single-use cartridges-packages-slides
Sample handling system/Model type	racks/floor-standing	rotors/benchtop
Dimensions in inches (H x W x D)/Instrument footprint	45 x 51 x 31 (without monitor)/10.6 sq ft	8.5 x 25 x 13/2.25 sq ft
Tests available on instrument in U.S.	ser. acetamino., acid phos., alb., alk. phos., ALT, ammonia, amylase, AST, automated HDL & LDL, C3 compl., C4, calc., carbamaz., CO ₂ , chlor., cholesterol, CRP, creat. kin., creatinine, CK-MB isoenzyme, digitoxin, digoxin, ethyl alcohol, gentamicin, GGT, glucose, HbA1c, IgA/G/M, iron, lactic acid, LDH, lidoc., lipase, lith., magnes., microalb., n-acetylprocain., NT-pro BNP, phenobart., pheny., phosphorus, potas., prealbum., procainam., pseudocholesterol, ser. salicyl., sod., ser. TCA, theophyl., thyronine uptake, TIBC, tobramycin, tot. protein, tPSA, tot. T4/thyroxine, transferrin, triglycerides, urea nitrog., uric acid, urine amphet. Screen, urine barbitura. screen, benzodiazepine., cannabinoids, cocaine metabolite, methadone, opiates, phencyclidine, TBIL, DBIL, cyclosporine, ferritin, fPSA, free T4/thyroxine, hCG, myoglobin, TSH, triiodothyronine, trop. I, urine/CSF protein, valporic acid, vancomycin	ALP, GGT, GPT, GOT, BUN, glucose, calcium, cholesterol, creatinine, triglycerides, amylase, uric acid, total bilirubin, total protein, HDL cholesterol
Tests cleared but not clinically released	—	none
Tests not available in U.S. but submitted for 510(k) clearance	—	none
Tests not available in U.S. but available in other countries	—	none
Research-use-only assays/Tests in development	—/sirolimus, tacrolimus, serum barb., serum benzodiazep., serum TCA, myeloperox., urine ecstasy, urine propoxy., CSEA, mycophenolic acid	none/—
User-defined methods implemented for what analytes	—	none
Methods supported/Immunoassay methods	photometry, potentiometry, turbidimetric assays/Petinia, Emit, Acmia, mag. part. sep.	photometry/—
No. of direct ion selective electrode channels	3	—
• Must load separate reag. pack for each specimen/No. of diff. assays in pack	no	yes/14
• Separate reag. pack for each test run	no	no
No. of different measured assays onboard simultaneously	47	—
No. of different assays programmed, calibrated at once	190	14
No. of user-definable (open) channels/No. active simultaneously	10/10	—/—
No. of different analytes for which system accommodates reag. containers onboard at once/Tests per container set	47/15-360	14/14
Shortest/Median onboard reag. stability/Refrigerated onboard	72 hr/30 days/yes (2-8°C)	—/—/—
Multiple reag. configurations supported	yes	—
Reag. container placed directly on system for use	yes	yes
Instrument has same capabilities when 3rd-party reag. used	yes	no
Reag. only cost per reportable result for standard chemistries/Therapeutic drugs/Special analytes	—	—/—/—
Walkaway capacity in minutes/No. of specimens/No. of tests-assays	can be hrs/60/>1,000	10/1/14
System is liquid, dry, or reconstituted onboard	liquid, no reagent prep required by operator	dry
Uses disposable cuvettes/Max. No. stored	yes/12,000	no (uses rotors)
Uses washable cuvettes/Replacement frequency	no/—	no/n/a
Minimum sample volume aspirated precisely at one time	2 µL	10 µL & 80 µL
Supplied with UPS (backup power)/Requires floor drain	yes/no	no/no
Requires dedicated water system/Water consumption in L per hour	yes/up to 2 µL	no/none
Noise generated in decibels	<70	—
Dedicated pediatric sample cup/Dead volume	yes/10-20 µL	no
Primary tube sampling/Pierces caps on primary tubes	yes/no	no/no
Sample bar-code reading capability/Autodiscrimination	yes (2 of 5 interleaved, Codabar, codes 39 & 128)/yes	no/—
Reagent bar-code reading capability	yes	yes
Bar-code placement per CLSI standard Auto2A	yes	—
Onboard test auto inventory (determines volume in container)	yes	no
Measures No. of tests remaining/Short sample detection/Clot detection	yes/yes/yes	no/no/no
Automatic detection of adequate reag. for aspir. & analysis	yes	no
Hemolysis/Turbidity detection-quantitation	yes/yes	no/no
Dilution of patient samples onboard/Automatic rerun capability	yes/yes	no/no
Sample volume can be reduced to rerun out-of-linear-range high results/Increased to rerun out-of-linear-range low results	yes/yes	no/no
Autocalibration or autocalibration alert	yes	no
Calibrants stored onboard/Multipoint calibration supported	yes (Na, K, Cl)/yes	no/—
Typical calib. frequency for ISE/Metabolites/Ther. drugs/Drugs of abuse	—/up to 90 days/—/—	—/60 days/—/—
Automatic shutdown/Startup programmable	not required	no/no
Stat time to completion of all analytes, throughput per hr. for:		
• Sodium, potassium, chloride, TCO ₂	2 min, 62	—, —
• Sodium, potassium, chloride, TCO ₂ , glucose, urea, creatinine	4 min, 62	10 min, 6 specimens
• Album., direct & total bili., AST, ALT, ALP	8 min, 62	10 min, 6 specimens
Typical time delay from ordering stat test to aspir. of sample	60 sec steady state, 2 min from standby	—
How often QC required/Onboard SW capability to review QC	daily/yes	—/—
Onboard real-time QC/Support multiple QC lot Nos. per analyte	yes/yes	no/no
QC results transferred automatically to LIS	yes	—
Data mgmt. capability/Instrument vendor supplies LIS interface	optional add-on/yes (additional cost)	no/yes (included in price)
Interfaces up and running in active user sites with Bidirectional interface capability	interfaces available for all major LIS vendors yes (broadcast download & host query)	in development no
Test results transmitted to LIS as soon as chem. time complete	yes	—
LIS interface operates simultaneously with running assays	yes	—
Uses LOINC to transmit orders & results	no	—
How labs get LOINC codes for reagent kits	—	—
Lab can control analyzer remotely	no	—
Interface avail. (or will be) to automated specimen handling system	no	—
Modem servicing available/Can diagnose own malfunctions/ Determine malfunctioning component	yes/yes/yes	no/yes/yes
On-site time of svc. engineer/Onboard error codes for troubleshooting	2-8 hr/yes	—/yes
Mean time between failures/To repair failures	—/—	—
Average time to complete maintenance by lab personnel	daily: 5 min; weekly: 10 min; monthly: 15 min	—
Onboard maintenance records/Maint. training demo module	yes/no	no/no
Training provided with purchase/Advanced oper. training avail.	5 days on site, 4 days at vendor offices/no	1 day on site/yes
Annual service contract cost (24 h/7 d)	multiple types	\$650 per year
Distinguishing features (supplied by company)	consolidated low-volume workstation that integrates immunoassays onboard with other chemistries; allows single platform to meet over 95 percent of testing needs; eliminates sample splitting, aliquotting	uses only 90 µL of sample & requires less than 60 seconds of prep work; minimal maintenance required; offered with sodium, potassium, and chloride ISE units

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Chemistry analyzers (for low-volume laboratories)

Part 6 of 9	Nova Biomedical Corp. info@novabiomedical.com 200 Prospect St. Waltham, MA 02454-9141 800-458-5813 www.novabiomedical.com	Nova Biomedical Corp. info@novabiomedical.com 200 Prospect St. Waltham, MA 02454-9141 800-458-5813 www.novabiomedical.com
See accompanying article on page 19		
Name of instrument/First year sold in U.S. List price/No. of analyzers sold in 2005 No. units in clinical use in U.S./Outside U.S. Country where designed/Manufactured/Where reagents mftd. Operational type/Reagent type	Stat Profile Critical Care Xpress/2002 \$25,000-\$59,000/n/a —/— U.S./U.S./U.S. discrete/self-contained multi-use cartridges	Stat Profile pH0x Series/1998 \$12,000-\$32,000/n/a —/— U.S./U.S./U.S. discrete/self-contained multi-use cartridges-packages-slides
Sample handling system/Model type	sample automatically drawn from syringe, capillary, or open tube/benchtop	sample automatically drawn from syringe, capillary, or open tube/benchtop
Dimensions in inches (H x W x D)/Instrument footprint	17.2 x 17.3 x 22.3/2.7 sq ft	15 x 15 x 18/1.9 sq ft
Tests available on instrument in U.S.	pH, PCO ₂ , PO ₂ , SO ₂ %, hematocrit, hemoglobin, sodium, potassium, chloride, ionized calcium, ionized Mg, glucose, BUN, creatinine, lactate, deoxyhemoglobin, oxyhemoglobin, methemoglobin, carboxyhemoglobin	pH, PCO ₂ , PO ₂ , SO ₂ %, hematocrit, hemoglobin, sodium, potassium, chloride, ionized calcium, glucose, lactate
Tests cleared but not clinically released	none	none
Tests not available in U.S. but submitted for 510(k) clearance	none	none
Tests not available in U.S. but available in other countries	none	none
Research-use-only assays/Tests in development	none	none
User-defined methods implemented for what analytes	none	none
Methods supported/Immunoassay methods	potentiometry (ISE), optical, reflectance/n/a	potentiometry (ISE), optical, reflectance/n/a
No. of direct ion selective electrode channels	12	5
• Must load separate reagent pack for each specimen/No. of diff. assays in pack	no/n/a	no/n/a
• Separate reagent pack for each test run	no	no
No. of different measured assays onboard simultaneously	19	11
No. of different assays programmed, calibrated at once	19	11
No. of user-definable (open) channels/No. active simultaneously	0/n/a	0/n/a
No. of different analytes for which system accommodates reagent containers onboard at once/Tests per container set	19/200-500 samples (2,600-6,500 tests), depending on lab	11/varies by analyzer and laboratory use pattern
Shortest/Median onboard reagent stability/Refrigerated onboard	45 days/45 days/no	45 days/45 days/no
Multiple reagent configurations supported	n/a	n/a
Reagent container placed directly on system for use	requires operator prehandling, preparation	requires operator prehandling, preparation
Instrument has same capabilities when 3rd-party reagent used	n/a	n/a
Reagent only cost per reportable result for standard chemistries/Therapeutic drugs/Special analytes	\$.06-\$28 per test (cost varies with volume); bundled instr. reagent maint. cost per result \$.07-\$31 per test (5-yr reagent rental)/n/a/n/a	varies by model/n/a/n/a
Walkaway capacity in minutes/No. of specimens/No. of tests-assays	n/a/n/a/n/a	n/a/n/a/n/a
System is liquid, dry, or reconstituted onboard	ISE	ISE
Uses disposable cuvettes/Max. No. stored	no/n/a	no/n/a
Uses washable cuvettes/Replacement frequency	no/n/a	no/n/a
Minimum sample volume aspirated precisely at one time	60 µL	45 µL
Supplied with UPS (backup power)/Requires floor drain	no (optional)/no	no (optional)/no
Requires dedicated water system/Water consumption in L per hour	no/n/a	no/n/a
Noise generated in decibels	minimal	minimal
Dedicated pediatric sample cup/Dead volume	no/n/a	no/n/a
Primary tube sampling/Pierces caps on primary tubes	yes/no	yes/no
Sample bar-code reading capability/Autodiscrimination	yes (optional), by handheld scanner as tubes are loaded onto instrument (2 of 5 interleaved, UPC, Codabar, codes 39 & 128)/yes	yes, by handheld scanner as tubes are loaded onto instrument (2 of 5 interleaved, UPC, Codabar, codes 39 & 128)/yes
Reagent bar-code reading capability	yes	yes
Bar-code placement per CLSI standard Auto2A	no	no
Onboard test auto inventory (determines volume in container)	yes	yes
Measures No. of tests remaining/Short sample detection/Clot detection	yes/yes/yes	yes/yes/yes
Automatic detection of adequate reagent for aspir. & analysis	yes	yes
Hemolysis/Turbidity detection-quantitation	yes (on co-oximeter module)/yes (on co-oximeter module)	yes*/yes*
Dilution of patient samples onboard/Automatic rerun capability	yes (on co-oximeter module)/no	yes*/no
Sample volume can be reduced to rerun out-of-linear-range high results/Increased to rerun out-of-linear-range low results	no/no	no/no
Autocalibration or autocalibration alert	yes	yes
Calibrants stored onboard/Multipoint calibration supported	yes/yes	yes/yes
Typical calib. frequency for ISE/Metabolites/Ther. drugs/Drugs of abuse	30-120 min/30-120 min/n/a/n/a	30-120 min/30-120 min/n/a/n/a
Automatic shutdown/Startup programmable	yes/yes	yes/yes
Stat time to completion of all analytes, throughput per hr. for: • Sodium, potassium, chloride, TCO ₂ • Sodium, potassium, chloride, TCO ₂ , glucose, urea, creatinine • Album., direct & total bili., AST, ALT, ALP	50 sec, 26-36, depending on use mode 123 sec, 21-24, depending on use mode n/a, n/a	50 sec, 44 n/a, n/a n/a, n/a
Typical time delay from ordering stat test to aspir. of sample	<2 sec	<2 sec
How often QC required/Onboard SW capability to review QC	8 hr/yes	8 hr (CLIA)/yes
Onboard real-time QC/Support multiple QC lot Nos. per analyte	yes/yes	yes/yes
QC results transferred automatically to LIS	yes	yes
Data mgmt. capability/Instrument vendor supplies LIS interface	onboard/no	no/no
Interfaces up and running in active user sites with	n/a	virtually all
Bidirectional interface capability	yes	yes (broadcast download & host query)
Test results transmitted to LIS as soon as chem. time complete	yes	yes
LIS interface operates simultaneously with running assays	yes	yes
Uses LOINC to transmit orders & results	no	no
How labs get LOINC codes for reagent kits	n/a	n/a
Lab can control analyzer remotely	yes	yes
Interface avail. (or will be) to automated specimen handling system	no	no
Modem servicing available/Can diagnose own malfunctions/ Determine malfunctioning component	yes/yes/yes	yes/yes/yes
On-site time of svc. engineer/Onboard error codes for troubleshooting	<8 business hr/yes	<8 business hr/yes
Mean time between failures/To repair failures	n/a/n/a	n/a/n/a
Average time to complete maintenance by lab personnel	daily: none; weekly: <5 min; monthly: <15 min	daily: none; weekly: <5 min; monthly: <15 min
Onboard maintenance records/Maint. training demo module	yes (includes audit trail of who replaced parts)/yes	yes/yes
Training provided with purchase/Advanced oper. training avail.	1 day on site/yes	1 day on site/yes
Annual service contract cost (24 h/7 d)	\$3,750-\$7,685	varies by analyzer configuration & geographic location; discounts for multiple-year contract or 5-year reagent rental or lease
Distinguishing features (supplied by company)	comprehensive 19-test critical care profile, including ionized Mg, BUN, and creatinine; color touch screen; integrated co-oximeter; open software architecture; onboard data management; automated onboard quality control; sealed waste system; auto-monitoring of QC and reagent packs; tankless gas calibration; automated maintenance	onboard quality control; liquid calibration eliminates gas tanks; remote control; remote review; space saving design

* on co-oximeter module

Chemistry analyzers (for low-volume laboratories)

Part 7 of 9	Nova Biomedical Corp. info@novabiomedical.com 200 Prospect St. Waltham, MA 02454-9141 800-458-5813 www.novabiomedical.com	Ortho-Clinical Diagnostics Sales Support 1001 U.S. Highway 202 Raritan, NJ 08869 800-828-6316 www.orthoclinical.com
<i>See accompanying article on page 19</i>		
Name of instrument/First year sold in U.S. List price/No. of analyzers sold in 2005 No. units in clinical use in U.S./Outside U.S. Country where designed/Manufactured/Where reagents mftd. Operational type/Reagent type	Nova 16/1995 \$22,500-\$25,500/n/a —/— U.S./U.S./U.S. batch, random access/self-contained multiuse cartridges	VITROS DT 60 II Chemistry System (DT 60 II, DTE, DTSC)/1993 —/— 15,000 units worldwide U.S./U.S./U.S. batch, random access, discrete/self-contained single-use cartridges-packages-slides —/—/—/—
Sample handling system/Model type	40-position tray, stat sampling directly from sample container/benchtop	—/—/—/—
Dimensions in inches (H x W x D)/Instrument footprint	20.5 x 19.2 x 20.7/2.75 sq ft	6.75 x 18.75 x 13.75/1.8 sq ft (DT 60 II)
Tests available on instrument in U.S.	sodium, potassium, chloride, total CO ₂ , glucose, BUN, creatinine, Hct	ammonia, cholesterol, HDL chol., neonatal bilirubin, total protein, amylase, creatinine, lactate, phosphorus, triglycerides, BUN-urea, glucose, Mg, total bilirubin, uric acid, albumin, AST, CK, GGT, lipase, ALP, calcium, iron, lithium, ALT, cholinesterase, LDH, theophylline, CO ₂ , sodium, potassium, chloride, urine creatinine, CK-MB
Tests cleared but not clinically released	none	none
Tests not available in U.S. but submitted for 510(k) clearance	none	none
Tests not available in U.S. but available in other countries	none	none
Research-use-only assays/Tests in development	none/none	none/none
User-defined methods implemented for what analytes	none	none
Methods supported/Immunoassay methods	potentiometry/n/a	potentiometry, colorimetric, enzymatic/n/a
No. of direct ion selective electrode channels	8	4
• Must load separate reagent pack for each specimen/No. of diff. assays in pack	no/n/a	yes/1
• Separate reagent pack for each test run	no	yes
No. of different measured assays onboard simultaneously	8	one per module (DT 60 II, DTE II, DTSC II)
No. of different assays programmed, calibrated at once	8	1
No. of user-definable (open) channels/No. active simultaneously	0/n/a	none
No. of different analytes for which system accommodates reagent containers onboard at once/Tests per container set	8/(@ 8,000 tests/mo): 2,700 tests	n/a/n/a
Shortest/Median onboard reagent stability/Refrigerated onboard	21 days/21 days/no	n/a/n/a/no
Multiple reagent configurations supported	n/a	no
Reagent container placed directly on system for use	no, requires prehandling (remove clip from sealed bag & mix)	no
Instrument has same capabilities when 3rd-party reagent used	n/a	n/a
Reagent only cost per reportable result for standard chemistries/Therapeutic drugs/Special analytes	standard chemistries: @25 sam/d: \$0.40 (8-test panel); bundled instr., reagent, maint. cost per result: \$0.92 (8-test panel)/—/—	n/a/n/a/n/a
Walkaway capacity in minutes/No. of specimens/No. of tests-assays	60 per tray/40 per tray/280 per tray	n/a/n/a/n/a
System is liquid, dry, or reconstituted onboard	n/a	dry
Uses disposable cuvettes/Max. No. stored	no/n/a	no/n/a
Uses washable cuvettes/Replacement frequency	n/a/n/a	no/n/a
Minimum sample volume aspirated precisely at one time	50 µL	10 µL
Supplied with UPS (backup power)/Requires floor drain	no/no	no/no
Requires dedicated water system/Water consumption in L per hour	no/n/a	no/none
Noise generated in decibels	minimal	—
Dedicated pediatric sample cup/Dead volume	n/a	n/a
Primary tube sampling/Pierces caps on primary tubes	yes/no	no/no
Sample bar-code reading capability/Autodiscrimination	yes, by handheld scanner as tubes are loaded onto instrument (2 of 5 interleaved, UPC, Codabar, codes 39 & 128)/yes	no/—
Reagent bar-code reading capability	alternate method	yes
Bar-code placement per CLSI standard Auto2A	n/a	—
Onboard test auto inventory (determines volume in container)	yes	n/a
Measures No. of tests remaining/Short sample detection/Clot detection	no/yes/yes	n/a/n/a/n/a
Automatic detection of adequate reagent for aspir. & analysis	yes	n/a
Hemolysis/Turbidity detection-quantitation	no/no	no/no
Dilution of patient samples onboard/Automatic rerun capability	yes/yes	no/no
Sample volume can be reduced to rerun out-of-linear-range high results/Increased to rerun out-of-linear-range low results	no/no	no/no
Autocalibration or autocalibration alert	yes	no
Calibrants stored onboard/Multipoint calibration supported	yes/n/a	no/yes
Typical calib. frequency for ISE/Metabolites/Ther. drugs/Drugs of abuse	2 hr/2 hr/n/a/n/a	reagent lot changes
Automatic shutdown/Startup programmable	n/a/n/a	no/no
Stat time to completion of all analytes, throughput per hr. for:		
• Sodium, potassium, chloride, TCO ₂	52 sec, 69 specimens	15 tests
• Sodium, potassium, chloride, TCO ₂ , glucose, urea, creatinine	85 sec, 45 specimens	75 tests
• Album., direct & total bili., AST, ALT, ALP	n/a	20 tests
Typical time delay from ordering stat test to aspir. of sample	9 sec	none
How often QC required/Onboard SW capability to review QC	CLIA minimum/yes	every 24 hr/no
Onboard real-time QC/Support multiple QC lot Nos. per analyte	no/yes	no/no
QC results transferred automatically to LIS	yes	yes
Data mgmt. capability/Instrument vendor supplies LIS interface	onboard & optional add-on (\$9,225, SW mfr: Nova)/no	—/no
Interfaces up and running in active user sites with	most LIS vendors including Cerner, Misys, McKesson, Soft, others	—
Bidirectional interface capability	yes	no
Test results transmitted to LIS as soon as chem. time complete	yes	yes
LIS interface operates simultaneously with running assays	no	yes
Uses LOINC to transmit orders & results	no	—
How labs get LOINC codes for reagent kits	—	—
Lab can control analyzer remotely	yes	no
Interface avail. (or will be) to automated specimen handling system	no	no
Modem servicing available/Can diagnose own malfunctions/ Determine malfunctioning component	no/yes/yes	no/yes/yes
On-site time of svc. engineer/Onboard error codes for troubleshooting	<8 business hr/yes	—/yes
Mean time between failures/To repair failures	n/a/n/a	—
Average time to complete maintenance by lab personnel	daily: <2 min; weekly: <5 min; monthly: <5 min	daily: 5 min; weekly: 5 min; monthly: none
Onboard maintenance records/Maint. training demo module	no/no	no/no
Training provided with purchase/Advanced oper. training avail.	2 days on site/yes	yes/—
Annual service contract cost (24 h/7 d)	call for pricing	—
Distinguishing features (supplied by company)	whole blood analyzer for creatinine & TCO ₂ ; can analyze whole blood, serum, plasma, urine, CSF, and dialysate	disposable tips eliminate sample carryover; random access testing so chemistries can be run in any order, with no reagent prep.; indiv. packaged test slides elim. waste and facilitate rapid analysis; dry slide technology minimizes the effects of interferences to provide accurate results

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Chemistry analyzers (for low-volume laboratories)

Part 8 of 9	Randox Laboratories marketing@randox.com 4065 Oceanside Blvd., Ste. Q Oceanside, CA 92056 760-639-1500 www.randox.com	Roche Diagnostics Corp. Todd Atkinson todd.atkinson@roche.com 9115 Hague Rd. Indianapolis, IN 46256 317-521-4564 www.roche.com
See accompanying article on page 20		
Name of instrument/First year sold in U.S. List price/No. of analyzers sold in 2005 No. units in clinical use in U.S./Outside U.S. Country where designed/Manufactured/Where reagents mftd. Operational type/Reagent type	Rx Daytona/2005 —/— >600 units worldwide Japan/Japan/U.K. random access, discrete/self-contained multi-use cartridges-packages-slides	Cobas Integra 400 Plus/1999 \$175,000/— >2,000/2,000 Switzerland/Switzerland/U.S. & Germany continuous random access/self-contained multi-use cassettes
Sample handling system/Model type Dimensions in inches (H x W x D)/Instrument footprint	removable ring/benchtop 30.2 x 24.8 x 20.2 sq ft/—	rack/benchtop 30 x 53 x 26/9.6 sq ft
Tests available on instrument in U.S.	*acid phos., alb., aldolase, ALT, ammonia, alk. phos., AST (GOT), amylase, panc. amylase, bilirubin (direct/total), calcium, total CO ₂ , cholesterol, HDL-C, LDL-C, CK-NAC, CK-MB, complement C3/C4, copper, CRP, HS CRP, FR CRP, creatinine, ferritin, fructosamine, homocysteine, glucose, GGT, HbA1c, IgA, IgE, IgG, IgM, LDH, lipase, lithium, ASO, lipoprotein(a), ApoA1, ApoB, microalb., magnes., myoglobin, sodium, prealbumin, phosphorus, potas., RF, iron, phenobarbital, phenytoin, digoxin, digitoxin, theophylline, gentamicin, valp. acid, carbamazepine, transferrin, TIBC, total protein, triglycerides, uric acid, BUN/urea, urinary protein, zinc, ISE Na, others	*α-1-acid glycoprot., α-1-antitryp., apo A1 & B, antistrepto.-O, comp. C3c & C4, cerul., CRP latex, CRP(hs), hapt., IgA/G/M, myo., prealb., RF, transferr., amph., barb., benz., coca., ethanol, LSD, meth., methaq., opia., PCP, PPX, S barb., S benz., THC, ACPP, ALP, ALT, α-amy. pancreatic, AP, AST, cholest., CK-MB, γ-glutamyltrans., LDH, lipase, alb., bil direct & total, Ca., chol., CO ₂ , creat. jaffe, creat. enzy., fructosam., gluc., HbA1c, HDL direct, iron, lact., LDL direct, Mg, ammon., phos., TP, TPU-C, trig., UA, UIBC, urea, Na, K, Cl, Li, acet., amik., carb., dig., gent., lido., NAPA, pheno., pheny., prim., proc., quin., sali., theo., tobra., valp. acid, vanc., T4, T-up, D-dimer, others
Tests cleared but not clinically released Tests not available in U.S. but submitted for 510(k) clearance Tests not available in U.S. but available in other countries Research-use-only assays/Tests in development	— — —	none none lipoprotein A
User-defined methods implemented for what analytes	*acetic acid, Apo E, Apo CIII, Apo CII, ApoAII, alpha-1-antitryp., α-1-acid glycoprotein, bile acids, butyryl choline., others/— acetaminophen, drugs of abuse, salicylate cyclosporine, alcohol, glycerol-3-phosphate, oxidase, phospholipids, maltose, T4, T-uptake	none/MPA, tacrolimus, sirolimus caffeine
Methods supported/Immunoassay methods	photometry, potentiometry (ISE), immunoturbidimetry, latex enhanced immunoturbidimetry/—	photometry, potentiometry, fluorescence polarization/turbidimetric, latex particle enhanced
No. of direct ion selective electrode channels • Must load separate reag. pack for each specimen/No. of diff. assays in pack • Separate reag. pack for each test run	3 Na ⁺ , K ⁺ , Cl ⁻ no/50-2,205 no	4 no/1 no
No. of different measured assays onboard simultaneously	30	36 tests plus applications for urine & CSF
No. of different assays programmed, calibrated at once	60	up to 999
No. of user-definable (open) channels/No. active simultaneously	10/60	0/0
No. of different analytes for which system accommodates reag. containers onboard at once/Tests per container set	27/71-1,053	36/50-800 tests, cassettes
Shortest/Median onboard reag. stability/Refrigerated onboard	8 hr/30 days/yes (8-15°C)	2 weeks/8-12 weeks/yes (12°C)
Multiple reag. configurations supported	yes	yes
Reag. container placed directly on system for use	yes	yes
Instrument has same capabilities when 3rd-party reag. used	yes	no
Reag. only cost per reportable result for standard chemistries/Therapeutic drugs/Special analytes	—/—/—	—/—/—
Walkaway capacity in minutes/No. of specimens/No. of tests-assays	—/40/—	176/90/1,808
System is liquid, dry, or reconstituted onboard	liquid	liquid
Uses disposable cuvettes/Max. No. stored	no/45	yes/1,500
Uses washable cuvettes/Replacement frequency	yes/5 years	no/n/a
Minimum sample volume aspirated precisely at one time	2 µL	1 µL
Supplied with UPS (backup power)/Requires floor drain	no/no	no/no
Requires dedicated water system/Water consumption in L per hour	yes/7.5 L daily	no/2 L maximum
Noise generated in decibels	60	—
Dedicated pediatric sample cup/Dead volume	yes/20 µL	—
Primary tube sampling/Pierces caps on primary tubes	yes/no	yes/no
Sample bar-code reading capability/Autodiscrimination	yes, on sample transport, shortly before sample is aspirated (2 of 5 interleaved, UPC, Codabar, codes 39 & 128)/yes	yes (2 of 5 interleaved, Codabar, codes 39 & 128)/yes
Reagent bar-code reading capability	yes	yes
Bar-code placement per CLSI standard Auto2A	—	—
Onboard test auto inventory (determines volume in container)	yes	yes
Measures No. of tests remaining/Short sample detection/Clot detection	yes/yes/no	yes/yes/yes
Automatic detection of adequate reag. for aspir. & analysis	yes	—
Hemolysis/Turbidity detection-quantitation	yes/yes	no/no
Dilution of patient samples onboard/Automatic rerun capability	yes/yes	yes/yes
Sample volume can be reduced to rerun out-of-linear-range high results/Increased to rerun out-of-linear-range low results	yes/yes	yes/yes
Autocalibration or autocalibration alert	yes	yes
Calibrants stored onboard/Multipoint calibration supported	no/yes	yes/yes
Typical calib. frequency for ISE/Metabolites/Ther. drugs/Drugs of abuse	daily/28 days/7 days/—	5 hr/once per lot/each lot & 12 weeks/each lot & 12 weeks
Automatic shutdown/Startup programmable	no/yes	yes/yes
Stat time to completion of all analytes, throughput per hr. for: • Sodium, potassium, chloride, TCO ₂ • Sodium, potassium, chloride, TCO ₂ , glucose, urea, creatinine • Album., direct & total bili., AST, ALT, ALP	—, 270 —, 315 —, 180	369 tests 369 tests 250 tests
Typical time delay from ordering stat test to aspir. of sample	60 sec	none
How often QC required/Onboard SW capability to review QC	shortest: daily; longest: at customer discretion/yes	24 hr/yes
Onboard real-time QC/Support multiple QC lot Nos. per analyte	yes/yes	yes/yes
QC results transferred automatically to LIS	yes	yes
Data mgmt. capability/Instrument vendor supplies LIS interface	onboard/no	onboard/yes (add'l cost)
Interfaces up and running in active user sites with	—	all major LIS vendors
Bidirectional interface capability	yes (host query)	yes (broadcast download & host query)
Test results transmitted to LIS as soon as chem. time complete	yes	yes
LIS interface operates simultaneously with running assays	yes	yes
Uses LOINC to transmit orders & results	no	—
How labs get LOINC codes for reagent kits	—	—
Lab can control analyzer remotely	—	yes
Interface avail. (or will be) to automated specimen handling system	no	—
Modem servicing available/Can diagnose own malfunctions/ Determine malfunctioning component	no/yes/yes	yes/yes/yes
On-site time of svc. engineer/Onboard error codes for troubleshooting	within 24 hr/yes	—/yes
Mean time between failures/To repair failures	—/—	—/—
Average time to complete maintenance by lab personnel	daily: 5 min; weekly: 15 min	daily: none; weekly: 5 min; monthly: none
Onboard maintenance records/Maint. training demo module	no/no	yes (includes audit trail of who replaced parts)/yes
Training provided with purchase/Advanced oper. training avail.	3 days on site/yes	5 days at vendor offices/yes
Annual service contract cost (24 h/7 d)	—	—
Distinguishing features (supplied by company)	comprehensive clinical & research test menu, benchtop, low water consumption, automatic start, multi-speed mixing for improved reagent performance, comprehensive and easy to use Windows software	unique reagent cassette eliminates reagent preparation; menu consolidates testing, including direct LDL, whole blood, HbA1c, and lithium
	*Contact company for complete list	*Contact company for complete list

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Part 9 of 9 <i>See accompanying article on page 19</i>	Roche Diagnostics Corp. Todd Atkinson todd.atkinson@roche.com 9115 Hague Rd. Indianapolis, IN 46256 317-521-4564 www.roche.com	Thermo Electron Corp. Bola Nicholson bola.nicholson@thermo.com 171 Industry Drive Pittsburgh, PA 15275 800-558-9115 www.thermo.com/clinicalchem
Name of instrument/First year sold in U.S. List price/No. of analyzers sold in 2005 No. units in clinical use in U.S./Outside U.S. Country where designed/Manufactured/Where reagents mftd. Operational type/Reagent type Sample handling system/Model type Dimensions in inches (H x W x D)/Instrument footprint	Roche Hitachi 912/1997 \$159,000/— >1,100 Japan-U.S./Japan-U.S./U.S.-Germany continuous random access/open reagent system disk/floor-standing 46 x 40 x 30/8.3 sq ft	Data Pro PLUS/2005 \$45,800/2 4/995 Argentina/Argentina/Australia batch, random access, discrete, continuous random access/self-contained multi-use cartridges-packages-slides, open reagent system ring/benchtop 33.5 x 18.5 x 22.8/51.63 sq ft
Tests available on instrument in U.S. Tests cleared but not clinically released Tests not available in U.S. but submitted for 510(k) clearance Tests not available in U.S. but available in other countries Research-use-only assays/Tests in development User-defined methods implemented for what analytes	alb., ALP, ALT, ammonia, amy. total & panc., AST, bili. total & direct, BUN, Ca, cholest., cholinest., CK, CO ₂ , fruct., GGT, glu., HDL direct, iron, lact., LD, LD-1, LDL direct, lipase, Mg, phos., TIBC (calc.), NAPA, procainamide, TP, trig., T ₄ , T-up, UIBC, UA, Na, K, Cl, α -1-antitryp., ASLO, B-2-microgl., C3c, C4, ceru., CRP, ferr., fol., hapt., HbA1c, IgA/E/G/M, microalb., myo., prealb., RF, transferrin, B ₁₂ , carb., dig., gent., pheno., pheny., salicy., theo., tobra., valp. acid, alcohol, amph., barb., benz., coca., methad., opia., PCP, propoxy., THC; also CSF and urine chemistries, D-dimer, sol. transfer. recept., microalb., creat. jaffe, creat. enzym., (hs)CRP, LDH, -TPU-c, acetaminophen, ACT P-5-P, AST P-5-P, CRP, (hs)latex, Apo A1, Apo B none none kappa/lambda light chains, %CDT, α -1-glycoprotein, α -1-microgl., cyclos., lipoprotein A none/homocysteine none	alb., alk. phos., amy., AST, BUN, Ca., chloride, chol., CK, CO ₂ , crea., direct bilirubin, GGT, glucose (HK), HDL, iron, LDH, Mg, phosphorus, total bilirubin, total protein, triglycerides, uric acid — — — —/ISE: Na, K, Cl; TDM: HbA1c none
Methods supported/Immunoassay methods No. of direct ion selective electrode channels • Must load separate reag. pack for each specimen/No. of diff. assays in pack • Separate reag. pack for each test run No. of different measured assays onboard simultaneously No. of different assays programmed, calibrated at once No. of user-definable (open) channels/No. active simultaneously No. of different analytes for which system accommodates reag. containers onboard at once/Tests per container set Shortest/Median onboard reag. stability/Refrigerated onboard Multiple reag. configurations supported Reag. container placed directly on system for use Instrument has same capabilities when 3rd-party reag. used Reag. only cost per reportable result for standard chemistries/Therapeutic drugs/Special analytes Walkaway capacity in minutes/No. of specimens/No. of tests-assays System is liquid, dry, or reconstituted onboard Uses disposable cuvettes/Max. No. stored Uses washable cuvettes/Replacement frequency Minimum sample volume aspirated precisely at one time Supplied with UPS (backup power)/Requires floor drain Requires dedicated water system/Water consumption in L per hour Noise generated in decibels Dedicated pediatric sample cup/Dead volume Primary tube sampling/Pierces caps on primary tubes Sample bar-code reading capability/Autodiscrimination Reagent bar-code reading capability Bar-code placement per CLSI standard Auto2A Onboard test auto inventory (determines volume in container) Measures No. of tests remaining/Short sample detection/Clot detection Automatic detection of adequate reag. for aspir. & analysis Hemolysis/Turbidity detection-quantitation Dilution of patient samples onboard/Automatic rerun capability Sample volume can be reduced to rerun out-of-linear-range high results/Increased to rerun out-of-linear-range low results Autocalibration or autocalibration alert Calibrants stored onboard/Multipoint calibration supported Typical calib. frequency for ISE/Metabolites/Ther. drugs/Drugs of abuse Automatic shutdown/Startup programmable	photometry, potentiometry/turbidimetric, latex particle enhanced, CEDIA 3 no/n/a no 35 tests plus applications for urine & CSF 68 65/65 35/100-500 —/30 days/yes (2-12°C) yes yes no —/—/— 408/70/2,450 liquid no/n/a yes/monthly (120 stored on instrument) 2 μ L no/yes yes/30 L 65 yes/— yes/no yes, on sample transport, shortly before sample is aspirated (2 of 5 interleaved, Codabar, codes 39 & 128)/yes yes yes yes yes/yes/no (not necessary due to sampling method) yes yes/yes yes/yes yes/yes yes yes/yes 24 hr/lot change (every 6 months)/3-5 days/56 days yes/—	photometry, turbidimetry/— 3 no/n/a no 48 48 12/12 48/225 —/—/yes yes yes yes —/—/— —/48/48 liquid yes/80 yes/once a week 3 μ L no/no no/0.58 — yes/100 μ L yes/no yes, on sample transport, shortly before sample is aspirated (2 of 5 interleaved, Codabar, codes 39 & 128)/— yes — yes yes/yes/no yes no/no yes/yes yes/no no no/yes —/—/—/— no/no
Stat time to completion of all analytes, throughput per hr. for: • Sodium, potassium, chloride, TCO ₂ • Sodium, potassium, chloride, TCO ₂ , glucose, urea, creatinine • Album., direct & total bili., AST, ALT, ALP Typical time delay from ordering stat test to aspir. of sample How often QC required/Onboard SW capability to review QC Onboard real-time QC/Support multiple QC lot Nos. per analyte QC results transferred automatically to LIS	3.5 min, 180 specimens 5.5 min, 90 specimens 10.5 min, 60 specimens 30 sec 24 hr/yes yes/yes yes	— — — less than 60 sec daily/yes yes/yes yes
Data mgmt. capability/Instrument vendor supplies LIS interface Interfaces up and running in active user sites with Bidirectional interface capability Test results transmitted to LIS as soon as chem. time complete LIS interface operates simultaneously with running assays Uses LOINC to transmit orders & results How labs get LOINC codes for reagent kits	onboard/yes (add'l cost) all major LIS vendors yes (host query) yes yes no —	onboard/no — yes (host query) no yes — —
Lab can control analyzer remotely Interface avail. (or will be) to automated specimen handling system	no yes (CLAS)	no no
Modem servicing available/Can diagnose own malfunctions/ Determine malfunctioning component On-site time of svc. engineer/Onboard error codes for troubleshooting Mean time between failures/To repair failures Average time to complete maintenance by lab personnel Onboard maintenance records/Maint. training demo module Training provided with purchase/Advanced oper. training avail. Annual service contract cost (24 h/7 d)	no/yes/yes —/yes —/— daily: —; weekly: —; monthly: — yes (includes audit trail of who replaced parts)/yes 5 days at vendor offices/yes —	no/yes/yes —/yes —/— daily: 5 min; weekly: 15 min; monthly: 30 min yes/no 3 days on site, 5 days at vendor offices/no —
Distinguishing features (supplied by company)	sophisticated software with easy stat function provides instant stat selection; Roche Hitachi open system dependability and throughput	open system; compact benchtop; user friendly Windows software

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