

# JANUS Automated Workstation powered by Packard innovation



## Introduction

The JANUS™ automated workstation is designed for the efficient automation of sample preparation procedures utilized in pharmaceutical, biotech, and research applications. The instrument consists of a modular platform that enables one pipetting arm with different tip configurations as well as one plate movement arm on a single workstation. The JANUS platform allows for one or two arms in a variety of combinations with the option to upgrade a one arm system to a two arm system. Liquid transfers can be performed in a multi-tipped mode from any combination of laboratory containers including 384-well formats for complete and flexible assay automation. JANUS is controlled by a Windows® XP compatible computer. Three different JANUS platforms are available.

## Instrument features

- Computer controlled Cartesian X-Y-Z robotic liquid handling system: JANUS can be equipped with one or two arms, consisting of one four- or eight-channel pipetting arm and gripper arm.
- Independent Z motion: Each tip is capable of independent motion and independent liquid level sensing in the Z direction.

- Choice of sampling probes: Address a variety of carry-over elimination requirements with sampling options which include:
  - Washable, stainless steel sampling probes with Teflon®-coating
  - VersaTip® PLUS adapters which employ a variety of disposable tip types
  - Reduced inner diameter, washable, stainless steel fixed tips for dispensing volumes less than 1 µL
- The optional integrated gripper arm is capable of “picking and placing” SBS-approved microplates, microplate lids, tip racks, deep-well plates, extraction blocks and approved vacuum manifolds within the workspace for walk-away assay automation. In addition, the gripper arm moves labware to/from peripheral devices such as readers, washers, incubators and more when using the Integrator version.
- Adaptable platforms to meet any capacity requirement: JANUS is available in **3 platforms**, the **Standard**, the **Expanded**, and the **Integrator**.
  - The **Standard** platform provides compact deck configurations capable of holding up to 24 microplates on the deck at one time.
  - The **Expanded** version offers 32 microplate positions on the deck at one time.
  - The **Integrator** version provides capacity for 24 microplates with the option to expand to 32 microplates.
- Expandable modular deck design: The **Integrator** platform offers an extension of the system deck. The X travel of the arm extends beyond the boundaries of the central deck to access external devices adjacent to the deck. Optionally, a right expansion module can be attached to the central deck for additional 8 microplate positions.
- Positioning reproducibility: Enhanced design provides better than 1 mm positioning accuracy and resolution for the pipetting arm to ensure sample preparation using standard 384-well microplate formats.

- Varispan™ for variable spacing between sampling probes: Varispan provides automatic computer controlled variable sample probe spacing for automation of different methodologies allowing test tubes, microplates, deep-well plates, vials, etc., to be utilized in various combinations on the work surface. Sampling probes can vary in spacing from 9 mm to 20 mm for four tip arms, and from 9 mm to 40 mm for the 8 tip arms to ensure multi-tipped throughput regardless of the labware utilized.
- Arm movement: JANUS pipetting arms are capable of moving in X and Y directions at speeds up to 800 mm/sec and capable of stopping at ±0.25 mm repeatability. The gripper arm moves along the X and Y axis at speeds of 420 mm/sec.
- Accusense™ patented independent liquid level sensing: Accusense provides multichannel liquid level sensing technology to minimize sample volume requirements. Volumes of 50 µL can be detected in microplates and as low as 100 µL can be detected in test tubes utilizing a patented modified capacitive mode of detection. Low or nonionic polar solutions and organic solvents such as DMSO or methanol are also detectable.
- Flexible deck layouts: A unique modular tile design enables rapid allocation of labware onto the deck surface. Predefined labware definitions simplify assay setup and enable labware definitions to remain independent of deck position. High precision tiles ensure precise positioning for high-density 384-well labware.

### Precision liquid handling features

- High precision syringe pumps: JANUS utilizes stepper motor driven, microprocessor controlled syringe modules. Each pump module is comprised of a syringe and a valve assembly. The four-port valve assembly is comprised of a Kel-F® valve body and a Teflon-coated valve plug. A variety of syringe sizes are available including 250 µL, 500 µL, 1,000 µL, 2,500 µL, and 5,000 µL.
- Precision and accuracy: Precision of better than 2.0% C.V. at 5 µL utilizing a 20 µL disposable tip with distilled water and 500 µL syringe under gravimetric evaluation; precision of better than 1% C.V. at 50 µL with distilled water utilizing a 500 µL syringe under gravimetric evaluation can be achieved with the system. Accuracy at 50 µL is better than 2.0%.
- Carry-over elimination: A peristaltic pump provides programmable, high volume/high throughput sample tip washing for the reduction of carry-over. Carry-over is reduced to less than 1:1,000,000 with appropriate washing. Disposable tip options are available for applications requiring improved elimination of carry-over.
- Performance file library: Optimization of pipetting performance is achieved via the automatic use of

performance files. Performance files contain information such as volume specific aspirate and dispense pump speeds, air gaps, liquid delays, waste and blowout volumes, speeds for entering and exiting liquids, liquid submersion levels, etc. Default performance files are provided and user-defined performance files can be added to the library.

### Application design features

- Versatile labware configurations: Combinations of test tubes, vials, microplates, deep-well plates, racks, and troughs can be allocated to the work surface of the system to meet the needs of your specific assay automation.
- Complete assay automation: JANUS allows walk away sample preparation including automatic transfer of standards, controls, samples and reagents from their original containers to any combination of destination vessels. The optional gripper arm allows full walk away automation of today's applications by enabling labware movement within the workspace.
- Ability to integrate ancillary equipment within the sampling envelope: A flexible Integrator deck concept enables direct sampling probe access into off-the-shelf ancillary equipment such as microplate readers, labware shakers etc. for complete application automation. Ancillary devices can be located adjacent to the deck in place of an expansion module, or placed directly onto the deck.

### Software features

- WinPREP® applications software: Flexible applications software is compatible with the Microsoft® Windows XP operating system with pull-down menus and simple user-prompts. Standard tests are created by performing three basic steps: placing labware on deck, creation of procedures, and linking labware to procedure operation steps.
- Easy-to-use default procedure templates: Default procedure templates are available for standard pipetting operations such as single liquid transfers, reagent additions, multiple liquid transfers, pre-dilutions, serial dilutions, custom dilutions, mother/daughter replication (Panel), wash/flush steps, mixing steps, etc.
- Flexible custom procedure programming: Custom procedure definition is available when additional flexibility is required. Users can program custom procedures by linking basic pipetting commands together. Custom steps include aspirate, dispense, flush, get tip, drop tip, mix, move to position, etc.
- Predefined labware library: A library of standard labware definitions is available which enables labware to be placed anywhere on the deck without the need to define additional labware parameters. Additional

labware can be added to the labware library to meet user specific application requirements.

- Reagent dispensing: Automatic dispensing of reagents can be programmed before, with, or after other liquid transfers. Reagents can be aspirated from original reagent vials, troughs or any user-specified container in a single transfer mode or via multiple dispenses per single aspirate for higher throughput.
- Automatic and flexible dilution capabilities: WinPREP software allows for easy programming of pre-dilutions, serial dilutions, or variable dilution schemes. Each sample is capable of being diluted with unique sample and diluent volumes.
- Procedure variables definition: Each procedure parameter can be defined by assigning a fixed value, enabling the user to enter a value at run time, extracting the value from a file, or by calculating the value using mathematical operations. Parameters include number of samples, sample volume, number of replicates, start source position, start destination position, etc.
- Flexible mapping of pipetting patterns: Standard pipetting patterns such as by column or by row can be utilized, or the user can define their own pipetting patterns. Multiple unique pipetting patterns can be created for each piece of labware.
- Error log/database report files: The system allows recording of all tests processed, samples prepared, and error tracking of instrument and liquid errors. Information is maintained in a Utilities database written in Microsoft Access 2000.
- Creation and utilization of Worklists: Worklists (sample lists) can be customized for automatic selective test processing. Information contained in a worklist, while varying in content, establishes data for sample identifiers, source and destination rack I.D., source and destination rack position, volumes, and tests requested in a comma-delimited ASCII file format. Data can be manually entered into WinPREP or extracted from a user-supplied ASCII file.
- Robotic compatibility: The WinPREP application is an OLE automation server providing services to open and execute predefined test protocols. User interaction can be eliminated by embedding custom scripts in test protocols to handle runtime errors, assembly changes, etc. that may occur during the execution of a test.
- User diagnostics: User diagnostics procedures are provided to test accuracy and precision performance for each syringe pump, liquid level sensing capabilities, alignment of tips, verification of disposable tip pickup and removal, and flushing operations.
- Password protection: Two levels of user rights are provided to enable supervisory personnel to restrict operator access to protocol creation or modification,

labware modification, performance file modification, and low level system utilities and system reconfiguration.

- Minimum computer requirements: Windows XP compatible computer with 2.8 GHz Pentium processor, 256 MB RAM, 40.0 GB hard drive, one 3.5" 1.44 MB floppy disk drive, 48X/32X/48X CD-RW CD-ROM drive, one available PCI slot; SVGA color graphic adapter and color monitor (17" recommended), Windows XP operating system and Microsoft Office 2000.

## Options and accessories

- The optional gripper arm is capable of “picking and placing” SBS-approved microplates, microplate lids, tip racks, deep-well plates, extraction blocks and approved vacuum manifolds around the deck. The gripper arm offers X and Y accuracy of 1.6 mm and moves at speeds of up to 420 mm/sec.
- VersaTip option: VersaTip provides selective use of either washable tips or a variety of disposable tips in the same routine without any user-intervention required to change from one tip type to another.
- Expansion module: A right side expansion module for additional capacity of 8 tiles can be added to JANUS Integrator systems.
- Syringe options: Syringe sizes are available in 250 µL, 500 µL, 1,000 µL, 2,500 µL, and 5,000 µL sizes.
- Reagent reservoirs: A variety of reagent reservoirs are available. Reagents can be stored in reagent troughs or gravity fed reagent bottles.
- Customer maintenance kits: These kits include syringe barrels, O-rings and piston seals, valves, tubing replacement kit, and lubrication fluid. Parts required for proper preventive maintenance can be ordered separately. The sampling tips are sold separately.
- Low volume tips: Tips and syringes designed for accurate dispensing between 500 nL and 200 µL.
- PlateStak™: Microplate storage system that can hold 50 standard or 15 deepwell microplates. It presents microplates individually via a diving board that extends onto the JANUS deck.
- Solid phase extraction/DNA purification: Integrated vacuum-based and magnetic bead based for purification of compounds, plasmids and other nucleic acids from samples.
- Heating support tiles: Plate adapter support tiles capable of heating microplates from ambient to 65 °C.
- Shaker: An integration kit is available for the DPC® MicroMix 5 shaker that can be used to mix samples or reagents in a variety of labware.
- Plate ID bar code scanner: Laser bar code reader scans microplates in either portrait or landscape position through the use of the gripper arm.

- Disposable tips: Disposable tips are available in 20 µL, 200 µL and 1 mL sizes, and in 25 µL and 175 µL filter disposable tips. Tips are available in liquid sensing (conductive) styles. *Note: Tips for JANUS systems may be obtained through PerkinElmer. PerkinElmer cannot guarantee the performance of tips obtained from other manufacturers.*
- Multi-purpose support tiles: These support tiles enable a single microplate, deep-well plate or standard PerkinElmer microcentrifuge tube rack to be positively positioned on a JANUS deck.
- Labware holders: JANUS accommodates a variety of labware holders on the deck including test tube, microfuge tube, and vial racks as well as disposable tip racks.

- Wash station assemblies: A variety of wash station assemblies are available. Multiple wash stations can be placed within a single deck layout.

### Deck capacities

A wash station requires the space of one tile. Other types of vessels can also be utilized on JANUS. The types of labware noted below are for reference only.

- JANUS Standard platform:  Up to 768 test tubes or 20 tiles or a combination.
- JANUS Expanded platform: Up to 1,536 test tubes or 32 tiles or a combination.
- JANUS Integrator platform: Up to 1,536 test tubes or 32 tiles or a combination.

### Physical Data

Dimensions		Height, inches (mm)	Width, inches (mm)	Depth, inches (mm)
JANUS Standard platform	with 8 tip arm	32 inches (813 mm)	47 inches (1194 mm)	32 inches (813 mm)
	with gripper arm	43 inches (1092 mm)		
JANUS Expanded platform	with 8 tip arm	32 inches (813 mm)	62 inches (1575 mm)	32 inches (813 mm)
	with gripper arm	43 inches (1092 mm)		
JANUS Integrator platform	with 8 tip arm	32 inches (813 mm)	62 inches (1575 mm)	32 inches (813 mm)
	with gripper arm	43 inches (1092 mm)		

Total working area	Height, inches (mm)	Width, inches (mm)	Depth, inches (mm)
JANUS Standard platform	6.88 inches (175 mm)	33 inches (838 mm)	15.25 inches (387 mm)
JANUS Expanded System	6.88 inches (175 mm)	44 inches (1118 mm)	15.25 inches (387 mm)
JANUS Integrator platform	6.88 inches (175 mm)	33 inches (838 mm)	15.25 inches (387 mm)
JANUS Integrator platform w/expansion module	6.88 inches (175 mm)	44 inches (1118 mm)	15.25 inches (387 mm)

Weight (approximate)	Net weight	Shipping weight
JANUS Standard platform	235 lb (107 kg)	310 lb (141 kg)
JANUS Expanded platform	275 lb (125 kg)	350 lb (159 kg)
JANUS Integrator platform	260 lb (118 kg)	335 lb (152 kg)

### Requirements

#### Electrical:

- 100-130 Vac, 200-240 Vac 50/60 Hz; 800 VA
- Certifications CE, CSA

#### Environmental:

- Operating ambient temperature: 59–95 °F (15-35 °C)
- Operating relative humidity: 30% to 80% at 85 °F (30 °C) non-condensing

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