# Beckman Coulter's New Line of Centrifuges Provides Support for 21 CFR Part 11 Compliant Laboratories

## Introduction

As technology and software advance, security and protection of data is becoming increasingly important to ensure a properly functioning lab environment. In this regard, many laboratories are requiring the use of regulations for storage and protection of electronically stored data and the application of electronic signatures. "Part 11 of Title 21 of the Code of Federal Regulations; Electronic Records; Electronic Signatures" (21 CFR Part 11) provides a set of U.S. federal regulations for data protection. These regulations are being adopted by many laboratories to ensure that electronic records are accurate, reliable, authentic, and consistent.

Beckman Coulter's new line of centrifuges—the high-performance Avanti JXN and the ultracentrifuge Optima XPN—offers solutions to support 21 CFR Part 11 regulations, making it easy to use Beckman centrifuges and remain compliant. This article discusses sections of the code and how the Avanti JXN and Optima XPN support compliant environments. The Avanti JXN and Optima XPN centrifuges offer a multitude of features including a large touch-screen display, remote monitoring and control, and increased security and tracking features.

Optima XPN-100 Ultracentrifuge

BECKMAN COULTER
Life Sciences

## Subpart B—Electronic Records

### 21 CFR Sec. 11.10 Controls for Closed Systems

Persons who use closed systems to create, modify, maintain, or transmit electronic records shall employ procedures and controls designed to ensure the authenticity, integrity, and when appropriate, the confidentiality of electronic records, and to ensure that the signer cannot readily repudiate the signed record as not genuine. Such procedures and controls shall include the following:

| Part | Description | Comment |
|---|---|---|
| 11.10 (a) | Validation of systems to ensure accuracy, reliability, consistent intended performance, and the ability to discern invalid or altered records. | Beckman Coulter products are developed through a rigorous review process involving strict validation protocols and testing. Records are not editable on the User interface by any Users or Administrators, ensuring no accidental or intentional modification can occur. All records are read-only. Avanti JXN and Optima XPN software generates a fault upon detection of corrupted data or application files. |
| 11.10 (b) | The ability to generate accurate and complete copies of records in both human readable and electronic form suitable for inspection, review, and copying by the agency. Persons should contact the agency if there are any questions regarding the ability of the agency to perform such review and copying of the electronic records. | Avanti JXN/Optima XPN software generates and stores records in both human readable and electronic form suitable for inspection and review on an internal memory device and over a wireless network. Electronic records can be printed. Run logs, Program logs, and Diagnostic logs can be exported to USB devices or network storage as CSV files. The Systems Option log can also be exported to a USB device. |
| 11.10 (c) | Protection of records to enable their accurate and ready retrieval throughout the records retention period. | Avanti JXN/Optima XPN software provides the necessary functionality to secure electronic records with up to 5,000 records per log, which well exceeds the estimated lifetime usage of the instrument. |
| 11.10 (d) | Limiting system access to authorized individuals. | Avanti JXN/Optima XPN software allows up to 50 unique Users with password protection. Software allows for Administrator capabilities that can override other User accounts. The User will be logged out automatically after inactivity. The interval is customizable by Administrators, from 2 to 15 minutes. |
| 11.10 (e) | Use of secure, computer-generated, time-stamped audit trails to independently record the date and time of operator entries and actions that create, modify, or delete electronic records. Record changes shall not obscure previously recorded information. Such audit trail documentation shall be retained for a period at least as long as that required for the subject electronic records and shall be available for agency review and copying. | Date and time can be changed only by a User with Administrator permissions. Date and time changes are logged in the Systems Options log. |
| 11.10 (f) | Use of operational system checks to enforce permitted sequencing of steps and events, as appropriate. | Processes are performed in a structured sequence in Avanti JXN/Optima XPN built-in software. This ensures that separate steps are completed in the proper order. An error is prompted when a step is attempted out of order. Authentication with a username and PIN is required to start a run and generate a record. |

| Part | Description | Comment |
|---|---|---|
| 11.10 (g) | Use of authority checks to ensure that only authorized individuals can use the system, electronically sign a record, access the operation or computer system input or output device, alter a record, or perform the operation at hand. | Users are required to log in with a unique username and PIN prior to access. Changes and modifications to the system are recorded and maintained with username. |
| 11.10 (h) | Use of device (e.g., terminal) checks to determine, as appropriate, the validity of the source of data input or operational instruction. | Avanti JXN/Optima XPN software is built-in to each centrifuge and source data input. Operational instruction can only be provided by the centrifuge of use. |
| 11.10 (i) | Determination that persons who develop, maintain, or use electronic record/electronic signature systems have the education, training, and experience to perform their assigned tasks. | Regulation refers to the responsibility of the User and should be maintained using proper protocols and documentation. |
| 11.10 (j) | The establishment of, and adherence to, written policies that hold individuals accountable and responsible for actions initiated under their electronic signatures, in order to deter record and signature falsification. | Regulation refers to the responsibility of the User and should be maintained using proper protocols and documentation. |
| 11.10 (k) | Use of appropriate controls over systems documentation including: (1) Adequate controls over the distribution of, access to, and use of documentation for system operation and maintenance; (2) Revision and change control procedures to maintain an audit trail that documents time-sequenced development and modification of systems documentation. | Online help is built into the application and cannot be changed outside of system software updates. Such updates can only be executed by field service. |

A large, touch-screen display allows Users to easily access Run and System Logs simplifying the User experience. An interactive question mark symbol provides help solutions to software modalities. Many functionalities are embedded in the software which support 21 CFR compliance.

| 21 CFR Sec. 11.30 Controls for Open Systems | Comment |
|---|---|
| Persons who use open systems to create, modify, maintain, or transmit electronic records shall employ procedures and controls designed to ensure the authenticity, integrity, and, as appropriate, the confidentiality of electronic records from the point of their creation to the point of their receipt. Such procedures and controls shall include those identified in 11.10, as appropriate, and additional measures such as document encryption and use of appropriate digital signature standards to ensure, as necessary under the circumstances, record authenticity, integrity and confidentiality. | Not applicable. Avanti JXN/Optima XPN centrifuges are closed systems. |

| 21 CFR Sec. 11.50 Signature Manifestations | Comment |
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| (a) Signed electronic records shall contain information associated with signing that clearly indicates all of the following:<br>(1) The printed name of the signer;<br>(2) The date and time when the signature was executed; and<br>(3) The meaning (such as review, approval, responsibility, or authorship) associated with the signature. | Avanti JXN/Optima XPN software clearly indicates all of the following in signed electronic records: 1) the printed name of the signer; 2) the date and time when the signature was executed; and 3) the meaning (such as review, approval, responsibility or authorship) associated with the signature. The software designates 3 roles: author, reviewer, and approver. A User can select the author option only if he/she started the run. The User must have super User or Administrator access to select reviewer or approver. |
| (b) The items identified in paragraph (a)(1), (a)(2), and (a)(3) of this section shall be subject to the same controls as for electronic records and shall be included as part of any human readable form of electronic record (such as electronic display or printout). | For CSV versions of the files, a signature must be included for the CSV to be a valid record for inspection. |

| 21 CFR Sec. 11.70 Signature/Record Linking | Comment |
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| Electronic signatures and handwritten signatures executed to electronic records shall be linked to their respective electronic records to ensure that the signatures cannot be excised, copied, or otherwise transferred to falsify an electronic record by ordinary means. | Electronic signatures are embedded in the document and encrypted. |

## Subpart C—Electronic Signatures

### 21 CFR Sec. 11.100 General Requirements

| Part | Description | Comment |
|---|---|---|
| 11.100 (a) | (a) Each electronic signature shall be unique to one individual and shall not be reused by, or reassigned to, anyone else. | Reuse or reassignment of a username is not permitted. |
| 11.100 (b) | (b) Before an organization establishes, assigns, certifies, or otherwise sanctions an individual's electronic signature, or any element of such electronic signature, the organization shall verify the identity of the individual. | Regulation refers to the responsibility of the User and should be maintained using proper protocols and documentation. |
| 11.100 (c) | (c) Persons using electronic signatures shall, prior to or at the time of such use, certify to the agency that the electronic signatures in their system, used on or after August 20, 1997, are intended to be the legally binding equivalent of traditional handwritten signatures.<br>(1) The certification shall be submitted in paper form and signed with a traditional handwritten signature, to the Office of Regional Operations (HFC-100), 5600 Fishers Lane, Rockville, MD 20857.<br>(2) Persons using electronic signatures shall, upon agency request, provide additional certification or testimony that a specific electronic signature is the legally binding equivalent of the signer's handwritten signatures. | The User is responsible to certify that digital signatures are the legal equivalent of previous handwritten signatures. |

| 21 CFR Sec. 11.200 Electronic Signatures Components and Controls | Comment |
|---|---|
| (a) Electronic signatures that are not based upon biometrics shall:<br>(1) Employ at least two distinct identification components such as an identification code and password.<br>(i) When an individual executes a series of signings during a single, continuous period of controlled system access, the first signing shall be executed using all electronic signature components; subsequent signings shall be executed using at least one electronic signature component that is only executable by, and designed to be used only by, the individual.<br>(ii) When an individual executes one or more signings not performed during a single, continuous period of controlled system access, each signing shall be executed using all of the electronic signature components. | The User must first log in using both components of their signature. Signing during that session is accomplished by PIN entry when prompted. |
| (2) Be used only by their genuine owners; and | Regulation refers to the responsibility of the User and should be maintained using proper protocols and documentation. |
| (3) Be administered and executed to ensure that attempted use of an individual's electronic signature by anyone other than its genuine owner requires collaboration of two or more individuals. | Only the Administrator or an account owner can modify a PIN. |
| (b) Electronic signatures based upon biometrics shall be designed to ensure that they cannot be used by anyone other than their genuine owners. | Avanti JXN/Optima XPN built-in software does not currently support biometric signatures. |

## 21 CFR Sec. 11.300 Controls for Identification Codes/Passwords

Persons who use electronic signatures based upon use of identification codes in combination with passwords shall employ controls to ensure their security and integrity. Such controls shall include:

| Part | Description | Comment |
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| Sec. 11.300 (a) | Maintaining the uniqueness of each combined identification code and password, such that no two individuals have the same combination of identification code and password. | User IDs and PINs are required to be unique and duplicated in no way. |
| Sec. 11.300 (b) | Ensuring that identification code and password issuances are periodically checked, recalled, or revised (e.g., to cover such events as password aging). | A PIN is set to expire when first created or reset. PINs can also expire on command by the Administrator. |
| Sec. 11.300 (c) | Following loss management procedures to electronically deauthorize lost, stolen, missing, or otherwise potentially compromised tokens, cards, and other devices that bear or generate identification code or password information, and to issue temporary or permanent replacements using suitable, rigorous controls. | Administrators can remove accounts or change compromised PINs as needed. PINs are for temporary use only if reset by Administrator. User must create new PIN to ensure Administrator does not possess User's PIN. |
| Sec. 11.300 (d) | Use of transaction safeguards to prevent unauthorized use of passwords and/or identification codes, and to detect and report in an immediate and urgent manner any attempts at their unauthorized use to the system security unit, and, as appropriate, to organizational management. | Software locks out the offending User for 20 minutes after 3 consecutive unsuccessful login attempts. |
| Sec. 11.300 (e) | Initial and periodic testing of devices, such as tokens or cards, that bear or generate identification code or password information to ensure that they function properly and have not been altered in an unauthorized manner. | Periodic checks are the responsibility of the User. It's suggested that Administrators perform regular checks on access restrictions and unauthorized data manipulation. |

Supporting FDA regulations to promote enhanced security and data protection is good business for both Beckman Coulter and laboratories containing Beckman Coulter products. By complying with these regulations, labs can be confident in generating trusted and secure data. Beckman Coulter's new line of centrifuges—the Avanti JXN and Optima XPN—support Code 21 CFR Part 11 and make it easy for Users to gather, securely access, and protect data.

Avanti JXN-26 Centrifuge

## Source Documents

1. *Code of Federal Regulations,* Title 21, Volume 1, Part 11: Electronic Records; Electronic Signatures. Revised as of April 1, 2013.
2. Guidance for Industry: Part 11, Electronic Records; Electronic Signatures—Scope and Application. August 2003.
3. Guidance for Industry: Computerized Systems Used in Clinical Investigations. May 2007.

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