

Appendix A - Connex CS Technical System Requirements (Central Station+Server)

This deployment configuration is for customers who wish to install the Connex CS software on their own Windows Server OS and SQL Server with the Central continuous monitoring option (Central Station(s)) or Stand Alone Central Station. See *Appendix B* for system specifications without continuous monitoring.

Technical Requirements for Connex CS

Connex CS is a system comprised of Connex CS and connected devices. Connex CS is a medical product consisting of software deployed on your physical or virtual server. Connex CS interfaces with Welch Allyn supported spot or continuous vital signs monitoring devices to collect, store, review, and provide reports of patient vital signs data. Connex CS also provides alarming of physiological and technical events related to this data and the operation of the connected monitoring devices.

Components of Connex CS may include:

- **Welch Allyn vital signs devices** provide frontline monitoring tools to gather patient data and vitals, and support various clinical workflows from spot-check readings to optional continuous bedside monitoring.
- **Welch Allyn Connex CS Central Station** communicates with vital signs devices to provide a central monitoring location and visual presence for all connected devices. Central Station supports patient alarms, reports & printing, and capabilities for extended recording and reviewing of patient data.
- **Multiple Welch Allyn Connex CS Central Stations** work together with a **Welch Allyn Connex CS server** to provide a scalable solution for your facility.
- **Welch Allyn Connex CS Server** can support an interface with your HIS applications, sharing data via HL7 messaging. The CS server can also be deployed independently, without Central Stations, to send spot measurements directly to your HIS.

Welch Allyn Connex CS takes a flexible approach to technology by recognizing the differing network infrastructures and equipment that exist in hospital settings. That's why Welch Allyn Connex CS relies on the standard technology in place in most facilities. Welch Allyn understands that customers collect vital signs in many areas using different workflows from spot-check readings to continuous bedside monitoring.

We've designed the Connex Clinical Surveillance System to work the way you do – using the network infrastructure you have in place.

Listed in the tables below are the equipment and software that may be required to use Welch Allyn Connex CS.

Also refer to the Best Practices Guides for additional detail at www.welchallyn.com/networkbestpractices



Network	<p>Welch Allyn Connex CS is a flexible solution that allows spot vital signs readings and/or continuous monitoring data to be transferred via a network that supports TCP/IP version 4. Refer to the Best Practices Guides for additional detail.</p> <ul style="list-style-type: none"> • Standard Ethernet communication for wired vital sign devices (10base-T, auto-negotiate). • DHCP assigned IP address for all vital sign devices • Static assigned IP addresses for all central station and server hardware. • Vitals sign devices with wireless workflows require the use of a WLAN for communication with Connex CS. • Welch Allyn's vital signs devices support running on a wireless network from a several vendors including: <ul style="list-style-type: none"> ○ Aruba (Also sold as Dell Power Connect W and Alcatel) ○ Cisco ○ Meru ○ Juniper (Trapeze) ○ Motorola (Also sold as Extreme and Brocade) ○ HP (Also sold as Colubris) ○ Visit www.welchallyn.com/networkbestpractices for more information about wireless requirements. • Internet access is required for remote support and device upgrades. • Remote desktop support is most commonly provided via TeamViewer®. <p>If desired, Connex CS application can be run in a network across separate VLANs. A list of required open ports is shown below. The ECS and CCS ports (unsecure or secured) may be disabled as needed by setting the port number to "0" in CS Connection Settings.</p>			
	Port #	Protocol	Service	Firewall: Inside or Outside
53	UDP, TCP	DNS for NRS	I	Optional DNS communication, allows Vital sign devices to locate a Connex CS system on the network.
7711-7720	UDP	NRS	I	Network Rendezvous Service request/response, data from Vital Signs device to locate Connex CS application server
281, 7750	TCP	ECS	I	Episodic Connectivity Service, spot profile data from Vital Signs device. (7750 for secure episodic data connection)
291, 7751 51500-51501	UDP TCP	CCS	I	Continuous Connectivity Service, continuous profile patient data from Vital Signs device. (7751 for secure continuous data connection)
7731, 7732	TCP	Connex Client Services	I	Service interface for managing Patient data, configuration, user account management and readings. Used by internal Welch Allyn applications.
7733	TCP	ECS	I	Connex ProView remote access to the Connex Server Database.
8001-8099	TCP	Corepoint	I	HL7 data between clients and Enterprise Gateway application.
51500	TCP	AGS	I	Alarm Gateway Service to provide alarm messages in a data stream to a 3rd party system.
80 443 & 5938	TCP	TeamViewer Server	O	TeamViewer®
22	TCP	SecureLink Server	O	SecureLink® (On CSAS Server Only)
80 / 443	TCP	Axeda Server	O	Partner Connect agent
3011 & 3030	TCP	N/A	I	Partner Connect remote agent deployment utility
283, 16283 & 7721	TCP	Service Monitor	I	Service Monitor service, device health and status data from Vital Signs device. (Port 16283 for secure service data connection) Port 7721 used for CSM Device Upgrades.
1433 1434	TCP UPD	SQL Server	I	Allows Remote SQL Server connection
137-139	UDP	SQL Server	I	SQL file sharing, data and schema transfer port
Port number may vary*	TCP	SQL Server	I	A recommended fixed port on a new SQL Instance that allows inbound remote connection to the SQL instance.

	5094	TCP	Connex License Activation	○	Connection to the Welch Allyn License server during initial setup or for license reactivation
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Patient Monitor Device to System Communication	<p>Welch Allyn Connex CS uses your network to communicate with patient monitor devices; several different methods for most device clients to locate a server are supported. Patient Monitor Device communication options may vary by devices type.</p> <ul style="list-style-type: none"> • DNS Name support at device • DHCP Option 43/60 support at device • Static IP support from the device to the Server
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Server	<p>The Connex Server performs data storage tasks and relays HL7 messages to and from the HIS. We recommend a dedicated server for Connex.</p> <p>The Connex Server software is compatible with the following operating system: (Customers are responsible all OS service pack & patch maintenance)</p> <ul style="list-style-type: none"> • Microsoft Windows® Server 2012 R2 (64-bit) • Microsoft Windows® Server 2016 (64-bit) • Microsoft Windows® Server 2019 (64-bit) <hr/> <p>The following are our recommended minimum specifications for the Connex Server:</p> <ul style="list-style-type: none"> • CPU: Minimum: Quad core, 64 bit, 1.7GHz, manufactured Jan. 1, 2016 or later. • RAM: Minimum 8GB (12GB for local SQL Server) DDR3 SDRAM / 1600Mhz • Storage: 2 256GB drives RAID-1, Minimum 150GB of free disk space after software install • 100/1000 MB Ethernet • 1024x768 graphics adapter with color screen • TCP/IP: Predetermined Static IP address. Dynamic addresses are not supported • Microsoft .NET Framework 4.7.2 <p>If running on a virtual machine, designated resources should be comparable to the recommended specifications for the Connex server as given above.</p> <p>Server specifications may need to be adjusted to the size of your facility, the number of connected devices, the average number of admitted patients and the number of concurrent users.</p> <p>A single Connex Server can support:</p> <ul style="list-style-type: none"> • 800 Spot devices, plus 288 continuous devices • 6 Connex CS Central Stations and 1 Warm Spare <ul style="list-style-type: none"> ○ Each Central Station can support 48 Continuous devices
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Database	<p>The Connex Server software is compatible with the following database systems: (Customers are responsible all SQL service pack & patch maintenance)</p> <ul style="list-style-type: none"> - MS SQL Server 2012 Standard x64 - MS SQL Server 2014 Standard x64 - MS SQL Server 2016 Standard x64 - MS SQL Server 2017 Standard x64 - MS SQL Server 2019 Standard x64 <ul style="list-style-type: none"> • MS SQL Server must be configured for mixed mode authentication and default instance collation <i>SQL_Latin1_General_CP1_CI_AS</i> • MS SQL Server Management Studio is required to access the Connex database • To reduce the performance impact from other enterprise applications, it is recommended that the Connex Database be allocated on its own SQL instance <ul style="list-style-type: none"> ○ If a new instance is to be used, it is recommended that SQL Server be configured to use a static port for ease of firewall administration • Test Servers: MS SQL Standard is recommended however MS SQL Express is also supported but may have limitations. Refer to Microsoft for version comparison and limitations • Database disk space allocation: 20GB recommended
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Associated Software	<ul style="list-style-type: none"> • Corepoint Integration Engine version 7.4.4 • Remote desktop support: TeamViewer or SecureLink • Welch Allyn Partner Connect • Connex CS Application: Welch Allyn Connex • Connex ProView
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Connex CS Licensing	<p>Welch Allyn provides the following licenses as part of a standard order.</p> <ul style="list-style-type: none"> • Connex CS licenses (dependent on features purchase)
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Central Station: (Customer Supplied PC)	<p>CS Central Station hardware must meet the specifications listed below.</p> <ul style="list-style-type: none"> • OS: Clean install of Microsoft Windows 10 x64 with no unnecessary commercial software installed. • TCP/IP: Predetermined Static IP address. Dynamic addresses are not supported • CPU: Minimum of Intel quad core 2.66 GHz, FSB Speed 1333 MHz • RAM: Minimum 4 GB DDR2 SDRAM / 1600Mhz • Microsoft .NET Framework 4.7.2 • Hard Disk Drive: Minimum 256 GB, at least 150 GB of free hard disk space after the software install, 7200 RPM, SATA-2 (SSD Recommended) • Ethernet: 1 G-bit RJ45 • USB Port: One available USB 2.0 Port • Power: 100-240 VAC, 50/60 Hz • Video Graphics: 1680 x 1050 resolution available, DirectX 9 with WDDM 1.0 minimum • Display: 24" Multimedia display with minimum 1680 x 1050 (16:10 aspect ratio) native resolution and speakers capable of producing the auditory alarm signal characteristics and volumes specified in IEC 60601-1-8 <ul style="list-style-type: none"> ○ An audio connection from the PC to the display is required <p>Notes:</p> <ul style="list-style-type: none"> - The PC must be purposed exclusively as a Welch Allyn Connex CS Workstation. - Windows 10 version 1607 or greater to support .NET 4.7.2 - MS SQL Server Management Studio is required to access the local Connex database - The Workstation shall meet IEC 60950-1, Information Technology Equipment - Safety or equivalent - The Workstation shall meet EN 55022 / CISPR 22 or equivalent (emissions) and EN 55024 / CISPR 24 or equivalent (immunity)
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Alarm Interfaces	<p>Welch Allyn Connex CS uses standards-based interoperability. Connex CS leverages IHE PCD ACM interface. This interface is an industry standard managed by Integrating the Healthcare Enterprise (IHE) International, Incorporated (http://www.ihe.net/). Please refer to your alarm management vendor to determine whether & how they support the ACM standard as well as how to install and configure their system to receive messages using that interface.</p> <p>ACM Standard</p> <ul style="list-style-type: none"> • ACM PCD-04 Alarm Report message <p>HL7 Message Standard</p> <ul style="list-style-type: none"> • HL7 Version 2.5 message. (Subject to updates) <p>Alarm Message Type</p> <ul style="list-style-type: none"> • PCD-04 message <p>Message Type</p> <ul style="list-style-type: none"> • ORU^R40
Printers	<p>Welch Allyn supports customer provided printers for the Central Station that meet or exceed the following basic specifications.</p> <ul style="list-style-type: none"> • Monochrome Laser printer technology with Ethernet network interface. • Print Resolution at , 600 x 600 dpi resolution or higher • 15 ppm minimum paper engine speed, US Letter Size (8 ½" x 11") • 128 Mb or higher internal memory
Power	<p>Your facility is responsible to provide reliable power, including emergency backup, to Connex CS. Connex CS will only work with a reliable power source. Welch Allyn strongly recommends that Connex CS hardware be installed with a redundant power source, such as an uninterruptable power supply (UPS) or equivalent.</p>
HIS Interfaces	<p>Welch Allyn Connex CS uses standards-based interoperability. Connex CS leverages HL7 messaging to support sharing patients' vital signs and other data with your HIS and to import patient demographics from your ADT system. Refer to the Connex CS HL7 Interface Guide and Conformance Statement (80018284) for additional details.</p>
Connex ProView	<p>Welch Allyn Connex ProView allows the user to review data actively being processed by the Welch Allyn Connex CS database for the purpose of troubleshooting issues with data processing. The software is pre-installed on the CS Server by default; however, ProView may also be installed on another PC on the same network to view Connex data. The host PC requirements listed below. For more Detail on ProView refer to the Connex CS Admin Guide.</p> <p>Operating System Compatibility:</p> <ul style="list-style-type: none"> • Microsoft Windows® 10 <p>Recommended minimum hardware specifications:</p> <ul style="list-style-type: none"> • Dual-core Pentium 2GHz, • 4GB memory, • 5GB of free disk space, • Ethernet or wireless network connection to the Server • 1024x768 graphics adapter with color screen.
Barcode Scanners	<p>While barcode scanners are not required to capture vitals, they help improve the speed and accuracy of data collection. Connex CS is optimized to use barcoded patient data.</p>

Compatible Welch Allyn Devices

The device should be configured for patient and clinician identification.

Refer to the directions for use that came with the device or visit our product catalog at welchallyn.com for Connex CS specific configuration requirements for desired workflow(s).

Model	Connectivity (Wireless may be a device option)	Workflow
CSM (Connex Spot Monitor)	- Ethernet - Wireless	Spot vitals (Episodic only)
CVSM & CIWS (Connex Vital Signs Monitor) (Connex Integrated Wall System)	- Ethernet - Wireless	- Spot vitals - Continuous Monitoring (Optional)
Spot LXi	- Ethernet - Wireless	Spot vitals (Episodic only)

Connex CS 1.8.3 - 1.8.7 Feature Compatibility

CS Feature ↓	<i>Vital signs device</i>							
	Spot LXI	CVSM/CIWS 1.71.0x	CVSM 2.10.00	CVSM 2.20.0x	CVSM/CIWS 2.30.0x ¹⁰	CVSM/CIWS ¹⁰ 2.40.0x 2.41.00 2.42.00 2.43.0x 2.44.0x 2.45.0x	CSM 1.2x	CSM 1.3x 1.4x 1.5x
Vitals Record Push	✓	✓	✓	✓	✓	✓	✓	✓
Clinician ID Query	-	✓	✓	✓	✓	✓	✓	✓
Patient ID Query	-	✓	✓	✓	✓	✓	✓	✓
Patient List (Acquired from Connex CS)	-	✓	✓	✓	✓	✓	✓	✓
Clinician Authentication	-	✓ _{6,8,9}	✓ _{6,9}	✓ _{6,9}	✓ _{6,9}	✓ _{6,9}	-	✓ ₉
Custom Modifiers & Parameters	-	-	✓ _{2,6}	✓ _{2,6}	✓ _{2,6}	✓ _{2,6}	✓ ₂	✓ ₂
Custom Scores	-	-	-	✓ _{2,6}	✓ _{2,6}	✓ _{2,6}	✓ ₂	✓ ₂
Patient Rest Mode	-	-	-	✓	✓	✓	-	-
3 rd Party Alarms	-	-	✓	✓	✓	✓	-	-
NRS (Network Rendezvous)	-	✓	✓	✓	✓	✓	✓	✓
Averaged BP (Office Profile)	-	✓ ₄	-	-	✓ ₄	✓ ₄	✓ ₄	✓ ₄
Encryption Compatibility	-	-	-	-	-	✓ ₇	✓ ₇	✓ ₇
Server Authentication	-	-	-	-	-	-	-	✓ ₇
ECG snapshot, ECG sourced HR, RR and LTA alarms connectivity	-	-	-	-	-	✓ 2.44 and later	-	-
Manual SAVE while in Continuous Profile	-	-	-	-	-	✓ 2.45 and later	-	-
Notes								
2	Data may not appear in Flowsheet depending on what is configured in CS per covered area							
4	Averaged BP reading will look like a normal BP reading without a source and no contributing NIBP readings							
6	Not supported in Connex Continuous workflows							
7	CVSM Software version 2.4.5 and higher supports continuous data encryption on Connex CS version 1.8.7 (and above) CSM Software version 1.22.00 and higher supports episodic data encryption							
8	Clinician Authorization with Single Sign On using Imprivata Server supporting ConfirmID™ for Medical Devices with Barcode on Device Version 1.71.03 or higher.							
9	Clinician Authorization with Single Sign On using Imprivata Server supporting ConfirmID™ for Medical Devices with Barcode on all versions while Barcode and RFID is supported.1.32.00 and higher							
10	Connex CS pre 1.8.5 will reject the connection if an ECG module is connected to CVSM							