Agilent

OpenLab CDS

Workstations, Clients, and Instrument Controller

Requirements and Supported Instruments

Notices

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This guide is valid for revision 2.7 of Agilent OpenLab CDS.

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In this Guide ...

This document details the minimum hardware and software requirements that need to be met to run OpenLab CDS. It is valid for Workstation, Workstation Plus, Client, or Analytical Instrument Controller (AIC) components. It also provides information on supported Agilent and Non-Agilent instruments.

For server components please refer to the *OpenLab Server and OpenLab ECM XT Hardware and Software Requirements Guide* (ECM_XT_v2.7_HardwareSoftwareRequirements_en.pdf), or the Requirement guide for ECM, respectively.

Table 1 Terms and abbreviations used in this document

Term	Description
Content Management	Component of OpenLab Server including a database, used to manage your analytical data
AIC	Agilent's Analytical Instrument Controller
Control Panel	Control Panel for Agilent OpenLab software
Microsoft Control Panel	Part of the Microsoft Windows operating system
Shared Services	Set of administrative services that control, for example, the security policy and the central configuration of OpenLab CDS. Shared services are accessed via the Control Panel.

1 Hardware Requirements

This chapter contains the hardware requirements for the different components of an OpenLab CDS system.

2 Software Requirements

This chapter contains the software requirements for the different components of an OpenLab CDS system.

3 Network Specifications

This chapter provides network specifications for an OpenLab CDS system.

4 System Preparation Tool

The System Preparation Tool (SPT) checks and applies Windows settings on your machine.

5 Instrument Information

This chapter provides information on the instruments supported by the current revision of OpenLab CDS and the required respective instrument drivers and firmware revisions.

6 Software Compatibility

This chapter contains information on compatibility with other Agilent or non-Agilent software.

Contents

1 Hardware Requirements

This chapter contains the hardware requirements for the different components of an OpenLab CDS system.

OpenLab CDS Topologies

OpenLab CDS is available in different topologies. They differ on where the various software components (Clients, Shared Services and, if relevant, Content Management) are located. For details on the topologies refer to the respective installation guide or check with your Agilent representative.

OpenLab CDS Workstation and Workstation Plus

OpenLab CDS Workstation installations include all required components on the same PC. Agilent provides two different storage options for this topology: *CDS Workstation* with file store, and *Workstation Plus* with included content management. Workstation and Workstation Plus primary storage environment must use a local drive.

Figure 1 All components on the same PC

Networked Workstation

Networked Workstation is defined as a PC machine that supports both user interaction (i.e. sample submission and data review and processing) as well as automated functions (i.e. data acquisition and automated processing and printing). For OpenLab CDS, a Networked Workstation is an AIC used interactively for sample submission and data processing. The Client components are installed as part of the AIC installation.

OpenLab CDS Client/Server

With an OpenLab CDS Client/Server installation, you need multiple hardware components (see "OpenLab CDS Client/Server System Topologies" on page 10 for more detail). The *OpenLab CDS* software provides the chromatography data system components for instrument control, data analysis and reporting on Analytical Instrument Controllers (AICs) and clients.

On the server(s), the *OpenLab Server* software provides the Shared Services and Content Management components.

For configurations with multiple servers, you will receive a starter pack with two OpenLab Server software licenses; in addition, you will need an OpenLab Content Management Index server.

OpenLab CDS Client/Server System Topologies

Based on your expected system load, that depends on the number and type of instruments and users, OpenLab CDS Client/Server systems can be deployed with different topologies:

- ✓ 1-server all-in-one system (see Figure 2 on page 11),
- ✓ 2-server system: (see Figure 3 on page 11),
  - the database is hosted on a separate machine
- ✓ 4-server system (see Figure 4 on page 12)
  - Content Management and Shared Services on the first server
  - database on the second server
  - Index server on the third server
  - the file server on the fourth server
- ✓ as a Scalable System.

  For more information on scalable systems, please refer to the *Agilent OpenLab Server and OpenLab ECM XT Scalable System Installation Guide*.

Consult with your Agilent support representative to decide which topology is appropriate for your environment.

The following diagrams are a conceptual representation of the system topology. They are not intended to represent the topology's network architecture.

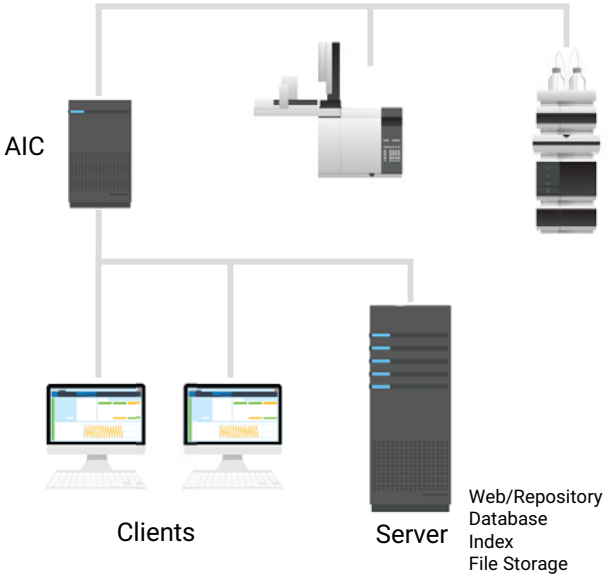


Figure 2 All-in-one topology: Clients and AIC link to one server

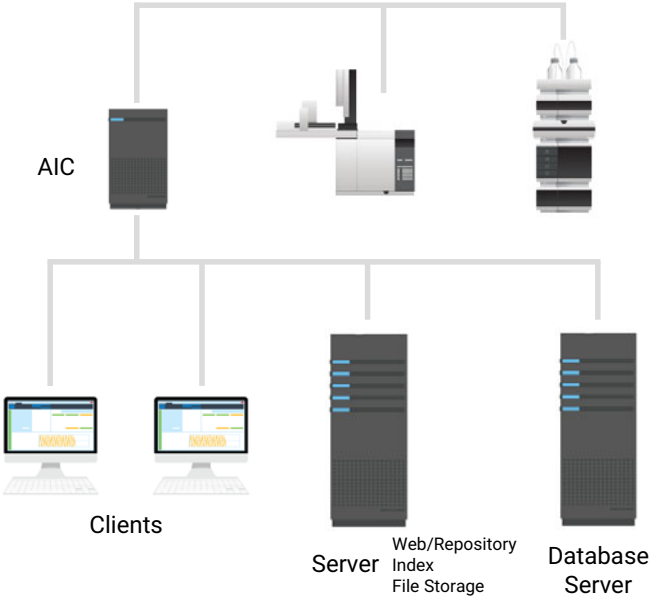


Figure 3 2-Server topology: Clients and AIC link to two dedicated servers.

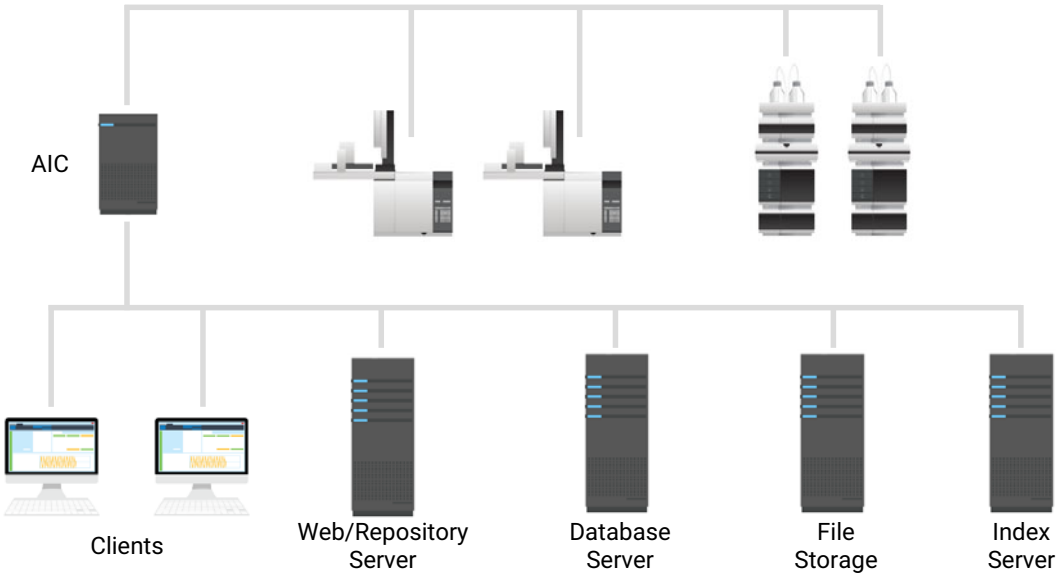


Figure 4 **4-Server topology: For high-load environments with multiple AICs**

Cloud Services Compatibility

OpenLab CDS client/server installations with OpenLab ECM XT as back-end can run in an Amazon Web Services (AWS) or Microsoft Azure cloud environment, where OpenLab ECM XT is configured as the secured repository for OpenLab CDS; see compatibility statements listed on the next page.

The table provides a simplified view of the possible cloud configurations. Alternative cloud platforms such as Google Cloud, AWS China, Azure China, IBM Cloud, Alibaba Cloud, etc. have not been tested. Agilent can only provide basic guidelines for alternative cloud platforms which often use different services and operate with different specifications. Support for these platforms would be the responsibility of the lab and IT resources of the end user.

Table 2 Supported Cloud configurations

Private cloud provider *OpenLab component*	AWS EC2, or Azure VM	AWS S3 or Azure File storage[1]	AWS RDS	Azure SQL (managed)
Workstations	-	-	-	-
Clients	c	c	n/a	n/a
Instrument controller	-	-	n/a	n/a
OpenLab ECM XT server	●	●	n/a	n/a
Index Server	●	●	n/a	n/a
Database Server	●	●	-	c
Content Storage[2]	●	●	n/a	n/a

[1] Azure File storage requires the OpenLab servers to be on Azure as well

[2] File storage on Azure is not supported

Legend

●	supported	AWS:	Amazon Web Services
-	Not supported	EC2:	Elastic Compute Cloud
n/a:	not applicable	RDS:	Relational Database Service - managed
c:	contact Agilent	S3:	Simple Storage Service
VM:	Virtual machine	File Storage:	File based storage
		Azure SQL:	Azure database management service

Additional Cloud Service compatibility statements:

- English language only supported
- On-Premises VM hosts must be below 50% capacity (client side)
- Azure Active Directory (AAD) is not supported
- No support of Oracle in the cloud

For more information and assistance with cloud deployment check *Deploying OpenLab CDS in the cloud - Guidance for IT* at https://www.agilent.com/en/product/software-informatics/analytical-software-suite/chromatography-data-systems/openlab-cds/cloud-deployments.

Cloud deployments with OpenLab ECM 3.x as back-end are not supported under a standard support agreement.

PC Recommendations

NOTE

The following tables are intended to be guidelines for minimum hardware and may need to be adjusted based on your intended load. Consult with your Agilent support representative to decide which hardware and topology is appropriate for your needs. Factors to consider include number of logical instruments, concurrent users, and other connection points. See also calculations for "Disk Space" on page 21 and "Configuration Capacity" on page 18.

For information on pre-configured Agilent original bundle PCs see https://www.agilent.com/en/products/software-informatics/chromatography-data-systems/openlab-cds/originalpcbundle.

Client

Table 3 Minimum hardware configuration for a client

Item	HW requirements
Recommended Agilent original bundle PC	Small Form Factor HP Z2 G5
Processor	3.0 GHz or greater 4 Core
Physical memory (RAM)	8 GB
	Ensure that at least 4 GB is reserved for the Windows operating system.
Hard disk	500 GB 7200 RPM SATA drives minimum or equivalent solid state drive
USB port	USB 2 required for installation via provided media
LAN Card	100 MB/1 GB LAN for instrument control
Graphic resolution	1600 x 900 minimum 1920 x 1080 recommended

Workstation

OpenLab CDS is available in two workstation flavors: With storage in the local file system (OpenLab CDS Workstation software), or with a built-in Content Management database (OpenLab CDS Workstation Plus software).

Based on the number of instruments OpenLab CDS Workstation software has two recommended PC configurations: A small (default) with 8GB to control up to 2 instruments, and with upgraded memory (16GB) that can be used to control up to 4 instruments. The table below provides the minimum hardware configuration for Workstations. It also applies to OpenLab CDS VL (Note: VL only supports 1 instrument).

Table 4 Minimum hardware configuration for workstations

Item	OpenLab CDS Workstation	OpenLab CDS WS Plus
Recommended Agilent Original Bundle PC with Win 11	HP Workstation Z2G9 SFF	HP Workstation Z2G9 SFF
Processor speed (CPU)	3.0 GHz or greater, 6 Core	3.0 GHz or greater, 6 Core
Physical memory (RAM)	8 GB (up to 2 instrument points) 16 GB (3 or more instrument points)	16 GB
	Note that at least 4 GB is reserved for the Windows operating system.	
Hard disk	1 x 500 GB 7200 RPM SATA drive minimum SSD drive recommended for better performance See Table 12 on page 21	2 x 500 GB or 1 TB 7200 RPM SATA drive minimum[1] SSD drive recommended for better performance See Table 12 on page 21
Graphic Resolution	1600 x 900 minimum; 1920 x 1080 recommended	
RS-232 port	1 serial port required for selected instruments that are still using RS-232 communication. See instrument specifications for details.	
USB port	USB 2 required for installation via provided media	
LAN card	100 MB/1 GB LAN for instrument control 2nd LAN card required for lab intranet connection, to isolate the instrument's data traffic from the lab intranet connection.	
Win 11	Microsoft has specific chipset requirements for Win 11. Refer to Microsoft for details	

[1] If the computer has a disc array controller we recommend 2 x 1 TB in RAID1.

Analytical Instrument Controller (AIC)

The below table is applicable for AICs with up to 6 instruments. For AIC's configured with fewer instruments, the amount of memory required by the system may be decreased.

Table 5 Minimum hardware for an Instrument Controller

Item	HW requirements
Recommended Agilent original bundle PC with Win 11	Z2G9 SFF with 16 GB RAM
Processor	3.0 GHz or greater, 18MB cache 6 Core
Physical memory (RAM)	16 GB ensure to reserve at least 4 GB for the Windows operating system.
Hard disk	2 x 500 GB or 1 TB 7200 RPM SATA drive minimum SSD drive recommended for better performance If the computer has a disc array controller Agilent recommends 2 x 1 TB in RAID1.
RS-232 port	1 serial port required for selected instruments that are still using RS-223 communication. See instrument specifications for details.
USB port	USB 2 required for installation via provided media
LAN card	100 MB/1 GB LAN for instrument control 2nd LAN card required for house, to isolate the instrument's data traffic from the lab intranet connection.
Graphic resolution (Monitor required for failover mode only)	1600 x 900 minimum 1920 x 1080 recommended

Shared Services Server

A separate Shared Services server is needed for configurations with OpenLab ECM as storage backend. For more information, please refer to the *Configuring OpenLab CDS with ECM* guide. It is available from the **Planning** tab of the OpenLab installer.

Configuration Capacity

Instrument An analytical system, made up of one or more modules that are configured together to achieve the desired analytical functionality. Also known as a system, i.e. an LC/MSD system.

Points The relative level of load (load value) that an instrument or module puts on a physical or virtual system, aggregating CPU and RAM (memory) consumption. Different types of detectors require more processing power and memory than others, so they have been assigned higher "point" values.

Concurrent sessions The number of simultaneous connections to the system. This includes user connections and instrument connections. For OpenLab CDS, use points as the measure of instrumentation as this reflects both number of instruments and the amount of data generated by each instrument system. See below for examples of number of points per instrument type.

Instrument licenses Connection Licenses refer to the licenses required in the software in order to run a specific instrument configuration. Note: Points do not equal instrument connection licenses.

The instrument capacity (number of configurable instruments) per Workstation or AIC depends on the type of instrument configured. Work with your Agilent representative to ensure your system is configured sufficiently for your projected number of users, concurrent sessions, instruments, and load.

You can configure any number of instruments that sum up to *4* instrument points per OpenLab CDS Workstation (Standard configuration). Per OpenLab CDS VL Workstation you can configure 1 instrument with up to 2 instrument points.

Table 6 Instrument Capacity of OpenLab CDS Workstations

OpenLab CDS standard configuration	Supported Instrument points
Standalone Workstation	Up to 4 points
Standalone Workstation with Content Management	Up to 4 points
Standalone VL Workstation	1 instrument; up to 2 points
Standalone VL Workstation with Content Management	1 instrument; up to 2 points

Table 7 Instrument Capacity of OpenLab CDS AICs

OpenLab CDS AIC	Instrument points per AIC[1]
Standalone PC	Up to 6 points
Virtualized PC[2]	Up to 6 points
Networked WorkStation	Up to 4 points
Client/Server	Scalable, with 6 points per AIC.

1 For customers migrating from OpenLab ChemStation their existing computer hardware is supported. In this case it is possible to configure up to 10 points per AIC. See OpenLab ChemStation documentation for ChemStation AIC specifications

2 AIC virtualization is supported but not recommended

Load Approximations

The following tables provide some guidance how to approximate load-based requirements for different instruments. Note that the load is also depending on actual instrument utilization and number of users.

Table 8 Points vs Licenses – OpenLab CDS system with Agilent LC Instruments

Module Type	Instrument Points	Connection Licenses
LC Instrument (= injector + pump + Agilent 2D detector[1] such as VWD)	1	1
LC 2D detector	0	0
LC 3D detector (such as DAD or (3D) FLD)[2]	1	1
HDR (High Dynamic Range)	2	1
MSD (Single quadrupole mass spectrograph)	2	1
OpenLab CDS Client	2	0

1 Includes any detector connected via an Analog-to-Digital converter

2 Additional Agilent DAD (if same DAD model) or a 3D-FLD, does not consume an additional license. Non-Agilent 2D or 3D detectors require a specific own connection license.

Table 9 Points vs LIcenses – Openlab CDS with Agilent GC Instruments

Module Type	Instrument Points (load value)	Connection Licenses
GC Instrument (GC=Inlet + detector i.e. FID[1])	1	1
Additional GC detector/ Headspace	0	0
GC Sampler e.g. PAL, Headspace	0	0
MSD (Single quadrupole mass spectrometer)	2	1
OpenLab CDS Client	2	0

[1] Includes any detector connected via an Analog-to-Digital converter

Table 10 Points vs Licenses – Other OpenLab CDS system components

	Instrument Points	Connection Licenses
A2D instrument[1]	1	1[2]
Agilent Instrument with A2D[3]	0	0
Non-Agilent Instrument with A2D[4]	0	1 [2]
Test Services (QualA)	1	0

[1] For a system that is configured using only an A2D module

[2] Non-Agilent Instrument connection

[3] For a system that includes an A2D module as part of a supported Agilent instrument configuration, e.g. a 8890 with additional detector connected through A2D

[4] Non-Agilent 2D or 3D detectors require a connection license on their own

NOTE

The instruments points can be different for non-Agilent instruments. Please check the respective driver documentation.

Capacity approximations for some example configurations:

Table 11 Examples

System	Points	Connection Licenses
LC + DAD	2 points	2 Connections (1x LC + 1x LC 3D)
LC + HDR DAD	3 points	2 Connections (1 x LC + 1 x LC 3D)
LC + DAD + FLD	2 points	2 Connections (1 x LC + 1 x LC 3D)
LC + MS	3 points	2 Connections (1x LC + 1x MS)
LC + MS + DAD	4 points	3 Connections (1x LC + 1x MS + 1xLC 3D)
GC with HS	1 point	1 Connection (1x GC; HSS is 0 connections)
GC + MS	3 points	2 Connections (1x GC +1x MS)

Disk Space

Disk space requirements should be adjusted based on the number and type of instruments and archival periodicity. Agilent recommends providing disk space for one year of lab operation in addition to the operating system and OpenLab CDS requirements.

Table 12 Typical expected file sizes

	Run time	Description	Expected data size
2D data	60 min	10 Hz, 2 channel data	300-700 KB
3D data	60 min	10 Hz, 5 channel data, plus spectra at 1 nm resolution from 200 to 400 nm	100-300 MB
LC/MS data (SQ)	60 min	Scan mode	20-40 MB
GC/MS data (SQ)	60 min	Scan mode	50-300 MB
GC/MS data (SQ)	60 min	SIM mode with 2 ions	1-3 MB

OpenLab Server / OpenLab ECM XT configurations

The choice of a specific server topology depends on the specific requirements and constellations in your lab. The table below just provides a rough guideline. Please check with your Agilent representative to determine the correct configurations for your laboratory.

Table 13 OpenLab Server / OpenLab ECM XT configurations

Concurrent Sessions[1]	typically this corresponds to x Instruments in Lab	Recommended OpenLab Server Configuration
Up to 70	Up to 30	All-in-One server
Up to 90	Up to 50	Two-server
Up to 115	Up to 100	Four-server
Up to 290	Above 100	Scalable system

[1] See section "Configuration Capacity" for details on how to calculate Concurrent Sessions for OpenLab CDS

2 Software Requirements

This chapter contains the software requirements for the different components of an OpenLab CDS system.

General Software Requirements

Component	Details
.NET Framework (64-bit)[1]	.NET 3.5.x .NET 4.8 or higher[2]
.NET Core (64 bit)	.NET 5.x .NET 6.x
Web browser	• Google Chrome 98 or higher • Microsoft Edge (Chromium-based, as provided with the supported OS versions)
Antivirus software [3]	• Symantec Endpoint Protection (64 bit) • Trend Micro • Microsoft Defender Antivirus • McAfee

[1] Will be installed by the OpenLab installer if needed

[2] Both Frameworks are required, they coexist.

[3] The listed antivirus software has been tested and is recommended by Agilent. Support is not limited to this software. Check the specific requirements and support of each product.

You may use a PDF viewer to open PDF manuals in OpenLab Help & Learning. The PDF viewer is not required for the system to function correctly.

Supported Operating Systems

Language Compatibility

User interfaces are displayed in the language of the Windows operating system for the following languages:

- English
- Chinese
- Japanese
- Brazilian Portuguese
- Russian (Workstations only)

The English language OpenLab CDS software is also supported with Western European language operating systems, provided the OS Region settings are configured correctly.

HINT

OpenLab Server/ECM XT, as well as Test Services (QualA) are supported with English, Chinese, Japanese and Brazilian Portuguese Windows OS languages only.

Non-localized instrument drivers are supported; They will appear in English even when running localized versions of OpenLab CDS.

Customized locale settings might be required for Non-Agilent drivers. Please check the localization statement in the driver documentation.

Supported Operating Systems

Table 14 Supported Operating Systems by components of OpenLab CDS v2.7

Windows Product	Workstation	Networked Workstation[1]	Client	AIC
Windows 11 64 bit, Professional or Enterprise	✓	✓	✓	✓
Windows 10 64 bit, Professional or Enterprise	✓	✓	✓	✓
Windows Server 2016 64-bit Standard or Datacenter	✗	✓ 2	✓ 3	✓ 2
Windows Server 2019 64-bit Standard or Datacenter	✗	✓ 2	✓ 3	✓ 2

1 Networked Workstation is defined as a PC machine that supports both user interaction (i.e. sample submission and data review and processing) as well as automated functions (i.e. data acquisition and automated processing and printing). For OpenLab CDS a Networked Workstation is an AIC used interactively for sample submission and data processing.

2 supported, but not recommended

3 virtual environment

Agilent may ship any supported Windows version, see Table 15 for details.

Table 15 Supported versions of Microsoft Windows

OpenLab CDS *Windows Product*[1]	v2.5	v2.6	v2.7
Windows 11 Pro (64 bit)	✗	✗	21H2 or greater
Windows 11 Enterprise (64 bit)[2]	✗	✗	21H2 or greater
Windows 10 Pro (64 bit)[2]	1909 1809	20H2 2004	21H1 or greater 20H2
Windows 10 Enterprise (64 bit)[2]	1809 or greater	1909 or greater	21H1 or greater

Table 15 Supported versions of Microsoft Windows

OpenLab CDS *Windows Product*[1]	v2.5	v2.6	v2.7
Windows 10 LTSC/LTSB	✖	Check FAQ on Agilent.com / OpenLab CDS [3]	
Windows 8.1 Pro/Enterprise	✖	✖	✖
Windows 7 Pro /Enterprise	✖	✖	✖
Windows Server 2022	✖	✖	Standard[4] Data Center[4]
Windows Server SAC	✖	✖	✖
Windows Server 2019	Standard Data Center	Standard Data Center	Standard Data Center
Windows Server 2016	Standard Data Center	Standard Data Center	Standard Data Center
Windows Server 2012 R2	✖	✖	✖

1 Agilent supports the versions supported at release per Windows life-cycle fact sheet https://learn.microsoft.com/en-us/lifecycle/faq/windows.
Agilent expects, but cannot guarantee, that newer minor product versions will be compatible.

2 Agilent does not support use on Windows Home Edition, or Windows Education Edition.

3 https://www.agilent.com/en/support/software-informatics/analytical-software-suite/chromatography-data-systems/openlab-cds/faq-openlab-cds-ltsc.

4 Requires v2.7 update 6. All Windows Server compatibility is provided per ECM XT/OpenLab Server compatibility. Other content management compatibility is defined by that product.

Upgrade to current version of Windows OS

Upgrading to a different version is the responsibility of the end user and is not part of the standard installation process. Refer to https://www.agilent.com/en/support/windows-upgrade-faq for more information.

Supported Databases

OpenLab CDS supports PostgreSQL databases for hosting the Data Repository.

OpenLab CDS Workstation Plus uses a PostgreSQL database for Shared Services, the Data Repository and Content Management. It is installed and configured automatically during installation. Agilent supports only the use of the PostgreSQL version as installed by the OpenLab software.

If you are using OpenLab Server/ECM XT or OpenLab ECM to store data, please refer to the respective product documentation for information on supported databases.

For information on Databases for Shared Services Server please check the manual *Configuring OpenLab CDS with OpenLab ECM*.

Virtualization

OpenLab CDS supports two separate virtualization technologies: *Application Publishing Technologies* such as Microsoft Remote Desktop Services (RDS/Terminal Server) and *Operating System Virtualization Technologies* such as Hyper-V for Windows Server, sometimes known as hardware virtualization. Basic machine and processing requirements do not change when virtualizing your machine. Ensure to comply with the recommendations provided in this guide.

Thin Client or Remote Access

OpenLab CDS clients can be virtualized on application virtualization platforms like Citrix. OpenLab CDS clients have been tested with the following virtualization software. Note that the resource requirements are equal to those of the physical machines. On-Premises VM hosts must be at less than 50% capacity (client side).

Tested client application publishing software

- Microsoft Remote Desktop Services (RDS/Terminal Server) for Windows Server 2016, 2019 and 2022

  Additional information (Microsoft): https://docs.microsoft.com/en-us/windows-server/remote/remote-desktop-services/rds-deploy-infrastructure
- Citrix XenApp for Windows Server 2016, 2019, and 2022

  Tested revision: 7.15u2. Additional information (Citrix): https://docs.citrix.com/en-us/citrix-application-delivery-management-software/current-release/deploy.html

Registration

For Citrix or plain Windows RDS, at least the **OpenLab Control Panel** needs to be registered on the server side to allow 'thin client' access. For the default installation folder this is: C:\Program Files (x86)\Agilent Technologies\OpenLab Services\UI\Agilent.OpenLab.ControlPanel.exe.

Further programs to optionally register for sharing are:

- OpenLab Help and Learning - C:\Program Files (x86)\Agilent Technologies\OpenLabHelp\en\index.htm

- Parts Finder - C:\Program Files (x86)\Agilent Technologies\Parts Finder\Parts Finder\PartsFinder.exe
- IMPORT - eMethod - C:\Program Files (x86)\Agilent Technologies\eMethodWizard\Agilent.eMethodWizard.OpenLabCDS.exe

NOTE

Terminating client sessions when there is data in the File Upload Queue will result in data loss (for example, when reprocessing a large data set).

To avoid the risk of data loss do not use aggressive session management settings that automatically terminate client sessions as a way to save server resources. Session management should only *disconnect* idle sessions but not terminate them.

NOTE

Users opening Data Analysis in a restricted mode (Snapshot, Review completed Injections) may lose access to their Data Analysis sessions in Citrix / RDS OpenLab CDS environments. This could occur when a user closes the Citrix session but not DA. When restarting Citrix, this user may be distributed to a different Citrix client.

To minimize the risk of losing unsaved changes to your results in restricted Data Analysis mode, Agilent recommends to always allocate the user to Citrix / RDS clients for one entire work day or shift (8-10) hours, rather than just 30 min. This mitigates the risk that the restricted Data Analysis closes automatically without saving, due to loss of user server allocation within the 30 minute persistence time.

NOTE

Be aware of a potential conflict when using an All-in-one Citrix environment: Both Citrix and OpenLab CDS use port 27000 for the License Manager Daemon. See "Firewall Settings" on page 40.

Tested Operating System virtualization software

- VMware vSphere (64 bit) for Windows Server 2016, 2019, and 2022
- Hyper-V (64 bit) for Windows Server 2016, 2019, and 2022

NOTE

To prevent OpenLab CDS licensing issues when using client application virtualization software, disable the (default) dynamic MAC address.

The product licensing is based on the MAC address of the server or Workstation/Workstation Plus. A change of MAC address, will break licensing and the application won't be functional.

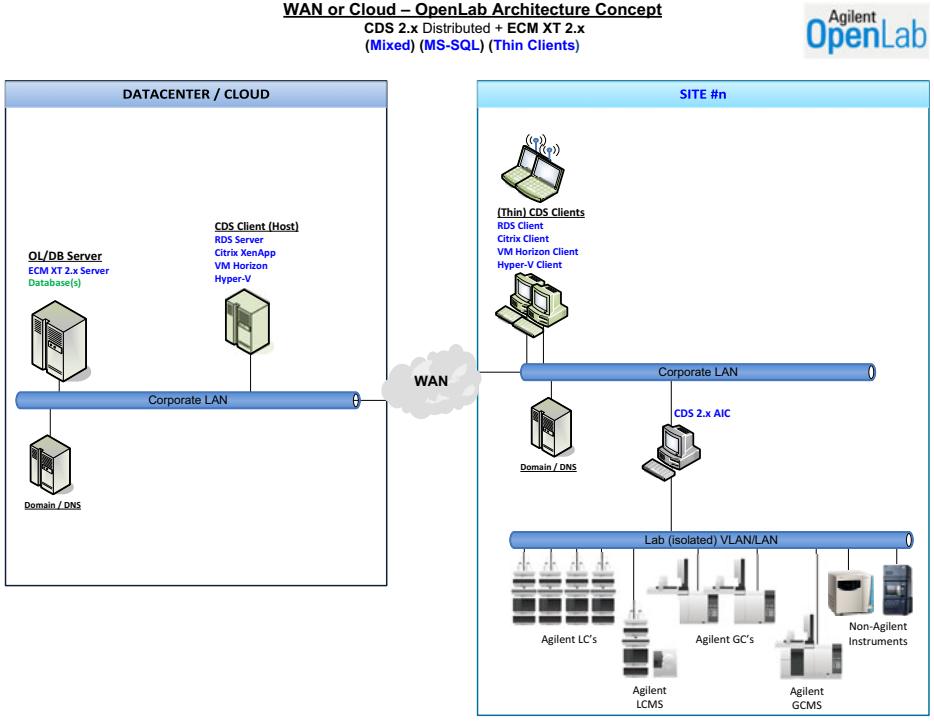


Figure 5 Example Topology

Please contact Agilent if you are interested in other application publishing technologies such as VMWare Horizon View.

Analytical Instrument Controllers (AIC)

Virtualizing AICs is supported with VMWare vSphere.

Agilent does not recommend virtualizing AICs due to the added risks associated with not locating the AIC near to the instrumentation. The Instrument-to-AIC connection is outside of the OpenLab communication redundancy protocols and, to reduce the chance of non-recoverable communication issues, it is recommended that this connection be in a local network. It is the responsibility of the customer to make the appropriate risk assessment when choosing where and how to deploy the AIC within their environment.

More Information

See the Technical Overview *Virtualizing OpenLab CDS Client/Server Systems* (5994-3609EN) for more detail.

For details on virtualization of OpenLab servers contact your Agilent support representative.

Licensing

OpenLab CDS uses FlexNet Publisher (v. 11.12) for the distribution and tracking of license entitlements. This software is installed with the OpenLab CDS components.

3 Network Specifications

This chapter provides network specifications for an OpenLab CDS system.

Introduction

OpenLab CDS systems rely on network infrastructure in order to support the communication between various system nodes. This communication is based on standard TCP/IP protocols. In order to provide optimum performance and uptime, the network must meet design criteria for available bandwidth, IP address assignment, name resolution and appropriate isolation of the lab subnet from the corporate network.

Use of other network topologies, such as wide area networks (WAN), are considered *non- standard configurations* and it is your responsibility to ensure performance to these specifications.

NOTE

The communication path between instruments and workstations or instrument controllers is intolerant of latency, competitive traffic or service interruptions. For this reason, the instruments and their controllers should be on an isolated network segment. This means there should be no routing within the segment, switching must provide dedicated resources for instrument communication, and the segment should have no other traffic including broadcast messages or network management traffic.

Failure to isolate instrument traffic properly may make data acquisition unreliable.

Servers used in an OpenLab CDS environment (for example, OpenLab Server or license server) must be accessible via http or https in the network. This might require adjusting the proxy settings.

Cloud topologies are supported for OpenLab CDS. Please see "Cloud Services Compatibility" on page 13 for details.

Network Specifications

The specifications provided below apply to one or several of the following OpenLab network points:

- Client running OpenLab CDS
- Analytical Instrument Controller (AIC)
- Content Management server (OpenLab Server / ECM XT, or OpenLab ECM 3.x)
- Shared Services Server (only in conjunction with OpenLab ECM 3.x.)
- Database Server
- File Server

The following diagram gives an overview of OpenLab network recommendations. Depending on the OpenLab products you have configured, your network may or may not include all of the network components described here.

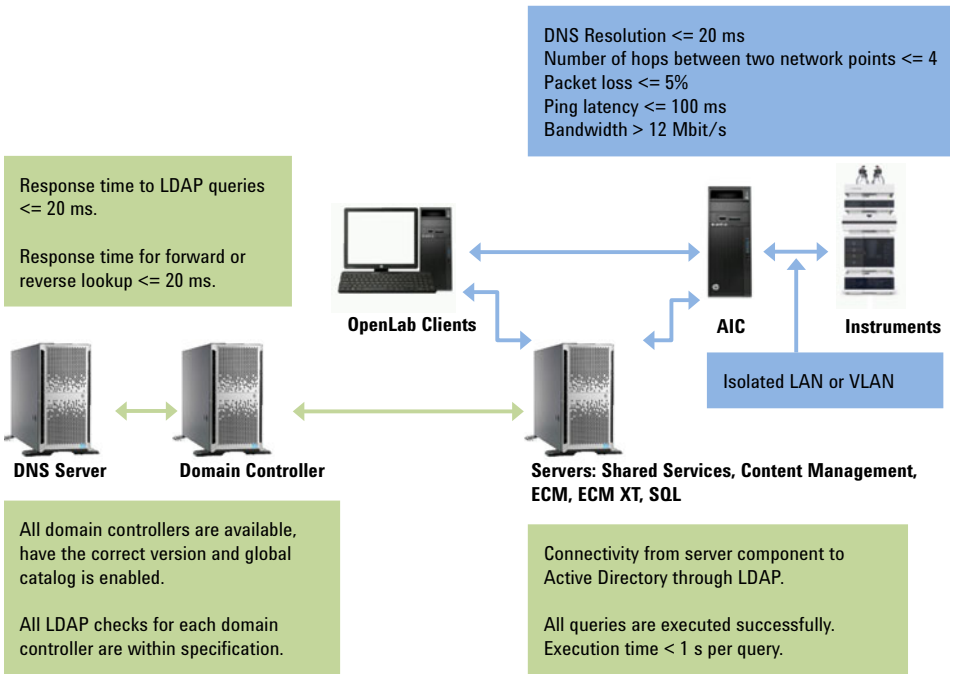


Figure 6 Specification summary (without IaaS)

Table 16 Basic network requirements

Network Specification description	Specification
Max MTU for Local Interfaces	> 999
MTU size	MTU size on all segments of the packet path is the same
IP Address Resolution Time (DNS Resolution)	<= 20 ms <= 200 ms server to Internet
Packet loss	= 0% > 1% - warning > 2% - indicates serious problems
Ping latency	<= 100 ms
Bandwidth	> 12 Mbps
Overall throughput for TCP and UDP protocols	>= 10 Mbps >= 100 Mbps for Shared Services Server and SQL Server >= 100 Mbps for Shared Services Server and Content Management Server >= 100 Mbps for ECM Server and Client
Connectivity from server component to Active Directory through LDAP: • Retrieve 2000 users from AD • Get all available domains • Get global catalog	All queries are executed successfully. Execution time is < 1 s per query.
All domains trusted from the currently running domain: • Domain Controller is available and the tool can establish connection • Requires domain functional levels Windows Server 2008 or higher • Global catalog is enabled • Run all standard LDAP Checks	All domain controllers are available, have the correct version and global catalog is enabled. All LDAP checks for each domain controller are within specification.
Domain names	Consistent with RFC-1034
TLS Protocol	TLS 1.2, or TLS 1.3

Table 17 Additional network requirements for Shared Services Server and Domain Controller Server

Check	Specification
Response time to LDAP queries	<= 20 ms

Additional network specifications for connections with a DNS Server:

- Shared Service Server and DNS Server
- ECM Server and DNS Server
- SQL Server and DNS Server
- Client and DNS Server

Table 18 Additional network specifications for DNS Server

Check	Specification
Response time for forward lookup like nslookup	<= 20 ms
Response time for reverse lookup like nslookup	<= 20 ms

About LAN Communications

When using LAN communications to connect workstations to an instrument, use one of these methods:

- Connect via an isolated switch using standard CAT-5 network cabling
- LAN communication hardware should be 100/1000 Mbps (or higher) speed capable.

NOTE The J4100 Jet Direct Card is not supported. For example, use a G1369 LAN interface card instead.

- NIC teaming: LAN cards should *not* be teamed on workstations, instrument controllers, or clients.
- LAN communication must be on the same subnet as instruments, and preferably on the same segment.

NOTE See the separate driver installation guides for further information regarding vendor specific instrument connections. GPIB or RS232 might be required.

Power Management

Avoid data capture or transfer interruptions in your data acquisition system by making network communication cards available for instrument and system component communications.

Windows may be set to turn instruments/components off to save power while sleeping or hibernating. To change this setting:

1. In the Microsoft Control Panel, open the **Network and Sharing Center**[1].
2. Select **Change adapter settings**. Right-click **Local Area Connection > Properties > Configure**.
3. Select the **Power Management** tab.
4. Clear the **Allow the computer to turn off this device to save power** check box.

Specific Requirements for Compliant Systems

If you intend to use your system in a compliant environment, ensure the following settings related to time synchronization:

- Your network must have a time synchronization service to make sure that all systems are using a consistent and valid time.
- To ensure that users cannot change the time, users must not operate using an administrator account.

[1] View the items by icon to see a list of all items.

Firewall Settings

If you are using a third party firewall or anti-virus software on a network with OpenLab CDS, the firewall ports listed in this section may not be in use by other applications to allow communication between the system components of OpenLab CDS. These apply to workstations as well as to Client/Server systems as component communications rely on these communication channels.

For any mixed distributed configurations (clients or server) also the ports required for v2.6 need to be opened and available. The System Preparation Tool (SPT) of OpenLab installer will check the ports during installation, and set up firewall rules that apply including v2.6 to allow for mixed mode configurations during upgrade.

NOTE

The ports listed only in the column for v2.6 and earlier, are not needed for pure new installations of v2.7. They may be closed manually.

Local ports are used for internal communications only and do not need to be opened in the firewall.

Terms used in the following tables

ATS	Audit Trail Service
CertSvc	Certificate Service
CM	Content Management
DCS	Data Collection Service
DR	Data Repository
OLSS	OpenLab Shared Services

NOTE

Ports in bold are required in secure systems.

OpenLab Server /OpenLab ECM XT

Table 19 OpenLab Server - Inbound Rules

Application	v2.7 or higher		v2.6 or earlier		Remote System	Comments/Description
	Protocol	Port	Protocol	Port		
CM Server[1]	FTP	21	FTP	21	Any	[Optional] Only if FTP service is turned on for OpenLab Server. By default it is off
OpenLab Reverse Proxy (Apache HTTPD)	HTTP	:80/	HTTP	:80/	Any	OpenLab Reverse Proxy
	HTTPS	:443/	HTTPS	:443/	Any	OpenLab Reverse Proxy
OLSS Diagnostics	HTTPS	443	TCP	3424	Clients, AICs, Servers	Used for collecting diagnostic logs
Content Management PostgreSQL Server	**TCP**	**5432**	**TCP**	**5432**	Alfresco	*Required for secure system on PostgreSQL systems* For database access
DR PostgreSQL Server	**TCP**	**5433**	**TCP**	**5433**	DR Services	*Required for Sample Scheduler Desktop or configuration* Database port (Firewall rule gets applied during installation of DR) Used by all internal and external applications + services, which connect against DR/PG: e.g. DCS, Audit Trail Service, Test Services, Sample Scheduler Desktop Client
CM Server[1]	**HTTP**	**5701**	**TCP**	**5701**	Cluster Servers	OpenLab scalable servers, between the nodes
Data Collection Service[2]	HTTPS HTTP	:443/openlab/dcs 6328 (used by ECM XT)	HTTPS HTTP	52088 6328 (used by ECM XT)	ChemStation ECM XT Server	DCS (until CDS 2.4, ChemStation) ECM XT (may or may not be remote)

Table 19 OpenLab Server - Inbound Rules

Application	v2.7 or higher		v2.6 or earlier		Remote System	Comments/Description
	Protocol	Port	Protocol	Port		
OLSS Server	**TCP**	**6570**	**TCP**	**6570**	Clients, AICs	OpenLab Licensing (Flexera) Server
	HTTPS (WCF)	**443**	**TCP (WCF)**	**6577**	Clients, AICs	OpenLab Shared Services WCF APIs
	-	-	HTTP	6624	Clients, AICs, others	Legacy Shared Services REST API, Legacy Licensing Support service REST API
	HTTPS	443 8084	TCP	8084	Clients, AICs	Licensing API
	HTTP	**8090 8098, 8099**	**HTTP**	**8085 - 8099**	Clients, AICs	OpenLab Licensing view-only web UI (Flexera). Default is 8090. Other ports may be used if 8090 is in use
	TCP	**27000 - 27009**	**TCP**	**27000 - 27009**	Clients, AICs	OpenLab Licensing (Flexera) Server
OLSS Server (REST API)	**HTTP HTTPS**	**6625**[3] **443**	**HTTP HTTPS**	**6625 443**	Clients, AICs	(SSL Termination) Shared Services REST API, Licensing Support service REST API
CM Server[1]	HTTP	localhost:8006	HTTP	8006	Internal for CM	Content Management Server
	HTTPS	**8443**	**HTTPS**	**8443**	CM and Index Server	*Required for secure system on 4-server and scalable only* OpenLab Server website and REST APIs for index service
CM Search Service[4]	**HTTPS**	**8983**	**HTTPS**	**8983**	Index server	Search Service *Required for secure system on 4-server and scalable only*
CM Server[1]	HTTP	localhost:9083	HTTP	9083	Internal	OpenLab Server website and REST APIs (accessed via Reverse Proxy only)
Test Services (QualA) Web Service (REST APIs and website)	**HTTPS**	**:443/testservices/ :443/openlab/ca/**	**HTTPS**	**9092**	Any	The port number can be changed using QualA Config tool
Test Services (QualA) Central Management Service	**HTTPS**	**:443/testservicesserver/**	**HTTPS**	**:52088/openlab/testservicesserver/**	Any	Central Management Service manages scheduling and email notifications for Test Services

Table 19 OpenLab Server - Inbound Rules

Application	v2.7 or higher		v2.6 or earlier		Remote System	Comments/Description
	Protocol	Port	Protocol	Port		
Reverse Proxy Configuration Service[5]	HTTP	12876	HTTP	12876	Internal	Reverse Proxy Configuration Service hosts REST APIs to configure the Reverse Proxy Server Disabled after install
DCS[2] CertSvc[6] ATS OLSS Server	HTTPS HTTPS	:443/openlab/dcs /openlab/certservice/	HTTPS **HTTPS**	52088 **52088**	Any	*Required in secure systems for backwards compatibility with older clients/servers* Certificate Service • *Required for internal communication on secure systems* • Not required in a secure configuration for incoming traffic Not required for secure systems: • Data Collection Service, • Audit Trail Service
RabbitMQ Server	TCP	5671	TCP	5671, 5672	Any	AMQP Ports (HTTPS)
		15671		15671, 15672	Any	RabbitMQ Management UI (HTTPS)
		4369		4369	Server, Clients	Peer discovery service (used by RabbitMQ nodes and CLI tools)
Sample Scheduler Webserver, Orchestrator, DB-Management	**HTTPS**	**443**	**HTTPS**	**52088**	Any	

1 C:\Program Files (x86)\Agilent Technologies\OpenLAB Data Store\tomcat\bin\tomcat8.exe

2 Set the "Programs" property for this port to "Any".

3 As of 2.7, called only by OpenLab Installer

4 C:\Program Files (x86)\Agilent Technologies\OpenLAB Data Store\java\bin\java.exe

5 C:\Program Files (x86)\Agilent Technologies\OpenLab Reverse Proxy Configuration Service\ConfigurationService\Agilent.OpenLab.ReverseProxy.ConfigurationService.exe

6 No program configured in Windows Firewall - exe path is: C:\Program Files\Agilent Technologies\OpenLab Certificate Service\Bin\Agilent.OpenLab.CertService.CertServiceCore.exe

Table 20 OpenLab Server - Outbound Rules

Application	Protocol	Port	Remote System	Description
OLSS Server	TCP	25	Email Server	If email server uses a different port, or uses secure ports, the destination port will be different.
OLSS Server	TCP/UDP	53	DNS Server	DNS
OLSS Server	TCP/UDP	67, 68	DHCP Server	DHCP or BootP
OLSS Server	TCP	137 -139	NetBios WINS	For NetBios/Name resolution for NT Share
OLSS Server	TCP	389	LDAP Server	LDAP
OLSS Server	TCP	445	NAS/Share Server	Server Message Block (SMB). Used for storage on a remote NAS share.
CM Server, OLSS	TCP	1433	SQL Server	Only when using MS SQL Server. Configurable
CM Server, OLSS	UDP	1434	SQL Server	Only when using MS SQL Server. UDP
CM Server, OLSS	TCP	1521	Oracle Server	Only when using Oracle Server; Configurable
OLSS Server	TCP	3268	LDAP Server	Global Catalog LDAP
OLSS Server	TCP	3269	LDAP Server	Global Catalog LDAP SSL
CM Server, OLSS	TCP	5432	PostgreSQL Server	Only when using external PostgreSQL Server. Configurable

ECM XT Add-ons

Table 21 ECM XT Add-ons - Inbound Rules

Application	Protocol	Port	Remote System	Description
Import Scheduler	HTTP	9091	Server, Services for CM	Import Scheduler communication port for Web UI and REST API
Import Scheduler	HTTPS	9093	Server, Services for CM	Import Scheduler communication port for Web UI and REST API

OpenLab CDS AICs

Table 22 AIC - Inbound Rules

Application	v2.7 or higher		v2.6 or earlier		Remote System	Comments/Description
	Protocol	Port	Protocol	Port		
OLSS Storage Client			TCP	2886	localhost	*Local traffic only, does not require open port* OpenLab Automation Service (Work Area, Buffered Upload)
OLSS Diagnostics	**HTTPS (WCF)**	**443**	**TCP (WCF)**	**3424**	Clients, AICs, Server	WCF. Used for collecting troubleshooting logs
OLSS Storage Client	**HTTPS**	**443**	**HTTP**	**6628**	Clients	Remote Work Area REST API
Test Services (QualA) Website & REST APIs	HTTPS	:443/testservices/ :443/openlab/ca	HTTPS	9092	Any	Test Services Web Service hosts REST APIs and website on this port. The port number can be changed using Test Services Config tool.
Acquisition	**WS**	**:443/openlab/AcquisitionServices**	**TCP**	**9753**		CDS 2.5 or earlier messaging communication[1]
	WS HTTPS	**:443/openlab/AcquisitionServices/{ID}** 443	**HTTPS** HTTPS	**9753** 443	Clients	CDS 2.6 messaging communication[2] CDS 2.7 or later messaging communication [3]
Sample Scheduler Agent	**HTTPS**	**443**	**HTTPS**	**52088**	Clients	CDS 2.7 or later - messaging communication[4]

1 Reverse proxy is not installed and communication is TCP based

2 Reverse proxy is installed but dormant, so 9753 is used directly

3 Reverse proxy is installed and active; all incoming connections are routed through the proxy

4 Reverse proxy is installed and active; all incoming connections are routed through the proxy

Table 23 AIC - Outbound Rules

Application	Protocol	Port	Remote System	Description
	TCP/UDP	53	DNS Server	DNS
	TCP/UDP	67, 68	DHCP Server	DHCP or BootP
Content Management	TCP	80	OpenLab Server	OpenLab Server website and REST APIs
	TCP	443	OpenLab Server	OpenLab Server secure website & secure REST APIs. Needed only if HTTPS is used
OLSS Client API	HTTPS	443	OpenLab Server	OpenLab Shared Services WCF APIs
OLSS Licensing API	TCP	6570	OpenLab Server	OpenLab Licensing (Flexera) Server
Control Panel	HTTPS	443	OpenLab Server	Shared Services REST API, Licensing Support service REST API
	TCP	8084	Clients, AICs	Licensing API
	TCP	8090, 8098, 8099	OpenLab Server	OpenLab Licensing view-only Web UI (Flexera). Default is 8090. If 8090 is in use, other ports may be used
	TCP	27000 - 27009	OpenLab Server	OpenLab Licensing (Flexera) Server
OLCF Data Collection API, Data Collection Agent	HTTPS HTTP	443 6328	OpenLab Server	Data Collection Service 6328 used as fallback only if HTTPS is not available
Sample Scheduler	HTTPS	443	OpenLab Server	Sample Scheduler, connection to Orchestrator service

Please see the instruments "outbound" section at “Instrument Communication” on page 49 for additional ports that certain drivers listen on for incoming communications from instruments.

Firewalls on AICs must be configured to allow such traffic.

OpenLab CDS Clients

Table 24 CDS Client - Inbound Rules

Application	v2.7 or higher		v2.6 or earlier		Remote System	Comments/Description
	Protocol	Port	Protocol	Port		
OLSS Storage Client	-	-	TCP	2886	localhost	OpenLab Automation Service (work area, buffered upload) *Local traffic only, does not require open port*
Control Panel	TCP	3424	TCP	3424	Clients, AICs, Servers	Used for collecting diagnostics logs
Test Services (QualA)	HTTPS	9092 (optional)[1]	HTTPS	9092	Any	Test Services Web Service hosts REST APIs and website on port 9092 [1]

[1] It is not necessary to open this port in the firewall for the tool to work. Users can load the web UI and access REST APIs using https://localhost:9092/ from local system (client) itself. However if remote access it required, then this port should be open in the firewall and users can access https://<client-fqdn>:9092/ from remote systems. PS 1: Reverse Proxy is not available on Client systems. PS 2: The port number can be changed using QualA Config tool.

Table 25 CDS Client Outbound Rules

Application	Protocol	Port	Remote System	Description/Comments
	TCP/UDP	53	DNS Server	DNS
	TCP/UDP	67, 68	DHCP Server	DHCP or BootP
	TCP	80	OpenLab Server	OpenLab Server website and REST APIs
	TCP	443	OpenLab Server	OpenLab Server secure website and secure REST APIs. Needed only if HTTPS is used.
OLSS Client API	HTTPS	443	OpenLab Server	OpenLab Shared Services WCF APIs
OLSS Licensing API	TCP	6570	OpenLab Server	OpenLab Licensing (Flexera) Server
Control Panel	TCP	8084	Clients, AICs	Licensing API (WCF)
	HTTP	8090 8098, 8099	OpenLab Server	OpenLab Licensing view-only web UI (Flexera). Default is 8090. If 8090 is in use, other ports may be used.
	TCP	27000 - 27009	OpenLab Server	OpenLab Licensing (Flexera)Server

Table 25 CDS Client Outbound Rules

Application	Protocol	Port	Remote System	Description/Comments
Acquisition Messaging communication	TCP HTTPS HTTPS	9753 9753 443	AIC	CDS 2.5 or earlier CDS 2.6 CDS 2.7 or later
Acquisition	HTTPS	443	AIC	Agilent OpenLab remote work area. Client talks to AICs on this port
OLCF Data Collection API, Data Collection Agent	HTTPS HTTP	443 6328	OpenLab Server	Data Collection Service, 6328 used as fallback only if HTTPS is not available
Sample Scheduler	HTTPS TCP	443 5433	OpenLab Server, AIC OpenLab Server	Sample Scheduler Sample Scheduler Desktop Client / Configuration OLDR connection (only if activated, only if OLDR configuration)

Instrument Communication

Table 26 Instruments - Inbound Rules

Protocol	Port	Remote System	Description
TCP, UDP	20	AIC, Workstation	(FTP) GC MSD Firmware installation e.g. SQ 597*, Triple-Quad 70**
TCP	21	AIC, Workstation	
TCP	22	AIC, Workstation	(SFTP) Firmware installation & SmartCard Trace for some instruments (e.g. 7000 series GC-Triple-Quad, 7200A GC-QTOF)
TCP, UDP TCP	23	AIC, Workstation	(Telnet) GC MSD Firmware installation (SQ 597*, Triple-Quad 70**) Instrument communication (LC, CE)
UDP	69	AIC, Workstation	(TFTP) Required for communication with legacy instruments (Jet Direct Cards)
TCP	111, 1004, 1007, 1024-1026	AIC, Workstation	LC/MS instrument communication GC MSD instrument communication
TCP	2883-2886 3068, 3071	AIC, Workstation	GC MSD instrument control (5975, 5973 MSD) (proprietary/SunRPC/TCP)
TCP	4879	AIC, Workstation	Instrument communication (Headspace)
TCP	5813	AIC, Workstation	GC MSD Firmware installation (ICMP/Ping)
TCP	5973	AIC, Workstation	GC MSD instrument control (proprietary/SunRPC/TCP)
TCP	7972, 7973	AIC, Workstation	GC MSD instrument control (597* MSD): Slick protocol
TCP	8194	AIC, Workstation	PAL3, data subscription
TCP	9001, 9002	AIC, Workstation	Instrument communication (GC, LC, CE)
TCP	9100	AIC, Workstation	Instrument communication (GC, LC, CE, 35900)
TCP	9101, 9110	AIC, Workstation	Instrument communication (GC, LC, CE)
TCP	10000-10020	AIC, Workstation	Instrument communication (GC 78xx, 88xx, 9000)
TCP	30718	AIC, Workstation	Instrument utilities
TCP	55055-55057	AIC, Workstation	Instrument utilities
UDP	55065	AIC, Workstation	GC MSD instrument control
TCP	60000	AIC, Workstation	PAL XT communication
TCP	61001	AIC, Workstation	Instrument utilities

Table 26 Instruments - Inbound Rules

Protocol	Port	Remote System	Description
TCP	64000, 64001	AIC, Workstation	PAL3 communication
TCP	64500	AIC, Workstation	PAL3, plain socket protocol

Table 27 Instruments - Outbound Rules

Protocol	Port	Remote System	Description
TCP/UDP	53	DNS Server	DNS
TCP/UDP	67, 68	DHCP Server	DNS or BootP
TCP	7980 - 7983	AIC, Workstation	GC MSD - Reverse Slick

OpenLab ECM 3.x Server

Table 28 ECM 3.x Server - Inbound Rules

Application	Protocol	Port	Remote System	Description
	TCP	80	Clients	OpenLab ECM Server website and REST APIs operate on this port. Configurable.
	TCP	443	Clients	OpenLab ECM Server secure website & REST APIs operate on this port.
Reverse Proxy Configuration Service[1]	HTTP	12876	Internal (localhost only)	Reverse Proxy Configuration Service hosts REST APIs to configure the Reverse Proxy Server's configuration file. Currently, this modifies the Apache HTTPD server's httpd.conf file.

[1] C:\Program Files (x86)\Agilent Technologies\OpenLab Reverse Proxy Configuration Service\ConfigurationService\Agilent.OpenLab.ReverseProxy.ConfigurationService.exe

Table 29 ECM 3.x Server - Outbound Rules

Protocol	Port	Remote System	Description
TCP	25	Email Server	If email server uses a different port, it can be specified in OpenLab Control Panel.
TCP/UDP	53	DNS Server	DNS
TCP/UDP	67, 68	DHCP Server	DHCP or BootP
UDP	161	SNMP Server	Simple Network Management Protocol (SNMP)
TCP	389	LDAP Server	LDAP
TCP	636	Secure LDAP Server	Secure LDAP
TCP	1433	SQL Server	Only when using MS SQL Server. Configurable.
UDP	1434	SQL Server	Only when using MS SQL Server. UDP
TCP	1521	Oracle Server	Only when using Oracle Server. Configurable.
TCP	3268	LDAP Server	Global Catalog LDAP
TCP	3269	LDAP Server	Global Catalog LDAP SSL

Table 29 ECM 3.x Server - Outbound Rules

Protocol	Port	Remote System	Description
TCP	8211	ECM Comm Service	If caller is a Service
TCP	18211	ECM Comm Service	If caller is Forms Host

OpenLab ECM 3.x Clients

Table 30 ECM 3.x Client - Inbound Rules

Protocol	Port	Remote System	Description
TCP	1801	MSMQ	MSMQ messages used in ECM Scheduler Agent

Table 31 ECM 3.x Client - Outbound Rules

Protocol	Port	Remote System	Description
TCP/UDP	53	DNS Server	DNS
TCP/UDP	67, 68	DHCP Server	DHCP or BootP
UDP	161	SNMP	Simple Network Management Protocol (SNMP)
TCP	389	LDAP Server	LDAP
TCP	636	Secure LDAP Server	Secure LDAP

Dynamic Ports

Dynamic Ports: used for temporary communications between clients. The ports used depend on the operating system in use and are configurable. See the operating system documentation for more information.

4 System Preparation Tool

The System Preparation Tool (SPT) checks and applies Windows settings on your machine.

NOTE The SPT only checks that minimum requirements are met. Work with your Agilent representative to ensure your system is configured sufficiently for your projected number of users, instruments, and load.

Use the System Preparation Tool

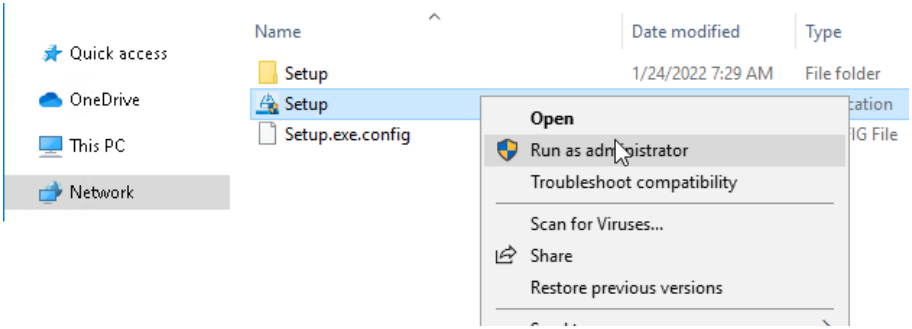
The settings are also applied automatically when you run the OpenLab installer. Running the SPT in advance helps you to shorten the installation process and gives you an overview of both mandatory and recommended settings.

1 Optional: Copy the entire content of the USB media to a local drive or centralized folder, then remove the USB media from the PC.

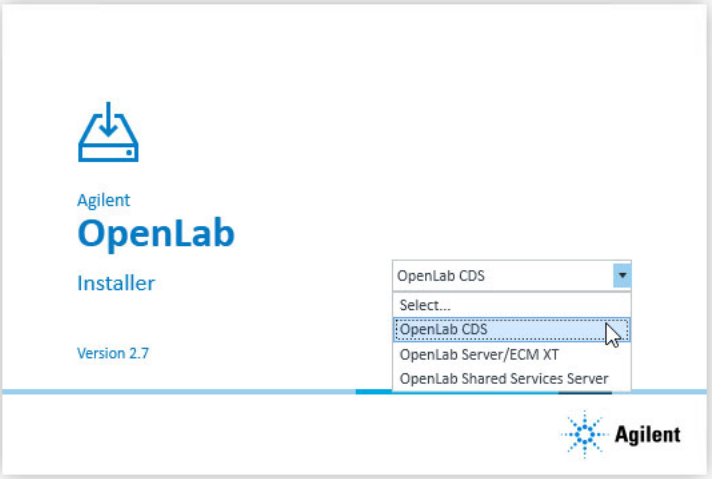
2 To open the installer, right-click the setup.exe file, and run it as administrator.

NOTE

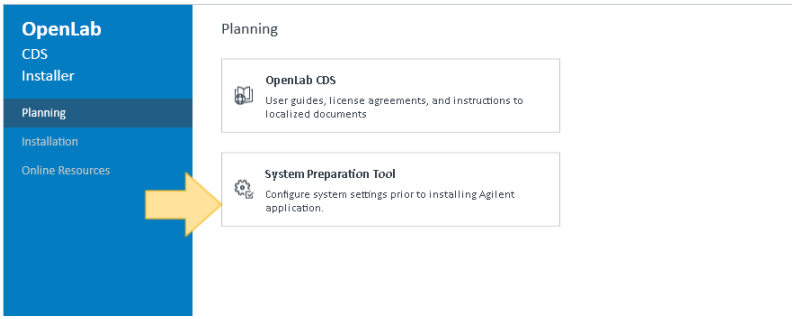
If User Account Control (UAC) is switched on, this step requires active confirmation to continue.



3 On the start screen, select **OpenLab CDS**, and click **OK**.



4 From the **Planning** tab, select **System Preparation Tool**.



The **System Preparation Tool** window opens.

5 Select the product configuration corresponding to your system:

- For a Workstation with file system storage, select **OpenLab CDS~2.7~Workstation~Win10** or **OpenLab CDS~2.7~Workstation~Win11**.
- For a Workstation with Content Management, select **OpenLab CDS~2.7~WorkstationPlus~Win10** or **OpenLab CDS~2.7~WorkstationPlus~Win11**

For AICs:

- **OpenLab CDS~2.7~AIC~Win10**
- **OpenLab CDS~2.7~AIC~Win11**
- **OpenLab CDS~2.7~AIC~Win2016**
- **OpenLab CDS~2.7~AIC~Win2019**

For clients:

- **OpenLab (CDS, ECMXT)~2.7~(Client, CMServices)~Win10**
- **OpenLab (CDS, ECMXT)~2.7~(Client, CMServices)~Win11**
- **OpenLab (CDS, ECMXT)~2.6~(Client, CMServices)~Win2016**
- **OpenLab (CDS, ECMXT)~2.6~(Client, CMServices)~Win2019**

Click **Continue**. The installer automatically applies all mandatory Windows settings to ensure proper installation.

6 Select which recommended settings to apply to the system.

There are several recommended settings that can improve the performance and stability of your system, but do not need to be completed to deploy the application. The recommended settings are listed after the mandatory settings.

You can clear the check boxes for recommended settings. Mandatory settings cannot be cleared. Recommended actions are selected by default and will be applied unless they are cleared.

For more information on mandatory and recommended settings, see "Reference of SPT Checks" on page 57.

7 Click **Apply Fixes** to apply the correct settings.

The System Preparation Tool attempts to fix the selected settings and displays the new status on the **Update Configuration** page. All actions are saved to a log file. A link to the log file is provided at the bottom of the page.

8 Click **Next** to proceed to the **System Preparation Report** page.

The System Preparation Report is displayed. It lists the new status for all selected settings.

The System Preparation Report is saved to disk. Its location is shown at the top of the page.

9 Click **Print Report** to print the *System Preparation Report*.

You may print to a file, for example, using the *Adobe PDF* printer, and add comments.

10 The System Preparation Report lists any mandatory or recommended settings that are not automatically updated by the System Preparation Tool. Follow the instructions provided in the **Actions Required** section of the System Preparation report to manually update operating system settings.

11 Click **Finish**.

12 Reboot your system if requested to do so.

Reference of SPT Checks

Table 32 Mandatory settings

Name	Workstation Workstation Plus	Client CM Services	AIC	OpenLab Server ECM XT OLSS Server
Programs and Features				
Enable/deploy .NET Framework 3.5	●	●	●	●
Tcp Port Sharing and Activation	●	●	●	●
Windows Communication Foundation Non-HTTP Activation	●	●	●	●
.NET Framework 4.X Advanced Services[1]	●	●	●	
Telnet Client	●	●	●	
TFTP Client	●	●	●	
System				
Local Group Policy Requirements[2]	●	●	●	●
Set Services Timeout	●	●	●	●
HTTP service	●	●	●	●
Set Services Timeout	●	●	●	●
Power options				
Set preferred plan to High performance	●	●	●	●
Set "Put the computer to sleep" to "Never for Performance Power Plan"	●	●	●	●
Set "Turn off hard disk" after to "Never for Performance Power Plan"	●	●	●	●
Disable Quick Start	●	●	●	
Security Options: Set Sharing and security model for local accounts to Classic	●	●	●	●
Network: Disable Power Management options for Network Adapter	●	●	●	●

1 W10/W11 only

2 Local Group Policy Requirements for OpenLab: - Set "Hide entry points for Fast User Switching" to Enabled - Adds “Users” group to "Access this computer from the network" setting

Table 33 System Checks

Name	Workstation Workstation Plus	Client CM Services	AIC	OpenLab Server ECM XT OLSS Server
CPU	●	●	●	●
Minimum Memory	●	●	●	●
OS Compatibility	●	●	●	●
OS Minimum Version [1]	●	●	●	
OS Architecture (64 bit)[1]	●	●	●	
Screen Resolution	●	●	●	●
Language Compatibility	●	●	●	●
Network Availability - Verify active network adapter	●	●	●	●
Ports - configuration	●	●	●	●

[1] W10/W11 only

Table 34 Recommendet Settings

Name	Workstation Workstation Plus	Client CM Services	AIC	OpenLab Server ECM XT OLSS Server
System - Startup and recovery settings	●	●	●	
System - Turn off system protection (restore points) for all drives[1]	●	●	●	
Indexing options - Disable indexing options for all drives and locations			●	
Offline Maps - Disable metered connections and map updates	●	●	●	
Windows Update - Disable windows update service	●	●	●	●
Tablet mode: Enable desktop mode[2]	●	●	●	
Windows Explorer - Enable navigation panel[2]	●	●	●	
Personalization - Disable transparency effects[2]	●	●	●	
Personalization - Disable advertising info	●	●	●	

Table 34 Recommendet Settings

Name	Workstation Workstation Plus	Client CM Services	AIC	OpenLab Server ECM XT OLSS Server
Personalization - Combine taskbar buttons	●	●	●	
Personalization - Disable advertising info	●	●	●	

[1] W10/W11 only

[2] Windows 10 only

Table 35 Actions Required section of the SPT report (Settings need to be checked and updated manually)

Name	Workstation Workstation Plus	Client CM Services	AIC	OpenLab Server ECM XT OLSS Server
Windows Update - Apply pending updates	●	●	●	●
Windows activation	●	●	●	●
System domain membership	●	●	●	●
Region - Change system locale	●	●	●	●
File Explorer - Display Settings	●	●	●	
Recycle Bin - Set Recycle Bin properties	●	●	●	
System - Performance Settings	●	●	●	
Privacy - Set privacy settings	●	●	●	
Apps - Default browser	●	●	●	
Personalization - Turn off show lockscreen background picture	●	●	●	

5 Instrument Information

This chapter provides information on the instruments supported by the current revision of OpenLab CDS and the required respective instrument drivers and firmware revisions.

Instrument Drivers

The following Agilent instrument drivers are packaged with the OpenLab CDS v2.7 software.

Table 36 Agilent driver packages shipped with OpenLab CDS v2.7

RC .Net Instrument Driver	Driver Software Revision	Installed by default
Agilent LC and CE	3.4[1]	●
Agilent LC/MS SQ	2.5	●
Agilent ELSD	1.8	
Agilent GC	3.7	●
Agilent GC/MS SQ	1.4.xx	●
Agilent Micro GC	2.3.x	
Agilent Gas Analyser	2.7	
Agilent G1888 Headspace Agilent 7697A-8697 Headspace	1.09.2.7 3.3	
35900E A/D Converter	2.3.53	●
Agilent SS420X A/D Converter	1.2	●
Agilent Data Player	2.4	●
Agilent CTC PAL 3 (for GC only)	2.5	
Agilent CTC PAL-xt	B.01.08	

[1] NOTE: LC&CE driver version 3.5 or higher is required to use the extended CE workflow, for non-RC.Net Method Import (2DLC), and for the whole feature set provided by the *Modify instrument* configuration in CDS Client permission.

Drivers that are not automatically installed by the OpenLab CDS installer can be found on the media under Setup\Packages\Add-ons. To install these drivers see section *Install or Upgrade Driver Software* in chapter 2 of your *OpenLab CDS Workstation*, or *Clients and Instrument Controller* guide.

Agilent driver software is forward compatible with respect to firmware, i.e. the firmware can be updated without the need of updating the driver or CDS. Note that Agilent and other vendors release drivers and firmware independent of the OpenLab CDS releases.

NOTE

Instrument driver versions must always match in a networked system.

Accidental use of a method from a different driver version, and accidental launching of an AIC instrument from a client with a mismatched driver version will have unpredictable behavior, including subtle errors that might not be spotted immediately.

More information on instrument drivers and firmware is available in the respective driver release notes.

Non-Agilent Instrument Drivers

OpenLab CDS 2.7 supports various Non-Agilent instruments. See "Non-Agilent Instruments" on page 85, or check with your sales representative if a corresponding driver is available.

Always install the dedicated current driver available from SubscribeNet at **OpenLab CDS > OpenLab 3rd-Party Instrument drivers**.

Agilent LC, SFC, and CE Instrument support

Recommended Firmware

OpenLab CDS 2.7 is shipped with Agilent LC and CE Drivers 3.4. With the release of this driver version it is recommended to use the following firmware revisions:

Device	Recommended Firmware
Agilent 1100 Series, 1200 Series and 1200 Infinity	A.07.01 or later
Agilent 1200 Series, 1200 Infinity and 1120 Compact LC	B.07.34 or later
Agilent 1200 Infinity Hosted Modules	C.07.30 or later
Agilent 1260/1290 Infinity II Modules	D.07.34 or later

Note that some driver features like valve-thermostat clusters and new temperature control modes require current firmware versions. Agilent recommends that you always use the most recent firmware revisions with your OpenLab CDS to have access to the latest firmware features and improvements. Download current LC/CE Firmware from www.agilent.com/en-us/firmwareDownload?whid=69761.

Firmware revisions are grouped into sets for each module or system. Firmware sets include just the latest firmware of each module.

NOTE

Do not mix firmware revisions from one set with older or newer sets. A firmware update within set A/B/C/D.07.xx is required for all modules in that stack, not only new modules.

For detailed driver information please refer to the LC driver release notes. A recent version of *Release Note for Agilent LC and CE Drivers* (LC-and-CE-Driver-Release-Note-3-4.pdf) is available in the Docs/EN folder of the OpenLab CDS media.

Supported LC modules

Most Agilent LC modules can be controlled with the current version of OpenLab CDS. LC & CE driver release 3.4 has been tested with this revision and is installed by default with the software.

LC & CE Drivers 3.4 come “ready for data acquisition” with 2D-LC systems. 2D-LC release 1.1 together with OpenLab CDS v2.7, provides extensive functionality around 2D-LC. Several new features have been added to the 2D-LC functionality. Activating the 2D-LC System driver will require a separate dongle-based license.

NOTE

The Agilent LC drivers are backwards compatible. Modules with identical product numbers are supported. The tables below list the name of the current model version. Look for the product number at the lower right of each module or system. 1100 Series models are supported on a best effort basis only.

For more detail please refer to the release notes of the driver revision you are using.

Table 37 Agilent LC - Sampling Systems

Product Number	Module Name	Compatibility Statement
G1328C	1260 Manual Injector	supported, without driver
G1328D	1260 Infinity II Manual Preparative Injector	supported, without driver
G1329A	1100/1200 Series Standard Autosampler	supported
G1329B	1260 Infinity Standard Autosampler	supported
G1330A	1200 Series Thermostat	supported
G1330B	1290 Infinity Thermostat	supported
G1367B	1200 Series High Performance Autosampler	supported
G1367C	1200 Series High Performance Autosampler SL	supported
G1367D	1200 Series High Performance Autosampler SL+	supported
G1367E	1260 Infinity High Performance Autosampler	supported
G1377A	1260 Infinity High Performance Micro Autosampler	not supported
G2258A	1260 Infinity Dual-Loop Autosamper	supported
G2260A	1260 Infinity Preparative Autosampler (High flow)	supported
G4226A	1290 Infinity Autosampler	supported
G5667A	1260 Infinity Bio-inert Multisampler	supported

Table 37 Agilent LC - Sampling Systems

Product Number	Module Name	Compatibility Statement
G5668A	1260 Infinity II Bio-inert Multisampler	supported
G7129A	1260 Infinity II Vialsampler	supported
G7129B	1290 Infinity II Vialsampler	supported
G7129C	1260 Infinty II Vialsampler (Prime LC, 800bar)	supported
G7137A	1290 Infinity II Bio Multisampler	supported
G7157A	1260 Infinity II Preparative Autosampler	supported
G7158B	1290 Infinity II Preparative Open-bed Sampler / Collector	Module is represented by two modules in the driver: G7159B and G7169B
G7167A	1260 Infinity II Multisampler (Prime LC, 800bar)	supported Use legacy addressing scheme (P1-A1)
G7167B	1290 Infinity II Multisampler	

Table 38 Agilent CTC PAL Autosampler with Agilent LC

Product Number	Module Name	Compatibility Statement
G4277A	Agilent 1290 Infinity LC Injector HTS	supported
G4278A	Agilent 1290 Infinity LC Injector HTC	supported
G4270-CTC	HTC PAL Auto sampler	supported requires motherboard with FW 4.1.5 or higher
G4271-CTC	HTS PAL Auto sampler	

Table 39 Agilent LC – Pumps

Product Number	Module Name	Compatibility Statement
G1310A	1200 Series Isocratic Pump	supported
G1310B	1260 Infinity Isocratic Pump	supported
G1311A	1200 Series Quaternary Pump [1]	supported
G1311B	1260 Infinity Quaternary Pump [1]	supported
G1311C	1260 Infinity Quaternary Pump VL [1]	supported

Table 39 Agilent LC – Pumps

Product Number	Module Name	Compatibility Statement
G1312A	1260 Infinity Binary Pump [1]	supported
G1312B	1260 Infinity Binary Pump SL [1]	supported
G1312C	1260 Infinity Binary Pump VL [1]	supported
G1361A	1260 Infinity Preparative Pump [1]	supported
G1376A	1200 Micro Capillary Pump	not supported
G2226A	1200 Micro Nano Pump	not supported
G4204A	1290 Infinity Quaternary Pump [1]	supported
G4220A	1290 Infinity Binary Pump [1]	supported
G4220B	1290 Infinity Binary Pump[1]	supported
G5611A	1260 Infinity Bio-inert Quaternary Pump [1]	supported
G5654A	1260 Infinity II Bio-inert Quaternary Pump [1]	supported
G7104A	1290 Infinity II Flexible Pump [1]	supported
G7104C	1260 Infinity II Flexible Pump[1] (Prime LC, 800bar)	supported
G7110B	1260 Infinity II Isocratic Pump [1]	supported
G7111A	1260 Infinity II Quaternary Pump VL [1]	supported
G7111B	1260 Infinity II Quaternary Pump[1]	supported
G7112B	1260 Infinity II Binary Pump[1]	supported
G7120A	1290 Infinity II High Speed Pump [1]	supported
G7131A	1290 Infinity II Bio Flexible Pump	supported
G7131C	1260 Infinity II Bio Flexible Pump	supported
G7132A	1290 Infinity II Bio High-Speed Pump	supported
G7161A	1260 Infinity II Preparative Binary Pump	supported
G7161B	1290 Infinity II Preparative Binary Pump	supported

[1] Pump valve clusters are possible for marked pumps with up to 2 valves of type G1160A and/or G1170A with 5067-4159 or 5067-4147.

Table 40 Agilent LC – Column Compartments

Product Number	Module Name	Compatibility Statement
G1316A	1260 Infinity Thermostatted Column Compartment	supported
G1316B	1200 Series Thermostatted Column Compartment	supported
G1316C	1290 Infinity Thermostatted Column Compartment	supported
G1330A	1200 Thermostat	Not configurable w/ compact LC
TCC Cluster	Cluster with up to three G1316C with integrated 8pos/9port valves (products G4230A/B). Minimum two G1316C TCCs, the third TCC can be a G1316A, B or C.	supported
G4761A	InfinityLab Sample Thermostat	supported with G7129X and G7167X
G7116A	1260 Infinity II Multicolumn Thermostat	supported
G7116B	1290 Infinity II Multicolumn Thermostat	supported with host-module B.06.75/D.06.75
G7130A	InfinityLab Integrated Column Compartment	supported as option for G7129A/B
VTC Valve Thermostat Cluster	Combinations of G7116B, G1170A and G1316C (valve or column hosts) and G1316A/B and G7130A	See LC Driver Release Notes: *Valve-Thermostat Cluster*

Table 41 Agilent LC – Detectors

Product Number	Module Name	Compatibility Statement
G1314A	1100/1200 Variable Wavelength Detector	supported
G1314B	1260 Infinity Variable Wavelength Detector VL	supported
G1314C	1260 Infinity Variable Wavelength Detector VL+	supported
G1314D	1260 Infinity Variable Wavelength Detector	supported
G1314E	1290 Infinity Variable Wavelength Detector	supported
G1314F	1260 Infinity Variable Wavelength Detector	supported
G1315A	1100/1200 Diode-Array Detector	supported
G1315B	1200 Series Diode Array Detector	supported

Table 41 Agilent LC – Detectors

Product Number	Module Name	Compatibility Statement
G1315C	1260 Infinity Diode Array Detector VL+	supported
G1315D	1260 Infinity Diode Array Detector VL	supported
G1321A	1100/1200 Fluorescence Detector	supported
G1321B	1260 Infinity Fluorescence Detector Spectra	supported
G1321C	1260 Infinity Fluorescence Detector	supported
G1362A	Agilent 1100/1200 Refractive Index Detector	supported
G1365A	1100 Series Multiple Wavelength Detector	supported
G1365B	1200 Series Multi-Wavelength Detector	supported
G1365C	1260 Infinity Multiple Wavelength Detector	supported
G1365D	1260 Infinity Multiple Wavelength Detector VL	supported
G4212A	1290 Infinity Diode Array Detector	supported
G4212B	1260 Infinity Diode Array Detector	supported
HDR-DAD Cluster	2x G4212A, 2x G4212B, 2x G7117A or 2x G7117B, or a combination of either 1x G4212A and 1x G4212B, or 1x G7117A and 1x G7117B	supported: Up to 2 DAD
G7114A	1260 Infinity II Variable Wavelength Detector	supported
G7114B	1290 Infinity II Variable Wavelength Detector	supported
G7115A	1260 Infinity II Diode Array Detector WR	supported
G7117A	1290 Infinity II Diode Array Detector FS	supported
G7117B	1290 Infinity II Diode Array Detector	supported
G7117C	1260 Infinity II Diode Array Detector HS	supported
G7121A	1260 Infinity II Fluorescence Detector	supported
G7121B	1260 Infinity II Fluorescence Detector Spectra	supported
G7162A	1260 Infinity II Refractive Index Detector	supported
G7162B	1290 Infinity II Refractive Index Detector	supported
G7165A	1260 Infinity II Multiple Wavelength Detector	supported
G7800A	1260 Infinity II Multi Detector Suite	not supported
G4260A	380-ELSD	supported

Table 41 Agilent LC – Detectors

Product Number	Module Name	Compatibility Statement
G4260B	1260 Infinity II Evaporative Light Scattering Detector	supported
G4261A	385-ELSD	supported
G4261B	1290 Infinity Evaporative Light Scattering Detector	supported
G7102A	1290 Infinity II Evaporative Light Scattering Detector	supported

NOTE

In general, all Agilent valve configurations are supported.
The below table lists selected valves, valve drives and clusters. Please refer to the LC&CE Driver Release Note of your driver version for a complete list of supported Agilent valves.

Table 42 Agilent LC – Valve Solutions

Product Number	Module Name	Compatibility Statement
G1156A	1200 Series 6-Position/7-Port Valve (400 bar) part of purge kit	A module to hold valve head host required
G1157A	1200 Series 2-Position/10-Port Valve	supported
G1158A	1200 Series 2-Position/6-Port Valve	supported
G1158B	1200 Series 2-Position/6-Port Valve (600bar)	supported
G1159A	1200 Series 6-Position Selection Valve	supported
G1160A	1200 Series 12-Position/13-Port Valve	supported
G1162A	1200 Series 2-Position/6-Port Micro Valve	not supported
G1163A	1200 Series 2-Position/10-Port Micro Valve	not supported
G1170A	1290 Infinity II Valve Drive	host required. For details see latest LC driver release note.
G3167A	1260 Infinity II Online Sample Manager	supported as part of the G3167AA Online LC Solution (with G2954-64000 Online LC Monitoring SW)[1]

Table 42 Agilent LC – Valve Solutions

Product Number	Module Name	Compatibility Statement
G4231A	5067-4282 2-Position/6-Port Valve head 800 bar	Includes backward compatibility to the former 600 bar valves. For more detail on required driver versions see customer letter (p/n 01200-90134).
G4232C	5067-4283 2-Position/10-Port Valve head 800 bar	
G4223A	5067-4284 6-Position/14-Port, 6-column selector Valve head 800 bar	
G4237A	5067-4279 4-Position/10-Port, 4-column selector Valve head 800 bar	
	5067-6680 3-Position/6-Port 800 bar Valve	required for G3167A
G4234C	5067-4273 6-Position/14-Port selector Valve head 1300 bar	supported
G4734B	Preparative 6-column selector valve, 600 bar	supported
G5641A	2-Position/10-Port 1300 bar Bio Valve	supported
G9322A	1260 Infinity II Clustering Valve (solvent selection)	supported

[1] requires LC driver 3.4 or higher

Table 43 Fraction Collectors

Product Number	Module Name	Compatibility Statement
G1364A	1100 Series Automatic Fraction Collector	supported
G1364B	1260 Infinity Fraction Collector (preparative-scale)	supported
G1364C	1260 Infinity Fraction Collector (analytical-scale)	supported
G1364D	1260 Infinity Micro-Scale Fraction Collector/Spotter	not supported
G1364E	1260 Infinity II Preparative Fraction Collector	supported
G1364F	1260 Infinity II Analytical Fraction Collector	supported
G5664A	1260 Infinity Bio-inert Fraction Collector AS	supported
G5664B	1260 Infinity II Bio-inert Fraction Collector	supported
G7159B	1290 Infinity II Preparative Open-Bed Fraction Collector	supported
G7166A	1260 Infinity II Preparative Valve-Based Fraction Collector	supported
G7169B	1290 Infinity II Open-bed Sampler/Fraction Collector	supported

Table 43 Fraction Collectors

Product Number	Module Name	Compatibility Statement
	Clustering Up to 3×G1364x, or 1×G5664A + 1×G1364; or 1×G5664A for recovery;	supported
NOTE: Mass Based Fraction Collection is not supported.		

Table 44 Other LC and LC/MSD Modules

Product Number	Description	Compatibility Statement
G1390A	Agilent 1100 Series Universal Interface Box	supported Part of fraction collector
G1390B	Agilent InfinityLab Universal Interface Box	supported
G4227A	Agilent 1290 Infinity II Flexible Cube	supported
G4240A	Agilent 1260 Infinity Chip Cube MS Interface	not supported
G7170B	Agilent 1290 Infinity II MS Flow Modulator	supported LC/MSD can be used as an analytical detector in the purification Workflow

Table 45 Configurable Agilent Combined LC Systems

Product Number	System Name
G4286A	1120 Compact LC, Isocratic
G4286B	1220 Infinity LC System Isocratic, Man. Inj., VWD, 600 bar
G4286C	1220 Infinity LC System VL[1]
G4287A	1120 Compact LC, Isocratic with Oven and ALS
G4287B	1220 Infinity LC System Isocratic, ALS, VWD and Oven 600 bar
G4287C	1220 Infinity LC System VL[1]
G4288A	1120 Compact LC, Gradient
G4288B	1220 Infinity LC Gradient, Man. Inj., VWD, 600 bar
G4288C	1220 Infinity LC System VL, Gradient, Man. Inj. VWD, 400 bar
G4289A	1120 Compact LC, Gradient with Oven

Table 45 Configurable Agilent Combined LC Systems

Product Number	System Name
G4289B	1220 Infinity LC Gradient, Man. Inj., VWD and Oven 600 ba
G4289C	1220 Infinity LC System VL, Gradient, Man. Inj. VWD, 400 bar
G4290A	1120 Compact LC, Gradient with oven and ALS
G4290B	1220 Infinity LC Gradient, ALS, TCC, VWD, 600 bar
G4290C	1220 Infinity LC System VL, Gradient, ALS, TCC, VWD, 400 bar
G4291B	1220 Infinity LC System Isocratic, Man. Inj., VWD and Oven 600 bar
G4291C	1220 Infinity LC System VL[1]
G4292B	1220 Infinity LC System Isocratic, ALS, VWD, 600 bar
G4292C	1220 Infinity LC System VL[1]
G4293B	1220 Infinity LC Gradient, ALS, VWD, 600 bar
G4293C	1220 Infinity LC System VL, Gradient, ALS, VWD, 400 bar
G4294B	1220 Infinity LC Gradient, ALS, TCC, DAD, 600 bar

[1] System works without a driver. Supported within a 1200 LC instrument.

NOTE Agilent 1120 and 1220 Compact LC Systems are not supported with Fraction Collection.

Agilent Supercritical Fluid Chromatography (SFC) Modules

Table 46 Agilent SFC Modules

Product Number	Module Name	Compatibility Statement
G4301A	1260 Infinity II SFC Control Module	supported
G4302A	1260 Infinity SFC Binary Pump	supported
G4303A	1260 Infinity SFC Standard Autosampler	supported
G4767A	1260 Infinity II SFC Multisampler	supported
G4782A	1260 Infinity II SFC Binary Pump	supported

Capillary Electrophoresis (CE) Instruments

OpenLab CDS supports control of CE as well as CE/MSD instruments.

Starting with OpenLab CDS v2.7 in connection with LC&CE Driver 3.5, the following workflows are supported:

- Configure the 7100 Agilent CE or CE/MSD instruments using instrument type **Agilent LC & LC/MS**.
- Connect to the CE instrument, create methods, and run analyses using CE specific soft configuration options.
- Review CE analytic data with same feature set as for LC.
- Create reports from CE data with same feature set as for LC.
- Capillary Zone Electrophoresis (CZE) workflow (with or without corrected area and CE specific calculations).
- Data Analysis allows for scaled responses using various options.
- Audit trail is supported with CE.

In addition automation is available for method developments, including user vials/sequence overwrite.

Configurable Agilent Capillary Electrophoresis (CE) instruments

Table 47 Capillary Electrophoresis

Product Number	System Name	Compatibility Statement
G7150A	Agilent 7100 Capillary Electrophoresis System	supported
G7151A	Agilent 7100 Capillary Electrophoresis System (DAD)	supported

Agilent LC/MS Instrument support

NOTE

Mass Based Fraction Collection is not supported. However, an LC/MSD can be used as an analytical detector as part of Purification workflow

Recommended Firmware

Always use the most recent Firmware installation package that comes with the driver package.

LC/MS Modules

Agilent Single Quad 6100 Series instruments may be controlled with OpenLab CDS.

Table 48 Compatibility statements for Agilent LC/MS instruments

Product Number	Description	Compatibility Statement
61xxA	LC/MS family	not supported
G6160A	InfinityLab LC/MSD iQ	supported
61xxB	LC/MS family	requires smart card 4 update 6125B & 6135B via upgrade kit (G4934C)
G6150B	MS Module	not supported
G6120C G6125C G6130C G6135C	MS Module LC/MSD MS Module LC/MSD XT	supported, ESI or AJS source required for Tuning

Table 49 LC/MS Modules

Product Number	Description	Compatibility Statement
G1947B G1971B	APCI APPI (Photo Ionization)	supported
G1948B	ESI	supported
G1958B	Agilent Jet Stream for Single Quad	supported
G1978B	Multimode Source	supported
G1951A	Analog Output Accessory	not supported
G4240	Chip Cube Source	not supported

Agilent GC System and Sampler support

Agilent GC Firmware Interoperability

Agilent releases GC firmware updates independently of software releases. All Agilent GC instrument driver revisions have been designed to be backward compatible to the installed instrument base. Agilent recommends always using the latest module firmware revision to provide the highest level of system capability.

Upgrading firmware is not required in all cases. A firmware upgrade should be done if you face problems or want to add system capability to your GC. Refer to latest Hardware Service Notes for latest firmware available.

Agilent GC System support

Support statements for Agilent GC Systems with OpenLab CDS rev. 2.7

Table 50 Compatibility statements for Agilent GC systems

Product Number	Description	Compatibility Statement
G3950A G3952A G3953A	Intuvo 9000 GC system	supported
G3540A G3542A G3543A G3545A	8890 Series GC System	supported
G2970A	8860 Series GC System	supported
G3440A G3442A G3443A G3445A	7890A	supported
G3440B G3442B G3443B G3445B	7890B	supported

Table 50 Compatibility statements for Agilent GC systems

Product Number	Description	Compatibility Statement
G4350A G4350B	7820A	supported RTL, backflush, and EZ sample prep are not supported
G6589AA G6590AA	7820 VL	supported RTL, backflush, and EZ sample prep are not supported
G1530N G1540N	6890N	supported
G1530A G1540A	6890A 6890Plus	Non-EPC inlets and detectors are not supported
G2629A	6850 Handheld Controller	not supported
G2630A G2630B	6850	supported
G3581A G3582A	490 Micro GC 490 Micro GC Analyzer	supported, LAN only New 4.02 mainboard required (blue power LED or internal USB connector)
G3588A	990 Micro GC System	supported

Agilent GC Autosampler support

Table 51 7693 GC Autosampler

Product Number	Description	Support Statement
G3420A	GC ALS Controller	supported
G4513A	Injector	supported
G4514A	Tray	supported
G4515A	BCR/Mixer	supported
G4516A	External Controller for 68xx	supported
G4517A	6890 Plus Card Upgrade	supported
G4520A	Tray with BCR/Mixer	supported
G4521A	LVI Syringe Carriage	supported
G4522A	Cooling Accessory	supported

Table 52 7683A GC Autosampler

Product Number	Description	Support Statement
G2613A G2614A G2615A	7683A Injector Tray BCR/Mixer	supported, not compatible with 8860, 8890, and 9000 GC

Table 53 7683B GC Autosampler

Product Number	Description	Support Statement
G4516A	ALS Controller Board for 6890 Plus GC	
G2912A	ALS Controller for 6890	supported,
G2913A	7683B Injector	not compatible with 8860 Series,
G2614A	Tray	8890 Series, or
G2615A	BCR/Mixer	Intuvo 9000 GC systems

Table 54 Sampling Accessories

Product Number	Description	Support Statement
G3535A	GC Gasifier	supported
G3541A	GC Sample Selector	supported

Table 55 7650 and G2880A GC Autosamplers

Product Number	Description	Support Statement
G4567A	7650A ALS Injector	• Only one 7650 per GC • Operates on front or back inlet • No additional hardware required for the 7890 • Can be mounted and operated with second 7693A Auto injector but no dual injection on 7820A • Not compatible with 7693A 150 vial tray • Not compatible with 6850 and 6890 GC
G2880A	Injector	Supported; Only for 6850 GC

Agilent Headspace Sampler support

Table 56 7697A Headspace Sampler

Product Number	Description	Support Statement
G4556A	12 Vial	supported Not supported with PTV inlet
G4557A	111 Vial	supported
G4561A	Barcode Reader for 111 Vial	supported
G4562A	Carrier Gas EPC Module	supported
G4565A	Cooling Plate/Tray Assembly	supported with 111 Vial (G4557A) Not supported on 12 vial

Table 57 8697 Headspace Sampler

Product Number	Description	Support Statement
G4511A	8697 Headspace	supported Instrument control via GC touchscreen (8890, 8860, or Intuvo 9000 GCs)

Table 58 G1888 Headspace

Product Number	Description	Support Statement
G1888A	70 vial G1888 Headspace	supported

Installs of Headspace driver version 3.x will uninstall B.01.09 or earlier headspace drivers. Any instrument with a G1888 configured will encounter an error message that the G1888 driver is not installed and the G1888 will be removed from the configuration. In this case, install the Agilent OpenLab CDS – Agilent G1888 Headspace driver from the media and reconfigure the instrument with the G1888.

Agilent CTC Sampler support

Support statements for Agilent CTC / PAL samplers with OpenLab CDS rev. 2.7

Table 59 Agilent PAL-xt CTC Sampler with Agilent GC

Product Number	Description	Support Statement
G6500-CTC	Combi-Pal for Liquid and Headspace Injection	Supported on 7890, 7820, 6890 and 6850 GC Series. Not compatible with 8860 Series, 8890 Series, or Intuvo 9000 GC systems
G6501-CTC	Combi-Pal for Liquid Injection	
G6509-CTC	Combi-Pal for Liquid Injection	Not supported with any GC ALS.
G6502-CTC	GC-Pal for Liquid Injection	Requires 2 boards. FW up to 2.6.8. using driver 1.08.1 or greater

Table 59 Agilent PAL-xt CTC Sampler with Agilent GC

Product Number	Description	Support Statement
G6501B	Agilent GC Sampler 80 for Liquid Injection	Not compatible with 8860 Series, 8890 Series, or Intuvo 9000 GC systems. Not supported with any GC ALS. PCB. xt main board with FW 4.3.0. using driver B.1.08.1 or greater.
G6502B	Agilent GC Injector 80 for Liquid Injection	
G6509B	Agilent GC Sampler 120 for Liquid Injection	

Table 60 Agilent CTC PAL-3 Autosampler with Agilent GC

Product Number	Description	Support Statement
G7366A G7367A G7368A G7370A	PAL3 LSI 85 Autosampler PAL3 RSI 85 Autosampler PAL3 RSI 120 Autosampler PAL3 RTC 120 Autosampler	Supported on 8890, 8860, 7890, 7820, 6890, and 6850 GC. Not supported with additional samplers
G7366B G7367B G7368B G7370B	PAL3 Series II LSI 85 PAL3 Series II RSI 85 PAL3 Series II RSI 120 PAL3 Series II RTC 120	Supported on 8890, 8860, 7890, 7820, 6890, and 6850 GC. Not supported with additional samplers

Mini Thermal Desorber

Table 61 G2880A

Product Number	Description	Support Statement
7667A	Mini Thermal Desorber	supported

Agilent GC/MS Instrument support

Recommended Firmware

Always use the most recent MS Firmware installation package that comes with the driver package.

The supported GC/MS firmware is available after installation of OpenLab CDS in **Program Files (x86) > Agilent Technologies > OpenLab Acquisition > GCMS > Firmware**.
Open the appropriate MS folder (5977 or 5975) and run msupdate.exe to upgrade the MS firmware.

GC/MS Modules

The table below summarizes the compatibility of Agilent GC/MS Single Quad Series models with OpenLab CDS2.7.

For GCs supported as part of a GC/MS system - see "Agilent GC System and Sampler support" on page 77.

For Autosamplers, CTC Samplers and Headspace supported as part of a GC/MS system - see "Agilent GC Autosampler support" on page 79, "Agilent Headspace Sampler support" on page 80, or "Agilent CTC Sampler support" on page 81 respectively.

Table 62 Compatibility statements for Agilent GC/MS Single Quad Series Models

Model number / series	Description	Compatibility Statement
5973	GC/MS family	not supported
5975A 5975B 5975C 5975E	MS System	supported CI added with GC/MS Driver A.01.02
5975T	Integrated GC/MS	not supported

Table 62 Compatibility statements for Agilent GC/MS Single Quad Series Models

Model number / series	Description	Compatibility Statement
5977A 5977B 5977E	MS System	supported CI added with GC/MS Driver A.01.02
5977C	MS System	supported Expanded mass range (0.6-1091) requires GC/MS driver version 1.5 or higher

Other supported Agilent Instruments

Other Agilent instruments or modules that you can connect with the latest revision of OpenLab CDS:

Table 63 Other Agilent modules

Model number	Description	Support Statement
35900E 35900E (Series II)	35900 A/D Interface	supported
SS420x	A/D Converter	supported

Non-Agilent Instruments

OpenLab CDS offers comprehensive multi-vendor instrument control for LC, GC, LC/MS and GC/MS systems. The support matrix for non-Agilent drivers is subject to frequent changes.

NOTE

A current list of supported instruments is available on www.agilent.com. Search for *FAQ: What instruments are supported in OpenLab CDS?* or use: https://www.agilent.com/en/support/software-informatics/openlab-software-suite/chromatography-data-systems/faq-what-instruments-are-supported-in-openlab-cds.

A detailed *Compatibility Matrix non-Agilent Drivers OpenLab CDS* is available in PDF format from https://agilent.subscribenet.com (access via OpenLab > OpenLab AddOns).

The table below lists the supported drivers at time of release.

Table 64 Non-Agilent instrument drivers available for use with OpenLab CDS v2.7

Agilent Part number	Vendor	Driver Type
n/a	Antec ECD	LC
n/a	Axcend[1]	LC
M8223BA	CTC	LC
M8227BA	Hitachi	LC
n/a	Metrohm	IC
M8229BA M8242BA	PerkinElmer	LC GC
M8237BA	Scion/ Bruker/ Varian	GC
n/a	Sedere	ELSD
M8240BA M8232BA	Shimadzu	LC GC
n/a	Showa Denko, Shodex	RI
M8236BA	Thermo Fisher	LC
M8244BA	Thermo Fisher SII[2]	GC LC IC
M8224BA	Valco Instruments (VICI)	Valve
M8505BA	Waters[3]	LC

1 planned

2 Not supported on Windows 11 at time of release of OpenLab CDS v2.7

3 Waters Driver Pack does not support Windows 11 at time of release of OpenLab CDS v2.7

NOTE

Always download the most recent instrument drivers available from (https://agilent.subscribenet.com) to control non-Agilent instruments.

OpenLab CDS VL Workstation and OpenLab CDS VL Workstation Plus Instruments

OpenLab CDS VL and VL Plus licenses include one instrument connection, and provide a limited support for Agilent instruments. The following subset of Agilent Chromatography instruments is configurable with a *OpenLab CDS VL Workstation* or *OpenLab CDS VL Workstation Plus*.

1100 series LC modules that are predecessors of 1260 Infinity LC series modules listed below are supported on best effort basis.

Table 65 VL-configurable 1260 Infinity LC series modules

Product number	Module Name
G1310B	1260 Infinity Isocratic Pump
G1311B	1260 Infinity Quaternary Pump
G1311C	1260 Infinity Quaternary Pump VL
G1314A	1100/1200 Variable Wavelength Detector
G1314B	1260 infinity Variable Wavelength Detector VL
G1314C	1260 Infinity Variable Wavelength Detector VL+
G1314F	1260 Infinity Variable Wavelength Detector
G1315C	1260 Infinity Diode-Array Detector VL+
G1315D	1260 Infinity Diode-Array Detector VL
G1316A	1260 Infinity Thermostatted Column Compartment
G1321B	1260 Infinity Fluorescence Detector Spectra
G1321C	1260 Infinity Fluorescence Detector
G1328C	1260 Manual Injector
G1329A	1100 Series Standard Autosampler
G1329B	1260 Infinity Standard Autosampler
G1362A	1260 Infinity Refractive Index Detector
G1365C	1260 Infinity Multiple Wavelength Detector
G1365D	1260 Infinity Multiple Wavelength Detector VL

Table 65 VL-configurable 1260 Infinity LC series modules

Product number	Module Name
G1390B	1200 Infinity Series Universal Interface Box II
G4212B	1260 Infinity Diode-Array Detector

Table 66 VL-configurable 1260 Infinity II LC series modules

Product number	Module Name
G7110B	1260 Infinity II Isocratic Pump
G7111A/B	1260 Infinity II Quaternary Pump
G7114A	1260 Infinity II Variable Wavelength Detector
G7115A	1260 Infinity II Diode Array Detector WR
G7116A	1260 Infinity II Multicolumn Thermostat
G7117C	1260 Infinity II Diode Array Detector HS
G7121A	1260 Infinity II Fluorescence Detector
G7121B	1260 Infinity II Fluorescence Detector Spectra
G7129A	1260 Infinity II Vialsampler (includes G7130A ICC[1] as option)
G7162A	1260 Infinity II Refractive Index Detector
G7165A	1260 Infinity II Multiple Wavelength Detector

[1] Agilent InfinityLab Integrated Column Compartment

Table 67 Configurable Agilent Combined LC Systems

Product Number	System Name
G4286A	1120 Compact LC, Isocratic
G4286B	1220 Infinity LC System Isocratic, Man. Inj., VWD, 600 bar
G4286C	1220 Infinity LC System VL[1]
G4287A	1120 Compact LC, Isocratic with Oven and ALS
G4287B	1220 Infinity LC System Isocratic, ALS, VWD and Oven 600 bar
G4287C	1220 Infinity LC System VL[1]
G4288A	1120 Compact LC, Gradient

Table 67 Configurable Agilent Combined LC Systems

Product Number	System Name
G4288B	1220 Infinity LC Gradient, Man. Inj., VWD, 600 bar
G4288C	1220 Infinity LC System VL, Gradient, Man. Inj. VWD, 400 bar
G4289A	1120 Compact LC, Gradient with Oven
G4289B	1220 Infinity LC Gradient, Man. Inj., VWD and Oven 600 ba
G4289C	1220 Infinity LC System VL, Gradient, Man. Inj. VWD, 400 bar
G4290A	1120 Compact LC, Gradient with oven and ALS
G4290B	1220 Infinity LC Gradient, ALS, TCC, VWD, 600 bar
G4290C	1220 Infinity LC System VL, Gradient, ALS, TCC, VWD, 400 bar
G4291B	1220 Infinity LC System Isocratic, Man. Inj., VWD and Oven 600 bar
G4291C	1220 Infinity LC System VL[1]
G4292B	1220 Infinity LC System Isocratic, ALS, VWD, 600 bar
G4292C	1220 Infinity LC System VL[1]
G4293B	1220 Infinity LC Gradient, ALS, VWD, 600 bar
G4293C	1220 Infinity LC System VL, Gradient, ALS, VWD, 400 bar
G4294B	1220 Infinity LC Gradient, ALS, TCC, DAD, 600 bar

1 System works without a driver. Supported within a 1200 LC instrument

Table 68 VL-configurable Agilent GC systems

Product Number	System Name[1]
G4350A	7820A GC System
M8417AA[2]	7820A VL GC System
G2790	8860 GC System
G3581A	490 Micro GC System
G3588A	990 Micro GC System

1 Instrument add-ons, like Headspace and RTL, are supported per the availability of that feature on the associated instrument.

2 Bundle with OpenLab CDS VL Workstation

6 Software Compatibility

This chapter contains information on compatibility with other Agilent or non-Agilent software.

OpenLab CDS System Compatibility

OpenLab CDS System Compatibility

Component	Supported Revisions	Comments
OpenLab Server	all 2.7 configurations	supported
OpenLab ECM XT	all 2.7 configurations	supported
OpenLab CDS	2.4 2.5 2.6	Supported as part of an upgrade
	2.7	Supported for steady state usage
OpenLab ECM	3.5 Update 6, or greater 3.6 (all)	Details of CDS data usage in ECM are documented within ECM. 3.6 update 2 or greater is required for certain search related features.
OpenLab Shared Services Server	3.6	For **OpenLab CDS with OpenLab ECM 3.x** configurations only. Standalone Deployment of OpenLab Shared Services Server without a content management solution (aka Distributed Workstations) with OpenLab CDS is not supported.
Agilent Platform components	1.7	Shared Services 3.6, Data Repository, Client Framework, Audit Trail Service, Data Collection Service, Certificate Service, eSignature Service
SLIMS	planned (SLIMS v6.9)[1]	Requires Sample Scheduler for OpenLab Check with SLIMS support for details

[1] SLIMS v6.8 is compatible with OpenLab CDS 2.6 and v2.5

OpenLab ELN is not supported with OpenLab CDS 2.7.

NOTE

For Networked Workstations (Client Co-installed on AIC) not all add-ons are supported on all configurations. Check add-on Software product documentation for details.

Supported Content Management configurations

Supported Content Management configurations

Content Management	OpenLab Shared Services	Comments
OpenLab Basic Server	Included with OpenLab Server	Supported[1] Up to 4 total configured instruments – any data system.
OpenLab Server	Included with OpenLab Server	Supported[1]
OpenLab ECM XT	Included with OpenLab ECM XT	Supported[1]
OpenLab ECM	OpenLab Shared Services Server	See ECM requirements for additional details regarding capacity requirements

[1] See OpenLab ECM XT/ OpenLab Server Documentation for list of supported configurations.

Mixed configurations

Environments combining OpenLab CDS with other Agilent CDS products are supported with the following storage backends:

- **OpenLab Server/OpenLab ECM XT**

  Mixed configurations are supported if OpenLab CDS and the other CDS product can both connect to the same OpenLab Server/OpenLab ECM XT version. See Agilent white-paper *Mixed Environment Support in OpenLab CDS* for details on the Mixed Environment design.

  Check with your Agilent contact for details on the CDS versions supported in mixed configurations. At time of release the following versions can be connected with OpenLab CDS in mixed configurations, per compatibility of ChemStation or EZChrom with OpenLab Server/ECM XT respectively:

  - OpenLab Chemstation C.01.09
  - OpenLab Chemstation C.01.10
  - OpenLab EZChrom A.04.09
  - OpenLab EZChrom A.04.10

- **OpenLab ECM**

  OpenLab CDS can be configured with OpenLab ECM v3.x via an Agilent OpenLab Shared Services Server to operate in an environment containing different Data Systems. OpenLab ChemStation or OpenLab EZChrom may be connected to OpenLab ECM via a separate Shared Services server.

  For more details, refer to the *Configuring OpenLab CDS with OpenLab ECM* guide (CDS_v2.7_configure-with-ECM_en.pdf).

  Standalone deployment of OpenLab Shared Services Server without a content management solution (aka Distributed Workstations) with OpenLab CDS is not supported.

NOTE Using one project for both OpenLab CDS and EZChrom data is not supported.

Compatible Libraries and Databases

The libraries and databases listed below are compatible with version 2.7 of OpenLab CDS.

NOTE For distributed environments, MS Search and NIST library versions should be consistent on every client and AIC.

NIST MS Search/ NIST Library

Supported:

- 2.4 / NIST20

  This library ships with NIST MS Search

Backwards compatibility to

- 2.3 / NIST17
- 2.2 / NIST14
- Any library in the appropriate NIST format can be opened in NIST MS Search, and a basic search, e.g. name search, can be run against it.

NIST MS Search Software and Demo Library are available for download at https://chemdata.nist.gov/

Wiley/NIST Combined MS Library

Supported revisions:

- W12N20
- W11N17

Supported Agilent Software Add-Ons

In general Agilent Add-on Software is supported to be co-resident with OpenLab CDS components. For details consult the respective product information.

7 Sales and Support Assistance

Please check the following web site for your local sales and support contact:

https://www.agilent.com/en/support

Agilent Community

To get answers to your questions, join over 10,000 users in the Agilent Community. Review curated support materials organized by platform technology. Ask questions to industry colleagues and collaborators. Get notifications on new videos, documents, tools, and webinars relevant to your work.

https://community.agilent.com/

In This Book

This document details the minimum hardware and software requirements (PC specifications) that need to be met to run Agilent OpenLab CDS. It is valid for Workstation, Workstation Plus, Client, or Analytical Instrument Controller components. It also lists supported Agilent and Non-Agilent instruments.

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