Technical Specification

English

Ultrasound Workspace 7.0

PHILIPS

1 Introduction

This document describes the supported data formats and the standard hardware and software requirements for Ultrasound Workspace.

2 Data Compatibility

The following symbols are used in the tables to indicate support or compatibility.

Symbol	Meaning
✓	Supported or compatible
–	Not supported or compatible
*	No restriction

Cardiac Imaging

The following table lists the data format restrictions for the cardiology product modules.

	4D LV–ANALYSIS 3D Auto RV 3D Auto CFQ 3D Auto TV	3D Auto MV	4D CARDIO–VIEW	AutoStrain LV/SAX/RV/LA 2D Auto LV	IMAGE–COM
Minimal frame rate (fps)	10	*	*	*	*
Minimal number of frames per cardiac cycle (frames/cycle)	10	*	*	*	*
Minimal number of frames per clip (frames/clip)	*	3	*	2	*
Minimal number of Stages for stress studies (different values in StageNumber tag)	*	*	*	*	2
Modality for detection of stress echo studies	*	*	*	*	US

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2D Data Compatibility

The following table lists the compatibility of cardiology product modules with 2D data formats and associated acquisition protocols.

		AutoStrain LV/ SAX/RV/LA	2D Auto LV	IMAGE–COM
Modality [2]	**Acquisition Protocol**			
DICOM 2D US	B–Mode	✓ (6)	✓ (6, 7)	✓
DICOM 2D US	M–Mode, Doppler	–	–	✓
DICOM 2D US	Stress Echo	✓ (6)	✓ (6, 7)	✓
DICOM 2D XA, NM		–	–	✓

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3D Data Compatibility

The following tables list the compatibility of cardiology product modules with vendor-specific 3D data formats and associated transducers.

		4D LV–ANALYSIS 3D Auto RV	3D Auto MV	4D CARDIO–VIEW	3D Auto CFQ	3D Auto TV	IMAGE–COM
Modality [2]	**Format and Transducers**						
GE Vivid 7 [9] GE E9 [9] GE E95 [9]	3V-D 4V-D 4Vc-D 6VT-D 6Vc-D SW Version (v110-v113) (v201-v204) (v206)	✓	✓	✓	–	✓ [10]	✓ [1]
Philips	X3-1	✓ [3]	✓ [4]	✓ [4]	–	✓ [10]	✓ [1, 4]
	X5-1	✓ [3]	✓ [4]	✓ [4]	–	✓ [3]	✓ [1, 4]
	X5-1c	✓ [3]	✓ [4]	✓ [4]	–	✓ [3]	✓ [1, 4]
	X7-2	✓ [3]	✓ [4]	✓ [4]	–	✓ [10]	✓ [1, 4]
	X7-2t	✓ [3]	✓ [4]	✓ [4]	–	✓ [3]	✓ [1, 4]
	X8-2t	✓ [3]	✓ [4]	✓ [4]	✓ [8]	✓ [3]	✓ [1, 4]
	X11-4t	✓ [3]	✓ [4]	✓ [4]	–	✓ [3]	✓ [1, 4]
	VeriSight Pro ICE	–	–	✓ [4]	–	–	✓ [1, 4]
Siemens Acuson Sequoia 3D [9]	5Z1 (TTE)	–	–	✓	–	–	✓ [1]
	Z6T (TEE)	–	–	✓	–	–	✓ [1]

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3D Data Compatibility

			4D LV–ANALYSIS 3D Auto RV	3D Auto MV 4D CARDIO-VIEW	3D Auto TV	IMAGE–COM
Modality [2]	**Acquisition Protocol**	**Format**				
Toshiba ARTIDA 3D	Full Volume	Rev 2 and 3	✓ (3, 5)	✓ (3, 5)	✓ (10)	✓ (1)
Toshiba ARTIDA 3D	Single Volume	Rev 2 and 3	–	–	–	–
CANON 3D	Single Beat and Triggered Volume	Tissue only (no color Doppler)	✓	✓	✓ (10)	✓ (1)
HAM Cardiac F75 3D	Normal and Cycle Scan	Tissue only (no color Doppler)	✓	✓	✓ (10)	✓ (1)
Siemens SC2000 TTE / TEE 3D	4D real time	Tissue only (no color Doppler)	✓	✓	✓ (10)	✓ (1)

Footnotes for Cardiac Imaging:

1. Requires a separate 3D license.
2. Contact your modality provider regarding special configurations of your ultrasound machine.
3. Supports tissue data only.
4. Supports tissue and color (Doppler) data.
5. Datasets containing multiple cardiac cycle data are automatically cropped to one cardiac cycle. For the analysis of Toshiba ARTIDA 3D datasets, only the last cardiac cycle of a multiple cardiac cycle dataset is used. For all other datasets, the first cardiac cycle is used.
6. Support for Philips native single plane 2D data.
7. Segmental Wall Motion requires that the images were taken with supported transducers (X5-1, X5-1c, S5-1), have standard orientations, are not pediatric, and that all three apical views are available. If any of these conditions are not met for images, the corresponding workflow step is grayed out.
8. Requires color (Doppler) data.
9. Use of raw, uncompressed tissue, no color (Doppler) data.
10. Requires a separate multi-vendor license. Not available for the USA and Taiwan.

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Radiology Imaging

The following table lists product module compatibility with 2D and 3D radiology data formats and associated acquisition protocols.

Modality	Acquisition Protocol	Format	4D SONO-SCAN	IMAGE-COM
DICOM multi-frame (handheld)	Manually acquired 2D multi-frame clips	2D multi-frame DICOM (*.dcm or without extension). Specific Format[2]: DicomUS	✓ (3)	✓ (1)
Zonare (Z.ONE)	Wobbler probe acquisition Acquisition modes: 3D/4D static & real-time	Zonare's DICOM encapsulated proprietary 3D/4D volume data. Specific Format[2]: ZONARE_DATA	✓ (3)	✓ (1)
General Electric (Voluson, Logiq)	Wobbler or Matrix probe acquisition Acquisition modes: 4D, Tru3D, Advanced 3D and Easy 3D mode	GE's DICOM encapsulated proprietary (.V00 or .vol) 3D/4D volume data Specific Format[2]: GE_Kretzfile_Wobbler	✓ (4)	✓ (1)
Philips	Matrix probe acquisition Acquisition modes: 3D, 4D	Philips 3D	✓ (3)	✓ (1)
Alpinion (E-Cube)	Acquisition mode: 4D	Alpinion's DICOM encapsulated proprietary 3D/4D volume data. Specific Format[2]: ALPINION_VOLUME	✓ (3)	✓ (1)
Siemens ABVS	Mechanically acquired 3D data (it is actually spatially calibrated 2D multi-frame data) with a Siemens ABVS device.	2D multi-frame DICOM data (*.dcm or without extension) that includes the frame distance. Specific Format[2]: DicomUS	✓ (3)	✓ (1)

Footnotes for Ultrasound in Radiology:

1. Requires a separate 3D license.
2. As displayed in the DICOM properties dialog of IMAGE-COM.
3. Supports tissue data only.
4. Supports tissue and color (Doppler, power etc.) data.

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Image Visualization

Image Visualization on Client Workstations and Standalone Workstations

- No image compression algorithms are used for image visualization.

3 Single Seat Installation

Single Seat Workstation Requirements

This specification is intended to describe the standard hardware and software requirements for application installed and used on a singular workstation.

Operating System

Microsoft Windows operating systems with desktop experience in 64-bit variants which are supported by Microsoft, starting with Windows 10 version 1809 and higher.[1] Microsoft operating systems built on the Windows OneCore kernel support the x64 variant.

1. For more information, see: https://support.microsoft.com/en-us/lifecycle/search

Hardware

Hardware	Minimum	Recommended
CPU	Intel Core i-Series 6th generation or higher	Intel Core i-Series 10th generation or higher
Memory	16 GB or higher	16 GB or higher
Graphics Card[1]	DirectX 9.0c compatible (**TrueVue** users are advised to fulfill the recommended requirements for the graphics card.)	NVIDIA GPU (Kepler or higher)
Screen Resolution	1280x1024 or higher	1920x1080
Pointing Device	Mouse with wheel or equivalent input device	
Network	100 Mbit/s or higher	1 Gbit/s or higher

1. DirectX 9.0c feature set is included in higher versions, like DirectX 10, 11, and 12. Intel i-Series CPUs with integrated GPUs are compatible.

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Disk Space

The following table is an example of disk space partitioning based on standard values and use cases. This recommendation may vary depending on the infrastructure used and the setup scenario.

Partition		Size
1	Operating System	100 GB (SSD recommended)
2	Application	100 GB (SSD recommended)
3	Database + Archive	minimum 500 GB[1] (SSD recommended)

1. Depending on study throughput

NOTE

In case of PACS Archiving, the size of the file archive should be configured depending on the required time spread, where the data shall be accessible from the Online Cache. Older data will be retrieved from the PACS.

In case of Mass Storage Archiving, the size of the archive depends on the required online availability of the data.

A rough guideline for the size of the Archive can be estimated in both cases by the following formula:

Minimum size of Archive [GB] (assumed 25 days of acquiring data/month) = A * T * 25

A = Average Amount of data per day [GB], Input

T = Time spread of availability in Online Cache/Mass Storage Archive [Month]

NOTE

Ultrasound Workspace does not support archive locations on DFS file systems.

MSSQL Database

Ultrasound Workspace (6.0 or higher) is delivered with the PostgreSQL database. Existing installations can continue to use MSSQL as a database. The following SQL Server versions are compatible with Ultrasound Workspace and can be used as an alternative to the delivered PostgreSQL database.

Name	Release	End of Support Mainstream [1]	End of Support Extended [1]
SQL Server 2019	2019-11	2025-01	2030-01
SQL Server 2022	2022-11	2028-01	2033-01

1. For more information, see: https://support.microsoft.com/en-us/lifecycle/search

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NOTE

- The MSSQL database is not part of the product and must be provided and maintained by the customer.
- Only case insensitive collations are allowed (preferably Latin1_General_CI_AS).
- Ultrasound Workspace uses the TCP/IP protocol to connect to the SQL Server on the default port 1433.

More information can be found in the official documentation:

https://docs.microsoft.com/en-us/sql/sql-server/install/hardware-and-software-requirements-for-installing-sql-server-ver15?view=sql-server-ver15

CAUTION

We recommend configuring TLS encryption for your SQL server and adjusting the JDBC URL in tomtec.properties accordingly to secure the communication with the database and to prevent the disclosure of private data. For examples and more information on how to setup TLS encryption, see:

- **https://docs.microsoft.com/en-us/sql/database-engine/configure-windows/enable-encrypted-connections-to-the-database-engine?view=sql-server-ver15 for configuring your SQL server, and**
- **https://docs.microsoft.com/en-us/sql/connect/jdbc/connecting-with-ssl-encryption?view=sql-server-ver15 for configuring the JDBC URL**

TLS versions 1.0 and 1.1 are outdated and do not comply with current cybersecurity standards. Therefore, TLS versions 1.0 and 1.1 must not be used for Ultrasound Workspace.

Configuration

Server	
Virus Scanner	The virus scanner has to be disabled for all directories used by Ultrasound Workspace server for the exchange of DICOM data files (e.g. temporary folder of DICOM service and folder of working archive, etc.). For more information, see chapter “File Access and Virus Scanner” on page 23.

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Server	
Ultrasound Workspace service	Ultrasound Workspace must have sufficient NTFS permissions for the folder that will contain the Archives: • List folder / read data • Read attributes • Read extended attributes • Create files / write data • Create folders / append data • Write attributes • Write extended attributes • Delete subfolders and files • Delete For a local based file archive the easiest way to grant these permissions is to set the user which is used to run the Ultrasound Workspace … service to have "Full access" to the archives folder. This can be done via the "Security" tab of the folder properties. For remote drives, contact the administrator of the remote server to configure the required permissions.
_JAVA_OPTIONS	The environment variable _JAVA_OPTIONS shall not be set as it will influence the JVM used by Ultrasound Workspace. Especially setting maximum heap size below –Xmx4g will lead to startup failure of the Ultrasound Workspace.
PostgreSQL Database	For cyber security reasons, we strongly advise against letting the PostgreSQL database listen on an adapter other than the loopback.
Minimum Security Requirements	For minimum security requirements you must use a firewall appliance to limit, control or eliminate unwanted access to your local network. Furthermore, security safeguards to protect the system against the intrusion of malware (viruses, Trojans, worms) must be in place and must be updated on a regular level. In general, access to the software client(s) must be restricted to authorized users only. For further security recommendations and more details refer to the **Instructions for Use**, chapter **Security Considerations**.
Client	
Page File	The page file of the operating system must remain enabled. It is recommended to keep the default settings in the system properties. / Performance options / Virtual memory / : "Automatically manage paging file size for all drives"

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Client	
Computer Name	The name of the computer shall not exceed 15 characters. For more information, see: https://technet.microsoft.com/en-us/library/cc731383.aspx https://technet.microsoft.com/en-us/library/cc726016(v=ws.10).aspx
PDF Viewer	Adobe Acrobat Reader compatible with the installed operating system must be used.
Media Feature Pack	For Windows 10 N versions a separate installation of the Media Feature Pack is required.
WebView2	Microsoft Edge WebView2 Runtime version 119 or higher is required.
Screen Scaling	Recommended system scaling factor should be configured.
Monitor	We strongly recommend an aspect ratio of 4:3 or 16:9. The application runs in full screen mode. It is not possible to change the size of the window. Therefore, two monitors are required to display the image review and reporting side by side. Tools that allow the virtual desktop to be split are not supported.
Energy Settings	The energy saving mode must be set to "Balanced". The device must always be connected to a power source and have the highest power settings.

Backup Strategy

A backup strategy needs to be set up for every installation individually. To restore the system completely it is recommended to back up the database, the complete file archive and all configuration files.

4 Server Client Installation

Server client installations are for multi-seat configurations which supports multiple clients at the same time.

Client Workstation Requirements

This chapter describes the standard hardware and software requirements for all scenarios where the client application is installed on a workstation system with an external database such as an Ultrasound Workspace server or third-party integrations.

Operating System

Microsoft Windows operating systems with desktop experience in 64-bit variants which are supported by Microsoft, starting with Windows 10 version 1809 and higher.[1] Microsoft operating systems built on the Windows OneCore kernel support the x64 variant.

1. For more information, see: https://support.microsoft.com/en-us/lifecycle/search

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Hardware

Hardware	Minimum	Recommended
CPU	Intel Core i-Series 6th generation or higher	Intel Core i-Series 10th generation or higher
Memory	8 GB or higher[2]	16 GB or higher
Graphics Card[1]	DirectX 9.0c compatible (**TrueVue** users are advised to fulfill the recommended requirements for the graphics card.)	NVIDIA GPU (Kepler or higher)
Screen Resolution	1280x1024 or higher	1920x1080
Pointing Device	Mouse with wheel or equivalent input device	
Network	100 Mbit/s or higher[2]	1 Gbit/s or higher

1. DirectX 9.0c feature set is included in higher versions, like DirectX 10, 11, and 12. Intel i-Series CPUs with integrated GPUs are compatible.
2. For large image volumes, high frame rate studies, or uncompressed data, we recommend using the recommended setting for optimal system performance.

Disk Space

Software	Size
Client Software	4 GB (SSD recommended)

Configuration

Client	
Page File	The page file of the operating system must remain enabled. It is recommended to keep the default settings in the system properties. / Performance options / Virtual memory / : "Automatically manage paging file size for all drives"
Computer Name	The name of the computer shall not exceed 15 characters. For more information, see: https://technet.microsoft.com/en-us/library/cc731383.aspx https://technet.microsoft.com/en-us/library/cc726016(v=ws.10).aspx
PDF Viewer	Adobe Acrobat Reader compatible with the installed operating system must be used.
Media Feature Pack	For Windows 10 N versions a separate installation of the Media Feature Pack is required.
WebView2	Microsoft Edge WebView2 Runtime version 119 or higher is required.
Screen Scaling	Recommended system scaling factor should be configured.

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Client	
_JAVA_OPTIONS	The environment variable _JAVA_OPTIONS shall not be set as it will influence the JVM used by Ultrasound Workspace. Especially setting maximum heap size below –Xmx4g will lead to startup failure of the Ultrasound Workspace.
Minimum Security Requirements	For minimum security requirements you must use a firewall appliance to limit, control or eliminate unwanted access to your local network. Furthermore, security safeguards to protect the system against the intrusion of malware (viruses, Trojans, worms) must be in place and must be updated on a regular level. In general, access to the software client(s) must be restricted to authorized users only. For further security recommendations and more details refer to the **Instructions for Use**, chapter **Security Considerations**.

NOTE

The user manuals are provided as PDF files. If you do not have a PDF reader application installed, you can download Adobe Reader from the following website: www.adobe.com

Web Client Requirements

Officially Supported Browser

Windows Based Browser	Architecture	Supported Build
Google Chrome / Edge Chromium	x86, x64	>=124

NOTE

For security reasons we recommend that you always use the latest version of the browser.

Server Requirements

This chapter describes the standard physical and virtual hardware and software requirements for server applications installed in a network server and client infrastructure based on a standard clinical use case. For further scaling considerations, refer to chapter “System Scaling” on page 23.

Operating System

Microsoft Windows operating systems with desktop experience in 64-bit variants which are supported by Microsoft, starting with Windows Server 2019 and higher.[1] Microsoft operating systems built on the Windows OneCore kernel support the x64 variant.

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1. For more information, see: https://support.microsoft.com/en-us/lifecycle/search

NOTE

The language of the operating system installed on the server must be English.

MSSQL Database

Ultrasound Workspace (6.0 or higher) is delivered with the PostgreSQL database. Existing installations can continue to use MSSQL as a database. The following SQL Server versions are compatible with Ultrasound Workspace and can be used as an alternative to the delivered PostgreSQL database.

Name	Release	End of Support Mainstream [1]	End of Support Extended [1]
SQL Server 2019	2019-11	2025-01	2030-01
SQL Server 2022	2022-11	2028-01	2033-01

1. For more information, see: https://support.microsoft.com/en-us/lifecycle/search

NOTE

- The MSSQL database is not part of the product and must be provided and maintained by the customer.
- Due to limitations the Express Edition of the MS SQL Server cannot be used for Client Server Installations.
- Only case insensitive collations are allowed (preferably Latin1_General_CI_AS).
- Ultrasound Workspace uses the TCP/IP protocol to connect to the SQL Server on the default port 1433.

More information can be found in the official documentation:

https://docs.microsoft.com/en-us/sql/sql-server/install/hardware-and-software-requirements-for-installing-sql-server-ver15?view=sql-server-ver15

CAUTION

We recommend configuring TLS encryption for your SQL server and adjusting the JDBC URL in tomtec.properties accordingly to secure the communication with the database and to prevent the disclosure of private data. For examples and more information on how to setup TLS encryption, see:

- **https://docs.microsoft.com/en-us/sql/database-engine/configure-windows/enable-encrypted-connections-to-the-database-engine?view=sql-server-ver15 for configuring your SQL server, and**
- **https://docs.microsoft.com/en-us/sql/connect/jdbc/connecting-with-ssl-encryption?view=sql-server-ver15 for configuring the JDBC URL**

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TLS versions 1.0 and 1.1 are outdated and do not comply with current cyber security standards. Therefore, TLS versions 1.0 and 1.1 must not be used for Ultrasound Workspace.

Hardware (physical or virtual)

Hardware	Minimum	Recommended
CPU	Intel Core i-Series 6th generation or Intel Xeon E-series or higher	Intel Xeon E-series or higher
Memory	16 GB or higher	32 GB or higher
Graphics Card[(1)]	DirectX 9.0c compatible (**TrueVue** users are advised to fulfill the recommended requirements for the graphics card.)	NVIDIA GPU (Kepler or higher)
Network	100 Mbit/s or higher [(2)]	1 Gbit/s or higher

1. Only required when client applications are used on the server, otherwise no specific GPU required.

   DirectX 9.0c feature set is included in higher versions, like DirectX 10, 11, and 12. Intel i-Series CPUs with integrated GPUs are compatible.

2. For large image volumes, high frame rate studies, or uncompressed data, we recommend using the recommended setting for optimal system performance.

Disk Space

The following table is an example of disk space partitioning based on a standard departmental use case where a server is used to store and manage image data. This recommendation may vary depending on the archiving workflow, infrastructure used, and setup scenario such as Measurement Mapping service or license service only. Contact your representative for a recommendation tailored to your needs.

Partition		Size
1	Operating System	100 GB (SSD recommended)
2	Application	100 GB (SSD recommended)
3	Database + Archive	minimum 500 GB[(1)] (SSD recommended)

1. Depending on study throughput

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NOTE

In case of PACS Archiving, the size of the file archive should be configured depending on the required time spread, where the data shall be accessible from the Online Cache. Older data will be retrieved from the PACS.

In case of Mass Storage Archiving, the size of the archive depends on the required online availability of the data.

A rough guideline for the size of the Archive can be estimated in both cases by the following formula:

Minimum size of Archive [GB] (assumed 25 days of acquiring data/month) = A * T * 25

A = Average Amount of data per day [GB], Input

T = Time spread of availability in Online Cache/Mass Storage Archive [Month]

NOTE

Ultrasound Workspace does not support archive locations on DFS file systems.

Configuration

Server	
TCP/IP Ports	Port 80, 443, 41443 and 51080 must be accessible from all client workstations. Port 2100 must be accessible for HL7 communication. Ports 2762 and 50145 must be accessible for DICOM communication. Port 1433 is used to connect to the SQL Server. Port 5432 is used to connect to the PostgreSQL server (localhost only).
Secure Communication	The Ultrasound Workspace server uses TLS encryption for HTTPS connections, with optional support for DICOM TLS and HL7 over TLS. The customer must provide the required X509 certificates, which can be configured using PKCS#12 files or the Windows Certificate Store. For the Zero Footprint Agent, certificate keys must be marked as 'exportable' when using the Windows Certificate Store.
Virus Scanner	The virus scanner has to be disabled for all directories used by Ultrasound Workspace server for the exchange of DICOM data files (e.g. temporary folder of DICOM service and folder of working archive, etc.). For more information, see chapter “File Access and Virus Scanner” on page 23.

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Server	
Ultrasound Workspace Service	Ultrasound Workspace must have sufficient NTFS permissions for the folder that will contain the Archives: • List folder / read data • Read attributes • Read extended attributes • Create files / write data • Create folders / append data • Write attributes • Write extended attributes • Delete subfolders and files • Delete For a local based file archive the easiest way to grant these permissions is to set the user which is used to run the Ultrasound Workspace … service to have "Full access" to the archives folder. This can be done via the "Security" tab of the folder properties. For remote drives, contact the administrator of the remote server to configure the required permissions.
_JAVA_OPTIONS	The environment variable _JAVA_OPTIONS shall not be set as it will influence the JVM used by Ultrasound Workspace. Especially setting maximum heap size below –Xmx4g will lead to startup failure of the Ultrasound Workspace.
Minimum Security Requirements	For minimum security requirements you must use a firewall appliance to limit, control or eliminate unwanted access to your local network. Furthermore, security safeguards to protect the system against the intrusion of malware (viruses, Trojans, worms) must be in place and must be updated on a regular level. In general, access to the software client(s) must be restricted to authorized users only. For further security recommendations and more details refer to the **Instructions for Use**, chapter **Security Considerations**.

CAUTION

The software requires ports 80, 443, 41443 and 51080 to be accessible from all client workstations. Port 2100 must be accessible for HL7 communication. Ports 2762 and 50145 must be accessible for DICOM communication. Port 1433 is used to connect to the SQL Server. Port 5432 is used to connect to the PostgreSQL server (localhost only). Otherwise, all idle ports should be closed by your firewall to limit access to your system.

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Backup Strategy

A backup strategy needs to be set up for every installation individually. To restore the system completely it is recommended to back up the database, the complete file archive and all configuration files.

Zero Footprint Agent Requirements

This chapter describes the hardware and software requirements for all scenarios where the ZERO footprint application is installed and a separate server is used for server-side processing.

Operating System

Microsoft Windows operating systems with desktop experience in 64-bit variants which are supported by Microsoft, starting with Windows Server 2019 or Windows 10 version 1809 and higher.[(1)] Microsoft operating systems built on the Windows OneCore kernel support the x64 variant.

1. For more information, see: https://support.microsoft.com/en-us/lifecycle/search

NOTE

The language of the operating system installed on the server must be English.

Hardware (physical or virtual)

Hardware requirements of Zero Footprint Agent are highly dependent on the use case. Below is a sample specification of a standard departmental use case. Contact your sales representative for more information.

Hardware	Minimum	Recommended
CPU[(1)]	Intel Core i-Series 6th generation or Intel Xeon E-series or higher	More cores to serve more simultaneous users.
Memory	16 GB or higher	32 GB or higher
Graphics Card[(2, 3)]	DirectX 9.0c compatible	In combination with the Intel Core i-Series 6th generation a NVIDIA GPU (Kepler or higher) is recommended.
Network	1 Gbit/s or higher (multiple, aggregated 1 Gbit/s ports recommended)	10 Gbit/s network
Storage	100 GB OS drive (no permanent storage needed for Agent)	100 GB OS drive (no permanent storage needed for Agent)

1. When Agent is hosted on the same server as Ultrasound Workspace, 8 cores are suggested as a minimum.

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2. Presence of a NVIDIA GPU (Kepler or higher) will reduce the system CPU load and memory usage for **TrueVue**.
3. DirectX 9.0c feature set is included in higher versions, like DirectX 10, 11, and 12. Intel i-Series CPUs with integrated GPUs are compatible.

Configuration

Server	
Minimum Security Requirements	For minimum security requirements you must use a firewall appliance to limit, control or eliminate unwanted access to your local network. Furthermore, security safeguards to protect the system against the intrusion of malware (viruses, Trojans, worms) must be in place and must be updated on a regular level. In general, access to the software client(s) must be restricted to authorized users only. For further security recommendations and more details refer to the **Instructions for Use**, chapter **Security Considerations**.

5 License Server

This chapter describes the standard software requirements for all scenarios in which the license server is installed as a separate component for third-party integrations.

Operating System

Microsoft Windows operating systems with desktop experience in 64-bit variants which are supported by Microsoft, starting with Windows Server 2019 and higher.[1] Microsoft operating systems built on the Windows OneCore kernel support the x64 variant.

1. For more information, see: https://support.microsoft.com/en-us/lifecycle/search

NOTE

The language of the operating system installed on the server must be English.

Configuration

CAUTION

The license server requires port 50002 to be accessible from all client workstations. Otherwise, all idle ports should be closed by your firewall to limit access to your system.

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6 System Scaling

The system is designed to support departmental use cases and a workstation and server client based scenario. In case you plan to use the system in a multi-department multi-site scenario, additional system scaling considerations shall be considered which are highly dependent on the user workflow and use case. Contact your service representative for further information.

7 System Virtualization

The product supports server virtualization only. All clinical applications, which display or render data, must run on physical hardware with a rendering engine. In case image display and rendering will be used for maintenance purposes on virtual servers, a 3D acceleration support and WebGL is required.

NOTE

Virtualization of clients, e.g. clinical applications, is not supported.

8 File Access and Virus Scanner

For performance reasons, the virus scanner shall be deactivated for all directories used by Ultrasound Workspace server. On-access scan exclusions shall be configured for the data archive directories used as well as for log file and temp directories that are created after the installation of Ultrasound Workspace.

Installations that are integrated into third-party systems use additional configurable directories for the exchange of DICOM data. For performance reasons, these directories should also be excluded from the on-access scan of the virus scanner. For information about the on-access scan exclusions, contact your service representative.

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