

Recommended Hardware for an Image Acquisition Station (Full-Examination-License)

PC System:	Only systems with Intel Chipsets can be used. → E&L can provide information on complete system solutions on request. For HDSDI-PC see below.
Processor:	Intel Core i7, i5, i3
RAM:	8 GB
Hard disk:	256 GB SSD, alternatively 250 GB HDD
Housing:	Must have the capacity to house two expansion cards – full size or half size.
Serial interface:	2x COM-Port for data transmission and image triggering (also realizable via PCI/PCIe card)
Graphics card:	Chipset graphics or PCIe graphics card, min. resolution: 1920 x 1080, 32bit colour depth
Monitor:	at least 22", better 24" TFT display with a resolution of 1920 x 1080 4K/5K resolution monitors are not compatible!
Input devices:	Standard mouse with scroll wheel and high quality keyboard, each connected via USB or PS/2
Operating system:	Windows 10 Pro 64bit (Build 1803), Windows 8.1 Pro, Windows 7 Pro → Microsoft .NET Framework 4.7.2, 4.0 and 3.5 must be installed
Network card:	at least 100 Mbit/s; switched connection to the E&L server
Frame grabber:	E&L frame grabber with PCIe slot (low profile model available on request) Matrox VIO frame grabber (PCIe x4)

For HDSDI E&L Image Acquisition Station (High resolution HD)

E&L Medical-PC 3 HD by E&L: Core i5 with 3 GHz, 8 GB, SSD 500GB, Windows 10 Pro
→ **Use of a special PCIe-HDSDI frame grabber required**

For Diagnostic Station (Post-Examination License)

→ As image acquisition station with the following additions:

PC System:	no restriction
Processor:	Intel Core i5, i3 or similar processor by AMD
Hard disk:	SSD ≥ 128 GB, alternatively HDD ≥ 250 GB
Housing:	no restriction (also Small Form Factor or NUC possible)
Serial interface:	not required

For Cardiac Catheter E&L Diagnostic Documentation (Equipment per cardiac laboratory)

1x E&L Image Acquisition Station as above for diagnostic documentation, but with a connectivity option for **2 at least 22" TFT displays (1920 x 1080)**.
One display each for documentation and viewer.
Recommendation for DICOM Viewer display: EIZO MS230W.
There is NO requirement for an X-ray compliant, certified monitor.
1x standard PC with 22" or 24" TFT display (1920 x 1080) for material and progress documentation (alternatively terminal server access)

For E&L PC with Pacemaker Connection

PC System:	Standard PC identical to the diagnostic station, min. 2x USB 2.0 free for a connection with pacemaker programming devices.
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Printer

Laser printers are recommended (parallel/USB/LAN)

For E&L Remote Maintenance Station – additional equipment

Remote Maintenance:	Site-to-Site-VPN, further VPN connections on request (e.g. Cisco or TeamViewer) → The workstation must support a 1920 x 1080 resolution.
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E&L Long-Term Archiving (LTA)

PACS integration, archive system integration (e.g. Silent Cube) or other approved solutions

Application and Database Server

General

We recommend complete server systems from brand manufacturers with support response times of max. 8 hours, resolution min. 1920 x 1080

Processor

4 processor cores with 2,5 GHz or higher

Mass storage

SCSI/SAS-RAID1- or RAID5 hardware controller with at least 350 GB available, recommended hard disk configuration:

50GB for operating system

300GB (minimum) for application partitions

→ SAN, distributed file system or file server cluster integration possible

→ **Cardiac catheter installations increase the capacity to at least 1TB**

Main storage

8 GB RAM or more

Operating System

Windows Server 2016, 2012R2/2012, 2008R2/2008

→ Client access licenses according to the number of E&L workstations.

→ **.NET Framework 4.7.2, 4.0, 3.5 must be installed**

→ Windows Server 2016 Essentials only approved for practices or medical service centers

→ For the use of Novell clients please contact the technical department of E&L.

Terminal server

Microsoft Terminal server 2016, 2012R2/2012, 2008R2/2008, Citrix v6.x or higher

→ approximately 700 MB RAM are used per terminal session with E&L software

Virtualization

All versions of VMware, Parallels, Xen and HyperV are supported, depending on the server operating system.

Databases

Microsoft SQL server 2016, 2014, 2012, 2008R2/2008 Standard-Version or better, SQL server cluster

→ **Exception:** E&L test installations may run with SQL Express (version 2016) under the following conditions:

- max. use of 2 GB RAM (significant performance losses may occur)
- max. database size: 10 GB, physical size, not exceedable
- the „SQL Server Agent“ for e.g. the function “Maintenance Plan“ for automatically adjustable database backup runs is NOT available, i.e. the customer needs to create database backups elsewhere/independently with IT support!

Power supply

Uninterruptible Power Supply (UPS): at least 600VA, at least 10min durability

Data protection

→ see separate E&L data security concept

Components installed on this server

- E&L application incl. data storage
- Interface to the HIS (via CWDCConnect)
- Interface to the LTA

Explanatory Notes

Our Hardware specifications are regularly reviewed and revised. They contain the minimum requirements for new components to be procured. Often existing PCs can be used for E&L software systems. If questions occur, feel free to contact our technical department at +49 9131 / 810 33 - 0.

→ [These hardware specifications apply to all product variants of E&L, i.a. CWD, SBB, NBB, and ENDOBASE NEXT](#)

Many E&L software modules can also be installed on Microsoft or Citrix terminal server clients. The only exception are modules that require special hardware resources such as frame grabbers.

→ [Please note the separate hardware requirements for cardiac catheter installation!](#)

Central Import Server

General

We either recommend virtualised servers or dedicated server hardware. In the case of a VM server installation, the performance listed below must be provided.

→ **The import server is a new technical variant for connecting devices.**

→ **with E&L-Release 9.x (NG version) or higher mandatory**

Processor

4 processor cores with 2,5 GHz or higher

Mass storage

SCSI/SAS-RAID1- or RAID5 hardware controller with at least 150 GB available,

Recommended hard disk configuration:

50GB for operating system

100GB for clipboard objects

→ SAN, Distributed File System or file server cluster integration possible

Main storage

8 GB

Operating system

Windows Server 2016, 2012R2/2012, 2008R2/2008

→ **.NET Framework 4.7.2, 4.0, 3.5 must be installed**

LAN connection

min. 100 MBit/s, 1 GBit/s recommended

DivX codec

DivX 6.9.2 with E&L settings (if video conversion DICOM → AVI is desired/necessary)

Power supply

Uninterruptible Power Supply (UPS): at least 600VA, at least 10min durability (if possible, remove one SPOF)

Data protection

→ see separate E&L data security concept

Supported object classes

- DICOM (Single-Frame, Multi-Frame, Encapsulated PDF, Structured Report)
- E&L SmartBox objects
- File import: HL7, XML

→ [In the event of PC conversions, e.g. the replacement of an image acquisition workstation after several years of operation, we request prior consultation with our technical department or rather a request of our current hardware recommendations.](#)

Cable technology: The cable components supplied with the standard hardware always enable full functionality of E&L in the examination room. The E&L technical department offers additional cabling solutions at an extra charge (Harting industrial connectors, junction boxes, E&L system cables).

If a separate SQL server is to be used, the same requirements apply as for the application server.

With ENDOBASE NEXT, the functionalities ENDO DEVICE and ENDO CONNECT are executed primarily on the same main server. With separate servers, the above-mentioned recommendations apply in each case.

- Central import server = ENDO DEVICE with ENDOBASE NEXT
- CWDCConnect = ENDO CONNECT with ENDOBASE NEXT