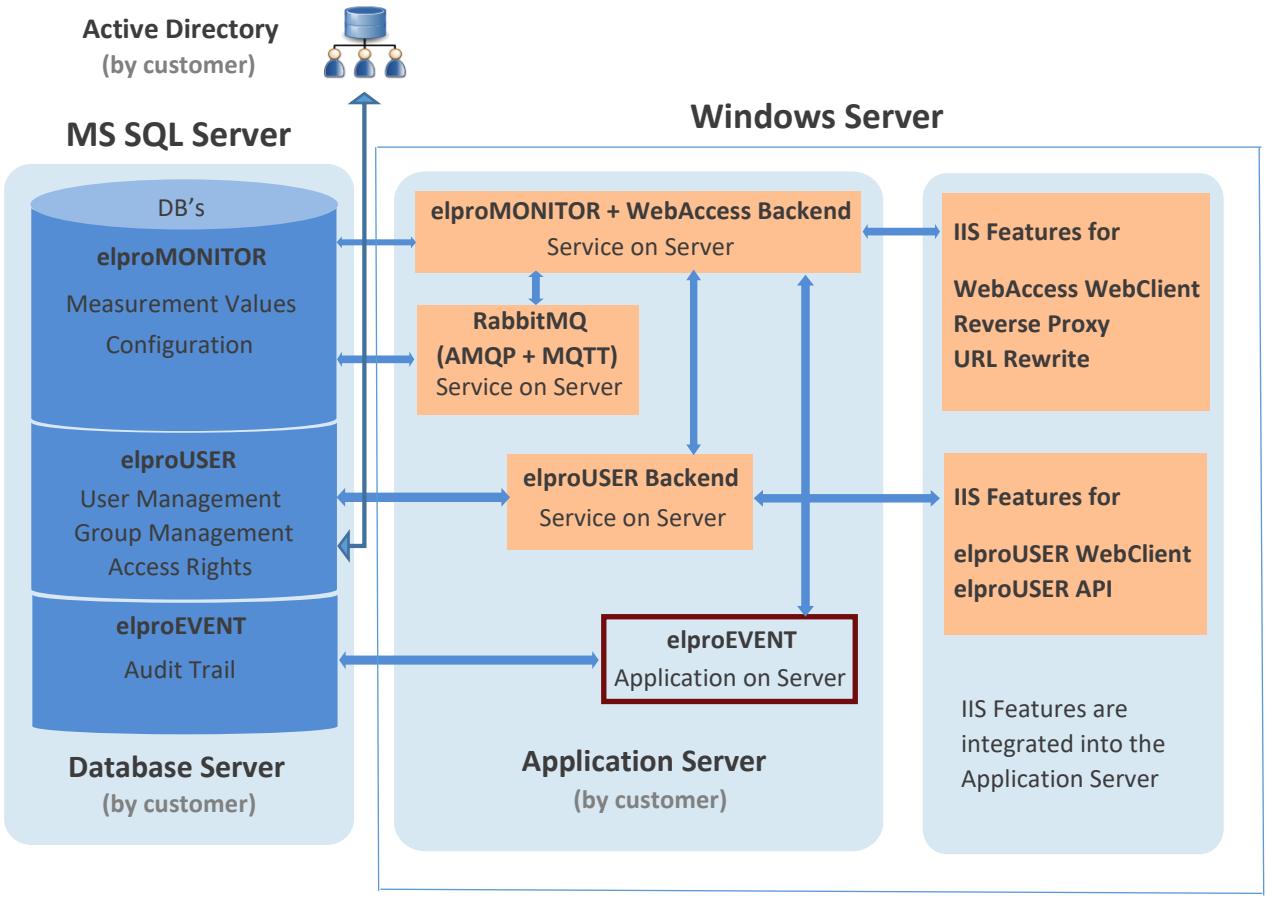
System requirements for ECOLOG Unlimited with software elproMONITOR 3.1

elproMONITOR 3.1.0 is compatible with the powerful ECOLOG-PRO wired, ECOLOG-PRO radio and existing ECOLOG-NET modules. Therefore, no change / replace of the installed hardware (data logger ECOLOG-NET, sensor and transmitter) are required for existing customers.

IT system architecture

elproMONITOR can be installed on one server. However, it is also possible for the database as a separate server and the application + Web Server to use in each case a separate server. Please let us know prior to installation how you set up your servers.

The ECOLOG-PRO radio modules communicate with elproMONITOR via MQTT protocol which is handled by the RabbitMQ service on the Windows server.



Three databases are necessary:

Database	Description
elproMONITOR	Database for the elproMONITOR application
elproEVENT	Database for the elproEVENT application
elproUSER	Database for the elproUSER application

We recommend creating for each database a separate user:

User	Description
elproMonitorDBUser	Dedicated user for the elproMONITOR application database. Has read/write rights to this database.
elproEventDBUser	Dedicated user for the elproEVENT application database. Has read/write rights to this database.
elproUserDBUser	Dedicated user for the elproUSER application database. Has read/write rights to this database. In addition, read-only rights must be granted for some tables in the elproMONITOR and elproEVENT application databases.

Details can be found in our installation manual.

System requirements

The installation on a client operating system (Windows 7/8/10) is not supported. All data is stored in a database. The operation of the software happens via a web interface, so no software installation is necessary at the work station.

IMPORTANT: The below mentioned hardware (server, database, web server) must be provided by the customer. The setup and also the care / maintenance of this hardware will be the sole responsibility of the customer. The web server must be placed on the application server.

Only last two MS SQL Versions available at the date of elproMONITOR new Version/ Patch release will be tested. For earlier versions, a risk assessment will be conducted.

Server (necessary):

Operating system (64Bit)	Internet Information Service (IIS) Version (is delivered with the operating system with)
Windows Server 2016	IIS 10
Windows Server 2019	IIS 10
Windows Server 2022	IIS 10

The hardware requirements for the Application-Server depend on the size of the system. The number of sensors, users and automatically generated reports have to be considered. The following table provides an overview for recommended requirements regarding physically CPU cores and RAM, depending on number of total sensors, sensors installed per ECOLOG-PRO LBR and an approximation of number of users and automatically created reports. The maximum number of Sensors per ECOLOG-PRO RBR is 50 and does not affect the system requirements additionally, other than requirements for the total number of sensors below. (see Exemplary Calculation)

The hard disk must have a capacity of 100 GB and an access time ≤ 8 ms, for larger installations, we recommend SSD NVMe. (Solid State Disc)

The CPU and RAM load in idle mode (without running elproMONITOR services) should only be in the following ranges to ensure trouble-free operation of the installation:

- 15% maximum load each for separated application server and SQL server 25% maximum load for shared application and SQL server

Calculation of Minimum System Requirements for a shared Application and DB-Server:

	Sensors installed per LBR = 12 [No.]			
	Number User + Auto. Reports = 0-19		Number User + Auto. Reports = 20-39	
Sensors	**Cores [No.]**	**RAM [GB]**	**Cores [No.]**	**RAM [GB]**
50	4	16	4	64
200	4	32	8	64
500	16	64	16	128
1000	32	64	32	128
2000	64	128	64	128
3000	64	128	64	256

If the systems number of users and automated reports exceed the example or a splitted DB- and ApplicationServer is used please contact ELPRO to get an individual calculation. Approximately 70% of the Server is used for Data Base and 30% for the Application and Web server.

Calculation of Minimum System Requirements for a separated Application and DB-Server:

	Sensor installed per LBR = 12 [No.]							
	Number User + Auto. Reports = 0-19				Number User + Auto. Reports = 20-39			
Sensors	Cores App Server [No.]	Cores SQL Server [No.]	RAM App Server [GB]	RAM SQL Server [GB]	Cores App Server [No.]	Cores SQL Server [No.]	RAM App Server [GB]	RAM SQL Server [GB]
50	4	4	16	16	4	4	16	16
150	4	4	16	32	4	4	16	32
200	4	4	16	32	4	4	16	32
500	6	6	16	32	6	6	16	32
1000	8	8	32	64	8	8	32	64
2000	12	16	64	128	12	16	64	128
3000	16	32	96	256	16	32	96	256

Database (necessary):

MS SQL database:

- Microsoft SQL Server 2016
- Microsoft SQL Server 2019
- Microsoft SQL Server 2022

The SQL Database Express is not allowed because of its limitations and is not supported.

The "SQL Server Always On" functionality is currently not supported.

SQL Server compatibility level 130 and above is required

Only last two MS SQL Versions available at the date of elproMONITOR new Version/ Patch release will be tested. For earlier versions, a risk assessment will be conducted.

For less than 250 measuring points, we recommend a dedicated SQL server on which only the elproMONITOR services have access.

For more than 250 measuring points, a dedicated SQL server is required.

Database size:

We make an estimation for the necessary database size depending on the number of measurement points together for elproMONITOR, elproEVENT and elproUSER.

This estimation was made considering a storage duration of five years, with the average measurement interval of 1min.

The hard drive of the database server should be separated into the following five different partitions with their associated blocksizes:

Partition	Blocksize
W:\Data	64KB
L:\Log	Standard
T:\Temp1	64KB
U:\Temp2	64KB
X:\Backup	SQL Enterprise: 64KB SQL Standard: 4KB

We recommend the following hard disk capacities for the database-, log file- and backup-partitions, depending on the number of measuring points:

- Database Partition -> 50GB per 100 sensors (this corresponds e.g. to 250GB for 500 sensors)
- Logfile Partition -> 20GB per 100 sensor, but a minimum of 100GB independent of the number of sensors.
- Temp Partitions -> 10GB for each Temp Partition.
- Backup Partition -> 50GB per 100 sensors (this corresponds to e.g. 250GB for 500 sensors)

The estimation was made with the consideration of a storage dimensioning for 5 years.

The number of events (alarms, warnings, system messages) can vary greatly in size. We have taken into account an average size of 5 MB / sensor / year for the storage of events (database elproEVENT). The space required for the database elproUSER is very small and was neglected in this calculation.

Required TCP-ports, which must be enabled for communication:

No	Protocol	Port	Description
1	TCP	502	Configuring and pulling measurements and status information from ecologPro devices
2	TCP	1883	Pushing measurements and status information to RabbitMQ broker
	UDP	1883	RBR time synchronization service
3	TCP	502	Configuring and pulling measurements and status information from Apex Particle Counter devices

No	Protocol	Port	Description
4	TCP	2101	Configuring and pulling measurements and status information from ecologNET devices
5	TCP	Default: 10001	elproMONITOR configuration Sending SMS notifications
6	TCP	1433	Application SQL database connection
7	TCP	80/443/81	Client access to elproMONITOR, elproUSER and webAccess applications
8	TCP	443	Sending e-mail notifications via Office 365's Graph Api
9	TCP	587	Sending e-mail notifications via a configured SMTP server
10	TCP	22123	Initial configuration for RBR devices
11	UDP	30718	Initial configuration for LBR devices

Virtual machine:

Tested with VMware® Workstation 12 Pro

Responsibilities Customer:

Power and network connection

Server procurement, installation of web, database and application servers

Server Back-up / Archiving

Disaster Recovery Plan

Maintenance plan for the database

The elproMONITOR depends **on** the server time.

The customer must ensure that there are no time jumps in the server time. **ELPRO sensors regularly sync their internal times with the server's time so a** time jump **in the server time** can lead to a gap in the graph and give the impression that a measured value is missing, even if this is not the case. In the other case, two or more measured values are recorded at the same time stamp, i.e. the new measured value is then saved in the MeasureRawValueBackup table. The measured values are not included in the analysis

Workstation (Client PC)

No software needs to be installed on the workstations. An Internet browser is required for the web application.

The following Internet browsers are tested:

- Microsoft Edge (Chromium)
- Chrome
- Firefox

Since Microsoft stopped supporting the Internet Explorer, we do not support this browser either. Therefore, the usage of IE is not recommended and supported by ELPRO.

The minimum screen resolution is 1366x768 px

Network

Permanent accessibility of the components in the network must be ensured with a latency < 350 ms. (in full-duplex mode) and < 100ms in (half-duplex mode)

TLS encryption

TLS encryption version 1.2 is supported by elproMONITOR.

Web server for elproMONITOR-WebAccess (optional):

Requirements for elproMONITOR-WebAccess for customer's own web server

- Web server IIS
- Web server with PHP 7.4
- FTP access for Web Upload
- GD2 Library
- Ability to change file permissions
- Password protected directories, if access protection is desired

For customers not operating their own web platform, ELPRO offers hosting of elproMONITOR-Webaccess on a highly available and secure web server with password-protected access on the domain www.elprolog.com
Advantages:

- You have no maintenance of the web server
- Worldwide access
- Always installed the latest version of elproMONITOR-WebAccess

A demo of the WebAccess can be found here:
http://www.elprolog.com/elpro-demo